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Imperial

Remediation Plan, 287 Main Street Selkirk, Manitoba

Prepared by:
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Winnipeg MB R3P 0YT

Prepared for:
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Date: July 2020
Project #: 60549588

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Date
July 27, 2020

Warren Rospad
Contaminated Sites Program Specialist, Environment Officer
Hazardous Waste, Petroleum, & Contaminated Sites Section
Environmental Compliance & Enforcement Branch
Manitoba Conservation and Climate
1007 Century Street
Winnipeg, MB R3H 0W4

Dear Mr. Rospad:

AECOM Project No: 60549588
Regarding: ..... Remediation Plan
Site Address: ..... 287 Main Street, Selkirk, MB
Imperial Site #: 88001943
Facility Type: ..... Former Service Station

On behalf of Imperial, AECOM Canada Ltd. (AECOM) is pleased to submit the subject Remedial Plan (RP) to complete remedial activities at the former Esso service station located at 287 Main Street, Selkirk, Manitoba (Imperial Site #88001943).

If you have any questions or concerns, please feel free to contact Aaron Jambrosic at 403-270-4810.

Sincerely,
AECOM Canada Ltd.

Aaron Jambrosic M.Sc.
Senior Environmental Scientist
Environment

Amber Zilinsky, P.Eng.
Environmental Engineer
Environment

AJ/rz

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AECOM: 2015-04-13

Quality Information

Report Prepared By:

Aaron Jambrosic M.Sc.
Senior Environmental Scientist
Environment

PROVINCE OF MANITOBA
A. D. ZILINSKY
Member
23786
July 27, 2020
REGISTERED PROFESSIONAL ENGINEER

Report Reviewed By:

Amber Zilinsky, P.Eng.
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APEGM
Certificate of Authorization
AECOM Canada Ltd.
No. 4671 Date: July 27, 2020

Table of Contents

page

List of Tables (in Text)

List of Tables (Attachment)

List of Figures

Appendices

1. Introduction

AECOM Canada Ltd. (AECOM) was retained by Imperial to develop a remediation plan (RP), for a former Esso service station located at 287 Main Street, Selkirk, Manitoba (Imperial Site #88001943); hereinafter referred to as "the Site". The purpose of this RP is to describe activities to be undertaken to complete a soil remediation at the Site.

1.1 Remediation Plan Objective

The objective of the proposed remediation plan is to remove the impacted soils identified at the Site that exceed the remedial objectives through excavation. Benzene, toluene, ethylbenzene and xylenes (BTEX) and petroleum hydrocarbon (PHC) fraction F1 and F2 impacted soil will be stockpiled and treated onsite with an Allu Bucket to promote degradation with treated soil meeting remedial criteria reused onsite and treated soil still exceeding remedial criteria disposed of at an offsite disposal location. The excavation will be backfilled with imported fill and/or segregated material from the Site that meets the remedial objectives.

2. Site Description and Background

The following subsections are summarized based on the historical investigations completed at the Site, as listed in Section 2.8.

2.1 Site Description

The Site occupies an area of approximately 0.30 hectares, and is located on the northwest side of Main Street between Rosser Avenue and Pacific Avenue in Selkirk, Manitoba. The legal land description for the Site is:

> Lots 22 and 23 Plan 22 WLTO (L DIV), in RL 45 Parish of St Clements. And, firstly: The N ½ of Lot 69 and all of Lots 70, 71, 72, and 73 Plan 9328 WLTO (L Div), Exc out of all of said Lots public land Plan 100518 WLTO in RL 46 Parish of St. Clements. Secondly, All that portion of Lot 69 PLAN 9328 WLTO (L Div) taken for public land plan 5570 WLTO (closed) which lies to the east of a line drawn east of parallel with perp distant 20 feet from the western limit of said Lot 69 Exc out of secondly all mines and minerals in RL 46 Parish of St. Clements. Thirdly, Lots 20, and 21 Plan 22 WLTO (L Div) in RL 45 of said Parish.

The Site is currently owned by Imperial (Imperial Oil Limited) and is the location of a former Esso service station. The location of the Site is indicated on **Figure 1** and a Site plan is provided as **Figure 2** (without utilities) and **Figure 3** (with utilities).

The Site was operated as a service station and retail fuel outlet from 1967 to 1995 and as a retail fuel outlet with a car wash from 1995 to 2004. The Site configuration between 1967 and 1989 included a service station building (repair garage) with a 2,270 L waste oil underground storage tank (UST); a tank nest with five 22,730 L steel gasoline underground storage tanks (USTs); two pump islands, associated product piping and dispensing equipment; and a storage garage. In 1989, the waste oil UST was removed, along with the gasoline tank nest with five USTs which were subsequently replaced with four 27,275 L fibreglass gasoline USTs in approximately the same location. In 1995, the repair garage was removed and a kiosk and carwash were installed. In 2004, Site operations were ceased and all Site facilities were decommissioned and removed, including four fiberglass USTs, two pump islands, a kiosk,

car wash, propane aboveground storage tank (AST), and a garbage enclosure. Since 2004, there have been no facilities located on the Site.

Currently the Site is vacant with a fence located on the northwest side. The Site can be accessed via roadway approaches from Main Street or Rosser Avenue, however concrete safety barriers are currently blocking these entrances.

2.2 Soil Stratigraphy

Based on the results of previous environmental investigations that have been undertaken at the Site, the soil stratigraphy generally consists of a surface layer of sand, gravel, silt or clay fill, encountered to depths of approximately 1.5 m below ground surface (bgs), underlain by highly plastic clay (with silt and sand lenses) to depths between 3.4 m to 5.3 mbgs, followed by glacial till to the maximum depth of investigation, 7.6 mbgs.

2.3 Hydrogeology

Based on previous environmental investigations completed between 1988 and 2016, shallow groundwater was encountered between 2.4 mbgs and 4.3 mbgs, with an indeterminant flow direction that was generally inferred towards the south/southeast.

A 2003 investigation conducted hydraulic conductivity tests on monitoring wells MW-32, MW-33, MW-34, MW-35, MW-36, MW37, and MW-38 (all screened from 1.6 mbgs to 4.6 mbgs in silt/clay), and reported horizontal hydraulic conductivity values ranging from 1.46×10^{-8} m/s to 5.11×10^{-8} m/s.

Based on groundwater gauging elevation from 2015 and 2016 the hydraulic gradient ranged from 0.003 m/m to 0.026 m/m with an average 0.017 m/m.

Based on the highest measured hydraulic conductivity (5.11×10^{-8} m/s) and hydraulic gradient (0.026 m/m) and default effective porosity for fine soil of 0.47 (CCME, 2006) the seepage velocity was calculated at 0.1 m/year.

2.4 Topography and Drainage

The Site topography is relatively flat, with surface water drainage generally through surface infiltration. The ground surface of the Site is generally covered by vegetation, gravel, and asphalt.

The nearest surface water body is the Red River located approximately 475 m to the east of the Site. Regional drainage is generally east towards the Red River.

Based on the horizontal shallow groundwater flow velocity, it would take groundwater approximately 4,750 years to reach the river.

2.5 Structures and Utilities

During the assessment and decommissioning of the four 22,730 L fibreglass USTs in 2004, all facilities at the Site associated with the former service station, retail fuel outlet, and car wash were reported to be decommissioned and removed, with the exception of a sewer line on the southern portion of the Site as shown on **Figure 3**. Based on the legal survey and the most recent Site plans available, there a Manitoba

Hydro box on a concrete pad is located in the southwestern portion of the Site. Some Site plans created by previous consultants since 2013 indicate the presence of a waste oil UST, located on the southeast side of the former car wash. Previous tank information included in the Phase I ESA and the 2004 Site decommissioning do not indicate the presence of this UST.

A total of 30 groundwater monitoring wells were known to have been installed at or around the Site, with 14 monitoring wells onsite and three monitoring wells offsite (along Main Street) reported to be still in service. All other previous monitoring wells were reported to be destroyed.

2.6 Vegetation

Visible vegetation within the boundary of the Site is generally limited to grasses, shrubs and trees.

2.7 Land Use

The Site is zoned as Central Commercial (C3), which is intended for properties located along major collector or arterial streets and is used for single or multi-tenant sites for multifunctional uses such as retail business, multi-family residential, recreational, social, cultural and administrative uses. The properties to the southeast and southwest are also zoned C3. The properties northwest of the Site are zoned as Residential General (R) which includes single family dwellings. The properties northeast of the Site are zoned as central commercial (C2), which includes the central business area and provides for multifunctional uses such as retail business, multi-family residential, recreational, social and administrative uses (City of Selkirk Zoning By- law 4968, June 23, 2020).

Based on communications from Imperial, the Site is intended for commercial land use in the future.

2.8 Previous Environmental Investigations

Previous environmental investigations at the Site are summarized in the following reports provided by Imperial:

- Re: Red River Esso, (60256A), Selkirk, Manitoba. Prepared by O'Connor Associates Environmental Inc. on January 3, 1989. (O'Connor Associates Environmental Inc., 1989a)
- Re: Red River Esso, Service Station No. 60256A, Selkirk, Manitoba. Prepared by O'Connor Associates Environmental Inc. on March 20, 1989. (O'Connor Associates Environmental Inc., 1989b)
- Re: Red River Esso, Service Station No. 60256A, Selkirk, Manitoba. Prepared by O'Connor Associates Environmental Inc. on July 31, 1989. (O'Connor Associates Environmental Inc., 1989c)
- Phase II Environmental Assessment, Red River Esso Service Station, Site #860265, 287 Main Street, Selkirk, Manitoba. Prepared by Aqua Terre Solutions Inc. on October 15, 2003. (Aqua Terre Solutions Inc., 2003)
- Environmental Assessment Program, Former IOL Automotive Retail Station, 287 Main Street, Selkirk, Manitoba, 860265/88001943. Prepared by AMEC Earth & Environmental on October 22, 2004. (AMEC Earth & Environmental, 2004)
- Phase II Environmental Site Assessment, City of Selkirk Property Adjacent to the Former IOL Automotive Retail Station, 287 Main Street, Selkirk, Manitoba, 860265/88001943. Prepared by AMEC Earth & Environmental on February 9, 2005. (AMEC Earth & Environmental, 2005)

- Re: Remedial Excavation Estimate Report, Former Red River Service Station, 287 Main Street, Selkirk, Manitoba, Location No. 8600265/88001943. Prepared by O'Connor Associates Environmental Inc. on April 9, 2007. (O'Connor Associates Environmental Inc., 2007)
- Field Data Report, Former ESSO Retail, 287 Main Street, Selkirk, MB, 88001943 / 860265. Prepared by O'Connor Associates Environmental Inc. on May 13, 2010. (O'Connor Associates Environmental Inc., 2010)
- Phase I Environmental Site Assessment, Former Service Station, 287 Main Street, Selkirk, Manitoba, 8001943. Prepared by O'Connor Associates Environmental Inc. on January 19, 2012. (O'Connor Associates Environmental Inc., 2012)
- Groundwater Monitoring and Sampling Report, 287 Main Street, Selkirk, Manitoba, Location No.: 88001943. Prepared by O'Connor Associates Environmental Inc. on February 21, 2013. (O'Connor Associates Environmental Inc., 2013)
- Phase II Environmental Site Assessment, Former Esso Service Station, Car Wash and Retail Fuel Facility, 287 Main Street, Selkirk, Manitoba, 8001943. Prepared by Parsons on December 13, 2013. (Parsons, 2013)
- Remedial Action Plan, Former Retail Fuel Facility and Carwash, 287 Main Street, Selkirk, Manitoba, 8001943. Prepared by Kleinfelder Canada Inc. on April 21, 2015. (Kleinfelder Canada Inc., 2015)
- Remediation Plan, Former Service Station, Car Wash and Retail Fuel Facility, 287 Main Street, Selkirk, Manitoba, 8001943. Prepared by Parsons on September 22, 2016. (Parsons, 2016a)
- Groundwater Monitoring and Sampling Data Package, 287 Main Street, Selkirk, Manitoba. Prepared by Parsons on December 19, 2016. (Parsons, 2016b)

A summary of the historical soil analytical results for petroleum hydrocarbons (PHCs), lead scavengers, and lead is presented on **Figure 4** and a summary of the historical groundwater analytical results for PHCs, lead scavengers, and lead is presented on **Figure 5**.

Historical borehole and test pit logs from previous environmental investigation reports are provided in **Appendix A**. A copy of the most recent legal property survey (Surveyor's Staking Certificate Showing Certain Features) conducted at the Site in 2013 is provided in **Appendix B**.

2.9 Areas of Environmental Concern

Based on the previous environmental investigations, areas of environmental concern (AECs) include the following:

- Former service station and waste oil UST.
- Former fuel USTs, associated pump islands, and proximate plumes of PHC impacted soil and groundwater.
- Former car wash.

2.10 Contaminants of Concern

Based past use of the Site as a retail fuel outlet, service station, and car wash, potential contaminants of concern (PCOCs) at the Site include those associated with lead and unleaded gasoline, middle distillate fuels (diesel), engine oils, engine coolants, used oil, degreasing solvents, and transformer oil. Fuel oxygenates were excluded from the PCOCs for the Site based on communication from Imperial indicating that these were not used in fuels within Manitoba. The PCOCs based on past use of the Site are summarized in **Table 2-1** below.

Table 2-1: Potential Contaminants of Concern by Area of Environmental Concern

Area of Environmental Concern	Associated Material or Product	Potential Contaminants of Concern
Former Service Station & Waste Oil UST	Leaded motor gasoline	Benzene, toluene, ethylbenzene xylenes (BTEX), n-hexane, PHC F1-F3, 2-ring polycyclic aromatic hydrocarbons (PAHs), 1,2-dibromoethane (1,2-DBA), 1,2-dichloroethane (1,2-DCA), lead
	Unleaded motor gasoline	BTEX, n-hexane, PHC F1-F3, 2-ring PAHs
	Engine oils	PHC F2-F4, PAHs, barium, zinc
	Engine coolants	Ethylene glycol, 1,2-propylene glycol
	Used oil	BTEX, n-hexane, PHC F1-F4, PAHs, volatile organic compounds (VOCs), arsenic, barium, chromium, copper, lead, tin, zinc, PCBs, ethylene glycol, 1,2-propylene glycol
	Degreasing solvents	PHC F1, 1,1,1-trichloroethane (1,1,1-TCA), 1,1,2-trichloroethane (1,1,2-TCA), 1,1-dichloroethane (1,1-DCA), tetrachloroethene (perchloroethylene, PCE), trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), trans-1,2-dichloroethene (trans-1,2-DCE), 1,1-dichloroethene (1,1-DCE), chloroethene (vinyl chloride, VC)
	Transformer oil	PHC F2-F4, polychlorinated biphenyls (PCBs)
Gasoline USTs	Leaded motor gasoline	BTEX, n-hexane, PHC F1-F3, 2-ring PAHs, 1,2-DBA, 1,2-DCA, lead
	Unleaded motor gasoline	BTEX, n-hexane, PHC F1-F3, 2-ring PAHs
Diesel UST	Middle distillate fuels	BTEX, PHC F1-F3, 2-ring and 3-ring PAHs
Former Car Wash	Leaded motor gasoline	BTEX, n-hexane, PHC F1-F3, 2-ring PAHs, 1,2-DBA, 1,2-DCA, lead
	Unleaded motor gasoline	BTEX, PHC F1-F3, 2-ring PAHs
	Used oil	BTEX, n-hexane, PHC F1-F4, PAHs, VOCs, arsenic, barium, chromium, copper, lead, tin, zinc, PCBs, ethylene glycol, 1,2-propylene glycol
	Engine Coolants	Ethylene glycol, 1,2-propylene glycol

Previous environmental investigations completed by AECOM and others have included soil and groundwater sampling for parameters related to PHCs, lead scavengers, PAHs, and select metals in the known AECs. A previous investigation completed by Parsons Canada Ltd. in 2013 assessed select VOCs, PAHs, metals and glycols in soil in the vicinity of the former service station building footprint, adjacent fuel oil UST, and car wash, and reported concentrations of these parameters below reportable detection limits and/or applied guideline values. In 2018 AECOM completed a PCOC investigation to address data gaps associated with assessment of VOCs (including n-hexane and those associated with degreasing solvents), tin, glycols, and PCBs at the Site. Details of the 2018 PCOC investigation are presented with the pre-remedial activities in Section 4.2.2 and 4.2.3 of this document.

Based on environmental investigations completed at the Site, the contaminants of concern (COCs) identified at the Site are PHC parameters (benzene and PHC fractions F1, F2, and F3) associated with historical Site activities involving the storage and handling of diesel and gasoline fuel.

3. Applicable Guidelines and Remedial Objectives

3.1 Remediation Guideline Selection

The Province of Manitoba currently references documents from the Canadian Council of Ministers of the Environment (CCME) and Ontario Ministry of the Environment and Climate Change (Ontario MOECC) as Primary and Secondary standards, respectively. Where these documents do not include applicable guidelines, the Province of Manitoba references documents from Alberta Environment and Parks (AEP) as a tertiary standard.

Primary standards:

- CCME Canadian Environmental Quality Guidelines (CEQG), (most recent online version).
- CCME Canada-Wide Standards (CWS) for Petroleum Hydrocarbons (PHC) in Soil, January 2008(a).
- Health Canada, Guidelines for Canadian Drinking Water Quality – Summary Table, 2019.

Secondary standard:

- Ontario Ministry of the Environment (MOE) Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, 2011.

Tertiary standard:

- AEP Alberta Environment and Parks Tier 1 and Tier 2 Soil and Groundwater Remediation Guidelines 2019.

The CCME CEQG and CWS use a risk-based approach allowing limited modification of the generic EQGs in light of prescribed site-specific factors affecting contaminant mobility and receptor characterization. In other words, in cases where soil and/or groundwater concentrations exceed the generic guidelines, an analysis of risk factors specific to the site in question is acceptable in order to allow for a realistic assessment of the actual risks at the site. Using this approach, EQGs are selected based on a step-through procedure eliminating the exposure pathways that do not apply to receptors in the vicinity of the

Site and finally selecting the appropriate and most conservative guideline remaining after the elimination procedure. The guidelines are protective of both human and environmental receptors.

This approach was undertaken for the Site in order to provide a more realistic assessment of human and environmental risks at the Site. The applicable site-specific factors at the Site and the supporting rationale are summarized in **Table 3-1** and **Table 3-2**.

Table 3-1: Applicability of Receptors and Exposure Pathways, CCME Tier II Assessment for BTEX

Potential Exposure Pathway	Applicability (Yes/No)	Rationale
Human Health Exposure Pathways		
Soil Ingestion	Yes	The Site ground surface cover consists predominantly of gravel areas with some vegetation and asphalt. Asphalt previously in place at the Site may be removed during remediation.
Soil Dermal Contact	Yes	The Site ground surface cover consists predominantly of gravel areas with some vegetation and asphalt. Asphalt previously in place at the Site may be removed during remediation.
Soil Inhalation	Yes	The Site ground surface cover consists predominantly of gravel areas with some vegetation and asphalt overlaying fine grained soils. Asphalt previously in place at the Site may be removed during remediation.
Inhalation of Indoor Air (Basement)	Yes	Buildings on adjacent properties are residential with potential basements, inhalation of indoor air into basements must be considered within 30 m of residential properties.
Inhalation of Indoor Air (Slab-on-Grade)	Yes	Potential for future building development at the Site. Buildings on adjacent properties are residential.
Off-Site Migration	Yes	The Site ground surface cover consists predominantly of gravel areas with some vegetation and asphalt. Asphalt previously in place at the Site may be removed during remediation. Potential for migration via wind/water from the Site to adjacent residential properties.
Groundwater (Drinking Water)	No	According to the City of Selkirk there is a by-law in place that prevents installation and use of private water wells with the City limits. Site conditions that insure isolation between the shallow impacted soil/groundwater and the deeper groundwater carbonate aquifer with a 5 m thickness of massive unfractured saturated fine-grained material with a bulk hydraulic conductivity of less than 10^{-6} m/s.

Potential Exposure Pathway	Applicability (Yes/No)	Rationale
Produce, Meat and Milk	No	No agricultural land use in vicinity of the Site. Site land use is commercial, limiting potential for garden exposure.
Environmental Health Exposure Pathways		
Soil Contact	Yes	The Site ground surface cover consists predominantly of gravel areas with some vegetation and asphalt. Asphalt previously in place at the Site may be removed during remediation.
Soil and Food Ingestion	Yes	The Site ground surface cover consists predominantly of gravel areas with some vegetation and asphalt. Asphalt previously in place at the Site may be removed during remediation.
Nutrient and Energy Cycling	Yes	The Site ground surface cover consists predominantly of gravel areas with some vegetation and asphalt. Asphalt previously in place at the Site may be removed during remediation.
Off-Site Migration	Yes	The Site ground surface cover consists predominantly of gravel areas with some vegetation and asphalt. Asphalt previously in place at the Site may be removed during remediation. Potential for migration via wind/water from the Site to adjacent residential properties.
Groundwater (Livestock)	No	No agricultural land use in vicinity of the Site.
Groundwater (Aquatic Life)	No	The nearest surface water body is the Red River located approximately 475 m east of the Site. However, the aquatic life pathway is not considered to be applicable because based on the following: • The average hydraulic conductivity of upper overburden soils at the Site, in which the soil and groundwater impacts are present, is sufficiently low (in the range of 10^{-8} m/s) to limit contaminant migration. • Based on the calculated shallow groundwater horizontal flow velocity it would take approximately 4,750 years to reach the river.

Table 3-2: Applicability of Receptors and Exposure Pathways, CWS Tier 1 Assessment for PHC fractions F1–F4

Potential Exposure Pathway	Applicability (Yes/No)	Rationale
Direct Contact (Ingestion & Dermal Contact)	Yes	The Site ground surface cover consists predominantly of gravel areas with some vegetation and asphalt. Asphalt may be removed during remediation.
Vapour Inhalation (Indoor)	Yes	Potential for future building development at the Site. Buildings on adjacent properties are residential.
Protection of Potable Groundwater	No	According to the City of Selkirk there is a by-law in place that prevents installation and use of private water wells with the City limits. Site conditions that insure isolation between the shallow impacted soil/groundwater and the deeper groundwater carbonate aquifer with a 5 m thickness of massive unfractured saturated fine-grained material with a bulk hydraulic conductivity of less than 10^{-6} m/s.
Protection of Groundwater for Aquatic Life	No	The nearest surface water body is the Red River which is located approximately 475 m east of the Site. However, the aquatic life pathway is not considered to be applicable because based on the following: • The average hydraulic conductivity of upper overburden soils at the Site, in which the soil and groundwater impacts are present, is sufficiently low (in the range of 10^{-8} m/s) to limit contaminant migration. • Based on the calculated shallow groundwater horizontal flow velocity it would take approximately 4,750 years to reach the river.
Nutrient Cycling	Yes	The Site ground surface cover consists predominantly of gravel areas with some vegetation and asphalt. Asphalt previously in place at the Site may be removed during remediation.
Eco Soil Contact	Yes	The Site ground surface cover consists predominantly of gravel areas with some vegetation and asphalt. Asphalt previously in place at the Site may be removed during remediation.
Off-Site Migration	Yes	The Site ground surface cover consists predominantly of gravel areas with some vegetation and asphalt. Asphalt previously in place at the Site may be removed during remediation. Potential for migration via wind/water from the Site to adjacent residential properties.
Management Limit	Yes	Applicable at all soil depths and not adjustable.

Environmental quality guidelines for commercial land use were selected based on zoning and communications from Imperial indicating that the Site is intended for continued commercial use in the future.

According to the City of Selkirk there is a by-law in place that prevents installation and use of private water wells with the City limits. Drinking water is supplied to the area via a municipal distribution system fed by four wells located 380 m to 460 m north, northeast, and east from the Site and drawing groundwater from the carbonate bedrock aquifer. The well records indicate the well installations encountered bedrock at a minimum of 26 mbgs and were installed with a solid casing to depths of a minimum of 26 mbgs.

Based on available well records from a search of the Manitoba Conservation and Climate (formerly Manitoba Conservation and Water Stewardship) water well records data base (2012) and information included in environmental investigations previously completed by others, 24 water wells (17 domestic, 2 municipal, 3 test wells, 1 air conditioning well and 1 recharge well) are reportedly potentially within a 500 m radius of the Site. The wells were drilled between 1963 and 2006 and are completed in bedrock formation at depths ranging between 7.9 mbgs and 84.4 mgbs. A summary of the wells identified as potentially within 500 m of the Site is presented in **Appendix C**. The nearest wells identified were located approximately 70 m (verified with homeowner that this well does not exist or is not in use) and 125 m from the Site (screened in the conductive bedrock interval at 27.1 – 28.3 mbgs and 28.5 – 61.8 mbgs, respectfully, below 26 meters of fine-grained material).

The low permeability overburden thickness is estimated to be approximately 20 m thick in the Site area. The average hydraulic conductivity of upper overburden soils at the Site, in which the soil and groundwater impacts are present, is sufficiently low (in the range of 10^{-8} m/s) to limit use as a domestic use aquifer.

The potable groundwater pathway is not considered applicable to the Site based on condition at the Site that ensure isolation between the shallow impacted soil/groundwater and the deeper groundwater carbonate aquifer with a 5 m thickness of massive unfractured saturated fine-grained material with bulk hydraulic conductivity of less than 10^{-6} m/s

The nearest surface water body is the Red River which is located approximately 475 m east of the Site. However, the average hydraulic conductivity of upper overburden soils at the Site, in which the soil and groundwater impacts are present, is sufficiently low (in the range of 10^{-8} m/s) to limit contaminant migration, based on the calculated shallow groundwater horizontal flow velocity it would take approximately 4,750 years to reach the river. The aquatic life pathway is not considered to be applicable

According to the CWS Technical Supplement Document (2008c), the soil contact exposure pathway may be eliminated for depths below 3 m with the provincial regulator to dictate how to address soils between 1.5 m and 3 mbgs. According to Manitoba Conservation and Climate (formerly Sustainable Development), surface soil is defined as soil at or above 1.5 mbgs with subsurface soil defined as soil below 1.5 mbgs, meaning the ecological soil contact exposure pathway may be eliminated below a depth of 1.5 m provided there are other applicable exposure pathways. Therefore, where appropriate, the ecological soil contact pathway has been removed from consideration for soil at depths greater than 1.5 mbgs (BTEX and PHC fraction F1-F4 parameters).

CCME developed SQGs for benzene based on incremental cancer risk for human health with human health SGQs having 10^{-5} and 10^{-6} incremental cancer risks. The 10^{-5} incremental cancer risk values were selected as part of this remedial program, as per Manitoba Conservation and Climate Guideline *Manitoba Criteria for BTEX in Investigation Results* (Manitoba Sustainable Development, 2016).

Further assessment of the vapour inhalation pathways was completed as part of a pre-remediation soil vapour investigation. The applicable site-specific receptors, exposure pathways, and associated

remediation guideline values and remedial approach/design were evaluated based on the results of the soil vapour investigation. Details of the vapour inhalation pathways analysis and suggested revisions to the remedial approach/design are provided in Section 4.2.4 and **Appendix D** for approval by Manitoba Conservation and Climate as part of a this Remediation Plan.

In summary, the current applied guidelines are based on the primary, secondary, and tertiary standards listed above, for Commercial land use and fine-grained soil, with potable groundwater and aquatic life exposure pathways excluded, and ecological direct contact excluded below 1.5 m for BTEX and PHC fractions F1–F4, and indoor air vapour removed for a select area of the Site.

3.2 Remediation Guideline Values

The following table summarizes the applied soil quality guideline (SQG) values used as soil remediation objectives for the Site.

Table 3-3: Soil Remediation Objectives for Primary COCs

Parameter	Surface Soil (≤1.5 mbgs) SQG (mg/kg)	Subsoil (>1.5 mbgs) SQG (mg/kg)
Benzene	2.8 [a,d,e, i]	2.9 [a,d, i]
Toluene	330 [a,f]	660 [a,f]
Ethylbenzene	430 [a,f]	860 [a,f]
Xylenes	230 [a,f]	460 [a,f]
PHC fraction F1	320 [b,g]	800 [b,h]
PHC fraction F2	260 [b,g]	1,000 [b,h]
PHC fraction F3	2,500 [b,g]	5,000 [b,h]
PHC fraction F4	6,600 [b,g]	10,000 [b,h]
1,2-Dibromoethane	0.05 [c]	0.05 [c]
1,2-Dichloroethane	50 [a]	50 [a]
Lead	260 [a]	260 [a]

Notes:
[a] Canadian Council of Ministers of the Environment (CCME) Soil Quality Guidelines (2014) - Commercial Land Use, Fine Grained Soils.
[b] CCME, Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil (2008) - Commercial Land Use, Fine Grained Soils.
[c] Ontario Ministry of the Environment (MOE) Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (2011) - Table 3: Full Depth Generic Site Condition Standards Non-Potable Ground Water Condition, Fine Textured Soil, Commercial Land Use.
[d] Inhalation of indoor air (basement).
[e] Inhalation of indoor air (slab on grade).
[f] Soil contact - Environmental Health.
[g] Eco Soil Contact.
[h] Management Limit.
[i] Guideline values of 110 mg/kg (surface soil) and 620 mg/kg (subsoil) utilized in select area of the Site, based on indoor air vapour modeling.

Table 3-4 summarizes the applicable groundwater quality guideline (GWQG) values used as groundwater remediation objectives for the Site:

Table 3-4: Groundwater Remediation Objectives for Primary COCs

Parameter	GWQG (mg/L) [a]
Benzene	0.43
Toluene	18
Ethylbenzene	2.3
Xylenes	4.2
PHC fraction F1	0.75
PHC fraction F2	0.15
PHC fraction F3	0.5
PHC fraction F4	0.5
1,2-Dibromoethane	0.00083
1,2-Dichloroethane	0.012
Lead (Dissolved)	0.025

Notes:
[a] Ontario Ministry of the Environment (MOE) Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (MOE, 2011) - Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Fine Textured Soil, Commercial Land Use.

Note these general guideline tables do not take into account site specific soil vapour assessment presented in Section 4.2.4 and **Appendix D** as the guideline modification only apply to the sub-section of the Site where the vapour investigation was performed.

4. Pre-Remediation and Proposed Remedial Actions

4.1 Scope of Work

AECOM completed the following scope of work prior to initiation of the remedial excavation to better design the soil remediation at the Site:

- Pre-Remediation Activities:
  - Preliminary health and safety planning;
  - Pre-remediation groundwater monitoring and sampling;
  - Soil PCOC and remaining infrastructure investigation; and
  - Soil vapour investigation.

AECOM proposes the following scope of work to conduct soil remediation at the Site:

- Site Remediation:
  - Finalization of health and safety plan;
  - Site survey;
  - Imported fill material verification;
  - Waste characterization and landfill acceptance;
  - Re-route/protect utilities/install shoring as required;
  - Turn soil within former building footprints;
  - On-site treatment of select impacted soils;
  - Excavation and disposal of select impacted soil; and

  - Site restoration.

- Post-Remediation Activities:
  - Post-remediation groundwater well installation, monitoring, and sampling.

The following sections provide a detailed summary of the remedial actions proposed for the Site.

4.2 Pre-Remediation Activities

4.2.1 Preliminary Health and Safety Planning

A Site-Specific Health and Safety Plan (SSHASP) was prepared to address safety, health, and security considerations for the tasks completed as part of the pre-remediation activities. The SSHASP was provided to Imperial under separate cover.

4.2.2 Pre-Remedial Groundwater Monitoring and Sampling

Groundwater monitoring and sampling conducted previously in 2010, 2012, 2015, and 2016, indicated groundwater impacts related to benzene and PHC fractions F1-F2, however these past programs had not assessed all of the applicable PCOCs in the groundwater. On October 10 and 12, 2018, a pre-remedial groundwater monitoring and sampling event was completed at all existing onsite groundwater monitoring wells to confirm current groundwater conditions and concentrations of COCs and PCOCs. Results of the 2018 event identified concentrations of PHC fraction F2 above remedial criteria in three groundwater monitoring well locations (04-1, MW35, and 04-8). PHC fraction F3, was which had not been previously analyzed, was also reported at a concentration above remedial criteria in groundwater monitoring well 04-7.

Analytical results from the 2018 monitoring and sampling event are summarized in **Table 3-1 though Table 3-6**. Groundwater monitoring well locations and sample results for the identified COCs are illustrated on **Figure 6**.

4.2.3 Soil PCOC and Remaining Infrastructure Investigation

On November 11 through 13, 2018, eight boreholes were advanced to a depth of up to 6.75 mbgs, and representative soil samples were collected from each of the AECs to investigate unassessed PCOCs and determine potential presence of remaining infrastructure. The collected soil samples were field screened for volatile organic vapours. Based on the field screening and observations, select soil samples were submitted for laboratory analysis of PCOCs associated with the AEC as outlined in **Table 2-1**: Potential Contaminants of Concern by Area of Environmental Concern. The 2018 laboratory analytical results were reviewed in combination with previous environmental investigation data to determine the need for additional COCs, additional investigation, and/or revision to the remedial approach/design. Results of the 2018 investigation identified benzene above remedial criteria in three boreholes (BH4, BH5, and BH6) and a concentration of PHC fraction F1 above remedial criteria in one borehole (BH6), all within the former Fuel UST Area. No other PCOCs or COCs, or remaining infrastructure were identified during the 2018 investigation.

Analytical results from the 2018 investigation are summarized in **Table 4-1** through **Table 4-6**. Borehole locations and sample results for identified COCs are illustrated on **Figure 7**.

4.2.4 Soil Vapour Investigation

Between November 2018 and February 2019, a soil vapour investigation was completed at the Site to assess the vapour inhalation exposure pathway. The soil vapour investigation included:

- Installation of four soil vapour probes;
- Two rounds of soil vapour sampling;
- Model indoor air concentrations using CCME dilution factors based on the Johnson and Ettinger (1991) model to assess potential risks posed by the indoor infiltration of volatile contaminants emanating from soil and/or groundwater; and
- Evaluation of potential modification to the remedial approach based on application of the soil vapour screening criteria.

On November 22, 2018, four soil vapour probes (VW18-1, VW18-2, VW18-3 and VW18-4) were installed for collection of representative soil vapour samples from areas exhibiting soil impacts. The assessment area was located southeast of the former tank farm (between the tank farm and Main Street) where identified soil impacts were driven by the vapour intrusion pathway for benzene (based on soil concentrations in locations BH4, BH5 and TP-17), and within the former tank farm (based on soil concentrations observed in BH6). The soil vapour monitoring probes were installed at 1.6-1.85 mbgs, above the water table and in the area of worst-case impacts. Two rounds of soil vapour sampling were completed, in November 2018 and February 2019.

The measured soil vapour concentrations were used to calculate predicted indoor air concentrations using soil gas to indoor air dilution factors (DF) as a function of depth/distance from building to contamination. These predicted concentrations were then used to determine a Hazard Quotient (HQ) for threshold chemicals, or an Incremental Lifetime Cancer Risk (ILCR) for non-threshold chemicals. for each of the BTEX constituents and PHC fractions F1 and F2.

The HQ / ILCR for each of the BTEX constituents and PHC fractions F1 and F2 was found to be less than 1 (i.e. the predicted indoor air concentrations were less than the respective indoor air guideline concentrations), therefore, there are no significant risks associated with the occupancy of a building exhibiting such concentrations.

Based on the soil vapour assessment the remedial design was modified as follows:

- Benzene impacted soil (based on indoor air vapour guideline values) that is not co-located with other contaminants requiring remediation driven a pathway other than indoor air will be left in place. This is a result of the modeling indicating that there is negligible exposure risk from soil vapours and benzene concentrations do not exceed remedial criteria for any other applicable exposure pathway.

Details of the evaluation and development of Site-specific soil vapour model are provided in **Appendix D**. Sample location and sample results for identified COCs are illustrated on **Figure 8**. Copies of vapour probe installation logs are provided in **Appendix A**.

4.3 Proposed Site Remediation Activities

4.3.1 Preliminary Health and Safety Planning

The Site-Specific Health and Safety Plan (SSHASP) will be updated to address any additional safety, health, and security considerations for the Site tasks required for remediation of the Site provided to Imperial under separate cover.

4.3.2 Site Survey

The Site property boundaries, boundaries of former structures, and key investigation locations will be surveyed and staked prior to remedial activities. A copy of the most recent legal property survey of the Site is attached in **Appendix B**.

4.3.3 Imported Fill Material Verification

Approximately 380 m^3 (in-situ volume) of imported fill material maybe required to replace the impacted soils that are to be excavated for potential offsite disposal. Material imported to the Site to be used as backfill will be sampled to verify that the material meets the remedial criteria for the Site. Soil samples from the imported backfill will be collected and submitted for laboratory analysis of grain size, BTEX, PHC fractions F1 to F4, metals, VOCs, PAHs, salinity parameters, and PCBs, at a minimum. Any backfill source will require at least two samples be provided for analysis, one sample for every 500 m^3 for the first 2,000 m^3 and one sample for each 1,000 m^3 thereafter.

4.3.4 Waste Characterization and Disposal Facility Acceptance

To obtain approval for acceptance of the select impacted soils at an appropriate disposal facility, soil samples will be collected at the start of remedial work and select samples will be submitted for laboratory analysis of landfill acceptance parameters. The analytical results will be forwarded to the appropriate disposal facility for approval prior to remedial work.

Based on historical soil analytical results, the PHC-impacted soils are expected to be suitable for disposal at a licensed soil treatment facility capable of accepting PHC-impacted soil the such as: the Progressive Waste Solutions facility near Winnipeg, Manitoba; the MidCanada Soil Treatment Facility in Ile des Chenes, Manitoba; or the Miller Environmental Corporation Industrial Waste Treatment Facility in the Rural Municipality of Montcalm, Manitoba.

4.3.5 Excavation, Treatment and Disposal of Select Impacted Soil

4.3.5.1 Soil Volume Estimate

The proposed extents of the remedial excavation are shown on **Figure 6**. The total estimated in-situ volume of soil to be excavated is approximately 1,718 m^3, including 1,308 m^3 of un-impacted overburden and soil from excavation side slopes, 24 m^3 of impacted surface soil that is below subsoil guidelines and can be re-used below 1.5 mbgs, and 386 m^3 of impacted soil. The 410 m^3 of impacted soil is expected to be treated onsite via Allu Bucket, or similar device. If Allu Bucket treatment is effective, treated soils below the remedial criteria will be reused onsite, with any soil remaining above the remedial criteria disposed of offsite.

Assuming a soil bulk density of 2.0 tonnes/m^3, approximately 770 tonnes of soil may require offsite disposal. Pending confirmatory laboratory results, it is estimated that approximately 1,308 m^3 of

overburden soils will be stockpiled and reused as backfill (assuming that 100% of soils excavated from building footprint areas will be re-used onsite as no impacts have been previously identified in these areas). These volumes do not include any contingency to account for locations where over-excavation may be required or due to adjustments to soil density.

Proposed excavation extent is illustrated in **Figure 9**.

4.3.5.2 Former Service Station, Garage, and Car Wash Building Footprints

The soil beneath the former service station, garage, and car wash buildings footprints will be excavated to a depth below the grade of the former slab or base support of said infrastructure for due diligence purposes, assumed to be 1.0 mbgs. Soil excavated from these areas will be stockpiled, and confirmatory samples will be collected from the excavation as described in Section 4.3.5.9 below, and the stockpiles as described in Section 4.3.5.10 below.

4.3.5.3 Monitoring Well Decommissioning

Any groundwater monitoring wells located within the excavation extents will be decommissioned prior to remedial activities by filling the well annulus with bentonite chips and hydrating with water. The metal road boxes, PVC well casing, and other monitoring well components will be removed during the excavation and disposed. Decommissioning of other wells located at the Site will be reviewed following completion of remedial activities.

Decommissioning of five existing groundwater monitoring wells, identified as 04-1, 04-4, 04-7, 04-8, and MW36, is expected to be required.

4.3.5.4 Overhead Power Lines and Underground Utilities

Street light poles and fire hydrants are located adjacent to the east and south sides of the Site. Appropriate safety precautions as per utility owner, government, and Imperial regulations/requirements, such as work setback distances/cable protection/de-energization, will need to be considered as part of the SSHASP.

Utility company representatives and a private locator will be retained to confirm the onsite utilities prior to the excavation. AECOM will coordinate and supervise utility locates with the remediation subcontractor, who will be responsible for performing field activities within a safe distance from any identified utilities, where applicable. Based on previous works it is anticipated that all underground utilities have been removed from the Site except sewer lines located on the southern portion of the Site. If utilities are identified at the Site they will be daylighted via exposure techniques such as hydro-excavation.

Based on previous works it is anticipated that a portion of the sewer line may require protection or removal; should it be required, it will be discussed in the SSHASP and will be the responsibility of the remediation subcontractor.

4.3.5.5 Excavation Stability

Soils at the site primarily consist of fine-grained materials within the areas and depths anticipated for remedial excavation. To maintain safe side walls and reduce chance of collapse, an approximate 1:1 slope will be utilized on excavation walls. As the excavation extents are not expected to abut property boundaries, it is not anticipated that temporary or permanent shoring will be required. If excavation at the

property boundary is required it is anticipated it will be performed using slot cutting, with excavation areas no wider than 2 m open at any one time and backfilled to 1:1 slope immediately following sampling to reduce potential of collapse. The excavation slope stability will be monitored by a competent person at all times. If slope stability indicates shoring is required, an engineered design will be provided by the remedial contractor prior to installation.

The estimated extents of the remedial excavation surface limits maintaining a 1:1 slope are shown on **Figure 9**.

4.3.5.6 Soil Excavation and Management

Soil will be excavated using a track-mounted excavator. AECOM personnel will directly supervise all stages of soil excavation. Select impacted soil will be excavated, stockpiled, and treated onsite using a Allu Bucket, or similar device, to promote degradation of the contaminants. It is estimated that a total of 380 m^3 of soil will be treated. Soils will be placed in 50 m^3 stockpiles for treatment. Post treatment, soils will be screened and sampled according to the stockpile screening and sampling procedure described in Section 4.3.5.10. Soils meeting applicable remedial criteria will be reused onsite, soils exceeding remedial criteria will under go a second round of treatment and sampling or be disposed of offsite, based on review of the analytical results. If offsite disposal is required, soils will be loaded into trucks and transported offsite for disposal at an Imperial-approved waste facility that is licensed to accept the impacted soil. Temporary stockpiles of excavated soil may be required in some areas to facilitate additional soil characterization prior to transport for offsite disposal.

Soils that are not suspected to be impacted will be stockpiled separately at the Site for potential re-use as backfill material. Confirmatory soil samples will be collected from the stockpiled soils and submitted for laboratory analysis. Should the analytical results of the stockpiled soils meet the remedial objectives for the Site, it will be considered for use as backfill.

4.3.5.7 Excavation Liner

Excavations are expected to abut the property boundary along the south property boundary. The use of a PHC-resistant liner will be considered based on observed site conditions at the property boundary following excavation. If COC concentrations in soil remain above remediation guidelines at the property boundary, a liner will be installed.

4.3.5.8 Excavation Water

Since the proposed maximum depth of excavation is approximately 5.0 mbgs and the potentiometric depths to groundwater ranges from approximately 1.0 mbgs and 4.3 mbgs, groundwater seepage and saturated soils are expected during the remedial excavation.

If required, any accumulated seepage water or precipitation affecting excavation activities will be pumped to temporary storage tanks onsite and the water will be sampled and submitted for laboratory analysis as required. If the water meets applicable regulations it will be discharged to the municipal drainage system, subject to approval. Should the water not meet applicable regulations it will be directly transported and disposed offsite at an Imperial-approved facility licensed to accept the wastewater. The remediation subcontractor will be responsible for obtaining the applicable permits and agreements from the municipal regulators as required.

4.3.5.9 Confirmatory Soil Sampling

Excavated soils will be visually screened for impacts (i.e. stained and non-stained areas), and representative grab samples collected at 1 m depth intervals, or at obvious stratigraphic boundaries along the excavation face. Organic vapour readings will be used as a preliminary screening tool during excavation activities and selection of soil samples for analysis.

The primary limits of the excavation will be based on organic vapour readings (i.e. using an RKI Eagle Combustible Vapour Analyzer or equivalent meter) of soil samples obtained at the time of excavation, as well as any visual indicators of PHC impacts (staining). Confirmatory samples will be collected once the primary margins of the excavation have been reached in a given section of the excavation. Discrete samples will be collected at 1 m depth intervals on excavation walls, spaced 5 m apart laterally (i.e. approximately one sample collected from every 5 m^2 or less) and at the base of the excavation in a minimum 3 m x 3 m grid. Organic vapour readings will be recorded for each sample collected. More closely spaced confirmatory sampling may be necessary where thin identifiable strata are present.

Select soil samples from the excavation extents will be submitted for laboratory analysis of relevant COCs to confirm that residual soils meet the remedial criteria. Samples selected for laboratory analysis will represent worst case potential impacts from the sampled area, based on organic vapour readings and field observations. Samples will be submitted for laboratory analysis as per the following: one for approximately every 100 m^2 in excavation base area (i.e. approximately one for every 10 floor samples field screened), and one sample from every wall profile (i.e. minimum every 5 m laterally along the excavation walls). If any analytical results exceed the established remedial criteria, additional soil will be excavated, and representative samples collected from the new limits of the excavation.

4.3.5.10 Stockpile Soil Sampling

For suspected non-impacted soil stockpiles (e.g. overburden, excavation side sloping, etc.), one soil sample for each 10 m^3 of soil will be collected for observation and organic vapour analysis. Based on field results, one discrete soil sample for each 50 m^3 of soil will be submitted to the laboratory for BTEX and PHC fractions F1 to F4 analysis (i.e. sample with the highest organic vapour reading of the five collected per 50 m^3 will be submitted for laboratory analysis). Should any analytical result exceed the established remedial criteria, the impacted soil will be combined with other impacted soils for offsite disposal, as appropriate, based on the analytical results.

4.3.5.11 Dust, Noise, and Air Quality Management

As the Site surface is primarily covered by vegetation or gravel, and since surrounding roadways are asphalt surfaced, abnormal or significant dust production that would detrimentally affect adjacent properties is not expected. If dust is found to be an issue, mitigation procedures will be implemented.

Site activities will produce noise as is typical for civil construction works. As the Site is located near a residential and commercial area, it is expected that noise will not be a concern; however, among other controls, Site work will be restricted to daytime working hours.

Odours and vapours from impacted soils may be an issue during excavation activities. Monitoring and mitigation measures will be discussed in detail in the SSHASP.

4.3.6 Site Restoration

Following removal of the impacted soil and receipt of confirmatory sampling, the Site will be restored. Backfilling of the excavation will be initiated with the use of non-overburden and treated soil that meet the remedial guidelines. If soil treatment is not successful up to 386 m^3 of imported soil may be required to replace impacted soil disposed of offsite. Restoration will entail placement and compaction of backfill to original elevations plus approximately 0.15 m of mounding for potential excavation settlement. The backfill soil will be placed in approximately 0.3 m lifts and compacted with the excavator tracks and/or bucket or other similar equipment prior to placement of the next lift. Compaction testing is not required.

The remediation subcontractor will be responsible for sourcing and importing the appropriate material to be used for backfilling purposes. Imported backfill will be fine-grained material. Prior to placement, backfill soil samples will be collected (one for every 500 m^3 for first 2,000 m^3 and then one for every 1,000 m^3 thereafter) and submitted for laboratory analysis of grain size, BTEX, PHC fractions F1 to F4, metals, VOCs, PAHs, glycols, salinity parameters, and PCBs, at a minimum.

Upon the conclusion of Site restoration activities, all temporary Site fencing will be removed.

4.4 Post-Remediation Activities

4.4.1 Post-Remedial Groundwater Well Installation, Monitoring & Sampling

To confirm groundwater quality following remedial activities, a minimum of three groundwater monitoring wells will be installed following remedial activities to augment the remaining groundwater monitoring well network. It is expected that the post-remedial groundwater monitoring and sampling will be conducted twice, with sampling events separated seasonally (approximately three to six months apart). Groundwater samples will be submitted for laboratory analysis of applicable COCs. If there are no groundwater impacts observed after two sampling events following the completion of remedial activities, based on the laboratory analytical results, it is expected that all groundwater monitoring wells at the Site will be decommissioned.

5. Schedule

A preliminary project schedule is provided below. It is expected that, once remedial activities commence, approximately one year will be required to complete remedial/post-remedial activities and restore the Site. The schedule provided is tentative and will be updated once duration of works and mobilization availability is confirmed with the Imperial project manager and the remedial subcontractor.

Table 5-1: Preliminary Remedial Schedule

Activity	Proposed Schedule							
	2020							
	M	J	J	A	S	O	N	D
Site Remediation								
Finalization of Health & Safety Plan	X	X	X					
Site Survey & Utility Locates			X	X				
Imported Fill Material Verification			X	X				
Waste Characterization & Landfill Acceptance			X	X				
Utility Protection/Install Shoring (as required)			X	X				
Excavation & Disposal of Impacted Soil				X				
Site Restoration				X				
Post-Remediation Activities								
Post-Remedial Groundwater Sampling				X			X	

6. Summary

This RP describes the activities that are recommended to be undertaken to remediate PHC-impacted soils to commercial guidelines. The key remedial activities in this RP include the excavation, onsite treatment, and transportation/disposal of non-treatable soil impacted soil with concentrations of benzene and PHC fractions F1 through F2 above the remedial criteria.

7. References

AEP, 2019a. Alberta Environment and Parks, Alberta Tier 1 Soil and Groundwater Remediation Guidelines, January 10, 2019.

AEP, 2019b. Alberta Environment and Parks, Alberta Tier 2 Soil and Groundwater Remediation Guidelines, January 10, 2019.

AMEC Earth & Environmental. 2004. Environmental Assessment Program, Former IOL Automotive Retail Station, 287 Main Street, Selkirk, Manitoba, 860265/88001943. October 22, 2004.

AMEC Earth & Environmental. 2005. Phase II Environmental Site Assessment, City of Selkirk Property Adjacent to the Former IOL Automotive Retail Station, 287 Main Street, Selkirk, Manitoba, 860265/88001943. February 9, 2005.

Aqua Terre Solutions Inc. 2003. Phase II Environmental Assessment, Red River Esso Service Station, Site #860265, 287 Main Street, Selkirk, Manitoba. October 15, 2003.

Canadian Council of Ministers of the Environment (CCME). A Protocol for the Derivation of Environmental and Human Health Soil Quality Guidelines. 2006.

CCME. A Protocol For The Derivation Of Soil Vapour Quality Guidelines For Protection Of Human Exposures Via Inhalation Of Vapours. 2014.

CCME. Canadian Environmental Quality Guidelines (CEQG), Online Guidelines, Available online: http://ceqg-rcqe.ccme.ca/en/index.html, copyright 2014.

CCME. Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil. 2001 (revised in January, 2008a).

CCME. Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil – Scientific Rationale Supporting Technical Document. January, 2008b.

CCME. Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil – Technical Supplement. January, 2008c.

CCME. Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil – User Guidance. 2001 (revised in January, 2008d.

CCME Soil Quality Guidelines for the Protection of Environmental and Human Health, Polycyclic Aromatic Hydrocarbons. 2010.

City of Selkirk, Zoning By- law 4968, June 23, 2020.

Health Canada, 2004a. Federal Contaminated Site Risk Assessment in Canada. Part I: Guidance on Human Health Preliminary Quantitative Risk Assessment (PQRA). Prepared by: Environmental Health Assessment Services Safe Environments Programme, September 2004.

Health Canada, 2004b. Federal Contaminated Site Risk Assessment in Canada. Part II: Health Canada Toxicological Reference Values (TRVs). Prepared by: Environmental Health Assessment Services Safe Environments Programme, September 2004

Health Canada, 2010. Federal Contaminated Site Risk Assessment in Canada, Part VII: Guidance for Soil Vapour Intrusion Assessment At Contaminated Sites. September 2010.

Health Canada, 2019, Guidelines for Canadian Drinking Water Quality – Summary Table, 2019
Kleinfelder Canada Inc. 2015. Remedial Action Plan, Former Retail Fuel Facility and Carwash, 287 Main Street, Selkirk, Manitoba, 8001943. April 21, 2015.

Manitoba Conservation and Climate (formerly Manitoba Sustainable Development, formerly Manitoba Conservation and Water Stewardship). 2012. GWDRILL. Manitoba Conservation and Water Stewardship. July 2012.

Manitoba Conservation and Climate (formerly Manitoba Sustainable Development). 2016a. Criteria for Acceptance of Contaminated Soil at Waste Disposal Grounds. Manitoba Sustainable Development, June 2016. (Available online: http://www.gov.mb.ca/sd/envprograms/contams/pdf/guidlines/criteria_acceptance_contaminated_soil_e.pdf).

Manitoba Conservation and Climate (formerly Manitoba Sustainable Development). 2016b. Manitoba Criteria for BTEX in Investigation Results. June 2016. (Available online: https://www.gov.mb.ca/sd/envprograms/contams/pdf/guidlines/manitoba_criteria_for_btex_in_investigation_results_e.pdf).

Manitoba Conservation and Climate (formerly Manitoba Sustainable Development). 2016c. Treatment and Disposal of Petroleum Contaminated Soil. Manitoba Sustainable Development, June 2016. (Available online: http://www.gov.mb.ca/sd/envprograms/contams/pdf/guidlines/treatment_disposal_petroleum_contaminated_soil_en.pdf).

O'Connor Associates Environmental Inc. 2013. 2012 Groundwater Monitoring and Sampling Report, 287 Main Street, Selkirk, Manitoba, Location No.: 88001943. February 21, 2013.

O'Connor Associates Environmental Inc. 2012. Phase I Environmental Site Assessment, Former Service Station, 287 Main Street, Selkirk, Manitoba, 8001943. January 19, 2012.

O'Connor Associates Environmental Inc. 2010. Field Data Report, Former ESSO Retail, 287 Main Street, Selkirk, MB, 88001943 / 860265. Prepared by O'Connor Associates Environmental Inc. on May 13, 2010.

O'Connor Associates Environmental Inc. 2007. Re: Remedial Excavation Estimate Report, Former Red River Service Station, 287 Main Street, Selkirk, Manitoba, Location No. 8600265/88001943. April 9, 2007.

O'Connor Associates Environmental Inc. 1989a. Re: Red River Esso, (60256A), Selkirk, Manitoba. January 3, 1989.

O'Connor Associates Environmental Inc.1989b. Re: Red River Esso, Service Station No. 60256A, Selkirk, Manitoba. March 20, 1989.

O'Connor Associates Environmental Inc. 1989c. Re: Red River Esso, Service Station No. 60256A, Selkirk, Manitoba. July 31, 1989.

Ontario Ministry of the Environment and Climate Change. 2011. Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the *Environmental Protection Act*, PIBS #7382e01. Ministry of the Environment, April 2011.

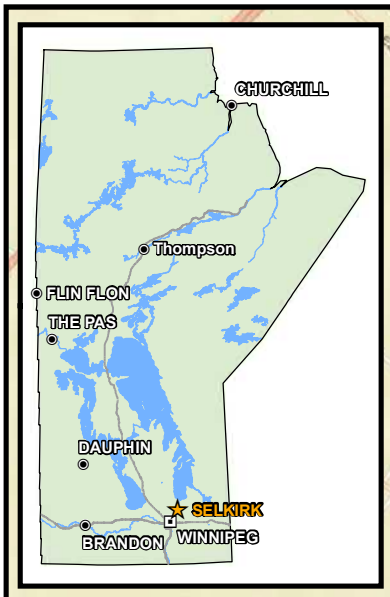
Parsons. 2013. Phase II Environmental Site Assessment, Former Esso Service Station, Car Wash and Retail Fuel Facility, 287 Main Street, Selkirk, Manitoba, 8001943. December 13, 2013.

Parsons. 2016a. Remediation Plan, Former Service Station, Car Wash and Retail Fuel Facility, 287 Main Street, Selkirk, Manitoba, 8001943. September 22, 2016.

Parsons Inc. 2016b. 2016 Groundwater Monitoring and Sampling Data Package, 287 Main Street, Selkirk, Manitoba. December 19, 2016.

US EPA (United States Environmental Protection Agency), 2006. Integrated Risk Information System (IRIS) On-Line Database available at www.epa.gov/iris

Figures



NORTH
W E
S

SITE LOCATION

Selkirk

Old England

Selkirk Golf & Country Club

REFERENCE:

LAYER CREDITS: © 2010 NAVTEQ © AND © 2016 MICROSOFT CORPORATION

0 0.25 0.5 Kilometers

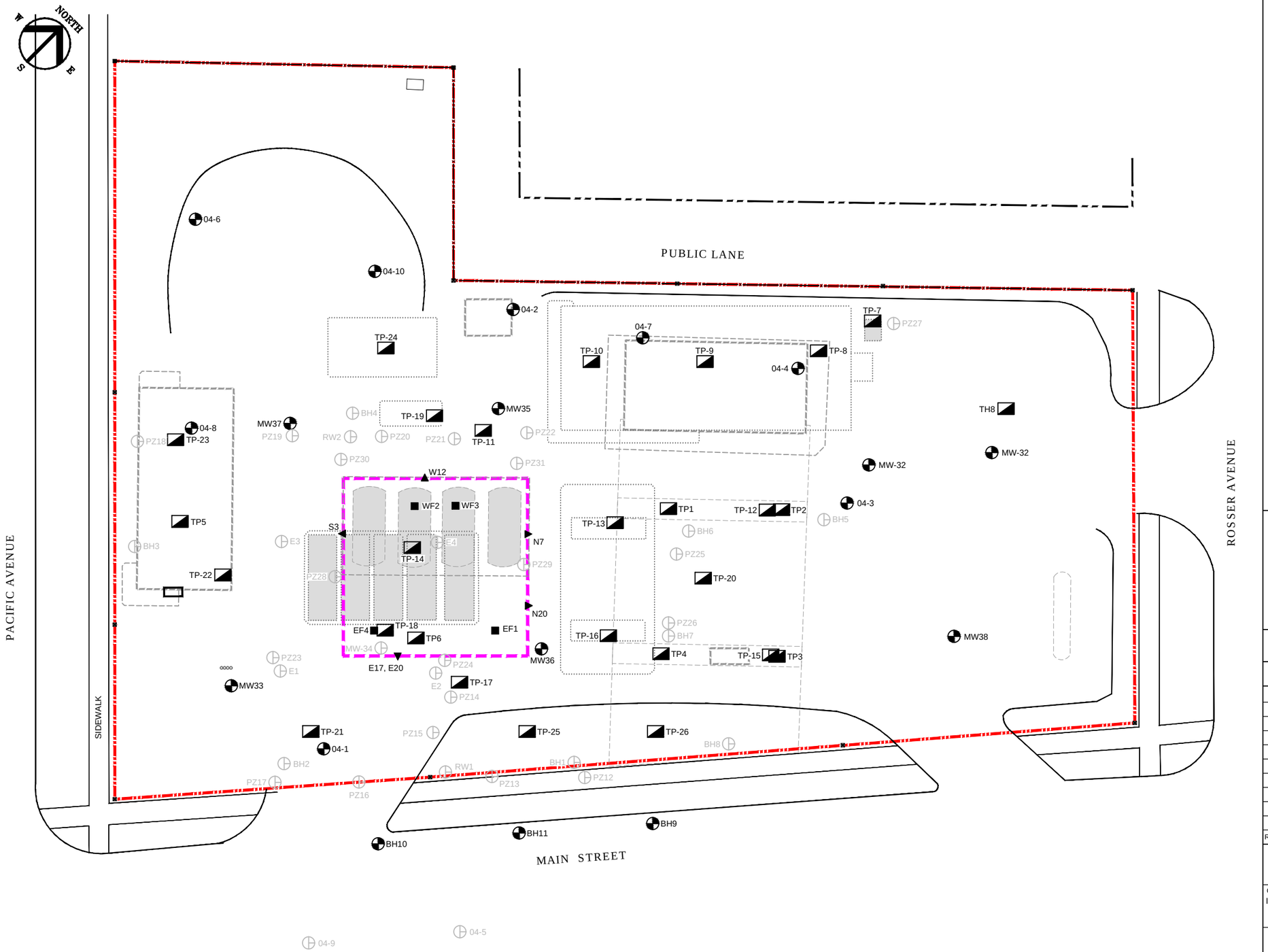
AECOM

SITE LOCATION MAP

CLIENT NAME:	PROJECT LOCATION:
IMPERIAL OIL LIMITED	287 MAIN STREET SELKIRK, MB

DRAWN BY: CM	SCALE: 1:20,000	FIGURE No. 1
CHECKED BY: AB	DATE: 03.01.2018	REVISION 0

File Location: \\cawpg1fp001\data\Projects\60549588\900-CAD_GIS\920-929 (GIS-Graphics)\HSelkirk\2018-01-03 ACM IOL Selkirk.mxd Date Revised: January 05, 2018 Prepared by: mahec Project: 60120262



LEGEND

- CURRENT PROPERTY LINE
- PROPERTY BOUNDARY PIN
- ADJACENT LOT LINE
- FENCE OF PROPERTY LINE
- FORMER FEATURES (1967-1995)
- FORMER FEATURES (1995-2004)
- TANK NEST EXCAVATION (2004)
- MONITORING WELL
- MONITORING WELL (DESTROYED)
- TEST PIT
- CONFIRMATORY WALL SAMPLE
- CONFIRMATORY FLOOR SAMPLE

NOTES:

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED ON SITE. NOT ALL UTILITIES MAY BE SHOWN.

REFERENCE DRAWINGS

NO.	DATE	DESCRIPTION

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
0	JAN. 2018			

AECOM

CLIENT NAME:
IMPERIAL OIL LIMITED

PROJECT LOCATION:
287 MAIN STREET
SELKIRK, MB

SITE PLAN

DRAWN BY: CM	SCALE: 1:300	FIGURE No. 2
CHECKED: AB	DATE: 04.01.18	REVISION 0

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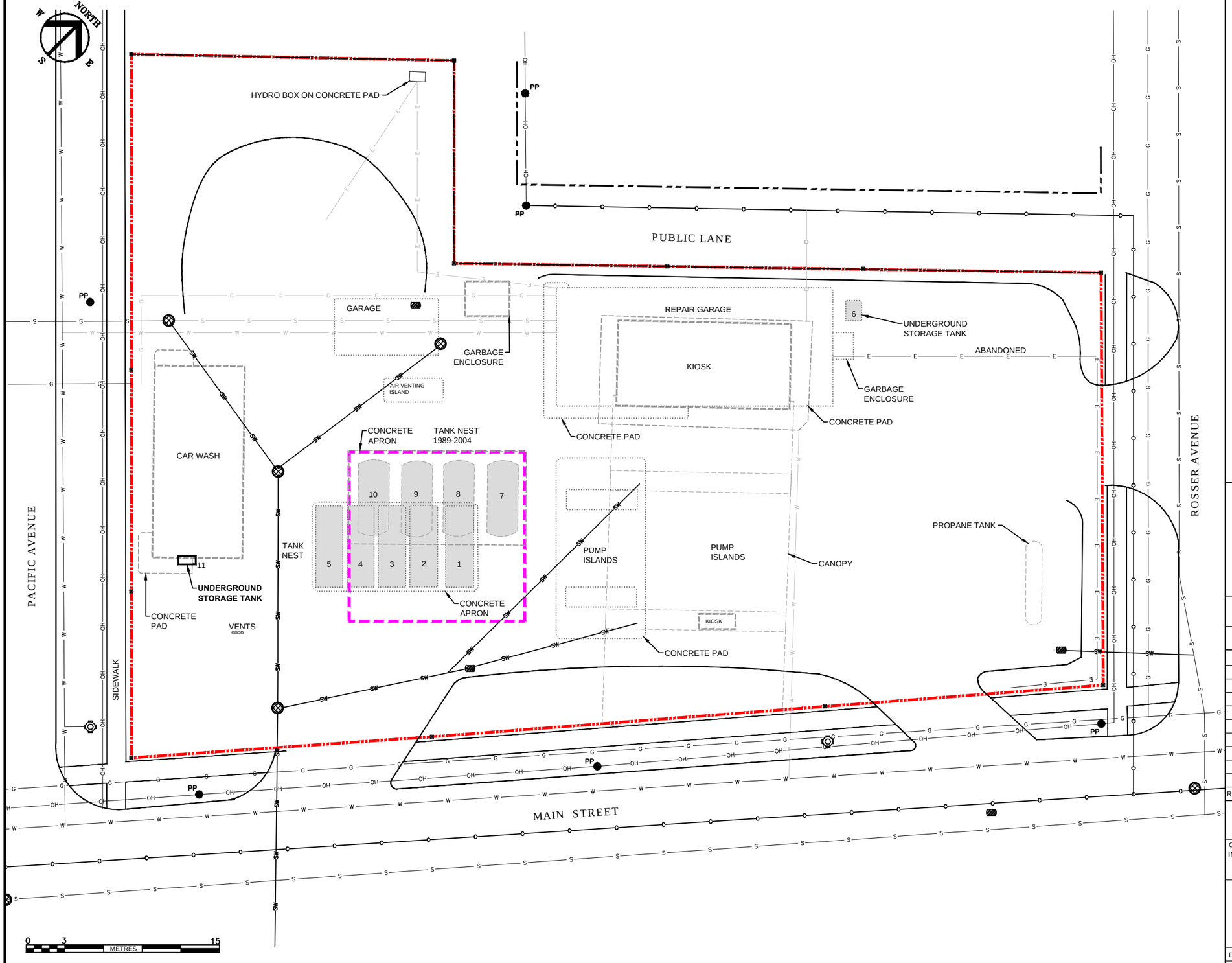

LEGEND

- CURRENT PROPERTY LINE
- PROPERTY BOUNDARY PIN
- ADJACENT LOT LINE
- FENCE OF PROPERTY LINE
- FORMER FEATURES (1967-1995)
- FORMER FEATURES (1995-2004)
- TANK NEST EXCAVATION (2004)
- OVERHEAD ELECTRICAL LINE
- UNDERGROUND ELECTRICAL LINE
- UNDERGROUND ELECTRICAL LINE (FORMER)
- UNDERGROUND COMMUNICATION LINE
- UNDERGROUND COMMUNICATION LINE (FORMER)
- UNDERGROUND NATURAL GAS LINE
- UNDERGROUND NATURAL GAS (FORMER)
- UNDERGROUND WATER LINE
- UNDERGROUND WATER LINE (FORMER)
- UNDERGROUND SANITARY SEWER LINE
- UNDERGROUND SANITARY SEWER (FORMER)
- UNDERGROUND STORM SEWER LINE
- UNDERGROUND STORM SEWER (FORMER)
- CATCH BASIN
- MANHOLE
- UTILITY POLE
- HYDRANT

NOTES:

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED ON SITE. NOT ALL UTILITIES MAY BE SHOWN.

REFERENCE DRAWINGS

NO.	DATE	DESCRIPTION

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
0	JAN. 2018			

AECOM

CLIENT NAME:
IMPERIAL OIL LIMITED

PROJECT LOCATION:
287 MAIN STREET
SELKIRK, MB

SITE PLAN WITH UTILITIES

DRAWN BY: CM	SCALE: 1:300	FIGURE No. 3
CHECKED: AB	DATE: 04.01.18	REVISION 0

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MW32											Sample Date: 2003/08/15
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2.6	<0.04	<0.10	<0.010	<0.1	<10	<10	<10	<10	-	-	13.7
4.3	<0.04	<0.10	<0.010	<0.1	<10	<10	<10	<10	-	-	11

MW33											Sample Date: 2003/08/15
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2.6	<0.04	<0.10	<0.010	<0.1	<10	<10	47	40	-	-	11.3
3.4	<0.04	<0.10	<0.010	<0.1	<10	<10	<10	<10	-	-	15

MW34											Sample Date: 2003/08/15
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2.6	7.4	16	5.0	27	310	52	<10	<10	-	-	15.2
2.6 Dup	2.8	11	6.5	27	420	63	<10	<10	-	-	14.8
3.4	2.3	2.2	1.1	5.1	58	<10	<10	<10	-	-	8.8

MW35											Sample Date: 2003/08/15
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
3.4	1.1	<0.10	2.4	3.7	220	26	29	<10	-	-	14.4
4.3	0.13	<0.10	<0.010	<0.1	<10	<10	20	<10	-	-	15

MW36											Sample Date: 2003/08/15
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
3.4	2.6	0.48	2.5	6.5	150	60	45	<10	-	-	14.5
3.4 Dup	2.6	1	6.4	19	320	64	22	<10	-	-	13.4
4.3	0.89	<0.10	<0.010	<0.1	<10	<10	28	13	-	-	9.8

MW37											Sample Date: 2003/08/15
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
4.2	1.7	0.19	3.9	9.5	370	55	18	<10	-	-	13.7
4.9	1.5	<0.10	0.73	6.3	59	<10	<10	<10	-	-	7.6
5.6	0.16	<0.10	<0.010	3.9	<10	<10	16	<10	-	-	9.6

MW38											Sample Date: 2003/08/15
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.3	<0.04	<0.10	<0.010	<0.1	<10	<10	20	<10	-	-	9.7
1.8	<0.04	<0.10	<0.010	<0.1	<10	<10	42	16	-	-	14.0
3.4	<0.04	<0.10	<0.010	<0.1	<10	<10	25	<10	-	-	13.9

04-1											Sample Date: 2004/08/04
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
3.8	1.4	0.094	2.5	2.3	65	<50	<50	<50	-	-	11.8
3.8 Dup	1.6	0.024	2.3	2.1	64	<50	<50	<50	-	-	12.0
4.6	0.12	<0.010	0.037	<0.1	<10	<50	<50	<50	-	-	4.5

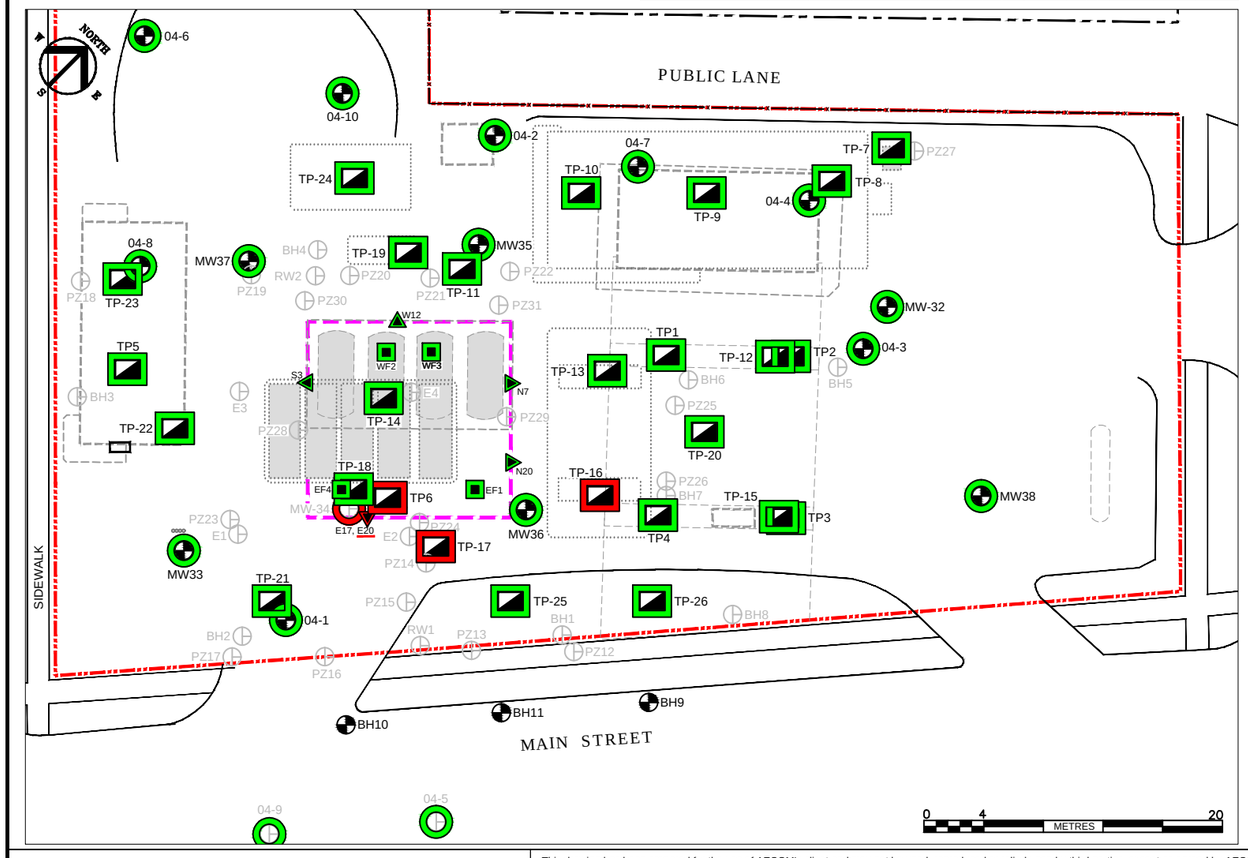
04-2											Sample Date: 2004/08/04
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.5-2.3	0.006	<0.010	0.009	<0.1	<10	<50	<50	<50	-	-	12.4

04-3											Sample Date: 2004/08/04
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
3.1-3.8	0.006	<0.010	0.008	<0.1	<10	<50	<50	<50	-	-	13.2

04-4											Sample Date: 2004/08/04
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2.3-3.1	0.005	<0.010	0.008	<0.1	<10	<50	<50	<50	-	-	12.1

04-5											Sample Date: 2004/08/04
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
3.1-3.8	0.008	<0.010	0.008	<0.1	<10	<50	<50	<50	-	-	10.1

04-6											Sample Date: 2004/08/04
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
6.9	0.003	<0.010	0.005	<0.1	<10	<50	<50	<50	-	-	3.5



04-7											Sample Date: 2004/08/04
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2.3-3.1	0.006	<0.010	0.007	<0.1	<10	<50	<50	<50	-	-	12.2

04-8											Sample Date: 2004/08/04
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
4.6	1.3	0.094	0.34	1.1	77	<50	<50	<50	-	-	12.9
5.3	0.25	<0.010	0.13	<0.1	<10	<50	<50	<50	-	-	7.7

04-9											Sample Date: 2004/08/04
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.5	0.004	<0.010	0.007	<0.1	<10	<50	<50	<50	-	-	9.8

04-10											Sample Date: 2004/08/04
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
0.8	0.004	<0.010	0.006	<0.1	<10	<50	<50	<50	-	-	18.3

E17											Sample Date: 2004/07/13
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
0.5	0.002	0.018	0.004	<0.1	<10	<50	<50	<50	-	-	2.0

E20											Sample Date: 2004/07/13
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
3.0	0.32	3.1	27	160	2400	970	130	<50	-	-	2.3

EF1											Sample Date: 2004/07/13
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
3.2	0.037	0.055	0.52	1.8	41	<50	<50	<50	-	-	11.0

EF4											Sample Date: 2004/07/13
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
3.2	0.077	0.12	0.4	2.1	33	<50	<50	<50	-	-	15.4

N7											Sample Date: 2004/07/13
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2.0	1.1	0.32	5.0	11	120	100	<50	<50	-	-	13.8

N20											Sample Date: 2004/07/13
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
3.0	0.31	1.1	2.8	13	93	<50	<50	<50	-	-	15.9

S3											Sample Date: 2004/07/13
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2.0	1.4	0.72	8.2	21	290	110	<50	<50	-	-	14.1

W12											Sample Date: 2004/07/13
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
3.0	0.1	0.037	1.4	1.5	51	<50	<50	<50	-	-	15.1

WF2											Sample Date: 2004/07/13
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
3.2	1.6	3.3	6.2	18	380	170	<50	<50	-	-	14.5

WF3											Sample Date: 2004/07/13
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
3.2	0.4	0.28	4.3	23	160	<50	<50	<50	-	-	14.4

TP1											Sample Date: 2004/07/16
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
3.1	0.005	0.039	0.024	<0.1	<10	<50	<50	<50	-	-	-

TP2											Sample Date: 2004/07/16
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2.4	0.16	<0.10	5.0	18	540	190	<50	<50	-	-	-
3.7	0.50	0.026	0.57	<0.1	34	<50	<50	<50	-	-	-

TP3											Sample Date: 2004/07/16
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
3.4	0.005	0.030	0.008	<0.1	<10	190	<50	<50	-	-	-

TP4											Sample Date: 2004/07/16
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.8	0.002	0.029	<0.003	<0.1	<10	190	<50	<50	-	-	-

TP5											Sample Date: 2004/07/16
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
3.1	0.008	0.049	0.014	<0.1	<10	190	<50	<50	-	-	-

TP6											Sample Date: 2004/07/16
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2.4	1.4	12	21	150	1100	1200	<50	<50	-	-	-
3.7	8.5	18	4.9	30	190	<50	<50	<50	-	-	-

TP-7											Sample Date: 2013/08/01
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.8-2.4	<0.0050	<0.020	<0.010	<0.040	<12	<10	790	<50	<0.0020	<0.0020	14
1.8-2.4 Dup	<0.0050	<0.020	<0.010	<0.040	<12	11	860	<50	<0.0020	<0.0020	14
2.4-3.1	<0.0050	<0.020	<0.010	<0.040	<12	<10	550	<50	<0.0020	<0.0020	13
4.3-4.9	<0.0050	<0.020	<0.010	<0.040	<12	<10	<50	<50	<0.0020	<0.0020	5.0

TP-8											Sample Date: 2013/08/01
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.8-2.4	<0.0050	<0.020	<0.010	<0.040	<12	<10	790	<50	<0.0020	<0.0020	13
4.3-4.9	<0.0050	0.026	<0.010	<0.040	<12	11	860	<50	<0.0020	<0.0020	6.2

TP-9											Sample Date: 2013/08/01
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.8-2.4	<0.0050	<0.020	<0.010	<0.040	<12	<10	790	<50	<0.0020	<0.0020	14

TP-10											Sample Date: 2013/08/01
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.8-2.4	<0.0050	<0.020	<0.010	<0.040	<12	<10	790	<50	<0.0020	<0.0020	13

TP-11											Sample Date: 2013/08/01
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.8-2.4	<0.0050	<0.020	0.094	<0.040	45	49	<50	<50	<0.0020	<0.0020	16

TP-12											Sample Date: 2013/08/01
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
3.1-3.7	<0.0050	<0.020	<0.010	<0.040	<12	<10	<50	<50	<0.0020	<0.0020	16

TP-13											Sample Date: 2013/08/01
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.8-2.4	0.0084	<0.020	0.68	0.14	52	60	<50	<50	<0.0020	<0.0020	14
3.1-3.7	0.11	<0.020	2.3	<0.040	150	93	<50	<50	<0.0020	<0.0020	13
3.1-3.7 Dup	<0.033	<0.020	1.5	0.43	140	110	<50	<50	<0.0020	<0.0020	13
4.3-4.9	0.9	<0.020	2.7	0.96	73	45	<50	<50	<0.0020	<0.0020	14

TP-14											Sample Date: 2013/08/02
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
0.6-1.2	<0.0050	<0.020	<0.010	<0.040	<12	<10	<50	<50	<0.0020	<0.0020	2.7

TP-15											Sample Date: 2013/08/02
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2.4-3.1	<0.0050	<0.020	<0.010	<0.040	<12	<10	57	<50	<0.0020	<0.0020	13

TP-16											Sample Date: 2013/08/02
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
0.9-1.5	0.29	4.8	9.9	150	1800	690	53	<50	<0.0020	<0.0020	7.4
0.9-1.5 Dup	0.35	3.4	11	150	2300	1100	55	<50	<0.0020	<0.0020	7.6
1.8-2.4	1.2	0.05	3.9	1.8	170	60	84	<50	<0.0020	0.0393	16
4.3-4.9	2.6	0.14	5.9	27	300	130	<50	<50	<0.0020	0.0764	14

TP-17											Sample Date: 2013/08/02
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.2-1.8	<0.090	0.077	1.4	8.6	450	330	67	<50	<0.027	<0.0020	14
1.8-2.4	12.00	19	7.8	47	460	81	<50	<50	0.0138	<0.0020	15
3.7-4.3	9.7	0.9	4.2	17	180	38	53	<50	<0.0020	<0.0020	15

TP-18											Sample Date: 2013/08/02
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
0.6-1.2	<0.0050	<0.020	<0.010	<0.040	<12	<10	<50	<50	<0.0020	<0.0020	2.4

TP-19											Sample Date: 2013/08/02
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.8-2.4	<0.0050	<0.020	<0.010	<0.040	<12	<10	<50	<50	<0.0020	<0.0020	15
2.4-3.1	<0.090	<0.020	1.4	<0.040	230	26	<50	<50	<0.0020	<0.0020	15
4.3-4.9	0.78	0.076	2.4	3.4	200	38	<50	<50	<0.0020	<0.0020	9

TP-20											Sample Date: 2013/08/06
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2.4-3.1	<0.0050	<0.020	<0.010	<0.040	<12	<10	52	<50	<0.0020	<0.0020	14

TP-21											Sample Date: 2013/08/06
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.5-1.8	<0.0050	<0.020	<0.010	<0.040	<12	<10	66	<50	<0.0020	<0.0020	13
2.4-3.1	1.3	0.026	7.0	3.6	520	120	60	<50	<0.011	<0.0020	11
4.3-4.9	0.69	0.026	0.3	0.06	<12	<10	<50	<50	<0.0020	<0.0020	5.5

TP-22											Sample Date: 2013/08/06
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.3-1.8	<0.0050	0.04	<0.010	<0.040	<12	<10	<50	<50	<0.0020	<0.0020	9.8

TP-23											Sample Date: 2013/08/06
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2.4-3.1	<0.0050	<0.020	<0.010	<0.040	180	29	<50	<50	<0.0020	<0.0020	13
2.4-3.1 Dup	<0.0050	<0.020	<0.010	<0.040	200	21	<50	<50	<0.0020	<0.0020	13
4.3-4.9	<0.0050	<0.020	0.098	<0.040	490	81	58	<50	<0.013	<0.0020	12

TP-24											Sample Date: 2013/08/06
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.8-2.4	<0.0050	<0.020	<0.010	<0.040	<12	<10	<50	<50	<0.0020	<0.0020	13
3.7-4.3	<0.0050	<0.020	<0.010	<0.040	29	<10	<50	<50	<0.0020	<0.0020	21

TP-25											Sample Date: 2013/08/06
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.8-2.4	0.13	<0.020	0.07	0.068	<12	<10	65	<50	<0.0020	<0.0020	13
2.4-3.1	1.8	<0.020	5.6	4.3	420	45	55	<50	<0.0020	<0.0020	14
4.3-4.9	0.55	0.54	2.5	12	160	63	<50	<50	<0.0020	<0.0020	4.6

TP-26											Sample Date: 2013/08/06
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.8-2.4	<0.0050	0.040	<0.010	<0.040	<12	<10	66	<50	<0.0020	<0.0020	14
2.4-3.1	<0.013	<0.020	2.4	6.7	670	260	<50	<50	<0.031	<0.0020	14
2.4-3.1 Dup	0.12	<0.020	1.7	5.1	550	130	<50	<50	<0.025	<0.0020	13
4.3-4.9	<0.0050	<0.020	<0.010	<0.040	<12	<10	<50	<50	<0.0020	<0.0020	4.8

LEGEND

- CURRENT PROPERTY LINE
- ADJACENT LOT LINE
- FENCE OF PROPERTY LINE
- FORMER FEATURES (1967-1995)
- FORMER FEATURES (1995-2004)
- TANK NEST EXCAVATION (2004)
- TESTPIT
- MONITORING WELL
- MONITORING WELL (DESTROYED)
- CONFIRMATORY BASE SAMPLE
- CONFIRMATORY WALL SAMPLE
- SAMPLE ID'S UNDERLINED FOR CLARITY
- SAMPLES LESS THAN OR EQUAL TO APPLICABLE GUIDELINE FOR ALL PARAMETERS ANALYSED
- SAMPLES GREATER THAN APPLICABLE GUIDELINE FOR AT LEAST ONE PARAMETER ANALYSED

ABBREVIATIONS: B - Benzene; T - Toluene; E - Ethylbenzene; X - Xylenes; F1 - PHC fraction F1; F2 - PHC fraction F2; F3 - PHC fraction F3; F4 - PHC fraction F4; 1,2-DBA - 1,2-Dibromoethane; 1,2-DCA - 1,2-Dichloroethane; Pb - Lead; m bgs - metres below ground surface; NG - No Guideline.

BTEX, 1,2-DCA, Pb: Canadian Council of Ministers of the Environment (CCME) Soil Quality Guidelines (2014) - Commercial Land Use, Fine Grained Soils.

F1-F4: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil (2008) - Commercial Land Use, Fine Grained Soils.

1,2-DBA: Ontario Ministry of the Environment and Climate Change (MOECC) Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (2011) - Table 3: Full Depth Generic Site Condition Standards Non-Potable Ground Water Condition - Commercial Land Use.

-: Denotes analysis not conducted.

<: Denotes concentration less than reportable detection limit.

mg/kg: Unit for all soil quality guideline criteria and analytical results is milligrams per kilogram.

XX: Bold and underlined analytical results indicate Reportable Detection Limit (RDL) exceeds applicable guidelines.

XX: Red and bold test results exceeded applicable guidelines.

Soil Quality Guidelines	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
Surface Soil (≤ 1.5 mbgs)	2.8	330	430	230	320	260	2500	6600	0.05	50	260
Subsurface Soil (> 1.5 mbgs)	2.9	660	860	460	800	1000	5000	10000	0.05	50	260

REFERENCE DRAWINGS

NO.	DATE	DESCRIPTION

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK

AECOM

CLIENT NAME: IMPERIAL OIL LIMITED

PROJECT LOCATION: 287 MAIN STREET SELKIRK, MB

HISTORICAL SOIL ANALYTICAL RESULTS FOR PETROLEUM HYDROCARBONS, LEAD SCAVENGERS AND LEAD

DRAWN BY: CM | SCALE: 1:500 | FIGURE No. 4

CHECKED: BR | DATE: 24.11.2017 | REVISION 0

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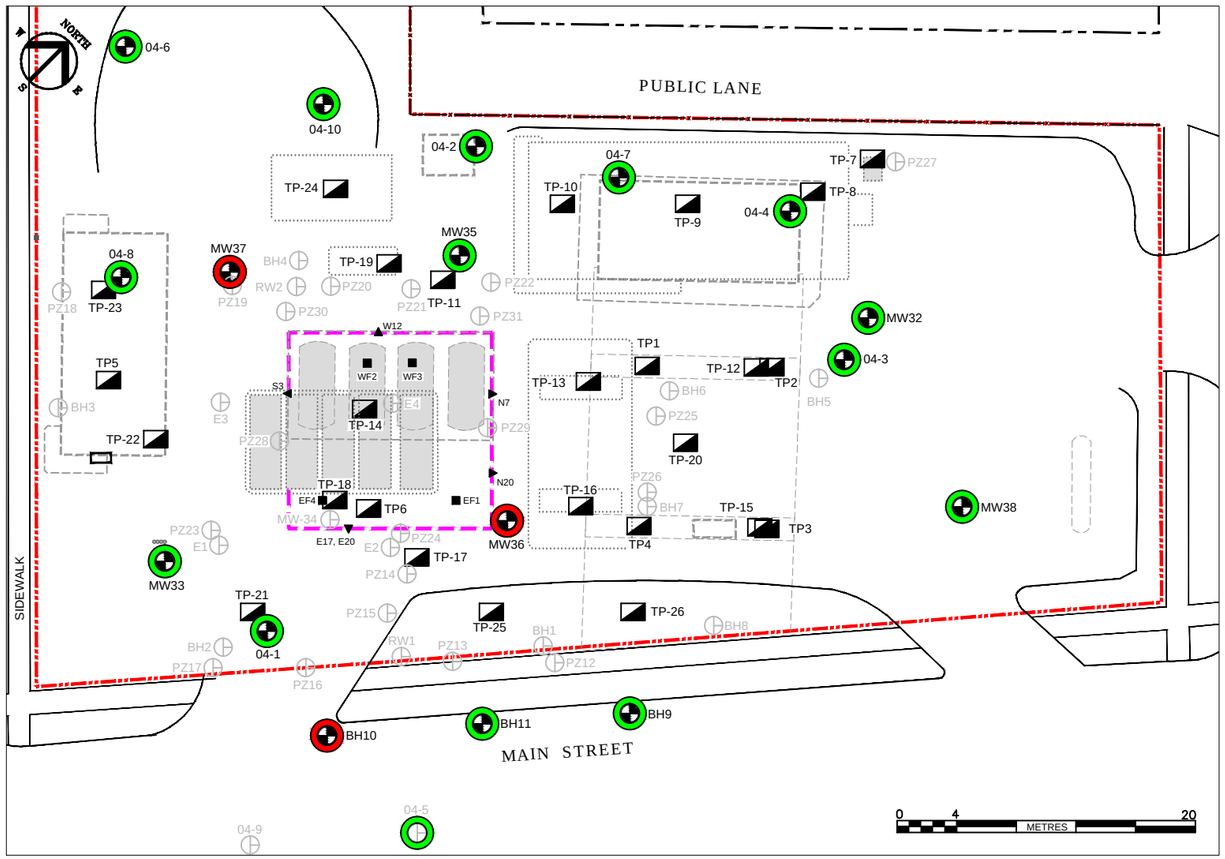
MW32	Screen Interval: 1.6 mbgs to 4.6 mbgs										
Sample Date	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2010/02/25	<0.0004	<0.0004	<0.0004	<0.0008	<0.100	<0.1	-	-	-	-	-
2012/12/18	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00050	<0.00050	<0.00020
2015/07/11	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00050	<0.00050	<0.00020
2015/07/11 Dup	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00050	<0.00050	<0.00020
2016/10/05	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00020	<0.00050	<0.00020
2016/10/05 Dup	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00020	<0.00050	<0.00020

MW33	Screen Interval: 1.6 mbgs to 4.6 mbgs										
Sample Date	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2010/02/25	<0.0004	<0.0004	<0.0004	<0.0008	<0.100	<0.1	-	-	-	-	-
2012/12/18	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00050	<0.00050	<0.00020
2015/07/11	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00050	<0.00050	0.00023
2016/10/06	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00020	<0.00050	<0.00020

MW35	Screen Interval: 1.6 mbgs to 4.6 mbgs										
Sample Date	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2010/02/25	0.28	<0.0004	0.11	<0.0008	0.54	0.4	-	-	-	-	-
2012/12/18	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00050	<0.00050	<0.00020
2015/07/11	0.0015	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00050	<0.00050	<0.00020
2016/10/06	0.1	<0.00040	0.0015	<0.00080	<0.10	0.15	-	-	<0.00020	<0.00050	<0.00020
2016/10/06 Dup	0.11	<0.00040	0.0051	<0.00080	0.11	0.12	-	-	<0.00020	<0.00050	<0.00020



MW36	Screen Interval: 1.6 mbgs to 4.6 mbgs										
Sample Date	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2010/02/25	**5.5**	0.027	0.68	0.12	<0.100	0.8	-	-	-	-	-

MW37	Screen Interval: 1.6 mbgs to 4.6 mbgs										
Sample Date	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2010/02/25	**0.51**	0.0045	0.18	0.02	**0.83**	1	-	-	-	-	-
2012/12/18	0.21	0.0021	0.099	<0.00080	**0.91**	0.45	-	-	<0.00050	<0.00050	<0.00020

MW38	Screen Interval: 1.6 mbgs to 4.6 mbgs										
Sample Date	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2010/02/25	<0.0004	<0.0004	<0.0004	<0.0008	<0.100	<0.1	-	-	-	-	-
2012/12/18	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00050	<0.00050	<0.00020
2012/12/18 Dup	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00050	<0.00050	<0.00020
2015/07/11	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00050	<0.00050	<0.00020
2016/10/05	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00020	<0.00050	<0.00020

04-1	Screen Interval: 6.7 mbgs to 7.6 mbgs										
Sample Date	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2012/12/18	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00050	<0.00050	<0.00020
2015/07/11	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00050	<0.00050	<0.00020
2016/10/06	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00020	<0.00050	<0.00020

04-2	Screen Interval: 3.1 mbgs to 6.1 mbgs										
Sample Date	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2010/02/25	<0.0004	<0.0004	<0.0004	<0.0008	<0.100	<0.1	-	-	-	-	-
2012/12/18	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00050	<0.00050	<0.00020
2015/07/11	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00050	<0.00050	<0.00020
2016/10/06	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00020	<0.00050	<0.00020

04-3	Screen Interval: 3.1 mbgs to 6.1 mbgs										
Sample Date	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2010/02/25	<0.0004	<0.0004	<0.0004	<0.0008	<0.100	<0.1	-	-	-	-	-
2012/12/18	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00050	<0.00050	<0.00020
2015/07/11	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00050	<0.00050	<0.00020
2016/10/06	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00020	<0.00050	<0.00020

04-4	Screen Interval:6.0 mbgs to 6.9 mbgs										
Sample Date	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2DCA	Pb
2010/02/25	<0.0004	<0.0004	<0.0004	<0.0008	<0.100	<0.1	-	-	-	-	-
2012/12/18	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00050	<0.00050	<0.00020
2015/07/11	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00050	<0.00050	<0.00020
2016/10/06	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00020	<0.00050	<0.00020

04-5	Screen Interval: 3.1 mbgs to 6.1 mbgs										
Sample Date	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2010/02/25	<0.0004	<0.0004	<0.0004	<0.0008	<0.100	<0.1	-	-	-	-	-

04-6	Screen Interval: 6.7 mbgs to 7.6 mbgs										
Sample Date	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2010/02/25	<0.0004	<0.0004	<0.0004	<0.0008	<0.100	<0.1	-	-	-	-	-
2012/12/18	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00050	<0.00050	<0.00020
2012/12/18 Dup	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00050	<0.00050	<0.00020
2015/07/11	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00050	<0.00050	<0.00020
2016/10/06	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00020	<0.00050	0.00022

04-7	Screen Interval: 3.1 mbgs to 5.5 mbgs										
Sample Date	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2012/12/18	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00050	<0.00050	<0.00020
2015/07/11	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00050	<0.00050	0.00020
2016/10/06	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00020	<0.00050	<0.00020

04-8	Screen Interval: 3.1 mbgs to 6.1 mbgs										
Sample Date	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2010/02/25	0.32	<0.0004	0.048	<0.0008	0.68	0.3	-	-	-	-	-
2012/12/18	0.0033	<0.00040	0.00062	<0.00080	<0.10	0.18	-	-	<0.00050	<0.00050	<0.00020
2015/07/11	0.14	<0.00040	0.012	<0.00080	0.40	0.24	-	-	<0.00050	<0.00050	<0.00020
2016/10/06	0.011	<0.00040	0.00046	<0.00080	0.11	<0.10	-	-	<0.00020	<0.00050	<0.00020

04-10	Screen Interval: 3.1 mbgs to 6.1 mbgs										
Sample Date	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2010/02/25	<0.0004	<0.0004	<0.0004	<0.0008	<0.100	<0.1	-	-	-	-	-
2012/12/18	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00050	<0.00050	<0.00020
2015/07/11	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00050	<0.00050	<0.00020
2015/07/11 Dup	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00050	<0.00050	<0.00020
2016/10/06	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00020	<0.00050	<0.00020

BH9	Screen Interval: 0.6 mbgs to 6.1 mbgs										
Sample Date	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2010/02/25	<0.0004	<0.0004	<0.0004	<0.0008	<0.100	<0.1	-	-	-	-	-
2016/10/05	<0.00040	<0.00040	<0.00040	<0.00080	<0.10	<0.10	-	-	<0.00020	<0.00050	<0.00020

BH10	Screen Interval: 0.6 mbgs to 6.1 mbgs										
Sample Date	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2010/02/25	0.22	<0.0004	0.02	0.0048	**1.1**	**1**	-	-	-	-	-

BH11	Screen Interval: 0.6 mbgs to 6.1 mbgs										
Sample Date	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2010/02/25	<0.0004	<0.0004	<0.0004	<0.0008	<0.100	<0.1	-	-	-	-	-
2016/10/05	0.025	<0.00040	<0.00040	0.00046	<0.10	<0.10	-	-	<0.00020	<0.00050	<0.00020

LEGEND

- CURRENT PROPERTY LINE
- ADJACENT LOT LINE
- FENCE OF PROPERTY LINE
- FORMER FEATURES (1967-1995)
- FORMER FEATURES (1995-2004)
- TANK NEST EXCAVATION (2004)
- TESTPIT
- MONITORING WELL
- MONITORING WELL (DESTROYED)
- CONFIRMATORY BASE SAMPLE
- CONFIRMATORY WALL SAMPLE
- SAMPLES LESS THAN OR EQUAL TO APPLICABLE GUIDELINE FOR ALL PARAMETERS ANALYSED
- SAMPLES GREATER THAN APPLICABLE GUIDELINE FOR AT LEAST ONE PARAMETER ANALYSED

ABBREVIATIONS: B - Benzene; T - Toluene; E - Ethylbenzene; X - Xylenes; F1 - PHC fraction F1; F2 - PHC fraction F2; F3 - PHC fraction F3; F4 - PHC fraction F4; 1,2-DBA - 1,2-Dibromoethane; 1,2-DCA - 1,2-Dichloroethane; Pb - Lead; mbgs - metres below ground surface; NG - No Guideline.

BTEX, F1-F4, 1,2-DBA, 1,2-DCA, Pb: Ontario Ministry of the Environment and Climate Change (MOECC) Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (2011) - Table 3: Full Depth Generic Site Condition Standards Non-Potable Ground Water Condition - Commercial Land Use.

-: Denotes analysis not conducted.

<: Denotes concentration less than reportable detection limit.

mg/L: Unit for all groundwater quality guideline criteria and analytical results is milligrams per litre.

XX: Bold and underlined analytical results indicate Reportable Detection Limit (RDL) exceeds applicable guidelines.

XX: Red and bold analytical results exceeded applicable guidelines.

Groundwater Quality Guidelines	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
Criteria (mg/L)	0.43	18	2.3	4.2	0.75	0.15	0.5	0.5	0.00083	0.012	0.025

REFERENCE DRAWINGS

NO.	DATE	DESCRIPTION

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK

AECOM

CLIENT NAME: IMPERIAL OIL LIMITED

PROJECT LOCATION: 287 MAIN STREET SELKIRK, MB

HISTORICAL GROUNDWATER ANALYTICAL RESULTS FOR PETROLEUM HYDROCARBONS, LEAD SCAVENGERS AND LEAD

DRAWN BY: CM | SCALE: 1:500 | FIGURE No. 5

CHECKED: BR | DATE: 24.11.2017 | REVISION 0

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NORTH

W E

S

04-1							Screen Interval: 6.7 mbgs to 7.6 mbgs	
Sample Date	B	T	E	X	F1	F2	F3	F4
2018/10/10	0.042	<0.0004	0.0071	<0.00089	<0.10	**0.34**	<0.10	<0.20

04-2							Screen Interval: 3.1 mbgs to 6.1 mbgs	
Sample Date	B	T	E	X	F1	F2	F3	F4
2018/10/10	<0.0004	<0.0004	<0.0004	<0.00089	<0.10	<0.10	<0.10	<0.20

04-3							Screen Interval: 3.1 mbgs to 6.1 mbgs	
Sample Date	B	T	E	X	F1	F2	F3	F4
2018/10/10	<0.0004	<0.0004	<0.0004	<0.00089	<0.10	<0.10	<0.10	<0.20

04-4							Screen Interval: 6.0 mbgs to 6.9 mbgs	
Sample Date	B	T	E	X	F1	F2	F3	F4
2018/10/10	<0.0004	<0.0004	<0.0004	<0.00089	<0.10	<0.10	<0.10	<0.20

04-6							Screen Interval: 6.7 mbgs to 7.6 mbgs	
Sample Date	B	T	E	X	F1	F2	F3	F4
2018/10/10	<0.0004	<0.0004	<0.0004	<0.00089	<0.10	<0.10	0.17	<0.20

04-7							Screen Interval: 3.1 mbgs to 5.5 mbgs	
Sample Date	B	T	E	X	F1	F2	F3	F4
2018/10/10	<0.0004	<0.0004	<0.0004	<0.00089	<0.10	<0.10	**0.67**	0.21

04-8							Screen Interval: 3.1 mbgs to 6.1 mbgs	
Sample Date	B	T	E	X	F1	F2	F3	F4
2018/10/10	<0.0004	<0.0004	<0.0004	<0.00089	0.36	**0.27**	<0.10	<0.20

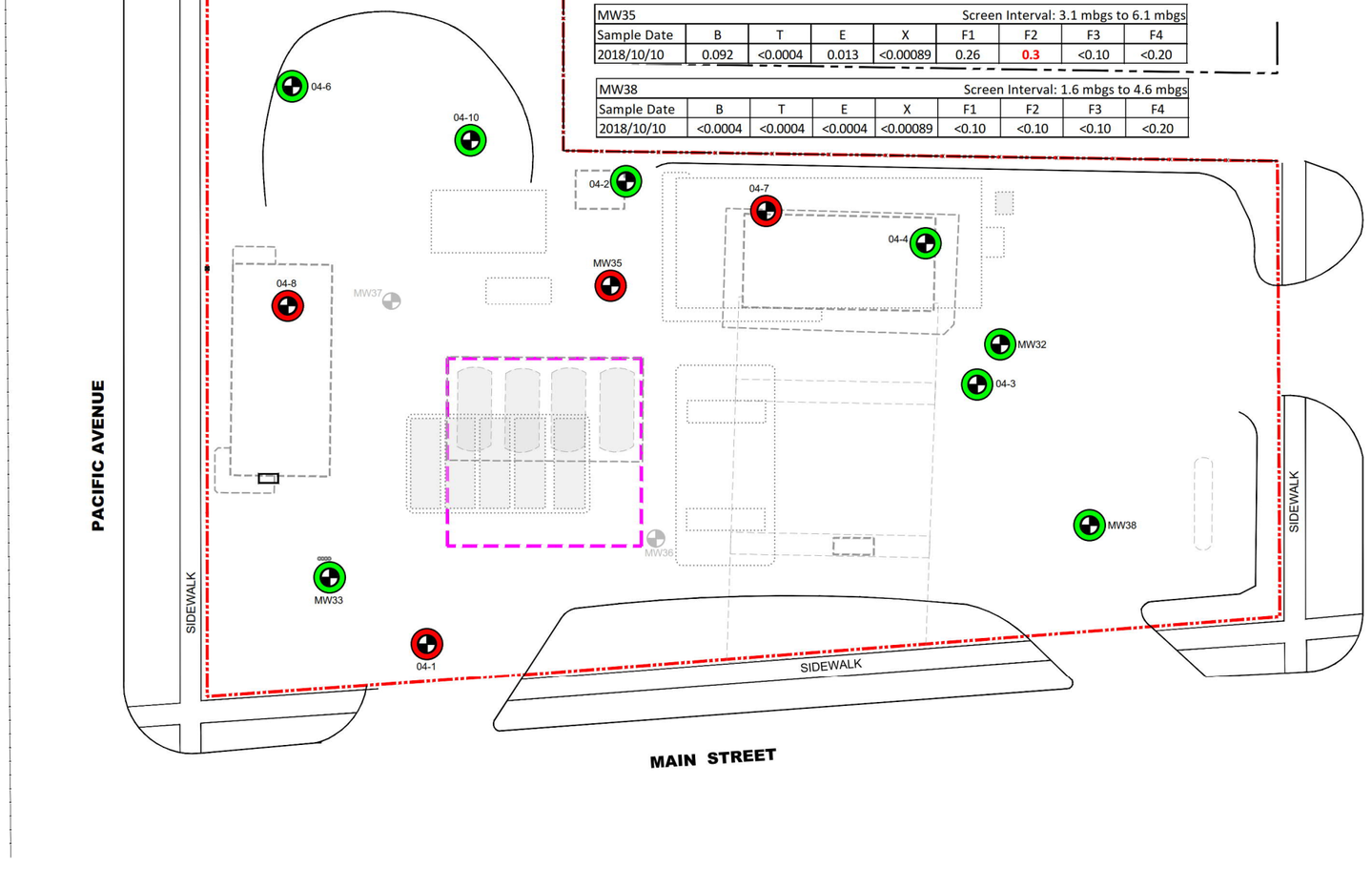
04-10							Screen Interval: 3.1 mbgs to 6.1 mbgs	
Sample Date	B	T	E	X	F1	F2	F3	F4
2018/10/10	<0.0004	<0.0004	<0.0004	<0.00089	<0.10	<0.10	<0.10	<0.20

MW32							Screen Interval: 1.6 mbgs to 4.6 mbgs	
Sample Date	B	T	E	X	F1	F2	F3	F4
2018/10/10	<0.0004	<0.0004	<0.0004	<0.00089	<0.10	<0.10	<0.10	<0.20

MW33							Screen Interval: 1.6 mbgs to 4.6 mbgs	
Sample Date	B	T	E	X	F1	F2	F3	F4
2018/10/10	<0.0004	<0.0004	<0.0004	<0.00089	<0.10	<0.10	<0.10	<0.20

MW35							Screen Interval: 3.1 mbgs to 6.1 mbgs	
Sample Date	B	T	E	X	F1	F2	F3	F4
2018/10/10	0.092	<0.0004	0.013	<0.00089	0.26	**0.3**	<0.10	<0.20

MW38							Screen Interval: 1.6 mbgs to 4.6 mbgs	
Sample Date	B	T	E	X	F1	F2	F3	F4
2018/10/10	<0.0004	<0.0004	<0.0004	<0.00089	<0.10	<0.10	<0.10	<0.20



0 3 METRES 15

LEGEND

- CURRENT PROPERTY LINE
- PROPERTY BOUNDARY PIN
- ADJACENT LOT LINE
- FORMER FEATURES (1967-1995)
- FORMER FEATURES (1995-2004)
- FORMER TANK NEST EXCAVATION
- FLAG POLE
- MONITORING WELL
- MONITORING WELL BLOCKED. NO SAMPLE COLLECTED
- SAMPLES LESS THAN OR EQUAL TO APPLICABLE GUIDELINE FOR ALL PARAMETERS ANALYSED
- SAMPLES GREATER THAN APPLICABLE GUIDELINE FOR AT LEAST ONE PARAMETER ANALYSED

ABBREVIATIONS: B - Benzene; T - Toluene; E - Ethylbenzene; X - Xylenes; F1 - PHC fraction F1; F2 - PHC fraction F2; F3 - PHC fraction F3; F4 - PHC fraction F4; mbgs - metres below ground surface; NG - No Guideline.

BTEX, F1-F4: Ontario Ministry of the Environment and Climate Change (MOECC) Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (2011) - Table 3: Full Depth Generic Site Condition Standards Non-Potable Ground Water Condition - Commercial Land Use.

-: Denotes analysis not conducted.

<: Denotes concentration less than reportable detection limit.

mg/L: Unit for all groundwater quality guideline criteria and analytical results is milligrams per litre.

XX: Bold and underlined analytical results indicate Reportable Detection Limit (RDL) exceeds applicable guidelines.

XX: Red and bold analytical results exceeded applicable guidelines.

NOTES:

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REFERENCE DRAWINGS

NO.	DATE	DESCRIPTION

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
0				

AECOM

CLIENT NAME:
IMPERIAL OIL LIMITED

PROJECT LOCATION:
287 MAIN STREET
SELKIRK, MB

2018 PRE-REMEDIATION GROUNDWATER ANALYTICAL RESULTS FOR PETROLEUM HYDROCARBONS

DRAWN BY: SC	SCALE: 1:300	FIGURE No. 6
CHECKED: MK	DATE: 31-10-2018	REVISION 0

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BH1								Sample Date: 2018-07-13
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4
3	0.012	<0.020	<0.010	<0.040	30	22	<50	<50
3	<0.0050	<0.020	<0.010	<0.040	83	84	55	<50
4.5	<0.0050	<0.020	<0.010	<0.040	<10	<10	<50	<50

BH2								Sample Date: 2018-07-12
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4
5.25	0.170	<0.020	0.81	0.19	50	47	<50	<50
6.75	0.13	<0.020	0.077	<0.040	<10	<10	<50	<50

BH3								Sample Date: 2018-07-12
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4
3.75	2.2	<0.020	1.8	0.71	120	25	<50	<50
6	0.02	<0.020	<0.010	<0.040	<10	<10	73	<50

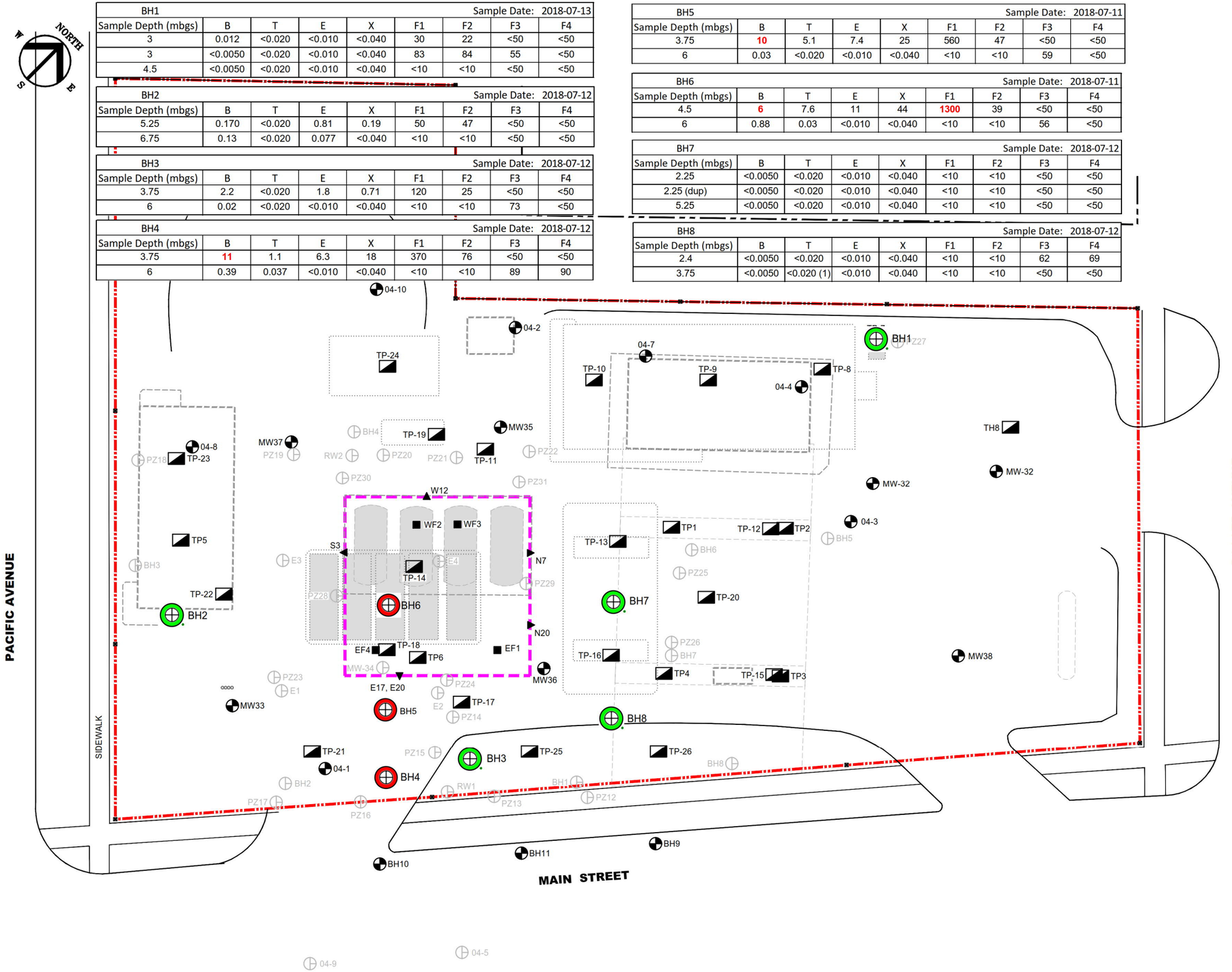
BH4								Sample Date: 2018-07-12
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4
3.75	**11**	1.1	6.3	18	370	76	<50	<50
6	0.39	0.037	<0.010	<0.040	<10	<10	89	90

BH5								Sample Date: 2018-07-11
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4
3.75	**10**	5.1	7.4	25	560	47	<50	<50
6	0.03	<0.020	<0.010	<0.040	<10	<10	59	<50

BH6								Sample Date: 2018-07-11
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4
4.5	**6**	7.6	11	44	**1300**	39	<50	<50
6	0.88	0.03	<0.010	<0.040	<10	<10	56	<50

BH7								Sample Date: 2018-07-12
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4
2.25	<0.0050	<0.020	<0.010	<0.040	<10	<10	<50	<50
2.25 (dup)	<0.0050	<0.020	<0.010	<0.040	<10	<10	<50	<50
5.25	<0.0050	<0.020	<0.010	<0.040	<10	<10	<50	<50

BH8								Sample Date: 2018-07-12
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4
2.4	<0.0050	<0.020	<0.010	<0.040	<10	<10	62	69
3.75	<0.0050	<0.020 (1)	<0.010	<0.040	<10	<10	<50	<50



LEGEND

- CURRENT PROPERTY LINE
- PROPERTY BOUNDARY PIN
- ADJACENT LOT LINE
- FENCE OF PROPERTY LINE
- FORMER FEATURES (1967-1995)
- FORMER FEATURES (1995-2004)
- TANK NEST EXCAVATION (2004)
- MONITORING WELL
- MONITORING WELL (DESTROYED)
- TEST PIT
- CONFIRMATORY WALL SAMPLE
- CONFIRMATORY FLOOR SAMPLE
- SAMPLES LESS THAN OR EQUAL TO APPLICABLE GUIDELINE FOR ALL PARAMETERS ANALYSED
- SAMPLES GREATER THAN APPLICABLE GUIDELINE FOR AT LEAST ONE PARAMETER ANALYSED

ABBREVIATIONS: B - Benzene; T - Toluene; E - Ethylbenzene; X - Xylenes; F1 - PHC fraction F1; F2 - PHC fraction F2; F3 - PHC fraction F3; F4 - PHC fraction F4; mbgs - metres below ground surface; NG - No Guideline.

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REFERENCE DRAWINGS

NO.	DATE	DESCRIPTION

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
0	JAN. 2018			

AECOM

CLIENT NAME:
IMPERIAL OIL LIMITED

PROJECT LOCATION:
287 MAIN STREET
SELKIRK, MB

2018 PRE-REMEDIATION SOIL ANALYTICAL RESULTS FOR PETROLEUM HYDROCARBONS

DRAWN BY: CM	SCALE: 1:300	FIGURE No. **7**
CHECKED: AB	DATE: 04.01.18	REVISION **0**

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MW32											Sample Date: 2003/08/15
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2.6	<0.04	<0.10	<0.010	<0.1	<10	<10	<10	<10	-	-	13.7
4.3	<0.04	<0.10	<0.010	<0.1	<10	<10	<10	<10	-	-	11

MW33											Sample Date: 2003/08/15
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2.6	<0.04	<0.10	<0.010	<0.1	<10	<10	47	40	-	-	11.3
3.4	<0.04	<0.10	<0.010	<0.1	<10	<10	<10	<10	-	-	15

MW34											Sample Date: 2003/08/15
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2.6	7.4	16	5.0	27	310	52	<10	<10	-	-	15.2
2.6 Dup	2.8	11	6.5	27	420	63	<10	<10	-	-	14.6
3.4	2.3	2.2	1.1	5.1	58	<10	<10	<10	-	-	8.8

MW35											Sample Date: 2003/08/15
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
3.4	1.1	<0.10	2.4	3.7	220	26	29	<10	-	-	14.4
4.3	0.13	<0.10	<0.010	<0.1	<10	<10	20	<10	-	-	15

MW36											Sample Date: 2003/08/15
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
3.4	2.6	0.48	2.5	6.5	150	60	45	<10	-	-	14.5
3.4 Dup	2.6	1	6.4	19	320	64	22	<10	-	-	13.4
4.3	0.89	<0.10	<0.010	<0.1	<10	<10	28	13	-	-	9.8

MW37											Sample Date: 2003/08/15
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
4.2	1.7	0.19	3.9	9.5	370	55	18	<10	-	-	13.7
4.9	1.5	<0.10	0.73	6.3	59	<10	<10	<10	-	-	7.6
5.6	0.16	<0.10	<0.010	3.9	<10	<10	18	<10	-	-	9.6

MW38											Sample Date: 2003/08/15
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.3	<0.04	<0.10	<0.010	<0.1	<10	<10	20	<10	-	-	9.7
1.8	<0.04	<0.10	<0.010	<0.1	<10	<10	42	16	-	-	14.0
3.4	<0.04	<0.10	<0.010	<0.1	<10	<10	25	<10	-	-	13.9

04-1											Sample Date: 2004/08/04
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
3.8	1.4	0.094	2.5	2.3	65	<50	<50	<50	-	-	11.8
3.8 Dup	1.6	0.024	2.3	2.1	64	<50	<50	<50	-	-	12.0
4.6	0.12	<0.010	0.037	<0.1	<10	<50	<50	<50	-	-	4.5

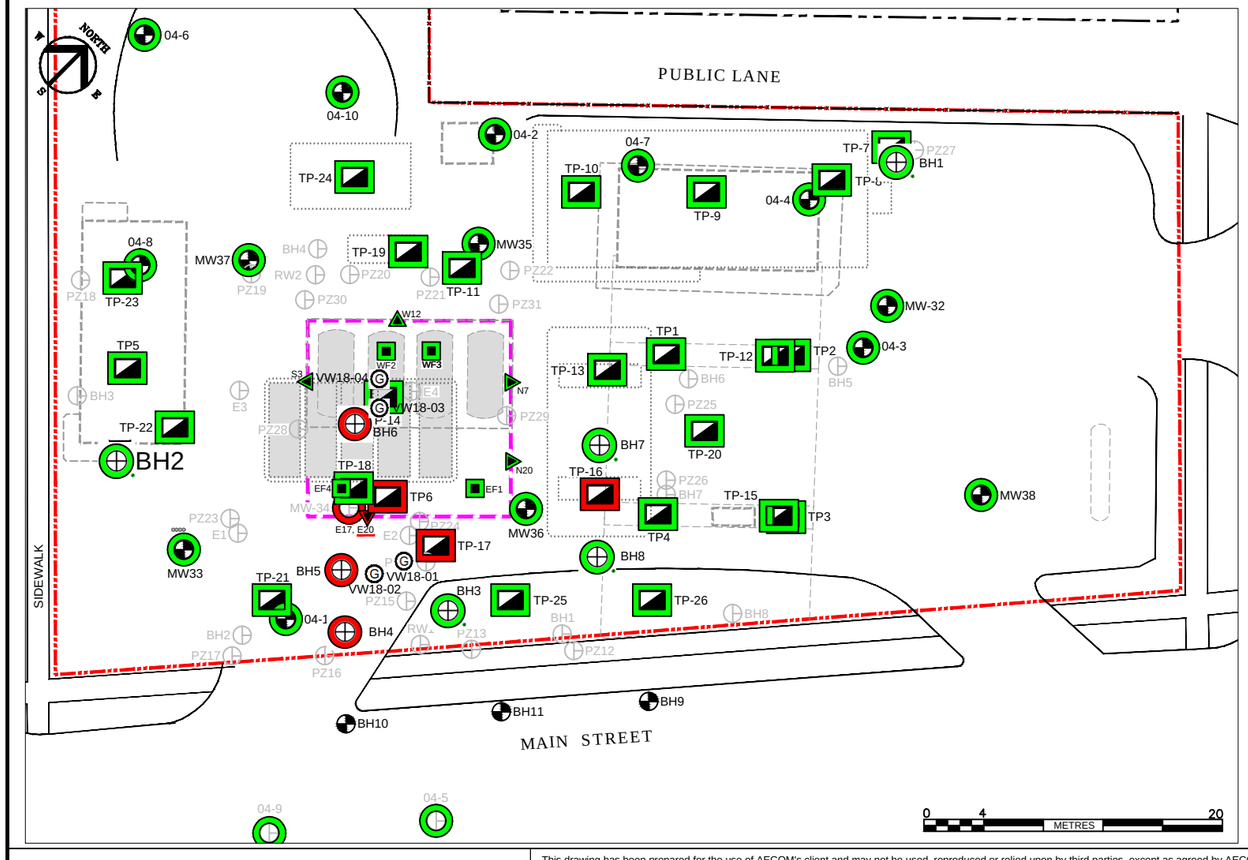
04-2											Sample Date: 2004/08/04
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.5-2.3	0.006	<0.010	0.009	<0.1	<10	<50	<50	<50	-	-	12.4

04-3											Sample Date: 2004/08/04
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
3.1-3.8	0.006	<0.010	0.008	<0.1	<10	<50	<50	<50	-	-	13.2

04-4											Sample Date: 2004/08/04
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2.3-3.1	0.005	<0.010	0.008	<0.1	<10	<50	<50	<50	-	-	12.1

04-5											Sample Date: 2004/08/04
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
3.1-3.8	0.008	<0.010	0.008	<0.1	<10	<50	<50	<50	-	-	10.1

04-6											Sample Date: 2004/08/04
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
6.9	0.003	<0.010	0.005	<0.1	<10	<50	<50	<50	-	-	3.5



04-7											Sample Date: 2004/08/04
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2.3-3.1	0.006	<0.010	0.007	<0.1	<10	<50	<50	<50	-	-	12.2

04-8											Sample Date: 2004/08/04
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
4.6	1.3	0.094	0.34	1.1	77	<50	<50	<50	-	-	12.9
5.3	0.25	<0.010	0.13	<0.1	<10	<50	<50	<50	-	-	7.7

04-9											Sample Date: 2004/08/04
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.5	0.004	<0.010	0.007	<0.1	<10	<50	<50	<50	-	-	9.8

04-10											Sample Date: 2004/08/04
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
0.8	0.004	<0.010	0.006	<0.1	<10	<50	<50	<50	-	-	18.3

E17											Sample Date: 2004/07/13
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
0.5	0.002	0.018	0.004	<0.1	<10	<50	<50	<50	-	-	2.0

E20											Sample Date: 2004/07/13
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
3.0	0.32	3.1	27	160	2400	970	130	<50	-	-	2.3

EF1											Sample Date: 2004/07/13
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
3.2	0.037	0.055	0.52	1.8	41	<50	<50	<50	-	-	11.0

EF4											Sample Date: 2004/07/13
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
3.2	0.077	0.12	0.4	2.1	33	<50	<50	<50	-	-	15.4

N7											Sample Date: 2004/07/13
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2.0	1.1	0.32	5.0	11	120	100	<50	<50	-	-	13.0

N20											Sample Date: 2004/07/13
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
3.0	0.31	1.1	2.8	13	93	<50	<50	<50	-	-	15.9

S3											Sample Date: 2004/07/13
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2.0	1.4	0.72	8.2	21	290	110	<50	<50	-	-	14.1

W12											Sample Date: 2004/07/13
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
3.0	0.1	0.037	1.4	1.5	51	<50	<50	<50	-	-	15.1

WF2											Sample Date: 2004/07/13
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
3.2	1.6	3.3	6.2	18	380	170	<50	<50	-	-	14.5

WF3											Sample Date: 2004/07/13
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
3.2	0.4	0.28	4.3	23	160	<50	<50	<50	-	-	14.4

TP1											Sample Date: 2004/07/16
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
3.1	0.005	0.039	0.024	<0.1	<10	<50	<50	<50	-	-	-

TP2											Sample Date: 2004/07/16
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2.4	0.18	<0.10	5.0	18	540	190	<50	<50	-	-	-
3.7	0.50	0.026	0.57	<0.1	34	<50	<50	<50	-	-	-

TP3											Sample Date: 2004/07/16
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
3.4	0.005	0.030	0.008	<0.1	<10	190	<50	<50	-	-	-

TP4											Sample Date: 2004/07/16
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.8	0.002	0.029	<0.003	<0.1	<10	190	<50	<50	-	-	-

TP5											Sample Date: 2004/07/16
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
3.1	0.008	0.049	0.014	<0.1	<10	190	<50	<50	-	-	-

TP6											Sample Date: 2004/07/16
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2.4	1.4	12	21	150	1800	1200	<50	<50	-	-	-
3.7	8.5	18	4.9	30	190	<50	<50	<50	-	-	-

TP-7											Sample Date: 2013/08/01
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.8-2.4	<0.0050	<0.020	<0.010	<0.040	<12	<10	790	<50	<0.0020	<0.0020	14
1.8-2.4 Dup	<0.0050	<0.020	<0.010	<0.040	<12	11	860	<50	<0.0020	<0.0020	14
2.4-3.1	<0.0050	<0.020	<0.010	<0.040	<12	<10	550	<50	<0.0020	<0.0020	13
4.3-4.9	<0.0050	<0.020	<0.010	<0.040	<12	<10	<50	<50	<0.0020	<0.0020	5.0

TP-8											Sample Date: 2013/08/01
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.8-2.4	<0.0050	<0.020	<0.010	<0.040	<12	<10	790	<50	<0.0020	<0.0020	13
4.3-4.9	<0.0050	0.026	<0.010	<0.040	<12	11	860	<50	<0.0020	<0.0020	6.2

TP-9											Sample Date: 2013/08/01
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.8-2.4	<0.0050	<0.020	<0.010	<0.040	<12	<10	790	<50	<0.0020	<0.0020	14

TP-10											Sample Date: 2013/08/01
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.8-2.4	<0.0050	<0.020	<0.010	<0.040	<12	<10	790	<50	<0.0020	<0.0020	13

TP-11											Sample Date: 2013/08/01
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.8-2.4	<0.0050	<0.020	0.094	<0.040	45	49	<50	<50	<0.0020	<0.0020	16

TP-12											Sample Date: 2013/08/01
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
3.1-3.7	<0.0050	<0.020	<0.010	<0.040	<12	<10	<50	<50	<0.0020	<0.0020	16

TP-13											Sample Date: 2013/08/01
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.8-2.4	0.0084	<0.020	0.68	0.14	52	60	<50	<50	<0.0020	<0.0020	14
3.1-3.7	0.11	<0.020	2.3	<0.040	150	93	<50	<50	<0.0020	<0.0020	13
3.1-3.7 Dup	<0.033	<0.020	1.5	0.43	140	110	<50	<50	<0.0020	<0.0020	13
4.3-4.9	0.9	<0.020	2.7	0.96	73	45	<50	<50	<0.0020	<0.0020	14

TP-14											Sample Date: 2013/08/02
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
0.6-1.2	<0.0050	<0.020	<0.010	<0.040	<12	<10	<50	<50	<0.0020	<0.0020	2.7

TP-15											Sample Date: 2013/08/02
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2.4-3.1	<0.0050	<0.020	<0.010	<0.040	<12	<10	57	<50	<0.0020	<0.0020	13

TP-16											Sample Date: 2013/08/02
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
0.9-1.5	0.29	4.8	9.9	130	1800	690	53	<50	<0.0020	<0.0020	7.4
0.9-1.5 Dup	0.35	3.4	11	150	2300	1100	55	<50	<0.0020	<0.0020	7.6
1.8-2.4	1.2	0.05	3.9	1.8	170	60	84	<50	<0.0020	0.0393	16
4.3-4.9	2.6	0.14	5.9	27	300	130	<50	<50	<0.0020	0.0764	14

TP-17											Sample Date: 2013/08/02
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.2-1.8	<0.090	0.077	1.4	8.6	450	330	67	<50	<0.027	<0.0020	14
1.8-2.4	12.00	19	7.8	47	460	81	<50	<50	0.0138	<0.0020	15
3.7-4.3	9.7	0.9	4.2	17	180	38	53	<50	<0.0020	<0.0020	15

TP-18											Sample Date: 2013/08/02
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
0.6-1.2	<0.0050	<0.020	<0.010	<0.040	<12	<10	<50	<50	<0.0020	<0.0020	2.4

TP-19											Sample Date: 2013/08/02
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.8-2.4	<0.0050	<0.020	<0.010	<0.040	<12	<10	<50	<50	<0.0020	<0.0020	15
2.4-3.1	<0.090	<0.020	1.4	<0.040	230	26	<50	<50	<0.0020	<0.0020	15
4.3-4.9	0.78	0.078	2.4	3.4	200	38	<50	<50	<0.0020	<0.0020	9

TP-20											Sample Date: 2013/08/06
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2.4-3.1	<0.0050	<0.020	<0.010	<0.040	<12	<10	52	<50	<0.0020	<0.0020	14

TP-21											Sample Date: 2013/08/06
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.5-1.8	<0.0050	<0.020	<0.010	<0.040	<12	<10	66	<50	<0.0020	<0.0020	13
2.4-3.1	1.3	0.026	7.0	3.6	520	120	60	<50	<0.011	<0.0020	11
4.3-4.9	0.69	0.026	0.3	0.06	<12	<10	<50	<50	<0.0020	<0.0020	5.5

TP-22											Sample Date: 2013/08/06
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.2-1.8	<0.0050	0.04	<0.010	<0.040	<12	<10	<50	<50	<0.0020	<0.0020	9.8

TP-23											Sample Date: 2013/08/06
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
2.4-3.1	<0.0050	<0.020	<0.010	<0.040	180	29	<50	<50	<0.0020	<0.0020	13
2.4-3.1 Dup	<0.0050	<0.020	<0.010	<0.040	200	21	<50	<50	<0.0020	<0.0020	13
4.3-4.9	<0.0050	<0.020	0.098	<0.040	490	81	58	<50	<0.013	<0.0020	12

TP-24											Sample Date: 2013/08/06
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.8-2.4	<0.0050	<0.020	<0.010	<0.040	<12	<10	<50	<50	<0.0020	<0.0020	13
3.7-4.3	<0.0050	<0.020	<0.010	<0.040	29	<10	<50	<50	<0.0020	<0.0020	21

TP-25											Sample Date: 2013/08/06
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.8-2.4	0.13	<0.020	0.07	0.068	<12	<10	65	<50	<0.0020	<0.0020	13
2.4-3.1	1.8	<0.020	5.6	4.3	420	45	55	<50	<0.0020	<0.0020	14
4.3-4.9	0.55	0.54	2.5	12	160	63	<50	<50	<0.0020	<0.0020	4.6

TP-26											Sample Date: 2013/08/06
Sample Depth (mbgs)	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
1.8-2.4	<0.0050	0.040	<0.010	<0.040	<12	<10	66	<50	<0.0020	<0.0020	14
2.4-3.1	<0.013	<0.020	2.4	6.7	670	260	<50	<50	<0.031	<0.0020	14
2.4-3.1 Dup	0.12	<0.020	1.7	5.1	550	130	<50	<50	<0.025	<0.0020	13
4.3-4.9	<0.0050	<0.020	<0.010	<0.040	<12	<10	<50	<50	<0.0020	<0.0020	4.8

LEGEND

- CURRENT PROPERTY LINE
- ADJACENT LOT LINE
- FENCE OF PROPERTY LINE
- FORMER FEATURES (1967-1995)
- FORMER FEATURES (1995-2004)
- TANK NEST EXCAVATION (2004)
- TESTPIT
- SOIL VAPOUR WELL (2018)
- MONITORING WELL
- MONITORING WELL (DESTROYED)
- CONFIRMATORY BASE SAMPLE
- CONFIRMATORY WALL SAMPLE
- SAMPLE ID'S UNDERLINED FOR CLARITY
- SAMPLES LESS THAN OR EQUAL TO APPLICABLE GUIDELINE FOR ALL PARAMETERS ANALYSED
- SAMPLES GREATER THAN APPLICABLE GUIDELINE FOR AT LEAST ONE PARAMETER ANALYSED

ABBREVIATIONS: B - Benzene; T - Toluene; E - Ethylbenzene; X - Xylenes; F1 - PHC fraction F1; F2 - PHC fraction F2; F3 - PHC fraction F3; F4 - PHC fraction F4; 1,2-DBA - 1,2-Dibromoethane; 1,2-DCA - 1,2-Dichloroethane; Pb - Lead; mbgs - metres below ground surface; NG - No Guideline.

BTEX, 1,2-DCA, Pb: Canadian Council of Ministers of the Environment (CCME) Soil Quality Guidelines (2014) - Commercial Land Use, Fine Grained Soils.

F1-F4: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil (2008) - Commercial Land Use, Fine Grained Soils.

1,2-DBA: Ontario Ministry of the Environment and Climate Change (MOECC) Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (2011) - Table 3: Full Depth Generic Site Condition Standards Non-Potable Ground Water Condition - Commercial Land Use.

-: Denotes analysis not conducted.

<: Denotes concentration less than reportable detection limit.

mg/kg: Unit for all soil quality guideline criteria and analytical results is milligrams per kilogram.

XX: Bold and underlined analytical results indicate Reportable Detection Limit (RDL) exceeds applicable guidelines.

XX: Red and bold test results exceeded applicable guidelines.

Soil Quality Guidelines	B	T	E	X	F1	F2	F3	F4	1,2-DBA	1,2-DCA	Pb
Surface Soil (≤ 1.5 mbgs)	2.8	330	430	230	320	260	2500	6600	0.05	50	260
Subsurface Soil (> 1.5 mbgs)	2.9	660	860	460	800	1000	5000	10000	0.05	50	260

REFERENCE DRAWINGS

NO.	DATE	DESCRIPTION

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK

AECOM

CLIENT NAME: IMPERIAL OIL LIMITED

PROJECT LOCATION: 287 MAIN STREET SELKIRK, MB

SOIL VAPOUR WELL INSTALLATION LOCATIONS

DRAWN BY: CM | SCALE: 1:500 | FIGURE No. 8

CHECKED: BR | DATE: 24.11.2017 | REVISION 0

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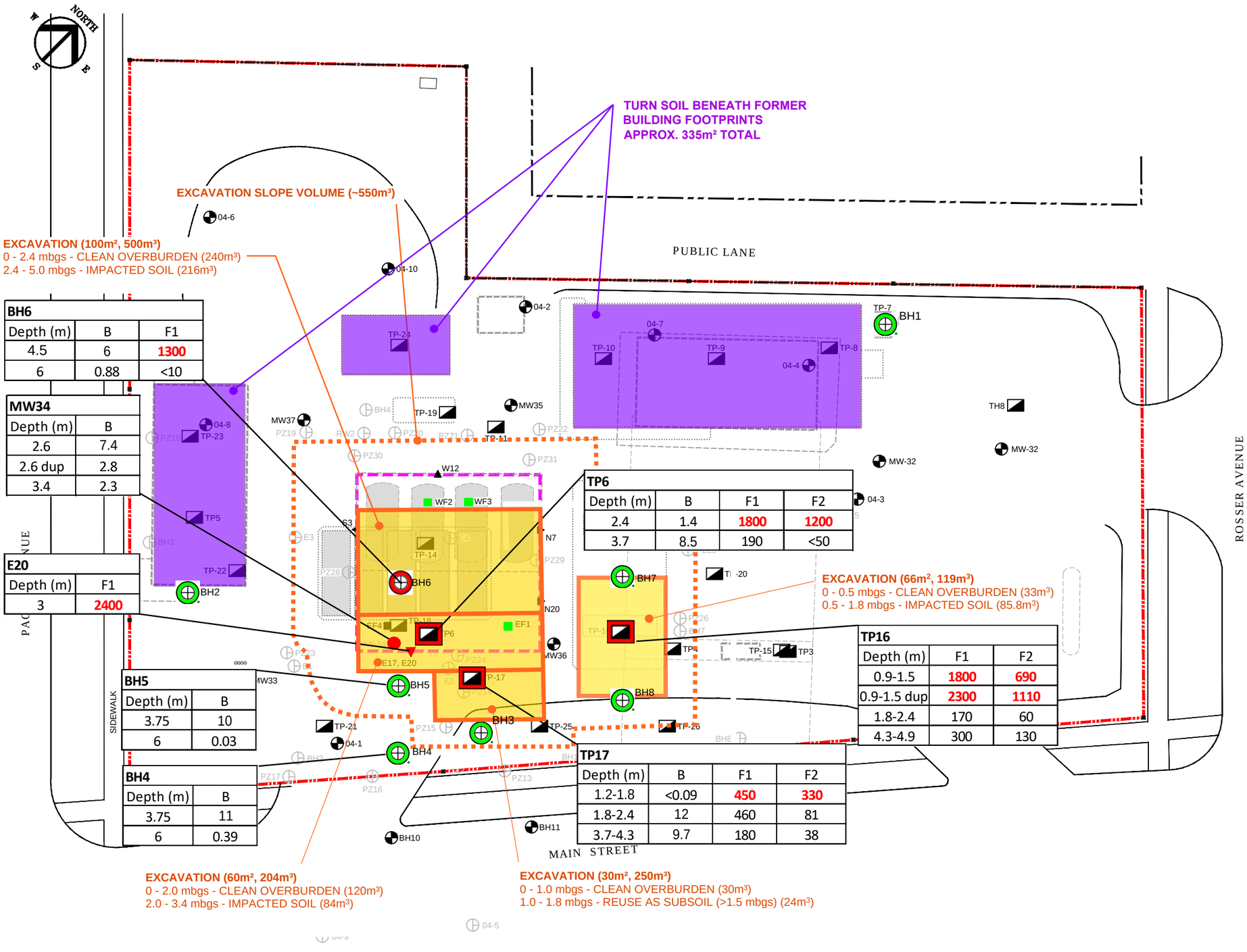

LEGEND

- CURRENT PROPERTY LINE
- PROPERTY BOUNDARY PIN
- ADJACENT LOT LINE
- FENCE OF PROPERTY LINE
- FORMER FEATURES (1967-1995)
- FORMER FEATURES (1995-2004)
- TANK NEST EXCAVATION (2004)
- MONITORING WELL
- MONITORING WELL (DESTROYED)
- TEST PIT
- CONFIRMATORY WALL SAMPLE
- CONFIRMATORY FLOOR SAMPLE
- AREA TO BE EXCAVATED FOR OFF-SITE DISPOSAL
- TOP OF EXCAVATION SLOPE (1:1)
- SOIL TURNOVER AREA
- SAMPLES GREATER THAN APPLICABLE GUIDELINE FOR AT LEAST ONE PARAMETER ANALYSED
- SAMPLES LESS THAN OR EQUAL TO APPLICABLE GUIDELINE FOR ALL PARAMETERS ANALYSED

NOTES:

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED ON SITE. NOT ALL UTILITIES MAY BE SHOWN.

REFERENCE DRAWINGS

NO.	DATE	DESCRIPTION

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
0	JUL. 2020			

AECOM

CLIENT NAME: IMPERIAL OIL LIMITED

PROJECT LOCATION: 287 MAIN STREET SELKIRK, MB

PROPOSED EXCAVATION LIMITS

DRAWN BY: CM | SCALE: 1:300 | FIGURE No. 9

CHECKED: AJ | DATE: 07.20.20 | REVISION 0

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Tables

AECOM

Table 1-1: Historical Soil Analytical Results for Petroleum Hydrocarbons, Lead Scavengers and Lead

Parameter	Guideline Values: Surface Soil (≤1.5 mbgs)	Guideline Values: Subsurface Soil (>1.5 mbgs)	MW32		MW33		MW34			MW35		MW36			MW37		
Sample Date			2003-08-15	2003-08-15	2003-08-15	2003-08-15	2003-08-15	2003-08-15	2003-08-15	2003-08-15	2003-08-15	2003-08-15	2003-08-15	2003-08-15	2003-08-15	2003-08-15	2003-08-15
Sample ID			MW32-4	MW32-6	MW33-4	MW33-5	MW34-4	MW34-14	MW34-6	MW35-5	MW35-6	MW36-5	MW36-15	MW36-6	MW37-6	MW37-7	MW37-8
Sample Depth (mbgs)			2.6	4.3	2.6	3.4	2.6	2.6 Dup	3.4	3.4	4.3	3.4	3.4 Dup	4.3	4.2	4.9	5.6
Benzene	2.8 [a,d,e]	2.9 [a,d]	<0.04	<0.04	<0.04	<0.04	**7.4**	2.8	2.3	1.1	0.13	2.6	2.6	0.89	1.7	1.5	0.16
Toluene	330 [a,f]	660 [a,f]	<0.10	<0.10	<0.10	<0.10	16	11	2.2	<0.10	<0.10	0.48	1	<0.10	0.19	<0.10	<0.10
Ethylbenzene	430 [a,f]	860 [a,f]	<0.010	<0.010	<0.010	<0.010	5.0	6.5	1.1	2.4	<0.010	2.5	6.4	<0.010	3.9	0.73	<0.010
Xylenes	230 [a,f]	460 [a,f]	<0.1	<0.1	<0.1	<0.1	27	27	5.1	3.7	<0.1	6.5	19	<0.1	9.5	6.3	3.9
PHC fraction F1-BTEX (C6 - C10)	320 [b,g]	800 [b,h]	<10	<10	<10	<10	310	420	58	220	<10	150	320	<10	370	59	<10
PHC fraction F2 (C10 - C16)	260 [b,g]	1,000 [b,h]	<10	<10	<10	<10	52	63	<10	26	<10	60	64	<10	55	<10	<10
PHC fraction F3 (C16 - C34)	2,500 [b,g]	5,000 [b,h]	<10	<10	47	<10	<10	<10	<10	29	20	45	22	28	18	<10	18
PHC fraction F4 (C34 - C50)	6,600 [b,g]	10,000 [b,h]	<10	<10	40	<10	<10	<10	<10	<10	<10	<10	<10	13	<10	<10	<10
1,2-Dibromoethane	0.05 [c]	0.05 [c]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	50 [a]	50 [a]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	260 [a]	260 [a]	13.7	11	11.3	15	15.2	14.6	8.8	14.4	15	14.5	13.4	9.8	13.7	7.6	9.6

Table Notes:

[a] Canadian Council of Ministers of the Environment (CCME) Soil Quality Guidelines (2014) - Commercial Land Use, Fine Grained Soils, Human Health Guideline Check Values 10^{-5} incremental risk

[b] CCME, Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil (2008) - Commercial Land Use, Fine Grained Soils

[c] Ontario MOECC Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (2011) - Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition

[d] Inhalation of indoor air (basement)

[e] Inhalation of Indoor Air (slab on grade)

[f] Soil Contact - Environmental Health

[g] Eco Soil Contact

[h] Management Limit

< Denotes concentration less than reportable detection limit

- Denotes analysis not conducted

mg/kg milligram/kilogram

mbgs metres below ground surface

PHC petroleum hydrocarbon

NG Denotes no applicable guideline value

Units: all units milligrams per kilogram (mg/kg) unless otherwise specified

XX Reportable Detection Limit (RDL) exceeds the applied guideline/standard value

XX Exceeds applied guideline/standard value

All data was obtained by other consultants and drawn from the following reports:

Aqua Terre Solutions Inc. 2003. Phase II Environmental Assessment, Red River Esso Service Station, Site #860265, 287 Main Street, Selkirk, Manitoba. October 15, 2003.

AMEC Earth & Environmental . 2004. Environmental Assessment Program, Former IOL Automotive Retail Station, 287 Main Street, Selkirk, Manitoba, 860265/88001943. October 22, 2004.

Parsons. 2013. Phase II Environmental Site Assessment, Former Esso Service Station, Car Wash and Retail Fuel Facility, 287 Main Street, Selkirk, Manitoba, 8001943. December 13, 2013.

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Table 1-1: Historical Soil Analytical Results for Petroleum Hydrocarbons, Lead Scavengers and Lead

Parameter	Guideline Values: Surface Soil (≤1.5 mbgs)	Guideline Values: Subsurface Soil (>1.5 mbgs)	MW38	MW38	MW38	04-1	04-1	04-1	04-2	04-3	04-4	04-5	04-6	04-7	04-8	04-8	04-9	04-10
Sample Date			2003-08-15	2003-08-15	2003-08-15	2004-08-04	2004-08-04	2004-08-04	2004-08-04	2004-08-04	2004-08-04	2004-08-04	2004-08-04	2004-08-04	2004-08-04	2004-08-04	2004-08-04	2004-08-04
Sample ID			MW38-2	MW38-3	MW38-5	04-1 @ 12.5'	DUP 3	04-1 @ 15'	04-2 @ 5'-7.5'	04-3 @10'-12.5	04-4 @ 7.5'-10	04-5 @ 10'-12.5	04-6 @ 22.5'	04-7 @ 7.5'-10'	04-8 @ 2.5'	04-8 @ 15'	04-9 @ 5'	04-10 @ 2.5'
Sample Depth (mbgs)			1.3	1.8	3.4	3.8	3.8 Dup	4.6	1.5-2.3	3.1-3.8	2.3-3.1	3.1-3.8	6.9	2.3-3.1	4.6	5.3	1.5	0.8
Benzene	2.8 [a,d,e]	2.9 [a,d]	<0.04	<0.04	<0.04	1.4	1.6	0.12	0.0060	0.0060	0.0050	0.0080	0.0030	0.0060	1.3	0.25	0.0040	0.0040
Toluene	330 [a,f]	660 [a,f]	<0.10	<0.10	<0.10	0.094	0.024	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.094	<0.010	<0.010	<0.010
Ethylbenzene	430 [a,f]	860 [a,f]	<0.010	<0.010	<0.010	2.5	2.3	0.037	0.0090	0.0080	0.0080	0.0080	0.0050	0.0070	0.34	0.13	0.0070	0.0060
Xylenes	230 [a,f]	460 [a,f]	<0.1	<0.1	<0.1	2.3	2.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.1	<0.1	<0.1	<0.1
PHC fraction F1-BTEX (C6 - C10)	320 [b,g]	800 [b,h]	<10	<10	<10	65	64	<10	<10	<10	<10	<10	<10	<10	77	<10	<10	<10
PHC fraction F2 (C10 - C16)	260 [b,g]	1,000 [b,h]	<10	<10	<10	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
PHC fraction F3 (C16 - C34)	2,500 [b,g]	5,000 [b,h]	20	42	25	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
PHC fraction F4 (C34 - C50)	6,600 [b,g]	10,000 [b,h]	<10	16	<10	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
1,2-Dibromoethane	0.05 [c]	0.05 [c]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	50 [a]	50 [a]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	260 [a]	260 [a]	9.7	14.0	13.9	11.8	12.0	4.5	12.4	13.2	12.1	10.1	3.5	12.2	12.9	7.7	9.8	18.3

Table Notes:

[a] Canadian Council of Ministers of the Environment (CCME) Soil Quality Guidelines (2014) - Commercial Land Use, Fine Grained Soils, Human Health Guideline Check Values 10^{-5} incremental risk

[b] CCME, Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil (2008) - Commercial Land Use, Fine Grained Soils

[c] Ontario MOECC Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (2011) - Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition

[d] Inhalation of indoor air (basement)

[e] Inhalation of Indoor Air (slab on grade)

[f] Soil Contact - Environmental Health

[g] Eco Soil Contact

[h] Management Limit

< Denotes concentration less than reportable detection limit

- Denotes analysis not conducted

mg/kg milligram/kilogram

mbgs metres below ground surface

PHC petroleum hydrocarbon

NG Denotes no applicable guideline value

Units: all units milligrams per kilogram (mg/kg) unless otherwise specified

XX Reportable Detection Limit (RDL) exceeds the applied guideline/standard value

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Table 1-1: Historical Soil Analytical Results for Petroleum Hydrocarbons, Lead Scavengers and Lead

Parameter	Guideline Values: Surface Soil (≤1.5 mbgs)	Guideline Values: Subsurface Soil (>1.5 mbgs)	E17	E20	EF1	EF4	N7	N20	S3	W12	WF2	WF3	TP1	TP2	TP2	TP3	TP4	TP5	TP6	TP6
Sample Date			2004-07-13	2004-07-13	2004-07-13	2004-07-13	2004-07-13	2004-07-13	2004-07-13	2004-07-13	2004-07-13	2004-07-13	2004-07-16	2004-07-16	2004-07-16	2004-07-16	2004-07-16	2004-07-16	2004-07-16	2004-07-16
Sample ID			E17	E20	EF1	EF4	N7	N20	S3	W12	WF2	WF3	TP1@10'	TP2@8'	TP2@12'	TP3@11'	TP4@6'	TP5@10'	TP6@8'	TP6@12'
Sample Depth (mbgs)			0.5	3.0	3.2	3.2	2.0	3.0	2.0	3.0	3.2	3.2	3.1	2.4	3.7	3.4	1.8	3.1	2.4	3.7
Benzene	2.8 [a,d,e]	2.9 [a,d]	0.0020	0.32	0.037	0.077	1.1	0.31	1.4	0.1	1.6	0.4	0.0050	0.18	0.50	0.0050	0.0020	0.0080	1.4	**8.5**
Toluene	330 [a,f]	660 [a,f]	0.018	3.1	0.055	0.12	0.32	1.1	0.72	0.037	3.3	0.28	0.039	<0.10	0.026	0.030	0.029	0.049	12	18
Ethylbenzene	430 [a,f]	860 [a,f]	0.0040	27	0.52	0.4	5.0	2.8	8.2	1.4	6.2	4.3	0.024	5.0	0.57	0.008	<0.003	0.014	21	4.9
Xylenes	230 [a,f]	460 [a,f]	<0.1	160	1.8	2.1	11	13	21	1.5	18	23	<0.1	18	<0.1	<0.1	<0.1	<0.1	150	30
PHC fraction F1-BTEX (C6 - C10)	320 [b,g]	800 [b,h]	<10	**2400**	41	33	120	93	290	51	380	160	<10	540	34	<10	<10	<10	**1800**	190
PHC fraction F2 (C10 - C16)	260 [b,g]	1,000 [b,h]	<50	970	<50	<50	100	<50	110	<50	170	<50	<50	190	<50	190	190	190	**1200**	<50
PHC fraction F3 (C16 - C34)	2,500 [b,g]	5,000 [b,h]	<50	130	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
PHC fraction F4 (C34 - C50)	6,600 [b,g]	10,000 [b,h]	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
1,2-Dibromoethane	0.05 [c]	0.05 [c]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	50 [a]	50 [a]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	260 [a]	260 [a]	2.0	2.3	11.0	15.4	13.0	15.9	14.1	15.1	14.5	14.4	-	-	-	-	-	-	-	-

Table Notes:

[a] Canadian Council of Ministers of the Environment (CCME) Soil Quality Guidelines (2014) - Commercial Land Use, Fine Grained Soils, Human Health Guideline Check Values 10^{-5} incremental risk

[b] CCME, Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil (2008) - Commercial Land Use, Fine Grained Soils

[c] Ontario MOECC Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (2011) - Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition

[d] Inhalation of indoor air (basement)

[e] Inhalation of Indoor Air (slab on grade)

[f] Soil Contact - Environmental Health

[g] Eco Soil Contact

[h] Management Limit

< Denotes concentration less than reportable detection limit

- Denotes analysis not conducted

mg/kg milligram/kilogram

mbgs metres below ground surface

PHC petroleum hydrocarbon

NG Denotes no applicable guideline value

Units: all units milligrams per kilogram (mg/kg) unless otherwise specified

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AMEC Earth & Environmental . 2004. Environmental Assessment Program, Former IOL Automotive Retail Station, 287 Main Street, Selkirk, Manitoba, 860265/88001943. October 22, 2004.

Parsons. 2013. Phase II Environmental Site Assessment, Former Esso Service Station, Car Wash and Retail Fuel Facility, 287 Main Street, Selkirk, Manitoba, 8001943. December 13, 2013.

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Table 1-1: Historical Soil Analytical Results for Petroleum Hydrocarbons, Lead Scavengers and Lead

Parameter	Guideline Values: Surface Soil (≤1.5 mbgs)	Guideline Values: Subsurface Soil (>1.5 mbgs)	TP-7				TP-8		TP-9	TP-10	TP-11	TP-12	TP-13				TP-14	TP-15
Sample Date			2013-08-01	2013-08-01	2013-08-01	2013-08-01	2013-08-01	2013-08-01	2013-08-01	2013-08-01	2013-08-01	2013-08-01	2013-08-01	2013-08-01	2013-08-01	2013-08-01	2013-08-02	2013-08-02
Sample ID			TP-7-1.8-2.4	DUP-7	TP-7-2.4-3.1	TP-7-4.3-4.9	TP-8-1.8-2.4	TP-8-4.3-4.9	TP-9-1.8-2.4	TP-10-1.8-2.4	TP-11-1.8-2.4	TP-12-3.1-3.7	TP-13-1.8-2.4	TP-13-3.1-3.7	DUP-13A	TP-13-4.3-4.9	TP-14-0.6-1.2	TP-15-2.4-3.1
Sample Depth (mbgs)			1.8-2.4	1.8-2.4 Dup	2.4-3.1	4.3-4.9	1.8-2.4	4.3-4.9	1.8-2.4	1.8-2.4	1.8-2.4	3.1-3.7	1.8-2.4	3.1-3.7	3.1-3.7 Dup	4.3-4.9	0.6-1.2	2.4-3.1
Benzene	2.8 [a,d,e]	2.9 [a,d]	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0084	0.11	<0.033	0.90	<0.0050	<0.0050
Toluene	330 [a,f]	660 [a,f]	<0.020	<0.020	<0.020	<0.020	<0.020	0.026	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Ethylbenzene	430 [a,f]	860 [a,f]	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.094	<0.010	0.68	2.3	1.5	2.7	<0.010	<0.010
Xylenes	230 [a,f]	460 [a,f]	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	0.14	<0.040	0.43	0.96	<0.040	<0.040
PHC fraction F1-BTEX (C6 - C10)	320 [b,g]	800 [b,h]	<12	<12	<12	<12	<12	<12	<12	<12	45	<12	52	150	140	73	<12	<12
PHC fraction F2 (C10 - C16)	260 [b,g]	1,000 [b,h]	<10	11	<10	<10	<10	11	<10	<10	49	<10	60	93	110	45	<10	<10
PHC fraction F3 (C16 - C34)	2,500 [b,g]	5,000 [b,h]	790	860	550	<50	790	860	790	790	<50	<50	<50	<50	<50	<50	<50	57
PHC fraction F4 (C34 - C50)	6,600 [b,g]	10,000 [b,h]	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
1,2-Dibromoethane	0.05 [c]	0.05 [c]	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
1,2-Dichloroethane	50 [a]	50 [a]	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Lead	260 [a]	260 [a]	14	14	13	5.0	13	6.2	14	13	16	16	14	13	13	14	2.7	13

Table Notes:

[a] Canadian Council of Ministers of the Environment (CCME) Soil Quality Guidelines (2014) - Commercial Land Use, Fine Grained Soils, Human Health Guideline Check Values 10^{-5} incremental risk

[b] CCME, Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil (2008) - Commercial Land Use, Fine Grained Soils

[c] Ontario MOECC Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (2011) - Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition

[d] Inhalation of indoor air (basement)

[e] Inhalation of Indoor Air (slab on grade)

[f] Soil Contact - Environmental Health

[g] Eco Soil Contact

[h] Management Limit

< Denotes concentration less than reportable detection limit

- Denotes analysis not conducted

mg/kg milligram/kilogram

mbgs metres below ground surface

PHC petroleum hydrocarbon

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Units: all units milligrams per kilogram (mg/kg) unless otherwise specified

XX Reportable Detection Limit (RDL) exceeds the applied guideline/standard value

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All data was obtained by other consultants and drawn from the following reports:

Aqua Terre Solutions Inc. 2003. Phase II Environmental Assessment, Red River Esso Service Station, Site #860265, 287 Main Street, Selkirk, Manitoba. October 15, 2003.

AMEC Earth & Environmental . 2004. Environmental Assessment Program, Former IOL Automotive Retail Station, 287 Main Street, Selkirk, Manitoba, 860265/88001943. October 22, 2004.

Parsons. 2013. Phase II Environmental Site Assessment, Former Esso Service Station, Car Wash and Retail Fuel Facility, 287 Main Street, Selkirk, Manitoba, 8001943. December 13, 2013.

AECOM

Table 1-1: Historical Soil Analytical Results for Petroleum Hydrocarbons, Lead Scavengers and Lead

Parameter	Guideline Values: Surface Soil (≤1.5 mbgs)	Guideline Values: Subsurface Soil (>1.5 mbgs)	TP-16	TP-16	TP-16	TP-16	TP-17	TP-17	TP-17	TP-18	TP-19	TP-19	TP-19	TP-20	TP-21	TP-21	TP-21	TP-22
Sample Date			2013-08-02	2013-08-02	2013-08-02	2013-08-02	2013-08-02	2013-08-02	2013-08-02	2013-08-02	2013-08-02	2013-08-02	2013-08-02	2013-08-06	2013-08-06	2013-08-06	2013-08-06	2013-08-06
Sample ID			TP-16-09-1.5	DUP-16	TP-16-1.8-2.4	TP-16-4.3-4.9	TP-17-1.2-1.8	TP-17-1.8-2.4	TP-17-3.7-4.3	TP-18-0.6-1.2	TP-19-1.8-2.4	TP-19-2.4-3.1	TP-19-4.3-4.9	TP-20-2.4-3.1	TP-21-1.5-1.8	TP-21-2.4-3.1	TP-21-4.3-4.9	TP-22-1.2-1.8
Sample Depth (mbgs)			0.9-1.5	0.9-1.5 Dup	1.8-2.4	4.3-4.9	1.2-1.8	1.8-2.4	3.7-4.3	0.6-1.2	1.8-2.4	2.4-3.1	4.3-4.9	2.4-3.1	1.5-1.8	2.4-3.1	4.3-4.9	1.2-1.8
Benzene	2.8 [a,d,e]	2.9 [a,d]	0.29	0.35	1.2	2.6	<0.090	**12**	**9.7**	<0.0050	<0.0050	<0.090	0.78	<0.0050	<0.0050	1.3	0.69	<0.0050
Toluene	330 [a,f]	660 [a,f]	4.8	3.4	0.050	0.14	0.077	19	0.900	<0.020	<0.020	<0.020	0.078	<0.020	<0.020	0.026	0.026	0.040
Ethylbenzene	430 [a,f]	860 [a,f]	9.9	11	3.9	5.9	1.4	7.8	4.2	<0.010	<0.010	1.4	2.4	<0.010	<0.010	7.0	0.300	<0.010
Xylenes	230 [a,f]	460 [a,f]	130	150	1.8	27	8.6	47	17	<0.040	<0.040	<0.040	3.4	<0.040	<0.040	3.6	0.06	<0.040
PHC fraction F1-BTEX (C6 - C10)	320 [b,g]	800 [b,h]	**1800**	**2300**	170	300	**450**	460	180	<12	<12	230	200	<12	<12	520	<12	<12
PHC fraction F2 (C10 - C16)	260 [b,g]	1,000 [b,h]	**690**	**1100**	60	130	**330**	81	38	<10	<10	26	38	<10	<10	120	<10	<10
PHC fraction F3 (C16 - C34)	2,500 [b,g]	5,000 [b,h]	53	55	84	<50	67	<50	53	<50	<50	<50	<50	52	66	60	<50	<50
PHC fraction F4 (C34 - C50)	6,600 [b,g]	10,000 [b,h]	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
1,2-Dibromoethane	0.05 [c]	0.05 [c]	<0.0020	<0.0020	<0.0020	<0.0020	<0.027	0.0138	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.011	<0.0020	<0.0020
1,2-Dichloroethane	50 [a]	50 [a]	<0.0020	<0.0020	0.0393	0.0764	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Lead	260 [a]	260 [a]	7.4	7.6	16	14	14	15	15	2.4	15	15	9	14	13	11	5.5	9.8

Table Notes:

[a] Canadian Council of Ministers of the Environment (CCME) Soil Quality Guidelines (2014) - Commercial Land Use, Fine Grained Soils, Human Health Guideline Check Values 10^{-5} incremental risk

[b] CCME, Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil (2008) - Commercial Land Use, Fine Grained Soils

[c] Ontario MOECC Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (2011) - Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition

[d] Inhalation of indoor air (basement)

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Table 1-1: Historical Soil Analytical Results for Petroleum Hydrocarbons, Lead Scavengers and Lead

Parameter	Guideline Values: Surface Soil (≤1.5 mbgs)	Guideline Values: Subsurface Soil (>1.5 mbgs)	TP-23			TP-24		TP-25			TP-26			
Sample Date			2013-08-06	2013-08-06	2013-08-06	2013-08-06	2013-08-06	2013-08-06	2013-08-06	2013-08-06	2013-08-06	2013-08-06	2013-08-06	2013-08-06
Sample ID			TP-23-2.4-3.1	DUP-23	TP-23-4.3-4.9	TP-24-1.8-2.4	TP-24-3.7-4.3	TP-25-1.8-2.4	TP-25-2.4-3.1	TP-25-4.3-4.9	TP-26-1.8-2.4	TP-26-2.4-3.1	DUP-26	TP-26-4.3-4.9
Sample Depth (mbgs)			2.4-3.1	2.4-3.1 Dup	4.3-4.9	1.8-2.4	3.7-4.3	1.8-2.4	2.4-3.1	4.3-4.9	1.8-2.4	2.4-3.1	2.4-3.1 Dup	4.3-4.9
Benzene	2.8 [a,d,e]	2.9 [a,d]	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.13	1.8	0.55	<0.0050	<0.013	0.12	<0.0050
Toluene	330 [a,f]	660 [a,f]	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.54	0.040	<0.020	<0.020	<0.020
Ethylbenzene	430 [a,f]	860 [a,f]	<0.010	<0.010	0.098	<0.010	<0.010	0.07	5.6	2.5	<0.010	2.4	1.7	<0.010
Xylenes	230 [a,f]	460 [a,f]	<0.040	<0.040	<0.040	<0.040	<0.040	0.068	4.3	12	<0.040	6.7	5.1	<0.040
PHC fraction F1-BTEX (C6 - C10)	320 [b,g]	800 [b,h]	180	200	490	<12	29	<12	420	160	<12	670	550	<12
PHC fraction F2 (C10 - C16)	260 [b,g]	1,000 [b,h]	29	21	81	<10	<10	<10	45	63	<10	260	130	<10
PHC fraction F3 (C16 - C34)	2,500 [b,g]	5,000 [b,h]	<50	<50	58	<50	<50	65	55	<50	66	<50	<50	<50
PHC fraction F4 (C34 - C50)	6,600 [b,g]	10,000 [b,h]	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
1,2-Dibromoethane	0.05 [c]	0.05 [c]	<0.0020	<0.0020	<0.013	<0.0020	<0.0020	<0.0020	<0.015	<0.0020	<0.0020	<0.031	<0.025	<0.0020
1,2-Dichloroethane	50 [a]	50 [a]	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Lead	260 [a]	260 [a]	13	13	12	13	21	13	14	4.6	14	14	13	4.8

Table Notes:

[a] Canadian Council of Ministers of the Environment (CCME) Soil Quality Guidelines (2014) - Commercial Land Use, Fine Grained Soils, Human Health Guideline Check Values 10^{-5} incremental risk

[b] CCME, Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil (2008) - Commercial Land Use, Fine Grained Soils

[c] Ontario MOECC Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (2011) - Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition

[d] Inhalation of indoor air (basement)

[e] Inhalation of Indoor Air (slab on grade)

[f] Soil Contact - Environmental Health

[g] Eco Soil Contact

[h] Management Limit

< Denotes concentration less than reportable detection limit

- Denotes analysis not conducted

mg/kg milligram/kilogram

mbgs metres below ground surface

PHC petroleum hydrocarbon

NG Denotes no applicable guideline value

Units: all units milligrams per kilogram (mg/kg) unless otherwise specified

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AMEC Earth & Environmental . 2004. Environmental Assessment Program, Former IOL Automotive Retail Station, 287 Main Street, Selkirk, Manitoba, 860265/88001943. October 22, 2004.

Parsons. 2013. Phase II Environmental Site Assessment, Former Esso Service Station, Car Wash and Retail Fuel Facility, 287 Main Street, Selkirk, Manitoba, 8001943. December 13, 2013.

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Table 2-1: Historical Groundwater Analytical Results for Petroleum Hydrocarbons, Lead Scavengers and Lead

Sample Location		MW32						MW33				MW35				
Sample Date		2010/02/25	2012/12/18	2015/07/11	2015/07/11 Dup	2016-10-05	2016/10/05 Dup	2010/02/25	2012/12/18	2015/07/11	2016/10/06	2010/02/25	2012/12/18	2015/07/11	2016/10/06	2016/10/06 Dup
Sample ID		MW32	MW32	MW32	DUP-0711-A	MW32	DUP-1	MW33	MW33	MW33	MW33	MW35	MW35	MW35	MW35	DUP-2
Screen Interval (mbgs)		1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs
Parameter	**Guideline Values [a]**															
Benzene	0.43	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.0004	<0.00040	<0.00040	<0.00040	0.28	<0.00040	0.0015	0.051	0.11
Toluene	18	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.0004	<0.00040	<0.00040	<0.00040	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	2.3	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.0004	<0.00040	<0.00040	<0.00040	0.11	<0.00040	<0.00040	0.0015	0.0051
Xylenes, Total	4.2	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.0008	<0.00080	<0.00080	<0.00080	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080
PHC fraction F1 (C6 - C10)	0.75	<0.100	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	<0.10	<0.10	<0.10	0.54	<0.10	<0.10	<0.10	0.11
PHC fraction F2 (C10 - C16)	0.15	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.40	<0.10	<0.10	0.15	0.12
PHC fraction F3 (C16 - C34)	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHC fraction F4 (C34 - C50)	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dibromoethane	0.00083	-	<0.00050	<0.00050	<0.00050	<0.00020	<0.00020	-	<0.00050	<0.00050	<0.00020	-	<0.00050	<0.00050	<0.00020	<0.00020
1,2-Dichloroethane	0.012	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	<0.00050	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
Lead, Dissolved	0.025	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	<0.00020	0.00023	<0.00020	-	<0.00020	<0.00020	<0.00020	<0.00020

Table Notes:

[a] Ontario MOE Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (MOE, 2011) - Table 3: Full Depth Generic Site Condition Standards Non-Potable Ground Water Condition - Fine Textured Soils

< Denotes concentration less than reportable detection limit

- Denotes analysis not conducted

mbgs metres below ground surface

PHC petroleum hydrocarbon

NG Denotes no applicable guideline value

Units: all units milligrams per litre (mg/L) unless otherwise specified

XX Reportable Detection Limit (RDL) exceeds the applied standard

XX Exceeds applied standard

All data was obtained by other consultants and drawn from the following reports:

O'Connor Associates Environmental Inc. 2010. Field Data Report, Former ESSO Retail, 287 Main Street, Selkirk, MB, 88001943 / 860265. Prepared by O'Connor Associates Environmental Inc. on May 13, 2010.

O'Connor Associates Environmental Inc. 2013. 2012 Groundwater Monitoring and Sampling Report, 287 Main Street, Selkirk, Manitoba, Location No.: 88001943. Prepared by O'Connor Associates Environmental Inc. on February 21, 2013.

Kleinfelder Canada Inc. 2015. Groundwater Monitoring Report, Former Imperial Oil Service Station SAP No. 88001943, 287 Main Street, Selkirk, Manitoba. Prepared by Kleinfelder Canada Inc. on August 24, 2015.

Parsons Inc. 2016. 2016 Groundwater Monitoring and Sampling Data Package, Site Address: 287 Main Street, Selkirk, Manitoba, SAP Site Location No.: 88001943. Prepared by Parsons Inc. on December 19, 2016.

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Table 2-1: Historical Groundwater Analytical Results for Petroleum Hydrocarbons, Lead Scavengers and Lead

Sample Location		MW36	MW37		MW38					04-1			04-2			
Sample Date		2010/02/25	2010/02/25	2012/12/18	2010/02/25	2012/12/18	2012/12/18 Dup	2015/07/11	2016/10/05	2012/12/18	2015/07/11	2016/10/06	2010/02/25	2012/12/18	2015/07/11	2016/10/06
Sample ID		MW36	MW37	MW37	MW38	MW38	DUP-2	MW38	MW38	04-1	04-1	04-1	04-2	04-2	04-2	04-2
Screen Interval (mbgs)		1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	6.7 to 7.6 mbgs	6.7 to 7.6 mbgs	6.7 to 7.6 mbgs	3.1 to 6.1 mbgs	3.1 to 6.1 mbgs	3.1 to 6.1 mbgs	3.1 to 6.1 mbgs
Parameter	**Guideline Values [a]**															
Benzene	0.43	**5.5**	**0.51**	0.21	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.0004	<0.00040	<0.00040	<0.00040
Toluene	18	0.027	0.0045	0.0021	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.0004	<0.00040	<0.00040	<0.00040
Ethylbenzene	2.3	0.68	0.18	0.099	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.0004	<0.00040	<0.00040	<0.00040
Xylenes, Total	4.2	0.12	0.020	<0.00080	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.0008	<0.00080	<0.00080	<0.00080
PHC fraction F1 (C6 - C10)	0.75	<0.100	**0.83**	**0.91**	<0.100	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	<0.10	<0.10	<0.10
PHC fraction F2 (C10 - C16)	0.15	**0.8**	**1**	**0.45**	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PHC fraction F3 (C16 - C34)	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHC fraction F4 (C34 - C50)	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dibromoethane	0.00083	-	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00020	<0.00050	<0.00050	<0.00020	-	<0.00050	<0.00050	<0.00020
1,2-Dichloroethane	0.012	-	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	<0.00050	<0.00050
Lead, Dissolved	0.025	-	-	<0.00020	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	<0.00020	<0.00020	<0.00020

Table Notes:

[a] Ontario MOE Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (MOE, 2011) - Table 3: Full Depth Generic Site Condition Standards Non-Potable Ground Water Condition - Fine Textured Soils

< Denotes concentration less than reportable detection limit

- Denotes analysis not conducted

mbgs metres below ground surface

PHC petroleum hydrocarbon

NG Denotes no applicable guideline value

Units: all units milligrams per litre (mg/L) unless otherwise specified

XX Reportable Detection Limit (RDL) exceeds the applied standard

XX Exceeds applied standard

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Parsons Inc. 2016. 2016 Groundwater Monitoring and Sampling Data Package, Site Address: 287 Main Street, Selkirk, Manitoba, SAP Site Location No.: 88001943. Prepared by Parsons Inc. on December 19, 2016.

AECOM

Table 2-1: Historical Groundwater Analytical Results for Petroleum Hydrocarbons, Lead Scavengers and Lead

Sample Location		04-3				04-4				04-5	04-6				
Sample Date		2010/02/25	2012/12/18	2015/07/11	2016/10/06	2010/02/25	2012/12/18	2015/07/11	2016/10/06	2010/02/25	2010/02/25	2012/12/18	2012/12/18 Dup	2015/07/11	2016/10/06
Sample ID		04-3	04-3	04-3	04-3	04-4	04-4	04-4	04-4	04-5	04-6	04-6	DUP-1	04-6	04-6
Screen Interval (mbgs)		3.1 to 6.1 mbgs	3.1 to 6.1 mbgs	3.1 to 6.1 mbgs	3.1 to 6.1 mbgs	6.0 to 6.9 mbgs	6.0 to 6.9 mbgs	6.0 to 6.9 mbgs	6.0 to 6.9 mbgs	3.1 to 6.1 mbgs	6.7 to 7.6 mbgs	6.7 to 7.6 mbgs	6.7 to 7.6 mbgs	6.7 to 7.6 mbgs	6.7 to 7.6 mbgs
Parameter	**Guideline Values [a]**														
Benzene	0.43	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	18	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	2.3	<0.0004	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylenes, Total	4.2	<0.0008	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
PHC fraction F1 (C6 - C10)	0.75	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PHC fraction F2 (C10 - C16)	0.15	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PHC fraction F3 (C16 - C34)	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHC fraction F4 (C34 - C50)	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dibromoethane	0.00083	-	<0.00050	<0.00050	<0.00020	-	<0.00050	<0.00050	<0.00020	-	-	<0.00050	<0.00050	<0.00050	<0.00020
1,2-Dichloroethane	0.012	-	<0.00050	<0.00050	<0.00050	-	<0.00050	<0.00050	<0.00050	-	-	<0.00050	<0.00050	<0.00050	<0.00050
Lead, Dissolved	0.025	-	<0.00020	<0.00020	<0.00020	-	<0.00020	<0.00020	<0.00020	-	-	<0.00020	<0.00020	<0.00020	0.00022

Table Notes:

[a] Ontario MOE Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (MOE, 2011) - Table 3: Full Depth Generic Site Condition Standards Non-Potable Ground Water Condition - Fine Textured Soils

< Denotes concentration less than reportable detection limit

- Denotes analysis not conducted

mbgs metres below ground surface

PHC petroleum hydrocarbon

NG Denotes no applicable guideline value

Units: all units milligrams per litre (mg/L) unless otherwise specified

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AECOM

Table 2-1: Historical Groundwater Analytical Results for Petroleum Hydrocarbons, Lead Scavengers and Lead

	Sample Location	04-7			04-8				04-10					BH9		BH10	BH11	BH11
	Sample Date	2012/12/18	2015/07/11	2016/10/06	2010/02/25	2012/12/18	2015/07/11	2016/10/06	2010/02/25	2012/12/18	2015/07/11	2015/07/11 Dup	2016/10/06	2010/02/25	2016/10/05	2010/02/25	2010/02/25	2016/10/05
	Sample ID	04-7	04-7	04-7	04-8	04-8	04-8	04-8	04-10	04-10	04-10	DUP-0711-B	04-10	BH9	BH9	BH10	BH11	BH11
	Screen Interval (mbgs)	3.1 to 5.5 mbgs	3.1 to 5.5 mbgs	3.1 to 5.5 mbgs	3.1 to 6.1 mbgs	3.1 to 6.1 mbgs	3.1 to 6.1 mbgs	3.1 to 6.1 mbgs	3.1 to 6.1 mbgs	3.1 to 6.1 mbgs	3.1 to 6.1 mbgs	3.1 to 6.1 mbgs	3.1 to 6.1 mbgs	0.6 to 6.1 mbgs	0.6 to 6.1 mbgs	0.6 to 6.1 mbgs	0.6 to 6.1 mbgs	0.6 to 6.1 mbgs
Parameter	**Guideline Values [a]**																	
Benzene	0.43	<0.00040	<0.00040	<0.00040	0.32	0.0033	0.14	0.011	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.22	<0.00040	0.025
Toluene	18	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.0004	<0.00040	<0.00040
Ethylbenzene	2.3	<0.00040	<0.00040	<0.00040	0.048	0.00062	0.012	0.00046	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.02	<0.00040	<0.00040
Xylenes, Total	4.2	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	0.0048	<0.00080	0.00046
PHC fraction F1 (C6 - C10)	0.75	<0.10	<0.10	<0.10	0.68	<0.10	0.40	0.11	<0.100	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	**1.1**	<0.10	<0.10
PHC fraction F2 (C10 - C16)	0.15	<0.10	<0.10	<0.10	**0.30**	**0.18**	**0.24**	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	**1**	<0.1	<0.10
PHC fraction F3 (C16 - C34)	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHC fraction F4 (C34 - C50)	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dibromoethane	0.00083	<0.00050	<0.00050	<0.00020	-	<0.00050	<0.00050	<0.00020	-	<0.00050	<0.00050	<0.00050	<0.00020	-	<0.00020	-	-	<0.00020
1,2-Dichloroethane	0.012	<0.00050	<0.00050	<0.00050	-	<0.00050	<0.00050	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	-	-	<0.00050
Lead, Dissolved	0.025	<0.00020	0.00020	<0.00020	-	<0.00020	<0.00020	<0.00020	-	<0.00020	<0.00020	<0.00020	<0.00020	-	<0.00020	-	-	<0.00020

Table Notes:

[a] Ontario MOE Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (MOE, 2011) - Table 3: Full Depth Generic Site Condition Standards Non-Potable Ground Water Condition - Fine Textured Soils

< Denotes concentration less than reportable detection limit

- Denotes analysis not conducted

mbgs metres below ground surface

PHC petroleum hydrocarbon

NG Denotes no applicable guideline value

Units: all units milligrams per litre (mg/L) unless otherwise specified

XX Reportable Detection Limit (RDL) exceeds the applied standard

XX Exceeds applied standard

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Parsons Inc. 2016. 2016 Groundwater Monitoring and Sampling Data Package, Site Address: 287 Main Street, Selkirk, Manitoba, SAP Site Location No.: 88001943. Prepared by Parsons Inc. on December 19, 2016.

Table 3-1: 2018 Groundwater Analytical Results for Petroleum Hydrocarbons in Water

			Sample Location	04-1	04-2	04-3	04-4	04-6	04-7	04-8
			Sample ID	04-1_M3_2018	04-2_M3_2018	04-3_M3_2018	04-4_M3_2018	04-6_M3_2018	04-7_M3_2018	04-8_M3_2018
			Sample Collection Date	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018
			Screen Interval	6.7 to 7.6 mbgs	3.1 to 6.1 mbgs	3.1 to 6.1 mbgs	6.0 to 6.9 mbgs	6.7 to 7.6 mbgs	3.1 to 5.5 mbgs	3.1 to 6.1 mbgs
Parameter	Guideline Value[1]	Units	RDL							
Petroleum Hydrocarbons										
Benzene	0.43	mg/L	0.00040	0.042	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.13
Toluene	18	mg/L	0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	2.3	mg/L	0.00040	0.0071	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.0099
Xylenes, Total	4.2	mg/L	0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089
F1 (C6-C10)	0.75	mg/L	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.22
F2 (C10-C16)	0.15	mg/L	0.10	0.34	<0.10	<0.10	<0.10	<0.10	<0.10	0.27
F3 (C16-C34)	0.5	mg/L	0.10	<0.10	<0.10	<0.10	<0.10	0.17	0.67	<0.10
F4 (C34-C50)	0.5	mg/L	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.21	<0.20

Table Notes:

[1] Ontario MOE Soil, Ground Water and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act (MOE, 2011) - Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, fine grained soil

- Denotes analysis not conducted

mg/L milligram/litre

mbgs metres below ground surface

XX Reportable Detection Limit (RDL) exceeds the applicable guideline value

XX Exceeds applicable guideline value

Table 3-1: 2018 Groundwater Analytical Results for Petroleum Hydrocarbons in Water

			Sample Location	04-10	MW32	MW33	MW35	MW38	Duplicate of MW04-7	Duplicate of MW04-3
			Sample ID	04-10_M3_2018	MW32_M3_2018	MW33_M3_2018	MW35_M3_2018	MW38_M3_2018	DUP01_M3_2018	DUP02_M3_2018
			Sample Collection Date	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018
			Screen Interval	3.1 to 6.1 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	3.1 to 5.5 mbgs	3.1 to 6.1 mbgs
Parameter	Guideline Value[1]	Units	RDL							
Petroleum Hydrocarbons										
Benzene	0.43	mg/L	0.00040	<0.00040	<0.00040	<0.00040	0.092	<0.00040	<0.00040	<0.00040
Toluene	18	mg/L	0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	2.3	mg/L	0.00040	<0.00040	<0.00040	<0.00040	0.013	<0.00040	<0.00040	<0.00040
Xylenes, Total	4.2	mg/L	0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089
F1 (C6-C10)	0.75	mg/L	0.10	<0.10	<0.10	<0.10	0.16	<0.10	<0.10	<0.10
F2 (C10-C16)	0.15	mg/L	0.10	<0.10	<0.10	<0.10	0.30	<0.10	<0.10	<0.10
F3 (C16-C34)	0.5	mg/L	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
F4 (C34-C50)	0.5	mg/L	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Table Notes:

[1] Ontario MOE Soil, Ground Water and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act (MOE, 2011) - Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, fine grained soil

- Denotes analysis not conducted

mg/L milligram/litre

mbgs metres below ground surface

XX Reportable Detection Limit (RDL) exceeds the applicable guideline value

XX Exceeds applicable guideline value

Table 3-2: 2018 Groundwater Analytical Results for Glycols in Water

			Sample Location	04-2	04-4	04-6	04-7	04-8
			Sample ID	04-2_M3_2018	04-4_M3_2018	04-6_M3_2018	04-7_M3_2018	04-8_M3_2018
			Sample Collection Date	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018
			Screen Interval	3.1 to 6.1 mbgs	6.0 to 6.9 mbgs	6.7 to 7.6 mbgs	3.1 to 5.5 mbgs	3.1 to 6.1 mbgs
Parameter	Guideline Value[1]	Units	RDL					
Glycols								
Ethylene Glycol	15,000	mg/L	3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Propylene Glycol	NG	mg/L	5.0	<5.0	<5.0	<5.0	<5.0	<5.0

Table Notes:

[1] Alberta Environment and Parks (AEP). 2019. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Land Policy Branch, Policy and Planning Division. 197 pp. - Table B-3. Groundwater Remediation Guidelines for Commercial Land Use - All Water Uses, for non-potable water and fine grained soils.

< Denotes concentration less than reportable detection limit

- Denotes analysis not conducted

mg/L milligram/litre

mbgs metres below ground surface

NG Denotes no applicable guideline value

XX Reportable Detection Limit (RDL) exceeds the applicable guideline value

XX Exceeds applicable guideline value

Table 3-2: 2018 Groundwater Analytical Results for Glycols in Water

			Sample Location	04-10	MW32	MW33	MW35	Duplicate of MW04-7
			Sample ID	04-10_M3_2018	MW32_M3_2018	MW33_M3_2018	MW35_M3_2018	DUP01_M3_2018
			Sample Collection Date	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018
			Screen Interval	3.1 to 6.1 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	3.1 to 5.5 mbgs
Parameter	Guideline Value[1]	Units	RDL					
Glycols								
Ethylene Glycol	15,000	mg/L	3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Propylene Glycol	NG	mg/L	5.0	<5.0	<5.0	<5.0	<5.0	<5.0

Table Notes:

[1] Alberta Environment and Parks (AEP). 2019. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Land Policy Branch, Policy and Planning Division. 197 pp. - Table B-3. Groundwater Remediation Guidelines for Commercial Land Use - All Water Uses, for non-potable water and fine grained soils.

< Denotes concentration less than reportable detection limit

- Denotes analysis not conducted

mg/L milligram/litre

mbgs metres below ground surface

NG Denotes no applicable guideline value

XX Reportable Detection Limit (RDL) exceeds the applicable guideline value

XX Exceeds applicable guideline value

Table 3-3: 2018 Groundwater Analytical Results for Metals in Water

			Sample Location	04-2	04-4	04-6	04-7	04-8
			Sample ID	04-2_M3_2018	04-4_M3_2018	04-6_M3_2018	04-7_M3_2018	04-8_M3_2018
			Sample Collection Date	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018
			Screen Interval	3.1 - 6.1 mbgs	6.0 to 6.9 mbgs	6.7 to 7.6 mbgs	3.1 to 5.5 mbgs	3.1 to 6.1 mbgs
Parameter	Guideline Value[1]	Units	RDL					
Elements								
Dissolved Arsenic (As)	1.9	mg/L	0.00020	0.00045	0.00072	0.00032	0.00037	0.0019
Dissolved Barium (Ba)	29	mg/L	0.010	0.14	0.10	0.11	0.19	0.52
Dissolved Chromium (Cr)	0.81	mg/L	0.0010	<0.010	<0.010	<0.010	<0.010	<0.010
Dissolved Copper (Cu)	0.087	mg/L	0.00020	0.0039	0.00037	0.0025	0.0034	0.00031
Dissolved Lead (Pb)	0.025	mg/L	0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Dissolved Tin (Sn)	NG	mg/L	0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Dissolved Zinc (Zn)	1.1	mg/L	0.0030	0.063	<0.0030	0.041	0.0057	<0.0030

Table Notes:

[1] Ontario MOE Soil, Ground Water and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act (MOE, 2011) - Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, fine grained soil

< Denotes concentration less than reportable detection limit

- Denotes analysis not conducted

mg/L milligram/litre

mbgs metres below ground surface

NG Denotes no applicable standard value

XX Reportable Detection Limit (RDL) exceeds the applicable guideline value

XX Exceeds applicable guideline value

Table 3-3: 2018 Groundwater Analytical Results for Metals in Water

			Sample Location	04-10	MW32	MW33	MW35	Duplicate of MW04-7
			Sample ID	04-10_M3_2018	MW32_M3_2018	MW33_M3_2018	MW35_M3_2018	DUP01_M3_2018
			Sample Collection Date	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018
			Screen Interval	3.1 to 6.1 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	3.1 to 5.5 mbgs
Parameter	Guideline Value[1]	Units	RDL					
Elements								
Dissolved Arsenic (As)	1.9	mg/L	0.00020	0.00043	0.00044	0.00042	0.0049	0.00037
Dissolved Barium (Ba)	29	mg/L	0.010	0.13	0.36	0.33	0.57	0.19
Dissolved Chromium (Cr)	0.81	mg/L	0.0010	<0.010	<0.010	<0.010	<0.010	<0.010
Dissolved Copper (Cu)	0.087	mg/L	0.00020	0.0030	0.0038	0.0045	0.0011	0.0038
Dissolved Lead (Pb)	0.025	mg/L	0.00020	<0.00020	<0.00020	0.00066	0.00071	<0.00020
Dissolved Tin (Sn)	NG	mg/L	0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Dissolved Zinc (Zn)	1.1	mg/L	0.0030	0.018	<0.0030	0.007	0.0031	0.014

Table Notes:

[1] Ontario MOE Soil, Ground Water and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act (MOE, 2011) - Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, fine grained soil

< Denotes concentration less than reportable detection limit

- Denotes analysis not conducted

mg/L milligram/litre

mbgs metres below ground surface

NG Denotes no applicable standard value

XX Reportable Detection Limit (RDL) exceeds the applicable guideline value

XX Exceeds applicable guideline value

Table 3-4: 2018 Groundwater Analytical Results for Volatile Organic Compounds (VOCs) in Water

			Sample Location	04-1	04-2	04-3	04-4	04-6	04-7	04-8
			Sample ID	04-1_M3_2018	04-2_M3_2018	04-3_M3_2018	04-4_M3_2018	04-6_M3_2018	04-7_M3_2018	04-8_M3_2018
			Sample Collection Date	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018
			Screen Interval	6.7 to 7.6 mbgs	3.1 to 6.1 mbgs	3.1 to 6.1 mbgs	6.0 to 6.9 mbgs	6.7 to 7.6 mbgs	3.1 to 5.5 mbgs	3.1 to 6.1 mbgs
Parameter	Guideline Value[1]	Units	RDL							
Volatiles										
Total Trihalomethanes	NG	mg/L	0.0013	-	<0.0013	-	<0.0013	<0.0013	<0.0013	<0.0013
Hexane	0.52	mg/L	0.0010	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bromodichloromethane	85	mg/L	0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
Bromoform	0.77	mg/L	0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
Bromomethane	0.056	mg/L	0.00200	-	<0.0020	-	<0.0020	<0.0020	<0.0020	<0.0020
Carbon tetrachloride	0.0084	mg/L	0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
Chlorobenzene	0.63	mg/L	0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
Chlorodibromomethane	82	mg/L	0.00100	-	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010
Chloroethane	NG	mg/L	0.00100	-	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010
Chloroform	0.022	mg/L	0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
Chloromethane	NG	mg/L	0.00200	-	<0.0020	-	<0.0020	<0.0020	<0.0020	<0.0020
1,2-dibromoethane	0.00083	mg/L	0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
1,2-dichlorobenzene	9.6	mg/L	0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
1,3-dichlorobenzene	9.6	mg/L	0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
1,4-dichlorobenzene	0.067	mg/L	0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
1,1-dichloroethane	3.1	mg/L	0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
1,2-dichloroethane	0.012	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
1,1-dichloroethene	0.017	mg/L	0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
cis-1,2-dichloroethene	0.017	mg/L	0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
trans-1,2-dichloroethene	0.017	mg/L	0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
Dichloromethane	5.5[b]	mg/L	0.00200	-	<0.0020	-	<0.0020	<0.0020	<0.0020	<0.0020
1,2-dichloropropane	0.14	mg/L	0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
cis-1,3-dichloropropene	0.045	mg/L	0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
trans-1,3-dichloropropene	0.045	mg/L	0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
Methyl methacrylate	120[b]	mg/L	0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	0.00058
Methyl-tert-butylether (MTBE)	1.4	mg/L	0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	0.0083
Styrene	9.1	mg/L	0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
1,1,1,2-tetrachloroethane	0.028	mg/L	0.00100	-	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010
1,1,2,2-tetrachloroethane	0.015	mg/L	0.00200	-	<0.0020	-	<0.0020	<0.0020	<0.0020	<0.0020
Tetrachloroethene	0.017	mg/L	0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
1,2,3-trichlorobenzene	6.9[b]	mg/L	0.00100	-	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010
1,2,4-trichlorobenzene	0.85	mg/L	0.00100	-	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010
1,3,5-trichlorobenzene	3.3[b]	mg/L	0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
1,1,1-trichloroethane	6.7	mg/L	0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
1,1,2-trichloroethane	0.03	mg/L	0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
Trichloroethene	0.017	mg/L	0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
Trichlorofluoromethane	2.5	mg/L	0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
1,2,4-trimethylbenzene	NG	mg/L	0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
1,3,5-trimethylbenzene	NG	mg/L	0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
Vinyl chloride	0.0017	mg/L	0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050

Table Notes:

[1] Ontario MOE Soil, Ground Water and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act (MOE, 2011) - Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, fine grained soil

[b] Alberta Environment and Parks (AEP). 2019. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Land Policy Branch, Policy and Planning Division. 197 pp. - Table B-3. Groundwater Remediation Guidelines for Commercial Land Use - All Water Uses, for non-potable water and fine grained soils.

< Denotes concentration less than reportable detection limit

- Denotes analysis not conducted

mg/L milligram/litre

mbgs metres below ground surface

NG Denotes no applicable standard value

XX Reportable Detection Limit (RDL) exceeds the applicable guideline value

XX Exceeds applicable guideline value

Table 3-4: 2018 Groundwater Analytical Results for Volatile Organic Compounds (VOCs) in Water

				Sample Location	04-10	MW32	MW33	MW35	MW38	Duplicate of MW04-7	Duplicate of MW04-3
				Sample ID	04-10_M3_2018	MW32_M3_2018	MW33_M3_2018	MW35_M3_2018	MW38_M3_2018	DUP01_M3_2018	DUP02_M3_2018
				Sample Collection Date	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018
				Screen Interval	3.1 to 6.1 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	3.1 to 5.5 mbgs	3.1 to 6.1 mbgs
Parameter	Guideline Value[1]	Units	RDL								
Volatiles											
Total Trihalomethanes	NG	mg/L	0.0013	<0.0013	<0.0013	<0.0013	<0.0013	-	<0.0013	-
Hexane	0.52	mg/L	0.0010	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bromodichloromethane	85	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	-
Bromoform	0.77	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	-
Bromomethane	0.056	mg/L	0.00200	<0.0020	<0.0020	<0.0020	<0.0020	-	<0.0020	-
Carbon tetrachloride	0.0084	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	-
Chlorobenzene	0.63	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	-
Chlorodibromomethane	82	mg/L	0.00100	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	-
Chloroethane	NG	mg/L	0.00100	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	-
Chloroform	0.022	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	-
Chloromethane	NG	mg/L	0.00200	<0.0020	<0.0020	<0.0020	<0.0020	-	<0.0020	-
1,2-dibromoethane	0.00083	mg/L	0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
1,2-dichlorobenzene	9.6	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	-
1,3-dichlorobenzene	9.6	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	-
1,4-dichlorobenzene	0.067	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	-
1,1-dichloroethane	3.1	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	-
1,2-dichloroethane	0.012	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
1,1-dichloroethene	0.017	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	-
cis-1,2-dichloroethene	0.017	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	-
trans-1,2-dichloroethene	0.017	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	-
Dichloromethane	5.5[b]	mg/L	0.00200	<0.0020	<0.0020	<0.0020	<0.0020	-	<0.0020	-
1,2-dichloropropane	0.14	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	-
cis-1,3-dichloropropene	0.045	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	-
trans-1,3-dichloropropene	0.045	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	-
Methyl methacrylate	120[b]	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	-
Methyl-tert-butylether (MTBE)	1.4	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	-
Styrene	9.1	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	-
1,1,1,2-tetrachloroethane	0.028	mg/L	0.00100	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	-
1,1,2,2-tetrachloroethane	0.015	mg/L	0.00200	<0.0020	<0.0020	<0.0020	<0.0020	-	<0.0020	-
Tetrachloroethene	0.017	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	-
1,2,3-trichlorobenzene	6.9[b]	mg/L	0.00100	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	-
1,2,4-trichlorobenzene	0.85	mg/L	0.00100	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	-
1,3,5-trichlorobenzene	3.3[b]	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	-
1,1,1-trichloroethane	6.7	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	-
1,1,2-trichloroethane	0.03	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	-
Trichloroethene	0.017	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	-
Trichlorofluoromethane	2.5	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	-
1,2,4-trimethylbenzene	NG	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	-
1,3,5-trimethylbenzene	NG	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	-
Vinyl chloride	0.0017	mg/L	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	-

Table Notes:

[1] Ontario MOE Soil, Ground Water and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act (MOE, 2011) - Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, fine grained soil

[b] Alberta Environment and Parks (AEP). 2019. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Land Policy Branch, Policy and Planning Division. 197 pp. - Table B-3. Groundwater Remediation Guidelines for Commercial Land Use - All Water Uses, for non-potable water and fine grained soils.

< Denotes concentration less than reportable detection limit

- Denotes analysis not conducted

mg/L milligram/litre

mbgs metres below ground surface

NG Denotes no applicable standard value

XX Reportable Detection Limit (RDL) exceeds the applicable guideline value

XX Exceeds applicable guideline value

Table 3-5: 2018 Groundwater Analytical Results for Polycyclic Aromatic Hydrocarbons (PAHs) in Water

			Sample Location	04-1	04-2	04-3	04-4	04-6	04-7	04-8
			Sample ID	04-1_M3_2018	04-2_M3_2018	04-3_M3_2018	04-4_M3_2018	04-6_M3_2018	04-7_M3_2018	04-8_M3_2018
			Sample Collection Date	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018
			Screen Interval	6.7 to 7.6 mbgs	3.1 to 6.1 mbgs	3.1 to 6.1 mbgs	6.0 to 6.9 mbgs	6.7 to 7.6 mbgs	3.1 to 5.5 mbgs	3.1 to 6.1 mbgs
Parameter	Guideline Value[1]	Units	RDL							
Polycyclic Aromatics										
Benzo[a]pyrene equivalency	NG	mg/L	0.000010	-	<0.000010	-	<0.000010	<0.000010	<0.000010	<0.000010
Acenaphthene	1.7	mg/L	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Acenaphthylene	0.0018	mg/L	0.00010	-	<0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010
Acridine	NG	mg/L	0.000050	-	<0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050
Anthracene	0.0024	mg/L	0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Benzo(a)anthracene	0.0047	mg/L	0.0000085	-	<0.0000085	-	<0.0000085	<0.0000085	<0.0000085	<0.0000085
Benzo(b&j)fluoranthene	0.00075	mg/L	0.0000085	-	<0.0000085	-	<0.0000085	<0.0000085	<0.0000085	<0.0000085
Benzo(k)fluoranthene	0.0004	mg/L	0.0000085	-	<0.0000085	-	<0.0000085	<0.0000085	<0.0000085	<0.0000085
Benzo(g,h,i)perylene	0.0002	mg/L	0.0000085	-	<0.0000085	-	<0.0000085	0.00001	<0.0000085	<0.0000085
Benzo(c)phenanthrene	NG	mg/L	0.000050	-	<0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050
Benzo(a)pyrene	0.00081	mg/L	0.0000075	-	<0.0000075	-	<0.0000075	<0.0000075	<0.0000075	<0.0000075
Benzo[e]pyrene	NG	mg/L	0.000050	-	<0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050
Chrysene	0.001	mg/L	0.0000085	-	<0.0000085	-	<0.0000085	<0.0000085	<0.0000085	<0.0000085
Dibenz(a,h)anthracene	0.00052	mg/L	0.0000075	-	<0.0000075	-	<0.0000075	<0.0000075	<0.0000075	<0.0000075
Fluoranthene	0.13	mg/L	0.000010	-	<0.000010	-	<0.000010	<0.000010	<0.000010	<0.000010
Fluorene	0.4	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Indeno(1,2,3-cd)pyrene	0.0002	mg/L	0.0000085	-	<0.0000085	-	<0.0000085	<0.0000085	<0.0000085	<0.0000085
1-Methylnaphthalene	1.8	mg/L	0.00010	-	<0.00010	-	<0.00010	<0.00010	<0.00010	0.00074
2-Methylnaphthalene	1.8	mg/L	0.00010	-	<0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010
Naphthalene	6.4	mg/L	0.00010	0.00031[2]	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00048
Phenanthrene	0.58	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Perylene	NG	mg/L	0.000050	-	<0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050
Pyrene	0.068	mg/L	0.000020	-	<0.000020	-	<0.000020	0.000039	<0.000020	<0.000020
Quinoline	NG	mg/L	0.00020	-	<0.00020	-	<0.00020	<0.00020	<0.00020	0.0019

Table Notes:

[1] Ontario MOE Soil, Ground Water and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act (MOE, 2011) - Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, fine grained soil

[2] Qualifying ion outside of acceptance criteria. Results are tentatively identified and potentially biased high.

< Denotes concentration less than reportable detection limit

- Denotes analysis not conducted

mg/L milligram/litre

mbgs metres below ground surface

NG Denotes no applicable standard value

XX Reportable Detection Limit (RDL) exceeds the applicable guideline value

XX Exceeds applicable guideline value

Table 3-5: 2018 Groundwater Analytical Results for Polycyclic Aromatic Hydrocarbons (PAHs) in Water

				Sample Location	04-10	MW32	MW33	MW35	MW38	Duplicate of MW04-7	Duplicate of MW04-3
				Sample ID	04-10_M3_2018	MW32_M3_2018	MW33_M3_2018	MW35_M3_2018	MW38_M3_2018	DUP01_M3_2018	DUP02_M3_2018
				Sample Collection Date	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018
				Screen Interval	3.1 to 6.1 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	3.1 to 5.5 mbgs	3.1 to 6.1 mbgs
Parameter	Guideline Value[1]	Units	RDL								
Polycyclic Aromatics											
Benzo[a]pyrene equivalency	NG	mg/L	0.000010		<0.000010	<0.000010	<0.000010	<0.000010	-	<0.000010	-
Acenaphthene	1.7	mg/L	0.00010		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Acenaphthylene	0.0018	mg/L	0.00010		<0.00010	<0.00010	<0.00010	<0.00010	-	<0.00010	-
Acridine	NG	mg/L	0.000050		<0.000050	<0.000050	<0.000050	<0.000050	-	<0.000050	-
Anthracene	0.0024	mg/L	0.000010		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Benzo(a)anthracene	0.0047	mg/L	0.0000085		<0.0000085	<0.0000085	<0.0000085	<0.0000085	-	<0.0000085	-
Benzo(b&j)fluoranthene	0.00075	mg/L	0.0000085		<0.0000085	<0.0000085	<0.0000085	<0.0000085	-	<0.0000085	-
Benzo(k)fluoranthene	0.0004	mg/L	0.0000085		<0.0000085	<0.0000085	<0.0000085	<0.0000085	-	<0.0000085	-
Benzo(g,h,i)perylene	0.0002	mg/L	0.0000085		<0.0000085	<0.0000085	<0.0000085	<0.0000085	-	<0.0000085	-
Benzo(c)phenanthrene	NG	mg/L	0.000050		<0.000050	<0.000050	<0.000050	<0.000050	-	<0.000050	-
Benzo(a)pyrene	0.00081	mg/L	0.0000075		<0.0000075	<0.0000075	<0.0000075	<0.0000075	-	<0.0000075	-
Benzo[e]pyrene	NG	mg/L	0.000050		<0.000050	<0.000050	<0.000050	<0.000050	-	<0.000050	-
Chrysene	0.001	mg/L	0.0000085		<0.0000085	<0.0000085	<0.0000085	<0.0000085	-	<0.0000085	-
Dibenz(a,h)anthracene	0.00052	mg/L	0.0000075		<0.0000075	<0.0000075	<0.0000075	<0.0000075	-	<0.0000075	-
Fluoranthene	0.13	mg/L	0.000010		<0.000010	<0.000010	<0.000010	<0.000010	-	<0.000010	-
Fluorene	0.4	mg/L	0.000050		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Indeno(1,2,3-cd)pyrene	0.0002	mg/L	0.0000085		<0.0000085	<0.0000085	<0.0000085	<0.0000085	-	<0.0000085	-
1-Methylnaphthalene	1.8	mg/L	0.00010		<0.00010	<0.00010	<0.00010	0.00011	-	<0.00010	-
2-Methylnaphthalene	1.8	mg/L	0.00010		<0.00010	<0.00010	<0.00010	<0.00010	-	<0.00010	-
Naphthalene	6.4	mg/L	0.00010		<0.00010	<0.00010	<0.00010	0.00034	<0.00010	<0.00010	<0.00010
Phenanthrene	0.58	mg/L	0.000050		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Perylene	NG	mg/L	0.000050		<0.000050	<0.000050	<0.000050	<0.000050	-	<0.000050	-
Pyrene	0.068	mg/L	0.000020		<0.000020	<0.000020	<0.000020	<0.000020	-	<0.000020	-
Quinoline	NG	mg/L	0.00020		<0.00020	<0.00020	<0.00020	0.0016	-	<0.00020	-

Table Notes:

[1] Ontario MOE Soil, Ground Water and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act (MOE, 2011) - Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, fine grained soil

[2] Qualifying ion outside of acceptance criteria. Results are tentatively identified and potentially biased high.

< Denotes concentration less than reportable detection limit

- Denotes analysis not conducted

mg/L milligram/litre

mbgs metres below ground surface

NG Denotes no applicable standard value

XX Reportable Detection Limit (RDL) exceeds the applicable guideline value

XX Exceeds applicable guideline value

Table 3-6: 2018 Groundwater Analytical Results for Polychlorinated Biphenyls (PCBs) in Water

			Sample Location	04-2	04-4	04-6	04-7	04-8
			Sample ID	04-2_M3_2018	04-4_M3_2018	04-6_M3_2018	04-7_M3_2018	04-8_M3_2018
			Sample Collection Date	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018
			Screen Interval	3.1 - 6.1 mbgs	6.0 to 6.9 mbgs	6.7 to 7.6 mbgs	3.1 to 5.5 mbgs	3.1 to 6.1 mbgs
Parameter	Guideline Value[1]	Units	RDL					
Polychlorinated Biphenyls								
Aroclor 1016	NG	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Aroclor 1221	NG	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Aroclor 1232	NG	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Aroclor 1242	NG	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Aroclor 1248	NG	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Aroclor 1254	NG	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Aroclor 1260	NG	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Aroclor 1262	NG	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Aroclor 1268	NG	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Total PCB	0.015	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050

Table Notes:

[1] Ontario MOE Soil, Ground Water and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act (MOE, 2011) - Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition

< Denotes concentration less than reportable detection limit

- Denotes analysis not conducted

mg/L milligram/litre

mbgs metres below ground surface

NG Denotes no applicable standard value

XX Reportable Detection Limit (RDL) exceeds the applicable guideline value

XX Exceeds applicable guideline value

Table 3-6: 2018 Groundwater Analytical Results for Polychlorinated Biphenyls (PCBs) in Water

			Sample Location	04-10	MW32	MW35	Duplicate of MW04-7
			Sample ID	04-10_M3_2018	MW32_M3_2018	MW35_M3_2018	DUP01_M3_2018
			Sample Collection Date	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018	Oct 10, 2018
			Screen Interval	3.1 to 6.1 mbgs	1.6 to 4.6 mbgs	1.6 to 4.6 mbgs	3.1 to 5.5 mbgs
Parameter	Guideline Value[1]	Units	RDL				
Polychlorinated Biphenyls							
Aroclor 1016	NG	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Aroclor 1221	NG	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Aroclor 1232	NG	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Aroclor 1242	NG	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Aroclor 1248	NG	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Aroclor 1254	NG	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Aroclor 1260	NG	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Aroclor 1262	NG	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Aroclor 1268	NG	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Total PCB	0.015	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050

Table Notes:

[1] Ontario MOE Soil, Ground Water and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act (MOE, 2011) - Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition

< Denotes concentration less than reportable detection limit

- Denotes analysis not conducted

mg/L milligram/litre

mbgs metres below ground surface

NG Denotes no applicable standard value

XX Reportable Detection Limit (RDL) exceeds the applicable guideline value

XX Exceeds applicable guideline value

AECOM

Table 4-1: 2018 Soil Analytical Results - Petroleum Hydrocarbons

	APEC	Waste Oil UST			Car Wash UST		Fuel UST Area								Pump Island Area				
	Sample Location	BH1			BH2		BH3		BH4		BH5		BH6		BH7			BH8	
	Sample Date	2018-07-13	2018-07-13	2018-07-13	2018-07-12	2018-07-12	2018-07-12	2018-07-12	2018-07-12	2018-07-12	2018-07-11	2018-07-11	2018-07-11	2018-07-11	2018-07-12	2018-07-12	2018-07-12	2018-07-12	2018-07-12
	Sample ID	BH1_3.0_M3	BH1_3.0_DUP02_M3	BH1_4.5_M3	BH2_5.25_M3	BH2_6.75_M3	BH3_3.75_M3	BH3_6.0_M3	BH4_3.75_M3	BH4_6.0_M3	BH5_3.75_M3	BH5_6.0_M3	BH6_4.5_M3	BH6_6.0_M3	BH7_2.25_M3	BH7_2.25_DUP01_M3	BH7_5.25_M3	BH8_2.4_M3	BH8_3.75_M3
	Sample Depth (mbgs)	3	3	4.5	5.25	6.75	3.75	6	3.75	6	3.75	6	4.5	6	2.25	2.25	5.25	2.4	3.75
Parameter	Guideline Values: Surface Soil (≤1.5 mbgs)	Guideline Values: Subsurface Soil (>1.5 mbgs)																	
Petroleum Hydrocarbons																			
Benzene	2.8 [a,d,e]	2.9 [a,d]	0.012	<0.0050	<0.0050	0.170	0.13	2.2	0.02	**11**	0.39	**10**	0.03	**6.0**	0.88	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Toluene	330 [a,f]	660 [a,f]	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	1.1	0.037	5.1	<0.020	7.6	0.030	<0.020	<0.020	<0.020	<0.020	<0.020 (1)
Ethylbenzene	430 [a,f]	860 [a,f]	<0.010	<0.010	<0.010	0.81	0.077	1.8	<0.010	6.3	<0.010	7.4	<0.010	11	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Xylenes	230 [a,f]	460 [a,f]	<0.040	<0.040	<0.040	0.19	<0.040	0.71	<0.040	18	<0.040	25	<0.040	44	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040
PHC fraction F1 - BTEX (C6 - C10)	320 [b,g]	800 [b,h]	30	83	<10	50	<10	120	<10	370	<10	560	<10	**1300**	<10	<10	<10	<10	<10	<10
PHC fraction F2 (C10 - C16)	260 [b,g]	1,000 [b,h]	22	84	<10	47	<10	25	<10	76	<10	47	<10	39	<10	<10	<10	<10	<10	<10
PHC fraction F3 (C16 - C34)	2,500 [b,g]	5,000 [b,h]	<50	55	<50	<50	<50	<50	73	<50	89	<50	59	<50	56	<50	<50	<50	62	<50
PHC fraction F4 (C34 - C50)	6,600 [b,g]	10,000 [b,h]	<50	<50	<50	<50	<50	<50	<50	<50	90	<50	<50	<50	<50	<50	<50	<50	69	<50

Table Notes:

[a] Canadian Council of Ministers of the Environment (CCME) Soil Quality Guidelines (2014) - Commercial Land Use, Fine Grained Soils, Human Health Guideline Check Values 10^{-5} incremental risk

[b] CCME, Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil (2008) - Commercial Land Use, Fine Grained Soils

[c] Ontario MOECC Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (2011) - Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition

[d] Inhalation of indoor air (basement)

[e] Inhalation of Indoor Air (slab on grade)

[f] Soil Contact - Environmental Health

[g] Eco Soil Contact

[h] Management Limit

[i] Alberta Environment and Parks (AEP). 2019. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Land Policy Branch, Policy and Planning Division. 197 pp. - Table 1. Alberta Tier 1 Soil Remediation Guidelines - Fine grained soils, Commercial land use

(1) Qualifying ion outside of acceptance criteria. Results are tentatively identified and potentially biased high.

< Denotes concentration less than reportable detection limit

- Denotes analysis not conducted

mg/kg milligram/kilogram

mbgs metres below ground surface

PHC petroleum hydrocarbon

NG Denotes no applicable guideline value

Units: all units milligrams per kilogram (mg/kg) unless otherwise specified

XX Reportable Detection Limit (RDL) exceeds the applicable guideline value

XX Exceeds applicable guideline value

AECOM

Table 4-2: 2018 Soil Analytical Results - Volitile Organic Compounds (VOCs)

	APEC	Waste Oil UST			Car Wash UST		Fuel UST Area								Pump Island Area				
	Sample Location	BH1			BH2		BH3		BH4		BH5		BH6		BH7			BH8	
	Sample Date	2018-07-13	2018-07-13	2018-07-13	2018-07-12	2018-07-12	2018-07-12	2018-07-12	2018-07-12	2018-07-12	2018-07-11	2018-07-11	2018-07-11	2018-07-11	2018-07-12	2018-07-12	2018-07-12	2018-07-12	2018-07-12
	Sample ID	BH1 3.0 M3	BH1 3.0 DUP02 M3	BH1 4.5 M3	BH2 5.25 M3	BH2 6.75 M3	BH3 3.75 M3	BH3 6.0 M3	BH4 3.75 M3	BH4 6.0 M3	BH5 3.75 M3	BH5 6.0 M3	BH6 4.5 M3	BH6 6.0 M3	BH7 2.25 M3	BH7 2.25 DUP01 M3	BH7 5.25 M3	BH8 2.4 M3	BH8 3.75 M3
	Sample Depth (mbgs)	3	3	4.5	5.25	6.75	3.75	6	3.75	6	3.75	6	4.5	6	2.25	2.25	5.25	2.4	3.75
Parameter	**Guideline Values**																		
	Surface Soil (≤1.5 mbgs)	**Subsurface Soil (>1.5 mbgs)**																	
VOCs																			
Hexane	21 [a]	21 [a]	<0.20	<0.20	<0.20	0.9	<0.20	1.5 (1)	<0.20	4.4	<0.20	5.5	<0.20	9.3 (1)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bromodichloromethane	18 [c]	18 [c]	<0.030	<0.030	<0.030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromoform	1.7 [c]	1.7 [c]	<0.050	<0.050	<0.050	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromomethane	0.05 [c]	0.05 [c]	<0.020	<0.020	<0.020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon tetrachloride	50 [a]	50 [a]	<0.00050	<0.00050	<0.00050	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorobenzene	10 [a]	10 [a]	<0.0010	<0.0010	<0.0010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorodibromomethane	13 [c]	13 [c]	<0.020	<0.020	<0.020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroethane	NG	NG	<0.020	<0.020	<0.020	<0.020	<0.020	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroform	50 [a]	50 [a]	<0.00080	<0.00080	<0.00080	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloromethane	NG	NG	<0.030	<0.030	<0.030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-dibromoethane	0.05 [c]	0.05 [c]	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
1,2-dichlorobenzene	10 [a]	10 [a]	<0.020	<0.020	<0.020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-dichlorobenzene	10 [a]	10 [a]	<0.020	<0.020	<0.020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-dichlorobenzene	10 [a]	10 [a]	<0.020	<0.020	<0.020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-dichloroethane	50 [a]	50 [a]	<0.020	<0.020	<0.020	<0.020	<0.020	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-dichloroethane	50 [a]	50 [a]	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.030	<0.0020	<0.0020	0.0033	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
1,1-dichloroethene	50 [a]	50 [a]	<0.020	<0.020	<0.020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-dichloroethene	50 [a]	50 [a]	<0.020	<0.020	<0.020	<0.020	<0.020	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-1,2-dichloroethene	50 [a]	50 [a]	<0.020	<0.020	<0.020	<0.020	<0.020	-	-	-	-	-	-	-	-	-	-	-	-	-
Dichloromethane	50 [a]	50 [a]	<0.030	<0.030	<0.030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-dichloropropane	50 [a]	50 [a]	<0.020	<0.020	<0.020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,3-dichloropropene	0.21 [c]	0.21 [c]	<0.020	<0.020	<0.020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-1,3-dichloropropene	0.21 [c]	0.21 [c]	<0.020	<0.020	<0.020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl methacrylate	1.3 [i]	1.3 [i]	<0.040	<0.040	<0.040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl-tert-butylether (MTBE)	3.2 [b]	3.2 [b]	<0.030	<0.030	<0.030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	50 [c]	50 [c]	<0.020	<0.020	<0.020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,1,2-tetrachloroethane	0.11 [c]	0.11 [c]	<0.10	<0.10	<0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2,2-tetrachloroethane	50 [a]	50 [a]	1.5	5.1	<0.050	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	50 [a]	50 [a]	<0.010	<0.010	<0.010	<0.010	<0.010	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,3-trichlorobenzene	10 [a]	10 [a]	<0.040	<0.040	<0.040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4-trichlorobenzene	10 [a]	10 [a]	<0.040	<0.040	<0.040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3,5-trichlorobenzene	10 [a]	10 [a]	<0.040	<0.040	<0.040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,1-trichloroethane	50 [a]	50 [a]	<0.020	<0.020	<0.020	<0.020	<0.020	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2-trichloroethane	50 [a]	50 [a]	<0.020	<0.020	<0.020	<0.020	<0.020	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroethene	0.01 [a]	0.01 [a]	<0.010	<0.010	<0.010	<0.010	<0.010	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane	5.8 [c]	5.8 [c]	<0.020	<0.020	<0.020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4-trimethylbenzene	NG	NG	<0.50	<0.50	<0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3,5-trimethylbenzene	NG	NG	<0.50	<0.50	<0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vinyl chloride	0.25 [c]	0.25 [c]	<0.00030	<0.00030	<0.00030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table Notes:

[a] Canadian Council of Ministers of the Environment (CCME) Soil Quality Guidelines (2014) - Commercial Land Use, Fine Grained Soils, Human Health Guideline Check Values 10^{-5} incremental risk

[b] CCME, Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil (2008) - Commercial Land Use, Fine Grained Soils

[c] Ontario MOECC Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (2011) - Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition

[d] Inhalation of indoor air (basement)

[e] Inhalation of Indoor Air (slab on grade)

[f] Soil Contact - Environmental Health

[g] Eco Soil Contact

[h] Management Limit

[i] Alberta Environment and Parks (AEP). 2019. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Land Policy Branch, Policy and Planning Division. 197 pp. - Table 1. Alberta Tier 1 Soil Remediation Guidelines - Fine grained soils, Commercial land use

(1) Qualifying ion outside of acceptance criteria. Results are tentatively identified and potentially biased high.

< Denotes concentration less than reportable detection limit

- Denotes analysis not conducted

mg/kg milligram/kilogram

mbgs metres below ground surface

PHC petroleum hydrocarbon

NG Denotes no applicable guideline value

Units: all units milligrams per kilogram (mg/kg) unless otherwise specified

XX Reportable Detection Limit (RDL) exceeds the applicable guideline value

XX Exceeds applicable guideline value

AECOM

Table 4-3: 2018 Soil Analytical Results - Polycyclic Aromatic Hydrocarbons (PAHs)

		APEC	Fuel UST Area								Pump Island Area				
		Sample Location	BH3		BH4		BH5		BH6		BH7			BH8	
		Sample Date	2018-07-12	2018-07-12	2018-07-12	2018-07-12	2018-07-11	2018-07-11	2018-07-11	2018-07-11	2018-07-12	2018-07-12	2018-07-12	2018-07-12	2018-07-12
		Sample ID	BH3_3.75_M3	BH3_6.0_M3	BH4_3.75_M3	BH4_6.0_M3	BH5_3.75_M3	BH5_6.0_M3	BH6_4.5_M3	BH6_6.0_M3	BH7_2.25_M3	BH7_2.25_DUP01_M3	BH7_5.25_M3	BH8_2.4_M3	BH8_3.75_M3
		Sample Depth (mbgs)	3.75	6	3.75	6	3.75	6	4.5	6	2.25	2.25	5.25	2.4	3.75
	Parameter	Guideline Values: Surface Soil (≤1.5 mbgs)	Guideline Values: Subsurface Soil (>1.5 mbgs)												
PAHs	Acenaphthene	96 [c]	96 [c]	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
PAHs	Anthracene	32 [a]	32 [a]	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
PAHs	Fluorene	69 [c]	69 [c]	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
PAHs	Naphthalene	22 [a]	22 [a]	0.08	<0.0050	2.1	<0.0050	1.7	<0.0050	1.6	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
PAHs	Phenanthrene	50 [a]	50 [a]	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0061	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050

Table Notes:

[a] Canadian Council of Ministers of the Environment (CCME) Soil Quality Guidelines for the Protection of Environmental and Human Health, Polycyclic Aromatic Hydrocarbons. 2010.

[b] CCME, Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil (2008) - Commercial Land Use, Fine Grained Soils

[c] Ontario MOECC Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (2011) - Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition

[d] Inhalation of indoor air (basement)

[e] Inhalation of Indoor Air (slab on grade)

[f] Soil Contact - Environmental Health

[g] Eco Soil Contact

[h] Management Limit

[i] Alberta Environment and Parks (AEP). 2019. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Land Policy Branch, Policy and Planning Division. 197 pp. - Table 1. Alberta Tier 1 Soil Remediation Guidelines - Fine grained soils, Commercial land use

< Denotes concentration less than reportable detection limit
- Denotes analysis not conducted
mg/kg milligram/kilogram
mbgs metres below ground surface
PHC petroleum hydrocarbon
NG Denotes no applicable guideline value
Units: all units milligrams per kilogram (mg/kg) unless otherwise specified
XX Reportable Detection Limit (RDL) exceeds the applicable guideline value
XX Exceeds applicable guideline value

Table 4-4: 2018 Soil Analytical Results - Glycols

				APEC	Car Wash UST	
				Sample Location	BH2	
				Sample Date	2018-07-12	2018-07-12
				Sample ID	BH2_5.25_M3	BH2_6.75_M3
				Sample Depth (mbgs)	5.25	6.75
	Parameter		Guideline Values			
			Surface Soil (≤1.5 mbgs)	Subsurface Soil (>1.5 mbgs)		
Glycols	Ethylene Glycol		960 [a]	960 [a]	<10	<10
	Diethylene Glycol		10 [i]	10 [i]	<10	<10
	Triethylene Glycol		100 [i]	100 [i]	<10	<10
	Propylene Glycol		NG	NG	<10	<10

Table Notes:

[a] Canadian Council of Ministers of the Environment (CCME) Soil Quality Guidelines (2014) - Commercial Land Use, Fine Grained Soils, Human Health Guideline Check Values 10^{-5} incremental risk

[b] CCME, Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil (2008) - Commercial Land Use, Fine Grained Soils

[c] Ontario MOECC Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (2011) - Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition

[d] Inhalation of indoor air (basement)

[e] Inhalation of Indoor Air (slab on grade)

[f] Soil Contact - Environmental Health

[g] Eco Soil Contact

[h] Management Limit

[i] Alberta Environment and Parks (AEP). 2019. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Land Policy Branch, Policy and Planning Division. 197 pp. - Table 1. Alberta Tier 1 Soil Remediation Guidelines - Fine grained soils, Commercial land use

< Denotes concentration less than reportable detection limit

- Denotes analysis not conducted

mg/kg milligram/kilogram

mbgs metres below ground surface

PHC petroleum hydrocarbon

NG Denotes no applicable guideline value

Units: all units milligrams per kilogram (mg/kg) unless otherwise specified

XX Reportable Detection Limit (RDL) exceeds the applicable guideline value

XX Exceeds applicable guideline value

AECOM

Table 4-5: Soil Analytical Results - Polychlorinated Biphenyls (PCBs)

		APEC	Waste Oil UST			Car Wash UST	
		Sample Location	BH1			BH2	
		Sample Date	2018-07-13	2018-07-13	2018-07-13	2018-07-12	2018-07-12
		Sample ID	BH1_3.0_M3	BH1_3.0_DUP02_M3	BH1_4.5_M3	BH2_5.25_M3	BH2_6.75_M3
		Sample Depth (mbgs)	3	3	4.5	5.25	6.75
Parameter	Guideline Values						
	Surface Soil (≤1.5 mbgs)	Subsurface Soil (>1.5 mbgs)					
Polychlorinated Biphenyl							
Aroclor 1016	NG	NG	<0.010	<0.010	<0.010	<0.050	<0.010
Aroclor 1221	NG	NG	<0.010	<0.010	<0.010	<0.050	<0.010
Aroclor 1232	NG	NG	<0.010	<0.010	<0.010	<0.050	<0.010
Aroclor 1242	NG	NG	<0.010	<0.010	<0.010	<0.050	<0.010
Aroclor 1248	NG	NG	<0.010	<0.010	<0.010	<0.050	<0.010
Aroclor 1254	NG	NG	<0.010	<0.010	<0.010	<0.050	<0.010
Aroclor 1260	NG	NG	<0.010	<0.010	<0.010	<0.050	<0.010
Aroclor 1262	NG	NG	<0.010	<0.010	<0.010	<0.050	<0.010
Aroclor 1268	NG	NG	<0.010	<0.010	<0.010	<0.050	<0.010
Total PCB	33[a]	33[a]	<0.010	<0.010	<0.010	<0.050	<0.010

Table Notes:

[a] Canadian Council of Ministers of the Environment (CCME) Soil Quality Guidelines (2014) - Commercial Land Use, Fine Grained Soils, Human Health Guideline Check Values 10^{-5} incremental risk

[b] CCME, Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil (2008) - Commercial Land Use, Fine Grained Soils

[c] Ontario MOECC Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (2011) - Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition

[d] Inhalation of indoor air (basement)

[e] Inhalation of Indoor Air (slab on grade)

[f] Soil Contact - Environmental Health

[g] Eco Soil Contact

[h] Management Limit

[i] Alberta Environment and Parks (AEP). 2019. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Land Policy Branch, Policy and Planning Division. 197 pp. - Table 1. Alberta Tier 1 Soil Remediation Guidelines - Fine grained soils, Commercial land use

< Denotes concentration less than reportable detection limit

- Denotes analysis not conducted

mg/kg milligram/kilogram

mbgs metres below ground surface

PHC petroleum hydrocarbon

NG Denotes no applicable guideline value

Units: all units milligrams per kilogram (mg/kg) unless otherwise specified

XX Reportable Detection Limit (RDL) exceeds the applicable guideline value

XX Exceeds applicable guideline value

Table 4-6: 2018 Soil Analytical Results - Metals

		APEC	Waste Oil UST			Car Wash UST	
		Sample Location	BH1			BH2	
		Sample Date	2018-07-13	2018-07-13	2018-07-13	2018-07-12	2018-07-12
		Sample ID	BH1_3.0_M3	BH1_3.0_DUP02_M3	BH1_4.5_M3	BH2_5.25_M3	BH2_6.75_M3
		Sample Depth (mbgs)	3	3	4.5	5.25	6.75
Parameter	**Guideline Values**						
	Surface Soil (≤1.5 mbgs)	**Subsurface Soil (>1.5 mbgs)**					
Metals							
Total Arsenic (As)	12[a]	12[a]	10	8.5	4.8	4.7	4.7
Total Barium (Ba)	2000[a]	2000[a]	200	200	130	120	130
Total Chromium (Cr)	87[a]	87[a]	41	36	30	27	27
Total Copper (Cu)	91[a]	91[a]	38	33	20	18	18
Total Lead (Pb)	260[a]	260[a]	16	14	8.7	9.7	8.2
Total Tin (Sn)	300[a]	300[a]	1.3	1.1	<1.0	<1.0	<1.0
Total Zinc (Zn)	410[a]	410[a]	96	81	49	43	42

Table Notes:

[a] Canadian Council of Ministers of the Environment (CCME) Soil Quality Guidelines (2014) - Commercial Land Use, Fine Grained Soils, Human Health Guideline Check Values 10^{-5} incremental risk

[b] CCME, Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil (2008) - Commercial Land Use, Fine Grained Soils

[c] Ontario MOECC Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (2011) - Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition

[d] Inhalation of indoor air (basement)

[e] Inhalation of Indoor Air (slab on grade)

[f] Soil Contact - Environmental Health

[g] Eco Soil Contact

[h] Management Limit

[i] Alberta Environment and Parks (AEP). 2019. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Land Policy Branch, Policy and Planning Division. 197 pp. - Table 1. Alberta Tier 1 Soil Remediation Guidelines - Fine grained soils, Commercial land use

< Denotes concentration less than reportable detection limit

- Denotes analysis not conducted

mg/kg milligram/kilogram

mbgs metres below ground surface

PHC petroleum hydrocarbon

NG Denotes no applicable guideline value

Units: all units milligrams per kilogram (mg/kg) unless otherwise specified

XX Reportable Detection Limit (RDL) exceeds the applicable guideline value

XX Exceeds applicable guideline value

Appendix A

Borehole and Test Pit Logs

PROJECT: Red River Esso (#60256A)	**GD ELEV.:** 99.386 m	**HOLE No.:** A
LOCATION: Selkirk, MB	**TPC ELEV.:** 99.253 m	**DRILL:** Backhoe

SAMPLE TYPE: SHELBY | SPLIT SPOON | CORE | DISTURBED | NO RECOVERY | OTHER

METRES	SOIL DESCRIPTION	SAMPLE TYPE	FEET	Vapour Concentrations ●%LEL ▲ppm (▲ 100 200 300 400 / ● 20 40 60 80)	N	OTHER TESTS
1	ASPHALT - 75 mm thick GRAVEL (FILL) - frozen CLAY - olive brown, silty, trace gravel, trace sand, trace limestone inclusions, moist, firm, medium plasticity		5	▲		
2				▲		
3			10	▲		
4	BOTTOM OF EXCAVATION AT 3.7 m. Monitoring piezometer installed to 3.7 m.		15			
5						
6			20			
7						
8			25			
9			30			

O'CONNOR ASSOCIATES	**DATE:** 89/02/28	**JOB No.:** 10-907.2
	LOGGED BY: APM	**DWG.No.:** A-1

PROJECT: Red River Esso (#60256A)	GD ELEV.: 99.400 m	HOLE No.: B
LOCATION: Selkirk, MB	TPC ELEV.: 99.343 m	DRILL: Backhoe

SAMPLE TYPE: SHELBY | SPLIT SPOON | CORE | DISTURBED | NO RECOVERY | OTHER

METRES	SOIL DESCRIPTION	SAMPLE TYPE	FEET	Vapour Concentrations ●% LEL ▲ppm (▲ 100 200 300 400; ● 20 40 60 80)	N	OTHER TESTS
1	ASPHALT - 75 mm thick GRAVEL (FILL) - frozen CLAY - olive brown, silty, trace gravel, trace sand, trace limestone inclusions, moist, firm, medium plasticity		5	▲		
2						
3			10	▲		
4				▲		
5	BOTTOM OF EXCAVATION AT 4.1 m. Monitoring piezometer installed to 4.1 m.		15			
6			20			
7						
8			25			
9			30			

O'CONNOR ASSOCIATES	DATE: 89/02/28	JOB No.: 10-907.2
	LOGGED BY: APM	DWG.No.: A-2

PROJECT: Red River Esso (#60256A)	**GD ELEV.:** 99.634 m	**HOLE No.:** C
LOCATION: Selkirk, MB	**TPC ELEV.:** 99.486 m	**DRILL:** Backhoe

SAMPLE TYPE: ☒ SHELBY ☒ SPLIT SPOON ▦ CORE ▯ DISTURBED ☒ NO RECOVERY ☐ OTHER

METRES	SOIL DESCRIPTION	SAMPLE TYPE	FEET	Vapour Concentrations ●%LEL ▲ppm (▲ 100 200 300 400; ● 20 40 60 80)	N	OTHER TESTS
1	ASPHALT - 75 mm thick		5			
	GRAVEL (FILL) - frozen					
	CLAY (FILL) - olive brown, silty, trace gravel, trace sand, trace limestone inclusions					
2	SAND (FILL) - gray, silty, some gravel, frozen, well graded, noticeable petroleum odour		10			
3	CLAY - olive brown, silty, trace gravel, trace sand, trace limestone inclusions, moist, firm, medium plasticity					
4			15			
5	BOTTOM OF EXCAVATION AT 4.6 m.					
	Monitoring piezometer installed to 4.6 m.					
6	Note: Two dry former vent lines were located in the sand fill.		20			
7						
			25			
8						
9			30			

O'CONNOR ASSOCIATES	**DATE:** 89/02/28	**JOB No.:** 10-907.2
	LOGGED BY: APM	**DWG.No.:** A-3

PROJECT: Red River Esso (#60256A)	**GD ELEV.:** 99.634 m	**HOLE No.:** D
LOCATION: Selkirk, MB	**TPC ELEV.:** 99.570 m	**DRILL:** Backhoe

SAMPLE TYPE: ☒ SHELBY ☒ SPLIT SPOON ▦ CORE ▯ DISTURBED ☒ NO RECOVERY ☐ OTHER

METRES	SOIL DESCRIPTION	SAMPLE TYPE	FEET	Vapour Concentrations ●% LEL ▲ppm (▲ 100 200 300 400 / ● 20 40 60 80)	N	OTHER TESTS
1	ASPHALT - 75 mm thick GRAVEL (FILL) - frozen CLAY - olive brown, silty, trace gravel, trace sand, trace limestone inclusions, moist, firm, medium plasticity		5	▲		
2				●		
3			10	●		
4				●		
	BOTTOM OF EXCAVATION AT 4.1 m. Monitoring piezometer installed to 4.1 m.		15			
5						
6			20			
7						
			25			
8						
9			30			

O'CONNOR ASSOCIATES	**DATE:** 89/02/28	**JOB No.:** 10-907.2
	LOGGED BY: APM	**DWG. No.:** A-4

PROJECT: Red River Esso (#60256A)	GD ELEV.: 99.659 m	HOLE No.: E
LOCATION: Selkirk, MB	TPC ELEV.: 99.536 m	DRILL: Backhoe

SAMPLE TYPE: SHELBY | SPLIT SPOON | CORE | DISTURBED | NO RECOVERY | OTHER

METRES	SOIL DESCRIPTION	SAMPLE TYPE	FEET	Vapour Concentrations ●% LEL ▲ppm (▲ 100 200 300 400; ● 20 40 60 80)	N	OTHER TESTS
1	ASPHALT - 75 mm thick GRAVEL (FILL) - frozen CLAY - olive brown, silty, trace gravel, trace sand, trace limestone inclusions, moist, firm, medium plasticity - noticeable petroleum odour		5	▲ ▲ ▲ ●		
2						
3			10			
4	BOTTOM OF EXCAVATION AT 3.7 m. Monitoring piezometer installed to 3.7 m.					
5			15			
6			20			
7						
8			25			
9			30			

O'CONNOR ASSOCIATES	DATE: 89/02/28	JOB No.: 10-907.2
	LOGGED BY: APM	DWG. No.: A-5

PROJECT: Red River Esso Service Station	GD ELEV.: 99.665 m	HOLE No.: BH1
LOCATION: Selkirk, MB (#60256A)	TPC ELEV.: 99.539 m	DRILL: Auger

SAMPLE TYPE: SHELBY | SPLIT SPOON | CORE | DISTURBED | NO RECOVERY | OTHER

METRES	SOIL DESCRIPTION	SAMPLE TYPE	FEET	Vapour Concentrations ●%LEL ▲ppm (▲ 100 200 300 400 / ● 20 40 60 80)	N	OTHER TESTS
1	SILT (TOPSOIL) - dark brown, some clay, organics, damp		5			
2	CLAY - light grayish brown, silty, damp, firm - light olive brown, trace silt, silt inclusions, dry to damp, firm, laminated - stiff below 1.7 m, fractured - moist below 2.6 m		10			
3						
4	- olive brown, trace sand, occasional gravel, moist, soft, medium plasticity, laminated		15			
5	- grayish brown, silty, gravelly, oxidized, laminated		20			
6	END OF HOLE AT 6.1 m. Monitoring piezometer installed to 6.1 m.					
7			25			
8						
9			30			

O'CONNOR ASSOCIATES	DATE: 88/11/11	JOB No.: 10-907
	LOGGED BY: GMD	DWG. No.: A-1

PROJECT: Red River Esso Service Station	GD ELEV.: 99.510 m	HOLE No.: BH2
LOCATION: Selkirk, MB (60256A)	TPC ELEV.: 99.410 m	DRILL: Auger

SAMPLE TYPE: ⊘ SHELBY ⊠ SPLIT SPOON ▦ CORE ▯ DISTURBED ⊘ NO RECOVERY ☐ OTHER

METRES	SOIL DESCRIPTION	SAMPLE TYPE	FEET	Vapour Concentrations ●%LEL ▲ppm (▲ 100 200 300 400 / ● 20 40 60 80)	N	OTHER TESTS
	SILT (TOPSOIL) - dark brown, organics, some clay, damp					
1	CLAY - olive brown, silty, damp, firm, fractured, laminated		5			
	- trace silt below 1.2 m					
2						
	- moist below 2.4 m		10			
3	- silt inclusions and firm below 3.0 m					
4						
	- trace gravel, moist, soft, laminated		15			
5						
6	- grayish brown, moist, soft		20			
	END OF HOLE AT 6.1 m.					
7	Monitoring piezometer installed to 6.1 m.		25			
8						
9			30			

O'CONNOR ASSOCIATES	DATE: 88/11/11	JOB No.: 10-907
	LOGGED BY: GMD	DWG. No.: A-2

PROJECT: Red River Esso Service Station	GD ELEV.: 99.392 m	HOLE No.: BH3
LOCATION: Selkirk, MB (#60256A)	TPC ELEV.: 99.274 m	DRILL: Auger

SAMPLE TYPE: SHELBY | SPLIT SPOON | CORE | DISTURBED | NO RECOVERY | OTHER

METRES	SOIL DESCRIPTION	SAMPLE TYPE	FEET	Vapour Concentrations ●%LEL ▲ppm (▲ 100 200 300 400 / ● 20 40 60 80)	N	OTHER TESTS
	SILT (TOPSOIL) - dark brown and black, organics, some clay, damp					
1	CLAY - olive brown, trace silt, trace gravel, stiff, fractured, laminated		5			
2	- moist and firm below 2.1 m					
3	- some silt and damp below 3.0 m		10			
4						
5			15			
6	- gray, silty		20			
	END OF HOLE AT 6.1 m.					
	Monitoring piezometer installed to 6.1 m.					
7			25			
8						
9			30			

O'CONNOR ASSOCIATES	DATE: 88/11/11	JOB No.: 10-907
	LOGGED BY: GMD	DWG.No.: A-3

PROJECT: Red River Esso Service Station	GD ELEV.: 99.611 m	HOLE No.: BH4
LOCATION: Selkirk, MB (#60256A)	TPC ELEV.: 99.491 m	DRILL: Auger

SAMPLE TYPE: SHELBY | SPLIT SPOON | CORE | DISTURBED | NO RECOVERY | OTHER

METRES	SOIL DESCRIPTION	SAMPLE TYPE	FEET	Vapour Concentrations ●% LEL ▲ppm (▲ 100 200 300 400 / ● 20 40 60 80)	N	OTHER TESTS
0	SILT (TOPSOIL) - dark brown, organics, some clay, damp					
1	CLAY - olive brown, silty, damp, stiff, laminated					
	- fractured below 1.5 m		5			
2	- moist and firm below 2.1 m					
3	- noticeable petroleum odour at 3.0 m		10			
4	- grayish brown, some gravel, damp, firm					
	- stiff below 4.6 m		15			
5	- trace gravel, trace silt inclusions					
6	SILT - grayish brown, gravelly		20			
	END OF HOLE AT 6.2 m.					
7	Monitoring piezometer installed to 6.1 m.		25			
8						
9			30			

O'CONNOR ASSOCIATES	DATE: 88/11/11	JOB No.: 10-907
	LOGGED BY: GMD	DWG. No.: A-4

PROJECT: Red River Esso Service Station	GD ELEV.:	HOLE No.: BH5
LOCATION: Selkirk, MB (#60256A)	TPC ELEV.:	DRILL: Auger

SAMPLE TYPE: ☒ SHELBY ☒ SPLIT SPOON ▦ CORE ▥ DISTURBED ▨ NO RECOVERY ☐ OTHER

METRES	SOIL DESCRIPTION	SAMPLE TYPE	FEET	Vapour Concentrations ●%LEL ▲ppm (▲ 100 200 300 400 / ● 20 40 60 80)	N	OTHER TESTS
0	SAND AND GRAVEL (FILL) - light brown, some silt, some clay, damp, soft					
1	CLAY - dark brown and black, silty, organics, damp					
	- olive brown, trace silt, damp, stiff, fractured, laminated	☒	5			
2	- very stiff below 1.8 m					
	- stiff below 2.4 m					
	- firm below 3.0 m	☒	10			
3	- olive brown, silt inclusions, moist, fractured					
4						
		☒	15			
5	- grayish brown, laminated, silt lenses, some gravel, damp, stiff					
	- olive brown, trace gravel, silt inclusions, moist, firm	☒				
6			20			
	END OF HOLE AT 6.1 m.					
	Monitoring piezometer installed to 6.1 m.					
7			25			
8						
9			30			

O'CONNOR ASSOCIATES	DATE: 88/11/11	JOB No.: 10-907
	LOGGED BY: GMD	DWG. No.: A-5

PROJECT: Red River Esso Service Station	GD ELEV.: 99.762 m	HOLE No.: BH6
LOCATION: Selkirk, MB (#60256A)	TPC ELEV.: 99.698 m	DRILL: Auger

SAMPLE TYPE: SHELBY | SPLIT SPOON | CORE | DISTURBED | NO RECOVERY | OTHER

METRES	SOIL DESCRIPTION	SAMPLE TYPE	FEET	Vapour Concentrations ●%LEL ▲ppm (▲ 100 200 300 400 / ● 20 40 60 80)	N	OTHER TESTS
0	ASPHALT (25 mm)		0			
	CONCRETE (75 mm)					
1	GRAVEL (FILL) - light reddish brown, oxidized, sandy, some silt, damp, dense, frozen to 0.3 m					
	SILT - dark olive brown with black mottling, some clay, moist, firm, laminated		5			
2						
	CLAY - dark olive brown, oxidized, moist, very stiff, medium plasticity, laminated					
3			10			
	- becoming moister with depth					
4	- wet below 2.1 m, fractured					
	- trace sand and silt lenses below 3.3 m		15			
5	- water seepage at 4.6 m					
6	- dark gray		20			
	END OF HOLE AT 6.2 m.					
7	Monitoring piezometer installed to 6.1 m.		25			
8						
9			30			

O'CONNOR ASSOCIATES	DATE: 88/12/06	JOB No.: 10-907
	LOGGED BY: GJB	DWG. No.: A-6

PROJECT: Red River Esso Service Station	GD ELEV.: 99.699 m	HOLE No.: BH7
LOCATION: Selkirk, MB (#60256A)	TPC ELEV.: 99.741 m	DRILL: Auger

SAMPLE TYPE: ☒ SHELBY ☒ SPLIT SPOON ▦ CORE ▯ DISTURBED ▨ NO RECOVERY ☐ OTHER

METRES	SOIL DESCRIPTION	SAMPLE TYPE	FEET	Vapour Concentrations ●%LEL ▲ppm (▲ 100 200 300 400 / ● 20 40 60 80)	N	OTHER TESTS
0	ASPHALT (50 mm)					
	GRAVEL (FILL) - light reddish brown, oxidized, sandy, some silt, damp, dense, frozen to 0.3 m					
1						
	SILT - olive brown, oxidized, some clay, trace sand, firm, wet		5			
2						
	CLAY - dark olive brown, oxidized, some silt, moist, very stiff, medium plasticity, fractured					
3	- water seepage at 3.0 m		10			
	- trace sand and silt lenses					
4						
			15			
5	- light brown, silty, some sand, trace cobbles, wet, dense, laminae below 3.0 m					
6			20			
	END OF HOLE AT 6.2 m.					
	Monitoring piezometer installed to 6.1 m.					
7						
			25			
8						
9			30			

O'CONNOR ASSOCIATES	DATE: 88/12/06	JOB No.: 10-907
	LOGGED BY: GJB	DWG. No.: A-7

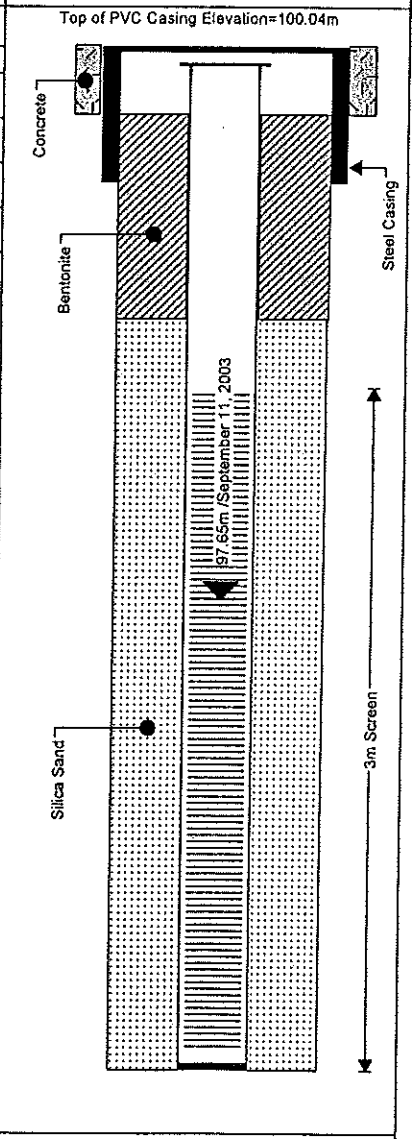
Borehole/Monitoring Well ID: MW-32

Project No.: 03937
Client: Imperial Oil Limited
Location: Red River Esso (860265)
Date Completed: August 15, 2003
Site Datum: West Bolt on Lightpost

ATSI Supervisor: B. Kohlsmith
Drilling Method: Auger (Split Spoon)
Borehole Diameter: 15cm
Monitoring Well Diameter: 5cm

Drilling Company: Paddock Drilling
Drilling Equipment: Hollow Stem Auger
Well Casing: 5cm PVC Solid Pipe
Well Screen: 5cm PVC Slotted Pipe
OVM: Gastech 1238 ME

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	LOCATION	OVM (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
0 / 0							GROUND SURFACE	100.12
							ASPHALT	
							dry, yellow, loose SAND FILL; gravelly	100.00
1 / 2		MW32-1		25 ppmv			damp, grey, very stiff CLAY FILL; gravelly, some silt	
3 / 4	6-5-7	MW32-2		25 ppmv	50		grey SILT; clayey, some sand, trace gravel	99.00
5 / 6	3-5-6	MW32-3		10 ppmv	50		sand seam (2cm thickness) moist, greyish-brown, stiff CLAY; silty, trace gravel	
7 / 8	3-6-6	MW32-4		50 ppmv	75		light brown	98.00
9 / 10	3-3-5	MW32-5		20 ppmv	100			97.00
11 / 12	5-5-5	MW32-6		<5 ppmv	100			96.00
13 / 14								
15							End of Hole at 4.6m	



MONITORING WELL CONSTRUCTION / BOREHOLE BACKFILL DETAILS

(1) Blow count per 0.15 m
(2) Organic Vapour Meter (OVM) reading

The data represented in this borehole log requires interpretation by Aqua Terre personnel. Third parties using this log do so at their own risk.

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

♦ = Sample submitted for laboratory analysis

Soil samples MW32-4 and MW32-6 were submitted for laboratory analyses of CCME -PHC (Fractions 1-4 plus BTEX) and lead.

Borehole/Monitoring Well ID: MW-33

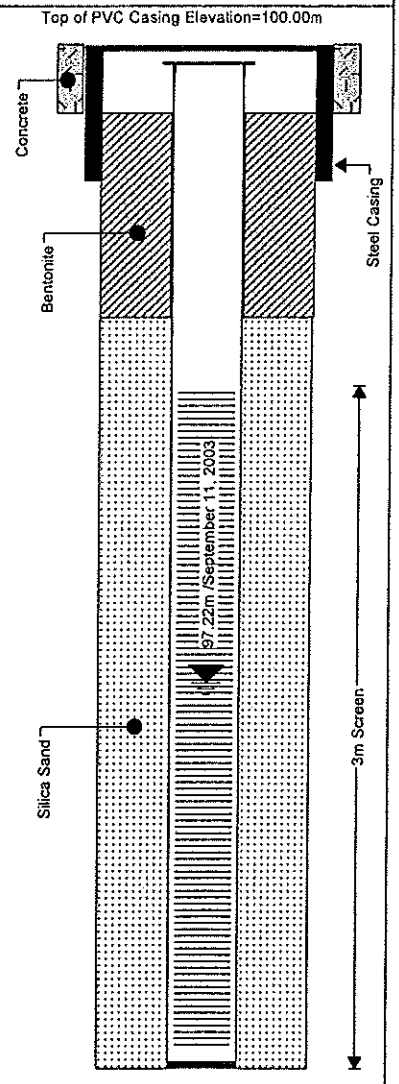
Project No.: 03937
Client: Imperial Oil Limited
Location: Red River Esso (860265)
Date Completed: August 15, 2003
Site Datum: West Bolt on Lightpost

ATSI Supervisor: B. Kohlsmith
Drilling Method: Auger (Split Spoon)
Borehole Diameter: 15cm
Monitoring Well Diameter: 5cm

Drilling Company: Paddock Drilling
Drilling Equipment: Hollow Stem Auger
Well Casing: 5cm PVC Solid Pipe
Well Screen: 5cm PVC Slotted Pipe
OVM: Gastech 1238 ME

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	LOCATION	OVM (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
0							GROUND SURFACE	100.07
0							ASPHALT	
1		MW33-1		25 ppmv			yellow, coarse grained SAND; gravelly	
2								
3	1	MW33-2		5 ppmv				
4							damp, black, firm SILT; sandy, trace gravel	99.00
5								
6	3-4-4	MW33-3		20 ppmv	75		damp, grey, stiff CLAY; silty, trace sand some discontinuous black staining	98.00
7	2							
8								
9	2-2-5	MW33-4		25 ppmv	30		moist, brown, stiff SILT; sandy, trace clay some black staining	
10	3						moist, brown, stiff CLAY; silty	97.00
11	1-2-3	MW33-5		25 ppmv	100			
12								
13	4							96.00
14	1-2-4	MW33-6		25 ppmv	100			
15							End of Hole at 4.6m	

MONITORING WELL CONSTRUCTION / BOREHOLE BACKFILL DETAILS



(1) Blow count per 0.15 m
(2) Organic Vapour Meter (OVM) reading

The data represented in this borehole log requires interpretation by Aqua Terre personnel. Third parties using this log do so at their own risk.

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

♦ = Sample submitted for laboratory analysis

Soil samples MW33-4 and MW33-5 were submitted for laboratory analyses of CCME -PHC (Fractions 1-4 plus BTEX) and lead.

Borehole/Monitoring Well ID: MW-34

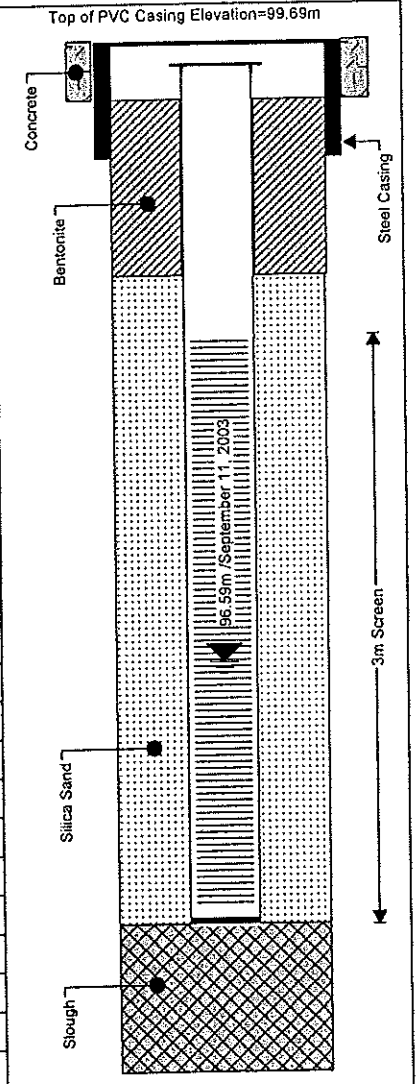
Project No.: 03937
Client: Imperial Oil Limited
Location: Red River Esso (860265)
Date Completed: August 15, 2003
Site Datum: West Bolt on Lightpost

ATSI Supervisor: B. Kohlsmith
Drilling Method: Auger (Split Spoon)
Borehole Diameter: 15cm
Monitoring Well Diameter: 5cm

Drilling Company: Paddock Drilling
Drilling Equipment: Hollow Stem Auger
Well Casing: 5cm PVC Solid Pipe
Well Screen: 5cm PVC Slotted Pipe
OVM: Gastech 1238 ME

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	LOCATION	OVM (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
							GROUND SURFACE	99.80
0							ASPHALT	
1		MW34-1		60 ppmv			yellow SAND; gravelly	
2								
3 / 1		MW34-2		60 ppmv				99.00
4							greyish-black, firm SILT; clayey, some sand, trace gravel	
5							damp, grey, very stiff CLAY; silty	
6 / 2	4-5-8	MW34-3		125 ppmv	75			98.00
7								
8	2-3-4	MW34-4		45% LEL	100			
9								
10 / 3	2-2-3	MW34-5		16% LEL	100			97.00
11								
12								
13 / 4	4-5-8	MW34-6		400 ppmv	100		some sand	
14								96.00
15								
16 / 5	3-4-5	MW34-7		50 ppmv	100		brown SILT; clayey, some sand	
17								95.00
18							End of Hole at 5.3m	

MONITORING WELL CONSTRUCTION / BOREHOLE BACKFILL DETAILS



(1) Blow count per 0.15 m
(2) Organic Vapour Meter (OVM) reading

The data represented in this borehole log requires interpretation by Aqua Terre personnel. Third parties using this log do so at their own risk.

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

♦ = Sample submitted for laboratory analysis

Soil samples MW34-4, MW34-6 and MW34-7 were submitted for laboratory analyses of CCME -PHC (Fractions 1-4 plus BTEX) and lead.

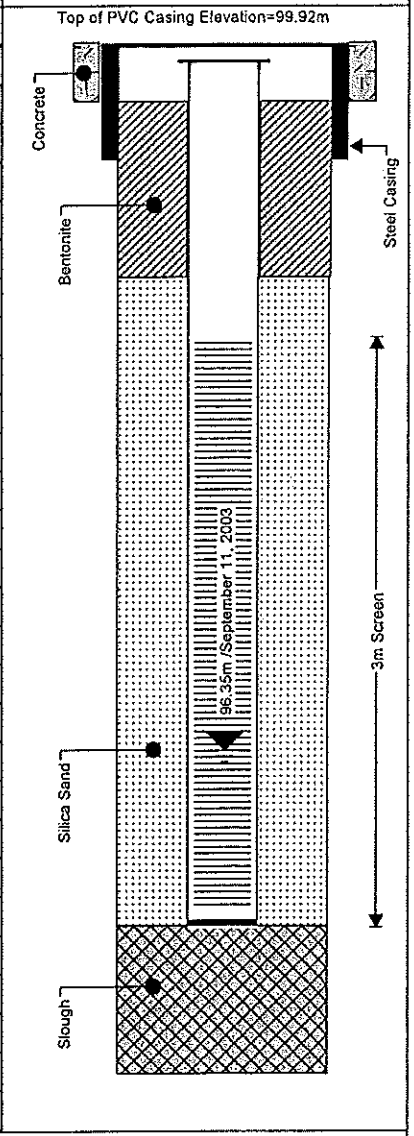
Borehole/Monitoring Well ID: MW-35

Project No.: 03937
Client: Imperial Oil Limited
Location: Red River Esso (860265)
Date Completed: August 15, 2003
Site Datum: West Bolt on Lightpost

ATSI Supervisor: B. Kohlsmith
Drilling Method: Auger (Split Spoon)
Borehole Diameter: 15cm
Monitoring Well Diameter: 5cm

Drilling Company: Paddock Drilling
Drilling Equipment: Hollow Stem Auger
Well Casing: 5cm PVC Solid Pipe
Well Screen: 5cm PVC Slotted Pipe
OVM: Gastech 1238 ME

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	LOCATION	OVM (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
							GROUND SURFACE	100.01
0							ASPHALT	
1		MW35-1		100 ppmv			yellow SAND FILL; gravelly damp, greyish-black, very stiff SILT; clayey, some sand, trace gravel	
2								
3	6-6-7	MW35-2		75 ppmv	10			99.00
4								
5							damp, brownish-grey, very stiff CLAY; silty, some sand reddish	
6	4-5-6	MW35-3		125 ppmv	75			98.00
7								
8								
9	3-4-5	MW35-4		200 ppmv	100			
10								97.00
11	3-3-4	MW35-5		6% LEL	100			
12								
13	3-3-3	MW35-6		125 ppmv	100		some sand	96.00
14								
15							moist, brown, stiff SILT; sandy, some coal and clay, trace gravel	
16	3-4-6	MW35-7		100 ppmv	100		medium grained sand seam (7.5cm thickness)	95.00
17								
18							End of Hole at 5.3m	



MONITORING WELL CONSTRUCTION / BOREHOLE BACKFILL DETAILS

(1) Blow count per 0.15 m
(2) Organic Vapour Meter (OVM) reading

The data represented in this borehole log requires interpretation by Aqua Terre personnel. Third parties using this log do so at their own risk.

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

♦ = Sample submitted for laboratory analysis

Soil samples MW35-5 and MW35-6 were submitted for laboratory analyses of CCME -PHC (Fractions 1-4 plus BTEX) and lead. Soil sample MW35-3 was submitted for grain size analysis.

Borehole/Monitoring Well ID: MW-36

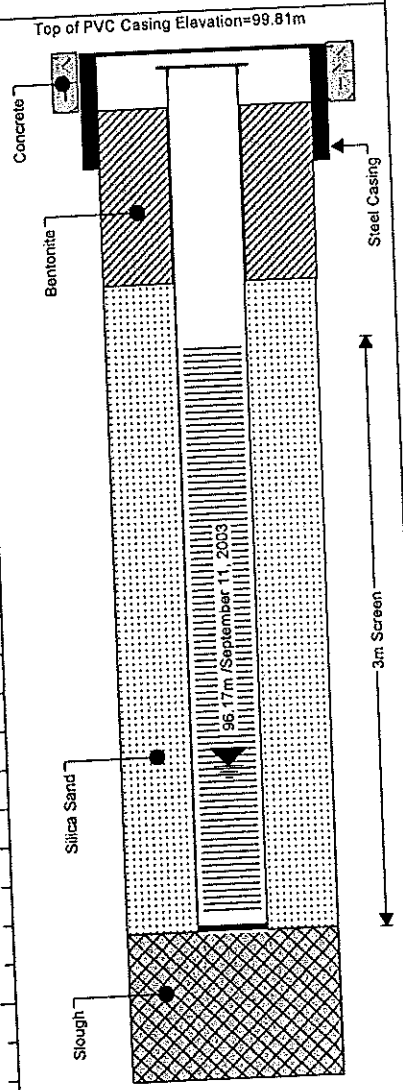
Project No.: 03937
Client: Imperial Oil Limited
Location: Red River Esso (860265)
Date Completed: August 15, 2003
Site Datum: West Bolt on Lightpost

ATSI Supervisor: B. Kohlsmith
Drilling Method: Auger (Split Spoon)
Borehole Diameter: 15cm
Monitoring Well Diameter: 5cm

Drilling Company: Paddock Drilling
Drilling Equipment: Hollow Stem Auger
Well Casing: 5cm PVC Solid Pipe
Well Screen: 5cm PVC Slotted Pipe
OVM: Gastech 1238 ME

DEPTH (m)	BLOW COUNT (1)	SAMPLE ID	LOCATION	OVM (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
0							GROUND SURFACE	99.89
0							ASPHALT	
1		MW36-1		70 ppmv			yellow SAND FILL; gravelly	
2								
3	1	MW36-2		225 ppmv				
4							green SAND; silty, some clay, trace gravel	99.00
5							damp, greyish-black, very stiff CLAY; silty, trace sand	
6	2	4-5-7	MW36-3	100 ppmv	45			
7								98.00
8		3-4-4	MW36-4	6% LEL	100			
9								
10	3	3-3-4	MW36-5	20% LEL	100			97.00
11								
12								
13	4	2-3-4	MW36-6	150 ppmv	100		sand interbeds (<1cm thickness)	96.00
14								
15								
16	5	3-4-6	MW36-7	60 ppmv	100			95.00
17								
18							End of Hole at 5.3m	

MONITORING WELL CONSTRUCTION / BOREHOLE BACKFILL DETAILS



(1) Blow count per 0.15 m
(2) Organic Vapour Meter (OVM) reading

The data represented in this borehole log requires interpretation by Aqua Terre personnel. Third parties using this log do so at their own risk.

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

♦ = Sample submitted for laboratory analysis

Soil samples MW36-5 and MW36-6 were submitted for laboratory analyses of CCME -PHC (Fractions 1-4 plus BTEX) and lead.

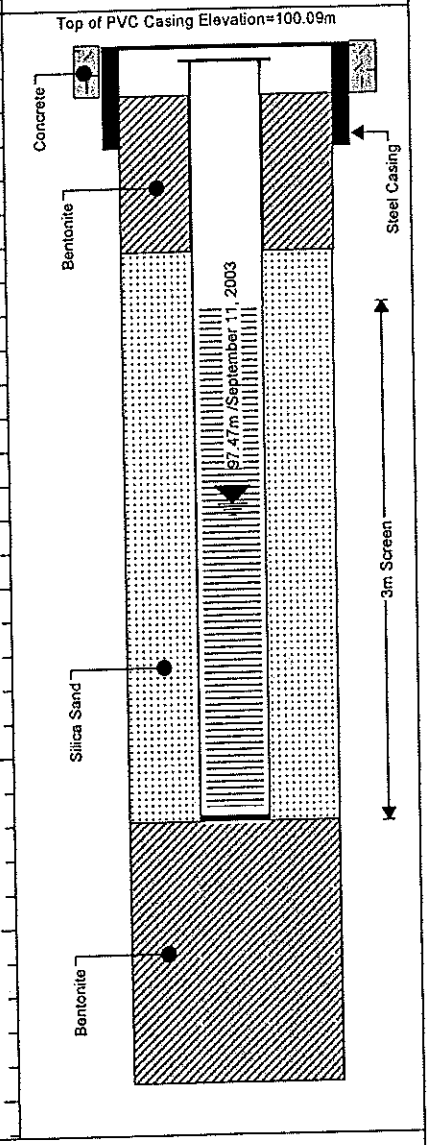
Borehole/Monitoring Well ID: MW-37

Project No.: 03937
Client: Imperial Oil Limited
Location: Red River Esso (860265)
Date Completed: August 15, 2003
Site Datum: West Bolt on Lightpost

ATSI Supervisor: B. Kohlsmith
Drilling Method: Auger (Split Spoon)
Borehole Diameter: 15cm
Monitoring Well Diameter: 5cm

Drilling Company: Paddock Drilling
Drilling Equipment: Hollow Stem Auger
Well Casing: 5cm PVC Solid Pipe
Well Screen: 5cm PVC Slotted Pipe
OVM: Gastech 1238 ME

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	LOCATION	OVM (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
							GROUND SURFACE	100.17
							ASPHALT	
0								100.00
1		MW37-1		70 ppmv			dry to damp, greyish-black, firm SAND; silty, some gravel some black staining	
2								
3	1	MW37-2		60 ppmv				99.00
4								
5							dry to damp, grey, very stiff SILT; clayey, trace gravel	
6		3-6-7	MW37-3	70 ppmv	50		dry to damp, greyish-brown, very stiff CLAY; silty, trace gravel	
7	2							98.00
8		4-5-5	MW37-4	150 ppmv	75			
9								
10	3	2-3-5	MW37-5	300 ppmv	100			
11								97.00
12								
13	4	2-3-4	MW37-6	9% LEL	100			
14								
15							moist, light brown, firm SILT TILL; clayey, some sand, trace gravel and coal fragments	96.00
16	5	4-5-5	MW37-7	6% LEL	100			
17								
18		2-3-3	MW37-8	75 ppmv	100		medium grained sand interbed (10cm thickness)	95.00
19	6							
20							End of Hole at 6.1m	94.00



MONITORING WELL CONSTRUCTION / BOREHOLE BACKFILL DETAILS

(1) Blow count per 0.15 m
(2) Organic Vapour Meter (OVM) reading

The data represented in this borehole log requires interpretation by Aqua Terre personnel. Third parties using this log do so at their own risk.

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

♦ = Sample submitted for laboratory analysis

Soil samples MW37-6, MW37-7 and MW37-8 were submitted for laboratory analyses of CCME -PHC (Fractions 1-4 plus BTEX) and lead.

Borehole/Monitoring Well ID: MW-38

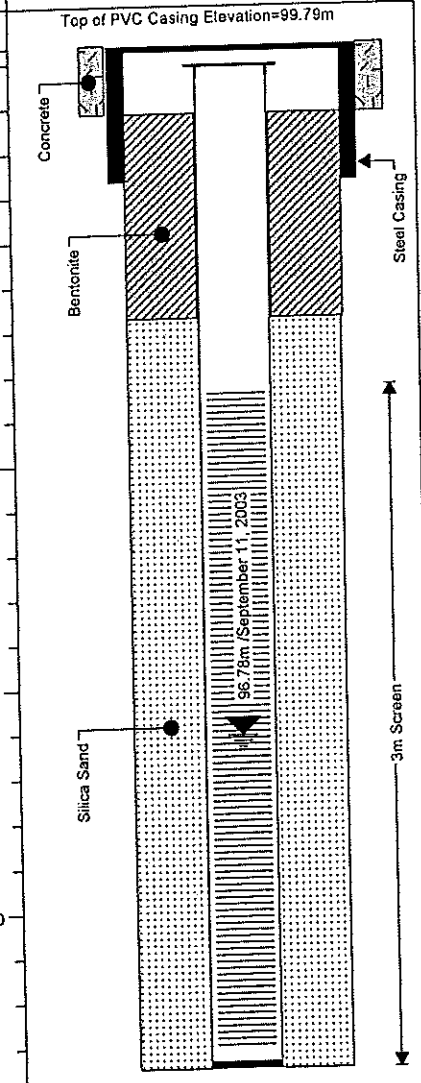
Project No.: 03937
Client: Imperial Oil Limited
Location: Red River Esso (860265)
Date Completed: August 15, 2003
Site Datum: West Bolt on Lightpost

ATSI Supervisor: B. Kohlsmith
Drilling Method: Auger (Split Spoon)
Borehole Diameter: 15cm
Monitoring Well Diameter: 5cm

Drilling Company: Paddock Drilling
Drilling Equipment: Hollow Stem Auger
Well Casing: 5cm PVC Solid Pipe
Well Screen: 5cm PVC Slotted Pipe
OVM: Gastech 1238 ME

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	LOCATION	OVM (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
							GROUND SURFACE	99.87
0							ASPHALT	
							yellow, loose SAND FILL; gravelly	
1		MW38-1		75 ppmv			damp, black, stiff SILT; sandy, some clay, trace gravel	
2								
3	1	MW38-2		130 ppmv				99.00
4								
5							damp, grey, very stiff CLAY; silty, some sand	
6		4-6-7	MW38-3	75 ppmv	50			98.00
7	2							
8		3-4-4	MW38-4	25 ppmv	100			
9								97.00
10	3							
11		3-4-4	MW38-5	30 ppmv	100			
12								96.00
13	4							
14		3-4-6	MW38-6	<5 ppmv	100			
15							End of Hole at 4.6m	

MONITORING WELL CONSTRUCTION / BOREHOLE BACKFILL DETAILS



(1) Blow count per 0.15 m
(2) Organic Vapour Meter (OVM) reading

The data represented in this borehole log requires interpretation by Aqua Terre personnel. Third parties using this log do so at their own risk.

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

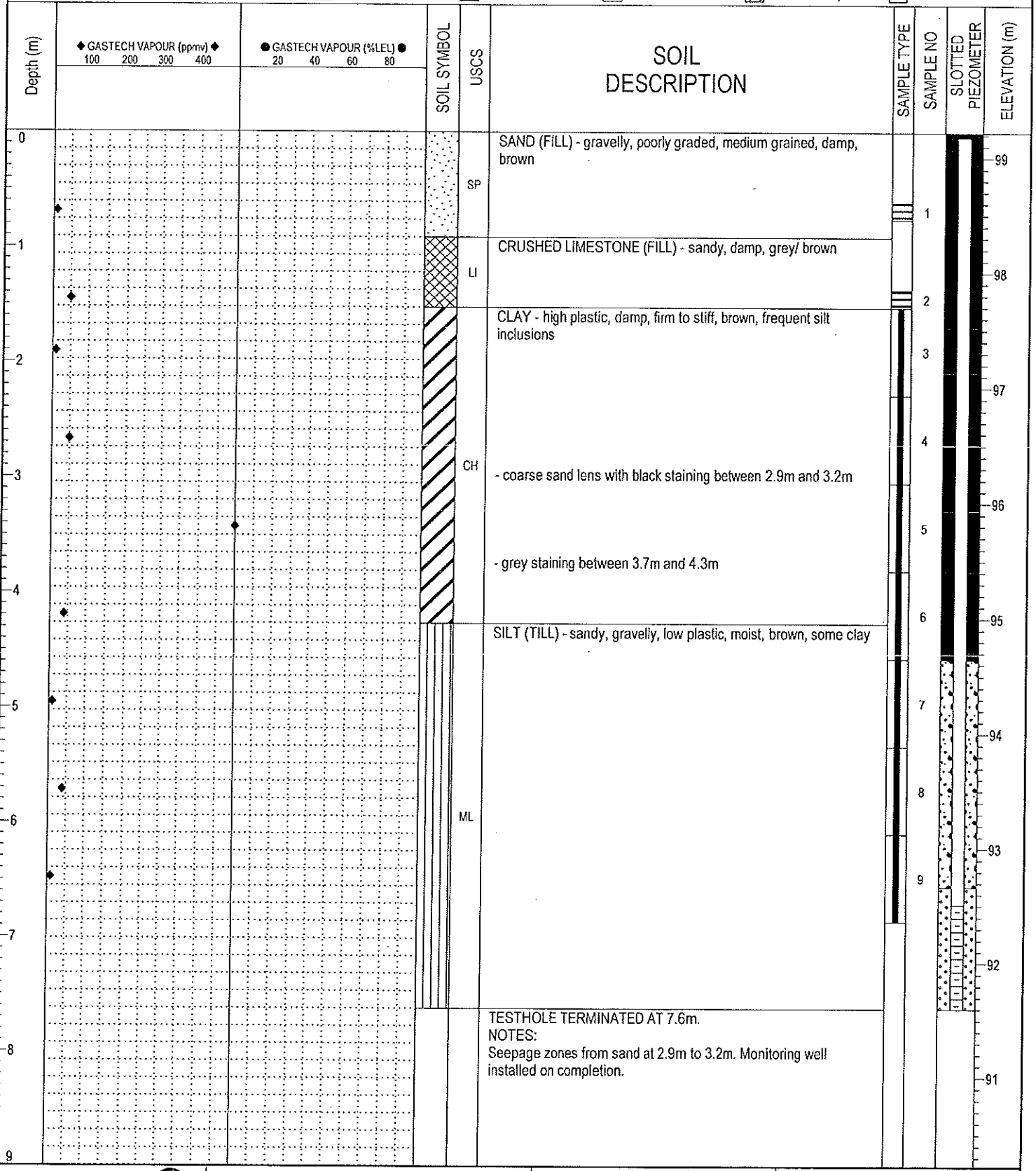
♦ = Sample submitted for laboratory analysis

Soil samples MW38-2, MW38-3 and MW38-5 were submitted for laboratory analyses of CCME -PHC (Fractions 1-4 plus BTEX) and lead. Soil sample MW38-4 was submitted for grain size analysis.

CLIENT: Imperial Oil Limited	PROJECT: Intrusive Assessment	BOREHOLE NO: **04-01**
DRILLER: Maple Leaf	LOCATION: 287 Main Street Selkirk, MB	PROJECT NO: WX05876
DRILL/METHOD: HSA		ELEVATION: 99.22 m

SAMPLE TYPE: Shelby Tube; No Recovery; SPT Test (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Bentonite Chips; Sand



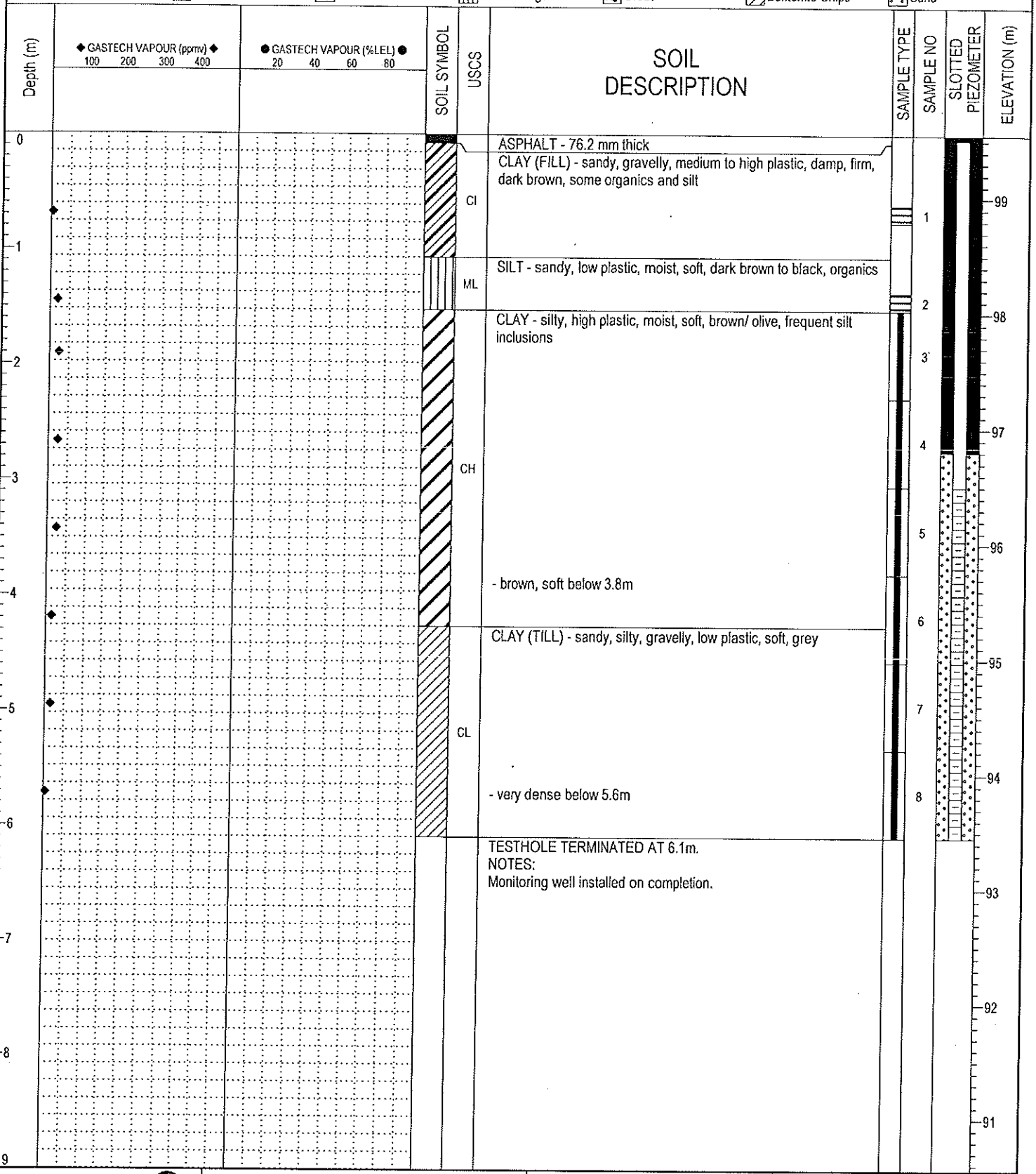
amec	AMEC Earth & Environmental Winnipeg, Manitoba	LOGGED BY: AH	COMPLETION DEPTH: 7.6 m
		REVIEWED BY: AD	COMPLETION DATE: 5 August 2004
		Fig. No: 2	Page 1 of 1

5876 - SELKIRK.GPJ 04/09/29 02:21 PM (IMPERIAL OIL 2)

CLIENT: Imperial Oil Limited	PROJECT: Intrusive Assessment	BOREHOLE NO: **04-03**
DRILLER: Maple Leaf	LOCATION: 287 Main Street Selkirk, MB	PROJECT NO: WX05876
DRILL/METHOD: HSA		ELEVATION: 99.55 m

SAMPLE TYPE: Shelby Tube; No Recovery; SPT Test (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Bentonite Chips; Sand



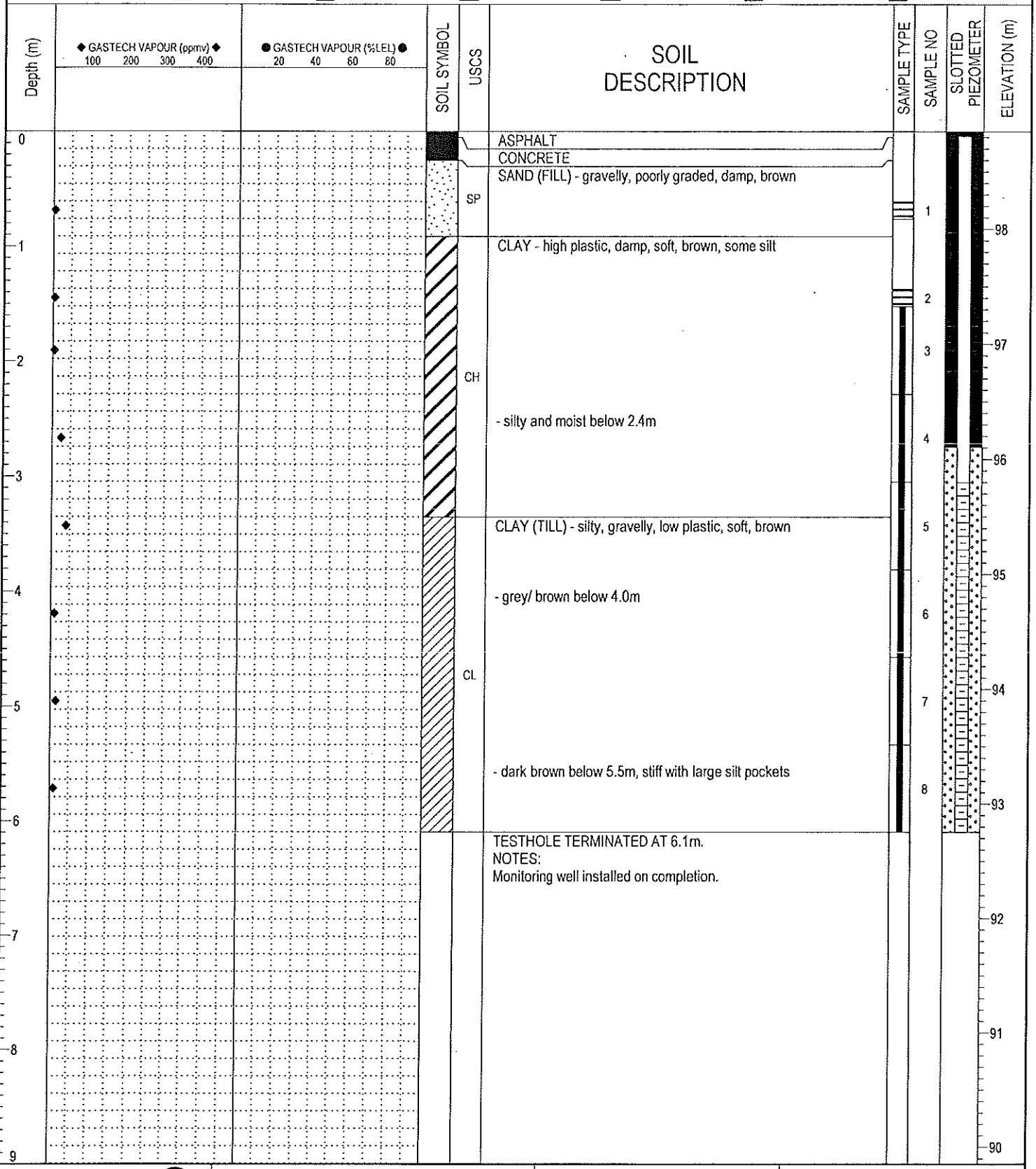
amec	AMEC Earth & Environmental Winnipeg, Manitoba	LOGGED BY: AH	COMPLETION DEPTH: 6.1 m
		REVIEWED BY: AD	COMPLETION DATE: 4 August 2004
		Fig. No: 4	Page 1 of 1

5876- SELKIRK.GPJ 04/09/29 02:21 PM (IMPERIAL OIL 2)

CLIENT: Imperial Oil Limited	PROJECT: Intrusive Assessment	BOREHOLE NO: **04-05**
DRILLER: Maple Leaf	LOCATION: 287 Main Street Selkirk, MB	PROJECT NO: WX05876
DRILL/METHOD: HSA		ELEVATION: 98.85 m

SAMPLE TYPE: Shelby Tube; No Recovery; SPT Test (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Bentonite Chips; Sand



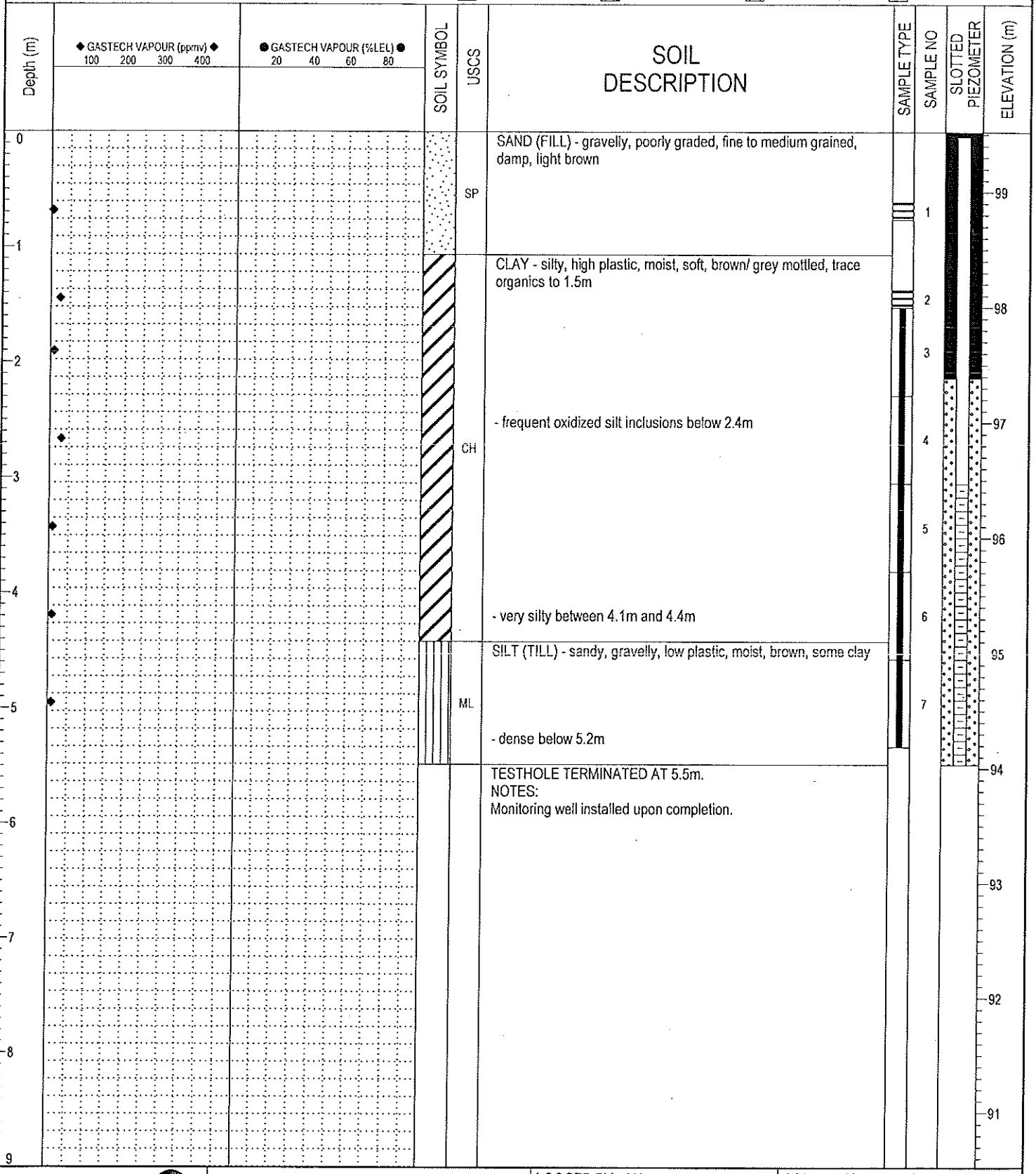
amec	AMEC Earth & Environmental Winnipeg, Manitoba	LOGGED BY: AH	COMPLETION DEPTH: 6.1 m
		REVIEWED BY: AD	COMPLETION DATE: 6 August 2004
		Fig. No: 6	Page 1 of 1

5876- SELKIRK.GPJ 04/09/29 02:22 PM (IMPERIAL OIL 2)

CLIENT: Imperial Oil Limited	PROJECT: Intrusive Assessment	BOREHOLE NO: **04-07**
DRILLER: Maple Leaf	LOCATION: 287 Main Street Selkirk, MB	PROJECT NO: WX05876
DRILL/METHOD: HSA		ELEVATION: 99.52 m

SAMPLE TYPE: Shelby Tube; No Recovery; SPT Test (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Bentonite Chips; Sand



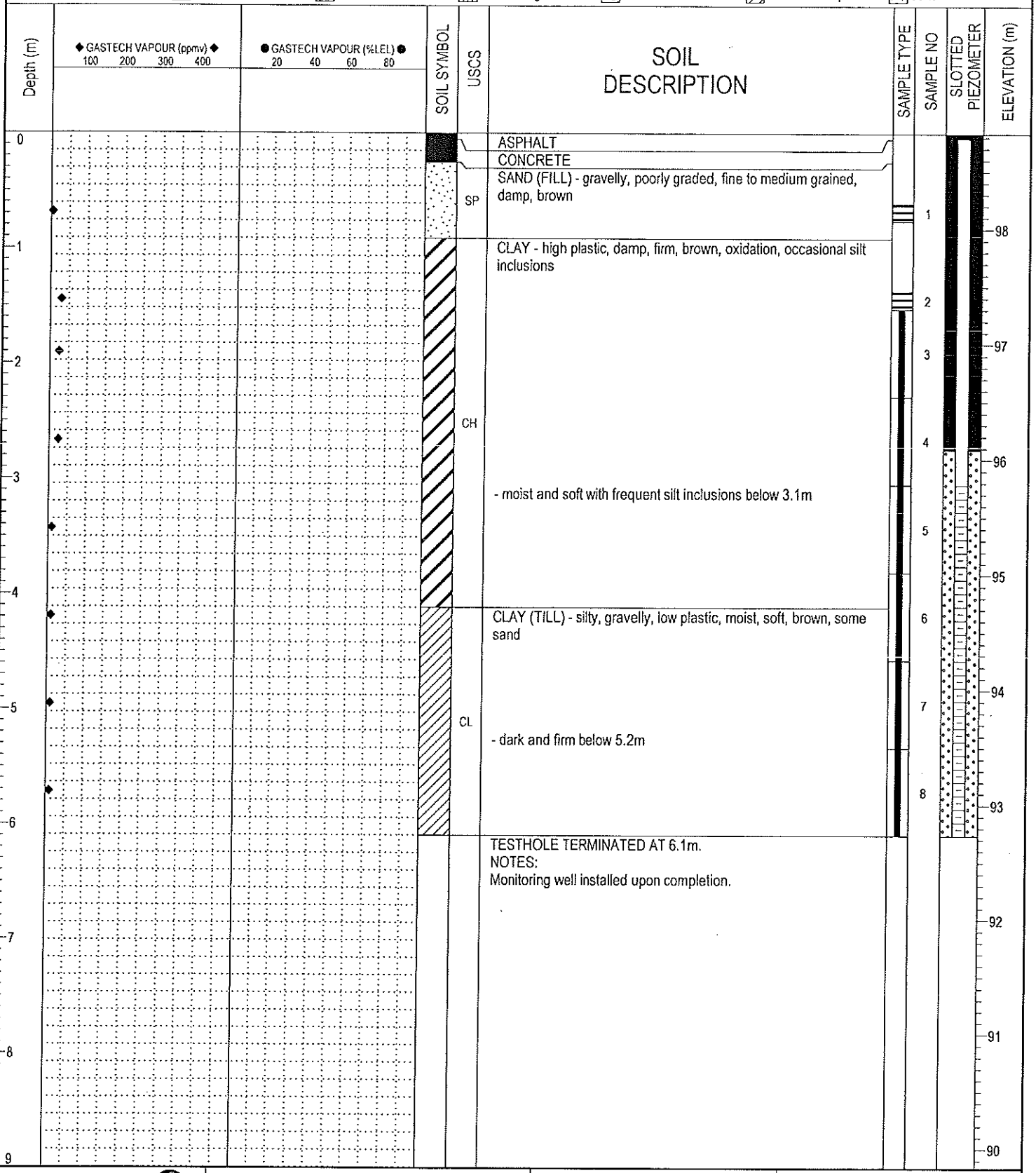
amec	AMEC Earth & Environmental Winnipeg, Manitoba	LOGGED BY: AH	COMPLETION DEPTH: 5.5 m
		REVIEWED BY: AD	COMPLETION DATE: 4 August 2004
		Fig. No: 8	Page 1 of 1

5876- SELKIRK.GPJ 04/09/29 02:22 PM (IMPERIAL OIL 2)

CLIENT: Imperial Oil Limited	PROJECT: Intrusive Assessment	BOREHOLE NO: **04-09**
DRILLER: Maple Leaf	LOCATION: 287 Main Street Selkirk, MB	PROJECT NO: WX05876
DRILL/METHOD: HSA		ELEVATION: 98.83 m

SAMPLE TYPE: Shelby Tube; No Recovery; SPT Test (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Bentonite Chips; Sand



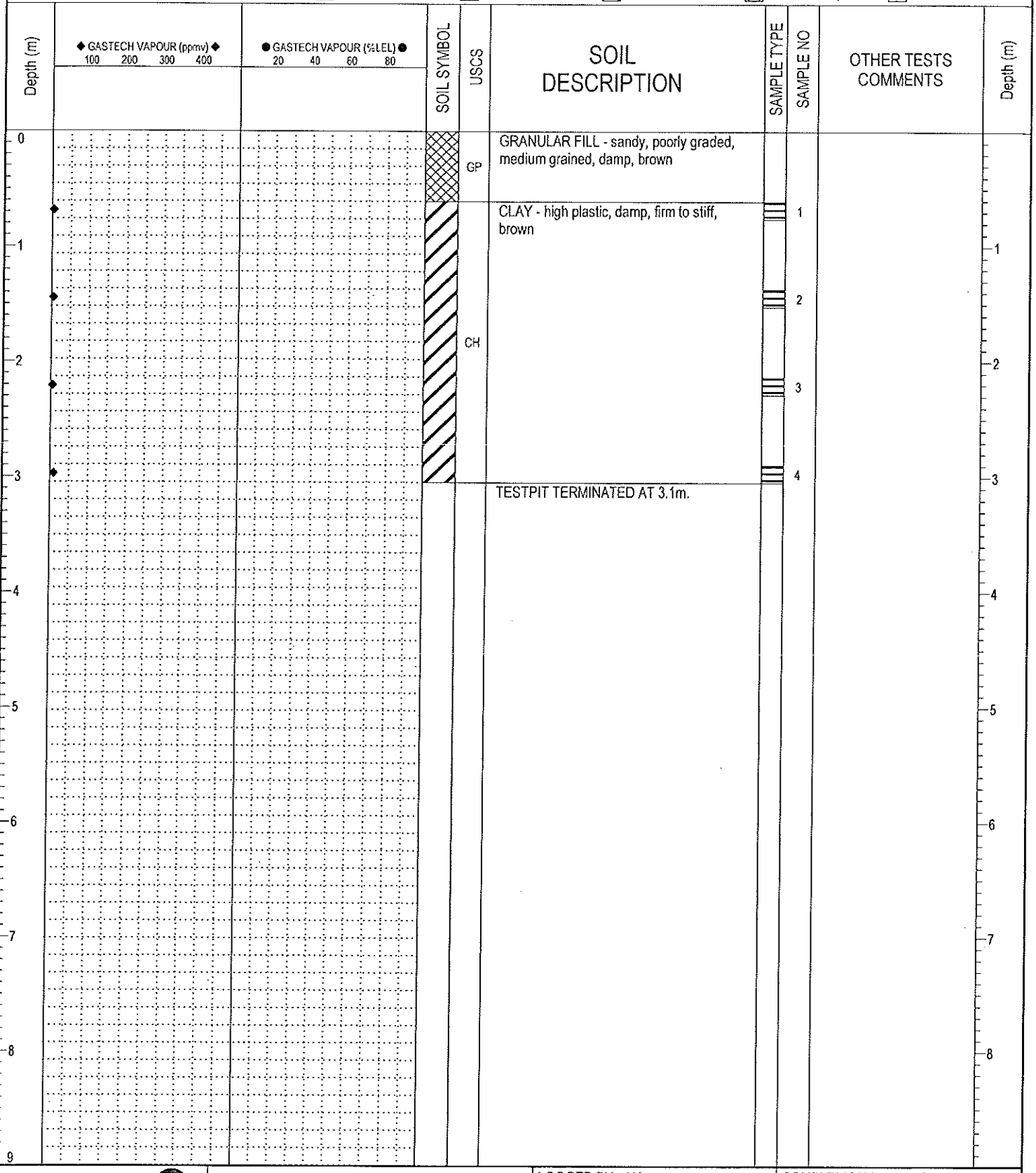
amec	AMEC Earth & Environmental Winnipeg, Manitoba	LOGGED BY: AH	COMPLETION DEPTH: 6.1 m
		REVIEWED BY: AD	COMPLETION DATE: 6 August 2004
		Fig. No: 10	Page 1 of 1

5876- SELKIRK.GPJ 04/09/29 02:22 PM (IMPERIAL OIL 2)

CLIENT: Imperial Oil Limited	PROJECT: Testpit Program	BOREHOLE NO: TP1
DRILLER: Hazco	LOCATION: 287 Main Street Selkirk, MB	PROJECT NO: WX05876
DRILL/METHOD: Backhoe		ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT Test (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Bentonite Chips; Sand



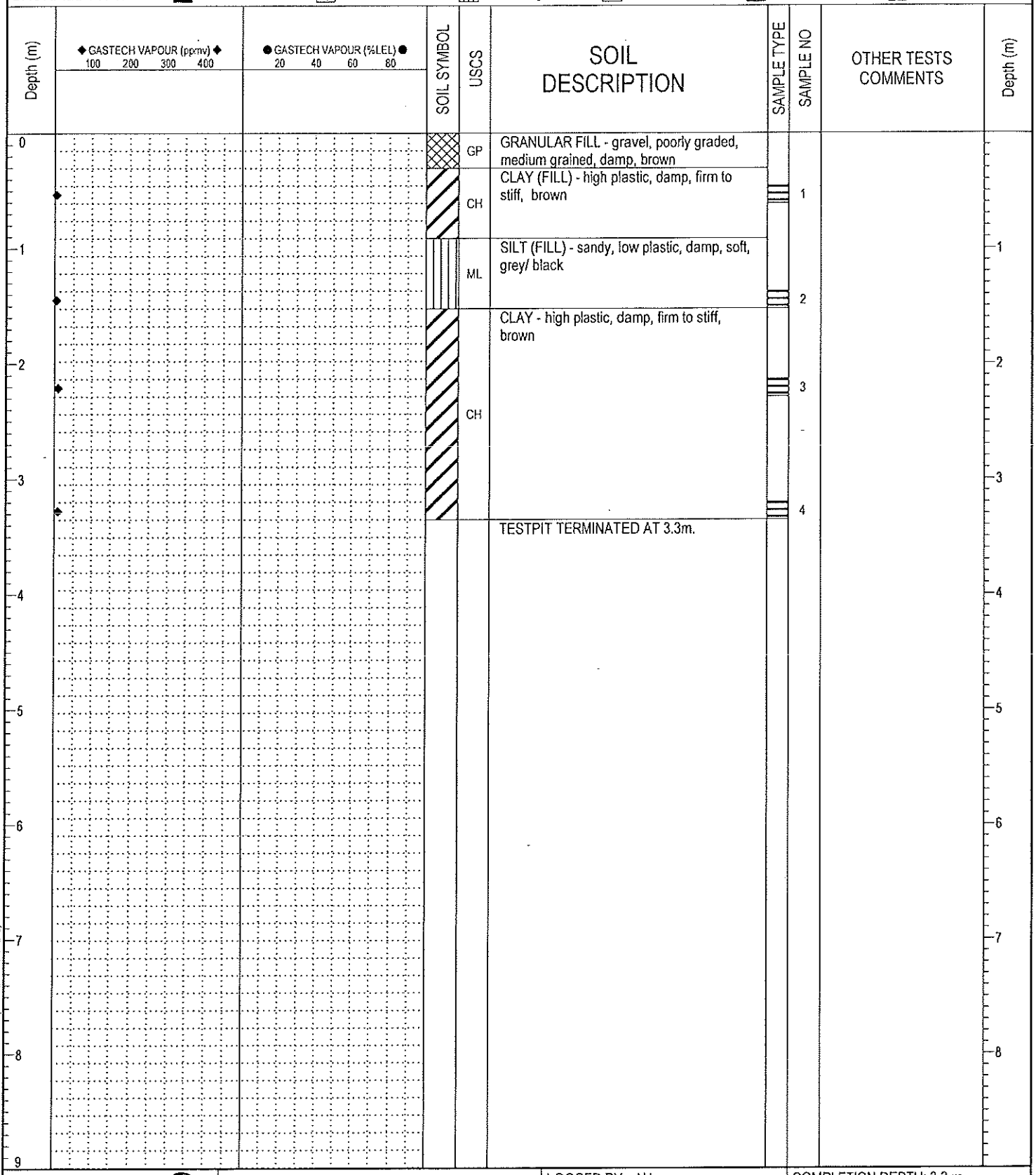
amec	AMEC Earth & Environmental Winnipeg, Manitoba	LOGGED BY: AH	COMPLETION DEPTH: 3 m
		REVIEWED BY: AD	COMPLETION DATE: 16 July 2004
		Fig. No: 2	Page 1 of 1

5876-TESTPITS.GPJ 04/09/29 02:24 PM (IMPERIAL OIL 2)

CLIENT: Imperial Oil Limited	PROJECT: Testpit Program	BOREHOLE NO: TP3
DRILLER: Hazco	LOCATION: 287 Main Street Selkirk, MB	PROJECT NO: WX05876
DRILL/METHOD: Backhoe		ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT Test (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Bentonite Chips; Sand



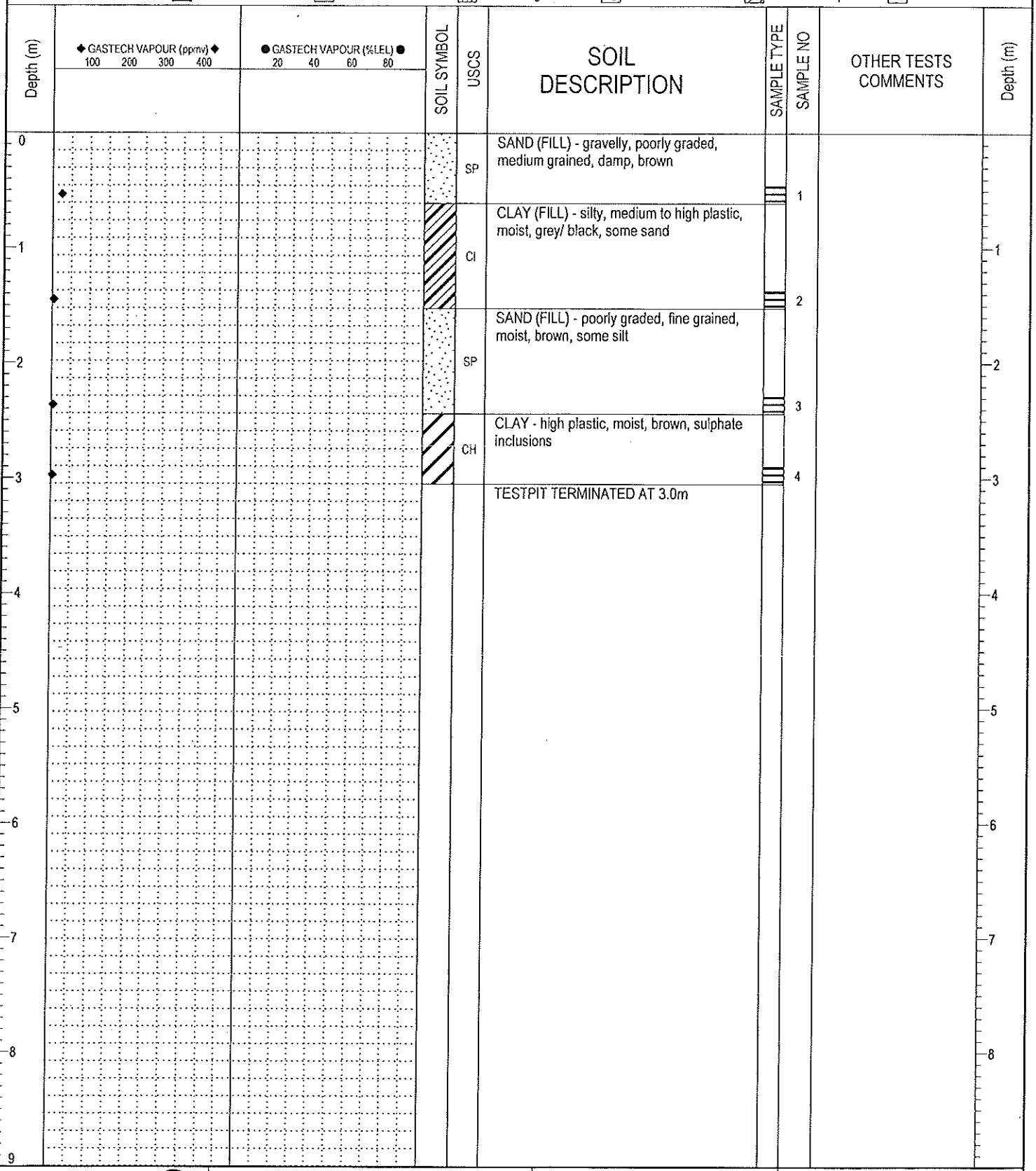
amec	AMEC Earth & Environmental Winnipeg, Manitoba	LOGGED BY: AH
		REVIEWED BY: AD
		Fig. No: 4
		COMPLETION DEPTH: 3.3 m
		COMPLETION DATE: 16 July 2004
		Page 1 of 1

5876- TESTPITS.GPJ 04/09/29 02:24 PM (IMPERIAL OIL 2)

CLIENT: Imperial Oil Limited	PROJECT: Testpit Program	BOREHOLE NO: **TP5**
DRILLER: Hazco	LOCATION: 287 Main Street Selkirk, MB	PROJECT NO: WX05876
DRILL/METHOD: Backhoe		ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT Test (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Bentonite Chips; Sand



amec	AMEC Earth & Environmental Winnipeg, Manitoba	LOGGED BY: AH	COMPLETION DEPTH: 3 m
		REVIEWED BY: AD	COMPLETION DATE: 16 July 2004
		Fig. No: 6	Page 1 of 1

5876- TESTPITS.GPJ 04/09/29 02:25 PM (IMPERIAL OIL 2)

TEST PIT LOG

TEST PIT LOCATION: 287 Main Street, Selkirk, Manitoba	REF. NO: 10-907T07	TEST PIT NO: **TP-7**
CLIENT: Imperial Oil		START DATE: 2013/08/01
SAMPLE TYPE: G - Grab OS - Other		COMPLETION DATE: 2013/08/01
		PAGE 1 of 1

Depth (m)	DESCRIPTION STRATIGRAPHY	SAMPLING SAMPLE TYPE	ZONE TESTED	LAB SAMPLE NAME/ LAB ANALYSES	▲ SOIL VAPOUR CONCENTRATION (ppmv) 100 200 300 400	COMMENTS	Depth (ft)
0	GROUND SURFACE ASPHALT. GRAVEL (Fill) - brown, coarse grained, some sand, trace silt, trace clay, moist.	G			▲		0
1	CLAY - dark gray, some silt, trace sand, moist.	G			▲		
		G			▲		5
2	- brown below 1.8 m. - mottled gray from 1.8 m to 4.3 m.	G		TP-7-1.8-2.4 (DUP-7) / BTEX, PHC F1-F4, PAH, Sel-Metals, 1,2-DBA, 1,2-DCA, glycols	▲		
		G		TP-7-2.4-3.1 / BTEX, PHC F1-F4, PAH, Sel-Metals, 1,2-DBA, 1,2-DCA, glycols	▲	Test Pit backfilled with excavated material which was replaced in the original order and then nominally compacted with the excavator bucket.	
3		G			▲		10
4		G			▲		
	- trace gravel below 4.3 m.	G		TP-7-4.3-4.9 / BTEX, PHC F1-F4, PAH, Sel-Metals, 1,2-DBA, 1,2-DCA, glycols	▲		15
5	END OF TEST PIT at 4.9 m No Daylighting Performed						
6							20
7							
8							25
9							

START DATE	START DEPTH	EQUIPMENT	CONTRACTOR	GAS METER TYPE: RKI Eagle		
2013/08/01	0.0 m	Hitachi 200LC Track Excavator	Main Line Industries Ltd.	LOGGED: ATK	REVIEW: KAF	DRAFTED: MLM

PARSONS

TEST PIT LOG

TEST PIT LOCATION: 287 Main Street, Selkirk, Manitoba	REF. NO: 10-907T07	TEST PIT NO: **TP-8**
CLIENT: Imperial Oil		START DATE: 2013/08/01
SAMPLE TYPE: G - Grab OS - Other		COMPLETION DATE: 2013/08/01
		PAGE 1 of 1

Depth (m)	DESCRIPTION STRATIGRAPHY	SAMPLING SAMPLE TYPE	ZONE TESTED	LAB SAMPLE NAME/ LAB ANALYSES	▲ SOIL VAPOUR CONCENTRATION (ppmv) 100 200 300 400	COMMENTS	Depth (ft)
0	GROUND SURFACE ASPHALT. GRAVEL (Fill) - brown, coarse grained, sandy, some silt, trace clay, moist.	G					0
1	CLAY - dark gray, some silt, trace sand, moist.	G					5
		G					
2	- brown below 1.8 m.	G		TP-8-1.8-2.4 / BTEX, PHC F1-F4, PAH, Sel-Metals, 1,2-DBA, 1,2-DCA, glycols			
	- mottled gray from 2.4 m to 3.7 m.	G				Test Pit backfilled with excavated material which was replaced in the original order and then nominally compacted with the excavator bucket.	
3		G					10
4		G					
	- grayish brown, trace gravel below 4.3 m.	G		TP-8-4.3-4.9 / BTEX, PHC F1-F4, PAH, Sel-Metals, 1,2-DBA, 1,2-DCA, glycols			15
5	END OF TEST PIT at 4.9 m No Daylighting Performed						
6							20
7							
8							25
9							

START DATE	START DEPTH	EQUIPMENT	CONTRACTOR	GAS METER TYPE: RKI Eagle		
2013/08/01	0.0 m	Hitachi 200LC Track Excavator	Main Line Industries Ltd.	LOGGED: ATK	REVIEW: KAF	DRAFTED: MLM

PARSONS

TEST PIT LOG

TEST PIT LOCATION: 287 Main Street, Selkirk, Manitoba	REF. NO: 10-907T07	TEST PIT NO: **TP-9**
CLIENT: Imperial Oil		START DATE: 2013/08/01
SAMPLE TYPE: G - Grab OS - Other		COMPLETION DATE: 2013/08/01
		PAGE 1 of 1

Depth (m)	DESCRIPTION STRATIGRAPHY	SAMPLING SAMPLE TYPE	ZONE TESTED	LAB SAMPLE NAME/ LAB ANALYSES	▲ SOIL VAPOUR CONCENTRATION (ppmv) 100 200 300 400	COMMENTS	Depth (ft)
0	GROUND SURFACE						0
	GRAVEL (Fill) - grayish brown, medium grained, sandy, trace silt, trace clay, moist.	G			▲		
	SILT - grayish brown, some clay, trace gravel, trace sand, moist.						
1		G			▲		
		G			▲		5
2		G		TP-9-1.8-2.4 / BTEX, PHC F1-F4, PAH, Sel-Metals, 1,2-DBA, 1,2-DCA, glycols	▲		
	CLAY - brown, some silt, trace sand, moist.	G			▲	Test Pit backfilled with excavated material which was replaced in the original order and then nominally compacted with the excavator bucket.	
3		G			▲		10
	- grayish brown, trace gravel below 3.7 m.	G			▲		
4		G			▲		
	END OF TEST PIT at 4.9 m						15
5	No Daylighting Performed						
6							20
7							
8							25
9							

START DATE	START DEPTH	EQUIPMENT	CONTRACTOR	GAS METER TYPE: RKI Eagle		
2013/08/01	0.0 m	Hitachi 200LC Track Excavator	Main Line Industries Ltd.	LOGGED: ATK	REVIEW: KAF	DRAFTED: MLM

PARSONS

TEST PIT LOG

TEST PIT LOCATION: 287 Main Street, Selkirk, Manitoba	REF. NO: 10-907T07	TEST PIT NO: **TP-10**
CLIENT: Imperial Oil		START DATE: 2013/08/01
SAMPLE TYPE: G - Grab OS - Other		COMPLETION DATE: 2013/08/01
		PAGE 1 of 1

Depth (m)	DESCRIPTION STRATIGRAPHY	SAMPLING SAMPLE TYPE	ZONE TESTED	LAB SAMPLE NAME/ LAB ANALYSES	▲ SOIL VAPOUR CONCENTRATION (ppmv) 100 200 300 400	COMMENTS	Depth (ft)
0	GROUND SURFACE ASPHALT.	G			▲		0
	GRAVEL (Fill) - brown, medium grained, sandy, some silt, some clay, damp.						
1	SAND (Fill) - brown, medium to fine grained, trace silt, trace clay, damp.	G			▲		
	CLAY - brown, some silt, trace sand, moist.	G			▲		5
2		G		TP-10-1.8-2.4 / BTEX, PHC F1-F4, PAH, Sel-Metals, 1,2-DBA, 1,2-DCA, glycols	▲		
		G			▲	Test Pit backfilled with excavated material which was replaced in the original order and then nominally compacted with the excavator bucket.	10
3		G			▲		
		G			▲		
4		G			▲		15
5	END OF TEST PIT at 4.9 m No Daylighting Performed						
6							20
7							
8							25
9							

START DATE	START DEPTH	EQUIPMENT	CONTRACTOR	GAS METER TYPE: RKI Eagle		
2013/08/01	0.0 m	Hitachi 200LC Track Excavator	Main Line Industries Ltd.	LOGGED: ATK	REVIEW: KAF	DRAFTED: MLM

PARSONS

TEST PIT LOG

TEST PIT LOCATION: 287 Main Street, Selkirk, Manitoba	REF. NO: 10-907T07	TEST PIT NO: **TP-11**
CLIENT: Imperial Oil		START DATE: 2013/08/01
SAMPLE TYPE: G - Grab OS - Other		COMPLETION DATE: 2013/08/01
		PAGE 1 of 1

Depth (m)	DESCRIPTION STRATIGRAPHY	SAMPLING SAMPLE TYPE	ZONE TESTED	LAB SAMPLE NAME/ LAB ANALYSES	▲ SOIL VAPOUR CONCENTRATION (ppmv) 100 200 300 400	COMMENTS	Depth (ft)
0	GROUND SURFACE ASPHALT.						0
	SAND (Fill) - brown, coarse to fine grained, some gravel, some silt, trace cobbles, moist.	G			▲		
1	SILT - grayish brown, some clay, trace gravel, trace sand, wet.	G			▲		5
		G			▲	Test Pit backfilled with excavated material which was replaced in the original order and then nominally compacted with the excavator bucket.	
2	CLAY - grayish brown, some silt, trace gravel, trace sand, moist, mottled gray below 1.8 m.	G		TP-11-1.8-2.4 / BTEX, PHC F1-F4, Lead, 1,2-DBA, 1,2-DCA	▲		10
	END OF TEST PIT at 2.4 m No Daylighting Performed						
3							
4							15
5							
6							20
7							
8							25
9							

START DATE	START DEPTH	EQUIPMENT	CONTRACTOR	GAS METER TYPE: RKI Eagle		
2013/08/01	0.0 m	Hitachi 200LC Track Excavator	Main Line Industries Ltd.	LOGGED: ATK	REVIEW: KAF	DRAFTED: MLM

PARSONS

TEST PIT LOG

TEST PIT LOCATION: 287 Main Street, Selkirk, Manitoba	REF. NO: 10-907T07	TEST PIT NO: **TP-12**
CLIENT: Imperial Oil		START DATE: 2013/08/01
SAMPLE TYPE: G - Grab OS - Other		COMPLETION DATE: 2013/08/01
		PAGE 1 of 1

Depth (m)	DESCRIPTION STRATIGRAPHY	SAMPLING SAMPLE TYPE	ZONE TESTED	LAB SAMPLE NAME/ LAB ANALYSES	▲ SOIL VAPOUR CONCENTRATION (ppmv) 100 200 300 400	COMMENTS	Depth (ft)
0	GROUND SURFACE ASPHALT.						0
	GRAVEL (Fill) - light brown, coarse to fine grained, some sand, trace silt, damp.	G			▲		
1	ORGANIC SILT - black, some clay, trace sand, moist.	G			▲		
	SILT - grayish brown, trace gravel, trace sand, moist.	G			▲		5
2	CLAY - brown, trace sand, trace silt, moist.	G		TP-12-1.8-2.4 / Grain Size	▲		
		G			▲	Test Pit backfilled with excavated material which was replaced in the original order and then nominally compacted with the excavator bucket.	
3		G		TP-12-3.1-3.7 / BTEX, PHC F1-F4, Lead, 1,2-DBA, 1,2-DCA	▲		10
4		G		TP-12-3.7-4.3 / Grain Size	▲		
		G			▲		15
5	END OF TEST PIT at 4.9 m No Daylighting Performed						
6							20
7							
8							25
9							

START DATE	START DEPTH	EQUIPMENT	CONTRACTOR	GAS METER TYPE: RKI Eagle		
2013/08/01	0.0 m	Hitachi 200LC Track Excavator	Main Line Industries Ltd.	LOGGED: ATK	REVIEW: KAF	DRAFTED: MLM

PARSONS

TEST PIT LOG

TEST PIT LOCATION: 287 Main Street, Selkirk, Manitoba	REF. NO: 10-907T07	TEST PIT NO: **TP-13**
CLIENT: Imperial Oil		START DATE: 2013/08/01
SAMPLE TYPE: G - Grab OS - Other		COMPLETION DATE: 2013/08/01
		PAGE 1 of 1

Depth (m)	DESCRIPTION STRATIGRAPHY	SAMPLING SAMPLE TYPE	ZONE TESTED	LAB SAMPLE NAME/ LAB ANALYSES	▲ SOIL VAPOUR CONCENTRATION (ppmv) 100 200 300 400	◆ SOIL VAPOUR CONCENTRATION (%LEL) 20 40 60 80	COMMENTS	Depth (ft)
0	GROUND SURFACE ASPHALT. GRAVEL (Fill) - light brown, coarse grained, some sand, some silt, damp.	G			▲			0
1	ORGANIC SILT - black, some clay, trace gravel, trace sand, moist.	G			▲			
	SILT - brown, trace sand, trace clay, moist.	G			▲			5
2	- grayish brown, clayey, trace gravel, trace sand, damp.	G		TP-13-1.8-2.4 / BTEX, PHC F1-F4, Lead, 1,2-DBA, 1,2-DCA		◆		
		G			▲		Test Pit backfilled with excavated material which was replaced in the original order and then nominally compacted with the excavator bucket.	10
3	CLAY - brown, some silt, trace gravel, trace sand, moist, mottled gray from 3.0 m to 4.9 m.	G		TP-13-3.1-3.7 / BTEX, PHC F1-F4, Lead, 1,2-DBA, 1,2-DCA		◆		
4		G				◆		
		G		TP-13-4.3-4.9 / BTEX, PHC F1-F4, Lead, 1,2-DBA, 1,2-DCA		◆		15
5	END OF TEST PIT at 4.9 m No Daylighting Performed							
6								20
7								
8								25
9								

START DATE	START DEPTH	EQUIPMENT	CONTRACTOR	GAS METER TYPE: RKI Eagle		
2013/08/01	0.0 m	Hitachi 200LC Track Excavator	Main Line Industries Ltd.	LOGGED: ATK	REVIEW: KAF	DRAFTED: MLM

PARSONS

TEST PIT LOG

TEST PIT LOCATION: 287 Main Street, Selkirk, Manitoba	REF. NO: 10-907T07	TEST PIT NO: **TP-14**
CLIENT: Imperial Oil		START DATE: 2013/08/02
SAMPLE TYPE: G - Grab OS - Other		COMPLETION DATE: 2013/08/02
		PAGE 1 of 1

Depth (m)	DESCRIPTION STRATIGRAPHY	SAMPLING SAMPLE TYPE	ZONE TESTED	LAB SAMPLE NAME/ LAB ANALYSES	▲ SOIL VAPOUR CONCENTRATION (ppmv) 100 200 300 400	COMMENTS	Depth (ft)
0	GROUND SURFACE						0
	GRAVEL (Fill) - light brown, coarse grained, some sand, some silt, damp.						
	SAND (Fill) - brown, trace gravel, damp.	G			▲		
1	GRAVEL (Fill) - brown, coarse to fine grained, some sand, trace silt, damp.	G		TP-14-0.6-1.2 / BTEX, PHC F1-F4, Lead, 1,2-DBA, 1,2-DCA	▲		
		G			▲	Test Pit backfilled with excavated material which was replaced in the original order and then nominally compacted with the excavator bucket.	5
2		G			▲		
	END OF TEST PIT at 2.4 m						
	No Daylighting Performed						
3							10
4							
							15
5							
6							20
7							
							25
8							
9							

START DATE	START DEPTH	EQUIPMENT	CONTRACTOR	GAS METER TYPE: RKI Eagle		
2013/08/02	0.0 m	Hitachi 200LC Track Excavator	Main Line Industries Ltd.	LOGGED: ATK	REVIEW: KAF	DRAFTED: MLM

PARSONS

TEST PIT LOG

TEST PIT LOCATION: 287 Main Street, Selkirk, Manitoba	REF. NO: 10-907T07	TEST PIT NO: **TP-15**
CLIENT: Imperial Oil		START DATE: 2013/08/02
SAMPLE TYPE: G - Grab OS - Other		COMPLETION DATE: 2013/08/02
		PAGE 1 of 1

Depth (m)	DESCRIPTION STRATIGRAPHY	SAMPLING SAMPLE TYPE	ZONE TESTED	LAB SAMPLE NAME/ LAB ANALYSES	▲ SOIL VAPOUR CONCENTRATION (ppmv) 100 200 300 400	COMMENTS	Depth (ft)
0	GROUND SURFACE ASPHALT.						0
	GRAVEL (Fill) - brown, coarse grained, silty, some sand, damp.	G			▲		
1	ORGANIC SILT - black, some clay, trace sand, damp.	G			▲		
	CLAY - dark brown, silty, trace gravel, trace sand, damp.	G			▲		5
2	- brown, trace silt, moist.	G			▲		
		G		TP-15-2.4-3.1 / BTEX, PHC F1-F4, Lead, 1,2-DBA, 1,2-DCA	▲	Test Pit backfilled with excavated material which was replaced in the original order and then nominally compacted with the excavator bucket.	
3		G			▲		10
		G			▲		
4	- trace gravel, mottled gray below 4.3 m.	G			▲		
		G			▲		15
5	END OF TEST PIT at 4.9 m No Daylighting Performed						
6							20
7							
8							25
9							

START DATE	START DEPTH	EQUIPMENT	CONTRACTOR	GAS METER TYPE: RKI Eagle		
2013/08/02	0.0 m	Hitachi 200LC Track Excavator	Main Line Industries Ltd.	LOGGED: ATK	REVIEW: KAF	DRAFTED: MLM

PARSONS

TEST PIT LOG

TEST PIT LOCATION: 287 Main Street, Selkirk, Manitoba	REF. NO: 10-907T07	TEST PIT NO: **TP-16**
CLIENT: Imperial Oil		START DATE: 2013/08/02
SAMPLE TYPE: G - Grab OS - Other		COMPLETION DATE: 2013/08/02
		PAGE 1 of 1

Depth (m)	DESCRIPTION STRATIGRAPHY	SAMPLING SAMPLE TYPE	ZONE TESTED	LAB SAMPLE NAME/ LAB ANALYSES	▲ SOIL VAPOUR CONCENTRATION (ppmv) 100 200 300 400	◆ SOIL VAPOUR CONCENTRATION (%LEL) 20 40 60 80	COMMENTS	Depth (ft)
0	GROUND SURFACE ASPHALT.							0
	SAND (Fill) - brown, coarse to fine grained, some cobbles, some gravel, some silt, damp.	G			▲			
1	SILT - gray, trace sand, trace clay, damp.	G		TP-16-0.9-1.5 (DUP-16) / BTEX, PHC F1-F4, Lead, 1,2-DBA, 1,2-DCA		◆		5
	CLAY - dark gray, silty, trace gravel, trace sand, damp.	G				◆		
2	- brown, trace silt, moist, mottled dark gray below 1.8 m.	G		TP-16-1.8-2.4 / BTEX, PHC F1-F4, Lead, 1,2-DBA, 1,2-DCA		◆		
		G				◆	Test Pit backfilled with excavated material which was replaced in the original order and then nominally compacted with the excavator bucket.	
3		G				◆		10
		G				◆		
4		G		TP-16-4.3-4.9 / BTEX, PHC F1-F4, Lead, 1,2-DBA, 1,2-DCA		◆		15
5	END OF TEST PIT at 4.9 m No Daylighting Performed							
6								20
7								
8								25
9								

START DATE	START DEPTH	EQUIPMENT	CONTRACTOR	GAS METER TYPE: RKI Eagle		
2013/08/02	0.0 m	Hitachi 200LC Track Excavator	Main Line Industries Ltd.	LOGGED: ATK	REVIEW: KAF	DRAFTED: MLM

PARSONS

TEST PIT LOG

TEST PIT LOCATION: 287 Main Street, Selkirk, Manitoba	REF. NO: 10-907T07	TEST PIT NO: **TP-17**
CLIENT: Imperial Oil		START DATE: 2013/08/02
SAMPLE TYPE: G - Grab OS - Other		COMPLETION DATE: 2013/08/02
		PAGE 1 of 1

Depth (m)	DESCRIPTION STRATIGRAPHY	SAMPLING SAMPLE TYPE	ZONE TESTED	LAB SAMPLE NAME/ LAB ANALYSES	▲ SOIL VAPOUR CONCENTRATION (ppmv) 100 200 300 400	◆ SOIL VAPOUR CONCENTRATION (%LEL) 20 40 60 80	COMMENTS	Depth (ft)
0	GROUND SURFACE ASPHALT. GRAVEL (Fill) - light brown, coarse grained, some sand, some silt, damp. CLAY - gray, some silt, trace sand, damp.	G			▲			0
1		G			▲			
	- brown, silty, moist.	G		TP-17-1.2-1.8 / BTEX, PHC F1-F4, Lead, 1,2-DBA, 1,2-DCA	▲			5
2	- brown, trace silt, mottled gray below 1.8 m.	G		TP-17-1.8-2.4 / BTEX, PHC F1-F4, Lead, 1,2-DBA, 1,2-DCA		◆	Test Pit backfilled with excavated material which was replaced in the original order and then nominally compacted with the excavator bucket.	
3		G				◆		10
		G				◆		
4		G		TP-17-3.7-4.3 / BTEX, PHC F1-F4, Lead, 1,2-DBA, 1,2-DCA		◆		
	END OF TEST PIT at 4.3 m No Daylighting Performed							15
5								
6								20
7								
8								25
9								

START DATE	START DEPTH	EQUIPMENT	CONTRACTOR	GAS METER TYPE: RKI Eagle		
2013/08/02	0.0 m	Hitachi 200LC Track Excavator	Main Line Industries Ltd.	LOGGED: ATK	REVIEW: KAF	DRAFTED: MLM

PARSONS

TEST PIT LOG

TEST PIT LOCATION: 287 Main Street, Selkirk, Manitoba	REF. NO: 10-907T07	TEST PIT NO: **TP-18**
CLIENT: Imperial Oil		START DATE: 2013/08/02
SAMPLE TYPE: G - Grab OS - Other		COMPLETION DATE: 2013/08/02
		PAGE 1 of 1

Depth (m)	DESCRIPTION STRATIGRAPHY	SAMPLING SAMPLE TYPE	ZONE TESTED	LAB SAMPLE NAME/ LAB ANALYSES	▲ SOIL VAPOUR CONCENTRATION (ppmv) 100 200 300 400	COMMENTS	Depth (ft)
0	GROUND SURFACE						0
	GRAVEL (Fill) - light brown, coarse to fine grained, some sand, some silt, damp.	G			▲		
1		G		TP-18-0.6-1.2 / BTEX, PHC F1-F4, Lead, 1,2-DBA, 1,2-DCA	▲		
		G			▲	Test Pit backfilled with excavated material which was replaced in the original order and then nominally compacted with the excavator bucket.	5
2		G			▲		
	END OF TEST PIT at 2.4 m No Daylighting Performed						
3							10
4							
							15
5							
6							20
7							
							25
8							
9							

START DATE	START DEPTH	EQUIPMENT	CONTRACTOR	GAS METER TYPE: RKI Eagle
2013/08/02	0.0 m	Hitachi 200LC Track Excavator	Main Line Industries Ltd.	LOGGED: ATK / REVIEW: KAF / DRAFTED: MLM

PARSONS

TEST PIT LOG

TEST PIT LOCATION: 287 Main Street, Selkirk, Manitoba	REF. NO: 10-907T07	TEST PIT NO: **TP-19**
CLIENT: Imperial Oil		START DATE: 2013/08/02
SAMPLE TYPE: G - Grab OS - Other		COMPLETION DATE: 2013/08/02
		PAGE 1 of 1

Depth (m)	DESCRIPTION STRATIGRAPHY	SAMPLING SAMPLE TYPE	ZONE TESTED	LAB SAMPLE NAME/ LAB ANALYSES	▲ SOIL VAPOUR CONCENTRATION (ppmv) 100 200 300 400	◆ SOIL VAPOUR CONCENTRATION (%LEL) 20 40 60 80	COMMENTS	Depth (ft)
0	GROUND SURFACE ASPHALT. GRAVEL (Fill) - light brown, coarse to fine grained, damp. CLAY - gray, some silt, trace sand, damp.	G			▲			0
1	SILT - brown, trace sand, trace clay, moist.	G G			▲ ▲			5
2	CLAY - brown, trace sand, trace silt, moist, mottled gray from 1.8 m to 4.9 m.	G		TP-19-1.8-2.4 / BTEX, PHC F1-F4, Lead, 1,2-DBA, 1,2-DCA	▲			
3		G G		TP-19-2.4-3.1 / BTEX, PHC F1-F4, Lead, 1,2-DBA, 1,2-DCA		◆	Test Pit backfilled with excavated material which was replaced in the original order and then nominally compacted with the excavator bucket.	10
4	- trace gravel below 4.3 m.	G G		TP-19-4.3-4.9 / BTEX, PHC F1-F4, Lead, 1,2-DBA, 1,2-DCA	▲	◆ ◆		15
5	END OF TEST PIT at 4.9 m No Daylighting Performed							
6								20
7								
8								25
9								

START DATE	START DEPTH	EQUIPMENT	CONTRACTOR	GAS METER TYPE: RKI Eagle		
2013/08/02	0.0 m	Hitachi 200LC Track Excavator	Main Line Industries Ltd.	LOGGED: ATK	REVIEW: KAF	DRAFTED: MLM

PARSONS

TEST PIT LOG

TEST PIT LOCATION: 287 Main Street, Selkirk, Manitoba	REF. NO: 10-907T07	TEST PIT NO: **TP-20**
CLIENT: Imperial Oil		START DATE: 2013/08/06
SAMPLE TYPE: G - Grab OS - Other		COMPLETION DATE: 2013/08/06
		PAGE 1 of 1

Depth (m)	DESCRIPTION STRATIGRAPHY	SAMPLING SAMPLE TYPE	ZONE TESTED	LAB SAMPLE NAME/ LAB ANALYSES	▲ SOIL VAPOUR CONCENTRATION (ppmv) 100 200 300 400	COMMENTS	Depth (ft)
0	GROUND SURFACE						0
	GRAVEL (Fill) - light brown, coarse grained, silty, some sand, damp.	G			▲		
	CLAY (Fill) - dark gray, some silt, trace gravel, trace sand, damp.						
1	SILT - brown, some sand, some clay, moist.	G			▲		
	CLAY - dark gray, some silt, trace sand, damp.	G			▲		5
2	- brown, trace silt, moist, mottled gray below 1.8 m.	G			▲		
		G		TP-20-2.4-3.1 / BTEX, PHC F1-F4, Lead, 1,2-DBA, 1,2-DCA	▲	Test Pit backfilled with excavated material which was replaced in the original order and then nominally compacted with the excavator bucket.	
3		G			▲		10
	- some silt, trace gravel below 3.7 m.	G			▲		
4		G			▲		
	END OF TEST PIT at 4.9 m						15
5	No Daylighting Performed						
6							20
7							
8							25
9							

START DATE	START DEPTH	EQUIPMENT	CONTRACTOR	GAS METER TYPE: RKI Eagle		
2013/08/06	0.0 m	Hitachi 200LC Track Excavator	Main Line Industries Ltd.	LOGGED: ATK	REVIEW: KAF	DRAFTED: MLM

PARSONS

TEST PIT LOG

TEST PIT LOCATION: 287 Main Street, Selkirk, Manitoba	REF. NO: 10-907T07	TEST PIT NO: **TP-21**
CLIENT: Imperial Oil		START DATE: 2013/08/06
SAMPLE TYPE: G - Grab OS - Other		COMPLETION DATE: 2013/08/06
		PAGE 1 of 1

Depth (m)	DESCRIPTION STRATIGRAPHY	SAMPLING SAMPLE TYPE	ZONE TESTED	LAB SAMPLE NAME/ LAB ANALYSES	▲ SOIL VAPOUR CONCENTRATION (ppmv) 100 200 300 400	◆ SOIL VAPOUR CONCENTRATION (%LEL) 20 40 60 80	COMMENTS	Depth (ft)
0	GROUND SURFACE ASPHALT.							0
	GRAVEL (Fill) - light brown, coarse grained, some sand, some silt, damp.	G			▲			
	CLAY (Fill) - dark gray, some gravel, some silt, trace sand, damp.	G						
1	SILT - brown, some clay, trace sand, damp.	G			▲			
	CLAY - brown, trace sand, trace silt, moist, mottled gray from 1.5 m to 4.9 m.	G		TP-21-1.5-1.8 / BTEX, PHC F1-F4, Lead, 1,2-DBA, 1,2-DCA	▲			5
2		G				◆		
		G		TP-21-2.4-3.1 / BTEX, PHC F1-F4, Lead, 1,2-DBA, 1,2-DCA		◆	Test Pit backfilled with excavated material which was replaced in the original order and then nominally compacted with the excavator bucket.	
3		G				◆		10
		G			▲			
4	- trace gravel below 4.3 m.	G		TP-21-4.3-4.9 / BTEX, PHC F1-F4, Lead, 1,2-DBA, 1,2-DCA	▲			15
5	END OF TEST PIT at 4.9 m No Daylighting Performed							
6								20
7								
8								25
9								

START DATE	START DEPTH	EQUIPMENT	CONTRACTOR	GAS METER TYPE: RKI Eagle		
2013/08/06	0.0 m	Hitachi 200LC Track Excavator	Main Line Industries Ltd.	LOGGED: ATK	REVIEW: KAF	DRAFTED: MLM

PARSONS

TEST PIT LOG

TEST PIT LOCATION: 287 Main Street, Selkirk, Manitoba	REF. NO: 10-907T07	TEST PIT NO: **TP-22**
CLIENT: Imperial Oil		START DATE: 2013/08/06
SAMPLE TYPE: G - Grab OS - Other		COMPLETION DATE: 2013/08/06
		PAGE 1 of 1

Depth (m)	DESCRIPTION STRATIGRAPHY	SAMPLING SAMPLE TYPE	ZONE TESTED	LAB SAMPLE NAME/ LAB ANALYSES	▲ SOIL VAPOUR CONCENTRATION (ppmv) 100 200 300 400	COMMENTS	Depth (ft)
0	GROUND SURFACE						0
	GRAVEL (Fill) - light brown, coarse grained, some sand, some silt, damp.	G					
	CLAY - black, some gravel, some silt, trace sand, moist.	G					
1		G		TP-22-1.2-1.8 / BTEX, PHC F1-F4, PAH, Sel-Metals, 1,2-DBA, 1,2-DCA			5
		G					
2		G				Test Pit backfilled with excavated material which was replaced in the original order and then nominally compacted with the excavator bucket.	
	CLAY - brown, trace sand, trace silt.	G					
3		G					10
	END OF TEST PIT at 3.7 m						
4	No Daylighting Performed						
5							15
6							20
7							
8							25
9							

START DATE	START DEPTH	EQUIPMENT	CONTRACTOR	GAS METER TYPE: RKI Eagle		
2013/08/06	0.0 m	Hitachi 200LC Track Excavator	Main Line Industries Ltd.	LOGGED: ATK	REVIEW: KAF	DRAFTED: MLM

PARSONS

TEST PIT LOG

TEST PIT LOCATION: 287 Main Street, Selkirk, Manitoba	REF. NO: 10-907T07	TEST PIT NO: **TP-23**
CLIENT: Imperial Oil		START DATE: 2013/08/06
SAMPLE TYPE: G - Grab OS - Other		COMPLETION DATE: 2013/08/06
		PAGE 1 of 1

Depth (m)	DESCRIPTION STRATIGRAPHY	SAMPLING SAMPLE TYPE	ZONE TESTED	LAB SAMPLE NAME/ LAB ANALYSES	▲ SOIL VAPOUR CONCENTRATION (ppmv) 100 200 300 400	◆ SOIL VAPOUR CONCENTRATION (%LEL) 20 40 60 80	COMMENTS	Depth (ft)
0	GROUND SURFACE							0
	GRAVEL (Fill) - light brown, coarse grained, some sand, some silt, moist.	G			▲			
1	CLAY - gray, some silt, trace sand, moist.	G			▲			5
		G			▲			
2	- brown, trace silt below 1.8 m.	G			▲			
		G		TP-23-2.4-3.1 / BTEX, PHC F1-F4, PAH, Sel-Metals, 1,2-DBA, 1,2-DCA		◆	Test Pit backfilled with excavated material which was replaced in the original order and then nominally compacted with the excavator bucket.	10
3		G				◆		
		G				▲		
4		G		TP-23-4.3-4.9 / BTEX, PHC F1-F4, PAH, Sel-Metals, 1,2-DBA, 1,2-DCA		▲		15
5	END OF TEST PIT at 4.9 m No Daylighting Performed							
6								20
7								
8								25
9								

START DATE	START DEPTH	EQUIPMENT	CONTRACTOR	GAS METER TYPE: RKI Eagle
2013/08/06	0.0 m	Hitachi 200LC Track Excavator	Main Line Industries Ltd.	LOGGED: ATK / REVIEW: KAF / DRAFTED: MLM

PARSONS

TEST PIT LOG

TEST PIT LOCATION: 287 Main Street, Selkirk, Manitoba	REF. NO: 10-907T07	TEST PIT NO: **TP-24**
CLIENT: Imperial Oil		START DATE: 2013/08/06
SAMPLE TYPE: G - Grab OS - Other		COMPLETION DATE: 2013/08/06
		PAGE 1 of 1

Depth (m)	DESCRIPTION STRATIGRAPHY	SAMPLING SAMPLE TYPE	ZONE TESTED	LAB SAMPLE NAME/ LAB ANALYSES	▲ SOIL VAPOUR CONCENTRATION (ppmv) 100 200 300 400	COMMENTS	Depth (ft)
0	GROUND SURFACE						0
	ASPHALT.						
	GRAVEL (Fill) - light brown, coarse grained, some sand, some silt, damp.	G			▲		
	CLAY (Fill) - black, some gravel, some silt, trace sand, damp.						
1		G			▲		
	SAND - brown, medium to fine grained, some gravel, some silt, damp.	G			▲		5
2	CLAY - brown, some silt, trace sand, moist.	G		TP-24-1.8-2.4 / BTEX, PHC F1-F4, PAH, Sel-Metals, 1,2-DBA, 1,2-DCA, glycols	▲		
		G			▲	Test Pit backfilled with excavated material which was replaced in the original order and then nominally compacted with the excavator bucket.	
3		G			▲		10
4		G		TP-24-3.7-4.3 / BTEX, PHC F1-F4, PAH, Sel-Metals, 1,2-DBA, 1,2-DCA, glycols	▲		
		G			▲		15
5	END OF TEST PIT at 4.9 m						
	No Daylighting Performed						
6							20
7							
8							25
9							

START DATE	START DEPTH	EQUIPMENT	CONTRACTOR	GAS METER TYPE: RKI Eagle		
2013/08/06	0.0 m	Hitachi 200LC Track Excavator	Main Line Industries Ltd.	LOGGED: ATK	REVIEW: KAF	DRAFTED: MLM

PARSONS

TEST PIT LOG

TEST PIT LOCATION: 287 Main Street, Selkirk, Manitoba	REF. NO: 10-907T07	TEST PIT NO: **TP-25**
CLIENT: Imperial Oil		START DATE: 2013/08/06
SAMPLE TYPE: G - Grab OS - Other		COMPLETION DATE: 2013/08/06
		PAGE 1 of 1

Depth (m)	DESCRIPTION STRATIGRAPHY	SAMPLING SAMPLE TYPE	ZONE TESTED	LAB SAMPLE NAME/ LAB ANALYSES	▲ SOIL VAPOUR CONCENTRATION (ppmv) 100 200 300 400	◆ SOIL VAPOUR CONCENTRATION (%LEL) 20 40 60 80	COMMENTS	Depth (ft)
0	GROUND SURFACE							0
	ORGANIC SILT - black, some clay, trace sand, damp.	G			▲			
1	SILT (Fill) - brown, some sand, trace clay, damp.	G			▲			
	CLAY - brown, trace sand, trace silt, damp, mottled gray from 1.2 m to 4.9 m.	G		TP-25-1.2-1.8 / Grain Size	▲			5
2		G		TP-25-1.8-2.4 / BTEX, PHC F1-F4, Lead, 1,2-DBA, 1,2-DCA	▲			
		G		TP-25-2.4-3.1 / BTEX, PHC F1-F4, Lead, 1,2-DBA, 1,2-DCA		◆	Test Pit backfilled with excavated material which was replaced in the original order and then nominally compacted with the excavator bucket.	
3	- some sand, some silt, trace gravel, moist.	G		TP-25-3.1-3.7 / Grain Size		◆		10
		G						
4		G		TP-25-4.3-4.9 / BTEX, PHC F1-F4, Lead, 1,2-DBA, 1,2-DCA		◆		15
5	END OF TEST PIT at 4.9 m No Daylighting Performed							
6								20
7								
8								25
9								

START DATE	START DEPTH	EQUIPMENT	CONTRACTOR	GAS METER TYPE: RKI Eagle		
2013/08/06	0.0 m	Hitachi 200LC Track Excavator	Main Line Industries Ltd.	LOGGED: ATK	REVIEW: KAF	DRAFTED: MLM

PARSONS

TEST PIT LOG

TEST PIT LOCATION: 287 Main Street, Selkirk, Manitoba	REF. NO: 10-907T07	TEST PIT NO: **TP-26**
CLIENT: Imperial Oil		START DATE: 2013/08/06
SAMPLE TYPE: G - Grab OS - Other		COMPLETION DATE: 2013/08/06
		PAGE 1 of 1

Depth (m)	DESCRIPTION STRATIGRAPHY	SAMPLING SAMPLE TYPE	ZONE TESTED	LAB SAMPLE NAME/ LAB ANALYSES	▲ SOIL VAPOUR CONCENTRATION (ppmv) 100 200 300 400	◆ SOIL VAPOUR CONCENTRATION (%LEL) 20 40 60 80	COMMENTS	Depth (ft)
0	GROUND SURFACE							0
	ORGANIC SILT - black, some clay, trace sand, damp.	G			▲			
1	SILT (Fill) - brown, some sand, trace clay, moist.	G			▲			
	CLAY - brown, some silt, trace sand, damp.	G			▲			5
2	- trace silt, damp.	G		TP-26-1.8-2.4 / BTEX, PHC F1-F4, Lead, 1,2-DBA, 1,2-DCA	▲			
		G		TP-26-2.4-3.1 / BTEX, PHC F1-F4, Lead, 1,2-DBA, 1,2-DCA		◆	Test Pit backfilled with excavated material which was replaced in the original order and then nominally compacted with the excavator bucket.	
3		G			▲			10
		G				◆		
4	- some gravel, some silt, moist.	G		TP-26-4.3-4.9 / BTEX, PHC F1-F4, Lead, 1,2-DBA, 1,2-DCA	▲			15
5	END OF TEST PIT at 4.9 m No Daylighting Performed							
6								20
7								
8								25
9								

START DATE	START DEPTH	EQUIPMENT	CONTRACTOR	GAS METER TYPE: RKI Eagle		
2013/08/06	0.0 m	Hitachi 200LC Track Excavator	Main Line Industries Ltd.	LOGGED: ATK	REVIEW: KAF	DRAFTED: MLM

PARSONS

PROJECT: Subsurface Investigation Summary	CLIENT: Imperial Oil Ltd.	TESTHOLE NO: **BH1**
LOCATION: 287 Main St, Selkirk, MB		PROJECT NO.: 60549588
CONTRACTOR: Maple Leaf Drilling	METHOD: Hollow Stem Auger	ELEVATION (m):

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	⊗ Vapour Reading ⊗ (ppm) 10 100 1000	COMMENTS	DEPTH (m)
0		GRAVEL Gravel, some sand, some silt, loose, moist, coasre, dark brown, coase frags @ 2.5					0
		SILTY CLAY Silty clay, some gravel, dark brown, moist, firm					
1		CLAY Clay, some gravel, dark grey, moist, firm, mottles, coarse frags @ 2cm					1
2		-Clay, moist, brownish grey, firm, mottles					2
3						-sample BH1_3.0_M3 BH1_3.0_DUP02_M3 submitted for PHCs, VOCs, Select Metals, PCBs	3
4		-Clay, light grey, moist, firm, mottles					4
5						-sample BH1_4.5_M3 submitted for PHCs, VOCs, Select Metals, PCBs	5
		EOH @ 5.25 mbgs					
6							6
7							7
8							

AECOM

LOGGED BY: MK	COMPLETION DEPTH: 5.25 m
REVIEWED BY: BR	COMPLETION DATE: 18/7/13
PROJECT ENGINEER: BR	Page 1 of 1

ENVIRONMENTAL (VAPOUR ONLY) 60549588_SELKRIK.GPJ UMA.GDT 18/11/30

PROJECT: Subsurface Investigation Summary	CLIENT: Imperial Oil Ltd.	TESTHOLE NO: **BH2**
LOCATION: 287 Main St, Selkirk, MB		PROJECT NO.: 60549588
CONTRACTOR: Maple Leaf Drilling	METHOD: Hollow Stem Auger	ELEVATION (m):

SAMPLE TYPE ■ GRAB ▥ SHELBY TUBE ▨ SPLIT SPOON ▤ BULK ▧ NO RECOVERY ◧ CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	⊗ Vapour Reading ⊗ (ppm) 10 100 1000	COMMENTS	DEPTH (m)
0		GRAVEL Gravel, some sand, some silt, light brown, dry, loose, coarse frags @ 2.5cm					0
1		PEA GRAVEL Pea gravel, some sand, light brown, moist, loose, coarse frags @ 2.0cm					1
2							2
3							3
4		CLAY Clay, brown, wet, slightly sticky, mottles -HC odor 3.8m t0 4.7m					4
5		CLAY Clay, light gray, mottles, coarse frags @ 0.2cm -Strong HC odor .1m				-sample BH2_5.25_M3 submitted for PHCs, degreasing VOCs, n-hexane, Lead Scavengers, Select Metals, PCBs, Glycols	5
6							6
7		EOH @ 6.75 mbgs				-sample BH2_6.75_M3 submitted for PHCs, degreasing VOCs, n-hexane, Lead Scavengers, Select Metals, PCBs, Glycols	7
8							

AECOM

LOGGED BY: MK	COMPLETION DEPTH: 6.75 m
REVIEWED BY: BR	COMPLETION DATE: 18/7/13
PROJECT ENGINEER: BR	Page 1 of 1

ENVIRONMENTAL (VAPOUR ONLY) 60549588_SELKRIK.GPJ UMA.GDT 18/11/30

PROJECT: Subsurface Investigation Summary	CLIENT: Imperial Oil Ltd.	TESTHOLE NO: **BH3**
LOCATION: 287 Main St, Selkirk, MB		PROJECT NO.: 60549588
CONTRACTOR: Maple Leaf Drilling	METHOD: Hollow Stem Auger	ELEVATION (m):

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	⊗ Vapour Reading ⊗ (ppm) 10 100 1000	COMMENTS	DEPTH (m)
0		SILTY LOAM Silty loam, black, moist, firm, some organics					0
1		CLAY Clay, some silt, dark brown, moist, firm, coarse frags @ 0-2cm, gleying					1
		-Clay, dark greyish brown, moist, very firm, gleying					
2		-Clay , brown, moist, firm, gleying, mottles, coarse frags @ 0-2cm -HC odor 2.5m to 3.8m					2
3		-Clay, light grey, moist, very firm, gleying, mottles					3
		-Clay, dark grey, moist, very firm, mottles, gleying				-sample BH3_3.75_M3 submitted for PHCs, n-hexane, Lead Scavengers, PAHs	
4		-Clay, dark grey, moist, firm, mottles, soft flecks, coarse frags @ 0-2cm					4
5		-Clay, light grey, moist, firm, mottles, coarse frags @ 0-2cm					5
		-Clay, dark grey, very firm, gleying, coarse frags @ 0-2cm				-sample BH3_6.0_M3 submitted for PHCs, n-hexane, Lead Scavengers, PAHs	
6							6
7		EOH @ 6.75 mbgs					7
8							

AECOM

LOGGED BY: MK	COMPLETION DEPTH: 6.75 m
REVIEWED BY: BR	COMPLETION DATE: 18/7/12
PROJECT ENGINEER: BR	Page 1 of 1

ENVIRONMENTAL (VAPOUR ONLY) 60549588_SELKRIK.GPJ UMA.GDT 18/11/30

PROJECT: Subsurface Investigation Summary	CLIENT: Imperial Oil Ltd.	TESTHOLE NO: **BH4**
LOCATION: 287 Main St, Selkirk, MB		PROJECT NO.: 60549588
CONTRACTOR: Maple Leaf Drilling	METHOD: Hollow Stem Auger	ELEVATION (m):

SAMPLE TYPE ■ GRAB ▯ SHELBY TUBE ⊠ SPLIT SPOON ▬ BULK ⊘ NO RECOVERY ◧ CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	⊗ Vapour Reading ⊗ (ppm) 10 100 1000	COMMENTS	DEPTH (m)
0		SANDY CLAY Sandy clay, loose, moist, firm, light brown, coarse frags @ 0-2cm					0
1		CLAY Clay, some sand, minor silt, moist, firm, coarse frags @ 0-2cm, dark grey					1
		-Clay, dark grey, moist, firm, gleying, coarse frags @ 0-2cm					
2		-Clay, grey, moist, very firm, gleying, coarse frags @ 0-2cm -HC odor 2.7m to 3.9m					2
3							3
		-Clay, light brown, moist, firm, mottles, coal flecks, mineral flecks, coarse frags @ 0-2cm				-sample BH4_3.75_M3 submitted for PHCs, n-hexane, Lead Scavengers, PAHs	
4							4
5		-Clay, light grey, moist, firm, coarse frags @ 0-2cm, mottles					5
6		-Clay, light grey, wet, slighty sticky, gleying, mottles				-sample BH4_6.0_M3 submitted for PHCs, n-hexane, Lead Scavengers, PAHs	6
		EOH @ 6.75 mbgs					
7							7
8							

AECOM

LOGGED BY: MK	COMPLETION DEPTH: 6.75 m
REVIEWED BY: BR	COMPLETION DATE: 18/7/12
PROJECT ENGINEER: BR	Page 1 of 1

ENVIRONMENTAL (VAPOUR ONLY) 60549588_SELKRIK.GPJ UMA.GDT 18/11/30

PROJECT: Subsurface Investigation Summary	CLIENT: Imperial Oil Ltd.	TESTHOLE NO: **BH5**
LOCATION: 287 Main St, Selkirk, MB		PROJECT NO.: 60549588
CONTRACTOR: Maple Leaf Drilling	METHOD: Hollow Stem Auger	ELEVATION (m):

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	⊗ Vapour Reading ⊗ (ppm) 10 100 1000	COMMENTS	DEPTH (m)
0		SILTY CLAY Silty clay, some sand, C.S BK, dark brown, moist, firm, coarse frags @ 2-5cm					0
1		SANDY CLAY Sandy clay, minor silt, C.S BK, dark brown, moist, firm, coarse frags @ 2-5cm					1
2		CLAY Clay, dark grey, moist, firm, gleying, coarse frags @ 0-2cm					2
3		-clay, dark grey, mosit, firm, gleying, salt flecks -HC odor 3.5m to 3.8m					3
4		-Clay, grey, wet, slightly sticky, mottles, coarse frags @ 0.2-0.5ccm, iron deposits, some silt				-sample BH5_3.75_M3 submitted for PHCs, n-hexane, Lead Scavengers, PAHs	4
5							5
6		-Clay, light grey, moist, firm				-sample BH5_6.0_M3 submitted for PHCs, n-hexane, Lead Scavengers, PAHs	6
7		EOH @ 6.0 mbgs					7
8							

AECOM

LOGGED BY: MK	COMPLETION DEPTH: 6.75 m
REVIEWED BY: BR	COMPLETION DATE: 18/7/11
PROJECT ENGINEER: BR	Page 1 of 1

ENVIRONMENTAL (VAPOUR ONLY) 60549588_SELKRIK.GPJ UMA.GDT 18/11/30

PROJECT: Subsurface Investigation Summary	CLIENT: Imperial Oil Ltd.	TESTHOLE NO: **BH6**
LOCATION: 287 Main St, Selkirk, MB		PROJECT NO.: 60549588
CONTRACTOR: Maple Leaf Drilling	METHOD: Hollow Stem Auger	ELEVATION (m):

SAMPLE TYPE ■ GRAB ▥ SHELBY TUBE ▨ SPLIT SPOON ▤ BULK ▨ NO RECOVERY ◧ CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	⊗ Vapour Reading ⊗ (ppm) 10 100 1000	COMMENTS	DEPTH (m)
0		GRAVEL Gravel, some sand, light brown, dry, coarse frags @ 2-5cm					0
		SAND Gravel, some sand, brown, firm, dry, coarse frags @ 0-2cm					
1		GRAVEL Gravel, some sand, brown, firm, dry, coarse frags @ 2-5cm					1
2							2
3		-Pea gravel					3
4		CLAY Clay, some gravel, dark grey, moist, mottles, gleying -Strong HC odor 4.0m to 4.5m -Clay, dark grey, wet, slightly sticky, mottles				-sample BH6_4.5_M3 submitted for PHCs, n-hexane, Lead Scavengers, PAHs	4
5		-Clay, dark grey, moist, mottles, coarse frags @ 0-2cm, coal flecks, salt deposits					5
6		EOH @ 6 mbgs				-sample BH6_6.0_M3 submitted for PHCs, n-hexane, Lead Scavengers, PAHs	6
7							7
8							

AECOM

LOGGED BY: MK	COMPLETION DEPTH: 6.00 m
REVIEWED BY: BR	COMPLETION DATE: 18/7/11
PROJECT ENGINEER: BR	Page 1 of 1

ENVIRONMENTAL (VAPOUR ONLY) 60549588_SELKRIK.GPJ UMA.GDT 18/11/30

PROJECT: Subsurface Investigation Summary	CLIENT: Imperial Oil Ltd.	TESTHOLE NO: **BH7**
LOCATION: 287 Main St, Selkirk, MB		PROJECT NO.: 60549588
CONTRACTOR: Maple Leaf Drilling	METHOD: Hollow Stem Auger	ELEVATION (m):

SAMPLE TYPE ■ GRAB ▥ SHELBY TUBE ▨ SPLIT SPOON ▤ BULK ▧ NO RECOVERY ◧ CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	⊗ Vapour Reading ⊗ (ppm) 10 100 1000	COMMENTS	DEPTH (m)
0		SAND Gravel, some sand, some silt					0
		CLAY Clay, dark grey, C.SBK, moist, firm, coarse frags @ 2-5cm, some gravel					
		SILT Silt, minor gravel, minor clay, black, moist, firm, C.SBK, coarse frags @ 0-2cm					
1		CLAY Clay, some silt, dark grey, moist, very firm, coarse frags @ 2-5cm, C.SBK					1
		-Clay, dark grey, moist, very firm, C.SBK, mottles					
2						-sample BH7_2.25_M3 BH7_2.25_DUP01_M3 submitted for PHCs, n-hexane, Lead Scavengers, PAHs	2
3		-Clay, dark grey, moist, firm, C.SBK, gleying, mottles, coal flecks					3
4							4
5		-Clay, light grey, moist, very firm, C.SBK, salt flecks, mottles, coarse frags @ 0-2cm				-sample BH7_5.25_M3 submitted for PHCs, n-hexane, Lead Scavengers, PAHs	5
6		EOH @ 6.0 mbgs					6
7							7
8							

AECOM

LOGGED BY: MK	COMPLETION DEPTH: 6.00 m
REVIEWED BY: BR	COMPLETION DATE: 18/7/12
PROJECT ENGINEER: BR	Page 1 of 1

ENVIRONMENTAL (VAPOUR ONLY) 60549588_SELKRIK.GPJ UMA.GDT 18/11/30

PROJECT: Subsurface Investigation Summary	CLIENT: Imperial Oil Ltd.	TESTHOLE NO: **BH8**
LOCATION: 287 Main St, Selkirk, MB		PROJECT NO.: 60549588
CONTRACTOR: Maple Leaf Drilling	METHOD: Hollow Stem Auger	ELEVATION (m):

SAMPLE TYPE ■ GRAB ▯ SHELBY TUBE ⊠ SPLIT SPOON ☰ BULK ⊘ NO RECOVERY ◧ CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	⊗ Vapour Reading ⊗ (ppm) 10 100 1000	COMMENTS	DEPTH (m)
0		SANDY CLAY Sandy clay, dark brown, F.SBK, moist, firm, coarse frags @ 0-2cm					0
1		-Sandy clay, light brown, F.SBK, moist, very firm, coarse frags @ 0-2cm, gleying					1
2		SAND Sand, some clay, wet, slightly sticky, moist, coarse frags @ 0-2cm					2
3		CLAY Clay, some sand, light brown, MSBK, moist, firm, coarse frags @ 0-2cm				-sample BH8_2.4_M3 submitted for PHCs, n-hexane, Lead Scavengers, PAHs	3
		-Clay, light grey, wet, slightly sticky, C.SBK, gleying, mottles, coal flecks					
4		-Clay, light grey, moist, firm, C.SBK, gleying, salt flecks				-sample BH8_3.75_M3 submitted for PHCs, n-hexane, Lead Scavengers, PAHs	4
5		-Clay, light grey, moist, very firm, C.SBK, gleying, coarse frags @ 2-5cm					5
6		EOH @ 6.0 mbgs					6
7							7
8							

AECOM

LOGGED BY: MK	COMPLETION DEPTH: 6.00 m
REVIEWED BY: BR	COMPLETION DATE: 18/7/12
PROJECT ENGINEER: BR	Page 1 of 1

ENVIRONMENTAL (VAPOUR ONLY) 60549588_SELKRIK.GPJ UMA.GDT 18/11/30

PROJECT: IOL Cost to Closure Canada West	CLIENT: Imperial Oil Ltd.	TESTHOLE NO: **VW18-01**
LOCATION: 287 Main St, Selkirk MB		PROJECT NO.: 60549588
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Solid Stem Auger	ELEVATION (m):

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	WELL INSTALLATION	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	⊗ Vapour Reading ⊗ (ppm) 10 100 1000	COMMENTS	DEPTH (m)
0			SILTY CLAY -Silty clay loam, light brown, moist, friable, medium subangular blocky, coarse fragments (0-2 cm)				-Sample: VW18-01 BTEX/TPH Fractionation.	
			CLAY LOAM -Clay loam, brown, moist, firm, coarse subangular blocky, coarse fragments (0-2 cm)				-Sample collected for particle size analysis.	
1								1
							-Sample collected for particle size analysis.	
			CLAY LOAM -Clay loam, some sand, dark grey, moist, firm, coarse subangular blocky, coarse fragments (0-2 cm), coal flecks, strong potential hydrocarbon odor				-Sample collected for particle size analysis. -Vapour probe installed at 1.6 m to 1.85 m.	
2			End of borehole at 2.0 m below ground surface in CLAY. Notes: 1. Vapour well installed upon completion of borehole. 2. HDPE sample tubing (1/4") from surface to 1.6 m below ground surface. 3. Vapour probe installed at 1.6 m to 1.85 m. 4. Borehole backfilled with sand, bentonite #20 and hydrated bentonite chips. 5. Flush mount casing installed at surface.					2
3								

AECOM

LOGGED BY: MK	COMPLETION DEPTH: 2.00 m
REVIEWED BY: BR	COMPLETION DATE: 18/11/22
PROJECT ENGINEER: BR	Page 1 of 1

ENVIRONMENTAL (VAPOUR ONLY) 60549588_SELKRIK_VP_NOV 22 2018.GPJ UMA.GDT 18/12/3

PROJECT: IOL Cost to Closure Canada West	CLIENT: Imperial Oil Ltd.	TESTHOLE NO: **VW18-02**
LOCATION: 287 Main St, Selkirk MB		PROJECT NO.: 60549588
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Solid Stem Auger	ELEVATION (m):

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	WELL INSTALLATION	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	⊗ Vapour Reading ⊗ (ppm) 10 100 1000	COMMENTS	DEPTH (m)
0			SILTY CLAY -Silty clay loam, brown, moist, friable, fine subangular blocky, coarse fragments (0-2 cm)				-Sample: VW18-02 BTEX/TPH Fractionation.	
							-Sample collected for particle size analysis.	
			SILTY SAND -Silty sand, some clay, light brown, moist, friable, medium granular, coarse fragments (0-2 cm)					
1								1
							-Sample collected for particle size analysis.	
			SANDY CLAY -Sandy clay, some silt, light grey, moist, firm, coarse subangular blocky, coarse fragments (0-2 cm), potential hydrocarbon odor and staining					
							-Sample collected for particle size analysis. -Vapour probe installed at 1.6 m to 1.85 m.	
2			End of borehole at 2.0 m below ground surface in CLAY. Notes: 1. Vapour well installed upon completion of borehole. 2. HDPE sample tubing (1/4") from surface to 1.6 m below ground surface. 3. Vapour probe installed at 1.6 m to 1.85 m. 4. Borehole backfilled with sand, bentonite #20 and hydrated bentonite chips. 5. Flush mount casing installed at surface.					2
3								

AECOM

LOGGED BY: MK	COMPLETION DEPTH: 2.00 m
REVIEWED BY: BR	COMPLETION DATE: 18/11/22
PROJECT ENGINEER: BR	Page 1 of 1

ENVIRONMENTAL (VAPOUR ONLY) 60549588_SELKRIK_VP_NOV 22 2018.GPJ UMA.GDT 18/12/3

AECOM Imagine it. Delivered.

Appendix B

2013 Site Survey Plan

Sketch of
Surveyor's Staking Certificate
showing Certain Features
287 Main Street
Selkirk, Manitoba

BARNES & DUNCAN
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298 Fort Street
Winnipeg, Manitoba
R3C 1E5

180-A, 5th Street
Morden, Manitoba
R6M 1C9

Our File: 10-1122
Acad dwg: 10-1122 SKETCH
Field Book: 1136/28-33_BD
Drafter: HT

Iron Posts found and confirmed are described and shown thus _____○
1/2" x 1/2" x 18" iron posts are placed at all points shown thus _____■

SKETCH - all distances are in feet and decimals of a foot.
This survey was made on the 23rd day of July, 2013.

Signed & Sealed

Jesse P.S. Carels, M.L.S.
Dated this
26th day of July, 2013

Appendix C

Well Record Summary

Appendix C - Summary of Wells Identified as Potentially within 500 m of Site

No.	Well_PID	Well Use	Water Use	UTMX	UTMY	Accuracy XY	top of screen (ft)	Top of Screen (m)	bottom of screen (ft)	Bottom of Screen (m)	water level (ft)	Depth to Water (m)	total depth (ft)	Total Depth (m)	Owner	Address/NOTES	Approximate Distance from Site
1	Well_PID: 29955	Well Use: PRODUCTION	Water Use: Domestic	UTMX: 649996.552	UTMY: 5556958.08	UNKNOWN	66	20.1	153.9	46.9	-	-	-	-	Owner: F HAWTHORNE	CORNER OF SELKIRK AVE AND SELKRIK BYPASS (PTH #9A)	3.1km
2	Well_PID: 43509	Well Use: PRODUCTION	Water Use: Domestic	UTMX: 650064.188	UTMY: 5557012.24	UNKNOWN	80.9	24.7	118.9	36.2	-	-	-	-	Owner: SELKIRK G & C CLUB	SUTHERLAND AVE EAST	>162m
3	Well_PID: 71328	Well Use: PRODUCTION	Water Use: Domestic	UTMX: 650064.188	UTMY: 5557012.24	UNKNOWN	89.4	27.2	185.9	56.7	-	-	-	-	Owner: SELKIRK GOLF COURSE	100 SUTHERLAND AVE, SELKIRK, H=35 GPG, FE=.1 PPM	534 m
4	Well_PID: 49643	Well Use: PRODUCTION	Water Use: Domestic	UTMX: 650064.188	UTMY: 5557012.24	UNKNOWN	64	19.5	177.9	54.2	-	-	-	-	Owner: L HEBISCHUK	MAPLETON PLACE ZONES - 39.6M;0.5 L/S- 53.0M;1.4 L/S	2.5 km
5	Well_PID: 20330	Well Use: TEST WELL		UTMX: 650123.868	UTMY: 5557080.7	UNKNOWN	N/A	N/A	N/A	N/A	34	10.4	205.9	62.8	Owner: WRB	130 FT HWY #9, .3 MI S CLOVERDALE RD, NEAR GRAVEL PIT	2.5km
6	Well_PID: 63048	Well Use: PRODUCTION	Water Use: Domestic	UTMX: 650123.868	UTMY: 5557080.7	UNKNOWN	93.4	28.5	202.9	61.8	-	-	-	-	Owner: H COOK	225 TORONTO AVE., SELKIRK	125 m
7	Well_PID: 10585	Well Use: PRODUCTION	Water Use: Domestic	UTMX: 650172.404	UTMY: 5557127.31	UNKNOWN	56	17.1	79.9	24.4	-	-	-	-	Owner: J BUNID	50 FT S OF PACIFIC ST, E OF RAILWAY ST, GROUND LEVEL ELEV EST 730 FT	>500m
8	Well_PID: 58043	Well Use: PRODUCTION	Water Use: Municipal	UTMX: 651953	UTMY: 5556168	1 EXACT [<5M] [GPS]	184.9	56.4	259.8	79.2	-	-	-	-	Owner: CITY OF SELKIRK	EAST END OF ROSSER AVE AND EVELINE ST, NEAR RIVER INTAKE	450m
9	Well_PID: 57211	Well Use: TEST WELL		UTMX: 650240.04	UTMY: 5557201.76	UNKNOWN	96.9	29.5	261.8	79.8	-	-	-	-	Owner: CITY OF SELKIRK	E. END ROSSER AVE. N. SIDE RIVER INTAKE PUMPHOUSE	450 m
10	Well_PID: 17864	Well Use: PRODUCTION	Water Use: Domestic	UTMX: 650240.04	UTMY: 5557201.76	UNKNOWN	26	7.9	57	17.4	-	-	-	-	Owner: C STEPHANSON	N/A	N/A
11	Well_PID: 43455	Well Use: PRODUCTION	Water Use: Domestic	UTMX: 650240.04	UTMY: 5557201.76	UNKNOWN	88.9	27.1	92.9	28.3	-	-	-	-	Owner: J BOYCE	307 ROSSER AVE (AECOM verified with home owner there is no operational well at this property)	70 m
12	Well_PID: 32421	Well Use: PRODUCTION	Water Use: Domestic	UTMX: 650240.04	UTMY: 5557201.76	UNKNOWN	60	18.3	96.9	29.5	-	-	-	-	Owner: W MARSH	N/A	N/A
13	Well_PID: 18220	Well Use: PRODUCTION	Water Use: Domestic	UTMX: 650240.04	UTMY: 5557201.76	UNKNOWN	43	13.1	86.9	26.5	-	-	-	-	Owner: A STEFANSON	CLOVERDALE RD	4 km
14	Well_PID: 13422	Well Use: PRODUCTION	Water Use: Domestic	UTMX: 650375.311	UTMY: 5557337.14	UNKNOWN	44	13.4	106.9	32.6	-	-	-	-	Owner: S SCHKAWRITKA	150 FT E OF HWY #9, GROUND LEVEL ELEV EST 750 FT	>5 km
15	Well_PID: 5098	Well Use: PRODUCTION	Water Use: Domestic	UTMX: 650402.365	UTMY: 5557384.53	UNKNOWN	N/A	N/A	N/A	N/A	27	8.2	86.9	26.5	Owner: H SIEMEN	150 FT W OF SELKIRK BY PASS	>2.8 km
16	Well_PID: 141797	Well Use: RECHARGE		UTMX: 650402.365	UTMY: 5557384.53	5 GENERAL [1KM-8KM]	110	33.5	120	36.6	-	-	-	-	Owner: BRAD BELL	226 VAUGHN, SELKIRK, WELL IS IN THE FRONT YARD.	330 m
17	Well_PID: 141709	Well Use: PRODUCTION	Water Use: Air conditioning	UTMX: 650402.365	UTMY: 5557384.53	5 GENERAL [1KM-8KM]	107	32.6	115	35.1	-	-	-	-	Owner: BRAD BELL	226 VAUGHN, SELKIRK, SUPPLY WELL BEHIND THE HOUSE.	330 m
18	Well_PID: 52039	Well Use: PRODUCTION	Water Use: Domestic	UTMX: 650402.365	UTMY: 5557384.53	UNKNOWN	57	17.4	159.9	48.7	-	-	-	-	Owner: J SEAMENS	N/A	N/A
19	Well_PID: 64735	Well Use: PRODUCTION	Water Use: Domestic	UTMX: 650402.365	UTMY: 5557384.53	UNKNOWN	61	18.6	239.8	73.1	-	-	-	-	Owner: J STEPHANSON	631 VAUGHAN AVE., SELKIRK	850 m
20	Well_PID: 7985	Well Use: PRODUCTION	Water Use: Domestic	UTMX: 650402.365	UTMY: 5557384.53	UNKNOWN	50	15.2	74	22.6	-	-	-	-	Owner: S STEFENSON	N/A	3.5 km
21	Well_PID: 35852	Well Use: PRODUCTION	Water Use: Domestic	UTMX: 650444.135	UTMY: 5557431.14	UNKNOWN	88.9	27.1	116.9	35.6	-	-	-	-	Owner: B SPARKES	705 MCLEAN AVE	1 km
22	Well_PID: 104580	Well Use: PRODUCTION	Water Use: Municipal	UTMX: 651601	UTMY: 5556777	2 VERY ACCURATE [<50M]	172	52.4	277	84.4	-	-	-	-	Owner: CITY OF SELKIRK	SELKIRK - PUBLIC WATER SYSTEM WELL	375 m
23	Well_PID: 110013	Well Use: TEST WELL		UTMX: 650507.981	UTMY: 5557476.59	N/A	85.2	26.0	137.7	42.0	-	-	-	-	Owner: TOWN OF SELKIRK/UMA	7.3 M E OF SELKIRK WATER TOWER, BETWEEN WATER	480 m
24	Well_PID: 79681	Well Use: PRODUCTION	Water Use: Domestic	UTMX: 650507.981	UTMY: 5557476.59	UNKNOWN	48	14.6	165.9	50.6	-	-	-	-	Owner: SELKRK ALLIANCE CHURCH	N SIDE MANITOBA AVE, W SIDE OF CHURCH	2.6 km

Notes:
Records sourced from Manitoba Water Stewardship water well records GWDrill data base

Appendix D

Soil Vapour Assessment

Appendix D: Soil Vapour Assessment

Background

Prior to initiation of the remedial excavation, a soil vapour investigation was completed at the Site. The results of the soil vapour investigation were used to further assess the vapour inhalation exposure pathway at the Site.

Soil Vapour Investigation

Between November 2018 and February 2019 a soil vapour investigation was completed to assess the vapour inhalation exposure pathway at the Site. The soil vapour investigation included:

- Installation of four soil vapour probes;
- Two rounds of soil vapour sampling;
- Model indoor air concentrations using CCME dilution factors based on the Johnson and Ettinger (1991) model to assess potential risks posed by the indoor infiltration of volatile contaminants emanating from soil and/or groundwater; and
- Evaluation of potential modification to the remedial approach based on application of the soil vapour screening criteria.

On November 22, 2018, four soil vapour probes (VW18-1, VW18-2, VW18-3 and VW18-4) were installed for collection of representative soil vapour samples from areas exhibiting soil impacts. The assessment area comprised two locations, as illustrated on **Figure 8**:

- VW18-1 and VW18-2 were located in the southeast of the former tank farm (between the tank farm and Main Street) where identified soil impacts were driven by the vapour intrusion pathway for benzene (based on soil concentrations in locations BH4, BH5 and TP-17). Benzene in soil exceed the applicable soil criteria in subsoil (below 1.5 metres below ground surface (mbgs)) but not within surface soil (0-1.5 mbgs). No remediation would be necessary for benzene in this area if soil vapour concentrations meet the soil vapour screening criteria.
- VW18-3 and VW18-4 were located within the former tank farm (based on soil concentrations observed in BH6). Soil concentrations in BH6 exceed management limits so excavation is required of these soils regardless of the soil vapour sampling and vapour intrusions modeling results.

The soil vapour monitoring probes were installed at 1.6-1.85 mbgs, above the water table and in the area of worst-case impacts. Two rounds of soil vapour sampling were completed, in November 2018 and February 2019 from VW18-1 and VW18-2, and one round of sampling was completed from VW18-3 and VW18-4 in November 2018. Soil vapour samples were submitted for analysis of benzene, toluene, ethylbenzene, xylenes (BTEX), aliphatic and aromatic petroleum hydrocarbon (F1–F2) fractions. All samples were shipped to Bureau Veritas Laboratory in Calgary, Alberta. Analytical results are summarized in Table D-3 and Table D-4.

Vapour Intrusion Modeling

The measured soil vapour concentrations were used to calculate predicted indoor air concentrations using soil gas to indoor air dilution factors (DF) as a function of depth/distance from building to contamination as presented in Table 3.2 of CCME Canada-Wide Standard for Petroleum Hydrocarbons (PHC) in Soil: Scientific Rationale Supporting Technical Document, January 2008(b), also provided below.

Table 3.2: Soil gas to indoor air dilution factor (DF)* as a function of depth/distance from building to contamination (L_t).

Dilution Factors for Indoor Infiltration (DF)						
L_T (cm)	Residential, with basement		Residential, slab-on-grade		Commercial/Industrial, slab-on-grade	
	f/g	c/g	f/g	c/g	f/g	c/g
30	35671	1889	30524	1438	62935	4605
100	36137	2469	31360	2480	64190	6167
200	36802	3297	32556	3968	65983	8399
300	37468	4125	33751	5456	67777	10630
500	38798	5781	36142	8431	71363	15094
1000	42124	9922	42119	15871	80328	26252
2000	48778	18202	54073	30749	98259	48570
3000	55430	26483	66026	45627	116189	70887

* - adjustment factor (below) not included in DF

Calculations were made according to the following equation to determine the indoor air concentration:

$$C_{air} = C_v / DF$$

C_{air} = indoor air concentration
C_v = soil vapour concentration
DF = dilution factor

According to the most recent guidance, (CCME 2014, *A Protocol For The Derivation Of Soil Vapour Quality Guidelines For Protection Of Human Exposures Via Inhalation Of Vapours*) ,a bioattenuation adjustment factor of 10 is applicable to soil vapour inhalation modelling results. The adjustment factor only pertains to petroleum hydrocarbons (BTEX, F1 and F2), assuming there is at least one metre of clean soil between the top of the soil vapour probe screen and building foundation, or ground surface in the case of outdoor air guidelines. Based on the observed site conditions (no soil impacts between ground surface and a depth of 1.5 m), the adjustment factor has been applied to the calculated indoor air concentrations.

The highest measured concentration was used to convert measured soil vapour concentrations to predicted indoor air concentrations (Table 2). These predicted concentrations were then used to determine a Hazard Quotient (HQ) for threshold chemicals, or an Incremental Lifetime Cancer Risk (ILCR) for non-threshold chemicals, for each of the BTEX constituents and PHC fractions F1 and F2.

The HQ or ILCR is an indication of potential risk from contaminants. It is estimated by dividing the expected exposure level by the associated reference dose for that contaminant (Tolerable Concentration (TC) for threshold contaminants and Risk-Specific Concentration (RsC) for non-threshold contaminants) (CCME, 2008b). To be conservative, a soil allocation factor (SAF) of 0.5 was applied to all threshold substances to account for exposure form other media.

$$\textit{Incremental Lifetime Cancer Risk (ILCR)} = C_{air} * ET / RsC$$
$$\textit{Hazard Quotient (HQ)} = C_{air} * ET / TC / SAF$$

To derive soil quality guidelines for a PHC fraction, guidelines must first be estimated for each individual sub-fraction, for the target Hazard Quotient desired. Then, the guidelines for sub-fractions must be combined according to their mass fraction within the fraction, according to the algorithm below (CCME, 2008b).

$$SQG_{Fraction\_i} = \frac{1}{\sum\left(\frac{MF_{subfraction\ j}}{SQG_{subfraction\ j}}\right)}$$

$SQG_{fraction\_i}$ = soil quality guideline for the fraction *i* (mg/kg)
$SQG_{sub\text{-}fraction\ j}$ = soil quality guideline (mg/kg) for each sub-fraction within fraction *i* for the target Hazard Quotient for fraction *i*
$MF_{sub\text{-}fraction\ j}$ = mass fraction of each sub-fraction within the fraction *i*

Dilution factors and mass fraction are grain size specific, although the site is identified as fine-grained based on boring logs and grain size analysis, the soil vapour intrusion modeling was conducted for both fine-grained and coarse-grained soil conditions to be conservative and evaluate the relative risk. The dilution factor for minimum depth of contamination of 1.0 m was used for this modelling.

Soil vapour intrusion modeling is presented in Tables D-3 and Table D-4.

Soil Vapour Intrusion Modeling Results

The HQ / ILCR for each of the BTEX constituents and PHC fractions F1 and F2 was found to be less than 1 (i.e. the predicted indoor air concentrations were less than the respective indoor air guideline concentrations), therefore, there are no significant risks associated with the occupancy of a building exhibiting such concentrations.

Benzene is the only soil contaminant for which vapour indoor air was the driving pathway. Based on the soil vapour evaluation there is no risk from soil vapour intrusion in areas evaluated, therefore the vapour indoor air pathway can be eliminated for these areas. The revised soil guidelines, based on the exclusion of soil vapour in select areas, is detailed in the tables below.

Table D-1: Modified Tier 2 Guideline Summary - CCME Commercial Fine-Grained (Surface Soil)

Parameter	B	T	E	X	F1	F2	F3	F4
Tier 1	0.0068	0.08	0.018	2.4	170	230	2,500	6,600
Tier 2 (site specific)	110	330	430	230	320	260	2,500	6,600
Human Health 10^{-5}								
soil ingestion	**110**	82,000	36,000	560,000				
soil dermal contact	250	790,000	210,000	NA	19,000	10,000	23,000	RES
soil inhalation	NC	NC	NC	NC	-	-	-	-
vapour indoor air (basement)	-	-	-	-				
vapour indoor air (slab on grade)	2.8	13,000	6,500	1,600	4,600	23,000	NA	NA
offsite migration	-	-	-	-	-	-	-	-
GW (potable)	0.0068	0.08	0.018	2.4	170	230	NA	NA
produce, meat and milk	-	-	-	-	-	-	-	-
Environmental Risk								
soil dermal contact	310	**330**	**430**	**230**	**320**	**260**	**2,500**	**6,600**
soil and food ingestion	-	-	-	-	-	-	-	-
nutrient and energy cycling	NC	NC	NC	NC	NC	NC	NC	NC
offsite migration	-	-	-	-	NA	NA	19,000	RES
GW (livestock)	-	-	-	-	-	-	-	-
GW (aquatic life)	NC	NC	NC	NC	RES	RES	NA	NA
management limit	-	-	-	-	800	1,000	5,000	10,000

Notes:

NA = Not applicable. Calculated value exceeds 1,000,000 mg/kg or pathway excluded.

RES = Residual PHC formation. Calculated value exceeds 30,000 mg/kg and solubility limit.

NC = Not calculated. Insufficient data to allow derivation.

- = no value available

Bold = applicable guideline

Grey = Excluded pathway

Table D-2: Modified Tier 2 Guideline Summary - CCME Commercial Fine-Grained (Subsoil)

Parameter	B	T	E	X	F1	F2	F3	F4
Tier 1	0.0068	0.08	0.018	2.4	170	230	5,000	10,000
Tier 2 (site specific)	620	660	860	460	800	1,000	5,000	10,000
Human Health 10^{-5}								
soil ingestion	NC	NC	NC	NC				
soil dermal contact	NC	NC	NC	NC	NA	NA	NA	RES
soil inhalation	NC	NC	NC	NC	-	-	-	-
vapour indoor air (basement)	-	-	-	-				
vapour indoor air (slab on grade)	2.9	13,000	6,700	1,600	4,600	23,000	NA	NA
off-site migration	-	-	-	-	-	-	-	-
GW (potable)	0.0068	0.08	0.018	2.4	170	230	NA	NA
produce, meat and milk	-	-	-	-	-	-	-	-
Environmental Risk								
soil dermal contact	**620**	**660**	**860**	**460**	NA	NA	NA	NA
soil and food ingestion	-	-	-	-	-	-	-	-
nutrient and energy cycling	NC	NC	NC	NC	NC	NC	NC	NC
offsite migration	-	-	-	-	NA	NA	19,000	NA
GW (livestock)	-	-	-	-	-	-	-	-
GW (aquatic life)	NC	NC	NC	NC	RES	RES	NA	NA
management limit	-	-	-	-	**800**	**1,000**	**5,000**	**10,000**

Notes:

NA = Not applicable. Calculated value exceeds 1,000,000 mg/kg or pathway excluded.

RES = Residual PHC formation. Calculated value exceeds 30,000 mg/kg and solubility limit.

NC = Not calculated. Insufficient data to allow derivation.

- = no value available

Bold = applicable guideline

Grey = Excluded pathway

Based on the soil vapour assessment, the remedial design will be modified as follows: benzene impacted soil (based on indoor air vapour guideline values) that is not co-located with other contaminants requiring remediation driven by a pathway other than indoor air will be left in place. This is a result of the modeling indicating there is negligible exposure risk from soil vapours and benzene concentrations do not exceed remedial criteria for any other applicable exposure pathway.

The proposed extent of excavation is illustrated on **Figure 9**.

Imperial Cross Canada Cost to Closure
287 Main Street, Selkirk, Manitoba
Remediation Plan

Table D-3: VAPOUR INTRUSION MODEL - SOIL VAPOUR (FINE GRAINED SOIL)

Chemical Properties

Name	Units	Benzene	Toluene	Ethylbenzene	Xylenes	Aliphatic C6-C8	Aliphatic C>8-C10	Aromatic C>8-C10	F1	Aliphatic C>10-C12	Aliphatic C>12-C16	Aromatic C>10-C12	Aromatic C>12-C16	F2
Threshold / Non-Threshold	N/A	Non-Threshold	Threshold	Threshold	Threshold	Threshold	Threshold	Threshold	Threshold	Threshold	Threshold	Threshold	Threshold	Threshold
Risk-Specific Concentration (RsC) or Tolerable Concentration (TC)	mg/m^3	0.003	3.8	1	0.18	1.84E+01	1.00E+00	2.00E-01	-	1.00E+00	1.00E+00	2.00E-01	2.00E-01	-
Background Air Concentration	mg/m^3	NA	0.0442	0.0075	0.00182	9.11E-02	3.88E-02	3.75E-02	-	0	0	0	0	-
Background Soil Concentration	(mg/kg)	0	0	0	0	0	0	0	-	0	0	0	0	-
Soil Allocation Factor (SAF)	N/A	NA	0.5	0.5	0.5	0.5	0.5	0.5	-	0.5	0.5	0.5	0.5	-
Exposure Term	N/A	1	0.2747	0.2747	0.2747	0.2747	0.2747	0.2747	0.2747	0.2747	0.2747	0.2747	0.2747	0.2747

Site Specific Soil Vapour Sampling Results

Sample Results	Date	Units	Benzene	Toluene	Ethylbenzene	Total Xylenes	Aliphatic >C6-C8	Aromatic >C8-C10	Aliphatic >C8-C10	F1	Aliphatic >C10-C12	Aliphatic >C12-C16	Aromatic >C10-C12	Aromatic >C12-C16	F2
VW18-1	2018-11-29	mg/m^3	52	8.15	41.4	281	42,400	462	1,430	47,100	70.1	<15	237	<15	407
VW18-2	2018-11-29	mg/m^3	2.9	<0.8	2.18	202	7,870	239	681	9,070	96.9	<2.5	155	<2.5	359
VW18-3	2018-11-29	mg/m^3	<0.0034	<0.011	0.032	0.337	10.7	1.53	2.52	15.8	0.971	0.099	1.55	0.097	5.02
VW18-4	2018-11-29	mg/m^3	0.0008	0.0019	0.0031	0.043	1.09	0.241	0.407	1.9	0.306	0.386	0.362	0.0915	2.28
VW18-1	2020-02-21	mg/m^3	39.9	<9.7	<9.7	79.4	37,300	847	94.4	26,900	<30	<30	<30	<30	58.8
VW18-1 (Duplicate)	2020-02-21	mg/m^3	26.4	<8.9	<8.9	76.7	24,100	1400	197	19,300	<28	<28	95.9	<28	147
VW18-2	2020-02-21	mg/m^3	<0.0038	<0.012	<0.012	<0.017	10.7	5.23	<0.038	11.8	8.03	0.188	0.053	<0.038	5.72
Maximum		mg/m^3	52	8.15	41.4	281	42,400	462	1,430	47100	96.9	30	237	30	407

Site Specific Indoor Air Concentration Calculation and Risk Evaluation

Based on CCME Canada-Wide Standard for Petroleum Hydrocarbons (PHC) in Soil: Scientific Rationale Supporting Technical Document, January 2008
Soil gas to indoor air dilution factor (DF) as a function of depth/distance from building to contamination.

Depth to Contamination	DF	Units	Benzene	Toluene	Ethylbenzene	Total Xylenes	Aliphatic >C6-C8	Aromatic >C8-C10	Aliphatic >C8-C10	F1	Aliphatic >C10-C12	Aliphatic >C12-C16	Aromatic >C10-C12	Aromatic >C12-C16	F2
30 cm	62,935	mg/m^3	8.26E-04	1.29E-04	6.58E-04	4.46E-03	6.74E-01	7.34E-03	2.27E-02	7.48E-01	1.54E-03	4.77E-04	3.77E-03	4.77E-04	6.47E-03
100 cm	64,190	mg/m^3	8.10E-04	1.27E-04	6.45E-04	4.38E-03	6.61E-01	7.20E-03	2.23E-02	7.34E-01	1.51E-03	4.67E-04	3.69E-03	4.67E-04	6.34E-03
200 cm	65,983	mg/m^3	7.88E-04	1.24E-04	6.27E-04	4.26E-03	6.43E-01	7.00E-03	2.17E-02	7.14E-01	1.47E-03	4.55E-04	3.59E-03	4.55E-04	6.17E-03
300 cm	67,777	mg/m^3	7.67E-04	1.20E-04	6.11E-04	4.15E-03	6.26E-01	6.82E-03	2.11E-02	6.95E-01	1.43E-03	4.43E-04	3.50E-03	4.43E-04	6.00E-03
Adjustment Factor		N/A	10	10	10	10	10	10	10	10	10	10	10	10	10
Adjusted Indoor Air Concentration		mg/m^3	8.26E-05	1.29E-05	6.58E-05	4.46E-04	6.74E-02	7.34E-04	2.27E-03	7.48E-02	1.54E-04	4.77E-05	3.77E-04	4.77E-05	6.47E-04
Soil Allocation Factor		N/A	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Mass Fraction in Soil Vapour (fine-grained site)		N/A	N/A	N/A	N/A	N/A	8.40E-01	1.55E-01	5.00E-03	N/A	7.66E-01	2.07E-01	2.25E-02	5.30E-03	N/A
Hazard Quotient		N/A	2.75E-02	1.87E-06	3.61E-05	1.36E-03	2.01E-03	4.03E-04	6.24E-03	1.25E-03	8.46E-05	2.62E-05	1.03E-03	1.31E-04	5.88E-05
Indoor Vapour Risk		N/A	No	No	No	No	No	No	No	No	No	No	No	No	No

Notes:
1. Calculation performed on sample exhibiting the highest concentration. Wjhere a none detect value exceeded detected concentration the unmodified non-detected values was used.
2. Indoor air concentration values derived by dividing result concentration by the commercial, slab-on-grade dilution factor, for fine-grained soil, adopted from *CCME Canada-Wide Standard for Petroleum Hydrocarbons (PHC) in Soil: Scientific Rationale Supporting Technical Document* , January 2008
3. Toxicity Reference Values, Tolerable Concentration (TC) for PHC Fractions adopted from values publised in CCME, 2008, *Canada-Wide Standard for Petroleum Hydrocarbons (PHC) in Soil: Scientific Rationale Supporting Technical Document,* January 2008
4. Toxicity Reference Values, Risk-Specific Concentration (RsC) or Tolerable Concentration (TC) for Benzene, Toluene, Xylene, adopted from values publised in Health Canada, 2004, *Federal Contaminated Site Risk Assessment in Canada. Part II: Health Canada Toxicological Reference Values (TRVs)* .
5. Toxicity Reference Values, Tolerable Concentration (TC) for Ethylbenzene adopted from values publised in US EPA (United States Environmental Protection Agency), 2006. *Integrated Risk Information System (IRIS) On-Line Database* available at www.epa.gov/iris
6. Hazard Quotient derived by summing the fractions of recommended guidelines for PHC fraction but is considered individually for BTEX parameters. A soil allocation factor of 0.5 has been applied to all threshold substances to account for exposure form other media.
7. Hazard Quotient >1 for BTEX, PHC F1-F2 indicates no indoor air risk (CCME, 2008b).
8. Exposure Term for non-threshold is defaulted as "one" as the exposure time (e.g., 10hr/day, 5 days/week, 48weeks/year for 30-40 years over a lifetime) exceeds the likely latency period for most carcinogens, as explained in Heath Canada - Part I (2004).
9. Background Air Concentration and Soil Allocation Factor (SAF) are not applicable to non-threshold contaminants (CCME, 2006).

Imperial Cross Canada Cost to Closure
287 Main Street, Selkirk, Manitoba
Remediation Plan

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Table D-4: VAPOUR INTRUSION MODEL - SOIL VAPOUR (COARSE GRAINED SOIL)

Chemical Properties

Name	Units	Benzene	Toluene	Ethylbenzene	Xylenes	Aliphatic C6-C8	Aliphatic C>8-C10	Aromatic C>8-C10	F1	Aliphatic C>10-C12	Aliphatic C>12-C16	Aromatic C>10-C12	Aromatic C>12-C16	F2
Threshold / Non-Threshold	N/A	Non-Threshold	Threshold	Threshold	Threshold	Threshold	Threshold	Threshold	Threshold	Threshold	Threshold	Threshold	Threshold	Threshold
Risk-Specific Concentration (RsC) or Tolerable Concentration (TC)	(mg/m^3)	0.003	3.8	1	0.18	18.4	1	0.2	-	1	1	0.2	0.2	-
Background Air Concentration	(mg/m^3)		0.0442	0.0075	0.00182	0.0911	0.0388	0.0375	-	0	0	0	0	-
Background Soil Concentration	(mg/kg)	0	0	0	0	0	0	0	-	0	0	0	0	-
Soil Allocation Factor (SAR)	N/A		0.5	0.5	0.5	0.5	0.5	0.5	-	0.5	0.5	0.5	0.5	-
Exposure Term	N/A	1	0.2747	0.2747	0.2747	0.2747	0.2747	0.2747	0.2747	0.2747	0.2747	0.2747	0.2747	0.2747

Site Specific Soil Vapour Sampling Results

Sample	Date	Units	Benzene	Toluene	Ethylbenzene	Total Xylenes	Aliphatic >C6-C8	Aromatic >C8-C10	Aliphatic >C8-C10	F1	Aliphatic >C10-C12	Aliphatic >C12-C16	Aromatic >C10-C12	Aromatic >C12-C16	F2
VW18-1	2018-11-29	(mg/m^3)	52	8.15	41.4	281	42,400	462	1,430	47100	70.1	<15	237	<15	407
VW18-2	2018-11-29	(mg/m^3)	2.9	<0.8	2.18	202	7,870	239	681	9070	96.9	<2.5	155	<2.5	359
VW18-3	2018-11-29	(mg/m^3)	<0.0034	<0.011	0.032	0.337	10.7	1.53	2.52	15.8	0.971	0.099	1.55	0.097	5.02
VW18-4	2018-11-29	(mg/m^3)	0.0008	0.0019	0.0031	0.043	1.09	0.241	0.407	1.9	0.306	0.386	0.362	0.0915	2.28
VW18-1	2020-02-21	(mg/m^3)	39.9	<9.7	<9.7	79.4	37,300	847	94.4	26900	<30	<30	<30	<30	58.8
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VW18-2	2020-02-21	(mg/m^3)	<0.0038	<0.012	<0.012	<0.017	10.7	5.23	<0.038	11.8	8.03	0.188	0.053	<0.038	5.72
Maximum		(mg/m^3)	52	8.15	41.4	281	42,400	462	1,430	47100	96.9	30	237	30	407

Site Specific Indoor Air Concentration Calculation and Risk Evaluation

Based on CCME Canada-Wide Standard for Petroleum Hydrocarbons (PHC) in Soil: Scientific Rationale Supporting Technical Document, January 2008

Soil gas to indoor air dilution factor (DF) as a function of depth/distance from building to contamination.

Depth to Contamination	DF	Units	Benzene	Toluene	Ethylbenzene	Total Xylenes	Aliphatic >C6-C8	Aromatic >C8-C10	Aliphatic >C8-C10	F1	Aliphatic >C10-C12	Aliphatic >C12-C16	Aromatic >C10-C12	Aromatic >C12-C16	F2
30 cm	4,605	(mg/m^3)	1.13E-02	1.77E-03	8.99E-03	6.10E-02	9.21E+00	1.00E-01	3.11E-01	1.02E+01	2.10E-02	6.51E-03	5.15E-02	6.51E-03	8.84E-02
100 cm	6,167	(mg/m^3)	8.43E-03	1.32E-03	6.71E-03	4.56E-02	6.88E+00	7.49E-02	2.32E-01	7.64E+00	1.57E-02	4.86E-03	3.84E-02	4.86E-03	6.60E-02
200 cm	8,399	(mg/m^3)	6.19E-03	9.70E-04	4.93E-03	3.35E-02	5.05E+00	5.50E-02	1.70E-01	5.61E+00	1.15E-02	3.57E-03	2.82E-02	3.57E-03	4.85E-02
300 cm	10,630	(mg/m^3)	4.89E-03	7.67E-04	3.89E-03	2.64E-02	3.99E+00	4.35E-02	1.35E-01	4.43E+00	9.12E-03	2.82E-03	2.23E-02	2.82E-03	3.83E-02
Adjustment Factor		N/A	10	10	10	10	10	10	10	10	10	10	10	10	10
Adjusted Indoor Air Concentration		(mg/m^3)	8.43E-04	1.77E-04	8.99E-04	6.10E-03	9.21E-01	1.00E-02	3.11E-02	1.02E+00	2.10E-03	6.51E-04	5.15E-03	6.51E-04	8.84E-03
Soil Allocation Factor		N/A	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Mass Fraction in Soil Vapour (coarse-grained site)		N/A	N/A	N/A	N/A	N/A	0.8531	0.1424	0.0045	N/A	0.7666	0.2056	0.0225	0.0052	N/A
Hazard Quotient		N/A	2.81E-01	2.56E-05	4.94E-04	1.86E-02	2.75E-02	5.51E-03	8.53E-02	1.76E-02	1.16E-03	3.58E-04	1.41E-02	1.79E-03	8.05E-04
Indoor Vapour Risk		N/A	No	No	No	No	No	No	No	No	No	No	No	No	No

Notes:

1. Calculation performed on sample exhibiting the highest concentration. Where a none detect value exceeded detected concentration the unmodified non-detected values was used.
2. Indoor air concentration values derived by dividing result concentration by the commercial, slab-on-grade dilution factor, for fine-grained soil, adopted from *CCME Canada-Wide Standard for Petroleum Hydrocarbons (PHC) in Soil: Scientific Rationale Supporting Technical Document*, January 2008
3. Toxicity Reference Values, Tolerable Concentration (TC) for PHC Fractions adopted from values published in CCME, 2008, *Canada-Wide Standard for Petroleum Hydrocarbons (PHC) in Soil: Scientific Rationale Supporting Technical Document,* January 2008
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5. Toxicity Reference Values, Tolerable Concentration (TC) for Ethylbenzene adopted from values published in US EPA (United States Environmental Protection Agency), 2006. *Integrated Risk Information System (IRIS) On-Line Database* available at www.epa.gov/iris
6. Hazard Quotient derived by summing the fractions of recommended guidelines for PHC fraction but is considered individually for BTEX parameters. A soil allocation factor of 0.5 has been applied to all threshold substances to account for exposure form other media.
7. Hazard Quotient >1 for BTEX, PHC F1-F2 indicates no indoor air risk.
8. Exposure Term for non-threshold is defaulted as "one" as the exposure time (e.g., 10hr/day, 5 days/week, 48weeks/year for 30-40 years over a lifetime) exceeds the likely latency period for most carcinogens, as explained in Heath Canada - Part I (2004)
9. Background Air Concentration and Soil Allocation Factor (SAF) are not applicable to non-threshold contaminants (CCME, 2006).