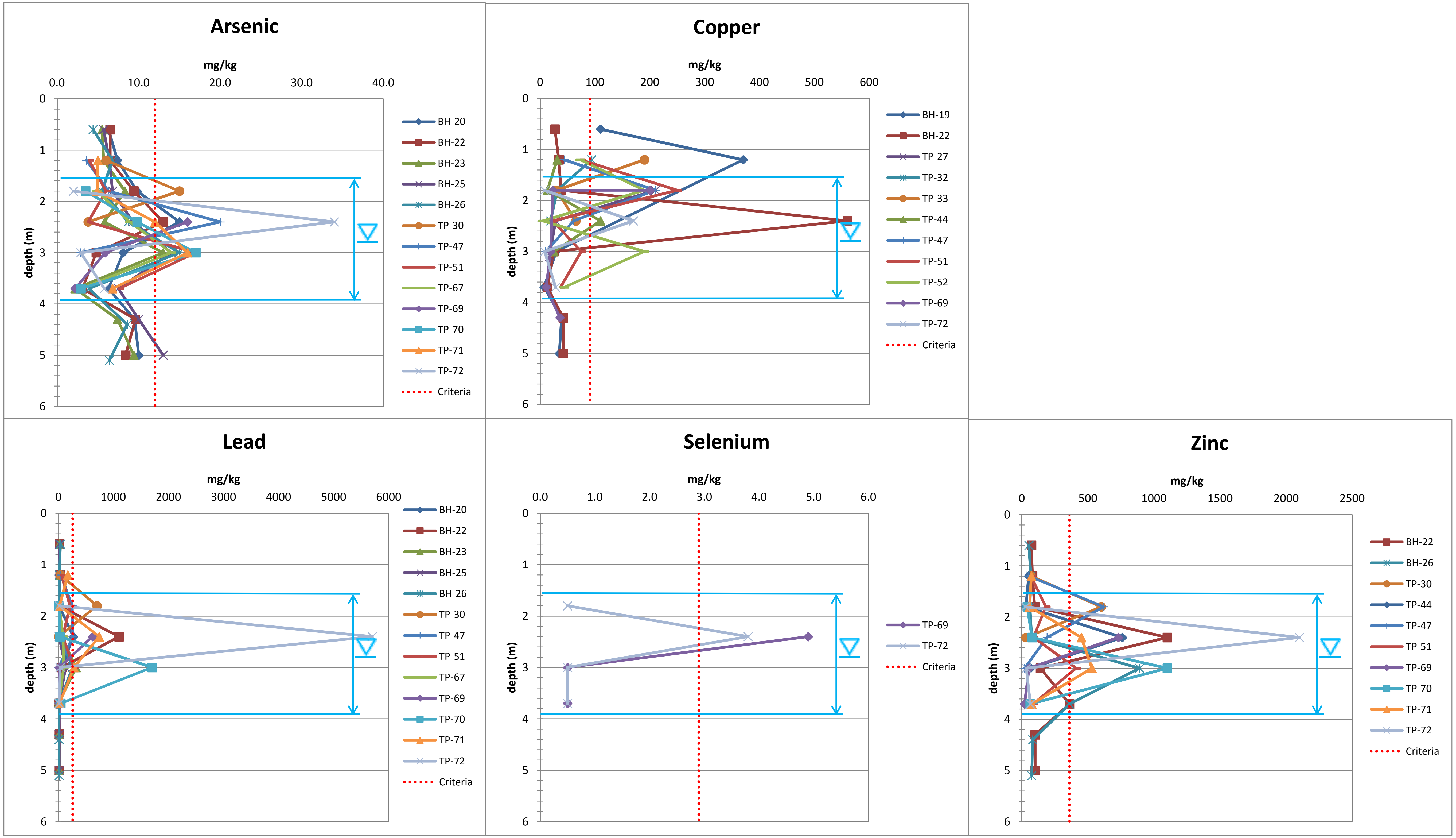

Source: Parsons (2014, 2016)

Water table depth range (2014-2016, south portion of Site)

Depth Profiles of Soil Analytical Results - Select Metals Parameters

PARSONS

JOB NO.:	10-5133	DATE:	2016-07-29
DRAWN BY:	LAW	DWG. NO.:	9

LEGEND

	CONTROL ZONE
	DUMP OR LANDFILL SITE
●	TEST HOLE (BY LANDFILL ENVIRONMENTAL SECTION)
⊙	GAS PROBE (BY LANDFILL ENVIRONMENTAL SECTION)
✱	TEST HOLE (BY OTHERS)
☆	GAS PROBE (BY OTHERS)
(N2)	AREA DELINEATED AS CONTOURS OF DETECTABLE GAS CONCENTRATIONS
(R3)	REFUSE
(G2)	CINDERS, ASH
(B5)	IMPORTED ORGANICS

"WARNING"

THE EXACT BOUNDARY OF REFUSE CAN BE CERTIFIED ONLY BY DETAILED INVESTIGATION. THE EXISTENCE AND EXACT LOCATION OF ALL UNDERGROUND SERVICES INCLUDING NEW CONNECTIONS MUST BE CHECKED WITH THE APPROPRIATE UTILILITIES.

METRIC
WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES

NO.	REVISIONS	DATE	BY
2.	REMOVED LANDFILL BOUNDARY & CONTROL ZONE FOR LOT 61, PLAN NO. 24342 WLTO	03.09.16	WKT
1.	CONVERT TO AUTOCAD DRAWING	OCT 99	D.S.

B.M. ELEV.
FIELD BOOK #
POSTED TO LBIS

LANDFILL ENVIRONMENTAL SECTION

DESIGNED BY
CHECKED BY
DRAWN BY D.S.
APPROVED BY C.A.P.
HOR. SCALE 1:1000
VERTICAL
RELEASED FOR CONSTRUCTION
DATE OCT 99
DATE

ENGINEER'S SEAL

PLOT DATE: 2008 11 27

Winnipeg
THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT
SOLID WASTE DIVISION

NO.28
BROOKLANDS
LANDFILL SITE DETAIL

SHEET OF
CITY DRAWING NUMBER
SWD-D-125A

CITY OF WINNIPEG

PHASE I ENVIRONMENTAL SITE ASSESSMENT

NORTH GARAGE OAK POINT HIGHWAY, WINNIPEG, MB

JANUARY 24, 2023 FINAL

PHASE I ENVIRONMENTAL SITE ASSESSMENT

NORTH GARAGE OAK POINT HIGHWAY, WINNIPEG, MB

CITY OF WINNIPEG

CONFIDENTIAL

PROJECT NO.: 221-07203-00
DATE: JANUARY 24, 2023

WSP
1600 BUFFALO PLACE
WINNIPEG, MB
CANADA R3T 6B8

T: +1 204 477-6650
F: +1 204 474-2864
WSP.COM

January 24, 2022

CONFIDENTIAL

City of Winnipeg
4th Floor - 510 Main Street,
Winnipeg, Manitoba R3A 0J8

Attention: Mr. Jesse Crowder

Dear Sir:

Subject: Phase I Environmental Site Assessment – North Garage Oak Point Highway, Winnipeg, MB

Please find attached the results of the Phase I Environmental Site Assessment for the Study Area:

SP Lots 49 to 58 Plan 24342 WLTO, Block 3 Plan 17744 WLTO and PT 7 Plan 9218 WLTO.

The Phase I ESA was completed in general accordance with the Canadian Standards Association's Phase I Environmental Site Assessment Standard Z768-01 (R2022).

Should you have any questions regarding the information presented in this report, please contact the undersigned at your convenience.

Yours sincerely,

Cassie Bujan, B.Sc.
Project Scientist, Earth & Environment

Alfred Chan, B.Sc., P.Geo, PMP
Project Manager, Earth & Environment

CB/ac

WSP ref.: 221-07203-00

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REVISION HISTORY

FIRST ISSUE

December 16, 2022	DRAFT			
Prepared by	Reviewed by	Approved by		
Cassie Bujan	Alfred Chan	Alfred Chan		
REVISION 1				
January 24, 2023	FINAL			
Prepared by	Reviewed by	Approved by		
Cassie Bujan	Alfred Chan	Alfred Chan		

SIGNATURES

PREPARED BY

24 January 2023

Cassie Bujan, B.Sc.
Project Scientist

Date

APPROVED[1] BY

24 January 2023

Alfred Chan, B.Sc., P. Geo., PMP
Project Manager

Date

[1] Approval of this document is an administrative function indicating readiness for release and does not impart legal liability on to the Approver for any technical content contained herein. Technical accuracy and fit-for-purpose of this content is obtained through the review process. The Approver shall ensure the applicable review process has occurred prior to signing the document.

EXECUTIVE SUMMARY

WSP Canada Inc. (WSP) was retained by the City of Winnipeg (the Client) to conduct a Phase I Environmental Site Assessment (ESA) of a Study Area inclusive of the location former Brooklands Landfill ("Site") and an east adjacent property of interest ("POI") formerly occupied by Imperial Oil. The Site and the east adjacent POI will be collectively referred to as the "Study Area" for the purpose of this Phase I ESA. Legal land description information of the Study Area is defined as follows:

Table 1: Subject parcels within the Phase I ESA Study Area

	CITY OF WINNIPEG SURVEY PARCEL	CITY OF WINNIPEG ROLL NUMBER	TITLE CERTIFICATE NUMBER(S)
Site	Block 3, Plan 17744	14096460000	1059705/1
	Lot 49, Plan 24342	7092321000	1129021/1
	Lot 50, Plan 24342	7092308000	1129019/1
	Lot 51, Plan 24342	7092313000	1129013/1 & 1129011/1
	Lot 52, Lot 56 & Lot 57, Plan 24342	7092163000	3214490/1
	Lot 53, Plan 24342	7092238000	1129008/1 & 1129012/1
	Lot 54, Plan 24342	7092304000	1129013/1 & 1129011/1
	Lot 55, Plan 24342	7092190000	1129006/1 & 1129011/1
	PT 7, Plan 9218	14096344100	3038514/1
POI	Lot 58, Plan 24342	7092127100	1129036/1

The Phase I ESA was conducted for the City of Winnipeg in support of due diligence in determining the environmental disposition of the subject properties prior to site development. The Phase I ESA evaluates the current and historical conditions of the Site and neighbouring properties to identify any issues of potential environmental concerns that may exist in connection with the Site and surrounding properties. A site visit was conducted by Ms. Cassie Bujan and Ms. Annie McIntyre of WSP on November 29, 2022. The Study Area and readily visible and publicly accessible portions of adjoining and neighboring properties were observed for the presence of potential sources of environmental concern.

A Phase I ESA does not include sampling or testing of air, soil, groundwater, surface water or building materials. The Phase I ESA was visually inspected only from readily accessible areas of the Site. An intrusive sampling investigation was not conducted. For this Phase I ESA, no additions to the CSA standards were made.

ENVIRONMENTAL DATABASE/RECORDS REVIEW

- A total of 11 current title certificates are associated with the Study Area. Two of them (CT 1129008/1 and CT 1129011/1) are registered to Her Majesty the Queen in Right of the Province of Manitoba and lay claim to all mines and minerals vested in the Crown (Manitoba) in survey parcels Lots 51, 53, 53A, 54, 55, and 62, Plan 24342. No environmental caveats or liens related to the Study Area were noted during the review of the land titles for the Study Area.
- Manitoba Environment, Climate and Parks (MECP) File Search responses received on November 15 (File Search No.'s 6243, 6244, 6245, 6246, 6247, 6248, 6249, 6250, 6251, 6252, 6253, and 6254) only registered the POI site (File No. 6252) as an operating Registered Hazardous Waste Generator, inactive Registered Petroleum Storage Site, and an inactive Contaminated/Impacted Site. MECP designated the City of Winnipeg as a Potentially Responsible Person (PRP) for the heavy metal contamination but understood that it is the City of Winnipeg's view that they are not responsible for the contamination. Since mediation attempts between Imperial Oil and the City of Winnipeg did not result in an agreement to determine which

party is responsible, the matter was referred to the Clean Environment Commission, an arms-length provincial government agency, for review.

- Two well logs (PID 37008 and 106762) are registered in the MECP GWDrill 2018 database to Cadorath Plating and are located approximately 165 m south-southeast of the Study Area boundary. No well logs were identified to be located in the Study Area.
- Ten ERIS Ecolog listings were found within the Study Area boundaries and 157 listings were found for the surrounding properties within 250 m. The listings identified within the Study Area Boundaries include one contaminated/impacted site, one ERIS historical search, one fuel storage tank, one bulk fuel distributor, three waste generator summaries, and three retail fuel storage tanks. Based on the records review, only the POI (not the Site properties) is designated as impacted and/or contaminated
- Historical aerial photographs indicated that prior to 1950, a major portion of the Study Area was used primarily as agricultural land with the western portion of the Study Area consisting of trails and re-worked soil, consistent with previous reports stating that the Village of Brooklands may have used the western portion of the Study Area as a dumping ground. The former Brooklands Landfill occupied the southwest portion of the Study Area from 1950 to 1968 before it was decommissioned. The footprint of the former Brooklands Landfill currently occupies survey parcel Lots 49 and 50, Plan 24342 (CT 1129021/1 and CT 1129019/1, respectively) and the City of Winnipeg is listed as the registered owner.
- An oval structure similar to a race-track with stands for spectators was observed in the 1959 and 1968 aerial photographs, believed to be the former Brooklands Speedway in operation from 1953 to 1973 and occupying present day survey parcels Lot 52 and part of Lot 57, Plan 24342.
- A total of 18 previous environmental reports and letters associated with the Study Area were reviewed, in addition to several drawings, maps and figures provided by the Client.

SUMMARY OF FINDINGS

Based on historical potentially contaminating activities (PCAs) identified within the Study Area in this Phase I ESA, five areas of potential environmental concern (APECs) were identified, with the contaminants of potential concern identified for each area. APECs are represented in Figures 3 to 5 (Appendix A).

- **APEC-1: Former Brooklands Landfill**
    - The Village of Brooklands may have used the western portion of the Study Area as a dumping ground prior to 1950s (City of Winnipeg, 1984). It was reported that the site received all types of waste including local garbage and septic wastes, rubble and inorganic material. Burning was also carried out at the Site.
    - The former Brooklands Landfill occupied the southwest portion of the Study Area from 1950 to 1968 before it was decommissioned.
    - No active waste production was present within the Study Area during the time of the site visit but observations by City of Winnipeg staff during previous routine inspection visits that illegal dumping of construction waste such as concrete, metal, and yard trimmings are present (Golder, 2015a). This is consistent with field observations by WSP site assessors during the Phase I ESA site visit.
    - The landfill design details were documented by Golder (2015a), covering an area of approximately 2.4 hectares (ha) with buried wastes up to 1.5m below ground surface, and heights of 1.5 to 3 m above ground surface. Cover material was reportedly 0.3 to 0.6 m and consists of undocumented fill. No leachate collection system was known to be present.
    - Hazardous materials such as ACM, lead, mercury, ODS, PCBs, etc may have been buried on-site and capped with approximately 0.3 to 0.6 m of low permeability clay fill material during the landfill decommissioning (Golder, 2015a). Development of the Study Area involving excavation may uncover buried hazardous waste detrimental to the health of workers.

- Active landfill gas generation through anaerobic decomposition of buried refuse will be an ongoing health concern to building occupants within a building developed in the vicinity of the former Brooklands Landfill if soil vapour intrusion indoors is not properly mitigated. The estimated extent of landfill gas generated as determined by Golder (2015b) is approximately 30 m around the areal extent of the former Brooklands Landfill and extends to the southeast towards the southwest corner of the POI (subject parcel Lot 58, Plan 24342).

- **APEC-2: Former Brooklands Speedway**
    - An oval structure similar to a race-track with stands for spectators was observed in the 1959 and 1968 aerial photographs, believed to be the former Brooklands Speedway in operation from 1953 to 1973 and occupying present day survey parcels Lot 52 and part of Lot 57, Plan 24342.
    - Online historical archives reported the race-track as a major racing venue in Manitoba summer months during its 20 years of operation as a paved quarter-mile race-track featuring stock, modified and super modified race cars. It was eventually sold to Motorways, a trucking company in 1974.
    - Historical automobile fuel spills, leaks, and maintenance operations in pit-stops and garages of the racetrack would be contributive to potential contaminants such as BTEX, PHC, PAH, and metals in soil and groundwater.
- **APEC-3: Historic and current imported fill material of unknown origin across the Study Area**
    - Surface vegetation in subject parcel PT7, Plan 9218 appears to have been either removed or replaced with lighter colored fill material in the 1959 aerial photograph, with several areas of lighter fill material and darker patchy vegetation visible in the 1968 aerial photograph, The subject parcel becomes mostly vegetated in a homogeneous color tone in the 1979 aerial photograph. Light-colored fill stockpile resembling the present-day concrete stockpile observed during the site visit is visible at the southwest corner of subject parcel PT7, Plan 9218's 1979 aerial photograph.
    - Fill is also present in the northern subject parcel Block 3, Plan 17744 (CT 1059705/1) along Oak Point Highway, as reported in the City of Winnipeg (1984) report on Brooklands Landfill.
    - Following the decommissioning of the former Brooklands Landfill and the demolition of the Brooklands Speedway, the 1979 aerial photograph shows an unvegetated roadway that transects the Study Area as a continuation of Selkirk Avenue from the east. South of the roadway are abundant fill material deposited to decommission the Brooklands landfill, and to level the terrain of the former footprint of the Brooklands Speedway. By 1988, vegetation appears to have overgrown the deposited fill material and stockpiles, with some visible trails apparent throughout the property. Due to the variance in ground elevation of the deposited fill material and the access roadway, it is likely that the present day low-lying marshy area observed during the site visit is the former footprint of the access roadway. This low lying area likely serves as a catchment area for surface run-off from the former Brooklands Landfill to the south and subject parcel PT 7, Plan 9218 to the north.
    - A City of Winnipeg Water and Waste Department Solid Waste Division drawing (SWD-D-125A) entitled "*No. 28 Brooklands Landfill Site Detail"* (1999) illustrates the areal extent of the former Brooklands Landfill and other areas of approximate delineation with regards to surficial dumping of refuse, cinder ash, and imported organics. Incinerated ash could contain contaminant parameters such as BTEX, PHC F1-F4, PAHs, dioxins, and metals.
    - By the 1988 aerial photograph, the entire Study Area is presumed to contain surficial fill cover of unknown origins as per Figure 6 of the 1984 City of Winnipeg report of Brooklands Landfill Site No. 28.
    - Currently, illegal dumping of waste such as concrete, metal, and yard trimmings may still be ongoing as observed in previous City of Winnipeg inspections and during Golder's site visit (Golder, 2015a & b).
- **APEC-4: Former gas station at subject parcel Block 3, Plan 17744**
    - Historical aerial photographs show subject parcel Block 3, Plan 17744 at the northern portion of the Study Area fronting Oak Point Highway to be vacant land from prior to 1940s. The subject

parcel was first observed to be developed with two access points from Oak Point Highway in 1959, where a small building structure is visible in the south-central portion of the Subject Parcel. The building structure is still visible in the 1988 aerial photograph.
  - The City of Winnipeg's Brooklands Landfill Site – Landfill No. 28 report (1984) described that a portion of "Area 3" had previously been developed for a gas station. Although the gas station had been closed at the time of the report, the building remains on-site. Area 3 is present-day's northern half of the Study Area consisting of subject Parcel PT 7, Plan 9218 WLTO, Block 3, Plan 17744 WLTO, and 200 Oak Point Highway.
  - Contaminants of potential concern associated with a retail fuel outlet would likely consist of: BTEX, PHC F1-F4, PAH, VOCs and metals.
- **APEC-5: Former Imperial Oil Retail Fuel Outlet at 100 Oak Point Highway, Winnipeg, MB**
  - The former Imperial Oil Esso retail fuel outlet and cardlock facility is a property of interest (POI) in this Phase I ESA. It does not appear on aerial photos until 2002 where there appears to be canopy-covered pump islands and approximately four (4) cardlock semi-truck gas stations to the south. Previous environmental reports indicate that the Imperial Oil Esso retail fuel outlet was in operation from approximately 1988 to approximately 2012, and also a restaurant from the late 1990s to approximately 2012 (Parsons, 2015).
  - Potentially contaminating former facilities at the POI consisted of two petroleum warehouse buildings, two 45,456 litre (L) UST containing gasoline, one 45,456 L UST containing diesel, and one 36,365 L UST containing diesel, one 9,090 L UST containing wastewater, pump islands, and associated product distribution piping. COPCs include BTEX, PHC F1-F4, PAH, VOC, and metals.
  - Prior to decommissioning the facility in 2015, Parsons was retained by Imperial Oil to conduct assessment excavations around the cardlock pump island UST nest to the south, and a UST nest to the north. Exceedances of PHC F2 was noted for soil samples collected from the walls of two testpits advanced around the UST nests at depths of 1 to 2 mbgs.
  - Testpits TP-36, TP-21 advanced along the sidewalk at the north site boundary indicated PHC F2 impacts in exceedance of guidelines. Testpits TP-25, TP-7, TP-8 and TP-19 immediately west, centre and southeast of the cardlock UST nest south of the service building indicated exceedances of PHC F2 and F3. All PHC impacts do not appear to be present past 2.0 mbgs.

RECOMMENDATIONS

Based on the findings of the Phase I ESA, WSP recommends the following:

- Conduct a Phase II ESA program for the intrusive investigation of soil and groundwater at:
  - **APEC-1: Former Brooklands Landfill** to delineate the vertical extent of buried waste, capping fill material, and determine leachate impacts to shallow groundwater in and around the footprint of the former Brooklands Landfill. Monitoring wells installed should be fitted with well lids with adapters for well vapour monitoring of methane gas. COPCs include: methane, BTEX, PHC F1-F4, PAH, VOC, metals, dioxins. It is recommended to have groundwater samples analysed for ammonia, nitrate-N, nitrite-N, total Kjedahl nitrogen, total phosphorus, sulphates, total dissolved solids (TDS), biological oxygen demand (BOD), dissolved organic carbon, chemical oxygen demand (COD) and alkalinity.
  - **APEC-2: Former Brooklands Speedway** to determine the presence or absence of COPCs associated with potentially contaminating activities such as vehicle maintenance, possible fuel spills and leaks associated with the historic operation of the former Brooklands Speedway. COPCs would likely consist of BTEX, PHC F1-F4, PAH, and metals.
  - **APEC-4: Former gas station at subject parcel Block 3, Plan 17744** to determine the presence or absence of COPCs associated with the historic operation of subject parcel Block 3, Plan 17744 at Oak Point Highway and Selkirk Avenue as a retail fuel outlet between 1950s and 1970s. An

excavation of where the pump island and potentially where a UST nest might be located could be observed in the 2002 satellite imagery in the middle of a concrete pad in the centre of the subject parcel. COPCs associated with a retail fuel outlet would likely consist of BTEX, PHC F1-F4, PAH, VOCs and metals.

  - **APEC-5: Former Imperial Oil Retail Fuel Outlet at 100 Oak Point Highway, Winnipeg, MB** to determine the presence or absence of residual PHC and metal impacts associated with the operation of 100 Oak Point Highway as an Imperial Oil Esso retail fuel outlet between 1988 and 2012. Metal impacts in exceedance of applicable guidelines (lead, zinc, copper, arsenic, etc.) previously defined by other consultants localised along the south property boundary would have to be confirmed in the Phase II ESA.

- Preparation of a Soil Management Plan in acceptance of the environmental risk posed by existing imported fill material and historic dumping across the entire Study Area as represented by **APEC-3** (Figure 4, Appendix A). The Soil Management Plan should be submitted for approval by MECP prior to commencing construction within the Study Area and should, at a minimum:
  - include plans, such as capping with clean fill or hard pavement, to minimize or mitigate the potential uncovering of buried waste that may be hazardous to the health of workers;
  - outline a soil monitoring plan in response to suspected impacted soil (staining or odours) encountered during development of the Study Area, a qualified environmental professional should be consulted and present on-site for construction environmental monitoring to determine type, level, and extent of contamination;
  - determine applicable guidelines to be applied for the development as the deciding factor for whether impacted soil can be relocated on-site as fill to level terrain, or for disposal off-site at a licensed soil treatment facility;
  - identify locations and extent of all surficial refuse, building material debris and scrap metal on-site and for disposal in the appropriate waste streams during construction.
- Groundwater wells, such as monitoring wells previously installed by other environmental consultants and any unregistered production wells encountered, should be decommissioned during site development according to Manitoba's *Guide for Sealing Abandoned Water Wells in Manitoba* and reported to Manitoba Conservation and Climate, Agriculture and Resource Development.
- As the Study Area contains a former landfill with active landfill gas generation including the estimated migration of methane gas southeast from the former landfill footprint,
  - a methane gas monitoring program of wells across the Study Area should be in place to determine methane gas levels in proximity to future developments; and
  - development of building structures within the Study Area should incorporate into their design appropriate soil vapour extraction and methane gas mitigation engineered systems in accordance with the *Standards and Guidelines for the Mitigation of Methane Gas at Buildings and Utilities and Guidelines for Construction on Landfill Sites* document prepared by the City of Winnipeg (December, 2006).

The statements made in this Executive Summary are subject to WSP Canada Inc's Standard Limitations found in **Appendix F** of this report and should be read in its entirety with the remainder of this report.

TABLE OF CONTENTS

TABLES

APPENDICES

1 GENERAL INFORMATION

SITE LOCATION

Legal Land Description(s):

SITE
Block 3, Plan 17744 (City of Winnipeg Roll Number [CofW RN] 14096460000)
Lot 49, Plan 24342 (CofW RN 7092321000)
Lot 50, Plan 24342 (CofW RN 7092308000)
Lot 51, Plan 24342 (CofW RN 7092313000)
Lot 52, Lot 56 & Lot 57, Plan 24342 (CofW RN 7092163000)
Lot 53, Plan 24342 (CofW RN 7092238000)
Lot 54, Plan 24342 (CofW RN 7092304000)
Lot 55, Plan 24342 (CofW RN 7092190000)
Parcel 7, Plan 9218 (CofW RN 14096344100)

POINT OF INTEREST (POI)
Lot 58, Plan 24342 (CofW RN 7092127100)

SITE REPRESENTATIVE

Mr. Jesse Crowder, Manager, Asset Management Office – Transit, City of Winnipeg

CLIENT

Mr. Jesse Crowder, Manager, Asset Management Office – Transit, City of Winnipeg

CONSULTANT

WSP Canada Inc.
1600 Buffalo Place
Winnipeg, MB R3T 6B8
PH: 204-477-6650
Website: wsp.com

SITE VISIT DATE: November 29, 2022

REPORT DATE: December 16, 2022

2 INTRODUCTION

2.1 OBJECTIVES

WSP Canada Inc. (WSP) was retained by the City of Winnipeg (the Client) to conduct a Phase I Environmental Site Assessment (ESA) of a study area consisting primarily of vacant land, with the legal land description for a total of ten parcels as follows:

“Site”
Block 3, Plan 17744 (City of Winnipeg Roll Number [CofW RN] 14096460000)
Lot 49, Plan 24342 (CofW RN 7092321000)
Lot 50, Plan 24342 (CofW RN 7092308000)
Lot 51, Plan 24342 (CofW RN 7092313000)
Lot 52, Lot 56 & Lot 57, Plan 24342 (CofW RN 7092163000)
Lot 53, Plan 24342 (CofW RN 7092238000)
Lot 54, Plan 24342 (CofW RN 7092304000)
Lot 55, Plan 24342 (CofW RN 7092190000)
Parcel 7, Plan 9218 (CofW RN 14096344100)

“Property of Interest (POI)”
Lot 58, Plan 24342 (CofW RN 7092127100)

The entirety of the abovementioned ten parcels will herein be referred to as the “Study Area”. The detailed legal land descriptions can be found in Section 6.1.1.

The Phase I ESA was conducted for the City of Winnipeg in support of due diligence in determining the environmental disposition of the Site and Property of Interest prior to site development. The Phase I ESA evaluates the current and historical conditions of the Site and neighbouring properties to identify any issues of potential environmental concerns that may exist in connection with the Study Area and surrounding properties.

A site location plan and site layout plan are included in **Appendix A** and selected photographs of the Site are included in **Appendix B**.

2.2 SCOPE OF WORK

The Phase I ESA carried out at the Site by WSP was conducted in general accordance with the Canadian Standards Association's (CSA) Phase I Environmental Site Assessment Standard Z768-01 (R2022) and included the following:

- Records review, including but not limited to, publicly available land titles, aerial photographs, and groundwater well reports, geological and topographic maps.
- Provincial government regulatory search.
- Review of Environmental Risk Information Service (ERIS) Ecolog Report.
- A site visit of the property and publicly accessible neighbouring properties.
- Review of previous environmental reports if any are available; and
- Evaluation of information and preparation of this report.

A Phase I ESA does not include sampling or testing of air, soil, groundwater, surface water or building materials. The Phase I ESA was visually inspected only from readily accessible areas of the Site. An intrusive sampling investigation was not conducted. For this Phase I ESA, no additions to the CSA standards were made.

The site visit was conducted by Ms. Cassie Bujan and Ms. Annie McIntyre of WSP on November 29, 2022. The Study Area and readily visible and publicly accessible portions of adjoining and neighboring properties were observed for the presence of potential sources of environmental concern. The site visit included all parcels within each of the ten subject properties defined in subsection 2.1. WSP was unescorted during the Site visit, but an interview was conducted with Mr. Jesse Crowder, Manager of the City of Winnipeg Asset Management Office, who has knowledge of the overall Study Area.

3 REGULATORY FRAMEWORK

A Phase I ESA investigation involves the evaluation and reporting of existing information for the site property and associated buildings collected through records review, a site visit and interviews with person(s) knowledgeable of the current and former site activities. This includes an assessment for the potential presence of hazardous materials associated with site activities and/or building structures. Federal and provincial regulations, guidelines and codes of practice exist for hazardous materials and where applicable, are taken into account during the Phase I ESA investigation to determine appropriate conclusions and recommendations.

A Phase I ESA does not comprise a Hazardous Materials Survey or Designated Substances Survey, nor does it include a systematic review or audit of operational compliance issues, or of any environmental management systems which may exist for the Site.

4 SITE DESCRIPTION

4.1 PROPERTY INFORMATION

The Study Area consists of ten (10) subject properties with discrete certificate title numbers, with each of their certificate title numbers and municipal roll number as outlined in Table 2 below:

Table 2. Details of the Phase I ESA Study Area

	City of Winnipeg Survey Parcel	CITY OF WINNIPEG ROLL NUMBER	Land Area (Square feet [sq.ft])
Site	Block 3, Plan 17744	14096460000	41,973
	Lot 49, Plan 24342	7092321000	139,179
	Lot 50, Plan 24342	7092308000	120,255
	Lot 51, Plan 24342	7092313000	32,203
	Lot 52, Lot 56 & Lot 57, Plan 24342	7092163000	453,099
	Lot 53, Plan 24342	7092238000	15,041
	Lot 54, Plan 24342	7092304000	6,869
	Lot 55, Plan 24342	7092190000	31,600
	PT 7, Plan 9218	14096344100	237,220
POI	Lot 58, Plan 24342	7092127100	182,954

According to the City of Winnipeg Map of Assessment Parcels, the Study Area consists of portions zoned as M1 – Light Manufacturing and C3 – Com Corridor. The City of Winnipeg property use code (PUC) of the POI is currently designated as vacant commercial. Figure 2 (Appendix A) outlines each subject property that defines the Site.

4.2 ON-SITE BUILDINGS AND STRUCTURES

No buildings were observed on the Study Area during the Phase I ESA site visit.

4.3 PHYSICAL SETTING

4.3.1 SURFACE WATER DRAINAGE

The Study Area is generally level with more variance in relief towards the western portion of the Study Area, where the presence of reworked fill materials on-site are evident as mounds of fill stockpiles. Due to snow cover during the site visit, surface water drainage on-site was not readily observed, but is presumed to infiltrate through unpaved soil cover with excess run-off following the contours of the property into areas with lower elevations in the north central portion of the Site and south along the rail right-of-way.

The closest water body is Omand's Creek at a distance of approximately 750 meters southwest of the Study Area.

4.3.2 SOIL AND SURFICIAL GEOLOGY

The soil on-site is anticipated to consist predominantly of the Red River Association, lacustrine fine clay that ranges from Red River Clay to Osborne Clay. Red River Clay Are well to intermediately drained associates while Osborne Clay are poorly drained associates. The Red River Association consist of blackearth soils developed on lacustrine fine clay deposits in the central basin of glacial Lake Agassiz. Due to differences in drainage or moisture regime, different soil types with varying morphological features can develop on the same fine textured clay parent material (Ehrlich, Poyser, Pratt and Ellis, 1953). According to Agriculture and Agri-Food Canada's Soils of Canada Interactive Map, the dominant soils in the area of the Study Area prior to development are Vertisolic (98%) and Regosolic (2%).

The surficial geology in the area consists of offshore glaciolacustrine sediments and alluvial sediments. Glaciolacustrine sediments consists of clay, silt and minor sand and are 1-20 metres (m) thick. These sediments were deposited from suspension in offshore, deep water of the glacial Lake Agassiz and were commonly scoured by icebergs. Alluvial sediments consist of sand and gravel, sand, silt, clay and organic detritus. They are also 1-20 m in thickness and are deposited as channel and overbank sediments and reworked by existing rivers and deposited as bars (Matile and Keller, 2004).

4.3.3 TOPOGRAPHY, GROUNDWATER AND REGIONAL DRAINAGE

The Site topography is primarily level with surface flows infiltrating directly into the ground or into areas with lower elevations in the north central portion of the Site and south along the rail right-of-way.

Shallow groundwater depth was reported to be between approximately 1.5 metres below ground surface (mbgs) to 4.0 mbgs at the east end of the Study Area in the POI.

A review of the topographic map for the area (Natural Resources Canada, 2021) indicates the Site is located at approximately between 230 to 240 m above sea level (masl). According to LIDAR data used in Golder's report (2015a), the Study Area is approximately 235 masl along the north and south boundary by Oak Point Highway and the rail right-of-way respectively, with the highest elevation determined to be 241 masl at the former Brooklands Landfill. The surrounding areas in the southern half of the Study Area ranges from 238 to 239 masl while the northwestern portion is slightly undulating ranging from 237 to 238 masl. The northeastern portion of the Study Area is inferred to have minimal fill material and averages approximately 235 to 236 masl.

An anticipated local down gradient flow (shallow groundwater flow direction) to the northeast was reported in the western portion of the Study Area on the POI subject parcel where a Phase II ESA and a series of groundwater monitoring programs was conducted by Parsons in between 2015 and 2018.

Regional groundwater flow is anticipated to be primarily east and southeast, downgradient towards the Assiniboine River which is approximately 5.5 km from the southernmost site boundary and the Red River approximately 6 km east of Site.

It is important to note that local shallow groundwater flow direction can be affected by the presence of underground utility corridors and fill materials and may not necessarily reflect the regional or local groundwater flow or area topography.

4.3.4 BEDROCK GEOLOGY

According to a geological map of Manitoba, the bedrock geology at the Site consists of the Gunton Member of the Stony Mountain Formation from the Ordovician period. The Gunton member is the lower portion of the formation and consists of nodular dense dolomite (Manitoba Energy and Mines, 1990).

5 SUMMARY OF RECORDS REVIEWED

A summary of the records reviewed in support of the Phase I ESA is outlined in Table .

Table 3. Summary of Historical Record Resources

PARAMETER	REFERENCE
Aerial Photographs	Canada Map Sales. Dates: 1948, 1959, 1968, 1979 and 1988.
	Google Earth™ satellite imagery: 2002 and 2010.
Land Titles	Teranet Manitoba, The Property Registry, Titles Online.
ECOLOG ERIS Environmental Database Search	ERIS EcoLog Database Report. Custom Report. Order 22102800061. November 30, 2022.
Fire Insurance Plans	None accessed.
City Directories	ERIS City Directory Search (Appendix E-2)
Previous Environmental Reports	1. BOMA Environmental & Safety Inc. (BOMA). (2015). *Phase I Environmental Site Assessment of Property at 65 Hyde Avenue, Winnipeg, MB. Prepared for Mr. Harvey Bergner of Stonewall, MB on November 12, 2015.* 2. City of Winnipeg. (1984). *The Brooklands Landfill Site – Landfill No. 28.* Prepared by the Waterworks, Waste and Disposal Department of the City of Winnipeg in December 1984. 3. City of Winnipeg. (1999). *City Drawing Number SWD-D-125A: No. 28 Brooklands Landfill Site Detail.* Prepared by the City of Winnipeg Water and Waste Department Solid Waste Division on October 1999 and revised in September 2016. 4. Golder Associates Ltd. (2015a). *Landfill Status Report for Closed Landfills Winnipeg, Manitoba.* Prepared for the City of Winnipeg in September 2015. 5. Golder Associates Ltd. (2015b). *Landfill Environmental Risk Report for Closed Landfills Winnipeg, Manitoba.* Prepared for the City of Winnipeg in October 2015. 6. Golder Associates Ltd. (2019). *Assessment of Potential Off-Site Impacts – Brooklands Landfill, Site 28.* Prepared for the City of Winnipeg in January 2019. 7. Imperial Oil Limited. (2019). *Former Petroleum Retail Fuel Outlet and Cardlock Facility 100 Oak Point Highway, Winnipeg, Manitoba 88000583. Legal Description: SP Lot 58, Plan 24342 WLTO in E½ 14-11-2 EPM (collectively referred to as the "Site"). Application for Determination of Responsibility (the "Application").* Letter from Jenny Hay of Imperial Oil Limited to Warren Rospad of Manitoba Sustainable Development (MSD, currently MECP), dated August 1, 2019. 8. J&D Environmental. (2021a). *Phase II Environmental Site Assessment – 250 Oak Point Highway – Site B (*Parcel 7 of Plan 9218 WLTO). Prepared for Harpreet Lali on May 31, 2021. 9. J&D Environmental. (2021b). *Phase II Environmental Site Assessment – Site A.* Prepared for the Estate of Paul Albrechtsen on August 4, 2021. 10. Manitoba Sustainable Development (MSD, currently MECP). (2018). *Letter to Imperial Oil regarding Former Petroleum Retail Fuel Outlet and Cardlock Facility, 100 Oak Point Highway, Winnipeg, MB, Designation under the Contaminated Sites Remediation Act. Dated August 9, 2018.*

PARAMETER	REFERENCE
	11. Manitoba Sustainable Development (MSD, currently MECP). (2019a). *Letter to Imperial Oil regarding 100 Oak Point Highway, Winnipeg, MB, SP Lot 58, Plan 24342 WLTO - Determination of Responsibility under the Contaminated Sites Remediation Act*. Dated August 7, 2019. 12. Manitoba Sustainable Development (MSD, currently MECP). (2019b). *Letter to City of Winnipeg regarding 100 Oak Point Highway, Winnipeg, MB SP Lot 58, Plan 24342 WLTO – Notice to Potentially Responsible Persons under the Contaminated Sites Remediation Act*. Dated August 7, 2019. 13. Manitoba Conservation and Climate (MCC, currently MECP). (2021). *Letter to Imperial Oil regarding 100 Oak Point Highway, Winnipeg, MB, SP Lot 58, Plan 24342 WLTO - Determination of Responsibility under the Contaminated Sites Remediation Act*. Dated February 3, 2021. 14. Parsons. (2015). *Pre-excavation Groundwater Assessment Program, Site Decommissioning Activities and Subsurface Investigation Program, Former Retail Fuel Outlet, Restaurant and Cardlock Facility – 100 Oak Point Highway, Winnipeg, Manitoba.* Prepared for Imperial Oil on April 16, 2015. 15. Parsons Inc. (2016). *Supplemental Phase II Environmental Assessment Former* Petroleum *Retail Outlet and Cardlock Facility.* Prepared for Imperial Oil on December 8, 2016. 16. Parsons. (2017). *2017 Groundwater Monitoring and Sampling Data Package – 100 Oak Point Highway, Winnipeg, Manitoba.* Prepared for Environmental Services, Imperial on November 23, 2017. 17. Parsons. (2018). *2018 Groundwater Monitoring and Sampling Data Package – 100 Oak Point Highway, Winnipeg, Manitoba.* Prepared for Environmental Services, Imperial on July 17, 2018. 18. Parsons. (2019). *Review of Third-party Report Dated January 2019 – Former Petroleum Retail Fuel Outlet and Cardlock Facility, 100 Oak Point Highway, Winnipeg, Manitoba, Site Location No. 88000583.* Prepared for Environmental Services, Imperial on May 17, 2019.
Geological and Geotechnical Reports	1. Ehrlich, W.A., Poyser, E.A., Pratt, L.E., Ellis, J.H., 1953. Report of reconnaissance soil survey of Winnipeg and Morris map sheet areas. Soils Report No. 5. Manitoba Soil Survey, Manitoba Department of Agriculture, Winnipeg, Manitoba. 2. Manitoba Energy and Mines. 1990. Bedrock Geology Compilation Map Series, Winnipeg, NTS 62H, 1:250,000. 3. Matile, G.L.D. and Keller, G.R. 2004: Surficial geology of the Winnipeg map sheet (NTS 62H), Manitoba; Manitoba Industry, Economic Development and Mines, Manitoba Geological Survey, Surficial Geology Compilation Map Series, SG-62H, scale 1:250 000. 4. Natural Resources Canada. 2022. Geogratis: Toporama. Accessed November 2022. 5. Natural Resources Canada. 2022. Open Maps Viewer: National Hydrographic Network. Accessed October 2022.
Environmental Infractions and Orders	Manitoba Conservation and Climate file searches. File No. 6244, 6245, 6246, 6247, 6248, 6249, 6250, 6251, 6252, 6253, and 6254.

PARAMETER	REFERENCE
Reportable Spill/Release Occurrences	Manitoba Conservation and Climate file searches. File No. 6244, 6245, 6246, 6247, 6248, 6249, 6250, 6251, 6252, 6253, and 6254.
Contaminated Sites	Manitoba Conservation and Climate file searches. File No. 6244, 6245, 6246, 6247, 6248, 6249, 6250, 6251, 6252, 6253, and 6254.
Environmental Approvals, Licenses, Registrations, and Permits	Manitoba Conservation and Climate file searches. File No. 6244, 6245, 6246, 6247, 6248, 6249, 6250, 6251, 6252, 6253, and 6254.
Underground and Aboveground Storage Tanks	Manitoba Conservation and Climate file searches. File No. 6244, 6245, 6246, 6247, 6248, 6249, 6250, 6251, 6252, 6253, and 6254.
Water Well Records	1. GWDrill Well Search Database. 2018. Manitoba Environment, Climate and Parks. 2. ERIS EcoLog Database Report. Custom Report. Order 22102800061. November 30, 2022.

6 DISCUSSION OF FINDINGS

6.1 RECORDS REVIEW

- The current land titles were requested from the Property Registration, Teranet Manitoba. Eleven (11) title certificates (Certificate Title [CT] 1059705/1, CT 1129006/1, CT 1129008/1, CT 1129011/1, CT 1129012/1, CT 1129013/1, CT 1129019/1, CT 1129021/1, CT 1129036/1, CT 3038514/1, and CT 3214490/1) were reviewed for the ten land parcels. There are no caveats or liens in the land titles that appear to indicate an environmental concern to the Study Area.
- Historical aerial photographs indicated that the Study Area was used primarily as agricultural land prior to 1950, with the western portion of the Study Area comprising of trails and re-worked soil, consistent with previous reports stating that the Village of Brooklands used the western portion of the Study Area as a dumping ground. The former Brooklands Landfill occupied the southwest portion of the Study Area from 1950 to 1968 before it was decommissioned. The footprint of the former Brooklands Landfill currently occupies survey parcel Lots 49 and 50, Plan 24342 (CT 1129021/1 and CT 1129019/1, respectively) and the City of Winnipeg is listed as the registered owner.
- An oval structure similar to a race-track with stands for spectators was observed in the 1959 and 1968 aerial photographs, believed to be the former Brooklands Speedway in operation from 1953 to 1973 and occupying present day survey parcels Lot 52 and part of Lot 57, Plan 24342. Lots 52, 56 and 57 are currently under the ownership of Miracle Property Developers Ltd. as indicated on CT 3214490/1.
- In the 1979 aerial photograph, both the former Brooklands landfill and the Brooklands Speedway are no longer visible. There appears to be a gravel roadway that splits the Study Area as an extension of Selkirk Avenue from the east. The southern portion appears to be sparsely vegetated with fill stockpiles. By 1988, vegetation appears to have overgrown the remnants of the former landfill footprint and fill stockpiles with some visible trails apparent throughout the property. The Imperial Oil Esso facility (POI) does not appear on aerial photograph imageries until 2002 where there appears to be a pump island canopy at the northern portion of the POI and approximately four (4) cardlock pump islands to the south for semi-trucks. Sea-can containers and vehicle storage along the west Site boundary begins approximately in 2010 to present.
- Ten ERIS Ecolog listings were found within the Study Area boundary and 157 listings were found for the surrounding properties within 250 m. The listings identified within the Study Area boundary include one contaminated/impacted site, one ERIS historical search, one fuel storage tank, one bulk fuel distributor, three waste generator summaries, and three retail fuel storage tanks.
- Previous environmental reports were reviewed in preparation for the on-site visit to compare any potential areas of interest or concerns previously identified. These reports indicated areas of potential environmental concern (APECs) that required further background research and an in-depth on-site investigation.
- A request was made to MCC on October 26, 2022, for a search of their databases for any reported information regarding spills, environmental infractions, hazardous wastes, listing on a contaminated sites registry and/or any remediation actions pertaining to the Study Area. The responses received on November 15 (File Search No.'s 6243, 6244, 6245, 6246, 6247, 6248, 6249, 6250, 6251, 6252, 6253, and 6254) only registered the POI site (File No. 6252) as an operating Registered Hazardous Waste Generator, inactive Registered Petroleum Storage Site, and a designated impacted Contaminated/Impacted Site.
- A water well database search was conducted through the MECP GWDrill (2018) database for the Study Area on November 10, 2022. The search as conducted using the Study Area's legal land description Range 2E Township 11 to 14, by plotting all the well logs from the data file on Google Earth and acquiring the Well PID's of all well logs within 250 m of the Study Area. Two unique well logs had coordinates listed within 250 m of the Study Area, with no well logs listed within the Study Area boundary.
- Based on the records review, only the POI (100 Oak Point Highway) and not the Site is designated impacted under the MECP Contaminated Sites Inventory program.

6.1.1 LAND TITLES

Eleven land title certificates for the Study Area were requested from The Property Registry, Teranet Manitoba. Details of the current titles are below, and copies of the title certificates can be found in **Appendix C**.

Title Number: 1059705/1
Registration Date: DECEMBER 6, 1988
Registered Owner: THE CITY OF WINNIPEG
Previous Owner: HARVEY WIEBE
Legal Land Description:
SP BLOCK 3 PLAN 17744 WLTO
EXC FIRSTLY: ALL MINES AND MINERALS
IN S1/2 23-11-2EPM
Originating Title Number: 1100589/1

Title Number: 1129006/1
Registration Date: OCTOBER 12, 1989
Registered Owner: THE CITY OF WINNIPEG
Previous Owner: WLTO SURVEY OFFICE
Legal Land Description:
SP LOT 55 PLAN 24342 WLTO
EXC THEREOUT ALL MINES AND MINERAL VEST IN THE CROWN (MAN) BY THE REAL PROPERTY ACT
IN E1/2 14-11-2-EPM
Originating Title Number: 1215384/1

Title Number: 1129008/1
Registration Date: OCTOBER 12, 1989
Registered Owner: HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE OF MANITOBA
Previous Owner: WLTO SURVEY OFFICE
Legal Land Description:
ALL MINES AND MINERALS VESTED IN THE CROWN (MANITOBA) BY THE REAL PROPERTY ACT UNDER THE FOLLOWING DESCRIBED LAND:
SP LOT 53 AND 53A PLAN 24342 WLTO
IN E1/2 14-11-2-EPM
Originating Title Number: 1215383/1

Title Number: 1129011/1
Registration Date: OCTOBER 12, 1989
Registered Owner: HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE OF MANITOBA
Previous Owner: WLTO SURVEY OFFICE
Legal Land Description:
ALL MINES AND MINERALS VESTED IN THE CROWN (MANITOBA) BY THE REAL PROPERTY ACT UNDER THE FOLLOWING DESCRIBED LAND:
SP LOTS 51, 54, 55 AND 62 PLAN 24342 WLTO
IN E ½ 14-11-2 EPM
Originating Title Number: 1215381/1

Title Number: 1129012/1
Registration Date: OCTOBER 12, 1989
Registered Owner: THE CITY OF WINNIPEG

Previous Owner: WLTO SURVEY OFFICE
Legal Land Description:
SP LOT 53 AND 53A PLAN 24342 WLTO
EXC THEREOUT ALL MINES AND MINERALS VESTED IN THE CROWN (MAN.) BY THE REAL PROPERTY ACT
IN E1/2 14-11-2 EPM
Originating Title Number: 1215377/1

Title Number: 1129013/1
Registration Date: OCTOBER 12, 1989
Registered Owner: THE CITY OF WINNIPEG
Previous Owner: WLTO SURVEY OFFICE
Legal Land Description:
SP LOTS 51 AND 54 PLAN 24342 WLTO
EXC THEREOUT ALL MINES AND MINERALS VESTED IN THE CROWN (MAN.) BY THE REAL PROPERTY ACT
IN E1/2 14-11-2-EPM
Originating Title Number: 1215374/1

Title Number: 1129019/1
Registration Date: OCTOBER 12, 1989
Registered Owner: THE CITY OF WINNIPEG
Previous Owner: WLTO SURVEY OFFICE
Legal Land Description:
SP LOTS 50 PLAN 24342 WLTO
IN E1/2 14-11-2-EPM
Originating Title Number: 1215372/1

Title Number: 1129021/1
Registration Date: OCTOBER 12, 1989
Registered Owner: THE CITY OF WINNIPEG
Previous Owner: WLTO SURVEY OFFICE
Legal Land Description:
SP LOT 49 PLAN 24342 WLTO
IN E1/2 14-11-2-EPM
Originating Title Number: 1215366/1

Title Number: 1129036/1
Registration Date: OCTOBER 12, 1989
Registered Owner: IMPERIAL OIL LIMITED
Previous Owner: WLTO SURVEY OFFICE
Legal Land Description:
SP LOT 58 PLAN 24342 WLTO
IN E1/2 14-11-2-EPM
Originating Title Number: 1215386/1

Title Number: 3038514/1
Registration Date: DECEMBER 9, 2019
Registered Owner: JOHN ERIK ALBRECHTSEN, RODNEY BRENT CORBETT, DONNA ELAINE HILL, RONALD STANLEY ADE AND SCOTT ALBRECHTSEN
AS EXECUTORS UNDER THE LAST WILL OF PAUL ERIK ALBRECHTSEN
Previous Owner: ESTATE OF PAUL ERIK ALBRECHTSEN
Legal Land Description:

PARCEL 7 PLAN 9218 WLTO
EXC FIRSTLY: NELY 47 FEET PERP
SECONDLY: PLAN 21937 WLTO
THIRDLY: PLAN 23406 WLTO AND
FOURTHLY: ALL MINES AND MINERALS
IN W1/2 OF SE1/4 23-11-2 EPM
Originating Title Number: 5135679/1

Title Number: 3214490/1
Registration Date: OCTOBER 20, 2022
Registered Owner: MIRACLE PROPERTY DEVELOPERS LTD.
Previous Owner: 10134152 MANITOBA INC.
Legal Land Description:
SP LOTS 52, 56 AND 57 PLAN 24342 WLTO
SAID LOT 56 BEING SUBJECT TO THE RESERVATIONS REPECTING MINES, MINERALS, MINERAL OILS AND OTHER MATTERS AS THE SAME ARE MORE FULLY SET FORTH IN TRANSFER 740533 WLTO
IN E1/2 14-11-2 EPM
Originating Title Number: 5481577/1

There are no caveats or liens in the land titles that appear to indicate an environmental concern to the Study Area.

6.1.2 AERIAL PHOTOGRAPHS

Selected aerial photographs obtained from Canada Map Sales included the dates 1948, 1959, 1968, 1979, and 1988 and were reviewed to determine former land use at the Study Area (**Appendix D**). Google Earth™ satellite imagery from 2002 and 2010 were also viewed but not reproduced for the report. A summary of the aerial photography and satellite imagery observations for the Study Area is provided in Table 4.

Table 4. Historical Aerial Photograph Summary

DATE	SOURCE	STUDY AREA	NORTH ADJACENT PROPERTY	SOUTH ADJACENT PROPERTY	EAST ADJACENT PROPERTY	WEST ADJACENT PROPERTY
1948	Canada Map Sales	The Site is mostly vacant agricultural land with a small farmstead at the south portion of the POI subject parcel. A roadway runs east to west transecting the northern portion of the Study Area as an extension of Selkirk Avenue. The roadway appears to lead to a clearing at the west central portion of the Site with a defined boundary around an area of reworked soil cover. Long narrow rows of troughs and ridges visible is suggestive of an early dumping area for the Village of Brooklands.	Immediately north adjacent appears to be Oak Point Highway and single-family homes further northeast. Northwest of the Study Area, the area appears to be agricultural land.	Immediately south adjacent appears to be a Canadian Pacific rail right-of-way and vacant agricultural land further south with a farmstead.	The east adjacent property appears to be a large farmstead with vacant land that is used for agricultural purposes.	The west adjacent properties are mostly agricultural with a large area to the southwest that appears to be a dumping area that extends into the southwest corner of the Study Area.
1959	Canada Map Sales	The Brookside Landfill has been developed in the center-southern portion of the Study Area with areas of sparsely vegetated clearing north of the landfill and fill material stockpiled west of the landfill. The Brooklands Speedway is visible as an oval structure with spectator stands along the north and south lengths of the structure. The northwest portion of the Study Area, predominantly within subject parcel PT 7, Plan 9218 (CT 3038514) appears to have cleared vegetation. A small building structure and cleared gravel parking has been developed in the northeastern corner of the Study Area (subject parcel Block 3, Plan 17744) by Oak Point Highway and the Selkirk Avenue intersection. This building structure likely services the retail of fuel (City of Winnipeg, 1984).	Further development of single-family houses is present to the north of the north adjacent Oak Point Highway.	No substantial changes were apparent.	East adjacent to the POI appears to have a potential water pond dug out at the northern most part of the east adjacent property. It appears that several buildings have been added to the eastern portion of the east adjacent property while the southern portion remains vacant.	No substantial changes were apparent.
1968	Canada Map Sales	The fill material west of the landfill appears to have been either relocated or buried and the terrain levelled. The POI area appears to have been leveled and revegetated.	Appears to be development of a commercial business north of the Study Area and west of previously mentioned single-family houses.	The area south of the POI appears to have fill piles present. Commercial development and roadways have been established further south of the rail right-of-way.	The pond dugout appears to have been backfilled with soil material and is now vacant.	A large building has been built further northwest along Oak Point Highway with what appears to be a large parking lot.
1979	Canada Map Sales	The landfill has been decommissioned and filled in. The property is now vacant land that appears to mostly revegetated fill with remnants of the old access road for the landfill. A light-colored fill stockpile resembling the present-day concrete stockpile observed during the site visit is visible at the southwest corner of subject parcel PT 7, Plan 9218's.	Further residential community development has occurred.	Further commercial development has occurred.	It appears that dumping has continued southeast of the POI site. Commercial development has occurred further east to the Oak Point Highway/King Edward corner.	Further commercial development has occurred.

DATE	SOURCE	STUDY AREA	NORTH ADJACENT PROPERTY	SOUTH ADJACENT PROPERTY	EAST ADJACENT PROPERTY	WEST ADJACENT PROPERTY
1988	Canada Map Sales	Vegetation appears to be regrowing through the area with trails visible. There remains a structure in the northeastern subject parcel Block 3, Plan 17744, consistent with the City of Winnipeg report (1984) that a building remains on-site even though the former gas station has closed.	The property between parcels Block 3, Plan 17744 (CT 1059705) and PT 7, Plan 9218 (CT 3038514) has been developed into a commercial building with a surrounding parking lot.	No substantial changes were apparent.	No substantial changes were apparent.	No substantial changes were apparent.
2002	Google Earth™	The central and southern portions of the Site appear to be cleared of vegetation and covered levelled with fill material. The Site appears to be accessible by an access road from the east, just south of the POI. A pump island canopy is developed at the northern portion of the POI, with cardlock pump islands visible at the southern portion. This is likely the Imperial Oil retail fuel outlet that was in operation. There appears to be a low-lying area along the south boundary of parcel PT7 Plan 9218 in the west-central portion of the Site.	No substantial changes were apparent.	No substantial changes were apparent.	No substantial changes were apparent.	The west adjacent property (250 Oak Point Highway) has a large number of sea-can containers and trailers stored along the property line.
2010	Google Earth™	Majority of the Study Area is covered in grass and shrubbery. A narrow trail/roadway runs east to west along the southern portion of the Site. The southwestern portion of the Site looks to be a storage area for excess semi-trailers from the property to the west.	No substantial changes were apparent.	No substantial changes were apparent.	No substantial changes were apparent.	No substantial changes were apparent.

6.1.3 PREVIOUS ENVIRONMENTAL REPORTS

Previous environmental reports and documents including drawings, letters and maps associated with the environmental disposition of subject properties within the Study Area were reviewed by WSP.

WSP was provided by the Client three portable document format (PDF) files associated with the former Brooklands Landfill, 10 PDF files on the Imperial Oil property located on 100 Oak Point Highway, Winnipeg, MB (POI), and three PDF files with information from environmental investigation conducted on behalf of Paul's Hauling (northwest adjacent property to the Study Area).

In addition, WSP requested publicly available files via email communication with Mr. Warren Rospad, MECP Contaminated Sites Program Specialist for File #73438 (100 Oak Point Highway) of the Contaminated Sites Registry. 16 PDF files were electronically transferred by Mr. Rospad to WSP on December 12, 2022 for review.

Two publicly available reports entitled *"Landfill Status Report for Closed Landfills, Winnipeg, Manitoba"* and *"Landfill Environmental Risk Report for Closed Landfills, Winnipeg, Manitoba"*, both prepared by Golder Associates Ltd. for the City of Winnipeg in September 2015 and October 2015 was also reviewed by WSP.

6.1.3.1 THE BROOKLANDS LANDFILL SITE – LANDFILL NO. 28 (CITY OF WINNIPEG, 1984)

The City of Winnipeg Waterworks, Waste and Disposal Department prepared this report in December 1984 to document the evaluation of the former Brooklands Landfill site through previous reports, air photograph evaluation, pre-drilling assessment and mapping, monitoring results and drill reports, etc. The No. 28 Brooklands Landfill Site was organized into Area 1 to Area 6, the total of all six areas similar in size to the current Phase I ESA Study Area. The six areas and their APECs can be summarized as follows:

- Area 1: Actual landfill site in subject parcel Lot 49, 50, and 51, Plan 24342. Open hole tests for methane yielded a range of 1% to 93% lower explosive limit (LEL). Gas probes installed by the City of Winnipeg at the periphery of Area 1 yielded no detectable methane concentrations during a 2-year monitoring period. A control zone of 15 m had been established around the landfill control zone.
- Area 2: The site of the former Brooklands Speedway east adjacent to Area 1. Previously completed borehole data indicated only one small area to be refuse-type fill and the remaining area to be filled over thick organic topsoil layers. Methane gas generation of this Site remains high. While this area is not part of the actual landfill site, variability of fill material and complex fill situation overlying organic topsoil was classified on-site.
- Area 3: Area north Selkirk Ave right-of-way extending to Oak Point Highway. A portion of Area 3 at the corner of Selkirk Avenue had previously been developed as a gas station. While this area is not part of the actual landfill site, variability of fill material and complex fill situation overlying organic topsoil was classified on-site.
- Area 4: The area of the subject parcel south adjacent to the POI site, with the civic address 61 Hyde Avenue. Illegal surface dumping was evident, and the area was piled high with debris. Additional testing and evaluation for methane potential in this area was recommended.
- Area 5: The area encompassing the POI at 100 Oak Point Highway and the northern portions of subject parcel Lot 57 and 58, Plan 24342. While this area is not part of the actual landfill site, variability of fill material and complex fill situation overlying organic topsoil was classified on-site.
- Area 6: West adjacent properties of the Site currently used by Paul's Hauling for the storage of trailers and sea-can containers. According to this report, this area is not considered part of the landfill site.

6.1.3.2 PRE-EXCAVATION GROUNDWATER ASSESSMENT PROGRAM, SITE DECOMMISSIONING ACTIVITIES AND SUBSURFACE INVESTIGATION PROGRAM, FORMER RETAIL FUEL OUTLET, RESTAURANT AND CARDLOCK FACILITY – 100 OAK POINT HIGHWAY, WINNIPEG, MANITOBA (PARSONS, 2015)

Prior to decommissioning the facility in 2015, Parsons was retained by Imperial Oil to conduct assessment excavations around the cardlock pump island and UST nest to the south, and the UST nest to the north of the service building under the canopy.

Exceedances of PHC F2 was noted for soil samples collected from the walls of two testpit advanced around the UST nest at depths of 1 to 2 mbgs. Testpits TP-36, TP-21 along the sidewalk at the north site boundary indicated PHC F2 impacts in exceedance of guidelines. Testpits TP-25, TP-7, TP-8 and TP-19 immediately west, centre and southeast of the cardlock UST nest south of the service building indicated exceedances of PHC F2 and F3. All PHC impacts do not appear to be present past 2.0 mbgs.

Exceedances in lead were noted from soil samples in several testpits near the south site boundary, including a localised occurrence of PHC F4 exceedance in one testpit location (TP-47).

Groundwater depths measured from monitoring wells vary across the POI ranging from 0.87 mbgs to 3.37 mbgs, with the inferred principal direction of groundwater flow was generally to the southwest. This inference of groundwater flow direction is contradictory of findings from subsequent groundwater monitoring programs.

A total of 72 testpits and 12 boreholes were advanced across the Site, with 24 testpits containing soil samples exceeding metals criteria, two testpits containing soil samples exceeding PAH criteria, four boreholes containing soil samples exceeding PHC criteria and one borehole containing soil samples exceeding metals criteria. Impacts to the south appear to be associated with fill material either brought onto property, or from shallow groundwater transportation of leached impacts from fill material deposited south of the property.

6.1.3.3 LANDFILL STATUS REPORT (GOLDER, 2015a)

Golder Associates was retained by the City of Winnipeg to assess 33 closed landfill sites which includes a site visit with solid waste staff from the City of Winnipeg, Environmental Branch to document the setting of the sites and surrounding area, assess and document the physical condition of the landfill, and view the monitoring locations/installations to assist in subsequent data interpretation. The report on Brooklands Landfill was included in Appendix Y of this report.

A site inspection of the former Brooklands Landfill No. 28 was completed on August 20, 2014. At the time of the site inspection, the vegetation was recorded to have limited signs of stress and was recorded to be much shorter than the previous year. Signs of dumping was observed as construction waste with the remains of metal, concrete and yard trimmings. A Golder Associates staff member conducted a site walkabout on June 15, 2015, where they identified some fill placement in the central portion of the landfill but was otherwise flat and overgrown with grass.

Landfill gas probes were previously installed throughout the landfill site to measure any methane gas concentrations that are consistent with landfill decommissioning. In 1983, three monitoring probes detected trace methane concentrations of less than 20% lower explosive limit (LEL). The location of these probes was just northeast and southeast of the landfill and the control zone. Trace concentrations of methane were again identified in 1987 in a probe that was located outside the waste fill area. Due to the trace concentrations of methane present in wells distant form the landfill control zone, it indicates that the landfill gas has the potential to migrate but would be considered limited as there are no natural landfill gas barriers and the gas would likely escape through the surficial fill.

6.1.3.4 LANDFILL ENVIRONMENTAL RISK REPORT FOR CLOSED LANDFILLS (GOLDER, 2015b)

Golder Associates prepared this report to provide a high-level risk assessment based on the previously completed Landfill Status Report (Golder, 2015a) which documented the existing conditions at that time for 33 closed landfills across the City of Winnipeg. With regards to the recommendations for Brooklands Landfill included in Appendix Y of this report, Golder recommended installing monitoring well nests for the collection of groundwater samples outside of the landfill footprint and submitting them for all parameters in the "*Landfill Standards: A Guidance on the Regulatory and Approval Requirements for New or Expanding Landfill Sites (Landfill Standards)*" document by

Ontario Ministry of Environment and Climate Change before re-assessing to determine reduction of analytical parameters. Signs for no smoking or open flames were also recommended for the vicinity of the landfill site. Fencing was recommended to restrict access and prevent illegal dumping of construction wastes. The extent of landfill gas impacts were estimated to be trending from the footprint of the former Brooklands Landfill towards the southeast, possibly due to buried utilities acting as migration pathways for landfill gas.

6.1.3.5 *SUPPLEMENTAL PHASE II ENVIRONMENTAL SITE ASSESSMENT – FORMER PETROLEUM RETAIL FUEL OUTLET AND CARDLOCK FACILITY, 100 OAK POINT HIGHWAY, WINNIPEG, MANITOBA (PARSONS, 2016)*

This Phase II was conducted at the former petroleum retail outlet and cardlock facility located at 100 Oak Point Highway. A total of 13 boreholes were drilled on-site, with a monitoring well installed at each location. Soil samples and groundwater sampling were collected from these boreholes and were analyzed for their concentrations of metals and PAHs. The groundwater potentiometric surface elevations for May 16, 2016 indicated an inferred principal direction of the shallow overburden groundwater flow to the northeast. Seven borehole soil samples indicated metal concentration exceedances to applicable criteria and two boreholes indicated PAH concentration exceedances. No groundwater samples indicated any exceedances for metal or PAHs. No additional investigations were recommended following this Phase II ESA.

6.1.3.6 *LETTER TO IMPERIAL OIL: FORMER PETROLEUM RETAIL FUEL OUTLET AND CARDLOCK FACILITY, 100 OAK POINT HIGHWAY, WINNIPEG, MANITOBA; DESIGNATION UNDER THE CONTAMINATED SITES REMEDIATION ACT (MSD, 2018)*

This letter was written by MECP (formerly MSD) to advise Imperial Oil that 100 Oak Point Highway, Winnipeg, Manitoba had been designated as an impacted site under the Contaminated Sites Remediation Act. MECP further acknowledged the receipt of a Remediation Plan for the site in the report entitled "*Remediation Plan, Former Petroleum Retail Fuel Outlet and Cardlock Facility, 100 Oak Point Highway, Winnipeg, Manitoba"* prepared by Parsons Inc. dated July 6, 2017.

It should be noted that WSP was not provided this Remediation Plan for review.

6.1.3.7 *ASSESSMENT OF POTENTIAL OFF-SITE IMPACTS – BROOKLANDS LANDFILL (GOLDER, JANUARY 2019)*

Golder Associates Ltd. was retained by the City of Winnipeg to provide a third-party review of documents to assess the potential off-site impacts from the Brooklands Landfill (Site 28) in the City of Winnipeg, Manitoba as it related to a nearby property. The report completed a review of previous environmental reports on subsurface investigations conducted on behalf of the Imperial Group as well as historical reports associated with the Brooklands Landfill provided by the City of Winnipeg. The assessment report was prepared in January 2019 to determine if the Brooklands Landfill is contributing to soil contamination at 100 Oak Point Highway, as asserted by the owners.

Golder determined that the identified Brooklands Landfill was misidentified in a previous Parsons' report and was not the former Village of Brooklands municipal landfill but an area having had surficial dumping in the past. Gas probes were previously used to detect concentrations of metals and other substances in the soil where exceedances of arsenic, lead and pH were found. It was concluded that Brooklands Landfill was not contributing to the contaminated soil identified at 100 Oak Point Highway by the lack of groundwater impacts observed, the direction of groundwater flow and due to the parameters of exceeding concentrations not being typical municipal landfill leachate indicators.

6.1.3.8 *REVIEW OF THIRD-PARTY REPORT DATED JANUARY 2019 – FORMER PETROLEUM RETAIL FUEL OUTLET AND CARDLOCK FACILITY, 100 OAK POINT HIGHWAY, WINNIPEG, MANITOBA. (PARSONS, MAY 2019)*

In this report, Parsons discussed several points in critique of a review report previously completed by Golder Associates Ltd. in January 2019 regarding Imperial Oil's concern that heavy metals impacted soil found at depth beneath the south end of 100 Oak Point Highway was from an off-site source to the south. The south adjacent area labelled "G3" in a City of Winnipeg drawing SWD-D-125A (1999), stipulating the historic deposition of cinders and ash, was less than 10 m from the 100 Oak Point Highway site boundary.

6.1.3.9 LETTER FORMER PETROLEUM RETAIL FUEL OUTLET AND CARDLOCK FACILITY 100 OAK POINT HIGHWAY, WINNIPEG, MANITOBA 88000583. LEGAL DESCRIPTION: SP LOT 58, PLAN 24342 WLTO IN E½ 14-11-2 EPM (COLLECTIVELY REFERRED TO AS THE "SITE"). APPLICATION FOR DETERMINATION OF RESPONSIBILITY (THE "APPLICATION"). (IMPERIAL OIL LIMITED, 2019)

This letter was written by Jenny Hay of Imperial Oil Limited to MECP (formerly MSD) as a formal Application for the Determination of Responsibility as Imperial Oil believes that the property located southwest of the Imperial Site (100 Oak Point Highway) was associated with waste disposal operations according to a diagram entitled "*City Landfill Drawing and Impacts*". Since the City of Winnipeg formerly owned the property located southwest of the Imperial Site and that based on Section 9(1)(b) of the Contaminated Sites Remediation Act, the City is a person who was an owner or occupier of the site at a time when the contamination occurred, or at any time thereafter, the City is responsible for the remediation of isolated heavy metal impacts discovered at the south portion of the Imperial Site.

6.1.3.10 LETTER TO IMPERIAL OIL LIMITED: 100 OAK POINT HIGHWAY, WINNIPEG, MB, SP LOT 58, PLAN 24342 WLTO – DETERMINATION OF RESPONSIBILITY UNDER THE CONTAMINATED SITES REMEDIATION ACT (MSD, 2019a)

This letter was written by MECP (formerly MSD) on August 7, 2019 to acknowledge Imperial Oil Limited's submission of an application requesting Determination of Responsibility for the remediation at 100 Oak Point Highway, as well as twelve reports accompanying the application. The application indicated that Imperial Oil Limited accepts responsibility for the contamination of the site that resulted from the operation of their petroleum retail fuel outlet and cardlock facility on the site, but not the heavy metals contamination that appears to be a result of the past use of the site as a landfill. MECP concurs that Imperial Oil Limited is not the party responsible for remediation of heavy metals contamination at 100 Oak Point Highway but remains responsible for the remediation of the contamination that was the result of the former operation of the petroleum retail fuel outlet and cardlock facility by Imperial Oil Limited.

MECP also approved a Remediation Plan (Risk Management Plan) for the site in a letter to Imperial Oil dated August 9, 2018 and acknowledges that Imperial Oil Limited has implemented the plan.

6.1.3.11 LETTER TO THE CITY OF WINNIPEG: 100 OAK POINT HIGHWAY, WINNIPEG, MB, SP LOT 58, PLAN 24342 WLTO – NOTICE TO POTENTIALLY RESPONSIBLE PERSONS UNDER THE CONTAMINATED SITES REMEDIATION ACT (MSD, 2019b)

This letter was written by MECP (formerly MSD) on August 7, 2019 to advise the City of Winnipeg that they have been designated as a Potentially Responsible Person (PRP) for the remediation of metals contamination at the property located at 100 Oak Point Highway, Winnipeg, MB (Site) under the Contaminated Sites Remediation Act because:

- A site investigation completed at the Site and submitted to MECP indicated the presence of heavy metals in soil and groundwater in concentrations that exceed the applicable criteria.
- The presence of heavy metals at the site is not consistent with the former operation of a petroleum fuel outlet and cardlock facility by Imperial Oil Limited. However, the heavy metal contamination is consistent with the past use of the site as a landfill.
- A historical land title search indicated that the Village of Brooklands (incorporated into the City of Winnipeg in 1972) formerly owned the site and that the Village of Brooklands operated a landfill at the site prior to 1954.

6.1.3.12 LETTER TO IMPERIAL OIL LIMITED: DETERMINATION OF RESPONSIBILITY UNDER THE CONTAMINATED SITES REMEDIATION ACT (MANITOBA CONSERVATION AND CLIMATE [MCC], 2021)

This letter was written to inform Imperial Oil Limited that on August 7, 2019, MECP (formerly Manitoba Conservation and Climate [MCC]) revoked the designation of Imperial Oil as a PRP for the heavy metal contamination at 100 Oak Point Highway, Winnipeg, Manitoba, SP Lot 58, Plan 24342 WLTO. In addition, MECP designated the City of Winnipeg as a PRP for the heavy metal contamination but understood that it is the City of Winnipeg's view that they are not responsible for the contamination. Since mediation attempts between Imperial Oil and the City of Winnipeg did not result in an agreement to determine which party is responsible, the matter was referred to the Clean Environment Commission, an arms-length provincial government agency, for review.

6.1.3.13 *PHASE II ESA – 250 OAK POINT HIGHWAY - SITE B (J&D ENVIRONMENTAL, 2021a)*

J&D Environmental was retained by a potential buyer to conduct a Phase II ESA on property defined as "Site B", composed of survey parcels Lots 52 and 57, Plan 24342 (CT 3214490/1). The Phase II ESA report was prepared for Harpreet Lali of 44 McPhillips Street, Winnipeg, MB, and documented the collection of 76 soil samples through the advancement of 15 boreholes, with two of them completed as monitoring wells (MW1 and MW2) located at the western and eastern boundary of "Site B" respectively. The borehole locations form a perimeter around the "Site B" boundary, with two boreholes advanced in the vicinity of the northeastern footprint of the former Brooklands Speedway, to investigate potential contaminants from human activity observed in a 1960 aerial photograph. The four APECs, their contaminants of potential concern (COPC) investigated, and their investigation results are summarized as follows:

- APEC 1: West adjacent former Brooklands Landfill with COPC parameters: benzene, toluene, ethylbenzene, xylenes (BTEX) and petroleum hydrocarbons (PHC) fraction 1 to 4 (F1-F4), metals, polycyclic aromatic hydrocarbons (PAHs), and methane. Suspected impacts of hydrocarbon and trichloroethene were noted from four borehole locations but analytical results returned acceptable concentrations to human health. No further action required.
- APEC 2: East adjacent former gas station (100 Oak Point Highway – Imperial Oil) with COPC parameters: BTEX, F1 to F4. Suspected impacts of BTEX and PHC were noted from five boreholes, but analytical results returned acceptable concentrations to human health. No further action required.
- APEC 3: North adjacent Superior Finishes business operations with COPC parameters: metals and volatile organic compounds (VOCs). Suspected impacts VOCs and metals were noted from one borehole, but analytical results returned acceptable concentrations indicative of minimal concern to "Site B". No further action required.
- APEC 4: South adjacent CP Rail right-of-way with COPC parameters: PAHs, and metals. Suspected impacts of BTEX, PHC F1-F4, and metals were noted from three boreholes, but analytical results returned acceptable concentrations to human health. No further action required.

Based on the site findings and analytical results, J&D environmental reported that "Site B" is considered clean for development and there were no major concerns identified.

6.1.3.14 *PHASE II ESA – PARCEL 7 (J&D ENVIRONMENTAL, 2021b)*

J&D Environmental was retained by the Estate of Paul Albrechtsen to conduct a Phase II ESA on property defined as "Site A", with the legal description Parcel 7, Plan 9218 (CT 3038514/1). A total of 45 soil samples were analyzed from eight boreholes advanced to investigate two APECs for the COPC parameters summarized as follows:

- APEC 1: South adjacent former Brooklands Landfill with COPC parameters: BTEX, PHC FF1-F4, metals, PAHs, VOCs, and methane.
- APEC 3: East adjacent Superior Finishes business operations with COPC parameters: metals and VOCs.

Laboratory analysis of VOCs, PHC fractions F1 to F4, metals, PAHs and methane were requested for submitted soil Phase II ESA. Levels of VOCs, PHC Fraction F1 to F4 and methane were not discovered or were below detection limits, implying the soil in these investigated areas were not impacted by these contaminants. Metal exceedances in soil samples investigating APEC 1 include concentrations of copper, zinc and lead in BH5 and copper in BH3. A soil sample from BH1 resulted in levels of PAH concentrations exceeding applicable guidelines.

Metal exceedances in APEC 3 were discovered for concentrations of arsenic and lead in BH7. No additional investigations were recommended by J&D Environmental unless the lead and PAH impacted soils were expected to be disturbed or uncovered.

6.1.4 ECOLOG ERIS DATABASE SEARCH

An ERIS EcoLog database search (**Appendix E-1**) of the Study Area and surrounding properties (0.25 kilometres) was conducted and revealed that the Study Area contains the following listings:

Table 5. Summary of ERIS Ecolog Registrations

Database	No. Of Listings For The Site	No. Of Listings For Surrounding Properties	Comments
Certificates of Approval	0	4	No listings are located within Study Area boundary. None of the surrounding listings are within 100m of the Study Area Boundary.
Contaminated/Impacted Sites	1	14	The one listing located within the Study Area boundary is at the POI at 100 Oak Point Highway (Imperial Oil Retail and Cardlock). Six of the 14 listings are within 100m of the Study Area Boundary, and none are within 50m.
ERIS Historical Searches	1	13	The one listing located within the Study Area boundary is the POI at 100 Oak Point Highway (Imperial Oil Retail and Cardlock). Four of the 13 listings are within 100m of the Study Area Boundary, and none are within 50m.
Fuel Storage Tanks	1	8	The one listing located within the Study Area boundary is at the POI at 100 Oak Point Highway (former Esso). Four of the eight listings are within 100m of the Study Area Boundary, and none are within 50m.
Bulk Fuel Distributors	1	9	The one listing located within the Study Area boundary is at the POI at 100 Oak Point Highway (Imperial Oil Retail and Cardlock). None of the listings are within 100m of the Study Area Boundary.
Waste Generators Summary	3	95	Three listings are located within the Study Area boundary and are all located at 100 Oak Point Highway (former Esso). 29 of the 95 listings are within 100m of the Study Area Boundary, with three of them being within 50m.
Sustainable Development Public Registry	0	3	No listings are located within Study Area boundary. None of the surrounding listings are within 100m of the Study Area Boundary.
Waste Receivers Summary	0	6	No listings are located within Study Area boundary. None of the surrounding listings are within 100m of the Study Area Boundary.
Retail Fuel Storage Tanks	3	2	Three listings are located within the Study Area boundary and are all located at 100 Oak Point Highway (former Imperial Oil).

Database	No. Of Listings For The Site	No. Of Listings For Surrounding Properties	Comments
			Only one of the two surrounding listings are located within 100m of the Study Area Boundary.
Manitoba Spills	0	1	No listings are located within Study Area boundary. The surrounding listing is not within 100m of the Study Area boundary.
Water Well Inventory	0	2	No listings are located within Study Area boundary. None of the surrounding listings are within 100m of the Study Area boundary.

There is a total of 20 unplottable summary included the following:

— Five unplottable Certificates of Approvals with two listings each for Battery Direct of Manitoba Inc. (license number 173 HW) and Wes-T-Rans Limited (license number 1657), and one listing under Cadorath Plating Co. Ltd. (no license number available).

— Three unplottable Enforcement Actions database listings include two at Cadorath Plating Co. where one was a warning for improper disposal of hazardous materials and a rectified EO order for the disposal of accumulated hazardous materials. The listing at Northwest Smelting and Refining Ltd. was a warning for improper disposal of hazardous materials.

— 12 unplottable FUEL listings include two at the Oak Point Esso Cardlock (permit number 20883), two at the Beaver Truck Centre permit number 31188), three at Knysh Construction (permit numbers 28306 and 49088), one at Custom Truck Sales Inc. (permit number 21600), one at Oak Point Services (permit number 34291), two at Superior Finishes (permit number 27012), and one at Northland Petroleum Ltd. (permit number 34232).

These unplottable summaries are not anticipated to pose an environmental concern to the Site.

6.1.5 ERIS CITY DIRECTORY SEARCH

A request was made through ERIS for a city directory search of any business listings within the Study Area. Search results indicate that 100 Oak Point Highway, Winnipeg, Manitoba has records in the city directory database for several years, with listings summarized in the table below:

Table 6. City Directory Search Results

Year	Site Address	Site Listing
1960	100 Oak Point Highway, Winnipeg. Manitoba	- Not listed
1964		- Not listed
1970		- Not listed
1975		- Not listed
1979		- Not listed
1985		- Not listed

1990		- Esso Commercial Cardlock - Esso Convenience Store
1995		- Garvi Enterprises - Esso Convenience Store
2000		- Garvi Enterprises - Esso Convenience Store

A copy of the ERIS city directory search results can be found in **Appendix E-2**.

6.1.6 REGULATORY AGENCY FILES AND DATABASES

A request was made to Manitoba Environment, Climate, and Parks (MECP) on October 26, 2022, for a search of their databases for any reported information regarding spills, environmental infractions, hazardous wastes, listing on a contaminated sites registry and/or any remediation actions pertaining to the Study Area. Each of the 12 discrete parcels within the Study Area with a legal land description was submitted as an individual file search. The responses received on November 15 (File Search No.'s 6243, 6244, 6245, 6246, 6247, 6248, 6249, 6250, 6251, 6252, 6253, and 6254) indicate that only the POI site (File No. 6252) is registered as an operating Registered Hazardous Waste Generator, inactive Registered Petroleum Storage Site, and has a record in the Contaminated/Impacted Site program.

Table 7. Environmental Impacted/Contaminated File Search Results

PROGRAM	STATUS	LICENCE / PERMIT/ OPERATION ID / OPERATION NAME
Registered Hazardous Waste Generator	Operating	OPID: 16025 – Oak Point Esso – Operating – MBG02888 – 100 Oak Point Highway
Registered Petroleum Storage Site	Inactive	OPID: 21657 – Oak Point Esso Cardlock – Petroleum – Mothballed – 100 Oak Point Highway
Contaminated/Impacted Site	Designated Impacted	Operation 73438 – Imperial Oil Retail and Cardlock, 100 Oak Point Hwy: this site is a designated impacted site pursuant to The Contaminated Sites Remediation Act.

Copies of the MECP file search results can be found in **Appendix E-3**.

6.1.7 WATER WELL DATABASE SEARCH

A water well database search was conducted through the MECP GWDrill (2018) database for the Site on September 29, 2021. The search was conducted using the Site's legal land description Township 11, Range 2 EPM. Based on the Universal Traverse Mercator (UTM) coordinates provided in the GWDrill database, two well logs were registered within 250 m of the Study Area boundary with no well logs registered within the Study Area boundary.

The following information was obtained from GWDrill 2018:

Well PID: 37008
Owner: Cadorath Plating
Water Use: Industrial
Driller: Paul Slusarchuk Well Drilling Ltd.
Date Completed: Nov 13, 1979
Termination depth: 130 ft (39.6 m)
Water level before pumping: 29 ft (8.8 m) below ground

Well PID: 106762
Owner: Cadorath Plating
Water Use: Domestic
Driller: Maple Leaf Drilling Ltd.
Date Completed: Apr 1, 1998
Termination depth: 246.8 ft (75.2 m)
Water level before pumping: 25 ft (7.6 m) below ground

The locations of the two abovementioned wells are located approximately 165 m south-southeast of the southeast corner of the Study Area.

Copies of the groundwater well logs are in **Appendix E-4**.

6.2 SITE VISIT AND INTERVIEWS

The site visit was conducted by Ms. Cassie Bujan and Ms. Annie McIntyre with WSP on November 29, 2022. The Site and readily visible and publicly accessible portions of adjoining and neighboring properties were observed for the presence of potential sources of environmental concern. All available vacant land was assessed on foot or by the roadside. WSP was unescorted during the site visit but was able to conduct a virtual meeting with Mr. Jesse Crowder, Manager of the Asset Management Office for the City of Winnipeg on December 1, 2022.

At the time of the site visit, the ground was covered with snow, the weather was cold, windy with snow overcast and the temperature was approximately -8ºC.

6.3 CURRENT SITE OPERATIONS

The current on-site operations consist of vacant lands with semi-truck storage observed on the far southwest side of the Site. On the southwestern portion of the Site, there was evidence of recent plowing of snow-covered areas mainly surrounding the large fill piles observed on-site.

6.4 WASTE GENERATION AND STORAGE

6.4.1 SOLID WASTE

No current waste production was observed within the Study Area during the time of the site visit, but historical buried waste about 1.5m below ground surface was reportedly located within the boundaries of the Study Area (City of Winnipeg, 1984 & Golder, 2015). The presence of this buried waste remnants from the decommissioned Brooklands Landfill gives cause to believe there may be potential of methane generation present in certain areas of the Study Area.

6.4.2 LIQUID AND SEWAGE WASTE

No developments are present within the Site that may generate liquid and sewage waste.

6.4.3 DRAINS AND SUMPS

No drains and sumps were observed during the Site visit. Historic drains and sumps if present on-site might be localised to the POI site to the northeast of the Study Area.

6.4.4 AIR DISCHARGES AND ODOURS

Strong odour was identified in the southwestern portion of the Study Area. The odour gave senses of chemical and rubber and was very pungent. During the site visit, it was unclear as to where the odour was coming from.

6.5 FUEL AND CHEMICAL STORAGE

6.5.1 UNDERGROUND STORAGE TANKS

No evidence of underground storage tanks (USTs) was observed on-Site at the time of the site visit (i.e. no vent pipes, fill pipes or other indicators of USTs) but according to previous reports, historically there were USTs on the POI site for the fuel pumps of the previous Imperial Oil.

6.5.2 ABOVEGROUND STORAGE TANKS (ASTS)

No evidence of aboveground storage tanks (ASTs) was observed on-Site at the time of the site visit (i.e. tank piping, dead vegetation or bare soil or other indicators of ASTs) but there was a concrete pad covering the majority of the POI site where the previous Imperial Oil was located. The northeastern subject parcel Block 3

6.6 BUILDING STRUCTURE, SYSTEMS AND EQUIPMENT

6.6.1 HEATING AND COOLING SYSTEMS

No heating and cooling systems were observed to be present on-site.

6.6.2 HYDRAULIC EQUIPMENT

No hydraulic equipment (hoists, elevators, compactors) was observed on-site during the site visit nor reported by the Site representative.

6.7 EXTERIOR SITE OBSERVATIONS

6.7.1 STRESSED OR STAINED VEGETATION

No stressed or stained vegetation was observed on-site at the time of the site visit. A layer of snow cover limited the vegetation to be observed.

6.7.2 SURFACE STAINS

No surface staining was observed on-site at the time of the site visit. A layer of snow cover limited the ground surface to be observed.

6.7.3 FILL MATERIALS

Multiple stockpiles of miscellaneous fill materials were observed throughout the Study Area. Majority of the prominent fill stockpiles transect the center of the Study Area from west to east with smaller piles located to the east and two large piles located further to the western portion of the Study Area. As the Study Area is unfenced, illegal dumping of waste such as concrete, metal, and yard trimmings may still be ongoing as observed in previous City of Winnipeg inspections and during Golder's site visit (Golder, 2015a & b)

The smaller stockpiles along the eastern portion of the Study Area consisted of small concrete chunks in a gravel/sand mixture with garbage and wood shards dispersed randomly, with grasses and trees growing on top. These stockpiles range from approximately 1.8 m to 4.6 m long and 0.3 m to 1.2 m high.

A large stockpile located in the western portion of the site had large blocks of concrete with rebar, wooden pallets and scrap metal including a partial vehicle chassis frame. The exterior of the stockpile was approximately 1.8 m high and approaches ground level in the inner portion, visible as a depression. The general stockpile area approximates 9 m by 6 m with undulating crests and troughs.

At the most southwestern corner of the Study Area, several large cylindrical concrete blocks (diameter of approximately 0.6 m) were observed with large metal parts and rebar sticking out. Some portions of the concrete blocks were buried within the fill piles and the lengths could not be measured.

By the 1977 aerial photograph, the entire Study Area is presumed to contain surficial fill cover of unknown origins as per Figure 6 of the 1984 City of Winnipeg report of Brooklands Landfill Site No. 28. Previous environmental reports on intrusive soil investigation programs within the Study Area produced borehole logs for WSP's review. Mixed clay fill was encountered from surface to approximately 1.0 to 1.8 mbgs in the northwestern portion of the Study Area in subject parcel PT 7, Plan 9218 (J&D Environmental, 2021b). Sand and gravel fill extending from surface to depths of 0.4 mbgs to 1.5 mbgs was observed in testpits advanced in the eastern portion of the Study Area at 100 Oak Point Highway (Parsons, 2015).

6.7.4 WELLS

No water well heads were observed on-site at the time of the site visit. A layer of snow cover limited visual observations.

ERIS Ecolog search results (**Appendix E-1**) confirmed that there were no well logs on-site. The results noted two identified well logs that were located within 250 m of the Study Area boundaries.

Well logs identified to be on-site or within 250 m of the Study Area boundary are discussed in subsection 6.1.7 above and included in Appendix E-2.

6.7.5 PITS AND LAGOONS

No pits and lagoons were observed on-site during the site visit.

6.7.6 WATERCOURSES, DITCHES OR STANDING WATER

There was no standing water observed on-site at the time of the site visit due to snow cover. A large ditch was observed along the entire south boundary of the Study Area running parallel to the adjacent railway line.

A lower-lying area was observed along the south parcel boundary of parcel PT7, Plan 9218, which aligns with one of the historic access roads transecting Site from Selkirk Avenue to the east as evident from the historic aerial photographs. Subsequent fill cover deposited on-site for the decommissioning of the historic Brooklands landfill and the Brooklands Speedway could result in the variance in surface elevation from the access road. The former Brooklands landfill was generally filled to a higher elevation than the surrounding terrain (City of Winnipeg, 1984).

6.7.7 ROADS, PARKING FACILITIES AND RAILWAY RIGHTS-OF-WAY

The site is bounded by Oak Point Highway along the north boundary of the Study Area and two Canadian Pacific rail rights-of-ways that run parallel to the Study Area's south boundary. Large parking lots are observed adjacent to the Study Area's west and east boundaries, where semi-trucks and trailers are observed to be parked.

6.8 HAZARDOUS BUILDING MATERIALS

6.8.1 ASBESTOS-CONTAINING MATERIALS (ACM)

Asbestos is a commercial term given to six naturally occurring minerals that are incombustible and separable into fibers. The fibers are strong, durable, and resistant to heat and fire and are long, thin, and flexible, enabling them to be woven into cloth. These qualities have resulted in the wide use of asbestos in commercial, industrial, automotive, and building materials. Common ACMs include pipe-covering, insulating cement, insulating block, refractory and boiler insulation materials, transite board, fireproofing spray, plasters, joint compound, vinyl floor tile, vinyl sheet flooring, ceiling tile, mastics, roofing products, and duct insulation for HVAC applications. The application of friable (crumbles with hand pressure) ACMs was banned by legislation in the mid to late 1980s. Non-friable ACMs are still used in some products. ACMs are not regulated in all countries and as such can be present in imported materials. Inhalation of asbestos fibers can result in deleterious health effects.

No building structures were observed to be present on-site. However, historic landfill activities may have resulted in ACMs buried on-site.

6.8.2 MERCURY-CONTAINING EQUIPMENT (MCE)

Mercury is a naturally occurring metal that is found in air, water and soil. Elemental or metallic mercury is the most common industrial form of mercury. Mercury containing equipment (MCE) is commonly found in mercury vapour lamps, high intensity discharge lamps, fluorescent light tubes, thermostats and electrical switches.

Mercury may be present in light fixtures, fluorescent lighting and in older thermostats, all of which might have been buried as waste on-site during the operating years of the former Brooklands landfill.

6.8.3 POLYCHLORINATED BIPHENYLS (PCB)

PCBs were widely used as coolants and lubricants for electrical equipment from the 1930s to the 1970s. Historically, PCBs were used in transformers and capacitors, and in such industrial materials as sealing and caulking compounds, inks and additives of paint. The only remaining uses of PCBs in Canada are in electrical transformers and capacitors existing in Canada before July 1, 1980, and in certain other "closed-use equipment" (specifically heat transfer equipment, hydraulic equipment and vapour diffusion pumps) that were in Canada before September 1, 1977. PCB containing equipment must now be taken out of service prior to regulatory deadlines.

Exterior pole-mounted transformers may be present on-site associated with power lines. Localised staining on the ground immediately adjacent to power poles may be present if PCB in transformers had historically leaked as a result of damage to the housing unit. Historic landfill activities may have resulted in PCB-containing equipment being buried on-site.

6.8.4 LEAD-BASED MATERIALS

Sources of lead in buildings include lead paint that was used during building construction prior to 1976 and lead-based water pipes and lead-solder joints on copper pipes that were primarily utilized in building construction between 1930 and 1986. Lead from paint, chips and dust can pose health hazards, especially in young children.

No painted surfaces nor building structures were observed to be present on-site. Historic landfill activities may have resulted in lead-containing materials and materials with lead surface coatings being buried on-site.

6.8.5 UREA FORMALDEHYDE FOAM INSULATION (UFFI)

Urea Formaldehyde Foam Insulation (UFFI) use was banned in Canada in 1980. Prior to the ban, UFFI was utilized as an insulation product in houses from the mid to late 1970s. It should be noted that commercial and industrial buildings do not commonly contain UFFI.

No building structures were observed to be present on-Site, therefore it is likely that there are no UFFI present on-site. Historic landfill activities may have resulted in UFFI building materials being buried on-site.

6.8.6 OZONE DEPLETING SUBSTANCES (ODS)

Ozone-depleting substances (ODS) were commonly found in refrigeration and air conditioning equipment manufactured prior to 1998.

No building structures were observed to be present on-Site. Historic landfill activities may have resulted in ODS-containing equipment being buried on-site.

6.9 SPECIAL ATTENTION ITEMS

6.9.1 ELECTROMAGNETIC FIELDS (EMFS)

Power transmission lines and electrical substations are common sources of EMFs. Currently, human health risks associated with exposure to EMFs are being investigated by Health Canada. Currently, Canada does not have any national, territorial, or provincial standards or guidelines related to EMFs.

Power transmission lines run west to east along the southern borders of subject parcels PT 7, Plan 9218 (CT 3038514) and Block 3, Plan 17744 (CT 1059705). Due to the height of the towers, EMFs are not likely a concern at ground level.

6.9.2 NOISE AND VIBRATION

Human health effects from noise and vibration are varied and are based on the characteristics of the noise/vibration, length of exposure and the susceptibility of the exposed individual.

Significant noise or vibrations were not detected during the site visit. A CP rail line is located along the south site boundary. Oak Point Highway (Route 90) is located along the northeast portion of the Site's boundary. Vehicle or train traffic may be a source of noise and vibration, but it is not expected to be at a level that pose an environmental concern.

6.10 ADJOINING PROPERTY INFORMATION

A summary of the current and historic activities conducted on neighboring properties is presented below (Table 8). Information regarding adjoining properties was collected from observations completed during the site visit and from a historical records review.

Table 8. Current and Historic Activities Conducted on Neighbouring Properties

Property 1	Description
Address:	200 Oak Point Highway
Direction From Site:	North
Relation to Property:	Adjacent
Occupant Name and Current Activities:	Traction Heavy Duty Parts, commercial retailer of heavy equipment spare parts
Historical Activities:	Historically, 200 Oak Point Highway was an undeveloped parcel until the 1980s before being developed into the location of a light industrial operation, Superior Finishes, specializing in the application of coatings for materials (J&D Environmental 2021b). The current occupant is a retail outlet for heavy equipment spare parts.
Potential Environmental Concerns:	Current retail operations are not anticipated to pose an environmental concern to the Study Area. Former operations of Superior Finishes may be potentially contaminating if solvents, fuel, and spent solvents were not properly stored. The soil investigation conducted by J&D Environmental (2021b) within the Study Area in subject parcel PT 7, Plan 9218 along the east parcel boundary with 200 Oak Point Highway resulted in no VOC, BTEX, PHC nor metal exceedances, with the exception of a localized soil sample with PAH total potency equivalence (TPE) exceedance that was determined to be associated with imported fill material and not 200 Oak Point Highway. Therefore, 200 Oak Point Highway is not likely to pose an environmental concern to the Study Area.
Property 2	**Description**
Address:	Multiple
Direction From Site:	Further north
Relation to Property:	Across Oak Point Highway
Occupant Name and Current Activities:	Single family houses
Historical Activities:	Historically, partially agricultural land with small single-family homesteads in the late 1940s.
Potential Environmental Concerns:	Not anticipated to pose an environmental concern to the Study Area due to the low contaminating potential of historic and current activities occurring within the residential area and the apparent shallow groundwater flow direction northeast, placing the Study Area upgradient of the north adjacent properties.
Property 3	**Description**
Address:	70 Oak Point Hwy
Direction From Site:	East
Relation to Property:	Adjacent
Occupant Name and Current Activities:	Straight Ahead Ventures / North End Spring & Trailer is a truck repair shop and parking lot for vehicle storage.
Historical Activities:	Potential homestead in the late 1940s, with what appears to be a circular pond dugout at the north portion of the property in the 1959 aerial photograph that was filled in when the homestead was demolished and no longer visible in the 1968 aerial photograph. The vacant lot develops into a commercial shop in the late 1970s. Possible area of imported fill material visible in historic aerial photographs along the north portion of this property.

Potential Environmental Concerns:	While 70 Oak Point Highway has a file record under the MECP Contaminated Sites Registry (File# 44094), it is not designated as an impacted site. Furthermore, extensive drilling by Imperial Oil along the east Study Area boundary did not indicate soil impacts other than contaminant parameters characteristic of 100 Oak Point Highway's former operation as a retail fuel outlet. Shallow groundwater flow direction was also determined to be northeast, and the Study Area is hydraulically upgradient from 70 Oak Point Highway. Therefore, it is not anticipated to pose an environmental concern to the Study Area.
Property 4	**Description**
Address:	N/A
Direction From Site:	South
Relation to Property:	Adjacent
Occupant Name and Current Activities:	Two CP railway lines running along the southern boundary of the Study Area.
Historical Activities:	Railway lines have been present since the 1940s.
Potential Environmental Concerns:	No active refuelling depots were observed along the two rail right-of-ways during the historic aerial photograph review and the Phase I ESA site visit. The surface topography of the Study Area is generally at a higher elevation that drains into marshy troughs parallel to the south Study Area boundary and the rail right-of-ways (Golder, 2015a). High plastic, glaciolacustrine clay native to the Study Area is highly impermeable and not likely to allow for efficient transport of hydrophobic PAHs should they be present through the leaching of creosote from rail ties. Fifteen soil samples collected in a previous environmental investigation (J&D Environmental, 2021a) were analysed for BTEX, PHC F1-F4, and metals, with analytical results indicating concentrations of parameters acceptable to human health guidelines. Therefore, contaminants, if present from rail traffic, are not anticipated to pose an environmental concern to the Study Area.
Property 5	**Description**
Address:	61 and 65 Hyde Avenue
Direction From Site:	Southeast
Relation to Property:	Adjacent
Occupant Name and Current Activities:	Royal Bros Yard. A chain-link fence compound used as parking and storage space for lease.
Historical Activities:	Agricultural lands from prior to 1940s before visibly clearing of vegetation is evident in the 1968 aerial photograph and stockpiles of unknown materials are present in the 1979 aerial photograph. Some vegetation appears to have regrown in the 1988 aerial photograph, but the lot remains vacant until 2004 where development is visible with the levelling of the terrain and gravel cover applied. By the 2010 satellite imagery, the lot resembles the present-day fenced compound for storage, and parked trailers, vehicles and containers are visible.
Potential Environmental Concerns:	Buried fill material (cinders and ash) according to a 1984 City of Winnipeg report (Figure 3) on the Brooklands Landfill. A City of Winnipeg drawing entitled "*No. 28 Brooklands Landfill Site Detail"* indicates that refuse, cinder and ash dumping areas are present at the southwestern portion of 61 Hyde Avenue. Due to the proximity of documented refuse, cinder and ash extents with the Study Area, such fill material may pose a probable concern if COPC such as hydrocarbons, metals, and dioxins are transported by shallow groundwater.
Property 6	**Description**
Address:	60 Eagle Drive
Direction From Site:	West
Relation to Property:	Adjacent

Occupant Name and Current Activities:	Gardewine shipping yard borders the majority of the southwestern boundary of the Study Area. Semi-trucks and trailers are stored on extensive parking lots.
Historical Activities:	The west adjacent property may have been used as agricultural land since prior to the 1940s and vacant until some time between 1988 and 2002, where it was developed as an expansion of semi-trailer storage for Gardewine.
Potential Environmental Concerns:	Not anticipated to pose an environmental concern to the Study Area as no potentially contaminating activities were identified.
Property 7	**Description**
Address:	250 Oak Point Highway
Direction From Site:	West
Relation to Property:	Adjacent
Occupant Name and Current Activities:	Paul's Hauling yard borders the northwestern boundary of the Study Area. Semi-trucks and trailers are stored on the parking lot.
Historical Activities:	The area may have been used as agricultural land but in the 1959 aerial photograph, clearing of vegetation is observed on the property. Parking lot surrounding two large commercial buildings by Oak Point Highway and a long rectangular building south the them is observed to be developed in the late 1970s.
Potential Environmental Concerns:	As the maintenance of vehicles may take place on this property as a potentially contaminating activity, the distance of the buildings presumed to be maintenance workshops are more than 100 m from the Study Area's west boundary. Therefore, 250 Oak Point Highway is not anticipated to pose an environmental concern to the Study Area.

7 SUMMARY OF FINDINGS AND PRELIMINARY CONCEPTUAL SITE MODEL

Based on the results of the Phase I ESA, a highlight of findings for the Site is as follows:

- A total of 11 current title certificates are associated with the Study Area. Two of them (CT 1129008/1 and CT 1129011/1) are registered to Her Majesty the Queen in Right of the Province of Manitoba and lay claim to all mines and minerals vested in the Crown (Manitoba) in survey parcels Lots 51, 53, 53A, 54, 55, and 62 Plan 24342. No environmental caveats or liens related to the Study Area were noted during the review of the land titles for the Study Area.
- MCC File Search responses received on November 15 (File Search No.'s 6243, 6244, 6245, 6246, 6247, 6248, 6249, 6250, 6251, 6252, 6253, and 6254) only registered the POI site (File No. 6252) as an operating Registered Hazardous Waste Generator, inactive Registered Petroleum Storage Site, and an inactive Contaminated/Impacted Site. MECP designated the City of Winnipeg as a Potentially Responsible Person (PRP) for the heavy metal contamination but understood that it is the City of Winnipeg's view that they are not responsible for the contamination. Since mediation attempts between Imperial Oil and the City of Winnipeg did not result in an agreement to determine which party is responsible, the matter was referred to the Clean Environment Commission, an arms-length provincial government agency, for review.
- Two well logs (PID 37008 and 106762) are registered in the MECP GWDrill 2018 database to Cadorath Plating and are located approximately 165 m south-southeast of the Study Area boundary. No well logs were identified to be located in the Study Area.
- Ten ERIS Ecolog listings were found within the Study Area boundaries and 157 listings were found for the surrounding properties within 250 m. The listings identified within the Study Area Boundaries include one contaminated/impacted site, one ERIS historical search, one fuel storage tank, one bulk fuel distributor, three waste generator summaries, and three retail fuel storage tanks. Based on the records review, only the POI (not the Site properties) is designated as impacted and/or contaminated
- Historical aerial photographs indicated that prior to 1950, a major portion of the Study Area was used primarily as agricultural land with the western portion of the Study Area consisting of trails and re-worked soil, consistent with previous reports stating that the Village of Brooklands may have used the western portion of the Study Area as a dumping ground. The former Brooklands Landfill occupied the southwest portion of the Study Area from 1950 to 1968 before it was decommissioned. The footprint of the former Brooklands Landfill currently occupies survey parcel Lots 49 and 50, Plan 24342 (CT 1129021/1 and CT 1129019/1, respectively) and the City of Winnipeg is listed as the registered owner.
- An oval structure similar to a race-track with stands for spectators was observed in the 1959 and 1968 aerial photographs, believed to be the former Brooklands Speedway in operation from 1953 to 1973 and occupying present day survey parcels Lot 52 and part of Lot 57, Plan 24342.
- A total of 18 previous environmental reports and letters associated with the Study Area were reviewed, in addition to several drawings, maps and figures provided by the Client.

7.1 PRELIMINARY CONCEPTUAL SITE MODEL

Relying on the background review of previous environmental reports, environmental database searches, physical setting reports, and considering the intended development of the Study Area as a transit garage, a preliminary conceptual site model (CSM) is developed below based on contaminants of potential concern (COPC) associated with the identified APECs, the exposure pathways that may be present for the future development of the Study Area, and the sensitive human or environmental receptors that may be affected by the COPCs.

7.1.1 AREAS OF POTENTIAL ENVIRONMENTAL CONCERN

Based on historical potentially contaminating activities (PCAs) identified within the Study Area in this Phase I ESA, five areas of potential environmental concern (APECs) were identified, with the contaminants of potential concern identified for each area. APECs are represented in Figures 3 to 5 (Appendix A).

1) **APEC-1: Former Brooklands Landfill (Figure 3, Appendix A)**
   a) The Village of Brooklands may have used the western portion of the Study Area as a dumping ground prior to 1950s (City of Winnipeg, 1984). It was reported that the site received all types of waste including local garbage and septic wastes, rubble and inorganic material. Burning was also carried out at the Site.
   b) The former Brooklands Landfill occupied the southwest portion of the Study Area from 1950 to 1968 before it was decommissioned.
   c) No active waste production was present within the Study Area during the time of the site visit but observations by City of Winnipeg staff during previous routine inspection visits that illegal dumping of construction waste such as concrete, metal, and yard trimmings are present (Golder, 2015a). This is consistent with field observations by WSP site assessors during the Phase I ESA site visit.
   d) The landfill design details were documented by Golder (2015a), covering an area of approximately 2.4 hectares (ha) with buried wastes up to 1.5m below ground surface, and heights of 1.5 to 3 m above ground surface. Cover material was reportedly 0.3 to 0.6 m and consists of undocumented fill. No leachate collection system was known to be present.
   e) Hazardous materials such as ACM, lead, mercury, ODS, PCBs, etc may have been buried on-site and capped with approximately 0.3 to 0.6 m of low permeability clay fill material during the landfill decommissioning (Golder, 2015a). Development of the Study Area involving excavation may uncover buried hazardous waste detrimental to the health of workers.
   f) Active landfill gas generation through anaerobic decomposition of buried refuse will be an ongoing health concern to building occupants within a building developed in the vicinity of the former Brooklands Landfill if soil vapour intrusion indoors is not properly mitigated. The estimated extent of landfill gas generated as determined by Golder (2015b) is approximately 30 m around the areal extent of the former Brooklands Landfill and extends to the southeast towards the southwest corner of the POI (subject parcel Lot 58, Plan 24342).
2) **APEC-2: Former Brooklands Speedway (Figure 3, Appendix A)**
   a) An oval structure similar to a race-track with stands for spectators was observed in the 1959 and 1968 aerial photographs, believed to be the former Brooklands Speedway in operation from 1953 to 1973 and occupying present day survey parcels Lot 52 and part of Lot 57, Plan 24342.
   b) Online historical archives reported the race-track as a major racing venue in Manitoba summer months during its 20 years of operation as a paved quarter-mile race-track featuring stock, modified and super modified race cars. It was eventually sold to Motorways, a trucking company in 1974.
   c) Historical automobile fuel spills, leaks, and maintenance operations in pit-stops and garages of the racetrack would be contributive to potential contaminants such as BTEX, PHC, PAH, and metals in soil and groundwater.
3) **APEC-3: Historic and current imported fill material of unknown origin across the Study Area (Figure 4, Appendix A)**
   a) Surface vegetation in subject parcel PT7, Plan 9218 appears to have been either removed or replaced with lighter colored fill material in the 1959 aerial photograph, with several areas of lighter fill material and darker patchy vegetation visible in the 1968 aerial photograph, The subject parcel becomes mostly vegetated in a homogeneous color tone in the 1979 aerial photograph. Light-colored fill stockpile resembling the present-day concrete stockpile observed during the site visit is visible at the southwest corner of subject parcel PT7, Plan 9218’s 1979 aerial photograph.

b) Fill is also present in the northern subject parcel Block 3, Plan 17744 (CT 1059705/1) along Oak Point Highway, as reported in the City of Winnipeg (1984) report on Brooklands Landfill.

c) Following the decommissioning of the former Brooklands Landfill and the demolition of the Brooklands Speedway, the 1979 aerial photograph shows an unvegetated roadway that transects the Study Area as a continuation of Selkirk Avenue from the east. South of the roadway are abundant fill material deposited to decommission the Brooklands landfill, and to level the terrain of the former footprint of the Brooklands Speedway. By 1988, vegetation appears to have overgrown the deposited fill material and stockpiles, with some visible trails apparent throughout the property. Due to the variance in ground elevation of the deposited fill material and the access roadway, it is likely that the present day low-lying marshy area observed during the site visit is the former footprint of the access roadway. This low lying area likely serves as a catchment area for surface run-off from the former Brooklands Landfill to the south and subject parcel PT 7, Plan 9218 to the north.

d) A City of Winnipeg Water and Waste Department Solid Waste Division drawing (SWD-D-125A) entitled "*No. 28 Brooklands Landfill Site Detail"* (1999) illustrates the areal extent of the former Brooklands Landfill and other areas of approximate delineation with regards to surficial dumping of refuse, cinder ash, and imported organics. Incinerated ash could contain contaminant parameters such as BTEX, PHC F1-F4, PAHs, dioxins, and metals.

e) By the 1988 aerial photograph, the entire Study Area is presumed to contain surficial fill cover of unknown origins as per Figure 6 of the 1984 City of Winnipeg report of Brooklands Landfill Site No. 28.

f) Currently, illegal dumping of waste such as concrete, metal, and yard trimmings may still be ongoing as observed in previous City of Winnipeg inspections and during Golder's site visit (Golder, 2015a & b).

4) APEC-4: Former gas station at subject parcel Block 3, Plan 17744 (Figure 5, Appendix A)

a) Historical aerial photographs show subject parcel Block 3, Plan 17744 at the northern portion of the Study Area fronting Oak Point Highway to be vacant land from prior to 1940s. The subject parcel was first observed to be developed with two access points from Oak Point Highway in 1959, where a small building structure is visible in the south-central portion of the Subject Parcel. The building structure is still visible in the 1988 aerial photograph.

b) The City of Winnipeg's Brooklands Landfill Site – Landfill No. 28 report (1984) described that a portion of "Area 3" had previously been developed for a gas station. Although the gas station had been closed at the time of the report, the building remains on-site. Area 3 is present-day's northern half of the Study Area consisting of subject Parcel PT 7, Plan 9218 WLTO, Block 3, Plan 17744 WLTO, and 200 Oak Point Highway.

c) Contaminants of potential concern associated with a retail fuel outlet would likely consist of: BTEX, PHC F1-F4, PAH, VOCs and metals.

5) APEC-5: Former Imperial Oil Retail Fuel Outlet at 100 Oak Point Highway, Winnipeg, MB (Figure 5, Appendix A)

a) The former Imperial Oil Esso retail fuel outlet and cardlock facility is a property of interest (POI) in this Phase I ESA. It does not appear on aerial photos until 2002 where there appears to be canopy-covered pump islands and approximately four (4) cardlock semi-truck gas stations to the south. Previous environmental reports indicate that the Imperial Oil Esso retail fuel outlet was in operation from approximately 1988 to approximately 2012, and also a restaurant from the late 1990s to approximately 2012 (Parsons, 2015).

b) Potentially contaminating former facilities at the POI consisted of two petroleum warehouse buildings, two 45,456 litre (L) UST containing gasoline, one 45,456 L UST containing diesel, and one 36,365 L UST containing diesel, one 9,090 L UST containing wastewater, pump islands, and associated product distribution piping. COPCs include BTEX, PHC F1-F4, PAH, VOC, and metals.

c) Prior to decommissioning the facility in 2015, Parsons was retained by Imperial Oil to conduct assessment excavations around the cardlock pump island UST nest to the south, and a UST nest to the north. Exceedances of PHC F2 was noted for soil samples collected from the walls of two testpits advanced around the UST nests at depths of 1 to 2 mbgs.

d) Testpits TP-36, TP-21 advanced along the sidewalk at the north site boundary indicated PHC F2 impacts in exceedance of guidelines. Testpits TP-25, TP-7, TP-8 and TP-19 immediately west, centre and southeast of the cardlock UST nest south of the service building indicated exceedances of PHC F2 and F3. All PHC impacts do not appear to be present past 2.0 mbgs.

7.1.2 SITE CHARACTERIZATION

To appropriately apply the applicable regulatory criteria, a preliminary site characterization was performed, details are provided in Table 9 below:

Table 9. Site Characterization

Land Use Classification	The Study Area consists of an assortment of subject parcels zoned Commercial and Industrial. The proposed development of the Study Area into a transit garage consists of offices where workers are present but not engaged in manufacturing operations. Therefore, commercial land use guidelines would be more conservative and applicable.
Predominant soil type in the zone (s) of contamination	The Study Area, with the exception of the former Brooklands Landfill, consists of predominantly fine-grained glaciolacustrine silty clay, and typically overlain by 1.0 to 1.9 m of mixed clay fill (J&D Environmental, 2021b), likely imported or dumped from unknown origins. Fine-grained soil guidelines would be applicable for the Study Area.
Is there a fine-grained soil layer which may govern contaminant transport?	Yes.
Is there a coarse-grained soil layer which may govern contaminant transport?	No.
Is groundwater beneath/near the site used (or potentially used) as a potable groundwater source?	No. The Study Area will use treated water supplied by the City of Winnipeg. The two nearest production wells registered in the GWDrill 2018 database is approximately 165 m south-southeast of the Study Area. *(Protection of groundwater disabled)*
Are there any surface water bodies within 500 m of the site?	No. *(Protection of aquatic life disabled)*
Topography	According to LIDAR data used in Golder's report (2015a), the Study Area is approximately 235 masl along the north and south boundary by Oak Point Highway and the rail right-of-way respectively, with the highest elevation determined to be 241 masl at the former Brooklands Landfill. The surrounding areas in the southern half of the Study Area ranges from 238 to 239 masl while the northwestern portion is slightly undulating ranging from 237 to 238 masl. The northeastern portion of the Study Area is inferred to have minimal fill material and averages approximately 235 to 236 masl.

7.1.3 EXPOSURE PATHWAYS AND RECEPTORS FOR THE SITE

To appropriately apply the Canadian Council of Ministers of Environment (CCME) Canadian Environmental Quality Guidelines (CEQG) and PHC Canada-Wide Standards (CWS) for soil quality, an exposure pathway and receptor assessment was performed for both human and ecological receptors. Tables 10 and 11 provide a description of the exposure pathway and receptor along with a justification to account for the pathway or receptor to be applicable or not applicable as a governing exposure pathway.

Table 10. Exposure Pathway and Human Receptor Assessment

EXPOSURE PATHWAY FOR HUMAN RECEPTOR	APPLICABILITY DESCRIPTION
Direct Contact Humans coming into direct contact with contaminated soil via incidental ingestion, dermal contact, or inhalation of airborne soil particles. *Applicable to all land uses.*	**Applicable:** Access to the Site is open to public and future construction activities at the Site may expose soil particles to workers.
Groundwater Ingestion Humans drinking from and showering or bathing in water that is sourced from groundwater. *Applicable to all land uses.*	**Not Applicable:** The Site does not use groundwater as a potable water source.
Vapour Inhalation Volatile contaminants being released from soil and/or groundwater and migrating upwards into living or working spaces where humans are exposed via inhalation. *Applicable to all land uses.*	**Applicable:** As a transit garage with offices is proposed as a potential future development at the Study Area, vapour intrusion from landfill gases, volatile hydrocarbon impacted soil or groundwater may pose an environmental health hazard to building occupants.
Off-site Migration Wind and water erosion transport of contaminated soil from a commercial or industrial site onto an adjacent site with a more sensitive land use could potentially result in contaminate concentrations that exceed the direct contact soil quality guideline applicable to the more sensitive land use. The off-site migration check is completed to ensure that the commercial or industrial guidelines set are protective of this exposure pathway.	**Not applicable:** The Site and immediately surrounding land use are classified as industrial or commercial.

Table 11. Exposure Pathway and Ecological Receptor Assessment

EXPOSURE PATHWAY FOR ECOLOGICAL RECEPTOR	APPLICABILITY DESCRIPTION
Direct Soil Contact Plants and soil invertebrates coming into direct contact with contaminants in the soil or shallow groundwater. *Ecological soil contact is applicable to all land uses.* *This pathway may be eliminated below 3 m.*	**Applicable:** Plants and soil invertebrates may come in direct contact with contaminants in the soil and shallow groundwater. Ecological soil contact pathway is identified as the governing pathway for surface soils and cannot be eliminated.
Nutrient Energy Cycling Microbial functioning of the soil, including carbon and nitrogen cycling. *Applicable to all land uses.*	**Applicable:** Microbial functioning of the soil, including carbon and nitrogen cycling may be affected. Ecological soil contact pathway is identified as the governing pathway and cannot be eliminated.

Livestock/Wildlife Soil and Food Ingestion Livestock or wildlife ingesting contaminants via the incidental ingestion of soil and ingesting contaminants that have bio-accumulated from soil to fodder. *Applicable to agricultural and natural area land use.* *May be applicable to urban parks frequented by wildlife.*	**Not Applicable:** Applicable to agricultural and natural area land use only.
Aquatic Life Aquatic life (fish, invertebrates and plants) being exposed to contaminants when groundwater discharges to a surface water body that is capable of supporting an aquatic ecosystem. *Applicable to all land uses when a surface water body is located within 500 m from the Site.*	**Not Applicable:** There is no surface water body within 500 m of the Site.
Irrigation Crops being exposed to contaminants when groundwater is used for irrigation. *Applicable to agricultural land use only.*	**Not Applicable:** Irrigation activities do not take place on the Site nor on adjacent properties.
Livestock/Wildlife Watering Livestock or wildlife being exposed to contaminants when groundwater is used for livestock watering or groundwater discharge to surface water body where wildlife may drink. *Applicable to agricultural use.* *May be applicable to urban parks frequented by wildlife.*	**Not Applicable:** Applicable to agricultural land use only. Site is classified as commercial use.

8 RECOMMENDATIONS

Based on the findings of the Phase I ESA, WSP recommends the following:

- Conduct a Phase II ESA program for the intrusive investigation of soil and groundwater at:
  - **APEC-1: Former Brooklands Landfill** to delineate the vertical extent of buried waste, capping fill material, and determine leachate impacts to shallow groundwater in and around the footprint of the former Brooklands Landfill. Monitoring wells installed should be fitted with well lids with adapters for well vapour monitoring of methane gas. COPCs include: methane, BTEX, PHC F1-F4, PAH, VOC, metals, dioxins. It is recommended to have groundwater samples analysed for ammonia, nitrate-N, nitrite-N, total Kjedahl nitrogen, total phosphorus, sulphates, total dissolved solids (TDS), biological oxygen demand (BOD), dissolved organic carbon, chemical oxygen demand (COD) and alkalinity.
  - **APEC-2: Former Brooklands Speedway** to determine the presence or absence of COPCs associated with potentially contaminating activities such as vehicle maintenance, possible fuel spills and leaks associated with the historic operation of the former Brooklands Speedway. COPCs would likely consist of BTEX, PHC F1-F4, PAH, and metals.
  - **APEC-4: Former gas station at subject parcel Block 3, Plan 17744** to determine the presence or absence of COPCs associated with the historic operation of subject parcel Block 3, Plan 17744 at Oak Point Highway and Selkirk Avenue as a retail fuel outlet between 1950s and 1970s. An excavation of where the pump island and potentially where a UST nest might be located could be observed in the 2002 satellite imagery in the middle of a concrete pad in the centre of the subject parcel. COPCs associated with a retail fuel outlet would likely consist of BTEX, PHC F1-F4, PAH, VOCs and metals.
  - **APEC-5: Former Imperial Oil Retail Fuel Outlet at 100 Oak Point Highway, Winnipeg, MB** to determine the presence or absence of residual PHC and metal impacts associated with the operation of 100 Oak Point Highway as an Imperial Oil Esso retail fuel outlet between 1988 and 2012. Metal impacts in exceedance of applicable guidelines (lead, zinc, copper, arsenic, etc.) previously defined by other consultants localised along the south property boundary would have to be confirmed in the Phase II ESA.
- Preparation of a Soil Management Plan in acceptance of the environmental risk posed by existing imported fill material and historic dumping across the entire Study Area as represented by **APEC-3** (Figure 4, Appendix A). The Soil Management Plan should be submitted for approval by MECP prior to commencing construction within the Study Area and should, at a minimum:
  - include plans, such as capping with clean fill or hard pavement, to minimize or mitigate the potential uncovering of buried waste that may be hazardous to the health of workers;
  - outline a soil monitoring plan in response to suspected impacted soil (staining or odours) encountered during development of the Study Area, a qualified environmental professional should be consulted and present on-site for construction environmental monitoring to determine type, level, and extent of contamination;
  - determine applicable guidelines to be applied for the development as the deciding factor for whether impacted soil can be relocated on-site as fill to level terrain, or for disposal off-site at a licensed soil treatment facility;
  - identify locations and extent of all surficial refuse, building material debris and scrap metal on-site and for disposal in the appropriate waste streams during construction.
- Groundwater wells, such as monitoring wells previously installed by other environmental consultants and any unregistered production wells encountered, should be decommissioned during site development according to Manitoba's *Guide for Sealing Abandoned Water Wells in Manitoba* and reported to Manitoba Conservation and Climate, Agriculture and Resource Development.

- As the Study Area contains a former landfill with active landfill gas generation including the estimated migration of methane gas southeast from the former landfill footprint,
    - a methane gas monitoring program of wells across the Study Area should be in place to determine methane gas levels in proximity to future developments; and
    - development of building structures within the Study Area should incorporate into their design appropriate soil vapour extraction and methane gas mitigation engineered systems in accordance with the *Standards and Guidelines for the Mitigation of Methane Gas at Buildings and Utilities and Guidelines for Construction on Landfill Sites* document prepared by the City of Winnipeg (December, 2006).

9 STANDARD TERMS AND CONDITIONS

This report has been prepared for use by the City of Winnipeg in accordance with generally accepted environmental investigation practices at the time of the assessment within the scope suggested by Canadian Standard Association's Phase I Environmental Site Assessment document (CSA Z768-94). The Standard Limitations pertaining to the use of this report are presented in **Appendix F**.

10 QUALIFICATION OF ASSESSORS

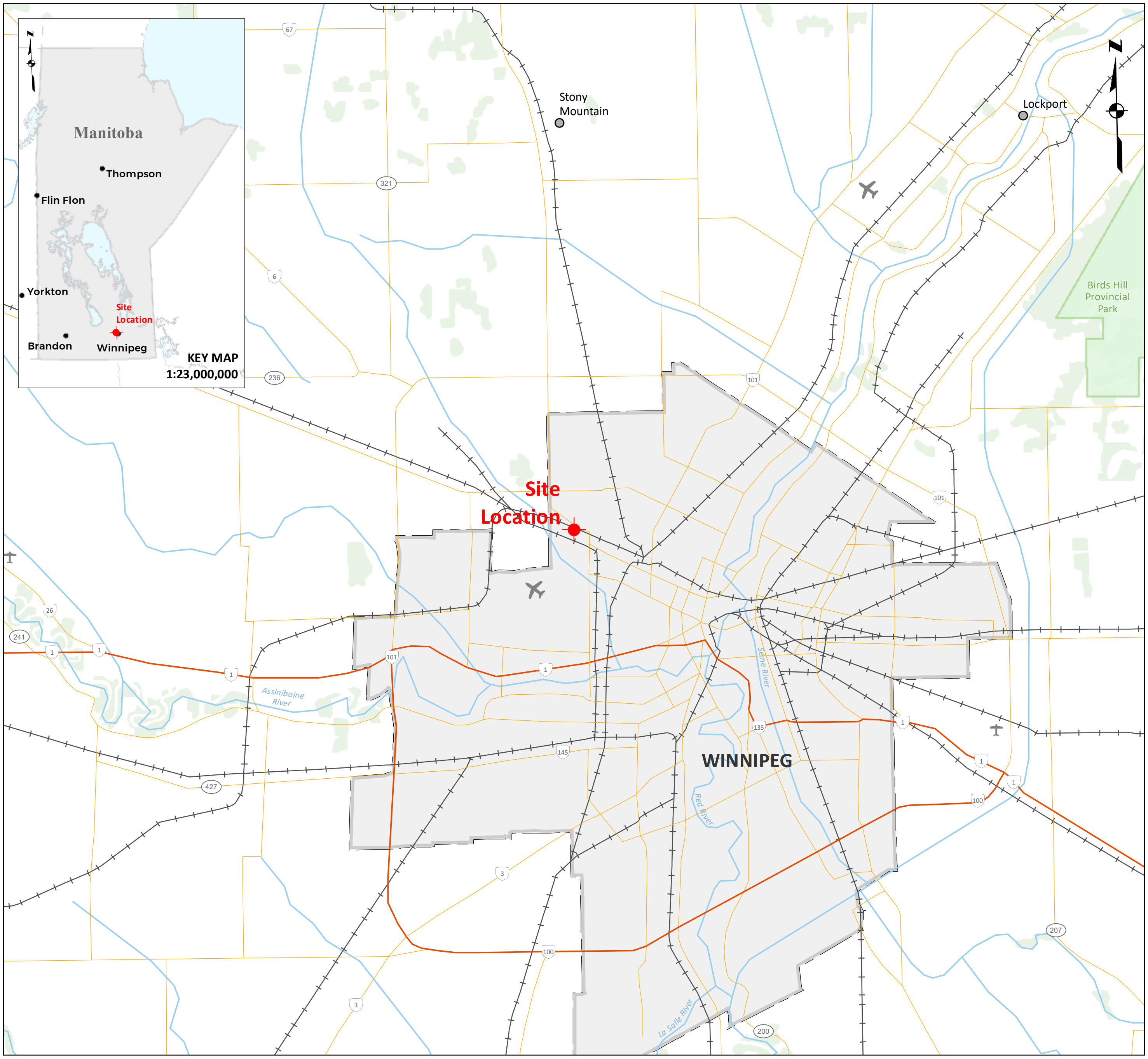
Mr. Darren Keam, M.Sc., P.Ag., is the Regional Manager, Senior Soil Scientist and Senior Project Manager with the Environmental Management (EM) business unit at WSP. He has more than 22 years of experience in agriculture and environmental management and more than 19 years conducting and managing Phase I and II ESA projects. Mr. Keam leads EM opportunities, including Phase I and II ESA planning, site assessments and investigations and data analysis as well as providing senior technical review and quality assurance and quality control review of ESA data and reports. Mr. Keam is a member in good standing with the Manitoba Institute of Agrologists.

Alfred Chan, B.Sc. Geol., P.Geo., PMP is a Project Scientist in the WSP Earth and Environment team in Winnipeg, Manitoba. Alfred is a licensed Professional Geoscientist (P.Geo.) with the Association of Professional Engineers and Geoscientists of the Province of Manitoba (EGM). Alfred has over 10 years of consulting experience consisting of Phase I and II environmental site assessments, site inspections, remedial groundwater monitoring, soil remediation, petroleum storage tank removal inspections, mineral exploration, geotechnical investigations and community road upgrades. In addition to field investigations, Alfred is involved with the management of projects, data analysis, technical reporting review and utilizes software such as Bentley gINT Professional, MapINFO, ArcGIS and AutoCAD to produce deliverables for clients.

Cassie Bujan, B.Env.Sc. is an Environmental Scientist with the WSP Earth & Environment in Winnipeg, MB. She has a Bachelor of Environmental Science with a major in conservation and biodiversity. Cassie has a year of experience working in the Manitoba agriculture and environmental industries including laboratory research and analysis. Cassie has worked for numerous clients and projects including commercial and residential projects. Her responsibilities with WSP include conducting Phase I and Phase II ESAs, site inspections, biosolid management and groundwater monitoring. In addition to field investigation, Cassie is involved in the coordination of projects, data analysis and technical report writing.

APPENDIX

A FIGURES



Legend

Activity
- Site Location

Water Features
- Perennial Creeks/Streams

Municipal
- Towns/City
- Major Urban Centre

Transportation
- Paved Roads
- TransCanada Highway
- Railways
- Airport
- Airfield

Environmental
- Provincial Park
- Vegetation

Scale: 1:500,000

0 2.5 5 7.5 10 12.5 Km

Universal Transverse Mercator (Zone 14)

North American Datum (1983)

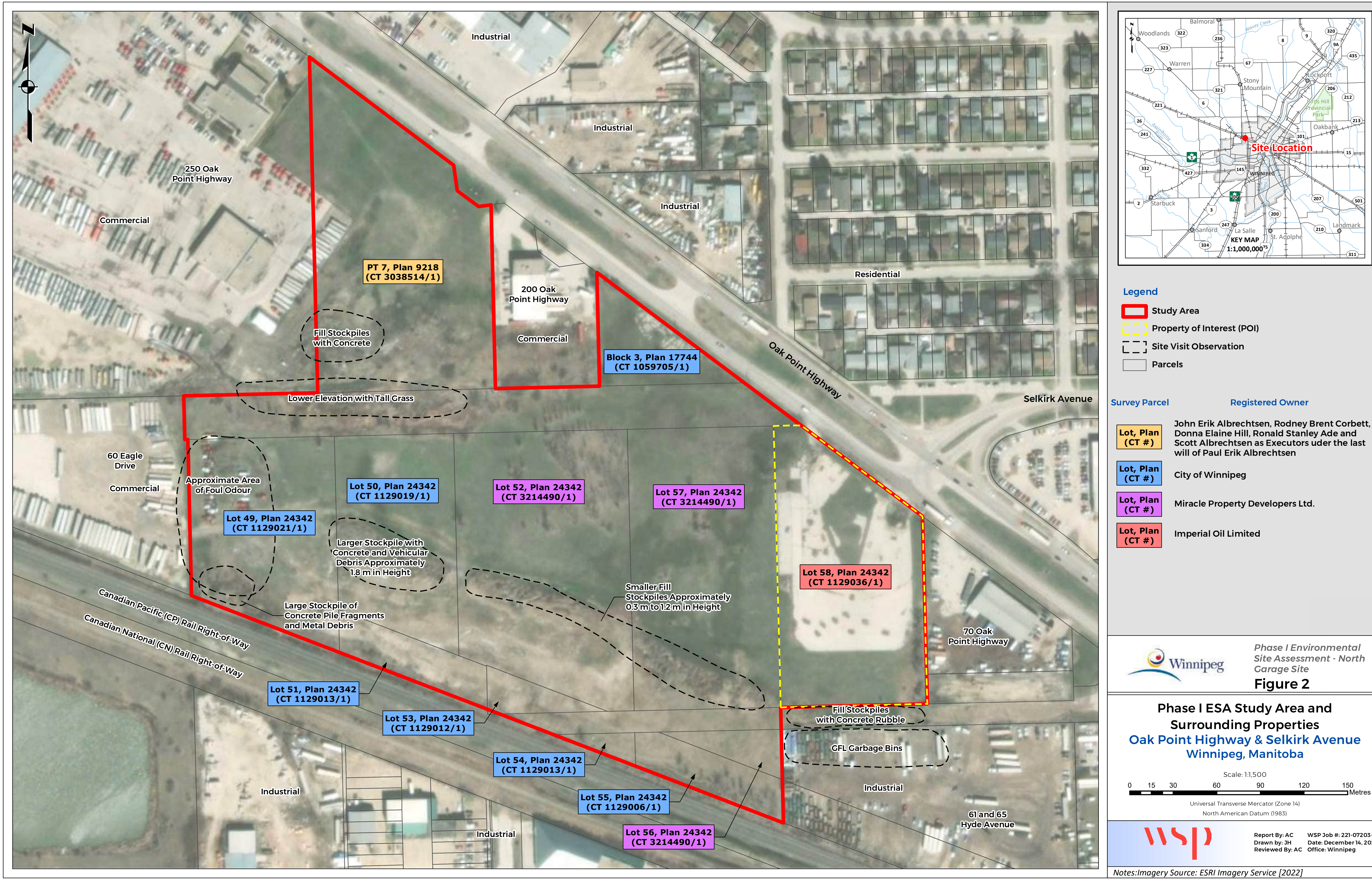
Draft

Site Location Map

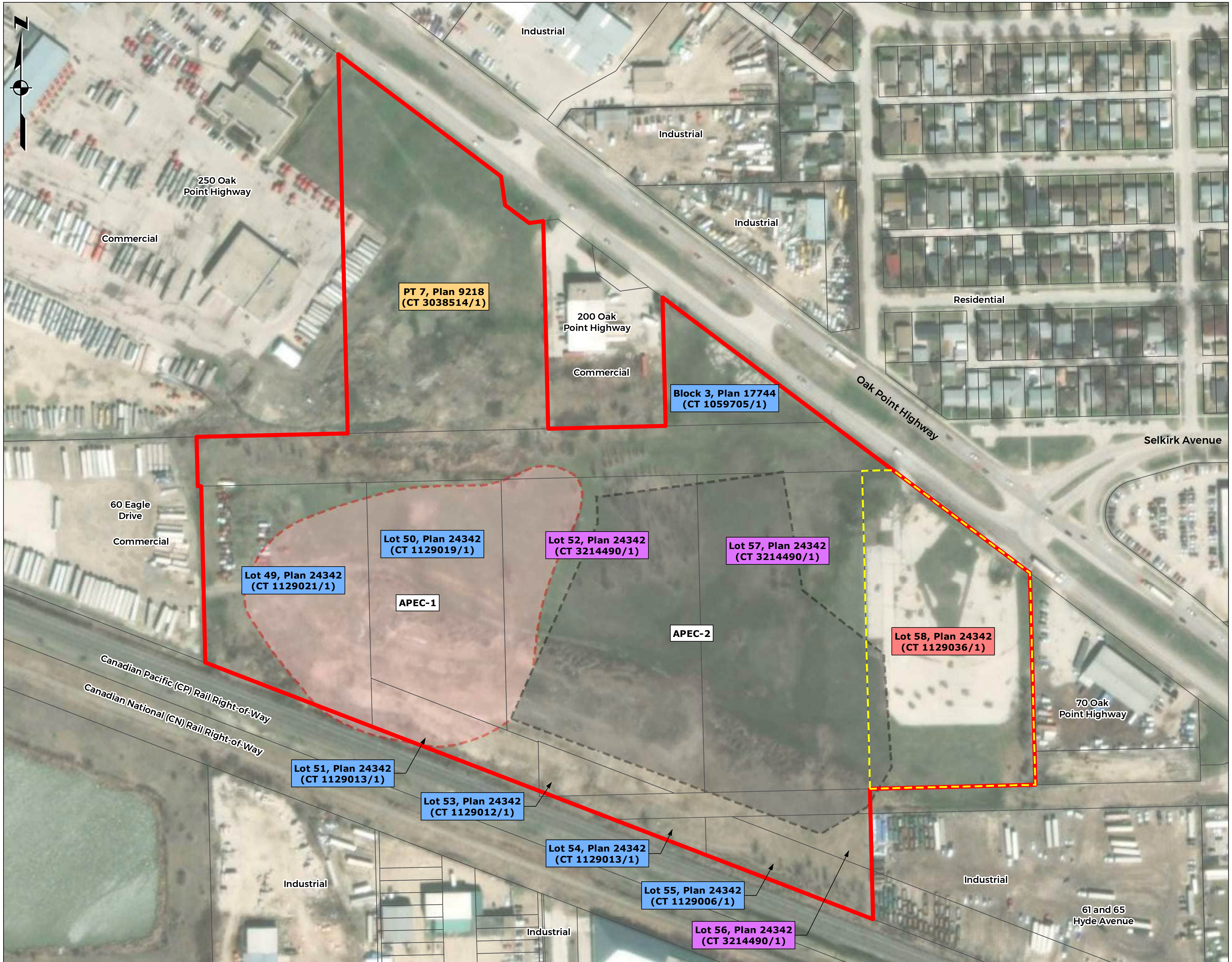
Oak Point Highway & Selkirk Avenue

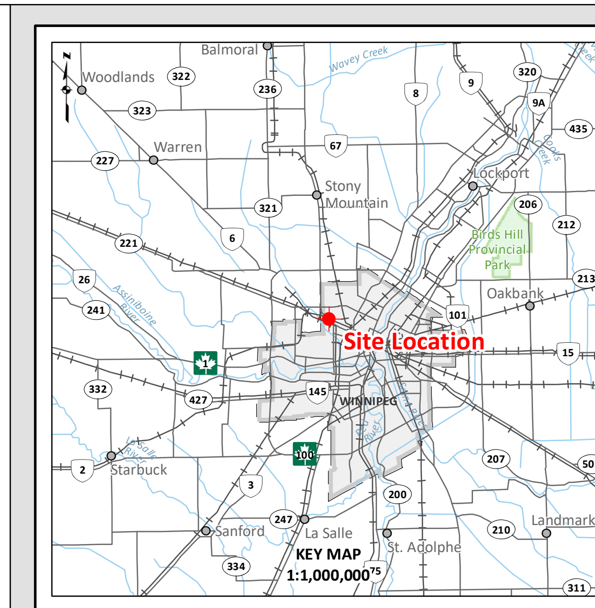
Winnipeg, Manitoba

Figure 1



Industrial
Industrial
Industrial
Residential
250 Oak Point Highway
Commercial
PT 7, Plan 9218 (CT 3038514/1)
200 Oak Point Highway
Commercial
Fill Stockpiles with Concrete
Block 3, Plan 17744 (CT 1059705/1)
Oak Point Highway
Selkirk Avenue
Lower Elevation with Tall Grass
60 Eagle Drive
Commercial
Approximate Area of Foul Odour
Lot 50, Plan 24342 (CT 1129019/1)
Lot 52, Plan 24342 (CT 3214490/1)
Lot 57, Plan 24342 (CT 3214490/1)
Lot 49, Plan 24342 (CT 1129021/1)
Larger Stockpile with Concrete and Vehicular Debris Approximately 1.8 m in Height
Lot 58, Plan 24342 (CT 1129036/1)
Smaller Fill Stockpiles Approximately 0.3 m to 1.2 m in Height
Large Stockpile of Concrete Pile Fragments and Metal Debris
Canadian Pacific (CP) Rail Right-of-Way
Canadian National (CN) Rail Right-of-Way
70 Oak Point Highway
Lot 51, Plan 24342 (CT 1129013/1)
Lot 53, Plan 24342 (CT 1129012/1)
Fill Stockpiles with Concrete Rubble
GFL Garbage Bins
Lot 54, Plan 24342 (CT 1129013/1)
Industrial
Industrial
Lot 55, Plan 24342 (CT 1129006/1)
61 and 65 Hyde Avenue
Industrial
Lot 56, Plan 24342 (CT 3214490/1)
Site Location
KEY MAP 1:1,000,000
Legend
Study Area
Property of Interest (POI)
Site Visit Observation
Parcels
Survey Parcel
Registered Owner
Lot, Plan (CT #)
John Erik Albrechtsen, Rodney Brent Corbett, Donna Elaine Hill, Ronald Stanley Ade and Scott Albrechtsen as Executors uder the last will of Paul Erik Albrechtsen
Lot, Plan (CT #)
City of Winnipeg
Lot, Plan (CT #)
Miracle Property Developers Ltd.
Lot, Plan (CT #)
Imperial Oil Limited
Winnipeg
Phase I Environmental Site Assessment - North Garage Site
Figure 2
Phase I ESA Study Area and Surrounding Properties
Oak Point Highway & Selkirk Avenue
Winnipeg, Manitoba
Scale: 1:1,500
0 15 30 60 90 120 150 Metres
Universal Transverse Mercator (Zone 14)
North American Datum (1983)
wsp
Report By: AC
Drawn by: JH
Reviewed By: AC
WSP Job #: 221-07203-00
Date: December 14, 2022
Office: Winnipeg
Notes:Imagery Source: ESRI Imagery Service [2022]





Legend

- Study Area
- Property of Interest (POI)
- Parcels

Areas of Potential Environmental Concern

- APEC-1: Former Brooklands Landfill
- APEC-2: Former Brooklands Speedway

Survey Parcel	Registered Owner
Lot, Plan (CT #)	John Erik Albrechtsen, Rodney Brent Corbett, Donna Elaine Hill, Ronald Stanley Ade and Scott Albrechtsen as Executors uder the last will of Paul Erik Albrechtsen
Lot, Plan (CT #)	City of Winnipeg
Lot, Plan (CT #)	Miracle Property Developers Ltd.
Lot, Plan (CT #)	Imperial Oil Limited

Winnipeg

Phase I Environmental Site Assessment - North Garage Site

Figure 3

Areas of Potential Environmental Concern (APEC) 1 and 2

Oak Point Highway & Selkirk Avenue
Winnipeg, Manitoba

Scale: 1:1,500

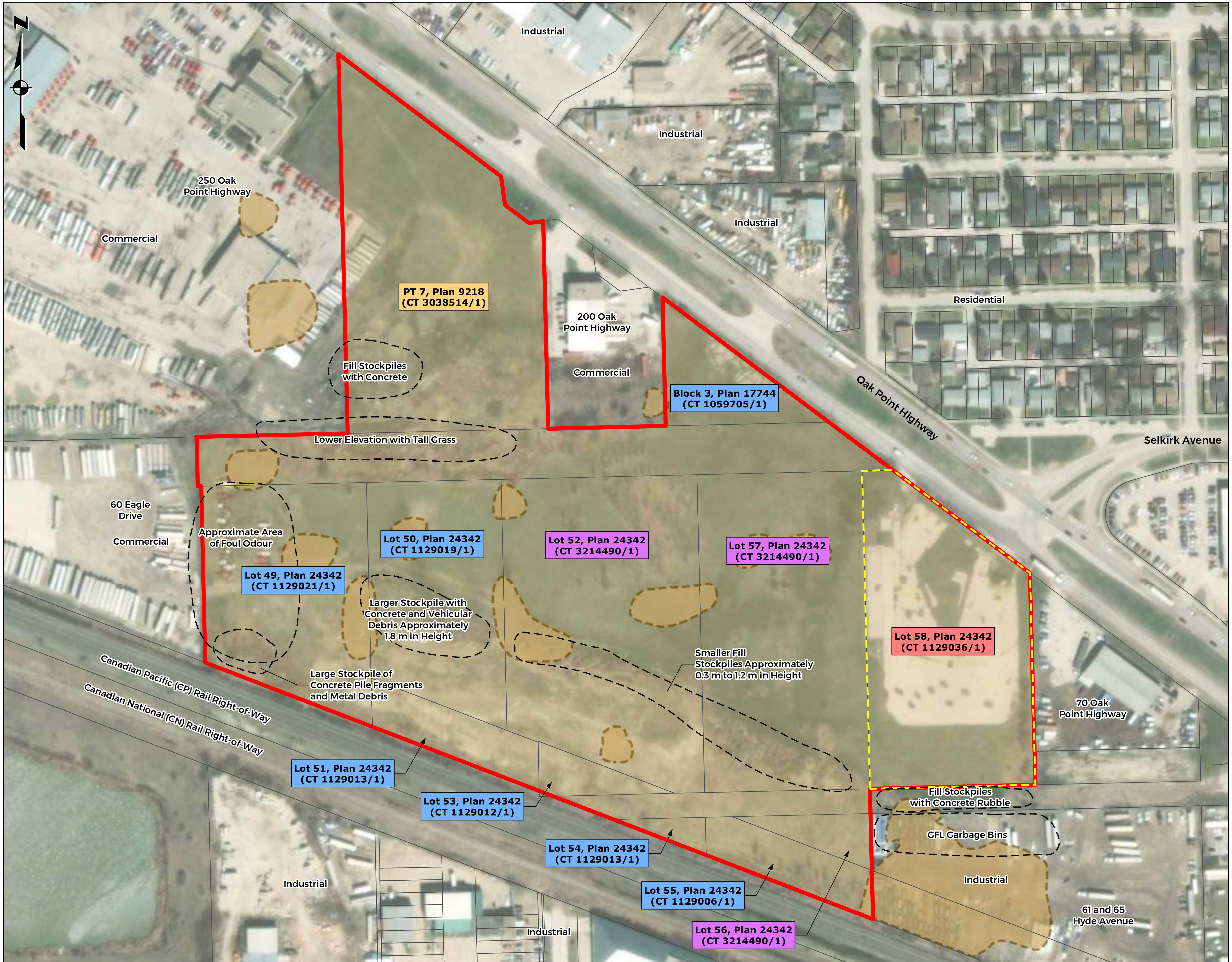
0 15 30 60 90 120 150 Metres

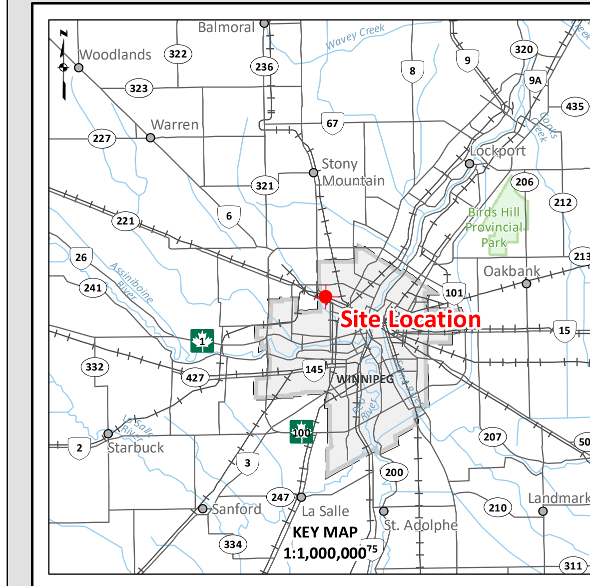
Universal Transverse Mercator (Zone 14)
North American Datum (1983)

Report By: AC
Drawn by: JH
Reviewed By: AC

WSP Job #: 221-07203-00
Date: December 14, 2022
Office: Winnipeg

Notes:Imagery Source: ESRI Imagery Service [2022]





Legend

- Study Area
- Property of Interest (POI)
- Site Visit Observation
- Parcels

Areas of Potential Environmental Concern

- Dumping Extent of Refuse, Cinder and Ash According to City of Winnipeg Drawing SWD-D-125A (1999)
- APEC-3: Historic Extent of Imported Fill Material

Survey Parcel	Registered Owner
Lot, Plan (CT #)	John Erik Albrechtsen, Rodney Brent Corbett, Donna Elaine Hill, Ronald Stanley Ade and Scott Albrechtsen as Executors uder the last will of Paul Erik Albrechtsen
Lot, Plan (CT #)	City of Winnipeg
Lot, Plan (CT #)	Miracle Property Developers Ltd.
Lot, Plan (CT #)	Imperial Oil Limited

Winnipeg

Phase I Environmental Site Assessment - North Garage Site

Figure 4

Areas of Potential Environmental Concern (APEC) 3
Oak Point Highway & Selkirk Avenue
Winnipeg, Manitoba

Scale: 1:1,500

0 15 30 60 90 120 150 Metres

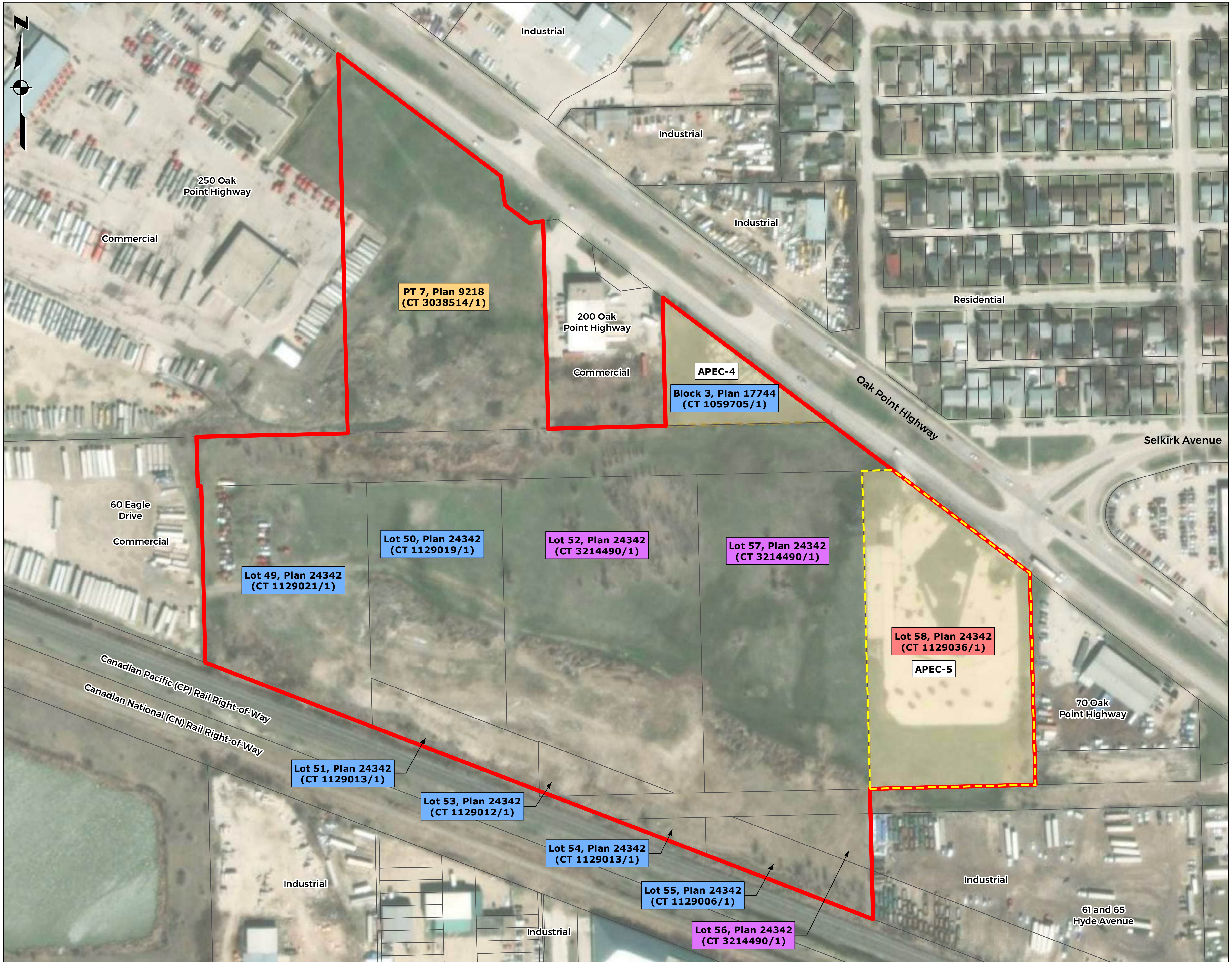
Universal Transverse Mercator (Zone 14)
North American Datum (1983)

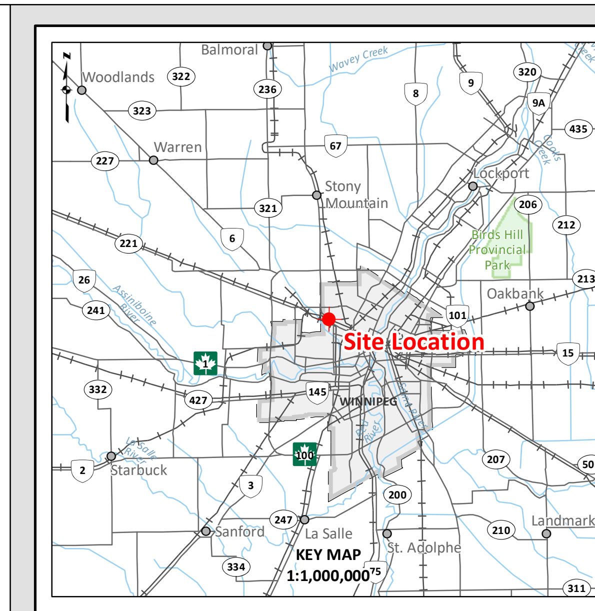
WSP

Report By: AC
Drawn by: JH
Reviewed By: AC

WSP Job #: 221-07203-00
Date: December 14, 2022
Office: Winnipeg

Notes:Imagery Source: ESRI Imagery Service [2022]





Legend

- Study Area
- Property of Interest (POI)
- Parcels

Areas of Potential Environmental Concern

- APEC-4: Former Gas Station at Block 3, Plan 17744
- APEC-5: Former Imperial Oil Retail Fuel Outlet, Property of Interest (Lot 58, Plan 24342)

Survey Parcel	Registered Owner
Lot, Plan (CT #)	John Erik Albrechtsen, Rodney Brent Corbett, Donna Elaine Hill, Ronald Stanley Ade and Scott Albrechtsen as Executors uder the last will of Paul Erik Albrechtsen
Lot, Plan (CT #)	City of Winnipeg
Lot, Plan (CT #)	Miracle Property Developers Ltd.
Lot, Plan (CT #)	Imperial Oil Limited

Winnipeg

Phase I Environmental Site Assessment - North Garage Site

Figure 5

Areas of Potential Environmental Concern (APEC) 4 and 5
Oak Point Highway & Selkirk Avenue
Winnipeg, Manitoba

Scale: 1:1,500

0 15 30 60 90 120 150 Metres

Universal Transverse Mercator (Zone 14)
North American Datum (1983)

WSP

Report By: AC
Drawn by: JH
Reviewed By: AC

WSP Job #: 221-07203-00
Date: December 14, 2022
Office: Winnipeg

Notes: Imagery Source: ESRI Imagery Service [2022]

APPENDIX

B PHOTOGRAPHS

November 29, 2022

Photograph 1 – Outward View from Subject Parcel Lot 56, Plan 24342.

Looking east at the east adjacent property, a storage compound on 61 Hyde Avenue.

November 29, 2022

Photograph 2 – Outward View from the Property of Interest (POI) at 100 Oak Point Highway

Looking south from the POI towards the east adjacent property, 61 Hyde Avenue.

November 29, 2022

Photograph 3 – Outward View from Subject Parcel Lot 49, Plan 24342.

Looking west at the west boundary of the Study Area towards the west adjacent property, 60 Eagle Drive.

November 29, 2022

Photograph 4 – Outward View from Subject Parcel Block 3, Plan 17744.

Looking north at the north boundary of the Study Area towards Oak Point Highway. Former location of a gas station between the 1950's and 1970s.

November 29, 2022

Photograph 5 – Inward View of the Study Area

Looking north from the south boundary of Subject Parcel Lot 57, Plan 24342.

November 29, 2022

Photograph 6 – Inward View of the Study Area

Looking north from the south boundary of Subject Parcel Lot 50, Plan 24342.

November 29, 2022

Photograph 7 – Inward View of the Study Area

Looking north from the south boundary of Subject Parcel Lot 49, Plan 24342.

November 29, 2022

Photograph 8 – Inward View of the Study Area

Looking east from the west elevation of Subject Parcel Lot 49, Plan 24342.

November 29, 2022

Photograph 9 – Inward View of the Study Area

Looking north from the north boundary of Subject Parcel Lot 50, Plan 24342, with Oak Point Highway in the background.

November 29, 2022

Photograph 10 – Inward View of the Study Area

Looking south at the north boundary of Subject Parcel Lot 50, Plan 24342.

November 29, 2022

Photograph 11 – Inward View of the POI Site

Looking east into the POI from the POI west boundary.

November 29, 2022

Photograph 12 – Inward View of the POI Site

Looking south into the POI from the POI north boundary.

November 29, 2022

Photograph 13 – Inward View of the POI Site

Looking west into the POI from the POI east boundary.

November 29, 2022

Photograph 14 – Inward View of the POI Site

Looking north into the POI from the south elevation.

November 29, 2022

Photograph 15 – Outward View from the POI Site

Looking north towards Oak Point Highway and adjacent properties from the POI north boundary.

November 29, 2022

Photograph 16 – Outward View from the POI Site

Looking west toward Subject Parcel Lot 57, Plan 24342 from the POI west elevation.

November 29, 2022

Photograph 17 – Outward View from the POI Site

Looking south toward the adjacent property from the POI south boundary.

November 29, 2022

Photograph 18 – Outward View from the POI Site

Looking east toward the adjacent property from the POI east elevation.

November 29, 2022

Photograph 19 – View of one of the small stockpiles present within the Study Area

Looking at concrete rubble found in the small stockpiles, south of the POI.

November 29, 2022

Photograph 20 – View of one of the Small Stockpiles

Looking at the fill stockpiles located within Subject Parcel Lot 57, Plan 24342.

November 29, 2022

Photograph 21 – View of a Rubble Pile

Looking at a waste pile located in the southwest corner of Subject Parcel Lot 57, Plan 24342.

November 29, 2022

Photograph 22 – View of Multiple Small Stockpiles

Looking west over multiple small stockpiles along the west portion of Subject Parcel Lot 57 and 52, Plan 24342.

November 29, 2022

Photograph 23 – View of Plowed Areas and Snow Piles

Looking southeast into Subject Parcel Lot 52 & 57, Plan 24342 at snow piles due to recent plowing in the area.

November 29, 2022

Photograph 24 – View of large Stockpile in Subject Parcel Lot 49 & 50, Plan 24342

Looking north from Subject Parcel Lot 51, Plan 24342 towards the large stockpiles located in Subject Parcel Lot 49 & 50, Plan 24342, at the former location of the Brooklands Landfill.

November 29, 2022

Photograph 25 – Concrete and Scrap Metal

Looking at a concrete pile with metal, located in the southwest corner of Subject Parcel Lot 49, Plan 24342.

November 29, 2022

Photograph 26 – Scrap Metal

Looking at a large piece of scrap metal, located in the southwest corner of Subject Parcel Lot 49, Plan 24342.

November 29, 2022

Photograph 27 – Vehicles stored on Subject Parcel Lot 57, Plan 24342

Looking at northwestern portion of Subject Parcel Lot 57, Plan 24342 where multiple semi truck cabs are being stored.

November 29, 2022

Photograph 28 –Scrap Vehicle Frame

Looking at the frame of a scrap vehicle, located at the top of the large stockpile in Subject Parcel Lot 50, Plan 24342.

November 29, 2022

Photograph 29 – Concrete with Rebar

Looking at concrete with rebar located in the large stockpile in Subject Parcel Lot 50.

November 29, 2022

Photograph 30 – Interior of the Large Stockpile

Looking at the inner portion of the large stockpile depression with garbage, scrap metal and concrete visible.

November 29, 2022

Photograph 31 – Tall Grassed Low-lying Area

Looking north towards the southwestern portion of Subject Parcel Lot PT 7, Plan 9218.

November 29, 2022

Photograph 32 – Concrete Blockade Barrier

Looking at one of the multiple concrete blockades that surround the POI Site.

November 29, 2022

Photograph 33 – Off-Site AST

Looking at an above storage tank located just off-site to the west of the southwestern portion of Subject Parcel PT 7, Plan 9218.

APPENDIX

C LAND TITLES

STATUS OF TITLE

Title Number	**1059705/1**
Title Status	**Accepted**
Client File	221-07203-00

1. REGISTERED OWNERS, TENANCY AND LAND DESCRIPTION

THE CITY OF WINNIPEG

IS REGISTERED OWNER SUBJECT TO SUCH ENTRIES RECORDED HEREON IN THE FOLLOWING DESCRIBED LAND:

SP BLOCK 3 PLAN 17744 WLTO
EXC: ALL MINES AND MINERALS
IN S 1/2 23-11-2 EPM

The land in this title is, unless the contrary is expressly declared, deemed to be subject to the reservations and restrictions set out in section 58 of *The Real Property Act.*

2. ACTIVE INSTRUMENTS

Instrument Type:	**Caveat**
Registration Number:	**249027/1**
Instrument Status:	**Accepted**
Registration Date:	1977-12-01
From/By:	GULF OIL CANADA LTD.
To:	
Amount:	
Notes:	No notes
Description:	No description

INSTRUMENTS THAT AFFECT THIS INSTRUMENT

Registration Number	Instrument Type	Status
87-25894/1	Assignment Of Caveat	Accepted

Instrument Type:	**Assignment Of Caveat**
Registration Number:	**87-25894/1**
Instrument Status:	**Accepted**
Registration Date:	1987-03-19
From/By:	GULF OIL CANADA LTD.
To:	PETRO-CANADA
Amount:	
Notes:	No notes
Description:	No description

Instrument Type:	**Easement**
Registration Number:	**4955890/1**
Instrument Status:	**Accepted**
Registration Date:	2018-05-10
From/By:	THE CITY OF WINNIPEG
To:	THE MANITOBA HYDRO-ELECTRIC BOARD
Amount:	
Notes:	ALL WTN LTS ROW PL 62956
Description:	STATUTORY EASEMENT

3. ADDRESSES FOR SERVICE

THE CITY OF WINNIPEG
510 MAIN STREET
WINNIPEG, MB
R3B 1B9

4. TITLE NOTES

No title notes

5. LAND TITLES DISTRICT

Winnipeg

6. DUPLICATE TITLE INFORMATION

Duplicate not produced

7. FROM TITLE NUMBERS

K2416/1 All

8. REAL PROPERTY APPLICATION / CROWN GRANT NUMBERS

No real property application or grant information

9. ORIGINATING INSTRUMENTS

Instrument Type:	**Transfer Of Land**
Registration Number:	**1100589/1**
Registration Date:	1988-12-06
From/By:	HARVEY WIEBE
To:	THE CITY OF WINNIPG
Consideration:	$105,000.00

10. LAND INDEX

Block 3 Plan 17744
EXC RES

CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA STORAGE SYSTEM OF TITLE NUMBER 1059705/1

STATUS OF TITLE

Title Number	**1129006/1**
Title Status	**Accepted**
Client File	221-07203-00

1. REGISTERED OWNERS, TENANCY AND LAND DESCRIPTION

THE CITY OF WINNIPEG

IS REGISTERED OWNER SUBJECT TO SUCH ENTRIES RECORDED HEREON IN THE FOLLOWING DESCRIBED LAND:

SP LOT 55 PLAN 24342 WLTO
EXC THEREOUT ALL MINES AND MINERALS VESTED IN THE CROWN (MAN) BY THE REAL PROPERTY ACT
IN E 1/2 14-11-2 EPM

The land in this title is, unless the contrary is expressly declared, deemed to be subject to the reservations and restrictions set out in section 58 of *The Real Property Act.*

2. ACTIVE INSTRUMENTS

No active instruments

3. ADDRESSES FOR SERVICE

CITY OF WINNIPEG (LAW)
CIVIC CENTRE
510 MAIN STREET
WINNIPEG, MAN.
R3B 1B9

4. TITLE NOTES

No title notes

5. LAND TITLES DISTRICT

Winnipeg

6. DUPLICATE TITLE INFORMATION

Duplicate Produced for: HOLD FOR PRODUCTION OF TITLE 792756

7. FROM TITLE NUMBERS

792756/1 All

8. REAL PROPERTY APPLICATION / CROWN GRANT NUMBERS

No real property application or grant information

9. ORIGINATING INSTRUMENTS

Instrument Type:	**Request Electronic Title Conversion**
Registration Number:	**1215384/1**
Registration Date:	1989-10-12
From/By:	WLTO SURVEY OFFICE
To:	
Amount:	

10. LAND INDEX

Lot 55 Plan 24342
EX M & M

CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA STORAGE SYSTEM OF TITLE NUMBER 1129006/1

STATUS OF TITLE

Title Number	**1129008/1**
Title Status	**Accepted**
Client File	221-07203-00

Manitoba Land Titles Registry

1. REGISTERED OWNERS, TENANCY AND LAND DESCRIPTION

HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE OF MANITOBA

IS REGISTERED OWNER OF ALL MINES AND MINERALS VESTED IN THE CROWN (MANITOBA) BY THE REAL PROPERTY ACT SUBJECT TO SUCH ENTRIES RECORDED HEREON, IN, UPON OR UNDER THE FOLLOWING DESCRIBED LAND:

SP LOT 53 AND 53A PLAN 24342 WLTO
IN E 1/2 14-11-2 EPM

The land in this title is, unless the contrary is expressly declared, deemed to be subject to the reservations and restrictions set out in section 58 of *The Real Property Act.*

2. ACTIVE INSTRUMENTS

No active instruments

3. ADDRESSES FOR SERVICE

DEPT. NATURAL RES/LANDS BRANCH
BOX 2
1495 ST. JAMES ST.
WPG., MAN.
R3H 0W9

4. TITLE NOTES

No title notes

5. LAND TITLES DISTRICT

Winnipeg

6. DUPLICATE TITLE INFORMATION

Duplicate Produced for: HOLD FOR PRODUCTION OF TITLE 528641

7. FROM TITLE NUMBERS

528641/1 Balance

8. REAL PROPERTY APPLICATION / CROWN GRANT NUMBERS

No real property application or grant information

9. ORIGINATING INSTRUMENTS

Instrument Type: **Request Electronic Title Conversion**
Registration Number: **1215383/1**

Registration Date: 1989-10-12
From/By: WLTO SURVEY OFFICE
To:
Amount:

10. LAND INDEX

Lot 53A Plan 24342
ALL M & M

Lot 53 Plan 24342
ALL M & M

CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA STORAGE SYSTEM OF TITLE NUMBER 1129008/1

STATUS OF TITLE

Title Number	**1129011/1**
Title Status	**Accepted**
Client File	221-07203-00

Manitoba Land Titles Registry

1. REGISTERED OWNERS, TENANCY AND LAND DESCRIPTION

HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE OF MANITOBA

IS REGISTERED OWNER OF ALL MINES AND MINERALS VESTED IN THE CROWN (MANITOBA) BY THE REAL PROPERTY ACT SUBJECT TO SUCH ENTRIES RECORDED HEREON, IN, UPON OR UNDER THE FOLLOWING DESCRIBED LAND:

SP LOTS 51, 54, 55 AND 62 PLAN 24342 WLTO
IN E 1/2 14-11-2 EPM

The land in this title is, unless the contrary is expressly declared, deemed to be subject to the reservations and restrictions set out in section 58 of *The Real Property Act.*

2. ACTIVE INSTRUMENTS

No active instruments

3. ADDRESSES FOR SERVICE

DEPT. NATURAL RES/LANDS BRANCH
BOX 2
1495 ST. JAMES ST.
WPG., MAN.
R3H 0W9

4. TITLE NOTES

No title notes

5. LAND TITLES DISTRICT

Winnipeg

6. DUPLICATE TITLE INFORMATION

Duplicate Produced for: HOLD FOR PRODUCTION OF TITLE 528640

7. FROM TITLE NUMBERS

528640/1 Balance

8. REAL PROPERTY APPLICATION / CROWN GRANT NUMBERS

No real property application or grant information

9. ORIGINATING INSTRUMENTS

Instrument Type: **Request Electronic Title Conversion**
Registration Number: **1215381/1**

Registration Date: 1989-10-12
From/By: WLTO SURVEY OFFICE
To:
Amount:

10. LAND INDEX

Lot 51 Plan 24342
ALL M & M

Lot 54 Plan 24342
ALL M & M

Lot 55 Plan 24342
ALL M & M

Lot 62 Plan 24342
ALL M & M

CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA STORAGE SYSTEM OF TITLE NUMBER 1129011/1

STATUS OF TITLE

Title Number	**1129012/1**
Title Status	**Accepted**
Client File	221-07203-00

1. REGISTERED OWNERS, TENANCY AND LAND DESCRIPTION

THE CITY OF WINNIPEG

IS REGISTERED OWNER SUBJECT TO SUCH ENTRIES RECORDED HEREON IN THE FOLLOWING DESCRIBED LAND:

SP LOT 53 AND 53A PLAN 24342 WLTO
EXC THEREOUT ALL MINES AND MINERALS VESTED IN THE CROWN (MAN.) BY THE REAL PROPERTY ACT
IN E 1/2 14-11-2 EPM

The land in this title is, unless the contrary is expressly declared, deemed to be subject to the reservations and restrictions set out in section 58 of *The Real Property Act.*

2. ACTIVE INSTRUMENTS

No active instruments

3. ADDRESSES FOR SERVICE

CITY OF WINNIPEG (LAW)
CIVIC CENTRE
510 MAIN STREET
WINNIPEG, MAN.
R3B 1B9

4. TITLE NOTES

No title notes

5. LAND TITLES DISTRICT

Winnipeg

6. DUPLICATE TITLE INFORMATION

Duplicate not produced

7. FROM TITLE NUMBERS

792751/1 Part

8. REAL PROPERTY APPLICATION / CROWN GRANT NUMBERS

No real property application or grant information

9. ORIGINATING INSTRUMENTS

Instrument Type:	**Request Electronic Title Conversion**
Registration Number:	**1215377/1**
Registration Date:	1989-10-12
From/By:	WLTO SURVEY OFFICE
To:	
Amount:	

10. LAND INDEX

Lot 53A Plan 24342
EX M & M

Lot 53 Plan 24342
EX M & M

CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA STORAGE SYSTEM OF TITLE NUMBER 1129012/1

STATUS OF TITLE

Title Number	**1129013/1**
Title Status	**Accepted**
Client File	221-07203-00

Manitoba Land Titles Registry

1. REGISTERED OWNERS, TENANCY AND LAND DESCRIPTION

THE CITY OF WINNIPEG

IS REGISTERED OWNER SUBJECT TO SUCH ENTRIES RECORDED HEREON IN THE FOLLOWING DESCRIBED LAND:

SP LOTS 51 AND 54 PLAN 24342 WLTO
EXC THEREOUT ALL MINES AND MINERALS VESTED IN THE CROWN (MAN.) BY
THE REAL PROPERTY ACT
IN E 1/2 14-11-2 EPM

The land in this title is, unless the contrary is expressly declared, deemed to be subject to the reservations and restrictions set out in section 58 of *The Real Property Act.*

2. ACTIVE INSTRUMENTS

No active instruments

3. ADDRESSES FOR SERVICE

CITY OF WINNIPEG (LAW)
CIVIC CENTRE
510 MAIN STREET
WINNIPEG, MAN.
R3B 1B9

4. TITLE NOTES

No title notes

5. LAND TITLES DISTRICT

Winnipeg

6. DUPLICATE TITLE INFORMATION

Duplicate Produced for: HOLD FOR PRODUCTION OF TITLE 792754

7. FROM TITLE NUMBERS

792754/1	All

8. REAL PROPERTY APPLICATION / CROWN GRANT NUMBERS

No real property application or grant information

9. ORIGINATING INSTRUMENTS

Instrument Type: **Request Electronic Title Conversion**
Registration Number: **1215374/1**

Registration Date: 1989-10-12
From/By: WLTO SURVEY OFFICE
To:
Amount:

10. LAND INDEX

Lot 51 Plan 24342
EX M & M

Lot 54 Plan 24342
EX M & M

CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA STORAGE SYSTEM OF TITLE NUMBER 1129013/1

STATUS OF TITLE

Title Number	**1129019/1**
Title Status	**Accepted**
Client File	221-07203-00

Manitoba Land Titles Registry

1. REGISTERED OWNERS, TENANCY AND LAND DESCRIPTION

THE CITY OF WINNIPEG

IS REGISTERED OWNER SUBJECT TO SUCH ENTRIES RECORDED HEREON IN THE FOLLOWING DESCRIBED LAND:

SP LOT 50 PLAN 24342 WLTO
IN E 1/2 14-11-2 EPM

The land in this title is, unless the contrary is expressly declared, deemed to be subject to the reservations and restrictions set out in section 58 of *The Real Property Act.*

2. ACTIVE INSTRUMENTS

Instrument Type:	**Lien**
Registration Number:	**160135/1**
Instrument Status:	**Accepted**
Registration Date:	1953-07-16
From/By:	ROBERT A. GILLESPIE
Against:	VILLAGE OF BROOKLANDS
Amount:	
Notes:	No notes
Description:	MECHANICS' LIEN

Instrument Type:	**Lien**
Registration Number:	**160274/1**
Instrument Status:	**Accepted**
Registration Date:	1953-08-14
From/By:	CITY LUMBER CO. LTD.
Against:	VILLAGE OF BROOKLANDS
Amount:	
Notes:	No notes
Description:	MECHANICS' LIEN

Instrument Type:	**Lien**
Registration Number:	**161905/1**
Instrument Status:	**Accepted**
Registration Date:	1954-08-19
From/By:	MAPLE LEAF CONSTRUCTION LTD.
Against:	WILLIAM HINKEL, ET AL
Amount:	
Notes:	No notes
Description:	MECHANICS' LIEN

3. ADDRESSES FOR SERVICE

CITY OF WINNIPEG (LAW)
CIVIC CENTRE
510 MAIN STREET
WINNIPEG, MAN.
R3B 1B9

4. TITLE NOTES

No title notes

5. LAND TITLES DISTRICT

Winnipeg

6. DUPLICATE TITLE INFORMATION

Duplicate Produced for: HOLD FOR PRODUCTION OF TITLE 360905

7. FROM TITLE NUMBERS

360905/1 Balance

8. REAL PROPERTY APPLICATION / CROWN GRANT NUMBERS

No real property application or grant information

9. ORIGINATING INSTRUMENTS

Instrument Type:	**Request Electronic Title Conversion**
Registration Number:	**1215372/1**
Registration Date:	1989-10-12
From/By:	WLTO SURVEY OFFICE
To:	
Amount:	

10. LAND INDEX

Lot 50 Plan 24342

CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA STORAGE SYSTEM OF TITLE NUMBER 1129019/1

STATUS OF TITLE

Title Number	**1129021/1**
Title Status	**Accepted**
Client File	221-07203-00

1. REGISTERED OWNERS, TENANCY AND LAND DESCRIPTION

THE CITY OF WINNIPEG

IS REGISTERED OWNER SUBJECT TO SUCH ENTRIES RECORDED HEREON IN THE FOLLOWING DESCRIBED LAND:

SP LOT 49 PLAN 24342 WLTO
IN E 1/2 14-11-2 EPM

The land in this title is, unless the contrary is expressly declared, deemed to be subject to the reservations and restrictions set out in section 58 of *The Real Property Act.*

2. ACTIVE INSTRUMENTS

Instrument Type:	**Caveat**
Registration Number:	**235604/1**
Instrument Status:	**Accepted**
Registration Date:	1975-07-24
From/By:	MANITOBA HYDRO ELECTRIC BOARD/MANITOBA TELEPHONE SYSTEM
To:	
Amount:	
Notes:	No notes
Description:	No description

3. ADDRESSES FOR SERVICE

CITY OF WINNIPEG (LAW)
CIVIC CENTRE
510 MAIN STREET
WINNIPEG, MAN.
R3B 1B9

4. TITLE NOTES

No title notes

5. LAND TITLES DISTRICT

Winnipeg

6.	**DUPLICATE TITLE INFORMATION**	
	Duplicate Produced for:	HOLD FOR PRODUCTION OF TITLE 498937
7.	**FROM TITLE NUMBERS**	
	498937/1	Balance
8.	**REAL PROPERTY APPLICATION / CROWN GRANT NUMBERS**	
	No real property application or grant information	
9.	**ORIGINATING INSTRUMENTS**	
	Instrument Type:	**Request Electronic Title Conversion**
	Registration Number:	**1215366/1**
	Registration Date:	1989-10-12
	From/By:	WLTO SURVEY OFFICE
	To:	
	Amount:	
10.	**LAND INDEX**	
	Lot 49 Plan 24342	

CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA STORAGE SYSTEM OF TITLE NUMBER 1129021/1

STATUS OF TITLE

Title Number	**1129036/1**
Title Status	**Accepted**
Client File	221-07203-00

1. REGISTERED OWNERS, TENANCY AND LAND DESCRIPTION

IMPERIAL OIL LIMITED

IS REGISTERED OWNER SUBJECT TO SUCH ENTRIES RECORDED HEREON, IN THE FOLLOWING DESCRIBED LAND:

SP LOT 58 PLAN 24342 WLTO
IN E 1/2 14-11-2 EPM

The land in this title is, unless the contrary is expressly declared, deemed to be subject to the reservations and restrictions set out in section 58 of *The Real Property Act.*

2. ACTIVE INSTRUMENTS

Instrument Type:	**Caveat**
Registration Number:	**229519/1**
Instrument Status:	**Accepted**
Registration Date:	1974-02-12
From/By:	MANITOBA HYDRO ELECTRIC BOARD/MANITOBA TELEPHONE SYSTEM
To:	
Amount:	
Notes:	No notes
Description:	No description

Instrument Type:	**Caveat**
Registration Number:	**1233270/1**
Instrument Status:	**Accepted**
Registration Date:	1989-11-27
From/By:	THE CITY OF WINNIPEG
To:	
Amount:	
Notes:	No notes
Description:	No description

3. ADDRESSES FOR SERVICE

IMPERIAL OIL LIMITED
1661 PORTAGE AVE
WPG. MB
R3J 3T7

4. TITLE NOTES

No title notes

5. LAND TITLES DISTRICT

Winnipeg

6. DUPLICATE TITLE INFORMATION

Duplicate Produced for: HOLD FOR PRODUCTION OF TITLE 1017440

7. FROM TITLE NUMBERS

1017440/1 All

8. REAL PROPERTY APPLICATION / CROWN GRANT NUMBERS

No real property application or grant information

9. ORIGINATING INSTRUMENTS

Instrument Type:	**Request Electronic Title Conversion**
Registration Number:	**1215386/1**
Registration Date:	1989-10-12
From/By:	WLTO SURVEY OFFICE
To:	
Amount:	

10. LAND INDEX

Lot 58 Plan 24342

CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA STORAGE SYSTEM OF TITLE NUMBER 1129036/1

STATUS OF TITLE

Title Number	**2860307/1**
Title Status	**Accepted**
Client File	221-07203-00

Manitoba Land Titles Registry

1. REGISTERED OWNERS, TENANCY AND LAND DESCRIPTION

7380586 MANITOBA LTD.

IS REGISTERED OWNER SUBJECT TO SUCH ENTRIES RECORDED
HEREON IN THE FOLLOWING DESCRIBED LAND:

SP LOTS 61 AND 62 PLAN 24342 WLTO
EXCEPT OUT OF SAID LOT 62 ALL MINES AND MINERALS VESTED IN THE
CROWN (MANITOBA) BY THE REAL PROPERTY ACT
IN E 1/2 14-11-2 EPM

The land in this title is, unless the contrary is expressly declared, deemed to be subject to the reservations and restrictions set out in section 58 of *The Real Property Act.*

2. ACTIVE INSTRUMENTS

Instrument Type:	**Caveat**
Registration Number:	**81-17181/1**
Instrument Status:	**Accepted**
Registration Date:	1981-03-16
From/By:	MANITOBA HYDRO ELECTRIC BOARD/MANITOBA TELEPHONE SYSTEM
To:	
Amount:	
Notes:	AFFECTS: PART LOT 61
Description:	No description

Instrument Type:	**Mortgage**
Registration Number:	**4761605/1**
Instrument Status:	**Accepted**
Registration Date:	2016-09-06
From/By:	7380586 MANITOBA LTD.
To:	SUNOVA CREDIT UNION LIMITED
Amount:	$4,000,000.00
Notes:	No notes
Description:	No description

3. ADDRESSES FOR SERVICE

7380586 MANITOBA LTD.
35 BIBEAUDEL PLACE
WINNIPEG MB
R3V 1V1

4. TITLE NOTES

No title notes

5. LAND TITLES DISTRICT

Winnipeg

6. DUPLICATE TITLE INFORMATION

Duplicate not produced

7. FROM TITLE NUMBERS

2146815/1 All

8. REAL PROPERTY APPLICATION / CROWN GRANT NUMBERS

No real property application or grant information

9. ORIGINATING INSTRUMENTS

Instrument Type:	**Transfer Of Land**
Registration Number:	**4761604/1**
Registration Date:	2016-09-06
From/By:	BERGNER EQUIPMENT RENTALS LTD.
To:	7380586 MANITOBA LTD.
Consideration:	$1,510,500.00

10. LAND INDEX

Lot 61 Plan 24342

Lot 62 Plan 24342
EX ALL M & M

CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA STORAGE SYSTEM OF TITLE NUMBER 2860307/1

STATUS OF TITLE

Title Number	**3038514/1**
Title Status	**Accepted**
Client File	221-07203-00

Manitoba Land Titles Registry

1. REGISTERED OWNERS, TENANCY AND LAND DESCRIPTION

JOHN ERIK ALBRECHTSEN, RODNEY BRENT CORBETT, DONNA ELAINE HILL, RONALD STANLEY ADE AND SCOTT ALBRECHTSEN
AS EXECUTORS UNDER THE LAST WILL OF PAUL ERIK ALBRECHTSEN

ARE REGISTERED OWNERS SUBJECT TO SUCH ENTRIES RECORDED HEREON IN THE FOLLOWING DESCRIBED LAND:

PARCEL 7 PLAN 9218 WLTO
EXC FIRSTLY: NELY 47 FEET PERP
SECONDLY: PLAN 21937 WLTO
THIRDLY: PLAN 23406 WLTO AND
FOURTHLY: ALL MINES AND MINERALS
IN W 1/2 OF SE 1/4 23-11-2 EPM

The land in this title is, unless the contrary is expressly declared, deemed to be subject to the reservations and restrictions set out in section 58 of *The Real Property Act.*

2. ACTIVE INSTRUMENTS

Instrument Type:	**Caveat**
Registration Number:	**1042112/1**
Instrument Status:	**Accepted**
Registration Date:	1988-07-13
From/By:	MAN. HYDRO ELECTRIC BOARD/MAN. TELEPHONE SYSTEM
To:	
Amount:	
Notes:	PART
Description:	No description

Instrument Type:	**Caveat**
Registration Number:	**1871296/1**
Instrument Status:	**Accepted**
Registration Date:	1994-12-16
From/By:	THE MANITOBA TELEPHONE SYSTEM
To:	
Amount:	
Notes:	WTN LTS R/W PLAN 31786
Description:	EASEMENT

Instrument Type:	**Easement**
Registration Number:	**5301544/1**
Instrument Status:	**Accepted**
Registration Date:	2021-06-03
From/By:	Paul Erik Albrechtsen
To:	The Manitoba Hydro-Electric Board & Shaw Cablesystems
Amount:	
Notes:	No notes
Description:	Statutory Easmement

Instrument Type:	**Easement**
Registration Number:	**5301545/1**
Instrument Status:	**Accepted**
Registration Date:	2021-06-03
From/By:	Paul Erik Albrechtsen
To:	Centra Gas Manitoba Inc.
Amount:	
Notes:	No notes
Description:	Statutory Easement

3. ADDRESSES FOR SERVICE

JOHN ERIK ALBRECHTSEN, EXECUTOR
102-1015 Wilkes Avenue
Winnipeg MB
R3P 2R8

RODNEY BRENT CORBETT, EXECUTOR
102-1015 Wilkes Avenue
Winnipeg MB
R3P 2R8

DONNA ELAINE HILL, EXECUTOR
102-1015 Wilkes Avenue
Winnipeg MB
R3P 2R8

RONALD STANLEY ADE, EXECUTOR
102-1015 Wilkes Avenue
Winnipeg MB
R3P 2R8

SCOTT ALBRECHTSEN, EXECUTOR
102-1015 Wilkes Avenue
Winnipeg MB
R3P 2R8

4. TITLE NOTES

No title notes

5. LAND TITLES DISTRICT

Winnipeg

6. DUPLICATE TITLE INFORMATION

Duplicate not produced

7. FROM TITLE NUMBERS

1953333/1 All

8. REAL PROPERTY APPLICATION / CROWN GRANT NUMBERS

No real property application or grant information

9. ORIGINATING INSTRUMENTS

Instrument Type:	**Transmission Of Land**
Registration Number:	**5135679/1**
Registration Date:	2019-12-09
From/By:	Estate of Paul Erik Albrechtsen
To:	John Albrechtsen, Rodney Corbett et al. as executors
Amount:	

10. LAND INDEX

Lot 7 Plan 9218
W1/2 SE 23-11-2E, EX NELY 47'P, EX PL 21937, 23406, RES

CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA STORAGE SYSTEM OF TITLE NUMBER 3038514/1

STATUS OF TITLE

Title Number	**3214490/1**
Title Status	**Accepted**
Client File	221-07203-00

Manitoba Land Titles Registry

1. REGISTERED OWNERS, TENANCY AND LAND DESCRIPTION

MIRACLE PROPERTY DEVELOPERS LTD.

IS REGISTERED OWNER SUBJECT TO SUCH ENTRIES RECORDED HEREON IN THE FOLLOWING DESCRIBED LAND:

SP LOTS 52, 56 AND 57 PLAN 24342 WLTO
SAID LOT 56 BEING SUBJECT TO THE RESERVATIONS RESPECTING MINES,
MINERALS, MINERAL OILS AND OTHER MATTERS AS THE SAME ARE MORE FULLY
SET FORTH IN TRANSFER 740533 WLTO
IN E 1/2 14-11-2 EPM

The land in this title is, unless the contrary is expressly declared, deemed to be subject to the reservations and restrictions set out in section 58 of *The Real Property Act.*

2. ACTIVE INSTRUMENTS

Instrument Type:	**Mortgage**
Registration Number:	**5481578/1**
Instrument Status:	**Accepted**
Registration Date:	2022-10-20
From/By:	MIRACLE PROPERTY DEVELOPERS LTD.
To:	ASSINIBOINE CREDIT UNION LIMITED
Amount:	$3,718,000.00
Notes:	No notes
Description:	No description

3. ADDRESSES FOR SERVICE

MIRACLE PROPERTY DEVELOPERS LTD.
23 HERMAN AVENUE
WINNIPEG MB
R2R 1L8

4. TITLE NOTES

No title notes

5. LAND TITLES DISTRICT

Winnipeg

6. DUPLICATE TITLE INFORMATION

Duplicate not produced

7. FROM TITLE NUMBERS

3206847/1 All

8. REAL PROPERTY APPLICATION / CROWN GRANT NUMBERS

No real property application or grant information

9. ORIGINATING INSTRUMENTS

Instrument Type:	**Transfer Of Land**
Registration Number:	**5481577/1**
Registration Date:	2022-10-20
From/By:	10134152 MANITOBA INC.
To:	MIRACLE PROPERTY DEVELOPERS LTD.
Consideration:	$5,720,000.00

10. LAND INDEX

Lot 52 Plan 24342

Lot 56 Plan 24342
EX RES

Lot 57 Plan 24342

CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA STORAGE SYSTEM OF TITLE NUMBER 3214490/1

APPENDIX

D AERIAL PHOTOGRAPHS

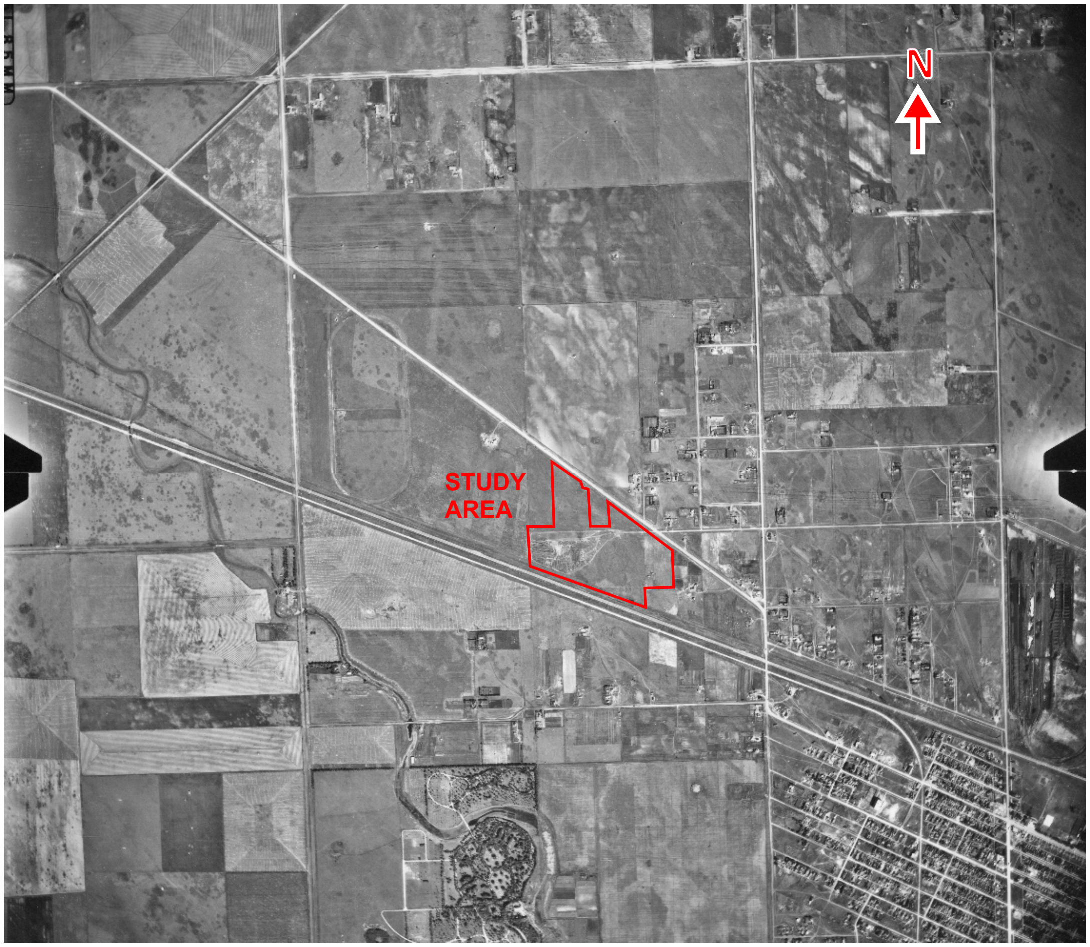


Photo 1. 1948 Aerial Photograph

wsp	Date: 1948	Client: City of Winnipeg
	Obtained from: Canada Map Sales	Location: Oak Point Highway, Winnipeg, Manitoba
	Project No.: 221-07203-00	

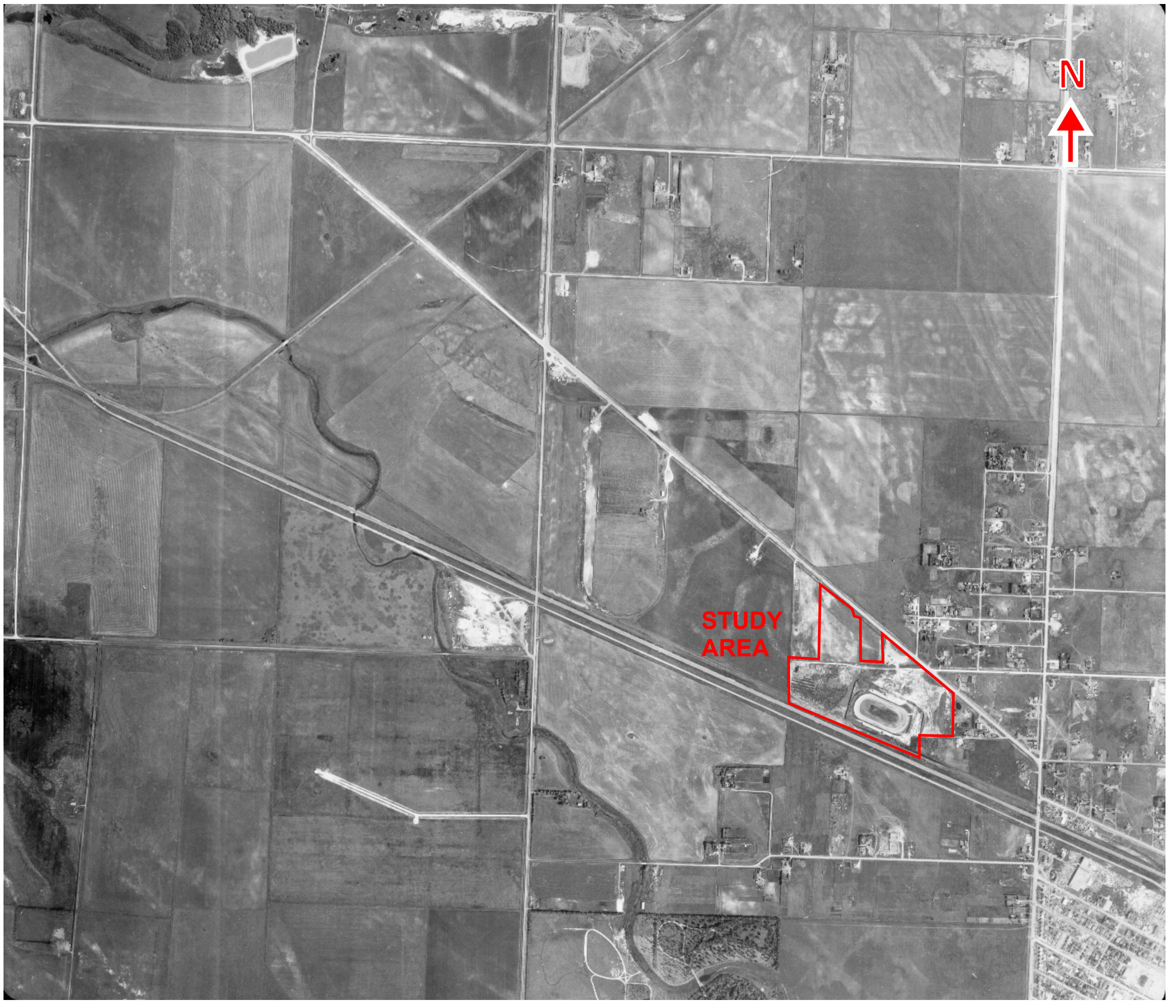


Photo 2. 1959 Aerial Photograph

wsp	Date: 1959	Client: City of Winnipeg
	Obtained from: Canada Map Sales	Location: Oak Point Highway, Winnipeg, Manitoba
	Project No.: 221-07203-00	

Photo 3. 1968 Aerial Photograph

wsp	Date: 1968	Client: City of Winnipeg
	Obtained from: Canada Map Sales	Location: Oak Point Highway, Winnipeg, Manitoba
	Project No.: 221-07203-00	

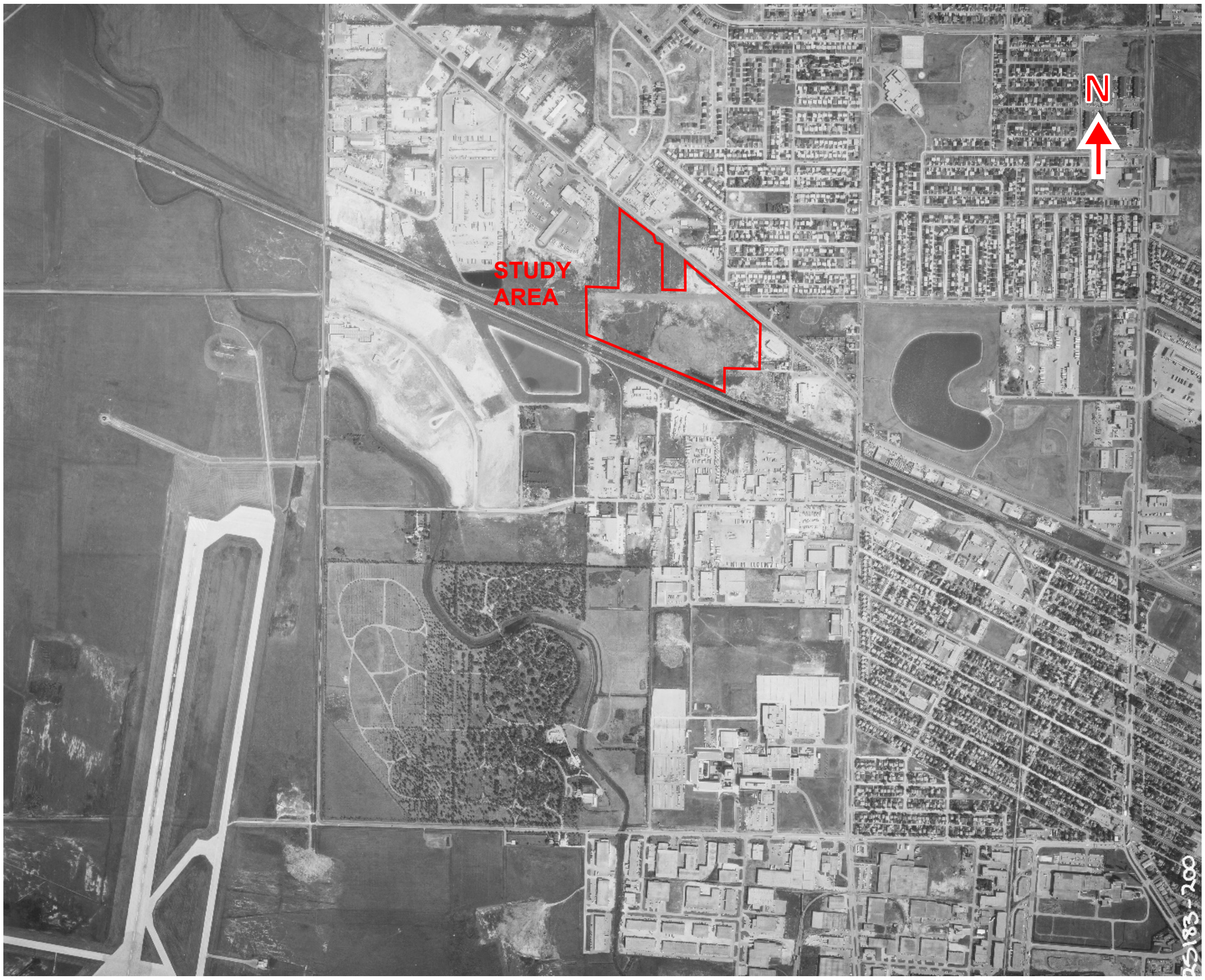


Photo 4. 1979 Aerial Photograph

	Date: 1979	Client: City of Winnipeg
	Obtained from: Canada Map Sales	Location: Oak Point Highway, Winnipeg, Manitoba
	Project No.: 221-07203-00	

Photo 5. 1988 Aerial Photograph

wsp	Date: 1988	Client: City of Winnipeg
	Obtained from: Canada Map Sales	Location: Oak Point Highway, Winnipeg, Manitoba
	Project No.: 221-07203-00	

APPENDIX

E

SUPPORTING DOCUMENTS

APPENDIX

E-1 ERIS ECOLOG SEARCH RESULTS

ERIS

DATABASE REPORT

Project Property:	*North Garage Oak Point Hwy* *North Garage Oak Point Hwy* *Winnipeg MB*
Project No:	*221-07203-00*
Report Type:	*Quote - Custom-Build Your Own Report*
Order No:	*22102800061*
Requested by:	*WSP Canada Inc.*
Date Completed:	*November 1, 2022*

Environmental Risk Information Services
A division of Glacier Media Inc.
1.866.517.5204 | info@erisinfo.com | erisinfo.com

Table of Contents

Executive Summary

Property Information:

Project Property:	*North Garage Oak Point Hwy* *North Garage Oak Point Hwy Winnipeg MB*
Project No:	*221-07203-00*

Order Information:

Order No:	*22102800061*
Date Requested:	*October 28, 2022*
Requested by:	*WSP Canada Inc.*
Report Type:	*Quote - Custom-Build Your Own Report*

Historical/Products:

City Directory Search	*CD - Subject Site*
ERIS Xplorer	*ERIS Xplorer*

Executive Summary: Report Summary

Database	Name	Searched	Project Property	Boundary to 0.25km	Total
AUWR	Automobile Wrecking & Supplies	Y	0	0	0
CA	Certificates of Approval	Y	0	4	4
CDRY	Dry Cleaning Facilities	Y	0	0	0
CHEM	Chemical Manufacturers	N	-	-	-
CHM	Chemical Register	N	-	-	-
CNG	Compressed Natural Gas Stations	N	-	-	-
CONV	Enforcement Actions	Y	0	0	0
CS	Contaminated/Impacted Sites	Y	1	14	15
DRL	Drill Holes	N	-	-	-
EEM	Environmental Effects Monitoring	N	-	-	-
EHS	ERIS Historical Searches	Y	1	13	14
EIIS	Environmental Issues Inventory System	Y	0	0	0
FCON	Federal Convictions	N	-	-	-
FCS	Contaminated Sites on Federal Land	Y	0	0	0
FRST	Federal Identification Registry for Storage Tank Systems (FIRSTS)	Y	0	0	0
FST	Fuel Storage Tanks	Y	1	8	9
FUEL	Bulk Fuel Distributors	Y	1	9	10
GEN	Waste Generators Summary	Y	3	95	98
GHG	Greenhouse Gas Emissions from Large Facilities	N	-	-	-
IAFT	Indian & Northern Affairs Fuel Tanks	N	-	-	-
MAST	Manure Storage Facilities	N	-	-	-
MINE	Canadian Mine Locations	N	-	-	-
MNR	Mineral Occurrences	N	-	-	-
MOGW	Manitoba Oil and Gas Wells	N	-	-	-
NATE	National Analysis of Trends in Emergencies System (NATES)	N	-	-	-
NDFT	National Defense & Canadian Forces Fuel Tanks	N	-	-	-
NDSP	National Defense & Canadian Forces Spills	N	-	-	-
NDWD	National Defence & Canadian Forces Waste Disposal Sites	N	-	-	-
NEBI	National Energy Board Pipeline Incidents	N	-	-	-
NEBP	National Energy Board Wells	N	-	-	-
NEES	National Environmental Emergencies System (NEES)	N	-	-	-
NPCB	National PCB Inventory	Y	0	0	0
NPRI	National Pollutant Release Inventory	N	-	-	-
OGWW	Oil and Gas Wells	N	-	-	-
PAP	Canadian Pulp and Paper	N	-	-	-
PCB	Inventory of PCB Storage Sites	Y	0	0	0

Database	Name	Searched	Project Property	Boundary to 0.25km	Total
PCFT	***Parks Canada Fuel Storage Tanks***	*N*	-	-	-
PITS	***Manitoba Pits and Quarries***	*N*	-	-	-
PR	***Sustainable Development Public Registry***	*Y*	*0*	*3*	*3*
REC	***Waste Receivers Summary***	*Y*	*0*	*6*	*6*
RST	***Retail Fuel Storage Tanks***	*Y*	*3*	*2*	*5*
SCT	***Scott's Manufacturing Directory***	*N*	-	-	-
SPL	***Manitoba Spills***	*Y*	*0*	*1*	*1*
SWS	***Solid Waste Sites***	*Y*	*0*	*0*	*0*
TCFT	***Transport Canada Fuel Storage Tanks***	*Y*	*0*	*0*	*0*
WDS	***Waste Disposal Site Inventory***	*Y*	*0*	*0*	*0*
WWIS	***Water Well Inventory***	*Y*	*0*	*2*	*2*
		Total:	*10*	*157*	*167*

Executive Summary: Site Report Summary - Project Property

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev diff (m)	Page Number
1	GEN	OAKPOINT ESSO	OAK POINT HWY., 100 WINNIPEG MB R2R 1T8	E/0.0	0.00	41
1	RST	ESSO (IMPERIAL OIL)	100 OAK POINT HWY WINNIPEG MB R2R 1T8	E/0.0	0.00	41
1	FST	Oak Point Esso	100 Oak Point Hwy. Winnipeg MB R2R 1T8	E/0.0	0.00	41
1	GEN	OAK POINT ESSO	100 OAK POINT HWY Winnipeg MB R2R 1T8	E/0.0	0.00	41
1	FUEL	OAK POINT ESSO CARDLOCK	100 OAK POINT HWY Winnipeg MB R2R 1T8	E/0.0	0.00	41
1	RST	OAKPOINT ESSO	100 OAK POINT HWY WINNIPEG MB R2R 1T8	E/0.0	0.00	42
1	RST	OAKPOINT ESSO	100 OAK POINT HWY WINNIPEG MB R2R1T8	E/0.0	0.00	42
1	EHS		100 Oak Point Highway Winnipeg MB	E/0.0	0.00	42

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev diff (m)	Page Number
1	GEN	OAK POINT ESSO	100 OAK POINT HWY Winnipeg MB	E/0.0	0.00	42
1	CS	IMPERIAL OIL RETAIL AND CARDLOCK	100 OAK POINT HIGHWAY Winnipeg MB	E/0.0	0.00	42

Executive Summary: Site Report Summary - Surrounding Properties

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev Diff (m)	Page Number
2	GEN	SUPERIOR FINISHES	200 OAKPOINT HWY Winnipeg MB R2R 1V1	N/33.9	0.00	43
2	GEN	SUPERIOR FINISHES	200 OAK POINT HWY Winnipeg MB	N/33.9	0.00	43
3	GEN	PAUL'S HAULING	250 OAK POINT HWY Winnipeg MB	NW/48.1	1.00	43
3	FUEL	PAUL'S HAULING LTD	Winnipeg MB	NW/48.1	1.00	43
4	GEN	BENNETT'S TRUCK & TRAILER REPAIRS LTD.	OAK POINT HWY., 70 WINNIPEG MB R2R 1T6	ESE/52.6	0.00	43
4	RST	BENNETT'S POWER DIESEL ADDITIVES	70 OAK POINT HWY WINNIPEG MB R2R 1T6	ESE/52.6	0.00	43
4	FST	Bennetts Truck & Trailer Rep.	70 Oak Point Hwy. Winnipeg MB R2R 1T6	ESE/52.6	0.00	43
4	GEN	BENNETT'S TRUCK & TRAILER REPAIRS	70 OAK POINT HWY Winnipeg MB R2R 1T6	ESE/52.6	0.00	44
4	FUEL	CITY WIDE TRUCK & TRAILER REPAIRS	70 OAK POINT HWY Winnipeg MB R2R 1T6	ESE/52.6	0.00	44
4	CS	CITY WIDE TRUCK & TRAILER REPAIRS LTD	70 OAK POINT HWY Winnipeg MB	ESE/52.6	0.00	44
4	GEN	BENNETT'S TRUCK & TRAILER REPAIRS	70 OAK POINT HWY Winnipeg MB	ESE/52.6	0.00	44
4	EHS		70 Oak Point Hwy Winnipeg MB R2R 1T6	ESE/52.6	0.00	44

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev Diff (m)	Page Number
4	EHS		70 Oak Point Hwy Winnipeg MB R2R 1T6	ESE/52.6	0.00	45
5	EHS		Hyde Avenue Winnipeg MB	ESE/73.7	0.00	45
6	GEN	CUSTOM RADIATOR SERVICE	155 OAK POINT HWY Winnipeg MB R2R 1T7	N/73.9	0.00	45
6	GEN	CUSTOM RADIATOR SERVICE	155 OAK POINT HWY Winnipeg MB	N/73.9	0.00	45
7	GEN	RYAN FOREST PRODUCTS	165 RYAN ST Winnipeg MB R2R 0N9	S/79.0	-1.00	45
7	GEN	RYAN FOREST PRODUCTS	165 RYAN ST Winnipeg MB	S/79.0	-1.00	45
8	GEN	MACDONALD TRUCK COLLISION	OAK POINT HWY., 201 WINNIPEG MB R2R 1T7	NNW/88.2	0.00	46
8	GEN	BOBCAT OF CENTRAL MANITOBA	201 OAK POINT HWY Winnipeg MB R2R 1T7	NNW/88.2	0.00	46
8	FUEL	KYNSH CONSTRUCTION	201 OAK POINT HWY Winnipeg MB R2R 1T7	NNW/88.2	0.00	46
8	FUEL	KNYSH CONSTRUCTION	201 Oak Point Hwy Winnipeg MB R2R 1T7	NNW/88.2	0.00	46
8	GEN	BOBCAT OF CENTRAL MANITOBA	201 Oak Point Hwy Winnipeg MB	NNW/88.2	0.00	46
8	GEN	DURON EQUIPMENT - WINNIPEG	201 OAK POINT HWY Winnipeg MB	NNW/88.2	0.00	46
8	CS	KNYSH CONSTRUCTION LTD	201 OAK POINT HWY Winnipeg MB	NNW/88.2	0.00	46

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev Diff (m)	Page Number
9	GEN	LONE STAR HARLEY-DAVIDSON	OAK POINT HWY., 231 WINNIPEG MB R2R 1T7	NNW/88.3	1.00	47
9	GEN	RENTWAY TRUCK LEASING	OAKPOINT HWY., 231 WINNIPEG MB	NNW/88.3	1.00	47
9	GEN	RENTWAY TRUCK LEASING	231 OAKPOINT HWY Winnipeg MB R2R 1T7	NNW/88.3	1.00	47
9	GEN	LONE STAR HARLEY DAVIDSON	231 OAK POINT HWY Winnipeg MB R2R 1T7	NNW/88.3	1.00	47
9	GEN	RENTWAY TRUCK LEASING	231 OAK POINT HWY Winnipeg MB	NNW/88.3	1.00	47
9	GEN	LONE STAR HARLEY DAVIDSON	231 OAK POINT HWY Winnipeg MB	NNW/88.3	1.00	47
10	GEN	CANADIAN AUCTION GROUP - WINNIPEG	OAKPOINT RD., 199 WINNIPEG MB	N/92.7	0.00	47
10	GEN	CANADIAN AUCTION GROUP-WINNIPEG	OAK POINT RD., 199 WINNIPEG MB R2R 1T7	N/92.7	0.00	48
10	GEN	MID CANADA TRUCK COLLISION	OAK POINT HWY., 199 WINNIPEG MB R2R 1T7	N/92.7	0.00	48
10	CS	T N T CANADA	199 OAK POINT HWY WINNIPEG MB R2R 1T7	N/92.7	0.00	48
10	FST	Mid-Canada Truck Collision	199 Oak Point Hwy. Winnipeg MB R2R 1T7	N/92.7	0.00	48
10	GEN	CANADIAN AUCTION GROUP-WINNIPEG	OAK POINT HWY., 199 WINNIPEG MB R2R 1T7	N/92.7	0.00	48
10	GEN	CANADIAN AUCTION GROUP	199 OAK POINT HWY Winnipeg MB R2R 1T7	N/92.7	0.00	49

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev Diff (m)	Page Number
10	CS	MID CANADA TRUCK COLLISION & RECYCLING (FORMER)	199 OAK POINT HWY Winnipeg MB	N/92.7	0.00	49
11	FUEL	PAUL'S HAULING	250 OAK POINT HWY Winnipeg MB R2R 1V1	WNW/93.1	1.00	49
11	FUEL	NORTHLAND PETROLEUM LTD	250 Oak Point Hwy Winnipeg MB R2R 1V1	WNW/93.1	1.00	49
11	FUEL	PAUL'S HAULING - 250 OAK POINT HWY - PSF	250 OAK POINT HWY Winnipeg MB R2R 1V1	WNW/93.1	1.00	49
11	EHS		250 Oak Point Hwy Winnipeg MB R2R 1V1	WNW/93.1	1.00	49
12	GEN	JV AUTO SALES LTD.	OAK POINT RD., 149 WINNIPEG MB R2R 1T7	NE/94.5	0.00	49
12	CS	TRANSLEASE	149 OAK POINT HWY WINNIPEG MB R2R 1T7	NE/94.5	0.00	50
12	FST	JV Auto Sales Ltd.	149 Oak Point Hwy. Winnipeg MB R2R 1T7	NE/94.5	0.00	50
12	GEN	J V AUTO SALES	149 OAK POINT HWY Winnipeg MB R2R 1T7	NE/94.5	0.00	50
12	CS	TRANSLEASE (FORMER)	149 OAK POINT HWY Winnipeg MB	NE/94.5	0.00	50
12	GEN	J V AUTO SALES	149 OAK POINT HWY Winnipeg MB	NE/94.5	0.00	50
13	FST	Kwikasair Express Ltd.	180 Ryan St. Winnipeg MB R2R 0P1	SSW/99.7	0.00	51
13	GEN	FLYWHEEL TRUCK AND TRAILER SERVICES LTD	180 RYAN ST Winnipeg MB	SSW/99.7	0.00	51

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev Diff (m)	Page Number
14	GEN	BIG RIG COLLISION (2) INC.	OAK POINT RD., 237-A WINNIPEG MB R2R 1T7	NNW/118.2	1.00	51
14	FST	Scotty's Truck Wash	237 Oak Point Rd. Winnipeg MB R2R 1T7	NNW/118.2	1.00	51
14	GEN	EBD Enterprises	237 Oak Point Hwy Winnipeg MB R2R 1T7	NNW/118.2	1.00	52
14	GEN	E B D ENTERPRISES	237 OAK POINT HWY Winnipeg MB	NNW/118.2	1.00	52
15	EHS		195 Oak Point Hwy Winnipeg MB R2R1T7	N/120.3	0.00	52
16	RST	OAK POINT HUSKY	71 OAK POINT HWY WINNIPEG MB R2R 0T8	E/137.4	1.00	52
16	GEN	OAK POINT HUSKY	OAK POINT HWY, #71 WINNIPEG MB R2R 0T8	E/137.4	1.00	52
16	FST	Oak Point Husky	71 Oak Point Hwy. Winnipeg MB R2R 0T8	E/137.4	1.00	52
16	GEN	OAK POINT HUSKY	71 OAK POINT HWY Winnipeg MB R2R 0T8	E/137.4	1.00	53
16	FUEL	OAK POINT HUSKY	71 OAK POINT HWY Winnipeg MB R2R 0T8	E/137.4	1.00	53
16	CS	OAK POINT HUSKY	71 OAK POINT HWY Winnipeg MB	E/137.4	1.00	53
16	GEN	OAK POINT HUSKY	71 OAK POINT HWY Winnipeg MB	E/137.4	1.00	53
17	EHS		250 Oak Point Hwy Winnipeg MB R2R 1V1	WNW/142.3	1.00	53

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev Diff (m)	Page Number
17	EHS		250 Oak Point Hwy Winnipeg MB R2R 1V1	WNW/142.3	1.00	53
18	GEN	WEIDMANN AUTO BODY & PAINTING LTD.	OAK POINT HWY., 261 WINNIPEG MB R2R 1T9	NNW/146.7	1.00	54
18	GEN	WEIDMANN AUTO BODY & PAINTING	261 OAK POINT HWY Winnipeg MB R2R 1T9	NNW/146.7	1.00	54
18	GEN	VICTOR MARTCHENKO USED CAR DEALER	4-261 OAK POINT HWY Winnipeg MB R2R 1T9	NNW/146.7	1.00	54
18	GEN	VICTOR MARTCHENKO USED CAR DEALER	4-261 OAK POINT HWY Winnipeg MB	NNW/146.7	1.00	54
18	GEN	WEIDMANN AUTO BODY & PAINTING	261 OAK POINT HWY Winnipeg MB	NNW/146.7	1.00	54
19	GEN	BREADNER TRAILER SALES WINNIPEG LIMITED	KING EDWARD ST., 1870 WINNIPEG MB	ESE/157.2	1.00	54
19	GEN	CUSTOM TRUCK SALES MANITOBA LTD.	KING EDWARD ST., 1870 WINNIPEG MB	ESE/157.2	1.00	55
19	GEN	FLEET BRAKE TRUCK TRAILER PARTS	1870 KING EDWARD ST Winnipeg MB R2R 0Z9	ESE/157.2	1.00	55
19	GEN	FLEET BRAKE TRUCK TRAILER PARTS & SERVICE	1870 KING EDWARD ST Winnipeg MB	ESE/157.2	1.00	55
19	GEN	FAST FLEET SOLUTIONS LTD	1870 KING EDWARD ST Winnipeg MB	ESE/157.2	1.00	55
20	WWIS	CADORATH PLATING	MB ***Well PID:*** 106762	SE/157.8	-1.00	55
20	WWIS	CADORATH PLATING	MB	SE/157.8	-1.00	55

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev Diff (m)	Page Number
			Well PID: 37008			
21	GEN	OAK POINT SERVICE	OAK POINT RD., 272 WINNIPEG MB R2R 1V1	NW/161.4	1.00	56
21	FST	Oak Point Service	272 Oak Point Hwy. Winnipeg MB R2R 1V1	NW/161.4	1.00	56
21	GEN	OAK POINT SERVICE	272 OAK POINT HWY Winnipeg MB R2R 1V1	NW/161.4	1.00	56
21	REC	Oak Point Service	272 Oak Point Rd Winnipeg MB R2R 1V1	NW/161.4	1.00	57
21	FUEL	OAK POINT SERVICE	272 OAK POINT HWY Winnipeg MB R2R 1V1	NW/161.4	1.00	57
21	CA	Paul's Hauling (Oak Point Service	272 Oak Point Rd Winnipeg MB R2R 1V1	NW/161.4	1.00	57
21	CS	OAK POINT SERVICE	272 OAK POINT HWY Winnipeg MB	NW/161.4	1.00	57
21	GEN	OAK POINT SERVICE	272 OAK POINT HWY Winnipeg MB	NW/161.4	1.00	57
22	GEN	FAVOURITE REFRIGERATION	OAK POINT HWY., 251 WINNIPEG MB R2R 1T9	NNW/163.4	1.00	57
22	GEN	HI-PERFORMANCE TRUCK REPAIR	OAK POINT HWY., 251 UNIT B WINNIPEG MB R2R 1T9	NNW/163.4	1.00	58
22	GEN	HI-PERFORMANCE TRUCK REPAIR	B-251 OAK POINT HWY Winnipeg MB R2R 1T9	NNW/163.4	1.00	58
22	GEN	HI-TECH REEFER SERVICE	A-251 OAK POINT HWY Winnipeg MB R2R 1T9	NNW/163.4	1.00	58
22	GEN	WINNIPEG TRUCK & TRAILER SERVICE LTD	B-251 OAK POINT HWY Winnipeg MB R2R 1T9	NNW/163.4	1.00	58

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev Diff (m)	Page Number
22	SPL		251 Oak Point Hwy WINNIPEG MB R2R 1T9	NNW/163.4	1.00	58
22	GEN	WINNIPEG TRUCK & TRAILER SERVICE LTD	B-251 OAK POINT HWY Winnipeg MB	NNW/163.4	1.00	59
22	GEN	CENTREPORT TRUCK & TRAILER SERVICES INC	251 OAK POINT HWY Winnipeg MB	NNW/163.4	1.00	59
23	GEN	S K F TRUCK & TRAILER REPAIR	271 OAK POINT HWY Winnipeg MB R2R 1T9	NNW/219.0	1.00	59
23	GEN	SELBY TRUCK SERVICE LTD	271 OAK POINT HWY Winnipeg MB R2R 1T9	NNW/219.0	1.00	59
23	GEN	S K F TRUCK & TRAILER REPAIR	271 OAK POINT HWY Winnipeg MB	NNW/219.0	1.00	59
23	GEN	SELBY TRUCK SERVICE LTD	271 OAK POINT HWY Winnipeg MB	NNW/219.0	1.00	59
24	GEN	TRANSPORT INTERNATIONAL POOL	OAK POINT HWY., 277 WINNIPEG, MB MB R2R 1T9	NW/225.8	1.00	59
24	GEN	TRANSPORT INTERNATIONAL POOL	277 OAK POINT HWY Winnipeg MB R2R 1T9	NW/225.8	1.00	60
24	GEN	TRAILER WIZARDS	277 OAK POINT HWY Winnipeg MB R2R 1T9	NW/225.8	1.00	60
25	GEN	TRAILMOBILE CANADA	LOGAN AVE., 2095 WINNIPEG MB	SSE/234.4	-1.00	60
25	GEN	TRAILMOBILE CANADA	2095 LOGAN AVE Winnipeg MB R2R 0J1	SSE/234.4	-1.00	60
26	GEN	DOMAR TRANSMISSION	LOGAN AVE., 2073 UNIT 8 WINNIPEG MB R2R 0J1	SE/234.8	0.00	60

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev Diff (m)	Page Number
26	GEN	DOMAR TRANSMISSION	8-2073 LOGAN AVE Winnipeg MB R2R 0J1	SE/234.8	0.00	60
26	GEN	CONQUEST EQUIPMENT CORPORATION	1-2073 LOGAN AVE Winnipeg MB R2R 0J1	SE/234.8	0.00	61
26	REC	Battery Direct of Manitoba Inc.	3 - 2073 Logan Ave. Winnipeg MB R2R 0J1	SE/234.8	0.00	61
26	EHS		2073 Logan Avenue Winnipeg MB R2R 0J1	SE/234.8	0.00	61
26	REC	Battery Direct of Manitoba Inc.	#3 ¿ 2073 Logan Ave Winnipeg MB R2R 0J1	SE/234.8	0.00	61
26	EHS		2073 Logan Avenue Winnipeg MB R2R 0J1	SE/234.8	0.00	62
26	CA	Battery Direct of Manitoba Inc.	3-2073 Logan Avenue Winnipeg MB R2R 0J1	SE/234.8	0.00	62
26	GEN	WINNIPEG BATTERY DIRECT	3-2073 Logan Ave Winnipeg MB	SE/234.8	0.00	62
26	GEN	CONQUEST EQUIPMENT CORPORATION	1-2073 LOGAN AVE Winnipeg MB	SE/234.8	0.00	62
26	GEN	DOMAR TRANSMISSION	8-2073 LOGAN AVE Winnipeg MB	SE/234.8	0.00	62
26	GEN	AVIALL WINNIPEG CSC	9-2073 LOGAN AVE Winnipeg MB	SE/234.8	0.00	62
26	PR	Waste Lead Acid Battery Transfer Facility	#3 2073 Logan Avenue Winnipeg MB	SE/234.8	0.00	63
27	GEN	GARDEWINE & SONS LTD.	OAK POINT RD., 300 WINNIPEG MB R2R 1V1	NW/235.3	1.00	63

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev Diff (m)	Page Number
27	GEN	TCT CANADA	OAK POINT HWY., 300 WINNIPEG MB R2R 1V1	NW/235.3	1.00	63
27	GEN	AUDLEY CARTAGE	OAK POINT HWY., 300 WINNIPEG MB R2R 1V1	NW/235.3	1.00	63
27	GEN	T C T CANADA	300 OAK POINT HWY Winnipeg MB R2R 1V1	NW/235.3	1.00	63
27	GEN	AUDLEY CARTAGE	300 OAK POINT HWY Winnipeg MB R2R 1V1	NW/235.3	1.00	63
27	GEN	T C T CANADA	300 OAK POINT HWY Winnipeg MB	NW/235.3	1.00	64
28	GEN	CALMONT TRUCK RENTALS AND LEASING	LOGAN AVE., 2091 WINNIPEG MB	SSE/237.6	-1.00	64
28	CS	SUNRISE DISTRIBUTORS LTD	2091 LOGAN AVE WINNIPEG MB R2R 0J1	SSE/237.6	-1.00	64
28	FST	Calmont Truck Rentals	2091 Logan Ave. Winnipeg MB R2R 0J1	SSE/237.6	-1.00	64
28	GEN	CALMONT TRUCK RENTALS AND LEASING	2091 LOGAN AVE Winnipeg MB R2R 0J1	SSE/237.6	-1.00	65
28	CS	CALMONT TRUCK RENTALS	2091 LOGAN AVE Winnipeg MB	SSE/237.6	-1.00	65
28	EHS		2091 Logan Ave Winnipeg MB R2R 0J1	SSE/237.6	-1.00	65
28	GEN	CALMONT TRUCK RENTALS & LEASING	2091 LOGAN AVE Winnipeg MB	SSE/237.6	-1.00	65
29	CA	NORTHWEST SMELTING & REFINING - 2185 LOGAN	Winnipeg MB R2R 0J3	SSW/240.1	-1.00	65

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev Diff (m)	Page Number
29	REC	North-West Smelting and Refining Ltd.	2185 Logan Avenue Winnipeg MB R2R 0J3	SSW/240.1	-1.00	65
29	GEN	NORTH-WEST SMELTING & REFINING LTD.	LOGAN AVE., 2185 WINNIPEG MB	SSW/240.1	-1.00	66
29	CS	NORTH-WEST SMELTING & REFINING LTD	2185 LOGAN AVE WINNIPEG MB R2R 0J3	SSW/240.1	-1.00	66
29	CS	NORTH - WEST SMELTING	2185 LOGAN AVE Winnipeg MB	SSW/240.1	-1.00	66
29	CA	NORTHWEST SMELTING & REFINING - 2185 LOGAN	Winnipeg MB	SSW/240.1	-1.00	66
29	EHS		2185 Logan Ave Winnipeg MB R2R 0J3	SSW/240.1	-1.00	66
29	GEN	NORTH WEST SMELTING & REFINING	2185 LOGAN AVE Winnipeg MB R2R 0J3	SSW/240.1	-1.00	66
29	GEN	NORTH WEST SMELTING & REFINING	2185 LOGAN AVE Winnipeg MB	SSW/240.1	-1.00	67
29	PR	Non-ferrous metal smelting and refining plant	2185 Logan Avenue Winnipeg MB	SSW/240.1	-1.00	67
30	GEN	IPEX INC.	LOGAN AVE., 2081 WINNIPEG MB	SE/241.7	-1.00	67
30	GEN	IPEX	2081 LOGAN AVE Winnipeg MB R2R 0J1	SE/241.7	-1.00	67
30	GEN	IPEX INC	2081 LOGAN AVE Winnipeg MB	SE/241.7	-1.00	67
31	GEN	SHARPIE'S TRUCK & AUTO REPAIR	B-2201 LOGAN AVE Winnipeg MB R2R 0J3	SW/241.7	0.00	68

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev Diff (m)	Page Number
31	GEN	T & T TRUCKING LTD	2-2201 LOGAN AV Winnipeg MB R2R 0J3	SW/241.7	0.00	68
31	GEN	JANSSEN EQUIPMENT REPAIR	2201 LOGAN AVE Winnipeg MB	SW/241.7	0.00	68
32	GEN	MW TRANSPORT	LOGAN AVE., 2065-UNIT #2 WINNIPEG MB	ESE/243.8	0.00	68
32	CS	COLLIERS PRATT MCGARRY	2061 TO 2065 LOGAN AVE WINNIPEG MB	ESE/243.8	0.00	68
32	GEN	M W TRANSPORT	2-2065 LOGAN AVE Winnipeg MB R2R 0J1	ESE/243.8	0.00	68
32	CS	LOGAN PLACE INDUSTRIAL MALL	2061 TO 2065 LOGAN AVE Winnipeg MB	ESE/243.8	0.00	68
32	EHS		2065 Logan Avenue Winnipeg MB r2r 0j1	ESE/243.8	0.00	69
33	EHS		277 Oak Point Highway Winnipeg MB R2R 1T9	NW/244.1	1.00	69
34	GEN	VOLVO MANITOBA TRUCK CENTRE	OAK POINT HWY., 33 WINNIPEG MB R2R 0T8	E/245.6	1.00	69
34	GEN	VOLVO MANITOBA TRUCK CENTRE	33 OAK POINT HWY Winnipeg MB R2R 0T8	E/245.6	1.00	69
34	GEN	BEAVER TRUCK CENTRE	33 OAK POINT HWY Winnipeg MB R2R 0T8	E/245.6	1.00	69
34	REC	BEAVER TRUCK CENTRE	33 OAK POINT HWY Winnipeg MB R2R 0T8	E/245.6	1.00	70
34	GEN	BEAVER TRUCK CENTRE	33 OAK POINT HWY Winnipeg MB	E/245.6	1.00	70

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev Diff (m)	Page Number
34	REC	Used Oil Burner Facility, City of Winnipeg	33 Oak Point Highway Winnipeg MB	E/245.6	1.00	70
34	PR	Used Oil Burner Facility, City of Winnipeg	33 Oak Point Hwy. Winnipeg MB	E/245.6	1.00	70

Executive Summary: Summary By Data Source

CA - Certificates of Approval

A search of the CA database, dated 1988-Jun 2013* has found that there are 4 CA site(s) within approximately 0.25 kilometers of the project property.

Site	Address	Distance (m)	Map Key
Paul's Hauling (Oak Point Service	272 Oak Point Rd Winnipeg MB R2R 1V1	161.4	21
Battery Direct of Manitoba Inc.	3-2073 Logan Avenue Winnipeg MB R2R 0J1	234.8	26
NORTHWEST SMELTING & REFINING - 2185 LOGAN	Winnipeg MB	240.1	29
NORTHWEST SMELTING & REFINING - 2185 LOGAN	Winnipeg MB R2R 0J3	240.1	29

CS - Contaminated/Impacted Sites

A search of the CS database, dated Up to Mar 2021 has found that there are 15 CS site(s) within approximately 0.25 kilometers of the project property.

Site	Address	Distance (m)	Map Key
IMPERIAL OIL RETAIL AND CARDLOCK	100 OAK POINT HIGHWAY Winnipeg MB	0.0	1
CITY WIDE TRUCK & TRAILER REPAIRS LTD	70 OAK POINT HWY Winnipeg MB	52.6	4
KNYSH CONSTRUCTION LTD	201 OAK POINT HWY Winnipeg MB	88.2	8
T N T CANADA	199 OAK POINT HWY WINNIPEG MB R2R 1T7	92.7	10

Site	Address	Distance (m)	Map Key
MID CANADA TRUCK COLLISION & RECYCLING (FORMER)	199 OAK POINT HWY Winnipeg MB	92.7	10
TRANSLEASE (FORMER)	149 OAK POINT HWY Winnipeg MB	94.5	12
TRANSLEASE	149 OAK POINT HWY WINNIPEG MB R2R 1T7	94.5	12
OAK POINT HUSKY	71 OAK POINT HWY Winnipeg MB	137.4	16
OAK POINT SERVICE	272 OAK POINT HWY Winnipeg MB	161.4	21
CALMONT TRUCK RENTALS	2091 LOGAN AVE Winnipeg MB	237.6	28
SUNRISE DISTRIBUTORS LTD	2091 LOGAN AVE WINNIPEG MB R2R 0J1	237.6	28
NORTH - WEST SMELTING	2185 LOGAN AVE Winnipeg MB	240.1	29
NORTH-WEST SMELTING & REFINING LTD	2185 LOGAN AVE WINNIPEG MB R2R 0J3	240.1	29
LOGAN PLACE INDUSTRIAL MALL	2061 TO 2065 LOGAN AVE Winnipeg MB	243.8	32
COLLIERS PRATT MCGARRY	2061 TO 2065 LOGAN AVE WINNIPEG MB	243.8	32

EHS - ERIS Historical Searches

A search of the EHS database, dated 1999-Jul 31, 2022 has found that there are 14 EHS site(s) within approximately 0.25 kilometers of the project property.

Site	Address	Distance (m)	Map Key
	100 Oak Point Highway Winnipeg MB	0.0	1
	70 Oak Point Hwy Winnipeg MB R2R 1T6	52.6	4
	70 Oak Point Hwy Winnipeg MB R2R 1T6	52.6	4
	Hyde Avenue Winnipeg MB	73.7	5
	250 Oak Point Hwy Winnipeg MB R2R 1V1	93.1	11
	195 Oak Point Hwy Winnipeg MB R2R1T7	120.3	15
	250 Oak Point Hwy Winnipeg MB R2R 1V1	142.3	17
	250 Oak Point Hwy Winnipeg MB R2R 1V1	142.3	17
	2073 Logan Avenue Winnipeg MB R2R 0J1	234.8	26
	2073 Logan Avenue Winnipeg MB R2R 0J1	234.8	26
	2091 Logan Ave Winnipeg MB R2R 0J1	237.6	28

Site	Address	Distance (m)	Map Key
	2185 Logan Ave Winnipeg MB R2R 0J3	240.1	29
	2065 Logan Avenue Winnipeg MB r2r 0j1	243.8	32
	277 Oak Point Highway Winnipeg MB R2R 1T9	244.1	33

FST - Fuel Storage Tanks

A search of the FST database, dated 1905-Feb 2003* has found that there are 9 FST site(s) within approximately 0.25 kilometers of the project property.

Site	Address	Distance (m)	Map Key
Oak Point Esso	100 Oak Point Hwy. Winnipeg MB R2R 1T8	0.0	1
Bennetts Truck & Trailer Rep.	70 Oak Point Hwy. Winnipeg MB R2R 1T6	52.6	4
Mid-Canada Truck Collision	199 Oak Point Hwy. Winnipeg MB R2R 1T7	92.7	10
JV Auto Sales Ltd.	149 Oak Point Hwy. Winnipeg MB R2R 1T7	94.5	12
Kwikasair Express Ltd.	180 Ryan St. Winnipeg MB R2R 0P1	99.7	13
Scotty's Truck Wash	237 Oak Point Rd. Winnipeg MB R2R 1T7	118.2	14

Site	Address	Distance (m)	Map Key
Oak Point Husky	71 Oak Point Hwy. Winnipeg MB R2R 0T8	137.4	16
Oak Point Service	272 Oak Point Hwy. Winnipeg MB R2R 1V1	161.4	21
Calmont Truck Rentals	2091 Logan Ave. Winnipeg MB R2R 0J1	237.6	28

FUEL - Bulk Fuel Distributors

A search of the FUEL database, dated 2006 - Jul 2022 has found that there are 10 FUEL site(s) within approximately 0.25 kilometers of the project property.

Site	Address	Distance (m)	Map Key
OAK POINT ESSO CARDLOCK	100 OAK POINT HWY Winnipeg MB R2R 1T8	0.0	1
PAUL'S HAULING LTD	Winnipeg MB	48.1	3
CITY WIDE TRUCK & TRAILER REPAIRS	70 OAK POINT HWY Winnipeg MB R2R 1T6	52.6	4
KNYSH CONSTRUCTION	201 Oak Point Hwy Winnipeg MB R2R 1T7	88.2	8
KYNSH CONSTRUCTION	201 OAK POINT HWY Winnipeg MB R2R 1T7	88.2	8
PAUL'S HAULING	250 OAK POINT HWY Winnipeg MB R2R 1V1	93.1	11
PAUL'S HAULING - 250 OAK POINT HWY - PSF	250 OAK POINT HWY Winnipeg MB R2R 1V1	93.1	11

Site	Address	Distance (m)	Map Key
NORTHLAND PETROLEUM LTD	250 Oak Point Hwy Winnipeg MB R2R 1V1	93.1	11
OAK POINT HUSKY	71 OAK POINT HWY Winnipeg MB R2R 0T8	137.4	16
OAK POINT SERVICE	272 OAK POINT HWY Winnipeg MB R2R 1V1	161.4	21

GEN - Waste Generators Summary

A search of the GEN database, dated 1998 - Mar 2022 has found that there are 98 GEN site(s) within approximately 0.25 kilometers of the project property.

Site	Address	Distance (m)	Map Key
OAKPOINT ESSO	OAK POINT HWY., 100 WINNIPEG MB R2R 1T8	0.0	1
OAK POINT ESSO	100 OAK POINT HWY Winnipeg MB R2R 1T8	0.0	1
OAK POINT ESSO	100 OAK POINT HWY Winnipeg MB	0.0	1
SUPERIOR FINISHES	200 OAKPOINT HWY Winnipeg MB R2R 1V1	33.9	2
SUPERIOR FINISHES	200 OAK POINT HWY Winnipeg MB	33.9	2
PAUL'S HAULING	250 OAK POINT HWY Winnipeg MB	48.1	3

Site	Address	Distance (m)	Map Key
BENNETT'S TRUCK & TRAILER REPAIRS LTD.	OAK POINT HWY., 70 WINNIPEG MB R2R 1T6	52.6	4
BENNETT'S TRUCK & TRAILER REPAIRS	70 OAK POINT HWY Winnipeg MB R2R 1T6	52.6	4
BENNETT'S TRUCK & TRAILER REPAIRS	70 OAK POINT HWY Winnipeg MB	52.6	4
CUSTOM RADIATOR SERVICE	155 OAK POINT HWY Winnipeg MB R2R 1T7	73.9	6
CUSTOM RADIATOR SERVICE	155 OAK POINT HWY Winnipeg MB	73.9	6
RYAN FOREST PRODUCTS	165 RYAN ST Winnipeg MB R2R 0N9	79.0	7
RYAN FOREST PRODUCTS	165 RYAN ST Winnipeg MB	79.0	7
MACDONALD TRUCK COLLISION	OAK POINT HWY., 201 WINNIPEG MB R2R 1T7	88.2	8
BOBCAT OF CENTRAL MANITOBA	201 OAK POINT HWY Winnipeg MB R2R 1T7	88.2	8
BOBCAT OF CENTRAL MANITOBA	201 Oak Point Hwy Winnipeg MB	88.2	8
DURON EQUIPMENT - WINNIPEG	201 OAK POINT HWY Winnipeg MB	88.2	8
LONE STAR HARLEY-DAVIDSON	OAK POINT HWY., 231 WINNIPEG MB R2R 1T7	88.3	9

Site	Address	Distance (m)	Map Key
RENTWAY TRUCK LEASING	OAKPOINT HWY., 231 WINNIPEG MB	88.3	9
RENTWAY TRUCK LEASING	231 OAKPOINT HWY Winnipeg MB R2R 1T7	88.3	9
LONE STAR HARLEY DAVIDSON	231 OAK POINT HWY Winnipeg MB R2R 1T7	88.3	9
RENTWAY TRUCK LEASING	231 OAK POINT HWY Winnipeg MB	88.3	9
LONE STAR HARLEY DAVIDSON	231 OAK POINT HWY Winnipeg MB	88.3	9
CANADIAN AUCTION GROUP - WINNIPEG	OAKPOINT RD., 199 WINNIPEG MB	92.7	10
CANADIAN AUCTION GROUP-WINNIPEG	OAK POINT RD., 199 WINNIPEG MB R2R 1T7	92.7	10
MID CANADA TRUCK COLLISION	OAK POINT HWY., 199 WINNIPEG MB R2R 1T7	92.7	10
CANADIAN AUCTION GROUP-WINNIPEG	OAK POINT HWY., 199 WINNIPEG MB R2R 1T7	92.7	10
CANADIAN AUCTION GROUP	199 OAK POINT HWY Winnipeg MB R2R 1T7	92.7	10
JV AUTO SALES LTD.	OAK POINT RD., 149 WINNIPEG MB R2R 1T7	94.5	12

Site	Address	Distance (m)	Map Key
J V AUTO SALES	149 OAK POINT HWY Winnipeg MB R2R 1T7	94.5	12
J V AUTO SALES	149 OAK POINT HWY Winnipeg MB	94.5	12
FLYWHEEL TRUCK AND TRAILER SERVICES LTD	180 RYAN ST Winnipeg MB	99.7	13
BIG RIG COLLISION (2) INC.	OAK POINT RD., 237-A WINNIPEG MB R2R 1T7	118.2	14
EBD Enterprises	237 Oak Point Hwy Winnipeg MB R2R 1T7	118.2	14
E B D ENTERPRISES	237 OAK POINT HWY Winnipeg MB	118.2	14
OAK POINT HUSKY	OAK POINT HWY, #71 WINNIPEG MB R2R 0T8	137.4	16
OAK POINT HUSKY	71 OAK POINT HWY Winnipeg MB R2R 0T8	137.4	16
OAK POINT HUSKY	71 OAK POINT HWY Winnipeg MB	137.4	16
WEIDMANN AUTO BODY & PAINTING LTD.	OAK POINT HWY., 261 WINNIPEG MB R2R 1T9	146.7	18
WEIDMANN AUTO BODY & PAINTING	261 OAK POINT HWY Winnipeg MB R2R 1T9	146.7	18
VICTOR MARTCHENKO USED CAR DEALER	4-261 OAK POINT HWY Winnipeg MB R2R 1T9	146.7	18

Site	Address	Distance (m)	Map Key
VICTOR MARTCHENKO USED CAR DEALER	4-261 OAK POINT HWY Winnipeg MB	146.7	18
WEIDMANN AUTO BODY & PAINTING	261 OAK POINT HWY Winnipeg MB	146.7	18
BREADNER TRAILER SALES WINNIPEG LIMITED	KING EDWARD ST., 1870 WINNIPEG MB	157.2	19
CUSTOM TRUCK SALES MANITOBA LTD.	KING EDWARD ST., 1870 WINNIPEG MB	157.2	19
FLEET BRAKE TRUCK TRAILER PARTS	1870 KING EDWARD ST Winnipeg MB R2R 0Z9	157.2	19
FLEET BRAKE TRUCK TRAILER PARTS & SERVICE	1870 KING EDWARD ST Winnipeg MB	157.2	19
FAST FLEET SOLUTIONS LTD	1870 KING EDWARD ST Winnipeg MB	157.2	19
OAK POINT SERVICE	OAK POINT RD., 272 WINNIPEG MB R2R 1V1	161.4	21
OAK POINT SERVICE	272 OAK POINT HWY Winnipeg MB R2R 1V1	161.4	21
OAK POINT SERVICE	272 OAK POINT HWY Winnipeg MB	161.4	21
FAVOURITE REFRIGERATION	OAK POINT HWY., 251 WINNIPEG MB R2R 1T9	163.4	22

Site	Address	Distance (m)	Map Key
HI-PERFORMANCE TRUCK REPAIR	OAK POINT HWY., 251 UNIT B WINNIPEG MB R2R 1T9	163.4	22
HI-PERFORMANCE TRUCK REPAIR	B-251 OAK POINT HWY Winnipeg MB R2R 1T9	163.4	22
HI-TECH REEFER SERVICE	A-251 OAK POINT HWY Winnipeg MB R2R 1T9	163.4	22
WINNIPEG TRUCK & TRAILER SERVICE LTD	B-251 OAK POINT HWY Winnipeg MB R2R 1T9	163.4	22
WINNIPEG TRUCK & TRAILER SERVICE LTD	B-251 OAK POINT HWY Winnipeg MB	163.4	22
CENTREPORT TRUCK & TRAILER SERVICES INC	251 OAK POINT HWY Winnipeg MB	163.4	22
S K F TRUCK & TRAILER REPAIR	271 OAK POINT HWY Winnipeg MB R2R 1T9	219.0	23
SELBY TRUCK SERVICE LTD	271 OAK POINT HWY Winnipeg MB R2R 1T9	219.0	23
S K F TRUCK & TRAILER REPAIR	271 OAK POINT HWY Winnipeg MB	219.0	23
SELBY TRUCK SERVICE LTD	271 OAK POINT HWY Winnipeg MB	219.0	23
TRANSPORT INTERNATIONAL POOL	OAK POINT HWY., 277 WINNIPEG, MB MB R2R 1T9	225.8	24
TRANSPORT INTERNATIONAL POOL	277 OAK POINT HWY Winnipeg MB R2R 1T9	225.8	24

Site	Address	Distance (m)	Map Key
TRAILER WIZARDS	277 OAK POINT HWY Winnipeg MB R2R 1T9	225.8	24
TRAILMOBILE CANADA	LOGAN AVE., 2095 WINNIPEG MB	234.4	25
TRAILMOBILE CANADA	2095 LOGAN AVE Winnipeg MB R2R 0J1	234.4	25
DOMAR TRANSMISSION	LOGAN AVE., 2073 UNIT 8 WINNIPEG MB R2R 0J1	234.8	26
DOMAR TRANSMISSION	8-2073 LOGAN AVE Winnipeg MB R2R 0J1	234.8	26
CONQUEST EQUIPMENT CORPORATION	1-2073 LOGAN AVE Winnipeg MB R2R 0J1	234.8	26
WINNIPEG BATTERY DIRECT	3-2073 Logan Ave Winnipeg MB	234.8	26
CONQUEST EQUIPMENT CORPORATION	1-2073 LOGAN AVE Winnipeg MB	234.8	26
DOMAR TRANSMISSION	8-2073 LOGAN AVE Winnipeg MB	234.8	26
AVIALL WINNIPEG CSC	9-2073 LOGAN AVE Winnipeg MB	234.8	26
GARDEWINE & SONS LTD.	OAK POINT RD., 300 WINNIPEG MB R2R 1V1	235.3	27

Site	Address	Distance (m)	Map Key
TCT CANADA	OAK POINT HWY., 300 WINNIPEG MB R2R 1V1	235.3	27
AUDLEY CARTAGE	OAK POINT HWY., 300 WINNIPEG MB R2R 1V1	235.3	27
T C T CANADA	300 OAK POINT HWY Winnipeg MB R2R 1V1	235.3	27
AUDLEY CARTAGE	300 OAK POINT HWY Winnipeg MB R2R 1V1	235.3	27
T C T CANADA	300 OAK POINT HWY Winnipeg MB	235.3	27
CALMONT TRUCK RENTALS AND LEASING	LOGAN AVE., 2091 WINNIPEG MB	237.6	28
CALMONT TRUCK RENTALS AND LEASING	2091 LOGAN AVE Winnipeg MB R2R 0J1	237.6	28
CALMONT TRUCK RENTALS & LEASING	2091 LOGAN AVE Winnipeg MB	237.6	28
NORTH-WEST SMELTING & REFINING LTD.	LOGAN AVE., 2185 WINNIPEG MB	240.1	29
NORTH WEST SMELTING & REFINING	2185 LOGAN AVE Winnipeg MB R2R 0J3	240.1	29
NORTH WEST SMELTING & REFINING	2185 LOGAN AVE Winnipeg MB	240.1	29
IPEX INC.	LOGAN AVE., 2081 WINNIPEG MB	241.7	30

Site	Address	Distance (m)	Map Key
IPEX	2081 LOGAN AVE Winnipeg MB R2R 0J1	241.7	30
IPEX INC	2081 LOGAN AVE Winnipeg MB	241.7	30
SHARPIE'S TRUCK & AUTO REPAIR	B-2201 LOGAN AVE Winnipeg MB R2R 0J3	241.7	31
T & T TRUCKING LTD	2-2201 LOGAN AV Winnipeg MB R2R 0J3	241.7	31
JANSSEN EQUIPMENT REPAIR	2201 LOGAN AVE Winnipeg MB	241.7	31
MW TRANSPORT	LOGAN AVE., 2065-UNIT #2 WINNIPEG MB	243.8	32
M W TRANSPORT	2-2065 LOGAN AVE Winnipeg MB R2R 0J1	243.8	32
VOLVO MANITOBA TRUCK CENTRE	33 OAK POINT HWY Winnipeg MB R2R 0T8	245.6	34
BEAVER TRUCK CENTRE	33 OAK POINT HWY Winnipeg MB R2R 0T8	245.6	34
BEAVER TRUCK CENTRE	33 OAK POINT HWY Winnipeg MB	245.6	34
VOLVO MANITOBA TRUCK CENTRE	OAK POINT HWY., 33 WINNIPEG MB R2R 0T8	245.6	34

PR - Sustainable Development Public Registry

A search of the PR database, dated Jan 31, 2021 has found that there are 3 PR site(s) within approximately 0.25 kilometers of the project property.

Site	Address	Distance (m)	Map Key
Waste Lead Acid Battery Transfer Facility	#3 2073 Logan Avenue Winnipeg MB	234.8	26
Non-ferrous metal smelting and refining plant	2185 Logan Avenue Winnipeg MB	240.1	29
Used Oil Burner Facility, City of Winnipeg	33 Oak Point Hwy. Winnipeg MB	245.6	34

REC - Waste Receivers Summary

A search of the REC database, dated 1998-Jul 2017 has found that there are 6 REC site(s) within approximately 0.25 kilometers of the project property.

Site	Address	Distance (m)	Map Key
Oak Point Service	272 Oak Point Rd Winnipeg MB R2R 1V1	161.4	21
Battery Direct of Manitoba Inc.	#3 ¿ 2073 Logan Ave Winnipeg MB R2R 0J1	234.8	26
Battery Direct of Manitoba Inc.	3 - 2073 Logan Ave. Winnipeg MB R2R 0J1	234.8	26
North-West Smelting and Refining Ltd.	2185 Logan Avenue Winnipeg MB R2R 0J3	240.1	29
BEAVER TRUCK CENTRE	33 OAK POINT HWY Winnipeg MB R2R 0T8	245.6	34
Used Oil Burner Facility, City of Winnipeg	33 Oak Point Highway Winnipeg MB	245.6	34

Site	Address	Distance (m)	Map Key

RST - Retail Fuel Storage Tanks

A search of the RST database, dated 1999-May 31, 2022 has found that there are 5 RST site(s) within approximately 0.25 kilometers of the project property.

Site	Address	Distance (m)	Map Key
ESSO (IMPERIAL OIL)	100 OAK POINT HWY WINNIPEG MB R2R 1T8	0.0	1
OAKPOINT ESSO	100 OAK POINT HWY WINNIPEG MB R2R1T8	0.0	1
OAKPOINT ESSO	100 OAK POINT HWY WINNIPEG MB R2R 1T8	0.0	1
BENNETT'S POWER DIESEL ADDITIVES	70 OAK POINT HWY WINNIPEG MB R2R 1T6	52.6	4
OAK POINT HUSKY	71 OAK POINT HWY WINNIPEG MB R2R 0T8	137.4	16

SPL - Manitoba Spills

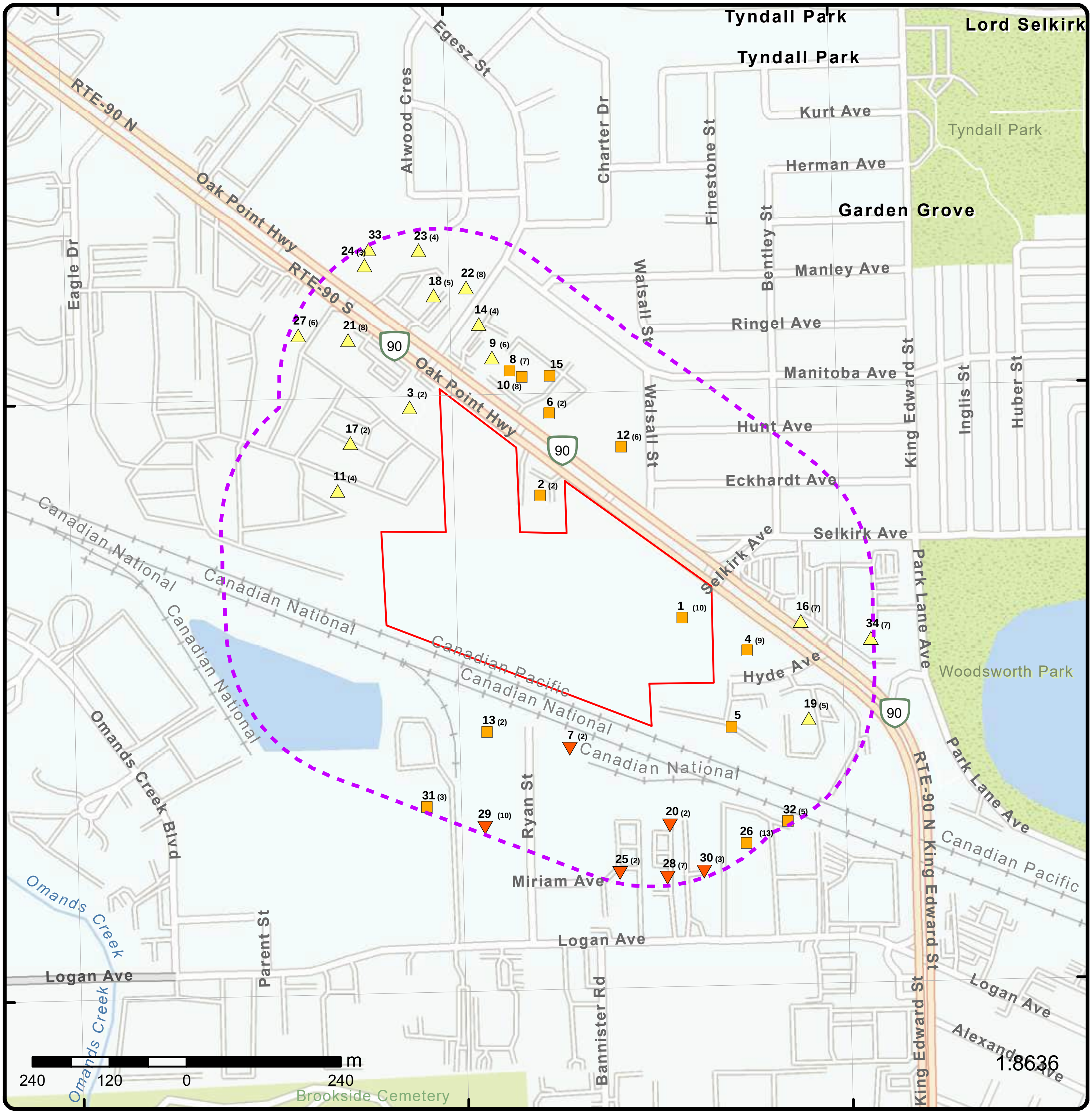
A search of the SPL database, dated Apr 2009-Jun 2022 has found that there are 1 SPL site(s) within approximately 0.25 kilometers of the project property.

Site	Address	Distance (m)	Map Key
	251 Oak Point Hwy WINNIPEG MB R2R 1T9	163.4	22

WWIS - Water Well Inventory

A search of the WWIS database, dated 1880-May 2015 has found that there are 2 WWIS site(s) within approximately 0.25 kilometers of the project property.

Site	Address	Distance (m)	Map Key
CADORATH PLATING	MB ***Well PID:*** 37008	157.8	20
CADORATH PLATING	MB ***Well PID:*** 106762	157.8	20



Map: 0.25 Kilometer Radius

Order Number: 22102800061

Address: North Garage Oak Point Hwy, Winnipeg, MB

ERIS

Project Property	Freeways; Highways	Beach	Shopping & Sports Area
Buffer Outline	Traffic Circle; Ramp	Airport	University/College
Eris Sites with Higher Elevation	Major Arterial; Minor Arterial	Industrial Area	Cemetery; Golf Course
Eris Sites with Same Elevation	Local Road	Military Base	Parkt (National)
Eris Sites with Lower Elevation	Service Road; Traffic Circle; Ramp	Aircraft Roads	Park (City/County)
Eris Sites with Unknown Elevation	Rail	Native Reservation	
		Hospital	

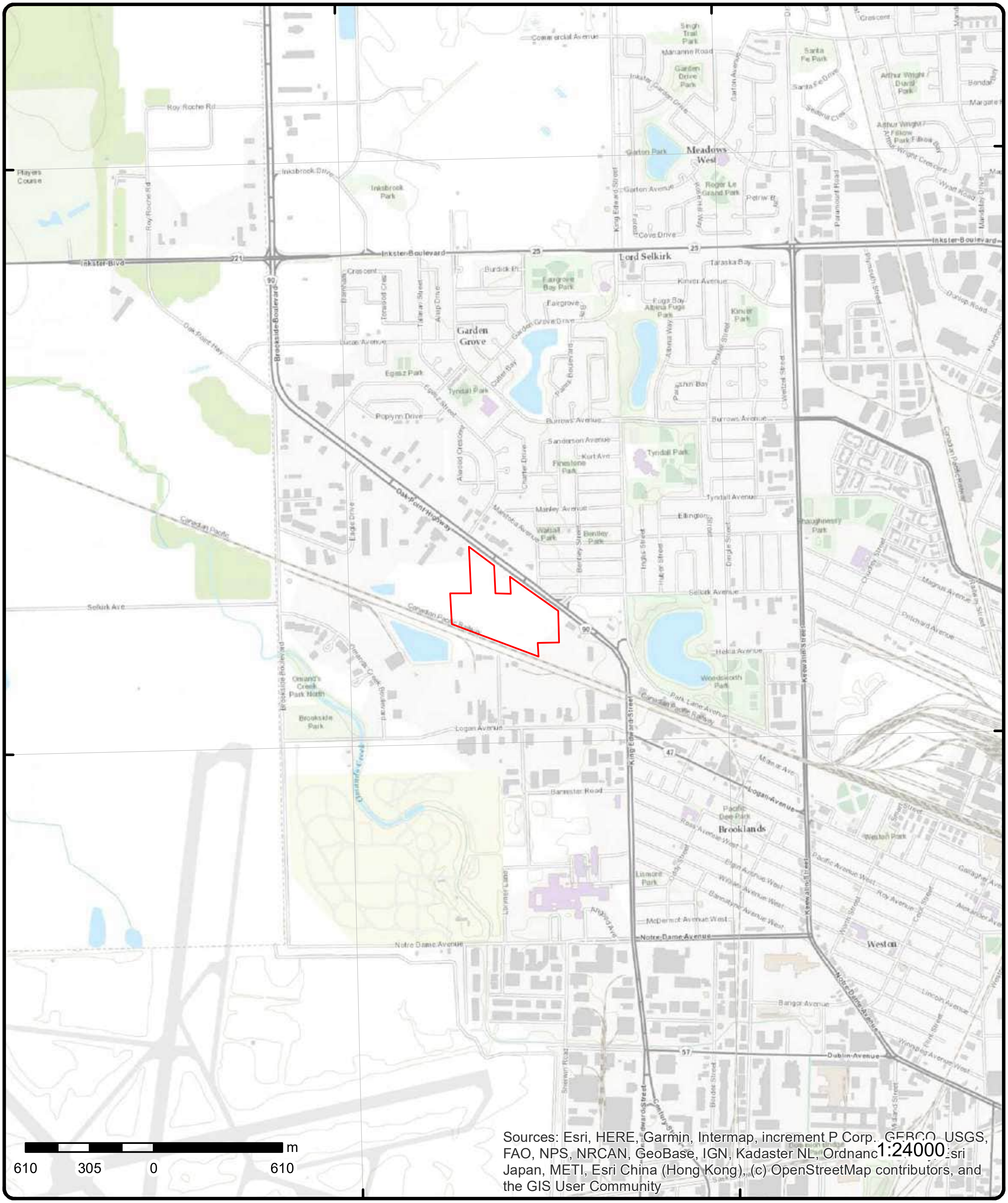
Aerial

Year: 2022

Order Number: 22102800061

Address: North Garage Oak Point Hwy, Winnipeg, MB

Source: ESRI World Imagery



Topographic Map

Order Number: 22102800061

Address: North Garage Oak Point Hwy, MB

Source: ESRI World Topographic Map

Detail Report

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
1	1 of 10	E/0.0	236.4 / 0.00	OAKPOINT ESSO OAK POINT HWY., 100 WINNIPEG MB R2R 1T8	GEN

Registration No: MBG002888
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
1	2 of 10	E/0.0	236.4 / 0.00	ESSO (IMPERIAL OIL) 100 OAK POINT HWY WINNIPEG MB R2R 1T8	RST

Headcode: 1186800
Headcode Desc: Service Stations-Gasoline, Oil & Natural Gas
Phone: 2046944559
List Name:
Description: Gasoline Service Stations

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
1	3 of 10	E/0.0	236.4 / 0.00	Oak Point Esso 100 Oak Point Hwy. Winnipeg MB R2R 1T8	FST

Site ID:	13193	***Owner Category:***	Oil Company
Owner:	Imperial Oil	***Site Status:***	Active
Operator:	Garry Zwarich	***Outlet Type:***	Retail
Mailing City:	Winnipeg MB	***Inventory:***	Daily
Mailing Address:	100 Oak Point Hwy.		

--Details--

Status:	Installed	***NO Of Tanks:***	4
Position:	Underground	***Status Date:***	12-Sep-88
Spill Protect:	Fiberglass	***Capacity(L):***	45460.00
Status:	Installed	***NO Of Tanks:***	1
Position:	Underground	***Status Date:***	12-Sep-88
Spill Protect:	Fiberglass	***Capacity(L):***	9090.00

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
1	4 of 10	E/0.0	236.4 / 0.00	OAK POINT ESSO 100 OAK POINT HWY Winnipeg MB R2R 1T8	GEN

Registration No: MBG02888
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
1	5 of 10	E/0.0	236.4 / 0.00	OAK POINT ESSO CARDLOCK 100 OAK POINT HWY	FUEL

Winnipeg MB R2R 1T8

Permit No: 20883
Type of Facility: U/G
Region:
Expiry Date: 12/31/2010
Office:
Comment: Not storing used oil

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
1	6 of 10	E/0.0	236.4 / 0.00	OAKPOINT ESSO 100 OAK POINT HWY WINNIPEG MB R2R 1T8	RST

Headcode: 01186800
Headcode Desc: SERVICE STATIONS-GASOLINE, OIL & NATURAL GAS
Phone:
List Name:
Description:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
1	7 of 10	E/0.0	236.4 / 0.00	OAKPOINT ESSO 100 OAK POINT HWY WINNIPEG MB R2R1T8	RST

Headcode: 01186800
Headcode Desc: SERVICE STATIONS GASOLINE OIL & NATURAL
Phone: 2046944559
List Name:
Description:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
1	8 of 10	E/0.0	236.4 / 0.00	100 Oak Point Highway Winnipeg MB	EHS

Order No: 20131002062
Status: C
Report Type: Standard Report
Report Date: 11-OCT-13
Date Received: 02-OCT-13
Previous Site Name: Imperial Oil Limited
Lot/Building Size:
Additional Info Ordered: Fire Insur. Maps and/or Site Plans; City Directory
Nearest Intersection:
Municipality:
Client Prov/State: MB
Search Radius (km): .25
X: -97.211848
Y: 49.93015

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
1	9 of 10	E/0.0	236.4 / 0.00	OAK POINT ESSO 100 OAK POINT HWY Winnipeg MB	GEN

Registration No: MBG02888
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
1	10 of 10	E/0.0	236.4 / 0.00	IMPERIAL OIL RETAIL AND CARDLOCK 100 OAK POINT HIGHWAY Winnipeg MB	CS

File No: 73438
File Name:
Site Desig Under the CSRA: LIST OF ALL SITES ON FILE WITH THE CONTAMINATED/IMPACTED SITES PROGRAM; MANITOBA DESIGNATED IMPACTED SITES LIST

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
2	1 of 2	N/33.9	236.4 / 0.00	SUPERIOR FINISHES 200 OAKPOINT HWY Winnipeg MB R2R 1V1	GEN

Registration No: MBG04253
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
2	2 of 2	N/33.9	236.4 / 0.00	SUPERIOR FINISHES 200 OAK POINT HWY Winnipeg MB	GEN

Registration No: MBG04253
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
3	1 of 2	NW/48.1	237.4 / 1.00	PAUL'S HAULING 250 OAK POINT HWY Winnipeg MB	GEN

Registration No: MBG13913
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
3	2 of 2	NW/48.1	237.4 / 1.00	PAUL'S HAULING LTD Winnipeg MB	FUEL

Permit No: 50196
Type of Facility: AST
Region: Red River
Expiry Date:
Office:
Comment:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
4	1 of 9	ESE/52.6	236.4 / 0.00	BENNETT'S TRUCK & TRAILER REPAIRS LTD. OAK POINT HWY., 70 WINNIPEG MB R2R 1T6	GEN

Registration No: MBG002362
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
4	2 of 9	ESE/52.6	236.4 / 0.00	BENNETT'S POWER DIESEL ADDITIVES 70 OAK POINT HWY WINNIPEG MB R2R 1T6	RST

Headcode: 924200
Headcode Desc: Oils-Diesel
Phone: 2046941777
List Name:
Description:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
4	3 of 9	ESE/52.6	236.4 / 0.00	Bennetts Truck & Trailer Rep. 70 Oak Point Hwy. Winnipeg MB R2R 1T6	FST

Site ID: 13701
Owner Category: Independent

Owner:	Bennetts Truck & Trailer Rep.	**Site Status:**	Active
Operator:		**Outlet Type:**	Used Oil
Mailing City:	Winnipeg MB	**Inventory:**	Exempt
Mailing Address:	70 Oak Point Hwy.		

--Details--

Status:	Installed	**NO Of Tanks:**	1
Position:	Underground	**Status Date:**	17-Nov-93
Spill Protect:	Sacrificial Anode	**Capacity(L):**	2500.00

4	4 of 9	ESE/52.6	236.4 / 0.00	BENNETT'S TRUCK & TRAILER REPAIRS 70 OAK POINT HWY Winnipeg MB R2R 1T6	GEN

Registration No:	MBG02362
SIC:	
DLS:	

4	5 of 9	ESE/52.6	236.4 / 0.00	CITY WIDE TRUCK & TRAILER REPAIRS 70 OAK POINT HWY Winnipeg MB R2R 1T6	FUEL

Permit No:	21975	**Expiry Date:**	12/31/2010
Type of Facility:	U/G	**Office:**	
Region:		**Comment:**	Storing used oil

4	6 of 9	ESE/52.6	236.4 / 0.00	CITY WIDE TRUCK & TRAILER REPAIRS LTD 70 OAK POINT HWY Winnipeg MB	CS

File No:	44094
File Name:	
Site Desig Under the CSRA:	LIST OF ALL SITES ON FILE WITH THE CONTAMINATED/IMPACTED SITES PROGRAM

4	7 of 9	ESE/52.6	236.4 / 0.00	BENNETT'S TRUCK & TRAILER REPAIRS 70 OAK POINT HWY Winnipeg MB	GEN

Registration No:	MBG02362
SIC:	
DLS:	

4	8 of 9	ESE/52.6	236.4 / 0.00	70 Oak Point Hwy Winnipeg MB R2R 1T6	EHS

Order No:	20302800437	**Nearest Intersection:**	
Status:	C	**Municipality:**	
Report Type:	Standard Select Report	**Client Prov/State:**	MB
Report Date:	02-NOV-20	**Search Radius (km):**	.25
Date Received:	28-OCT-20	**X:**	-97.2104609
Previous Site Name:		**Y:**	49.9296719
Lot/Building Size:			
Additional Info Ordered:	Fire Insur. Maps and/or Site Plans		

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
4	9 of 9	ESE/52.6	236.4 / 0.00	70 Oak Point Hwy Winnipeg MB R2R 1T6	EHS

Order No:	20302800437	**Nearest Intersection:**	
Status:	C	**Municipality:**	
Report Type:	Standard Select Report	**Client Prov/State:**	MB
Report Date:	02-NOV-20	**Search Radius (km):**	.25
Date Received:	28-OCT-20	**X:**	-97.2104609
Previous Site Name:		**Y:**	49.9296719
Lot/Building Size:			
Additional Info Ordered:	Fire Insur. Maps and/or Site Plans		

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
5	1 of 1	ESE/73.7	236.4 / 0.00	Hyde Avenue Winnipeg MB	EHS

Order No:	20151027114	**Nearest Intersection:**	
Status:	C	**Municipality:**	
Report Type:	Standard Report	**Client Prov/State:**	MB
Report Date:	03-NOV-15	**Search Radius (km):**	.25
Date Received:	27-OCT-15	**X:**	-97.21083
Previous Site Name:		**Y:**	49.92861
Lot/Building Size:			
Additional Info Ordered:			

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
6	1 of 2	N/73.9	236.4 / 0.00	CUSTOM RADIATOR SERVICE 155 OAK POINT HWY Winnipeg MB R2R 1T7	GEN

Registration No: MBG11793
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
6	2 of 2	N/73.9	236.4 / 0.00	CUSTOM RADIATOR SERVICE 155 OAK POINT HWY Winnipeg MB	GEN

Registration No: MBG11793
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
7	1 of 2	S/79.0	235.4 / -1.00	RYAN FOREST PRODUCTS 165 RYAN ST Winnipeg MB R2R 0N9	GEN

Registration No: MBG10874
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
7	2 of 2	S/79.0	235.4 / -1.00	RYAN FOREST PRODUCTS 165 RYAN ST Winnipeg MB	GEN

Registration No: MBG10874
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
8	1 of 7	NNW/88.2	236.4 / 0.00	MACDONALD TRUCK COLLISION OAK POINT HWY., 201 WINNIPEG MB R2R 1T7	GEN

Registration No:	MBG001174
SIC:	
DLS:	

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
8	2 of 7	NNW/88.2	236.4 / 0.00	BOBCAT OF CENTRAL MANITOBA 201 OAK POINT HWY Winnipeg MB R2R 1T7	GEN

Registration No:	MBG10607
SIC:	
DLS:	

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
8	3 of 7	NNW/88.2	236.4 / 0.00	KYNSH CONSTRUCTION 201 OAK POINT HWY Winnipeg MB R2R 1T7	FUEL

Permit No:	28306	Expiry Date:	12/31/2010
Type of Facility:	A/G	Office:	
Region:		Comment:	ULC S653 - 15,000 L tank

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
8	4 of 7	NNW/88.2	236.4 / 0.00	KNYSH CONSTRUCTION 201 Oak Point Hwy Winnipeg MB R2R 1T7	FUEL

Permit No:	24311	Expiry Date:	6/30/2006
Type of Facility:	A/G	Office:	
Region:		Comment:	

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
8	5 of 7	NNW/88.2	236.4 / 0.00	BOBCAT OF CENTRAL MANITOBA 201 Oak Point Hwy Winnipeg MB	GEN

Registration No:	MBG10607
SIC:	
DLS:	

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
8	6 of 7	NNW/88.2	236.4 / 0.00	DURON EQUIPMENT - WINNIPEG 201 OAK POINT HWY Winnipeg MB	GEN

Registration No:	MBG10607
SIC:	
DLS:	

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
8	7 of 7	NNW/88.2	236.4 / 0.00	KNYSH CONSTRUCTION LTD 201 OAK POINT HWY Winnipeg MB	CS

File No:	67217
File Name:	

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB

Site Desig Under the CSRA: LIST OF ALL SITES ON FILE WITH THE CONTAMINATED/IMPACTED SITES PROGRAM

9	1 of 6	NNW/88.3	237.4 / 1.00	LONE STAR HARLEY-DAVIDSON OAK POINT HWY., 231 WINNIPEG MB R2R 1T7	GEN

Registration No: MBG004699
SIC:
DLS:

9	2 of 6	NNW/88.3	237.4 / 1.00	RENTWAY TRUCK LEASING OAKPOINT HWY., 231 WINNIPEG MB	GEN

Registration No: MBG002323
SIC:
DLS:

9	3 of 6	NNW/88.3	237.4 / 1.00	RENTWAY TRUCK LEASING 231 OAKPOINT HWY Winnipeg MB R2R 1T7	GEN

Registration No: MBG02323
SIC:
DLS:

9	4 of 6	NNW/88.3	237.4 / 1.00	LONE STAR HARLEY DAVIDSON 231 OAK POINT HWY Winnipeg MB R2R 1T7	GEN

Registration No: MBG04699
SIC:
DLS:

9	5 of 6	NNW/88.3	237.4 / 1.00	RENTWAY TRUCK LEASING 231 OAK POINT HWY Winnipeg MB	GEN

Registration No: MBG02323
SIC:
DLS:

9	6 of 6	NNW/88.3	237.4 / 1.00	LONE STAR HARLEY DAVIDSON 231 OAK POINT HWY Winnipeg MB	GEN

Registration No: MBG04699
SIC:
DLS:

10	1 of 8	N/92.7	236.4 / 0.00	CANADIAN AUCTION GROUP - WINNIPEG OAKPOINT RD., 199 WINNIPEG MB	GEN

Registration No: MBG004001
SIC:
DLS:

10	2 of 8	N/92.7	236.4 / 0.00	CANADIAN AUCTION GROUP-WINNIPEG OAK POINT RD., 199 WINNIPEG MB R2R 1T7	GEN

Registration No: MBG004113
SIC:
DLS:

10	3 of 8	N/92.7	236.4 / 0.00	MID CANADA TRUCK COLLISION OAK POINT HWY., 199 WINNIPEG MB R2R 1T7	GEN

Registration No: MBG001771
SIC:
DLS:

10	4 of 8	N/92.7	236.4 / 0.00	T N T CANADA 199 OAK POINT HWY WINNIPEG MB R2R 1T7	CS

File No: 0931
File Name: MID CANADA TRUCK COLLISION OAK POINT (FORMER)
Site Desig Under the CSRA:

10	5 of 8	N/92.7	236.4 / 0.00	Mid-Canada Truck Collision 199 Oak Point Hwy. Winnipeg MB R2R 1T7	FST

Site ID: 13964
Owner: Bruce McIvor & Terry Wright
Operator:
Mailing City: Winnipeg MB
Mailing Address: 199 Oak Point Hwy.
Owner Category: Independent
Site Status: Dismantled
Outlet Type: Used Oil
Inventory: NA

--Details--

Status: Installed
Position: Underground
Spill Protect: Unprotected
NO Of Tanks: 1
Status Date: 01-Jan-76
Capacity(L): 9090.00

Status: Removed
Position: Underground
Spill Protect: Unprotected
NO Of Tanks: 1
Status Date: 15-Jul-95
Capacity(L): 9090.00

10	6 of 8	N/92.7	236.4 / 0.00	CANADIAN AUCTION GROUP-WINNIPEG OAK POINT HWY., 199 WINNIPEG MB R2R 1T7	GEN

Registration No: MBG0041J3
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
10	7 of 8	N/92.7	236.4 / 0.00	CANADIAN AUCTION GROUP 199 OAK POINT HWY Winnipeg MB R2R 1T7	GEN

Registration No: MBG04113
SIC:
DLS:

10	8 of 8	N/92.7	236.4 / 0.00	MID CANADA TRUCK COLLISION & RECYCLING (FORMER) 199 OAK POINT HWY Winnipeg MB	CS

File No: 20673
File Name:
Site Desig Under the CSRA: LIST OF ALL SITES ON FILE WITH THE CONTAMINATED/IMPACTED SITES PROGRAM

11	1 of 4	WNW/93.1	237.4 / 1.00	PAUL'S HAULING 250 OAK POINT HWY Winnipeg MB R2R 1V1	FUEL

Permit No: 31840
Type of Facility: A/G
Region:
Expiry Date: 12/31/2010
Office:
Comment: 50,000 Liter Self Contained Tank

11	2 of 4	WNW/93.1	237.4 / 1.00	NORTHLAND PETROLEUM LTD 250 Oak Point Hwy Winnipeg MB R2R 1V1	FUEL

Permit No: 34232
Type of Facility: A/G
Region:
Expiry Date: 12/31/2010
Office:
Comment: 1-75,000 Litre ULC S653 Tank

11	3 of 4	WNW/93.1	237.4 / 1.00	PAUL'S HAULING - 250 OAK POINT HWY - PSF 250 OAK POINT HWY Winnipeg MB R2R 1V1	FUEL

Permit No: 31840
Type of Facility: A/G
Region:
Expiry Date:
Office:
Comment:

11	4 of 4	WNW/93.1	237.4 / 1.00	250 Oak Point Hwy Winnipeg MB R2R 1V1	EHS

Order No: 20181114212
Status: C
Report Type: Standard Select Report
Report Date: 15-NOV-18
Date Received: 14-NOV-18
Previous Site Name:
Lot/Building Size:
Additional Info Ordered:
Nearest Intersection:
Municipality:
Client Prov/State: AB
Search Radius (km): .25
X: -97.219244
Y: 49.93204

12	1 of 6	NE/94.5	236.4 / 0.00	JV AUTO SALES LTD. OAK POINT RD., 149 WINNIPEG MB R2R 1T7	GEN

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB

Registration No: MBG003534
SIC:
DLS:

12	2 of 6	NE/94.5	236.4 / 0.00	TRANSLEASE 149 OAK POINT HWY WINNIPEG MB R2R 1T7	CS

File No: 0054
File Name: TRANSLEASE (FORMER)
Site Desig Under the CSRA:

12	3 of 6	NE/94.5	236.4 / 0.00	JV Auto Sales Ltd. 149 Oak Point Hwy. Winnipeg MB R2R 1T7	FST

Site ID:	12930	**Owner Category:**	Independent
Owner:	JV Auto Sales Ltd.	**Site Status:**	Dismantled
Operator:	Vanderploey, Jack	**Outlet Type:**	Retail
Mailing City:	Winnipeg MB	**Inventory:**	NA
Mailing Address:	149 Oak Point Hwy.		

--Details--

Status:	Installed	**NO Of Tanks:**	1
Position:	Underground	**Status Date:**	01-Jan-70
Spill Protect:	Unprotected	**Capacity(L):**	18180.00
Status:	Installed	**NO Of Tanks:**	2
Position:	Underground	**Status Date:**	01-Jan-70
Spill Protect:	Unprotected	**Capacity(L):**	9090.00
Status:	Removed	**NO Of Tanks:**	1
Position:	Underground	**Status Date:**	29-May-91
Spill Protect:	Unprotected	**Capacity(L):**	18180.00
Status:	Removed	**NO Of Tanks:**	2
Position:	Underground	**Status Date:**	29-May-91
Spill Protect:	Unprotected	**Capacity(L):**	9090.00

12	4 of 6	NE/94.5	236.4 / 0.00	J V AUTO SALES 149 OAK POINT HWY Winnipeg MB R2R 1T7	GEN

Registration No: MBG03534
SIC:
DLS:

12	5 of 6	NE/94.5	236.4 / 0.00	TRANSLEASE (FORMER) 149 OAK POINT HWY Winnipeg MB	CS

File No: 20669
File Name:
Site Desig Under the CSRA: LIST OF ALL SITES ON FILE WITH THE CONTAMINATED/IMPACTED SITES PROGRAM

12	6 of 6	NE/94.5	236.4 / 0.00	J V AUTO SALES 149 OAK POINT HWY	GEN

Winnipeg MB

Registration No: MBG03534
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
13	1 of 2	SSW/99.7	236.4 / 0.00	Kwikasair Express Ltd. 180 Ryan St. Winnipeg MB R2R 0P1	FST

Site ID: 12011
Owner: Kwikasair Express Ltd.
Operator:
Mailing City: Winnipeg MB
Mailing Address: 180 Ryan St.

Owner Category: Independent
Site Status: Dismantled
Outlet Type: Fleet
Inventory: NA

--Details--

Status: Installed
Position: Underground
Spill Protect: Sacrificial Anode
NO Of Tanks: 3
Status Date: 04-Jan-80
Capacity(L): 45460.00

Status: Removed
Position: Underground
Spill Protect: Sacrificial Anode
NO Of Tanks: 3
Status Date: 24-Aug-90
Capacity(L): 45460.00

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
13	2 of 2	SSW/99.7	236.4 / 0.00	FLYWHEEL TRUCK AND TRAILER SERVICES LTD 180 RYAN ST Winnipeg MB	GEN

Registration No: MBG13943
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
14	1 of 4	NNW/118.2	237.4 / 1.00	BIG RIG COLLISION (2) INC. OAK POINT RD., 237-A WINNIPEG MB R2R 1T7	GEN

Registration No: MBG000667
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
14	2 of 4	NNW/118.2	237.4 / 1.00	Scotty's Truck Wash 237 Oak Point Rd. Winnipeg MB R2R 1T7	FST

Site ID: 13651
Owner: Crossroad Oil Ltd.
Operator:
Mailing City: Winnipeg MB
Mailing Address: 237 Oak Point Rd.

Owner Category: Independent
Site Status: Dismantled
Outlet Type: Retail
Inventory: NA

--Details--

Status: Installed
Position: Underground
Spill Protect: Unprotected
NO Of Tanks: 1
Status Date: 01-Jan-75
Capacity(L): 9090.00

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB

Status: Removed
Position: Underground
Spill Protect: Unprotected
NO Of Tanks: 1
Status Date: 28-Apr-86
Capacity(L): 9090.00

14	3 of 4	NNW/118.2	237.4 / 1.00	EBD Enterprises 237 Oak Point Hwy Winnipeg MB R2R 1T7	GEN

Registration No: MBG10017
SIC:
DLS:

14	4 of 4	NNW/118.2	237.4 / 1.00	E B D ENTERPRISES 237 OAK POINT HWY Winnipeg MB	GEN

Registration No: MBG10017
SIC:
DLS:

15	1 of 1	N/120.3	236.4 / 0.00	195 Oak Point Hwy Winnipeg MB R2R1T7	EHS

Order No: 20170213018
Status: C
Report Type: Custom Report
Report Date: 16-FEB-17
Date Received: 13-FEB-17
Previous Site Name:
Lot/Building Size:
Additional Info Ordered:
Nearest Intersection:
Municipality:
Client Prov/State: MB
Search Radius (km): .25
X: -97.214591
Y: 49.933576

16	1 of 7	E/137.4	237.4 / 1.00	OAK POINT HUSKY 71 OAK POINT HWY WINNIPEG MB R2R 0T8	RST

Headcode: 1186800
Headcode Desc: Service Stations-Gasoline, Oil & Natural Gas
Phone: 2046331366
List Name:
Description: Gasoline Service Stations

16	2 of 7	E/137.4	237.4 / 1.00	OAK POINT HUSKY OAK POINT HWY, #71 WINNIPEG MB R2R 0T8	GEN

Registration No: MBG006820
SIC:
DLS:

16	3 of 7	E/137.4	237.4 / 1.00	Oak Point Husky 71 Oak Point Hwy. Winnipeg MB R2R 0T8	FST

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB

Site ID: 13120
Owner: Husky Oil Marketing Co.
Operator: Web, Ken
Mailing City: Winnipeg MB
Mailing Address: 71 Oak Point Hwy.
Owner Category: Oil Company
Site Status: Active
Outlet Type: Retail
Inventory: Daily

16	4 of 7	E/137.4	237.4 / 1.00	OAK POINT HUSKY 71 OAK POINT HWY Winnipeg MB R2R 0T8	GEN

Registration No: MBG06820
SIC:
DLS:

16	5 of 7	E/137.4	237.4 / 1.00	OAK POINT HUSKY 71 OAK POINT HWY Winnipeg MB R2R 0T8	FUEL

Permit No: 20620
Type of Facility: U/G
Region:
Expiry Date: 12/31/2010
Office:
Comment: Not storing used oil

16	6 of 7	E/137.4	237.4 / 1.00	OAK POINT HUSKY 71 OAK POINT HWY Winnipeg MB	CS

File No: 43462
File Name:
Site Desig Under the CSRA: LIST OF ALL SITES ON FILE WITH THE CONTAMINATED/IMPACTED SITES PROGRAM

16	7 of 7	E/137.4	237.4 / 1.00	OAK POINT HUSKY 71 OAK POINT HWY Winnipeg MB	GEN

Registration No: MBG06820
SIC:
DLS:

17	1 of 2	WNW/142.3	237.4 / 1.00	250 Oak Point Hwy Winnipeg MB R2R 1V1	EHS

Order No: 20200213220
Status: C
Report Type: Custom Report
Report Date: 24-FEB-20
Date Received: 13-FEB-20
Previous Site Name:
Lot/Building Size:
Additional Info Ordered: Aerial Photos
Nearest Intersection:
Municipality:
Client Prov/State: IL
Search Radius (km): .25
X: -97.21894765
Y: 49.93270839

17	2 of 2	WNW/142.3	237.4 / 1.00	250 Oak Point Hwy Winnipeg MB R2R 1V1	EHS

Order No: 20200213220
Status: C
Report Type: Custom Report
Nearest Intersection:
Municipality:
Client Prov/State: IL

Report Date: 24-FEB-20
Date Received: 13-FEB-20
Previous Site Name:
Lot/Building Size:
Additional Info Ordered: Aerial Photos
Search Radius (km): .25
X: -97.21894765
Y: 49.93270839

18	*1 of 5*	*NNW/146.7*	*237.4 / 1.00*	***WEIDMANN AUTO BODY & PAINTING LTD.*** ***OAK POINT HWY., 261*** ***WINNIPEG MB R2R 1T9***	GEN

Registration No: MBG002045
SIC:
DLS:

18	*2 of 5*	*NNW/146.7*	*237.4 / 1.00*	***WEIDMANN AUTO BODY & PAINTING*** ***261 OAK POINT HWY*** ***Winnipeg MB R2R 1T9***	GEN

Registration No: MBG02045
SIC:
DLS:

18	*3 of 5*	*NNW/146.7*	*237.4 / 1.00*	***VICTOR MARTCHENKO USED CAR DEALER*** ***4-261 OAK POINT HWY*** ***Winnipeg MB R2R 1T9***	GEN

Registration No: MBG11672
SIC:
DLS:

18	*4 of 5*	*NNW/146.7*	*237.4 / 1.00*	***VICTOR MARTCHENKO USED CAR DEALER*** ***4-261 OAK POINT HWY*** ***Winnipeg MB***	GEN

Registration No: MBG11672
SIC:
DLS:

18	*5 of 5*	*NNW/146.7*	*237.4 / 1.00*	***WEIDMANN AUTO BODY & PAINTING*** ***261 OAK POINT HWY*** ***Winnipeg MB***	GEN

Registration No: MBG02045
SIC:
DLS:

19	*1 of 5*	*ESE/157.2*	*237.4 / 1.00*	***BREADNER TRAILER SALES WINNIPEG LIMITED*** ***KING EDWARD ST., 1870*** ***WINNIPEG MB***	GEN

Registration No: MBG004052
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
19	2 of 5	ESE/157.2	237.4 / 1.00	CUSTOM TRUCK SALES MANITOBA LTD. KING EDWARD ST., 1870 WINNIPEG MB	GEN

Registration No: MBG000347
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
19	3 of 5	ESE/157.2	237.4 / 1.00	FLEET BRAKE TRUCK TRAILER PARTS 1870 KING EDWARD ST Winnipeg MB R2R 0Z9	GEN

Registration No: MBG10947
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
19	4 of 5	ESE/157.2	237.4 / 1.00	FLEET BRAKE TRUCK TRAILER PARTS & SERVICE 1870 KING EDWARD ST Winnipeg MB	GEN

Registration No: MBG10947
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
19	5 of 5	ESE/157.2	237.4 / 1.00	FAST FLEET SOLUTIONS LTD 1870 KING EDWARD ST Winnipeg MB	GEN

Registration No: MBG14771
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
20	1 of 2	SE/157.8	235.4 / -1.00	CADORATH PLATING MB	WWIS

Well PID:	106762	**Well Name:**	
Water Use:	Domestic	**Driller:**	Maple Leaf Enterprises LTd.
Well Use:	PRODUCTION	**Owner:**	
Date Completed:	1998 Apr 01	**Utm X:**	628315
Location:	NE14-11-2E	**Utm Y:**	5532074
Remarks:	2150 LOGAN AVE, SW CORNER OF BLDG		

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
20	2 of 2	SE/157.8	235.4 / -1.00	CADORATH PLATING MB	WWIS

Well PID:	37008	**Well Name:**	
Water Use:	Industrial	**Driller:**	Paul Slusarchuk Well Drilling LTd.
Well Use:	PRODUCTION	**Owner:**	
Date Completed:	1979 Nov 13	**Utm X:**	628315
Location:	NE14-11-2E	**Utm Y:**	5532074
Remarks:	2150 LOGAN AVE.W.(NE14-11-02E)		

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
21	1 of 8	NW/161.4	237.4 / 1.00	OAK POINT SERVICE OAK POINT RD., 272 WINNIPEG MB R2R 1V1	GEN

Registration No: MBG001574
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
21	2 of 8	NW/161.4	237.4 / 1.00	Oak Point Service 272 Oak Point Hwy. Winnipeg MB R2R 1V1	FST

Site ID:	12636	**Owner Category:**	Independent
Owner:	Paul's Hauling Ltd.	**Site Status:**	Active
Operator:	Mabon, Al 633-4330 Ext. 222	**Outlet Type:**	Used Oil
Mailing City:	Winnipeg MB	**Inventory:**	Exempt
Mailing Address:	272 Oak Point Hwy.		

--Details--

Status:	Installed	**NO Of Tanks:**	1
Position:	Underground	**Status Date:**	01-Jan-64
Spill Protect:	Unprotected	**Capacity(L):**	22730.00
Status:	Installed	**NO Of Tanks:**	1
Position:	Underground	**Status Date:**	01-Jan-64
Spill Protect:	Unprotected	**Capacity(L):**	4545.00
Status:	Installed	**NO Of Tanks:**	1
Position:	Underground	**Status Date:**	01-Jan-71
Spill Protect:	Unprotected	**Capacity(L):**	13635.00
Status:	Installed	**NO Of Tanks:**	1
Position:	Underground	**Status Date:**	01-Jan-79
Spill Protect:	Unprotected	**Capacity(L):**	45460.00
Status:	Installed	**NO Of Tanks:**	1
Position:	Underground	**Status Date:**	02-Jan-86
Spill Protect:	Fiberglass	**Capacity(L):**	4545.00
Status:	Removed	**NO Of Tanks:**	1
Position:	Underground	**Status Date:**	01-Sep-86
Spill Protect:	Unprotected	**Capacity(L):**	4545.00
Status:	Filled with inert material	**NO Of Tanks:**	1
Position:	Underground	**Status Date:**	01-Jun-87
Spill Protect:	Unprotected	**Capacity(L):**	13635.00
Status:	Filled with inert material	**NO Of Tanks:**	1
Position:	Underground	**Status Date:**	15-Nov-93
Spill Protect:	Unprotected	**Capacity(L):**	45460.00

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
21	3 of 8	NW/161.4	237.4 / 1.00	OAK POINT SERVICE 272 OAK POINT HWY Winnipeg MB R2R 1V1	GEN

Registration No: MBG01574
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
21	4 of 8	NW/161.4	237.4 / 1.00	Oak Point Service 272 Oak Point Rd Winnipeg MB R2R 1V1	REC

File No:
File No Link:
Licence No: 186 HW
Licence No Link:
Proponent Licencee:
Licence Issue Date:
MBR No: MBR30060
DLS:
Date Last Modified:
Project Summary:
EAB Contact Person:
Phone:
Mailing Address:
Region:
Facility Description: Construction and operation of a used oil burner.

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
21	5 of 8	NW/161.4	237.4 / 1.00	OAK POINT SERVICE 272 OAK POINT HWY Winnipeg MB R2R 1V1	FUEL

Permit No: 25499
Type of Facility: U/G
Region:
Expiry Date: 12/31/2010
Office:
Comment: Storing used oil

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
21	6 of 8	NW/161.4	237.4 / 1.00	Paul's Hauling (Oak Point Service 272 Oak Point Rd Winnipeg MB R2R 1V1	CA

Licence NO: 186 HW R
Operation Type: Used Oil Burners and Two Space Heating Used Oil Boilers Facility
Date Received: April 22, 2002
Date Issued: 2008.03.27
Class:
Act: Dangerous Goods Handling and Transportation Act
Proposal N:
Overview:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
21	7 of 8	NW/161.4	237.4 / 1.00	OAK POINT SERVICE 272 OAK POINT HWY Winnipeg MB	CS

File No: 45045
File Name:
Site Desig Under the CSRA: LIST OF ALL SITES ON FILE WITH THE CONTAMINATED/IMPACTED SITES PROGRAM

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
21	8 of 8	NW/161.4	237.4 / 1.00	OAK POINT SERVICE 272 OAK POINT HWY Winnipeg MB	GEN

Registration No: MBG01574
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
22	1 of 8	NNW/163.4	237.4 / 1.00	FAVOURITE REFRIGERATION OAK POINT HWY., 251 WINNIPEG MB R2R 1T9	GEN

Registration No: MBG003468
SIC:
DLS:

22	2 of 8	NNW/163.4	237.4 / 1.00	HI-PERFORMANCE TRUCK REPAIR OAK POINT HWY., 251 UNIT B WINNIPEG MB R2R 1T9	GEN

Registration No: MBG007089
SIC:
DLS:

22	3 of 8	NNW/163.4	237.4 / 1.00	HI-PERFORMANCE TRUCK REPAIR B-251 OAK POINT HWY Winnipeg MB R2R 1T9	GEN

Registration No: MBG07089
SIC:
DLS:

22	4 of 8	NNW/163.4	237.4 / 1.00	HI-TECH REEFER SERVICE A-251 OAK POINT HWY Winnipeg MB R2R 1T9	GEN

Registration No: MBG10567
SIC:
DLS:

22	5 of 8	NNW/163.4	237.4 / 1.00	WINNIPEG TRUCK & TRAILER SERVICE LTD B-251 OAK POINT HWY Winnipeg MB R2R 1T9	GEN

Registration No: MBG12107
SIC:
DLS:

22	6 of 8	NNW/163.4	237.4 / 1.00	251 Oak Point Hwy WINNIPEG MB R2R 1T9	SPL

Spill No:		**Off Lease:**	
Incident ID:	108221	**Off Lease m2:**	
Incident Date:	08/03/2010	**Call Reason:**	Land
Spill Source:		**Plan:**	
Sub Type Desc:	Vandalism	**Block:**	
Issue Incident:		**Lot:**	
Oil Volume m3:		**Location:**	
SW Volume m3:		**Easting:**	
Other Volume m3:		**Northing:**	
Recovered m3:		**NAD Type:**	
Total Area m2:		**UTM Source:**	

Details

Amount: 200
Unit: L

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
Contaminant Code:		UN1202-DIESEL			
22	7 of 8	NNW/163.4	237.4 / 1.00	WINNIPEG TRUCK & TRAILER SERVICE LTD B-251 OAK POINT HWY Winnipeg MB	GEN
Registration No:		MBG12107			
SIC:					
DLS:					
22	8 of 8	NNW/163.4	237.4 / 1.00	CENTREPORT TRUCK & TRAILER SERVICES INC 251 OAK POINT HWY Winnipeg MB	GEN
Registration No:		MBG14022			
SIC:					
DLS:					
23	1 of 4	NNW/219.0	237.4 / 1.00	S K F TRUCK & TRAILER REPAIR 271 OAK POINT HWY Winnipeg MB R2R 1T9	GEN
Registration No:		MBG03547			
SIC:					
DLS:					
23	2 of 4	NNW/219.0	237.4 / 1.00	SELBY TRUCK SERVICE LTD 271 OAK POINT HWY Winnipeg MB R2R 1T9	GEN
Registration No:		MBG11606			
SIC:					
DLS:					
23	3 of 4	NNW/219.0	237.4 / 1.00	S K F TRUCK & TRAILER REPAIR 271 OAK POINT HWY Winnipeg MB	GEN
Registration No:		MBG03547			
SIC:					
DLS:					
23	4 of 4	NNW/219.0	237.4 / 1.00	SELBY TRUCK SERVICE LTD 271 OAK POINT HWY Winnipeg MB	GEN
Registration No:		MBG11606			
SIC:					
DLS:					
24	1 of 3	NW/225.8	237.4 / 1.00	TRANSPORT INTERNATIONAL POOL OAK POINT HWY., 277 WINNIPEG, MB MB R2R 1T9	GEN

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB

Registration No: MBG002270
SIC:
DLS:

24	2 of 3	NW/225.8	237.4 / 1.00	TRANSPORT INTERNATIONAL POOL 277 OAK POINT HWY Winnipeg MB R2R 1T9	GEN

Registration No: MBG02270
SIC:
DLS:

24	3 of 3	NW/225.8	237.4 / 1.00	TRAILER WIZARDS 277 OAK POINT HWY Winnipeg MB R2R 1T9	GEN

Registration No: MBG12883
SIC:
DLS:

25	1 of 2	SSE/234.4	235.4 / -1.00	TRAILMOBILE CANADA LOGAN AVE., 2095 WINNIPEG MB	GEN

Registration No: MBG002041
SIC:
DLS:

25	2 of 2	SSE/234.4	235.4 / -1.00	TRAILMOBILE CANADA 2095 LOGAN AVE Winnipeg MB R2R 0J1	GEN

Registration No: MBG02041
SIC:
DLS:

26	1 of 13	SE/234.8	236.4 / 0.00	DOMAR TRANSMISSION LOGAN AVE., 2073 UNIT 8 WINNIPEG MB R2R 0J1	GEN

Registration No: MBG007625
SIC:
DLS:

26	2 of 13	SE/234.8	236.4 / 0.00	DOMAR TRANSMISSION 8-2073 LOGAN AVE Winnipeg MB R2R 0J1	GEN

Registration No: MBG07625
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
26	3 of 13	SE/234.8	236.4 / 0.00	CONQUEST EQUIPMENT CORPORATION 1-2073 LOGAN AVE Winnipeg MB R2R 0J1	GEN

Registration No: MBG10952
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
26	4 of 13	SE/234.8	236.4 / 0.00	Battery Direct of Manitoba Inc. 3 - 2073 Logan Ave. Winnipeg MB R2R 0J1	REC

File No:
File No Link:
Licence No:
Licence No Link:
Proponent Licencee:
Licence Issue Date:
MBR No:
DLS:
Date Last Modified:
Project Summary:
EAB Contact Person:
Phone: (204) 489-6666
Mailing Address:
Region:
Facility Description: Waste Lead-Acid Batteries

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
26	5 of 13	SE/234.8	236.4 / 0.00	2073 Logan Avenue Winnipeg MB R2R 0J1	EHS

Order No: 20060707032
Status: C
Report Type: Complete Report
Report Date: 7/12/2006
Date Received: 7/7/2006
Previous Site Name:
Lot/Building Size:
Additional Info Ordered: Fire Insur. Maps And /or Site Plans; Aerials Photos; Topographical Maps; City Directory

Nearest Intersection:
Municipality:
Client Prov/State: ON
Search Radius (km): 0.25
X: -97.208553
Y: 49.925726

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
26	6 of 13	SE/234.8	236.4 / 0.00	Battery Direct of Manitoba Inc. #3 ¿ 2073 Logan Ave Winnipeg MB R2R 0J1	REC

File No:
File No Link:
Licence No: 173 HW
Licence No Link:
Proponent Licencee:
Licence Issue Date:
MBR No: MBR30000
DLS:
Date Last Modified:
Project Summary:
EAB Contact Person:
Phone:
Mailing Address:
Region:
Facility Description: Operation of a waste lead acid battery transfer facility

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
26	7 of 13	SE/234.8	236.4 / 0.00	2073 Logan Avenue Winnipeg MB R2R 0J1	EHS

Order No: 20090421033
Status: C
Report Type: Standard Report
Report Date: 4/23/2009
Date Received: 4/21/2009
Previous Site Name:
Lot/Building Size: 67,803 Sq Ft. building
Additional Info Ordered:

Nearest Intersection:
Municipality:
Client Prov/State: WA
Search Radius (km): 0.25
X: -97.21003
Y: 49.926054

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
26	8 of 13	SE/234.8	236.4 / 0.00	Battery Direct of Manitoba Inc. 3-2073 Logan Avenue Winnipeg MB R2R 0J1	CA

Licence NO:
Operation Type: Waste Lead Acid Battery Transfer Facility
Date Received:
Date Issued:

Class:
Act: Dangerous Goods Handling and Transportation Act
Proposal N:
Overview:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
26	9 of 13	SE/234.8	236.4 / 0.00	WINNIPEG BATTERY DIRECT 3-2073 Logan Ave Winnipeg MB	GEN

Registration No: MBG10053
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
26	10 of 13	SE/234.8	236.4 / 0.00	CONQUEST EQUIPMENT CORPORATION 1-2073 LOGAN AVE Winnipeg MB	GEN

Registration No: MBG10952
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
26	11 of 13	SE/234.8	236.4 / 0.00	DOMAR TRANSMISSION 8-2073 LOGAN AVE Winnipeg MB	GEN

Registration No: MBG07625
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
26	12 of 13	SE/234.8	236.4 / 0.00	AVIALL WINNIPEG CSC 9-2073 LOGAN AVE Winnipeg MB	GEN

Registration No: MBG14067
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
26	13 of 13	SE/234.8	236.4 / 0.00	Waste Lead Acid Battery Transfer Facility #3 2073 Logan Avenue Winnipeg MB	PR

File No: 4969.00
Licence No: 173 HW
Licence Issue Date: 2003-10-17
Proponent Licencee: Battery Direct of Manitoba Inc.
Project Name: Waste Lead Acid Battery Transfer Facility
Status: Completed
Comment Deadline Date:
Project Summary: Summary
EAB Contact Person: Eshetu Beshada
EAB Contact Person Email: mailto:eshetu.beshada@gov.mb.ca
Last Date Modified: 2018-03-19
Region:
City: Winnipeg
DLS:
Location: #3 2073 Logan Avenue
File No URL: https://www.gov.mb.ca/sd/eal/registries/4969candianenergy/index.html
Licence No URL: https://www.gov.mb.ca/sd/eal/registries/4969candianenergy/173hw.pdf
Project Summary URL: https://www.gov.mb.ca/sd/eal/archive/2003/summaries/4969.pdf

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
27	1 of 6	NW/235.3	237.4 / 1.00	GARDEWINE & SONS LTD. OAK POINT RD., 300 WINNIPEG MB R2R 1V1	GEN

Registration No: MBG000645
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
27	2 of 6	NW/235.3	237.4 / 1.00	TCT CANADA OAK POINT HWY., 300 WINNIPEG MB R2R 1V1	GEN

Registration No: MBG004261
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
27	3 of 6	NW/235.3	237.4 / 1.00	AUDLEY CARTAGE OAK POINT HWY., 300 WINNIPEG MB R2R 1V1	GEN

Registration No: MBG005530
SIC: 4210
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
27	4 of 6	NW/235.3	237.4 / 1.00	T C T CANADA 300 OAK POINT HWY Winnipeg MB R2R 1V1	GEN

Registration No: MBG04261
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
27	5 of 6	NW/235.3	237.4 / 1.00	AUDLEY CARTAGE 300 OAK POINT HWY	GEN

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
				Winnipeg MB R2R 1V1	

Registration No: MBG05530
SIC:
DLS:

[27]()	***6 of 6***	***NW/235.3***	***237.4 / 1.00***	***T C T CANADA*** ***300 OAK POINT HWY*** ***Winnipeg MB***	***GEN***

Registration No: MBG04261
SIC:
DLS:

[28]()	***1 of 7***	***SSE/237.6***	***235.4 / -1.00***	***CALMONT TRUCK RENTALS AND LEASING*** ***LOGAN AVE., 2091*** ***WINNIPEG MB***	***GEN***

Registration No: MBG004545
SIC:
DLS:

[28]()	***2 of 7***	***SSE/237.6***	***235.4 / -1.00***	***SUNRISE DISTRIBUTORS LTD*** ***2091 LOGAN AVE*** ***WINNIPEG MB R2R 0J1***	***CS***

File No: 1402
File Name: SUNRISE DISTRIBUTORS (FORMER)
Site Desig Under the CSRA:

[28]()	***3 of 7***	***SSE/237.6***	***235.4 / -1.00***	***Calmont Truck Rentals*** ***2091 Logan Ave.*** ***Winnipeg MB R2R 0J1***	***FST***

Site ID:	12051	***Owner Category:***	Independent
Owner:	2686156 Manitoba Ltd.	***Site Status:***	Dismantled
Operator:		***Outlet Type:***	Fleet
Mailing City:	Winnipeg MB	***Inventory:***	NA
Mailing Address:	2091 Logan Ave.		

--Details--

Status:	Installed	***NO Of Tanks:***	2
Position:	Underground	***Status Date:***	22-Sep-83
Spill Protect:	Sacrificial Anode	***Capacity(L):***	13635.00
Status:	Removed	***NO Of Tanks:***	2
Position:	Underground	***Status Date:***	23-Nov-89
Spill Protect:	Sacrificial Anode	***Capacity(L):***	13635.00
Status:	Installed	***NO Of Tanks:***	1
Position:	Underground	***Status Date:***	24-Nov-89
Spill Protect:	Fiberglass	***Capacity(L):***	35000.00
Status:	Removed	***NO Of Tanks:***	1
Position:	Underground	***Status Date:***	15-Apr-98
Spill Protect:	Fiberglass	***Capacity(L):***	35000.00

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
28	4 of 7	SSE/237.6	235.4 / -1.00	CALMONT TRUCK RENTALS AND LEASING 2091 LOGAN AVE Winnipeg MB R2R 0J1	GEN

Registration No: MBG04545
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
28	5 of 7	SSE/237.6	235.4 / -1.00	CALMONT TRUCK RENTALS 2091 LOGAN AVE Winnipeg MB	CS

File No: 20706
File Name:
Site Desig Under the CSRA: LIST OF ALL SITES ON FILE WITH THE CONTAMINATED/IMPACTED SITES PROGRAM

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
28	6 of 7	SSE/237.6	235.4 / -1.00	2091 Logan Ave Winnipeg MB R2R 0J1	EHS

Order No: 20121128035
Status: C
Report Type: Standard Select Report
Report Date: 07-DEC-12
Date Received: 28-NOV-12
Previous Site Name:
Lot/Building Size:
Additional Info Ordered:
Nearest Intersection:
Municipality: City of Winnipeg
Client Prov/State: MB
Search Radius (km): .25
X: -97.21215
Y: 49.925805

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
28	7 of 7	SSE/237.6	235.4 / -1.00	CALMONT TRUCK RENTALS & LEASING 2091 LOGAN AVE Winnipeg MB	GEN

Registration No: MBG04545
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
29	1 of 10	SSW/240.1	235.4 / -1.00	NORTHWEST SMELTING & REFINING - 2185 LOGAN Winnipeg MB R2R 0J3	CA

Licence NO: 28 HW
Operation Type: Battery Recycling
Date Received: 91.04.30
Date Issued: 94.05.27
Class: 1000-5000 ppl
Act:
Proposal N:
Overview:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
29	2 of 10	SSW/240.1	235.4 / -1.00	North-West Smelting and Refining Ltd. 2185 Logan Avenue Winnipeg MB R2R 0J3	REC

File No:
File No Link:
Licence No:
Licence No Link:
Proponent Licencee:
Licence Issue Date:
MBR No:

DLS:
Date Last Modified:
Project Summary:
EAB Contact Person:
Phone: Tel: (204) 633-9183
Mailing Address:
Region:
Facility Description: Handles lead-acid batteries

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
29	3 of 10	SSW/240.1	235.4 / -1.00	NORTH-WEST SMELTING & REFINING LTD. LOGAN AVE., 2185 WINNIPEG MB	GEN

Registration No: MBG003116
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
29	4 of 10	SSW/240.1	235.4 / -1.00	NORTH-WEST SMELTING & REFINING LTD 2185 LOGAN AVE WINNIPEG MB R2R 0J3	CS

File No: 0132
File Name: NORTH-WEST SMELTING
Site Desig Under the CSRA:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
29	5 of 10	SSW/240.1	235.4 / -1.00	NORTH - WEST SMELTING 2185 LOGAN AVE Winnipeg MB	CS

File No: 20164
File Name:
Site Desig Under the CSRA: LIST OF ALL SITES ON FILE WITH THE CONTAMINATED/IMPACTED SITES PROGRAM

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
29	6 of 10	SSW/240.1	235.4 / -1.00	NORTHWEST SMELTING & REFINING - 2185 LOGAN Winnipeg MB	CA

Licence NO:	28 HW	**Class:**	
Operation Type:	Battery Recycling	**Act:**	
Date Received:	1991.04.30	**Proposal N:**	
Date Issued:	1994.05.27	**Overview:**	

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
29	7 of 10	SSW/240.1	235.4 / -1.00	2185 Logan Ave Winnipeg MB R2R 0J3	EHS

Order No:	20121024019	**Nearest Intersection:**	
Status:	C	**Municipality:**	
Report Type:	Standard Report	**Client Prov/State:**	MB
Report Date:	01-NOV-12	**Search Radius (km):**	.25
Date Received:	24-OCT-12	**X:**	-97.216481
Previous Site Name:	Northwest Smelting and Refining	**Y:**	49.926308
Lot/Building Size:			
Additional Info Ordered:			

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
29	8 of 10	SSW/240.1	235.4 / -1.00	NORTH WEST SMELTING & REFINING 2185 LOGAN AVE	GEN

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
				Winnipeg MB R2R 0J3	

Registration No: MBG03116
SIC:
DLS:

[29]()	*9 of 10*	*SSW/240.1*	*235.4 / -1.00*	***NORTH WEST SMELTING & REFINING*** ***2185 LOGAN AVE*** ***Winnipeg MB***	**GEN**

Registration No: MBG03116
SIC:
DLS:

[29]()	*10 of 10*	*SSW/240.1*	*235.4 / -1.00*	***Non-ferrous metal smelting and refining plant*** ***2185 Logan Avenue*** ***Winnipeg MB***	**PR**

File No: 235.10
Licence No: 1131
Licence Issue Date: 1987-12-21
Proponent Licencee: North West Smelting and Refining Ltd.
Project Name: Non-ferrous metal smelting and refining plant
Status: Completed
Comment Deadline Date:
Project Summary:
EAB Contact Person:
EAB Contact Person Email:
Last Date Modified: 2015-04-08
Region:
City: Winnipeg
DLS:
Location: 2185 Logan Avenue
File No URL:
Licence No URL: https://www.gov.mb.ca/sd/eal/archive/2014licence.updates/1131-0325-10.pdf
Project Summary URL:

[30]()	*1 of 3*	*SE/241.7*	*235.4 / -1.00*	***IPEX INC.*** ***LOGAN AVE., 2081*** ***WINNIPEG MB***	**GEN**

Registration No: MBG002716
SIC:
DLS:

[30]()	*2 of 3*	*SE/241.7*	*235.4 / -1.00*	***IPEX*** ***2081 LOGAN AVE*** ***Winnipeg MB R2R 0J1***	**GEN**

Registration No: MBG02716
SIC:
DLS:

[30]()	*3 of 3*	*SE/241.7*	*235.4 / -1.00*	***IPEX INC*** ***2081 LOGAN AVE*** ***Winnipeg MB***	**GEN**

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB

Registration No: MBG02716
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
31	1 of 3	SW/241.7	236.4 / 0.00	SHARPIE'S TRUCK & AUTO REPAIR B-2201 LOGAN AVE Winnipeg MB R2R 0J3	GEN

Registration No: MBG11794
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
31	2 of 3	SW/241.7	236.4 / 0.00	T & T TRUCKING LTD 2-2201 LOGAN AV Winnipeg MB R2R 0J3	GEN

Registration No: MBG12320
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
31	3 of 3	SW/241.7	236.4 / 0.00	JANSSEN EQUIPMENT REPAIR 2201 LOGAN AVE Winnipeg MB	GEN

Registration No: MBG12746
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
32	1 of 5	ESE/243.8	236.4 / 0.00	MW TRANSPORT LOGAN AVE., 2065-UNIT #2 WINNIPEG MB	GEN

Registration No: MBG004082
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
32	2 of 5	ESE/243.8	236.4 / 0.00	COLLIERS PRATT MCGARRY 2061 TO 2065 LOGAN AVE WINNIPEG MB	CS

File No: 1283
File Name: LOGAN PLACE INDUSTRIAL MALL
Site Desig Under the CSRA:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
32	3 of 5	ESE/243.8	236.4 / 0.00	M W TRANSPORT 2-2065 LOGAN AVE Winnipeg MB R2R 0J1	GEN

Registration No: MBG04082
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
32	4 of 5	ESE/243.8	236.4 / 0.00	LOGAN PLACE INDUSTRIAL MALL	CS

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
				2061 TO 2065 LOGAN AVE Winnipeg MB	

File No: 20701
File Name:
Site Desig Under the CSRA: LIST OF ALL SITES ON FILE WITH THE CONTAMINATED/IMPACTED SITES PROGRAM

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
32	5 of 5	ESE/243.8	236.4 / 0.00	2065 Logan Avenue Winnipeg MB r2r 0j1	EHS

Order No: 20110920034
Status: C
Report Type: Site Report
Report Date: 9/21/2011
Date Received: 9/20/2011 11:38:35 AM
Previous Site Name:
Lot/Building Size:
Additional Info Ordered:
Nearest Intersection:
Municipality:
Client Prov/State: ON
Search Radius (km): 0.25
X: -97.209423
Y: 49.925733

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
33	1 of 1	NW/244.1	237.4 / 1.00	277 Oak Point Highway Winnipeg MB R2R 1T9	EHS

Order No: 20100203041
Status: C
Report Type: Standard Report
Report Date: 2/9/2010
Date Received: 2/3/2010
Previous Site Name:
Lot/Building Size:
Additional Info Ordered: Fire Insur. Maps and/or Site Plans;
Nearest Intersection: Oak Point Highway and Egesz Street
Municipality: Winnipeg
Client Prov/State: MB
Search Radius (km): 0.25
X: -97.218452
Y: 49.935409

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
34	1 of 7	E/245.6	237.4 / 1.00	VOLVO MANITOBA TRUCK CENTRE OAK POINT HWY., 33 WINNIPEG MB R2R 0T8	GEN

Registration No: MBG004163
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
34	2 of 7	E/245.6	237.4 / 1.00	VOLVO MANITOBA TRUCK CENTRE 33 OAK POINT HWY Winnipeg MB R2R 0T8	GEN

Registration No: MBG04163
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
34	3 of 7	E/245.6	237.4 / 1.00	BEAVER TRUCK CENTRE 33 OAK POINT HWY Winnipeg MB R2R 0T8	GEN

Registration No: MBG11528
SIC:
DLS:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
34	4 of 7	E/245.6	237.4 / 1.00	BEAVER TRUCK CENTRE 33 OAK POINT HWY Winnipeg MB R2R 0T8	REC

File No:	
File No Link:	
Licence No:	
Licence No Link:	
Proponent Licencee:	
Licence Issue Date:	
MBR No:	MBR30013
DLS:	
Date Last Modified:	
Project Summary:	
EAB Contact Person:	
Phone:	
Mailing Address:	
Region:	
Facility Description:	

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
34	5 of 7	E/245.6	237.4 / 1.00	BEAVER TRUCK CENTRE 33 OAK POINT HWY Winnipeg MB	GEN

Registration No:	MBG11528
SIC:	
DLS:	

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
34	6 of 7	E/245.6	237.4 / 1.00	Used Oil Burner Facility, City of Winnipeg 33 Oak Point Highway Winnipeg MB	REC

File No:	4785.00
File No Link:	
Licence No:	183 HW R
Licence No Link:	http://www.gov.mb.ca/sd/eal/archive/2013/licences/183hwr.pdf
Proponent Licencee:	Winnipeg Equipment Sales LTD., O/A Beaver Truck Centre
Licence Issue Date:	2004-11-03
MBR No:	
DLS:	
Date Last Modified:	2013-04-01
Project Summary:	
EAB Contact Person:	
Phone:	
Mailing Address:	
Region:	
Facility Description:	

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
34	7 of 7	E/245.6	237.4 / 1.00	Used Oil Burner Facility, City of Winnipeg 33 Oak Point Hwy. Winnipeg MB	PR

File No:	4785.00
Licence No:	183 HW R
Licence Issue Date:	2013-01-14
Proponent Licencee:	Winnipeg Equipment Sales LTD., O/A Beaver Truck Centre
Project Name:	Used Oil Burner Facility, City of Winnipeg
Status:	Completed
Comment Deadline Date:	
Project Summary:	
EAB Contact Person:	

EAB Contact Person Email:	
Last Date Modified:	2013-04-01
Region:	
City:	Winnipeg
DLS:	
Location:	33 Oak Point Hwy.
File No URL:	
Licence No URL:	https://www.gov.mb.ca/sd/eal/archive/2013/licences/183hwr.pdf
Project Summary URL:	

Unplottable Summary

Total: 20 Unplottable sites

DB	Company Name/Site Name	Address	City	Postal
CA	BATTERY DIRECT OF MANITOBA INC.		Winnipeg MB	
CA	WES-T-RANS LIMITED		Winnipeg MB	
CA	BATTERY DIRECT OF MANITOBA INC.		Winnipeg MB	
CA	WES-T-RANS LIMITED		Winnipeg MB	
CA	CADORATH PLATING CO. LTD.		Winnipeg MB	
CONV	Cadorath Plating Co.		Winnipeg MB	
CONV	Northwest Smelting & Refining Ltd.		Winnipeg MB	
CONV	Cadorath Plating Co.		Winnipeg MB	
FUEL	OAK POINT ESSO CARDLOCK - PSF		Winnipeg MB	
FUEL	BEAVER TRUCK CENTRE		Winnipeg MB	
FUEL	KNYSH CONSTRUCTION		Winnipeg MB	
FUEL	CUSTOM TRUCK SALES INC - PSF		Winnipeg MB	
FUEL	KNYSH CONSTRUCTION		Winnipeg MB	
FUEL	SUPERIOR FINISHES		Winnipeg MB	
FUEL	OAK POINT SERVICE - PSF		Winnipeg MB	
FUEL	KNYSH CONSTRUCTION - PSF		Winnipeg MB	
FUEL	BEAVER TRUCK CENTRE - PSF		Winnipeg MB	

FUEL	SUPERIOR FINISHES - PSF	Winnipeg MB
FUEL	OAK POINT ESSO CARDLOCK	Winnipeg MB
FUEL	NORTHLAND PETROLEUM LTD - PSF	Winnipeg MB

Unplottable Report

Site:	***BATTERY DIRECT OF MANITOBA INC.*** ***Winnipeg MB***			***Database:*** ***CA***
Licence NO:	173 HW	***Class:***		
Operation Type:	Waste Transfer Stations	***Act:***		
Date Received:	2003.08.07	***Proposal N:***		
Date Issued:	2003.10.17	***Overview:***		

Site:	***WES-T-RANS LIMITED*** ***Winnipeg MB***			***Database:*** ***CA***
Licence NO:	1657	***Class:***		
Operation Type:		***Act:***		
Date Received:	92.10.29	***Proposal N:***		
Date Issued:	93.04.30	***Overview:***		

Site:	***BATTERY DIRECT OF MANITOBA INC.*** ***Winnipeg MB***			***Database:*** ***CA***
Licence NO:	173 HW	***Class:***	5000+ ppl	
Operation Type:	Waste Transfer Stations	***Act:***		
Date Received:	2003.08.07	***Proposal N:***		
Date Issued:	2003.10.17	***Overview:***		

Site:	***WES-T-RANS LIMITED*** ***Winnipeg MB***			***Database:*** ***CA***
Licence NO:	1657	***Class:***		
Operation Type:	-	***Act:***		
Date Received:	1992.10.29	***Proposal N:***		
Date Issued:	1993.04.30	***Overview:***		

Site:	***CADORATH PLATING CO. LTD.*** ***Winnipeg MB***			***Database:*** ***CA***
Licence NO:		***Class:***		
Operation Type:	-	***Act:***		
Date Received:	2003.03.04	***Proposal N:***		
Date Issued:	. .	***Overview:***		

Site:	***Cadorath Plating Co.*** ***Winnipeg MB***			***Database:*** ***CONV***
Document No:		***Status Indicator:***		
Inv ID:		***Status Date:***		
Stakeholder ID:		***Issue Date:***		
Section Code:		***Penalty Amount:***		
Act Code:		***Municipality Code:***		
Act Description:		***Municipality:***		
Informant ID:		***Postal Code:***		
SFN:		***Court:***		

Ticket No:
Action: Warning
Legislation: DGH&TA, S.8(3)
Date: 94-08-23
Enforcement ID:
Enforcement Detail ID:
Enforcement Type Cd:
Enforcement Role Type Cd:
Enforcement Type Desc:
Disposition Offence Date:
Disposition: Warning only
Provision No:
Provision Description:
Agency Name:
Agency Address:
Agency Reference:
Offence: Improper disposal of hazardous waste
Name:
Name Location:
Section:
Section Description:
Data Source:

Proceedings:
Seizure:
Badge:
Response:

Site: ***Northwest Smelting & Refining Ltd.***
Winnipeg MB

Database: ***CONV***

Document No:
Inv ID:
Stakeholder ID:
Section Code:
Act Code:
Act Description:
Informant ID:
SFN:
Ticket No:
Action: Warning
Legislation: DGH&TA, S.8(3)
Date: 94-08-25
Enforcement ID:
Enforcement Detail ID:
Enforcement Type Cd:
Enforcement Role Type Cd:
Enforcement Type Desc:
Disposition Offence Date:
Disposition: Compliance
Provision No:
Provision Description:
Agency Name:
Agency Address:
Agency Reference:
Offence: Improper disposal of hazardous wastes
Name:
Name Location:
Section:
Section Description:
Data Source:

Status Indicator:
Status Date:
Issue Date:
Penalty Amount:
Municipality Code:
Municipality:
Postal Code:
Court:
Proceedings:
Seizure:
Badge:
Response:

Site: ***Cadorath Plating Co.***
Winnipeg MB

Database: ***CONV***

Document No:
Inv ID:
Stakeholder ID:
Section Code:
Act Code:
Act Description:

Status Indicator:
Status Date:
Issue Date:
Penalty Amount:
Municipality Code:
Municipality:

Informant ID:
SFN:
Ticket No:
Action: EO Order
Legislation: DGH&TA, S.20
Date: 94-08-23
Enforcement ID:
Enforcement Detail ID:
Enforcement Type Cd:
Enforcement Role Type Cd:
Enforcement Type Desc:
Disposition Offence Date:
Disposition: Rectified
Provision No:
Provision Description:
Agency Name:
Agency Address:
Agency Reference:
Offence: Dispose of accumulated hazardous waste
Name:
Name Location:
Section:
Section Description:
Data Source:

Postal Code:
Court:
Proceedings:
Seizure:
Badge:
Response:

Site: ***OAK POINT ESSO CARDLOCK - PSF***
Winnipeg MB

Database: **FUEL**

Permit No: 20883
Type of Facility: U/G
Region:

Expiry Date: 31-Dec-10
Office:
Comment:

Site: ***BEAVER TRUCK CENTRE***
Winnipeg MB

Database: **FUEL**

Permit No: 31188
Type of Facility: AST
Region: Red River

Expiry Date:
Office:
Comment:

Site: ***KNYSH CONSTRUCTION***
Winnipeg MB

Database: **FUEL**

Permit No: 28306
Type of Facility: Above Ground Storage Tank(s)
Region:

Expiry Date: 09-30-20
Office:
Comment:

Site: ***CUSTOM TRUCK SALES INC - PSF***
Winnipeg MB

Database: **FUEL**

Permit No: 216 00
Type of Facility: U/G
Region:

Expiry Date: 31-Dec-10
Office:
Comment:

Site: ***KNYSH CONSTRUCTION***
Winnipeg MB

Database: **FUEL**

Permit No: 49088
Type of Facility: AST
Region: Red River

Expiry Date:
Office:
Comment:

Site:	***SUPERIOR FINISHES*** ***Winnipeg MB***		***Database:*** ***FUEL***
Permit No:	27012	***Expiry Date:***	31-Dec-11
Type of Facility:	A/G	***Office:***	
Region:		***Comment:***	

Site:	***OAK POINT SERVICE - PSF*** ***Winnipeg MB***		***Database:*** ***FUEL***
Permit No:	34291	***Expiry Date:***	
Type of Facility:	U/G	***Office:***	
Region:		***Comment:***	

Site:	***KNYSH CONSTRUCTION - PSF*** ***Winnipeg MB***		***Database:*** ***FUEL***
Permit No:	28306	***Expiry Date:***	
Type of Facility:	A/G	***Office:***	
Region:		***Comment:***	

Site:	***BEAVER TRUCK CENTRE - PSF*** ***Winnipeg MB***		***Database:*** ***FUEL***
Permit No:	31188	***Expiry Date:***	
Type of Facility:	A/G	***Office:***	
Region:		***Comment:***	

Site:	***SUPERIOR FINISHES - PSF*** ***Winnipeg MB***		***Database:*** ***FUEL***
Permit No:	27012	***Expiry Date:***	31-Dec-10
Type of Facility:	A/G	***Office:***	
Region:		***Comment:***	

Site:	***OAK POINT ESSO CARDLOCK*** ***Winnipeg MB***		***Database:*** ***FUEL***
Permit No:	20883	***Expiry Date:***	31-Dec-15
Type of Facility:	U/G	***Office:***	
Region:		***Comment:***	

Site:	***NORTHLAND PETROLEUM LTD - PSF*** ***Winnipeg MB***		***Database:*** ***FUEL***
Permit No:	34232	***Expiry Date:***	31-Dec-10
Type of Facility:	A/G	***Office:***	
Region:		***Comment:***	

Appendix: Database Descriptions

*Environmental Risk Information Services (ERIS) can search the following databases. The extent of historical information varies with each database and current information is determined by what is publicly available to ERIS at the time of update. **Note:** Databases denoted with " * " indicates that the database will no longer be updated. See the individual database description for more information.*

Automobile Wrecking & Supplies: Private AUWR

This database provides an inventory of known locations that are involved in the scrap metal, automobile wrecking/recycling, and automobile parts & supplies industry. Information is provided on the company name, location and business type.

Government Publication Date: 1999-May 31, 2022

Certificates of Approval: Provincial CA

This database contains approvals issued since July 1988 within the following categories: Approvals for Air or Effluent and Orders, Permits and/or Regulated Sites designations for Air, Effluent, Refuse or Storage. The information available within this database pertains to client information, general location, class type, operation type, license # and the issue date of the CA. Please note that no specific site address information is available.

Government Publication Date: 1988-Jun 2013*

Dry Cleaning Facilities: Federal CDRY

List of dry cleaning facilities made available by Environment and Climate Change Canada. Environment and Climate Change Canada's Tetrachloroethylene (Use in Dry Cleaning and Reporting Requirements) Regulations (SOR/2003-79) are intended to reduce releases of tetrachloroethylene to the environment from dry cleaning facilities.

Government Publication Date: Jan 2004-Dec 2020

Chemical Manufacturers: Private CHEM

The Manitoba Industry, Trade and Tourism department maintains a chemical register of all known 'active' manufacturers of chemicals, fertilizers and pesticides within the province. Inactive chemical manufacturers are not required to remain in the database. Information available within this register pertains to company name, location and the 'product line'.

Government Publication Date: 1999-Jan 31, 2020

Chemical Register: Private CHM

This database includes a listing of locations of facilities within the Province or Territory that either manufacture and/or distributes chemicals.

Government Publication Date: 1999-May 31, 2022

Compressed Natural Gas Stations: Private CNG

Canada has a network of public access compressed natural gas (CNG) refuelling stations. These stations dispense natural gas in compressed form at 3,000 pounds per square inch (psi), the pressure which is allowed within the current Canadian codes and standards. The majority of natural gas refuelling is located at existing retail gasoline that have a separate refuelling island for natural gas. This list of stations is made available by the Canadian Natural Gas Vehicle Alliance.

Government Publication Date: Dec 2012 -Sep 2022

Enforcement Actions: Provincial CONV

This database summarizes enforcement activities (Convictions, Warnings, Director's Order's, EO Order's, MOH Order's, Offence Notice's, and Permit Suspensions) where companies/individual have been found guilty of environmental offenses under Manitoba's Environmental Protection Legislation. Please note that enforcement actions resulting from activities regulated under the Livestock Manure & Mortalities Mgmt Regulation MR 42/98 are also included.

Government Publication Date: Apr 1994-Mar 2022

Contaminated/Impacted Sites: Provincial CS

List of sites registered under the Contaminated/Impacted Sites Program, made available by Manitoba Sustainable Development, Environmental Programs and Strategies branch. Includes sites that are on the Designated Impacted and Designated Contaminated Sites lists, as well as sites where impacts do not pose a concern, remediation has been completed, or further action is necessary.

Government Publication Date: Up to Mar 2021

Drill Holes: Provincial DRL

The "Open File Drill Holes" database contains information on more than 10,000 drill holes in the province of Manitoba. The database provides information in regard to drill hole location (place, latitude and longitude), depth and overburden of hole, exploration company and assessment report year.

Government Publication Date: Feb 28, 2022

Environmental Effects Monitoring: Federal EEM

The Environmental Effects Monitoring program assesses the effects of effluent from industrial or other sources on fish, fish habitat and human usage of fisheries resources. Since 1992, pulp and paper mills have been required to conduct EEM studies under the Pulp and Paper Effluent Regulations. This database provides information on the mill name, geographical location and sub-lethal toxicity data.

Government Publication Date: 1992-2007*

ERIS Historical Searches: Private EHS

ERIS has compiled a database of all environmental risk reports completed since March 1999. Available fields for this database include: site location, date of report, type of report, and search radius. As per all other databases, the ERIS database can be referenced on both the map and "Statistical Profile" page.

Government Publication Date: 1999-Jul 31, 2022

Environmental Issues Inventory System: Federal EIIS

The Environmental Issues Inventory System was developed through the implementation of the Environmental Issues and Remediation Plan. This plan was established to determine the location and severity of contaminated sites on inhabited First Nation reserves, and where necessary, to remediate those that posed a risk to health and safety; and to prevent future environmental problems. The EIIS provides information on the reserve under investigation, inventory number, name of site, environmental issue, site action (Remediation, Site Assessment), and date investigation completed.

Government Publication Date: 1992-2001*

Federal Convictions: Federal FCON

Environment Canada maintains a database referred to as the "Environmental Registry" that details prosecutions under the Canadian Environmental Protection Act (CEPA) and the Fisheries Act (FA). Information is provided on the company name, location, charge date, offence and penalty.

Government Publication Date: 1988-Jun 2007*

Contaminated Sites on Federal Land: Federal FCS

The Federal Contaminated Sites Inventory includes information on known federal contaminated sites under the custodianship of departments, agencies and consolidated Crown corporations as well as those that are being or have been investigated to determine whether they have contamination arising from past use that could pose a risk to human health or the environment. The inventory also includes non-federal contaminated sites for which the Government of Canada has accepted some or all financial responsibility. It does not include sites where contamination has been caused by, and which are under the control of, enterprise Crown corporations, private individuals, firms or other levels of government. Includes fire training sites and sites at which Per- and Polyfluoroalkyl Substances (PFAS) are a concern.

Government Publication Date: Jun 2000-Sep 2022

Federal Identification Registry for Storage Tank Systems (FIRSTS): Federal FRST

A list of federally regulated Storage tanks from the Federal Identification Registry for Storage Tank Systems (FIRSTS). FIRSTS is Environment and Climate Change Canada's database of storage tank systems subject to the Storage Tank for Petroleum Products and Allied Petroleum Products Regulations. The main objective of the Regulations is to prevent soil and groundwater contamination from storage tank systems located on federal and aboriginal lands. Storage tank systems that do not have a valid identification number displayed in a readily visible location on or near the storage tank system may be refused product delivery.

Government Publication Date: May 31, 2018

Fuel Storage Tanks: Provincial FST

The Petroleum Storage Tank database, which is maintained by Manitoba's Petroleum Storage Program, contains information in regard to company name, location, status, outlet type (retail, used oil, bulk/used'), number of tanks, tank capacity and tank status. This database will not be updated as this information is no longer collected in this format. For current information regarding bulk fuel distributors, please see the FUEL database.

Government Publication Date: 1905-Feb 2003*

Bulk Fuel Distributors: Provincial FUEL

Petroleum and allied product storage facilities are issued operating permits in accordance with the Regulation. This inventory contains a listing of current valid operating permits maintained by Government of Manitoba department of Environment, Climate and Parks. Fields such as Permit Number, Operation Name, Type of Facility, City/Municipality, and Region are included.

Government Publication Date: 2006 - Jul 2022

Waste Generators Summary: Provincial GEN

Within Manitoba, a waste generator is defined as any site, equipment and/or operation involved in the production, collection, handling and/or storage of regulated wastes. A generator of regulated waste is required to register the waste generation site and each waste produced, collected, handled or stored at the site. This database contains the licensing/registration number (MB1 #), company name and address of registered generators. At present, access to the type of hazardous waste generated and the form of treatment used in the handling of the waste is only available by directly calling Manitoba's Hazardous Waste Program.

Government Publication Date: 1998 - Mar 2022

Greenhouse Gas Emissions from Large Facilities: Federal GHG

List of greenhouse gas emissions from large facilities made available by Environment Canada. Greenhouse gas emissions in kilotonnes of carbon dioxide equivalents (kt CO2 eq).

Government Publication Date: 2013-Dec 2019

Indian & Northern Affairs Fuel Tanks: Federal IAFT

The Department of Indian & Northern Affairs Canada (INAC) maintains an inventory of aboveground & underground fuel storage tanks located on both federal and crown land. Our inventory provides information on the reserve name, location, facility type, site/facility name, tank type, material & ID number, tank contents & capacity, and date of tank installation.

Government Publication Date: 1950-Aug 2003*

Manure Storage Facilities: Provincial MAST

Under the Livestock Manure and Mortalities Management Regulation (MR 42/98), permits are issued for the construction, modification or expansion of manure storage facilities. Once issued, the Environmental Livestock Program is responsible for the enforcement of regulations on the management of manure and mortalities. Please note that the MAST database only provides information on permit number, operation name, RM and permit issue date. All other information must be obtained from MB Conservation.

Government Publication Date: Jul 1994-Jun 2021

Canadian Mine Locations: Private MINE

This information is collected from the Canadian & American Mines Handbook. The Mines database is a national database that provides over 290 listings on mines (listed as public companies) dealing primarily with precious metals and hard rocks. Listed are mines that are currently in operation, closed, suspended, or are still being developed (advanced projects). Their locations are provided as geographic coordinates (x, y and/or longitude, latitude). As of 2002, data pertaining to Canadian smelters and refineries has been appended to this database.

Government Publication Date: 1998-2009*

Mineral Occurrences: Provincial MNR

For over 25 years, Manitoba has been compiling Mineral Inventory Cards on mineral deposits in the province. This database was obtained from Manitoba Industry, Trade and Mines, and contains information on over 650 mineral occurrences in the province. Data is provided on the Mineral Inventory File No., Mineral Deposit Name, Product, Associated Minerals or Products of Value, NTS area, Name of Property Owner or Operator and Address, location, and geographical coordinates.

Government Publication Date: 1961-Mar 2022

Manitoba Oil and Gas Wells: Provincial MOGW

The Manitoba Oil and Gas Wells database was collected through the assistance of The Land Systems Company. Information is provided regarding license number and location for over 4,800 wells. Please note that this database will not be updated, information on wells drilled after May 2002 can be found in the Oil and Gas Wells (OGW) database under the `Private Source Database' section.

Government Publication Date: 1951-May 2002*

National Analysis of Trends in Emergencies System (NATES): Federal NATE

In 1974 Environment Canada established the National Analysis of Trends in Emergencies System (NATES) database, for the voluntary reporting of significant spill incidents. The data was to be used to assist in directing the work of the emergencies program. NATES ran from 1974 to 1994. Extensive information is available within this database including company names, place where the spill occurred, date of spill, cause, reason and source of spill, damage incurred, and amount, concentration, and volume of materials released.

Government Publication Date: 1974-1994*

National Defense & Canadian Forces Fuel Tanks: Federal NDFT

The Department of National Defense and the Canadian Forces maintains an inventory of all aboveground & underground fuel storage tanks located on DND lands. Our inventory provides information on the base name, location, tank type & capacity, tank contents, tank class, date of tank installation, date tank last used, and status of tank as of May 2001. This database will no longer be updated due to the new National Security protocols which have prohibited any release of this database.

Government Publication Date: Up to May 2001*

National Defense & Canadian Forces Spills: Federal NDSP

The Department of National Defense and the Canadian Forces maintains an inventory of spills to land and water. All spill sites have been classified under the "Transportation of Dangerous Goods Act - 1992". Our inventory provides information on the facility name, location, spill ID #, spill date, type of spill, as well as the quantity of substance spilled & recovered.

Government Publication Date: Mar 1999-Apr 2018

National Defence & Canadian Forces Waste Disposal Sites: Federal NDWD

The Department of National Defence and the Canadian Forces maintains an inventory of waste disposal sites located on DND lands. Where available, our inventory provides information on the base name, location, type of waste received, area of site, depth of site, year site opened/closed and status.

Government Publication Date: 2001-Apr 2007*

National Energy Board Pipeline Incidents: Federal NEBI

Locations of pipeline incidents from 2008 to present, made available by the Canada Energy Regulator (CER) - previously the National Energy Board (NEB). Includes incidents reported under the Onshore Pipeline Regulations and the Processing Plant Regulations related to pipelines under federal jurisdiction, does not include incident data related to pipelines under provincial or territorial jurisdiction.

Government Publication Date: 2008-Jun 30, 2021

National Energy Board Wells: Federal NEBP

The NEBW database contains information on onshore & offshore oil and gas wells that are outside provincial jurisdiction(s) and are thereby regulated by the National Energy Board. Data is provided regarding the operator, well name, well ID No./UWI, status, classification, well depth, spud and release date.

Government Publication Date: 1920-Feb 2003*

National Environmental Emergencies System (NEES): Federal NEES

In 2000, the Emergencies program implemented NEES, a reporting system for spills of hazardous substances. For the most part, this system only captured data from the Atlantic Provinces, some from Quebec and Ontario and a portion from British Columbia. Data for Alberta, Saskatchewan, Manitoba and the Territories was not captured. However, NEES is also a repository for previous Environment Canada spill datasets. NEES is composed of the historic datasets ' or Trends ' which dates from approximately 1974 to present. NEES Trends is a compilation of historic databases, which were merged and includes data from NATES (National Analysis of Trends in Emergencies System), ARTS (Atlantic Regional Trends System), and NEES. In 2001, the Emergencies Program determined that variations in reporting regimes and requirements between federal and provincial agencies made national spill reporting and trend analysis difficult to achieve. As a consequence, the department has focused efforts on capturing data on spills of substances which fall under its legislative authority only (CEPA and FA). As such, the NEES database will be decommissioned in December 2004.

Government Publication Date: 1974-2003*

National PCB Inventory: Federal NPCB

Environment Canada's National PCB inventory includes information on in-use PCB containing equipment in Canada including federal, provincial and private facilities. Federal out-of-service PCB containing equipment and PCB waste owned by the federal government or by federally regulated industries such as airlines, railway companies, broadcasting companies, telephone and telecommunications companies, pipeline companies, etc. are also listed. Although it is not Environment Canada's mandate to collect data on non-federal PCB waste, the National PCB inventory includes some information on provincial and private PCB waste and storage sites. Some addresses provided may be Head Office addresses and are not necessarily the location of where the waste is being used or stored.

Government Publication Date: 1988-2008*

National Pollutant Release Inventory: Federal NPRI

Environment Canada has defined the National Pollutant Release Inventory ("NPRI") as a federal government initiative designed to collect comprehensive national data regarding releases to air, water, or land, and waste transfers for recycling for more than 300 listed substances.

Government Publication Date: 1993-May 2017

Oil and Gas Wells: Private OGWW

The Nickle's Energy Group (publisher of the Daily Oil Bulletin) collects information on drilling activity including operator and well statistics. The well information database includes name, location, class, status and depth. The main Nickle's database is updated on a daily basis, however, this database is updated on a monthly basis. More information is available at www.nickles.com.

Government Publication Date: 1988-Aug 31, 2022

Canadian Pulp and Paper: Private PAP

This information is part of the Pulp and Paper Canada Directory. The Directory provides a comprehensive listing of the locations of pulp and paper mills and the products that they produce.

Government Publication Date: 1999, 2002, 2004, 2005, 2009-2014

Inventory of PCB Storage Sites: Provincial PCB

Manitoba's Hazardous Waste Program maintains a listing of all "active" PCB storage facilities. Inactive PCB storage equipment and/or disposal sites are not required to remain as part of the PCB inventory database for the province. Please note that some of the sites have no wastes in storage at present, but are retained should they be required for future acceptance of PCB equipment as it comes out of service. The records within this database only provide information on facility name and location. Information pertaining to the inventory of stored wastes and waste quantities at a designated site is only available by directly contacting the Hazardous Waste Program. Please note that this database will not be updated, information after 1999 can be found in the National PCB Inventory (NPCB) database.

Government Publication Date: 1998-1999*

Parks Canada Fuel Storage Tanks: Federal PCFT

Canadian Heritage maintains an inventory of known fuel storage tanks operated by Parks Canada, in both National Parks and at National Historic Sites. The database details information on site name, location, tank install/removal date, capacity, fuel type, facility type, tank design and owner/operator.

Government Publication Date: 1920-Jan 2005*

Manitoba Pits and Quarries: Provincial PITS

The Manitoba Pits and Quarries database is comprised of 3 different types of permits. 1.Quarry Lease and Exploration Permits, which have a ten year term with exclusive rights for crown minerals. Quarry Exploration permits have a three year term with exclusive rights. 2. Private Pits and Quarry Permits require annual registration of private aggregate operations in the province and 3. Casual Permits which are for annual permits of Crown materials.

Government Publication Date: 1994-Aug 2022

Sustainable Development Public Registry: Provincial PR

The public registry system contains information on projects that are undergoing environmental assessment under The Environmental Act and projects applying for a license under The Dangerous Goods Handling and Transportation Act. This listing is made available by Manitoba Sustainable Development.

Government Publication Date: Jan 31, 2021

Waste Receivers Summary: Provincial REC

Disposal of regulated waste is maintained through an operating waste management system or a waste disposal site operated or used pursuant to the terms and conditions of a Certificate of Approval or a Provisional Certificate of Approval. A waste receiving location is any site or facility to which waste is transferred through a waste carrier. A receiver of regulated waste is required to register the waste receiving facility. This database represents registered receivers of regulated wastes, identified by company name and address.

Government Publication Date: 1998-Jul 2017

Retail Fuel Storage Tanks: Private RST

This database includes an inventory of retail fuel outlet locations (including marinas) that have on their property gasoline, oil, waste oil, natural gas and / or propane storage tanks.

Government Publication Date: 1999-May 31, 2022

Scott's Manufacturing Directory: Private SCT

Scott's Directories is a data bank containing information on over 200,000 manufacturers across Canada. Even though Scott's listings are voluntary, it is the most comprehensive database of Canadian manufacturers available. Information concerning a company's address, plant size, and main products are included in this database.

Government Publication Date: 1992-Mar 2011*

Manitoba Spills: Provincial SPL

The Manitoba Conservation Environmental Management System (EMS) records spills from across the province. Information from this database includes incident type, substance type, reason, location of spill, contaminate info and responsible party.

Government Publication Date: Apr 2009-Jun 2022

Solid Waste Sites: Provincial SWS

Locations of solid waste sites and waste transfer stations registered with the Waste Reduction and Recycling Support (WRARS) Program, as well as First Nation landfills. Includes Class 1, 2, and 3 Solid Waste Sites, First Nation Solid Waste Sites, and Waste Transfer Stations. First Nations data was sourced from Indigenous and Northern Affairs Canada (INAC). Made available by Manitoba Government.

Government Publication Date: Mar 2022

Transport Canada Fuel Storage Tanks: Federal TCFT

List of fuel storage tanks currently or previously owned or operated by Transport Canada. This inventory also includes tanks on The Pickering Lands, which refers to 7,530 hectares (18,600 acres) of land in Pickering, Markham, and Uxbridge owned by the Government of Canada since 1972; properties on this land has been leased by the government since 1975, and falls under the Site Management Policy of Transport Canada, but is administered by Public Works and Government Services Canada. This inventory provides information on the site name, location, tank age, capacity and fuel type.

Government Publication Date: 1970 - Dec 2020

Waste Disposal Site Inventory: Provincial WDS

Manitoba Conservation retains a separate inventory of all known active and inactive regulated waste disposal grounds and waste transfer facilities for each of the five regions in the province. Registered companies may hold a permit or certificate for release of the following waste types: Effluent, Refuse, Air and Special Waste Storage.

Government Publication Date: 1998*

Water Well Inventory: Provincial WWIS

The GW Drill database compiled by the Manitoba Water Stewardship Division and Groundwater Management Program provides information on water wells across the province. The GW Drill database is a compilation of records from various sources and is intended to provide water well, stratigraphic, and hydrogeologic background information. The compilation is extensive but is not a comprehensive or complete inventory of wells in the province. For many records, location has been provided in DLS (Dominion Land Survey) format and locations may be accurate to the section or quarter section only. Any analysis or interpretation of records or the absence thereof must take into consideration that the GW Drill database is not comprehensive and should not be used as an inventory.

Government Publication Date: 1880-May 2015

Definitions

Database Descriptions: This section provides a detailed explanation for each database including: source, information available, time coverage, and acronyms used. They are listed in alphabetic order.

Detail Report: This is the section of the report which provides the most detail for each individual record. Records are summarized by location, starting with the project property followed by records in closest proximity.

Distance: The distance value is the distance between plotted points, not necessarily the distance between the sites' boundaries. All values are an approximation.

Direction: The direction value is the compass direction of the site in respect to the project property and/or center point of the report.

Elevation: The elevation value is taken from the location at which the records for the site address have been plotted. All values are an approximation. Source: Google Elevation API.

Executive Summary: This portion of the report is divided into 3 sections:

'Report Summary'- Displays a chart indicating how many records fall on the project property and, within the report search radii.

'Site Report Summary'-Project Property'- This section lists all the records which fall on the project property. For more details, see the 'Detail Report' section.

'Site Report Summary-Surrounding Properties'- This section summarizes all records on adjacent properties, listing them in order of proximity from the project property. For more details, see the 'Detail Report' section.

Map Key: The map key number is assigned according to closest proximity from the project property. Map Key numbers always start at #1. The project property will always have a map key of '1' if records are available. If there is a number in brackets beside the main number, this will indicate the number of records on that specific property. If there is no number in brackets, there is only one record for that property.

The symbol and colour used indicates 'elevation': the red inverted triangle will dictate 'ERIS Sites with Lower Elevation', the yellow triangle will dictate 'ERIS Sites with Higher Elevation' and the orange square will dictate 'ERIS Sites with Same Elevation.'

Unplottables: These are records that could not be mapped due to various reasons, including limited geographic information. These records may or may not be in your study area, and are included as reference.

APPENDIX

E-2 CITY DIRECTORY SEARCH

ERIS

ENVIRONMENTAL RISK INFORMATION SERVICES

CITY DIRECTORY

Project Property: *100 Oak Point Highway, Winnipeg, Manitoba*
Report Type: *City Directory*
Order No: *22102800061*
Information Source: *Polk's Winnipeg, Manitoba City Directory (LAC)*
Date Completed: *30/11/2022*

Environmental Risk Information Services
A division of Glacier Media Inc.
1.866.517.5204 | info@erisinfo.com | erisinfo.com

City Directory Information Source
Polk's Winnipeg, Manitoba City Directory

PROJECT NUMBER: 22102800061	
Site Address:	100 Oak Point Highway, Winnipeg, Manitoba
Year: 2000	
Site Listing:	-Garvi Enterprises -Esso Convenience Store

PROJECT NUMBER: 22102800061	
Site Address:	100 Oak Point Highway, Winnipeg, Manitoba
Year: 1995	
Site Listing:	-Garvi Enterprises -Esso Convenience Store

PROJECT NUMBER: 22102800061	
Site Address:	100 Oak Point Highway, Winnipeg, Manitoba
Year: 1990	
Site Listing:	-Esso Commercial Cardlock

	-Esso Convenience Store

PROJECT NUMBER: 22102800061	
Site Address:	100 Oak Point Highway, Winnipeg, Manitoba
Year: 1985	
Site Listing:	-Address Not Listed

PROJECT NUMBER: 22102800061	
Site Address:	100 Oak Point Highway, Winnipeg, Manitoba
Year: 1979	
Site Listing:	-Address Not Listed

PROJECT NUMBER: 22102800061	
Site Address:	100 Oak Point Highway, Winnipeg, Manitoba
Year: 1975	
Site Listing:	-Address Not Listed

PROJECT NUMBER: 22102800061	
Site Address:	100 Oak Point Highway, Winnipeg, Manitoba

Year: 1970	
Site Listing:	-Address Not Listed

PROJECT NUMBER: 22102800061	
Site Address:	100 Oak Point Highway, Winnipeg, Manitoba
Year: 1964	
Site Listing:	-Address Not Listed

PROJECT NUMBER: 22102800061	
Site Address:	100 Oak Point Highway, Winnipeg, Manitoba
Year: 1960	
Site Listing:	-Street Not Listed

-All listings for businesses were listed as they are in the city directory.

-Listings that are residential are listed as “residential” with the number of tenants. The name of the residential tenant is not listed in the above city directory.

APPENDIX

E-3 GWDRILL 2018 GROUNDWATER WELL LOGS

Location: NE14-11-2E

Well_PID: 37008

Owner: CADORATH PLATING

Driller: Paul Slusarchuk Well Drilling Ltd.

Well Name:

Well Use: PRODUCTION

Water Use: Industrial

UTMX: 628315

UTMY: 5532074

Accuracy XY: UNKNOWN

UTMZ:

Accuracy Z:

Date Completed: 1979 Nov 13

WELL LOG

From (ft.)	To (ft.)	Log
0	16	CLAY
16	32	TILL
32	64	RED SHALY LIMESTONE MIXED WITH RED SHALE
64	66	FRACTURED RED LIMESTONE, MIXED WITH RED SHALE AND WHITE LIMESTONE
66	72	WHITE LIMESTONE
72	75	YELLOW SOFT FRACTURED LIMESTONE
75	79.9	GREY LIMESTONE
79.9	83.9	YELLOW LIMESTONE
83.9	89.9	WHITE LIMESTONE, SOME YELLOW
89.9	101.9	YELLOW FRACTURED LIMESTONE AND SOME CLAY
101.9	246.8	LIMESTONE

WELL CONSTRUCTION

From (ft.)	To (ft.)	Casing Type	Inside Dia.(in)	Outside Dia.(in)	Slot Size(in)	Type	Material
0	66.5	casing	6.5	INSERT	BLACK	IRON	
66.5	112.9	open	hole	6.5			
112.9	246.8	open	hole	5			

Top of Casing: 1.502 ft. above ground

PUMPING TEST

Date: 1979 Nov 15

Pumping Rate: 74.974 Imp. gallons/minute

Water level before pumping: 29 ft. below ground

Pumping level at end of test: 49 ft. below ground

Test duration: 16 hours, minutes

Water temperature: ?? degrees F

REMARKS

2150 LOGAN AVE.W. (NE14-11-02E)

Location: NE14-11-2E
Well_PID: 106762
Owner: CADORATH PLATING
Driller: Maple Leaf Drilling Ltd.
Well Name:
Well Use: PRODUCTION
Water Use: Domestic
UTMX: 628315
UTMY: 5532074
Accuracy XY: 4 FAIR [350M-1KM] [WITHIN SECTION]
UTMZ:
Accuracy Z:
Date Completed: 1998 Apr 1

WELL LOG

From (ft.)	To (ft.)	Log
0	17	CLAY
17	34	TILL
34	68	SHALE AND LAYERS OF GYPSUM AND LIMESTONE
68	130	LIMESTONE

WELL CONSTRUCTION

From (ft.)	To (ft.)	Casing Type	Inside Dia.(in)	Outside Dia.(in)	Slot Size(in)	Type	Material
0	71	CASING	5	INSERT	PVC		
71	100	OPEN	HOLE	4.8			
100	130	OPEN	HOLE	4			
0	35	CASING	GROUT	BENTONITE			

Top of Casing: 2 ft. above ground

PUMPING TEST
Date: 1998 Apr 1
Pumping Rate: ?? Imp. gallons/minute
Water level before pumping: 25 ft. below ground
Pumping level at end of test: ?? ft. below ground
Test duration: ??? hours, ?? minutes
Water temperature: ?? degrees F

REMARKS
2150 LOGAN AVE, SW CORNER OF BLDG

E-4 MCC FILE SEARCH

Manitoba

Environmental File Search Request Form

Search Requested By

Name: Cassie Bujan

Company Name: WSP Canada Inc.

Email: cassie.bujan@wsp.com

Phone Number: 204-999-8512

Responder

Environment Officer: Kaitlin Sawisky

Date Completed: 2022-11-02

Environment Officer Phone Number: 204-914-8404

Office Use

Date Received: 2022-10-26

File Search #: 6250

Total Fees: 1386.00

Order Number: mhp22298142953p62

Environmental File Search Request Form

Property Information #7

Business Name(s)/Property Owner: The City of Winnipeg

Business Type: Mines and minerals

Corporate File Number:

Legal Land Description

Municipality: Winnipeg - City of Winnipeg

Roll Number: 7092304000 File Number:

Nearest Road/Street Intersection: Oak Point Highway and Selkirk Avenue

Civic Address

Street Address: Postal Code:

911 Address

Street Address: Postal Code:

Lot, Block, Plan

Lot: 54 Block: NA Plan: 24342

Section, Township, Range

Quarter Section: Section Information:

Section: Township: Range: Meridian:

River Lot

River Lot Number:

Parish

Parish Number:

Settlement

Settlement Number:

GPS Coordinates

Latitude: Longitude:

Additional Information

Additional Information:

Small section north of the adjacent highway

Environmental File Search Request Form

Program	File	Status	Licence/Permit/Operation ID/Operation Name ("+" in lower right corner of field indicates more information. Click to expand field.)
Environmental Act Licence or Permit	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
DGHT Act Licence or Permit	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Registered Hazardous Waste Generator	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Registered Petroleum Storage Site	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Permitted/Registered Manure Storage Facility or Confined Livestock Area	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Contaminated/ Impacted Site	☐ Yes ☑ No	☑ Not Designated ☐ Designated Contaminated ☐ Designated Impacted	The Contaminated/Impacted Site Program does not have a file on the site. This site is not a designated contaminated or impacted site pursuant to The Contaminated Sites Remediation Act.
Orders (Environmental Protection Order, Emergency Notice, Director's Order, or Environmental Order)	☐ Yes ☑ No		

Disclaimer: This response summarizes the information found in current records maintained by the Department of Conservation and Climate and is for informational purposes only. No representation or responsibility is assumed whatsoever as to the completeness of this information as it relates to the environmental condition or prior incidents associated with the property in question. In order to obtain more complete information on the property, persons may wish to retain the services of a qualified consultant for the purposes of conducting an environmental audit.

Additional Comments:

Information is based on the roll number provided.

Manitoba

Environmental File Search Request Form

Search Requested By

Name: Cassie Bujan

Company Name: WSP Canada Inc.

Email: cassie.bujan@wsp.com

Phone Number: 204-999-8512

Responder

Environment Officer: Kaitlin Sawisky

Date Completed: 2022-11-02

Environment Officer Phone Number: 204-914-8404

Office Use

Date Received: 2022-10-26

File Search #: 6244

Total Fees: 1386.00

Order Number: mhp22298142953p62

Environmental File Search Request Form

Property Information #1

Business Name(s)/Property Owner: The City of Winnipeg

Business Type: Mines and minerals

Corporate File Number:

Legal Land Description

Municipality: Winnipeg - City of Winnipeg

Roll Number: 14096460000 File Number:

Nearest Road/Street Intersection: Oak Point Highway and Selkirk Avenue

Civic Address

Street Address: Postal Code:

911 Address

Street Address: Postal Code:

Lot, Block, Plan

Lot: NA Block: 3 Plan: 17744

Section, Township, Range

Quarter Section: Section Information:

Section: Township: Range: Meridian:

River Lot

River Lot Number:

Parish

Parish Number:

Settlement

Settlement Number:

GPS Coordinates

Latitude: Longitude:

Additional Information

Additional Information:

Environmental File Search Request Form

Program	File	Status	Licence/Permit/Operation ID/Operation Name ("+" in lower right corner of field indicates more information. Click to expand field.)
Environmental Act Licence or Permit	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
DGHT Act Licence or Permit	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Registered Hazardous Waste Generator	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Registered Petroleum Storage Site	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Permitted/Registered Manure Storage Facility or Confined Livestock Area	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Contaminated/ Impacted Site	☐ Yes ☑ No	☑ Not Designated ☐ Designated Contaminated ☐ Designated Impacted	The Contaminated/Impacted Site Program does not have a file on the site. This site is not a designated contaminated or impacted site pursuant to The Contaminated Sites Remediation Act.
Orders (Environmental Protection Order, Emergency Notice, Director's Order, or Environmental Order)	☐ Yes ☑ No		

Disclaimer: This response summarizes the information found in current records maintained by the Department of Conservation and Climate and is for informational purposes only. No representation or responsibility is assumed whatsoever as to the completeness of this information as it relates to the environmental condition or prior incidents associated with the property in question. In order to obtain more complete information on the property, persons may wish to retain the services of a qualified consultant for the purposes of conducting an environmental audit.

Additional Comments:

Information is based on the roll number provided.

Manitoba

Environmental File Search Request Form

Search Requested By

Name: Cassie Bujan

Company Name: WSP Canada Inc.

Email: cassie.bujan@wsp.com

Phone Number: 204-999-8512

Responder

Environment Officer: Kaitlin Sawisky

Date Completed: 2022-11-02

Environment Officer Phone Number: 204-914-8404

Office Use

Date Received: 2022-10-26

File Search #: 6245

Total Fees: 1386.00

Order Number: mhp22298142953p62

Environmental File Search Request Form

Property Information #2

Business Name(s)/Property Owner: The City of Winnipeg

Business Type: Vacant land

Corporate File Number:

Legal Land Description

Municipality: Winnipeg - City of Winnipeg

Roll Number: 7092321000 File Number:

Nearest Road/Street Intersection: Oak Point Highway and Selkirk Avenue

Civic Address

Street Address: Postal Code:

911 Address

Street Address: Postal Code:

Lot, Block, Plan

Lot: 49 Block: NA Plan: 24342

Section, Township, Range

Quarter Section: Section Information:

Section: Township: Range: Meridian:

River Lot

River Lot Number:

Parish

Parish Number:

Settlement

Settlement Number:

GPS Coordinates

Latitude: Longitude:

Additional Information

Additional Information:

Property is just north of the adjacent railroad.

Environmental File Search Request Form

Program	File	Status	Licence/Permit/Operation ID/Operation Name ("+" in lower right corner of field indicates more information. Click to expand field.)
Environmental Act Licence or Permit	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
DGHT Act Licence or Permit	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Registered Hazardous Waste Generator	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Registered Petroleum Storage Site	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Permitted/Registered Manure Storage Facility or Confined Livestock Area	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Contaminated/ Impacted Site	☐ Yes ☑ No	☑ Not Designated ☐ Designated Contaminated ☐ Designated Impacted	The Contaminated/Impacted Site Program does not have a file on the site. This site is not a designated contaminated or impacted site pursuant to The Contaminated Sites Remediation Act.
Orders (Environmental Protection Order, Emergency Notice, Director's Order, or Environmental Order)	☐ Yes ☑ No		

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Additional Comments:

Information is based on the roll number provided.

Manitoba

Environmental File Search Request Form

Search Requested By

Name: Cassie Bujan

Company Name: WSP Canada Inc.

Email: cassie.bujan@wsp.com

Phone Number: 204-999-8512

Responder

Environment Officer: Kaitlin Sawisky

Date Completed: 2022-11-02

Environment Officer Phone Number: 204-914-8404

Office Use

Date Received: 2022-10-26

File Search #: 6246

Total Fees: 1386.00

Order Number: mhp22298142953p62

Environmental File Search Request Form

Property Information #3

Business Name(s)/Property Owner: The City of Winnipeg

Business Type: Vacant land

Corporate File Number:

Legal Land Description

Municipality: Winnipeg - City of Winnipeg

Roll Number: 7092308000 File Number:

Nearest Road/Street Intersection: Oak Point Highway and Selkirk Avenue

Civic Address

Street Address: Postal Code:

911 Address

Street Address: Postal Code:

Lot, Block, Plan

Lot: 50 Block: NA Plan: 24342

Section, Township, Range

Quarter Section: Section Information:

Section: Township: Range: Meridian:

River Lot

River Lot Number:

Parish

Parish Number:

Settlement

Settlement Number:

GPS Coordinates

Latitude: Longitude:

Additional Information

Additional Information:

North of property 7092313000 (Lot 51, Plan 24342).

Environmental File Search Request Form

Program	File	Status	Licence/Permit/Operation ID/Operation Name ("+" in lower right corner of field indicates more information. Click to expand field.)
Environmental Act Licence or Permit	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
DGHT Act Licence or Permit	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Registered Hazardous Waste Generator	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Registered Petroleum Storage Site	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Permitted/Registered Manure Storage Facility or Confined Livestock Area	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Contaminated/ Impacted Site	☐ Yes ☑ No	☑ Not Designated ☐ Designated Contaminated ☐ Designated Impacted	The Contaminated/Impacted Site Program does not have a file on the site. This site is not a designated contaminated or impacted site pursuant to The Contaminated Sites Remediation Act.
Orders (Environmental Protection Order, Emergency Notice, Director's Order, or Environmental Order)	☐ Yes ☑ No		

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Additional Comments:

Information is based on the roll number provided.

Environmental File Search Request Form

Search Requested By

Name: Cassie Bujan

Company Name: WSP Canada Inc.

Email: cassie.bujan@wsp.com

Phone Number: 204-999-8512

Responder

Environment Officer: Kaitlin Sawisky

Date Completed: 2022-11-02

Environment Officer Phone Number: 204-914-8404

Office Use

Date Received: 2022-10-26

File Search #: 6247

Total Fees: 1386.00

Order Number: mhp22298142953p62

Environmental File Search Request Form

Property Information #4

Business Name(s)/Property Owner: The City of Winnipeg

Business Type: Mines and minerals

Corporate File Number:

Legal Land Description

Municipality: Winnipeg - City of Winnipeg

Roll Number: 7092313000 File Number:

Nearest Road/Street Intersection: Oak Point Highway and Selkirk Avenue

Civic Address

Street Address: Postal Code:

911 Address

Street Address: Postal Code:

Lot, Block, Plan

Lot: 51 Block: NA Plan: 24342

Section, Township, Range

Quarter Section: Section Information:

Section: Township: Range: Meridian:

River Lot

River Lot Number:

Parish

Parish Number:

Settlement

Settlement Number:

GPS Coordinates

Latitude: Longitude:

Additional Information

Additional Information:

North of the railroad and east of adjacent property 7092321000 (Lot 49, Plan 24342).

Environmental File Search Request Form

Program	File	Status	Licence/Permit/Operation ID/Operation Name ("+" in lower right corner of field indicates more information. Click to expand field.)
Environmental Act Licence or Permit	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
DGHT Act Licence or Permit	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Registered Hazardous Waste Generator	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Registered Petroleum Storage Site	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Permitted/Registered Manure Storage Facility or Confined Livestock Area	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Contaminated/ Impacted Site	☐ Yes ☑ No	☑ Not Designated ☐ Designated Contaminated ☐ Designated Impacted	The Contaminated/Impacted Site Program does not have a file on the site. This site is not a designated contaminated or impacted site pursuant to The Contaminated Sites Remediation Act.
Orders (Environmental Protection Order, Emergency Notice, Director's Order, or Environmental Order)	☐ Yes ☑ No		

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Additional Comments:

Information is based on the roll number provided.

Manitoba

Environmental File Search Request Form

Search Requested By

Name: Cassie Bujan

Company Name: WSP Canada Inc.

Email: cassie.bujan@wsp.com

Phone Number: 204-999-8512

Responder

Environment Officer: Kaitlin Sawisky

Date Completed: 2022-11-02

Environment Officer Phone Number: 204-914-8404

Office Use

Date Received: 2022-10-26

File Search #: 6248

Total Fees: 1386.00

Order Number: mhp22298142953p62

Environmental File Search Request Form

Property Information #5

Business Name(s)/Property Owner: Miracle Property Developers LTD.

Business Type: Mines, Minerals

Corporate File Number:

Legal Land Description

Municipality: Winnipeg - City of Winnipeg

Roll Number: 7092163000 File Number:

Nearest Road/Street Intersection: Oak Point Highway and Selkirk Avenue

Civic Address

Street Address: Postal Code:

911 Address

Street Address: Postal Code:

Lot, Block, Plan

Lot: 52 56 57 Block: NA Plan: 24342

Section, Township, Range

Quarter Section: Section Information:

Section: Township: Range: Meridian:

River Lot

River Lot Number:

Parish

Parish Number:

Settlement

Settlement Number:

GPS Coordinates

Latitude: Longitude:

Additional Information

Additional Information:

Three lot numbers 52, 56, 57.

Environmental File Search Request Form

Program	File	Status	Licence/Permit/Operation ID/Operation Name *("+" in lower right corner of field indicates more information. Click to expand field.)*
Environmental Act Licence or Permit	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
DGHT Act Licence or Permit	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Registered Hazardous Waste Generator	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Registered Petroleum Storage Site	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Permitted/Registered Manure Storage Facility or Confined Livestock Area	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Contaminated/ Impacted Site	☐ Yes ☑ No	☑ Not Designated ☐ Designated Contaminated ☐ Designated Impacted	The Contaminated/Impacted Site Program does not have a file on the site. This site is not a designated contaminated or impacted site pursuant to The Contaminated Sites Remediation Act.
Orders (Environmental Protection Order, Emergency Notice, Director's Order, or Environmental Order)	☐ Yes ☑ No		

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Additional Comments:

Information is based on the roll number provided.

Manitoba

Environmental File Search Request Form

Search Requested By

Name: Cassie Bujan

Company Name: WSP Canada Inc.

Email: cassie.bujan@wsp.com

Phone Number: 204-999-8512

Responder

Environment Officer: Kaitlin Sawisky

Date Completed: 2022-11-02

Environment Officer Phone Number: 204-914-8404

Office Use

Date Received: 2022-10-26

File Search #: 6249

Total Fees: 1386.00

Order Number: mhp22298142953p62

Environmental File Search Request Form

Property Information #6

Business Name(s)/Property Owner: The City of Winnipeg

Business Type: Mines and minerals

Corporate File Number:

Legal Land Description

Municipality: Winnipeg - City of Winnipeg

Roll Number: 7092238000 File Number:

Nearest Road/Street Intersection: Oak Point Highway and Selkirk Avenue

Civic Address

Street Address: Postal Code:

911 Address

Street Address: Postal Code:

Lot, Block, Plan

Lot: 53 Block: NA Plan: 24342

Section, Township, Range

Quarter Section: Section Information:

Section: Township: Range: Meridian:

River Lot

River Lot Number:

Parish

Parish Number:

Settlement

Settlement Number:

GPS Coordinates

Latitude: Longitude:

Additional Information

Additional Information:

North of the adjacent railroad.

Environmental File Search Request Form

Program	File	Status	Licence/Permit/Operation ID/Operation Name ("+" in lower right corner of field indicates more information. Click to expand field.)
Environmental Act Licence or Permit	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
DGHT Act Licence or Permit	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Registered Hazardous Waste Generator	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Registered Petroleum Storage Site	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Permitted/Registered Manure Storage Facility or Confined Livestock Area	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Contaminated/ Impacted Site	☐ Yes ☑ No	☑ Not Designated ☐ Designated Contaminated ☐ Designated Impacted	The Contaminated/Impacted Site Program does not have a file on the site. This site is not a designated contaminated or impacted site pursuant to The Contaminated Sites Remediation Act.
Orders (Environmental Protection Order, Emergency Notice, Director's Order, or Environmental Order)	☐ Yes ☑ No		

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Additional Comments:

Information is based on the roll number provided.

Manitoba

Environmental File Search Request Form

Search Requested By

Name: Cassie Bujan

Company Name: WSP Canada Inc.

Email: cassie.bujan@wsp.com

Phone Number: 204-999-8512

Responder

Environment Officer: Kaitlin Sawisky

Date Completed: 2022-11-01

Environment Officer Phone Number: 204-914-8404

Office Use

Date Received: 2022-10-26

File Search #: 6251

Total Fees: 1386.00

Order Number: mhp22298142953p62

Environmental File Search Request Form

Property Information #8

Business Name(s)/Property Owner: The City of Winnipeg

Business Type: Mines and minerals

Corporate File Number:

Legal Land Description

Municipality: Winnipeg - City of Winnipeg

Roll Number: 7092190000 File Number:

Nearest Road/Street Intersection: Oak Point Highway and Selkirk Avenue

Civic Address

Street Address: Postal Code:

911 Address

Street Address: Postal Code:

Lot, Block, Plan

Lot: 55 Block: NA Plan: 24342

Section, Township, Range

Quarter Section: Section Information:

Section: Township: Range: Meridian:

River Lot

River Lot Number:

Parish

Parish Number:

Settlement

Settlement Number:

GPS Coordinates

Latitude: Longitude:

Additional Information

Additional Information:

North of the adjacent railroad

Environmental File Search Request Form

Program	File	Status	Licence/Permit/Operation ID/Operation Name ("+" in lower right corner of field indicates more information. Click to expand field.)
Environmental Act Licence or Permit	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
DGHT Act Licence or Permit	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Registered Hazardous Waste Generator	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Registered Petroleum Storage Site	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Permitted/Registered Manure Storage Facility or Confined Livestock Area	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Contaminated/ Impacted Site	☐ Yes ☑ No	☑ Not Designated ☐ Designated Contaminated ☐ Designated Impacted	The Contaminated/Impacted Site Program does not have a file on the site. This site is not a designated contaminated or impacted site pursuant to The Contaminated Sites Remediation Act.
Orders (Environmental Protection Order, Emergency Notice, Director's Order, or Environmental Order)	☐ Yes ☑ No		

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Additional Comments:

Information is based on the roll number provided.

Manitoba

Environmental File Search Request Form

Search Requested By

Name: Cassie Bujan

Company Name: WSP Canada Inc.

Email: cassie.bujan@wsp.com

Phone Number: 204-999-8512

Responder

Environment Officer: Kaitlin Sawisky

Date Completed: 2022-11-01

Environment Officer Phone Number: 204-914-8404

Office Use

Date Received: 2022-10-26

File Search #: 6252

Total Fees: 1386.00

Order Number: mhp22298142953p62

Environmental File Search Request Form

Property Information #9

Business Name(s)/Property Owner: Imperial Oil Limited

Business Type: Gas and oil

Corporate File Number:

Legal Land Description

Municipality: Winnipeg - City of Winnipeg

Roll Number: 7092127100 File Number:

Nearest Road/Street Intersection: Oak Point Highway and Selkirk Avenue

Civic Address

Street Address: Postal Code:

911 Address

Street Address: Postal Code:

Lot, Block, Plan

Lot: 58 Block: NA Plan: 24342

Section, Township, Range

Quarter Section: Section Information:

Section: Township: Range: Meridian:

River Lot

River Lot Number:

Parish

Parish Number:

Settlement

Settlement Number:

GPS Coordinates

Latitude: Longitude:

Additional Information

Additional Information:

South of the Oak Point Highway and Selkirk Avenue intersection

Environmental File Search Request Form

Program	File	Status	Licence/Permit/Operation ID/Operation Name *("+" in lower right corner of field indicates more information. Click to expand field.)*
Environmental Act Licence or Permit	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
DGHT Act Licence or Permit	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Registered Hazardous Waste Generator	☑ Yes ☐ No	☑ Operating ☐ Decomissioned ☐ Inactive	OPID: 16025 - OAK POINT ESSO - Operating - MBG02888 - (100 Oak Point Highway)
Registered Petroleum Storage Site	☑ Yes ☐ No	☐ Operating ☐ Decomissioned ☑ Inactive	OPID: 21657 - OAK POINT ESSO CARDLOCK - Petroleum - Mothballed - (100 Oak Point Highway)
Permitted/Registered Manure Storage Facility or Confined Livestock Area	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Contaminated/ Impacted Site	☑ Yes ☐ No	☐ Not Designated ☐ Designated Contaminated ☑ Designated Impacted	Operation 73438, Imperial Oil Retail and Cardlock, 100 Oak Point Hwy: this site is a designated impacted site pursuant to The Contaminated Sites Remediation Act.
Orders (Environmental Protection Order, Emergency Notice, Director's Order, or Environmental Order)	☐ Yes ☑ No		

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Additional Comments:

This information is based on the roll number provided.

Manitoba

Environmental File Search Request Form

Search Requested By

Name: Cassie Bujan

Company Name: WSP Canada Inc.

Email: cassie.bujan@wsp.com

Phone Number: 204-999-8512

Responder

Environment Officer: Kaitlin Sawisky

Date Completed: 2022-11-02

Environment Officer Phone Number: 204-914-8404

Office Use

Date Received: 2022-10-26

File Search #: 6253

Total Fees: 1386.00

Order Number: mhp22298142953p62

Environmental File Search Request Form

Property Information #10

Business Name(s)/Property Owner: 7380586 Manitoba LTD.

Business Type: Mines and minerals

Corporate File Number:

Legal Land Description

Municipality: Winnipeg - City of Winnipeg

Roll Number: 7569036700 File Number:

Nearest Road/Street Intersection: Oak Point Highway and Selkirk Avenue

Civic Address

Street Address: Postal Code:

911 Address

Street Address: Postal Code:

Lot, Block, Plan

Lot: 61 Block: NA Plan: 24342

Section, Township, Range

Quarter Section: Section Information:

Section: Township: Range: Meridian:

River Lot

River Lot Number:

Parish

Parish Number:

Settlement

Settlement Number:

GPS Coordinates

Latitude: Longitude:

Additional Information

Additional Information:

Environmental File Search Request Form

Program	File	Status	Licence/Permit/Operation ID/Operation Name ("+" in lower right corner of field indicates more information. Click to expand field.)
Environmental Act Licence or Permit	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
DGHT Act Licence or Permit	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Registered Hazardous Waste Generator	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Registered Petroleum Storage Site	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Permitted/Registered Manure Storage Facility or Confined Livestock Area	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Contaminated/ Impacted Site	☐ Yes ☑ No	☑ Not Designated ☐ Designated Contaminated ☐ Designated Impacted	The Contaminated/Impacted Site Program does not have a file on the site. This site is not a designated contaminated or impacted site pursuant to The Contaminated Sites Remediation Act.
Orders (Environmental Protection Order, Emergency Notice, Director's Order, or Environmental Order)	☐ Yes ☑ No		

Disclaimer: This response summarizes the information found in current records maintained by the Department of Conservation and Climate and is for informational purposes only. No representation or responsibility is assumed whatsoever as to the completeness of this information as it relates to the environmental condition or prior incidents associated with the property in question. In order to obtain more complete information on the property, persons may wish to retain the services of a qualified consultant for the purposes of conducting an environmental audit.

Additional Comments:

Information is based on the roll number provided.

Environmental File Search Request Form

Search Requested By

Name: Cassie Bujan
Company Name: WSP Canada Inc.

Email: cassie.bujan@wsp.com
Phone Number: 204-999-8512

Responder

Environment Officer: Kaitlin Sawisky
Date Completed: 2022-11-02

Environment Officer Phone Number: 204-914-8404

Office Use

Date Received: 2022-10-26
File Search #: 6254

Total Fees: 1386.00
Order Number: mhp22298142953p62

Environmental File Search Request Form

Property Information #11

Business Name(s)/Property Owner: Paul Erik Albrechtsen

Business Type: Mines and minerals

Corporate File Number:

Legal Land Description

Municipality: Winnipeg - City of Winnipeg

Roll Number: 14096344100 File Number:

Nearest Road/Street Intersection: Oak Point Highway and Selkirk Avenue

Civic Address

Street Address: Postal Code:

911 Address

Street Address: Postal Code:

Lot, Block, Plan

Lot: PT7 Block: NA Plan: 9218

Section, Township, Range

Quarter Section: Section Information:

Section: Township: Range: Meridian:

River Lot

River Lot Number:

Parish

Parish Number:

Settlement

Settlement Number:

GPS Coordinates

Latitude: Longitude:

Additional Information

Additional Information:

South of Oak Point Highway

Environmental File Search Request Form

Program	File	Status	Licence/Permit/Operation ID/Operation Name ("+" in lower right corner of field indicates more information. Click to expand field.)
Environmental Act Licence or Permit	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
DGHT Act Licence or Permit	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Registered Hazardous Waste Generator	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Registered Petroleum Storage Site	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Permitted/Registered Manure Storage Facility or Confined Livestock Area	☐ Yes ☑ No	☐ Operating ☐ Decomissioned ☐ Inactive	
Contaminated/ Impacted Site	☐ Yes ☑ No	☑ Not Designated ☐ Designated Contaminated ☐ Designated Impacted	The Contaminated/Impacted Site Program does not have a file on the site. This site is not a designated contaminated or impacted site pursuant to The Contaminated Sites Remediation Act.
Orders (Environmental Protection Order, Emergency Notice, Director's Order, or Environmental Order)	☐ Yes ☑ No		

Disclaimer: This response summarizes the information found in current records maintained by the Department of Conservation and Climate and is for informational purposes only. No representation or responsibility is assumed whatsoever as to the completeness of this information as it relates to the environmental condition or prior incidents associated with the property in question. In order to obtain more complete information on the property, persons may wish to retain the services of a qualified consultant for the purposes of conducting an environmental audit.

Additional Comments:

Information is based on the roll number provided.

APPENDIX

F

CONDITIONS AND LIMITATIONS

STANDARD LIMITATIONS OF LIABILITY

WSP Canada Inc. (“WSP”) prepared this report solely for the use of the intended recipient, City of Winnipeg, in accordance with the professional services agreement between the parties. In the event a contract has not been executed, the parties agree that the WSP General Terms for Consultant shall govern their business relationship which was provided to you prior to the preparation of this report.

The report is intended to be used in its entirety. No excerpts may be taken to be representative of the findings in the assessment.

The conclusions presented in this report are based on work performed by trained, professional and technical staff, in accordance with their reasonable interpretation of current and accepted engineering and scientific practices at the time the work was performed.

The content and opinions contained in the present report are based on the observations and/or information available to WSP at the time of preparation, using investigation techniques and engineering analysis methods consistent with those ordinarily exercised by WSP and other engineering/scientific practitioners working under similar conditions, and subject to the same time, financial and physical constraints applicable to this project.

WSP disclaims any obligation to update this report if, after the date of this report, any conditions appear to differ significantly from those presented in this report; however, WSP reserves the right to amend or supplement this report based on additional information, documentation or evidence.

WSP makes no other representations whatsoever concerning the legal significance of its findings.

The intended recipient is solely responsible for the disclosure of any information contained in this report. If a third party makes use of, relies on, or makes decisions in accordance with this report, said third party is solely responsible for such use, reliance or decisions. WSP does not accept responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken by said third party based on this report.

WSP has provided services to the intended recipient in accordance with the professional services agreement between the parties and in a manner consistent with that degree of care, skill and diligence normally provided by members of the same profession performing the same or comparable services in respect of projects of a similar nature in similar circumstances. It is understood and agreed by WSP and the recipient of this report that WSP provides no warranty, express or implied, of any kind. Without limiting the generality of the foregoing, it is agreed and understood by WSP and the recipient of this report that WSP makes no representation or warranty whatsoever as to the sufficiency of its scope of work for the purpose sought by the recipient of this report.

In preparing this report, WSP has relied in good faith on information provided by others, as noted in the report. WSP has reasonably assumed that the information provided is correct and WSP is not responsible for the accuracy or completeness of such information.

Benchmark and elevations used in this report are primarily to establish relative elevation differences between the specific testing and/or sampling locations and should not be used for other purposes, such as grading, excavating, construction, planning, development, etc.

disclaims any responsibility for consequential financial effects on transactions or property values, or requirements for follow-up actions /or costs.

The original of this digital file will be kept by WSP for a period of not less than 10 years. As the digital file transmitted to the intended recipient is no longer under the control of WSP, its integrity cannot be assured. As such, WSP does not guarantee any modifications made to this digital file subsequent to its transmission to the intended recipient.

This limitations statement is considered an integral part of this report.

CITY OF WINNIPEG
PROJECT NUMBER: 221-07203-00

PHASE II ENVIRONMENTAL SITE ASSESSMENT

100 Oak Point Highway, Winnipeg, Manitoba

February 21, 2023

DRAFT

PHASE II ENVIRONMENTAL SITE ASSESSMENT 100 OAK POINT HIGHWAY, WINNIPEG, MANITOBA

CITY OF WINNIPEG

PROJECT NO.: 221-07203-00
DATE: FEBRUARY 21, 2023

DRAFT

WSP CANADA INC.
1600 BUFFALO PLACE
WINNIPEG, MB, CANADA, R3T 6B8

WSP.COM

February 21, 2023

Mr. Adolfo Laufer
Asset Management Office
Transit Department
4th Floor – 510 Main Street
Winnipeg, Manitoba R3A 0J8

Dear Mr. Laufer:

Subject: Phase II Environmental Site Assessment – 100 Oak Point Highway, Winnipeg, Manitoba

WSP Canada Inc. (WSP) was retained by City of Winnipeg (the Client) to conduct a Phase II Environmental Site Assessment of the commercial property located at 100 Oak Point Highway, Winnipeg, Manitoba.

Please accept the submission of the following report:

- Phase II Environmental Site Assessment – 100 Oak Point Highway, Winnipeg, Manitoba.

If you have any questions or concerns, please contact the undersigned at your convenience at (204) 259-1679 or Alfred.chan@wsp.com.

Yours sincerely,

Alfred Chan, B.Sc., P.Geo.
Project Manager, WSP Earth & Environment

AC/jk
Encl. — Phase II Environmental Site Assessment – 100 Oak Point Highway, Winnipeg, Manitoba
cc:
WSP ref.:221-07203-00

QUALITY MANAGEMENT

ISSUE/REVISION	FIRST ISSUE	REVISION 1	FINAL
Remarks			
Date	February 21, 2023		
Prepared by	Jeremiah Kevin		
Signature			
Checked by	Alfred Chan		
Signature			
Checked by	Darren Keam		
Signature			
Project number	221-07203-00		
Report number	Draft		

SIGNATURES

PREPARED BY

DRAFT

Jeremiah Kevin, B.Env.Sc.
Project Scientist

REVIEWED BY

DRAFT

Alfred Chan, B.Sc. Geol., P.Geo., PMP
Project Manager

DRAFT

Darren Keam, M.Sc., P.Ag.
Senior Reviewer

PRODUCTION TEAM

CLIENT

City of Winnipeg

CLIENT CONTACT

Project Manager Asset Management Office Transit Department City of Winnipeg	Mr. Adolfo Laufer

WSP

Regional Manager / Senior Reviewer	Darren Keam, M.Sc., P.Ag.
Project Manager / Technical Reviewer	Alfred Chan, B.Sc., P.Geo., PMP
Project Scientist	Jeremiah Kevin, B.Sc.
GIS / Mapping Technician	Jeff Heck

SUBCONSULTANTS

Analytical Services	ALS Global Environmental
Private Utility Locates	Structure Scan Inc.
Drilling Contractor	Maple Leaf Drilling Ltd.

EXECUTIVE SUMMARY

WSP Canada Inc. (WSP) was retained by City of Winnipeg (The Client) to conduct a Phase II Environmental Site Assessment (ESA) on a vacant commercial property located at 100 Oak Point Highway, Winnipeg, Manitoba, herein referred to as the "Site". The field activities for the investigation were conducted at the Site on January 25 to 27 and February 10, 2023. The objective of this Phase II ESA is to determine and investigate the presence or absence of residual petroleum hydrocarbon (PHC) and metal impacts associated with the historic operation of 100 Oak Point Highway as a former Imperial Oil retail fuel outlet and cardlock facility.

Summary of Findings

Field Activities and Observations

The drilling program was conducted on-site on January 25 to 27, and a WSP Project Scientist visited the Site on February 1, 2023, to conduct monitoring well survey, groundwater monitoring and sampling activities. A total of ten (10) boreholes were advanced to 6.1 and 4.57 metres below ground surface (mbgs) across the Site and four (4) were completed into monitoring wells to a depth of 4.57 mbgs.

The following observations were noted during on-site field activities:

- The soil stratigraphy existing on-site is predominantly clay with increased silt content, mottled, hematized silt pockets below 2.29 to 6.10 mbgs.
- Surface sandy gravel aggregate fill or asphalt pavement were observed in several borehole locations throughout the Site with the exception of MW12 where native clay was observed and TH05 and TH06 where sand fill material was observed to a depth of approximately 1.52 mbgs.
- Frozen soil conditions encountered during drilling was observed in all ten (10) boreholes, generally extending to 1.22 mbgs.
- All monitoring wells were assessed five (5) days after installation and have ample groundwater for sampling with the exception of MW11 where the well was observed to be dry.
- Depths to the shallow groundwater table were measured at all monitoring well locations; MW01, MW03, and MW12 were measured to be 2.185, 0.886, and 2.834 metres below the top of casing (mbtoc) respectively.
- PHC odour was observed during drilling and soil sampling at boreholes TH03, TH07 and TH08, no soil discolouration was observed.
- Elevated soil headspace vapour measurements in the methane elimination (HEX) mode and isobutylene (IBL) mode using the RKI Eagle vapour analyzer was encountered at boreholes MW03, TH10, TH08 and TH07. The highest reading was encountered at borehole TH08 at the depth of 1.52 mbg with a reading of 90 ppm in HEX mode and 263 ppm in IBL mode, consistent with high PHC concentrations confirmed through laboratory analytical results.

Analytical Results

Soil Analytical Results

Laboratory analytical results of two soil samples obtained respectively from TH07-S3 and TH08-S2 reported exceedances of PHC F2 and F3, suggesting diesel fuel as a likely contaminant source. An exceedance of fluorene in a soil sample collected from TH08 is likely associated with diesel impacts. PHC odour without visible staining was noted during soil sampling in MW03, TH07, and TH08. The locations of borehole TH07 and TH08 is located adjacent to the historic location of the cardlock pump island UST nest towards the centre of the property, consistent with diesel fuel storage servicing the cardlock pump islands.

Two discrete soil impact plumes were inferred – the larger one covers an approximate area of 1,200 m^2 and extends from the cardlock pump island UST nest from the centre of the property towards the north following the inferred groundwater flow direction. The smaller soil impact plume estimated at approximately 400 m^2 extends from the north UST nest adjacent to the former canopy pump islands and extends north under the pavement curb towards Oak Point Highway. Based on an estimated depth of impact extending from 0.8 mbgs to 3.43 mbgs, the volumes of impacted soil for each of the PHC soil impact plumes would be approximately 3,200 m^3 and 1,000 m^3. Unimpacted overburden soil is estimated to be approximately 1,300 m^3.

An exceedance of total copper and total arsenic was reported from soil samples collected from borehole TH08 at 1.52 mbgs and 3.81 mbgs respectively.

No exceedances of metals were reported from soil samples collected from borehole MW12 located at the southwest corner of the property advanced for the purpose of investigating metal exceedances identified by Parsons in previous environmental investigations on-site.

Groundwater Analytical Results

Groundwater samples collected from monitoring well MW03 reported concentrations PHC F2 and F3 exceeding the applied guidelines. The field duplicate groundwater sample collected for DUP-GW-1 also reported similar values. Detectable concentrations of PHC F2 were also noted from monitoring well MW01 but did not exceed the applied guidelines. No visible film or sheen was observed in all purged groundwater.

Groundwater samples from monitoring well MW12 reported concentrations of dissolved beryllium, copper, lead, molybdenum, sodium, and vanadium exceeding applicable guidelines. Groundwater sample collected for DUP-GW-2 analyzed for dissolved metals also reporting similar exceedances with the exception of dissolved copper not exceeding the guideline value in the field duplicate.

Conclusions

This Phase II ESA has successfully achieved the objective in determining the presence of residual soil and groundwater impact from the former operation of the Site as an Imperial Oil Retail Fuel Outlet.

Exceedances of PHC F2 to F3 in soil samples collected by Parsons in previous environmental investigations have been verified through this Phase II ESA. Two discrete PHC soil impact plumes inferred from the combined consideration of soil analytical data collected from previous environmental investigation by others and from this Phase II ESA suggests that the approximate total volume of PHC impacted soil on-site is estimated to be 4,200 m^3.

Exceedances of PHC F2 to F3 in groundwater samples collected from MW03 during this Phase II ESA and the lack of PHC exceedances in groundwater analytical results from monitoring wells included in the 2017 and 2018 groundwater monitoring events conducted by Parsons allowed for the inference of a groundwater impact plume with an approximate area of 560 m^2 located at the northeast corner of the Site.

Based on the inferred groundwater flow direction, PHC impacted soil and groundwater may extend north off-site towards Oak Point Highway.

Metal impacts in exceedance of guidelines (arsenic, nickel, copper, lead, selenium, and zinc) previously identified by Parsons in soil samples collected between 1.2 mbgs to 3.7 mbgs along the south Site boundary (Parsons, 2015) were not observed in the soil sample submitted by WSP collected from the southern portion of the Site for metal analyses during this Phase II ESA. This could be due to the limited number of samples collected from the southern portion of the Site in this Phase II ESA, and the apparent localised occurrence of metal impacts in soil previously identified as exhibiting the greatest concentration at the top of the groundwater table (Parsons, 2019). However, dissolved metal exceedances (dissolved beryllium, copper, lead, molybdenum, sodium, and vanadium) were reported from the groundwater sample collected from monitoring well MW12 installed at the southwestern corner of the Site during this Phase II ESA, suggesting that elevated metal concentrations in soil previously identified in the southern portion of the Site may indeed be associated with groundwater transport and chemistry.

Recommendations

Based on the Site characterization and the Phase II ESA, WSP recommends the following:

1) As the inferred soil and groundwater PHC impact plumes have been delineated to extend towards the north Site boundary, it is unknown as to the extent of impacts that have migrated off-site towards Oak Point Highway. Therefore, WSP recommends a Supplemental Phase II ESA to further define the existing soil and groundwater impact plumes for both on-site impacts and off-site towards Oak Point Highway.
2) As this Site is currently listed under the Contaminated Sites Remediation Act with a file #73438, the submission of the final Phase II ESA report to Manitoba Environment and Climate (MEC) is required for record-keeping purposes.
3) Prior to any remedial activities conducted on-site, confirm that a Remedial Plan has been developed and submitted to MEC for approval. Remediation cannot proceed prior to Director authorization (typical authorization is provided within one to two weeks).
    a. A Remedial Plan is a comprehensive approach to mitigation of risks associated with the contamination identified in the soil and groundwater that is site specific and protects both human and environmental health. A remedial plan can implement a variety of approaches depending on site specific characteristics including passive (risk assessment and monitoring), containment and isolation (barriers and ventilation), removal for treatment (e.g., excavation), and in-situ treatment.
    b. A Remedial Plan will outline the proposed procedures and methods, target remediation criteria, quantities of contaminated soil and groundwater, soil management plan, schedule, reporting and monitoring requirements and any other significant requirements of the plan.
4) Prior to any future excavation or development of the Site, a health and safety plan should be developed and implemented to address potential residual soil and groundwater impacts that may be encountered.
5) If any odours, colour changes or staining is encountered during sub-surface disturbance, future excavation or development of the Site, an environmental professional should provide guidance and construction environmental monitoring before proceeding.

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1 INTRODUCTION

WSP Canada Inc. (WSP) was previously retained by the City of Winnipeg (the Client) to conduct a Phase I ESA of a Study Area inclusive of the location of the former Brooklands Landfill and an east adjacent property of interest ("POI") formerly occupied by Imperial Oil. The scope of work in this Phase II Environmental Site Assessment (ESA) focuses only on the POI with the parcel description Lot 58, Plan 24342 WLTO, and the civic address 100 Oak Point Highway, Winnipeg, Manitoba, herein after referred to as the "Site". The POI has been identified as one of five areas of potential environmental concern (APEC) in the Phase I ESA study area, as described in the Phase I ESA report submitted to the City of Winnipeg on January 24, 2023.

The objective of this Phase II ESA is to determine and investigate the presence or absence of residual petroleum hydrocarbon (PHC) and metal impacts associated with the historic operation of 100 Oak Point Highway as a former Imperial Oil retail fuel outlet and cardlock facility.

All figures and all tables not included in the body of the report text are provided in Appendix A and B, respectively. Additional information is provided in the following appendices: Photographs (Appendix C), Borehole and Monitoring Well Logs (Appendix D), Supporting Documents (Appendix E), Laboratory Certificates of Analysis and Chain of Custody Documents (Appendix F) and Standard Limitations for the Phase II ESA conducted by WSP (Appendix G).

1.1 BACKGROUND

A Phase I ESA previously completed by WSP (2023) of a study area inclusive of the former Brooklands Landfill and the POI identified five Areas of Potential Environmental Concern (APEC). Based on historically potentially contaminating activities, the former Imperial Oil Retail Fuel Outlet and cardlock facility, with a civic address of 100 Oak point Highway, was identified as the fifth APEC in the Phase I ESA study. The Site was identified as an APEC due to the following reasons:

- The former Imperial Oil retail fuel outlet and cardlock facility was a POI in the Phase I ESA. It does not appear on aerial photos until 2002 where there appears to be canopy-covered pump islands and approximately four (4) cardlock semi-truck gas stations to the south. Previous environmental reports indicate that the Imperial Oil Retail Fuel Outlet and cardlock facility was in operation from approximately 1988 to approximately 2012, including a restaurant from the late 1990s to approximately 2012 (Parsons, 2015).
- Potentially contaminating former facilities at the POI consisted of two petroleum warehouse buildings, two 45,456 litre (L) underground storage tank (UST) containing gasoline, one 45,456 L UST containing diesel, and one 36,365 L UST containing diesel, one 9,090 L UST containing wastewater, pump islands, and associated product distribution piping. Contaminants of potential concern (COPCs) include benzene, toluene, ethylbenzene, xylenes (BTEX), PHC fraction 1 to 4 (F1-F4), polycyclic aromatic hydrocarbons (PAH), volatile organic compounds (VOC), and metals.
- Prior to decommissioning the facility in 2015, Parsons was retained by Imperial Oil to conduct assessment excavations around the cardlock pump island to the south, and UST nest to the north. Exceedances of PHC F2 was noted for soil samples collected from the walls of testpit EX-2 advanced around the cardlock UST nest at depths of 1 to 2 mbgs.
- Historic testpits TP-36, TP-21 located along the sidewalk at the north site boundary indicated PHC F2 impacts in exceedance of guidelines. Testpits TP-25, TP-7, TP-8, and TP-19 immediately west, centre and southeast of the cardlock UST nest south of the service building indicated exceedances of PHC F2 and F3. All PHC impacts do not appear to be present past 2.0 mbgs.

WSP reviewed a 2016 Supplemental Phase II Environmental Site Assessment by Parsons. The 2016 Phase II ESA was conducted at the former petroleum retail outlet and cardlock facility located at 100 Oak Point Highway. A total of 13 boreholes were drilled on-site, with a monitoring well installed at each location. Soil samples and groundwater sampling were collected from these boreholes and were analyzed for their concentrations of metals and PAHs. The groundwater potentiometric surface elevations for May 16, 2016 indicated an inferred principal direction of the shallow overburden groundwater flow to the northeast. Seven borehole soil samples indicated metal concentration exceedances to applicable criteria and two boreholes indicated PAH concentration exceedances. No groundwater samples indicated any exceedances for metal or PAHs. Parsons provided no further recommendations for additional investigations following their 2016 Phase II ESA.

1.2 OBJECTIVES

The objective of the WSP Phase II ESA is to investigate the presence or absence of residual PHC impacts associated with the historic operation of 100 Oak Point Highway as a former Imperial Oil retail fuel outlet and cardlock facility APEC and metals associated with historic activities. The Phase II ESA is to verify findings of previous environmental work completed by other consultants, and to provide an updated characterization of the Site's environmental disposition. An intrusive drill investigation program was carried out on-site in support of environmental site characterization through site observations and laboratory analysis of representative soil and groundwater samples collected from boreholes and monitoring wells. All collected analytical data were compared to established soil and groundwater quality standards.

1.3 SCOPE OF INVESTIGATION

The scope of work completed for the Phase II ESA is outlined below:

- Prepared a Sampling and Analysis Plan (SAP) which included information documenting the identification and rationale for sampling media, number of samples, sample frequency, sample depth and location and other information to be obtained during the intrusive investigation.
- A total of ten (10) boreholes with four (4) completed into monitoring wells was deemed sufficient to meet the objective requirements for the Phase II ESA. Four (4) of the boreholes were advanced to 6 m below grade (mbg) at the location of the former pump islands and associated UST nests. The remaining six (6) boreholes were advanced to 4.6 mbg unless visual or olfactory indications of hydrocarbon contamination were observed around 4.6 mbg and a confirmatory soil sample is required from below 4.6 mbg to vertically delineate the extent of soil impacts.
- The following COPC parameters were requested for soil and groundwater samples submitted for laboratory analysis: BTEX, PHC F1-F4, PAH, VOC, and metals.
- Soil stratigraphy was logged for each borehole and sample obtained from each regular depth intervals and/or by stratigraphy. Headspace vapour concentrations were evaluated with an RKI Eagle II vapour analyzer for soil samples.
- WSP submitted for following laboratory analysis:
  - Two (2) samples for soil physical characteristics (texture; 1 borehole x 2 depths);
  - A total of 15 soil samples for BTEX, PHC F1-F4 analysis based on highest in-field soil screening measurements comprised of 13 soil samples and two field duplicates;
  - One soil sample for soil sample for VOC analysis;
  - One soil sample for PAH analysis;
  - A total of 10 soil samples for total metals in soil analysis comprised of 9 soil samples and one field duplicate;
  - A total of four groundwater samples for BTEX, PHC F1-F4, and dissolved metals analyses; comprising of one from each of three monitoring wells with ample groundwater for sampling and a field duplicate; and
  - One trip blank for groundwater sample quality assurance and quality control (QA/QC) will be submitted for BTEX, PHC F1-F4 analysis.
- MEC regulatory requirements for all soil samples collected for analysis of VOCs including BTEX and F1 fraction PHC to be field preserved in methanol immediately after collection. It is prescribed two vials be collected per sample to be analyzed for BTEX/F1 along with a single glass jar with zero headspace for moisture analysis. Additional glass jars and/or polyethylene bags may be required depending upon additional analytical requirements (i.e., moisture and head space analysis).
- Analytical samples were submitted to ALS Global in Winnipeg, Manitoba, a Canadian Association for Laboratory Accreditation Inc. (CALA) credited laboratory. Analytical samples were submitted based on standard turnaround time (5 to 7 days).

— The deliverable is a Phase II ESA report documenting the findings and conclusions. The Phase II ESA report includes a summary of investigation methods, evaluation of laboratory data, summary of Site findings, recommendations (if required), figures, analytical tables, representative photos, borehole logs, supporting documents, laboratory and certificates of analysis.

1.4 DEVIATIONS FROM THE SCOPE OF WORK AND SAMPLING AND ANALYSIS PLAN

Deviations from the Scope of Work and Sampling and Analysis Plan are outlined below.

- **Proposed borehole locations TH04 & TH09**: At the time of the intrusive site investigation, limited drill rig accessibility at the Site due to excessive snow cover and severe weather condition was encountered. Drilling activities were impeded and not all of the proposed borehole location were able to be investigated within the scheduled time frame. Based on the information available from background information, and the current on-site conditions the WSP Project Manager, during the last scheduled day of the drilling program, prioritized the investigation of borehole locations with the greatest potential to identify COPCs based on the location of former infrastructure and accessibility on-site. Therefore, TH04 and THO9 were not completed during the drilling program. As a result, a total of 15 soil samples were submitted for BTEX, PHC F1-F4 analysis instead of the proposed 21 soil samples, and a total of 10 soil samples were submitted for total metals instead of the proposed 11 soil samples.
- **Monitoring well MW11** was observed to be dry during the field program, therefore no groundwater samples for laboratory analyses were available for collection.

2 REGULATORY FRAMEWORK

Contaminated site issues in Manitoba are governed by *The Contaminated Sites Remediation Act, C.C.S.M c. C205 (CSRA)*, and its amendment *The Contaminated Sites Remediation Amendment Act (MCWS, 1996, amended 2014)* and administered by Manitoba Environment and Climate (MEC) Under the *CSRA*, it is prohibited to discharge any substance(s) to the environment, which by their quantity, concentration or characteristics, are harmful to the health of humans or the environment. The intent of the *CSRA* is to protect human health and the environmental resources (air, land, and water) of Manitoba. Where an unlicensed or unpermitted release of material has occurred, the *CSRA* requires the affected area be remediated to mitigate the risk to human health and/or the environment. Section 3.1 of the *CSRA* states that the owner or occupier of a site must notify MEC in writing when they become aware of information that indicates that the site has been contaminated at a level that exceeds a standard established or adopted by regulation (*CSRA*); and provide MEC with all reports and any other documentation in their possession respecting the contamination at the site.

The *CSRA* does not contain actual quality guidelines to be used for site investigation and remediation, however, has adopted reporting standards that are divided into Primary Standards, Secondary Standard and Tertiary Standard. If a standard for a contamination in relation to the applicable site conditions is provided in a primary standard, this standard is to be utilized. If a contaminant is not listed in a primary standard or if none of the primary standards address the applicable site conditions, a secondary standard is to be used if it addresses the specific contaminant and the applicable site conditions. If a contaminant is not listed in the primary or secondary standards or they do not address the applicable site conditions, the tertiary standard is to be used if it addresses the specific contaminant and the applicable site conditions. The environmental quality guidelines adopted by MEC divided into primary, secondary and tertiary standards are as follows:

1. Primary Standards:
   - Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health (CSQG), Canadian Council of Ministers of the Environment (CCME).
   - Canada-wide Standards for Petroleum Hydrocarbons in Soil (PHC CWS) – Technical Supplement, CCME, 2008.
   - Health Canada, Guidelines for Canadian Drinking Water Quality (2020).
2. Secondary Standard:
   - Ontario Ministry of the Environment, Conservation and Parks Site Condition Standards (OMECP SCS): Soil, Groundwater and Sediment Standards (SGWS) for use under Part XV.1 of the *Environmental Protection Act*, OMECP (formerly Ontario Ministry of Environment and Climate Change), 2011.
   - Rationale for the Development of Soil and Ground Water Standards for Use at Contaminated Sites in Ontario, Ontario Ministry of the Environment Standards Development Branch, 2011.
3. Tertiary Standard:
   - Government of Alberta, Alberta Tier 1 Soil and Groundwater Remediation Guidelines 2010 (Updated 2023).

Based on Site characterization, exposure pathways and anticipated potential receptors, which are discussed in more detail in Section 3 of this report, the environmental quality guidelines used in this remediation project are referenced from primary standards. Numerous exposure pathways could be defined for the site through the Site characterization, and therefore WSP decided to apply a guideline based on the most sensitive exposure pathway and receptor that reflects the actual conditions of the Site. The environmental quality guidelines applied to the Site are as follows:

Soil:

- Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health (CSQG), Canadian Council of Ministers of the Environment (CCME).
- Canada-wide Standards for Petroleum Hydrocarbons in Soil (PHC CWS) – Technical Supplement, CCME, 2008.
- Ontario MECP (2011). Soil, Groundwater and Sediment Standards for use Under Part XV.1 of the *Environmental Protection Act*

Groundwater:

- Ontario Ministry of the Environment, Conservation and Parks Site Condition Standards (OMECP SCS): Soil, Groundwater and Sediment Standards (SGWS) for use under Part XV.1 of the *Environmental Protection Act*, OMECP (formerly Ontario Ministry of Environment and Climate Change), 2011.
- Government of Alberta, Alberta Tier 1 Soil and Groundwater Remediation Guidelines 2010 (Updated 2023).

2.1 SOIL QUALITY GUIDELINES APPLIED TO THE SITE

2.1.1 *CANADIAN SOIL QUALITY GUIDELINES FOR THE PROTECTION OF ENVIRONMENTAL AND HUMAN HEALTH (CSQG)*

The CSQG are derived using toxicological data to determine the threshold level to key receptors and are provided for different levels of land use; agricultural, residential/parkland, commercial, and industrial.

In the past MEC has applied both 10^{-6} and 10^{-5} SCG for benzene to sites in Manitoba, the 10^{-6} SQG generally include very conservative risk estimates that may result in decisions on remedial actions which are more stringent than the site conditions require. MEC recognizes this and has outlined that 10^{-5} SQG for benzene will be applied and accepted for both the assessment and remedial phases of site impacts based on site condition requirements.

The land use guidelines for the Site should be selected to protect the most sensitive current or proposed future land use at the Site. Land use criteria for determining the appropriate land use based guidelines are provided below:

- Agricultural Land Use: where the primary activity is related to the productive capability of the land and is agricultural in nature.
- Residential/Parkland Land Use: where the primary activity is residential or recreational activity.
- Commercial Land Use: where the full range of allowable uses is commercial and there is free access to all members of the public, including children.
- Industrial Land Use: where the primary activity involves the production, manufacture, or construction of goods. Public access is restricted and children are not permitted continuous access or occupancy.

A land use and exposure pathway assessment was completed for the Site and adjacent properties to select the appropriate soil guidelines. This is discussed in detail in Section 3.

2.1.2 *CANADA-WIDE STANDARDS FOR PETROLEUM HYDROCARBONS IN SOIL (PHC-CWS)*

The PHC CWS is a remedial standard for PHC impacted soil and subsoil under various land use categories. The standard is grounded in the science of risk assessment and can be applied at any one of three levels or “Tiers”: Tier 1 – generic numerical standards corresponding to four generic land use scenarios; Tier 2 – adjustments to Tier 1 levels based on site-specific conditions; Tier 3 – site-specific risk assessment and/or risk management. The same degree of human health and environmental protection is required at all three tiers; higher tiers require more detailed site-specific data.

PHC describe a mixture of organic compounds found in or derived from geological substances such as oil, bitumen and coal. They are composed predominantly of carbon and hydrogen. For the purposes of the PHC CWS, PHC are subdivided according to specified ranges of equivalent carbon number (ECN):

- Fraction 1 (F1) encompasses the range of ECN from C6 to C10. It represents the volatile fraction of most hydrocarbon mixtures and consists of the aromatic sub-fraction in the range of C>8 to C10, as well as aliphatic sub-fractions in the ranges of C6 to C8 and C>8 to C10.

- Fraction 2 (F2) encompasses the range of ECN for C>10 to C16. It represents the semi-volatile fraction and comprises aromatic and aliphatic sub-fractions in the ranges C>10 to C12 and C>12 to C16.
- Fraction 3 (F3) encompasses the range of ECN from C>16 to C34. It includes both aromatics and aliphatics in the C>16 to C21 and C>21 to C34 ranges.
- Fraction 4 (F4) encompasses compounds with ECN of C>34 to C50+. PHC within this range often make up a significant proportion of crude oils and petroleum products, although the fraction is generally considered to be of low mobility (volatility and solubility).

Specific aromatic compounds falling within F1 fraction (i.e., BTEX) are assumed to be managed separately and should be subtracted from the aromatics in this fraction.

A land use and exposure pathway assessment was completed for the Site and adjacent properties to select the appropriate soil guidelines. This is discussed in detail in Section 3.

2.2 GROUNDWATER QUALITY GUIDELINES APPLIED TO THE SITE

2.2.1 ONTARIO MINISTRY OF THE ENVIRONMENT, CLIMATE AND PARKS SITE CONDITION STANDARDS (OMECP SCS) – SOIL, GROUNDWATER AND SEDIMENT STANDARDS FOR USE UNDER PART XV.1 OF THE ENVIRONMENTAL PROTECTION ACT

The OMECP SCS define acceptable contaminant concentrations with respect to land use, based on the effects that the criteria may have on human health and the natural environment. The minimum requirements that need to be met in order to consider a remedial effort complete are outlined in this regulation. The OMECP generic criteria are health-based concentrations that are protective of site sensitivity, groundwater use (potable or non-potable), property use (residential, parkland, institutional, commercial, industrial, community and agricultural/other), soil type (coarse or medium/fine textured) and restoration depth (full or stratified restoration).

The 2016 publication "*Modified Generic Risk Assessment* (*MGRA) - Approved Model"* by the OMECP was referenced for the component values of the SCS. Components considered for application are as follows: (i) The drinking water component (GW1), (ii) the protection of indoor air from vapors originating from groundwater component (GW2), (iii) the protection of the aquatic environment component (GW3), and (iv) Half-solubility.

The MGRA guideline values are based on sufficiently conservative calculations that assumes the contamination source are, at minimum, 36 m away from a surface water body. Given the Site and adjacent properties do not utilize the groundwater for human consumption and the Red River is more than than 300 metres from Site, the drinking water component (GW1) and the protection of freshwater aquatic life receptor pathway (GW3) is excluded. WSP selected OMECP MGRA Table 3 SCS for sites with Industrial/Commercial property use, for non-potable groundwater use with medium-fine textured soils, where full depth restoration is intended. If a parameter has a GW2 value that is higher than its half-solubility value, the lower (more conservative) half-solubility value would be applied.

2.2.2 ALBERTA ENVIRONMENT AND PARKS – TIER 1 SOIL AND GROUNDWATER REMEDIATION GUIDELINES, GOVERNMENT OF ALBERTA

The Alberta Environment and Parks (AEP) Tier 1 guidelines are generic, risk-based remediation guidelines for contaminated site management designed using relatively conservative assumptions. The guidelines take into consideration site-specific information, contaminant characteristics and assess human and ecological receptors to identify contaminant levels that pose minimal risk. Table 2 – Alberta Tier 1 Groundwater Remediation Guidelines is referenced in this report for fine-grained soil type in a commercial/industrial land use setting.

3 SITE CHARACTERIZATION

To appropriately apply the applicable regulatory criteria, a preliminary site characterization was performed, details are provided in Table 1.

Table 1. Site Characterization

SITE CHARACTERIZATION	DESCRIPTION
Site Description and Land Use	The Site has the civic address 100 Oak Point Highway, Winnipeg, Manitoba and is located in Lot 58, Plan 24342 WLTO. The site is zoned C3 – Commercial Corridor by the City of Winnipeg. Historically, the Site was use for Imperial Oil retail fuel outlet and cardlock facility with approximately four (4) cardlock semi-truck gas stations to the south. Previous environmental reports indicate that the Imperial Oil retail fuel outlet and cardlock facility was in operation from approximately 1988 to approximately 2012, and also a restaurant from the late 1990s to approximately 2012 (Parsons, 2015). The Site is currently vacant with all structures demolished approximately in 2012.
Surrounding Land Use	**North:** The north is bounded by a roadway, Oak Point Highway, immediate to the north and further north are multiple residential properties.
	East: 70 Oak Point Highway: North End Spring & Trailer
	South: 61 and 65 Hydra Avenue: Royal Bros. Yard
	West: Vacant Land
Topography	A review of the topographic map for the area (Natural Resources Canada, 2018) indicates the Site is located at approximately 235 metres above sea level (masl), and confirmed through a global positioning system (GPS) elevation survey. The Site is generally flat.
Soil and Geology	The soil profile in the Winnipeg area generally consists of mainly stratified silty clay and silt with variable alluvial deposits. Based on the historic development and activities of the Site surficial soil likely does not consist of a native soil profile. The surficial geology in the area consists primarily of alluvial, channel deposits which are sediments made up of sand, gravel, silt, clay and organic detritus from one to twenty meters thick. These sediments were deposited by postglacial rivers (Matile and Keller, 2004). Fine-grained soil criteria are applicable to the Site.

	Regional Bedrock Geology: According to a geological map of Manitoba, the bedrock geology at the Site consists of the Gunton Member of the Stony Mountain Formation from the Ordovician period. The Gunton member is the lower portion of the formation and consists of nodular dense dolomite (Manitoba Energy and Mines, 1990).
Water	**Surface:** The Site is level, and precipitation is expected to seep into any unpaved soil and gravel-covered exterior surface or into the area with lower elevation in the north central portion of the Site.
	Groundwater: Shallow groundwater depths measured across the Site from three (3) monitoring wells installed by WSP range from 231.621 masl to 234.042 masl with a general flow direction inferred to be northwest. The regional groundwater flow direction is inferred to be east and southeast towards the location of the Red River, approximately 6 km to the east. It is important to note that local shallow groundwater flow direction can be affected by the presence of underground utility corridors and fill materials and may not necessarily reflect the regional or local groundwater flow or area topography.

3.1 EXPOSURE PATHWAYS AND RECEPTORS FOR THE SITE

To appropriately apply the CSQG and PHC CWS, an exposure pathway and receptor assessment was performed for both human and ecological receptors. Tables 2 and 3 provide a description of the exposure pathway and receptor along with a justification to account for the pathway or receptor to be applicable or not applicable as a governing exposure pathway.

Table 2. Exposure Pathway and Human Receptor Assessment

EXPOSURE PATHWAY FOR HUMAN RECEPTOR	APPLICABILITY DESCRIPTION
Direct Contact Humans coming into direct contact with contaminated soil via incidental ingestion, dermal contact, or inhalation of airborne soil particles. *Applicable to all land uses.*	**Applicable:** Although most of the Site is paved with asphalt, they may crack over time. Access to the Site is open to public and future construction activities at the Site may expose soil particles to workers.
Groundwater Ingestion Humans drinking from and showering or bathing in water that is sourced from groundwater. *Applicable to all land uses.*	**Not Applicable:** The Site does not use groundwater as a potable water source.
Vapour Inhalation Volatile contaminants being released from soil and/or groundwater and migrating upwards into living or working spaces where humans are exposed via inhalation. *Applicable to all land uses.*	**Applicable:** Based on the laboratory analytical results and previous environmental records, there are potentially volatile contaminants of BTEX and PHC F1 from residual soil impacts on-site associated with former USTs during the period in which the retail fuel outlet was in operation. Future developments on-site may include a site building where vapour inhalation by building occupants is a possible exposure pathway.
Off-site Migration Wind and water erosion transport of contaminated soil from a commercial or industrial site onto an adjacent site with a more sensitive land use could potentially result in contaminate concentrations that exceed the direct contact soil quality guideline applicable to the more sensitive land use. The off-site migration check is completed to ensure that the commercial or industrial guidelines set are protective of this exposure pathway.	**Not applicable:** The Site and surrounding land use are classified as commercial.

Table 3. Exposure Pathway and Ecological Receptor Assessment

EXPOSURE PATHWAY FOR ECOLOGICAL RECEPTOR	APPLICABILITY DESCRIPTION
Direct Soil Contact Plants and soil invertebrates coming into direct contact with contaminants in the soil or shallow groundwater. *Ecological soil contact is applicable to all land uses.* *This pathway may be eliminated below 3 m.*	**Not applicable:** Plants and soil invertebrates may come in direct contact with contaminants in the soil and shallow groundwater. Ecological soil contact pathway is identified as the governing pathway for surface soils and cannot be eliminated.

Nutrient Energy Cycling Microbial functioning of the soil, including carbon and nitrogen cycling. *Applicable to all land uses.*	**Applicable:** Microbial functioning of the soil, including carbon and nitrogen cycling may be affected. Ecological soil contact pathway is identified as the governing pathway and cannot be eliminated.
Livestock/Wildlife Soil and Food Ingestion Livestock or wildlife ingesting contaminants via the incidental ingestion of soil and ingesting contaminants that have bio-accumulated from soil to fodder. *Applicable to agricultural and natural area land use.* *May be applicable to urban parks frequented by wildlife.*	**Not Applicable:** Applicable to agricultural and natural area land use only.
Aquatic Life Aquatic life (fish, invertebrates and plants) being exposed to contaminants when groundwater discharges to a surface water body that is capable of supporting an aquatic ecosystem. *Applicable to all land uses when a surface water body is located within 500 m from the Site.*	**Not Applicable:** There is no surface water body within 500 m of the Site.
Irrigation Crops being exposed to contaminants when groundwater is used for irrigation. *Applicable to agricultural land use only.*	**Not Applicable:** Irrigation activities do not take place on the Site nor on adjacent properties.
Livestock/Wildlife Watering Livestock or wildlife being exposed to contaminants when groundwater is used for livestock watering or groundwater discharge to surface water body where wildlife may drink. *Applicable to agricultural use.* *May be applicable to urban parks frequented by wildlife.*	**Not Applicable:** Applicable to agricultural land use only. The Site is classified as commercial use.

3.1.1 SITE CONDITION CRITERIA AND RISK BASED JUSTIFICATION

After completing the exposure pathway and receptor assessment as well as CCME's published spreadsheet model of the PHC CWS (Table 4 and Table 5), the governing exposure pathway, for use with the CSQG for commercial land use on predominantly fine-grained soil and the Tier 1 PHC CWS for Fractions 1 to 4, is ecological soil contact for surface soil and management limit for subsurface soil.

Table 4. Canada-Wide Standard for Petroleum Hydrocarbons in Soil Model for Tier 1 Evaluation

What is the land use classification?	The Site is zoned Commercial.
What is the predominant soil type in the zone of contamination?	The Site consists of predominantly fine-grained soil, confirmed through the soil particle size analysis during the intrusive site investigation.
Is there a fine-grained soil layer which may govern contaminant transport?	Yes
Is there a coarse-grained soil layer which may govern contaminant transport?	No
Is groundwater beneath/near the site used (or potentially used) as a potable groundwater source?	No *(Protection of groundwater disabled)*
Are there any surface water bodies within 500 m of the site?	No *(Protection of aquatic life disabled)*

Table 5. Governing Tier 2 Objectives for Commercial Land Use Based on PHC CWS Model for Tier 2 Evaluation

PHC FRACTION	OBJECTIVE		SURFACE SOIL GOVERNING PATHWAY	SUBSURFACE SOIL GOVERNING PATHWAY
	Fine-grained Surface Soil (≤ 1.5 mbg)	Fine-grained Subsurface Soil (> 1.5 mbg)		
Fraction 1 (F1)	320 mg/kg	800 mg/kg	Ecological Soil Contact	Management Limit
Fraction 2 (F2)	260 mg/kg	1,000 mg/kg	Ecological Soil Contact	Management Limit
Fraction 3 (F3)	2,500 mg/kg	5,000 mg/kg	Ecological Soil Contact	Management Limit
Fraction 4 (F4)	6,600 mg/kg	10,000 mg/kg	Ecological Soil Contact	Management Limit

The governing exposure pathways for each contaminant of concern were selected based on the site-specific exposure pathway and receptor assessment. WSP utilized the governing exposure pathway to apply appropriate soil and groundwater criteria as outlined in Table 6.

Table 6. Site Condition Criteria for Risk Based Justification

SITE CONDITION	GOVERNING PATHWAY JUSTIFICATION
Land Use (Current and Intended Future Land Use)	Commercial
Soil Texture	Predominantly fine-grained surface soil and subsoil confirmed through site investigation and laboratory textural analysis.
Lifetime Incremental Cancer Risk	SQG_{HH} value based on lifetime incremental cancer risk of 10^{-5} selected conservatively based on Site specific characterization.
Governing Pathway and Guidelines – Soil	**BTEX and PHC F1-F4:** ***Governing Pathways:*** — SQG^{HH} Groundwater Check — SQG^{E} Soil contact (S2 Soil Contact Risk) — Protection of Potable Groundwater (Groundwater Check) — Eco Soil Contact (Plants and Soil Organisms Check) — Management Limit ***Applicable Guidelines:*** — Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health (CSQG). CCME, 2004. — Canada-wide Standards for Petroleum Hydrocarbons in Soil (PHC CWS) – Technical Supplement. CCME, 2008. — Ontario Ministry of Environment, Conservation and Parks Site Condition Standards (OMECP SCS): Soil, Groundwater and Sediment Standards (SGWS) for use under Part XV.1 of the Environmental Protection Act. MECP, 2011.
Governing Pathway and Guidelines – Groundwater	**BTEX and PHC F1-F4:** ***Governing Pathways:*** — Non-Potable Groundwater Check (GW2) — ½ Solubility — Ont. GW Background ***Applicable Guidelines:*** — Alberta Environment and Parks. (2023) Tier 1 Groundwater Remediation Guidelines. — Ontario Ministry of Environment, Conservation and Parks Site Condition Standards (OMECP SCS): Soil, Groundwater and Sediment Standards (SGWS) for use under Part XV.1 of the Environmental Protection Act. OMECP, 2011.

4 SITE ACTIVITIES AND METHODOLOGY

WSP Project Scientists were on-site to conduct Phase II ESA field activities on January 25, 26, & 27 and February 1, 2023. The soil and groundwater quality of the Site was investigated through the advancement of boreholes and the installation of monitoring wells in predetermined locations in the SAP based on potential migration pathways identified in the Phase I ESA.

Sample analytical parameters were defined based on the nature of the historic potentially contaminating activities (PCAs) and contaminants of concern identified from laboratory analytical results in the Phase II ESA. Soil and groundwater samples were submitted to ALS Global Environmental (certified under the Canadian Association for Laboratory Accreditation [CALA]) for analysis. Methodologies and protocols are described in the following sections.

4.1 ENVIRONMENTAL HEALTH AND SAFETY

Both private and public (Manitoba Hydro, MTS, Shaw, etc.) buried utility clearances were completed at the Site prior to ground disturbance. During the project planning phase, a Project Risk Assessment and Safety Plan (PRASP) of the likely or expected hazards to human health and safety associated with implementation of the Scope of Work was created and made known to all staff involved. Once the WSP scientist was on site, a safety meeting was held with all workers prior to commencing work. A Field Level Risk Assessment (FLRA) form completed with site-specific risks and hazards and their proposed mitigation measures was signed by all in attendance. Copies of private and public utility clearances and available drawings are provided in Appendix E.

4.2 BOREHOLE DRILLING AND MONITORING WELL INSTALLATION

A total of ten (10) boreholes were advanced on January 25, 26, & 27 to assess potential impacts on-Site. All boreholes were advanced using a Scout track mounted drill rig to the maximum depth of the environmental investigation, approximately 6.1 mbg. Four (4) of the boreholes were completed as groundwater monitoring wells. The drilling operations were conducted with equipment supplied and operated by Maple Leaf Drilling Ltd.

Boreholes were backfilled with clean silica sand and bentonite clay and capped with asphalt, cement or gravel based on the surface covering present at the borehole location.

4.3 SOIL SAMPLING METHOD

Soil sampling was completed at each of the boreholes identified in Figure 2 by a WSP Project Scientist.

A clean steel knife was used to collect the soil subsample from the drill auger stem. Representative soil samples were collected from surface to the maximum depth of environmental investigation. The steel knife was cleaned after collecting each subsample to avoid cross contamination and nitrile gloves were worn throughout the sampling program and changed after the collection of each sample.

The recovered soil samples were visually inspected and logged in the field for colour, odour, texture, soil type and moisture by a WSP Project Scientist. Borehole logs are presented in Appendix D.

The WSP project scientist used laboratory supplied glass vials and jars based on SAP requirements. All soil samples were placed in a cooler and maintained at a temperature below 10ºC. Labels were completed with sample ID, date, and time of sample collection; labels were made with toluene free ink.

4.4 FIELD SCREENING MEASUREMENT METHOD

Soil samples collected in polyethylene bags were sealed with some air headspace and left for a minimum of 15 minutes to allow the soil vapours to equilibrate. The soil samples were then field screened with a RKI Eagle II vapour analyzer with sensors calibrated to hexane with methane elimination (HEX) and isobutylene (IBL). The Eagle II was inspected and calibrated in accordance with the recommended procedures as outlined by the manufacturer. Based on the field observations and results obtained through the vapour analyzer, select soil samples were submitted to the laboratory for analysis within 48 hours of collection. Standard chain-of-custody procedures were followed during sample handling and delivery.

4.5 GROUNDWATER MONITORING WELL INSTALLATION METHOD

Four (4) of the boreholes were completed as groundwater monitoring wells. The wells consist of 50.8 mm diameter PVC well casing with a minimum of 3.0 m length of slotted PVC screen, and J-style plug with a flush mount cover. Once each borehole was advanced to the desired depth, the screen, well casing and plug were assembled and placed into the borehole. A silica sand filter pack was placed around the screen and extends to approximately 0.3 m above the screen. The silica sand filter pack provides a permeable zone and prevents fine-grained materials from entering the well screen. Approximately 1.0 m of pellet form bentonite was placed above the sand pack to create a surface seal. All wells were completed with flush-mount protective casings, each secured in place with asphalt patch to seal the edges of the flushmount casing. Monitoring well locations are identified in Figure 2 and monitoring well logs are provided in Appendix D.

4.6 FIELD MEASUREMENT OF GROUNDWATER QUALITY PARAMETERS

Prior to groundwater purging and sample collection, the probe of the RKI Eagle II vapour analyzer with sensors calibrated to hexane with methane elimination (HEX) and isobutylene (IBL) was inserted into the monitoring well and the opening sealed with a gloved hand. Vapour measurements of the interior of the monitoring well was recorded once a peak number has reached for each of the sensors.

Depths to groundwater and bottom of the well were measured with a clean Heron Instruments HO1L oil water interface meter, to the lip of the PVC well casing. The water interface meter is used to detect liquids using an infra-red beam and detector. As the probe end is lowered down the well and enters a liquid the beam is refracted away from the detector which activates an audible tone and light. If the liquid is a non-conductive oil/product the signals are steady; whereas a conductive liquid, such as water, will result in an intermittent tone and light signal.

Prior to sampling the groundwater, groundwater quality data is measured by pumping groundwater through a YSI 5083 flow-thru cell container fitted with sensors from a YSI Pro Plus multiparameter probe. Groundwater quality parameters measured are temperature, pH, conductivity, dissolved oxygen (DO), and oxidation-reduction potential (ORP). These parameters are recorded at regular intervals of groundwater purged until consecutive readings vary by less than 10% or until the monitoring well becomes dry.

4.7 GROUNDWATER SAMPLING METHOD

A Waterra Spectra Field-Pro portable peristaltic pump was used for low-flow sampling to minimize water column agitation. Dedicated ¼ inch poly-tubing was used for each monitoring well and the extracted groundwater goes directly through a YSI 5083 flow-thru cell container from the bottom. As groundwater fills the flow-through cell container, an outlet at the top of the container allows groundwater to be slowly pumped out and sampled. The flow-through cell container was washed with soap and clean water between each monitoring well.

Samples were placed in clean, laboratory-supplied sample containers that were appropriately pre-labelled and placed in a cooler with ice packs to maintain a temperature of 10ºC for preservation. These samples were then delivered to ALS Global Environmental within eight hours of collection for analysis. Standard chain-of-custody procedures were followed during sample handling and delivery.

4.8 BOREHOLE AND MONITORING WELL SURVEYING

An elevation survey of the monitoring wells was completed on January 25 and 26, 2023, using a Trimble R10 Integrated Global Navigation Satellite System (GNSS) connected via data-only SIM cards to Can-Net's Virtual Reference Network for Real Time Global Positioning System (GPS) corrections to offer sub-centimeter accuracy. The ground surface and top of the monitoring wells were topographically surveyed to georeferenced controls (fire hydrant and nail in hydropole located northeast of Site) and documented. Data collected included well ID, GPS location, ground surface elevation, well depth and depth to groundwater. GPS coordinates referenced as Universal Transverse Mercator (UTM) Zone 14N are included in borehole and monitoring well logs (Appendix D).

4.9 LABORATORY ANALYTICAL TESTING METHODS

Collected soil samples were submitted to ALS Global Environmental for the analysis of one or more of the following parameters and methods outlined in Table 7.

Table 7. ALS Global Environmental Parameters and Methods

TEST DESCRIPTION	MATRIX	LAB METHOD TEST CODE	METHOD REFERENCE
VOC plus F1 by GCMS	Soil	VOC+F1-HSMS-WP	EPA 8260C
CCME Total Hydrocarbons	Soil	F1-F4-CALC-WP	CCME CWS-PHC, Pub#1310
CCME Gravimetric Heavy Hydrocarbons	Soil	F4G-TMB- WP	CCME CWS-PHC, Pub#1310
% Moisture	Soil	Moisture-WP	CCME PHC in Soil – Tier 1
Polyaromatic Hydrocarbons (PAHs)	Soil	PAH, PANH-WP	EPA SW 846/8270-GC/MS
Sum of Xylene Isomer Concentrations	Soil	XYLENES-SUM-CALC-WP	CALCULCATED RESULT
Mercury in Soil	Soil	HG-200.2-CVAA-WP	EPA200.2/1631E (mod)
Metals in Soil by CRC ICPMS	Soil	MET-200.2-CCMS-WP	EPA200.2/6020B (mod)
BTX plus F1 by GCMS	Water	BTEX+F1-HSMS-WP	EPA 8260C / EPA 5021A
CCME Total Hydrocarbons	Water	F1-F4-CALC-WP	CCME CWS-PHC, Pub#1310
CCME PHC F2-F4 in Water	Water	F2-F4-FID-WP	EPA 3511
Dissolved Metals in Water by CRC ICPMS	Water	MET-D-CCMS-WP	APHA 3030B/6020B
Polyaromatic Hydrocarbons (PAHs)	Water	PAH, PANH-WP	EPA 3511/8270D
Sum of Xylene Isomer Concentrations	Water	XYLENES-SUM-CALC-WP	CALCULATED RESULT

A description of the methodologies can be reviewed in the Certificates of Analysis provided in Appendix F.

4.10 QUALITY ASSURANCE AND QUALITY CONTROL MEASURES

Quality control is the process of verifying that work is technically correct and accurate. The following quality assurance and control measures were carried out during the field investigation and reporting:

- All equipment that was used for in-field screening including the RKI Eagle II was calibrated to the manufacturer's recommendations prior to use.
- A clean steel knife was used to obtain soil samples.
- Nitrile gloves were worn by the WSP Project Scientist and changed after the collection of each sample to avoid cross contamination.
- Dedicated polytubes and bailers were used for sampling and purging groundwater for each monitoring well.
- A duplicate soil sample Duplicate-1 (TH07-S3) and Duplicate-2 (TH05-S3) was submitted for the field replication of BTEX, PHC F1-F4 analyses and Metals-Duplicate (MW12-S1) was submitted for the field replication of total metals analyses.
- A duplicate groundwater sample DUP-GW-1 (MW03) was submitted for the field replication of BTEX, PHC F1-F4 analyses and DUP-GW-2 (MW12) was submitted for the field replication of dissolved metals analysis.
- ALS Global Environmental completed a variety of quality assurance/quality control (QA/QC) measures on the samples submitted as part of the sampling program. These QA/QC measures include: sample replicates, matrix spiked laboratory blanks and process blanks. Analytical and quality control data were reviewed and have been validated by ALS. Copies of the Quality Assurance Reports and analytical methods are included with the Certificates of Analysis in Appendix F.

5 FINDINGS

5.1 FIELD OBSERVATIONS

The following observations were noted during on-site field activities:

— The soil stratigraphy existing on-site is predominantly clay with increased silt content, mottled, hematized silt pockets below 2.29 to 6.10 mbgs.

— Surface sandy gravel aggregate fill or asphalt pavement were observed in several borehole locations throughout the Site with the exception of MW12 where native clay was observed and TH05 and TH06 where sand fill material was observed to a depth of approximately 1.52 mbgs.

— Frozen soil conditions encountered during drilling was observed in all ten (10) boreholes, generally extending to 1.22 mbgs.

— All monitoring wells were assessed five (5) days after installation and have ample groundwater for sampling with the exception of MW11 where the well was observed to be dry.

— Depths to the shallow groundwater table were measured at all monitoring well locations; MW01, MW03, and MW12 were measured to be 2.185, 0.886, and 2.834 metres below the top of casing (mbtoc) respectively.

— PHC odour was observed during drilling and soil sampling at boreholes TH03, TH07 and TH08, no soil discolouration was observed.

— Elevated soil headspace vapour measurements in the methane elimination (HEX) mode and isobutylene (IBL) mode using the RKI Eagle vapour analyzer was encountered at boreholes MW03, TH10, TH08 and TH07. The highest reading was encountered at borehole TH08 at the depth of 1.52 mbg with a reading of 90 ppm in HEX mode and 263 ppm in IBL mode, consistent with high PHC concentrations confirmed through laboratory analytical results.

5.2 SOIL STRATIGRAPHY

Surficial soil observed on-site consists of coarse-grained gravelly sand fill approximately 0.12 to 0.18 m in thickness underlying 0.05 m to 0.08 m of asphalt. Predominantly dark grey clay fill with some silt pockets was observed underlying the shallow sand fill and extends to approximately 1.52 mbgs, overlying native clay observed to the extent of the drill investigation at 4.57 and 6.1 mbgs. The native clay is brown-grey to mottled and typically increase in silt content below 2.29 to 6.10 m depth. Particle size analysis results from soil samples collected from borehole TH08 at 2.29 and 3.81 mbgs indicated 68% and 97% grain size less than 75 µm and are therefore categorized as fine-grained soil (Insert table/Appendix reference).

5.3 SOIL QUALITY

The soil analytical results from the field sampling program are summarized in Table 9 to 12 (Appendix B). Observations for soil sample analyses parameters with exceedances to applicable guidelines are as follows:

- **TH07-S3 (2.29 mbgs)**
  - PHC Fraction 2 (C10-16) concentration of 1,150 mg/kg exceeding the guideline value of 1,000mg/kg.
- **Duplicate-1 (TH07-S3)**
  - PHC Fraction 2 (C10-16) concentration of 1800 mg/kg exceeding guidelines of 1,000 mg/kg
- **TH08-S2 (1.52 mbgs)**
  - PHC Fraction 2 (C10-16) concentration of 4,550 mg/kg exceeding the guideline value of 1,000 mg/kg.

- PHC Fraction 3 (C16-134) concentration of 3,710 mg/kg exceeding the guideline value of 2,500 mg/kg.
- Fluorene concentration of 0.711 mg/kg exceeding the CCME CSQG guideline value of 0.25 mg/kg but not the OMECP guideline value of 4,200 mg/kg.
- Copper (Total) concentration of 99.4 mg/kg exceeding the guideline value of 91 mg/kg.

- **TH08-S5 (3.81 mbgs)**
  - Total arsenic concentration of 12.3 mg/kg exceeding the guideline value of 12 mg/kg.

All other soil samples submitted for the analysis of PHC, VOC, PAH and total metals that are not discussed above are below applicable guideline values.

5.4 GROUNDWATER QUALITY

Groundwater quality measurements with a YSI Pro Plus are summarized in Table 13 (Appendix B). The analytical groundwater results from the groundwater monitoring program are summarized in Table 14 to 17 (Appendix B).

The pH of groundwater encountered in all monitoring wells ranging from 5.14 to 5.86 and is weakly acidic. The low pH measurements may be associated with leachate migration through shallow groundwater from the west adjacent historic municipal solid waste dumping ground. Dissolved oxygen (DO) content is generally low and within acceptable range as expected from groundwater as there is little no interface with the atmosphere within the monitoring well. Conductivity in groundwater is variable depending on the pH, redox conditions, and the subsurface mineralogy. Conductivity values of 998 to 3281 us/cm from groundwater collected from the three installed monitoring wells on-site is considered acceptable within the natural range. The oxidation-reduction potential ORP parameter is an extension of the amount of dissolved oxygen in the groundwater and dependent on ion species present in groundwater. Strongly negative ORP indicates a reduced environment that can be a result of poor groundwater quality from the biodegradation of hydrocarbon molecules by bacteria. ORP concentration for MW03 and MW12 is measured at -331.9 and -276.3, respectively. This is consistent with groundwater samples collected from monitoring well MW03 reporting concentration of PHC F2 and F3 exceeding the applied guidelines.

Observations for groundwater sample analyses parameters with exceedances to applicable guidelines are as follows:

- **MW03**
  - PHC Fraction 2 (C10-16) concentration of 9.65 mg/L exceeding the guideline value of 0.15 mg/L.
  - PHC Fraction 3 (C16-34) concentration of 7.1 mg/L exceeding the guideline value of 0.5 mg/L.
- **DUP-GW-1 (MW03)**
  - PHC Fraction 2 (C10-16) concentration of 8.2 mg/L exceeding the guideline value of 0.15 mg/L.
  - PHC Fraction 3 (C16-34) concentration of 6.08 mg/L exceeding the guideline value of 0.5 mg/L.
- **MW12**
  - Beryllium (Dissolved) concentration of 0.000971 mg/L exceeding the guideline value of 0.0005 mg/L.
  - Copper (Dissolved) concentration of 0.00530 mg/L exceeding the guideline value of 0.005 mg/L.
  - Lead (Dissolved) concentration of 0.00386 mg/L exceeding the guideline value of 0.0019 mg/L.
  - Molybdenum (Dissolved) Concentration of 0.0361 exceeding the guideline value of 0.023 mg/L.
  - Sodium (Dissolved) concentration of 917 mg/L exceeding the guideline value of 490 mg/L.
  - Vanadium (Dissolved) Concentration of 0.00710 mg/L exceeding the guideline value of 0.0039 mg/L.
- **DUP-GW-2**
  - Beryllium (Dissolved) concentration of 0.00111 mg/L exceeding the guideline value of 0.0005 mg/L.
  - Lead (Dissolved) concentration of 0.00370 mg/L exceeding the guideline value of 0.0019 mg/L.

- Molybdenum (Dissolved) Concentration of 0.0407 exceeding the guideline value of 0.023 mg/L.
- Sodium (Dissolved) concentration of 867 mg/L exceeding the guideline value of 490 mg/L.
- Vanadium (Dissolved) Concentration of 0.00616 mg/L exceeding the guideline value of 0.0039 mg/L.

All other groundwater samples submitted for the analysis of PHC and dissolved metals that are not discussed above are below applicable guideline values.

5.5 QUALITY ASSURANCE AND QUALITY CONTROL RESULTS

The samples submitted for laboratory analyses were collected in laboratory-supplied sample containers and analyzed within their applicable holding times using approved analytical methods. The Certificates of Analysis received from the laboratory indicate that reporting limits were met for the tested parameters. No tested parameter was present in a detectable concentration in the laboratory method blanks and surrogate recoveries were within acceptable ranges. Results of the laboratory matrix spike were within acceptable quality control limits.

Field duplicates were submitted for laboratory analyses:

- Sample Duplicate-1 which is a field duplicate of soil sample TH07-S3 and sample Duplicate-2 which is a field duplicate of soil sample TH05-S3 were analyzed for BTEX, F1-F4,
- Sample Metals-Duplicate which is a field duplicate of soil sample MW12-S1 was analyzed for total metals.
- Sample DUP-GW-1 which is a field duplicate of groundwater sample MW03 was analyzed for BTEX, F1-F4.
- Sample DUP-GW-2 which is a field duplicate of groundwater sample MW12 was analyzed for dissolved metal.

The results from the analysis were used to assess the accuracy and reliability of the laboratory procedures and instruments. Relative percent difference (RPD) values for duplicate samples were compared by WSP (Table 9, 12, 14 and 16; Appendix B).

Due to concentrations of PHC below detection limits for at least one of the analysed parameters in the duplicate sample set, no RPD could be calculated for duplicate soil samples Duplicate-2 (TH05-S3).

RPD values of PHC F1, F2, F3, and F4 for soil sample set TH07-S3 and Duplicate-1 were calculated at 8.87%, 8.87%, 44.07%, and 46.20%, respectively. RPD values for total metals in soil range from 0.39% to 24.56%. The soil RPD values are all below 50%, which is suitable representation of field duplication and reaffirms the presence of hydrocarbon concentrations detected in the duplicate sample sets.

RPD values of groundwater duplicate sets for the analyses of PHC and dissolved metals were all under 25%, indicative of suitable representation of field duplication. The only groundwater parameter with an RPD above 25% is dissolved copper at 44.8% but that is considered an outlier since the other 39 dissolved metals parameters are below 25% RPD. This could be due to laboratory instrumentation error or the introduction of groundwater sediments containing copper minerals in the field sample.

Based on the review of the results of the quality control data, it is concluded that the analysis of the submitted samples for soil accurately represent the Site conditions and the results meet the quality objectives of the investigation.

6 DISCUSSION AND CONCLUSIONS

At the request of City of Winnipeg, WSP conducted a Phase II ESA on a commercial property located at 100 Oak Point Highway, Winnipeg, Manitoba. The objective of the field investigation program is to investigate the presence or absence of residual PHC and metal impacts in soil and groundwater associated with historical operation of a retail fuel outlet and cardlock facility on-site, and to verify findings of previous environmental work completed by other consultants.

The objective of the WSP Phase II ESA is to investigate the presence or absence of residual PHC impacts associated with the historic operation of 100 Oak Point Highway as a former Imperial Oil retail fuel outlet and cardlock facility APEC and metals associated with historic activities. The drilling program was conducted on-site by Maple Leaf Drilling Ltd. and supervised by WSP Project Scientist between January 26 and 27, 2023. A WSP Project Scientist visited the Site on February 1, 2023, to conduct monitoring well survey, groundwater monitoring and sampling activities. A total of ten (10) boreholes were advanced to depths of 4.57 and 6.1 mbgs across the Site and four (4) boreholes were completed into monitoring wells to a depth of 4.57 mbgs.

Soil Analytical Results

<u>Petroleum Hydrocarbons</u>

Laboratory analytical results of two soil samples obtained respectively from TH07-S3 and TH08-S2 reported exceedances of PHC F2 and F3, suggesting diesel fuel as a likely contaminant source. An exceedance of fluorene in a soil sample collected from TH08 is likely associated with diesel impacts, as fluorene is a major component of fossil fuels and their derivatives. PHC odour without visible staining was noted during soil sampling in MW03, TH07, and TH08. The locations of borehole TH07 and TH08 is located adjacent to the historic location of the cardlock pump island UST nest towards the centre of the property, consistent with diesel fuel storage servicing the cardlock pump islands.

PHC soil impact plumes were inferred by defining lateral plume boundaries using an industry accepted method of the halfway distance to adjacent ‘clean’ boreholes with no soil exceedances. The vertical extent of the soil impact plume is inferred as the halfway depth to a ‘clean’ soil sample with no exceedances. For the purpose of inferring PHC soil impact plumes, soil analytical data from previous consultant’s work on-site were considered.

Two discrete soil impact plumes were inferred – the larger one covers an approximate area of 1,200 m^2 and extends from the cardlock pump island UST nest from the centre of the property towards the north following the inferred groundwater flow direction. The smaller soil impact plume estimated at approximately 400 m^2 extends from the north UST nest adjacent to the former canopy pump islands and extends north under the pavement curb towards Oak Point Highway. Based on an estimated depth of impact extending from 0.8 mbgs to 3.43 mbgs, the volumes of impacted soil for each of the PHC soil impact plumes would be approximately 3,200 m^3 and 1,000 m^3 (Figure 6, Appendix A). Unimpacted overburden soil is estimated to be approximately 1,300 m^3.

The location of the PHC soil impact plume along the north site boundary suggests that PHC impacts from the source at the UST nests have been migrating north consistent with the inferred shallow groundwater flow direction. It is highly probable that off-site migration of soil PHC impacts towards Oak Point Highway has occurred, but an intrusive soil and groundwater sampling program off-site on Oak Point Highway would be required for further delineation.

A duplicate soil sample collected from historic testpit TP-47 previously advanced along the south Site boundary reported an exceedance of PHC F3, but not the parent sample (Parsons, 2015). Surrounding testpits also did not report any indications of soil PHC impacts. Therefore, this occurrence may likely be a localised and associated with historic dumping of waste by residents of the Village of Brooklands in the area prior to the development of the Brooklands landfill in the 1950’s (WSP, 2023).

<u>Total Metals</u>

An exceedance of total copper concentration of 99.4 mg/kg exceeding the guideline value of 91.0 mg/kg was reported from a soil sample collected from borehole TH08 at 1.52 mbgs. Due to the elevated copper concentration reported from the soil sample collected at 1.52 mbgs but not the deeper soil sample collected at 3.81 mbgs, nor were there elevated copper concentrations exceeding guidelines in soil samples collected from adjacent boreholes, this is likely an anomalous localised occurrence that could be attributed to naturally occurring minerals within the soil sample matrix. Due to the localised extent of this exceedance, it is not likely to pose an environmental concern.

An exceedance of total arsenic concentration of 12.3 mg/kg exceeding the guideline value of 12.0 mg/kg was reported for the soil sample collected from TH08 at 3.81 mbgs. Due to the depth of the soil sample well within the in-situ clay stratigraphic unit, this is likely naturally occurring from minerals within the soil sample matrix. As the reported concentration is within the margin of error to lie below the guideline value of 12.0 mg/kg, this is not likely to be an environmental concern.

No exceedances of metals were reported from soil samples collected from borehole MW12 located at the southwest corner of the property for investigating the metal exceedances identified by Parsons (2015 & 2016) in previous environmental investigations on-site.

Groundwater Analytical Results

Three (3) groundwater samples (MW01, MW03, MW12) were submitted for the laboratory analyses of BTEX, PHC F1 to F4 and dissolved metals.

<u>Petroleum Hydrocarbons</u>

Groundwater samples collected from monitoring well MW03 reported concentrations PHC F2 and F3 exceeding the applied guidelines. The field duplicate groundwater sample collected for DUP-GW-1 also reported similar values. Detectable concentrations of PHC F2 were also noted from monitoring well MW01 but did not exceed the applied guidelines. No visible film or sheen was observed in all purged groundwater.

WSP noted that PHC F3 and F4 were not analyzed for in groundwater samples submitted by Parsons in previous groundwater monitoring events in 2017 and 2018, therefore the groundwater impact plume inferred by WSP in this report are based on halfway distances to adjacent 'clean' monitoring well locations previously installed by Parsons with no PHC F1 and F2 exceedances. Based on groundwater monitoring data by Parsons in 2018 and the groundwater analytical results from this Phase II ESA, the inferred groundwater impact plume (Figure 7, Appendix A) is localised to the northwestern corner of the Site measuring approximately 560 m^2. The shallow groundwater table is encountered approximately between 0.8 mbgs to 2.0 mbgs in the northern portion of the Site.

<u>Dissolved Metals</u>

Groundwater samples from monitoring well MW12 reported concentrations of dissolved beryllium, copper, lead, molybdenum, sodium, and vanadium exceeding applicable guidelines. Groundwater sample collected for DUP-GW-2 analyzed for dissolved metals also reporting similar exceedances with the exception of dissolved copper not exceeding the guideline value in the field duplicate.

Conclusion

This Phase II ESA has successfully achieved the objective in verifying the presence of residual soil and groundwater impacts associated with the former operation of the Site as an Imperial Oil retail fuel outlet and cardlock facility. The location of the former cardlock USTs nest in the central portion of the Site was investigated through borehole TH07 and TH08. Concentrations of PHC of soil analytical results collected from borehole TH07 and TH08 were exceeding reference guidelines and it is likely to pose an environmental liability risk.

Exceedances of PHC F2 to F3 in soil samples collected by Parsons in previous environmental investigations have been verified through this Phase II ESA. Two discrete PHC soil impact plumes inferred from the combined consideration of soil analytical data collected from previous environmental investigation by others and from this Phase II ESA suggests that the approximate total volume of PHC impacted soil on-site is estimated to be 4,200 m^3.

Exceedances of PHC F2 to F3 in groundwater samples collected from MW03 during this Phase II ESA and the lack of PHC exceedances in groundwater analytical results from monitoring wells included in the 2017 and 2018 groundwater monitoring events conducted by Parsons allowed for the inference of a groundwater impact plume with an approximate area of 560 m^3 located at the northeast corner of the Site.

Metal impacts in exceedance of guidelines (arsenic, nickel, copper, lead, selenium, and zinc) previously identified by Parsons in soil samples collected between 1.2 mbgs to 3.7 mbgs along the south Site boundary (Parsons, 2015) were not observed in the soil sample submitted by WSP collected from the southern portion of the Site for metal analyses during this Phase II

ESA. This could be due to the limited number of samples collected from the southern portion of the Site in this Phase II ESA, and the apparent localised occurrence of metal impacts in soil previously identified as exhibiting the greatest concentration at the top of the groundwater table (Parsons, 2019). However, dissolved metal exceedances (dissolved beryllium, copper, lead, molybdenum, sodium, and vanadium) were reported from the groundwater sample collected from monitoring well MW12 installed at the southwestern corner of the Site during this Phase II ESA, suggesting that elevated metal concentrations in soil previously identified in the southern portion of the Site may indeed be associated with groundwater transport and chemistry.

7 RECOMMENDATIONS

Based on the Site characterization and the Phase II ESA, WSP recommends the following:

1) As the inferred soil and groundwater PHC impact plumes have been delineated to extend towards the north Site boundary, it is unknown as to the extent of impacts that have migrated off-site towards Oak Point Highway. Therefore, WSP recommends a Supplemental Phase II ESA to further define the existing soil and groundwater impact plumes for both on-site impacts and off-site towards Oak Point Highway.
2) As this Site is currently listed under the Contaminated Sites Remediation Act with a file #73438, the submission of the final Phase II ESA report to Manitoba Environment and Climate (MEC) is required for record-keeping purposes.
3) Prior to any remedial activities conducted on-site, confirm that a Remedial Plan has been developed and submitted to MEC for approval. Remediation cannot proceed prior to Director authorization (typical authorization is provided within one to two weeks).
    a. A Remedial Plan is a comprehensive approach to mitigation of risks associated with the contamination identified in the soil and groundwater that is site specific and protects both human and environmental health. A remedial plan can implement a variety of approaches depending on site specific characteristics including passive (risk assessment and monitoring), containment and isolation (barriers and ventilation), removal for treatment (e.g., excavation), and in-situ treatment.
    b. A Remedial Plan will outline the proposed procedures and methods, target remediation criteria, quantities of contaminated soil and groundwater, soil management plan, schedule, reporting and monitoring requirements and any other significant requirements of the plan.
4) Prior to any future excavation or development of the Site, a health and safety plan should be developed and implemented to address potential residual soil and groundwater impacts that may be encountered.
5) If any odours, colour changes or staining is encountered during sub-surface disturbance, future excavation or development of the Site, an environmental professional should provide guidance and construction environmental monitoring before proceeding.

8 QUALIFICATIONS OF ASSESSORS

Mr. Darren Keam, M.Sc., P.Ag. is the Regional Manager, Senior Soil Scientist and Senior Project Manager with the Environmental Management (EM) business unit at WSP in Winnipeg, Manitoba. He has more than 24 years of experience in agriculture and environmental management and more than 20 years in conducting and managing Phase I and II ESA projects. Mr. Keam leads EM opportunities, including Phase I and II ESA planning, site assessments and investigations and data analysis as well as providing senior technical review and quality assurance and quality control review of ESA data and reports. Mr. Keam is a member in good standing with the Manitoba Institute of Agrologists.

Alfred Chan, B.Sc. Geol., P.Geo., PMP is a Project Manager in the WSP Earth and Environment team in Winnipeg, Manitoba. Alfred is a licensed Professional Geoscientist (P.Geo.) with the Association of Professional Engineers and Geoscientists of the Province of Manitoba (EGM). Alfred has over 10 years of consulting experience consisting of Phase I and II environmental site assessments, site inspections, remedial groundwater monitoring, soil remediation, petroleum storage tank removal inspections, mineral exploration, geotechnical investigations and community road upgrades. In addition to field investigations, Alfred is involved with the management of projects, data analysis, technical reporting review and utilizes software such as Bentley gINT Professional, MapINFO, ArcGIS and AutoCAD to produce deliverables for clients.

Jeremiah Kevin, B.Env.Sc Jeremiah Kevin is an environmental scientist with the WSP Earth & Environment in Winnipeg, MB. He has a Bachelor of Environmental Science with a major in Environmental Assessment and Soil Sciences. Jeremiah has over 3 years of experience working in the Manitoba environmental industry including crown corporation, government agency and consulting. He also has experience in the areas of environmental assessment and monitoring, geotechnical, and air quality management. Jeremiah has worked for numerous clients and projects included commercial, residential, and hydro development projects. His responsibilities with WSP include conducting Phase I and Phase II ESAs, site inspections, geotechnical intrusive investigations, soil remediation and biosolid management. In addition to field investigation, Jeremiah is involved in the coordination of projects, data analysis, and technical report writing.

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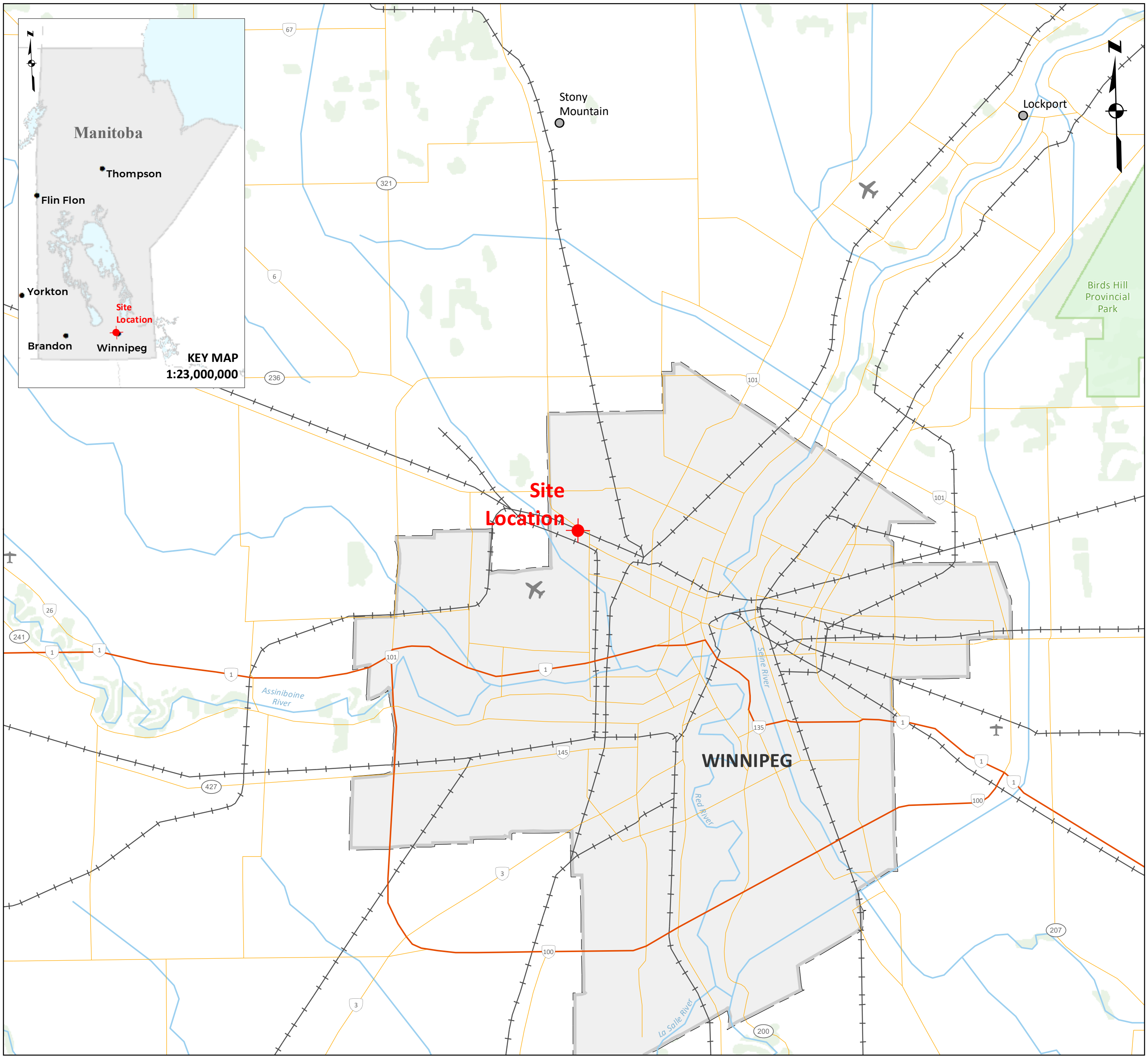
APPENDIX

A FIGURES



Legend

Activity
- Site Location

Water Features
- Perennial Creeks/Streams

Municipal
- Towns/City
- Major Urban Centre

Transportation
- Paved Roads
- TransCanada Highway
- Railways
- Airport
- Airfield

Environmental
- Provincial Park
- Vegetation

Scale: 1:500,000

0 2.5 5 7.5 10 12.5 Km

Universal Transverse Mercator (Zone 14)
North American Datum (1983)

Draft

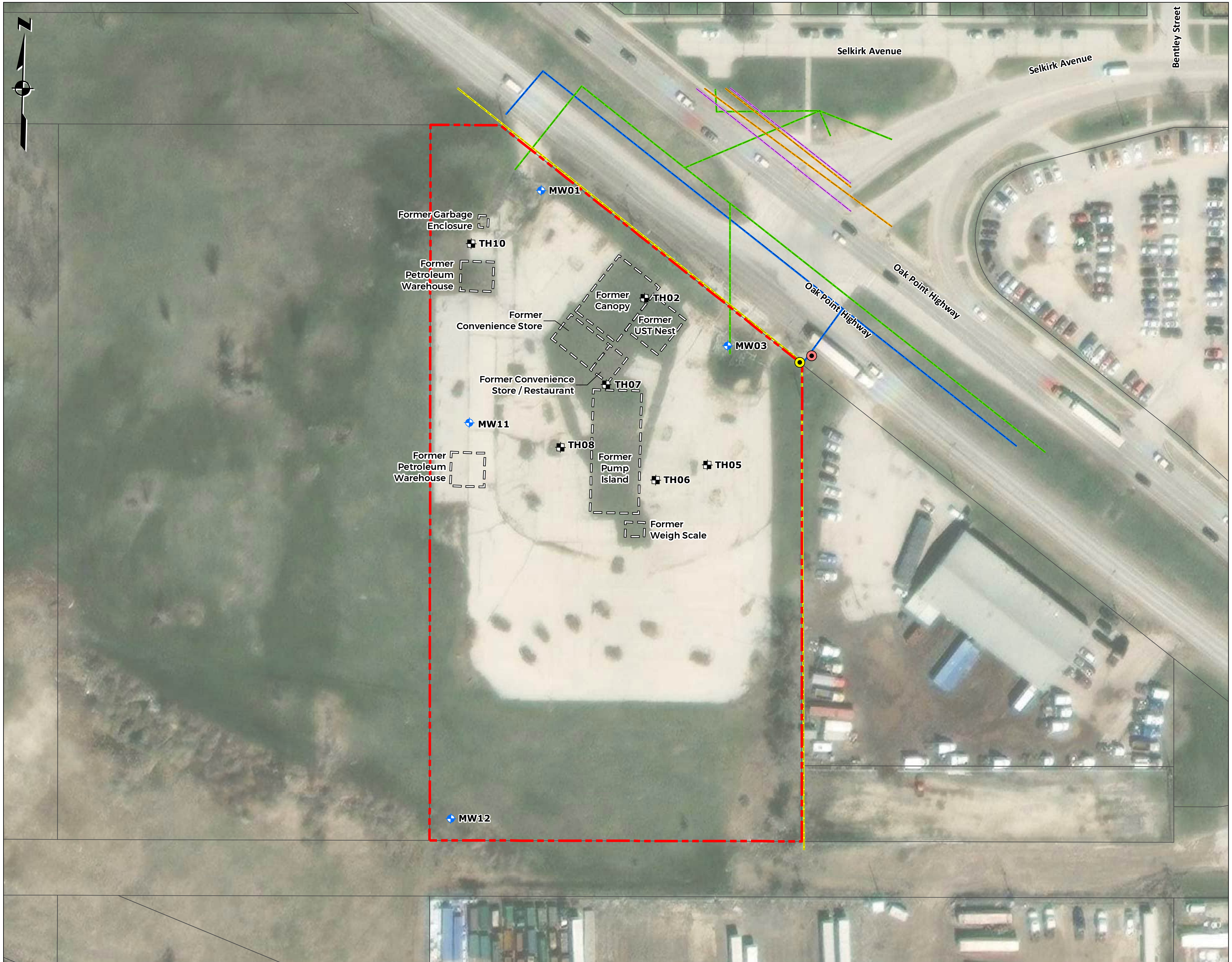
Site Location Map

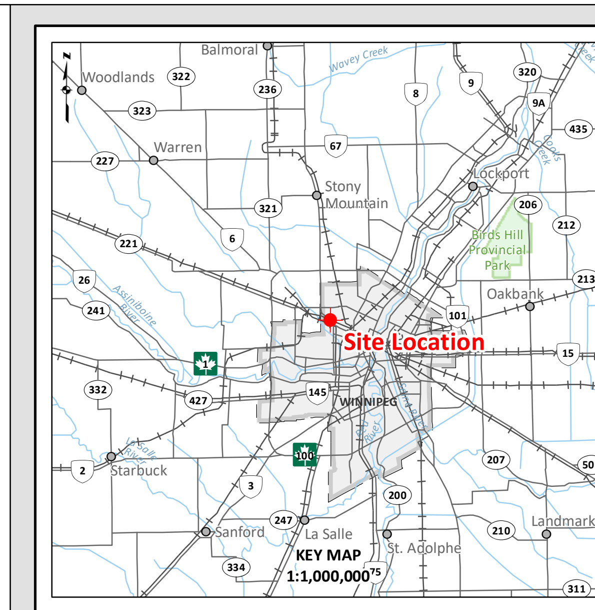
100 Oak Point Highway

Winnipeg, Manitoba

Figure 1

Phase II Environmental Site Assessment | Report By: JK | Drawn by: JH | Reviewed By: AC | WSP Job #: 221-07203-00





Legend

- Flushmount Monitoring Well Location
- Testhole Location
- Hydrant (Elevation: 235.007 masl)
- Nail in Pole (Elevation: 235.134 masl)
- Site Boundary
- Former Feature Footprint
- Parcels
- Approximate Electricity Line
- Approximate Natural Gas Line
- Approximate Sanitary Sewer Line
- Approximate Storm Sewer Line
- Approximate Water Line

Draft

Winnipeg

Phase II Environmental Site Assessment

Figure 2

Boreholes and Monitoring Well Location Plan

100 Oak Point Highway
Winnipeg, Manitoba

Scale: 1:1,500

0 5 10 20 30 40 50 Metres

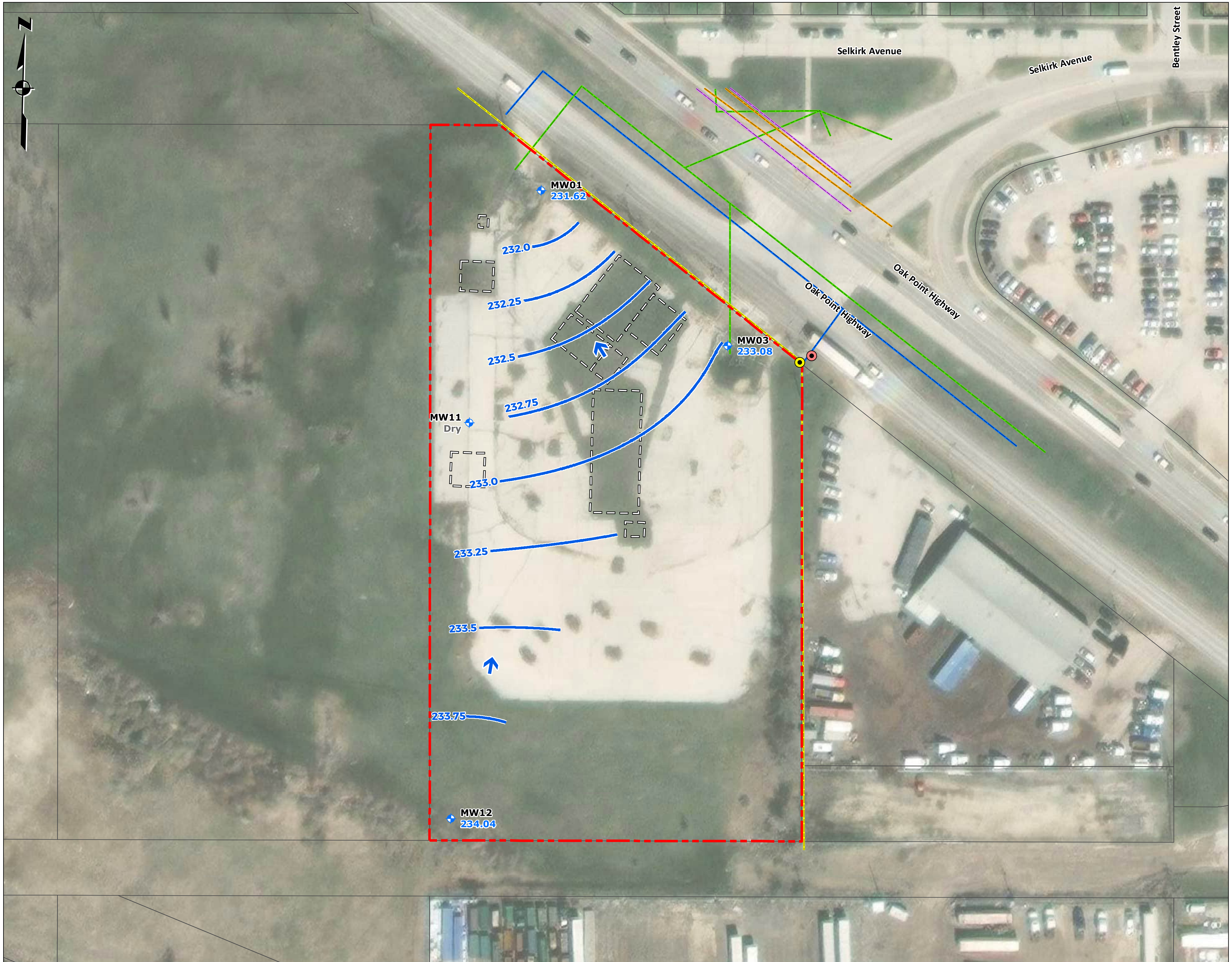
Universal Transverse Mercator (Zone 14)
North American Datum (1983)

wsp

Report By: JK
Drawn by: JH
Reviewed By: AC

WSP Job #: 221-07203-00
Date: February 8, 2023
Office: Winnipeg

Notes: Imagery Source: ESRI Imagery Service [2022]



Legend

- Flushmount Monitoring Well Location
- Hydrant (Elevation: 235.007 masl)
- Nail in Pole (Elevation: 235.134 masl)
- Site Boundary
- Former Feature Footprint
- Parcels
- Approximate Electricity Line
- Approximate Natural Gas Line
- Approximate Sanitary Sewer Line
- Approximate Storm Sewer Line
- Approximate Water Line
- Groundwater Flow Direction
- Groundwater Elevation Contour (masl)
- 233.00 Groundwater Elevation (masl)

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Winnipeg

Phase II Environmental Site Assessment

Figure 3

Inferred Groundwater Contours

100 Oak Point Highway
Winnipeg, Manitoba

Scale: 1:1,500

0 5 10 20 30 40 50 Metres

Universal Transverse Mercator (Zone 14)
North American Datum (1983)

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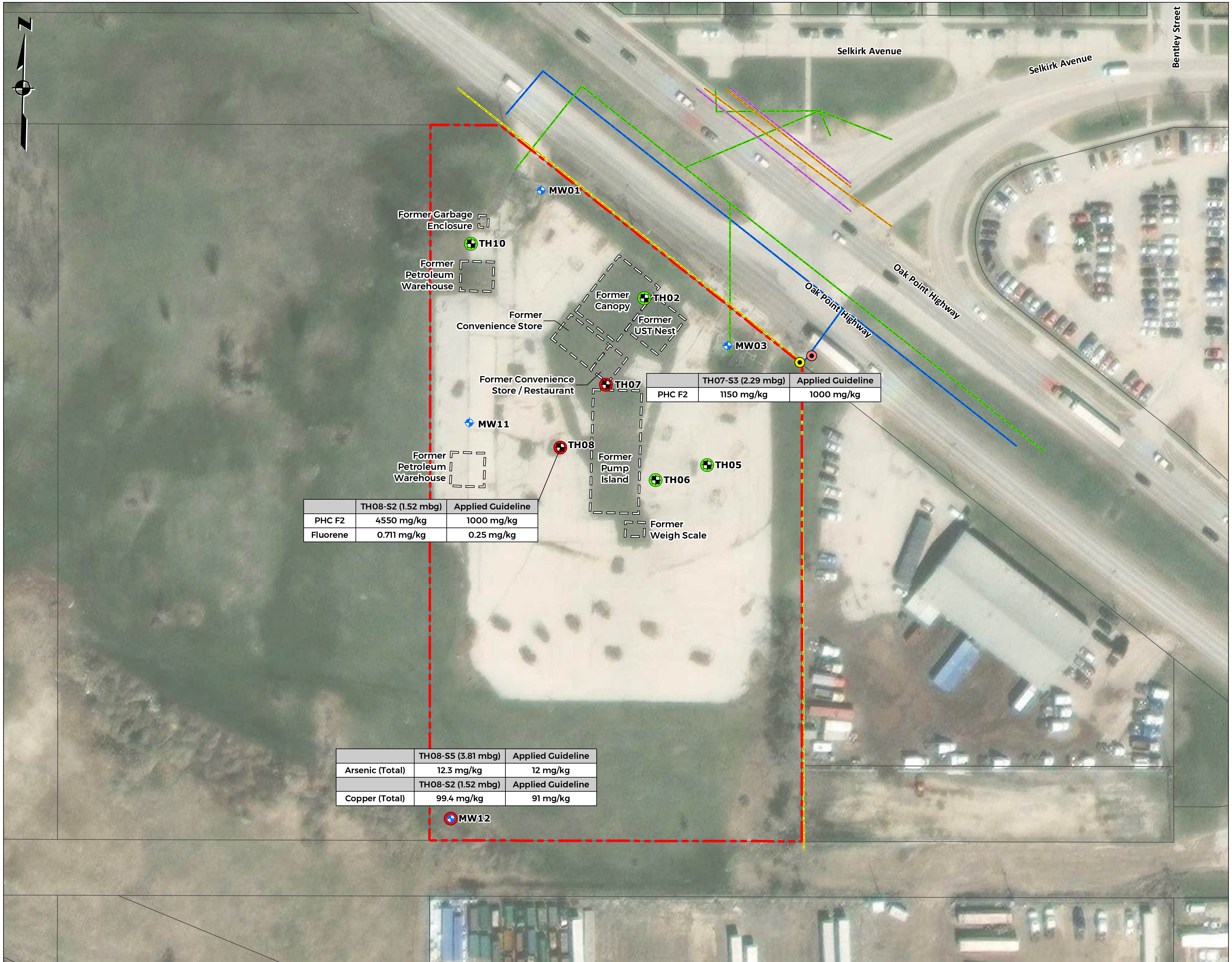
Drawn by: JH
Reviewed By: AC

WSP Job #: 221-07203-00
Date: February 8, 2023
Office: Winnipeg

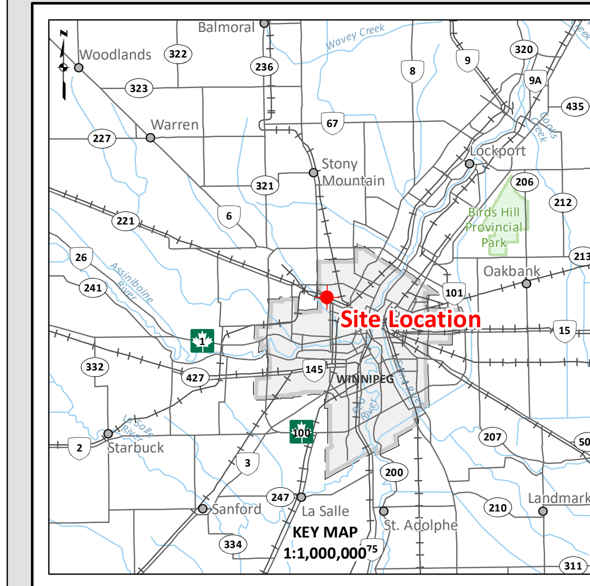
Notes: Imagery Source: ESRI Imagery Service [2022]



	TH07-S3 (2.29 mbg)	Applied Guideline
PHC F2	1150 mg/kg	1000 mg/kg

	TH08-S2 (1.52 mbg)	Applied Guideline
PHC F2	4550 mg/kg	1000 mg/kg
Fluorene	0.711 mg/kg	0.25 mg/kg

	TH08-S5 (3.81 mbg)	Applied Guideline
Arsenic (Total)	12.3 mg/kg	12 mg/kg
	TH08-S2 (1.52 mbg)	Applied Guideline
Copper (Total)	99.4 mg/kg	91 mg/kg



Legend

- Flushmount Monitoring Well Location
- Testhole Location
- Hydrant (Elevation: 235.007 masl)
- Nail in Pole (Elevation: 235.134 masl)
- Site Boundary
- Former Feature Footprint
- Parcels
- Approximate Electricity Line
- Approximate Natural Gas Line
- Approximate Sanitary Sewer Line
- Approximate Storm Sewer Line
- Approximate Water Line
- Below Guidelines
- Above Guidelines

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Phase II Environmental Site Assessment

Figure 4

Soil Exceedances

100 Oak Point Highway
Winnipeg, Manitoba

Scale: 1:1,500

0 5 10 20 30 40 50 Metres

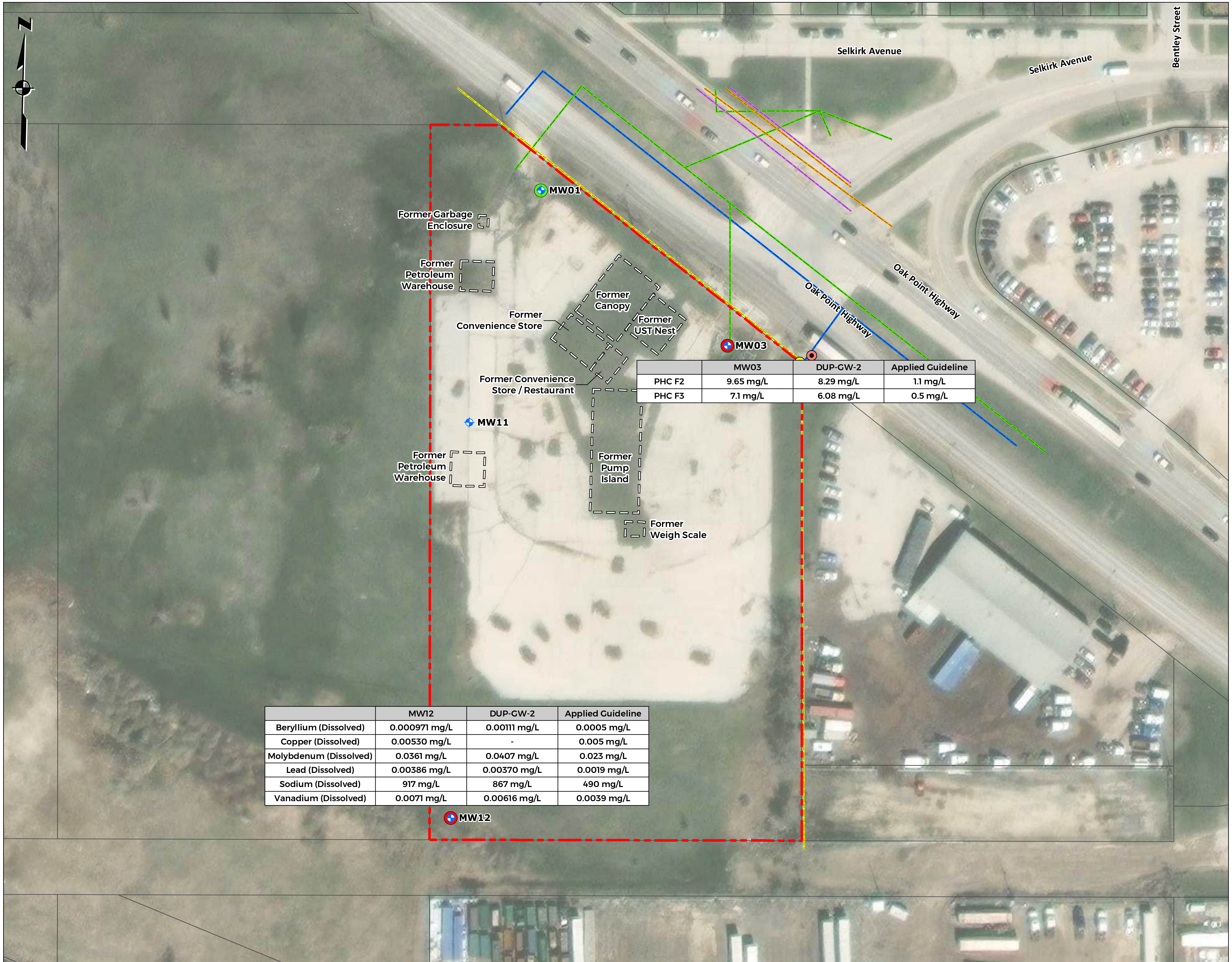
Universal Transverse Mercator (Zone 14)
North American Datum (1983)

WSP

Report By: JK
Drawn by: JH
Reviewed By: AC

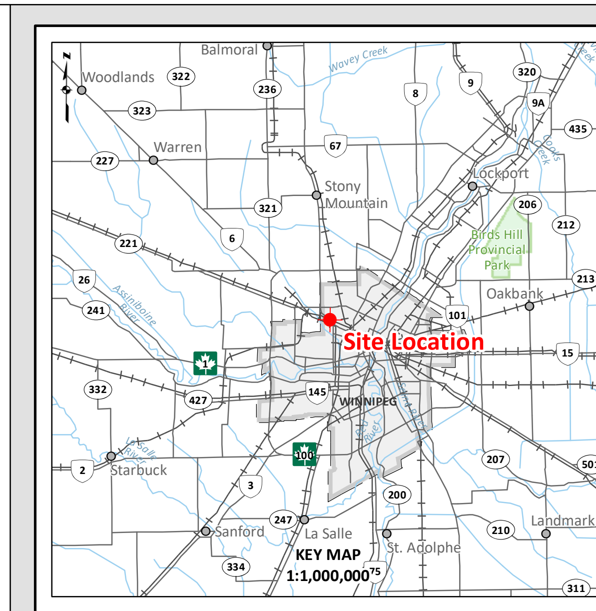
WSP Job #: 221-07203-00
Date: February 8, 2023
Office: Winnipeg

Notes: Imagery Source: ESRI Imagery Service [2022]



	MW03	DUP-GW-2	Applied Guideline
PHC F2	9.65 mg/L	8.29 mg/L	1.1 mg/L
PHC F3	7.1 mg/L	6.08 mg/L	0.5 mg/L

	MW12	DUP-GW-2	Applied Guideline
Beryllium (Dissolved)	0.000971 mg/L	0.00111 mg/L	0.0005 mg/L
Copper (Dissolved)	0.00530 mg/L	-	0.005 mg/L
Molybdenum (Dissolved)	0.0361 mg/L	0.0407 mg/L	0.023 mg/L
Lead (Dissolved)	0.00386 mg/L	0.00370 mg/L	0.0019 mg/L
Sodium (Dissolved)	917 mg/L	867 mg/L	490 mg/L
Vanadium (Dissolved)	0.0071 mg/L	0.00616 mg/L	0.0039 mg/L



Legend

- Flushmount Monitoring Well Location
- Hydrant (Elevation: 235.007 masl)
- Nail in Pole (Elevation: 235.134 masl)
- Site Boundary
- Former Feature Footprint
- Parcels
- Approximate Electricity Line
- Approximate Natural Gas Line
- Approximate Sanitary Sewer Line
- Approximate Storm Sewer Line
- Approximate Water Line
- Below Guidelines
- Above Guidelines

Draft

Winnipeg

Phase II Environmental Site Assessment

Figure 5

Groundwater Exceedances

100 Oak Point Highway
Winnipeg, Manitoba

Scale: 1:1,500

0 5 10 20 30 40 50 Metres

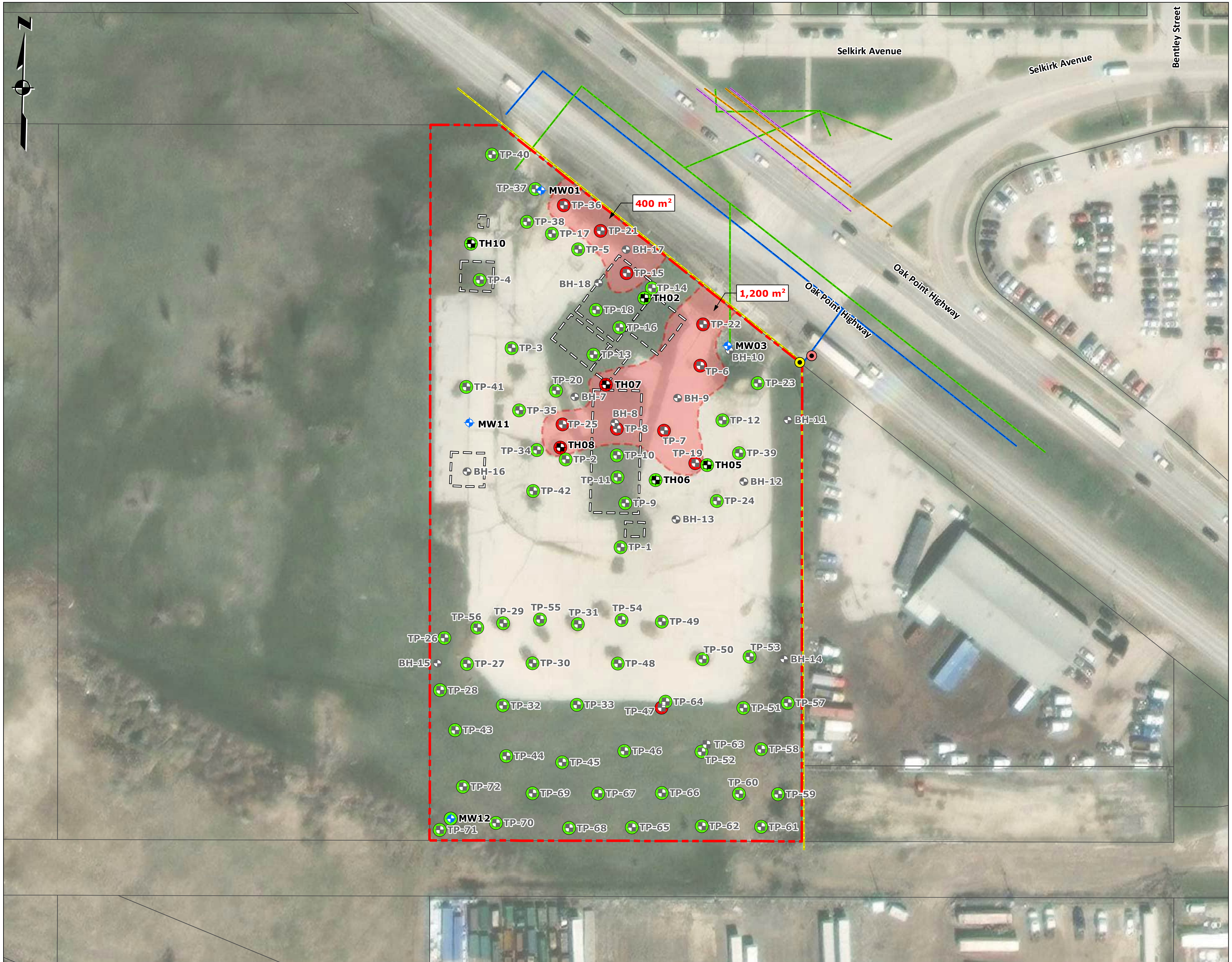
Universal Transverse Mercator (Zone 14)
North American Datum (1983)

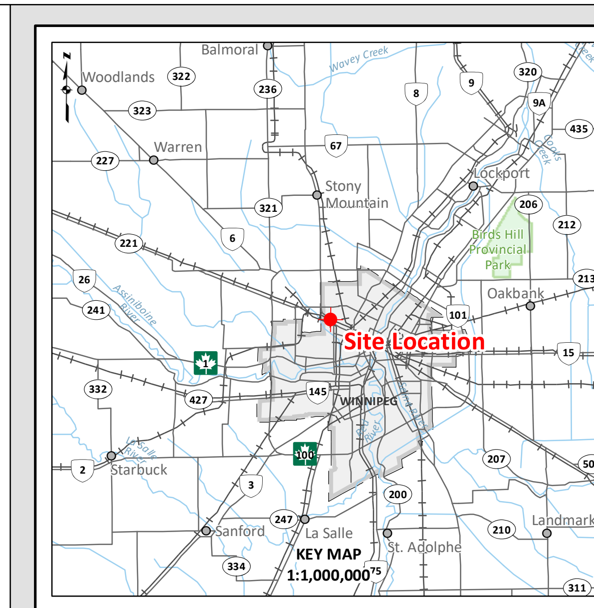
WSP

Report By: JK
Drawn by: JH
Reviewed By: AC

WSP Job #: 221-07203-00
Date: February 8, 2023
Office: Winnipeg

Notes: Imagery Source: ESRI Imagery Service [2022]





Legend

- Flushmount Monitoring Well Location
- Testhole Location
- Borehole Location (By Others)
- Testpit Location (By Others)
- Hydrant (Elevation: 235.007 masl)
- Nail in Pole (Elevation: 235.134 masl)
- Site Boundary
- Former Feature Footprint
- Parcels
- Approximate Electricity Line
- Approximate Natural Gas Line
- Approximate Sanitary Sewer Line
- Approximate Storm Sewer Line
- Approximate Water Line
- Below Applicable PHC in Soil Guidelines
- Above Applicable PHC in Soil Guidelines
- Inferred Soil PHC Impact Plume

Draft

Winnipeg

Phase II Environmental Site Assessment

Figure 6

Inferred Soil PHC Impact Plumes

100 Oak Point Highway
Winnipeg, Manitoba

Scale: 1:1,500

0 5 10 20 30 40 50 Metres

Universal Transverse Mercator (Zone 14)
North American Datum (1983)

wsp

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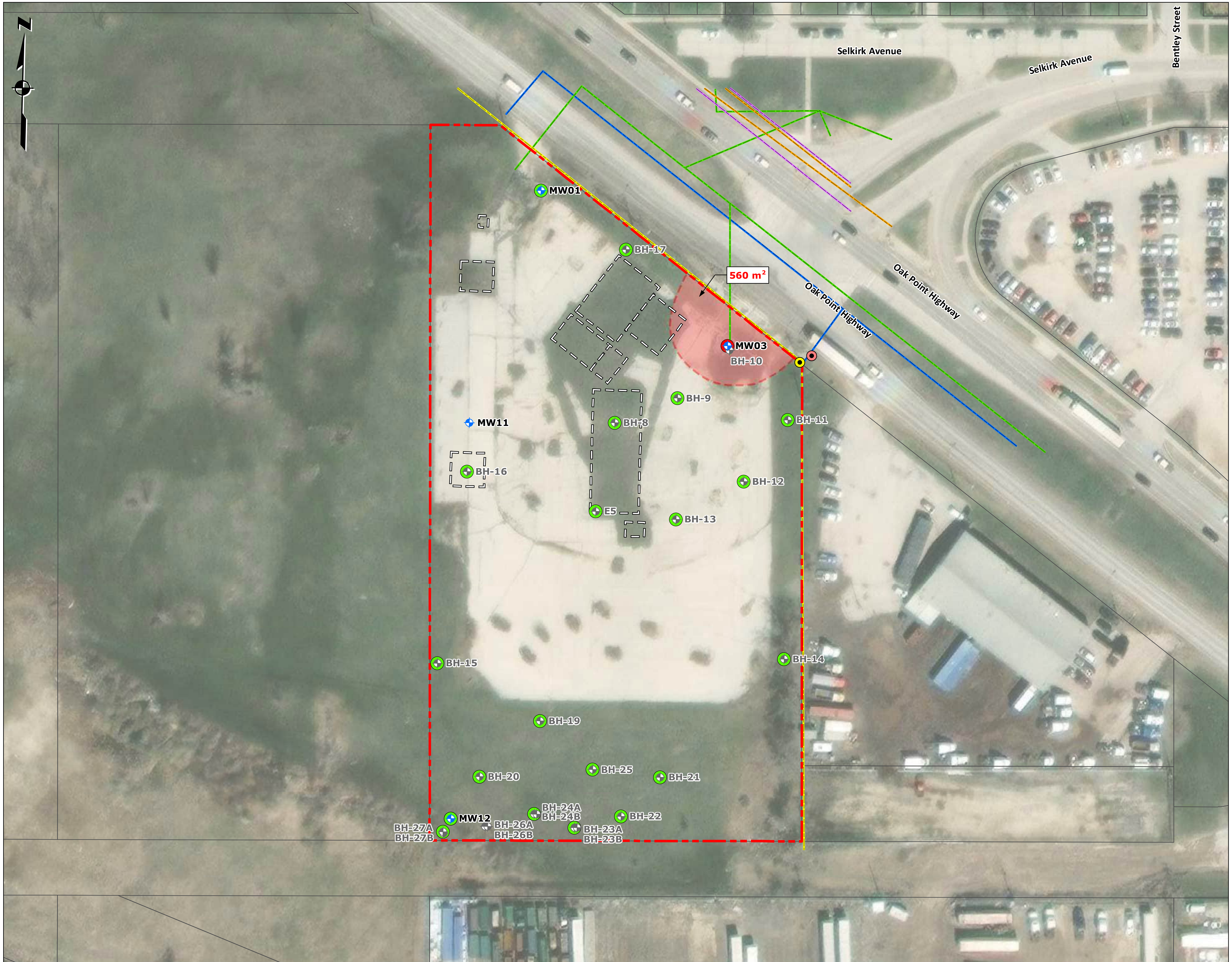
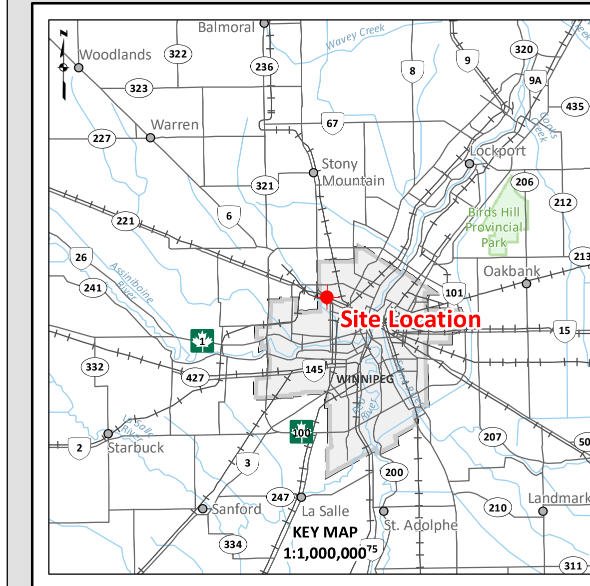
Notes: Imagery Source: ESRI Imagery Service [2022]





Legend

- Flushmount Monitoring Well Location
- Monitoring Well Location (By Others)
- Hydrant (Elevation: 235.007 masl)
- Nail in Pole (Elevation: 235.134 masl)
- Site Boundary
- Former Feature Footprint
- Parcels
- Approximate Electricity Line
- Approximate Natural Gas Line
- Approximate Sanitary Sewer Line
- Approximate Storm Sewer Line
- Approximate Water Line
- Below Applicable PHC in Groundwater Guidelines
- Above Applicable PHC in Groundwater Guidelines
- Inferred Groundwater PHC Impact Plume

Draft

Winnipeg

Phase II Environmental Site Assessment

Figure 7

Inferred Groundwater PHC Impact Plume

100 Oak Point Highway
Winnipeg, Manitoba

Scale: 1:1,500

0 5 10 20 30 40 50 Metres

Universal Transverse Mercator (Zone 14)
North American Datum (1983)

wsp

Report By: JK
Drawn by: JH
Reviewed By: AC

WSP Job #: 221-07203-00
Date: February 8, 2023
Office: Winnipeg

Notes: Imagery Source: ESRI Imagery Service [2022]

APPENDIX

B TABLES

Table 8. Particle Size Analysis of Soil Samples Collected on January 27, 2023

	Units	TH08-S5	TH08-S3
		3.81mbg	2.29mbg
Physical Properties			
Sand (>75 um)	%	31.1	3
Fines (<75 um)	%	68.8	97
Classification		Fine	Fine

Table 9. BTEX and Petroleum Hydrocarbons in Soil Samples Collected between January 25 to 27, 2023

	Units	MW03-S1	MW03-S3	TH07-S3	TH07-S6	TH08-S2	TH08-S5	TH02-S5	TH05-S3	MW11-S2	MW01-S4	TH06-S3	Duplicate-1 (TH07-S3)	Duplicate-2 (TH05-S3)	RPD (Duplicate-1 & TH07-S3)	RPD (Duplicate-2 & TH05-S3)	Applied Criteria Fine-grained	
		Surface	Subsurface	Subsurface	Subsurface	Surface	Subsurface	Subsurface	Subsurface	Subsurface	Subsurface	Subsurface	Subsurface	Subsurface			Surface	Subsurface
		0.76 mbg	2.29 mbg	2.29 mbg	4.57 mbg	1.52 mbg	3.81 mbg	3.81 mbg	2.29 mbg	1.52 mbg	3.05 mbg	2.29 mbg	2.29 mbg	2.29 mbg			< 1.5 mbg	> 1.5 mbg
Physical Properties																		
Moisture	%	9.57	33.1	12	40.3	18.4	37.9	34.9	33.7	22.6	33.7	36.1	11.9	29.6	0.8	13.0	-	-
BTEX																		
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0125	<0.0050	<0.0050	<0.0050	0.0075	<0.0050	<0.0050	<0.0050	<0.0050	N/A	N/A	0.28 [A]	0.29 [A]
Toluene	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	N/A	N/A	13,000 [B]	13,000 [B]
Ethylbenzene	mg/kg	<0.015	<0.015	0.015	<0.015	0.427	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	N/A	N/A	6,500 [C]	6,700 [C]
o-Xylene	mg/kg	<0.030	<0.030	<0.030	<0.030	0.064	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	N/A	N/A	-	-
m+p-Xylenes	mg/kg	<0.030	<0.030	<0.030	<0.030	0.110	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	N/A	N/A	-	-
Xylenes (Total)	mg/kg	<0.050	<0.050	<0.050	<0.050	0.174	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	N/A	N/A	1,600 [D]	1,600 [D]
Petroleum Hydrocarbons																		
F1 (C6-C10)	mg/kg	<10	<10	85.1	<5.0	210.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	93.0	<5.0	8.87	N/A	-	-
F1-BTEX	mg/kg	<10	<10	85.1	<5.0	209.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	93.0	<5.0	8.87	N/A	320 [E]	800 [F]
F2 (C10-C16)	mg/kg	<25	<25	1150	95	4550	55	<25	<25	<25	32	<25	1800	51	44.07	N/A	260 [E]	1000[F]
F3 (C16-C34)	mg/kg	128	80	987	96	3710	89	<50	<50	<50	<50	<50	1580	88	46.20	N/A	2500 [E]	5000 [F]
F4 (C34-C50)	mg/kg	167	68	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	N/A	N/A	6600 [E]	10000[F]

Notes:

Value exceeds applied criteria

Relative Percentage Difference (RPD) = I(sample-Dup)/[(sample+Dup)/2]I*100

N/A = RPD could not be calculated

Guidelines

\- = No Criteria

N/A= RPD could not be calculated

CCME = Canadian Council of Ministers of the Environment

[A] CCME. 2004. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health: Benzene.
Inhalation of indoor air check (slab-on-grade) for commercial land use, 10^{-5} incremental risk of cancer,
excluding the protection of drinking water, aquatic life, livestock and crops.

[B]CCME. 2004. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health: Toluene.
Inhalation of indoor air check (slab-on-grade) for commercial land use, excluding the protection of drinking water, aquatic life, livestock and crops.

[C]CCME. 2004. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health: Ethylbenzene.
Inhalation of indoor air check (slab-on-grade) for commercial land use, excluding the protection of drinking water, aquatic life, livestock and crops.

[D]CCME. 2004. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health: Xylene.
Inhalation of indoor air check (slab-on-grade) for commercial land use, excluding the protection of drinking water, aquatic life, livestock and crops.

[E]CCME. 2008. Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil.
Most stringent criteria for commercial land use, fine-grained surface soils - Eco Soil Contact

[F] CCME. 2008. Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil.
Most stringent criteria for commercial land use, fine-grained subsoils - Management Limit

Table 10. Volatile Organic Compounds in Soil Collected on January 25, 2023

	Units	MW03-S1	Applied Criteria	
			CSQG[A]	Ontario MECP
		0.76 mbg		Fine-grained
Volatile Organic Compounds				
Acetone	mg/kg	<0.50	-	12,000 [B]
Bromobenzene	mg/kg	<0.10	-	-
Bromochloromethane	mg/kg	<0.10	-	-
Bromodichloromethane	mg/kg	<0.050	-	18 [C]
Bromoform	mg/kg	<0.050	-	100 [C]
Bromomethane	mg/kg	<0.050	-	2.7 [B]
Carbon tetrachloride	mg/kg	<0.050	50	1.5 [B]
Chlorobenzene	mg/kg	<0.050	10	-
Chlorodibromomethane	mg/kg	<0.050	-	-
Chloroethane	mg/kg	<0.050	-	-
Chloroform	mg/kg	<0.050	50	19 [B]
Chloromethane	mg/kg	<0.050	-	-
Dibromomethane	mg/kg	<0.050	-	-
1,2-Dibromo-3-chloropropane	mg/kg	<0.050	-	-
1,2-dibromoethane	mg/kg	<0.050	-	-
1,2-dichlorobenzene	mg/kg	<0.050	10	8.5 [D]
1,3-dichlorobenzene	mg/kg	<0.050	10	12 [D]
1,4-dichlorobenzene	mg/kg	<0.050	10	0.84 [B]
1,1-dichloroethane	mg/kg	<0.050	50	21 [D]
1,2-dichloroethane	mg/kg	<0.050	50	0.04 [B]
1,1-dichloroethene	mg/kg	<0.050	50	0.48 [B]
cis-1,2-dichloroethene	mg/kg	<0.050	50	37 [B]
trans-1,2-dichloroethene	mg/kg	<0.050	50	9.3 [B]
Dichlorodifluoromethane	mg/kg	<0.050	-	100 [D]
Dichloromethane	mg/kg	<0.10	-	-
1,2-dichloropropane	mg/kg	<0.050	50	0.68 [B]
1,3-dichloropropane	mg/kg	<0.050	-	-
2,2-dichloropropane	mg/kg	<0.10	-	-
1,1-dichloropropene	mg/kg	<0.050	-	-
cis-1,3-dichloropropene	mg/kg	<0.050	50	-
trans-1,3-dichloropropene	mg/kg	<0.050	50	-
Methyl-tert-butylether (MTBE)	mg/kg	<0.20	-	3.2 [B]
Styrene	mg/kg	<0.050	50	43 [D]
1,1,1,2-tetrachloroethane	mg/kg	<0.050	-	0.11 [B]
1,1,2,2-tetrachloroethane	mg/kg	<0.050	50	0.094 [B]
Tetrachloroethene	mg/kg	<0.050	0.5	4.2 [B]
1,2,3-trichlorobenzene	mg/kg	<0.050	10	-
1,2,4-trichlorobenzene	mg/kg	<0.050	10	16 [B]
1,1,1-trichloroethane	mg/kg	<0.050	50	42 [B]
1,1,2-trichloroethane	mg/kg	<0.050	50	0.11 B
Trichloroethene	mg/kg	<0.050	0.01	0.014 [B]
1,2,3-trichloropropane	mg/kg	<0.050	-	-
Trichlorofluoromethane	mg/kg	<0.050	-	40 [D]
1,2,4-trimethylbenzene	mg/kg	<0.050	-	-
1,3,5-trimethylbenzene	mg/kg	<0.050	-	-
Hexachlorobutadiene	mg/kg	<0.050	-	0.095 [B]
Hexane	mg/kg	<0.050	-	420 [B]
Isopropylbenzene	mg/kg	<0.10	-	-
Vinyl chloride	mg/kg	<0.050	-	0.25 [B]

Notes:

Value exceeds applied criteria

- = No Criteria

CCME = Canadian Council of Ministers of the Environment

MECP = Ministry of the Environment, Conservation and Parks

Guidelines

[A] CCME Soil Quality Guidelines for the Protection of Environmental and Human Health. Accessed on-line February 13, 2023.
Most stringent criteria for commercial land use.

[B] Ontario MECP (2011). Soil, Groundwater and Sediment Standards for use Under Part XV.1 of the Environmental Protection Act
Soil Components for Table 3. Full Depth, Non-potable Water Scenario (Fine-Medium Textured Soil) for Industrial/Commercial Land Use - S-IA Indoor Air Check

[C] Ontario MECP (2011). Soil, Groundwater and Sediment Standards for use Under Part XV.1 of the Environmental Protection Act
Soil Components for Table 3. Full Depth, Non-potable Water Scenario (Fine-Medium Textured Soil) for Industrial/Commercial Land Use - S2 Soil Contact Risk

[D] Ontario MECP (2011). Soil, Groundwater and Sediment Standards for use Under Part XV.1 of the Environmental Protection Act
Soil Components for Table 3. Full Depth, Non-potable Water Scenario (Fine-Medium Textured Soil) for Industrial/Commercial Land Use - Plants and Soil Organisms Check

Table 11. Polycyclic Aromatic Hydrocarbons in Soil Samples Collected on January 27, 2023

	Units	TH08-S2	Applied Criteria	
		1.52 mbg	CSQG[A]	Ontario MECP Fine-grained
Polycyclic Aromatic Hydrocarbons				
Acenaphthene	mg/kg	<0.550	n/a	96 [B]
Acenaphthylene	mg/kg	<0.159	n/a	9.6 [B]
Acridine	mg/kg	1.08	-	-
Anthracene	mg/kg	<0.684	32	40 [C]
Benzo(a)anthracene	mg/kg	<0.050	10	0.96 [B]
Benzo(b&j)fluoranthene	mg/kg	<0.050	10	0.96 [B]
Benzo(k)fluoranthene	mg/kg	<0.075	10	0.96 [B]
Benzo(g,h,i)perylene	mg/kg	<0.050	-	9.6 [B]
Benzo(a)pyrene	mg/kg	<0.0050	72	0.096 [B]
Chrysene	mg/kg	0.062	-	9.6 [B]
Dibenz(a,h)anthracene	mg/kg	<0.050	10	0.096 [B]
Fluoranthene	mg/kg	<0.103	180	9.6 [B]
Fluorene	mg/kg	0.711	0.25	4,200 [D]
Indeno(1,2,3-cd)pyrene	mg/kg	<0.050	10	0.95 [C]
2-Methylnaphthalene	mg/kg	<0.089	-	560 [B]
Naphthalene	mg/kg	<0.637	22	28 [C]
Phenanthrene	mg/kg	0.930	50	16 [C]
Pyrene	mg/kg	0.682	100	96 [B]
Quinoline	mg/kg	0.084	-	-
Benzo[a]pyrene equivalency	mg/kg	<0.065	5.3	-
Index of Additive Cancer Risk (IARC)	n/a	<0.15	≤1	-

Notes:

Value exceeds applied criteria

Guidelines

- = No Criteria

n/a = Not Applicable

CCME = Canadian Council of Ministers of the Environment

MECP = Ministry of the Environment, Conservation and Parks

[A] CCME. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, Polycyclic Aromatic Hydrocarbons, 2010. Most stringent applicable criteria for commercial land use.

[B] Ontario MECP (2011). Soil, Groundwater and Sediment Standards for use Under Part XV.1 of the Environmental Protection Act Soil Components for Table 3. Full Depth, Non-potable Water Scenario (Fine-Medium Textured Soil) for Industrial/Commercial Land Use - S2 Soil Contact Risk

[C] Ontario MECP (2011). Soil, Groundwater and Sediment Standards for use Under Part XV.1 of the Environmental Protection Act Soil Components for Table 3. Full Depth, Non-potable Water Scenario (Fine-Medium Textured Soil) for Industrial/Commercial Land Use - Plants and Soil Organisms Check

[D] Ontario MECP (2011). Soil, Groundwater and Sediment Standards for use Under Part XV.1 of the Environmental Protection Act Soil Components for Table 3. Full Depth, Non-potable Water Scenario (Fine-Medium Textured Soil) for Industrial/Commercial Land Use - Free Phase Threshold

Table 12. Total Metal Concentrations in Soil Samples Collected between January 25 to 27, 2023

	Units	MW03-S1	TH07-S3	TH08-S2	TH02-S5	TH10-S3	MW12-S1	TH08-S5	Metals-Duplicate (MW12-S1)	RPD	Applied Criteria [A]
		0.76 mbg	2.29 mbg	1.52 mbg	3.81 mbg	2.29 mbg	0.76 mbg	3.81 mbg	2.29 mbg		
Elements											
Total Antimony (Sb)	mg/kg	0.11	0.33	1.93	0.46	0.46	0.47	0.50	0.50	6.19	40
Total Arsenic (As)	mg/kg	2.02	4.60	13.0	10.7	8.32	7.59	**12.3**	7.10	6.67	12
Total Barium (Ba)	mg/kg	56.1	149	1300	225	207	230	229	198	14.95	2000
Total Beryllium (Be)	mg/kg	0.25	0.57	2.14	0.95	1.11	0.99	1.08	0.92	7.33	8
Total Cadmium (Cd)	mg/kg	0.044	0.157	0.259	0.183	0.234	0.393	0.230	0.333	16.53	22
Total Chromium (Cr)	mg/kg	13.2	26.1	19.7	37.9	52.4	48.4	46.8	43.8	9.98	87
Total Cobalt (Co)	mg/kg	3.81	6.97	7.11	11.8	13.5	13.4	14.5	12.1	10.20	300
Total Copper (Cu)	mg/kg	10.8	17.9	**99.4**	26.4	33.4	31.1	33.1	28.6	8.38	91
Total Lead (Pb)	mg/kg	5.44	16.4	113	12.5	13.8	25.9	14.8	25.8	0.39	260
Total Molybdenum (Mo)	mg/kg	0.31	0.63	3.87	1.11	1.36	0.86	1.37	0.85	1.17	40
Total Nickel (Ni)	mg/kg	10.1	19.6	29.4	33.4	37.6	38.5	42.0	35.8	7.27	89
Total Selenium (Se)	mg/kg	<0.20	<0.20	1.11	0.47	0.32	0.25	0.58	0.32	24.56	2.9
Total Silver (Ag)	mg/kg	<0.10	<0.10	0.29	0.10	0.13	0.12	0.12	0.11	8.70	40
Total Thallium (Tl)	mg/kg	0.085	0.175	0.206	0.280	0.324	0.314	0.287	0.280	11.45	1
Total Tin (Sn)	mg/kg	<2.0	<2.0	23.5	<2.0	<2.0	<2.0	<2.0	<2.0	N/A	300
Total Uranium (U)	mg/kg	0.585	1.02	2.34	1.61	1.71	1.71	1.83	1.68	1.77	33
Total Vanadium (V)	mg/kg	21.6	45.3	37.2	67.7	91.7	81.3	79.9	75.2	7.80	130
Total Zinc (Zn)	mg/kg	18.1	59.4	140	74.3	88.2	82.9	85.4	80.0	3.56	410

Notes:

Value exceeds applied criteria

Relative Percentage Difference (RPD) = I(sample-Dup)/[(sample+Dup)/2]I*100

N/A = RPD could not be calculated

Guidelines

- = No Criteria

CCME = Canadian Council of Ministers of the Environment

[A] CCME Soil Quality Guidelines for the Protection of Environmental and Human Health. Accessed on-line April, 2022.
Most stringent criteria for commercial land use.

Table 13. Monitoring Well Screening Measurements
Collected on February 1, 2023

Monitoring Well ID	Northing	Easting	Top of Casing Elevation (masl)	Depth to Groundwater (mbtoc)	Groundwater Table Elevation (masl)	Well Vapour (HEX, IBL in ppm)	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (us/cm)	pH	Oxidation-reduction Potential (mV)
MW01	5532482.352	628308.819	233.806	2.185	231.621	0,0	5.7	13.06	1560	5.14	191.0
MW03	5532441.589	628360.412	233.966	0.886	233.08	0,1	3.6	14.29	998	5.41	-331.9
MW11	5532418.948	628291.395	235.083	DRY	DRY	-	-	-	-	-	-
MW12	5532311.801	628288.968	236.876	2.834	234.042	0,0	5.4	3.95	3281	5.86	-276.3

Notes:

All GPS coordinates are referenced to UTM NAD83 Zone 14N

m = Metres

masl = Metres above sea level

mbtoc = metres below top of casing

HEX = measurement calibrated to hexane

IBL = measurement calibrated to isobutylene

ppm = parts per million

mV = millivolt

µs/cm = microSiemens per centimeter

- = No data collected due to insufficient groundwater

Table 14. BTEX and Petroleum Hydrocarbons in Groundwater Samples Collected on February 1, 2023

Analyte	Units	MW01	MW03	MW11	MW12	DUP-GW-1 (MW03)	RPD	Applied Criteria
								Fine-grained
Benzene	mg/L	<0.00050	<0.00050	-	<0.00050	<0.00050	N/A	0.005 [A]
Toluene		<0.00050	<0.00050	-	<0.00050	<0.00050	N/A	0.024 [A]
Ethylbenzene		<0.00050	<0.00050	-	<0.00050	<0.00050	N/A	0.0016 [A]
Xylenes (total)		<0.00050	0.00057	-	<0.00050	<0.00050	N/A	0.020 [A]
F1 (C6-C10) - BTEX		<0.10	0.23	-	<0.10	0.19	19.05	2.2 [A]
F2 (C10-C16 Hydrocarbons)		0.13	9.65	-	<0.10	8.29	15.16	1.1 [A]
F3 (C16-C34 Hydrocarbons)		<0.25	7.1	-	<0.25	6.08	15.48	0.5 [B]
F4 (C34-C50 Hydrocarbons)		<0.25	<0.25	-	<0.25	<0.25	N/A	0.5 [B]

Notes:

- = Dry well

Relative Percentage Difference (RPD) = I(sample-Dup)/[(sample+Dup)/2]I*100

N/A = RPD could not be calculated

Value exceeds applied criteria

Guidelines

[A] Alberta Environment and Parks (2022). Alberta Tier 1 Soil and Groundwater Remediation Guidelines.

Table 2 - Tier 1 Groundwater Remediation Guidelines for Fine-textured Soil in a Commercial and Industrial Land Use Setting

[B] Ontario Ministry of the Environment and Climate Change, Standards Development Branch (2016). Modified Generic Risk Assessment "Approved Model".

Groundwater (Ont. GW Bkgrd) Components for Non-potable Water Scenario (Medium - Fine Textured Soil) in Commercial/Industrial Land Use.

Table 15 Dissolved Metals in Groundwater Samples Collected on February 1, 2023

	Units	MW01	MW03	MW11	MW12	DUP-GW-2 (MW12)	RPD	Applied Criteria [A] Fine-grained
Elements								
Dissolved Aluminum (Al)	mg/L	0.0014	0.250	-	0.778	0.718	8.02	-
Dissolved Antimony (Sb)		0.00092	0.00083	-	0.00101	0.00095	6.12	0.0015 [B]
Dissolved Arsenic (As)		0.00104	0.00162	-	0.00312	0.00278	11.53	0.013 [B]
Dissolved Barium (Ba)		0.0470	0.0666	-	0.0788	0.0696	12.40	0.61 [B]
Dissolved Beryllium (Be)		<0.000020	0.000042	-	0.000971	0.00111	13.36	0.0005 [B]
Dissolved Bismuth (Bi)		<0.000050	<0.000050	-	<0.000050	<0.000050	N/A	-
Dissolved Boron (B)		0.605	0.548	-	17.3	19.7	12.97	n/a
Dissolved Cadmium (Cd)		0.0000337	0.0000252	-	0.0000669	0.0000634	5.37	-
Dissolved Calcium (Ca)		183	97.3	-	472	450	4.77	-
Dissolved Cesium (Cs)		0.000104	0.000126	-	0.000190	0.000226	17.31	-
Dissolved Chromium (Cr)		<0.00050	0.00051	-	0.00107	0.00092	15.08	0.011 [B]
Dissolved Cobalt (Co)		0.00066	0.00081	-	0.00266	0.00215	21.21	0.0038 [B]
Dissolved Copper (Cu)		0.00225	0.00114	-	0.00530	0.00336	44.80	0.005 [B]
Dissolved Iron (Fe)		<0.010	0.223	-	0.539	0.451	17.78	-
Dissolved Lead (Pb)		0.000065	0.000356	-	0.00386	0.00370	4.23	0.0019 [B]
Dissolved Lithium (Li)		0.147	0.0568	-	0.238	0.213	11.09	-
Dissolved Magnesium (Mg)		153	84.7	-	713	632	12.04	-
Dissolved Manganese (Mn)		0.210	0.141	-	0.960	0.809	17.07	-
Dissolved Mercury (Hg)		-	-	-	0.0000052	-	N/A	0.0061 [C]
Dissolved Molybdenum (Mo)		0.00667	0.0102	-	0.0361	0.0407	11.98	0.023 [B]
Dissolved Nickel (Ni)		0.00365	0.00343	-	0.00912	0.00761	18.05	0.014 [B]
Dissolved Phosphorus (P)		0.110	0.053	-	0.232	0.204	12.84	-
Dissolved Potassium (K)		8.84	6.02	-	16.5	15.7	4.97	-
Dissolved Rubidium (Rb)		0.00205	0.00171	-	0.00667	0.00638	4.44	-
Dissolved Selenium (Se)		0.00376	0.000299	-	0.000502	0.000532	5.80	0.005 [B]
Dissolved Silicon (Si)		7.70	7.12	-	7.52	7.03	6.74	-
Dissolved Silver (Ag)		0.000010	<0.000010	-	0.000039	0.000038	2.60	-
Dissolved Sodium (Na)		265	174	-	917	867	5.61	490 [B]
Dissolved Strontium (Sr)		1.30	0.730	-	7.68	7.68	0.00	-
Dissolved Sulphur (S)		264	81.4	-	1210	1100	9.52	-
Dissolved Tellurium (Te)		<0.00020	<0.00020	-	0.00025	0.00020	22.22	-
Dissolved Thallium (Tl)		0.000019	0.000012	-	0.000029	0.000027	7.14	0.0005 [B]
Dissolved Thorium (Th)		<0.00010	0.00011	-	0.00034	0.00032	6.06	
Dissolved Tin (Sn)		0.00354	0.00106	-	0.00134	0.00121	10.20	-
Dissolved Titanium (Ti)		<0.00030	0.0102	-	0.0280	0.0243	14.15	-
Dissolved Tungsten (W)		0.00044	0.00169	-	0.00375	0.00409	8.67	-
Dissolved Uranium (U)		0.0605	0.00874	-	0.0609	0.0504	18.87	n/a
Dissolved Vanadium (V)		0.00085	0.00196	-	0.00710	0.00616	14.18	0.0039 [B]
Dissolved Zinc (Zn)		0.0066	0.0094	-	0.0071	0.0090	23.60	0.16 [B]
Dissolved Zirconium (Zr)		0.00070	0.00119	-	0.00338	0.00317	6.41	-

Notes:

Relative Percentage Difference (RPD) = I(sample-Dup)/[(sample+Dup)/2]I*100

- = No Criteria

MW11 = Dry

N/A = RPD could not be calculated

n/a = No applicable component value

Value exceeds applied criteria

Guidelines

[A] Ontario Ministry of Environment, Conservation and Parks (2011). Soil, Groundwater and Sediment Standards for use Under Part XV.1 of the Environmental Protection Act

[B] Ontario Ministry of Environment, Conservation and Parks, Standards Development Branch (2016). Modified Generic Risk Assessment "Approved Model". Groundwater (Groundwater Background) Components for Non-potable Water Scenario (Medium - Fine Textured Soil) in Commercial/Industrial Land Use - Appendix A3

[C] Ontario Ministry of Environment, Conservation and Parks, Standards Development Branch (2016). Modified Generic Risk Assessment "Approved Model". Groundwater (GW2) Components for Non-potable Water Scenario (Medium - Fine Textured Soil) in Commercial/Industrial Land Use - Appendix A3

APPENDIX

C PHOTOGRAPHS

January 25, 2023

Photograph 1 – Northeast portion of the Site

Looking west at the location of monitoring well MW01 (yellow arrow).

January 25, 2023

Photograph 2 – North portion of the Site

Looking west at the location of testhole TH02.

January 25, 2023

Photograph 3 – Northeast portion of the Site

Looking west at the location of monitoring well MW03.

January 25, 2023

Photograph 4 – Central portion of the Site

Looking east at the location of testhole TH05.

January 25, 2023

Photograph 5 – Central portion of Site

Looking east at the location of testhole TH06.

January 25, 2023

Photograph 6 – Central portion of Site

Looking north at the location of testhole TH07.

January 25, 2023

Photograph 8 – Central portion of Site
Looking southeast at the location of testhole TH08.

January 25, 2023

Photograph 9 – Northwest portion of the Site
Looking west at the location of testhole TH10.

January 25, 2023

Photograph 10 – South portion of the Site

Looking south at the location of monitoring well MW12 (yellow arrow).

APPENDIX

D

BOREHOLE AND MONITORING WELL LOGS

Figure No. ______________

LOG OF MONITORING WELL MW01

Project No.	221-07203-00		
Project:	Phase II ESA - 100 Oak Point Hwy		
Location:	Winnipeg, MB	Co-ordinates:	628308E, 5532482N
Date Drilled:	January 26, 2023	Datum:	UTM NAD 83 Zone 14
Drill Type:	Scout	Logged By:	J. Kevin
Drilling Contractor:	Maple Leaf Drilling	Checked By:	A. Chan

DEPTH (m bgs)	LITHOLOGY	SOIL DESCRIPTION	WELL	INSTALLATION DETAILS	SAMPLE ID	SOIL SAMPLE TEST	● VOCs (ppm) 40 80 120 160 / ▲ Combustible Gases (ppm) 20 40 60 80
0.08		**ASPHALT** - Surface covered by snow **CLAY FILL** - Brown-grey, some gravel, stiff, frozen to		Top of Solid Pipe 0.134 m Below Top of Flushmount Casing Bentonite Seal	MW01-S1 (GRAB) MW01-S2 (GRAB)		
2.19				Slotted Pipe and Sand Pack			
2.44		**CLAY** - Medium grey, firm, trace silt pockets, high plastic - Trace hematized silt pocket below the depth of 3.51 mbgs			MW01-S3 (GRAB) MW01-S4 (GRAB) MW01-S5 (GRAB) MW01-S6 (GRAB)	BTEX, PHC F1-F4 (MW01-S4)	
4.60		**END OF TESTHOLE** End of borehole at 4.60 mbgs No seepage observed, borehole open to 4.6 mbg and dry. No PHC odour or staining observed.		Water measured on 2022-02-01 231.621 masl 2.185 mbgs Well Diameter: 50 mm Well Material: Schedule 40 PVC			

Figure No. ____________

LOG OF TESTHOLE TH02

Project No.: **221-07203-00**
Project: **Phase II ESA - 100 Oak Point Hwy**
Location: **Winnipeg, MB** — Co-ordinates: **628337.7408E, 5532454.07N**
Date Drilled: **January 26, 2023** — Datum: **UTM NAD 83 Zone 14**
Drill Type: **Scout** — Logged By: **J. Kevin**
Drilling Contractor: **Maple Leaf Drilling** — Checked By: **A. Chan**

DEPTH (m bgs)	SOIL DESCRIPTION	INSTALLATION DETAILS	SAMPLE ID	SOIL SAMPLE TEST
0.10	**TOPSOIL** - Surface covered by snow - Organic rich, dark brown, frozen, with roots **CLAY FILL** - Brown-grey, some gravel, stiff, trace root-lets, frozen to the depth of 1.2 mbgs	No monitoring well Installed. Borehole backfilled with bentonite clay pellets to surface.	TH02-S1 (GRAB)	
			TH02-S2 (GRAB)	
			TH02-S3 (GRAB)	
3.05	**CLAY (CH)** - Medium grey, damp, trace silt, trace oxidation, high plastic		TH02-S4 (GRAB)	
	- Seepage encountered at the depth of 3.66 mbgs, wet, some silt		TH02-S5 (GRAB)	BTEX, PHC F1-F4, Metals, Mercury
			TH02-S6 (GRAB)	
			TH02-S7 (GRAB)	
6.10	**END OF TESTHOLE** End of borehole at 6.10 mbgs Seepage observed, borehole open to 5.49 mbg and wet. No PHC odor or staining observed.	Water measured on masl mbgs Well Diameter: mm Well Material:	TH02-S8 (GRAB)	

● VOCs (ppm) 40 80 120 160
▲ Combustible Gases (ppm) 20 40 60 80

wsp

Figure No. ______________

LOG OF MONITORING WELL MW03

Project No.	221-07203-00		
Project:	Phase II ESA - 100 Oak Point Hwy		
Location:	Winnipeg, MB	Co-ordinates:	628360.511E, 5532441.71N
Date Drilled:	January 26, 2023	Datum:	UTM NAD 83 Zone 14
Drill Type:	Scout	Logged By:	J. Kevin
Drilling Contractor:	Maple Leaf Drilling	Checked By:	A. Chan

DEPTH (m bgs)	Elevation	LITHOLOGY	SOIL DESCRIPTION	WELL	INSTALLATION DETAILS	SAMPLE ID	SOIL SAMPLE TEST	● VOCs (ppm) 40 80 120 160 / ▲ Combustible Gases (ppm) 20 40 60 80
	233.966		**GRAVEL** - Surface covered by snow - Beige, frozen to 1.2 mbg		Top of Solid Pipe 0.134 m Below Top of Flushmount Casing Bentonite Seal			
0.89	233.08					MW03-S1 (GRAB)	BTEX, PHC F1-F4, VOC	
1.22	232.746		**CLAY** - Medium grey, stiff, trace gravel - Seepage encountered at the depth of 1.52 mbgs - Dark grey below the depth of 1.52 mbgs - Trace silt pockets, trace hematized silt pockets, and soft below the depth of 2.29 mbgs		Slotted Pipe and Sand Pack	MW03-S2 (GRAB)		
						MW03-S3 (GRAB)	BTEX, F1-F4	
						MW03-S4 (GRAB)		
						MW03-S5 (GRAB)		
4.60	229.366					MW03-S6 (GRAB)		
			END OF TESTHOLE End of borehole at 4.60 mbgs Seepage observed, borehole open to 6.10 mbg and wet. PHC odor observed on sample MW03-S1 and no staining observed.		Water measured on 2022-02-01 233.08 masl 0.886 mbgs Well Diameter: 50 mm Well Material: Schedule 40 PVC			

Figure No. ____________

LOG OF TESTHOLE TH05

Project No.: 221-07203-00
Project: Phase II ESA - 100 Oak Point Hwy
Location: Winnipeg, MB
Co-ordinates: 628355.8799E, 5532409.34N
Date Drilled: January 27, 2023
Datum: UTM NAD 83 Zone 14
Drill Type: Scout
Logged By: J. Kevin
Drilling Contractor: Maple Leaf Drilling
Checked By: A. Chan

DEPTH (m bgs)	LITHOLOGY	SOIL DESCRIPTION	WELL	INSTALLATION DETAILS	SAMPLE ID	SOIL SAMPLE TEST	● VOCs (ppm) 40 80 120 160 / ▲ Combustible Gases (ppm) 20 40 60 80
		SAND FILL - Surface covered by snow - Frozen to the depth of 1.5 mbgs, beige		No monitoring well Installed. Borehole backfilled with bentonite clay pellets to surface.	TH05-S1 (GRAB)		
1.52		**CLAY** - Medium brown, firm to stiff, damp, high plastic			TH05-S2 (GRAB)		
		- Firm and trace hematized silt pockets below the depth of 3.96 mbgs			TH05-S3 (GRAB)	BTEX F1-F4, Metals	
					TH05-S4 (GRAB)		
					TH05-S5 (GRAB)		
4.60					TH05-S6 (GRAB)		
		END OF TESTHOLE End of borehole at 4.60 mbgs No seepage observed, borehole open to 4.6 mbg and dry. No PHC odor or staining observed.		Water measured on masl mbgs Well Diameter: mm Well Material:			

Figure No. ______________

LOG OF TESTHOLE TH06

Project No.	221-07203-00		
Project:	Phase II ESA - 100 Oak Point Hwy		
Location:	Winnipeg, MB	Co-ordinates:	628342.023E, 5532404.844N
Date Drilled:	January 27, 2023	Datum:	UTM NAD 83 Zone 14
Drill Type:	Scout	Logged By:	J. Kevin
Drilling Contractor:	Maple Leaf Drilling	Checked By:	A. Chan

DEPTH (m bgs)	LITHOLOGY	SOIL DESCRIPTION	WELL	INSTALLATION DETAILS	SAMPLE ID	SOIL SAMPLE TEST	● VOCs (ppm) 40 80 120 160 / ▲ Combustible Gases (ppm) 20 40 60 80
		SAND FILL - Surface covered by snow - Frozen to the depth of 1.5 mbgs, beige		No monitoring well Installed. Borehole backfilled with bentonite clay pellets to surface.	TH06-S1 (GRAB)		
1.52		**CLAY** - Medium brown, firm to stiff, damp, high plastic - Firm and trace hematized silt pockets below the depth of 3.96 mbgs			TH06-S2 (GRAB)		
					TH06-S3 (GRAB)	BTEX F1-F4, Metals	
					TH06-S4 (GRAB)		
					TH06-S5 (GRAB)		
4.60					TH06-S6 (GRAB)		

END OF TESTHOLE

End of borehole at 4.60 mbgs

No seepage observed, borehole open to 4.6 mbg and dry. No PHC odor or staining observed.

Water measured on
masl
mbgs

Well Diameter:
mm

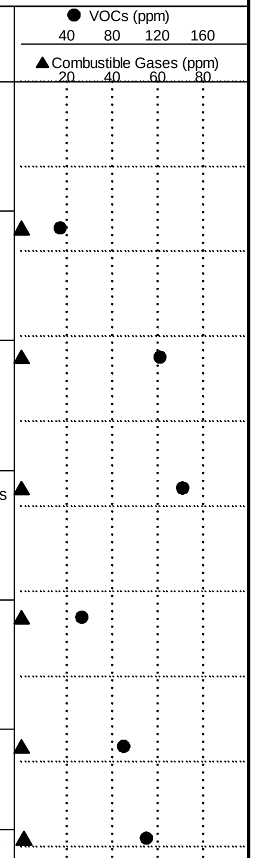
Well Material:

Figure No. ______________

LOG OF MONITORING WELL TH07

Project No.	221-07203-00
Project:	Phase II ESA - 100 Oak Point Hwy
Location:	Winnipeg, MB
Co-ordinates:	628327.9122E, 5532430.336N
Date Drilled:	January 27, 2023
Datum:	UTM NAD 83 Zone 14
Drill Type:	Scout
Logged By:	J. Kevin
Drilling Contractor:	Maple Leaf Drilling
Checked By:	A. Chan

DEPTH (m bgs)	LITHOLOGY	SOIL DESCRIPTION	WELL	INSTALLATION DETAILS	SAMPLE ID	SOIL SAMPLE TEST
		CLAY FILL - Surface covered by snow - Brown-grey, with gravel, stiff, some silt, frozen to 1.2 mbgs - Seepage encountered at the depth of 1.83 mbgs		No monitoring well Installed. Borehole backfilled with bentonite clay pellets to surface.	TH07-S1 (GRAB)	
					TH07-S2 (GRAB)	
					TH07-S3 (GRAB)	BTEX F1-F4, Metals
					TH07-S4 (GRAB)	
3.81		**CLAY** - Medium brown-hrey, stiff, high plastic - Trace hematized silt pockets at the depth of 3.96 mbgs			TH07-S5 (GRAB)	
4.60					TH07-S6 (GRAB)	BTEX, PHC F1-F4
		END OF TESTHOLE End of borehole at 4.60 mbgs Seepage observed, borehole open to 4.6 mbg and wet. Strong PHC odour observed on sample TH07-S1 (0.61 mbgs), TH07-S2 (1.52 mbgs), and TH07-S3 (2.29 mbgs) and no staining observed.		Water measured on masl mbgs Well Diameter: mm Well Material:		



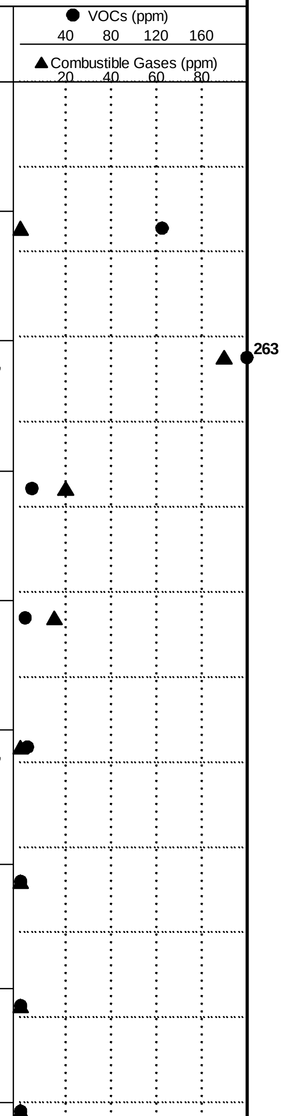
WSP MW REPORT VER.3 221-07203-00 OAK POINT HWY P2ESA.GPJ GINT STD CANADA.GDT 23-2-16

Figure No. ______________

LOG OF MONITORING WELL TH08

Project No.	221-07203-00		
Project:	Phase II ESA - 100 Oak Point Hwy		
Location:	Winnipeg, MB	Co-ordinates:	628312.1077E, 5532419.194N
Date Drilled:	January 27, 2023	Datum:	UTM NAD 83 Zone 14
Drill Type:	Scout	Logged By:	J. Kevin
Drilling Contractor:	Maple Leaf Drilling	Checked By:	A. Chan

DEPTH (m bgs)	SOIL DESCRIPTION	INSTALLATION DETAILS	SAMPLE ID	SOIL SAMPLE TEST
	SAND FILL - Frozen to the depth of 1.2 mbgs, beige - Surface covered by snow	No monitoring well Installed. Borehole backfilled with bentonite clay pellets to surface.	TH08-S1 (GRAB)	
1.52	**CLAY** - Medium brown, firm to stiff, damp, high plastic		TH08-S2 (GRAB)	BTEX, PHC F1-F4, PAH, Metals
	- Silt inclusion from the depth of 1.83 to 2.13 mbgs		TH08-S3 (GRAB)	PSA
	- At the depth of 3.81, trace oxidation, firm		TH08-S4 (GRAB)	
			TH08-S5 (GRAB)	BTEX, PHC F1-F4, PSA
			TH08-S6 (GRAB)	
			TH08-S7 (GRAB)	
6.10			TH08-S8 (GRAB)	
	END OF TESTHOLE End of borehole at 6.10 mbgs No seepage observed, borehole open to 6.1 mbg and wet. PHC odor observed on sample TH08-S2 and no staining observed.	Water measured on masl mbgs Well Diameter: mm Well Material:		



WSP MW REPORT VER.3 221-07203-00 OAK POINT HWY P2ESA.GPJ GINT STD CANADA.GDT 23-2-16

Figure No. ______________

LOG OF MONITORING WELL TH10

Project No.: 221-07203-00
Project: Phase II ESA - 100 Oak Point Hwy
Location: Winnipeg, MB
Co-ordinates: 628290.9813E, 5532418.443N
Date Drilled: January 27, 2023
Datum: UTM NAD 83 Zone 14
Drill Type: Scout
Logged By: J. Kevin
Drilling Contractor: Maple Leaf Drilling
Checked By: A. Chan

DEPTH (m bgs)	LITHOLOGY	SOIL DESCRIPTION	WELL	INSTALLATION DETAILS	SAMPLE ID	SOIL SAMPLE TEST	● VOCs (ppm) 40 80 120 160 / ▲ Combustible Gases (ppm) 20 40 60 80
0.08		**ASPHALT** - Suface covered by snow		No monitoring well Installed. Borehole backfilled with bentonite clay pellets to surface.			
0.61		**GRAVEL** - Beige, frozen to the depth of 1.2 mbgs					
		CLAY - Dark grey, stiff, damp, trace gravel, high plastic			TH10-S1 (GRAB)		
		- At the depth of 2.29 mbgs, color change to brown-grey, firm			TH10-S2 (GRAB)		
					TH10-S3 (GRAB)	BTEX, PHC F1-F4, Metals, Mercury	
					TH10-S4 (GRAB)		
					TH10-S5 (GRAB)		
4.60					TH10-S6 (GRAB)		
		END OF TESTHOLE End of borehole at 4.60 mbgs No seepage observed, borehole open to 4.6 mbg and wet. PHC odor observed on sample TH10-S3 and no staining observed.		Water measured on masl mbgs Well Diameter: mm Well Material:			

Figure No. ______________

LOG OF MONITORING WELL MW11

Project No.: 221-07203-00
Project: Phase II ESA - 100 Oak Point Hwy
Location: Winnipeg, MB
Co-ordinates: 628291.121E, 5532419.018N
Date Drilled: January 27, 2023
Datum: UTM NAD 83 Zone 14
Drill Type: Scout
Logged By: J. Kevin
Drilling Contractor: Maple Leaf Drilling
Checked By: A. Chan

DEPTH (m bgs)	Elev.	SOIL DESCRIPTION	INSTALLATION DETAILS	SAMPLE ID	SOIL SAMPLE TEST
	235.188				
0.08	235.112	**ASPHALT** - Surface covered by snow	Top of Solid Pipe 0.134 m Below Top of Flushmount Casing		
		GRAVEL - Beige, frozen to 1.0 mbgs	Bentonite Seal		
0.91	234.278	**CLAY** - Medium grey, soft to firm, damp, high plastic		MW11-S1 (GRAB)	
		- Silt lense at the depth of 1.52 to 1.72 mbgs		MW11-S2 (GRAB)	BTEX F1-F4, Metals, Mercury
		- Light brown and soft below 2.29 mbgs	Slotted Pipe and Sand Pack		
				MW11-S3 (GRAB)	
				MW11-S4 (GRAB)	
				MW11-S5 (GRAB)	
4.60	230.588			MW11-S6 (GRAB)	
		END OF TESTHOLE End of borehole at 4.60 mbgs	Water measured on 2022-02-01 masl mbgs		
		No seepage observed, borehole open to 4.6 mbg and dry. No PHC odor or staining observed.	Well Diameter: 50 mm		
		Monitoring well was observed to be dry during the groundwater monitoring event on February 1, 2023	Well Material: Schedule 40 PVC		

● VOCs (ppm): 40 80 120 160

▲ Combustible Gases (ppm): 20 40 60 80

Figure No. ______

LOG OF MONITORING WELL MW12

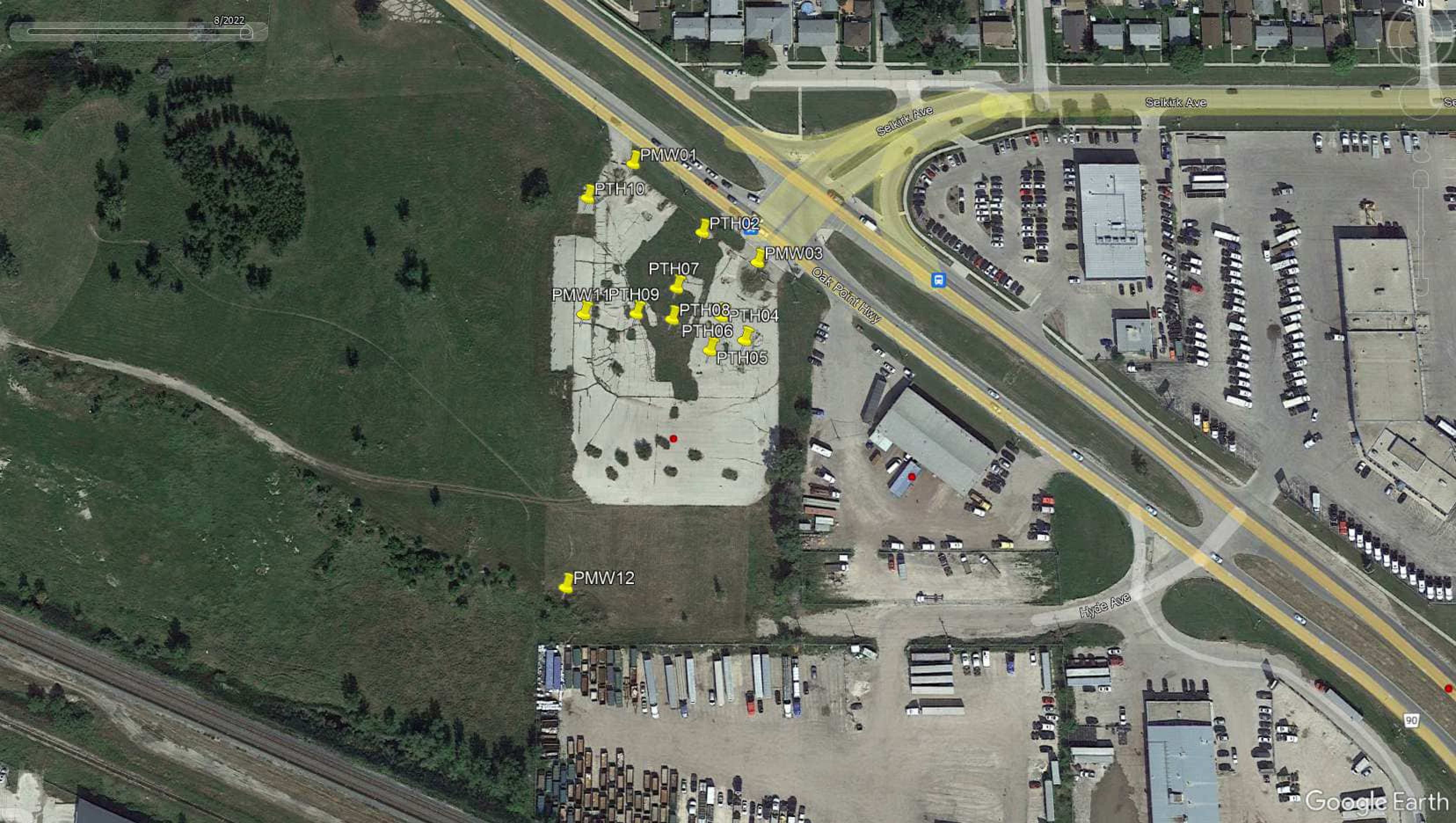
Project No.	221-07203-00		
Project:	Phase II ESA - 100 Oak Point Hwy		
Location:	Winnipeg, MB	Co-ordinates:	628288.932E, 5532311.801N
Date Drilled:	January 27, 2023	Datum:	UTM NAD 83 Zone 14
Drill Type:	Scout	Logged By:	J. Kevin
Drilling Contractor:	Maple Leaf Drilling	Checked By:	A. Chan

DEPTH (m bgs) 236.959	LITHOLOGY	SOIL DESCRIPTION	WELL	INSTALLATION DETAILS	SAMPLE ID	SOIL SAMPLE TEST	● VOCs (ppm) 40 80 120 160 / ▲ Combustible Gases (ppm) 20 40 60 80
0.30 236.659		**TOPSOIL** - Surface covered by snow - Organic rich, dark brown, frozen, with roots		Top of Solid Pipe 0.134 m Below Top of Flushmount Casing Bentonite Seal			
		CLAY - Dark brown-grey, stiff, trace rootlets, trace sand, trace silt, high plastic, frozen to 1.52 mbgs - Trace silt pockets at the depth of 1.52 mbgs - Light brown, some silt below the depth of 3.35 mbgs,			MW12-S1 (GRAB)	BTEX, PHC F1-F4, Metals, Mercury	
				Slotted Pipe and Sand Pack	MW12-S2 (GRAB)		
2.83 234.125					MW12-S3 (GRAB)		
					MW12-S4 (GRAB)		
					MW12-S5 (GRAB)		
4.60 232.359					MW12-S6 (GRAB)		
		END OF TESTHOLE End of borehole at 4.60 mbgs No seepage observed, borehole open to 4.6 mbg and dry. No PHC odor or staining observed.		Water measured on 2022-02-01 234.042 masl 2.834 mbgs Well Diameter: 50 mm Well Material: Schedule 40 PVC			

APPENDIX

E

SUPPORTING DOCUMENTS


8/2022
PMW01
PTH10
PTH02
PMW03
PTH07
PMW11
PTH09
PTH08
PTH04
PTH06
PTH05
PMW12
Selkirk Ave
Selkirk Ave
Oak Point Hwy
Hyde Ave
90
Google Earth

Ticket No: 20230306361

Excavator Details

Caller Id:	472513	**Phone:**	204 777 6590
Contact:	Allan Gunter	**Mobile:**	204 793 6556
Company:	Structure Scan	**Email:**	allan@structurescan.ca

Dig Site and Ticket Details

Open Map

soil samples around property

Land Grids: LLD

Not Supplied

Latitude: 49.930286 **Longitude:** -97.211863

Ticket Status	Original
Ticket Type	Project
Previous Ticket No.	Not Supplied
User Reference	WSP
Ticket Date	2023-01-11T14:28:26-06:00
Work Start Date	2023-01-24T02:00:00-06:00
Address	100 Oak Point Highway Winnipeg R2R 1T8
Nearest Cross Street	Not Supplied
Type of work	Poles/Holes
Activity	Soil Sample
Excavation Method	Drilling
Excavation Depth	>3m
Public Property	None
Private Property	Commercial
Onsite Contact	Alfred Chan
Onsite Phone	204 259 1679
Municipality	Not Supplied
Nearest Community	Not Supplied
Rural Subdivision	Not Supplied
Lot No.	
Block No.	
Plan No.	

Your Responsibilities

- Do not proceed with any excavation until all notified asset owners have responded by providing clearance, OR by identifying the location of their facilities with maps OR by placing locate marks on the ground.
- Pothole to establish the exact location of all underground assets using a hand shovel, before using heavy machinery.
- If you damage an underground asset you MUST advise the asset owner immediately.
- By using the Before You Dig Partners service, you agree to our privacy policy and the terms and conditions set out at on our web site.
- **For more information, visit www.BeforeYouDigPartners.com**

Utility Owner Details

The public utility owners listed below with a Status of "Notification Sent" have been requested to respond to your request. They may contact you directly for clarification of your request details.

Station Code	Authority Name	Status
WPGTS	CITY OF WINNIPEG TRAFFIC	Notification Sent
WPGWS	CITY OF WINNIPEG WATER AND WASTE	Notification Sent
MBHYDRO	MANITOBA HYDRO	Notification Sent
MTSWPG	MTS INC (MTSWPG)	Notification Sent

END OF UTILITIES LIST

BellMTS
Cable Locate Request

OC# 20230306361
WO# 0229571-1

LEDCOR TECHNICAL SERVICES

[CALLER DETAILS]
CUSTOMER ID= 472513
CONTACT NAME= Allan Gunter
COMPANY= Structure Scan
USER TYPE= Contractor
PHONE= 204 777 6590
MOBILE= 204 793 6556
EMAIL ADDRESS= allan@structurescan.ca
ONSITE CONTACT NAME= Alfred Chan
ONSITE CONTACT PHONE= 204 259 1679

[LOCATION DETAILS]
ADDRESS= 100 Oak Point Highway
CITY/TOWN= Winnipeg
PROVINCE= MB
NEAREST CROSS ST=
PROPERTY TYPE= Private Property, Public Property
PROPERTY DETAIL= Commercial, None
URBAN/RURAL= Urban
MUNICIPAL DISTRICT=
NEAREST COMMUNITY=
RURAL SUBDIVISION=
LOT NO=
BLOCK NO=
PLAN NO=
LAND GRID TYPE= LLD
LAND GRIDS=
LATITUDE= 49.930286
LONGITUDE= -97.211863
REMARKS= soil samples around property

Applicant Intends to:
☑ INSTALL ☐ REMOVE ☐ REPAIR
Drilling

1. Were facilities located (marked) at excavation site?
☑ YES ☐ NO (Give reason why below)

2.How was the location Marked?
☐ PAINT ☑ FLAGGED/STAKED

3. What type of facilities were located?
☑ BURIED CABLE ☐ ENCASED CONDUIT
☑ UNENCASED CONDUIT

4. What type of cable was located?
☐ COPPER ☐ DISTRIBUTION FIBRE
☑ TRUNK FIBRE ☐ POWER TO MTS CABINET

5. Was applicant Present at time of locate?
☐ YES ☑ NO

Emailed ☑ **Left on site** ☐
Fax ☐

Located by LTS (Ledcor Technical Services). For questions or clarification regarding this locate request, please call 1-800-755-7015

NOTES:

Name of Locator: Ralph Klippenstein

Date: 01/23/2023

Above Accepted by (Print Name):

Applicants Signature:

A copy of this BellMTS Cable Locate Request and Auxiliary Locate Sheet(s) **MUST** be on site and in the hands of the machine operator during work operations. Should sketch and markings not coincide, a new locate must be obtained

Auxiliary Locate Sheet

Phone: 1-800-755-7015 Email: Locatesupport@ledcor.com

LOCATED: BellMTS	Date Located: mm/dd/yyyy 01/23/2023	OC# 20230306361

LOCATED AREA: EXCAVATION SHALL NOT WORK OUTSIDE THE LOCATED AREA WITHOUT OBTAINING ANOTHER LOCATE

FROM: 70 Oak Point Hwy DW W RE TO: 121m W

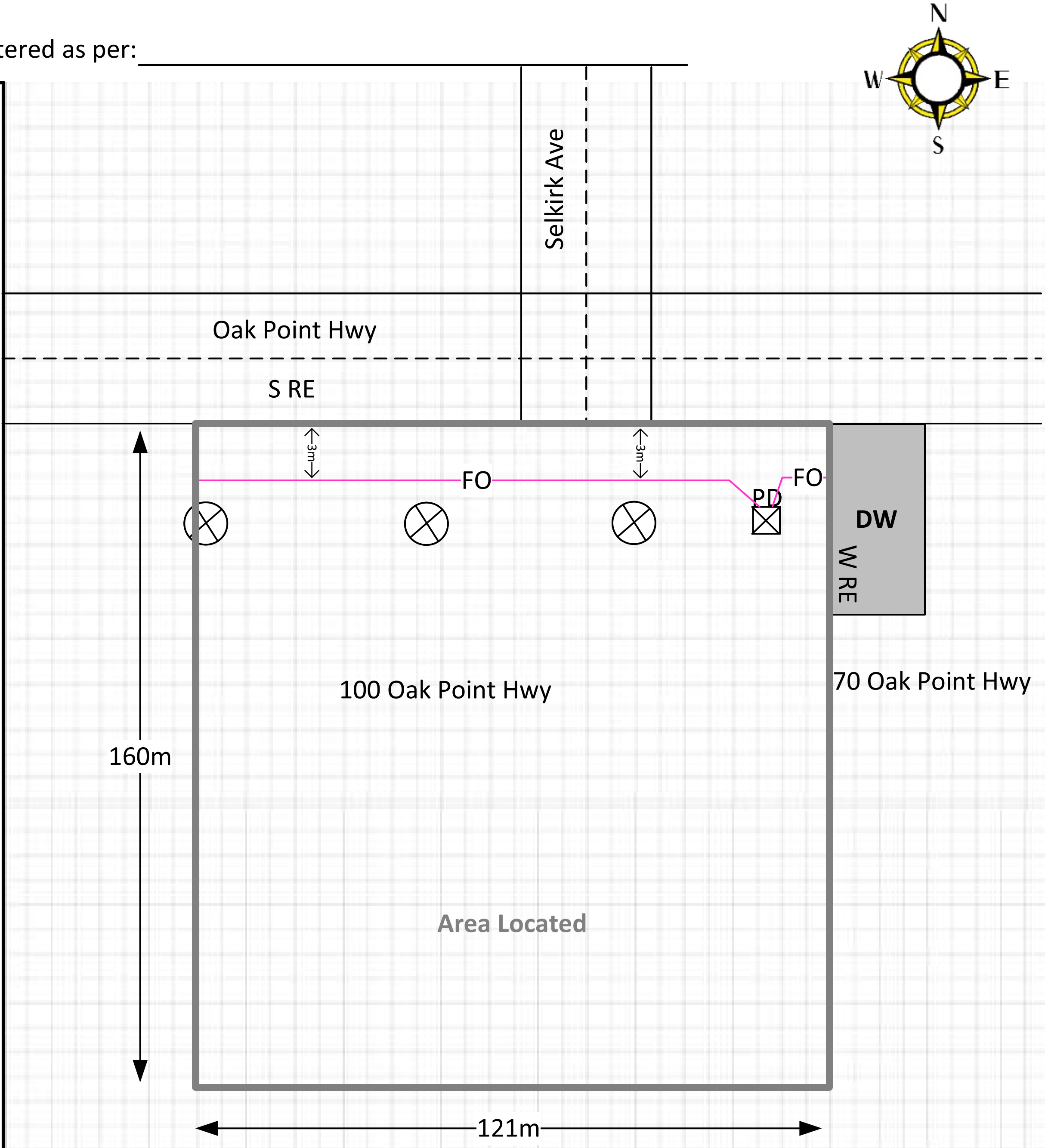
FROM: Oak Point Hwy S RE TO: 160m S

You must HAND DIG within one meter (3.28 feet) of markings for copper, distribution Fiber-optic cable and BELLMTS power cables; and within 2.5 meters (8.2 feet) of markings for trunk Fiber-optic cables. If you damage the plant you may be held liable. Depth varies and must be verified by hand digging or vacuum excavation. If you damage underground plant please notify facility owner immediately.

Located area has been altered as per: ______

LEGEND

Building Line -BL-
Fence Line -FL-
Face of Curb -FC-
Road Edge -RE-
Property Line -PL-
Driveway -DW-
Catch Basin CB
Sidewalk SW
Railway
Bell Pole
Flush to Grade Pedestal FTG
Pedestal
Buried Cable -B-
Conduit -C-
CATV -TV-
Buried Service Wire -BSW-
Manhole MH
Fibre Optic Cable -FO-
Hydrant FH
Transformer
Handhole HH
Hydro Pole
JUS
Rail Signal
North N
South S
East E
West W
Un Tonable Cable -X-
House
Power Cable -P-
Ductline D/L



BellMTS INC. – INSTRUCTIONS TO APPLICANT – PLEASE READ CAREFULLY

1. Locate requests are required at least five (5) working days prior to digging, visit ClickBeforeYouDigMB.com. For emergency locates, call 1-800-940-3447.

2. BellMTS cannot guarantee precise location or depth of facilities. You must HAND DIG within one meter (3.28 feet) of markings for copper, distribution fibre optic and BellMTS power cables; and within 2.5 meters (8.2 feet) of markings for trunk fibre optic cables.

3. This locate was completed based on information given to BellMTS's locator at the time of the request or locate. IF THERE ARE ANY CHANGES TO LOCATION OR NATURE OF WORK, A NEW LOCATE IS REQUIRED.

4. You will be liable for damages caused to BellMTS's facilities if you do not follow these instructions or abide by the locate.

5. Under no circumstance shall BellMTS or any of its affiliated or associated companies (collectively "BellMTS"), or any of their employees be held liable for any losses (including down time) suffered by anyone as a result of a location error made by BellMTS.

6. Applicant is responsible to remove any BellMTS flags or stakes at locate site once construction is complete.

TO ALL EXCAVATORS:

BellMTS locates are valid for the life of the project.

Please note the following for the above to apply:

a) Construction within the located area begins within 30 days of the "locate completed" date on the original ticket.

b) The construction company named on the locate remains active on the site.

BellMTS expects excavators will protect and preserve the paint marks put down on the original locate ticket. If markings are removed due to weather or excavation within 30 days of the "locate completed" date the excavator is expected to recreate the markings based on the tie-in measurements provided on the original locate ticket. After 30 days of the "locate completed" date BellMTS will provide a Remark/Refresh after 30 days if requested through Manitoba One Click.

*****In the event of a damage please call 611 Repair in Manitoba on a BellMTS phone or 204-CALLMTS (204-225-5687) and follow the prompts for repair

Allan Gunter

From: PWD-Underground Clearance Bookings <pwdsigcl@winnipeg.ca>
Sent: January 11, 2023 3:46 PM
To: Allan Gunter
Subject: Traffic Signals Underground Locates - Ticket No: 20230306361

No Traffic Signals equipment in the described work area at **100 Oak Point Highway**.

Thank you,

Winnipeg

Amelia Borysowich (she/her)
Technologist

Transportation Division
Public Works Department

Telephone: 204-986-4193

Email: aborysowich@winnipeg.ca

Website: winnipeg.ca

Address: 821 Elgin Ave., Winnipeg, MB

Winnipeg
Water and Waste Department

CAUTION:
This is for information only.
There is no guarantee as to the accuracy or completeness of the data.
For record drawing information, please contact Underground Structures at 204-986-6401 or by e-mail at: ugsinforequest@winnipeg.ca

WATER
Hydrant
Valve, LH
Valve, RH
Valve, Air
Curb Stop
Anode
Plug
Service Corp
Watermain
Feedermain
Aqueduct

SEWER
Man Hole
Catch Basin
Curb Inlet
Plug
Service Junction
Combined
Land Drainage
Waste Water
Storm Relief
Interceptor
Force Main
CB Lead

Print Date: January 11, 2023
Map Not to Scale

Manitoba Hydro

ELECTRIC AND/OR NATURAL GAS FACILITIES LOCATE
DEMANDE DE REPÉRAGE DE CONDUITES D'ÉLECTRICITÉ ET DE GAZ NATUREL

In case of Emergency, call / *En cas d'urgence, composez le* 204-480-5900 or / *ou le* 1-888 MB HYDRO (1-888-624-9376) outside / *à l'extérieur de Winnipeg*

Address or location of work / *Adresse ou site des travaux* 100 OAK POINT HIGHW& ,WINNIPEG	Company name (if applicable) / *Nom de l'entreprise (s'il y a lieu)* Structure Scan

Name of contact / *Nom de la personne-ressource* Alfred Chan	Contact tel. no. / *Tél. de la personne-ressource* 204-777-6590	Notice given by / *Avis signifié par* ALLAN GUNTER	Email / Courriel allan@structurescan.ca

Description of work / *Description des travaux*
Poles/Holes .

Work must start within 14 days of the date of this locate. If the nature of the work or the work area changes or the marks become displaced or obscured, stop work and obtain a new Locate. /Les travaux doivent commencer dans les 14 jours suivant la date de ce relevé de repérage. Si la nature ou la zone des travaux est modifiée ou si les marques sont déplacées ou obscurcies, vous devez arrêter les travaux et obtenir un nouveau Relevé.

This locate is only valid for the work area indicated (see attached excavation area map). / Le Relevé de repérage n'est valide que pour la zone des travaux indiquée (voir le plan de la zone d'excavation ci-joint).

Excavation constitutes a danger to the electrical cables and natural gas plant indicated below. / *Les travaux d'excavation comportent des risques pour les câbles électriques et les installations de gaz naturel indiqués ci-dessous.*

High pressure / *Haute pression*	Gas main / *Conduite principale de gaz*	Service line / *Ligne de desserte*	Size / *Taille*	High voltage > 750 V / *Haute tension*	Secondary voltage <750V / Tension secondaire	Overhead line / *Ligne aérienne*	Under-ground cable / *Câble souterrain*	Address or location of work / *Adresse ou site des travaux*

RED markings, flags or marked stakes indicate power utility cables. / *Les marques, les drapeaux ou les piquets **ROUGES** indiquent la présence de câbles électriques.*
YELLOW markings, flags or marked stakes indicate natural gas lines. / *Les marques, les drapeaux ou les piquets **JAUNES** indiquent la présence de conduites de gaz naturel.*

Safety watch required when work area is within three metres of primary overhead lines / Une veille de sécurité est exigée quand la zone des travaux est à moins de trois mètres de lignes aériennes primaires	☐
Hand dig when excavating within one metre of (secondary voltage) electric markings / Creusez à la main quand l'excavation est effectuée à moins de un mètre de marques d'installations d'électricité (tension secondaire)	☐
Safety watch required when excavating within one metre of primary (high voltage) electric marks as identified / Une veille de sécurité est exigée quand l'excavation est effectuée à moins de un mètre de marques d'installations d'électricité primaires (haute tension).	☐
Safety watch required when excavating within three metres of primary (high voltage) electric marks as identified / Une veille de sécurité est exigée quand l'excavation est effectuée à moins de trois mètres de marques d'installations d'électricité primaires (haute tension)	☐
Hand dig when excavating within one metre of gas marks / Creusez à la main quand l'excavation est effectuée à moins de un mètre de marques d'installations de gaz	☐
Safety watch required when excavating within 3 metres of gas marks as identified / Une veille de sécurité est exigée quand l'excavation est effectuée à moins de trois mètres de marques d'installations de gaz, tel qu'indiqué	☐
Contact the Utility for further instructions before working/excavating. /Communiquez avec le service public avant de commencer à travailler ou à creuser pour obtenir des instructions additionnelles	☐
Contact Manitoba Hydro Telecommunications "Fiber Optic Locating" for further instructions prior to excavating (204-360-3467) / Communiquez avec le service de télécommunications de Manitoba Hydro, chargé du repérage des conduites de fibres optiques, pour obtenir des renseignements avant l'excavation (204-360-3467).	☐

Notify the utility at least 2 business days in advance of excavation to request a Safety Watch / Avertir l'enterprise au moins 2 jours ouvrables avant les travaux d' excavation pour demander une veille de sécurité.

Any excavation of a cable or pipeline may require a Safety Watch. If identified, please contact / Toute excavation d'un câble ou d'une conduite peut exiger une veille de sécurité. Si une veille est indiquée, veuillez communiquer avec :

Electric Safety Watch contact: / Veille de sécurité – installations électriques :

Gas Safety Watch contact: / Veille de sécurité – installations de gaz :

No underground Hydro Electric cables in the WORK AREA

No underground Hydro Gas lines in the WORK AREA

CBYD MB Ticket # / Nº de fiche CBYD MB: 20230306361

Service Order # / Numéro d'ordre de service: BR15642043

Additional Information / Renseignements additionnels
.

Prepared by (print name) / *Fait par (nom en caractères d'imprimerie)* LOC CIC19	Employee signature / *Signature de l'employé(e)* Not Required	**DATE ADVICE GIVEN / *DATE DES CONSEILS***	yyyy mm dd / *a. m. j.* 2023-01-20

TERMS AND CONDITIONS:

Wherever used in this form, "Utility" means Manitoba Hydro and its employees and agents, directors, officers, successors, assigns:

By requesting this Locate, you acknowledge that you are the owner or the authorized agent of the owner of the work location(s) and you agree to the following terms and conditions:

1. This Locate applies only to facilities owned by the Utility.
2. In performing the work, you shall comply with the instructions described in this Locate and with all applicable statutes and regulations including (but not limited to) The Workplace Health and Safety Act, C.C.S.M., c.W210, The Workplace Health and Safety Regulation, M.R. 217/2006, The Gas Pipelines Act, C.C.S.M., c. G50 and the Gas Pipeline Excavations Regulation, M.R. 140/92.
3. You shall provide proper supervision of the work and safety watching services unless otherwise instructed in this Locate. Where safety watch services are to be provided by the Utility, you shall notify the Utility at least 2 days in advance.
4. The Utility shall have no liability or responsibility whatsoever for the work. You are solely responsible for any claims, costs, damages or loss, including property damage, personal injury or death, arising from, caused by or related to the work and you shall indemnify and save the Utility harmless from and against all manner of action, suit, debts, claims, costs, losses or demands, including claims by third parties, that arise as a result of the work.
5. You shall, upon demand, reimburse the Utility for cost, loss or damage incurred or suffered by the Utility as result of the work.

GENERAL INSTRUCTIONS:

1. **Locate Duration:** Work must start within 14 days of the date of this Locate. If not, you must obtain a new Locate.
2. **Locate Area:** This Locate applies only to the work area you have specified. If the nature of the work or the work area changes or the marks become displaced or obscured, stop work and obtain a new Locate.
3. **Post the Locate on site:** Keep a copy of this Locate on the work site for the duration of the work.
4. **Maintain Markings:** You must maintain all stakes or marks for the duration of the work. If stakes or marks are obscured or displaced, you must stop work and obtain a new Locate.
5. **Confirm the Location of the Facilities:** The information provided in this Locate is an estimate only. You must determine the exact location and depth of the facilities by hand digging at several locations before excavating with mechanical equipment. **DO NOT ATTEMPT TO LOCATE FACILITIES BY PROBING THE GROUND WITH ANY POINTED TOOL OR OBJECT.** If the actual location is different than the marked location, stop the work and contact the Utility immediately to confirm the location.
6. **Safety Watch:** Where a safety watch is required, the Utility requires a minimum of 2 business days notice.
7. **Backfilling:** When backfilling, ensure that underground facilities remain in place during settling by keeping them supported and by thoroughly tamping the backfill under the facilities.
8. **Damage to Facilities:** Take every precaution to ensure no damage or stress will occur to the facilities. Notify the Utility immediately of any damage or disturbance occurring or observed. **NEVER MOVE THE FACILITIES AS DANGEROUS CONDITIONS MAY RESULT.** Do not backfill until the Utility has inspected the facilities for damage or safety hazards.
9. Review Manitoba Hydro's Safe Excavation & Safety Watch Guidelines at: https://www.hydro.mb.ca/safety/pdfs/safe_excavation_safety_watch_guidelines.pdf

These instructions are provided for on-site reference. You are required to follow the requirements set out in all applicable statutes and regulations, copies of which are available from Statutory Publications or online at http://web2.gov.mb.ca/laws/ and/or http://laws-lois.justice.gc.ca/eng/regulations/SOR-2016-124/index.html. You are also required to comply with the excavation guidelines published by SAFE Work Manitoba at https://www.safemanitoba.com/Page Related Documents/uploads/guidelines/excavation_guide_updated_2011_web.pdf.

CAUTION:

You must notify the Utility immediately of any damage or disturbance to a facility by contacting 204-480-5900 in Winnipeg or 1-888-MB HYDRO (1-888-624-9376). **If a natural gas leak is suspected**, you must also:

- **evacuate the work site and immediate area**
- **keep traffic and pedestrians away**
- **Notify persons at all nearby premises that may be affected**
- **Remove or extinguish all sources of ignition**

CONDITIONS GÉNÉRALES

Partout où elle est utilisée dans les présentes, l'expression « Service public » fait référence à Manitoba Hydro et à ses employés, agents, dirigeants, administrateurs, successeurs et ayants droit.

En demandant le présent relevé de repérage d'installations (le « Relevé »), vous reconnaissez que vous êtes le propriétaire ou l'agent autorisé du propriétaire du ou des sites des travaux et vous acceptez les conditions générales suivantes :

1. Le Relevé ne s'applique qu'aux installations qui sont la propriété du Service public.
2. Pour l'exécution des travaux, vous devez vous conformer aux instructions précisées sur le présent Relevé, ainsi qu'à toutes les lois et tous les règlements applicables, y compris, sans vous y limiter, la Loi sur la sécurité et l'hygiène du travail (c. W210 de la C.P.L.M.), le Règlement sur la sécurité et la santé au travail (R.M. 217/2006), la Loi sur les gazoducs (c. G50 de la C.P.L.M.) et le Règlement sur les excavations effectuées à proximité des installations de gaz (R.M. 140/92).
3. Vous devez fournir une supervision adéquate des travaux et des services de veille de sécurité, sauf indication contraire sur le présent Relevé. Si des services de veille de sécurité doivent être fournis par le Service public, vous devez donner à ce dernier un préavis d'au moins deux jours ouvrables.
4. Le Service public n'assume aucune responsabilité, quelle qu'elle soit, à l'égard des travaux. Vous êtes entièrement responsable de toute réclamation ou perte et de tous les coûts ou dommages, y compris les dommages matériels, les blessures ou les décès, qui peuvent découler des travaux ou être causés par eux ou être liés à ceux-ci. Vous devez indemniser le Service public de toute action, poursuite, dette, réclamation, perte ou demande et de tout coût, y compris les réclamations soumises par des tierces parties, qui peut résulter des travaux.
5. Sur demande, vous devez rembourser au Service public les coûts, les pertes ou les dommages encourus ou subis par ce dernier qui peuvent résulter des travaux.

INSTRUCTIONS GÉNÉRALES

1. **Période de validité du Relevé.** Les travaux doivent débuter dans les 14 jours qui suivent la date du présent Relevé. Sinon vous devez obtenir un nouveau Relevé.
2. **Zone de repérage.** Le présent Relevé ne s'applique qu'à la zone des travaux que vous avez indiquée. Si la nature ou la zone des travaux est modifiée ou si les marques sont déplacées ou obscurcies, vous devez arrêter les travaux et obtenir un nouveau Relevé.
3. **Le Relevé doit être affiché sur le site des travaux.** Vous devez conserver une copie du présent Relevé sur le site des travaux pendant toute la durée des travaux.
4. **Conservation des marques.** Vous devez conserver toutes les marques et tous les piquets pendant toute la durée des travaux. Si les marques ou les piquets sont obscurcis ou déplacés, vous devez arrêter les travaux et obtenir un nouveau Relevé.
5. **Confirmez l'emplacement des installations.** Les renseignements fournis sur le présent Relevé ne sont que des estimations. Vous devez déterminer l'emplacement exact et la profondeur des installations en creusant à la main à divers endroits avant de procéder à une excavation avec un équipement mécanique. **NE TENTEZ PAS DE REPÉRER LES INSTALLATIONS EN SONDANT LE SOL AVEC UN OUTIL OU UN OBJET POINTU.** Si l'emplacement réel est différent de l'emplacement marqué, vous devez arrêter les travaux et communiquer immédiatement avec le Service public pour confirmer l'emplacement.
6. **Veille de sécurité.** Si une veille de sécurité est nécessaire, le Service public exige un préavis de deux jours ouvrables.
7. **Remblayage.** Lorsque vous remblayez une excavation, vous devez vous assurer que les installations souterraines demeurent en place pendant le tassement du sol en les supportant et en compactant entièrement le matériau de remblai sous les installations.
8. **Dommages causés aux installations.** Vous devez prendre toutes les précautions necessaires pour veiller à ce que les installations ne soient pas endommagées ou ne fassent pas l'objet de contraintes. Vous devez signaler immédiatement au Service public tout dommage ou toute perturbation observé ou causé aux installations. **NE NE DÉPLACEZ JAMAIS LES INSTALLATIONS, CAR DES CONDITIONS DANGEREUSES PEUVENT SE PRODUIRE.** Vous ne devez pas remblayer une excavation avant que le Service public ait inspecté les installations pour évaluer les dommages ou les dangers pour la sécurité.
9. Vous devez consulter les lignes directrices de Manitoba Hydro en matière de sécurité des excavations et de veille de sécurité sur la page Web https://www.hydro.mb.ca/safety/pdfs/safe_excavation_safety_watch_guidelines.pdf

Les présentes instructions sont offertes à titre de référence sur place. Vous devez satisfaire aux exigences stipulées dans toutes les lois et tous les règlements applicables dont vous pouvez obtenir une copie en vous adressant à la Direction des publications officielles ou en ligne sur le site http://web2.gov.mb.ca/laws/index.fr.php et/ou http://laws-lois.justice.gc.ca/fra/reglements/DORS-2016-124/index.html. Vous devez aussi vous conformer aux lignes directrices en matière d'excavation publiées par SAUF Manitoba sur le site https://www.safemanitoba.com/Page Related Documents/uploads/guidelines/excavation_guide_updated_2011_web.pdf.

ATTENTION!

Vous devez signaler immédiatement au Service public tout dommage ou toute perturbation causé à une installation en composant le 204 480-5900 à Winnipeg ou le 1 888 MB HYDRO (1 888 624-9376). **Si vous soupçonnez la** présence d'une fuite deglllllaz **présence d'une fuite de gaz naturel,**

- **évacuer le site des travaux et la zone environnante;**
- **éloigner les véhicules et les piétons qui circulent dans la zone des travaux;**
- **informer les personnes dans tous les lieux avoisinants qui peuvent être concernés par la fuite de gaz;**
- **enlever ou éteigner toutes les sources d'inflammation.**


MATCHLINE A
OAK POINT
HW
30m
Legend
Gas Main
Gas Service
Primary cable(s)
Secondary cable(s) only
Work Area
Transformer/DC

Allan Gunter

From:	DigShaw - Manitoba <Digshaw-Manitoba@sjrb.ca>
Sent:	January 12, 2023 7:57 AM
To:	Allan Gunter
Subject:	FW: Commercial - DIGSHAW Locate Request MANAS-6380-9065-7628
Attachments:	MANAS-6380-9065-7628.gml; MANAS-6380-9065-7628.kmz; MANAS-6380-9065-7628.jpg; MANAS-6380-9065-7628.pdf

Shaw is authorizing you to proceed as we have no services in your dig area. Proceed with your excavation once all other utilities have been Located within the specified work area only. Please be advised this authorization is good for 60 days from the date it is sent.

Leo Monzon, Plant Protection Coordinator
Shaw Communications Inc. 22 Scurfield Blvd., Winnipeg, Manitoba, Treaty 1 Territory
DigShaw Call Line: 1-866-DIGSHAW | W: digshaw.ca

-----Original Message-----
From: digshawman@sjrb.ca <digshawman@sjrb.ca>
Sent: Wednesday, January 11, 2023 2:29 PM
To: DigShaw - Manitoba <digshawman@sjrb.ca>
Subject: Commercial - DIGSHAW Locate Request MANAS-6380-9065-7628

DIGSHAW Reference Number: MANAS-6380-9065-7628
Company Name: Structure Scan
Contact Name: Allan Gunter
Contact Phone Number: (204) 793-6556
Alternate Contact Name:
Alternate Contact Num:
Email Address Copied: allan@structurescan.ca
One Call Ticket:
Design and Planning: No
Date of Excavation: 01/24/2023
Area: Winnipeg
Province: MB-Manitoba
Address: 100 Oak Point Highway, Winnipeg, MB, Canada
Address Type: Commercial
Area of Excavation

Primary contractor:
Description of site and comments:
soil samples around property
Excavation Map Data: [49.931039 -97.212335 49.930493 -97.211144 49.929291 -97.211455 49.929270 -97.212678]
See attached image.

APPENDIX

F

LABORATORY CERTIFICATES OF ANALYSIS AND CHAIN OF CUSTODY DOCUMENTS

CERTIFICATE OF ANALYSIS (GUIDELINE EVALUATION)

Work Order	: **WP2300990**	Page	: 1 of 7
Client	: **WSP Canada Inc.**	Laboratory	: Winnipeg - Environmental
Contact	: Alfred Chan	Account Manager	: Judy Dalmaijer
Address	: 1600 Buffalo Place Winnipeg MB Canada R3T 6B8	Address	: 1329 Niakwa Road East, Unit 12 Winnipeg, Manitoba Canada R2J 3T4
Telephone	: 204 477 6650	Telephone	: +1 204 255 9720
Project	: ----	Date Samples Received	: 30-Jan-2023 13:50
PO	: ----	Date Analysis Commenced	: 31-Jan-2023
C-O-C number	: ----	Issue Date	: 10-Feb-2023 16:08
Sampler	: ----		
Site	: ----		
Quote number	: Iqaluit (Q88748)		
No. of samples received	: 17		
No. of samples analysed	: 17		

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Guideline Comparison

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Christine Mason	Department Manager - Chemistry	Organics, Winnipeg, Manitoba
Gerry Vera	Analyst	Organics, Winnipeg, Manitoba
Greg Pokocky	Supervisor - Inorganic	Metals, Waterloo, Ontario
Jeremy Gingras	Team Leader - Semi-Volatile Instrumentation	Organics, Waterloo, Ontario
Kuljeet Chawla		Inorganics, Calgary, Alberta
Michelle Michalchuk	Analyst	Organics, Winnipeg, Manitoba

No Breaches Found

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.
Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guidelines are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Key : LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
%	percent
mg/kg	milligrams per kilogram

>: greater than.
<: less than.
Red shading is applied where the result is greater than the Guideline Upper Limit or the result is lower than the Guideline Lower Limit.
For drinking water samples, Red shading is applied where the result for E.coli, fecal or total coliforms is greater than or equal to the Guideline Upper Limit.

Qualifiers

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
DLQ	Detection Limit raised due to co-eluting interference. Mass Spectrometry qualifier ion ratio did not meet acceptance criteria.
EMPC	Estimated Maximum Possible Concentration. Parameter detected but didn't meet all criteria for positive identification.
R	The ion abundance ratio(s) did not meet the acceptance criteria. Value is an estimated maximum.

Analytical Results Evaluation

Matrix:		Client sample ID	----	----	----	----	----	----	----
		Sampling date/time	----	----	----	----	----	----	----
		Sub-Matrix	----		----	----	----	----	----
Analyte	CAS Number	Unit	----	----	----	----	----	----	----
		-							

Please refer to the General Comments section for an explanation of any qualifiers detected.

Moisture	----	%								
Fines (<0.075mm)	----	%								
Sand (>0.075mm)	----	%								
Texture class	----	-								
Aluminum	7429-90-5	mg/kg								
Antimony	7440-36-0	mg/kg								
Arsenic	7440-38-2	mg/kg								
Barium	7440-39-3	mg/kg								
Beryllium	7440-41-7	mg/kg								
Bismuth	7440-69-9	mg/kg								
Boron	7440-42-8	mg/kg								
Cadmium	7440-43-9	mg/kg								
Calcium	7440-70-2	mg/kg								
Chromium	7440-47-3	mg/kg								
Cobalt	7440-48-4	mg/kg								
Copper	7440-50-8	mg/kg								
Iron	7439-89-6	mg/kg								
Lead	7439-92-1	mg/kg								
Lithium	7439-93-2	mg/kg								
Magnesium	7439-95-4	mg/kg								
Manganese	7439-96-5	mg/kg								
Mercury	7439-97-6	mg/kg								
Molybdenum	7439-98-7	mg/kg								
Nickel	7440-02-0	mg/kg								
Phosphorus	7723-14-0	mg/kg								
Potassium	7440-09-7	mg/kg								
Selenium	7782-49-2	mg/kg								
Silver	7440-22-4	mg/kg								
Sodium	7440-23-5	mg/kg								
Strontium	7440-24-6	mg/kg								
Sulfur	7704-34-9	mg/kg								
Thallium	7440-28-0	mg/kg								
Tin	7440-31-5	mg/kg								
Titanium	7440-32-6	mg/kg								
Tungsten	7440-33-7	mg/kg								
Uranium	7440-61-1	mg/kg								
Vanadium	7440-62-2	mg/kg								
Zinc	7440-66-6	mg/kg								
Zirconium	7440-67-7	mg/kg								
Acetone	67-64-1	mg/kg								
Benzene	71-43-2	mg/kg								
Bromodichloromethane	75-27-4	mg/kg								

Bromoform	75-25-2	mg/kg								
Bromomethane	74-83-9	mg/kg								
BTEX, total	----	mg/kg								
Carbon disulfide	75-15-0	mg/kg								
Carbon tetrachloride	56-23-5	mg/kg								
Chlorobenzene	108-90-7	mg/kg								
Chloroethane	75-00-3	mg/kg								
Chloroform	67-66-3	mg/kg								
Chloromethane	74-87-3	mg/kg								
Dibromochloromethane	124-48-1	mg/kg								
Dibromoethane, 1,2-	106-93-4	mg/kg								
Dichlorobenzene, 1,2-	95-50-1	mg/kg								
Dichlorobenzene, 1,3-	541-73-1	mg/kg								
Dichlorobenzene, 1,4-	106-46-7	mg/kg								
Dichlorodifluoromethane	75-71-8	mg/kg								
Dichloroethane, 1,1-	75-34-3	mg/kg								
Dichloroethane, 1,2-	107-06-2	mg/kg								
Dichloroethylene, 1,1-	75-35-4	mg/kg								
Dichloroethylene, cis-1,2-	156-59-2	mg/kg								
Dichloroethylene, trans-1,2-	156-60-5	mg/kg								
Dichloromethane	75-09-2	mg/kg								
Dichloropropane, 1,2-	78-87-5	mg/kg								
Dichloropropylene, cis+trans-1,3-	542-75-6	mg/kg								
Dichloropropylene, cis-1,3-	10061-01-5	mg/kg								
Dichloropropylene, trans-1,3-	10061-02-6	mg/kg								
Ethylbenzene	100-41-4	mg/kg								
Hexane, n-	110-54-3	mg/kg								
Hexanone, 2-	591-78-6	mg/kg								
Methyl ethyl ketone [MEK]	78-93-3	mg/kg								
Methyl isobutyl ketone [MIBK]	108-10-1	mg/kg								
Methyl-tert-butyl ether [MTBE]	1634-04-4	mg/kg								
Styrene	100-42-5	mg/kg								
Tetrachloroethane, 1,1,1,2-	630-20-6	mg/kg								
Tetrachloroethane, 1,1,2,2-	79-34-5	mg/kg								
Tetrachloroethylene	127-18-4	mg/kg								
Toluene	108-88-3	mg/kg								
Trichloroethane, 1,1,1-	71-55-6	mg/kg								
Trichloroethane, 1,1,2-	79-00-5	mg/kg								
Trichloroethylene	79-01-6	mg/kg								
Trichlorofluoromethane	75-69-4	mg/kg								
Vinyl chloride	75-01-4	mg/kg								
Xylene, m+p-	179601-23-1	mg/kg								

Xylene, o-	95-47-6	mg/kg							
Xylenes, total	1330-20-7	mg/kg							
Benzene	71-43-2	mg/kg							
BTEX, total	----	mg/kg							
Ethylbenzene	100-41-4	mg/kg							
Toluene	108-88-3	mg/kg							
Xylene, m+p-	179601-23-1	mg/kg							
Xylene, o-	95-47-6	mg/kg							
Xylenes, total	1330-20-7	mg/kg							
Chromatogram to baseline at nC50	n/a	-							
F1 (C6-C10)	----	mg/kg							
F1-BTEX	----	mg/kg							
F2 (C10-C16)	----	mg/kg							
F3 (C16-C34)	----	mg/kg							
F4 (C34-C50)	----	mg/kg							
Hydrocarbons, total (C6-C50)	----	mg/kg							
TEH (C10-C50)	n/a	mg/kg							
TEH (C16-C50)	----	mg/kg							
Acenaphthene	83-32-9	mg/kg							
Acenaphthylene	208-96-8	mg/kg							
Acridine	260-94-6	mg/kg							
Anthracene	120-12-7	mg/kg							
B(a)P total potency equivalents [B(a)P TPE]	----	mg/kg							
Benz(a)anthracene	56-55-3	mg/kg							
Benzo(a)pyrene	50-32-8	mg/kg							
Benzo(b+j)fluoranthene	n/a	mg/kg							
Benzo(b+j+k)fluoranthene	n/a	mg/kg							
Benzo(g,h,i)perylene	191-24-2	mg/kg							
Benzo(k)fluoranthene	207-08-9	mg/kg							
Chrysene	218-01-9	mg/kg							
Dibenz(a,h)anthracene	53-70-3	mg/kg							
Fluoranthene	206-44-0	mg/kg							
Fluorene	86-73-7	mg/kg							
IACR (CCME)	----	-							
IACR AB (coarse)	----	-							
IACR AB (fine)	----	-							
Indeno(1,2,3-c,d)pyrene	193-39-5	mg/kg							
Methylnaphthalene, 1+2-	----	mg/kg							
Methylnaphthalene, 1-	90-12-0	mg/kg							
Methylnaphthalene, 2-	91-57-6	mg/kg							
Naphthalene	91-20-3	mg/kg							
PAHs, total (BC Sched 3.4)	n/a	mg/kg							

PAHs, total (EPA 16)	n/a	mg/kg								
Phenanthrene	85-01-8	mg/kg								
Pyrene	129-00-0	mg/kg								
Quinoline	91-22-5	mg/kg								

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CERTIFICATE OF ANALYSIS

Work Order	: **WP2300990**	Page	: 1 of 16
Client	: **WSP Canada Inc.**	Laboratory	: Winnipeg - Environmental
Contact	: Alfred Chan	Account Manager	: Judy Dalmaijer
Address	: 1600 Buffalo Place Winnipeg MB Canada R3T 6B8	Address	: 1329 Niakwa Road East, Unit 12 Winnipeg MB Canada R2J 3T4
Telephone	: 204 477 6650	Telephone	: +1 204 255 9720
Project	: ----	Date Samples Received	: 30-Jan-2023 13:50
PO	: ----	Date Analysis Commenced	: 31-Jan-2023
C-O-C number	: ----	Issue Date	: 10-Feb-2023 16:07
Sampler	: ----		
Site	: ----		
Quote number	: Iqaluit (Q88748)		
No. of samples received	: 17		
No. of samples analysed	: 17		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Christine Mason	Department Manager - Chemistry	Organics, Winnipeg, Manitoba
Gerry Vera	Analyst	Organics, Winnipeg, Manitoba
Greg Pokocky	Supervisor - Inorganic	Metals, Waterloo, Ontario
Jeremy Gingras	Team Leader - Semi-Volatile Instrumentation	Organics, Waterloo, Ontario
Kuljeet Chawla		Inorganics, Calgary, Alberta
Michelle Michalchuk	Analyst	Organics, Winnipeg, Manitoba

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
%	percent
mg/kg	milligrams per kilogram

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*
DLQ	*Detection Limit raised due to co-eluting interference. Mass Spectrometry qualifier ion ratio did not meet acceptance criteria.*
EMPC	*Estimated Maximum Possible Concentration. Parameter detected but didn't meet all criteria for positive identification.*
R	*The ion abundance ratio(s) did not meet the acceptance criteria. Value is an estimated maximum.*

Analytical Results

Sub-Matrix: **Soil/Solid**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	MW03-S1	MW03-S3	TH07-S3	TH08-S2	TH02-S5
				Client sampling date / time	30-Jan-2023	30-Jan-2023	30-Jan-2023	30-Jan-2023	30-Jan-2023
					WP2300990-001	WP2300990-002	WP2300990-003	WP2300990-004	WP2300990-005
					Result	Result	Result	Result	Result
Physical Tests									
Moisture	----	E144	0.25	%	9.57	33.1	12.0	18.4	34.9
Metals									
Aluminum	7429-90-5	E440	50	mg/kg	7240	----	14900	17200	23200
Antimony	7440-36-0	E440	0.10	mg/kg	0.11	----	0.33	1.93	0.46
Arsenic	7440-38-2	E440	0.10	mg/kg	2.02	----	4.60	13.0	10.7
Barium	7440-39-3	E440	0.50	mg/kg	56.1	----	149	1300	225
Beryllium	7440-41-7	E440	0.10	mg/kg	0.25	----	0.57	2.14	0.95
Bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	----	<0.20	<0.20	0.24
Boron	7440-42-8	E440	5.0	mg/kg	18.6	----	24.1	100	23.3
Cadmium	7440-43-9	E440	0.020	mg/kg	0.044	----	0.157	0.259	0.183
Calcium	7440-70-2	E440	50	mg/kg	174000	----	118000	79400	46300
Chromium	7440-47-3	E440	0.50	mg/kg	13.2	----	26.1	19.7	37.9
Cobalt	7440-48-4	E440	0.10	mg/kg	3.81	----	6.97	7.11	11.8
Copper	7440-50-8	E440	0.50	mg/kg	10.8	----	17.9	99.4	26.4
Iron	7439-89-6	E440	50	mg/kg	7940	----	16400	19300	27500
Lead	7439-92-1	E440	0.50	mg/kg	5.44	----	16.4	113	12.5
Lithium	7439-93-2	E440	2.0	mg/kg	10.8	----	18.0	18.6	24.1
Magnesium	7439-95-4	E440	20	mg/kg	103000	----	58000	28600	25500
Manganese	7439-96-5	E440	1.0	mg/kg	217	----	302	197	392
Molybdenum	7439-98-7	E440	0.10	mg/kg	0.31	----	0.63	3.87	1.11
Nickel	7440-02-0	E440	0.50	mg/kg	10.1	----	19.6	29.4	33.4
Phosphorus	7723-14-0	E440	50	mg/kg	172	----	376	1020	508
Potassium	7440-09-7	E440	100	mg/kg	1550	----	2630	1660	3660
Selenium	7782-49-2	E440	0.20	mg/kg	<0.20	----	<0.20	1.11	0.47
Silver	7440-22-4	E440	0.10	mg/kg	<0.10	----	<0.10	0.29	0.10
Sodium	7440-23-5	E440	50	mg/kg	282	----	514	2520	906
Strontium	7440-24-6	E440	0.50	mg/kg	57.3	----	98.6	826	79.5
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----	1100	2400	<1000
Thallium	7440-28-0	E440	0.050	mg/kg	0.085	----	0.175	0.206	0.280
Tin	7440-31-5	E440	2.0	mg/kg	<2.0	----	<2.0	23.5	<2.0

Analytical Results

Sub-Matrix: **Soil/Solid**

(Matrix: **Soil/Solid**)

				Client sample ID	MW03-S1	MW03-S3	TH07-S3	TH08-S2	TH02-S5
				Client sampling date / time	30-Jan-2023	30-Jan-2023	30-Jan-2023	30-Jan-2023	30-Jan-2023
Analyte	CAS Number	Method	LOR	Unit	WP2300990-001	WP2300990-002	WP2300990-003	WP2300990-004	WP2300990-005
					Result	Result	Result	Result	Result
Metals									
Titanium	7440-32-6	E440	1.0	mg/kg	200	----	323	603	224
Tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	----	<0.50	1.14	<0.50
Uranium	7440-61-1	E440	0.050	mg/kg	0.585	----	1.02	2.34	1.61
Vanadium	7440-62-2	E440	0.20	mg/kg	21.6	----	45.3	37.2	67.7
Zinc	7440-66-6	E440	2.0	mg/kg	18.1	----	59.4	140	74.3
Zirconium	7440-67-7	E440	1.0	mg/kg	6.8	----	11.1	18.7	13.9
Volatile Organic Compounds									
Acetone	67-64-1	E611D	0.50	mg/kg	<0.50	----	----	----	----
Benzene	71-43-2	E611D	0.0050	mg/kg	<0.0050	----	----	----	----
Bromodichloromethane	75-27-4	E611D	0.050	mg/kg	<0.050	----	----	----	----
Bromoform	75-25-2	E611D	0.050	mg/kg	<0.050	----	----	----	----
Bromomethane	74-83-9	E611D	0.050	mg/kg	<0.050	----	----	----	----
Carbon disulfide	75-15-0	E611D	0.050	mg/kg	<0.050	----	----	----	----
Carbon tetrachloride	56-23-5	E611D	0.050	mg/kg	<0.050	----	----	----	----
Chlorobenzene	108-90-7	E611D	0.050	mg/kg	<0.050	----	----	----	----
Chloroethane	75-00-3	E611D	0.050	mg/kg	<0.050	----	----	----	----
Chloroform	67-66-3	E611D	0.050	mg/kg	<0.050	----	----	----	----
Chloromethane	74-87-3	E611D	0.050	mg/kg	<0.050	----	----	----	----
Dibromochloromethane	124-48-1	E611D	0.050	mg/kg	<0.050	----	----	----	----
Dibromoethane, 1,2-	106-93-4	E611D	0.050	mg/kg	<0.050	----	----	----	----
Dichlorobenzene, 1,2-	95-50-1	E611D	0.050	mg/kg	<0.050	----	----	----	----
Dichlorobenzene, 1,3-	541-73-1	E611D	0.050	mg/kg	<0.050	----	----	----	----
Dichlorobenzene, 1,4-	106-46-7	E611D	0.050	mg/kg	<0.050	----	----	----	----
Dichlorodifluoromethane	75-71-8	E611D	0.050	mg/kg	<0.050	----	----	----	----
Dichloroethane, 1,1-	75-34-3	E611D	0.050	mg/kg	<0.050	----	----	----	----
Dichloroethane, 1,2-	107-06-2	E611D	0.050	mg/kg	<0.050	----	----	----	----
Dichloroethylene, 1,1-	75-35-4	E611D	0.050	mg/kg	<0.050	----	----	----	----
Dichloroethylene, cis-1,2-	156-59-2	E611D	0.050	mg/kg	<0.050	----	----	----	----
Dichloroethylene, trans-1,2-	156-60-5	E611D	0.050	mg/kg	<0.050	----	----	----	----
Dichloromethane	75-09-2	E611D	0.045	mg/kg	<0.045	----	----	----	----

Analytical Results

Sub-Matrix: **Soil/Solid**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	MW03-S1	MW03-S3	TH07-S3	TH08-S2	TH02-S5
				Client sampling date / time	30-Jan-2023	30-Jan-2023	30-Jan-2023	30-Jan-2023	30-Jan-2023
					WP2300990-001	WP2300990-002	WP2300990-003	WP2300990-004	WP2300990-005
					Result	Result	Result	Result	Result
Volatile Organic Compounds									
Dichloropropane, 1,2-	78-87-5	E611D	0.050	mg/kg	<0.050	----	----	----	----
Dichloropropylene, cis+trans-1,3-	542-75-6	E611D	0.050	mg/kg	<0.050	----	----	----	----
Dichloropropylene, cis-1,3-	10061-01-5	E611D	0.030	mg/kg	<0.030	----	----	----	----
Dichloropropylene, trans-1,3-	10061-02-6	E611D	0.030	mg/kg	<0.030	----	----	----	----
Ethylbenzene	100-41-4	E611D	0.015	mg/kg	<0.015	----	----	----	----
Hexane, n-	110-54-3	E611D	0.050	mg/kg	<0.050	----	----	----	----
Hexanone, 2-	591-78-6	E611D	0.50	mg/kg	<0.50	----	----	----	----
Methyl ethyl ketone [MEK]	78-93-3	E611D	0.50	mg/kg	<0.50	----	----	----	----
Methyl isobutyl ketone [MIBK]	108-10-1	E611D	0.50	mg/kg	<0.50	----	----	----	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611D	0.040	mg/kg	<0.040	----	----	----	----
Styrene	100-42-5	E611D	0.050	mg/kg	<0.050	----	----	----	----
Tetrachloroethane, 1,1,1,2-	630-20-6	E611D	0.050	mg/kg	<0.050	----	----	----	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.050	mg/kg	<0.050	----	----	----	----
Tetrachloroethylene	127-18-4	E611D	0.050	mg/kg	<0.050	----	----	----	----
Toluene	108-88-3	E611D	0.050	mg/kg	<0.050	----	----	----	----
Trichloroethane, 1,1,1-	71-55-6	E611D	0.050	mg/kg	<0.050	----	----	----	----
Trichloroethane, 1,1,2-	79-00-5	E611D	0.050	mg/kg	<0.050	----	----	----	----
Trichloroethylene	79-01-6	E611D	0.010	mg/kg	<0.010	----	----	----	----
Trichlorofluoromethane	75-69-4	E611D	0.050	mg/kg	<0.050	----	----	----	----
Vinyl chloride	75-01-4	E611D	0.020	mg/kg	<0.020	----	----	----	----
Xylene, m+p-	179601-23-1	E611D	0.030	mg/kg	<0.030	----	----	----	----
Xylene, o-	95-47-6	E611D	0.030	mg/kg	<0.030	----	----	----	----
Xylenes, total	1330-20-7	E611D	0.050	mg/kg	<0.050	----	----	----	----
BTEX, total	----	E611D	0.10	mg/kg	<0.10	----	----	----	----
Volatile Organic Compounds [Fuels]									
Benzene	71-43-2	E611A	0.0050	mg/kg	----	<0.0050	<0.0050	0.0125	<0.0050
Ethylbenzene	100-41-4	E611A	0.015	mg/kg	----	<0.015	0.015 EMPC	0.427	<0.015
Toluene	108-88-3	E611A	0.050	mg/kg	----	<0.050	<0.050	<0.050	<0.050
Xylene, m+p-	179601-23-1	E611A	0.030	mg/kg	----	<0.030	<0.030	0.110	<0.030
Xylene, o-	95-47-6	E611A	0.030	mg/kg	----	<0.030	<0.030	0.064	<0.030

Analytical Results

Sub-Matrix: **Soil/Solid**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	MW03-S1	MW03-S3	TH07-S3	TH08-S2	TH02-S5
				Client sampling date / time	30-Jan-2023	30-Jan-2023	30-Jan-2023	30-Jan-2023	30-Jan-2023
					WP2300990-001	WP2300990-002	WP2300990-003	WP2300990-004	WP2300990-005
					Result	Result	Result	Result	Result
Volatile Organic Compounds [Fuels]									
Xylenes, total	1330-20-7	E611A	0.050	mg/kg	----	<0.050	<0.050	0.174	<0.050
BTEX, total	----	E611A	0.10	mg/kg	----	<0.10	<0.10	0.61	<0.10
Hydrocarbons									
Chromatogram to baseline at nC50	n/a	E601.SG	-	-	Yes	Yes	Yes	Yes	Yes
F1 (C6-C10)	----	E581.F1	5.0	mg/kg	14.6	5.3	85.1	210	<5.0
F2 (C10-C16)	----	E601.SG	25	mg/kg	649	<25	1150	4550	<25
F3 (C16-C34)	----	E601.SG	50	mg/kg	490	<50	987	3710	<50
F4 (C34-C50)	----	E601.SG	50	mg/kg	<50	<50	<50	<50	<50
TEH (C10-C50)	n/a	E601.SG	75	mg/kg	----	<75	2140	8260	<75
TEH (C16-C50)	----	E601.SG	75	mg/kg	----	<75	987	3710	<75
F1-BTEX	----	EC580	5.0	mg/kg	14.6	5.3	85.1	209	<5.0
Hydrocarbons, total (C6-C50)	----	EC581	80	mg/kg	1150	----	----	----	----
Hydrocarbons Surrogates									
Bromobenzotrifluoride, 2- (F2-F4 surrogate)	392-83-6	E601.SG	1.0	%	82.2	100	100	99.4	101
Dichlorotoluene, 3,4-	95-75-0	E581.F1	1.0	%	101	119	108	124	97.4
Volatile Organic Compounds Surrogates									
Bromofluorobenzene, 4-	460-00-4	E611A	0.10	%	----	120	109	107	86.6
Difluorobenzene, 1,4-	540-36-3	E611A	0.10	%	----	116	111	112	98.0
Polycyclic Aromatic Hydrocarbons									
Acenaphthene	83-32-9	E641A	0.050	mg/kg	----	----	----	<0.550 DLQ	----
Acenaphthylene	208-96-8	E641A	0.050	mg/kg	----	----	----	<0.159 DLM	----
Acridine	260-94-6	E641A	0.050	mg/kg	----	----	----	1.08	----
Anthracene	120-12-7	E641A	0.050	mg/kg	----	----	----	<0.684 DLM	----
Benz(a)anthracene	56-55-3	E641A	0.050	mg/kg	----	----	----	<0.050	----
Benzo(a)pyrene	50-32-8	E641A	0.050	mg/kg	----	----	----	<0.050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.050	mg/kg	----	----	----	<0.050	----
Benzo(b+j+k)fluoranthene	n/a	E641A	0.075	mg/kg	----	----	----	<0.075	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.050	mg/kg	----	----	----	<0.050	----
Benzo(k)fluoranthene	207-08-9	E641A	0.050	mg/kg	----	----	----	<0.050	----
Chrysene	218-01-9	E641A	0.050	mg/kg	----	----	----	0.062 R	----

Analytical Results

Sub-Matrix: **Soil/Solid**

(Matrix: **Soil/Solid**)

				Client sample ID	MW03-S1	MW03-S3	TH07-S3	TH08-S2	TH02-S5
				Client sampling date / time	30-Jan-2023	30-Jan-2023	30-Jan-2023	30-Jan-2023	30-Jan-2023
Analyte	CAS Number	Method	LOR	Unit	WP2300990-001	WP2300990-002	WP2300990-003	WP2300990-004	WP2300990-005
					Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons									
Dibenz(a,h)anthracene	53-70-3	E641A	0.050	mg/kg	----	----	----	<0.050	----
Fluoranthene	206-44-0	E641A	0.050	mg/kg	----	----	----	<0.103 DLM	----
Fluorene	86-73-7	E641A	0.050	mg/kg	----	----	----	0.711	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.050	mg/kg	----	----	----	<0.050	----
Methylnaphthalene, 1-	90-12-0	E641A	0.030	mg/kg	----	----	----	0.596 R	----
Methylnaphthalene, 1+2-	----	E641A	0.050	mg/kg	----	----	----	0.596	----
Methylnaphthalene, 2-	91-57-6	E641A	0.030	mg/kg	----	----	----	<0.089 DLM	----
Naphthalene	91-20-3	E641A	0.010	mg/kg	----	----	----	<0.637 DLM	----
Phenanthrene	85-01-8	E641A	0.050	mg/kg	----	----	----	0.930 R	----
Pyrene	129-00-0	E641A	0.050	mg/kg	----	----	----	0.682	----
Quinoline	91-22-5	E641A	0.050	mg/kg	----	----	----	0.084	----
B(a)P total potency equivalents [B(a)P TPE]	----	E641A	0.065	mg/kg	----	----	----	<0.065	----
IACR (CCME)	----	E641A	0.60	-	----	----	----	0.61	----
IACR AB (coarse)	----	E641A	0.10	-	----	----	----	<0.10	----
IACR AB (fine)	----	E641A	0.10	-	----	----	----	<0.10	----
PAHs, total (BC Sched 3.4)	n/a	E641A	0.20	mg/kg	----	----	----	2.38	----
PAHs, total (EPA 16)	n/a	E641A	0.20	mg/kg	----	----	----	2.38	----
Polycyclic Aromatic Hydrocarbons Surrogates									
Acridine-d9	34749-75-2	E641A	0.1	%	----	----	----	105	----
Chrysene-d12	1719-03-5	E641A	0.1	%	----	----	----	77.7	----
Naphthalene-d8	1146-65-2	E641A	0.1	%	----	----	----	111	----
Phenanthrene-d10	1517-22-2	E641A	0.1	%	----	----	----	103	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: Soil/Solid

(Matrix: Soil/Solid)

Analyte	CAS Number	Method	LOR	Unit	TH10-S3	MW12-S1	TH08-S5	TH08-S3	TH07-S6
Client sampling date / time					30-Jan-2023	30-Jan-2023	30-Jan-2023	30-Jan-2023	30-Jan-2023
					WP2300990-006	WP2300990-007	WP2300990-008	WP2300990-009	WP2300990-010
					Result	Result	Result	Result	Result
Physical Tests									
Moisture	----	E144	0.25	%	31.8	26.3	37.9	----	40.3
Particle Size									
Sand (>0.075mm)	----	E178	1.0	%	----	----	31.1	3.0	----
Fines (<0.075mm)	----	E178	1.0	%	----	----	68.8	97.0	----
Texture class	----	E178	-	-	----	----	Fine	Fine	----
Metals									
Aluminum	7429-90-5	E440	50	mg/kg	30400	27500	28000	----	----
Antimony	7440-36-0	E440	0.10	mg/kg	0.46	0.47	0.50	----	----
Arsenic	7440-38-2	E440	0.10	mg/kg	8.32	7.59	12.3	----	----
Barium	7440-39-3	E440	0.50	mg/kg	207	230	229	----	----
Beryllium	7440-41-7	E440	0.10	mg/kg	1.11	0.99	1.08	----	----
Bismuth	7440-69-9	E440	0.20	mg/kg	0.30	0.25	0.30	----	----
Boron	7440-42-8	E440	5.0	mg/kg	25.5	24.2	19.9	----	----
Cadmium	7440-43-9	E440	0.020	mg/kg	0.234	0.393	0.230	----	----
Calcium	7440-70-2	E440	50	mg/kg	28300	47100	32000	----	----
Chromium	7440-47-3	E440	0.50	mg/kg	52.4	48.4	46.8	----	----
Cobalt	7440-48-4	E440	0.10	mg/kg	13.5	13.4	14.5	----	----
Copper	7440-50-8	E440	0.50	mg/kg	33.4	31.1	33.1	----	----
Iron	7439-89-6	E440	50	mg/kg	32200	28900	33000	----	----
Lead	7439-92-1	E440	0.50	mg/kg	13.8	25.9	14.8	----	----
Lithium	7439-93-2	E440	2.0	mg/kg	30.3	31.6	28.2	----	----
Magnesium	7439-95-4	E440	20	mg/kg	19500	25700	19700	----	----
Manganese	7439-96-5	E440	1.0	mg/kg	371	442	427	----	----
Mercury	7439-97-6	E510	0.0050	mg/kg	0.0391	0.0375	0.0393	----	----
Molybdenum	7439-98-7	E440	0.10	mg/kg	1.36	0.86	1.37	----	----
Nickel	7440-02-0	E440	0.50	mg/kg	37.6	38.5	42.0	----	----
Phosphorus	7723-14-0	E440	50	mg/kg	534	486	522	----	----
Potassium	7440-09-7	E440	100	mg/kg	4960	4780	4610	----	----
Selenium	7782-49-2	E440	0.20	mg/kg	0.32	0.25	0.58	----	----
Silver	7440-22-4	E440	0.10	mg/kg	0.13	0.12	0.12	----	----

Analytical Results

Sub-Matrix: Soil/Solid

(Matrix: Soil/Solid)

				Client sample ID	TH10-S3	MW12-S1	TH08-S5	TH08-S3	TH07-S6
				Client sampling date / time	30-Jan-2023	30-Jan-2023	30-Jan-2023	30-Jan-2023	30-Jan-2023
Analyte	CAS Number	Method	LOR	Unit	WP2300990-006	WP2300990-007	WP2300990-008	WP2300990-009	WP2300990-010
					Result	Result	Result	Result	Result
Metals									
Sodium	7440-23-5	E440	50	mg/kg	1060	1050	1290	----	----
Strontium	7440-24-6	E440	0.50	mg/kg	78.1	90.6	78.2	----	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	1600	1100	----	----
Thallium	7440-28-0	E440	0.050	mg/kg	0.324	0.314	0.287	----	----
Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	<2.0	----	----
Titanium	7440-32-6	E440	1.0	mg/kg	243	327	181	----	----
Tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	<0.50	----	----
Uranium	7440-61-1	E440	0.050	mg/kg	1.71	1.71	1.83	----	----
Vanadium	7440-62-2	E440	0.20	mg/kg	91.7	81.3	79.9	----	----
Zinc	7440-66-6	E440	2.0	mg/kg	88.2	82.9	85.4	----	----
Zirconium	7440-67-7	E440	1.0	mg/kg	15.7	14.8	14.9	----	----
Volatile Organic Compounds [Fuels]									
Benzene	71-43-2	E611A	0.0050	mg/kg	<0.0050	<0.0050	<0.0050	----	<0.0050
Ethylbenzene	100-41-4	E611A	0.015	mg/kg	<0.015	<0.015	<0.015	----	<0.015
Toluene	108-88-3	E611A	0.050	mg/kg	<0.050	<0.050	<0.050	----	<0.050
Xylene, m+p-	179601-23-1	E611A	0.030	mg/kg	<0.030	<0.030	<0.030	----	<0.030
Xylene, o-	95-47-6	E611A	0.030	mg/kg	<0.030	<0.030	<0.030	----	<0.030
Xylenes, total	1330-20-7	E611A	0.050	mg/kg	<0.050	<0.050	<0.050	----	<0.050
BTEX, total	----	E611A	0.10	mg/kg	<0.10	<0.10	<0.10	----	<0.10
Hydrocarbons									
Chromatogram to baseline at nC50	n/a	E601.SG	-	-	Yes	Yes	Yes	----	Yes
F1 (C6-C10)	----	E581.F1	5.0	mg/kg	<5.0	<5.0	<5.0	----	<5.0
F2 (C10-C16)	----	E601.SG	25	mg/kg	<25	<25	55	----	95
F3 (C16-C34)	----	E601.SG	50	mg/kg	<50	<50	89	----	96
F4 (C34-C50)	----	E601.SG	50	mg/kg	<50	<50	<50	----	<50
TEH (C10-C50)	n/a	E601.SG	75	mg/kg	<75	<75	144	----	191
TEH (C16-C50)	----	E601.SG	75	mg/kg	<75	<75	89	----	96
F1-BTEX	----	EC580	5.0	mg/kg	<5.0	<5.0	<5.0	----	<5.0
Hydrocarbons Surrogates									
Bromobenzotrifluoride, 2- (F2-F4 surrogate)	392-83-6	E601.SG	1.0	%	95.1	94.9	95.6	----	96.5

Analytical Results

Sub-Matrix: **Soil/Solid**

(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	TH10-S3	MW12-S1	TH08-S5	TH08-S3	TH07-S6
				Client sampling date / time	30-Jan-2023	30-Jan-2023	30-Jan-2023	30-Jan-2023	30-Jan-2023
					WP2300990-006	WP2300990-007	WP2300990-008	WP2300990-009	WP2300990-010
					Result	Result	Result	Result	Result
Hydrocarbons Surrogates									
Dichlorotoluene, 3,4-	95-75-0	E581.F1	1.0	%	100.0	88.0	94.4	----	98.8
Volatile Organic Compounds Surrogates									
Bromofluorobenzene, 4-	460-00-4	E611A	0.10	%	106	91.7	98.3	----	95.4
Difluorobenzene, 1,4-	540-36-3	E611A	0.10	%	102	95.6	94.3	----	92.5

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Soil/Solid**

(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	TH05-S3	DUPLICATE - 2	MW11-S2	MW01-S4	TH06-S3
				Client sampling date / time	30-Jan-2023	30-Jan-2023	30-Jan-2023	30-Jan-2023	30-Jan-2023
					WP2300990-011	WP2300990-012	WP2300990-013	WP2300990-014	WP2300990-015
					Result	Result	Result	Result	Result
Physical Tests									
Moisture	----	E144	0.25	%	33.7	29.6	22.6	33.7	36.1
Metals									
Aluminum	7429-90-5	E440	50	mg/kg	21800	20300	----	----	23100
Antimony	7440-36-0	E440	0.10	mg/kg	0.37	0.38	----	----	0.50
Arsenic	7440-38-2	E440	0.10	mg/kg	6.50	5.75	----	----	7.88
Barium	7440-39-3	E440	0.50	mg/kg	155	155	----	----	188
Beryllium	7440-41-7	E440	0.10	mg/kg	0.85	0.79	----	----	0.93
Bismuth	7440-69-9	E440	0.20	mg/kg	0.22	0.21	----	----	0.24
Boron	7440-42-8	E440	5.0	mg/kg	20.8	21.0	----	----	20.6
Cadmium	7440-43-9	E440	0.020	mg/kg	0.198	0.240	----	----	0.235
Calcium	7440-70-2	E440	50	mg/kg	53700	55500	----	----	50300
Chromium	7440-47-3	E440	0.50	mg/kg	37.1	37.0	----	----	39.0
Cobalt	7440-48-4	E440	0.10	mg/kg	10.0	10.5	----	----	13.0
Copper	7440-50-8	E440	0.50	mg/kg	23.7	24.8	----	----	27.0
Iron	7439-89-6	E440	50	mg/kg	23800	22600	----	----	24600
Lead	7439-92-1	E440	0.50	mg/kg	10.3	10.3	----	----	14.5
Lithium	7439-93-2	E440	2.0	mg/kg	23.8	23.9	----	----	24.9
Magnesium	7439-95-4	E440	20	mg/kg	35200	35600	----	----	32100
Manganese	7439-96-5	E440	1.0	mg/kg	416	460	----	----	423
Mercury	7439-97-6	E510	0.0050	mg/kg	----	----	0.0326	----	----
Molybdenum	7439-98-7	E440	0.10	mg/kg	0.99	0.99	----	----	1.11
Nickel	7440-02-0	E440	0.50	mg/kg	31.2	31.4	----	----	36.5
Phosphorus	7723-14-0	E440	50	mg/kg	467	478	----	----	468
Potassium	7440-09-7	E440	100	mg/kg	3770	3690	----	----	3620
Selenium	7782-49-2	E440	0.20	mg/kg	0.44	0.44	----	----	0.65
Silver	7440-22-4	E440	0.10	mg/kg	<0.10	<0.10	----	----	0.12
Sodium	7440-23-5	E440	50	mg/kg	1240	1190	----	----	1220
Strontium	7440-24-6	E440	0.50	mg/kg	72.8	72.3	----	----	87.6
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	----	----	1100
Thallium	7440-28-0	E440	0.050	mg/kg	0.245	0.251	----	----	0.260

Analytical Results

Sub-Matrix: Soil/Solid
(Matrix: Soil/Solid)

Analyte	CAS Number	Method	LOR	Unit	TH05-S3	DUPLICATE - 2	MW11-S2	MW01-S4	TH06-S3
				Client sampling date / time	30-Jan-2023	30-Jan-2023	30-Jan-2023	30-Jan-2023	30-Jan-2023
					WP2300990-011	WP2300990-012	WP2300990-013	WP2300990-014	WP2300990-015
					Result	Result	Result	Result	Result
Metals									
Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	----	----	<2.0
Titanium	7440-32-6	E440	1.0	mg/kg	263	277	----	----	231
Tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	----	----	<0.50
Uranium	7440-61-1	E440	0.050	mg/kg	1.59	1.82	----	----	2.34
Vanadium	7440-62-2	E440	0.20	mg/kg	65.8	64.6	----	----	68.7
Zinc	7440-66-6	E440	2.0	mg/kg	61.6	63.0	----	----	71.4
Zirconium	7440-67-7	E440	1.0	mg/kg	15.4	16.1	----	----	15.7
Volatile Organic Compounds [Fuels]									
Benzene	71-43-2	E611A	0.0050	mg/kg	<0.0050	<0.0050	0.0075	<0.0050	<0.0050
Ethylbenzene	100-41-4	E611A	0.015	mg/kg	<0.015	<0.015	<0.015	<0.015	<0.015
Toluene	108-88-3	E611A	0.050	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050
Xylene, m+p-	179601-23-1	E611A	0.030	mg/kg	<0.030	<0.030	<0.030	<0.030	<0.030
Xylene, o-	95-47-6	E611A	0.030	mg/kg	<0.030	<0.030	<0.030	<0.030	<0.030
Xylenes, total	1330-20-7	E611A	0.050	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050
BTEX, total	----	E611A	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Hydrocarbons									
Chromatogram to baseline at nC50	n/a	E601.SG	-	-	Yes	Yes	Yes	Yes	Yes
F1 (C6-C10)	----	E581.F1	5.0	mg/kg	<5.0	<5.0	<5.0	<5.0	<5.0
F2 (C10-C16)	----	E601.SG	25	mg/kg	<25	51	<25	32	<25
F3 (C16-C34)	----	E601.SG	50	mg/kg	<50	88	<50	<50	<50
F4 (C34-C50)	----	E601.SG	50	mg/kg	<50	<50	<50	<50	<50
TEH (C10-C50)	n/a	E601.SG	75	mg/kg	<75	139	<75	<75	<75
TEH (C16-C50)	----	E601.SG	75	mg/kg	<75	88	<75	<75	<75
F1-BTEX	----	EC580	5.0	mg/kg	<5.0	<5.0	<5.0	<5.0	<5.0
Hydrocarbons Surrogates									
Bromobenzotrifluoride, 2- (F2-F4 surrogate)	392-83-6	E601.SG	1.0	%	95.3	98.4	100	96.4	93.5
Dichlorotoluene, 3,4-	95-75-0	E581.F1	1.0	%	85.5	84.4	86.1	71.9	84.7
Volatile Organic Compounds Surrogates									
Bromofluorobenzene, 4-	460-00-4	E611A	0.10	%	87.0	98.3	94.9	75.1	84.2
Difluorobenzene, 1,4-	540-36-3	E611A	0.10	%	86.0	88.6	92.0	71.6	90.5

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: Soil/Solid

(Matrix: Soil/Solid)

Analyte	CAS Number	Method	LOR	Unit	DUPLICATE - 1	METALS - DUPLICATE	----	----	----
				Client sampling date / time	30-Jan-2023	30-Jan-2023	----	----	----
					WP2300990-016	WP2300990-017	--------	--------	--------
					Result	Result	----	----	----
Physical Tests									
Moisture	----	E144	0.25	%	11.9	----	----	----	----
Metals									
Aluminum	7429-90-5	E440	50	mg/kg	----	26100	----	----	----
Antimony	7440-36-0	E440	0.10	mg/kg	----	0.50	----	----	----
Arsenic	7440-38-2	E440	0.10	mg/kg	----	7.10	----	----	----
Barium	7440-39-3	E440	0.50	mg/kg	----	198	----	----	----
Beryllium	7440-41-7	E440	0.10	mg/kg	----	0.92	----	----	----
Bismuth	7440-69-9	E440	0.20	mg/kg	----	0.23	----	----	----
Boron	7440-42-8	E440	5.0	mg/kg	----	24.1	----	----	----
Cadmium	7440-43-9	E440	0.020	mg/kg	----	0.333	----	----	----
Calcium	7440-70-2	E440	50	mg/kg	----	58300	----	----	----
Chromium	7440-47-3	E440	0.50	mg/kg	----	43.8	----	----	----
Cobalt	7440-48-4	E440	0.10	mg/kg	----	12.1	----	----	----
Copper	7440-50-8	E440	0.50	mg/kg	----	28.6	----	----	----
Iron	7439-89-6	E440	50	mg/kg	----	26400	----	----	----
Lead	7439-92-1	E440	0.50	mg/kg	----	25.8	----	----	----
Lithium	7439-93-2	E440	2.0	mg/kg	----	28.4	----	----	----
Magnesium	7439-95-4	E440	20	mg/kg	----	29300	----	----	----
Manganese	7439-96-5	E440	1.0	mg/kg	----	449	----	----	----
Molybdenum	7439-98-7	E440	0.10	mg/kg	----	0.85	----	----	----
Nickel	7440-02-0	E440	0.50	mg/kg	----	35.8	----	----	----
Phosphorus	7723-14-0	E440	50	mg/kg	----	465	----	----	----
Potassium	7440-09-7	E440	100	mg/kg	----	4280	----	----	----
Selenium	7782-49-2	E440	0.20	mg/kg	----	0.32	----	----	----
Silver	7440-22-4	E440	0.10	mg/kg	----	0.11	----	----	----
Sodium	7440-23-5	E440	50	mg/kg	----	997	----	----	----
Strontium	7440-24-6	E440	0.50	mg/kg	----	92.6	----	----	----
Sulfur	7704-34-9	E440	1000	mg/kg	----	1400	----	----	----
Thallium	7440-28-0	E440	0.050	mg/kg	----	0.280	----	----	----
Tin	7440-31-5	E440	2.0	mg/kg	----	<2.0	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid

(Matrix: Soil/Solid)

Analyte	CAS Number	Method	LOR	Unit	DUPLICATE - 1	METALS - DUPLICATE	----	----	----
				Client sampling date / time	30-Jan-2023	30-Jan-2023	----	----	----
					WP2300990-016	WP2300990-017	--------	--------	--------
					Result	Result	----	----	----
Metals									
Titanium	7440-32-6	E440	1.0	mg/kg	----	273	----	----	----
Tungsten	7440-33-7	E440	0.50	mg/kg	----	<0.50	----	----	----
Uranium	7440-61-1	E440	0.050	mg/kg	----	1.68	----	----	----
Vanadium	7440-62-2	E440	0.20	mg/kg	----	75.2	----	----	----
Zinc	7440-66-6	E440	2.0	mg/kg	----	80.0	----	----	----
Zirconium	7440-67-7	E440	1.0	mg/kg	----	12.9	----	----	----
Volatile Organic Compounds [Fuels]									
Benzene	71-43-2	E611A	0.0050	mg/kg	<0.0050	----	----	----	----
Ethylbenzene	100-41-4	E611A	0.015	mg/kg	<0.015	----	----	----	----
Toluene	108-88-3	E611A	0.050	mg/kg	<0.050	----	----	----	----
Xylene, m+p-	179601-23-1	E611A	0.030	mg/kg	<0.030	----	----	----	----
Xylene, o-	95-47-6	E611A	0.030	mg/kg	<0.030	----	----	----	----
Xylenes, total	1330-20-7	E611A	0.050	mg/kg	<0.050	----	----	----	----
BTEX, total	----	E611A	0.10	mg/kg	<0.10	----	----	----	----
Hydrocarbons									
Chromatogram to baseline at nC50	n/a	E601.SG	-	-	Yes	----	----	----	----
F1 (C6-C10)	----	E581.F1	5.0	mg/kg	93.0	----	----	----	----
F2 (C10-C16)	----	E601.SG	25	mg/kg	1800	----	----	----	----
F3 (C16-C34)	----	E601.SG	50	mg/kg	1580	----	----	----	----
F4 (C34-C50)	----	E601.SG	50	mg/kg	<50	----	----	----	----
TEH (C10-C50)	n/a	E601.SG	75	mg/kg	3380	----	----	----	----
TEH (C16-C50)	----	E601.SG	75	mg/kg	1580	----	----	----	----
F1-BTEX	----	EC580	5.0	mg/kg	93.0	----	----	----	----
Hydrocarbons Surrogates									
Bromobenzotrifluoride, 2- (F2-F4 surrogate)	392-83-6	E601.SG	1.0	%	109	----	----	----	----
Dichlorotoluene, 3,4-	95-75-0	E581.F1	1.0	%	117	----	----	----	----
Volatile Organic Compounds Surrogates									
Bromofluorobenzene, 4-	460-00-4	E611A	0.10	%	121	----	----	----	----
Difluorobenzene, 1,4-	540-36-3	E611A	0.10	%	119	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

ALS Canada Ltd.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **WP2300990**	Page	: 1 of 14
Client	: **WSP Canada Inc.**	Laboratory	: Winnipeg - Environmental
Contact	: Alfred Chan	Account Manager	: Judy Dalmaijer
Address	: 1600 Buffalo Place Winnipeg MB Canada R3T 6B8	Address	: 1329 Niakwa Road East, Unit 12 Winnipeg, Manitoba Canada R2J 3T4
Telephone	: 204 477 6650	Telephone	: +1 204 255 9720
Project	: ----	Date Samples Received	: 30-Jan-2023 13:50
PO	: ----	Issue Date	: 10-Feb-2023 16:08
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: Iqaluit (Q88748)		
No. of samples received	: 17		
No. of samples analysed	: 17		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass soil methanol vial DUPLICATE - 1	E581.F1	30-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	40 days	2 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass soil methanol vial DUPLICATE - 2	E581.F1	30-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	40 days	2 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass soil methanol vial MW01-S4	E581.F1	30-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	40 days	2 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass soil methanol vial MW03-S3	E581.F1	30-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	40 days	2 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass soil methanol vial MW11-S2	E581.F1	30-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	40 days	2 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass soil methanol vial MW12-S1	E581.F1	30-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	40 days	2 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass soil methanol vial TH02-S5	E581.F1	30-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	40 days	2 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass soil methanol vial TH05-S3	E581.F1	30-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	40 days	2 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass soil methanol vial TH06-S3	E581.F1	30-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	40 days	2 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass soil methanol vial TH07-S3	E581.F1	30-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	40 days	2 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass soil methanol vial TH07-S6	E581.F1	30-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	40 days	2 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass soil methanol vial TH08-S2	E581.F1	30-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	40 days	2 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass soil methanol vial TH08-S5	E581.F1	30-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	40 days	2 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass soil methanol vial TH10-S3	E581.F1	30-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	40 days	2 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass soil methanol vial MW03-S1	E581.F1	30-Jan-2023	02-Feb-2023	----	----		07-Feb-2023	40 days	9 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Glass soil jar/Teflon lined cap DUPLICATE - 1	E601.SG	30-Jan-2023	01-Feb-2023	14 days	2 days	✓	02-Feb-2023	40 days	1 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Glass soil jar/Teflon lined cap DUPLICATE - 2	E601.SG	30-Jan-2023	01-Feb-2023	14 days	2 days	✓	02-Feb-2023	40 days	1 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Glass soil jar/Teflon lined cap MW01-S4	E601.SG	30-Jan-2023	01-Feb-2023	14 days	2 days	✓	02-Feb-2023	40 days	1 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Glass soil jar/Teflon lined cap MW03-S1	E601.SG	30-Jan-2023	01-Feb-2023	14 days	2 days	✓	02-Feb-2023	40 days	1 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Glass soil jar/Teflon lined cap MW03-S3	E601.SG	30-Jan-2023	01-Feb-2023	14 days	2 days	✓	02-Feb-2023	40 days	1 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Glass soil jar/Teflon lined cap MW11-S2	E601.SG	30-Jan-2023	01-Feb-2023	14 days	2 days	✓	02-Feb-2023	40 days	1 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Glass soil jar/Teflon lined cap MW12-S1	E601.SG	30-Jan-2023	01-Feb-2023	14 days	2 days	✓	02-Feb-2023	40 days	1 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Glass soil jar/Teflon lined cap TH02-S5	E601.SG	30-Jan-2023	01-Feb-2023	14 days	2 days	✓	02-Feb-2023	40 days	1 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Glass soil jar/Teflon lined cap TH05-S3	E601.SG	30-Jan-2023	01-Feb-2023	14 days	2 days	✓	02-Feb-2023	40 days	1 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Glass soil jar/Teflon lined cap TH06-S3	E601.SG	30-Jan-2023	01-Feb-2023	14 days	2 days	✓	02-Feb-2023	40 days	1 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Glass soil jar/Teflon lined cap TH07-S3	E601.SG	30-Jan-2023	01-Feb-2023	14 days	2 days	✓	02-Feb-2023	40 days	1 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Glass soil jar/Teflon lined cap TH07-S6	E601.SG	30-Jan-2023	01-Feb-2023	14 days	2 days	✓	02-Feb-2023	40 days	1 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Glass soil jar/Teflon lined cap TH08-S2	E601.SG	30-Jan-2023	01-Feb-2023	14 days	2 days	✓	02-Feb-2023	40 days	1 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Glass soil jar/Teflon lined cap TH08-S5	E601.SG	30-Jan-2023	01-Feb-2023	14 days	2 days	✓	02-Feb-2023	40 days	1 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Glass soil jar/Teflon lined cap TH10-S3	E601.SG	30-Jan-2023	01-Feb-2023	14 days	2 days	✓	02-Feb-2023	40 days	1 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap MW11-S2	E510	30-Jan-2023	02-Feb-2023	----	----		03-Feb-2023	28 days	4 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap MW12-S1	E510	30-Jan-2023	02-Feb-2023	----	----		03-Feb-2023	28 days	4 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap TH08-S5	E510	30-Jan-2023	02-Feb-2023	----	----		03-Feb-2023	28 days	4 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap TH10-S3	E510	30-Jan-2023	02-Feb-2023	----	----		03-Feb-2023	28 days	4 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group	*Method*	*Sampling Date*	*Extraction / Preparation*				*Analysis*			
Container / Client Sample ID(s)			*Preparation Date*	*Holding Times Rec*	*Holding Times Actual*	*Eval*	*Analysis Date*	*Holding Times Rec*	*Holding Times Actual*	*Eval*
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap DUPLICATE - 2	E440	30-Jan-2023	02-Feb-2023	----	----		03-Feb-2023	180 days	4 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap METALS - DUPLICATE	E440	30-Jan-2023	02-Feb-2023	----	----		03-Feb-2023	180 days	4 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap MW03-S1	E440	30-Jan-2023	02-Feb-2023	----	----		03-Feb-2023	180 days	4 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap MW12-S1	E440	30-Jan-2023	02-Feb-2023	----	----		03-Feb-2023	180 days	4 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap TH02-S5	E440	30-Jan-2023	02-Feb-2023	----	----		03-Feb-2023	180 days	4 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap TH05-S3	E440	30-Jan-2023	02-Feb-2023	----	----		03-Feb-2023	180 days	4 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap TH06-S3	E440	30-Jan-2023	02-Feb-2023	----	----		03-Feb-2023	180 days	4 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap TH07-S3	E440	30-Jan-2023	02-Feb-2023	----	----		03-Feb-2023	180 days	4 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap TH08-S2	E440	30-Jan-2023	02-Feb-2023	----	----		03-Feb-2023	180 days	4 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap TH08-S5	E440	30-Jan-2023	02-Feb-2023	----	----		03-Feb-2023	180 days	4 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap TH10-S3	E440	30-Jan-2023	02-Feb-2023	----	----		03-Feb-2023	180 days	4 days	✓
Particle Size : CCME fine/coarse Particle Size Analysis by wet sieve										
LDPE bag TH08-S3	E178	30-Jan-2023	----	----	----		06-Feb-2023	180 days	7 days	✓
Particle Size : CCME fine/coarse Particle Size Analysis by wet sieve										
LDPE bag TH08-S5	E178	30-Jan-2023	----	----	----		06-Feb-2023	180 days	7 days	✓
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap DUPLICATE - 1	E144	30-Jan-2023	----	----	----		01-Feb-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap DUPLICATE - 2	E144	30-Jan-2023	----	----	----		31-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap MW01-S4	E144	30-Jan-2023	----	----	----		31-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap MW03-S1	E144	30-Jan-2023	----	----	----		31-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap MW03-S3	E144	30-Jan-2023	----	----	----		31-Jan-2023	----	----	

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap MW11-S2	E144	30-Jan-2023	----	----	----		31-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap MW12-S1	E144	30-Jan-2023	----	----	----		31-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap TH02-S5	E144	30-Jan-2023	----	----	----		31-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap TH05-S3	E144	30-Jan-2023	----	----	----		31-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap TH06-S3	E144	30-Jan-2023	----	----	----		31-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap TH07-S3	E144	30-Jan-2023	----	----	----		31-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap TH07-S6	E144	30-Jan-2023	----	----	----		31-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap TH08-S2	E144	30-Jan-2023	----	----	----		31-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap TH08-S5	E144	30-Jan-2023	----	----	----		31-Jan-2023	----	----	

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap TH10-S3	E144	30-Jan-2023	----	----	----		31-Jan-2023	----	----	
Polycyclic Aromatic Hydrocarbons : PAHs by Hex:Ace GC-MS										
Glass soil jar/Teflon lined cap TH08-S2	E641A	30-Jan-2023	02-Feb-2023	14 days	4 days	✓	03-Feb-2023	40 days	1 days	✓
Volatile Organic Compounds : VOCs (Eastern Canada List) by Headspace GC-MS										
Glass soil methanol vial MW03-S1	E611D	30-Jan-2023	02-Feb-2023	----	----		07-Feb-2023	40 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass soil methanol vial DUPLICATE - 1	E611A	30-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	40 days	2 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass soil methanol vial DUPLICATE - 2	E611A	30-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	40 days	2 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass soil methanol vial MW01-S4	E611A	30-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	40 days	2 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass soil methanol vial MW03-S3	E611A	30-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	40 days	2 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass soil methanol vial MW11-S2	E611A	30-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	40 days	2 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass soil methanol vial MW12-S1	E611A	30-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	40 days	2 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass soil methanol vial TH02-S5	E611A	30-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	40 days	2 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass soil methanol vial TH05-S3	E611A	30-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	40 days	2 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass soil methanol vial TH06-S3	E611A	30-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	40 days	2 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass soil methanol vial TH07-S3	E611A	30-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	40 days	2 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass soil methanol vial TH07-S6	E611A	30-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	40 days	2 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass soil methanol vial TH08-S2	E611A	30-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	40 days	2 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass soil methanol vial TH08-S5	E611A	30-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	40 days	2 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass soil methanol vial TH10-S3	E611A	30-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	40 days	2 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: ✘ = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	820141	1	17	5.8	5.0	✓
CCME fine/coarse Particle Size Analysis by wet sieve	E178	825129	1	2	50.0	5.0	✓
CCME PHC - F1 by Headspace GC-FID	E581.F1	822036	2	18	11.1	5.0	✓
CCME PHCs - F2-F4 by GC-FID	E601.SG	820338	1	19	5.2	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	821831	1	7	14.2	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	821830	1	14	7.1	5.0	✓
Moisture Content by Gravimetry	E144	819689	2	21	9.5	5.0	✓
PAHs by Hex:Ace GC-MS	E641A	821841	1	8	12.5	5.0	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	822035	1	1	100.0	5.0	✓
Laboratory Control Samples (LCS)							
BTEX by Headspace GC-MS	E611A	820141	1	17	5.8	5.0	✓
CCME fine/coarse Particle Size Analysis by wet sieve	E178	825129	1	2	50.0	5.0	✓
CCME PHC - F1 by Headspace GC-FID	E581.F1	822036	2	18	11.1	5.0	✓
CCME PHCs - F2-F4 by GC-FID	E601.SG	820338	1	19	5.2	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	821831	2	7	28.5	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	821830	2	14	14.2	10.0	✓
Moisture Content by Gravimetry	E144	819689	2	21	9.5	5.0	✓
PAHs by Hex:Ace GC-MS	E641A	821841	1	8	12.5	5.0	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	822035	1	1	100.0	5.0	✓
Method Blanks (MB)							
BTEX by Headspace GC-MS	E611A	820141	1	17	5.8	5.0	✓
CCME PHC - F1 by Headspace GC-FID	E581.F1	822036	2	18	11.1	5.0	✓
CCME PHCs - F2-F4 by GC-FID	E601.SG	820338	1	19	5.2	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	821831	1	7	14.2	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	821830	1	14	7.1	5.0	✓
Moisture Content by Gravimetry	E144	819689	2	21	9.5	5.0	✓
PAHs by Hex:Ace GC-MS	E641A	821841	1	8	12.5	5.0	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	822035	1	1	100.0	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	820141	1	17	5.8	5.0	✓
CCME PHC - F1 by Headspace GC-FID	E581.F1	822036	2	18	11.1	5.0	✓
CCME PHCs - F2-F4 by GC-FID	E601.SG	820338	1	19	5.2	5.0	✓
PAHs by Hex:Ace GC-MS	E641A	821841	1	8	12.5	5.0	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	822035	0	1	0.0	5.0	✘

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by “mod”).

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Moisture Content by Gravimetry	E144 Winnipeg - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
CCME fine/coarse Particle Size Analysis by wet sieve	E178 Calgary - Environmental	Soil/Solid	CCME Vol 4 Analytical Methods	An air-dried sample is reduced to < 2 mm size and mixed with a dispersing agent (sodium hexametaphosphate). The sample is washed through a 200 mesh (0.075 mm) sieve. The retained mass of sample is used to determine % sand fraction. If the percentage of sand is >50%, the soil is considered to be coarse textured soil. If the percentage of sand is <50%, the soil is considered to be fine textured.
Metals in Soil/Solid by CRC ICPMS	E440 Waterloo - Environmental	Soil/Solid	EPA 6020B (mod)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines. Analysis is by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 Waterloo - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl, followed by CVAAS analysis.
CCME PHC - F1 by Headspace GC-FID	E581.F1 Winnipeg - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	CCME Fraction 1 (F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry’s law.
CCME PHCs - F2-F4 by GC-FID	E601.SG Winnipeg - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Sample extracts are subjected to in-situ silica gel treatment prior to analysis by GC-FID for CCME hydrocarbon fractions (F2-F4).
BTEX by Headspace GC-MS	E611A Winnipeg - Environmental	Soil/Solid	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry’s law.
VOCs (Eastern Canada List) by Headspace GC-MS	E611D Winnipeg - Environmental	Soil/Solid	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry’s law.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
PAHs by Hex:Ace GC-MS	E641A Waterloo - Environmental	Soil/Solid	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are extracted with hexane/acetone and analyzed by GC-MS. If reported, IACR (index of additive cancer risk, unitless) and B(a)P toxic potency equivalent (in soil concentration units) are calculated as per CCME PAH Soil Quality Guidelines fact sheet (2010) or ABT1.
F1-BTEX	EC580 Winnipeg - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	F1-BTEX is calculated as follows: F1-BTEX = F1 (C6-C10) minus benzene, toluene, ethylbenzene and xylenes (BTEX).
Sum F1 to F4 (C6-C50)	EC581 Winnipeg - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Hydrocarbons, total (C6-C50) is the sum of CCME Fractions F1(C6-C10), F2(C10-C16), F3(C16-C34), and F4(C34-C50). F4G-sg is not used within this calculation due to overlap with other fractions.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for Metals and Mercury	EP440 Waterloo - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. This method is intended to liberate metals that may be environmentally available.
VOCs Methanol Extraction for Headspace Analysis	EP581 Winnipeg - Environmental	Soil/Solid	EPA 5035A (mod)	VOCs in samples are extracted with methanol. Extracts are then prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PHCs and PAHs Hexane-Acetone Tumbler Extraction	EP601 Winnipeg - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1 (mod)	Samples are subsampled and Petroleum Hydrocarbons (PHC) and PAHs are extracted with 1:1 hexane:acetone using a rotary extractor.
Dry and Grind in Soil/Solid <60°C	EPP442 Calgary - Environmental	Soil/Solid	Soil Sampling and Methods of Analysis, Carter 2008	After removal of any coarse fragments and reservation of wet subsamples a portion of homogenized sample is set in a tray and dried at less than 60°C until dry. The sample is then particle size reduced with an automated crusher or mortar and pestle, typically to <2 mm. Further size reduction may be needed for particular tests.

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QUALITY CONTROL REPORT

Work Order	: **WP2300990**	Page	: 1 of 18
Client	: WSP Canada Inc.	Laboratory	: Winnipeg - Environmental
Contact	: Alfred Chan	Account Manager	: Judy Dalmaijer
Address	: 1600 Buffalo Place Winnipeg MB Canada R3T 6B8	Address	: 1329 Niakwa Road East, Unit 12 Winnipeg, Manitoba Canada R2J 3T4
Telephone	:	Telephone	: +1 204 255 9720
Project	: ----	Date Samples Received	: 30-Jan-2023 13:50
PO	: ----	Date Analysis Commenced	: 31-Jan-2023
C-O-C number	: ----	Issue Date	: 10-Feb-2023 16:07
Sampler	: ---- 204 477 6650		
Site	: ----		
Quote number	: Iqaluit (Q88748)		
No. of samples received	: 17		
No. of samples analysed	: 17		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Christine Mason	Department Manager - Chemistry	Winnipeg Organics, Winnipeg, Manitoba
Gerry Vera	Analyst	Winnipeg Organics, Winnipeg, Manitoba
Greg Pokocky	Supervisor - Inorganic	Waterloo Metals, Waterloo, Ontario
Jeremy Gingras	Team Leader - Semi-Volatile Instrumentation	Waterloo Organics, Waterloo, Ontario
Kuljeet Chawla		Calgary Inorganics, Calgary, Alberta
Michelle Michalchuk	Analyst	Winnipeg Organics, Winnipeg, Manitoba

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 819689)											
WP2300952-001	Anonymous	Moisture	----	E144	0.25	%	30.2	32.0	5.82%	20%	----
Physical Tests (QC Lot: 820492)											
WP2300990-016	DUPLICATE - 1	Moisture	----	E144	0.25	%	11.9	11.4	5.04%	20%	----
Particle Size (QC Lot: 825129)											
WP2300990-008	TH08-S5	Sand (>0.075mm)	----	E178	1.0	%	31.1	31.5	1.16%	10%	----
Metals (QC Lot: 821830)											
WP2300990-006	TH10-S3	Aluminum	7429-90-5	E440	50	mg/kg	30400	29600	2.69%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.46	0.47	0.005	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	8.32	8.37	0.536%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	207	207	0.104%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	1.11	1.17	5.46%	30%	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	0.30	0.30	0.003	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	25.5	23.7	1.8	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.234	0.221	5.75%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	28300	28600	1.21%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	52.4	50.4	3.92%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	13.5	13.5	0.289%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	33.4	33.3	0.361%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	32200	32000	0.853%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	13.8	13.8	0.130%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	30.3	30.9	1.90%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	19500	19500	0.235%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	371	373	0.680%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	1.36	1.36	0.525%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	37.6	37.1	1.25%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	534	507	5.32%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	4960	4620	7.12%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.32	0.34	0.02	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	0.13	0.13	0.003	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	1060	1070	0.912%	40%	----

Sub-Matrix: **Soil/Solid**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Metals (QC Lot: 821830) - continued											
WP2300990-006	TH10-S3	Strontium	7440-24-6	E440	0.50	mg/kg	78.1	76.3	2.30%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.324	0.323	0.001	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	243	231	5.04%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	1.71	1.70	0.463%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	91.7	87.3	4.98%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	88.2	88.3	0.127%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	15.7	16.0	2.01%	30%	----
Metals (QC Lot: 821831)											
WP2300990-006	TH10-S3	Mercury	7439-97-6	E510	0.0050	mg/kg	0.0391	0.0397	1.49%	40%	----
Volatile Organic Compounds (QC Lot: 820141)											
WP2300952-002	Anonymous	Benzene	71-43-2	E611A	0.0050	mg/kg	<0.0050	<0.0050	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.015	mg/kg	<0.015	<0.015	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.030	mg/kg	<0.030	<0.030	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.030	mg/kg	<0.030	<0.030	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 822035)											
WP2300990-001	MW03-S1	Acetone	67-64-1	E611D	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Benzene	71-43-2	E611D	0.0050	mg/kg	<0.0050	<0.0050	0	Diff <2x LOR	----
		Bromodichloromethane	75-27-4	E611D	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Bromoform	75-25-2	E611D	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Bromomethane	74-83-9	E611D	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Carbon disulfide	75-15-0	E611D	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Carbon tetrachloride	56-23-5	E611D	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Chlorobenzene	108-90-7	E611D	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Chloroethane	75-00-3	E611D	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Chloroform	67-66-3	E611D	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Chloromethane	74-87-3	E611D	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Dibromochloromethane	124-48-1	E611D	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Dibromoethane, 1,2-	106-93-4	E611D	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Dichlorobenzene, 1,2-	95-50-1	E611D	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Dichlorobenzene, 1,3-	541-73-1	E611D	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----

Sub-Matrix: **Soil/Solid**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Volatile Organic Compounds (QC Lot: 822035) - continued											
WP2300990-001	MW03-S1	Dichlorobenzene, 1,4-	106-46-7	E611D	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Dichlorodifluoromethane	75-71-8	E611D	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Dichloroethane, 1,1-	75-34-3	E611D	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Dichloroethane, 1,2-	107-06-2	E611D	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Dichloroethylene, 1,1-	75-35-4	E611D	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Dichloroethylene, cis-1,2-	156-59-2	E611D	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Dichloroethylene, trans-1,2-	156-60-5	E611D	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Dichloromethane	75-09-2	E611D	0.045	mg/kg	<0.045	<0.045	0	Diff <2x LOR	----
		Dichloropropane, 1,2-	78-87-5	E611D	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Dichloropropylene, cis-1,3-	10061-01-5	E611D	0.030	mg/kg	<0.030	<0.030	0	Diff <2x LOR	----
		Dichloropropylene, trans-1,3-	10061-02-6	E611D	0.030	mg/kg	<0.030	<0.030	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611D	0.015	mg/kg	<0.015	<0.015	0	Diff <2x LOR	----
		Hexane, n-	110-54-3	E611D	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Hexanone, 2-	591-78-6	E611D	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl ethyl ketone [MEK]	78-93-3	E611D	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl isobutyl ketone [MIBK]	108-10-1	E611D	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611D	0.040	mg/kg	<0.040	<0.040	0	Diff <2x LOR	----
		Styrene	100-42-5	E611D	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Tetrachloroethane, 1,1,1,2-	630-20-6	E611D	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Tetrachloroethylene	127-18-4	E611D	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Toluene	108-88-3	E611D	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Trichloroethane, 1,1,1-	71-55-6	E611D	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Trichloroethane, 1,1,2-	79-00-5	E611D	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Trichloroethylene	79-01-6	E611D	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		Trichlorofluoromethane	75-69-4	E611D	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Vinyl chloride	75-01-4	E611D	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611D	0.030	mg/kg	<0.030	<0.030	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611D	0.030	mg/kg	<0.030	<0.030	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 820140)											
WP2300952-002	Anonymous	F1 (C6-C10)	----	E581.F1	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 820338)											
WP2300952-001	Anonymous	F2 (C10-C16)	----	E601.SG	25	mg/kg	<25	<25	0	Diff <2x LOR	----
		F3 (C16-C34)	----	E601.SG	50	mg/kg	<50	89	39	Diff <2x LOR	----

Sub-Matrix: **Soil/Solid**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Hydrocarbons (QC Lot: 820338) - continued											
WP2300952-001	Anonymous	F4 (C34-C50)	----	E601.SG	50	mg/kg	<50	<50	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 822036)											
WP2300990-001	MW03-S1	F1 (C6-C10)	----	E581.F1	5.0	mg/kg	14.6	15.8	1.2	Diff <2x LOR	----
Polycyclic Aromatic Hydrocarbons (QC Lot: 821841)											
WT2302527-001	Anonymous	Acenaphthene	83-32-9	E641A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Acenaphthylene	208-96-8	E641A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Acridine	260-94-6	E641A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Anthracene	120-12-7	E641A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Benz(a)anthracene	56-55-3	E641A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Benzo(a)pyrene	50-32-8	E641A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Benzo(b+j)fluoranthene	n/a	E641A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Benzo(g,h,i)perylene	191-24-2	E641A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Benzo(k)fluoranthene	207-08-9	E641A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Chrysene	218-01-9	E641A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Dibenz(a,h)anthracene	53-70-3	E641A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Fluoranthene	206-44-0	E641A	0.050	mg/kg	0.057	0.068	0.011	Diff <2x LOR	J
		Fluorene	86-73-7	E641A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Methylnaphthalene, 1-	90-12-0	E641A	0.030	mg/kg	<0.030	<0.030	0	Diff <2x LOR	----
		Methylnaphthalene, 2-	91-57-6	E641A	0.030	mg/kg	<0.030	<0.030	0	Diff <2x LOR	----
		Naphthalene	91-20-3	E641A	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		Phenanthrene	85-01-8	E641A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Pyrene	129-00-0	E641A	0.050	mg/kg	<0.050	0.054	0.004	Diff <2x LOR	J
		Quinoline	91-22-5	E641A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----

Qualifiers

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 819689)						
Moisture	----	E144	0.25	%	<0.25	----
Physical Tests (QCLot: 820492)						
Moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 821830)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 821830) - continued						
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
Metals (QCLot: 821831)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Volatile Organic Compounds (QCLot: 820141)						
Benzene	71-43-2	E611A	0.005	mg/kg	<0.0050	----
Ethylbenzene	100-41-4	E611A	0.015	mg/kg	<0.015	----
Toluene	108-88-3	E611A	0.05	mg/kg	<0.050	----
Xylene, m+p-	179601-23-1	E611A	0.03	mg/kg	<0.030	----
Xylene, o-	95-47-6	E611A	0.03	mg/kg	<0.030	----
Volatile Organic Compounds (QCLot: 822035)						
Acetone	67-64-1	E611D	0.5	mg/kg	<0.50	----
Benzene	71-43-2	E611D	0.005	mg/kg	<0.0050	----
Bromodichloromethane	75-27-4	E611D	0.05	mg/kg	<0.050	----
Bromoform	75-25-2	E611D	0.05	mg/kg	<0.050	----
Bromomethane	74-83-9	E611D	0.05	mg/kg	<0.050	----
Carbon disulfide	75-15-0	E611D	0.05	mg/kg	<0.050	----
Carbon tetrachloride	56-23-5	E611D	0.05	mg/kg	<0.050	----
Chlorobenzene	108-90-7	E611D	0.05	mg/kg	<0.050	----
Chloroethane	75-00-3	E611D	0.05	mg/kg	<0.050	----
Chloroform	67-66-3	E611D	0.05	mg/kg	<0.050	----
Chloromethane	74-87-3	E611D	0.05	mg/kg	<0.050	----
Dibromochloromethane	124-48-1	E611D	0.05	mg/kg	<0.050	----
Dibromoethane, 1,2-	106-93-4	E611D	0.05	mg/kg	<0.050	----
Dichlorobenzene, 1,2-	95-50-1	E611D	0.05	mg/kg	<0.050	----
Dichlorobenzene, 1,3-	541-73-1	E611D	0.05	mg/kg	<0.050	----
Dichlorobenzene, 1,4-	106-46-7	E611D	0.05	mg/kg	<0.050	----
Dichlorodifluoromethane	75-71-8	E611D	0.05	mg/kg	<0.050	----
Dichloroethane, 1,1-	75-34-3	E611D	0.05	mg/kg	<0.050	----
Dichloroethane, 1,2-	107-06-2	E611D	0.05	mg/kg	<0.050	----
Dichloroethylene, 1,1-	75-35-4	E611D	0.05	mg/kg	<0.050	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 822035) - continued						
Dichloroethylene, cis-1,2-	156-59-2	E611D	0.05	mg/kg	<0.050	----
Dichloroethylene, trans-1,2-	156-60-5	E611D	0.05	mg/kg	<0.050	----
Dichloromethane	75-09-2	E611D	0.045	mg/kg	<0.045	----
Dichloropropane, 1,2-	78-87-5	E611D	0.05	mg/kg	<0.050	----
Dichloropropylene, cis-1,3-	10061-01-5	E611D	0.03	mg/kg	<0.030	----
Dichloropropylene, trans-1,3-	10061-02-6	E611D	0.03	mg/kg	<0.030	----
Ethylbenzene	100-41-4	E611D	0.015	mg/kg	<0.015	----
Hexane, n-	110-54-3	E611D	0.05	mg/kg	<0.050	----
Hexanone, 2-	591-78-6	E611D	0.5	mg/kg	<0.50	----
Methyl ethyl ketone [MEK]	78-93-3	E611D	0.5	mg/kg	<0.50	----
Methyl isobutyl ketone [MIBK]	108-10-1	E611D	0.5	mg/kg	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611D	0.04	mg/kg	<0.040	----
Styrene	100-42-5	E611D	0.05	mg/kg	<0.050	----
Tetrachloroethane, 1,1,1,2-	630-20-6	E611D	0.05	mg/kg	<0.050	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.05	mg/kg	<0.050	----
Tetrachloroethylene	127-18-4	E611D	0.05	mg/kg	<0.050	----
Toluene	108-88-3	E611D	0.05	mg/kg	<0.050	----
Trichloroethane, 1,1,1-	71-55-6	E611D	0.05	mg/kg	<0.050	----
Trichloroethane, 1,1,2-	79-00-5	E611D	0.05	mg/kg	<0.050	----
Trichloroethylene	79-01-6	E611D	0.01	mg/kg	<0.010	----
Trichlorofluoromethane	75-69-4	E611D	0.05	mg/kg	<0.050	----
Vinyl chloride	75-01-4	E611D	0.02	mg/kg	<0.020	----
Xylene, m+p-	179601-23-1	E611D	0.03	mg/kg	<0.030	----
Xylene, o-	95-47-6	E611D	0.03	mg/kg	<0.030	----
Hydrocarbons (QCLot: 820140)						
F1 (C6-C10)	----	E581.F1	5	mg/kg	<5.0	----
Hydrocarbons (QCLot: 820338)						
F2 (C10-C16)	----	E601.SG	25	mg/kg	<25	----
F3 (C16-C34)	----	E601.SG	50	mg/kg	<50	----
F4 (C34-C50)	----	E601.SG	50	mg/kg	<50	----
Hydrocarbons (QCLot: 822036)						
F1 (C6-C10)	----	E581.F1	5	mg/kg	<5.0	----
Polycyclic Aromatic Hydrocarbons (QCLot: 821841)						
Acenaphthene	83-32-9	E641A	0.05	mg/kg	<0.050	----
Acenaphthylene	208-96-8	E641A	0.05	mg/kg	<0.050	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 821841) - continued						
Acridine	260-94-6	E641A	0.05	mg/kg	<0.050	----
Anthracene	120-12-7	E641A	0.05	mg/kg	<0.050	----
Benz(a)anthracene	56-55-3	E641A	0.05	mg/kg	<0.050	----
Benzo(a)pyrene	50-32-8	E641A	0.05	mg/kg	<0.050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.05	mg/kg	<0.050	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.05	mg/kg	<0.050	----
Benzo(k)fluoranthene	207-08-9	E641A	0.05	mg/kg	<0.050	----
Chrysene	218-01-9	E641A	0.05	mg/kg	<0.050	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.05	mg/kg	<0.050	----
Fluoranthene	206-44-0	E641A	0.05	mg/kg	<0.050	----
Fluorene	86-73-7	E641A	0.05	mg/kg	<0.050	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.05	mg/kg	<0.050	----
Methylnaphthalene, 1-	90-12-0	E641A	0.03	mg/kg	<0.030	----
Methylnaphthalene, 2-	91-57-6	E641A	0.03	mg/kg	<0.030	----
Naphthalene	91-20-3	E641A	0.01	mg/kg	<0.010	----
Phenanthrene	85-01-8	E641A	0.05	mg/kg	<0.050	----
Pyrene	129-00-0	E641A	0.05	mg/kg	<0.050	----
Quinoline	91-22-5	E641A	0.05	mg/kg	<0.050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 819689)									
Moisture	----	E144	0.25	%	50 %	100	90.0	110	----
Physical Tests (QCLot: 820492)									
Moisture	----	E144	0.25	%	50 %	100	90.0	110	----
Metals (QCLot: 821830)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	104	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	108	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	107	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	105	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	98.3	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	97.8	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	96.9	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	99.0	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	103	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	102	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	102	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	100	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	101	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	102	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	100	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	107	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	101	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	108	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	102	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	107	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	104	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	104	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	90.2	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	103	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	108	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	103	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	104	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	100	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 821830) - continued									
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	101	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	101	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	105	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	98.6	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	107	80.0	120	----
Metals (QCLot: 821831)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	100	80.0	120	----
Volatile Organic Compounds (QCLot: 820141)									
Benzene	71-43-2	E611A	0.005	mg/kg	2.5 mg/kg	118	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.015	mg/kg	2.5 mg/kg	110	70.0	130	----
Toluene	108-88-3	E611A	0.05	mg/kg	2.5 mg/kg	92.5	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.03	mg/kg	5 mg/kg	116	70.0	130	----
Xylene, o-	95-47-6	E611A	0.03	mg/kg	2.5 mg/kg	102	70.0	130	----
Volatile Organic Compounds (QCLot: 822035)									
Acetone	67-64-1	E611D	0.5	mg/kg	12.5 mg/kg	93.9	60.0	140	----
Benzene	71-43-2	E611D	0.005	mg/kg	2.5 mg/kg	105	70.0	130	----
Bromodichloromethane	75-27-4	E611D	0.05	mg/kg	2.5 mg/kg	122	50.0	140	----
Bromoform	75-25-2	E611D	0.05	mg/kg	2.5 mg/kg	118	70.0	130	----
Bromomethane	74-83-9	E611D	0.05	mg/kg	2.5 mg/kg	108	50.0	140	----
Carbon disulfide	75-15-0	E611D	0.05	mg/kg	2.5 mg/kg	117	70.0	130	----
Carbon tetrachloride	56-23-5	E611D	0.05	mg/kg	2.5 mg/kg	130	70.0	130	----
Chlorobenzene	108-90-7	E611D	0.05	mg/kg	2.5 mg/kg	98.7	70.0	130	----
Chloroethane	75-00-3	E611D	0.05	mg/kg	2.5 mg/kg	97.0	70.0	130	----
Chloroform	67-66-3	E611D	0.05	mg/kg	2.5 mg/kg	120	70.0	130	----
Chloromethane	74-87-3	E611D	0.05	mg/kg	2.5 mg/kg	97.0	70.0	130	----
Dibromochloromethane	124-48-1	E611D	0.05	mg/kg	2.5 mg/kg	105	60.0	130	----
Dibromoethane, 1,2-	106-93-4	E611D	0.05	mg/kg	2.5 mg/kg	96.7	70.0	130	----
Dichlorobenzene, 1,2-	95-50-1	E611D	0.05	mg/kg	2.5 mg/kg	97.4	70.0	130	----
Dichlorobenzene, 1,3-	541-73-1	E611D	0.05	mg/kg	2.5 mg/kg	104	70.0	130	----
Dichlorobenzene, 1,4-	106-46-7	E611D	0.05	mg/kg	2.5 mg/kg	100	70.0	130	----
Dichlorodifluoromethane	75-71-8	E611D	0.05	mg/kg	2.5 mg/kg	69.7	50.0	140	----
Dichloroethane, 1,1-	75-34-3	E611D	0.05	mg/kg	2.5 mg/kg	115	60.0	130	----
Dichloroethane, 1,2-	107-06-2	E611D	0.05	mg/kg	2.5 mg/kg	113	60.0	130	----
Dichloroethylene, 1,1-	75-35-4	E611D	0.05	mg/kg	2.5 mg/kg	113	60.0	130	----
Dichloroethylene, cis-1,2-	156-59-2	E611D	0.05	mg/kg	2.5 mg/kg	108	70.0	130	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Volatile Organic Compounds (QCLot: 822035) - continued									
Dichloroethylene, trans-1,2-	156-60-5	E611D	0.05	mg/kg	2.5 mg/kg	116	60.0	130	----
Dichloromethane	75-09-2	E611D	0.045	mg/kg	2.5 mg/kg	124	70.0	130	----
Dichloropropane, 1,2-	78-87-5	E611D	0.05	mg/kg	2.5 mg/kg	106	70.0	130	----
Dichloropropylene, cis-1,3-	10061-01-5	E611D	0.03	mg/kg	2.5 mg/kg	103	70.0	130	----
Dichloropropylene, trans-1,3-	10061-02-6	E611D	0.03	mg/kg	2.5 mg/kg	106	70.0	130	----
Ethylbenzene	100-41-4	E611D	0.015	mg/kg	2.5 mg/kg	94.2	70.0	130	----
Hexane, n-	110-54-3	E611D	0.05	mg/kg	2.5 mg/kg	112	70.0	130	----
Hexanone, 2-	591-78-6	E611D	0.5	mg/kg	12.5 mg/kg	84.1	60.0	140	----
Methyl ethyl ketone [MEK]	78-93-3	E611D	0.5	mg/kg	12.5 mg/kg	97.2	60.0	140	----
Methyl isobutyl ketone [MIBK]	108-10-1	E611D	0.5	mg/kg	12.5 mg/kg	96.6	60.0	140	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611D	0.04	mg/kg	2.5 mg/kg	104	70.0	130	----
Styrene	100-42-5	E611D	0.05	mg/kg	2.5 mg/kg	96.6	70.0	130	----
Tetrachloroethane, 1,1,1,2-	630-20-6	E611D	0.05	mg/kg	2.5 mg/kg	111	60.0	130	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.05	mg/kg	2.5 mg/kg	100	60.0	130	----
Tetrachloroethylene	127-18-4	E611D	0.05	mg/kg	2.5 mg/kg	113	60.0	130	----
Toluene	108-88-3	E611D	0.05	mg/kg	2.5 mg/kg	92.1	70.0	130	----
Trichloroethane, 1,1,1-	71-55-6	E611D	0.05	mg/kg	2.5 mg/kg	125	60.0	130	----
Trichloroethane, 1,1,2-	79-00-5	E611D	0.05	mg/kg	2.5 mg/kg	98.3	60.0	130	----
Trichloroethylene	79-01-6	E611D	0.01	mg/kg	2.5 mg/kg	119	60.0	130	----
Trichlorofluoromethane	75-69-4	E611D	0.05	mg/kg	2.5 mg/kg	116	50.0	140	----
Vinyl chloride	75-01-4	E611D	0.02	mg/kg	2.5 mg/kg	89.1	60.0	140	----
Xylene, m+p-	179601-23-1	E611D	0.03	mg/kg	5 mg/kg	106	70.0	130	----
Xylene, o-	95-47-6	E611D	0.03	mg/kg	2.5 mg/kg	96.0	70.0	130	----
Hydrocarbons (QCLot: 820140)									
F1 (C6-C10)	----	E581.F1	5	mg/kg	92.77 mg/kg	78.8	70.0	130	----
Hydrocarbons (QCLot: 820338)									
F2 (C10-C16)	----	E601.SG	25	mg/kg	638 mg/kg	120	70.0	130	----
F3 (C16-C34)	----	E601.SG	50	mg/kg	1270 mg/kg	111	70.0	130	----
F4 (C34-C50)	----	E601.SG	50	mg/kg	1094 mg/kg	124	70.0	130	----
Hydrocarbons (QCLot: 822036)									
F1 (C6-C10)	----	E581.F1	5	mg/kg	92.77 mg/kg	96.6	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 821841)									
Acenaphthene	83-32-9	E641A	0.05	mg/kg	0.5 mg/kg	91.9	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.05	mg/kg	0.5 mg/kg	93.0	60.0	130	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 821841) - continued									
Acridine	260-94-6	E641A	0.05	mg/kg	0.5 mg/kg	76.3	60.0	130	----
Anthracene	120-12-7	E641A	0.05	mg/kg	0.5 mg/kg	93.2	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.05	mg/kg	0.5 mg/kg	90.6	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.05	mg/kg	0.5 mg/kg	88.6	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.05	mg/kg	0.5 mg/kg	87.9	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.05	mg/kg	0.5 mg/kg	83.2	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.05	mg/kg	0.5 mg/kg	84.4	60.0	130	----
Chrysene	218-01-9	E641A	0.05	mg/kg	0.5 mg/kg	86.0	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.05	mg/kg	0.5 mg/kg	88.2	60.0	130	----
Fluoranthene	206-44-0	E641A	0.05	mg/kg	0.5 mg/kg	92.8	60.0	130	----
Fluorene	86-73-7	E641A	0.05	mg/kg	0.5 mg/kg	93.9	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.05	mg/kg	0.5 mg/kg	89.1	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.03	mg/kg	0.5 mg/kg	85.9	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.03	mg/kg	0.5 mg/kg	88.0	60.0	130	----
Naphthalene	91-20-3	E641A	0.01	mg/kg	0.5 mg/kg	85.8	60.0	130	----
Phenanthrene	85-01-8	E641A	0.05	mg/kg	0.5 mg/kg	88.5	60.0	130	----
Pyrene	129-00-0	E641A	0.05	mg/kg	0.5 mg/kg	91.5	60.0	130	----
Quinoline	91-22-5	E641A	0.05	mg/kg	0.5 mg/kg	79.7	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 820141)										
WP2300952-002	Anonymous	Benzene	71-43-2	E611A	2.71 mg/kg	3.125 mg/kg	107	60.0	140	----
		Ethylbenzene	100-41-4	E611A	2.83 mg/kg	3.125 mg/kg	112	60.0	140	----
		Toluene	108-88-3	E611A	2.26 mg/kg	3.125 mg/kg	89.3	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	5.42 mg/kg	6.25 mg/kg	107	60.0	140	----
		Xylene, o-	95-47-6	E611A	2.51 mg/kg	3.125 mg/kg	99.0	60.0	140	----
Hydrocarbons (QCLot: 820140)										
WP2300952-002	Anonymous	F1 (C6-C10)	----	E581.F1	122 mg/kg	185.55 mg/kg	80.8	60.0	140	----
Hydrocarbons (QCLot: 820338)										
WP2300952-001	Anonymous	F2 (C10-C16)	----	E601.SG	474 mg/kg	638 mg/kg	97.7	60.0	140	----
		F3 (C16-C34)	----	E601.SG	892 mg/kg	1270 mg/kg	92.2	60.0	140	----
		F4 (C34-C50)	----	E601.SG	846 mg/kg	1094 mg/kg	102	60.0	140	----
Hydrocarbons (QCLot: 822036)										
WP2300990-001	MW03-S1	F1 (C6-C10)	----	E581.F1	91.7 mg/kg	185.55 mg/kg	77.9	60.0	140	----
Polycyclic Aromatic Hydrocarbons (QCLot: 821841)										
WT2302527-001	Anonymous	Acenaphthene	83-32-9	E641A	0.345 mg/kg	0.5 mg/kg	93.5	50.0	140	----
		Acenaphthylene	208-96-8	E641A	0.349 mg/kg	0.5 mg/kg	94.6	50.0	140	----
		Acridine	260-94-6	E641A	0.298 mg/kg	0.5 mg/kg	80.8	50.0	140	----
		Anthracene	120-12-7	E641A	0.368 mg/kg	0.5 mg/kg	99.6	50.0	140	----
		Benz(a)anthracene	56-55-3	E641A	0.337 mg/kg	0.5 mg/kg	91.2	50.0	140	----
		Benzo(a)pyrene	50-32-8	E641A	0.362 mg/kg	0.5 mg/kg	98.1	50.0	140	----
		Benzo(b+j)fluoranthene	n/a	E641A	0.319 mg/kg	0.5 mg/kg	86.5	50.0	140	----
		Benzo(g,h,i)perylene	191-24-2	E641A	0.309 mg/kg	0.5 mg/kg	83.6	50.0	140	----
		Benzo(k)fluoranthene	207-08-9	E641A	0.326 mg/kg	0.5 mg/kg	88.4	50.0	140	----
		Chrysene	218-01-9	E641A	0.302 mg/kg	0.5 mg/kg	81.9	50.0	140	----
		Dibenz(a,h)anthracene	53-70-3	E641A	0.343 mg/kg	0.5 mg/kg	92.8	50.0	140	----
		Fluoranthene	206-44-0	E641A	0.372 mg/kg	0.5 mg/kg	101	50.0	140	----
		Fluorene	86-73-7	E641A	0.354 mg/kg	0.5 mg/kg	96.0	50.0	140	----
		Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.328 mg/kg	0.5 mg/kg	88.7	50.0	140	----
		Methylnaphthalene, 1-	90-12-0	E641A	0.317 mg/kg	0.5 mg/kg	86.0	50.0	140	----
		Methylnaphthalene, 2-	91-57-6	E641A	0.330 mg/kg	0.5 mg/kg	89.3	50.0	140	----

Sub-Matrix: **Soil/Solid**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report: Spike Concentration	Spike Target	Recovery (%) MS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 821841) - continued										
WT2302527-001	Anonymous	Naphthalene	91-20-3	E641A	0.317 mg/kg	0.5 mg/kg	85.9	50.0	140	----
		Phenanthrene	85-01-8	E641A	0.359 mg/kg	0.5 mg/kg	97.3	50.0	140	----
		Pyrene	129-00-0	E641A	0.368 mg/kg	0.5 mg/kg	99.8	50.0	140	----
		Quinoline	91-22-5	E641A	0.306 mg/kg	0.5 mg/kg	82.8	50.0	140	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report: RM Target Concentration	Recovery (%) RM	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Particle Size (QCLot: 825129)									
	RM	Sand (>0.075mm)	----	E178	38.6 %	102	86.0	114	----
Metals (QCLot: 821830)									
	RM	Aluminum	7429-90-5	E440	9817 mg/kg	122	70.0	130	----
	RM	Antimony	7440-36-0	E440	3.99 mg/kg	109	70.0	130	----
	RM	Arsenic	7440-38-2	E440	3.73 mg/kg	100	70.0	130	----
	RM	Barium	7440-39-3	E440	105 mg/kg	105	70.0	130	----
	RM	Beryllium	7440-41-7	E440	0.349 mg/kg	107	70.0	130	----
	RM	Boron	7440-42-8	E440	8.5 mg/kg	123	40.0	160	----
	RM	Cadmium	7440-43-9	E440	0.91 mg/kg	99.8	70.0	130	----
	RM	Calcium	7440-70-2	E440	31082 mg/kg	100	70.0	130	----
	RM	Chromium	7440-47-3	E440	101 mg/kg	113	70.0	130	----
	RM	Cobalt	7440-48-4	E440	6.9 mg/kg	105	70.0	130	----
	RM	Copper	7440-50-8	E440	123 mg/kg	102	70.0	130	----
	RM	Iron	7439-89-6	E440	23558 mg/kg	104	70.0	130	----
	RM	Lead	7439-92-1	E440	267 mg/kg	101	70.0	130	----
	RM	Lithium	7439-93-2	E440	9.5 mg/kg	103	70.0	130	----
	RM	Magnesium	7439-95-4	E440	5509 mg/kg	109	70.0	130	----
	RM	Manganese	7439-96-5	E440	269 mg/kg	108	70.0	130	----
	RM	Molybdenum	7439-98-7	E440	1.03 mg/kg	107	70.0	130	----
	RM	Nickel	7440-02-0	E440	26.7 mg/kg	105	70.0	130	----
	RM	Phosphorus	7723-14-0	E440	752 mg/kg	103	70.0	130	----
	RM	Potassium	7440-09-7	E440	1587 mg/kg	113	70.0	130	----
	RM	Silver	7440-22-4	E440	4.06 mg/kg	118	70.0	130	----
	RM	Sodium	7440-23-5	E440	797 mg/kg	107	70.0	130	----
	RM	Strontium	7440-24-6	E440	86.1 mg/kg	103	70.0	130	----
	RM	Thallium	7440-28-0	E440	0.0786 mg/kg	106	40.0	160	----
	RM	Tin	7440-31-5	E440	10.6 mg/kg	95.9	70.0	130	----

Sub-Matrix:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report: RM Target Concentration	Recovery (%) RM	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Metals (QCLot: 821830) - continued									
	RM	Titanium	7440-32-6	E440	839 mg/kg	122	70.0	130	----
	RM	Uranium	7440-61-1	E440	0.52 mg/kg	108	70.0	130	----
	RM	Vanadium	7440-62-2	E440	32.7 mg/kg	108	70.0	130	----
	RM	Zinc	7440-66-6	E440	297 mg/kg	98.3	70.0	130	----
	RM	Zirconium	7440-67-7	E440	5.73 mg/kg	114	70.0	130	----
Metals (QCLot: 821831)									
	RM	Mercury	7439-97-6	E510	0.0585 mg/kg	99.5	70.0	130	----

(ALS) Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here
(lab use only)

COC Number: 17 - 878822 0990

Page 1 of 2

Report To	Contact and company name below will appear on the final report
Company:	WSP CANADA
Contact:	ALFRED CHAN
Phone:	(204) 477-6650
	Company address below will appear on the final report
Street:	1600 BUFFALO PLACE
City/Province:	WINNIPEG MB
Postal Code:	R3T 6B8

Invoice To	
Same as Report To	☐ YES ☑ NO
Copy of Invoice with Report	☐ YES ☑ NO
Company:	WSP CANADA INC
Contact:	apwest@wsp.com

Project Information

ALS Account # / Quote #:	Q88684
Job #:	221-07203-00
PO / AFE:	
LSD:	
ALS Lab Work Order # (lab use only):	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ YES ☐ NO

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	alfred.chan@wsp.com
Email 2	jeremiah.kevin@wsp.com
Email 3	

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	apwest@wsp.com
Email 2	alfred.chan@wsp.com

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	
ALS Contact: Judy D.	Sampler: JK

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4-20%] ☐ / 3 day [P3-25%] ☐ / 2 day [P2-50%] ☐

EMERGENCY: 1 Business day [E - 100%] ☐ / Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX, PHC F1-F4	VOC	PAH	METALS (Total)	PSA	MERCURY	SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
1	MW03-S1	26-JAN-23	12:33	SOIL	5	✓	✓		✓				
2	MW03-S3	26-JAN-23	12:33	SOIL	4	✓							
3	TH07-S3	27-JAN-23	14:12	SOIL	4	✓			✓				
4	TH08-S2	27-JAN-23	15:12	SOIL	5	✓		✓	✓				
5	TH02-S5	26-JAN-23	13:25	SOIL	4	✓			✓				
6	TH10-S3	27-JAN-23	09:59	SOIL	4	✓			✓		✓		
7	MW12-S1	27-JAN-23	12:49	SOIL	4	✓			✓		✓		
8	TH08-S5	27-JAN-23	15:12	SOIL	4	✓				✓			
9	TH08-S3	27-JAN-23	15:12	SOIL	1					✓			
10	TH07-S6	27-JAN-23	14:12	SOIL	3	✓							
11	TH05-S3	27-JAN-23	16:25	SOIL	4	✓			✓				
12	DUPLICATE-2	27-JAN-23	16:30	SOIL	3	✓							

Environmental Division
Winnipeg
Work Order Reference
WP2300990

Telephone : +1 204 255 9720

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?
☐ YES ☐ NO

Are samples for human consumption/ use?
☐ YES ☐ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C: -3.4

FINAL COOLER TEMPERATURES °C:

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Jeremiah Kevin	Date: 30 JAN 23	Time: 13:00	Received by: SB	Date: JAN 3 0 2023	Time: 1500	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

JUNE 2018 FRONT

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here
(lab use only)

COC Number: 17- 878821

Report To	Contact and company name below will appear on the final report
Company:	WSP CANADA
Contact:	ALFRED CHAN
Phone:	(204) 977-6650
	Company address below will appear on the final report
Street:	1600 BUFFALO PLACE
City/Province:	WINNIPEG, MB
Postal Code:	R3T 6B8
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	WSP CANADA
Contact:	apwest@wsp.com

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: alfred.chan@wsp.com
Email 2: [illegible] jeremiah.kevin@wsp.com
Email 3:

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: apwest@wsp.com
Email 2:

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
4 day [P4-20%] ☐		1 Business day [E - 100%] ☐	
3 day [P3-25%] ☐		Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐	
2 day [P2-50%] ☐			

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #: Q88684
Job #: 221-07203-00
PO / AFE:
LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center: | PO#:
Major/Minor Code: | Routing Code:
Requisitioner:
Location:

ALS Lab Work Order # (lab use only):
ALS Contact: Judy D
Sampler: [illegible]

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX, PHC F1-F4	VOC	PAH	METALS (TOTAL)	PSA	MERCURY	SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
13	MW11-S2	27-JAN-23	11:20	SOIL	4	✓			✓		✓		
14	MW01-S4	26-JAN-23	15:28	SOIL	4	✓							
15	TH06-S3	27-JAN-23	15:42	SOIL	4	✓			✓				
16	DUPLICATE-1	27-JAN-23	14:12	SOIL	3	✓							
17	METALS-DUPLICATE												

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO
Are samples for human consumption/ use? ☐ YES ☐ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C: -3.4
FINAL COOLER TEMPERATURES °C:

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Jeremiah Kevin	Date: 30 JAN 23	Time: 13:00	Received by: SB	Date: JAN 30 2023	Time: 1:30	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

JUNE 2018 FRONT

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

ALS Canada Ltd.

right solutions. right partner.

CERTIFICATE OF ANALYSIS

Work Order	: **WP2301147**	Page	: 1 of 6
Client	: **WSP Canada Inc.**	Laboratory	: Winnipeg - Environmental
Contact	: Alfred Chan	Account Manager	: Judy Dalmaijer
Address	: 1600 Buffalo Place Winnipeg MB Canada R3T 6B8	Address	: 1329 Niakwa Road East, Unit 12 Winnipeg MB Canada R2J 3T4
Telephone	: 204 477 6650	Telephone	: +1 204 255 9720
Project	: 221-07203-00, PHASE 502	Date Samples Received	: 01-Feb-2023 14:35
PO	: ----	Date Analysis Commenced	: 02-Feb-2023
C-O-C number	: ----	Issue Date	: 10-Feb-2023 13:12
Sampler	: ----		
Site	: ----		
Quote number	: Ground Water Monitoring Two Year Program (Q89180)		
No. of samples received	: 6		
No. of samples analysed	: 6		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Christine Mason	Department Manager - Chemistry	Organics, Winnipeg, Manitoba
Gerry Vera	Analyst	Organics, Winnipeg, Manitoba
Matthew Bouch		Metals, Winnipeg, Manitoba
Michelle Michalchuk	Analyst	Organics, Winnipeg, Manitoba
Oleksandr Busel		Metals, Winnipeg, Manitoba

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
µg/L	micrograms per litre
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
EMPC	*Estimated Maximum Possible Concentration. Parameter detected but didn't meet all criteria for positive identification.*

Analytical Results

Sub-Matrix: Groundwater
(Matrix: Water)

Analyte	CAS Number	Method	LOR	Unit	DUPLICATE-GW-2	MW12	MW01	DUPLICATE-GW-1	MW03
				Client sampling date / time	01-Feb-2023 13:49	01-Feb-2023 13:47	01-Feb-2023 12:44	01-Feb-2023 11:35	01-Feb-2023 11:33
					WP2301147-001	WP2301147-002	WP2301147-003	WP2301147-004	WP2301147-005
					Result	Result	Result	Result	Result
Dissolved Metals									
Aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.718	0.778	0.0014	----	0.250
Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00095	0.00101	0.00092	----	0.00083
Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00278	0.00312	0.00104	----	0.00162
Barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0696	0.0788	0.0470	----	0.0666
Beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	0.00111	0.000971	<0.000020	----	0.000042
Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	<0.000050
Boron, dissolved	7440-42-8	E421	0.010	mg/L	19.7	17.3	0.605	----	0.548
Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000634	0.0000669	0.0000337	----	0.0000252
Calcium, dissolved	7440-70-2	E421	0.050	mg/L	450	472	183	----	97.3
Cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000226	0.000190	0.000104	----	0.000126
Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	0.00092	0.00107	<0.00050	----	0.00051
Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00215	0.00266	0.00066	----	0.00081
Copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00336	0.00530	0.00225	----	0.00114
Iron, dissolved	7439-89-6	E421	0.010	mg/L	0.451	0.539	<0.010	----	0.223
Lead, dissolved	7439-92-1	E421	0.000050	mg/L	0.00370	0.00386	0.000065	----	0.000356
Lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.213	0.238	0.147	----	0.0568
Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	632	713	153	----	84.7
Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.809	0.960	0.210	----	0.141
Mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	----	0.0000052	----	----	----
Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.0407	0.0361	0.00667	----	0.0102
Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00761	0.00912	0.00365	----	0.00343
Phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	0.204	0.232	0.110	----	0.053
Potassium, dissolved	7440-09-7	E421	0.050	mg/L	15.7	16.5	8.84	----	6.02
Rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00638	0.00667	0.00205	----	0.00171
Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000532	0.000502	0.00376	----	0.000299
Silicon, dissolved	7440-21-3	E421	0.050	mg/L	7.03	7.52	7.70	----	7.12
Silver, dissolved	7440-22-4	E421	0.000010	mg/L	0.000038	0.000039	0.000010	----	<0.000010
Sodium, dissolved	7440-23-5	E421	0.050	mg/L	867	917	265	----	174
Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	7.68	7.68	1.30	----	0.730

Analytical Results

Sub-Matrix: Groundwater
(Matrix: Water)

Analyte	CAS Number	Method	LOR	Unit	DUPLICATE-GW-2	MW12	MW01	DUPLICATE-GW-1	MW03
Client sampling date / time					01-Feb-2023 13:49	01-Feb-2023 13:47	01-Feb-2023 12:44	01-Feb-2023 11:35	01-Feb-2023 11:33
					WP2301147-001	WP2301147-002	WP2301147-003	WP2301147-004	WP2301147-005
					Result	Result	Result	Result	Result
Dissolved Metals									
Sulfur, dissolved	7704-34-9	E421	0.50	mg/L	1100	1210	264	----	81.4
Tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	0.00020	0.00025	<0.00020	----	<0.00020
Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	0.000027	0.000029	0.000019	----	0.000012
Thorium, dissolved	7440-29-1	E421	0.00010	mg/L	0.00032	0.00034	<0.00010	----	0.00011
Tin, dissolved	7440-31-5	E421	0.00010	mg/L	0.00121	0.00134	0.00354	----	0.00106
Titanium, dissolved	7440-32-6	E421	0.00030	mg/L	0.0243	0.0280	<0.00030	----	0.0102
Tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	0.00409	0.00375	0.00044	----	0.00169
Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.0504	0.0609	0.0605	----	0.00874
Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00616	0.00710	0.00085	----	0.00196
Zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0090	0.0071	0.0066	----	0.0094
Zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	0.00317	0.00338	0.00070	----	0.00119
Dissolved mercury filtration location	----	EP509	-	-	----	Field	----	----	----
Dissolved metals filtration location	----	EP421	-	-	Field	Field	Field	----	Field
Volatile Organic Compounds									
Benzene	71-43-2	E611A	0.50	µg/L	----	<0.50	<0.50	<0.50	<0.50
BTEX, total	----	E611A	1.0	µg/L	----	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	100-41-4	E611A	0.50	µg/L	----	<0.50	<0.50	<0.50	<0.50
Toluene	108-88-3	E611A	0.50	µg/L	----	<0.50	<0.50	<0.50	<0.50
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	----	<0.40	<0.40	<0.40	<0.40
Xylene, o-	95-47-6	E611A	0.30	µg/L	----	<0.30	0.40	0.46	0.57 EMPC
Xylenes, total	1330-20-7	E611A	0.50	µg/L	----	<0.50	<0.50	<0.50	0.57
Hydrocarbons									
F1 (C6-C10)	----	E581.F1	100	µg/L	----	<100	<100	190	230
F1-BTEX	----	EC580	25	µg/L	----	<100	<100	190	230
F2 (C10-C16)	----	E601	100	µg/L	----	<100	130	8290	9650
F3 (C16-C34)	----	E601	250	µg/L	----	<250	<250	6080	7100
F4 (C34-C50)	----	E601	250	µg/L	----	<250	<250	<250	<250
TEH (C10-C50)	n/a	E601	400	µg/L	----	<400	<400	14400	16800
TEH (C16-C50)	----	E601	400	µg/L	----	<400	<400	6080	7100
Hydrocarbons Surrogates									

Analytical Results

Sub-Matrix: Groundwater
(Matrix: Water)

Analyte	CAS Number	Method	LOR	Unit	DUPLICATE-GW-2	MW12	MW01	DUPLICATE-GW-1	MW03
				Client sampling date / time	01-Feb-2023 13:49	01-Feb-2023 13:47	01-Feb-2023 12:44	01-Feb-2023 11:35	01-Feb-2023 11:33
					WP2301147-001	WP2301147-002	WP2301147-003	WP2301147-004	WP2301147-005
					Result	Result	Result	Result	Result
Hydrocarbons Surrogates									
Bromobenzotrifluoride, 2- (F2-F4 surrogate)	392-83-6	E601	1.0	%	----	97.8	97.5	102	105
Dichlorotoluene, 3,4-	95-75-0	E581.F1	1.0	%	----	86.7	90.6	83.0	96.1
Volatile Organic Compounds Surrogates									
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	----	84.3	86.7	110	107
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	----	102	104	103	103

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Groundwater**

(Matrix: **Water**)

				Client sample ID	TRIP BLANK	----	----	----	----
				Client sampling date / time	01-Feb-2023	----	----	----	----
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	**WP2301147-006**	--------	--------	--------	--------
					Result	----	----	----	----
Volatile Organic Compounds									
Benzene	71-43-2	E611A	0.50	µg/L	<0.50	----	----	----	----
BTEX, total	----	E611A	1.0	µg/L	<1.0	----	----	----	----
Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	----	----	----	----
Toluene	108-88-3	E611A	0.50	µg/L	<0.50	----	----	----	----
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	----	----	----	----
Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	----	----	----	----
Xylenes, total	1330-20-7	E611A	0.50	µg/L	<0.50	----	----	----	----
Hydrocarbons									
F1 (C6-C10)	----	E581.F1	100	µg/L	<100	----	----	----	----
F1-BTEX	----	EC580	25	µg/L	<100	----	----	----	----
Hydrocarbons Surrogates									
Dichlorotoluene, 3,4-	95-75-0	E581.F1	1.0	%	86.1	----	----	----	----
Volatile Organic Compounds Surrogates									
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	98.2	----	----	----	----
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	103	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

ALS Canada Ltd.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: WP2301147	Page	: 1 of 9
Client	: WSP Canada Inc.	Laboratory	: Winnipeg - Environmental
Contact	: Alfred Chan	Account Manager	: Judy Dalmaijer
Address	: 1600 Buffalo Place Winnipeg MB Canada R3T 6B8	Address	: 1329 Niakwa Road East, Unit 12 Winnipeg, Manitoba Canada R2J 3T4
Telephone	: 204 477 6650	Telephone	: +1 204 255 9720
Project	: 221-07203-00, PHASE 502	Date Samples Received	: 01-Feb-2023 14:35
PO	: ----	Issue Date	: 10-Feb-2023 13:12
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: Ground Water Monitoring Two Year Program (Q89180)		
No. of samples received	: 6		
No. of samples analysed	: 6		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Matrix Spike outliers occur.
- Laboratory Control Sample (LCS) outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Laboratory Control Sample (LCS) Recoveries								
Dissolved Metals	QC-MRG2-821629002	----	Lithium, dissolved	7439-93-2	E421	122 % MES	80.0-120%	Recovery greater than upper control limit

Result Qualifiers

Qualifier	*Description*
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MW12	E509	01-Feb-2023	06-Feb-2023	----	----		06-Feb-2023	28 days	5 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) DUPLICATE-GW-2	E421	01-Feb-2023	02-Feb-2023	----	----		03-Feb-2023	180 days	2 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW01	E421	01-Feb-2023	02-Feb-2023	----	----		03-Feb-2023	180 days	2 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW03	E421	01-Feb-2023	02-Feb-2023	----	----		03-Feb-2023	180 days	2 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW12	E421	01-Feb-2023	02-Feb-2023	----	----		03-Feb-2023	180 days	2 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) DUPLICATE-GW-1	E581.F1	01-Feb-2023	06-Feb-2023	----	----		07-Feb-2023	14 days	6 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) MW01	E581.F1	01-Feb-2023	06-Feb-2023	----	----		07-Feb-2023	14 days	6 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) MW03	E581.F1	01-Feb-2023	06-Feb-2023	----	----		07-Feb-2023	14 days	6 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) MW12	E581.F1	01-Feb-2023	06-Feb-2023	----	----		07-Feb-2023	14 days	6 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) TRIP BLANK	E581.F1	01-Feb-2023	06-Feb-2023	----	----		07-Feb-2023	14 days	6 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) DUPLICATE-GW-1	E601	01-Feb-2023	06-Feb-2023	14 days	5 days	✓	08-Feb-2023	40 days	2 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MW01	E601	01-Feb-2023	06-Feb-2023	14 days	5 days	✓	08-Feb-2023	40 days	2 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MW03	E601	01-Feb-2023	06-Feb-2023	14 days	5 days	✓	08-Feb-2023	40 days	2 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MW12	E601	01-Feb-2023	06-Feb-2023	14 days	5 days	✓	08-Feb-2023	40 days	2 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) DUPLICATE-GW-1	E611A	01-Feb-2023	06-Feb-2023	----	----		07-Feb-2023	14 days	6 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) MW01	E611A	01-Feb-2023	06-Feb-2023	----	----		07-Feb-2023	14 days	6 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) MW03	E611A	01-Feb-2023	06-Feb-2023	----	----		07-Feb-2023	14 days	6 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) MW12	E611A	01-Feb-2023	06-Feb-2023	----	----		07-Feb-2023	14 days	6 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) TRIP BLANK	E611A	01-Feb-2023	06-Feb-2023	----	----		07-Feb-2023	14 days	6 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	825128	1	9	11.1	5.0	✓
CCME PHC - F1 by Headspace GC-FID	E581.F1	825127	1	9	11.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	825437	1	1	100.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	821629	1	11	9.0	5.0	✓
Laboratory Control Samples (LCS)							
BTEX by Headspace GC-MS	E611A	825128	1	9	11.1	5.0	✓
CCME PHC - F1 by Headspace GC-FID	E581.F1	825127	1	9	11.1	5.0	✓
CCME PHCs - F2-F4 by GC-FID	E601	824972	1	7	14.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	825437	1	1	100.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	821629	1	11	9.0	5.0	✓
Method Blanks (MB)							
BTEX by Headspace GC-MS	E611A	825128	1	9	11.1	5.0	✓
CCME PHC - F1 by Headspace GC-FID	E581.F1	825127	1	9	11.1	5.0	✓
CCME PHCs - F2-F4 by GC-FID	E601	824972	1	7	14.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	825437	1	1	100.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	821629	1	11	9.0	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	825128	1	9	11.1	5.0	✓
CCME PHC - F1 by Headspace GC-FID	E581.F1	825127	1	9	11.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	825437	1	1	100.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	821629	1	11	9.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Water by CRC ICPMS	E421 Winnipeg - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Mercury in Water by CVAAS	E509 Winnipeg - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
CCME PHC - F1 by Headspace GC-FID	E581.F1 Winnipeg - Environmental	Water	CCME PHC in Soil - Tier 1	CCME Fraction 1 (F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
CCME PHCs - F2-F4 by GC-FID	E601 Winnipeg - Environmental	Water	CCME PHC in Soil - Tier 1	Sample extracts are analyzed by GC-FID for CCME hydrocarbon fractions (F2-F4).
BTEX by Headspace GC-MS	E611A Winnipeg - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
F1-BTEX	EC580 Winnipeg - Environmental	Water	CCME PHC in Soil - Tier 1	F1-BTEX is calculated as follows: F1-BTEX = F1 (C6-C10) minus benzene, toluene, ethylbenzene and xylenes (BTEX).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421 Winnipeg - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 Winnipeg - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.
VOCs Preparation for Headspace Analysis	EP581 Winnipeg - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
PHCs and PAHs Hexane Extraction	EP601 Winnipeg - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

ALS Canada Ltd.

QUALITY CONTROL REPORT

Work Order	: **WP2301147**	Page	: 1 of 10
Client	: WSP Canada Inc.	Laboratory	: Winnipeg - Environmental
Contact	: Alfred Chan	Account Manager	: Judy Dalmaijer
Address	: 1600 Buffalo Place Winnipeg MB Canada R3T 6B8	Address	: 1329 Niakwa Road East, Unit 12 Winnipeg, Manitoba Canada R2J 3T4
Telephone	:	Telephone	: +1 204 255 9720
Project	: 221-07203-00, PHASE 502	Date Samples Received	: 01-Feb-2023 14:35
PO	: ----	Date Analysis Commenced	: 02-Feb-2023
C-O-C number	: ----	Issue Date	: 10-Feb-2023 13:12
Sampler	: ---- 204 477 6650		
Site	: ----		
Quote number	: Ground Water Monitoring Two Year Program (Q89180)		
No. of samples received	: 6		
No. of samples analysed	: 6		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Christine Mason	Department Manager - Chemistry	Winnipeg Organics, Winnipeg, Manitoba
Gerry Vera	Analyst	Winnipeg Organics, Winnipeg, Manitoba
Matthew Bouch		Winnipeg Metals, Winnipeg, Manitoba
Michelle Michalchuk	Analyst	Winnipeg Organics, Winnipeg, Manitoba
Oleksandr Busel		Winnipeg Metals, Winnipeg, Manitoba

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Dissolved Metals (QC Lot: 821629)											
WP2300930-001	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0018	0.0023	0.0005	Diff <2x LOR	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00050	0.00043	0.00007	Diff <2x LOR	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.00682	0.00663	2.79%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	13.2	13.6	2.83%	20%	----
		Cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00158	0.00161	0.00003	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Lead, dissolved	7439-92-1	E421	0.000050	mg/L	0.000071	0.000079	0.000008	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	3.12	3.11	0.313%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00088	0.00087	0.000009	Diff <2x LOR	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000141	0.000100	0.000042	Diff <2x LOR	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.620	0.564	9.28%	20%	----
		Rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00080	0.00069	0.00011	Diff <2x LOR	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000092	<0.000050	0.000042	Diff <2x LOR	----
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	1.58	1.59	0.272%	20%	----
		Silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E421	0.050	mg/L	0.613	0.608	0.718%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.0146	0.0144	1.75%	20%	----
		Sulfur, dissolved	7704-34-9	E421	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report: LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 821629) - continued											
WP2300930-001	Anonymous	Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		Tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000041	0.000040	0.000002	Diff <2x LOR	----
		Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0073	0.0089	0.0015	Diff <2x LOR	----
		Zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 825437)											
WP2301147-002	MW12	Mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	0.0000052	0.0000104	0.0000052	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 825128)											
WP2301147-002	MW12	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 825127)											
WP2301147-002	MW12	F1 (C6-C10)	----	E581.F1	100	µg/L	<100	<100	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 821629)						
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 821629) - continued						
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 825437)						
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Volatile Organic Compounds (QCLot: 825128)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 824972)						
F2 (C10-C16)	----	E601	100	µg/L	<100	----
F3 (C16-C34)	----	E601	250	µg/L	<250	----
F4 (C34-C50)	----	E601	250	µg/L	<250	----
Hydrocarbons (QCLot: 825127)						
F1 (C6-C10)	----	E581.F1	100	µg/L	<100	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 821629)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	107	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	107	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	105	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	108	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	116	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	108	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	115	80.0	120	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	109	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	104	80.0	120	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	108	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	105	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	106	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	110	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	103	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	109	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	# 122	80.0	120	MES
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	117	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	102	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	105	80.0	120	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	112	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	108	80.0	120	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	98.8	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	109	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	103	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	103	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	110	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	103	80.0	120	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	113	80.0	120	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	105	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	109	80.0	120	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	103	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	106	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 821629) - continued									
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	103	80.0	120	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	107	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	108	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	105	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	108	80.0	120	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	92.8	80.0	120	----
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	98.5	80.0	120	----
Volatile Organic Compounds (QCLot: 825128)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	109	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	104	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	84.6	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	108	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	104	70.0	130	----
Hydrocarbons (QCLot: 824972)									
F2 (C10-C16)	----	E601	100	µg/L	3404 µg/L	104	70.0	130	----
F3 (C16-C34)	----	E601	250	µg/L	6777 µg/L	105	70.0	130	----
F4 (C34-C50)	----	E601	250	µg/L	5835 µg/L	107	70.0	130	----
Hydrocarbons (QCLot: 825127)									
F1 (C6-C10)	----	E581.F1	100	µg/L	5390 µg/L	102	70.0	130	----

Qualifiers

Qualifier	Description
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 821629)										
WP2300930-001	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.219 mg/L	0.2 mg/L	110	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0225 mg/L	0.02 mg/L	112	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0219 mg/L	0.02 mg/L	109	70.0	130	----
		Barium, dissolved	7440-39-3	E421	0.0215 mg/L	0.02 mg/L	107	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.0387 mg/L	0.04 mg/L	96.8	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.0105 mg/L	0.01 mg/L	105	70.0	130	----
		Boron, dissolved	7440-42-8	E421	0.098 mg/L	0.1 mg/L	98.6	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00430 mg/L	0.004 mg/L	108	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		Cesium, dissolved	7440-46-2	E421	0.0104 mg/L	0.01 mg/L	104	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.0423 mg/L	0.04 mg/L	106	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0215 mg/L	0.02 mg/L	108	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0213 mg/L	0.02 mg/L	106	70.0	130	----
		Iron, dissolved	7439-89-6	E421	2.12 mg/L	2 mg/L	106	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0218 mg/L	0.02 mg/L	109	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.104 mg/L	0.1 mg/L	104	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	0.0194 mg/L	0.02 mg/L	96.8	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	0.0207 mg/L	0.02 mg/L	104	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0426 mg/L	0.04 mg/L	106	70.0	130	----
		Phosphorus, dissolved	7723-14-0	E421	11.0 mg/L	10 mg/L	110	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	4.32 mg/L	4 mg/L	108	70.0	130	----
		Rubidium, dissolved	7440-17-7	E421	0.0192 mg/L	0.02 mg/L	96.1	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0448 mg/L	0.04 mg/L	112	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	10.0 mg/L	10 mg/L	100	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00416 mg/L	0.004 mg/L	104	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	1.91 mg/L	2 mg/L	95.7	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	0.0218 mg/L	0.02 mg/L	109	70.0	130	----
		Sulfur, dissolved	7704-34-9	E421	21.4 mg/L	20 mg/L	107	70.0	130	----
		Tellurium, dissolved	13494-80-9	E421	0.0425 mg/L	0.04 mg/L	106	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.00439 mg/L	0.004 mg/L	110	70.0	130	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report: Spike Concentration	Spike Target	Recovery (%) MS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Dissolved Metals (QCLot: 821629) - continued										
WP2300930-001	Anonymous	Thorium, dissolved	7440-29-1	E421	0.0219 mg/L	0.02 mg/L	109	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0214 mg/L	0.02 mg/L	107	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0429 mg/L	0.04 mg/L	107	70.0	130	----
		Tungsten, dissolved	7440-33-7	E421	0.0218 mg/L	0.02 mg/L	109	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.00380 mg/L	0.004 mg/L	95.1	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.108 mg/L	0.1 mg/L	108	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.429 mg/L	0.4 mg/L	107	70.0	130	----
		Zirconium, dissolved	7440-67-7	E421	0.0431 mg/L	0.04 mg/L	108	70.0	130	----
Dissolved Metals (QCLot: 825437)										
WP2301147-002	MW12	Mercury, dissolved	7439-97-6	E509	0.0000827 mg/L	0.0001 mg/L	82.7	70.0	130	----
Volatile Organic Compounds (QCLot: 825128)										
WP2301147-002	MW12	Benzene	71-43-2	E611A	114 µg/L	100 µg/L	114	60.0	140	----
		Ethylbenzene	100-41-4	E611A	94.4 µg/L	100 µg/L	94.4	60.0	140	----
		Toluene	108-88-3	E611A	81.4 µg/L	100 µg/L	81.4	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	215 µg/L	200 µg/L	108	60.0	140	----
		Xylene, o-	95-47-6	E611A	90.1 µg/L	100 µg/L	90.1	60.0	140	----
Hydrocarbons (QCLot: 825127)										
WP2301147-002	MW12	F1 (C6-C10)	----	E581.F1	5130 µg/L	5390 µg/L	95.2	60.0	140	----

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 17 - 878823

Page 1 of 1

Report To — Contact and company name below will appear on the final report

Company:	WSP CANADA INC
Contact:	ALFRED CHAN
Phone:	(204) 477-6650
Company address below will appear on the final report	
Street:	1600 BUFFALO PLACE
City/Province:	WINNIPEG, MB
Postal Code:	R3T 6B8

Invoice To

Same as Report To	☐ YES ☑ NO
Copy of Invoice with Report	☐ YES ☑ NO
Company:	WSP CANADA INC
Contact:	apwest@wsp.com

Project Information

ALS Account # / Quote #:	
Job #:	221-07203-00, phase 502.
PO / AFE:	
LSD:	
ALS Lab Work Order # (lab use only):	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ YES ☐ NO

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: alfred.chan@wsp.com

Email 2: jeremiah.kevin@wsp.com

Email 3:

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: apwest@wsp.com

Email 2: alfred.chan@wsp.com

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	
ALS Contact: Judy O.	Sampler: Jeremiah.K

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4-20%] ☐ 3 day [P3-25%] ☐ 2 day [P2-50%] ☐

EMERGENCY: 1 Business day [E - 100%] ☐ Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX, PHC F1-F4 (FP)	Dissolved metals (F)	Dissolved mercury	BTEX, F1	SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
	Duplicate-GW-2	01-FEB-23	13:49	GW	1		/				
	MW12.	01-FEB-23	13:47	GW	6	/	/	/			
	MW01	01-FEB-23	12:44	GW	5	/	/				
	Duplicate-GW-1	01-FEB-23	11:35	GW	4	/					
	MW03	01-FEB-23	11:33	GW	5	/	/				
	TRIP BLANK	16-JAN-23			2.				/		

Environmental Division
Winnipeg
Work Order Reference
WP2301147
Telephone : +1 204 255 9720

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C: 4.0

FINAL COOLER TEMPERATURES °C:

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Jeremiah Kevin	Date: Feb 1, 2023	Time: 15:00	Received by: JB	Date: FEB 01 2023	Time: 3:35	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

JUNE 2018 FRONT

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

1147

APPENDIX

G STANDARD CONDITION AND LIMITATIONS

STANDARD LIMITATIONS OF LIABILITY

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This limitations statement is considered an integral part of this report.

BH-11 2014/04/08

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.2-1.8	7.67	-	<1.0	4.2	100	0.59	0.15	31	8.9	21	8.0	<0.050	0.69	27	<0.50	<1.0	<0.30	<1.0	1.1	42	46
2.4-3.1	7.62	-	<1.0	9.2	200	1.2	0.28	40	14	34	13	0.050	1.6	42	1.7	<1.0	<0.30	<1.0	1.6	56	83

BH-14 2014/04/09

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.2-1.8	7.58	-	<1.0	4.2	160	0.64	0.24	29	6.4	30	69	0.061	0.86	20	<0.50	<1.0	<0.30	3.0	<1.0	31	97
2.4-3.1	7.65	-	<1.0	4.2	150	0.86	0.21	55	12	28	11	<0.050	1.0	39	<0.50	<1.0	0.30	<1.0	1.6	60	81
2.4-3.1 Dup	7.72	-	<1.0	3.3	140	0.73	0.22	42	11	24	10	<0.050	0.81	32	<0.50	<1.0	<0.30	<1.0	1.5	52	80

BH-15 2014/04/09

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
0.6-1.2	-	-	<1.0	6.3	190	0.83	0.25	36	11	30	35	<0.050	0.91	32	<0.50	<1.0	<0.30	1.7	1.3	52	76
0.6-2.1 Dup	-	-	<1.0	5.7	150	0.65	0.23	29	8.7	30	24	<0.050	0.79	27	<0.50	<1.0	<0.30	1.7	1.1	43	57
1.8-2.4	-	-	1.9	10	950	1.4	0.35	47	8.7	46	**310**	0.10	4.0	40	1.2	<1.0	<0.30	36	1.6	41	220
3.1-3.7	-	-	<1.0	6.5	270	0.94	0.27	37	9.4	27	25	<0.050	0.99	30	0.53	<1.0	<0.30	2.2	1.6	52	79

BH-16 2014/04/09

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
0.6-1.2	-	-	<1.0	5.3	240	0.69	0.32	29	9.1	26	29	0.054	0.88	27	<0.50	<1.0	<0.30	1.4	1.4	44	78
1.8-2.4	-	-	<1.0	4.2	76	<0.40	0.18	20	5.8	14	6	<0.050	0.45	18	<0.50	<1.0	<0.30	<1.0	<1.0	30	32

TP-26 2014/07/29

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.8	-	-	<1.0	7.6	250	1.1	0.26	51	15	42	47	<0.050	1.1	44	<0.50	<1.0	0.31	2.0	1.4	67	99
2.4	-	-	1.2	7.7	830	1.7	0.35	34	9.1	31	83	<0.050	2.4	28	1.0	<1.0	<0.30	3.4	2.1	56	98
3.1	-	-	<1.0	3.6	94	0.46	<0.10	26	6.4	14	5.7	<0.050	0.41	20	<0.50	<1.0	<0.30	<1.0	<1.0	32	34

TP-27 2014/07/29

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.8	-	-	9.4	4.1	170	<0.40	0.61	27	4.9	**210**	**700**	0.075	1.2	22	<0.50	<1.0	<0.30	18	<1.0	24	160
1.8 Dup	-	-	13	4.8	160	<0.40	0.60	20	4.7	**240**	**1200**	0.096	2.1	34	<0.50	<1.0	<0.30	20	<1.0	22	180
2.4	-	-	<1.0	4.4	180	0.85	0.36	34	8.7	28	44	<0.050	1.1	26	0.51	<1.0	<0.30	1.7	1.5	54	78
3.1	-	-	<1.0	3.2	120	0.48	0.14	27	6.9	17	8.5	<0.050	0.56	21	<0.50	<1.0	<0.30	<1.0	<1.0	34	34

TP-28 2014/07/29

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.8	-	-	<1.0	7.8	150	1.0	0.26	36	12	29	13	<0.050	1.2	36	0.66	<1.0	<0.30	1.1	1.4	53	75
2.4	-	-	1.3	9.1	190	1.0	0.38	39	13	38	53	0.054	1.6	40	1.1	<1.0	<0.30	2.1	1.9	57	100
3.1	-	-	<1.0	4.2	110	0.67	0.11	34	9.1	21	8.0	<0.050	0.40	28	<0.50	<1.0	<0.30	<1.0	<1.0	45	46

TP-29 2014/08/12

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.2	-	-	<1.0	4.7	130	0.55	0.25	52	7.7	25	50	0.057	1.2	35	<0.50	<1.0	<0.30	2.0	1.2	38	75
1.8	-	-	<1.0	3.8	130	0.49	0.22	31	6.8	17	17	<0.050	0.95	23	<0.50	<1.0	<0.30	1.1	1.0	38	56
2.4	-	-	1.1	5.8	630	1.2	0.53	31	7.3	55	73	0.071	2.3	25	0.82	<1.0	<0.30	4.6	1.6	37	160

TP-30 2014/08/12

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.2	-	-	<1.0	6.0	240	0.66	0.25	40	8.8	26	35	<0.050	1.1	31	<0.50	<1.0	<0.30	4.3	1.2	42	69
1.2 Dup	-	-	<1.0	7.0	150	0.65	0.25	36	9.4	28	33	<0.050	0.88	28	<0.50	<1.0	<0.30	2.6	1.2	41	78
1.8	-	-	7.0	**15**	1600	2.5	1.0	50	7.6	80	**700**	0.15	4.2	**54**	2.0	<1.0	<0.30	13	3.3	45	**600**
2.4	-	-	<1.0	3.8	86	<0.40	0.14	20	5.6	12	5.8	<0.050	0.90	18	<0.50	<1.0	<0.30	<1.0	1.1	31	31

TP-31 2014/08/12

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.2	-	-	<1.0	4.9	150	0.60	0.24	29	8.0	26	41	0.11	0.84	26	<0.50	<1.0	<0.30	2.4	1.3	35	66
1.8	-	-	<1.0	2.9	140	0.53	0.27	26	7.4	19	33	<0.050	0.43	22	0.57	<1.0	<0.30	<1.0	1.1	34	60
2.4	-	-	<1.0	3.0	86	<0.40	0.12	23	6.3	16	6.0	<0.050	<0.40	19	<0.50	<1.0	<0.30	<1.0	<1.0	28	33

TP-32 2014/08/12

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.2	-	-	2.2	8.0	170	0.89	0.32	44	12	**94**	100	<0.050	1.2	39	<0.50	<1.0	<0.30	26	1.5	53	94
1.8	-	-	<1.0	6.8	190	0.76	0.30	36	10	31	50	0.053	0.95	32	<0.50	<1.0	<0.30	3.3	1.6	49	85
2.4	-	-	<1.0	4.3	120	0.63	0.24	28	7.5	19	9.6	<0.050	0.65	22	<0.50	<1.0	<0.30	<1.0	1.8	49	57

TP-33 2014/08/12

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.2	-	-	3.7	5.4	130	0.57	0.23	25	8.1	**190**	63	0.058	0.87	25	<0.50	<1.0	<0.30	38	<1.0	33	250
1.8	-	-	<1.0	7.4	260	0.92	0.29	41	11	30	42	0.067	1.5	36	<0.50	<1.0	<0.30	1.6	1.4	49	89
1.8 Dup	-	-	<1.0	6.2	560	1.2	0.28	32	9.4	29	33	0.060	0.87	27	0.66	<1.0	<0.30	1.6	1.4	42	90
2.4	-	-	2.7	11	1500	2.8	0.81	43	9.1	65	**360**	0.096	3.2	40	1.2	<1.0	<0.30	11	3.1	46	250

TP-43 2014/10/16

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.2	-	-	<1.0	7.7	160	0.78	0.25	35	11	29	25	<0.050	1.3	32	<0.50	<1.0	<0.30	1.6	1.2	47	69
1.2 Dup	-	-	<1.0	5.2	140	0.57	0.23	28	8.0	22	23	<0.050	0.94	24	<0.50	<1.0	<0.30	1.4	<1.0	35	52
1.8	-	-	<1.0	2.2	43	<0.40	<0.10	14	3.4	8.4	5.0	<0.050	<0.40	11	<0.50	<1.0	<0.30	<1.0	<1.0	16	19
2.4	-	-	<1.0	5.2	130	0.40	0.19	17	6.2	17	8.4	<0.050	0.72	20	<0.50	<1.0	<0.30	<1.0	1.1	23	48
3.0	-	-	7.9	5.6	580	1.6	0.57	35	10	33	120	0.053	1.8	30	1.0	<1.0	<0.30	3.6	3.1	42	120
3.7	-	-	<1.0	2.7	51	<0.40	0.10	17	4.7	9.6	4.5	<0.050	<0.40	15	<0.50	<1.0	<0.30	<1.0	<1.0	24	20

TP-44 2014/10/16

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.2	-	-	<1.0	4.0	110	0.50	0.19	27	7.0	31	27	<0.050	0.42	22	<0.50	<1.0	<0.30	1.8	<1.0	37	51
1.8	-	-	<1.0	2.9	71	<0.40	0.13	18	5.0	13	5.7	<0.050	0.45	16	<0.50	<1.0	<0.30	<1.0	<1.0	22	30
2.4	-	-	8.6	**23**	320	3.6	1.3	41	9.4	**110**	**1100**	0.14	7.9	40	2.9	<1.0	<0.30	22	3.7	53	**760**
3.0	-	-	<1.0	8.4	230	0.86	0.24	34	10	25	21	<0.050	0.49	32	<0.50	<1.0	<0.30	<1.0	2.1	60	66

TP-45 2014/10/16

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.2	-	-	<1.0	4.5	94	0.49	0.13	23	6.4	15	9.1	<0.050	<0.40	20	<0.50	<1.0	<0.30	<1.0	1.1	35	36
1.2 Dup	-	-	<1.0	3.8	80	<0.40	0.12	28	5.8	14	7.5	<0.050	0.44	21	<0.50	<1.0	<0.30	<1.0	<1.0	28	30
1.8	-	-	<1.0	4.6	110	0.50	0.16	25	7.7	26	13	<0.050	0.61	24	<0.50	<1.0	<0.30	1.3	<1.0	34	50
2.4	-	-	<1.0	5.4	210	0.72	0.26	32	9.8	69	42	0.063	0.68	30	<0.50	<1.0	<0.30	4.8	1.6	40	96
3.0	-	-	<1.0	4.2	130	0.73	0.24	34	9.7	21	13	0.063	1.1	29	<0.50	<1.0	<0.30	<1.0	<1.0	44	68

TP-46 2014/10/16

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.2	-	-	<1.0	5.4	160	0.66	0.28	33	8.5	28	58	0.10	0.89	33	<0.50	<1.0	<0.30	2.4	1.3	38	70
1.8	-	-	<1.0	4.9	140	0.53	0.24	29	8.6	35	35	<0.050	1.1	27	<0.50	<1.0	<0.30	1.8	1.0	34	64
2.4	-	-	<1.0	8.1	120	0.86	0.28	32	13	31	13	<0.050	1.5	38	0.74	<1.0	<0.30	<1.0	1.6	44	82
3.0	-	-	<1.0	3.4	77	<0.40	0.13	15	3.9	9.8	5.2	<0.050	<0.40	13	<0.50	<1.0	<0.30	<1.0	<1.0	26	20

TP-47 2014/10/15

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.2	-	-	<1.0	3.6	99	<0.40	0.18	21	5.6	44	44	<0.050	0.60	18	<0.50	<1.0	<0.30	3.3	<1.0	27	51
1.8	-	-	4.0	6.3	450	0.82	0.53	26	6.8	**210**	250	0.16	1.4	24	0.82	<1.0	<0.30	13	1.7	35	**620**
2.4	-	-	3.6	**20**	1800	4.2	0.43	21	8.6	61	260	<0.050	4.2	26	1.4	<1.0	<0.30	6.5	3.6	63	190
2.4 Dup	-	-	4.9	**20**	1500	4.5	0.52	26	9.7	**130**	**280**	0.057	3.4	33	1.5	<1.0	<0.30	11	4.1	68	200
3.0	-	-	<1.0	2.9	62	<0.40	0.13	18	4.6	9.9	4.4	<0.050	<0.40	15	<0.50	<1.0	<0.30	<1.0	<1.0	24	21

TP-48 2014/10/16

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.2	-	-	<1.0	3.1	86	0.41	0.15	19	5.6	91	25	<0.050	0.44	17	<0.50	<1.0	<0.30	1.5	1.1	24	48
1.8	-	-	<1.0	4.3	110	0.48	0.18	24	6.8	22	24	<0.050	0.45	21	<0.50	<1.0	<0.30	2.0	<1.0	31	47
2.4	-	-	<1.0	2.8	74	<0.40	0.15	18	4.2	12	4.9	<0.050	0.42	13	<0.50	<1.0	<0.30	<1.0	1.1	24	24
3.0	-	-	<1.0	3.2	50	<0.40	0.14	17	4.4	11	4.7	<0.050	<0.40	14	<0.50	<1.0	<0.30	<1.0	<1.0	22	24

TP-49 2014/10/16

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.2	-	-	<1.0	6.5	140	0.65	0.22	32	9.7	25	15	<0.050	0.67	29	<0.50	<1.0	<0.30	1.5	1.3	45	57
1.8	-	-	<1.0	5.2	170	0.61	0.25	31	8.8	42	32	<0.050	0.76	28	<0.50	<1.0	<0.30	1.3	1.6	37	60
2.4	-	-	<1.0	2.9	110	<0.40	0.11	17	4.2	11	23	<0.050	0.45	13	<0.50	<1.0	<0.30	<1.0	1.1	20	39
3.0	-	-	<1.0	8.2	270	1.1	0.24	51	16	37	14	0.061	0.92	47	<0.50	<1.0	0.33	1.3	1.6	73	86
4.3	-	-	1.0	8.3	320	0.94	0.25	40	13	34	49	<0.050	1.5	43	<0.50	<1.0	<0.30	2.0	1.3	50	89
4.3 Dup	-	-	<1.0	4.9	250	0.64	0.25	25	7.2	19	27	<0.050	0.79	22	<0.50	<1.0	<0.30	1.1	2.0	35	53

TP-50 2014/10/15

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.2	-	-	<1.0	5.3	160	0.70	0.26	31	9.2	28	47	0.072	0.71	28	<0.50	<1.0	<0.30	2.0	1.3	45	68
1.8	-	-	<1.0	3.8	120	0.55	0.20	21	6.8	21	17	<0.050	0.72	21	<0.50	<1.0	<0.30	1.6	1.6	30	50
2.4	-	-	<1.0	6.2	250	0.62	0.54	34	8.0	26	49	0.059	1.3	28	0.72	<1.0	<0.30	1.4	1.4	31	76
3.0	-	-	<1.0	3.3	62	<0.40	0.13	18	5.7	13	5.7	<0.050	0.63	17	<0.50	<1.0	<0.30	<1.0	1.2	24	26

TP-51 2014/10/15

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.2	-	-	2.0	3.9	110	0.43	0.23	22	6.0	74	59	0.063	0.56	19	<0.50	<1.0	<0.30	7.2	<1.0	29	58
1.8	-	-	7.3	6.0	290	0.62	0.37	22	5.8	**250**	210	0.13	1.1	22	<0.50	<1.0	<0.30	26	1.1	25	180
2.4	-	-	<1.0	3.8	330	0.65	0.30	17	4.8	23	80	<0.050	0.76	15	<0.50	<1.0	<0.30	2.9	<1.0	24	87
3.0	-	-	2.2	**17**	1700	5.0	0.55	42	10	75	**280**	0.054	4.1	38	1.5	<1.0	<0.30	8.9	3.6	51	**410**
3.7	-	-	<1.0	7.6	220	1.1	0.23	54	16	37	15	0.055	0.82	48	<0.50	<1.0	0.38	1.3	1.6	75	85
3.7 Dup	-	-	<1.0	7.6	270	1.1	0.23	50	15	35	13	0.051	0.86	46	<0.50	<1.0	0.35	1.2	1.6	71	83

TP-52 2014/10/15

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.2	-	-	1.4	3.8	140	0.45	0.18	26	7.6	73	44	<0.050	0.58	23	<0.50	<1.0	<0.30	3.7	1.1	31	59
1.8	-	-	4.8	6.2	290	0.49	0.44	35	11	**190**	240	0.26	3.6	**58**	0.51	<1.0	<0.30	18	1.6	25	220
2.4	-	-	<1.0	1.1	69	<0.40	0.22	12	3.4	<5.0	3.6	<0.050	<0.40	11	<0.50	<1.0	<0.30	<1.0	1.4	14	14
3.0	-	-	5.0	11	210	0.85	0.62	49	11	**190**	**410**	0.057	1.4	37	0.54	<1.0	<0.30	18	1.4	45	160
3.7	-	-	<1.0	6.9	260	1.0	0.17	58	18	44	13	0.054	0.73	**53**	<0.50	<1.0	0.40	1.7	1.5	72	96

TP-53 2014/12/11

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.8	-	-	1.3	4.0	100	<0.40	0.18	69	4.4	35	55	0.093	<0.40	12	<0.50	<1.0	<0.30	4.6	<1.0	20	51
2.4	-	-	<1.0	7.5	120	0.57	0.19	33	11	17	9.0	<0.050	0.49	29	<0.50	<1.0	<0.30	<1.0	1.2	50	47
3.0	-	-	<1.0	6.3	190	0.86	0.21	44	14	31	12	0.088	0.83	42	<0.50	<1.0	0.31	<1.0	1.3	54	74
3.0 Dup	-	-	<1.0	6.5	190	0.84	0.22	44	14	32	12	<0.050	0.79	43	<0.50	<1.0	0.34	1.1	1.4	57	75
3.7	-	-	<1.0	8.2	220	0.98	0.23	45	16	35	14	<0.050	1.2	45	<0.50	<1.0	0.34	1.1	1.4	59	83

TP-54 2014/12/11

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.2	-	-	1.4	4.7	320	0.93	0.33	30	9.0	30	89	<0.050	1.3	25	0.74	<1.0	<0.30	4.5	1.5	37	87
1.8	-	-	<1.0	4.0	180	0.51	0.24	32	9.0	19	9.0	<0.050	<0.40	27	<0.50	<1.0	<0.30	<1.0	<1.0	41	44
1.8 Dup	-	-	<1.0	4.2	190	0.53	0.32	32	9.8	19	9.9	<0.050	<0.40	28	<0.50	<1.0	<0.30	<1.0	1.0	41	48

TP-55 2014/12/11

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.8	-	-	<1.0	3.7	280	0.54	0.34	23	5.9	17	110	<0.050	0.60	18	0.64	<1.0	<0.30	1.3	2.1	39	170
2.4	-	-	<1.0	3.0	80	<0.40	0.14	20	5.5	15	85	<0.050	0.57	17	<0.50	<1.0	<0.30	<1.0	<1.0	26	32

TP-56 2014/12/11

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.2	-	-	<1.0	5.1	120	0.62	0.29	21	7.6	19	11	<0.050	0.62	22	<0.50	<1.0	<0.30	<1.0	1.0	29	46
1.8	-	-	1.1	3.9	160	0.46	0.32	22	5.7	23	82	0.10	0.62	19	<0.50	<1.0	<0.30	3.5	<1.0	26	92
2.4	-	-	1.3	6.9	840	1.7	0.52	22	7.2	35	100	0.082	2.0	22	0.84	<1.0	<0.30	4.7	1.8	33	170
3.0	-	-	<1.0	2.7	40	<0.40	<0.10	6.4	2.4	<5.0	2.5	<0.050	<0.40	7.7	<0.50	<1.0	<0.30	<1.0	<1.0	10	16

TP-57 2014/12/12

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.8	-	-	1.7	3.2	140	<0.40	0.23	16	4.7	80	83	<0.050	0.53	16	<0.50	<1.0	<0.30	9.5	<1.0	21	80
2.4	-	-	1.1	5.6	200	0.60	0.42	27	7.5	36	71	0.059	0.78	22	<0.50	<1.0	<0.30	3.9	<1.0	31	88
3.0	-	-	<1.0	5.4	200	0.72	0.22	40	12	30	22	<0.050	0.58	37	<0.50	<1.0	<0.30	1.2	1.8	48	71
3.7	-	-	<1.0	6.2	200	0.90	0.23	45	14	31	12	<0.050	0.51	42	<0.50	<1.0	0.32	1.1	1.6	60	74
3.7 Dup	-	-	<1.0	6.3	210	0.94	0.22	46	15	33	12	<0.050	0.54	43	<0.50	<1.0	0.33	1.1	1.5	60	78

TP-58 2014/12/12

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.8	-	-	<1.0	8.8	150	0.48	0.18	20	6.4	26	26	<0.050	0.60	19	<0.50	<1.0	<0.30	5.8	<1.0	28	53
3.0	-	-	<1.0	3.2	51	<0.40	<0.10	21	5.2	13	6.2	<0.050	0.65	16	<0.50	<1.0	<0.30	<1.0	<1.0	28	26
3.7	-	-	<1.0	6.9	310	1.1	0.23	52	16	35	13	<0.050	0.69	47	<0.50	<1.0	0.35	1.2	1.5	74	77
4.3	-	-	<1.0	7.7	220	0.97	0.32	39	12	32	13	<0.050	1.5	36	<0.50	<1.0	<0.30	1.0	1.2	57	78
4.3 Dup	-	-	<1.0	8.9	260	1.1	0.28	43	15	35	15	<0.050	1.6	47	<0.50	<1.0	0.32	1.1	1.2	63	84

TP-59 2014/12/12

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.8	-	-	<1.0	6.5	160	0.83	0.39	36	12	25	20	<0.050	0.91	34	<0.50	<1.0	<0.30	1.0	1.4	53	70
3.0	-	-	<1.0	2.5	33	<0.40	<0.10	17	4.8	12	4.6	<0.050	<0.40	14	<0.50	<1.0	<0.30	<1.0	<1.0	21	21
3.0 Dup	-	-	<1.0	1.7	16	<0.40	<0.10	10	2.8	6.0	2.9	<0.050	<0.40	8.2	<0.50	<1.0	<0.30	<1.0	<1.0	13	10
3.7	-	-	<1.0	3.7	43	0.46	<0.10	23	6.4	15	6.5	<0.050	<0.40	19	<0.50	<1.0	<0.30	<1.0	<1.0	29	32
4.3	-	-	<1.0	6.9	210	1.0	0.25	44	15	32	14	<0.050	1.0	44	<0.50	<1.0	0.30	1.1	1.3	60	79

TP-60 2014/12/12

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.8	-	-	<1.0	3.7	84	0.41	0.16	23	5.8	23	18	<0.050	0.64	20	<0.50	<1.0	<0.30	1.3	<1.0	25	42
3.0	-	-	<1.0	2.4	27	<0.40	0.34	12	4.1	7.2	5.1	<0.050	<0.40	11	<0.50	<1.0	<0.30	<1.0	<1.0	17	14
3.7	-	-	<1.0	6.0	270	1.0	0.14	61	18	42	14	<0.050	0.56	**56**	<0.50	<1.0	0.45	1.3	1.2	71	96
4.3	-	-	<1.0	4.2	140	0.59	0.14	31	9.7	21	8.3	<0.050	<0.40	28	<0.50	<1.0	<0.30	<1.0	1.2	37	45

TP-61 2014/12/12

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.8	-	-	<1.0	4.7	140	0.53	0.28	24	6.8	30	58	0.061	0.70	22	<0.50	<1.0	<0.30	2.3	<1.0	32	98
3.0	-	-	<1.0	2.5	44	<0.40	<0.10	15	4.0	9.3	5.2	<0.050	<0.40	12	<0.50	<1.0	<0.30	<1.0	<1.0	20	19
3.7	-	-	<1.0	9.2	220	1.2	0.30	48	18	38	16	<0.050	1.5	**57**	<0.50	<1.0	0.34	1.2	1.4	67	91
4.3	-	-	<1.0	9.0	210	1.1	0.43	39	15	35	15	<0.050	1.7	**54**	0.64	<1.0	0.30	1.1	1.6	59	87

TP-62 2014/12/12

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.8	-	-	<1.0	4.9	280	0.77	0.31	22	7.1	39	63	<0.050	0.96	22	<0.50	<1.0	<0.30	4.0	1.1	31	91
3.0	-	-	<1.0	2.5	140	<0.40	0.12	12	3.6	9.3	24	<0.050	<0.40	10	<0.50	<1.0	<0.30	<1.0	<1.0	17	23
3.7	-	-	<1.0	3.8	72	<0.40	0.15	15	5.3	11	5.6	<0.050	<0.40	16	<0.50	<1.0	<0.30	<1.0	<1.0	22	25
4.3	-	-	<1.0	9.0	270	1.2	0.20	47	16	37	15	<0.050	1.2	46	<0.50	<1.0	0.33	1.3	1.3	66	89

TP-63 2014/12/12

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
4.3	-	-	<1.0	5.9	300	1.1	0.15	59	19	41	15	<0.050	0.59	**57**	<0.50	<1.0	0.42	1.3	1.4	71	92
4.9	-	-	1.2	7.0	250	0.82	0.26	31	10	58	60	<0.050	1.3	33	<0.50	<1.0	<0.30	5.6	1.4	44	89

TP-65 2014/12/15

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.8	-	-	6.3	5.4	530	0.87	0.38	22	6.6	**200**	250	0.056	1.0	23	0.51	<1.0	<0.30	47	1.6	31	190
3.0	-	-	<1.0	3.1	200	0.79	0.26	30	7.7	19	18	<0.050	0.66	24	<0.50	<1.0	<0.30	<1.0	2.3	34	64
3.7	-	-	<1.0	3.3	80	<0.40	0.11	16	5.1	11	6	<0.050	<0.40	15	<0.50	<1.0	<0.30	<1.0	<1.0	23	21
4.3	-	-	<1.0	8.4	210	1.1	0.19	47	17	36	17	<0.050	1.3	50	<0.50	<1.0	0.36	1.2	1.4	56	91

TP-66 2014/12/15

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.8	-	-	2.1	12	500	1.4	0.47	58	15	72	110	0.072	2.6	49	0.81	<1.0	0.36	8.1	2.6	67	210
2.4	-	-	4.7	7.9	550	0.66	3.8	54	7.8	52	**300**	0.057	1.5	34	<0.50	<1.0	<0.30	7.4	2.3	37	110
3.0	-	-	<1.0	7.3	280	1.3	0.17	52	14	33	31	0.050	0.87	42	<0.50	<1.0	0.37	2.3	2.3	70	110
3.7	-	-	<1.0	2.3	77	<0.40	0.10	20	5.9	13	5.5	<0.050	<0.40	18	<0.50	<1.0	<0.30	<1.0	<1.0	26	26
4.3	-	-	<1.0	5.2	240	0.98	0.14	49	15	35	13	<0.050	0.74	**51**	<0.50	<1.0	0.37	1.2	1.1	61	81

TP-67 2014/12/15

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.8	-	-	<1.0	4.9	140	0.68	0.21	29	8.5	22	15	<0.050	0.67	26	<0.50	<1.0	<0.30	1.0	1.1	43	58
1.8 Dup	-	-	<1.0	4.0	130	0.51	0.21	22	6.3	18	40	<0.050	0.54	20	<0.50	<1.0	<0.30	1.0	1.1	32	60
2.4	-	-	<1.0	8.9	270	1.0	0.34	34	11	32	81	<0.050	1.6	37	0.59	<1.0	<0.30	1.6	1.7	46	130
3.0	-	-	1.8	**14**	990	3.6	0.51	43	12	55	96	<0.050	3.0	40	1.2	<1.0	<0.30	5.8	3.6	58	220
3.7	-	-	<1.0	2.9	82	<0.40	<0.10	14	3.5	8.6	5.8	<0.050	<0.40	11	<0.50	<1.0	<0.30	<1.0	<1.0	19	20

TP-68 2014/12/15

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.8	-	-	<1.0	5.0	180	0.62	0.21	22	7.0	37	28	0.064	0.62	21	<0.50	<1.0	<0.30	1.5	1.0	30	51
2.4	-	-	<1.0	5.1	270	0.80	0.25	34	8.1	31	52	0.076	1.0	27	<0.50	<1.0	<0.30	4.1	1.3	38	85
3.0	-	-	<1.0	5.7	210	0.80	0.39	33	8.7	23	22	<0.050	0.82	25	0.52	<1.0	<0.30	1.3	1.8	55	78
3.0 Dup	-	-	<1.0	6.8	300	0.90	0.36	32	8.8	27	120	<0.050	1.5	26	0.65	<1.0	<0.30	1.7	1.8	50	150
3.7	-	-	<1.0	2.3	38	<0.40	<0.10	11	3.1	7.1	3.3	<0.050	<0.40	8.9	<0.50	<1.0	<0.30	<1.0	<1.0	15	15

TP-69 2014/12/15

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.8	-	-	1.0	4.5	200	0.46	0.29	23	5.4	23	88	0.063	0.70	18	<0.50	<1.0	<0.30	4.1	1.1	23	93
2.4	-	-	5.2	**16**	800	1.3	1.8	21	5.7	64	**620**	0.31	2.3	19	**4.9**	<1.0	<0.30	26	1.5	28	**730**
3.0	-	-	<1.0	5.9	160	0.63	0.19	33	9.1	19	16	<0.050	1.5	29	<0.50	<1.0	<0.30	<1.0	1.2	45	54
3.7	-	-	<1.0	2.2	47	<0.40	<0.10	14	3.8	8.8	5.1	<0.050	0.45	11	<0.50	<1.0	<0.30	<1.0	<1.0	17	20

TP-70 2014/12/15

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.8	-	-	<1.0	3.5	87	0.42	0.15	21	6.2	16	12	<0.050	<0.40	18	<0.50	<1.0	<0.30	<1.0	<1.0	28	40
2.4	-	-	<1.0	9.8	160	0.83	0.26	34	12	43	27	0.054	1.3	36	<0.50	<1.0	<0.30	1.4	1.6	43	77
3.0	-	-	6.5	**17**	320	4.3	1.4	22	6.7	66	**1700**	0.082	6.8	25	2.6	<1.0	<0.30	8.9	4.3	48	**1100**
3.7	-	-	<1.0	2.9	140	0.54	0.13	22	6.2	14	40	<0.050	<0.40	17	<0.50	<1.0	<0.30	1.1	1.0	25	62

TP-71 2014/12/15

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.2	-	-	2.0	5.0	120	0.59	0.30	24	7.4	23	170	0.081	0.71	23	<0.50	<1.0	<0.30	1.9	1.3	35	72
1.8	-	-	<1.0	4.9	140	0.68	0.20	29	8.5	21	19	<0.050	0.51	25	<0.50	<1.0	<0.30	1.0	<1.0	40	58
2.4	-	-	6.1	12	1000	2.1	1.5	24	6.1	72	**740**	0.053	6.5	24	1.9	<1.0	<0.30	17	2.6	35	**450**
3.0	-	-	3.2	**16**	850	3.5	1.5	27	9.8	76	**280**	0.11	5.0	30	1.8	<1.0	<0.30	28	2.9	48	**530**
3.7	-	-	<1.0	6.8	210	0.95	0.21	41	13	30	21	<0.050	0.57	38	<0.50	<1.0	<0.30	1.5	1.4	58	75

TP-72 2014/12/15

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
1.8	-	-	<1.0	2.0	50	<0.40	<0.10	12	3.1	7.9	14.0	<0.050	<0.40	9.6	<0.50	<1.0	<0.30	<1.0	<1.0	16	27
2.4	-	-	9.2	**34**	140	3.7	3.4	76	13	**170**	**5700**	0.18	11	38	**3.8**	<1.0	0.42	21	3.0	64	**2100**
2.4 Dup	-	-	7.0	**32**	130	3.6	3.2	57	12	85	**4500**	0.15	13	34	**4.1**	<1.0	0.44	15	3.0	66	**2100**
3.0	-	-	<1.0	2.9	140	<0.40	0.11	14	3.9	8.1	29	<0.050	<0.40	12	<0.50	<1.0	<0.30	<1.0	1.8	22	33
3.7	-	-	<1.0	5.8	230	0.88	0.19	41	13	28	12	<0.050	0.41	38	<0.50	<1.0	<0.30	1.0	1.3	58	64

BH-19 2016/04/26

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
0.0-0.6	7.48	15000	2.0	5.5	170	0.65	0.17	40	12	**110**	71	<0.050	0.66	34	<0.50	<0.20	0.23	11	1.0	50	92
0.6-1.2	7.52	15000	7.5	8.8	180	0.73	0.31	41	13	**370**	170	<0.050	1.2	41	<0.50	0.25	0.25	32	1.3	55	180
2.4-3.0	7.58	10000	1.3	4.6	150	0.47	0.28	24	7.6	29	59	0.056	0.64	22	<0.50	<0.20	0.17	3.0	1.1	34	81
3.0-3.7	7.71	3800	<0.50	1.7	34	<0.40	0.073	12	3.2	7.1	3.3	<0.050	<0.40	11	<0.50	<0.20	<0.10	<1.0	0.51	16	15
3.7-4.3	7.70	20000	<0.50	8.2	280	0.91	0.19	55	17	39	14	<0.050	1.2	49	<0.50	<0.20	0.35	1.2	1.4	70	98
4.3-5.0	7.50	16000	<0.50	8.3	220	0.85	0.36	41	13	35	13	<0.050	1.3	41	<0.50	<0.20	0.28	<1.0	1.6	56	88

BH-20 2016/04/26

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
0.0-0.6	7.52	14000	<0.50	6.3	200	0.68	0.31	35	11	29	20	<0.050	0.88	31	<0.50	<0.20	0.22	1.1	1.4	51	70
0.0-0.6 Dup	7.51	15000	<0.50	6.0	160	0.79	0.32	36	10	27	21	0.071	0.77	31	<0.50	<0.20	0.22	<1.0	1.2	52	72
0.6-1.2	7.49	16000	<0.50	7.4	190	0.94	0.28	38	12	28	15	0.080	0.91	35	<0.50	<0.20	0.24	<1.0	1.8	57	76
1.2-1.8	7.56	16000	0.52	9.8	210	0.85	0.34	42	15	37	15	0.078	1.5	44	0.51	<0.20	0.26	1.1	1.7	56	90
1.8-2.4	7.62	16000	3.6	**15**	680	2.0	0.62	30	8.4	69	270	0.20	5.4	27	1.6	0.25	0.21	38	2.7	41	240
2.4-3.0	**8.69**	19000	1.1	8.1	930	1.9	0.33	43	11	41	68	0.17	2.3	33	0.84	<0.20	0.20	5.3	3.7	50	100
3.0-3.7	7.76	19000	<0.50	6.3	240	0.66	0.16	55	16	37	12	0.056	0.52	47	<0.50	<0.20	0.34	1.1	1.4	64	85
3.7-4.3	7.54	18000	<0.50	9.5	250	0.91	0.23	52	18	37	13	<0.050	1.3	49	<0.50	<0.20	0.32	1.1	1.3	72	92
4.3-5.0	**8.36**	16000	0.52	10	230	0.92	0.25	43	14	42	14	<0.050	1.9	44	<0.50	<0.20	0.27	1.1	1.7	60	96

BH-21 2016/04/26

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
0.0-0.6	7.71	12000	0.57	4.9	110	0.64	0.17	57	7.6	20	19	<0.050	1.1	36	<0.50	<0.20	0.18	1.1	0.95	39	50
0.6-1.2	7.56	15000	0.62	6.3	150	0.80	0.27	33	9.4	29	33	<0.050	0.46	28	<0.50	<0.20	0.22	1.9	1.4	47	71
1.2-1.8	7.53	16000	0.53	9.1	230	0.81	0.33	39	14	35	14	<0.050	1.4	41	0.73	<0.20	0.26	1.1	1.7	59	89
1.8-2.4	7.72	16000	1.6	8.2	830	1.7	0.36	34	8.1	36	96	0.10	2.3	26	1.0	0.22	0.17	3.2	3.1	42	130
2.4-3.0	7.89	9500	<0.50	4.1	300	0.59	0.17	20	5.4	12	16	<0.050	0.65	15	<0.50	<0.20	0.12	<1.0	2.0	30	38
3.0-3.7	7.71	17000	<0.50	9.2	270	0.84	0.22	48	16	37	13	<0.050	1.4	45	<0.50	<0.20	0.30	1.0	1.3	65	89
3.0-3.7 Dup	7.64	18000	<0.50	8.5	270	0.85	0.21	50	16	36	13	<0.050	1.2	46	<0.50	<0.20	0.30	1.1	1.3	68	88
3.7-4.3	7.41	15000	<0.50	8.9	200	0.78	0.25	39	15	34	13	<0.050	1.7	41	<0.50	<0.20	0.26	<1.0	1.2	57	84
4.3-5.0	**8.19**	14000	<0.50	7.7	390	0.77	0.40	34	13	33	13	<0.050	1.2	38	<0.50	<0.20	0.22	<1.0	1.8	47	80

BH-22 2016/04/26

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
0.0-0.6	7.38	16000	<0.50	6.5	170	0.90	0.24	38	11	27	18	<0.050	0.88	32	<0.50	<0.20	0.23	1.1	1.3	55	72
0.6-1.2	7.53	14000	1.3	6.5	180	0.83	0.27	40	11	34	31	<0.050	1.3	33	<0.50	<0.20	0.22	2.1	1.4	48	80
0.6-1.2 Dup	7.55	15000	1.0	6.7	190	0.85	0.29	37	11	35	38	<0.050	0.99	33	<0.50	<0.20	0.23	2.2	1.6	50	87
1.2-1.8	7.44	17000	0.59	9.4	230	1.2	0.38	42	15	38	15	<0.050	1.5	45	1.0	<0.20	0.27	1.1	3.0	61	97
1.8-2.4	7.91	21000	7.0	**13**	1000	2.3	2.1	48	11	**560**	**1100**	0.24	6.0	38	1.1	0.34	0.21	19	2.5	54	**1100**
2.4-3.0	**8.09**	16000	0.73	4.8	370	0.99	0.29	36	8.8	25	61	0.11	1.3	27	0.63	<0.20	0.21	1.8	2.4	41	140
3.0-3.7	7.78	6700	<0.50	3.1	85	<0.40	0.15	20	5.3	13	7.9	<0.050	<0.40	16	<0.50	<0.20	0.12	<1.0	0.88	26	29
3.7-4.3	7.63	21000	<0.50	9.6	270	1.3	0.24	59	19	42	16	<0.050	1.3	54	<0.50	<0.20	0.34	1.3	1.6	76	100
4.3-5.0	**8.19**	17000	0.58	8.4	230	1.2	0.40	46	15	42	15	<0.050	1.4	48	0.62	<0.20	0.31	1.1	3.1	64	100

BH-23 2016/04/27

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
0.0-0.6	7.52	11000	<0.50	5.5	140	0.53	0.23	32	9.4	23	18	<0.050	0.80	29	<0.50	<0.20	0.19	<1.0	1.2	41	57
0.6-1.2	7.58	9400	<0.50	5.7	130	0.51	0.23	31	9.1	25	18	<0.050	0.97	28	<0.50	<0.20	0.17	1.2	1.4	36	58
1.2-1.8	7.53	12000	<0.50	8.3	170	0.75	0.34	30	12	32	12	<0.050	1.3	35	0.53	<0.20	0.22	<1.0	1.5	45	75
1.2-1.8 Dup	7.42	12000	<0.50	8.5	200	0.71	0.38	32	13	34	13	<0.050	1.4	37	0.62	<0.20	0.22	<1.0	1.5	47	78
1.8-2.4	**8.08**	13000	0.90	5.8	260	0.72	0.42	41	9.0	34	50	<0.050	1.2	30	<0.50	<0.20	0.19	2.6	1.3	39	160
2.4-3.0	7.62	21000	4.5	**13**	1200	1.9	1.1	36	9.6	56	**320**	<0.050	3.0	30	1.4	0.30	0.21	11	2.9	48	320
3.0-3.7	7.60	3800	<0.50	2.2	41	<0.40	0.070	12	3.3	8.0	4.4	<0.050	<0.40	9.6	<0.50	<0.20	<0.10	<1.0	0.54	15	17
3.7-4.3	7.52	13000	<0.50	7.4	170	0.75	0.22	35	13	30	12	<0.050	1.4	36	<0.50	<0.20	0.24	1.4	1.4	47	73
4.3-5.0	7.51	15000	<0.50	9.4	230	0.84	0.25	43	14	37	15	<0.050	1.4	43	<0.50	<0.20	0.29	1.0	1.8	58	94

BH-24 2016/04/27

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
0.0-0.6	7.50	11000	<0.50	5.9	200	0.72	0.26	32	9.7	24	14	<0.050	0.93	30	<0.50	<0.20	0.19	<1.0	1.4	39	64
0.6-1.2	7.56	11000	<0.50	6.0	140	0.71	0.17	30	9.0	23	15	<0.050	0.57	28	<0.50	<0.20	0.20	<1.0	1.3	39	68
1.2-1.8	7.55	13000	0.61	8.0	250	0.98	0.34	33	14	39	26	<0.050	1.3	38	0.65	<0.20	0.22	1.7	2.3	45	87
1.8-2.4	7.87	11000	1.1	5.8	360	0.73	0.31	30	9.3	28	43	0.064	0.91	29	<0.50	<0.20	0.18	6.2	1.5	37	81
2.4-3.0	7.67	15000	0.70	6.7	190	0.82	0.34	31	8.9	25	140	<0.050	1.6	27	<0.50	<0.20	0.22	1.4	1.4	52	99
2.4-3.0 Dup	7.60	13000	0.73	6.9	180	0.79	0.34	30	8.8	27	120	<0.050	1.5	26	<0.50	<0.20	0.21	1.3	1.4	51	89
3.0-3.7	7.80	5400	<0.50	2.3	68	<0.40	0.090	17	4.4	11	7.4	<0.050	0.50	13	<0.50	<0.20	<0.10	<1.0	0.65	20	23
3.7-4.3	7.65	17000	<0.50	7.3	260	1.2	0.18	46	16	36	12	<0.050	1.2	46	<0.50	<0.20	0.30	1.0	1.4	58	89
4.3-5.0	7.50	14000	<0.50	8.3	330	1.2	0.27	39	13	33	12	<0.050	1.6	44	<0.50	<0.20	0.25	<1.0	1.5	49	84

BH-25 2016/04/26

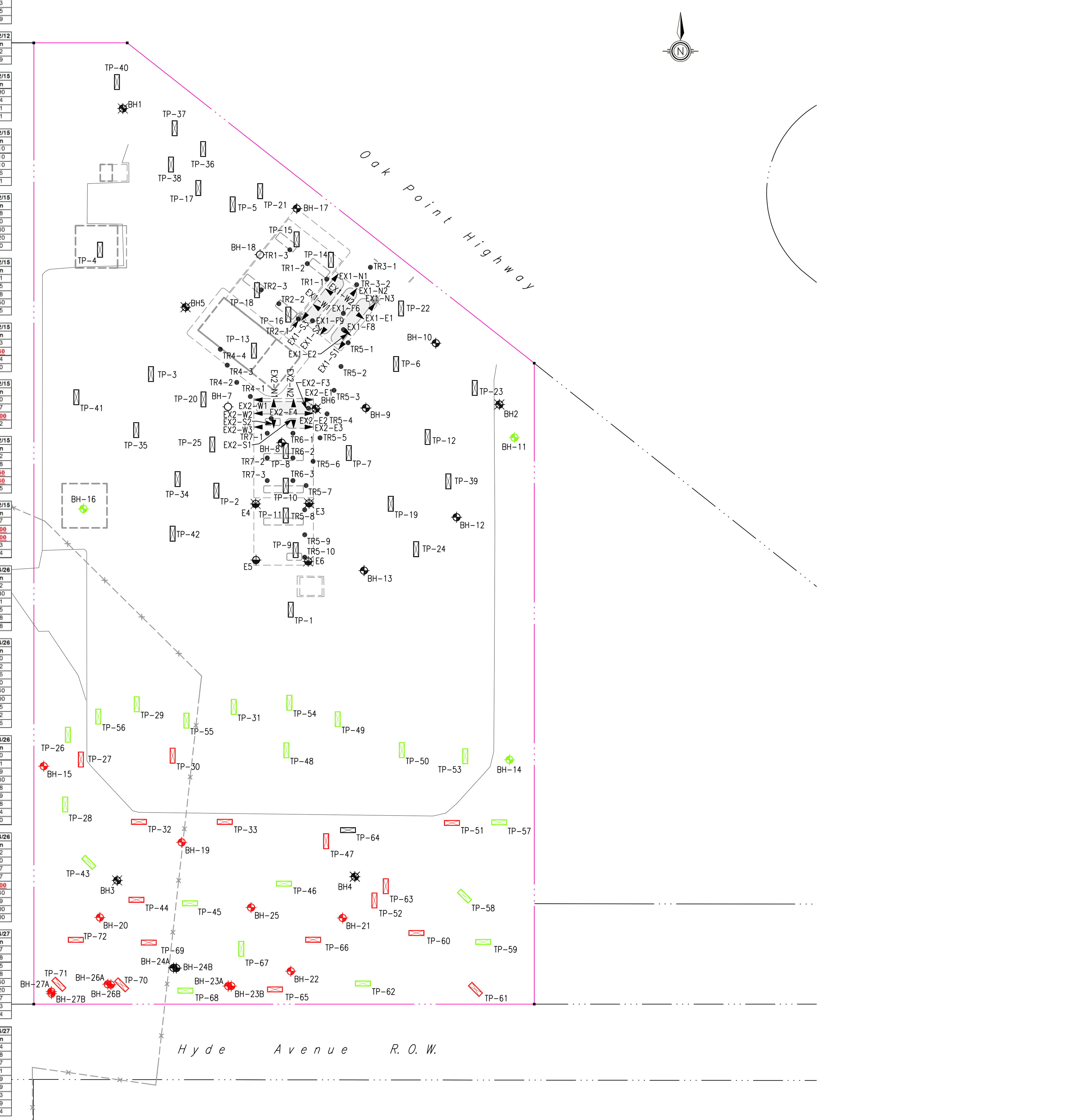
Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
0.0-0.6	7.44	12000	<0.50	5.7	130	0.64	0.21	33	9.8	23	14	<0.050	0.89	29	<0.50	<0.20	0.20	<1.0	1.3	42	60
0.6-1.2	7.63	13000	<0.50	6.4	140	0.64	0.18	33	10	24	18	<0.050	0.48	29	<0.50	<0.20	0.22	1.1	1.0	44	57
1.2-1.8	7.52	13000	0.93	6.8	170	0.91	0.25	34	11	27	12	<0.050	1.1	33	<0.50	<0.20	0.21	2.1	1.6	44	69
1.8-2.4	7.55	17000	<0.50	9.3	260	0.95	0.28	51	19	42	14	<0.050	1.4	50	<0.50	<0.20	0.32	1.1	1.8	64	100
2.4-3.0	7.47	24000	1.9	**14**	840	4.4	0.65	43	12	44	130	0.060	3.7	36	1.3	0.31	0.18	4.0	5.0	52	150
3.0-3.7	7.71	18000	<0.50	7.5	310	1.2	0.26	53	18	40	13	<0.050	1.0	56	<0.50	<0.20	0.32	1.1	1.7	68	93
3.7-4.3	7.65	18000	<0.50	10	320	1.2	0.21	48	18	42	15	<0.050	1.8	53	<0.50	<0.20	0.34	1.1	1.6	61	100
4.3-5.0	**8.32**	16000	0.57	**13**	260	1.2	0.37	40	18	42	15	<0.050	1.6	47	1.6	<0.20	0.30	1.0	5.4	56	99

BH-26 2016/04/27

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
0.0-0.6	7.46	9400	1.2	4.4	150	0.47	0.20	24	6.4	17	37	<0.050	0.44	20	<0.50	<0.20	0.15	1.4	0.87	33	53
0.6-1.2	7.56	14000	<0.50	6.8	150	0.82	0.25	39	11	26	13	<0.050	1.0	34	<0.50	<0.20	0.22	<1.0	1.5	50	68
0.6-1.2 Dup	7.56	13000	<0.50	6.7	170	0.68	0.24	32	12	27	13	<0.050	0.89	32	<0.50	<0.20	0.21	<1.0	1.5	47	65
1.2-1.8	7.60	13000	<0.50	5.5	140	0.58	0.21	34	9.8	24	15	<0.050	0.54	29	<0.50	<0.20	0.22	1.4	1.2	42	60
1.8-2.4	7.41	12000	0.52	8.7	180	0.74	0.31	31	13	32	17	<0.050	1.3	36	0.67	<0.20	0.22	<1.0	2.1	44	75
2.4-3.0	7.95	19000	4.7	**15**	1500	2.8	0.72	40	8.0	62	260	<0.050	6.6	33	1.7	<0.20	0.18	9.6	3.2	43	**890**
3.0-3.7	7.54	8300	<0.50	3.9	95	<0.40	0.13	22	6.5	16	6.7	<0.050	<0.40	19	<0.50	<0.20	0.16	<1.0	1.1	29	35
3.7-4.4	7.60	15000	<0.50	8.6	220	0.79	0.20	41	15	36	12	<0.050	1.0	44	<0.50	<0.20	0.27	1.0	1.3	56	81
4.4-5.1	**8.27**	12000	<0.50	6.4	170	0.77	0.22	33	11	32	12	<0.050	1.3	32	<0.50	<0.20	0.22	<1.0	1.6	46	74

BH-27 2016/04/28

Sample Depth (mbgs)	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
0.0-0.6	**8.89**	12000	0.50	5.3	130	0.59	0.23	31	7.9	22	20	0.079	0.66	25	<0.50	<0.20	0.17	1.1	1.0	39	61
0.6-1.2	7.76	11000	<0.50	4.5	120	0.68	0.18	26	7.5	19	16	<0.050	0.53	23	<0.50	<0.20	0.19	<1.0	1.5	37	51
1.2-1.8	7.67	11000	<0.50	4.7	190	0.65	0.18	33	9.1	25	23	<0.050	0.54	29	<0.50	<0.20	0.20	1.1	1.2	38	59
1.2-1.8 Dup	7.91	17000	<0.50	5.4	210	0.76	0.23	40	11	31	17	0.065	0.68	33	<0.50	<0.20	0.25	1.4	1.4	49	73
1.8-2.4	7.62	7200	3.9	3.8	160	<0.40	0.61	25	4.9	57	**430**	0.11	1.3	20	<0.50	0.84	0.10	9.2	0.92	23	170
2.4-3.0	7.69	14000	5.3	11	940	2.0	0.75	42	7.1	67	**500**	0.11	3.7	36	1.7	0.25	0.16	12	2.1	31	350
3.0-3.7	7.84	8800	<0.50	3.7	130	0.43	0.16	20	5.1	14	7.7	0.052	0.45	17	<0.50	<0.20	0.14	<1.0	1.4	29	29
3.7-4.3	7.59	18000	<0.50	7.0	280	0.95	0.23	40	12	30	11	<0.050	0.80	36	<0.50	<0.20	0.25	1.0	1.5	59	67
4.3-5.0	7.57	21000	0.60	11	270	1.3	0.31	51	22	39	17	<0.050	2.4	60	<0.50	<0.20	0.30	1.3	1.6	71	100



LEGEND

- Former Feature
- Former Fence
- Property Line, Surveyed 2013
- Property Boundary Pin
- Borehole
- Monitoring Well
- Piezometer
- Test Pit
- Destroyed Monitoring Well
- Destroyed Piezometer
- Extent of Excavation, 2013
- Excavation Floor Sample
- Excavation Wall Sample
- Exhumed by Excavation
- 2010/12/31 Date Format: yyyy/mm/dd
- mbgs Metres Below Ground Surface
- mg/kg Milligrams Per Kilogram, dry weight basis

Analytical Results

- All Results Reported in mg/kg
- Location Where All Soil Samples Met Applicable Criteria for All Parameters that Were Analyzed, Shown in Green
- Location Where at Least One Soil Sample Exceeded Applicable Criteria for At Least One Parameter that Was Analyzed, Shown in Red
- **1234** Exceedances of Applicable Criteria, Shown in Red and Bold
- DUP Field Duplicate Sample
- \- Not Analyzed
- < Result Less Than Reportable Detection Limit

Criteria

Parameter	pH	Al	Sb	As	Ba	Be	Cd	Cr (Total)	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	Sn	U	V	Zn
Criterion*	6-8	NV	40	12	2000	8	22	87	300	91	260	24	40	89	2.9	40	1	300	33	130	360
Units	SU	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg

pH-pH **Al**-Aluminum **Sb**-Antimony **As**-Arsenic **Ba**-Barium **Be**-Beryllium **Cd**-Cadmium **Cr**-Chromium **Co**-Cobalt **Cu**-Copper **Pb**-Lead **Hg**-Mercury **Mo**-Molybdenum **Ni**-Nickel **Se**-Selenium **Ag**-Silver **Tl**-Thallium **Sn**-Tin **U**-Uranium **V**-Vanadium **Zn**-Zinc

***Metals Parameters**
\- Canadian Council of Ministers of the Environment; Canadian Environmental Quality Guidelines (2016) - commercial land use

NOTE: All features are approximate.

REFERENCE: Air Photos, 1993, 2009, 2014 and 2016.
Drawings provided by IOL dated 1988/06/30 and 1997/05/27.
*The City of Winnipeg, No. 28 Brooklands Lanfill Site Detail Dwg. No. 5NO-D-125A, 2003/09/16
Barnes and Duncan survey dated 2016/054/28.

0 10 20 30m
Scale 1:600

Soil Analytical Results
Metals
Imperial Oil
100 Oak Point Highway, Winnipeg, Manitoba

Drawn: MLM	Page Size: 24 x 36 in	Ref. No.: 10-5133
Reviewed: KAF	File No.: 5133B053	Date: 2016/06/03
PARSONS		Drawing No.: 5

J&D ENVIRONMENTAL

Phase II
Environmental Site Assessment
Parcel 7 of Plan 9218 WLTO (Site A)
Winnipeg, Manitoba

Prepared for:

Rod Corbett
Pauls Hauling
250 Oakpoint Hwy
Winnipeg MB

August 4, 2021

TABLE of CONTENTS

EXECUTIVE SUMMARY

An October 2020 Phase I ESA (Environmental Site Assessment) was conducted on behalf of the Estate of Paul Albrechtsen at Parcel 7 of Plan 9218 WLTO and for the purposes of the report referred to as Site A, a vacant property south of Oak Point Highway. The report identified two Areas of Potential Environmental Concern (APEC) at adjacent properties, former Brooklands Landfill and Superior Finishes, a former hazardous waste generator, south and east of our subject site, Site A.

A total of 45 soil samples were recovered from the 8 boreholes drilled in potentially impacted areas. Soil was examined for evidence that would suggest that it was impacted with Volatile Organic Compounds (VOCs) plus Petroleum Hydrocarbon (PHC) Fractions F1 to F4, metals, Polycyclic Aromatic Hydrocarbons (PAHs) and/or methane. The following is a summary of the findings, conclusions and recommendations for each of the investigated areas.

Investigated Area North of APEC 1 (Former Brooklands Landfill Site)

- Thirty soil samples were recovered from an area north of the landfill from the five boreholes, BHs 1, 2, 3, 4 and 5, drilled in this area. A groundwater monitoring well (MW 1) was installed in BH3. A methane detection pump was used to check the downhole methane concentrations in each of the boreholes.
- Concentrations of VOCs in the three representative soil samples selected from this area were below laboratory detection limits suggesting that soil in the vicinity of the investigated area north of the former landfill has not been impacted with VOCs.
- An insignificant concentration of PHC Fraction F3 (56 mg/kg) was discovered in BH4 and was well below the referenced residential land use Management Limit CWS (3500 mg/kg) applied to this site. PHC F1 to F4 concentrations were below detection limits in the soil samples from BH 3. These test results imply that soil in this investigated area is not impacted with PHC Fractions F1 to F4.
- Metals test results for the two representative samples selected from this area show residential guideline exceedances of:

    - Copper - Concentrations in both representative samples recovered from boreholes BH3 and BH5 were 99.8 and 416 mg/kg respectively. Referenced guideline is 63 mg/kg. Harm to human and environmental health from soil with copper concentrations that exceed the guideline is most widely reported to be from the consumption of edible plants that would grow in this soil. Edible plant growth in soil in these sample locations is not an issue and will likely never become one.

    - Zinc - Concentration (357 mg/kg) in the sample recovered from BH5 exceeded the 250 mg/kg guideline. Water resources impacted by zinc can be hazardous to human health, however groundwater at this site will never become a potable water resource.

    - Lead - Concentration in the soil sample recovered from BH5 (321 mg/kg) exceeded the referenced guideline (140 mg/kg). The most serious source of exposure to soil lead is through direct ingestion of contaminated soil or dust inhalation. Given that there are no immediate plans to disturb the soil in this area, the potential for direct ingestion and dust inhalation are at present unlikely. Further investigation to determine the extent of this lead contamination can be delayed until development plans for this area are made.

- Three representative soil samples were selected for an assessment of Polycyclic Aromatic Hydrocarbons (PAH) concentrations. Test result of a soil sample from BH1 (1.14 mg/kg) exceeded the calculated B(a)P 10^{-6} lifetime cancer risk of 0.6 mg/kg. Direct contact with PAHs is a carcinogenic hazard to human health. Further investigation is not recommended unless the soil in the vicinity of BH1 is to be disturbed for development.
- The groundwater monitoring well installed in BH3 was examined several hours after its installation and discovered to be dry.
- No methane was discovered in five boreholes drilled in this investigated area of Site A.

Investigated Area West of APEC 3 (Former Location of Superior Finishes, a Hazardous Waste Generator

- Fifteen soil samples were recovered from an area west of APEC 3 from the three boreholes, BHs 6, 7, and 8, drilled in this area.
- Concentrations of VOCs in the representative soil sample selected from this area were below laboratory detection limits suggesting that soil in the vicinity of the investigated area west of Superior Finishes (APEC 3) has not been impacted with VOCs.
- Concentrations of PHC Fraction F3 (52 mg/kg) and PHC Fraction F4 (51 mg/kg) were discovered but were well below the referenced residential land use Management Limit CWS (3500 mg/kg) applied to this site. PHC F1 to F4 concentrations were below detection limits in the same soil sample. These test results imply that soil in this investigated area west of APEC 3 is not impacted with PHC Fractions F1 to F4.
- A representative soil sample from BH7 reported arsenic (12 mg/kg v 12.6 mg/kg) and lead (443 mg/kg v 140 mg/kg) exceedances of residential land use guidelines. The arsenic exceedance is marginal and any unlikely ingestion of this soil presents an insignificant human health risk. The most serious source of exposure to lead in soil is through direct ingestion of contaminated soil or dust inhalation. Lead impacted soil in the vicinity of BH7 was discovered at a depth of 0.8 m and is not exposed at ground surface. Ingestion and dust inhalation are unlikely. Remediation of this lead impacted soil is not required unless future excavations in this area would expose and/or require its removal.

Screening and laboratory test results suggest that activities at the former Brookland Landfill site (APEC 1) and at the former waste generator site (APEC 3) are not likely the result of migration of hazardous materials to the investigated areas of our subject site, Site A. Discovered copper, lead, zinc, arsenic and PAH exceedances appear to be localized and in the opinion of J & D Environmental the result of adding mixed fill of undetermined environmental quality to raise the elevation of the investigated areas. At present no additional investigations are recommended, however, should disruption of soil be required to develop the areas in which lead and PAH impacted soil were discovered, delineation of these impacts should be conducted.

It must be noted that this investigation does not confirm that portions of Site A not investigated have not been impacted. Drilling a limited number of boreholes and submitting a limited number of samples for laboratory analysis do not necessarily imply an accurate determination of impacted soil at this site. Should excavations for any future development result in suspected impacts, additional investigations that could result in a reassessment of conclusions and recommendations made in this report should be conducted.

1.0 INTRODUCTION AND BACKGROUND

This Phase II ESA (Environmental Site Assessment) was requested by our client for the property identified as Parcel 7 of Plan 9812 WLTO and for the purposes for this investigation will be referred to as Site A. Site A is vacant and presently undeveloped and is located south of Oak Point Highway and east of Paul's Hauling, 250 Oak Point Highway. Client is contemplating the purchase of this property and with the consent of the owner, Estate of Paul Albrechtsen, has embarked on due diligence to determine if activities at this site and/or at adjacent sites have resulted in environmental liabilities that may affect the value of the property. An October 2020 Phase I ESA conducted at this site reported the potential for impacted soil at this site from is largely from activities at adjacent properties and for Site A has identified two APECs (Areas of Potential Environmental Concern) and as a result recommended this subsequent Phase II ESA subsurface soil investigation to determine the migration potential for impacted soil from these adjacent properties to Site A. The APECs and the contaminants of concern identified in the Phase I ESA are illustrated in Photograph1 and include:

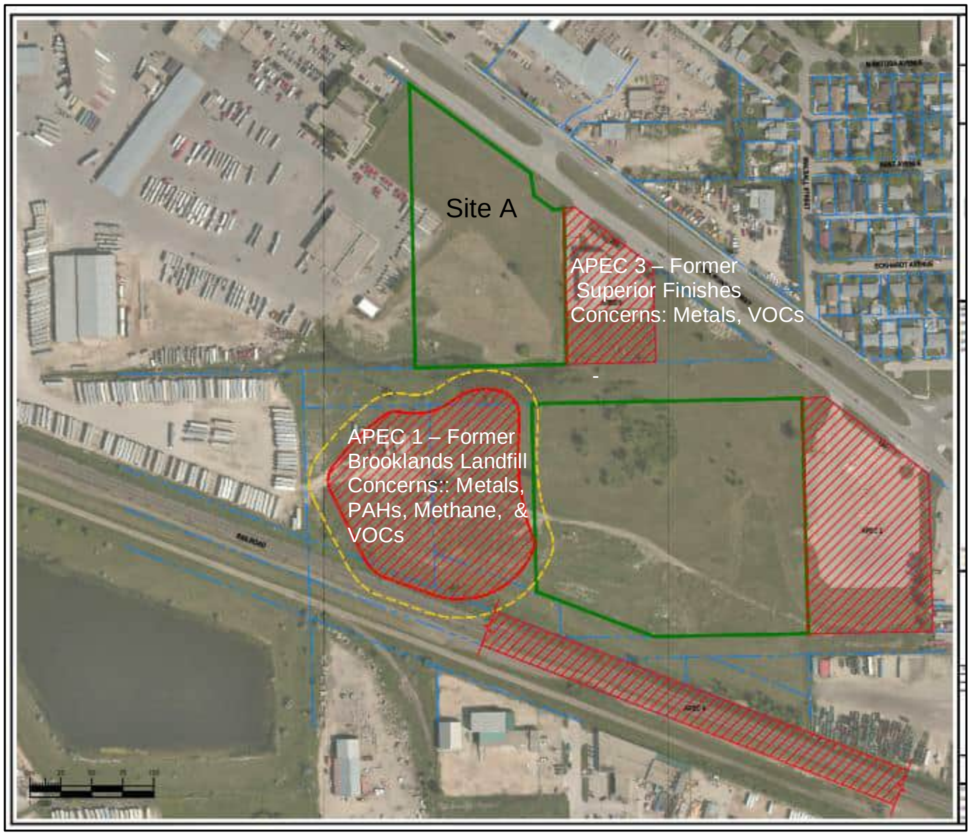
1. Benzene, Toluene, Ethylbenzene and Xylene and Petroleum Hydrocarbon Fractions F1 to F4. These compounds volatilize readily and can move through soil as vapours and exposure to these vapours can result in human health problems.

2. Polycyclic Aromatic Hydrocarbons (PAHs): Concentrations of PAHs in soil can occur naturally but exceedances can result from human activity such as wood-burning and incomplete combustion of other biofuels. Direct contact with PAHs is a carcinogenic hazard to human health.

3. Metals: All soils naturally contain trace levels of metals, however, human activity can increase the concentration of certain metals in soil. High exposure to concentrations of heavy metals such as lead, mercury, arsenic and cadmium can have negative effects on human health.

4. Methane Gas: Typically landfills generate methane gas as organic waste decomposes. Methane gas can move through soil and is particularly dangerous in confined spaces producing symptoms of dizziness and headache and in large concentrations can cause asphyxiation. High concentrations of methane are also an explosive hazard in enclosed spaces. Concentration of methane is measured in Lower Explosive Limit (LEL). Concentrations in confined spaces greater than 10% LEL are considered hazardous.

5. Volatile Organic Compounds (VOCs): VOCs are emitted as gases from certain compounds such as paints, cleansers, fuels, automotive products, disinfectants, solvents, dry cleaning fluids. Breathing VOC vapours from these types of products can have adverse effects on human health.



Photograph 1: Site A, APECs 1 & 3 and potential concerns as per 2020 Phase I ESA

This subsurface soil investigation was conducted in general conformance with Canadian Standard Association's Z769-00 (R2013), Phase II Environmental Site Assessment.

2.0 FIELDWORK

Prior to the onset of fieldwork, the following activities took place:

- A drill rig was booked to provide the environmental drilling services.
- Requests for underground services locates were ordered from CBYD Manitoba. No services were located in the drill areas inside the property lines.
- A preliminary drilling and soil sampling plan that would provide a reasonable determination of impacted soil at this site was developed.

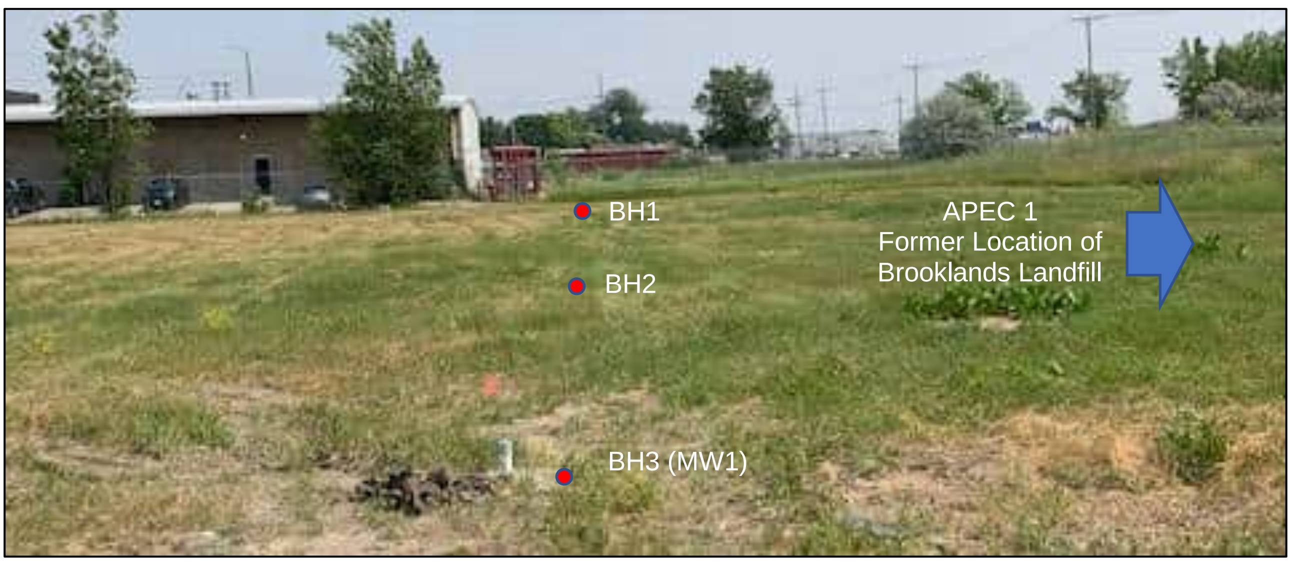
2.1 Borehole Drilling

Fieldwork took place on July 15/21.

2.1.1 Investigated Area North of APEC 1 (Former Brooklands Landfill Site)

The former Brooklands Landfill is located south of Site A. Investigation in this portion of Site A was recommended to determine if dumping activities at the former Brooklands Landfill site (APEC 1) may have resulted in migration of VOCs plus PHC Fractions F1 to F4, PAHs, metals and/or methane gas to our subject site, Site A. A marsh located along the south property line of Site A separates the former Brooklands Landfill site from Site A. Given the location of this marsh it was determined that five boreholes, BHs 1, 2, 3, 4 & 5 be drilled approximately 30 m north of the marsh (Photographs 2 & 3). A groundwater monitoring well (MW1) was installed in BH3.

Photograph 2: Boreholes BH4 & BH5, looking west



Photograph 3: Boreholes BH1, BH2 & BH3 (MW1) looking east

2.1.2 Investigated Area West of APEC 3 (Former Hazardous Waste Generator Site)

This area is located along the east property line of our subject site, Site A. Investigation in this portion of Site A was recommended to determine if activities at this former waste generating site may have resulted in the migration of VOC and/or metals impact to our subject site, Site A. Three boreholes, BHs 6, 7 & 8, were drilled approximately five m west of the east property line (Photograph 4).

Photograph 4: Locations of BH6, BH7 and BH8, looking north

The eight boreholes drilled for this investigation are shown in Figure 1, Borehole Location Plan, Appendix A.

2.2 Soil Sampling and Screening Results

Soil samples were removed directly from the augers and inspected for evidence of impacts and screened for hydrocarbon vapours. Samples were split, labelled and sealed in plastic, storage bags. The larger bagged samples were allowed to warm up to approximately +20°C to allow any vapours to volatilize into the headspace above the soil. The concentration of vapours in each bagged soil sample was measured using a calibrated RKI Eagle 2 portable gas detector. Those samples that would be selected for VOC plus PHC Fractions F1 to F4 analysis were placed in smaller bags and set aside in a cooler at approximately +4°C to minimize the loss of volatiles and those subsequently selected for laboratory analysis were then transferred to laboratory supplied vials and jars for transport to the ALS Global.

Soil samples selected for PAH and metals analysis were placed in 125 mL jars.

2.2.1 Investigated Area North of APEC 1 (Former Brooklands Landfill Site)

Downhole methane concentrations in each of the five boreholes drilled in this area were measured using a Gas Alert Max XT II gas monitor calibrated for Methane. The downhole methane concentrations are reported in Table 1.

Table 1: Methane Concentrations (%), APEC 1, May 12/21

Borehole	Down Hole Methane Concentration
BH1	0% LEL
BH2	0% LEL
BH3	0% LEL
BH4	0% LEL
BH5	0% LEL

The methane concentrations in all boreholes in this area of Site A were 0% LEL.

Thirty soil samples were recovered from the five boreholes drilled north of APEC, former Brooklands Landfill location. The samples were screened for hydrocarbon vapours. Elevated hydrocarbon vapour screening results are an indication that volatile organic compounds (VOCs) including BTEX and PHC Fractions F1 to F4 that may exceed referenced guidelines. Screening results are shown in Table 2.

Table 2: Screening Results, Site A, North of Former Brooklands Landfill, July 15/21

Sample	ppm[1]	Sample	ppm[1]	Sample	ppm[1]
1-0.8 m	**5**	**3-0.8 m**	**250**	4-0.8 m	10
1-1.5 m	20	**3-0.8 m**	**250**	**4-1.5 m**	35
1-2.3 m	5	**3-0.8 m**	**250**	**4-1.5 m**	35
1-3.0 m	0	3-1.5 m	15	4-2.0 m	10
1-3.8 m	0	**3-1.8 m**	**55**	4-2.3 m	20
1-4.6 m	0	3-1.8 m	55	4-3.0 m	0
2-0.8 m	0	3-2.3 m	10	4-3.8 m	0
2-1.5 m	10	3-3.0 m	15	**5-0.8 m**	**5**
2-2.3 m	0	3-3.8 m	15	5-1.5 m	15
2-3.0 m	0	3-4.6 m	5	5-2.3 m	10
2-3.8 m	0			5-3.0 m	0
2-4.6 m	0			5-3.8 m	0

[1] parts per million
Submitted for VOC analysis
Submitted for PAH analysis
Submitted for Metals scan

Soil samples 3-0.8 m (250 ppm), 3-1.8 m (55 ppm) and 4-1.5 m (35 ppm) had the highest screening results of the soil samples recovered from the area north of the former Brooklands Landfill and have a likely potential to be impacted by VOCs plus PHC Fractions F1 to F4.

Samples 3-0.8 m, 4-1.5 m and 5-0.8 m were selected for PAH and Metal analysis. These samples were typical of the fill material that was discovered in the boreholes. Fill material of unknown environmental quality and from unknown sources may be impacted with compounds like PAHs and metals.

Soil details, sample depths and hydrocarbon vapour screening results are shown in Borehole Logs BH1 to BH8, Appendix B.

2.2.2 Investigated Area West of APEC 3 (Former Waste Generator Site)

Fifteen soil samples were recovered from the three boreholes drilled in this area. Elevated hydrocarbon vapour screening results are an indication that volatile organic compounds (VOCs) including BTEX and PHC Fractions F1 to F4 that may exceed referenced guidelines. Hydrocarbon vapour screening results are shown in Table 3.

Table 3: Screening Results, Site A West of APEC 3, July 15/21

Sample	ppm[1]	Sample	ppm[1]	Sample	ppm[1]
6-0.8 m	0	7-0.8 m	0	8-0.8 m	0
6-1.5 m	**10**	7-1.5 m	0	8-1.5 m	10
6-2.3 m	0	7-2.3 m	0	8-2.3 m	0
6-3.0 m	0	7-3.0 m	0	8-3.0 m	0
6-3.8 m	5	7-3.8m	0	8-3.8 m	0

[1] ppm

Submitted for Metals scans

Submitted for VOC analysis

Soil sample 6-1.5 m (10 ppm) had the highest screening results of the soil samples recovered from this area and has the most likely potential to be impacted by volatile VOCs including PHC Fractions F1 to F4.

Sample 7-0.8 m was selected for Metals analysis. This sample was part of the fill material that extended to a depth of 0.8 m below ground surface and given that it was added to this area and was of undetermined environmental quality it was selected to provide a reasonable indication of metals impacts in this area.

Soil details, sample depths and hydrocarbon vapour screening results are shown in Borehole Logs BH1 to BH8, Appendix B.

3.0 LABORATORY INVESTIGATION

Manitoba Conservation and Climate (MCC) is the regulatory agency responsible for enforcing environmental legislation in Manitoba. To provide guidance in assessing a given site MCC has published Guideline 98-01 entitled “Environmental Site Investigations in Manitoba, June 1998, revised June 2016”. Criteria that must be considered when comparing test results to applicable Soil Quality Guidelines to assist in the assessment and remediation of contaminated lands include:

- Soil texture: Sands and gravels generally are considered to be coarse-grained soils while fine-grained usually refers to organics, clays and silts.
- Depth: Subsoils are defined as material above the water table not subject to soil forming processes below 1.5 m depth.

- Land Use: Four possible land uses need to be considered in assessments.

  - Agricultural – Land primarily used to grow crops or tend livestock.
  - Residential/Parkland – Land primarily used for residential or for recreational but not including wild lands.
  - Commercial – Land primarily used for commercial activities and businesses and is generally not restricted to the public, but does not include sites where food is grown.
  - Industrial – Land primarily used for the production, manufacture or construction of goods. Public access is generally restricted.

Our client plans to pursue the purchase of Site A for a possible residential development.

3.1 Test Results

Given that this site is being considered for residential development all test results were compared to residential guidelines.

3.1.1 Investigated Area North of Former Brooklands Landfill Location

Volatile Organic Compounds (VOCs) including BTEX & PHC Fractions F1 to F4

Three soil samples with the highest hydrocarbon vapour screening results and with the most likely potential of VOC and PHC Fractions F1 to F4 concentrations that may exceed referenced guidelines, 3-0.8 m (250 ppm), 3-1.8 m (55 ppm) and 4-1.5 m (35 ppm) were selected to provide a likely assessment of VOC concentrations including benzene, toluene, ethylbenzene and xylenes. A VOC analysis also reports PHC Fractions F1 to F4 concentrations. The complete ALS Environmental Certificate of Analysis (Lab Work Order #L2614767 dated 27-Jul-21) is presented in Appendix C.

All VOC compounds and PHC Fractions detected in soil samples from this area are shown in Table 4.

Table 4: VOCs & PHC Fractions detected in area north of APEC 1, Site A

Sample 3-0.8 m (250 ppm)		
Compound	Concentration (mg/kg)	SQG (mg/kg)
All VOC & PHC concentrations below laboratory detection limits		
Sample 3-1.8 m (55 ppm)		
Compound	Concentration (mg/kg)	SQG (mg/kg)
All VOC & PHC concentrations below laboratory detection limits		
Sample 4-1.5 m (35 ppm)		
Compound	Concentration (mg/kg)	SQG (mg/kg)
F3	56	3500 [1]

[1] CWS Exposure Pathway Management Limits

A concentration of 56 mg/kg of PHC Fraction F3 was detected in soil sample 4-1.5 m. This concentration is well below the referenced Management Limit check value of 3500 mg/kg.

Metals

Soil samples 3-0.8 m and 5-0.8 m were selected to provide a likely assessment of metals concentrations in the area north of the former location of the Brooklands Landfill. Test results of the 18 soil samples for which there are residential soil quality guidelines are summarized in Table 5. The complete ALS Environmental Certificate of Analysis (Lab Work Order #L2614767 dated 27-Jul-21) is presented in Appendix D.

Table 5: Metals in Soil Test Results, APEC 1, Oak Point Highway, Site A

Metal	mg/kg			Metal	mg/kg		
	3-0.8 m	5-0.8 m	SQGs[1]		3-0.8 m	5-0.8 m	SQGs[1]
Antimony (Sb)	3.01	8.87	20	Molybdenum (Mo)	0.70	1.14	10
Arsenic (As)	6.83	8.18	12	Nickel (Ni)	33.0	37.5	45
Barium (Ba)	181	234	300	Selenium (Se)	0.37	0.40	1
Beryllium (Be)	0.83	0.86	4	Silver (Ag)	0.17	0.54	20
Cadmium (Cd)	0.345	0.423	10	Thallium (Tl)	0.275	0.264	1
Chromium (Cr)	41.2	39.7	64	Tin (Sn)	16.4	31.3	50
Cobalt (Co)	10.8	11.5	50	Uranium (U)	1.77	1.55	23
Copper (Cu)	**99.8**	**416**	63	Vanadium (V)	65.9	65.9	130
Lead (Pb)	107	**321**	140	**Zinc (Zn)**	188	**357**	250

1 - CCME Soil Quality Guidelines (SQGs) for the Protection of Environmental and Human Health, Update 6.0, July 2006, Residential Land Use

Guideline Exceedances

Test results show residential soil quality guideline exceedances of copper in both samples and lead and zinc exceedances in sample 5-0.8 m.

PAHs (Polycyclic Aromatic Hydrocarbons)

Direct contact with PAHs is a carcinogenic hazard to human health. Soil samples 1-0.8 m, 3-0.8 m and 4-1.5 m were selected to provide a likely assessment of PAH concentrations in the investigated area north of the former location of the Brooklands Landfill. Benzo(a)Pyrene (B[a]P) is the calculation used to determine the Total Potential Equivalency (TPE) of PAH concentrations. TPE is the sum of estimated cancer potency relative to Benzo(a)Pyrene (B[a]P) for all potentially carcinogenic PAHs.

The calculated TPE of the three soil samples selected for PAH assessment are shown in Table 6. The complete ALS Environmental Certificate of Analysis (Lab Work Order #L2614767 dated 27-Jul-21) is presented in Appendix C.

Table 6: TPE of PAH Concentrations, Oak Point Hwy, Site A

Sample ID	B(a)P (mg/kg)	PAH TPE Guideline (mg/kg)
1-0.8 m	**1.14**	0.6
3-0.8 m	0.021	
4-1.5	0.024	

Guideline Exceedance

Table 6 shows that the calculated B(a)P concentration in soil sample 1-0.8 m exceeded the 10^{-6} lifetime cancer risk B(a)P TPE of 0.6 mg/kg.

Groundwater

During the course of fieldwork for a Phase II MCC recommends the installation of groundwater monitoring wells to monitor the stability hydrocarbon impact in the soil should any such impact be discovered. To that end groundwater monitoring well MW1 was installed in BH3. An initial inspection of the well and a later return to the site revealed that the well was dry.

3.1.2 Investigated Area West of Former Superior Finishes, a Waste Generating Site

Soil

Volatile Organic Compounds (VOCs) including BTEX & PHC Fractions F1 to F4

One soil sample, 6-1.5 m (10 ppm), with the highest hydrocarbon vapour screening result of the 15 soil samples recovered from this area and with the most likely potential of VOC and PHC Fractions F1 to F4 concentrations that may exceed referenced guidelines was selected to provide a likely assessment of VOC concentrations including benzene, toluene, ethylbenzene and xylenes. A VOC analysis also reports PHC Fractions F1 to F4 concentrations. The complete ALS Environmental Certificate of Analysis (Lab Work Order #L2614767 dated 27-Jul-21) is presented in Appendix C.

All characterized VOC compounds had concentrations below laboratory detection limits. Insignificant concentrations PHC Fractions F3 and F4 were detected in sample 6-1.5 m. Results are summarized in Table 7. The complete ALS Environmental Certificate of Analysis (Lab Work Order #L2614767 dated 27-Jul-21) is presented in Appendix C.

Table 7: VOCs & PHC Fractions detected in area along APEC 1, Site A

Sample 6-1.5 m (35 ppm)		
Compound	Concentration (mg/kg)	SQG (mg/kg)
F3	52	3500[1]
F4	51	10 000[1]

[1] CWS Exposure Pathway Management Limit

Concentrations of PHC Fraction F3 (52 mg/kg) and PHC Fraction F4 (51 mg/kg) were detected in soil sample 6-1.5 m. This concentration is well below the referenced Management Limit check values of 3500 mg/kg 10 000 mg/kg.

Metals

Soil sample 7-0.8 m was selected to provide a likely assessment of metals concentrations in the area west of APEC 3. Test results of the soil sample for which there are residential soil quality guidelines are summarized in Table 8. The complete ALS Environmental Certificate of Analysis (Lab Work Order #L2614767 dated 27-Jul-21) is presented in Appendix C.

Table 8: Metals in Soil Test Results for Area West of APEC 3, Site A

Metal	mg/kg		Metal		mg/kg
	7-0.8 m	SQGs[1]		7-0.8 m	SQGs[1]
Antimony (Sb)	9.03	20	Molybdenum (Mo)	0.71	10
Arsenic (As)	**12.6**	12	Nickel (Ni)	31.7	45
Barium (Ba)	194	300	Selenium (Se)	0.54	1
Beryllium (Be)	0.81	4	Silver (Ag)	0.14	20
Cadmium (Cd)	0.808	10	Thallium (Tl)	0.305	1
Chromium (Cr)	36.5	64	Tin (Sn)	5.9	50
Cobalt (Co)	11.0	50	Uranium (U)	1.72	23
Copper (Cu)	43.0	63	Vanadium (V)	72.9	130
Lead (Pb)	**443**	140	Zinc (Zn)	108	250

1 - CCME Soil Quality Guidelines (SQGs) for the Protection of Environmental and Human Health, Update 6.0, July 2006, Residential Land Use

Guideline Exceedances

Concentrations of arsenic and lead in sample 7-0.8 m show residential soil quality guideline exceedances.

3.2 Quality Assurance and Quality Control

ALS Global has an extensive QA/QC program where all analytical data reported is analyzed using approved reference procedures followed by checks and reviews by senior managers and quality assurance personnel. More specifically, ALS uses equipment blanks to check for interference from secondary sources and surrogates to measure the method efficiency. Detailed information is shown in the ALS Environmental Certificate of Analysis (Lab Work Order # L2614767, 27-Jul-21) is presented in Appendix C.

4.0 CONCLUSIONS & RECOMMENDATIONS

This Phase II ESA (Environmental Site Assessment) Winnipeg, Manitoba was requested to determine potential environmental liabilities reported in an October 2020 Phase I ESA that may affect the value of the property.

Fieldwork was conducted on July 15/21 at which time 45 soil samples were recovered from a total of 8 boreholes. A groundwater monitoring well was installed in the area north of the former Brooklands Landfill site.

4.1 Investigated Area North of APEC 1 (Former Brooklands Landfill Site)

Thirty soil samples were recovered from boreholes BH1, BH2, BH3, BH4 and BH5 drilled in this area. Investigation in this area was recommended to determine if former land fill activities may have resulted in migration of hydrocarbons, PAHs, metals, VOCs and/or methane gas to our subject site, Site A. The following is a summary of the findings, conclusions and recommendations for this area.

- Downhole methane concentrations were measured using a Gas Alert Max XT II gas monitor calibrated for Methane. These results suggest that methane gas that can be produced during the decomposition of organic landfill waste has not migrated to the soil in our investigated area.

- Concentrations of all characterized VOC compounds in the three soil samples selected for laboratory analysis were below detection limits suggesting that our investigated area has not been impacted with VOCs either from former landfill activities and/or from the subsequent addition of mixed fill of undetermined environmental quality to this area.

- An insignificant concentration of PHC Fraction F3 (56 mg/kg) was discovered in BH4 but was well below the referenced residential land use Management Limit CWS (3500 mg/kg) applied to this site. PHC F1 to F4 concentrations were below detection limits in the soil samples from BH 3. These test results imply that soil in our investigated area is not impacted with PHC Fractions F1 to F4.

- Discovered residential guideline exceedances of copper, lead and zinc concentrations in soil samples from two of the five boreholes drilled in our investigated area are not likely the result of former landfill activities. These exceedances appear localized and are likely the result of mixed fill of undetermined environmental quality added to this site from undetermined sources. Copper and zinc exceedances present no significant danger to human health. Lead guideline exceedance (321 v 140 mg/kg) discovered in BH5 presents no immediate and potential inhalation and/or ingestion human health risk. Given that there are no immediate plans to disturb the soil in this area, the potential for direct ingestion and dust inhalation is at present unlikely. Further investigation to determine the extent of this lead contamination should be conducted when there are development plans for this area.

- PAH test results in a soil sample recovered from BH1 (1.14 mg/kg) exceeded the calculated B(a)P 10^{-6} lifetime cancer risk of 0.6 mg/kg. Direct contact with PAHs is a carcinogenic hazard to human health. This exceedance is not of major concern and presents no immediate health risk. Further investigation is not required until the soil in the vicinity of BH1 is to be disturbed for future development.

4.2 Investigated Area West of APEC 3 (Former Superior Finishes Site)

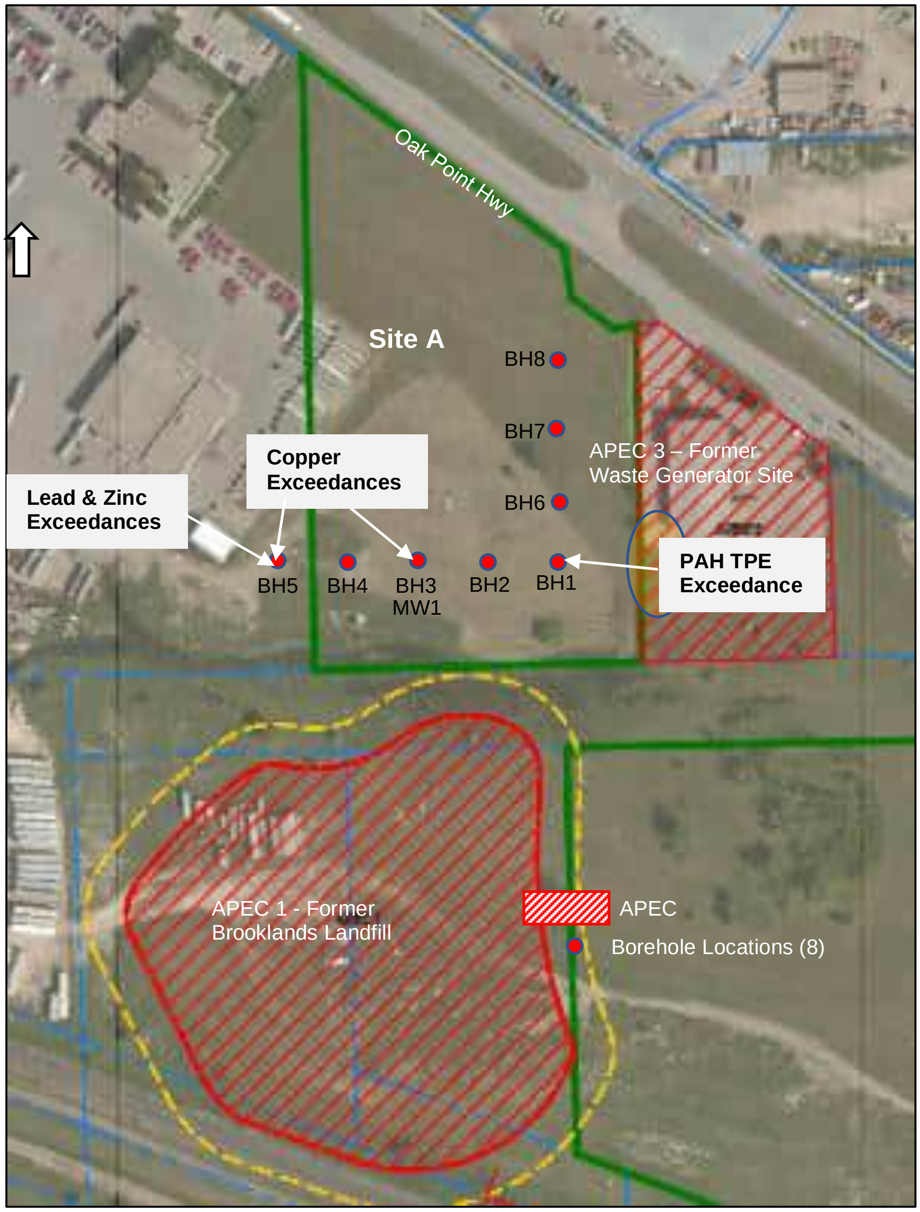
Former activities at this site presented a potential for soil impacted by metals and volatile organic compounds (VOCs) and as a result an investigation was recommended to determine if these contaminants may have migrated and impacted the area along the east property line of Site A. Fifteen soil samples were recovered from the three boreholes, BH6, BH7 and BH8, drilled in an area of west of this property line. The following is a summary of the findings, conclusions and recommendations for this area.

- All VOC concentrations in the representative soil sample (6-1.5 m) with the highest hydrocarbon vapour screening result selected from this area were below the laboratory detection limits. VOC impacted is unlikely.
- Insignificant concentrations of PHC Fractions F3 (52 mg/kg) and F4 (51 mg/kg) in the same sample were below the referenced residential land use Management Limit check values (3500 mg/kg and 10 000 mg/kg) applied to this site. F1 & F2 concentrations were below detection limits. These test results imply that soil in this investigated area is not impacted with PHC Fractions F1 to F4.

- A representative soil sample from BH7 reported arsenic (12 mg/kg v 12.6 mg/kg) and lead (443 mg/kg v 140 mg/kg) exceedances of residential land use guidelines. The arsenic exceedance is marginal and any unlikely ingestion of this soil presents an insignificant human health risk. The most serious source of exposure to lead in soil is through direct ingestion of contaminated soil or dust inhalation. Lead impacted soil in the vicinity of BH7 was discovered at a depth of 0.8 m and is not exposed at ground surface. Ingestion and dust inhalation are unlikely. Remediation of this lead impacted soil is not required unless future excavations would expose the soil in this area.

4.3 Investigation Summary

Although activities at APECs 1 & 3 cannot be discounted as sources of discovered exceedances, it must be noted that during the course of fieldwork a predominantly mixed clay fill ranging in depths to 1.0 m and 3.0 m was discovered in all boreholes. This gives rise to the likelihood that Site A was once an area that accepted excavated fill from unknown sources of unknown environmental quality to raise its present elevation. Discovered exceedances are illustrated in Photograph 9..



Photograph 9: Site A, Discovered Exceedances

5.0 LIMITATIONS

The scope of work detailed in this report is limited specifically to the matters expressly covered and is solely intended for the client to whom the report is addressed and is based on the findings of the Phase I ESA conducted at this site in October 2020. J & D Environmental makes no warranties, expressed or implied, related to the marketability or fitness of the site. Work was conducted using accepted engineering and scientific principles and practices.

It must be noted that drilling a limited number of boreholes and submitting a limited number of samples for laboratory analysis do not necessarily imply an accurate determination of impacted soil at this site. Any additional findings regarding site conditions that differ from those on which this report is based could result in a reassessment of the conclusions and recommendations made.

____

Danial Kolba
J & D Environmental

Appendix A

J&D ENVIRONMENTAL

Scale: as shown	Illustrated by: WL	Figure 1 Borehole Location Plan Parcel 7 of Plan 9218 WLTO (Site A) Winnipeg, Manitoba
Date: July 15, 2021	Checked by: DK	

Appendix B

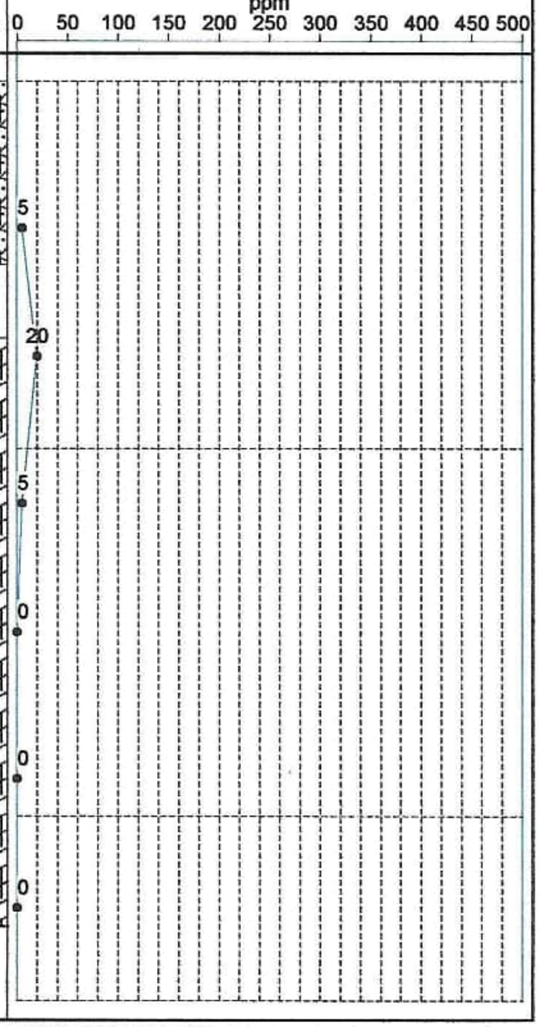
Project: Phase II Environmental Site Assessment

Client: Paul's Hauling

Site Location: Parcel 7 of Plan 9218, Site A

Borehole Number: BH1

Subsurface Profile		Sample			Screening Results
Depth (m)	Description	Depth	Number	Symbol	Hydrocarbon Vapour Concentrations ppm
0	Ground Surface	0			
	Mixed Clay Fill - Vegetated Surface - clay/silt/top soil with some granular	1	1		5
1	Silt - moist, tan	1			
	Clay - brown - firm - becoming softer, siltier and more moist with depth		2		20
2			3		5
3			4		0
			5		0
4		5	6		0
5	End of Borehole				



Drilled By: Raymond Vauclair Projects L:td.

Drill Method: Solid Stem

Drill Dates: July 15, 2021

Hole Size: 125 mm

Datum: Ground Surface

Sheet: 1 of 1

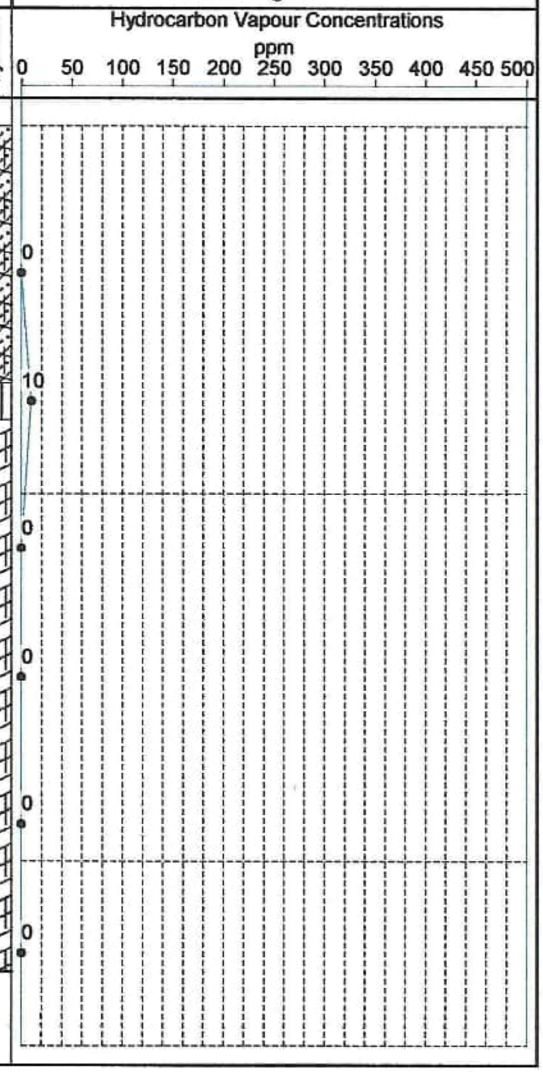
Project: Phase II Environmental Site Assessment

Client: Paul's Hauling

Site Location: Parcel 7 of Plan 9218, Site A

Borehole Number: BH2

Subsurface Profile		Sample			Screening Results
Depth (m)	Description	Depth	Number	Symbol	Hydrocarbon Vapour Concentrations ppm
0	Ground Surface	0			
	Mixed Clay Fill - Vegetated Surface - clay/silt/top soil with some granular - dry		1		0
1		1			
	Silt - moist, tan	2	2		10
2	Clay - brown - firmto stiff - becoming softer, siltier and more moist with depth		3		0
3			4		0
			5		0
4		5	6		0
5	End of Borehole				



Drilled By: Raymond Vauclair Projects L:td.

Drill Method: Solid Stem

Drill Dates: July 15, 2021

Hole Size: 125 mm

Datum: Ground Surface

Sheet: 1 of 1

Project: Phase II Environmental Site Assessment

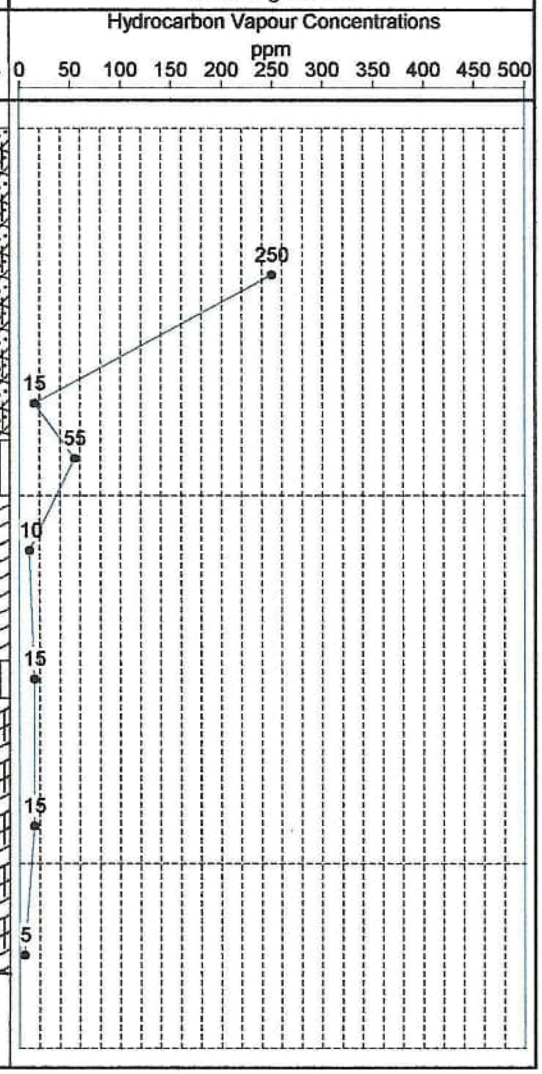
Client: Paul's Hauling

Site Location: Parcel 7 of Plan 9218, Site A

Borehole Number: BH3

Depth (m)	Subsurface Profile – Description	Sample Depth	Sample Number
0	Ground Surface	0	
	Mixed Clay Fill - Vegetated Surface - clay/silt/top soil with some granular - dry		1
1		2	2
	Silt - moist, tan	2	
2	Clay - brown - firm to stiff		4
		3	3
3	Silt Seam	3	5
	Silty Clay - moist - sticky		6
4		5	7
5	End of Borehole		

Screening Results



Drilled By: Raymond Vauclair Projects L:td.

Drill Method: Solid Stem

Drill Dates: July 15, 2021

Hole Size: 125 mm

Datum: Ground Surface

Sheet: 1 of 1

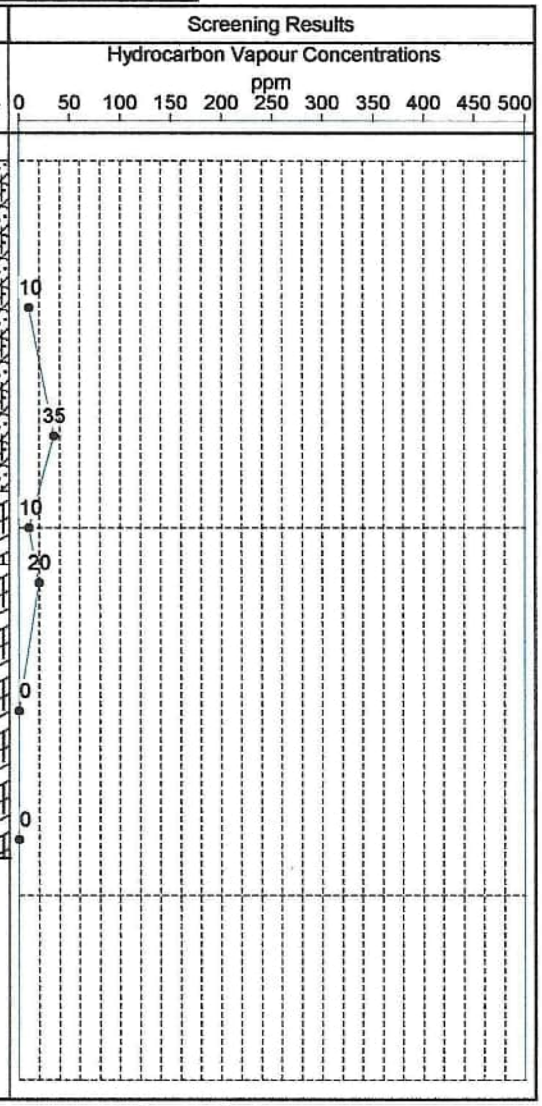
Project: Phase II Environmental Site Assessment

Client: Paul's Hauling

Site Location: Parcel 7 of Plan 9218, Site A

Borehole Number: BH4

Depth (m)	Subsurface Profile – Description	Sample Depth	Sample Number
	Ground Surface	0	
0	Mixed Clay Fill - Vegetated Surface - clay/silt/top soil with some granular - moist - wood fibres		1 2
		2	
	Silty Clay - moist, tan		3
2		2	
	Clay - silty, moist, light brown		4 5 6
		4	
4	End of Borehole		
5			



Drilled By: Raymond Vauclair Projects L:td.

Drill Method: Solid Stem

Drill Dates: July 15, 2021

Hole Size: 125 mm

Datum: Ground Surface

Sheet: 1 of 1

Project: Phase II Environmental Site Assessment

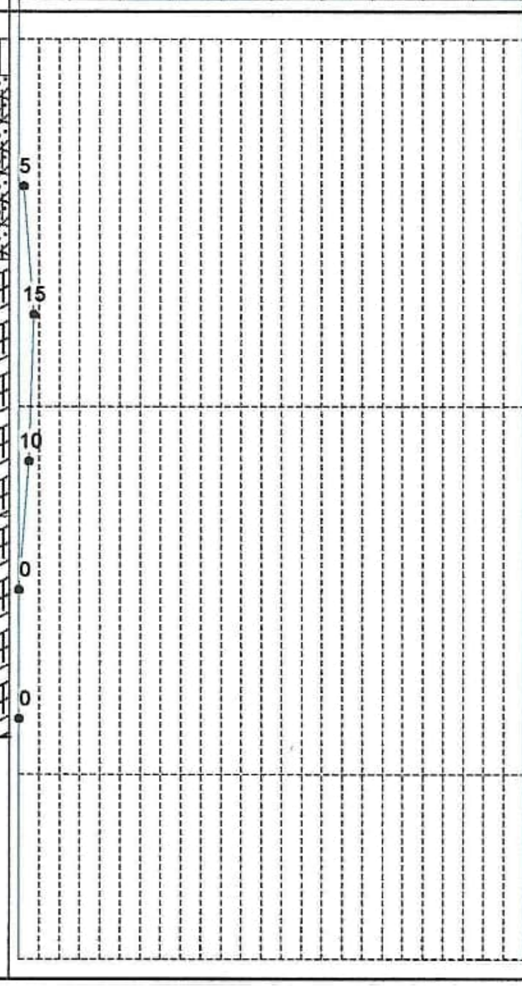
Client: Paul's Hauling

Site Location: Parcel 7 of Plan 9218, Site A

Borehole Number: BH5

J&D

Subsurface Profile		Sample			Screening Results
Depth (m)	Description	Depth	Number	Symbol	Hydrocarbon Vapour Concentrations ppm (0 50 100 150 200 250 300 350 400 450 500)
0	Ground Surface	0			
	Silt Fill - loose, dry	0			
	Mixed Clay Fill - Vegetated Surface - clay/silt/top soil with some granular - moist - wood fibres		1		5
1		1			
	Silty Clay - dry, tan		2		15
2			3		10
		3			
	Clay - firm, brown				
3			4		0
		4	5		0
	End of Borehole				
4					
5					



Drilled By: Raymond Vauclair Projects L:td.

Drill Method: Solid Stem

Drill Dates: July 15, 2021

Hole Size: 125 mm

Datum: Ground Surface

Sheet: 1 of 1

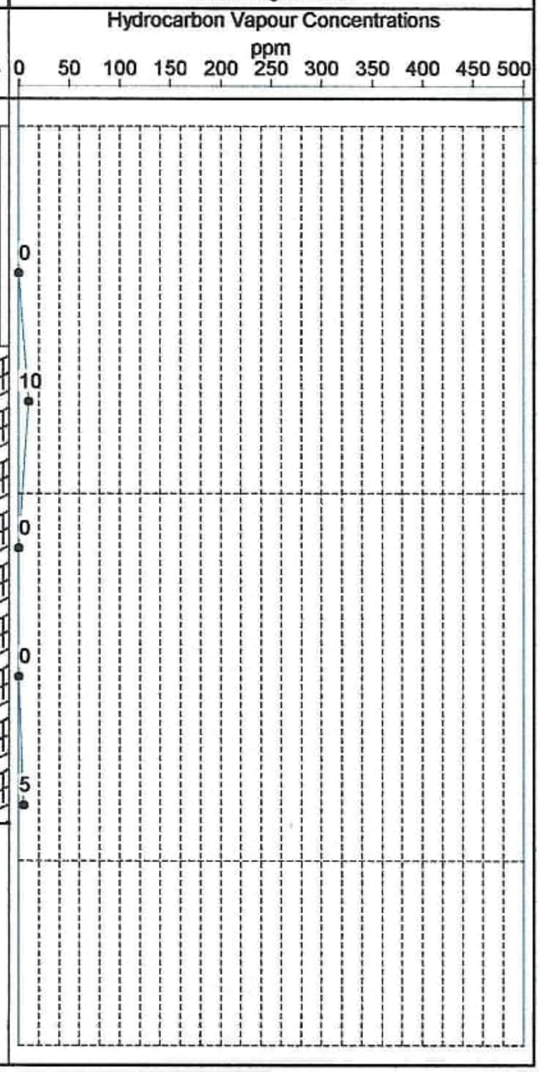
Project: Phase II Environmental Site Assessment

Client: Paul's Hauling

Site Location: Parcel 7 of Plan 9218, Site A

Borehole Number: BH6

Depth (m)	Subsurface Profile – Description	Sample Depth	Sample Number	Symbol
0	Ground Surface	0		
0–1.2	Silt Fill - some clay - loose, dry, light brown		1	
1.2–3.8	Clay - firm, dry, brown - siltier, softer, more moist, lighter brown with depth	1	2, 3, 4, 5	
3.8	End of Borehole	4		



Drilled By: Raymond Vauclair Projects Ltd.

Drill Method: Solid Stem

Drill Dates: July 15, 2021

Hole Size: 125 mm

Datum: Ground Surface

Sheet: 1 of 1

Project: Phase II Environmental Site Assessment

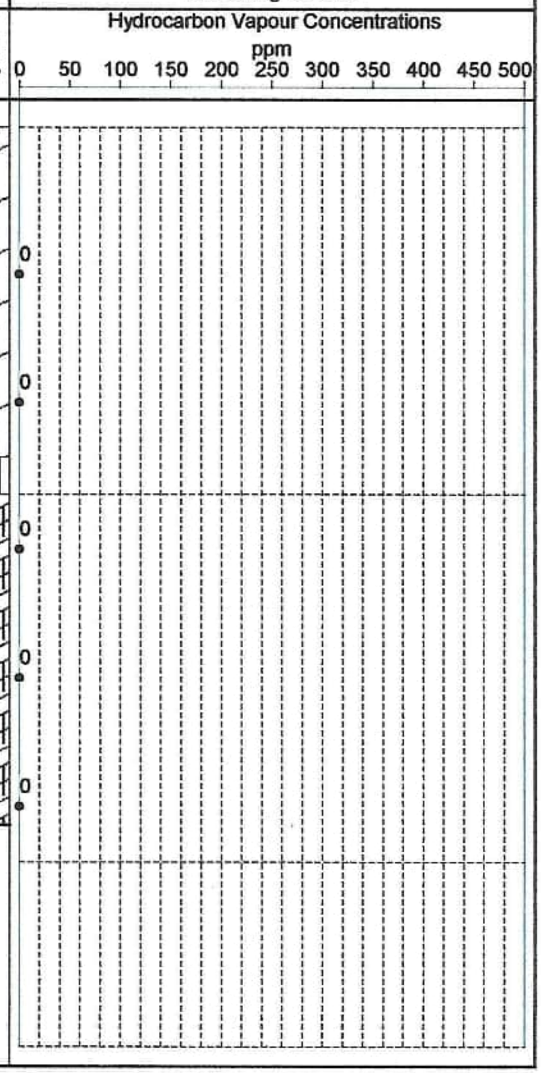
Client: Paul's Hauling

Site Location: Parcel 7 of Plan 9218, Site A

Borehole Number: BH7

Subsurface Profile		Sample		
Depth (m)	Description	Depth	Number	Symbol
0	Ground Surface	0		
	Silty Clay Fill - loose, dry, light brown		1	
1			2	
		2		
	Silt - moist, tan	2		
2	Clay - firm, dry, brown - siltier, softer, more moist, lighter brown with depth		3	
3			4	
		4	5	
4	End of Borehole			
5				

Screening Results



Drilled By: Raymond Vauclair Projects L:td.	Hole Size: 125 mm
Drill Method: Solid Stem	Datum: Ground Surface
Drill Dates: July 15, 2021	Sheet: 1 of 1

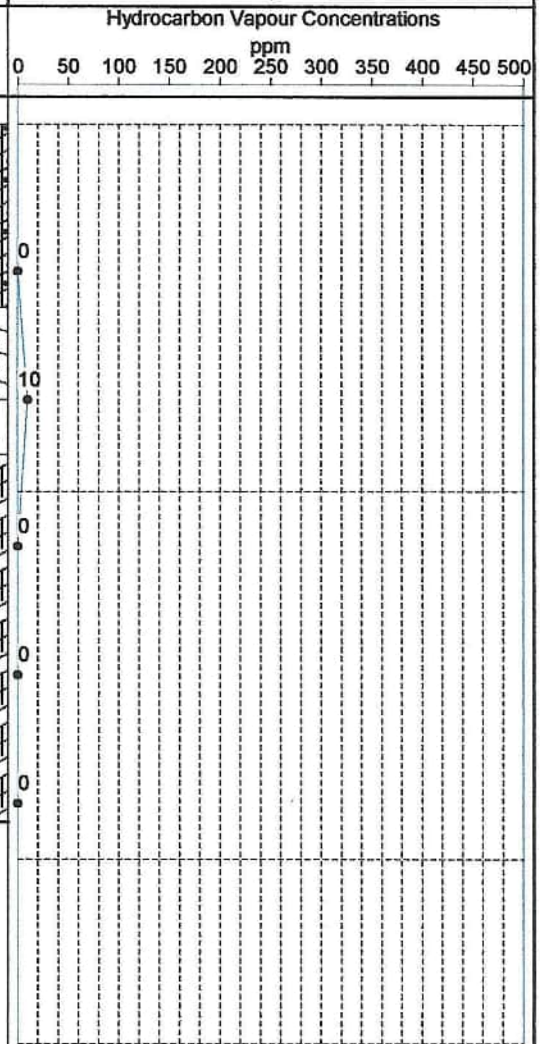
Project: Phase II Environmental Site Assessment

Client: Paul's Hauling

Site Location: Parcel 7 of Plan 9218, Site A

Borehole Number: BH8

Subsurface Profile		Sample			Screening Results
Depth (m)	Description	Depth	Number	Symbol	Hydrocarbon Vapour Concentrations (ppm)
	Ground Surface	0			
0	Mixed Fill - clay/silt/some granular	1	1		0
1	Top Soil	2	2		10
	Silt	2			
2	Clay - firm, dry, brown - siltier, softer, more moist, lighter brown with depth		3		0
3			4		0
		4	5		0
4	End of Borehole				
5					



Drilled By: Raymond Vauclair Projects L:td.

Drill Method: Solid Stem

Drill Dates: July 15, 2021

Hole Size: 125 mm

Datum: Ground Surface

Sheet: 1 of 1

Appendix C

J & D Environmental Inc.
ATTN: DANIAL KOLBA
PO Box 68052 RPO Osborne Village
Winnipeg MB R3L 2V9

Date Received: 16-JUL-21
Report Date: 27-JUL-21 12:04 (MT)
Version: FINAL

Client Phone: 204-960-9605

Certificate of Analysis

Lab Work Order #: L2614767

Project P.O. #: NOT SUBMITTED
Job Reference: SITE A OAK POINT HWY
C of C Numbers:
Legal Site Desc:

Hua Wo
Chemistry Laboratory Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2614767-1 1 - 0.8M							
Sampled By: CLIENT on 15-JUL-21							
Matrix: SOIL							
Miscellaneous Parameters							
% Moisture	18.3		0.25	%	24-JUL-21	25-JUL-21	R5529355
PAHs in Sediment							
1-Methylnaphthalene	0.0334		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
2-Methylnaphthalene	0.0424		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
Acenaphthene	0.0909		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
Acenaphthylene	0.0583		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
Acridine	0.043		0.010	ug/g	26-JUL-21	26-JUL-21	R5529444
Anthracene	0.254		0.0040	ug/g	26-JUL-21	26-JUL-21	R5529444
Benzo(a)anthracene	0.841		0.010	ug/g	26-JUL-21	26-JUL-21	R5529444
Benzo(a)pyrene	0.724		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
Benzo(b&j)fluoranthene	0.998		0.010	ug/g	26-JUL-21	26-JUL-21	R5529444
Benzo(g,h,i)perylene	0.454		0.010	ug/g	26-JUL-21	26-JUL-21	R5529444
Benzo(k)fluoranthene	0.330		0.010	ug/g	26-JUL-21	26-JUL-21	R5529444
Chrysene	0.831		0.010	ug/g	26-JUL-21	26-JUL-21	R5529444
Dibenz(a,h)anthracene	0.131		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
Fluoroanthene	1.72		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
Fluorene	0.0874		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
Indeno(1,2,3-cd)pyrene	0.529		0.010	ug/g	26-JUL-21	26-JUL-21	R5529444
Naphthalene	0.0521		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
Phenanthrene	1.00		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
Pyrene	1.39		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
Quinoline	<0.0050		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
B(a)P Total Potency Equivalent	1.14		0.020	ug/g	26-JUL-21	26-JUL-21	R5529444
IACR (CCME)	14.0		0.15		26-JUL-21	26-JUL-21	R5529444
Surrogate: 2-Fluorobiphenyl	90.1		60-140	%	26-JUL-21	26-JUL-21	R5529444
Surrogate: d14-Terphenyl	92.4		60-140	%	26-JUL-21	26-JUL-21	R5529444
L2614767-2 3 - 0.8M							
Sampled By: CLIENT on 15-JUL-21							
Matrix: SOIL							
Miscellaneous Parameters							
% Moisture	16.7		0.25	%	27-JUL-21	27-JUL-21	R5529622
PAHs in Sediment							
1-Methylnaphthalene	<0.0050		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
2-Methylnaphthalene	<0.0050		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
Acenaphthene	<0.0050		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
Acenaphthylene	<0.0050		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
Acridine	<0.010		0.010	ug/g	26-JUL-21	26-JUL-21	R5529444
Anthracene	0.0076		0.0040	ug/g	26-JUL-21	26-JUL-21	R5529444
Benzo(a)anthracene	0.016	R	0.010	ug/g	26-JUL-21	26-JUL-21	R5529444
Benzo(a)pyrene	0.0138		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
Benzo(b&j)fluoranthene	0.016		0.010	ug/g	26-JUL-21	26-JUL-21	R5529444
Benzo(g,h,i)perylene	0.010		0.010	ug/g	26-JUL-21	26-JUL-21	R5529444
Benzo(k)fluoranthene	<0.010		0.010	ug/g	26-JUL-21	26-JUL-21	R5529444
Chrysene	0.016		0.010	ug/g	26-JUL-21	26-JUL-21	R5529444
Dibenz(a,h)anthracene	<0.0050		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
Fluoroanthene	0.0331		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
Fluorene	<0.0050		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
Indeno(1,2,3-cd)pyrene	0.010		0.010	ug/g	26-JUL-21	26-JUL-21	R5529444
Naphthalene	<0.0050		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
Phenanthrene	0.0264		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
Pyrene	0.0290		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2614767-2 3 - 0.8M							
Sampled By: CLIENT on 15-JUL-21							
Matrix: SOIL							
PAHs in Sediment							
Quinoline	<0.0050		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
B(a)P Total Potency Equivalent	0.021		0.020	ug/g	26-JUL-21	26-JUL-21	R5529444
IACR (CCME)	0.24		0.15		26-JUL-21	26-JUL-21	R5529444
Surrogate: 2-Fluorobiphenyl	86.6		60-140	%	26-JUL-21	26-JUL-21	R5529444
Surrogate: d14-Terphenyl	89.7		60-140	%	26-JUL-21	26-JUL-21	R5529444
L2614767-3 3 - 0.8M							
Sampled By: CLIENT on 15-JUL-21							
Matrix: SOIL							
Miscellaneous Parameters							
Moisture	16.2		0.10	%		21-JUL-21	R5527178
VOC plus F1-F4 by Tumbler							
CCME Total Extractable Hydrocarbons							
F2 (C10-C16)	<25		25	mg/kg	21-JUL-21	22-JUL-21	R5527947
F3 (C16-C34)	<50		50	mg/kg	21-JUL-21	22-JUL-21	R5527947
F4 (C34-C50)	<50		50	mg/kg	21-JUL-21	22-JUL-21	R5527947
Surrogate: 2-Bromobenzotrifluoride	88.7		60-140	%	21-JUL-21	22-JUL-21	R5527947
Chrom. to baseline at nC50	YES				21-JUL-21	22-JUL-21	R5527947
CCME Total Hydrocarbons							
F1-BTEX	<10		10	mg/kg		23-JUL-21	
Total Hydrocarbons (C6-C50)	<76		76	mg/kg		23-JUL-21	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.071		0.071	mg/kg		23-JUL-21	
VOC plus F1 by GCMS							
Acetone	<0.50		0.50	mg/kg	15-JUL-21	19-JUL-21	R5527911
Benzene	<0.0050		0.0050	mg/kg	15-JUL-21	19-JUL-21	R5527911
Bromobenzene	<0.10		0.10	mg/kg	15-JUL-21	19-JUL-21	R5527911
Bromochloromethane	<0.10		0.10	mg/kg	15-JUL-21	19-JUL-21	R5527911
Bromodichloromethane	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
Bromoform	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
Bromomethane	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
n-Butylbenzene	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
sec-Butylbenzene	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
tert-Butylbenzene	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
Carbon disulfide	<0.25		0.25	mg/kg	15-JUL-21	19-JUL-21	R5527911
Carbon Tetrachloride	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
Chlorobenzene	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
Chloroethane	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
Chloroform	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
Chloromethane	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
2-Chlorotoluene	<0.10		0.10	mg/kg	15-JUL-21	19-JUL-21	R5527911
4-Chlorotoluene	<0.10		0.10	mg/kg	15-JUL-21	19-JUL-21	R5527911
Dibromochloromethane	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
1,2-Dibromo-3-chloropropane	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
1,2-Dibromoethane	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
Dibromomethane	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
1,2-Dichlorobenzene	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
1,3-Dichlorobenzene	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
1,4-Dichlorobenzene	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
Dichlorodifluoromethane	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
1,1-dichloroethane	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
1,2-Dichloroethane	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2614767-3 3 - 0.8M							
Sampled By: CLIENT on 15-JUL-21							
Matrix: SOIL							
VOC plus F1 by GCMS							
1,1-dichloroethene	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
cis-1,2-Dichloroethene	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
trans-1,2-Dichloroethene	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
Dichloromethane	<0.10		0.10	mg/kg	15-JUL-21	19-JUL-21	R5527911
1,2-Dichloropropane	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
1,3-Dichloropropane	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
2,2-Dichloropropane	<0.10		0.10	mg/kg	15-JUL-21	19-JUL-21	R5527911
1,1-Dichloropropene	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
cis-1,3-Dichloropropene	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
trans-1,3-Dichloropropene	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
Ethylbenzene	<0.015		0.015	mg/kg	15-JUL-21	19-JUL-21	R5527911
F1	<10		10	mg/kg	15-JUL-21	19-JUL-21	R5527911
Hexachlorobutadiene	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
Hexane	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
2-Hexanone (Methyl butyl ketone)	<0.50		0.50	mg/kg	15-JUL-21	19-JUL-21	R5527911
Isopropylbenzene	<0.10		0.10	mg/kg	15-JUL-21	19-JUL-21	R5527911
4-Isopropyltoluene	<0.10		0.10	mg/kg	15-JUL-21	19-JUL-21	R5527911
MEK	<0.50		0.50	mg/kg	15-JUL-21	19-JUL-21	R5527911
MIBK	<0.50		0.50	mg/kg	15-JUL-21	19-JUL-21	R5527911
MTBE	<0.20		0.20	mg/kg	15-JUL-21	19-JUL-21	R5527911
Styrene	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
1,1,1,2-Tetrachloroethane	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
1,1,2,2-Tetrachloroethane	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
Tetrachloroethene	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
Toluene	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
1,2,3-Trichlorobenzene	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
1,2,4-Trichlorobenzene	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
1,1,1-Trichloroethane	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
1,1,2-Trichloroethane	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
Trichloroethene	<0.010		0.010	mg/kg	15-JUL-21	19-JUL-21	R5527911
Trichlorofluoromethane	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
1,2,3-Trichloropropane	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
1,2,4-Trimethylbenzene	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
1,3,5-Trimethylbenzene	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
Vinyl Chloride	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
M+P-Xylenes	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
o-Xylene	<0.050		0.050	mg/kg	15-JUL-21	19-JUL-21	R5527911
Surrogate: 1,4-Difluorobenzene (SS)	80.7		70-130	%	15-JUL-21	19-JUL-21	R5527911
Surrogate: 3,4-Dichlorotoluene (SS)	98.2		70-130	%	15-JUL-21	19-JUL-21	R5527911
Surrogate: 4-Bromofluorobenzene (SS)	72.7		70-130	%	15-JUL-21	19-JUL-21	R5527911
L2614767-4 3 - 0.8M							
Sampled By: CLIENT on 15-JUL-21							
Matrix: SOIL							
Metals in Soil by CRC ICPMS							
Aluminum (Al)	22700		50	ug/g	26-JUL-21	27-JUL-21	R5529854
Antimony (Sb)	3.01		0.10	ug/g	26-JUL-21	27-JUL-21	R5529854
Arsenic (As)	6.83		0.10	ug/g	26-JUL-21	27-JUL-21	R5529854
Barium (Ba)	181		0.50	ug/g	26-JUL-21	27-JUL-21	R5529854
Beryllium (Be)	0.83		0.10	ug/g	26-JUL-21	27-JUL-21	R5529854
Bismuth (Bi)	0.22		0.20	ug/g	26-JUL-21	27-JUL-21	R5529854

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2614767-4 3 - 0.8M							
Sampled By: CLIENT on 15-JUL-21							
Matrix: SOIL							
Metals in Soil by CRC ICPMS							
Boron (B)	25.1		5.0	ug/g	26-JUL-21	27-JUL-21	R5529854
Cadmium (Cd)	0.345		0.020	ug/g	26-JUL-21	27-JUL-21	R5529854
Calcium (Ca)	61400		50	ug/g	26-JUL-21	27-JUL-21	R5529854
Chromium (Cr)	41.2		0.50	ug/g	26-JUL-21	27-JUL-21	R5529854
Cobalt (Co)	10.8		0.10	ug/g	26-JUL-21	27-JUL-21	R5529854
Copper (Cu)	99.8		0.50	ug/g	26-JUL-21	27-JUL-21	R5529854
Iron (Fe)	23900		50	ug/g	26-JUL-21	27-JUL-21	R5529854
Lead (Pb)	107		0.50	ug/g	26-JUL-21	27-JUL-21	R5529854
Lithium (Li)	26.7		2.0	ug/g	26-JUL-21	27-JUL-21	R5529854
Magnesium (Mg)	33000		20	ug/g	26-JUL-21	27-JUL-21	R5529854
Manganese (Mn)	461		1.0	ug/g	26-JUL-21	27-JUL-21	R5529854
Molybdenum (Mo)	0.70		0.10	ug/g	26-JUL-21	27-JUL-21	R5529854
Nickel (Ni)	33.0		0.50	ug/g	26-JUL-21	27-JUL-21	R5529854
Phosphorus (P)	647		50	ug/g	26-JUL-21	27-JUL-21	R5529854
Potassium (K)	4460		100	ug/g	26-JUL-21	27-JUL-21	R5529854
Selenium (Se)	0.37		0.20	ug/g	26-JUL-21	27-JUL-21	R5529854
Silver (Ag)	0.17		0.10	ug/g	26-JUL-21	27-JUL-21	R5529854
Sodium (Na)	2720		50	ug/g	26-JUL-21	27-JUL-21	R5529854
Strontium (Sr)	95.0		0.50	ug/g	26-JUL-21	27-JUL-21	R5529854
Sulfur (S)	<1000		1000	ug/g	26-JUL-21	27-JUL-21	R5529854
Thallium (Tl)	0.275		0.050	ug/g	26-JUL-21	27-JUL-21	R5529854
Tin (Sn)	16.4		2.0	ug/g	26-JUL-21	27-JUL-21	R5529854
Titanium (Ti)	467		1.0	ug/g	26-JUL-21	27-JUL-21	R5529854
Tungsten (W)	<0.50		0.50	ug/g	26-JUL-21	27-JUL-21	R5529854
Uranium (U)	1.77		0.050	ug/g	26-JUL-21	27-JUL-21	R5529854
Vanadium (V)	65.9		0.20	ug/g	26-JUL-21	27-JUL-21	R5529854
Zinc (Zn)	188		2.0	ug/g	26-JUL-21	27-JUL-21	R5529854
Zirconium (Zr)	5.0		1.0	ug/g	26-JUL-21	27-JUL-21	R5529854
L2614767-5 3 - 1.8M							
Sampled By: CLIENT on 15-JUL-21							
Matrix: SOIL							
Miscellaneous Parameters							
Moisture	20.6		0.10	%		21-JUL-21	R5527178
VOC plus F1-F4 by Tumbler							
CCME Total Extractable Hydrocarbons							
F2 (C10-C16)	<25		25	mg/kg	21-JUL-21	22-JUL-21	R5527947
F3 (C16-C34)	<50		50	mg/kg	21-JUL-21	22-JUL-21	R5527947
F4 (C34-C50)	<50		50	mg/kg	21-JUL-21	22-JUL-21	R5527947
Surrogate: 2-Bromobenzotrifluoride	95.5		60-140	%	21-JUL-21	22-JUL-21	R5527947
Chrom. to baseline at nC50	YES				21-JUL-21	22-JUL-21	R5527947
CCME Total Hydrocarbons							
F1-BTEX	<10		10	mg/kg		23-JUL-21	
Total Hydrocarbons (C6-C50)	<76		76	mg/kg		23-JUL-21	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.071		0.071	mg/kg		23-JUL-21	
VOC plus F1 by GCMS							
Acetone	<0.50		0.50	mg/kg	15-JUL-21	20-JUL-21	R5527911
Benzene	<0.0050		0.0050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Bromobenzene	<0.10		0.10	mg/kg	15-JUL-21	20-JUL-21	R5527911
Bromochloromethane	<0.10		0.10	mg/kg	15-JUL-21	20-JUL-21	R5527911
Bromodichloromethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2614767-5 3 - 1.8M							
Sampled By: CLIENT on 15-JUL-21							
Matrix: SOIL							
VOC plus F1 by GCMS							
Bromoform	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Bromomethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
n-Butylbenzene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
sec-Butylbenzene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
tert-Butylbenzene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Carbon disulfide	<0.25		0.25	mg/kg	15-JUL-21	20-JUL-21	R5527911
Carbon Tetrachloride	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Chlorobenzene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Chloroethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Chloroform	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Chloromethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
2-Chlorotoluene	<0.10		0.10	mg/kg	15-JUL-21	20-JUL-21	R5527911
4-Chlorotoluene	<0.10		0.10	mg/kg	15-JUL-21	20-JUL-21	R5527911
Dibromochloromethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,2-Dibromo-3-chloropropane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,2-Dibromoethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Dibromomethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,2-Dichlorobenzene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,3-Dichlorobenzene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,4-Dichlorobenzene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Dichlorodifluoromethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,1-dichloroethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,2-Dichloroethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,1-dichloroethene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
cis-1,2-Dichloroethene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
trans-1,2-Dichloroethene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Dichloromethane	<0.10		0.10	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,2-Dichloropropane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,3-Dichloropropane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
2,2-Dichloropropane	<0.10		0.10	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,1-Dichloropropene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
cis-1,3-Dichloropropene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
trans-1,3-Dichloropropene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Ethylbenzene	<0.015		0.015	mg/kg	15-JUL-21	20-JUL-21	R5527911
F1	<10		10	mg/kg	15-JUL-21	20-JUL-21	R5527911
Hexachlorobutadiene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Hexane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
2-Hexanone (Methyl butyl ketone)	<0.50		0.50	mg/kg	15-JUL-21	20-JUL-21	R5527911
Isopropylbenzene	<0.10		0.10	mg/kg	15-JUL-21	20-JUL-21	R5527911
4-Isopropyltoluene	<0.10		0.10	mg/kg	15-JUL-21	20-JUL-21	R5527911
MEK	<0.50		0.50	mg/kg	15-JUL-21	20-JUL-21	R5527911
MIBK	<0.50		0.50	mg/kg	15-JUL-21	20-JUL-21	R5527911
MTBE	<0.20		0.20	mg/kg	15-JUL-21	20-JUL-21	R5527911
Styrene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,1,1,2-Tetrachloroethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,1,2,2-Tetrachloroethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Tetrachloroethene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Toluene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,2,3-Trichlorobenzene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,2,4-Trichlorobenzene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,1,1-Trichloroethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2614767-5 3 - 1.8M							
Sampled By: CLIENT on 15-JUL-21							
Matrix: SOIL							
VOC plus F1 by GCMS							
1,1,2-Trichloroethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Trichloroethene	<0.010		0.010	mg/kg	15-JUL-21	20-JUL-21	R5527911
Trichlorofluoromethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,2,3-Trichloropropane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,2,4-Trimethylbenzene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,3,5-Trimethylbenzene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Vinyl Chloride	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
M+P-Xylenes	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
o-Xylene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Surrogate: 1,4-Difluorobenzene (SS)	86.0		70-130	%	15-JUL-21	20-JUL-21	R5527911
Surrogate: 3,4-Dichlorotoluene (SS)	104.0		70-130	%	15-JUL-21	20-JUL-21	R5527911
Surrogate: 4-Bromofluorobenzene (SS)	79.3		70-130	%	15-JUL-21	20-JUL-21	R5527911
L2614767-6 4 - 1.5M							
Sampled By: CLIENT on 15-JUL-21							
Matrix: SOIL							
Miscellaneous Parameters							
% Moisture	31.1		0.25	%	24-JUL-21	25-JUL-21	R5529355
PAHs in Sediment							
1-Methylnaphthalene	<0.0050		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
2-Methylnaphthalene	<0.0050		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
Acenaphthene	<0.0050		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
Acenaphthylene	<0.0050		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
Acridine	<0.010		0.010	ug/g	26-JUL-21	26-JUL-21	R5529444
Anthracene	0.0058		0.0040	ug/g	26-JUL-21	26-JUL-21	R5529444
Benzo(a)anthracene	0.018	R	0.010	ug/g	26-JUL-21	26-JUL-21	R5529444
Benzo(a)pyrene	0.0157		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
Benzo(b&j)fluoranthene	0.022		0.010	ug/g	26-JUL-21	26-JUL-21	R5529444
Benzo(g,h,i)perylene	0.014	R	0.010	ug/g	26-JUL-21	26-JUL-21	R5529444
Benzo(k)fluoranthene	<0.010		0.010	ug/g	26-JUL-21	26-JUL-21	R5529444
Chrysene	0.022		0.010	ug/g	26-JUL-21	26-JUL-21	R5529444
Dibenz(a,h)anthracene	<0.0050		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
Fluoroanthene	0.0387		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
Fluorene	<0.0050		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
Indeno(1,2,3-cd)pyrene	0.012		0.010	ug/g	26-JUL-21	26-JUL-21	R5529444
Naphthalene	<0.0050		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
Phenanthrene	0.0209		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
Pyrene	0.0355		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
Quinoline	<0.0050		0.0050	ug/g	26-JUL-21	26-JUL-21	R5529444
B(a)P Total Potency Equivalent	0.024		0.020	ug/g	26-JUL-21	26-JUL-21	R5529444
IACR (CCME)	0.29		0.15		26-JUL-21	26-JUL-21	R5529444
Surrogate: 2-Fluorobiphenyl	84.8		60-140	%	26-JUL-21	26-JUL-21	R5529444
Surrogate: d14-Terphenyl	74.0		60-140	%	26-JUL-21	26-JUL-21	R5529444
L2614767-7 4 - 1.5M							
Sampled By: CLIENT on 15-JUL-21							
Matrix: SOIL							
Miscellaneous Parameters							
Moisture	28.9		0.10	%		21-JUL-21	R5527178
VOC plus F1-F4 by Tumbler							
CCME Total Extractable Hydrocarbons							
F2 (C10-C16)	<25		25	mg/kg	21-JUL-21	22-JUL-21	R5527947
F3 (C16-C34)	56		50	mg/kg	21-JUL-21	22-JUL-21	R5527947

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2614767-7 4 - 1.5M							
Sampled By: CLIENT on 15-JUL-21							
Matrix: SOIL							
CCME Total Extractable Hydrocarbons							
F4 (C34-C50)	<50		50	mg/kg	21-JUL-21	22-JUL-21	R5527947
Surrogate: 2-Bromobenzotrifluoride	97.9		60-140	%	21-JUL-21	22-JUL-21	R5527947
Chrom. to baseline at nC50	YES				21-JUL-21	22-JUL-21	R5527947
CCME Total Hydrocarbons							
F1-BTEX	<10		10	mg/kg		23-JUL-21	
Total Hydrocarbons (C6-C50)	<76		76	mg/kg		23-JUL-21	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.071		0.071	mg/kg		23-JUL-21	
VOC plus F1 by GCMS							
Acetone	<0.50		0.50	mg/kg	15-JUL-21	20-JUL-21	R5527911
Benzene	<0.0050		0.0050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Bromobenzene	<0.10		0.10	mg/kg	15-JUL-21	20-JUL-21	R5527911
Bromochloromethane	<0.10		0.10	mg/kg	15-JUL-21	20-JUL-21	R5527911
Bromodichloromethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Bromoform	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Bromomethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
n-Butylbenzene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
sec-Butylbenzene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
tert-Butylbenzene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Carbon disulfide	<0.25		0.25	mg/kg	15-JUL-21	20-JUL-21	R5527911
Carbon Tetrachloride	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Chlorobenzene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Chloroethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Chloroform	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Chloromethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
2-Chlorotoluene	<0.10		0.10	mg/kg	15-JUL-21	20-JUL-21	R5527911
4-Chlorotoluene	<0.10		0.10	mg/kg	15-JUL-21	20-JUL-21	R5527911
Dibromochloromethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,2-Dibromo-3-chloropropane	<0.20	DLCI	0.20	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,2-Dibromoethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Dibromomethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,2-Dichlorobenzene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,3-Dichlorobenzene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,4-Dichlorobenzene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Dichlorodifluoromethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,1-dichloroethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,2-Dichloroethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,1-dichloroethene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
cis-1,2-Dichloroethene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
trans-1,2-Dichloroethene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Dichloromethane	<0.10		0.10	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,2-Dichloropropane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,3-Dichloropropane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
2,2-Dichloropropane	<0.10		0.10	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,1-Dichloropropene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
cis-1,3-Dichloropropene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
trans-1,3-Dichloropropene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Ethylbenzene	<0.015		0.015	mg/kg	15-JUL-21	20-JUL-21	R5527911
F1	<10		10	mg/kg	15-JUL-21	20-JUL-21	R5527911
Hexachlorobutadiene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Hexane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
2-Hexanone (Methyl butyl ketone)	<0.50		0.50	mg/kg	15-JUL-21	20-JUL-21	R5527911

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2614767-7 4 - 1.5M							
Sampled By: CLIENT on 15-JUL-21							
Matrix: SOIL							
VOC plus F1 by GCMS							
Isopropylbenzene	<0.10		0.10	mg/kg	15-JUL-21	20-JUL-21	R5527911
4-Isopropyltoluene	<0.10		0.10	mg/kg	15-JUL-21	20-JUL-21	R5527911
MEK	<0.50		0.50	mg/kg	15-JUL-21	20-JUL-21	R5527911
MIBK	<0.50		0.50	mg/kg	15-JUL-21	20-JUL-21	R5527911
MTBE	<0.20		0.20	mg/kg	15-JUL-21	20-JUL-21	R5527911
Styrene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,1,1,2-Tetrachloroethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,1,2,2-Tetrachloroethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Tetrachloroethene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Toluene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,2,3-Trichlorobenzene	<1.0	DLCI	1.0	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,2,4-Trichlorobenzene	<0.20	DLCI	0.20	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,1,1-Trichloroethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,1,2-Trichloroethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Trichloroethene	<0.010		0.010	mg/kg	15-JUL-21	20-JUL-21	R5527911
Trichlorofluoromethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,2,3-Trichloropropane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,2,4-Trimethylbenzene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,3,5-Trimethylbenzene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Vinyl Chloride	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
M+P-Xylenes	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
o-Xylene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Surrogate: 1,4-Difluorobenzene (SS)	94.4		70-130	%	15-JUL-21	20-JUL-21	R5527911
Surrogate: 3,4-Dichlorotoluene (SS)	119.2		70-130	%	15-JUL-21	20-JUL-21	R5527911
Surrogate: 4-Bromofluorobenzene (SS)	88.0		70-130	%	15-JUL-21	20-JUL-21	R5527911
L2614767-8 5 - 0.08M							
Sampled By: CLIENT on 15-JUL-21							
Matrix: SOIL							
Metals in Soil by CRC ICPMS							
Aluminum (Al)	21600		50	ug/g	26-JUL-21	27-JUL-21	R5529854
Antimony (Sb)	8.87		0.10	ug/g	26-JUL-21	27-JUL-21	R5529854
Arsenic (As)	8.18		0.10	ug/g	26-JUL-21	27-JUL-21	R5529854
Barium (Ba)	234		0.50	ug/g	26-JUL-21	27-JUL-21	R5529854
Beryllium (Be)	0.86		0.10	ug/g	26-JUL-21	27-JUL-21	R5529854
Bismuth (Bi)	0.36		0.20	ug/g	26-JUL-21	27-JUL-21	R5529854
Boron (B)	23.0		5.0	ug/g	26-JUL-21	27-JUL-21	R5529854
Cadmium (Cd)	0.423		0.020	ug/g	26-JUL-21	27-JUL-21	R5529854
Calcium (Ca)	51600		50	ug/g	26-JUL-21	27-JUL-21	R5529854
Chromium (Cr)	39.7		0.50	ug/g	26-JUL-21	27-JUL-21	R5529854
Cobalt (Co)	11.5		0.10	ug/g	26-JUL-21	27-JUL-21	R5529854
Copper (Cu)	416		0.50	ug/g	26-JUL-21	27-JUL-21	R5529854
Iron (Fe)	24700		50	ug/g	26-JUL-21	27-JUL-21	R5529854
Lead (Pb)	321		0.50	ug/g	26-JUL-21	27-JUL-21	R5529854
Lithium (Li)	24.4		2.0	ug/g	26-JUL-21	27-JUL-21	R5529854
Magnesium (Mg)	24000		20	ug/g	26-JUL-21	27-JUL-21	R5529854
Manganese (Mn)	464		1.0	ug/g	26-JUL-21	27-JUL-21	R5529854
Molybdenum (Mo)	1.14		0.10	ug/g	26-JUL-21	27-JUL-21	R5529854
Nickel (Ni)	37.5		0.50	ug/g	26-JUL-21	27-JUL-21	R5529854
Phosphorus (P)	598		50	ug/g	26-JUL-21	27-JUL-21	R5529854
Potassium (K)	4090		100	ug/g	26-JUL-21	27-JUL-21	R5529854

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2614767-8 5 - 0.08M							
Sampled By: CLIENT on 15-JUL-21							
Matrix: SOIL							
Metals in Soil by CRC ICPMS							
Selenium (Se)	0.40		0.20	ug/g	26-JUL-21	27-JUL-21	R5529854
Silver (Ag)	0.54		0.10	ug/g	26-JUL-21	27-JUL-21	R5529854
Sodium (Na)	3840		50	ug/g	26-JUL-21	27-JUL-21	R5529854
Strontium (Sr)	2600		0.50	ug/g	26-JUL-21	27-JUL-21	R5529854
Sulfur (S)	1200		1000	ug/g	26-JUL-21	27-JUL-21	R5529854
Thallium (Tl)	0.264		0.050	ug/g	26-JUL-21	27-JUL-21	R5529854
Tin (Sn)	31.3		2.0	ug/g	26-JUL-21	27-JUL-21	R5529854
Titanium (Ti)	293		1.0	ug/g	26-JUL-21	27-JUL-21	R5529854
Tungsten (W)	<0.50		0.50	ug/g	26-JUL-21	27-JUL-21	R5529854
Uranium (U)	1.55		0.050	ug/g	26-JUL-21	27-JUL-21	R5529854
Vanadium (V)	65.9		0.20	ug/g	26-JUL-21	27-JUL-21	R5529854
Zinc (Zn)	357		2.0	ug/g	26-JUL-21	27-JUL-21	R5529854
Zirconium (Zr)	9.2		1.0	ug/g	26-JUL-21	27-JUL-21	R5529854
L2614767-9 6 - 1.5M							
Sampled By: CLIENT on 15-JUL-21							
Matrix: SOIL							
Miscellaneous Parameters							
Moisture	15.2		0.10	%		21-JUL-21	R5527178
VOC plus F1-F4 by Tumbler							
CCME Total Extractable Hydrocarbons							
F2 (C10-C16)	<25		25	mg/kg	21-JUL-21	22-JUL-21	R5527947
F3 (C16-C34)	52		50	mg/kg	21-JUL-21	22-JUL-21	R5527947
F4 (C34-C50)	51		50	mg/kg	21-JUL-21	22-JUL-21	R5527947
Surrogate: 2-Bromobenzotrifluoride	98.9		60-140	%	21-JUL-21	22-JUL-21	R5527947
Chrom. to baseline at nC50	YES				21-JUL-21	22-JUL-21	R5527947
CCME Total Hydrocarbons							
F1-BTEX	<10		10	mg/kg		23-JUL-21	
Total Hydrocarbons (C6-C50)	103		76	mg/kg		23-JUL-21	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.071		0.071	mg/kg		23-JUL-21	
VOC plus F1 by GCMS							
Acetone	<0.50		0.50	mg/kg	15-JUL-21	20-JUL-21	R5527911
Benzene	<0.0050		0.0050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Bromobenzene	<0.10		0.10	mg/kg	15-JUL-21	20-JUL-21	R5527911
Bromochloromethane	<0.10		0.10	mg/kg	15-JUL-21	20-JUL-21	R5527911
Bromodichloromethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Bromoform	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Bromomethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
n-Butylbenzene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
sec-Butylbenzene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
tert-Butylbenzene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Carbon disulfide	<0.25		0.25	mg/kg	15-JUL-21	20-JUL-21	R5527911
Carbon Tetrachloride	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Chlorobenzene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Chloroethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Chloroform	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Chloromethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
2-Chlorotoluene	<0.10		0.10	mg/kg	15-JUL-21	20-JUL-21	R5527911
4-Chlorotoluene	<0.10		0.10	mg/kg	15-JUL-21	20-JUL-21	R5527911
Dibromochloromethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,2-Dibromo-3-chloropropane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2614767-9 6 - 1.5M							
Sampled By: CLIENT on 15-JUL-21							
Matrix: SOIL							
VOC plus F1 by GCMS							
1,2-Dibromoethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Dibromomethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,2-Dichlorobenzene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,3-Dichlorobenzene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,4-Dichlorobenzene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Dichlorodifluoromethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,1-dichloroethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,2-Dichloroethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,1-dichloroethene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
cis-1,2-Dichloroethene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
trans-1,2-Dichloroethene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Dichloromethane	<0.10		0.10	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,2-Dichloropropane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,3-Dichloropropane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
2,2-Dichloropropane	<0.10		0.10	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,1-Dichloropropene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
cis-1,3-Dichloropropene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
trans-1,3-Dichloropropene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Ethylbenzene	<0.015		0.015	mg/kg	15-JUL-21	20-JUL-21	R5527911
F1	<10		10	mg/kg	15-JUL-21	20-JUL-21	R5527911
Hexachlorobutadiene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Hexane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
2-Hexanone (Methyl butyl ketone)	<0.50		0.50	mg/kg	15-JUL-21	20-JUL-21	R5527911
Isopropylbenzene	<0.10		0.10	mg/kg	15-JUL-21	20-JUL-21	R5527911
4-Isopropyltoluene	<0.10		0.10	mg/kg	15-JUL-21	20-JUL-21	R5527911
MEK	<0.50		0.50	mg/kg	15-JUL-21	20-JUL-21	R5527911
MIBK	<0.50		0.50	mg/kg	15-JUL-21	20-JUL-21	R5527911
MTBE	<0.20		0.20	mg/kg	15-JUL-21	20-JUL-21	R5527911
Styrene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,1,1,2-Tetrachloroethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,1,2,2-Tetrachloroethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Tetrachloroethene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Toluene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,2,3-Trichlorobenzene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,2,4-Trichlorobenzene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,1,1-Trichloroethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,1,2-Trichloroethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Trichloroethene	<0.010		0.010	mg/kg	15-JUL-21	20-JUL-21	R5527911
Trichlorofluoromethane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,2,3-Trichloropropane	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,2,4-Trimethylbenzene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
1,3,5-Trimethylbenzene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Vinyl Chloride	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
M+P-Xylenes	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
o-Xylene	<0.050		0.050	mg/kg	15-JUL-21	20-JUL-21	R5527911
Surrogate: 1,4-Difluorobenzene (SS)	94.2		70-130	%	15-JUL-21	20-JUL-21	R5527911
Surrogate: 3,4-Dichlorotoluene (SS)	99.2		70-130	%	15-JUL-21	20-JUL-21	R5527911
Surrogate: 4-Bromofluorobenzene (SS)	87.5		70-130	%	15-JUL-21	20-JUL-21	R5527911
L2614767-10 7 - 0.8M							
Sampled By: CLIENT on 15-JUL-21							
Matrix: SOIL							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2614767-10 7 - 0.8M							
Sampled By: CLIENT on 15-JUL-21							
Matrix: SOIL							
Metals in Soil by CRC ICPMS							
Aluminum (Al)	19400		50	ug/g	26-JUL-21	27-JUL-21	R5529854
Antimony (Sb)	9.03		0.10	ug/g	26-JUL-21	27-JUL-21	R5529854
Arsenic (As)	12.6		0.10	ug/g	26-JUL-21	27-JUL-21	R5529854
Barium (Ba)	194		0.50	ug/g	26-JUL-21	27-JUL-21	R5529854
Beryllium (Be)	0.81		0.10	ug/g	26-JUL-21	27-JUL-21	R5529854
Bismuth (Bi)	0.24		0.20	ug/g	26-JUL-21	27-JUL-21	R5529854
Boron (B)	25.1		5.0	ug/g	26-JUL-21	27-JUL-21	R5529854
Cadmium (Cd)	0.808		0.020	ug/g	26-JUL-21	27-JUL-21	R5529854
Calcium (Ca)	63900		50	ug/g	26-JUL-21	27-JUL-21	R5529854
Chromium (Cr)	36.5		0.50	ug/g	26-JUL-21	27-JUL-21	R5529854
Cobalt (Co)	11.0		0.10	ug/g	26-JUL-21	27-JUL-21	R5529854
Copper (Cu)	43.0		0.50	ug/g	26-JUL-21	27-JUL-21	R5529854
Iron (Fe)	23700		50	ug/g	26-JUL-21	27-JUL-21	R5529854
Lead (Pb)	443		0.50	ug/g	26-JUL-21	27-JUL-21	R5529854
Lithium (Li)	21.1		2.0	ug/g	26-JUL-21	27-JUL-21	R5529854
Magnesium (Mg)	34100		20	ug/g	26-JUL-21	27-JUL-21	R5529854
Manganese (Mn)	563		1.0	ug/g	26-JUL-21	27-JUL-21	R5529854
Molybdenum (Mo)	0.71		0.10	ug/g	26-JUL-21	27-JUL-21	R5529854
Nickel (Ni)	31.7		0.50	ug/g	26-JUL-21	27-JUL-21	R5529854
Phosphorus (P)	610		50	ug/g	26-JUL-21	27-JUL-21	R5529854
Potassium (K)	3610		100	ug/g	26-JUL-21	27-JUL-21	R5529854
Selenium (Se)	0.54		0.20	ug/g	26-JUL-21	27-JUL-21	R5529854
Silver (Ag)	0.14		0.10	ug/g	26-JUL-21	27-JUL-21	R5529854
Sodium (Na)	1070		50	ug/g	26-JUL-21	27-JUL-21	R5529854
Strontium (Sr)	101		0.50	ug/g	26-JUL-21	27-JUL-21	R5529854
Sulfur (S)	<1000		1000	ug/g	26-JUL-21	27-JUL-21	R5529854
Thallium (Tl)	0.305		0.050	ug/g	26-JUL-21	27-JUL-21	R5529854
Tin (Sn)	5.9		2.0	ug/g	26-JUL-21	27-JUL-21	R5529854
Titanium (Ti)	281		1.0	ug/g	26-JUL-21	27-JUL-21	R5529854
Tungsten (W)	<0.50		0.50	ug/g	26-JUL-21	27-JUL-21	R5529854
Uranium (U)	1.72		0.050	ug/g	26-JUL-21	27-JUL-21	R5529854
Vanadium (V)	72.9		0.20	ug/g	26-JUL-21	27-JUL-21	R5529854
Zinc (Zn)	108		2.0	ug/g	26-JUL-21	27-JUL-21	R5529854
Zirconium (Zr)	9.2		1.0	ug/g	26-JUL-21	27-JUL-21	R5529854

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLCI	Detection Limit Raised: Chromatographic Interference due to co-elution.
R	The ion abundance ratio(s) did not meet the acceptance criteria. Value is an estimated maximum.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
F1-F4-CALC-WP	Soil	CCME Total Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001-S

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F2-F4-TMB-FID-WP	Soil	CCME Total Extractable Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001

A soil or sediment sample is extracted with 1:1 hexane/acetone in a tumbler, followed by a silica gel clean up to facilitate separation of the hydrocarbons from other polar extractions. An aliquot of the solvent is analyzed using a gas chromatograph equipped with a flame -ionization detector.

MET-200.2-CCMS-WT	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020B (mod)

Soil/sediment is dried, disaggregated, and sieved (2 mm). For tests intended to support Ontario regulations, the <2mm fraction is ground to pass through a 0.355 mm sieve. Strong Acid Leachable Metals in the <2mm fraction are solubilized by heated digestion with nitric and hydrochloric acids. Instrumental analysis is by Collision / Reaction Cell ICPMS.

Limitations: This method is intended to liberate environmentally available metals. Silicate minerals are not solubilized. Some metals may be only partially recovered (matrix dependent), including Al, Ba, Be, Cr, S, Sr, Ti, Tl, V, W, and Zr. Elemental Sulfur may be poorly recovered by this method. Volatile forms of sulfur (e.g. sulfide, H2S) may be excluded if lost during sampling, storage, or digestion.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

MOISTURE-WP	Soil	% Moisture	CCME PHC in Soil - Tier 1 (mod)

Moisture content in solid matrices is determined gravimetrically after drying to constant weight at 105°C.

MOISTURE-WT	Soil	% Moisture	CCME PHC in Soil - Tier 1 (mod)
PAH-CCME-SQGL-WT	Soil	PAHs in Sediment	SW846 8270

The procedure uses a mechanical shaking technique to extract a representative sub-sample with a mixture of methanol and toluene. The extract is analyzed by GC/MSD. Depending on the analytical GC/MS column used benzo(j)fluoranthene may chromatographically co-elute with benzo(b)fluoranthene or benzo(k)fluoranthene.

VOC+F1-HSMS-WP	Soil	VOC plus F1 by GCMS	EPA 8260C

The soil methanol extract is added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

XYLENES-SUM-CALC-WP	Soil	Sum of Xylene Isomer Concentrations	CALCULATED RESULT

Total xylenes represents the sum of o-xylene and m&p-xylene.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: J & D Environmental Inc.
PO Box 68052 RPO Osborne Village
Winnipeg MB R3L 2V9

Contact: DANIAL KOLBA

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2-F4-TMB-FID-WP	**Soil**							
Batch R5527947								
WG3582290-3 IRM		**ALS PHC RM3**						
F2 (C10-C16)			109.7		%		70-130	22-JUL-21
F3 (C16-C34)			97.5		%		70-130	22-JUL-21
F4 (C34-C50)			109.0		%		70-130	22-JUL-21
WG3582290-2 LCS								
F2 (C10-C16)			94.8		%		70-130	22-JUL-21
F3 (C16-C34)			92.4		%		70-130	22-JUL-21
F4 (C34-C50)			96.7		%		70-130	22-JUL-21
WG3582290-1 MB								
F2 (C10-C16)			<25		mg/kg		25	22-JUL-21
F3 (C16-C34)			<50		mg/kg		50	22-JUL-21
F4 (C34-C50)			<50		mg/kg		50	22-JUL-21
Surrogate: 2-Bromobenzotrifluoride			105.1		%		60-140	22-JUL-21
MET-200.2-CCMS-WT	**Soil**							
Batch R5529854								
WG3584143-2 CRM		**WT-SS-2**						
Aluminum (Al)			115.4		%		70-130	27-JUL-21
Antimony (Sb)			108.2		%		70-130	27-JUL-21
Arsenic (As)			116.6		%		70-130	27-JUL-21
Barium (Ba)			113.9		%		70-130	27-JUL-21
Beryllium (Be)			109.7		%		70-130	27-JUL-21
Bismuth (Bi)			0.15		mg/kg		0-0.34	27-JUL-21
Boron (B)			9.5		mg/kg		3.5-13.5	27-JUL-21
Cadmium (Cd)			120.9		%		70-130	27-JUL-21
Calcium (Ca)			103.4		%		70-130	27-JUL-21
Chromium (Cr)			118.5		%		70-130	27-JUL-21
Cobalt (Co)			115.6		%		70-130	27-JUL-21
Copper (Cu)			106.8		%		70-130	27-JUL-21
Iron (Fe)			110.9		%		70-130	27-JUL-21
Lead (Pb)			110.1		%		70-130	27-JUL-21
Lithium (Li)			102.4		%		70-130	27-JUL-21
Magnesium (Mg)			114.8		%		70-130	27-JUL-21
Manganese (Mn)			116.3		%		70-130	27-JUL-21
Molybdenum (Mo)			107.3		%		70-130	27-JUL-21
Nickel (Ni)			116.1		%		70-130	27-JUL-21
Phosphorus (P)			110.3		%		70-130	27-JUL-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R5529854								
WG3584143-2 CRM		**WT-SS-2**						
Potassium (K)			118.6		%		70-130	27-JUL-21
Selenium (Se)			0.13		mg/kg		0-0.34	27-JUL-21
Silver (Ag)			99.0		%		70-130	27-JUL-21
Sodium (Na)			113.9		%		70-130	27-JUL-21
Strontium (Sr)			108.4		%		70-130	27-JUL-21
Thallium (Tl)			0.088		mg/kg		0.029-0.129	27-JUL-21
Tin (Sn)			110.3		%		70-130	27-JUL-21
Titanium (Ti)			123.1		%		70-130	27-JUL-21
Uranium (U)			112.0		%		70-130	27-JUL-21
Vanadium (V)			118.5		%		70-130	27-JUL-21
Zinc (Zn)			109.8		%		70-130	27-JUL-21
Zirconium (Zr)			109.7		%		70-130	27-JUL-21
WG3584143-3 LCS		**1+2**						
Aluminum (Al)			107.6		%		80-120	27-JUL-21
Antimony (Sb)			105.6		%		80-120	27-JUL-21
Arsenic (As)			111.2		%		80-120	27-JUL-21
Barium (Ba)			109.6		%		80-120	27-JUL-21
Beryllium (Be)			97.1		%		80-120	27-JUL-21
Bismuth (Bi)			103.0		%		80-120	27-JUL-21
Boron (B)			92.6		%		80-120	27-JUL-21
Cadmium (Cd)			102.2		%		80-120	27-JUL-21
Calcium (Ca)			99.6		%		80-120	27-JUL-21
Chromium (Cr)			107.6		%		80-120	27-JUL-21
Cobalt (Co)			108.3		%		80-120	27-JUL-21
Copper (Cu)			106.4		%		80-120	27-JUL-21
Iron (Fe)			105.1		%		80-120	27-JUL-21
Lead (Pb)			103.3		%		80-120	27-JUL-21
Lithium (Li)			96.4		%		80-120	27-JUL-21
Magnesium (Mg)			108.5		%		80-120	27-JUL-21
Manganese (Mn)			108.1		%		80-120	27-JUL-21
Molybdenum (Mo)			103.7		%		80-120	27-JUL-21
Nickel (Ni)			107.7		%		80-120	27-JUL-21
Phosphorus (P)			105.1		%		80-120	27-JUL-21
Potassium (K)			107.6		%		80-120	27-JUL-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R5529854								
WG3584143-3 LCS		**1+2**						
Selenium (Se)			99.1		%		80-120	27-JUL-21
Silver (Ag)			106.6		%		80-120	27-JUL-21
Sodium (Na)			108.2		%		80-120	27-JUL-21
Strontium (Sr)			105.5		%		80-120	27-JUL-21
Sulfur (S)			101.5		%		80-120	27-JUL-21
Thallium (Tl)			103.9		%		80-120	27-JUL-21
Tin (Sn)			104.4		%		80-120	27-JUL-21
Titanium (Ti)			104.8		%		80-120	27-JUL-21
Tungsten (W)			105.3		%		80-120	27-JUL-21
Uranium (U)			105.5		%		80-120	27-JUL-21
Vanadium (V)			110.5		%		80-120	27-JUL-21
Zinc (Zn)			104.5		%		80-120	27-JUL-21
Zirconium (Zr)			104.5		%		80-120	27-JUL-21
WG3584143-1 MB								
Aluminum (Al)			<50		mg/kg		50	27-JUL-21
Antimony (Sb)			<0.10		mg/kg		0.1	27-JUL-21
Arsenic (As)			<0.10		mg/kg		0.1	27-JUL-21
Barium (Ba)			<0.50		mg/kg		0.5	27-JUL-21
Beryllium (Be)			<0.10		mg/kg		0.1	27-JUL-21
Bismuth (Bi)			<0.20		mg/kg		0.2	27-JUL-21
Boron (B)			<5.0		mg/kg		5	27-JUL-21
Cadmium (Cd)			<0.020		mg/kg		0.02	27-JUL-21
Calcium (Ca)			<50		mg/kg		50	27-JUL-21
Chromium (Cr)			<0.50		mg/kg		0.5	27-JUL-21
Cobalt (Co)			<0.10		mg/kg		0.1	27-JUL-21
Copper (Cu)			<0.50		mg/kg		0.5	27-JUL-21
Iron (Fe)			<50		mg/kg		50	27-JUL-21
Lead (Pb)			<0.50		mg/kg		0.5	27-JUL-21
Lithium (Li)			<2.0		mg/kg		2	27-JUL-21
Magnesium (Mg)			<20		mg/kg		20	27-JUL-21
Manganese (Mn)			<1.0		mg/kg		1	27-JUL-21
Molybdenum (Mo)			<0.10		mg/kg		0.1	27-JUL-21
Nickel (Ni)			<0.50		mg/kg		0.5	27-JUL-21
Phosphorus (P)			<50		mg/kg		50	27-JUL-21

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R5529854								
WG3584143-1 MB								
Potassium (K)			<100		mg/kg		100	27-JUL-21
Selenium (Se)			<0.20		mg/kg		0.2	27-JUL-21
Silver (Ag)			<0.10		mg/kg		0.1	27-JUL-21
Sodium (Na)			<50		mg/kg		50	27-JUL-21
Strontium (Sr)			<0.50		mg/kg		0.5	27-JUL-21
Sulfur (S)			<1000		mg/kg		1000	27-JUL-21
Thallium (Tl)			<0.050		mg/kg		0.05	27-JUL-21
Tin (Sn)			<2.0		mg/kg		2	27-JUL-21
Titanium (Ti)			<1.0		mg/kg		1	27-JUL-21
Tungsten (W)			<0.50		mg/kg		0.5	27-JUL-21
Uranium (U)			<0.050		mg/kg		0.05	27-JUL-21
Vanadium (V)			<0.20		mg/kg		0.2	27-JUL-21
Zinc (Zn)			<2.0		mg/kg		2	27-JUL-21
Zirconium (Zr)			<1.0		mg/kg		1	27-JUL-21
MOISTURE-WP	**Soil**							
Batch R5527178								
WG3580764-3 DUP		**L2614767-5**						
Moisture		20.6	19.4		%	6.2	20	21-JUL-21
WG3580764-2 LCS								
Moisture			100.9		%		90-110	21-JUL-21
WG3580764-1 MB								
Moisture			<0.10		%		0.1	21-JUL-21
MOISTURE-WT	**Soil**							
Batch R5529355								
WG3583025-2 LCS								
% Moisture			100.6		%		90-110	25-JUL-21
WG3583025-1 MB								
% Moisture			<0.25		%		0.25	25-JUL-21
Batch R5529622								
WG3584111-2 LCS								
% Moisture			99.9		%		90-110	27-JUL-21
WG3584111-1 MB								
% Moisture			<0.25		%		0.25	27-JUL-21
PAH-CCME-SQGL-WT	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-CCME-SQGL-WT	**Soil**							
Batch R5529444								
WG3583291-3 DUP		**L2614767-2**						
1-Methylnaphthalene		<0.0050	<0.0050	RPD-NA	ug/g	N/A	50	27-JUL-21
2-Methylnaphthalene		<0.0050	<0.0050	RPD-NA	ug/g	N/A	50	27-JUL-21
Acenaphthene		<0.0050	<0.0050	RPD-NA	ug/g	N/A	50	27-JUL-21
Acenaphthylene		<0.0050	<0.0050	RPD-NA	ug/g	N/A	50	27-JUL-21
Acridine		<0.010	<0.010	RPD-NA	ug/g	N/A	50	27-JUL-21
Anthracene		0.0076	0.0050		ug/g	41	50	27-JUL-21
Benzo(a)anthracene		0.016	0.013		ug/g	19	50	27-JUL-21
Benzo(a)pyrene		0.0138	0.0116		ug/g	18	50	27-JUL-21
Benzo(b&j)fluoranthene		0.016	0.014		ug/g	14	50	27-JUL-21
Benzo(g,h,i)perylene		0.010	<0.010	RPD-NA	ug/g	N/A	50	27-JUL-21
Benzo(k)fluoranthene		<0.010	<0.010	RPD-NA	ug/g	N/A	50	27-JUL-21
Chrysene		0.016	0.015		ug/g	7.3	50	27-JUL-21
Dibenz(a,h)anthracene		<0.0050	<0.0050	RPD-NA	ug/g	N/A	50	27-JUL-21
Fluoroanthene		0.0331	0.0264		ug/g	22	50	27-JUL-21
Fluorene		<0.0050	<0.0050	RPD-NA	ug/g	N/A	50	27-JUL-21
Indeno(1,2,3-cd)pyrene		0.010	<0.010	RPD-NA	ug/g	N/A	50	27-JUL-21
Naphthalene		<0.0050	<0.0050	RPD-NA	ug/g	N/A	50	27-JUL-21
Phenanthrene		0.0264	0.0188		ug/g	33	50	27-JUL-21
Pyrene		0.0290	0.0233		ug/g	22	50	27-JUL-21
Quinoline		<0.0050	<0.0050	RPD-NA	ug/g	N/A	50	27-JUL-21
WG3583291-2 LCS								
1-Methylnaphthalene			88.6		%		50-140	26-JUL-21
2-Methylnaphthalene			86.8		%		50-140	26-JUL-21
Acenaphthene			86.9		%		50-140	26-JUL-21
Acenaphthylene			85.9		%		50-140	26-JUL-21
Acridine			82.8		%		50-140	26-JUL-21
Anthracene			76.9		%		50-140	26-JUL-21
Benzo(a)anthracene			89.6		%		50-140	26-JUL-21
Benzo(a)pyrene			73.9		%		50-140	26-JUL-21
Benzo(b&j)fluoranthene			84.0		%		50-150	26-JUL-21
Benzo(g,h,i)perylene			76.9		%		50-140	26-JUL-21
Benzo(k)fluoranthene			80.0		%		50-140	26-JUL-21
Chrysene			86.1		%		50-140	26-JUL-21
Dibenz(a,h)anthracene			82.4		%		50-140	26-JUL-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-CCME-SQGL-WT	**Soil**							
Batch R5529444								
WG3583291-2 LCS								
Fluoroanthene			88.3		%		50-140	26-JUL-21
Fluorene			86.4		%		50-140	26-JUL-21
Indeno(1,2,3-cd)pyrene			88.9		%		50-140	26-JUL-21
Naphthalene			82.9		%		50-140	26-JUL-21
Phenanthrene			86.3		%		50-140	26-JUL-21
Pyrene			87.1		%		50-140	26-JUL-21
Quinoline			75.1		%		50-140	26-JUL-21
WG3583291-1 MB								
1-Methylnaphthalene			<0.0050		ug/g		0.005	26-JUL-21
2-Methylnaphthalene			<0.0050		ug/g		0.005	26-JUL-21
Acenaphthene			<0.0050		ug/g		0.005	26-JUL-21
Acenaphthylene			<0.0050		ug/g		0.005	26-JUL-21
Acridine			<0.010		ug/g		0.01	26-JUL-21
Anthracene			<0.0040		ug/g		0.004	26-JUL-21
Benzo(a)anthracene			<0.010		ug/g		0.01	26-JUL-21
Benzo(a)pyrene			<0.0050		ug/g		0.005	26-JUL-21
Benzo(b&j)fluoranthene			<0.010		ug/g		0.01	26-JUL-21
Benzo(g,h,i)perylene			<0.010		ug/g		0.01	26-JUL-21
Benzo(k)fluoranthene			<0.010		ug/g		0.01	26-JUL-21
Chrysene			<0.010		ug/g		0.01	26-JUL-21
Dibenz(a,h)anthracene			<0.0050		ug/g		0.005	26-JUL-21
Fluoroanthene			<0.0050		ug/g		0.005	26-JUL-21
Fluorene			<0.0050		ug/g		0.005	26-JUL-21
Indeno(1,2,3-cd)pyrene			<0.010		ug/g		0.01	26-JUL-21
Naphthalene			<0.0050		ug/g		0.005	26-JUL-21
Phenanthrene			<0.0050		ug/g		0.005	26-JUL-21
Pyrene			<0.0050		ug/g		0.005	26-JUL-21
Quinoline			<0.0050		ug/g		0.005	26-JUL-21
Surrogate: 2-Fluorobiphenyl			84.5		%		60-140	26-JUL-21
Surrogate: d14-Terphenyl			83.7		%		60-140	26-JUL-21
WG3583291-4 MS		**L2614767-2**						
1-Methylnaphthalene			93.0		%		50-150	27-JUL-21
2-Methylnaphthalene			91.1		%		50-150	27-JUL-21
Acenaphthene			90.6		%		50-150	27-JUL-21
Acenaphthylene			88.9		%		50-150	27-JUL-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-CCME-SQGL-WT	**Soil**							
Batch R5529444								
WG3583291-4 MS		**L2614767-2**						
Acridine			84.9		%		50-150	27-JUL-21
Anthracene			79.9		%		50-150	27-JUL-21
Benzo(a)anthracene			92.5		%		50-150	27-JUL-21
Benzo(a)pyrene			70.1		%		50-150	27-JUL-21
Benzo(b&j)fluoranthene			82.0		%		50-150	27-JUL-21
Benzo(g,h,i)perylene			66.7		%		50-150	27-JUL-21
Benzo(k)fluoranthene			80.2		%		50-150	27-JUL-21
Chrysene			89.7		%		50-150	27-JUL-21
Dibenz(a,h)anthracene			75.4		%		50-150	27-JUL-21
Fluoroanthene			93.7		%		50-150	27-JUL-21
Fluorene			89.7		%		50-150	27-JUL-21
Indeno(1,2,3-cd)pyrene			76.2		%		50-150	27-JUL-21
Naphthalene			86.4		%		50-150	27-JUL-21
Phenanthrene			88.5		%		50-150	27-JUL-21
Pyrene			91.6		%		50-150	27-JUL-21
Quinoline			72.6		%		50-150	27-JUL-21
VOC+F1-HSMS-WP	**Soil**							
Batch R5527911								
WG3578484-2 LCS								
Acetone			85.5		%		70-130	21-JUL-21
Benzene			86.2		%		70-130	21-JUL-21
Bromobenzene			78.9		%		70-130	21-JUL-21
Bromochloromethane			92.3		%		70-130	21-JUL-21
Bromodichloromethane			101.6		%		70-130	21-JUL-21
Bromoform			105.6		%		70-130	21-JUL-21
Bromomethane			113.0		%		60-140	21-JUL-21
n-Butylbenzene			92.9		%		70-130	21-JUL-21
sec-Butylbenzene			96.3		%		70-130	21-JUL-21
tert-Butylbenzene			82.3		%		70-130	21-JUL-21
Carbon disulfide			88.2		%		70-130	21-JUL-21
Carbon Tetrachloride			107.5		%		70-130	21-JUL-21
Chlorobenzene			82.7		%		70-130	21-JUL-21
Chloroethane			81.2		%		60-140	21-JUL-21
Chloroform			91.9		%		70-130	21-JUL-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC+F1-HSMS-WP	**Soil**							
Batch R5527911								
WG3578484-2 LCS								
Chloromethane			96.8		%		60-140	21-JUL-21
2-Chlorotoluene			76.8		%		70-130	21-JUL-21
4-Chlorotoluene			90.0		%		70-130	21-JUL-21
Dibromochloromethane			93.9		%		70-130	21-JUL-21
1,2-Dibromo-3-chloropropane			98.0		%		70-130	21-JUL-21
1,2-Dibromoethane			78.6		%		70-130	21-JUL-21
Dibromomethane			94.1		%		70-130	21-JUL-21
1,2-Dichlorobenzene			80.0		%		70-130	21-JUL-21
1,3-Dichlorobenzene			81.9		%		70-130	21-JUL-21
1,4-Dichlorobenzene			79.3		%		70-130	21-JUL-21
Dichlorodifluoromethane			63.9		%		60-140	21-JUL-21
1,1-dichloroethane			88.4		%		70-130	21-JUL-21
1,2-Dichloroethane			85.8		%		70-130	21-JUL-21
1,1-dichloroethene			82.5		%		70-130	21-JUL-21
cis-1,2-Dichloroethene			82.2		%		70-130	21-JUL-21
trans-1,2-Dichloroethene			83.4		%		70-130	21-JUL-21
Dichloromethane			93.1		%		60-140	21-JUL-21
1,2-Dichloropropane			85.3		%		70-130	21-JUL-21
1,3-Dichloropropane			79.1		%		70-130	21-JUL-21
2,2-Dichloropropane			118.4		%		70-130	21-JUL-21
1,1-Dichloropropene			82.4		%		70-130	21-JUL-21
cis-1,3-Dichloropropene			89.9		%		70-130	21-JUL-21
trans-1,3-Dichloropropene			98.8		%		70-130	21-JUL-21
Ethylbenzene			72.4		%		70-130	21-JUL-21
Hexachlorobutadiene			97.5		%		70-130	21-JUL-21
Hexane			74.8		%		70-130	21-JUL-21
2-Hexanone (Methyl butyl ketone)			73.3		%		70-130	21-JUL-21
Isopropylbenzene			85.5		%		70-130	21-JUL-21
4-Isopropyltoluene			88.4		%		70-130	21-JUL-21
MEK			85.6		%		70-130	21-JUL-21
MIBK			80.5		%		70-130	21-JUL-21
MTBE			82.2		%		70-130	21-JUL-21
Styrene			70.4		%		70-130	21-JUL-21
1,1,1,2-Tetrachloroethane			98.4		%		70-130	21-JUL-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC+F1-HSMS-WP	**Soil**							
Batch R5527911								
WG3578484-2 LCS								
1,1,2,2-Tetrachloroethane			84.7		%		70-130	21-JUL-21
Tetrachloroethene			89.4		%		70-130	21-JUL-21
Toluene			70.8		%		70-130	21-JUL-21
1,2,3-Trichlorobenzene			85.9		%		70-130	21-JUL-21
1,2,4-Trichlorobenzene			88.8		%		70-130	21-JUL-21
1,1,1-Trichloroethane			93.5		%		70-130	21-JUL-21
1,1,2-Trichloroethane			83.5		%		70-130	21-JUL-21
Trichloroethene			88.0		%		70-130	21-JUL-21
Trichlorofluoromethane			77.5		%		60-140	21-JUL-21
1,2,3-Trichloropropane			91.9		%		70-130	21-JUL-21
1,2,4-Trimethylbenzene			85.4		%		70-130	21-JUL-21
1,3,5-Trimethylbenzene			86.4		%		70-130	21-JUL-21
Vinyl Chloride			72.8		%		60-140	21-JUL-21
M+P-Xylenes			80.7		%		70-130	21-JUL-21
o-Xylene			72.5		%		70-130	21-JUL-21
WG3578484-3 LCS								
F1			93.8		%		70-130	19-JUL-21
WG3578484-1 MB								
Acetone			<0.50		mg/kg		0.5	19-JUL-21
Benzene			<0.0050		mg/kg		0.005	19-JUL-21
Bromobenzene			<0.10		mg/kg		0.1	19-JUL-21
Bromochloromethane			<0.10		mg/kg		0.1	19-JUL-21
Bromodichloromethane			<0.050		mg/kg		0.05	19-JUL-21
Bromoform			<0.050		mg/kg		0.05	19-JUL-21
Bromomethane			<0.050		mg/kg		0.05	19-JUL-21
n-Butylbenzene			<0.050		mg/kg		0.05	19-JUL-21
sec-Butylbenzene			<0.050		mg/kg		0.05	19-JUL-21
tert-Butylbenzene			<0.050		mg/kg		0.05	19-JUL-21
Carbon disulfide			<0.25		mg/kg		0.25	19-JUL-21
Carbon Tetrachloride			<0.050		mg/kg		0.05	19-JUL-21
Chlorobenzene			<0.050		mg/kg		0.05	19-JUL-21
Chloroethane			<0.050		mg/kg		0.05	19-JUL-21
Chloroform			<0.050		mg/kg		0.05	19-JUL-21
Chloromethane			<0.050		mg/kg		0.05	19-JUL-21
2-Chlorotoluene			<0.10		mg/kg		0.1	19-JUL-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC+F1-HSMS-WP	**Soil**							
Batch R5527911								
WG3578484-1 MB								
4-Chlorotoluene			<0.10		mg/kg		0.1	19-JUL-21
Dibromochloromethane			<0.050		mg/kg		0.05	19-JUL-21
1,2-Dibromo-3-chloropropane			<0.050		mg/kg		0.05	19-JUL-21
1,2-Dibromoethane			<0.050		mg/kg		0.05	19-JUL-21
Dibromomethane			<0.050		mg/kg		0.05	19-JUL-21
1,2-Dichlorobenzene			<0.050		mg/kg		0.05	19-JUL-21
1,3-Dichlorobenzene			<0.050		mg/kg		0.05	19-JUL-21
1,4-Dichlorobenzene			<0.050		mg/kg		0.05	19-JUL-21
Dichlorodifluoromethane			<0.050		mg/kg		0.05	19-JUL-21
1,1-dichloroethane			<0.050		mg/kg		0.05	19-JUL-21
1,2-Dichloroethane			<0.050		mg/kg		0.05	19-JUL-21
1,1-dichloroethene			<0.050		mg/kg		0.05	19-JUL-21
cis-1,2-Dichloroethene			<0.050		mg/kg		0.05	19-JUL-21
trans-1,2-Dichloroethene			<0.050		mg/kg		0.05	19-JUL-21
Dichloromethane			<0.10		mg/kg		0.1	19-JUL-21
1,2-Dichloropropane			<0.050		mg/kg		0.05	19-JUL-21
1,3-Dichloropropane			<0.050		mg/kg		0.05	19-JUL-21
2,2-Dichloropropane			<0.10		mg/kg		0.1	19-JUL-21
1,1-Dichloropropene			<0.050		mg/kg		0.05	19-JUL-21
cis-1,3-Dichloropropene			<0.050		mg/kg		0.05	19-JUL-21
trans-1,3-Dichloropropene			<0.050		mg/kg		0.05	19-JUL-21
Ethylbenzene			<0.015		mg/kg		0.015	19-JUL-21
F1			<10		mg/kg		10	19-JUL-21
Hexachlorobutadiene			<0.050		mg/kg		0.05	19-JUL-21
Hexane			<0.050		mg/kg		0.05	19-JUL-21
2-Hexanone (Methyl butyl ketone)			<0.50		mg/kg		0.5	19-JUL-21
Isopropylbenzene			<0.10		mg/kg		0.1	19-JUL-21
4-Isopropyltoluene			<0.10		mg/kg		0.1	19-JUL-21
MEK			<0.50		mg/kg		0.5	19-JUL-21
MIBK			<0.50		mg/kg		0.5	19-JUL-21
MTBE			<0.20		mg/kg		0.2	19-JUL-21
Styrene			<0.050		mg/kg		0.05	19-JUL-21
1,1,1,2-Tetrachloroethane			<0.050		mg/kg		0.05	19-JUL-21
1,1,2,2-Tetrachloroethane			<0.050		mg/kg		0.05	19-JUL-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC+F1-HSMS-WP	**Soil**							
Batch R5527911								
WG3578484-1 MB								
Tetrachloroethene			<0.050		mg/kg		0.05	19-JUL-21
Toluene			<0.050		mg/kg		0.05	19-JUL-21
1,2,3-Trichlorobenzene			<0.050		mg/kg		0.05	19-JUL-21
1,2,4-Trichlorobenzene			<0.050		mg/kg		0.05	19-JUL-21
1,1,1-Trichloroethane			<0.050		mg/kg		0.05	19-JUL-21
1,1,2-Trichloroethane			<0.050		mg/kg		0.05	19-JUL-21
Trichloroethene			<0.010		mg/kg		0.01	19-JUL-21
Trichlorofluoromethane			<0.050		mg/kg		0.05	19-JUL-21
1,2,3-Trichloropropane			<0.050		mg/kg		0.05	19-JUL-21
1,2,4-Trimethylbenzene			<0.050		mg/kg		0.05	19-JUL-21
1,3,5-Trimethylbenzene			<0.050		mg/kg		0.05	19-JUL-21
Vinyl Chloride			<0.050		mg/kg		0.05	19-JUL-21
M+P-Xylenes			<0.050		mg/kg		0.05	19-JUL-21
o-Xylene			<0.050		mg/kg		0.05	19-JUL-21
Surrogate: 1,4-Difluorobenzene (SS)			74.7		%		70-130	19-JUL-21
Surrogate: 3,4-Dichlorotoluene (SS)			102.7		%		70-130	19-JUL-21
Surrogate: 4-Bromofluorobenzene (SS)			74.4		%		70-130	19-JUL-21

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

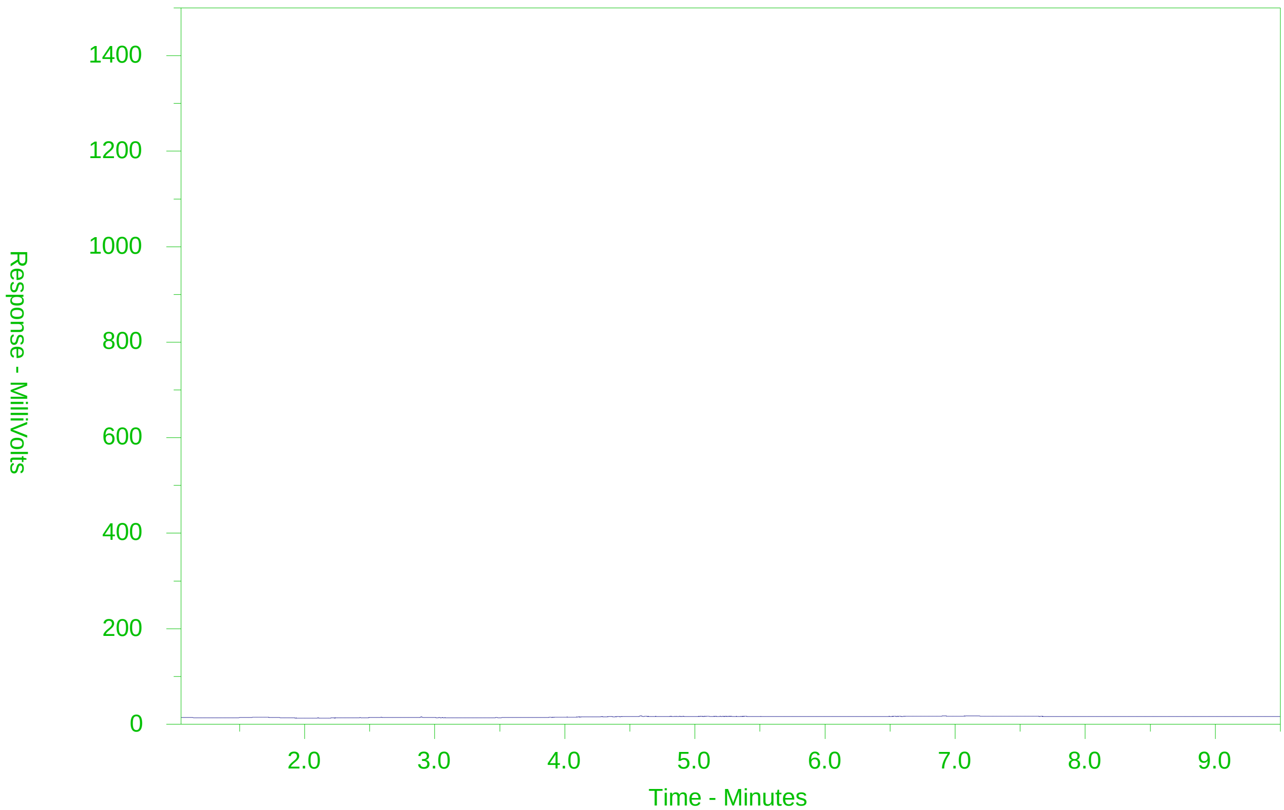
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2614767-3
Client Sample ID: 3 - 0.8M



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

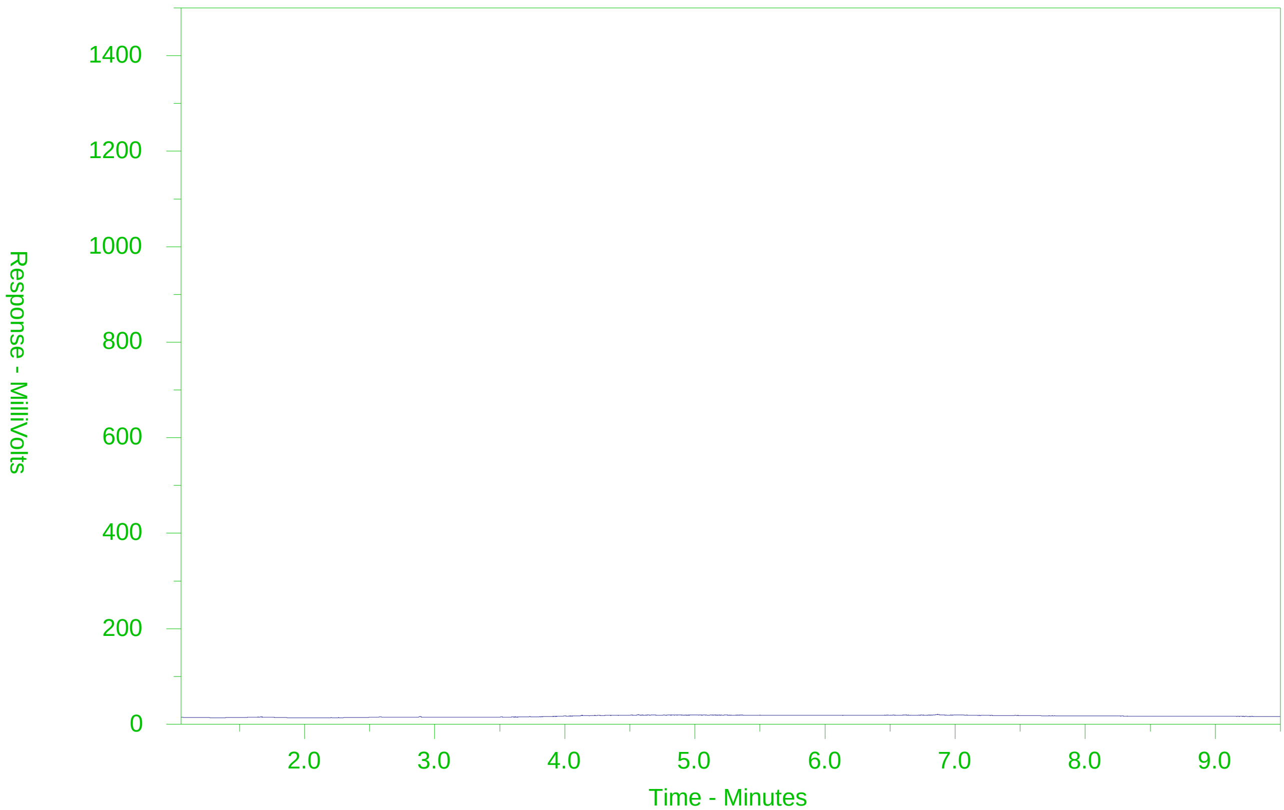
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2614767-5
Client Sample ID: 3 - 1.8M



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

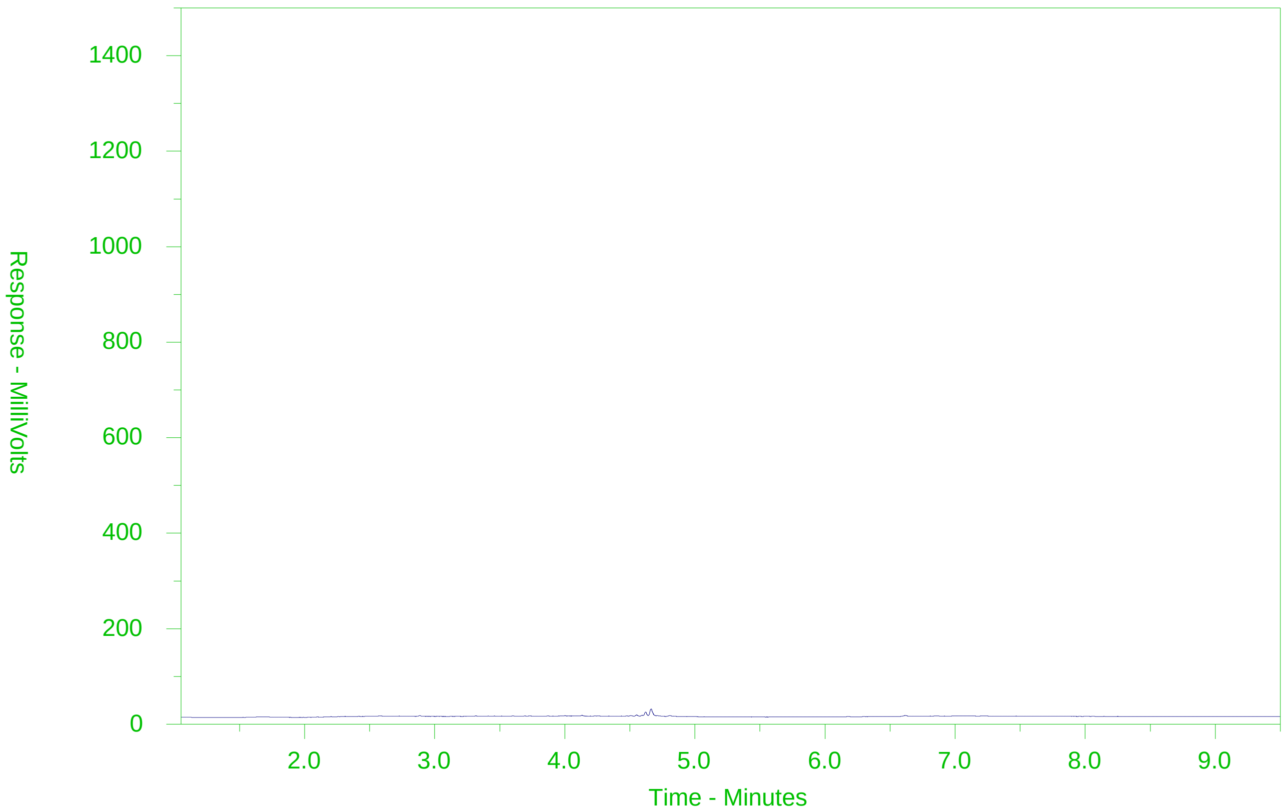
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2614767-7
Client Sample ID: 4 - 1.5M



← F2 →	← F3 →		← F4 →
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

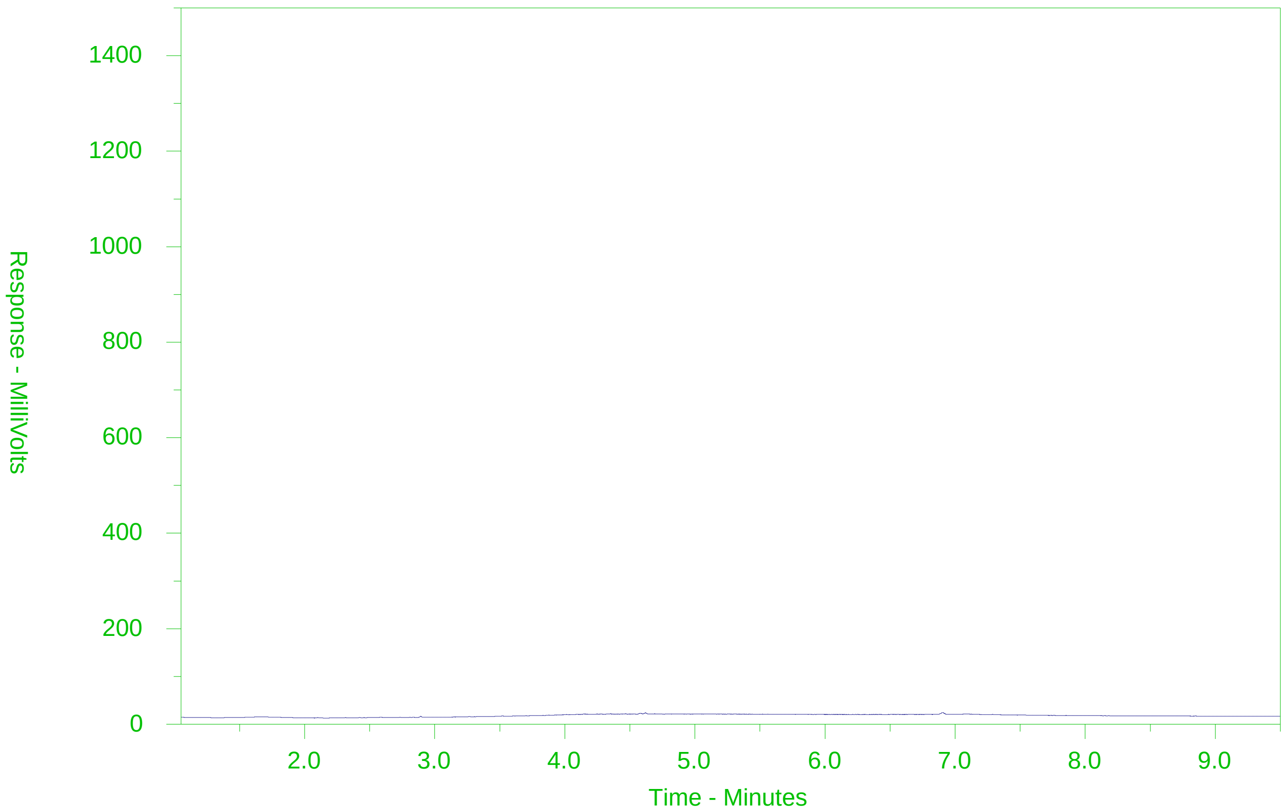
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2614767-9
Client Sample ID: 6 - 1.5M



← F2 →	← F3 →		← F4 →
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

page 1 of 2 pages

L2614767-COFC

Ship to: ALS LABS Unit 12 – 1329 Niakwa Rd East Winnipeg, MB R2J 3T6
Telephone: (204) 255-9720
Fax: (204) 255-9721
Toll Free: 1-800-607-7555

CHAIN OF CUSTODY/ANALYTICAL REQUEST FORM

J & D Environmental

Service Requested: Regular ✓ Rush 50% ____ Emergency 100% ____ Same Day 200% ____

Quotation Number: Q65246
Project Number / Name: Site A Oak Point Hwy

Sample ID	Sampled By	Date/Time Sampled	Sample Type	PAHs	VOCs + F1-F4	Metals
1-0.8 m	J+D	July 15/21	Soil	✓		
3-0.8 m	↓	↓	↓	✓		
3-0.8 m	↓	↓	↓		✓	
3-0.8 m	↓	↓	↓			✓
3-1.8 m	↓	↓	↓		✓	
4-1.5 m	↓	↓	↓	✓		
4-1.5 m	↓	↓	↓		✓	
5-0.08 m	↓	↓	↓			✓

Report to:
J & D Environmental
43 Osborne Street
PO Box 68052 Osborne Village
Winnipeg, MB R3L 2V9
Phone: Danial (204) 294-9002
Email: danial@jdenvor.ca Attention: Danial Kolba
Cc: wluba@shaw.ca Attention: Wayne Luba

Invoice to:
J & D Environmental
43 Osborne Street
PO Box 68052 Osborne Village
Winnipeg, MB R3L 2V9

FOR LABORATORY USE ONLY:
SAMPLE CONDITION UPON RECEIPT: FROZEN ____ COLD ✓ AMBIENT
ACCEPTABLE ✓ NON ACCEPTABLE ____
OTHER (BREAKAGE, LEAKAGE, ETC.):

NOTES AND CONDITIONS: 1. Hazardous samples must be labelled to comply with WHMIS regulations. 2. ETL's liability limited to cost of analysis. 3. Failure to complete all portions of this form may delay analysis.

Relinquished By:	Date: / Time:	Received By: / ETL Lab:	Date: JUL 16 2021 / Time:
Relinquished By:	Date: / Time:	Received By: / ETL Lab: T-L	Date: 7/16/21 / Time: 10:10

6.0°C

COMMENTS:

Summary: VOCs 3-0.8m, 3-1.8m, 4-1.5m, 6-1.5m (4)
PAHs 1-0.8m, 3-0.8m, 4-1.5m (3)
Metals 3-0.8m, 5-0.8m, 7-0.8m (3)
10

L2614767-COFC

Ship to: ALS LABS Unit 12 – 1329 Niakwa Rd East Winnipeg, MB R2J 3T6
Telephone: (204) 255-9720
Fax: (204) 255-9721
Toll Free: 1-800-607-7555

page 2 of 2 pages

CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

J & D Environmental

Service Requested: Regular ✓ Rush ____ 50% Emergency ____ 100% Same Day ____ 200%

Quotation Number: Q65246
Project Number / Name: Site A Oak Point Hwy

Sample ID	Sampled By	Date/Time Sampled	Sample Type	VOCs+F1-F4	Metals
6 - 1.5 m	J+D	July 15/21	Soil	✓	
7 - 0.8 m	↓	↓	↓		✓

Report to:
J & D Environmental
43 Osborne Street
PO Box 68052 Osborne Village
Winnipeg, MB R3L 2V9
Phone: Danial (204) 294-9002
Email: danial@jdenvor.ca Attention: Danial Kolba
Cc: wluba@shaw.ca Attention: Wayne Luba

Invoice to:
J & D Environmental
43 Osborne Street
PO Box 68052 Osborne Village
Winnipeg, MB R3L 2V9

FOR LABORATORY USE ONLY:
SAMPLE CONDITION UPON RECEIPT: FROZEN ____ COLD ✓ AMBIENT
ACCEPTABLE ✓ NON ACCEPTABLE ____
OTHER (BREAKAGE, LEAKAGE, ETC.):

NOTES AND CONDITIONS: 1. Hazardous samples must be labelled to comply with WHMIS regulations. 2. ETL's liability limited to cost of analysis. 3. Failure to complete all portions of this form may delay analysis.

Relinquished By:	Date: Time:	Received By: ETL Lab:	Date: JUL 16 2021 Time:
Relinquished By:	Date: Time:	Received By: ETL Lab: T.L.	Date: 7/16/21 Time: 10:10

6.0°C

COMMENTS:

J&D
ENVIRONMENTAL
(204) 960-9605 | www.jdenviro.ca

Phase 2 ESA

250 Oak Point Hwy - Site B
Winnipeg Manitoba

Prepared for:
Harpreet Lali
44 Mcphillips ST
Winnipeg MB
R3E 2J6

Project Number / Name: 250 Oak Point Hwy Site B Winnipeg MB

J&D ID#: JD20210531-1

Date Submitted: May 31 2021

J&D Tech: Danial Kolba

J&D Environmental would like to thank you for considering them for your phase 2 ESA of the premises. The recognition of safety and health as well as the sustainability and protection of our environment is our highest priority. Please take your time to review our approach below and should you have any questions or concerns, don't hesitate to contact us directly.

Best Regards

Danial P. Kolba
J&D Environmental Inc.

The sample(s) submitted for analysis on the date noted above were analyzed using regulation standards limited to:

Bulk Test For Asbestos: **PLM EPA 600/R-93/116**
Air Test For Asbestos: **NIOSH 7400 / TEM**
Bulk Test For Mold: **Reviewed and analyzed by environmental microbiologist.**
Air Test For Mold: **15LPM Flow rate / 1 - 10 minute test variance, Reviewed and analyzed by environmental microbiologist**
Soil / Rock / Vermiculite: **TEM Qualitative via Filtration Prep Technique**

Descriptive actions taken for analytical review of submitted samples are available at the request of an authorized officer acting on behalf of the organization requesting sample analysis.

Provincial Asbestos Limits Of Analytical Review	Threshold Limit
Manitoba - Friable	0.1%
Manitoba - Non-Friable	1%
Vermiculite	Any Asbestos Detected

1.0 Summary of Report

Based on a request by the potential buyer J&D Environmental was acquired to conduct a phase 2 ESA. This report is a preliminary review of the detailed findings attached in the appendix of this document.

1.1 Areas of Concern / J&D Comments

- After review of the property as well as available documentation provided to us at the time of our phase 2 ESA, it is the opinion of J&D Environmental soil conditions do not present concern for major hydrocarbon contamination. The site is considered acceptable for development at this time. A breakdown of our findings are as follows:

  - Former Brooklands Landfill site along the West property line.

    - Suspected impacts were noted in this ares where J&D Environmental performed 20 sample recoveries from 4 borehole locations (BH2, BH3, BH4 & BH5). Test results of all boreholes returned levels of acceptable concentrations to human health ranging from hydrocarbon to trichlorethene. Based on the data collected at the time of our review, it is the opinion of J&D Environmental this acknowledged potential environmental contamination should no longer be noted on the site. No further action required.

  - Former gas station site along East property line.

    - Suspected impacts were noted in this ares where J&D Environmental performed 25 soil sample recoveries from 5 boreholes (BH9, BH10, BH11, BH12 & BH13). Test results of all boreholes returned levels of acceptable concentrations to human health in Benzene, Toluene, Ethylene, Xylenes and PHC's. Based on the data collected at the time of our review, it is the opinion of J&D Environmental this acknowledged potential environmental contamination should no longer be noted on the site. No further action required.

  - Superior Finishes business operation - former Hazerdous waste generator along North property line.

    - Suspected impacts were noted in this ares where J&D Environmental performed 6 soil sample recoveries from 1 borehole (BH1). Test results of all boreholes returned levels of acceptable concentrations that are considered minimal if any concern to the site in VOC's & Metals. Based on the data collected at the time of our review, it is the opinion of J&D Environmental this acknowledged potential environmental contamination should no longer be noted on the site. No further action required.

  - CPR rail line along South property line.

- Suspected impacts were noted in this ares where J&D Environmental performed 15 soil sample recoveries from 3 boreholes (BH6, BH7, BH8). Test results of all boreholes returned levels of acceptable concentrations to human health in BTEX and PHC Fractions F1-F4 as well as metals in soil. Based on the data collected at the time of our review, it is the opinion of J&D Environmental this acknowledged potential environmental contamination should no longer be noted on the site. No further action required.

- At this time based on the findings of the Phase 2 ESA conducted at the site, it is the opinion of J&D Environmental no further action is required.

2.0 Definitions

Friable - Friable is the term used to describe a material that can become airborne should it be disturbed. A friable compound has higher threshold limits than non friable materials. It is considered possible to have non friable materials that can become friable when disturbed.

ESA - A term used to outline "Environmental Site Assessment". Typically accompanied by a level of assessment such as Phase 1, Phase 2 and Phase 3. A phase 1 ESA will include documentation and investigation of a property without drilling or collecting samples to determine a level of risk in contamination. A Phase 2 ESA will include hole boring or auger systems to collect samples in the ground in order to attain actual levels of contamination and a Phase 3 ESA will include a remediation of the contaminations based on the levels observed during the phase 2 ESA investigation.

Non Friable - Non Friable is a term used to describe a material that is either encapsulated by its own design or in a state at which it is airborne unless altered physically to become friable.

Asbestos - Asbestos is one of the primary concerns while doing pre demolition / renovation surveys. Asbestos is a naturally occurring material that was used in the early 1900's all the way up to the late 1980's. Although asbestos regulations began to come in effect in the early 80's it has still been noted in construction as late as 1993. Asbestos had a primary purpose as either an insulator or a fire retardant but can also be found in everything from gaskets, siding, insulations, panel boards, flooring tile, ceiling tile and many other materials. It is very difficult to determine if something contains asbestos without lab research, however some materials are so frequently containing asbestos that it is not uncommon for materials to be considered asbestos containing without actually performing a lab analysis. Although asbestos is considered a carcinogenic material, there are threshold limits that have been put in place that outline a safe level for human occupancy when working with or around asbestos. These levels of exposure can only be attained with competent air quality testing done to regulation standards.

ACM - ACM is an abbreviated term used to indicate a material is "Asbestos Containing Material"

Safe Work Procedure & Safe Work Practice - A safe work procedure or practice (SWP) is an outline step by step way that a task or specific job will be done. It is usually outlined in 10 or less steps that should be simple enough for an experienced worker to abide by. Due to most projects being unique when dealing with the remediation of hazardous materials, it is not uncommon for a SWP to be developed for each remediation project. It is highly advised that no remediation takes place without the review of a SWP.

Vermiculite - Vermiculite is a yellow or brown material that is a combination of minerals. It is commonly used as an insulation or moisture medium for growing plants. Vermiculite is a concern as an insulator in construction projects built before the 1990's due to the fact that asbestos fibres were commonly mixed with the vermiculite. Vermiculite is also a difficult material to test for asbestos so it is commonly assumed an ACM without testing as some labs are not able to determine 100% the level of asbestos in the vermiculite.

TEM - TEM is short for Transmission Electron Microscopy and is a form of testing that far exceeds the abilities of a standard optical microscope. A TEM is capable of examining single columns of atoms thus allowing it to view asbestos fibres that most optical microscopes would miss. TEM testing can cost nearly five times the expense of standard optical microscopy but is only requested when a definitive answer may be required for an asbestos test. On occasion it is not worth the testing expenses to use TEM so it is considered cheaper to assume a material is asbestos containing rather than spend thousands of dollars on TEM testing to confirm it.

Mastic - Mastic is a gum or resin that may be found on pipe wrap insulation or the back of flooring tiles. On occasion mastic can be found to contain asbestos fibres and will require remediation but due to its sticky nature will require a lower tolerance of removal then a standard friable or non friable material. The removal process will change depending on the type of material it is applied to and the level of asbestos found on it.

PCBs - PCB's is an acronym for Polychlorinated Biphenyls. PCB's are a group of man made compounds that were widely used in the past on electrical equipment such as light ballasts and control power regulators. PCB's were banned in the 1970's because of the environmental concerns they brought forward. There are tests to determine if an electrical component contains PCB's however a visual inspection of the electrical equipment by an experienced inspector is usually sufficient enough to determine if the components do in fact contain PCB's. Typically if an electrical component does not state on it "PVCB Free" it should be approached with caution and considered a PCB containing material.

OEL - OEL is an acronym for "Occupational Exposure Limit". An OEL is performed with an air test and will allow proper understanding of the air and its contamination levels as well as how safe it is for the workers and the approach the workers should take to being in the room. The OEL is outlined by Manitoba Workplace Safety & Health as being required to meet the standards developed by the American Conference of Governmental Industrial Hygienists

3.0 Project Details & Informative Breakdown

Project Details	Informative Breakdown
Property Address	Oak Point Hwy - Winnipeg MB - Site B
Project Details	Commercial property
Estimated Year of Construction	N/A
Type of Construction	Vacant Land
Purpose of Proposal	To investigate the premise for impacts and contamination
Areas of Concern	No concerns noted at this time
Areas that were not accessible during inspection	N/A
Soil Conditions	See appendix

4.0 Scope / Approach to Investigation

- A total of 15 bore holes were placed on the property with a total of 76 samples reviewed by an independent laboratory for hydrocarbon contamination, metals in soil as well as VOC's. The approach of the review was to determine if site activities as well as neighbour activities had present contamination to soil conditions. The site consisted of a vacant area where a previously noted landfill operated. Access to the site was off Rout 90 to the East o the site as well as a train crossing to the West. No major concerns were visually identified at the time of our investigation substantiating the need for additional review.

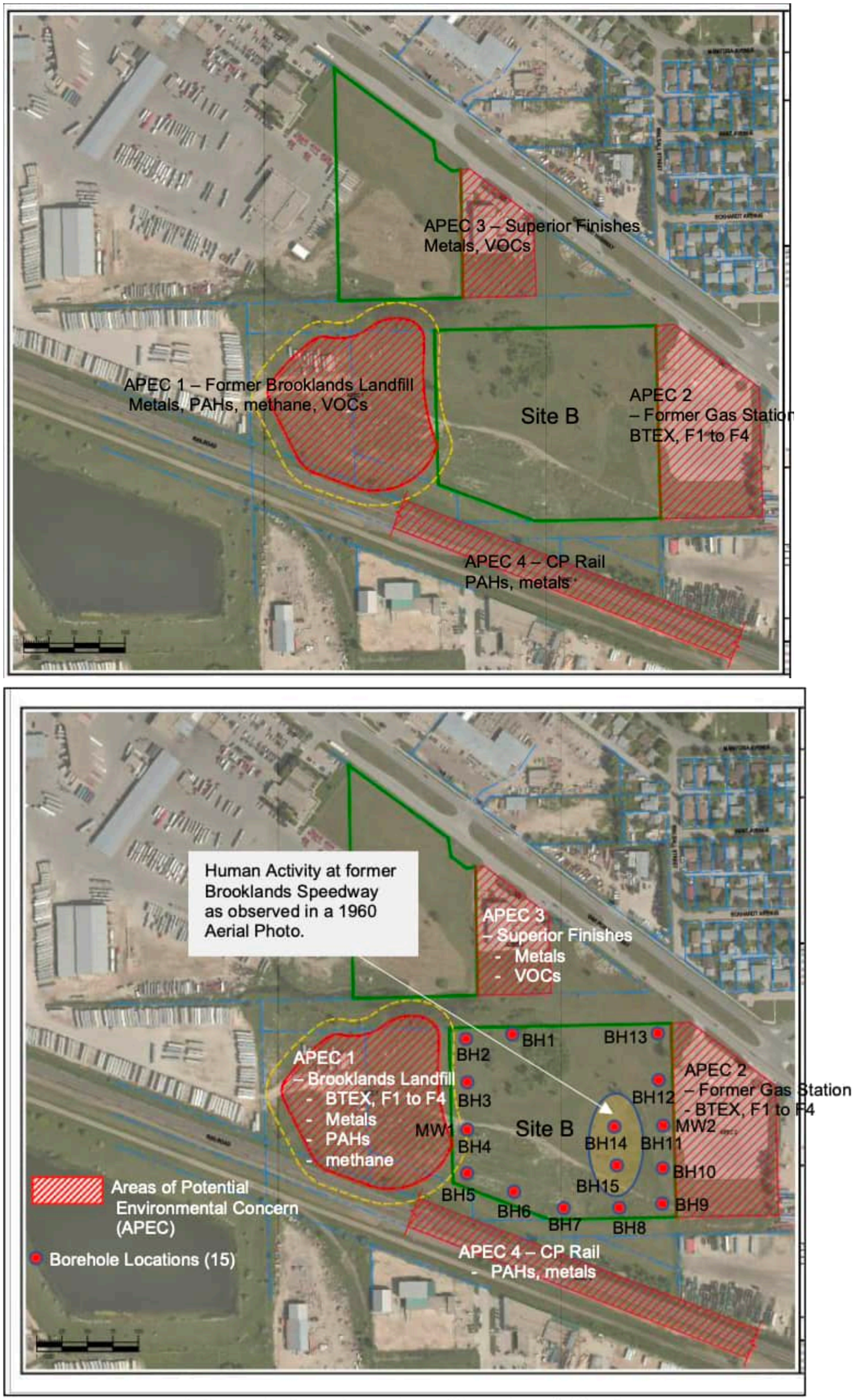


Figure 1: Borehole Location Plan, Site B

4.1 J&D Environmental Table Of Findings

Bore Hole	Depth (ft)	PPM Detection	Laboratory Findings	J&D Comments
BH 1	13	160 @ 9 feet	No major concerns identified requiring remediation	PPM Detection considered acceptable at this time based on laboratory findings.
BH 2	13	175 @4.5 feet	No major concerns identified requiring remediation	PPM Detection considered acceptable at this time based on laboratory findings.
BH 3	13	120 @ 4 feet	No major concerns identified requiring remediation	PPM Detection considered acceptable at this time based on laboratory findings.
BH 4	13	25 @ 9 feet	No major concerns identified requiring remediation	PPM Detection considered acceptable at this time based on laboratory findings.
BH 5	12	140 @ 6 feet	No major concerns identified requiring remediation	PPM Detection considered acceptable at this time based on laboratory findings.
BH 6	13	130 @ 6.5 feet	No major concerns identified requiring remediation	PPM Detection considered acceptable at this time based on laboratory findings.
BH 7	12	150 @ 6 feet	No major concerns identified requiring remediation	PPM Detection considered acceptable at this time based on laboratory findings.
BH 8	12	95 @ 9 feet	No major concerns identified requiring remediation	PPM Detection considered acceptable at this time based on laboratory findings.

Bore Hole	Depth (ft)	PPM Detection	Laboratory Findings	J&D Comments
BH 9	12	350 @ 9 feet	No major concerns identified requiring remediation	PPM Detection considered acceptable at this time based on laboratory findings.
BH 10	12	230 @ 7 feet	No major concerns identified requiring remediation	PPM Detection considered acceptable at this time based on laboratory findings.
BH 11	12	20 @ 7 feet	No major concerns identified requiring remediation	PPM Detection considered acceptable at this time based on laboratory findings.
BH 12	12	40 @ 4 feet	No major concerns identified requiring remediation	PPM Detection considered acceptable at this time based on laboratory findings.
BH 13	12	450 @ 7 feet	No major concerns identified requiring remediation	PPM Detection considered acceptable at this time based on laboratory findings.
BH 14	12	15 @ 4 feet	No major concerns identified requiring remediation	PPM Detection considered acceptable at this time based on laboratory findings.
BH 15	12	80 @ 12 feet	No major concerns identified requiring remediation	PPM Detection considered acceptable at this time based on laboratory findings.

4.2 Tables Of Reference

Agriculture

CCME Reference All measured at Cancer risk of 10 - 6 (benzene)	Benzene	Toluene	Ethyl Benzene	Xylenes	F1	F2	F3	F4	Combined Total
Environmental Quality Guideline Fine Grained Surface Soil	0.0068	0.08	0.018	2.4	N/A	N/A	N/A	N/A	N/A

CCME Reference All measured at Cancer risk of 10 - 6 (benzene)	Benzene	Toluene	Ethyl Benzene	Xylenes	F1	F2	F3	F4	Combined Total
Environmental Quality Guideline Fine Grained Subsoil	0.0068	0.08	0.018	2.4	N/A	N/A	N/A	N/A	N/A
Environmental Quality Guideline Coarse Grained Surface Soil	0.0095	0.37	0.082	11	N/A	N/A	N/A	N/A	N/A
Environmental Quality Guideline Coarse Grained Subsoil	0.011	0.37	0.082	11	N/A	N/A	N/A	N/A	N/A
Petroleum Hydrocarbons in Soil Guideline Coarse Grained Soil	N/A	N/A	N/A	N/A	30b	150	300	2800	2800
Petroleum Hydrocarbons in Soil Guideline Coarse Grained Soil Near Potable Groundwater	N/A	N/A	N/A	N/A	30b	150	300	2800	2800
Petroleum Hydrocarbons in Soil Guideline Fine Grained Soil	N/A	N/A	N/A	N/A	210	150	1300	5600	5600
Petroleum Hydrocarbons in Soil Guideline Fine Grained Soil Near Potable Groundwater	N/A	N/A	N/A	N/A	170	150	1300	5600	5600
Management Systems Limit to Petroleum Hydrocarbons in Soil Guidelines Fine Grain Surface Soil	N/A	N/A	N/A	N/A	800	1000	3500	10000	10000
Management Systems Limit to Petroleum Hydrocarbons in Soil Guidelines Coarse Grain Surface Soil	N/A	N/A	N/A	N/A	700	1000	2500	10000	10000
Management Systems Limit to Petroleum Hydrocarbons in Soil Guidelines Fine Grain Subsoil	N/A	N/A	N/A	N/A	800	1000	3500	10000	10000
Management Systems Limit to Petroleum Hydrocarbons in Soil Guidelines Coarse Grain Subsoil	N/A	N/A	N/A	N/A	700	1000	2500	10000	10000
Vapour Inhalation (Indoor Basement) Fine Grained Surface Soils	N/A	N/A	N/A	N/A	710	3600	N/A	N/A	N/A
Vapour Inhalation (Indoor Basement) Coarse Grained Surface Soils	N/A	N/A	N/A	N/A	40	190	N/A	N/A	N/A
Vapour Inhalation (Indoor Basement) Fine Grained Subsoil	N/A	N/A	N/A	N/A	710	3600	N/A	N/A	N/A
Vapour Inhalation (Indoor Basement) Coarse Grained Subsoil	N/A	N/A	N/A	N/A	40	190	N/A	N/A	N/A
Vapour Inhalation (Slab on Grade) Fine Grained Surface Soil	N/A	N/A	N/A	N/A	610	3100	N/A	N/A	N/A
Vapour Inhalation (Slab on Grade) Coarse Grained Surface Soil	N/A	N/A	N/A	N/A	30	150	N/A	N/A	N/A
Vapour Inhalation (Slab on Grade) Fine Grained Subsoil	N/A	N/A	N/A	N/A	610	3100	N/A	N/A	N/A

CCME Reference All measured at Cancer risk of 10 - 6 (benzene)	Benzene	Toluene	Ethyl Benzene	Xylenes	F1	F2	F3	F4	Combined Total
Vapour Inhalation (Slab on Grade) Coarse Grained Subsoil	N/A	N/A	N/A	N/A	30	150	N/A	N/A	N/A
Protection Of Potable GW Fine Grained Surface Soils	N/A	N/A	N/A	N/A	170	230	N/A	N/A	N/A
Protection Of Potable GW Coarse Grained Surface Soils	N/A	N/A	N/A	N/A	240	320	N/A	N/A	N/A
Protection Of Potable GW Fine Grained Subsoil	N/A	N/A	N/A	N/A	170	230	N/A	N/A	N/A
Protection Of Potable GW Coarse Grained Subsoils	N/A	N/A	N/A	N/A	240	320	N/A	N/A	N/A
Inhalation of indoor Air (Basement) Surface Soil Coarse	0.015	200	88	22	N/A	N/A	N/A	N/A	N/A
Inhalation of indoor Air (Basement) Surface Soil Fine	0.21	2600	1300	320	N/A	N/A	N/A	N/A	N/A
Inhalation of indoor Air (Basement) Subsoil Coarse	0.015	200	88	22	N/A	N/A	N/A	N/A	N/A
Inhalation of indoor Air (Basement) Subsoil Fine	0.21	2600	1300	320	N/A	N/A	N/A	N/A	N/A
Inhalation of indoor Air (Slab On Grade) Surface Soil Coarse	0.0095	120	55	14	N/A	N/A	N/A	N/A	N/A
Inhalation of indoor Air (Slab On Grade) Surface Soil Fine	0.21	2700	1300	320	N/A	N/A	N/A	N/A	N/A
Inhalation of indoor Air (Slab On Grade) Subsoil Coarse	0.011	140	63	16	N/A	N/A	N/A	N/A	N/A
Inhalation of indoor Air (Slab On Grade) Subsoil Fine	0.22	2800	1400	340	N/A	N/A	N/A	N/A	N/A
Groundwater Check Surface Soil Coarse	0.030	0.37	0.082	11	N/A	N/A	N/A	N/A	N/A
Groundwater Check Surface Soil Fine	0.0068	0.08	0.018	2.4	N/A	N/A	N/A	N/A	N/A
Groundwater Check Subsoil Coarse	0.030	0.37	0.082	11	N/A	N/A	N/A	N/A	N/A
Groundwater Check Subsoil Fine	0.0068	0.08	0.018	2.4	N/A	N/A	N/A	N/A	N/A

Residential / Parkland

CCME Reference All measured at Cancer risk of 10 - 6 (benzene)	Benzene	Toluene	Ethyl Benzene	Xylenes	F1	F2	F3	F4	Combined Total
Environmental Quality Guideline Fine Grained Surface Soil	0.0068	0.08	0.018	2.4	N/A	N/A	N/A	N/A	N/A
Environmental Quality Guideline Fine Grained Subsoil	0.0068	0.08	0.018	2.4	N/A	N/A	N/A	N/A	N/A
Environmental Quality Guideline Coarse Grained Surface Soil	0.0095	0.37	0.082	11	N/A	N/A	N/A	N/A	N/A

CCME Reference All measured at Cancer risk of 10 - 6 (benzene)	Benzene	Toluene	Ethyl Benzene	Xylenes	F1	F2	F3	F4	Combined Total
Environmental Quality Guideline Coarse Grained Subsoil	0.011	0.37	0.082	11	N/A	N/A	N/A	N/A	N/A
Petroleum Hydrocarbons in Soil Guideline Coarse Grained Soil	N/A	N/A	N/A	N/A	30b	150	300	2800	2800
Petroleum Hydrocarbons in Soil Guideline Coarse Grained Soil Near Potable Groundwater	N/A	N/A	N/A	N/A	30b	150	300	2800	2800
Petroleum Hydrocarbons in Soil Guideline Fine Grained Soil	N/A	N/A	N/A	N/A	210	150	1300	5600	5600
Petroleum Hydrocarbons in Soil Guideline Fine Grained Soil Near Potable Groundwater	N/A	N/A	N/A	N/A	170	150	1300	5600	5600
Management Systems Limit to Petroleum Hydrocarbons in Soil Guidelines Fine Grain Surface Soil	N/A	N/A	N/A	N/A	800	1000	3500	10000	10000
Management Systems Limit to Petroleum Hydrocarbons in Soil Guidelines Coarse Grain Surface Soil	N/A	N/A	N/A	N/A	700	1000	2500	10000	10000
Management Systems Limit to Petroleum Hydrocarbons in Soil Guidelines Fine Grain Subsoil	N/A	N/A	N/A	N/A	800	1000	3500	10000	10000
Management Systems Limit to Petroleum Hydrocarbons in Soil Guidelines Coarse Grain Subsoil	N/A	N/A	N/A	N/A	700	1000	2500	10000	10000
Vapour Inhalation (Indoor Basement) Fine Grained Surface Soils	N/A	N/A	N/A	N/A	710	3600	N/A	N/A	N/A
Vapour Inhalation (Indoor Basement) Coarse Grained Surface Soils	N/A	N/A	N/A	N/A	40	190	N/A	N/A	N/A
Vapour Inhalation (Indoor Basement) Fine Grained Subsoil	N/A	N/A	N/A	N/A	710	3600	N/A	N/A	N/A
Vapour Inhalation (Indoor Basement) Coarse Grained Subsoil	N/A	N/A	N/A	N/A	40	190	N/A	N/A	N/A
Vapour Inhalation (Slab on Grade) Fine Grained Surface Soil	N/A	N/A	N/A	N/A	610	3100	N/A	N/A	N/A
Vapour Inhalation (Slab on Grade) Coarse Grained Surface Soil	N/A	N/A	N/A	N/A	30	150	N/A	N/A	N/A
Vapour Inhalation (Slab on Grade) Fine Grained Subsoil	N/A	N/A	N/A	N/A	610	3100	N/A	N/A	N/A
Vapour Inhalation (Slab on Grade) Coarse Grained Subsoil	N/A	N/A	N/A	N/A	30	150	N/A	N/A	N/A
Protection Of Potable GW Fine Grained Surface Soils	N/A	N/A	N/A	N/A	170	230	N/A	N/A	N/A

CCME Reference All measured at Cancer risk of 10 - 6 (benzene)	Benzene	Toluene	Ethyl Benzene	Xylenes	F1	F2	F3	F4	Combined Total
Protection Of Potable GW Coarse Grained Surface Soils	N/A	N/A	N/A	N/A	240	320	N/A	N/A	N/A
Protection Of Potable GW Fine Grained Subsoil	N/A	N/A	N/A	N/A	170	230	N/A	N/A	N/A
Protection Of Potable GW Coarse Grained Subsoils	N/A	N/A	N/A	N/A	240	320	N/A	N/A	N/A
Inhalation of indoor Air (Basement) Surface Soil Coarse	0.015	200	88	22	N/A	N/A	N/A	N/A	N/A
Inhalation of indoor Air (Basement) Surface Soil Fine	0.21	2600	1300	320	N/A	N/A	N/A	N/A	N/A
Inhalation of indoor Air (Basement) Subsoil Coarse	0.015	200	88	22	N/A	N/A	N/A	N/A	N/A
Inhalation of indoor Air (Basement) Subsoil Fine	0.21	2600	1300	320	N/A	N/A	N/A	N/A	N/A
Inhalation of indoor Air (Slab On Grade) Surface Soil Coarse	0.0095	120	55	14	N/A	N/A	N/A	N/A	N/A
Inhalation of indoor Air (Slab On Grade) Surface Soil Fine	0.21	2700	1300	320	N/A	N/A	N/A	N/A	N/A
Inhalation of indoor Air (Slab On Grade) Subsoil Coarse	0.011	140	63	16	N/A	N/A	N/A	N/A	N/A
Inhalation of indoor Air (Slab On Grade) Subsoil Fine	0.22	2800	1400	340	N/A	N/A	N/A	N/A	N/A
Groundwater Check Surface Soil Coarse	0.030	0.37	0.082	11	N/A	N/A	N/A	N/A	N/A
Groundwater Check Surface Soil Fine	0.0068	0.08	0.018	2.4	N/A	N/A	N/A	N/A	N/A
Groundwater Check Subsoil Coarse	0.030	0.37	0.082	11	N/A	N/A	N/A	N/A	N/A
Groundwater Check Subsoil Fine	0.0068	0.08	0.018	2.4	N/A	N/A	N/A	N/A	N/A

Commercial

CCME Reference All measured at Cancer risk of 10 - 6 (benzene)	Benzene	Toluene	Ethyl Benzene	Xylenes	F1	F2	F3	F4	Combined Total
Environmental Quality Guideline Fine Grained Surface Soil	0.0068	0.08	0.018	2.4	N/A	N/A	N/A	N/A	N/A
Environmental Quality Guideline Fine Grained Subsoil	0.0068	0.08	0.018	2.4	N/A	N/A	N/A	N/A	N/A
Environmental Quality Guideline Coarse Grained Surface Soil	0.030	0.37	0.082	11	N/A	N/A	N/A	N/A	N/A
Environmental Quality Guideline Coarse Grained Subsoil	0.030	0.37	0.082	11	N/A	N/A	N/A	N/A	N/A
Petroleum Hydrocarbons in Soil Guideline Coarse Grained Soil	N/A	N/A	N/A	N/A	320	260	1700	3300	3300

CCME Reference All measured at Cancer risk of 10 - 6 (benzene)	Benzene	Toluene	Ethyl Benzene	Xylenes	F1	F2	F3	F4	Combined Total
Petroleum Hydrocarbons in Soil Guideline Coarse Grained Soil Near Potable Groundwater	N/A	N/A	N/A	N/A	240	260	1700	3300	3300
Petroleum Hydrocarbons in Soil Guideline Fine Grained Soil	N/A	N/A	N/A	N/A	320	260	2500	6600	6600
Petroleum Hydrocarbons in Soil Guideline Fine Grained Soil Near Potable Groundwater	N/A	N/A	N/A	N/A	170	230	2500	6600	6600
Management Systems Limit to Petroleum Hydrocarbons in Soil Guidelines Fine Grain Surface Soil	N/A	N/A	N/A	N/A	800	1000	5000	10000	10000
Management Systems Limit to Petroleum Hydrocarbons in Soil Guidelines Coarse Grain Surface Soil	N/A	N/A	N/A	N/A	700	1000	3500	10000	10000
Management Systems Limit to Petroleum Hydrocarbons in Soil Guidelines Fine Grain Subsoil	N/A	N/A	N/A	N/A	800	1000	5000	10000	10000
Management Systems Limit to Petroleum Hydrocarbons in Soil Guidelines Coarse Grain Subsoil	N/A	N/A	N/A	N/A	700	1000	3500	10000	10000
Vapour Inhalation (Indoor Basement) Fine Grained Surface Soils	N/A	N/A	N/A	N/A	4600	23000	N/A	N/A	N/A
Vapour Inhalation (Indoor Basement) Coarse Grained Surface Soils	N/A	N/A	N/A	N/A	320	1700	N/A	N/A	N/A
Vapour Inhalation (Indoor Basement) Fine Grained Subsoil	N/A	N/A	N/A	N/A	4600	23000	N/A	N/A	N/A
Vapour Inhalation (Indoor Basement) Coarse Grained Subsoil	N/A	N/A	N/A	N/A	320	1700	N/A	N/A	N/A
Protection Of Potable GW Fine Grained Surface Soils	N/A	N/A	N/A	N/A	170	230	N/A	N/A	N/A
Protection Of Potable GW Coarse Grained Surface Soils	N/A	N/A	N/A	N/A	240	320	N/A	N/A	N/A
Protection Of Potable GW Fine Grained Subsoil	N/A	N/A	N/A	N/A	170	230	N/A	N/A	N/A
Protection Of Potable GW Coarse Grained Subsoils	N/A	N/A	N/A	N/A	240	320	N/A	N/A	N/A
Inhalation of indoor Air (Slab On Grade) Surface Soil Coarse	0.030	1400	630	160	N/A	N/A	N/A	N/A	N/A
Inhalation of indoor Air (Slab On Grade) Surface Soil Fine	0.28	13000	6500	1600	N/A	N/A	N/A	N/A	N/A
Inhalation of indoor Air (Slab On Grade) Subsoil Coarse	0.032	1500	670	170	N/A	N/A	N/A	N/A	N/A

CCME Reference All measured at Cancer risk of 10 - 6 (benzene)	Benzene	Toluene	Ethyl Benzene	Xylenes	F1	F2	F3	F4	Combined Total
Inhalation of indoor Air (Slab On Grade) Subsoil Fine	0.29	13000	6700	1600	N/A	N/A	N/A	N/A	N/A
Groundwater Check Surface Soil Coarse	0.030	0.37	0.082	11	N/A	N/A	N/A	N/A	N/A
Groundwater Check Surface Soil Fine	0.0068	0.08	0.018	2.4	N/A	N/A	N/A	N/A	N/A
Groundwater Check Subsoil Coarse	0.030	0.37	0.082	11	N/A	N/A	N/A	N/A	N/A
Groundwater Check Subsoil Fine	0.0068	0.08	0.018	2.4	N/A	N/A	N/A	N/A	N/A

Industrial

CCME Reference All measured at Cancer risk of 10 - 6 (benzene)	Benzene	Toluene	Ethyl Benzene	Xylenes	F1	F2	F3	F4	Combined Total
Environmental Quality Guideline Fine Grained Surface Soil	0.0068	0.08	0.018	2.4	N/A	N/A	N/A	N/A	N/A
Environmental Quality Guideline Fine Grained Subsoil	0.0068	0.08	0.018	2.4	N/A	N/A	N/A	N/A	N/A
Environmental Quality Guideline Coarse Grained Surface Soil	0.030	0.37	0.082	11	N/A	N/A	N/A	N/A	N/A
Environmental Quality Guideline Coarse Grained Subsoil	0.030	0.37	0.082	11	N/A	N/A	N/A	N/A	N/A
Petroleum Hydrocarbons in Soil Guideline Coarse Grained Soil	N/A	N/A	N/A	N/A	320	260	1700	3300	3300
Petroleum Hydrocarbons in Soil Guideline Coarse Grained Soil Near Potable Groundwater	N/A	N/A	N/A	N/A	240	260	1700	3300	3300
Petroleum Hydrocarbons in Soil Guideline Fine Grained Soil	N/A	N/A	N/A	N/A	320	260	2500	6600	6600
Petroleum Hydrocarbons in Soil Guideline Fine Grained Soil Near Potable Groundwater	N/A	N/A	N/A	N/A	170	230	2500	6600	6600
Management Systems Limit to Petroleum Hydrocarbons in Soil Guidelines Fine Grain Surface Soil	N/A	N/A	N/A	N/A	800	1000	5000	10000	10000
Management Systems Limit to Petroleum Hydrocarbons in Soil Guidelines Coarse Grain Surface Soil	N/A	N/A	N/A	N/A	700	1000	3500	10000	10000
Management Systems Limit to Petroleum Hydrocarbons in Soil Guidelines Fine Grain Subsoil	N/A	N/A	N/A	N/A	800	1000	5000	10000	10000
Management Systems Limit to Petroleum Hydrocarbons in Soil Guidelines Coarse Grain Subsoil	N/A	N/A	N/A	N/A	700	1000	3500	10000	10000

CCME Reference All measured at Cancer risk of 10 - 6 (benzene)	Benzene	Toluene	Ethyl Benzene	Xylenes	F1	F2	F3	F4	Combined Total
Vapour Inhalation (Indoor Basement) Fine Grained Surface Soils	N/A	N/A	N/A	N/A	4600	23000	N/A	N/A	N/A
Vapour Inhalation (Indoor Basement) Coarse Grained Surface Soils	N/A	N/A	N/A	N/A	320	1700	N/A	N/A	N/A
Vapour Inhalation (Indoor Basement) Fine Grained Subsoil	N/A	N/A	N/A	N/A	4600	23000	N/A	N/A	N/A
Vapour Inhalation (Indoor Basement) Coarse Grained Subsoil	N/A	N/A	N/A	N/A	320	1700	N/A	N/A	N/A
Protection Of Potable GW Fine Grained Surface Soils	N/A	N/A	N/A	N/A	170	230	N/A	N/A	N/A
Protection Of Potable GW Coarse Grained Surface Soils	N/A	N/A	N/A	N/A	240	320	N/A	N/A	N/A
Protection Of Potable GW Fine Grained Subsoil	N/A	N/A	N/A	N/A	170	230	N/A	N/A	N/A
Protection Of Potable GW Coarse Grained Subsoils	N/A	N/A	N/A	N/A	240	320	N/A	N/A	N/A
Inhalation of indoor Air (Slab On Grade) Surface Soil Coarse	0.030	1400	630	160	N/A	N/A	N/A	N/A	N/A
Inhalation of indoor Air (Slab On Grade) Surface Soil Fine	0.28	13000	6500	1600	N/A	N/A	N/A	N/A	N/A
Inhalation of indoor Air (Slab On Grade) Subsoil Coarse	0.032	1500	670	170	N/A	N/A	N/A	N/A	N/A
Inhalation of indoor Air (Slab On Grade) Subsoil Fine	0.29	13000	6700	1600	N/A	N/A	N/A	N/A	N/A
Groundwater Check Surface Soil Coarse	0.030	0.37	0.082	11	N/A	N/A	N/A	N/A	N/A
Groundwater Check Surface Soil Fine	0.0068	0.08	0.018	2.4	N/A	N/A	N/A	N/A	N/A
Groundwater Check Subsoil Coarse	0.030	0.37	0.082	11	N/A	N/A	N/A	N/A	N/A
Groundwater Check Subsoil Fine	0.0068	0.08	0.018	2.4	N/A	N/A	N/A	N/A	N/A

Glycol Conditions Per CCME

Glycol	Agriculture	Residential	Commercial	Industrial
Diethylene	N/A	N/A	N/A	N/A
Ethylene	960	960	960	960
Propylene	N/A	N/A	N/A	N/A

Metals

Metal	Agriculture	Residential	Commercial	Industrial
Arsenic	12a	12a	12a	12a
Barium	750a	500a	2000a	2000a
Cadmium	1.4a	10a,b	22a	22a
Chromium	64	64	87	87
Copper	63	63	91	91
Lead	7	140	260	600
Nickel	45	45	89	89
Selenium	1	1	2.9	2.9
Thallium	1	1	1	1
Uranium	23	23	33	300
Vanadium	130	130	130	130
Zink	250	250	410	410

5.0 Site Conditions

- The site was open for access through a parking lot. All bore holes were filled with sand and packed prior to our removal from the site. Ground conditions were considered favourable with access being relatively easy. No major smells or observations were made at the time of our review. Neighbouring activities were non existent art the time of our review. No concerns at this time based on site conditions.

6.0 Recommendations

Area of Concern	Recommended Approach	Estimated Costs
Site is considered clean for development at this time No major concerns identified at this time	N/A	N/A

7.0 Resources

- Manitoba Workplace Safety & Health Act W210
- Manitoba Workplace Safety & Health Regulations M.R. 217/2006

- American Conference of Governmental Industrial Hygienists
- Guide for Asbestos Management - June 2016
- ASTM International Standards Worldwide - Asbestos Control: Surveys, Removal, and Management - Second Edition - ASTM Stock # MNL23-2nd
- Manitoba Sustainable Development Guidelines
- Canadian Standards Association - Standard Z769-00 (R2013)
- Canadian Soil Quality Guidelines for the Protection of Environment and Human Health
- Canadian Council of Ministers of the Environment
- Conversations with Harpreet Lali - Property Representative

8.0 Methodology

Bulk Sampling -

Destructive Sampling - Destructive sampling is the process of collecting samples for analytical review using means of smashing or destroying the material so it can be collected early. Destructive sampling is only used in situations where contamination of bystanders is minimal to no risk at all.

Clean / Core Sampling - Clean Sampling is the process of using a coring tool or sealed tool that limits the amount of contamination through taking the sample. Clean sampling will be more common in places that have current bystanders in the area such as residential dwellings with tenants living inside as well as workplaces with staff inside.

Air Sampling - Air sampling is the process of collecting a specific volume of air at a specific rate of flow in order to determine contamination levels. Cassettes are commonly used to collect the air in conjunction with a pump that is designed specifically for air sampling. Depending on what is being tested and the reasons a test is needed will effect on the amount of time and volume of air that is required for the test. An air test is almost always used to determine the OEL of the area that may be contaminated.

9.0 Notes to the Reader

J&D Environmental is performing an inspection based only on visual observation followed by lab testing on collected samples. Any hazardous materials not collected or observed during the site survey are not the responsibility of J&D Environmental. Concealed situations limiting J&D Environmental's ability to conduct a full inspection are not the responsibility of J&D Environmental. Opinions expressed by J&D Environmental are to be considered only an option of a possibility of several. Any discrepancies found on this report should be brought to the attention of J&D Environmental immediately so corrective action can be taken. J&D Environmental, its directors, staff and shareholders will not be held responsible for any unforeseen's that arise on this project that may have been concealed or overlooked during the inspection process. The information presented in this report is for the owner of the property and may not be disbursed to any outside agencies and or persons unless authorized to do so by the owner. J&D

Environmental accepts no responsibility for damages incurred to the property due to the development of this report. No warranties are included or expressed. Any actions or decisions based on this report is the sole responsibility of the party taking the action or making the decision J&D Environmental accepts no responsibility for damages suffered by any parties as a result of this report. This survey and all its findings are to be considered preliminary requiring further testing and review and not to be used as a full phase 2.

J&D
ENVIRONMENTAL
(204) 960-9605

Appendix A
Resources

J & D Environmental Inc.
ATTN: DANIAL KOLBA
PO Box 68052 RPO Osborne Village
Winnipeg MB R3L 2V9

Date Received: 13-MAY-21
Report Date: 26-MAY-21 14:06 (MT)
Version: FINAL

Client Phone: 204-960-9605

Certificate of Analysis

Lab Work Order #: L2587543

Project P.O. #: NOT SUBMITTED
Job Reference: OAK POINT HWY - SITE B
C of C Numbers:
Legal Site Desc:

Hua Wo
Chemistry Laboratory Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

		L2587543-1	L2587543-2	L2587543-3	L2587543-4	L2587543-5
	Sample ID	L2587543-1	L2587543-2	L2587543-3	L2587543-4	L2587543-5
	Description	SOIL	SOIL	SOIL	SOIL	SOIL
	Sampled Date	12-MAY-21	12-MAY-21	12-MAY-21	12-MAY-21	12-MAY-21
	Sampled Time					
	Client ID	APEC1 - 2-1.5M	APEC1 - 3-1.5M	APEC1 - 4-1.5M	APEC1 - 5-2.3M	APEC2 - 9-3.0M
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)		13.9			
	Moisture (%)	20.2			14.7	19.5
Metals	Aluminum (Al) (ug/g)			19400		
	Antimony (Sb) (ug/g)			0.56		
	Arsenic (As) (ug/g)			5.71		
	Barium (Ba) (ug/g)			185		
	Beryllium (Be) (ug/g)			1.07		
	Bismuth (Bi) (ug/g)			0.22		
	Boron (B) (ug/g)			22.7		
	Cadmium (Cd) (ug/g)			0.239		
	Calcium (Ca) (ug/g)			77100		
	Chromium (Cr) (ug/g)			35.7		
	Cobalt (Co) (ug/g)			9.45		
	Copper (Cu) (ug/g)			21.5		
	Iron (Fe) (ug/g)			21900		
	Lead (Pb) (ug/g)			29.0		
	Lithium (Li) (ug/g)			29.3		
	Magnesium (Mg) (ug/g)			29000		
	Manganese (Mn) (ug/g)			417		
	Molybdenum (Mo) (ug/g)			0.68		
	Nickel (Ni) (ug/g)			27.3		
	Phosphorus (P) (ug/g)			480		
	Potassium (K) (ug/g)			3930		
	Selenium (Se) (ug/g)			0.23		
	Silver (Ag) (ug/g)			0.13		
	Sodium (Na) (ug/g)			456		
	Strontium (Sr) (ug/g)			125		
	Sulfur (S) (ug/g)			<1000		
	Thallium (Tl) (ug/g)			0.288		
	Tin (Sn) (ug/g)			<2.0		
	Titanium (Ti) (ug/g)			223		
	Tungsten (W) (ug/g)			<0.50		
	Uranium (U) (ug/g)			2.22		
	Vanadium (V) (ug/g)			57.7		
	Zinc (Zn) (ug/g)			73.2		
	Zirconium (Zr) (ug/g)			10.6		
Volatile Organic Compounds	Acetone (mg/kg)	<0.50			<0.50	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L2587543-6 SOIL 12-MAY-21 APEC2 - 13-2.3M	L2587543-8 SOIL 12-MAY-21 APEC3 - 1-1.5M	L2587543-9 SOIL 12-MAY-21 APEC3 - 1-3.0M	L2587543-10 SOIL 12-MAY-21 APEC4 - 6-2.3M	L2587543-11 SOIL 12-MAY-21 APEC4 - 7-2.3M
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)				15.9	
	Moisture (%)	20.0		20.2		16.5
Metals	Aluminum (Al) (ug/g)		16200			
	Antimony (Sb) (ug/g)		9.28			
	Arsenic (As) (ug/g)		6.10			
	Barium (Ba) (ug/g)		179			
	Beryllium (Be) (ug/g)		0.65			
	Bismuth (Bi) (ug/g)		0.26			
	Boron (B) (ug/g)		18.8			
	Cadmium (Cd) (ug/g)		0.333			
	Calcium (Ca) (ug/g)		70200			
	Chromium (Cr) (ug/g)		31.2			
	Cobalt (Co) (ug/g)		7.86			
	Copper (Cu) (ug/g)		419			
	Iron (Fe) (ug/g)		19600			
	Lead (Pb) (ug/g)		275			
	Lithium (Li) (ug/g)		17.3			
	Magnesium (Mg) (ug/g)		32600			
	Manganese (Mn) (ug/g)		335			
	Molybdenum (Mo) (ug/g)		0.70			
	Nickel (Ni) (ug/g)		25.6			
	Phosphorus (P) (ug/g)		523			
	Potassium (K) (ug/g)		3430			
	Selenium (Se) (ug/g)		0.29			
	Silver (Ag) (ug/g)		0.24			
	Sodium (Na) (ug/g)		922			
	Strontium (Sr) (ug/g)		109			
	Sulfur (S) (ug/g)		2500			
	Thallium (Tl) (ug/g)		0.193			
	Tin (Sn) (ug/g)		31.6			
	Titanium (Ti) (ug/g)		209			
	Tungsten (W) (ug/g)		<0.50			
	Uranium (U) (ug/g)		1.35			
	Vanadium (V) (ug/g)		47.4			
	Zinc (Zn) (ug/g)		175			
	Zirconium (Zr) (ug/g)		7.3			
Volatile Organic Compounds	Acetone (mg/kg)			<0.50		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2587543-12	L2587543-13			
	Description	SOIL	SOIL			
	Sampled Date	12-MAY-21	12-MAY-21			
	Sampled Time					
	Client ID	APEC4 - 8-1.5M	FORMER SPEEDWAY - 15-1.5M			
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)					
	Moisture (%)					
Metals	Aluminum (Al) (ug/g)	17900	15100			
	Antimony (Sb) (ug/g)	0.53	0.41			
	Arsenic (As) (ug/g)	5.67	6.53			
	Barium (Ba) (ug/g)	161	149			
	Beryllium (Be) (ug/g)	0.68	0.70			
	Bismuth (Bi) (ug/g)	<0.20	<0.20			
	Boron (B) (ug/g)	19.9	13.6			
	Cadmium (Cd) (ug/g)	0.308	0.255			
	Calcium (Ca) (ug/g)	83200	69200			
	Chromium (Cr) (ug/g)	32.3	30.4			
	Cobalt (Co) (ug/g)	8.23	8.74			
	Copper (Cu) (ug/g)	28.1	22.0			
	Iron (Fe) (ug/g)	20600	20500			
	Lead (Pb) (ug/g)	50.6	21.9			
	Lithium (Li) (ug/g)	18.0	17.9			
	Magnesium (Mg) (ug/g)	37700	31000			
	Manganese (Mn) (ug/g)	388	373			
	Molybdenum (Mo) (ug/g)	0.54	0.73			
	Nickel (Ni) (ug/g)	23.9	25.2			
	Phosphorus (P) (ug/g)	444	431			
	Potassium (K) (ug/g)	3660	3230			
	Selenium (Se) (ug/g)	0.29	0.42			
	Silver (Ag) (ug/g)	0.15	<0.10			
	Sodium (Na) (ug/g)	803	1010			
	Strontium (Sr) (ug/g)	99.6	74.2			
	Sulfur (S) (ug/g)	1500	<1000			
	Thallium (Tl) (ug/g)	0.194	0.201			
	Tin (Sn) (ug/g)	3.6	<2.0			
	Titanium (Ti) (ug/g)	252	139			
	Tungsten (W) (ug/g)	<0.50	<0.50			
	Uranium (U) (ug/g)	1.20	1.44			
	Vanadium (V) (ug/g)	49.7	46.5			
	Zinc (Zn) (ug/g)	101	65.8			
	Zirconium (Zr) (ug/g)	7.5	8.1			
Volatile Organic Compounds	Acetone (mg/kg)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2587543-1	L2587543-2	L2587543-3	L2587543-4	L2587543-5
	Description	SOIL	SOIL	SOIL	SOIL	SOIL
	Sampled Date	12-MAY-21	12-MAY-21	12-MAY-21	12-MAY-21	12-MAY-21
	Sampled Time					
	Client ID	APEC1 - 2-1.5M	APEC1 - 3-1.5M	APEC1 - 4-1.5M	APEC1 - 5-2.3M	APEC2 - 9-3.0M
Grouping	**Analyte**					
SOIL						
Volatile Organic Compounds	Benzene (mg/kg)	<0.0050			<0.0050	<0.0050
	Bromobenzene (mg/kg)	<0.10			<0.10	
	Bromochloromethane (mg/kg)	<0.10			<0.10	
	Bromodichloromethane (mg/kg)	<0.050			<0.050	
	Bromoform (mg/kg)	<0.050			<0.050	
	Bromomethane (mg/kg)	<0.050			<0.050	
	n-Butylbenzene (mg/kg)	<0.050			<0.050	
	sec-Butylbenzene (mg/kg)	<0.050			<0.050	
	tert-Butylbenzene (mg/kg)	<0.050			<0.050	
	Carbon disulfide (mg/kg)	<0.25			<0.25	
	Carbon Tetrachloride (mg/kg)	<0.050			<0.050	
	Chlorobenzene (mg/kg)	<0.050			<0.050	
	Dibromochloromethane (mg/kg)	<0.050			<0.050	
	Chloroethane (mg/kg)	<0.050			<0.050	
	Chloroform (mg/kg)	<0.050			<0.050	
	Chloromethane (mg/kg)	<0.050			<0.050	
	2-Chlorotoluene (mg/kg)	<0.10			<0.10	
	4-Chlorotoluene (mg/kg)	<0.10			<0.10	
	1,2-Dibromo-3-chloropropane (mg/kg)	<0.050			<0.050	
	1,2-Dibromoethane (mg/kg)	<0.050			<0.050	
	Dibromomethane (mg/kg)	<0.050			<0.050	
	1,2-Dichlorobenzene (mg/kg)	<0.050			<0.050	
	1,3-Dichlorobenzene (mg/kg)	<0.050			<0.050	
	1,4-Dichlorobenzene (mg/kg)	<0.050			<0.050	
	Dichlorodifluoromethane (mg/kg)	<0.050			<0.050	
	1,1-dichloroethane (mg/kg)	<0.050			<0.050	
	1,2-Dichloroethane (mg/kg)	<0.050			<0.050	
	1,1-dichloroethene (mg/kg)	<0.050			<0.050	
	cis-1,2-Dichloroethene (mg/kg)	0.218			<0.050	
	trans-1,2-Dichloroethene (mg/kg)	<0.050			<0.050	
	Dichloromethane (mg/kg)	<0.10			<0.10	
	1,2-Dichloropropane (mg/kg)	<0.050			<0.050	
	1,3-Dichloropropane (mg/kg)	<0.050			<0.050	
	2,2-Dichloropropane (mg/kg)	<0.10			<0.10	
	1,1-Dichloropropene (mg/kg)	<0.050			<0.050	
	cis-1,3-Dichloropropene (mg/kg)	<0.050			<0.050	
	trans-1,3-Dichloropropene (mg/kg)	<0.050			<0.050	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2587543-6	L2587543-8	L2587543-9	L2587543-10	L2587543-11
	Description	SOIL	SOIL	SOIL	SOIL	SOIL
	Sampled Date	12-MAY-21	12-MAY-21	12-MAY-21	12-MAY-21	12-MAY-21
	Sampled Time					
	Client ID	APEC2 - 13-2.3M	APEC3 - 1-1.5M	APEC3 - 1-3.0M	APEC4 - 6-2.3M	APEC4 - 7-2.3M
Grouping	**Analyte**					
SOIL						
Volatile Organic Compounds	Benzene (mg/kg)	<0.0050		0.0302		<0.0050
	Bromobenzene (mg/kg)			<0.10		
	Bromochloromethane (mg/kg)			<0.10		
	Bromodichloromethane (mg/kg)			<0.050		
	Bromoform (mg/kg)			<0.050		
	Bromomethane (mg/kg)			<0.050		
	n-Butylbenzene (mg/kg)			<0.050		
	sec-Butylbenzene (mg/kg)			<0.050		
	tert-Butylbenzene (mg/kg)			<0.050		
	Carbon disulfide (mg/kg)			<0.25		
	Carbon Tetrachloride (mg/kg)			<0.050		
	Chlorobenzene (mg/kg)			<0.050		
	Dibromochloromethane (mg/kg)			<0.050		
	Chloroethane (mg/kg)			<0.050		
	Chloroform (mg/kg)			<0.050		
	Chloromethane (mg/kg)			<0.050		
	2-Chlorotoluene (mg/kg)			<0.10		
	4-Chlorotoluene (mg/kg)			<0.10		
	1,2-Dibromo-3-chloropropane (mg/kg)			<0.050		
	1,2-Dibromoethane (mg/kg)			<0.050		
	Dibromomethane (mg/kg)			<0.050		
	1,2-Dichlorobenzene (mg/kg)			<0.050		
	1,3-Dichlorobenzene (mg/kg)			<0.050		
	1,4-Dichlorobenzene (mg/kg)			<0.050		
	Dichlorodifluoromethane (mg/kg)			<0.050		
	1,1-dichloroethane (mg/kg)			<0.050		
	1,2-Dichloroethane (mg/kg)			<0.050		
	1,1-dichloroethene (mg/kg)			<0.050		
	cis-1,2-Dichloroethene (mg/kg)			<0.050		
	trans-1,2-Dichloroethene (mg/kg)			<0.050		
	Dichloromethane (mg/kg)			<0.10		
	1,2-Dichloropropane (mg/kg)			<0.050		
	1,3-Dichloropropane (mg/kg)			<0.050		
	2,2-Dichloropropane (mg/kg)			<0.10		
	1,1-Dichloropropene (mg/kg)			<0.050		
	cis-1,3-Dichloropropene (mg/kg)			<0.050		
	trans-1,3-Dichloropropene (mg/kg)			<0.050		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2587543-12	L2587543-13			
	Description	SOIL	SOIL			
	Sampled Date	12-MAY-21	12-MAY-21			
	Sampled Time					
	Client ID	APEC4 - 8-1.5M	FORMER SPEEDWAY - 15-1.5M			
Grouping	**Analyte**					
SOIL						
Volatile Organic Compounds	Benzene (mg/kg)					
	Bromobenzene (mg/kg)					
	Bromochloromethane (mg/kg)					
	Bromodichloromethane (mg/kg)					
	Bromoform (mg/kg)					
	Bromomethane (mg/kg)					
	n-Butylbenzene (mg/kg)					
	sec-Butylbenzene (mg/kg)					
	tert-Butylbenzene (mg/kg)					
	Carbon disulfide (mg/kg)					
	Carbon Tetrachloride (mg/kg)					
	Chlorobenzene (mg/kg)					
	Dibromochloromethane (mg/kg)					
	Chloroethane (mg/kg)					
	Chloroform (mg/kg)					
	Chloromethane (mg/kg)					
	2-Chlorotoluene (mg/kg)					
	4-Chlorotoluene (mg/kg)					
	1,2-Dibromo-3-chloropropane (mg/kg)					
	1,2-Dibromoethane (mg/kg)					
	Dibromomethane (mg/kg)					
	1,2-Dichlorobenzene (mg/kg)					
	1,3-Dichlorobenzene (mg/kg)					
	1,4-Dichlorobenzene (mg/kg)					
	Dichlorodifluoromethane (mg/kg)					
	1,1-dichloroethane (mg/kg)					
	1,2-Dichloroethane (mg/kg)					
	1,1-dichloroethene (mg/kg)					
	cis-1,2-Dichloroethene (mg/kg)					
	trans-1,2-Dichloroethene (mg/kg)					
	Dichloromethane (mg/kg)					
	1,2-Dichloropropane (mg/kg)					
	1,3-Dichloropropane (mg/kg)					
	2,2-Dichloropropane (mg/kg)					
	1,1-Dichloropropene (mg/kg)					
	cis-1,3-Dichloropropene (mg/kg)					
	trans-1,3-Dichloropropene (mg/kg)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		L2587543-1	L2587543-2	L2587543-3	L2587543-4	L2587543-5
	Sample ID	L2587543-1	L2587543-2	L2587543-3	L2587543-4	L2587543-5
	Description	SOIL	SOIL	SOIL	SOIL	SOIL
	Sampled Date	12-MAY-21	12-MAY-21	12-MAY-21	12-MAY-21	12-MAY-21
	Sampled Time					
	Client ID	APEC1 - 2-1.5M	APEC1 - 3-1.5M	APEC1 - 4-1.5M	APEC1 - 5-2.3M	APEC2 - 9-3.0M
Grouping	**Analyte**					
SOIL						
Volatile Organic Compounds	Ethyl benzene (mg/kg)					<0.015
	Ethylbenzene (mg/kg)	<0.015			<0.015	
	Hexachlorobutadiene (mg/kg)	<0.050			<0.050	
	Hexane (mg/kg)	<0.050			<0.050	
	2-Hexanone (Methyl butyl ketone) (mg/kg)	<0.50			<0.50	
	Isopropylbenzene (mg/kg)	<0.10			<0.10	
	4-Isopropyltoluene (mg/kg)	<0.10			<0.10	
	MEK (mg/kg)	<0.50			<0.50	
	MIBK (mg/kg)	<0.50			<0.50	
	MTBE (mg/kg)	<0.20			<0.20	
	Styrene (mg/kg)	<0.050			<0.050	
	1,1,1,2-Tetrachloroethane (mg/kg)	<0.050			<0.050	
	1,1,2,2-Tetrachloroethane (mg/kg)	<0.050			<0.050	
	Tetrachloroethene (mg/kg)	<0.050			0.330	
	Toluene (mg/kg)	<0.050			0.073	<0.050
	1,2,3-Trichlorobenzene (mg/kg)	<0.050			<0.050	
	1,2,4-Trichlorobenzene (mg/kg)	<0.050			<0.050	
	1,1,1-Trichloroethane (mg/kg)	<0.050			<0.050	
	1,1,2-Trichloroethane (mg/kg)	<0.050			<0.050	
	Trichloroethene (mg/kg)	0.044			0.015	
	Trichlorofluoromethane (mg/kg)	<0.050			<0.050	
	1,2,3-Trichloropropane (mg/kg)	<0.050			<0.050	
	1,2,4-Trimethylbenzene (mg/kg)	<0.050			<0.050	
	1,3,5-Trimethylbenzene (mg/kg)	<0.050			<0.050	
	Vinyl Chloride (mg/kg)	<0.050			<0.050	
	o-Xylene (mg/kg)	<0.050			<0.050	<0.050
	M+P-Xylenes (mg/kg)	<0.050			0.080	
	m+p-Xylenes (mg/kg)					<0.050
	Xylenes (Total) (mg/kg)	<0.071			0.080	<0.071
	F1 (mg/kg)	<10			<10	
	F1 (C6-C10) (mg/kg)					<10
	F1-BTEX (mg/kg)	<10			<10	<10
	Total Hydrocarbons (C6-C50) (mg/kg)	186			564	<76
	Surrogate: 4-Bromofluorobenzene (SS) (%)	118.4			113.9	101.7
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	123.0			118.2	104.7
	Surrogate: 1,4-Difluorobenzene (SS) (%)	127.8			111.5	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2587543-6	L2587543-8	L2587543-9	L2587543-10	L2587543-11
	Description	SOIL	SOIL	SOIL	SOIL	SOIL
	Sampled Date	12-MAY-21	12-MAY-21	12-MAY-21	12-MAY-21	12-MAY-21
	Sampled Time					
	Client ID	APEC2 - 13-2.3M	APEC3 - 1-1.5M	APEC3 - 1-3.0M	APEC4 - 6-2.3M	APEC4 - 7-2.3M
Grouping	**Analyte**					
SOIL						
Volatile Organic Compounds	Ethyl benzene (mg/kg)	<0.015				<0.015
	Ethylbenzene (mg/kg)			<0.015		
	Hexachlorobutadiene (mg/kg)			<0.050		
	Hexane (mg/kg)			<0.050		
	2-Hexanone (Methyl butyl ketone) (mg/kg)			<0.50		
	Isopropylbenzene (mg/kg)			<0.10		
	4-Isopropyltoluene (mg/kg)			<0.10		
	MEK (mg/kg)			<0.50		
	MIBK (mg/kg)			<0.50		
	MTBE (mg/kg)			<0.20		
	Styrene (mg/kg)			<0.050		
	1,1,1,2-Tetrachloroethane (mg/kg)			<0.050		
	1,1,2,2-Tetrachloroethane (mg/kg)			<0.050		
	Tetrachloroethene (mg/kg)			<0.050		
	Toluene (mg/kg)	<0.050		<0.050		<0.050
	1,2,3-Trichlorobenzene (mg/kg)			<0.050		
	1,2,4-Trichlorobenzene (mg/kg)			<0.050		
	1,1,1-Trichloroethane (mg/kg)			<0.050		
	1,1,2-Trichloroethane (mg/kg)			<0.050		
	Trichloroethene (mg/kg)			0.057		
	Trichlorofluoromethane (mg/kg)			<0.050		
	1,2,3-Trichloropropane (mg/kg)			<0.050		
	1,2,4-Trimethylbenzene (mg/kg)			<0.050		
	1,3,5-Trimethylbenzene (mg/kg)			<0.050		
	Vinyl Chloride (mg/kg)			<0.050		
	o-Xylene (mg/kg)	<0.050		<0.050		<0.050
	M+P-Xylenes (mg/kg)			<0.050		
	m+p-Xylenes (mg/kg)	<0.050				<0.050
	Xylenes (Total) (mg/kg)	<0.071		<0.071		<0.071
	F1 (mg/kg)			<10		
	F1 (C6-C10) (mg/kg)	<10				<10
	F1-BTEX (mg/kg)	<10		<10		<10
	Total Hydrocarbons (C6-C50) (mg/kg)	<76		122		185
	Surrogate: 4-Bromofluorobenzene (SS) (%)	123.4		125.3		103.7
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	SURR-ND 134.7		123.7		123.4
	Surrogate: 1,4-Difluorobenzene (SS) (%)			129.4		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2587543-12	L2587543-13			
	Description	SOIL	SOIL			
	Sampled Date	12-MAY-21	12-MAY-21			
	Sampled Time					
	Client ID	APEC4 - 8-1.5M	FORMER SPEEDWAY - 15-1.5M			
Grouping	**Analyte**					
SOIL						
Volatile Organic Compounds	Ethyl benzene (mg/kg)					
	Ethylbenzene (mg/kg)					
	Hexachlorobutadiene (mg/kg)					
	Hexane (mg/kg)					
	2-Hexanone (Methyl butyl ketone) (mg/kg)					
	Isopropylbenzene (mg/kg)					
	4-Isopropyltoluene (mg/kg)					
	MEK (mg/kg)					
	MIBK (mg/kg)					
	MTBE (mg/kg)					
	Styrene (mg/kg)					
	1,1,1,2-Tetrachloroethane (mg/kg)					
	1,1,2,2-Tetrachloroethane (mg/kg)					
	Tetrachloroethene (mg/kg)					
	Toluene (mg/kg)					
	1,2,3-Trichlorobenzene (mg/kg)					
	1,2,4-Trichlorobenzene (mg/kg)					
	1,1,1-Trichloroethane (mg/kg)					
	1,1,2-Trichloroethane (mg/kg)					
	Trichloroethene (mg/kg)					
	Trichlorofluoromethane (mg/kg)					
	1,2,3-Trichloropropane (mg/kg)					
	1,2,4-Trimethylbenzene (mg/kg)					
	1,3,5-Trimethylbenzene (mg/kg)					
	Vinyl Chloride (mg/kg)					
	o-Xylene (mg/kg)					
	M+P-Xylenes (mg/kg)					
	m+p-Xylenes (mg/kg)					
	Xylenes (Total) (mg/kg)					
	F1 (mg/kg)					
	F1 (C6-C10) (mg/kg)					
	F1-BTEX (mg/kg)					
	Total Hydrocarbons (C6-C50) (mg/kg)					
	Surrogate: 4-Bromofluorobenzene (SS) (%)					
	Surrogate: 3,4-Dichlorotoluene (SS) (%)					
	Surrogate: 1,4-Difluorobenzene (SS) (%)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2587543-1	L2587543-2	L2587543-3	L2587543-4	L2587543-5
	Description	SOIL	SOIL	SOIL	SOIL	SOIL
	Sampled Date	12-MAY-21	12-MAY-21	12-MAY-21	12-MAY-21	12-MAY-21
	Sampled Time					
	Client ID	APEC1 - 2-1.5M	APEC1 - 3-1.5M	APEC1 - 4-1.5M	APEC1 - 5-2.3M	APEC2 - 9-3.0M
Grouping	**Analyte**					
SOIL						
Hydrocarbons	F2 (C10-C16) (mg/kg)	<25			<25	<25
	F3 (C16-C34) (mg/kg)	115			200	<50
	F4 (C34-C50) (mg/kg)	70			364	56
	Chrom. to baseline at nC50	YES			YES	YES
	Surrogate: 2-Bromobenzotrifluoride (%)	84.6			80.7	82.4
Polycyclic Aromatic Hydrocarbons	Acenaphthene (ug/g)		0.0733			
	Acenaphthylene (ug/g)		0.0070			
	Acridine (ug/g)		0.025			
	Anthracene (ug/g)		0.163			
	Benzo(a)anthracene (ug/g)		0.315			
	Benzo(a)pyrene (ug/g)		0.294			
	Benzo(b&j)fluoranthene (ug/g)		0.334			
	Benzo(g,h,i)perylene (ug/g)		0.196			
	Benzo(k)fluoranthene (ug/g)		0.158			
	Chrysene (ug/g)		0.293			
	Dibenz(a,h)anthracene (ug/g)		0.0510			
	Fluoroanthene (ug/g)		0.693			
	Fluorene (ug/g)		0.0711			
	Indeno(1,2,3-cd)pyrene (ug/g)		0.201			
	1-Methylnaphthalene (ug/g)		0.0140			
	2-Methylnaphthalene (ug/g)		0.0199			
	Naphthalene (ug/g)		0.0329			
	Phenanthrene (ug/g)		0.597			
	Pyrene (ug/g)		0.569			
	Quinoline (ug/g)		<0.0050			
	Surrogate: 2-Fluorobiphenyl (%)		98.8			
	Surrogate: d14-Terphenyl (%)		101.5			
	B(a)P Total Potency Equivalent (ug/g)		0.451			
	IACR (CCME)		5.29			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2587543-6	L2587543-8	L2587543-9	L2587543-10	L2587543-11
	Description	SOIL	SOIL	SOIL	SOIL	SOIL
	Sampled Date	12-MAY-21	12-MAY-21	12-MAY-21	12-MAY-21	12-MAY-21
	Sampled Time					
	Client ID	APEC2 - 13-2.3M	APEC3 - 1-1.5M	APEC3 - 1-3.0M	APEC4 - 6-2.3M	APEC4 - 7-2.3M
Grouping	**Analyte**					
SOIL						
Hydrocarbons	F2 (C10-C16) (mg/kg)	<25		<25		<25
	F3 (C16-C34) (mg/kg)	<50		64		<50
	F4 (C34-C50) (mg/kg)	<50		58		185
	Chrom. to baseline at nC50	YES		YES		YES
	Surrogate: 2-Bromobenzotrifluoride (%)	83.3		79.4		84.5
Polycyclic Aromatic Hydrocarbons	Acenaphthene (ug/g)				0.0523	
	Acenaphthylene (ug/g)				0.0140	
	Acridine (ug/g)				0.016	
	Anthracene (ug/g)				0.107	
	Benzo(a)anthracene (ug/g)				0.327	
	Benzo(a)pyrene (ug/g)				0.286	
	Benzo(b&j)fluoranthene (ug/g)				0.367	
	Benzo(g,h,i)perylene (ug/g)				0.199	
	Benzo(k)fluoranthene (ug/g)				0.156	
	Chrysene (ug/g)				0.305	
	Dibenz(a,h)anthracene (ug/g)				0.0557	
	Fluoroanthene (ug/g)				0.699	
	Fluorene (ug/g)				0.0578	
	Indeno(1,2,3-cd)pyrene (ug/g)				0.204	
	1-Methylnaphthalene (ug/g)				0.0144	
	2-Methylnaphthalene (ug/g)				0.0205	
	Naphthalene (ug/g)				0.0390	
	Phenanthrene (ug/g)				0.497	
	Pyrene (ug/g)				0.557	
	Quinoline (ug/g)				<0.0050	
	Surrogate: 2-Fluorobiphenyl (%)				97.0	
	Surrogate: d14-Terphenyl (%)				96.2	
	B(a)P Total Potency Equivalent (ug/g)				0.452	
	IACR (CCME)				5.53	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L2587543-12 SOIL 12-MAY-21 APEC4 - 8-1.5M	L2587543-13 SOIL 12-MAY-21 FORMER SPEEDWAY - 15-1.5M			
Grouping	**Analyte**					
SOIL						
Hydrocarbons	F2 (C10-C16) (mg/kg)					
	F3 (C16-C34) (mg/kg)					
	F4 (C34-C50) (mg/kg)					
	Chrom. to baseline at nC50					
	Surrogate: 2-Bromobenzotrifluoride (%)					
Polycyclic Aromatic Hydrocarbons	Acenaphthene (ug/g)					
	Acenaphthylene (ug/g)					
	Acridine (ug/g)					
	Anthracene (ug/g)					
	Benzo(a)anthracene (ug/g)					
	Benzo(a)pyrene (ug/g)					
	Benzo(b&j)fluoranthene (ug/g)					
	Benzo(g,h,i)perylene (ug/g)					
	Benzo(k)fluoranthene (ug/g)					
	Chrysene (ug/g)					
	Dibenz(a,h)anthracene (ug/g)					
	Fluoroanthene (ug/g)					
	Fluorene (ug/g)					
	Indeno(1,2,3-cd)pyrene (ug/g)					
	1-Methylnaphthalene (ug/g)					
	2-Methylnaphthalene (ug/g)					
	Naphthalene (ug/g)					
	Phenanthrene (ug/g)					
	Pyrene (ug/g)					
	Quinoline (ug/g)					
	Surrogate: 2-Fluorobiphenyl (%)					
	Surrogate: d14-Terphenyl (%)					
	B(a)P Total Potency Equivalent (ug/g)					
	IACR (CCME)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2587543-7				
		Description	WATER				
		Sampled Date	12-MAY-21				
		Sampled Time					
		Client ID	APEC2 - MW2				
Grouping	**Analyte**						
WATER							
Volatile Organic Compounds	Benzene (mg/L)		<0.00050				
	Ethyl benzene (mg/L)		<0.00050				
	Toluene (mg/L)		<0.0010				
	o-Xylene (mg/L)		<0.00050				
	m+p-Xylenes (mg/L)		<0.00040				
	Xylenes (Total) (mg/L)		<0.00064				
	F1 (C6-C10) (mg/L)		<0.10				
	F1-BTEX (mg/L)		<0.10				
	Total Hydrocarbons (C6-C50) (mg/L)		<0.38				
	Surrogate: 4-Bromofluorobenzene (SS) (%)		96.6				
Hydrocarbons	F2 (C10-C16) (mg/L)		<0.10				
	F3 (C16-C34) (mg/L)		<0.25				
	F4 (C34-C50) (mg/L)		<0.25				
	Surrogate: 2-Bromobenzotrifluoride (%)		101.7				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Laboratory Control Sample	Carbon disulfide	MES	L2587543-1, -4, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).
SURR-ND	Surrogate recovery marginally exceeded ALS DQO. Reported non-detect results for associated samples were deemed to be unaffected.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BTEXS+F1-HSMS-WP	Water	BTX plus F1 by GCMS	EPA 8260C / EPA 5021A

The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transfered into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

BTEXS+F1-HSMS-WP	Soil	BTX plus F1 by GCMS	EPA 8260C

The soil methanol extract is added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

F1-F4-CALC-WP	Water	CCME Total Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-F4-CALC-WP	Soil	CCME Total Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001-S

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F2-F4-FID-WP	Water	CCME PHC F2-F4 in Water	EPA 3511

Reference Information

Petroleum hydrocarbons in water are determined by liquid-liquid micro-scale solvent extraction using a reciprocal shaker extraction apparatus prior to capillary column gas chromatography with flame ionization detection (GC-FID) analysis.

F2-F4-TMB-FID-WP	Soil	CCME Total Extractable Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001

A soil or sediment sample is extracted with 1:1 hexane/acetone in a tumbler, followed by a silica gel clean up to facilitate separation of the hydrocarbons from other polar extractions. An aliquot of the solvent is analyzed using a gas chromatograph equipped with a flame -ionization detector.

MET-200.2-CCMS-WT	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020B (mod)

Soil/sediment is dried, disaggregated, and sieved (2 mm). For tests intended to support Ontario regulations, the <2mm fraction is ground to pass through a 0.355 mm sieve. Strong Acid Leachable Metals in the <2mm fraction are solubilized by heated digestion with nitric and hydrochloric acids. Instrumental analysis is by Collision / Reaction Cell ICPMS.

Limitations: This method is intended to liberate environmentally available metals. Silicate minerals are not solubilized. Some metals may be only partially recovered (matrix dependent), including Al, Ba, Be, Cr, S, Sr, Ti, Tl, V, W, and Zr. Elemental Sulfur may be poorly recovered by this method. Volatile forms of sulfur (e.g. sulfide, H2S) may be excluded if lost during sampling, storage, or digestion.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

MOISTURE-WP	Soil	% Moisture	CCME PHC in Soil - Tier 1 (mod)

Moisture content in solid matrices is determined gravimetrically after drying to constant weight at 105 C.

MOISTURE-WT	Soil	% Moisture	CCME PHC in Soil - Tier 1 (mod)
PAH-CCME-SQGL-WT	Soil	PAHs in Sediment	SW846 8270

The procedure uses a mechanical shaking technique to extract a representative sub-sample with a mixture of methanol and toluene. The extract is analyzed by GC/MSD. Depending on the analytical GC/MS column used benzo(j)fluoranthene may chromatographically co-elute with benzo(b)fluoranthene or benzo(k)fluoranthene.

VOC+F1-HSMS-WP	Soil	VOC plus F1 by GCMS	EPA 8260C

The soil methanol extract is added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

XYLENES-SUM-CALC-WP	Water	Sum of Xylene Isomer Concentrations	CALCULATED RESULT

Total xylenes represents the sum of o-xylene and m&p-xylene.

XYLENES-SUM-CALC-WP	Soil	Sum of Xylene Isomer Concentrations	CALCULATED RESULT

Total xylenes represents the sum of o-xylene and m&p-xylene.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Quality Control Report

Workorder: L2587543 Report Date: 26-MAY-21

Client: J & D Environmental Inc.
PO Box 68052 RPO Osborne Village
Winnipeg MB R3L 2V9

Contact: DANIAL KOLBA

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTEXS+F1-HSMS-WP	Water							
Batch R5460673								
WG3537105-2 LCS								
Benzene			85.4		%		70-130	18-MAY-21
Toluene			86.2		%		70-130	18-MAY-21
Ethyl benzene			93.6		%		70-130	18-MAY-21
o-Xylene			92.5		%		70-130	18-MAY-21
m+p-Xylenes			89.1		%		70-130	18-MAY-21
WG3537105-3 LCS								
F1 (C6-C10)			88.5		%		70-130	18-MAY-21
WG3537105-1 MB								
Benzene			<0.00050		mg/L		0.0005	18-MAY-21
Toluene			<0.0010		mg/L		0.001	18-MAY-21
Ethyl benzene			<0.00050		mg/L		0.0005	18-MAY-21
o-Xylene			<0.00050		mg/L		0.0005	18-MAY-21
m+p-Xylenes			<0.00040		mg/L		0.0004	18-MAY-21
F1 (C6-C10)			<0.10		mg/L		0.1	18-MAY-21
Surrogate: 4-Bromofluorobenzene (SS)			85.1		%		70-130	18-MAY-21
F2-F4-FID-WP	Water							
Batch R5458192								
WG3534997-2 LCS								
F2 (C10-C16)			101.3		%		70-130	14-MAY-21
F3 (C16-C34)			95.0		%		70-130	14-MAY-21
F4 (C34-C50)			103.2		%		70-130	14-MAY-21
WG3534997-1 MB								
F2 (C10-C16)			<0.10		mg/L		0.1	14-MAY-21
F3 (C16-C34)			<0.25		mg/L		0.25	14-MAY-21
F4 (C34-C50)			<0.25		mg/L		0.25	14-MAY-21
Surrogate: 2-Bromobenzotrifluoride			101.5		%		60-140	14-MAY-21
BTEXS+F1-HSMS-WP	Soil							
Batch R5459131								
WG3535008-2 LCS								
Benzene			73.7		%		70-130	17-MAY-21
Toluene			75.4		%		70-130	17-MAY-21
Ethyl benzene			80.1		%		70-130	17-MAY-21
o-Xylene			83.0		%		70-130	17-MAY-21
m+p-Xylenes			73.5		%		70-130	17-MAY-21
WG3535008-3 LCS								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTEXS+F1-HSMS-WP	Soil							
Batch **R5459131**								
WG3535008-3 **LCS**								
F1 (C6-C10)			98.9		%		70-130	17-MAY-21
WG3535008-1 **MB**								
Benzene			<0.0050		mg/kg		0.005	17-MAY-21
Toluene			<0.050		mg/kg		0.05	17-MAY-21
Ethyl benzene			<0.015		mg/kg		0.015	17-MAY-21
o-Xylene			<0.050		mg/kg		0.05	17-MAY-21
m+p-Xylenes			<0.050		mg/kg		0.05	17-MAY-21
F1 (C6-C10)			<10		mg/kg		10	17-MAY-21
Surrogate: 4-Bromofluorobenzene (SS)			101.8		%		70-130	17-MAY-21
Surrogate: 3,4-Dichlorotoluene (SS)			124.2		%		70-130	17-MAY-21
F2-F4-TMB-FID-WP	Soil							
Batch **R5459060**								
WG3535413-3 **IRM**		**ALS PHC RM3**						
F2 (C10-C16)			100.6		%		70-130	15-MAY-21
F3 (C16-C34)			90.5		%		70-130	15-MAY-21
F4 (C34-C50)			93.2		%		70-130	15-MAY-21
WG3535413-2 **LCS**								
F2 (C10-C16)			110.1		%		70-130	15-MAY-21
F3 (C16-C34)			108.6		%		70-130	15-MAY-21
F4 (C34-C50)			116.9		%		70-130	15-MAY-21
WG3535413-1 **MB**								
F2 (C10-C16)			<25		mg/kg		25	15-MAY-21
F3 (C16-C34)			<50		mg/kg		50	15-MAY-21
F4 (C34-C50)			<50		mg/kg		50	15-MAY-21
Surrogate: 2-Bromobenzotrifluoride			82.8		%		60-140	15-MAY-21
MET-200.2-CCMS-WT	Soil							
Batch **R5466856**								
WG3539551-9 **CRM**		**WT-SS-2**						
Aluminum (Al)			99.0		%		70-130	25-MAY-21
Antimony (Sb)			101.4		%		70-130	25-MAY-21
Arsenic (As)			109.9		%		70-130	25-MAY-21
Barium (Ba)			109.1		%		70-130	25-MAY-21
Beryllium (Be)			90.7		%		70-130	25-MAY-21
Bismuth (Bi)			0.17		mg/kg		0-0.34	25-MAY-21
Boron (B)			7.9		mg/kg		3.5-13.5	25-MAY-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	Soil							
Batch R5466856								
WG3539551-9 CRM		**WT-SS-2**						
Cadmium (Cd)			106.4		%		70-130	25-MAY-21
Calcium (Ca)			105.6		%		70-130	25-MAY-21
Chromium (Cr)			103.3		%		70-130	25-MAY-21
Cobalt (Co)			96.7		%		70-130	25-MAY-21
Copper (Cu)			107.0		%		70-130	25-MAY-21
Iron (Fe)			104.0		%		70-130	25-MAY-21
Lead (Pb)			106.2		%		70-130	25-MAY-21
Lithium (Li)			81.6		%		70-130	25-MAY-21
Magnesium (Mg)			98.6		%		70-130	25-MAY-21
Manganese (Mn)			107.9		%		70-130	25-MAY-21
Molybdenum (Mo)			105.1		%		70-130	25-MAY-21
Nickel (Ni)			101.7		%		70-130	25-MAY-21
Phosphorus (P)			100.5		%		70-130	25-MAY-21
Potassium (K)			104.1		%		70-130	25-MAY-21
Selenium (Se)			0.13		mg/kg		0-0.34	25-MAY-21
Silver (Ag)			108.6		%		70-130	25-MAY-21
Sodium (Na)			92.7		%		70-130	25-MAY-21
Strontium (Sr)			107.0		%		70-130	25-MAY-21
Thallium (Tl)			0.073		mg/kg		0.029-0.129	25-MAY-21
Tin (Sn)			107.5		%		70-130	25-MAY-21
Titanium (Ti)			97.4		%		70-130	25-MAY-21
Uranium (U)			95.3		%		70-130	25-MAY-21
Vanadium (V)			101.0		%		70-130	25-MAY-21
Zinc (Zn)			100.3		%		70-130	25-MAY-21
Zirconium (Zr)			96.6		%		70-130	25-MAY-21
WG3539551-10 LCS		**1+2**						
Aluminum (Al)			93.4		%		80-120	25-MAY-21
Antimony (Sb)			105.5		%		80-120	25-MAY-21
Arsenic (As)			98.4		%		80-120	25-MAY-21
Barium (Ba)			92.7		%		80-120	25-MAY-21
Beryllium (Be)			89.7		%		80-120	25-MAY-21
Bismuth (Bi)			100.5		%		80-120	25-MAY-21
Boron (B)			86.7		%		80-120	25-MAY-21
Cadmium (Cd)			98.5		%		80-120	25-MAY-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	Soil							
Batch R5466856								
WG3539551-10 LCS		**1+2**						
Calcium (Ca)			96.3		%		80-120	25-MAY-21
Chromium (Cr)			96.4		%		80-120	25-MAY-21
Cobalt (Co)			89.5		%		80-120	25-MAY-21
Copper (Cu)			91.0		%		80-120	25-MAY-21
Iron (Fe)			100.4		%		80-120	25-MAY-21
Lead (Pb)			104.0		%		80-120	25-MAY-21
Lithium (Li)			85.1		%		80-120	25-MAY-21
Magnesium (Mg)			100.9		%		80-120	25-MAY-21
Manganese (Mn)			95.2		%		80-120	25-MAY-21
Molybdenum (Mo)			99.5		%		80-120	25-MAY-21
Nickel (Ni)			91.4		%		80-120	25-MAY-21
Phosphorus (P)			98.3		%		80-120	25-MAY-21
Potassium (K)			102.0		%		80-120	25-MAY-21
Selenium (Se)			101.2		%		80-120	25-MAY-21
Silver (Ag)			84.5		%		80-120	25-MAY-21
Sodium (Na)			95.4		%		80-120	25-MAY-21
Strontium (Sr)			104.2		%		80-120	25-MAY-21
Sulfur (S)			93.6		%		80-120	25-MAY-21
Thallium (Tl)			100.8		%		80-120	25-MAY-21
Tin (Sn)			101.4		%		80-120	25-MAY-21
Titanium (Ti)			94.1		%		80-120	25-MAY-21
Tungsten (W)			95.3		%		80-120	25-MAY-21
Uranium (U)			96.0		%		80-120	25-MAY-21
Vanadium (V)			98.5		%		80-120	25-MAY-21
Zinc (Zn)			92.7		%		80-120	25-MAY-21
Zirconium (Zr)			98.5		%		80-120	25-MAY-21
WG3539551-8 MB								
Aluminum (Al)			<50		mg/kg		50	25-MAY-21
Antimony (Sb)			<0.10		mg/kg		0.1	25-MAY-21
Arsenic (As)			<0.10		mg/kg		0.1	25-MAY-21
Barium (Ba)			<0.50		mg/kg		0.5	25-MAY-21
Beryllium (Be)			<0.10		mg/kg		0.1	25-MAY-21
Bismuth (Bi)			<0.20		mg/kg		0.2	25-MAY-21
Boron (B)			<5.0		mg/kg		5	25-MAY-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	Soil							
Batch R5466856								
WG3539551-8 MB								
Cadmium (Cd)			<0.020		mg/kg		0.02	25-MAY-21
Calcium (Ca)			<50		mg/kg		50	25-MAY-21
Chromium (Cr)			<0.50		mg/kg		0.5	25-MAY-21
Cobalt (Co)			<0.10		mg/kg		0.1	25-MAY-21
Copper (Cu)			<0.50		mg/kg		0.5	25-MAY-21
Iron (Fe)			<50		mg/kg		50	25-MAY-21
Lead (Pb)			<0.50		mg/kg		0.5	25-MAY-21
Lithium (Li)			<2.0		mg/kg		2	25-MAY-21
Magnesium (Mg)			<20		mg/kg		20	25-MAY-21
Manganese (Mn)			<1.0		mg/kg		1	25-MAY-21
Molybdenum (Mo)			<0.10		mg/kg		0.1	25-MAY-21
Nickel (Ni)			<0.50		mg/kg		0.5	25-MAY-21
Phosphorus (P)			<50		mg/kg		50	25-MAY-21
Potassium (K)			<100		mg/kg		100	25-MAY-21
Selenium (Se)			<0.20		mg/kg		0.2	25-MAY-21
Silver (Ag)			<0.10		mg/kg		0.1	25-MAY-21
Sodium (Na)			<50		mg/kg		50	25-MAY-21
Strontium (Sr)			<0.50		mg/kg		0.5	25-MAY-21
Sulfur (S)			<1000		mg/kg		1000	25-MAY-21
Thallium (Tl)			<0.050		mg/kg		0.05	25-MAY-21
Tin (Sn)			<2.0		mg/kg		2	25-MAY-21
Titanium (Ti)			<1.0		mg/kg		1	25-MAY-21
Tungsten (W)			<0.50		mg/kg		0.5	25-MAY-21
Uranium (U)			<0.050		mg/kg		0.05	25-MAY-21
Vanadium (V)			<0.20		mg/kg		0.2	25-MAY-21
Zinc (Zn)			<2.0		mg/kg		2	25-MAY-21
Zirconium (Zr)			<1.0		mg/kg		1	25-MAY-21
Batch R5469136								
WG3539629-8 CRM		**WT-SS-2**						
Aluminum (Al)			101.7		%		70-130	25-MAY-21
Antimony (Sb)			102.2		%		70-130	25-MAY-21
Arsenic (As)			110.8		%		70-130	25-MAY-21
Barium (Ba)			109.2		%		70-130	25-MAY-21
Beryllium (Be)			95.9		%		70-130	25-MAY-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	Soil							
Batch R5469136								
WG3539629-8 CRM		**WT-SS-2**						
Bismuth (Bi)			0.15		mg/kg		0-0.34	25-MAY-21
Boron (B)			8.1		mg/kg		3.5-13.5	25-MAY-21
Cadmium (Cd)			105.8		%		70-130	25-MAY-21
Calcium (Ca)			107.9		%		70-130	25-MAY-21
Chromium (Cr)			101.3		%		70-130	25-MAY-21
Cobalt (Co)			97.9		%		70-130	25-MAY-21
Copper (Cu)			104.8		%		70-130	25-MAY-21
Iron (Fe)			103.5		%		70-130	25-MAY-21
Lead (Pb)			106.0		%		70-130	25-MAY-21
Lithium (Li)			87.9		%		70-130	25-MAY-21
Magnesium (Mg)			100.5		%		70-130	25-MAY-21
Manganese (Mn)			104.8		%		70-130	25-MAY-21
Molybdenum (Mo)			102.4		%		70-130	25-MAY-21
Nickel (Ni)			101.2		%		70-130	25-MAY-21
Phosphorus (P)			107.3		%		70-130	25-MAY-21
Potassium (K)			102.5		%		70-130	25-MAY-21
Selenium (Se)			0.15		mg/kg		0-0.34	25-MAY-21
Silver (Ag)			109.9		%		70-130	25-MAY-21
Sodium (Na)			103.1		%		70-130	25-MAY-21
Strontium (Sr)			104.8		%		70-130	25-MAY-21
Thallium (Tl)			0.072		mg/kg		0.029-0.129	25-MAY-21
Tin (Sn)			99.2		%		70-130	25-MAY-21
Titanium (Ti)			92.4		%		70-130	25-MAY-21
Uranium (U)			92.2		%		70-130	25-MAY-21
Vanadium (V)			100.6		%		70-130	25-MAY-21
Zinc (Zn)			99.4		%		70-130	25-MAY-21
Zirconium (Zr)			93.8		%		70-130	25-MAY-21
WG3539629-9 LCS		**1+2**						
Aluminum (Al)			102.4		%		80-120	25-MAY-21
Antimony (Sb)			107.4		%		80-120	25-MAY-21
Arsenic (As)			105.9		%		80-120	25-MAY-21
Barium (Ba)			98.6		%		80-120	25-MAY-21
Beryllium (Be)			97.6		%		80-120	25-MAY-21
Bismuth (Bi)			104.4		%		80-120	25-MAY-21

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	Soil							
Batch R5469136								
WG3539629-9 LCS		**1+2**						
Boron (B)			97.9		%		80-120	25-MAY-21
Cadmium (Cd)			103.5		%		80-120	25-MAY-21
Calcium (Ca)			104.7		%		80-120	25-MAY-21
Chromium (Cr)			105.6		%		80-120	25-MAY-21
Cobalt (Co)			95.0		%		80-120	25-MAY-21
Copper (Cu)			96.3		%		80-120	25-MAY-21
Iron (Fe)			104.6		%		80-120	25-MAY-21
Lead (Pb)			107.6		%		80-120	25-MAY-21
Lithium (Li)			87.4		%		80-120	25-MAY-21
Magnesium (Mg)			108.2		%		80-120	25-MAY-21
Manganese (Mn)			100.5		%		80-120	25-MAY-21
Molybdenum (Mo)			104.6		%		80-120	25-MAY-21
Nickel (Ni)			97.4		%		80-120	25-MAY-21
Phosphorus (P)			106.7		%		80-120	25-MAY-21
Potassium (K)			110.3		%		80-120	25-MAY-21
Selenium (Se)			104.7		%		80-120	25-MAY-21
Silver (Ag)			90.1		%		80-120	25-MAY-21
Sodium (Na)			103.3		%		80-120	25-MAY-21
Strontium (Sr)			107.8		%		80-120	25-MAY-21
Sulfur (S)			104.4		%		80-120	25-MAY-21
Thallium (Tl)			106.6		%		80-120	25-MAY-21
Tin (Sn)			108.3		%		80-120	25-MAY-21
Titanium (Ti)			101.4		%		80-120	25-MAY-21
Tungsten (W)			100.8		%		80-120	25-MAY-21
Uranium (U)			102.7		%		80-120	25-MAY-21
Vanadium (V)			105.5		%		80-120	25-MAY-21
Zinc (Zn)			98.9		%		80-120	25-MAY-21
Zirconium (Zr)			103.2		%		80-120	25-MAY-21
WG3539629-7 MB								
Aluminum (Al)			<50		mg/kg		50	25-MAY-21
Antimony (Sb)			<0.10		mg/kg		0.1	25-MAY-21
Arsenic (As)			<0.10		mg/kg		0.1	25-MAY-21
Barium (Ba)			<0.50		mg/kg		0.5	25-MAY-21
Beryllium (Be)			<0.10		mg/kg		0.1	25-MAY-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	Soil							
Batch R5469136								
WG3539629-7 MB								
Bismuth (Bi)			<0.20		mg/kg		0.2	25-MAY-21
Boron (B)			<5.0		mg/kg		5	25-MAY-21
Cadmium (Cd)			<0.020		mg/kg		0.02	25-MAY-21
Calcium (Ca)			<50		mg/kg		50	25-MAY-21
Chromium (Cr)			<0.50		mg/kg		0.5	25-MAY-21
Cobalt (Co)			<0.10		mg/kg		0.1	25-MAY-21
Copper (Cu)			<0.50		mg/kg		0.5	25-MAY-21
Iron (Fe)			<50		mg/kg		50	25-MAY-21
Lead (Pb)			<0.50		mg/kg		0.5	25-MAY-21
Lithium (Li)			<2.0		mg/kg		2	25-MAY-21
Magnesium (Mg)			<20		mg/kg		20	25-MAY-21
Manganese (Mn)			<1.0		mg/kg		1	25-MAY-21
Molybdenum (Mo)			<0.10		mg/kg		0.1	25-MAY-21
Nickel (Ni)			<0.50		mg/kg		0.5	25-MAY-21
Phosphorus (P)			<50		mg/kg		50	25-MAY-21
Potassium (K)			<100		mg/kg		100	25-MAY-21
Selenium (Se)			<0.20		mg/kg		0.2	25-MAY-21
Silver (Ag)			<0.10		mg/kg		0.1	25-MAY-21
Sodium (Na)			<50		mg/kg		50	25-MAY-21
Strontium (Sr)			<0.50		mg/kg		0.5	25-MAY-21
Sulfur (S)			<1000		mg/kg		1000	25-MAY-21
Thallium (Tl)			<0.050		mg/kg		0.05	25-MAY-21
Tin (Sn)			<2.0		mg/kg		2	25-MAY-21
Titanium (Ti)			<1.0		mg/kg		1	25-MAY-21
Tungsten (W)			<0.50		mg/kg		0.5	25-MAY-21
Uranium (U)			<0.050		mg/kg		0.05	25-MAY-21
Vanadium (V)			<0.20		mg/kg		0.2	25-MAY-21
Zinc (Zn)			<2.0		mg/kg		2	25-MAY-21
Zirconium (Zr)			<1.0		mg/kg		1	25-MAY-21
MOISTURE-WP	Soil							
Batch R5458487								
WG3535406-3 DUP		**L2587543-5**						
Moisture		19.5	20.8		%	6.6	20	15-MAY-21
WG3535406-2 LCS								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-WP	Soil							
Batch R5458487								
WG3535406-2 LCS								
Moisture			99.9		%		90-110	15-MAY-21
WG3535406-1 MB								
Moisture			<0.10		%		0.1	15-MAY-21
MOISTURE-WT	Soil							
Batch R5460301								
WG3537355-2 LCS								
% Moisture			99.3		%		90-110	19-MAY-21
WG3537355-1 MB								
% Moisture			<0.25		%		0.25	19-MAY-21
Batch R5460857								
WG3538319-2 LCS								
% Moisture			100.1		%		90-110	21-MAY-21
WG3538319-1 MB								
% Moisture			<0.25		%		0.25	21-MAY-21
PAH-CCME-SQGL-WT	Soil							
Batch R5458986								
WG3535731-2 LCS								
1-Methylnaphthalene			98.1		%		50-140	18-MAY-21
2-Methylnaphthalene			95.6		%		50-140	18-MAY-21
Acenaphthene			96.1		%		50-140	18-MAY-21
Acenaphthylene			93.2		%		50-140	18-MAY-21
Acridine			84.5		%		50-140	18-MAY-21
Anthracene			81.9		%		50-140	18-MAY-21
Benzo(a)anthracene			95.5		%		50-140	18-MAY-21
Benzo(a)pyrene			83.4		%		50-140	18-MAY-21
Benzo(b&j)fluoranthene			85.7		%		50-150	18-MAY-21
Benzo(g,h,i)perylene			82.4		%		50-140	18-MAY-21
Benzo(k)fluoranthene			96.9		%		50-140	18-MAY-21
Chrysene			92.1		%		50-140	18-MAY-21
Dibenz(a,h)anthracene			86.9		%		50-140	18-MAY-21
Fluoroanthene			93.4		%		50-140	18-MAY-21
Fluorene			94.2		%		50-140	18-MAY-21
Indeno(1,2,3-cd)pyrene			89.9		%		50-140	18-MAY-21
Naphthalene			91.1		%		50-140	18-MAY-21
Phenanthrene			93.6		%		50-140	18-MAY-21

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-CCME-SQGL-WT	Soil							
Batch R5458986								
WG3535731-2 LCS								
Pyrene			92.8		%		50-140	18-MAY-21
Quinoline			78.9		%		50-140	18-MAY-21
WG3535731-1 MB								
1-Methylnaphthalene			<0.0050		ug/g		0.005	18-MAY-21
2-Methylnaphthalene			<0.0050		ug/g		0.005	18-MAY-21
Acenaphthene			<0.0050		ug/g		0.005	18-MAY-21
Acenaphthylene			<0.0050		ug/g		0.005	18-MAY-21
Acridine			<0.010		ug/g		0.01	18-MAY-21
Anthracene			<0.0040		ug/g		0.004	18-MAY-21
Benzo(a)anthracene			<0.010		ug/g		0.01	18-MAY-21
Benzo(a)pyrene			<0.0050		ug/g		0.005	18-MAY-21
Benzo(b&j)fluoranthene			<0.010		ug/g		0.01	18-MAY-21
Benzo(g,h,i)perylene			<0.010		ug/g		0.01	18-MAY-21
Benzo(k)fluoranthene			<0.010		ug/g		0.01	18-MAY-21
Chrysene			<0.010		ug/g		0.01	18-MAY-21
Dibenz(a,h)anthracene			<0.0050		ug/g		0.005	18-MAY-21
Fluoroanthene			<0.0050		ug/g		0.005	18-MAY-21
Fluorene			<0.0050		ug/g		0.005	18-MAY-21
Indeno(1,2,3-cd)pyrene			<0.010		ug/g		0.01	18-MAY-21
Naphthalene			<0.0050		ug/g		0.005	18-MAY-21
Phenanthrene			<0.0050		ug/g		0.005	18-MAY-21
Pyrene			<0.0050		ug/g		0.005	18-MAY-21
Quinoline			<0.0050		ug/g		0.005	18-MAY-21
Surrogate: 2-Fluorobiphenyl			98.0		%		60-140	18-MAY-21
Surrogate: d14-Terphenyl			100.0		%		60-140	18-MAY-21
VOC+F1-HSMS-WP	Soil							
Batch R5460369								
WG3535904-4 DUP		**L2587543-1**						
Acetone		<0.50	<0.50	RPD-NA	mg/kg	N/A	50	18-MAY-21
Benzene		<0.0050	<0.0050	RPD-NA	mg/kg	N/A	50	18-MAY-21
Bromobenzene		<0.10	<0.10	RPD-NA	mg/kg	N/A	50	18-MAY-21
Bromochloromethane		<0.10	<0.10	RPD-NA	mg/kg	N/A	50	18-MAY-21
Bromodichloromethane		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
Bromoform		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC+F1-HSMS-WP	Soil							
Batch R5460369								
WG3535904-4 DUP		**L2587543-1**						
Bromomethane		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
n-Butylbenzene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
sec-Butylbenzene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
tert-Butylbenzene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
Carbon disulfide		<0.25	<0.25	RPD-NA	mg/kg	N/A	50	18-MAY-21
Carbon Tetrachloride		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
Chlorobenzene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
Chloroethane		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
Chloroform		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
Chloromethane		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
2-Chlorotoluene		<0.10	<0.10	RPD-NA	mg/kg	N/A	50	18-MAY-21
4-Chlorotoluene		<0.10	<0.10	RPD-NA	mg/kg	N/A	50	18-MAY-21
Dibromochloromethane		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
1,2-Dibromo-3-chloropropane		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
1,2-Dibromoethane		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
Dibromomethane		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
1,2-Dichlorobenzene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
1,3-Dichlorobenzene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
1,4-Dichlorobenzene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
Dichlorodifluoromethane		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
1,1-dichloroethane		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
1,2-Dichloroethane		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
1,1-dichloroethene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
cis-1,2-Dichloroethene		0.218	0.210		mg/kg	3.8	50	18-MAY-21
trans-1,2-Dichloroethene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
Dichloromethane		<0.10	<0.10	RPD-NA	mg/kg	N/A	50	18-MAY-21
1,2-Dichloropropane		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
1,3-Dichloropropane		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
2,2-Dichloropropane		<0.10	<0.10	RPD-NA	mg/kg	N/A	50	18-MAY-21
1,1-Dichloropropene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
cis-1,3-Dichloropropene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
trans-1,3-Dichloropropene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
Ethylbenzene		<0.015	<0.015	RPD-NA	mg/kg	N/A	50	18-MAY-21
F1		<10	<10	RPD-NA	mg/kg	N/A	50	18-MAY-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC+F1-HSMS-WP	Soil							
Batch R5460369								
WG3535904-4 DUP		**L2587543-1**						
Hexachlorobutadiene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
Hexane		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
2-Hexanone (Methyl butyl ketone)		<0.50	<0.50	RPD-NA	mg/kg	N/A	50	18-MAY-21
Isopropylbenzene		<0.10	<0.10	RPD-NA	mg/kg	N/A	50	18-MAY-21
4-Isopropyltoluene		<0.10	<0.10	RPD-NA	mg/kg	N/A	50	18-MAY-21
MEK		<0.50	<0.50	RPD-NA	mg/kg	N/A	50	18-MAY-21
MIBK		<0.50	<0.50	RPD-NA	mg/kg	N/A	50	18-MAY-21
MTBE		<0.20	<0.20	RPD-NA	mg/kg	N/A	50	18-MAY-21
Styrene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
1,1,1,2-Tetrachloroethane		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
1,1,2,2-Tetrachloroethane		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
Tetrachloroethene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
Toluene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
1,2,3-Trichlorobenzene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
1,2,4-Trichlorobenzene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
1,1,1-Trichloroethane		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
1,1,2-Trichloroethane		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
Trichloroethene		0.044	0.046		mg/kg	3.6	50	18-MAY-21
Trichlorofluoromethane		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
1,2,3-Trichloropropane		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
1,2,4-Trimethylbenzene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
1,3,5-Trimethylbenzene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
Vinyl Chloride		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
M+P-Xylenes		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
o-Xylene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	18-MAY-21
WG3535904-2 LCS								
Acetone			115.2		%		70-130	18-MAY-21
Benzene			99.9		%		70-130	18-MAY-21
Bromobenzene			108.3		%		70-130	18-MAY-21
Bromochloromethane			114.3		%		70-130	18-MAY-21
Bromodichloromethane			109.6		%		70-130	18-MAY-21
Bromoform			119.6		%		70-130	18-MAY-21
Bromomethane			87.9		%		60-140	18-MAY-21
n-Butylbenzene			100.7		%		70-130	18-MAY-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC+F1-HSMS-WP	Soil							
Batch R5460369								
WG3535904-2 LCS								
sec-Butylbenzene			120.1		%		70-130	18-MAY-21
tert-Butylbenzene			109.5		%		70-130	18-MAY-21
Carbon disulfide			66.6	MES	%		70-130	18-MAY-21
Carbon Tetrachloride			97.7		%		70-130	18-MAY-21
Chlorobenzene			101.4		%		70-130	18-MAY-21
Chloroethane			88.6		%		60-140	18-MAY-21
Chloroform			102.4		%		70-130	18-MAY-21
Chloromethane			70.3		%		60-140	18-MAY-21
2-Chlorotoluene			104.8		%		70-130	18-MAY-21
4-Chlorotoluene			112.2		%		70-130	18-MAY-21
Dibromochloromethane			109.3		%		70-130	18-MAY-21
1,2-Dibromo-3-chloropropane			99.2		%		70-130	18-MAY-21
1,2-Dibromoethane			106.9		%		70-130	18-MAY-21
Dibromomethane			124.0		%		70-130	18-MAY-21
1,2-Dichlorobenzene			104.6		%		70-130	18-MAY-21
1,3-Dichlorobenzene			99.5		%		70-130	18-MAY-21
1,4-Dichlorobenzene			92.3		%		70-130	18-MAY-21
Dichlorodifluoromethane			73.7		%		60-140	18-MAY-21
1,1-dichloroethane			90.6		%		70-130	18-MAY-21
1,2-Dichloroethane			101.6		%		70-130	18-MAY-21
1,1-dichloroethene			83.0		%		70-130	18-MAY-21
cis-1,2-Dichloroethene			105.6		%		70-130	18-MAY-21
trans-1,2-Dichloroethene			86.6		%		70-130	18-MAY-21
Dichloromethane			99.9		%		60-140	18-MAY-21
1,2-Dichloropropane			98.6		%		70-130	18-MAY-21
1,3-Dichloropropane			94.2		%		70-130	18-MAY-21
2,2-Dichloropropane			74.4		%		70-130	18-MAY-21
1,1-Dichloropropene			96.7		%		70-130	18-MAY-21
cis-1,3-Dichloropropene			98.2		%		70-130	18-MAY-21
trans-1,3-Dichloropropene			80.5		%		70-130	18-MAY-21
Ethylbenzene			105.3		%		70-130	18-MAY-21
Hexachlorobutadiene			100.2		%		70-130	18-MAY-21
Hexane			74.7		%		70-130	18-MAY-21
2-Hexanone (Methyl butyl ketone)			91.6		%		70-130	18-MAY-21

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC+F1-HSMS-WP	Soil							
Batch R5460369								
WG3535904-2 LCS								
Isopropylbenzene			112.3		%		70-130	18-MAY-21
4-Isopropyltoluene			108.8		%		70-130	18-MAY-21
MEK			104.5		%		70-130	18-MAY-21
MIBK			122.7		%		70-130	18-MAY-21
MTBE			93.7		%		70-130	18-MAY-21
Styrene			108.0		%		70-130	18-MAY-21
1,1,1,2-Tetrachloroethane			104.3		%		70-130	18-MAY-21
1,1,2,2-Tetrachloroethane			105.9		%		70-130	18-MAY-21
Tetrachloroethene			90.9		%		70-130	18-MAY-21
Toluene			96.3		%		70-130	18-MAY-21
1,2,3-Trichlorobenzene			100.0		%		70-130	18-MAY-21
1,2,4-Trichlorobenzene			92.7		%		70-130	18-MAY-21
1,1,1-Trichloroethane			91.0		%		70-130	18-MAY-21
1,1,2-Trichloroethane			109.4		%		70-130	18-MAY-21
Trichloroethene			105.0		%		70-130	18-MAY-21
Trichlorofluoromethane			85.1		%		60-140	18-MAY-21
1,2,3-Trichloropropane			110.4		%		70-130	18-MAY-21
1,2,4-Trimethylbenzene			108.9		%		70-130	18-MAY-21
1,3,5-Trimethylbenzene			110.0		%		70-130	18-MAY-21
Vinyl Chloride			73.5		%		60-140	18-MAY-21
M+P-Xylenes			100.9		%		70-130	18-MAY-21
o-Xylene			107.9		%		70-130	18-MAY-21
WG3535904-3 LCS								
F1			83.1		%		70-130	18-MAY-21
WG3535904-1 MB								
Acetone			<0.50		mg/kg		0.5	18-MAY-21
Benzene			<0.0050		mg/kg		0.005	18-MAY-21
Bromobenzene			<0.10		mg/kg		0.1	18-MAY-21
Bromochloromethane			<0.10		mg/kg		0.1	18-MAY-21
Bromodichloromethane			<0.050		mg/kg		0.05	18-MAY-21
Bromoform			<0.050		mg/kg		0.05	18-MAY-21
Bromomethane			<0.050		mg/kg		0.05	18-MAY-21
n-Butylbenzene			<0.050		mg/kg		0.05	18-MAY-21
sec-Butylbenzene			<0.050		mg/kg		0.05	18-MAY-21
tert-Butylbenzene			<0.050		mg/kg		0.05	18-MAY-21

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC+F1-HSMS-WP	Soil							
Batch R5460369								
WG3535904-1 MB								
Carbon disulfide			<0.25		mg/kg		0.25	18-MAY-21
Carbon Tetrachloride			<0.050		mg/kg		0.05	18-MAY-21
Chlorobenzene			<0.050		mg/kg		0.05	18-MAY-21
Chloroethane			<0.050		mg/kg		0.05	18-MAY-21
Chloroform			<0.050		mg/kg		0.05	18-MAY-21
Chloromethane			<0.050		mg/kg		0.05	18-MAY-21
2-Chlorotoluene			<0.10		mg/kg		0.1	18-MAY-21
4-Chlorotoluene			<0.10		mg/kg		0.1	18-MAY-21
Dibromochloromethane			<0.050		mg/kg		0.05	18-MAY-21
1,2-Dibromo-3-chloropropane			<0.050		mg/kg		0.05	18-MAY-21
1,2-Dibromoethane			<0.050		mg/kg		0.05	18-MAY-21
Dibromomethane			<0.050		mg/kg		0.05	18-MAY-21
1,2-Dichlorobenzene			<0.050		mg/kg		0.05	18-MAY-21
1,3-Dichlorobenzene			<0.050		mg/kg		0.05	18-MAY-21
1,4-Dichlorobenzene			<0.050		mg/kg		0.05	18-MAY-21
Dichlorodifluoromethane			<0.050		mg/kg		0.05	18-MAY-21
1,1-dichloroethane			<0.050		mg/kg		0.05	18-MAY-21
1,2-Dichloroethane			<0.050		mg/kg		0.05	18-MAY-21
1,1-dichloroethene			<0.050		mg/kg		0.05	18-MAY-21
cis-1,2-Dichloroethene			<0.050		mg/kg		0.05	18-MAY-21
trans-1,2-Dichloroethene			<0.050		mg/kg		0.05	18-MAY-21
Dichloromethane			<0.10		mg/kg		0.1	18-MAY-21
1,2-Dichloropropane			<0.050		mg/kg		0.05	18-MAY-21
1,3-Dichloropropane			<0.050		mg/kg		0.05	18-MAY-21
2,2-Dichloropropane			<0.10		mg/kg		0.1	18-MAY-21
1,1-Dichloropropene			<0.050		mg/kg		0.05	18-MAY-21
cis-1,3-Dichloropropene			<0.050		mg/kg		0.05	18-MAY-21
trans-1,3-Dichloropropene			<0.050		mg/kg		0.05	18-MAY-21
Ethylbenzene			<0.015		mg/kg		0.015	18-MAY-21
F1			<10		mg/kg		10	18-MAY-21
Hexachlorobutadiene			<0.050		mg/kg		0.05	18-MAY-21
Hexane			<0.050		mg/kg		0.05	18-MAY-21
2-Hexanone (Methyl butyl ketone)			<0.50		mg/kg		0.5	18-MAY-21
Isopropylbenzene			<0.10		mg/kg		0.1	18-MAY-21

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC+F1-HSMS-WP	Soil							
Batch R5460369								
WG3535904-1 MB								
4-Isopropyltoluene			<0.10		mg/kg		0.1	18-MAY-21
MEK			<0.50		mg/kg		0.5	18-MAY-21
MIBK			<0.50		mg/kg		0.5	18-MAY-21
MTBE			<0.20		mg/kg		0.2	18-MAY-21
Styrene			<0.050		mg/kg		0.05	18-MAY-21
1,1,1,2-Tetrachloroethane			<0.050		mg/kg		0.05	18-MAY-21
1,1,2,2-Tetrachloroethane			<0.050		mg/kg		0.05	18-MAY-21
Tetrachloroethene			<0.050		mg/kg		0.05	18-MAY-21
Toluene			<0.050		mg/kg		0.05	18-MAY-21
1,2,3-Trichlorobenzene			<0.050		mg/kg		0.05	18-MAY-21
1,2,4-Trichlorobenzene			<0.050		mg/kg		0.05	18-MAY-21
1,1,1-Trichloroethane			<0.050		mg/kg		0.05	18-MAY-21
1,1,2-Trichloroethane			<0.050		mg/kg		0.05	18-MAY-21
Trichloroethene			<0.010		mg/kg		0.01	18-MAY-21
Trichlorofluoromethane			<0.050		mg/kg		0.05	18-MAY-21
1,2,3-Trichloropropane			<0.050		mg/kg		0.05	18-MAY-21
1,2,4-Trimethylbenzene			<0.050		mg/kg		0.05	18-MAY-21
1,3,5-Trimethylbenzene			<0.050		mg/kg		0.05	18-MAY-21
Vinyl Chloride			<0.050		mg/kg		0.05	18-MAY-21
M+P-Xylenes			<0.050		mg/kg		0.05	18-MAY-21
o-Xylene			<0.050		mg/kg		0.05	18-MAY-21
Surrogate: 1,4-Difluorobenzene (SS)			77.1		%		70-130	18-MAY-21
Surrogate: 3,4-Dichlorotoluene (SS)			82.4		%		70-130	18-MAY-21
Surrogate: 4-Bromofluorobenzene (SS)			73.5		%		70-130	18-MAY-21

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

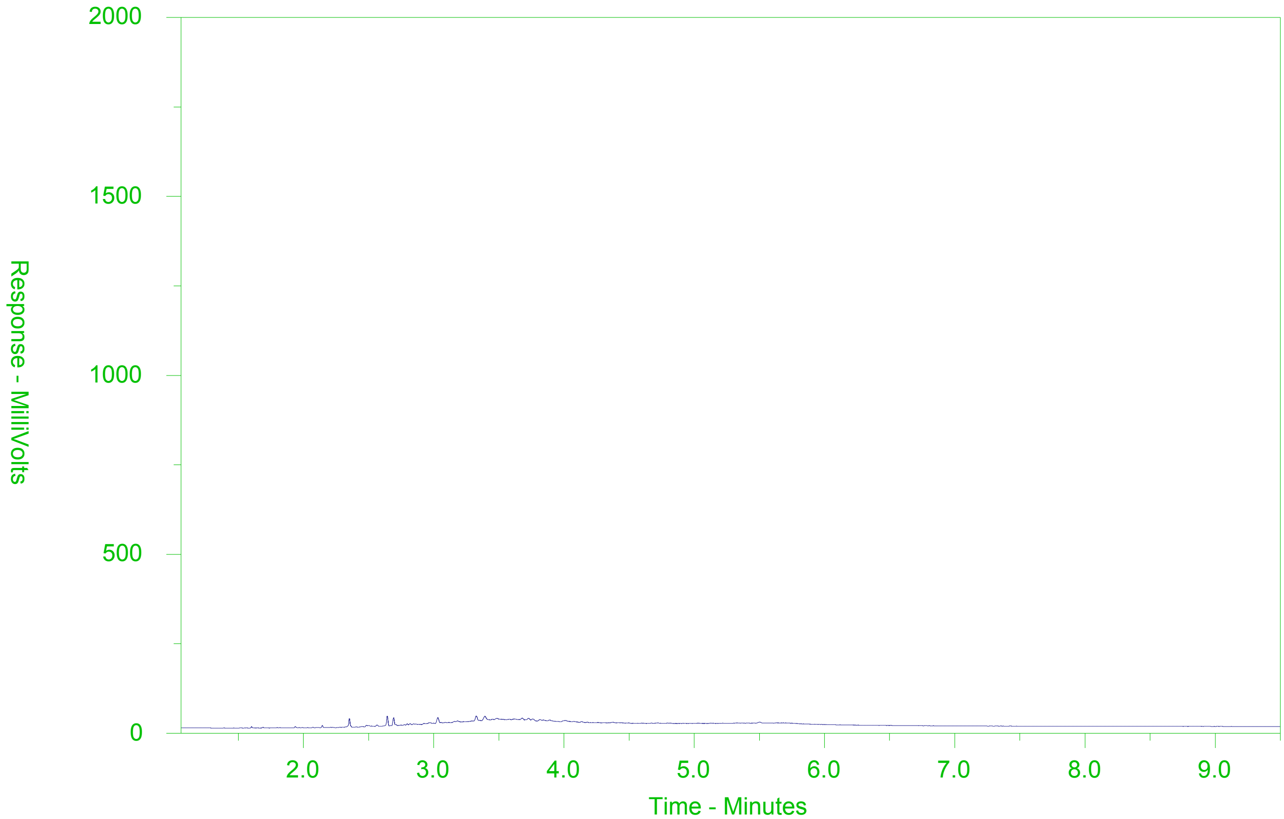
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2587543-1
Client Sample ID: APEC1 - 2-1.5M



← F2 →	← F3 →		← F4 →
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

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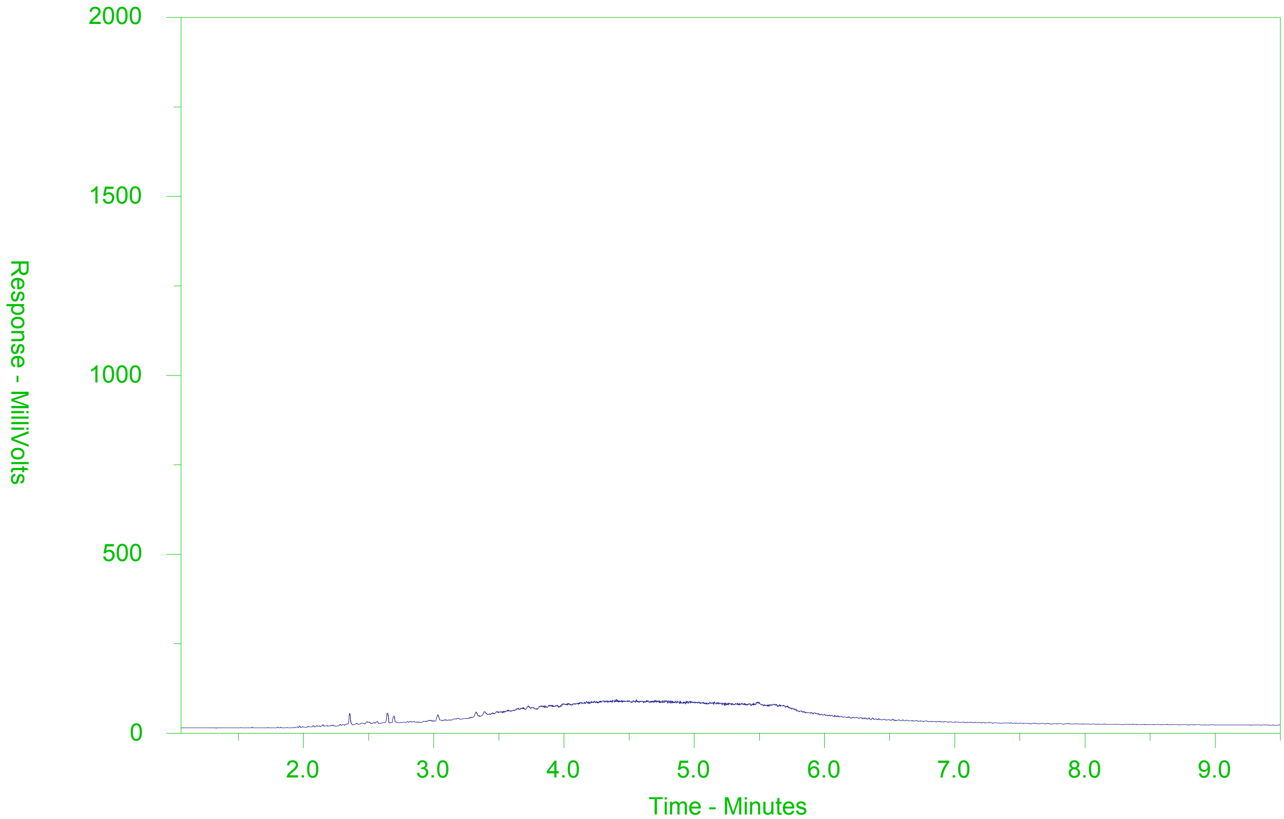
Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2587543-4
Client Sample ID: APEC1 - 5-2.3M



← F2 →	←	F3	→	← F4 →
nC10	nC16		nC34	nC50
174°C 346°F	287°C 549°F		481°C 898°F	575°C 1067°F

← Gasoline → ← Motor Oils/ Lube Oils/ Grease →

← Diesel/ Jet Fuels →

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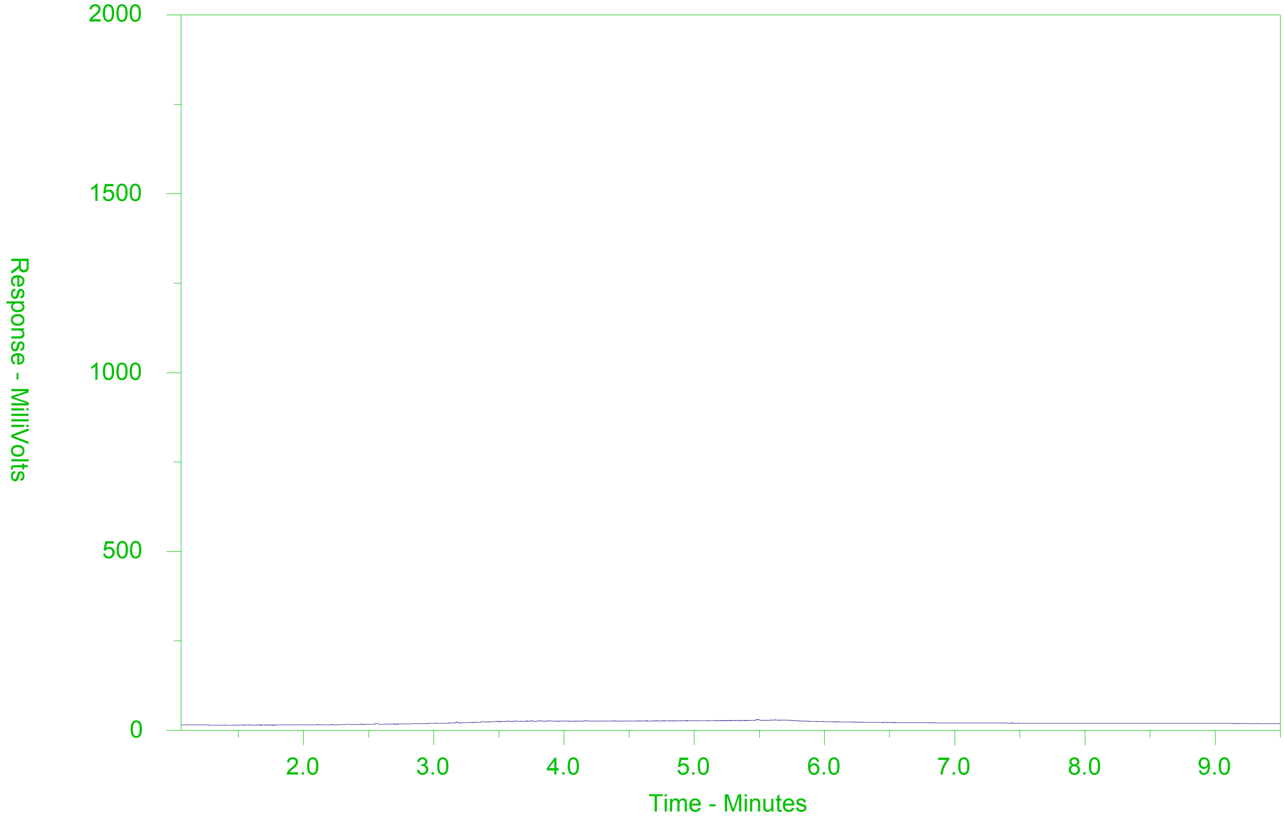
CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2587543-5
Client Sample ID: APEC2 - 9-3.0M



← F2 →	← F3 →		← F4 →
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

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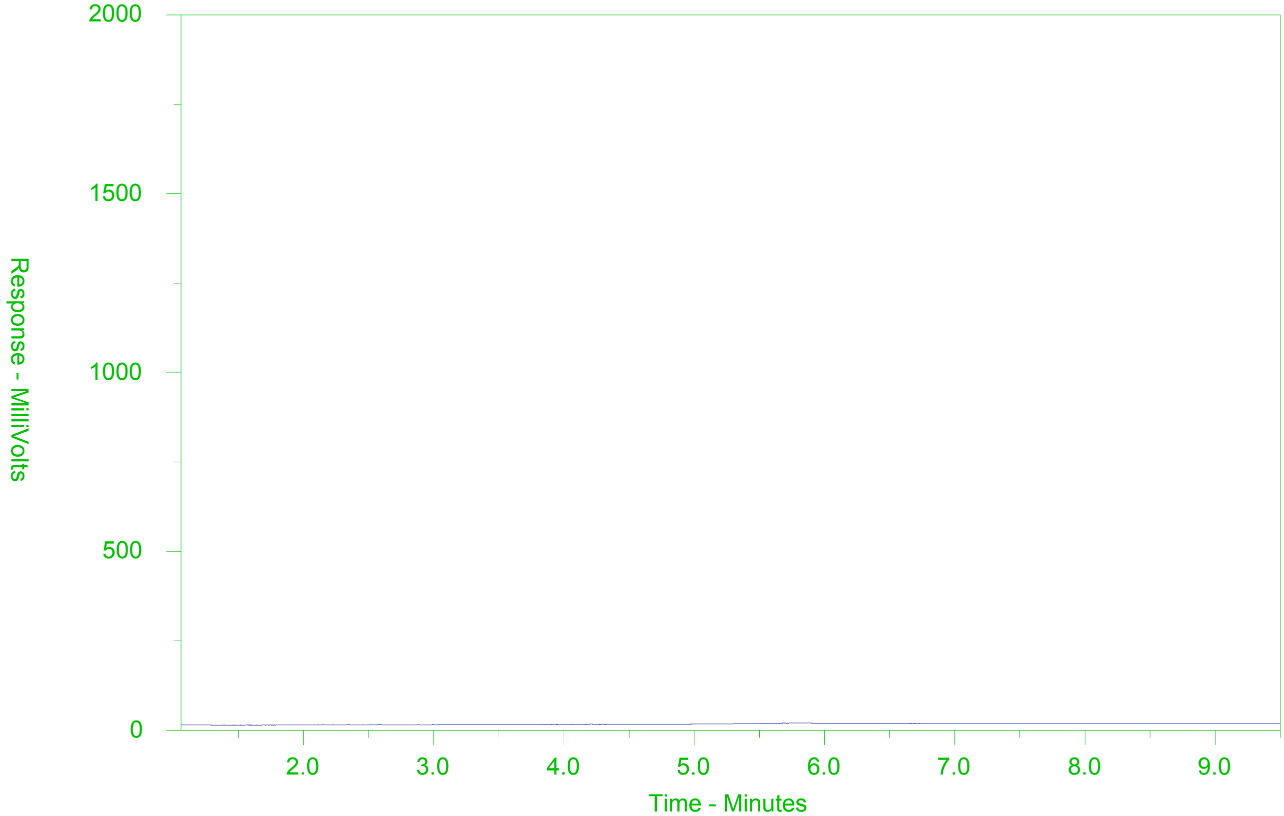
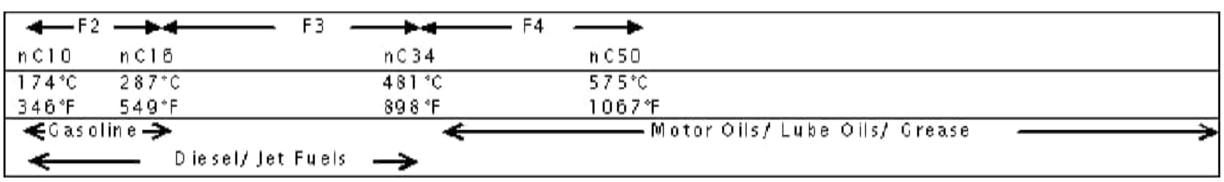
CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2587543-6
Client Sample ID: APEC2 - 13-2.3M





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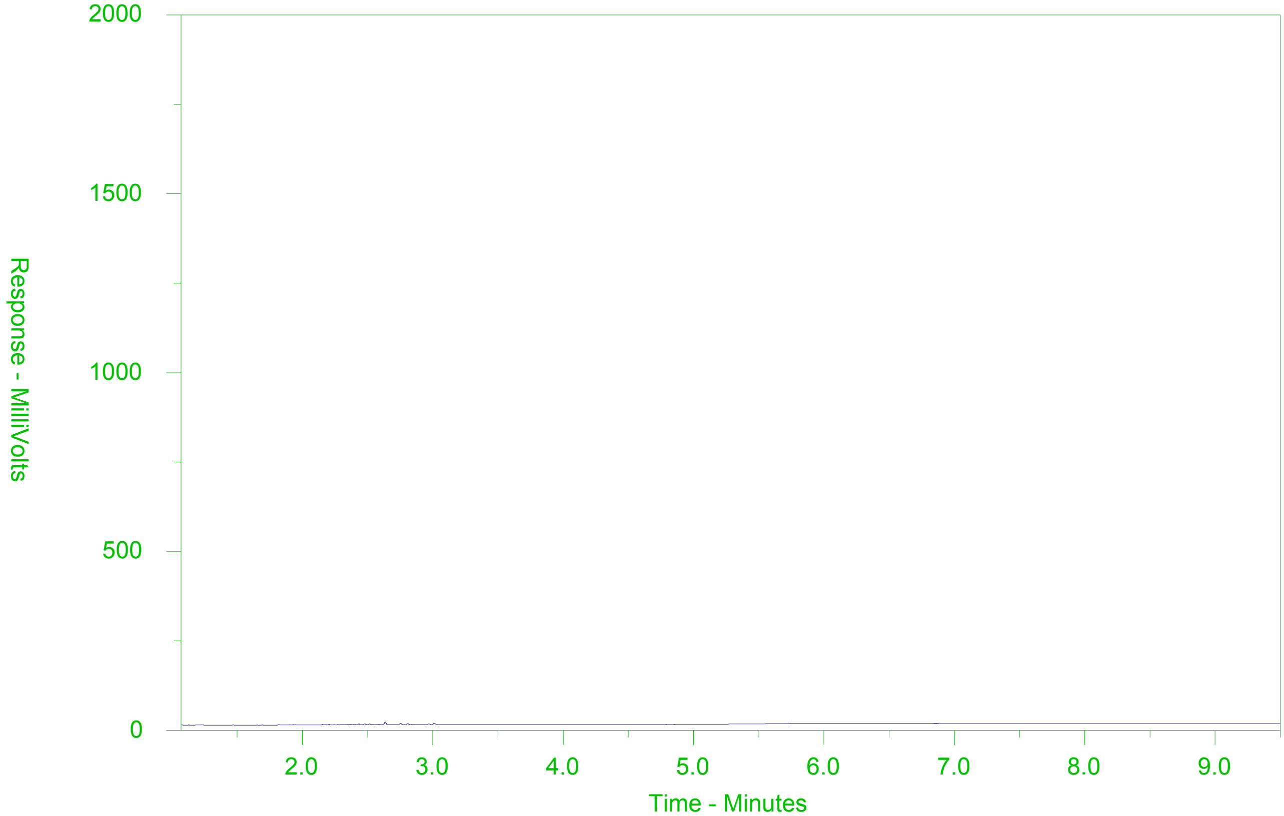
CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2587543-7
Client Sample ID: APEC2 - MW2



← F2 →	←	F3 →	← F4 →
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

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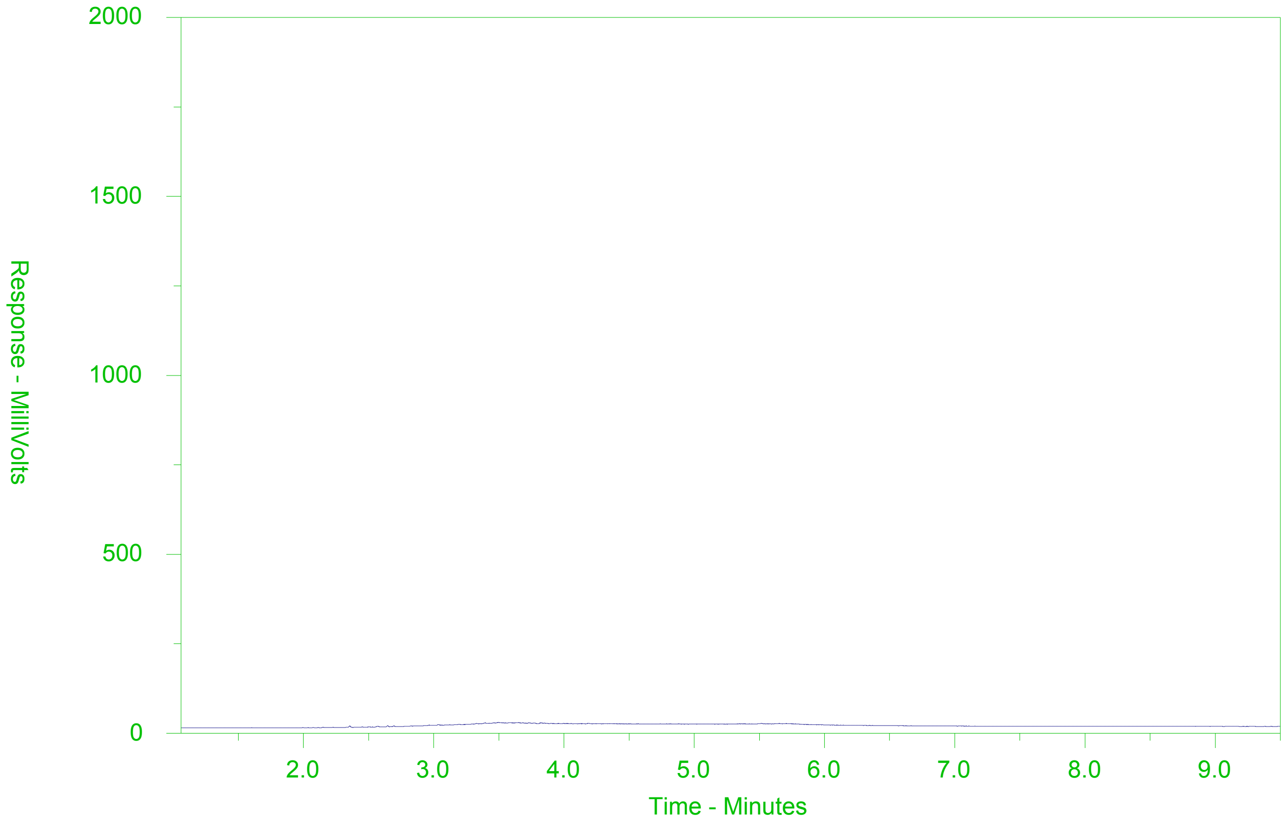
CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2587543-9
Client Sample ID: APEC3 - 1-3.0M



←F2→	←	F3	→	← F4 →
nC10	nC16		nC34	nC50
174°C	287°C		481°C	575°C
346°F	549°F		898°F	1067°F
←Gasoline→		← Motor Oils/ Lube Oils/ Grease →		
← Diesel/ Jet Fuels →				

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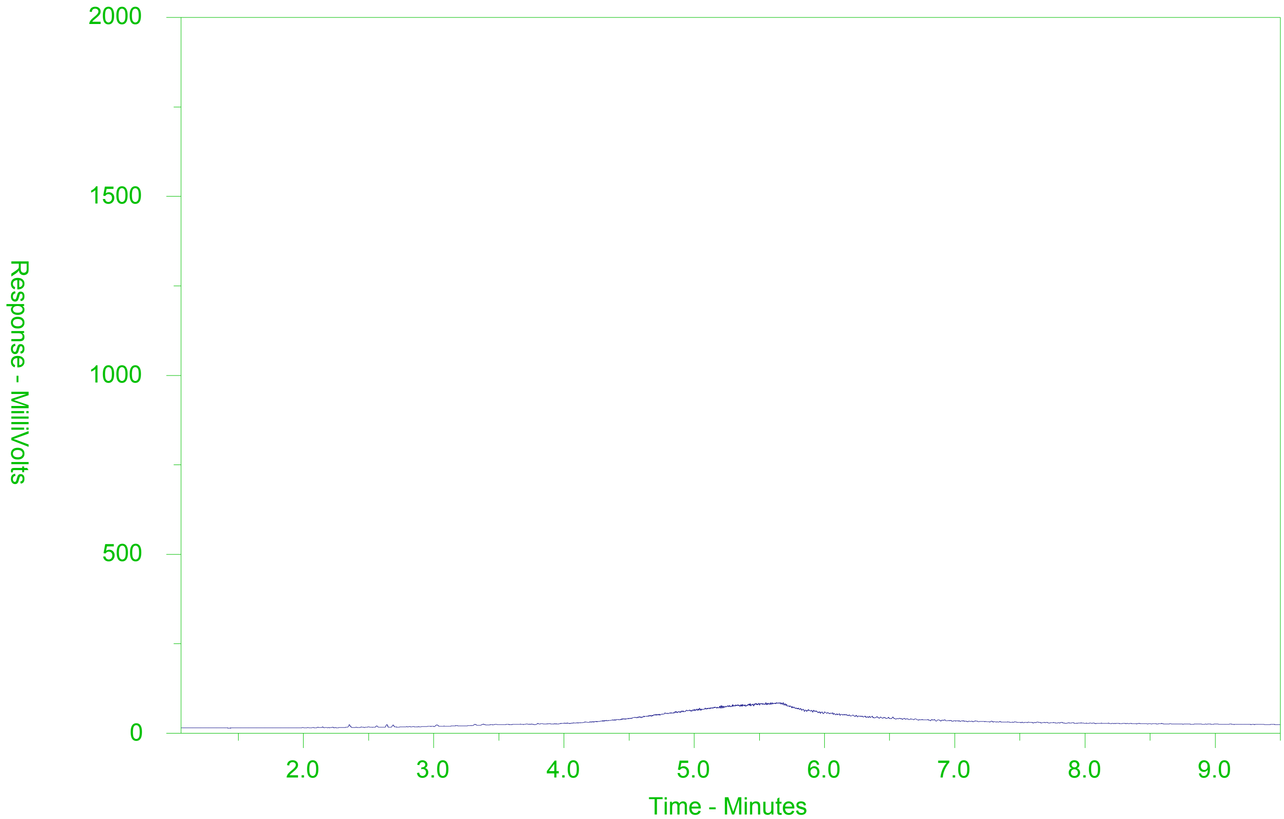
CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2587543-11
Client Sample ID: APEC4 - 7-2.3M



← F2 →	← F3 →		← F4 →
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F

← Gasoline → ← Motor Oils/ Lube Oils/ Grease →
← Diesel/ Jet Fuels →

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Ship to: ALS LABS Unit

L2587543-COFC

CHAIN OF CUSTODY/ANALYTICAL REQUEST FORM

J & D Environmental

Service Requested: Regular ✓ Rush 50% ____ Emergency 100% ____ Same Day 200% ____

Quotation Number: Q65246

Project Number / Name: Oak Point Hwy - Site B

	Sample ID	Sampled By	Date/Time Sampled	Sample Type	VOC's including F1-F4	PAH's	Metals	BTEX/F1	F2-F4														
	APEC 1			Soil																			
1	2-1.5m				✓																		
2	3-1.5m				✓																		
3	4-1.5m						✓																
4	5-2.3m				✓																		
	APEC 2																						
5	9-3.0m							✓	✓														
6	13-2.3m							✓	✓														

Report to:
J & D Environmental
43 Osborne Street
PO Box 68052 Osborne Village
Winnipeg, MB R3L 2V9
Phone: Danial (204) 294-8002
Email: danial@jdenvor.ca Attention: Danial Kolba
Cc: wluba@shaw.ca Attention: Wayne Luba

Invoice to:
J & D Environmental
43 Osborne Street
PO Box 68052 Osborne Village
Winnipeg, MB R3L 2V9

FOR LABORATORY USE ONLY:
SAMPLE CONDITION UPON RECEIPT: FROZEN ____ COLD ____ AMBIENT ✓ LC 14.4°C
ACCEPTABLE ✓ NON ACCEPTABLE ____
OTHER (BREAKAGE, LEAKAGE, ETC.):

NOTES AND CONDITIONS: 1. Hazardous samples must be labelled to comply with WHMIS regulations. 2. ETL's liability limited to cost of analysis. 3. Failure to complete all portions of this form may delay analysis.

Relinquished By:	Date: Time:	Received By: BU3 ETL Lab:	Date: 13 May 21 Time: 1:30
Relinquished By:	Date: Time:	Received By: ETL Lab: Ok	Date: Time: May 13/21

COMMENTS:

cc wluba@shaw.ca

① of 3 pages

ALS

Ship to: ALS LAB… L2587543-COFC

…rs
…20
…721
Toll Free: 1-800-607-7555

CHAIN OF CUSTODY/ANALYTICAL REQUEST FORM

J&D Environmental

Service Requested: Regular ____ Rush ____ 50% Emergency____ 100% Same Day____ 200%

Quotation Number: Q65246

Project Number / Name: ____________________

	Sample ID	Sampled By	Date/Time Sampled	Sample Type	BTEX, F1	F2-F4	Metals	VOCs	PAHs
	APEC 2								
7	MW2	WL	May 12/21	Water	✓	✓			
	APEC 3								
8	1-1.5m			Soil			✓		
9	1-3.0m							✓	
	APEC 4								
10	6-2.3m								✓
11	7-2.3m				✓	✓			

Report to:
J & D Environmental
43 Osborne Street
PO Box 68052 Osborne Village
Winnipeg, MB R3L 2V9
Phone: Danial (204) 294-9002
Email: danial@jdenvor.ca Attention: Danial Kolba
Cc: wluba@shaw.ca Attention: Wayne Luba

Invoice to:
J & D Environmental
43 Osborne Street
PO Box 68052 Osborne Village
Winnipeg, MB R3L 2V9

FOR LABORATORY USE ONLY:
SAMPLE CONDITION UPON RECEIPT: FROZEN ____ COLD ____ AMBIENT
ACCEPTABLE ____ NON ACCEPTABLE ____ 19.0°C
OTHER (BREAKAGE, LEAKAGE, ETC.):

NOTES AND CONDITIONS: 1. Hazardous samples must be labelled to comply with WHMIS regulations. 2. ETL's liability limited to cost of analysis. 3. Failure to complete all portions of this form may delay analysis.

Relinquished By:	Date: Time:	Received By: BU3 ETL Lab:	Date: 13May21 Time: 1:30
Relinquished By:	Date: Time:	Received By: ETL Lab:	Date: Time:

COMMENTS: ____________________

3 of 3 pages

Ship to: ALS LAB

L2587543-COFC

CHAIN OF CUSTODY/ANALYTICAL REQUEST FORM

J&D Environmental

Service Requested: Regular ____ Rush ____ 50% Emergency ____ 100% Same Day ____ 200%

Quotation Number: Q65246

Project Number / Name: ______________________

Sample ID	Sampled By	Date/Time Sampled	Sample Type	Metals
APEC 4				
12 8-1.5 m			Soil	✓
Former Speedway				
13 15-1.5 m			Soil	✓

Report to:
J & D Environmental
43 Osborne Street
PO Box 68052 Osborne Village
Winnipeg, MB R3L 2V9
Phone: Danial (204) 294-9002
Email: danial@jdenvor.ca Attention: Danial Kolba
Cc: wluba@shaw.ca Attention: Wayne Luba

Invoice to:
J & D Environmental
43 Osborne Street
PO Box 68052 Osborne Village
Winnipeg, MB R3L 2V9

FOR LABORATORY USE ONLY:
SAMPLE CONDITION UPON RECEIPT: FROZEN ____ COLD ____ AMBIENT
ACCEPTABLE ____ NON ACCEPTABLE ____ 17.8°
OTHER (BREAKAGE, LEAKAGE, ETC.):

NOTES AND CONDITIONS: 1. Hazardous samples must be labelled to comply with WHMIS regulations. 2. ETL's liability limited to cost of analysis. 3. Failure to complete all portions of this form may delay analysis.

Relinquished By:	Date: / Time:	Received By: / ETL Lab:	Date: / Time:
	Date: Time:	Received By: BV3 ETL Lab:	Date: 13 May 21 Time: 1:30
Relinquished By:	Date: Time:	Received By: ETL Lab:	Date: Time:

COMMENTS: ______________________

CLIMATE LENS

The Government of Canada is committed to exceeding its 2030 greenhouse gas reduction target, establishing a cleaner, more competitive and resilient economy and getting Canada to net-zero emissions by 2050. The Climate Lens is a key tool for assessing the climate impacts of the infrastructure being funded through the Investing in Canada Infrastructure Program as part of Canada's broader climate goals. The tool encourages applicants to consider how their projects can reduce GHG emissions and increase resilience to climate change, which benefits their communities and creates jobs.

1.0 PROJECT OVERVIEW

1.1 Project Title:

Winnipeg Transit Eastern Corridor Study - North Garage Replacement

1.2 Ultimate Recipient:

Winnipeg Transit

1.3 Project Description:

The North Garage Replacement project is proposed to relocate and replace Winnipeg Transit's existing North Garage, currently located at 1520 Main Street. The project includes the development of an energy efficient bus storage and maintenance facility with increased bus capacity, designed to accommodate a new fleet of zero-emissions buses, with the required infrastructure for their fueling, maintenance and operation.

The facility is proposed to be built in the north end of Winnipeg, adjacent to an arterial roadway. The new building will replace an ageing transit garage and be designed to meet the growing transit service demands of the City of Winnipeg. The current facility is in overall poor condition and is no longer able to meet Winnipeg Transit's service requirements.

The new facility will include:

- Bus storage bay for approximately 225-264 buses
- Refueling station
- Bus washing station
- Maintenance Bay
- Parts storage and receiving area
- Administrative offices, including reception and kitchen areas
- Additional power required for electric bus charging
- Training rooms

The project is in conceptual design stages and a Climate Lens assessment is in progress.

2.0 GHG EMISSIONS & MITIGATION

2.1 Are you using, or are you considering using, any best practices, GHG mitigation measures or clean technologies in the design of your project? ☒ Yes ☐ No

The project is in conceptual design stages and technologies have not been finalized. The project will meet the requirements of LEED Silver and possible LEED Gold certification.

The following technologies will be considered during review of the project case in the GHG assessment:

- Solar panels to offset grid electricity
- Air curtains to hold warm air inside the building
- Under-slab heating system
- Heat recovery ventilation units to preheat air from exhaust air
- Wall panels with an R20 insulation value
- Using recycled water in the bus wash system

2.2 Have you consulted, or will you consult, any international standards or GHG guidance to understand the GHG impact of the project? ☒ Yes ☐ No

The preliminary GHG assessment will align with the ISO 14064:1-2 standards and will be completed by a WSP Canada qualified professional.
Various guides and scientific articles will be consulted to develop the assumptions regarding emission factors

2.3 Do you expect that this project will result in GHG emissions reductions? ☒ Yes ☐ No

GHG reductions from the project will be estimated once the building size and energy reduction initiatives are confirmed.

3.0 CLIMATE RESILIENCY

3.1 Is the project in a location that is at risk or vulnerable to climate-influenced natural hazards such as flooding, wildfire risk, permafrost thaw or coastal erosion? ☒ Yes ☐ No

The climate resilience assessment will be conducted following the ISO 31000 standard in risk management and will consist of the following steps:

1. Hazard identification and assessment
2. Risk analysis: for each hazard, the vulnerabilities of the project will be identified
3. Risk evaluation: should the risk occur, the severity of the consequences will be assessed

The following hazards will be assessed:

- Increase in temperatures and heat waves
- Snow accumulation
- Freeze-thaw cycles
- Extreme precipitation and pluvial flooding
- Tornadoes
- Extreme wind and storm activity
- Flooding from river rise

- Wildfires

The following hazards were determined to not be relevant to the project site:

- Drought
- Decreases in temperature
- Lightning
- Landslides

3.2 Is this project protective infrastructure (e.g., a levee) or are you employing measures that increase the resiliency of your project and your community to climate impacts? ☒ Yes ☐ No

The project is still in conceptual design and measures to increase climate resilience will be considered through design upon review of the recommendations of the detailed Climate Resilience Assessment report to be completed by a WSP Canada qualified professional.

3.3 Have you consulted, or will you consult, climate change data and tools, such as future climate projections available through the Canadian Centre for Climate Services and ClimateData.ca? ☒ Yes ☐ No

The following climate data and tools will be consulted to assess current and future climate risks to the project:

- Environment and Climate Change Canada Weather Station Data
- Climate Atlas Climate Projections (Prairie Climate Centre)
- CRIM – Centre de recherche informatique de Montréal (2019). Climate data of Canada.
- Government of Manitoba. (2014). Climate Change in Manitoba.
- University of Winnipeg. (n.d.). Tornadoes: Emergency Response Guidelines.
- CCCR. (2019). Canada's Changing Climate – Chapter 5: Changes in Snow, Ice and Permafrost Across Canada
- Western University IDF_CC Tool (Western University)

4.0 CLIMATE OBJECTIVES

4.1 Does your community / municipality have a Climate Action Plan? ☒ Yes ☐ No

Yes, the City of Winnipeg published its Climate Action Plan in 2018:*'Winnipeg's Climate Action Plan: Planning for Climate Change - Acting for People'*
The renewed targets include:

- 20% reduction in greenhouse emissions by 2030 relative to 2011 levels
- 80% reduction in greenhouse gas emissions by 2050 relative to 2011 levels

4.2 Does this project (or measures being considered) align with this plan?
☒ Yes ☐ No ☐ Not Applicable

Action 3.7 of the Climate Action Plan is to transition the City's transit fleet to zero-emission vehicles. The North Garage Replacement provides critical infrastructure for the transition to a zero emissions bus fleet.

Action 5.2 is to improve energy performance of new buildings

Action 7.1 is to implement opportunities to improve Winnipeg's resilience and adaptability to the effects of a changing climate.

4.3 Optional/Supplemental: Please list relevant supporting information (sources, reports, studies, etc.) that were consulted in the course of completing the Climate Lens. Examples could include Impact Assessment studies, provincial environmental, GHG or climate risk assessments, benchmark studies, certification applications, etc.

The following is a non-exhaustive list of the documents that will be consulted in completion of the Climate Lens:

- City of Winnipeg, Climate Action Plan, 2018
- Eastern Corridor Study – Technical Memo Summary for 2500 Ferrier Street, WSP 2020
- North Garage Replacement Planning Study, WSP 2021
- National Building Code of Canada, Natural Resources Canada, 2015.
- Manitoba Building Code, 2011
- CSA PLUS 4013-2019: Technical Guide: Development, Interpretation and Use of Rainfall Intensity-Duration-Frequency (IDF) Information
- Canada's National Inventory Report, 1990-2018
- ISO 14064-2
- WRI GHG protocol for Project Accounting

5.0 I, the undersigned, as authorized by my organization, confirm the statements above are true and accurate, and attest that:

- opportunities to quantify and minimize GHG emissions during the construction and operation of the project will be considered in the planning, design and development/ implementation of this project to the extent possible;
- and, climate change risks and adaptation and resiliency measures will be considered in the siting/location, design/build, and planned operation and maintenance of this project to the extent possible and reflecting the project's cost, criticality and vulnerability.

Infrastructure Canada may follow up on the results of the Climate Lens to confirm the required information or to request further detail. Consequently, Applicants should retain all the information used to complete the Climate Lens.

Signature of person responsible for completing the Climate Lens:

X Erin Cooke

Name	Erin Cooke, P.Eng., PMP
Position	Project Manager
Organization Address Contact Number Email	Winnipeg Transit 421 Osborne Street, Winnipeg, MB R3L 2A2 204-226-3557 ecooke@winnipeg.ca

Bell MTS, a division of Bell
Canada
PO Box 6666
3-191 Pioneer Avenue

Date: 14 June 2023

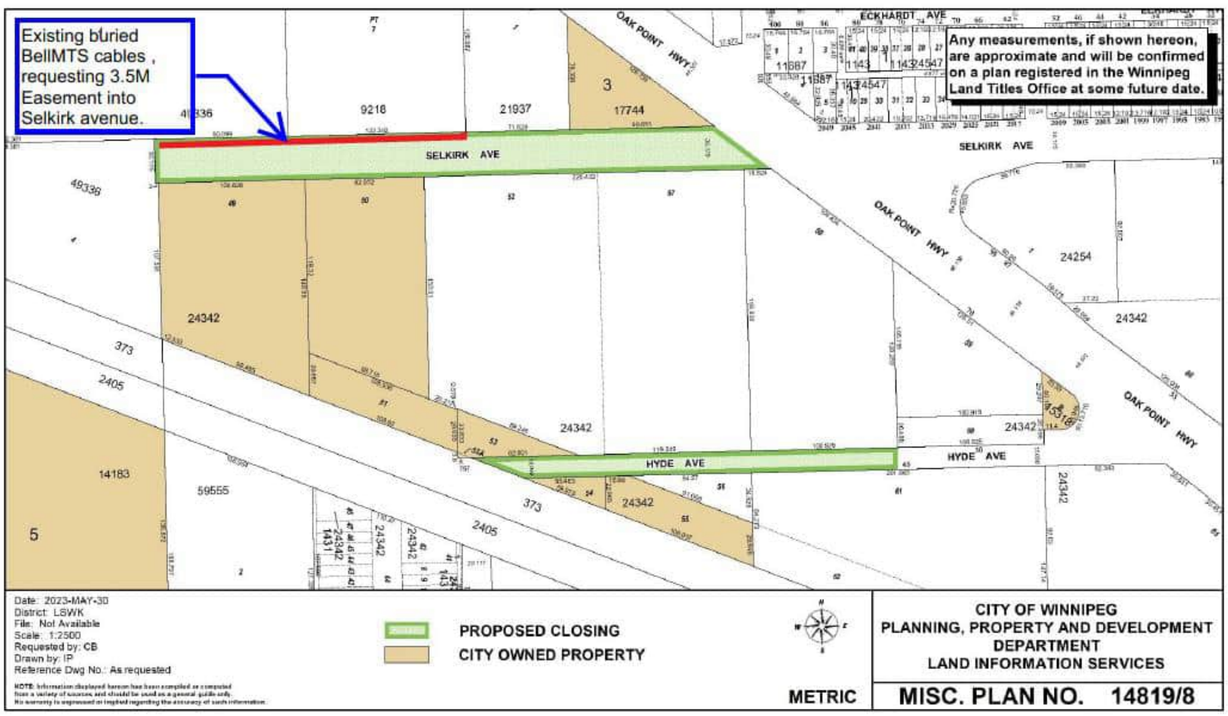
Real Property Officer, Planning, Property and Development Department
Phone: 204 986 6404
Address: 2nd Floor - 65 Garry Street, Winnipeg, MB R3C 4K4
Website: www.winnipeg.ca/ppd | Email: cgagnon@winnipeg.ca

Attention: *Catherine P. Gagnon*

File No.: Misc. Plan No. 14819/8

Re: Proposed Closing - Hyde Avenue and Selkirk Avenue west of Oak Point Highway [North Winnipeg Transit Garage] - DAC 2/2023

BellMTS has existing Cables **Selkirk Avenue** that is being closed **as shown in sketch below.**



BellMTS would want to secure Easements for the Road closing of Selkirk Avenue.
Any removal or relocation of BellMTS existing facilities as a result of the proposed activities will be at the expense of the developer and/or customer.
Developer responsibilities (BellMTS Pre-Service Charges, BellMTS Buried Crossings, etc.) can be made available by calling the BellMTS Network Engineering Control Centre at 204-941-4369 or 1-866-756-7642.

To determine if telephone facilities are available in your development and if construction charges will apply please call the BellMTS ANCO Office at 204-941-4217 or 1-888-570-5394.

Any existing BellMTS services, easement agreements and or caveats affecting the lands to be subdivided will be brought forward on the new plan of subdivision unless otherwise specified.

Should you require further information please contact BellMTS Access Engineering at the numbers listed below.

Regards,

Grace Bushi

BellMTS
Access Provisioning
Tel: 204-918-8191
Email: Grace.Bushi@bellmts.ca

cc. Manitoba Hydro
cc. BellMTS

EASTERN CORRIDOR SATELLITE GARAGE

BASIS OF ESTIMATE MEMO (DRAFT)

CITY OF WINNIPEG

DRAFT MEMO

PROJECT NO.: 17M-0063-00
DATE: SEPTEMBER 26, 2019

WSP
111-93 LOMBARD AVENUE
WINNIPEG, MB
CANADA R3B 3B1

T: +1 204 943-3178
F: +1 204 943-4948

WSP.COM

SIGNATURES

PREPARED BY

<professional stamp, if applicable>

Sander Quartero, PMP, P.Eng.
Senior Project Manager

September 26, 2019

APPROVED[1] BY *(must be reviewed for technical accuracy prior to approval)*

Grantley King, PMP, P.Eng.
Senior Project Manager

September 26, 2019

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[1] Approval of this document is an administrative function indicating readiness for release and does not impart legal liability on to the Approver for any technical content contained herein. Technical accuracy and fit-for-purpose of this content is obtained through the review process. The Approver shall ensure the applicable review process has occurred prior to signing the document.

INTRODUCTION

As part of the Eastern Corridor Study undertaken by The City of Winnipeg a Maintenance and Storage Facility (MSF) for the transit vehicles was determined necessary. The MSF was developed as a staged facility with initial phase construction for 225 buses beginning in 2020 with additions planned of 125 and 150 rigid body and articulated busses in 2035 and 2050 respectively. Due to constructability concerns at the site initially selected for the facility, the design and cost estimate was developed without a predetermined geographic location. The absence of a physical site has had implications on the development of this estimate insofar as the estimate could only be developed within the project data available. In this case without adequate location information the estimate was advanced to a preliminary level for the Site Work, Buildings, and Equipment required only. For the current design deliverables, within the bounds of the project data available, the methodology used to develop a capital cost estimate for each phase of the Winnipeg Satellite Garage can be described as parametric modeling checked against data for composite representative gross building costs and is considered accurate within +60% and -30%. Costs for offsite work including natural gas and electric site services have been provided as allowances only, with no specific scope attached.

GENERAL METHODOLOGY

Conceptual site and overall building drawings and/or written descriptions have been provided and form the basis for the identification of the various infrastructure elements that were used to prepare the capital cost estimate. These infrastructure elements are organized into the categories of site work, buildings, and equipment and are detailed below. In addition to infrastructure elements, cost allowances for professional services and escalation have also been included to reflect an overall estimate for the facility program. There has been no allowance made in the estimate for the purchase or lease of real estate.

PARAMETRIC MODELLING PROCESS

Parametric modeling is a process where typical infrastructure elements are grouped into a variety of typical facilities. Typical facility costs are developed by combining construction activities that can be associated either with a typical cross-section or plan based on a conceptual scope of work that is common to a specific facility. The typical facility composite unit cost is developed by combining the costs for individual construction elements common to a given typical section or facility and creating a representative composite unit cost. The following describes the process used to develop scope, quantity and cost parameters for each cost component used in the estimate.

Table 1 – Space Needs Program Summary

		PHASE 1 225 BUSES (SQ. METERS)	PHASE 2 125 BUSES (SQ. METERS)	PHASE 3 150 BUSES (SQ. METERS)	TOTAL 500 BUSES (SQ. METERS)
Building Areas					
Transit	Shared/Common Spaces, Operations, And Driver's Area	1,710	653	0	2,363
	Maint. Vehicle Syst-Support, Maint. Vehicle Syst-Shops, Maint-Facility, Stores/Parts	2,671	1,310	0	3,981
	Maintenance - Vehicles Systems - Shops	5,956	2,698	4,441	13,096
	Service - Vehicles	2,278	26	-10	2,295
	Agency Vehicle Parking - Interior Spaces	25,353	13,885	12,238	51,476
Total Building Areas		**37,970**	**18,573**	**16,670**	**73,214**
Exterior Areas					
Transit	Site Areas	901	9	345	1,255
	Employee / Visitor Vehicle Parking - Exterior Spaces	10,089	3,257	5,560	18,907
Total All Exterior Areas		**10,990**	**3,266**	**5,905**	**20,162**
Subtotal All Areas		**48,961**	**21,840**	**48,961**	**48,961**
Site Grossing Factor (setbacks, landscaping, stormwater, etc.)	75%	36,720	16,380	16,931	70,033
Total for All Areas		**85,682**	**38,220**	**16,931**	**70,033**
Site Area	Unused Space	95,585	-21,840	-48,961	51,169
Grand Total for All Areas		**144,546**	**144,546**	**144,546**	**144,546**
Acres		**35.72**	**35.72**	**35.72**	**35.72**

SITE WORK

The Site Work component of the attached estimates include costs for all anticipated work required to prepare the site for building construction and finishing of areas of the facility not typically considered building scopes. These scopes include: excavation & removal of contaminated soil and a limited amount of existing impermeable surfaces, clearing & grubbing allowance, rough grading, finish grading, footing excavation or cut as required, erosion control, storm water management, site finishing including aggregate base, asphalt concrete pavement, concrete pavement, signing and striping, parking lots, concrete curb and gutter, concrete sidewalk, and area lighting.

BUILDINGS

The Buildings component of the attached estimates include costs for all anticipated work required to construct the interior enclosed spaces of the facility as well as all typical 'base building' furnishings of the space. Building areas include: the substructure, structure, exterior enclosure, partitions, finishes, mechanical, and electrical. Allowances were included for general requirements, fees, and mobilization. The buildings were estimated for the following major use areas:

- Administrative and Operations Areas;
  - Finished, public office space construction.
  - Includes offices, wellness areas, employee use areas, and meeting space.
- Vehicle Maintenance Areas;
  - Industrial steel frame structure.
  - Includes spaces for in-ground and platform lifts; body repair, upholstery, and painting areas; lube/compressor rooms; and electronics shops.
- Parts Storage Areas;
  - Industrial steel frame structure - Bare, lightly serviced warehouse construction.
  - Includes secure storage, shipping and receiving, consumables area, and canopy covered garage.
- Interior Bus Parking;
  - Industrial steel frame structure - Unfinished, reinforced concrete and steel building.
  - Includes open parking spaces. Additional structure, mechanical, and electrical costs allowed for to permit future building outfitting and retrofitting for electrical and/or compressed natural gas bus fueling/storage
- Service Areas;
  - Industrial steel frame structure - Unfinished, industrial serviced.
  - Includes washing and fueling spaces. Additional structure, mechanical, and electrical costs allowed for to permit future building outfitting and retrofitting for electrical and/or compressed natural gas bus fueling/storage.

EQUIPMENT

The equipment beyond standard finishes, furniture, and equipment for the space use required for the functional operation of the space for the following areas:

- Maintenance Shops Spaces;
  - In-ground lift repair bays, platform lift repair bay, light duty flat bay, portable equipment, electronics bay, electronics shop, common work area, tire bay, tire storage, minor body repair / prep bay, paint booth, paint mix, central dust collection, body shop, upholstery, shop, body shop storage, battery charging, light duty hoist, chassis wash, forklift / scissor lift / sweeper parking, lube /compressor room.
- Maintenance Stores and Parts;
  - Stores, secure storage / tool crib, shipping and receiving, consumables area, and canopy covered garage.
- Maintenance – Facility Spaces;
  - Wood working shop, HVAC / industrial mech shop, electrical FM shop, and FM stores.
- Site Areas;
  - Liquid Fuel Tank Farm

For additional detail on assumed specialty equipment outfitting of the facility, see Appendix D.

SCOPE

The scope of work for the project estimate has been derived from review of the attached conceptual plans of the three phases of the facility development. Areas of scope not indicated on the plans have either been excluded from the estimate, or included as specific assumptions herein.

UNIT COST LIBRARY

Estimates were developed using area take offs, multiplied by an appropriate unit cost for the measured unit. Cost data was developed using several sources and is considered representative to those seen in the Winnipeg metro region for similar types of construction. All unit costs include contractor's direct construction cost plus all taxes, general conditions, mobilization, overhead and profit. Where costs were estimated in US currency and a conversion factor of $1.33 Canadian dollars to $1.00 US dollar was applied. The unit costs do not include allowances for such items as engineering, construction management, owner's administrative costs and allowances for contingencies. These costs were included as percentage add-ons to the cost estimate under separate sections.

ALLOWANCES

DESIGN ALLOWANCE

Design allowance is typically included in an estimate as an allowance for minor variability in scope between the time of estimate and construction that would not be significant enough to warrant re-estimation. This item accounts for potential design changes that could impact overall project cost including the selection of materials, finishes, fixtures, and specific equipment. A design allowance of 10% has been applied to each cost category.

CONSTRUCTION AND PRICING ALLOWANCE

A contingency for construction and pricing was included for the level of detail of estimate completed. Like the Design Allowance the construction and pricing contingency is meant to account for the differences in the final value from the calculated value due to potential project change resulting from unforeseen conditions/events during construction, economic conditions, trade pricing, and material costs. A Construction and Pricing allowance of 15% has been applied to each cost category.

PROFESSIONAL SERVICES ALLOWANCE

This cost category includes allowances for construction management, environmental clearance, design and specifications, design services during construction, design reviews by other, permitting and agency administration. These allowances are computed by applying a percentage to the total construction cost estimated for each cost category. The total percentage add-on for each of the various elements within this cost category is 30%.

ASSUMPTIONS

- The estimates for each phase reflect 2019 dollars.
- Escalation was determined based on the City of Winnipeg Rate table for Basis of Estimate (2019).

- Site work was developed based on the assumed work required for similarly sized facilities. As no site is known for this facility, risk exists in the costs estimated for sitework if site conditions vary significantly from the assumed topography, layout, size, or soil conditions.
- Buildings are assumed to be constructed to allow for future outfitting for compressed natural gas fueling and/or electrification of busses. No specific equipment has been included in the estimate to support electric bus charging or natural gas bus fueling, maintenance, or storage.
- This estimate is based upon the assumption that there will be an adequate level of competition.
- The estimate presents the total project value of the scope of work represented in the feasibility documents.
- That third parties will not interfere with the overall construction of the project.
- That no unusual work restriction or obligation will be imposed upon the contract that will prevent or impede the contractor in performing the work in the most efficient way.
- That the contractor will be required to have coverage for General Liability, Excess Liability and Builders Risk Insurance.
- That the contractor will not be restricted from access to work areas where work needs to be performed.
- Offsite utility servicing scope assumed with a budget of $350k.

EXCLUSIONS

Due to the nature of the estimate without an established site a number of site dependent and highly variable items could not be estimated as part of the project; these include but are not limited to:

- Land Acquisition
- Existing building or site improvement demolition
- External road improvements
- Traffic management
- Site Access
- Other Costs (Sound Attenuation, Public Realm and Placemaking)
- Financing Costs
- Provincial and Federal taxes

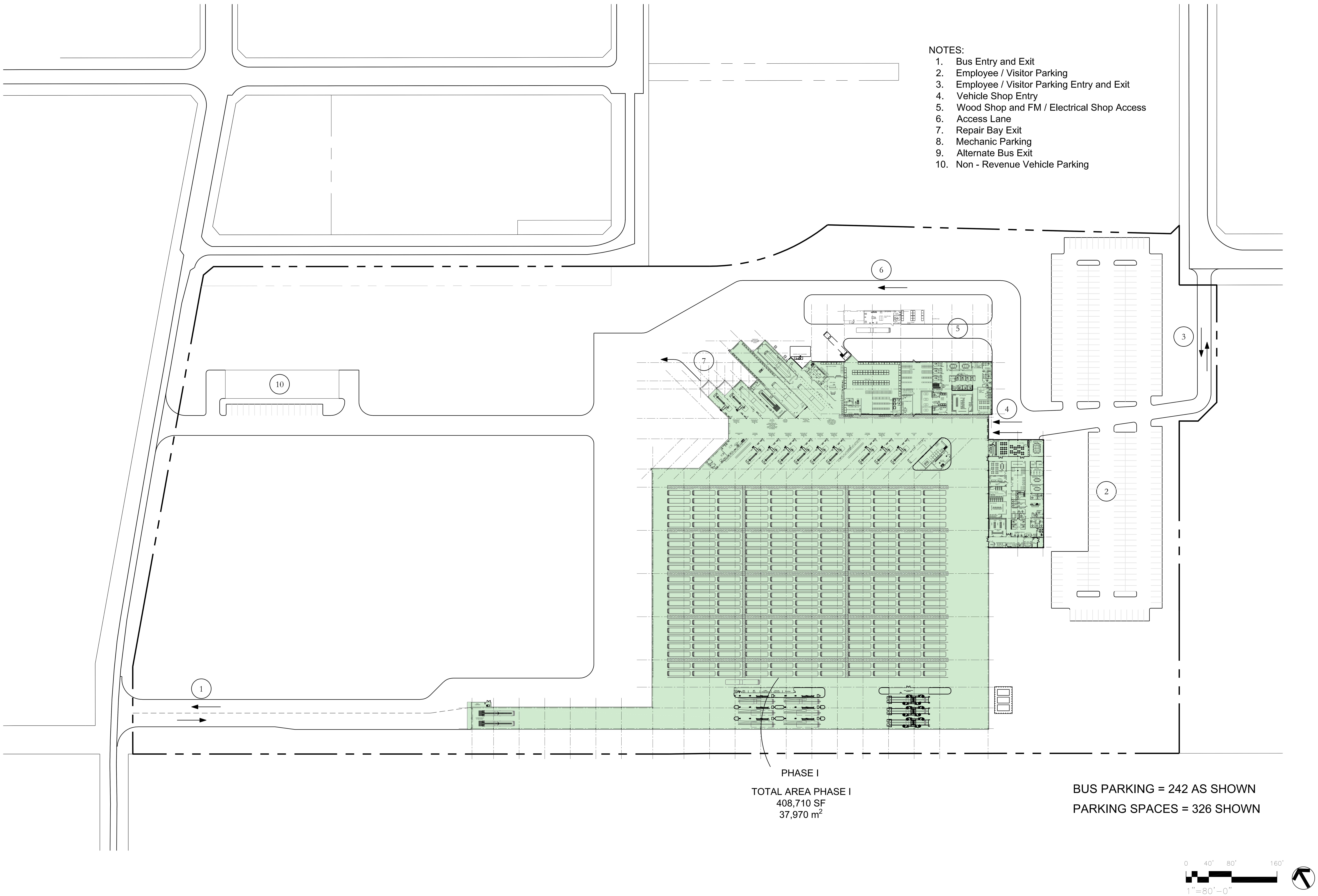
QUALIFICATION

This estimate represents an opinion of probable construction cost in 2019 dollars, based on our professional experience and qualifications. There are any number of factors which can influence a probable contractors actual bid, therefore we cannot guarantee that actual bids or final construction costs will not vary from this opinion of probable cost.

APPENDIX

A SITE PLANS

NOTES:
1. Bus Entry and Exit
2. Employee / Visitor Parking
3. Employee / Visitor Parking Entry and Exit
4. Vehicle Shop Entry
5. Wood Shop and FM / Electrical Shop Access
6. Access Lane
7. Repair Bay Exit
8. Mechanic Parking
9. Alternate Bus Exit
10. Non - Revenue Vehicle Parking



BUS PARKING = 242 AS SHOWN

PARKING SPACES = 326 SHOWN

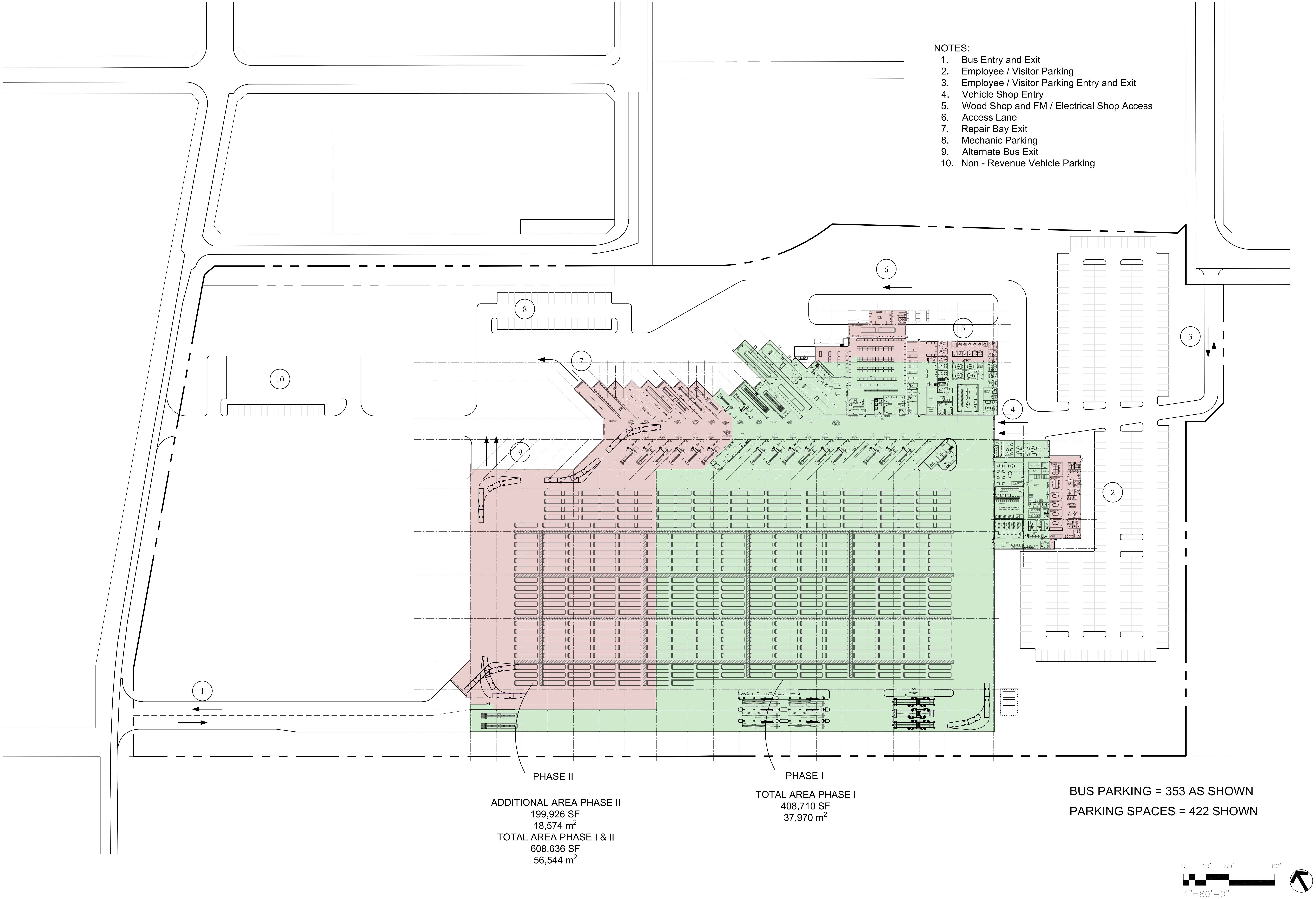
PROJECT NO.	189023
DRAWN BY	CDE
DATE	20190729
SCALE	22x34 1" = 80' 11 X 17 1" = 160'

PROJECT TITLE
WINNIPEG TRANSIT EAST GARAGE

WSP USA Inc.
16200 PARK ROW
SUITE 200
HOUSTON, TEXAS 77084
TEL: (281) 589-5900
FAX: (281) 759-5164

DRAWING TITLE
OVERALL SITE PLAN
WINNIPEG TSG
PHASE 1

DRAWING NUMBER
SITE1



NOTES:
1. Bus Entry and Exit
2. Employee / Visitor Parking
3. Employee / Visitor Parking Entry and Exit
4. Vehicle Shop Entry
5. Wood Shop and FM / Electrical Shop Access
6. Access Lane
7. Repair Bay Exit
8. Mechanic Parking
9. Alternate Bus Exit
10. Non - Revenue Vehicle Parking

PHASE II

ADDITIONAL AREA PHASE II
199,926 SF
18,574 m^2
TOTAL AREA PHASE I & II
608,636 SF
56,544 m^2

PHASE I

TOTAL AREA PHASE I
408,710 SF
37,970 m^2

BUS PARKING = 353 AS SHOWN

PARKING SPACES = 422 SHOWN

PROJECT NO.	189023
DRAWN BY	CDE
DATE	20190729
SCALE	22x34 1" = 80' 11 X 17 1" = 160'

PROJECT TITLE
WINNIPEG TRANSIT EAST GARAGE

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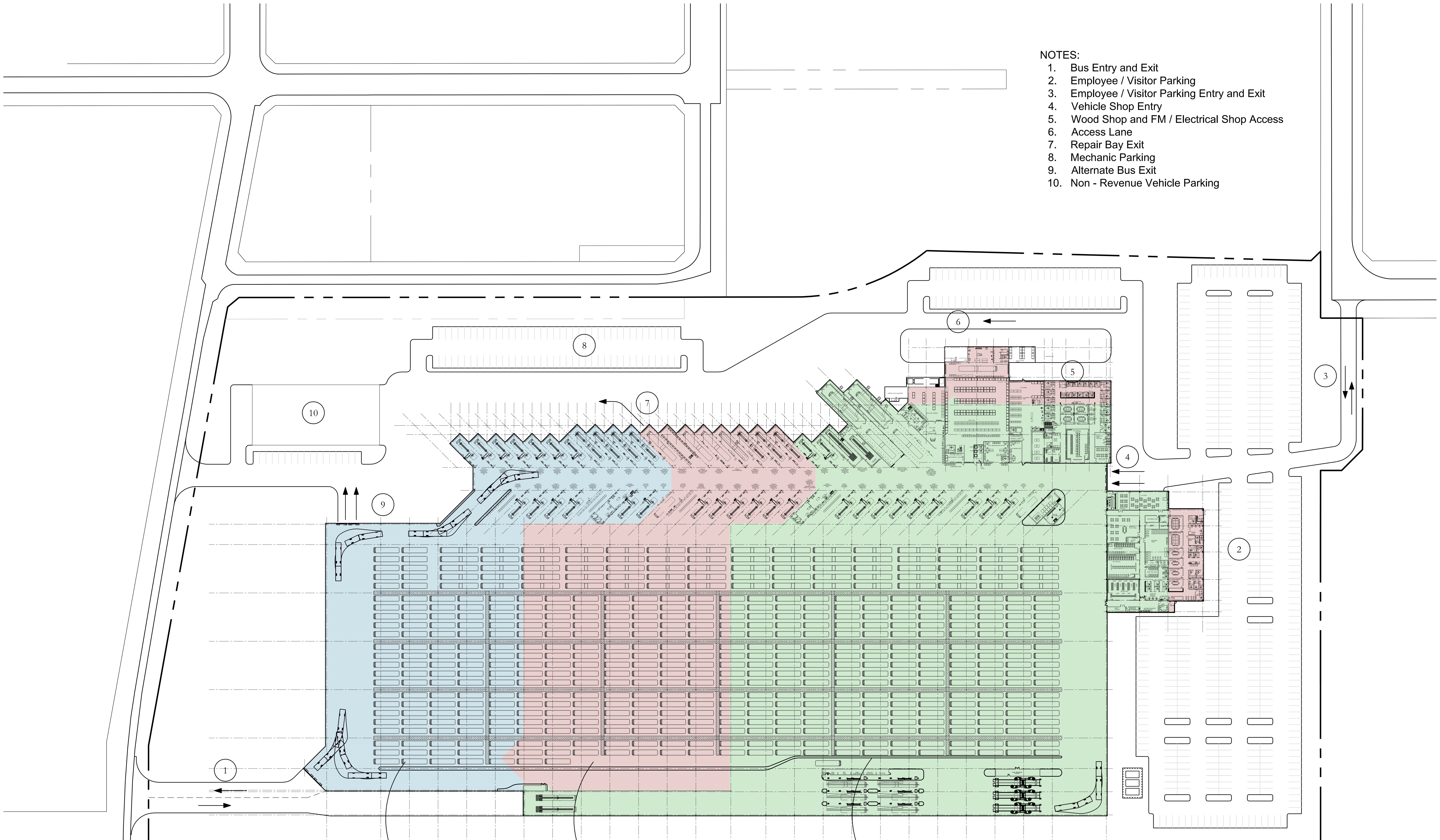
16200 PARK ROW
SUITE 200
HOUSTON, TEXAS 77084
TEL: (281) 589-5900
FAX: (281) 759-5164

DRAWING TITLE
OVERALL SITE PLAN
WINNIPEG TSG
PHASE 2

DRAWING NUMBER
SITE 2

NOTES:
1. Bus Entry and Exit
2. Employee / Visitor Parking
3. Employee / Visitor Parking Entry and Exit
4. Vehicle Shop Entry
5. Wood Shop and FM / Electrical Shop Access
6. Access Lane
7. Repair Bay Exit
8. Mechanic Parking
9. Alternate Bus Exit
10. Non - Revenue Vehicle Parking



PHASE III

ADDITIONAL AREA PHASE III
179,437 SF
16,670 m^2
TOTAL AREA PHASE I, II, III
788,073 SF
73,214 m^2

PHASE II

ADDITIONAL AREA PHASE II
199,926 SF
18,574 m^2
TOTAL AREA PHASE I & II
608,636 SF
56,544 m^2

PHASE I

TOTAL AREA PHASE I
408,710 SF
37,970 m^2

BUS PARKING = 500 AS SHOWN

PARKING SPACES = 612 SHOWN

0 40' 80' 160'
1"=80'-0"

PROJECT NO.	189023
DRAWN BY	CDE
DATE	20190729
SCALE	22x34 1" = 80' 11 X 17 1" = 160'

PROJECT TITLE
WINNIPEG TRANSIT EAST GARAGE

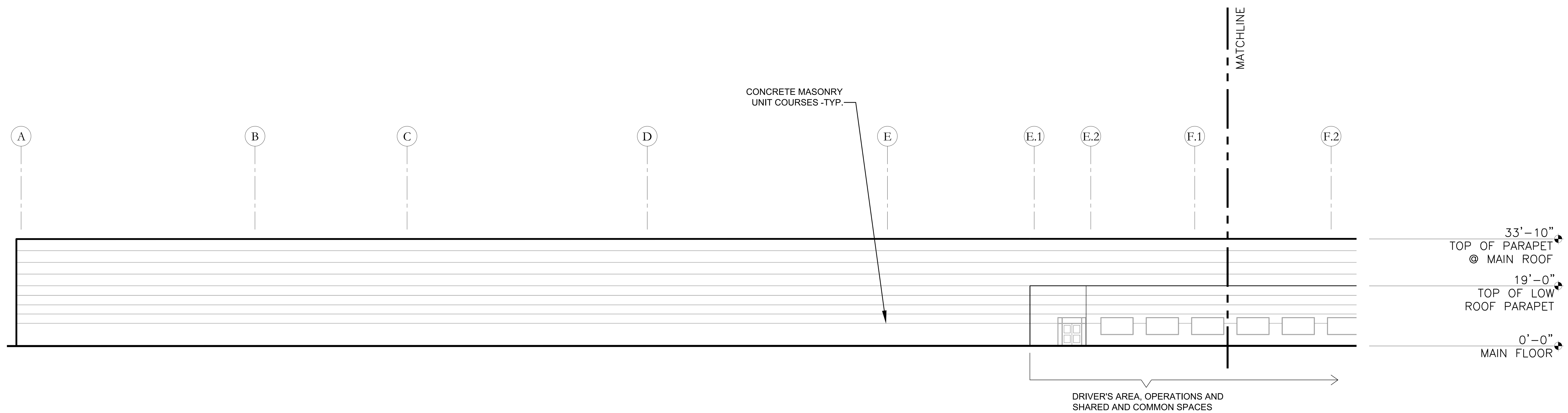
WSP USA Inc.
16200 PARK ROW
SUITE 200
HOUSTON, TEXAS 77084
TEL: (281) 589-5900
FAX: (281) 759-5164

DRAWING TITLE
OVERALL SITE PLAN
WINNIPEG TSG
PHASE 3

DRAWING NUMBER
SITE 3

APPENDIX

B ELEVATIONS



PARTIAL EAST ELEVATION 2 ELEV 1
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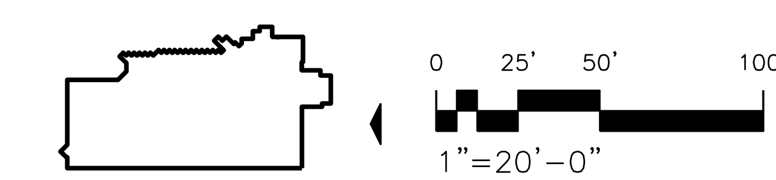

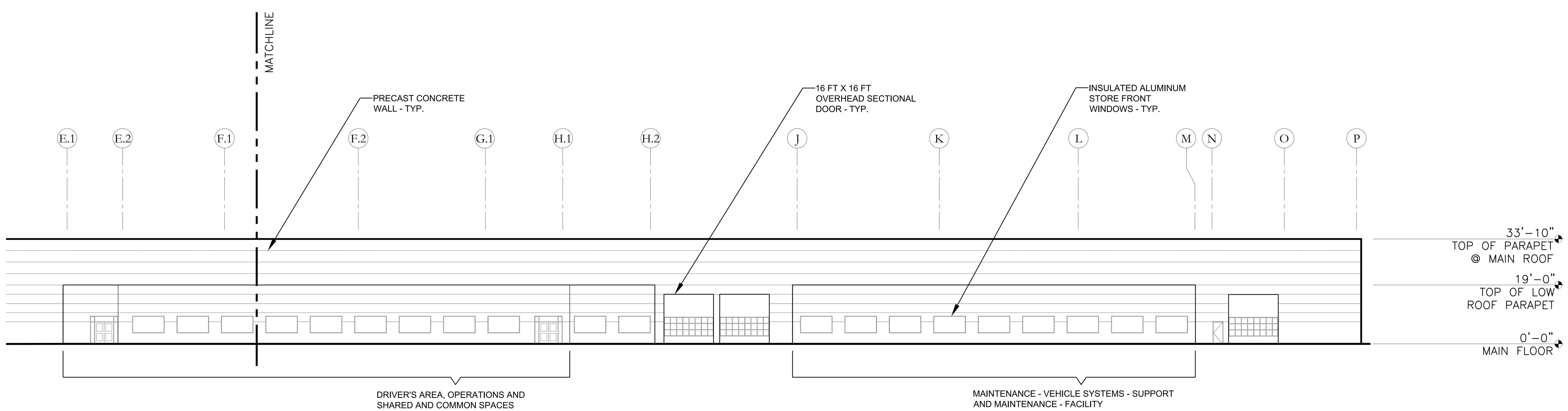

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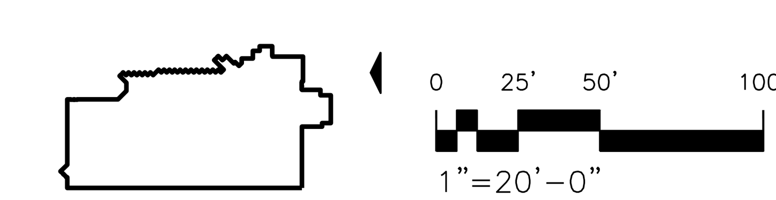

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DRAWN BY	CDE
DATE	20190729
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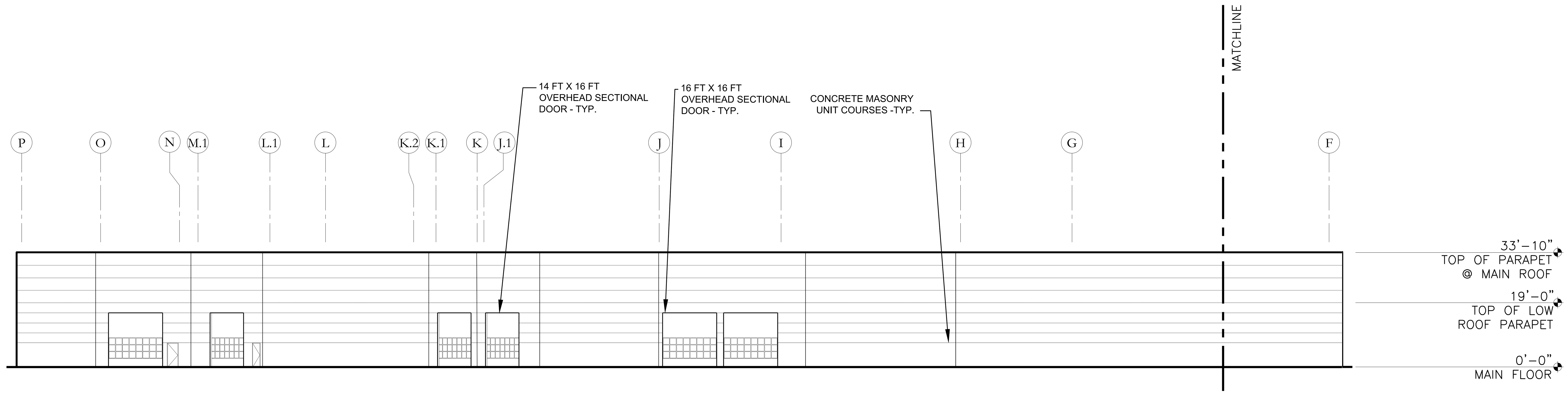
PROJECT TITLE
WINNIPEG TRANSIT EAST GARAGE

WSP USA Inc.
16200 PARK ROW
SUITE 200
HOUSTON, TEXAS 77084
TEL: (281) 589-5900
FAX: (281) 759-5164

DRAWING TITLE
PARTIAL ELEVATION
WINNIPEG TSG
EAST ELEVATION

DRAWING NUMBER
ELEV 1



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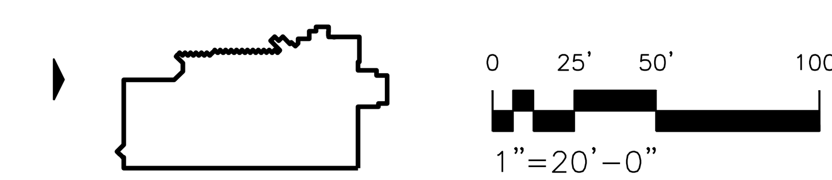

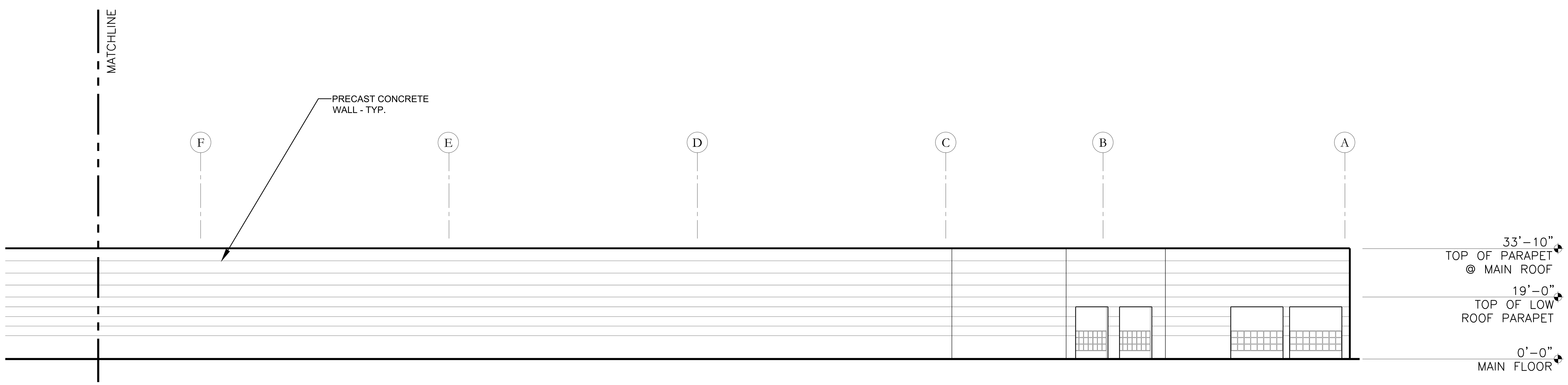

PARTIAL WEST ELEVATION 1 ELEV 2
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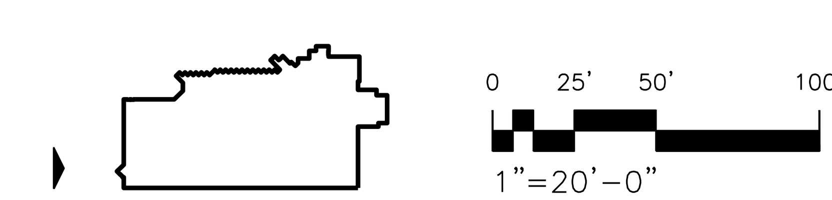


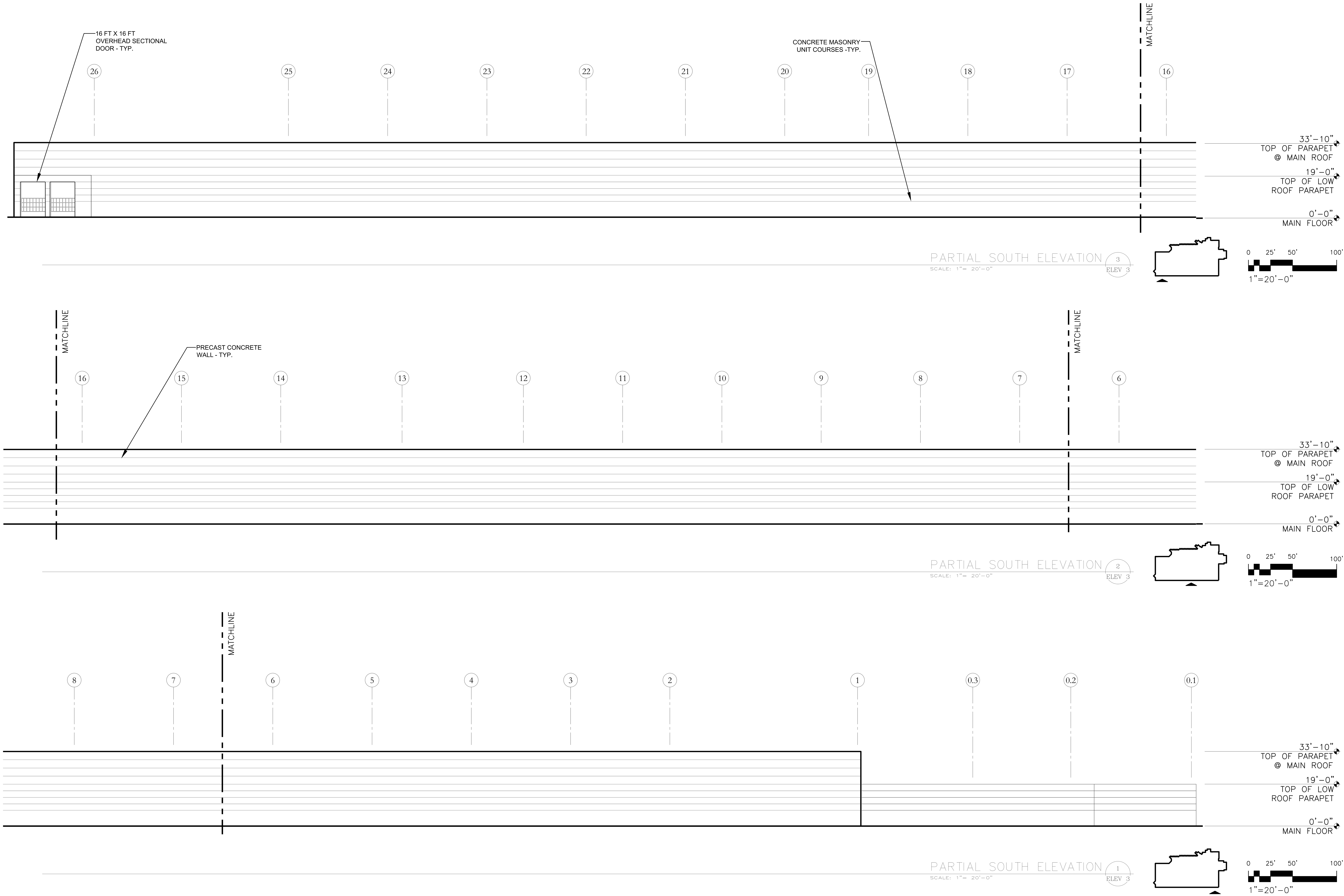
PROJECT NO.	189023
DRAWN BY	CDE
DATE	20190729
SCALE	22x34 1" = 20' 11 X 17 1" = 40'

PROJECT TITLE
WINNIPEG TRANSIT EAST GARAGE

WSP USA Inc.
16200 PARK ROW
SUITE 200
HOUSTON, TEXAS 77084
TEL: (281) 589-5900
FAX: (281) 759-5164

DRAWING TITLE
PARTIAL ELEVATION
WINNIPEG TSG
WEST ELEVATION

DRAWING NUMBER
ELEV 2



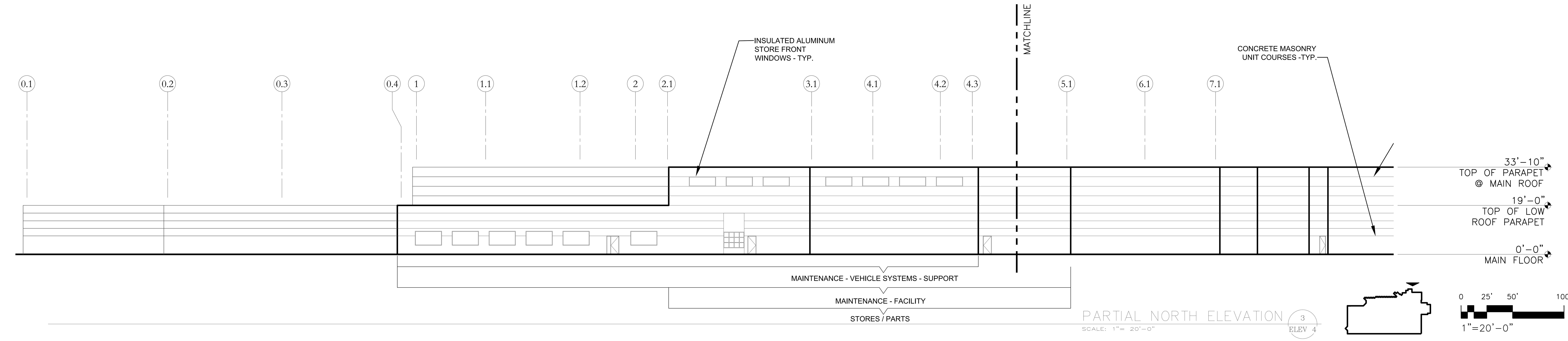
PROJECT NO.	189023
DRAWN BY	CDE
DATE	20190729
SCALE	22x34 1" = 20' 11 X 17 1" = 40'

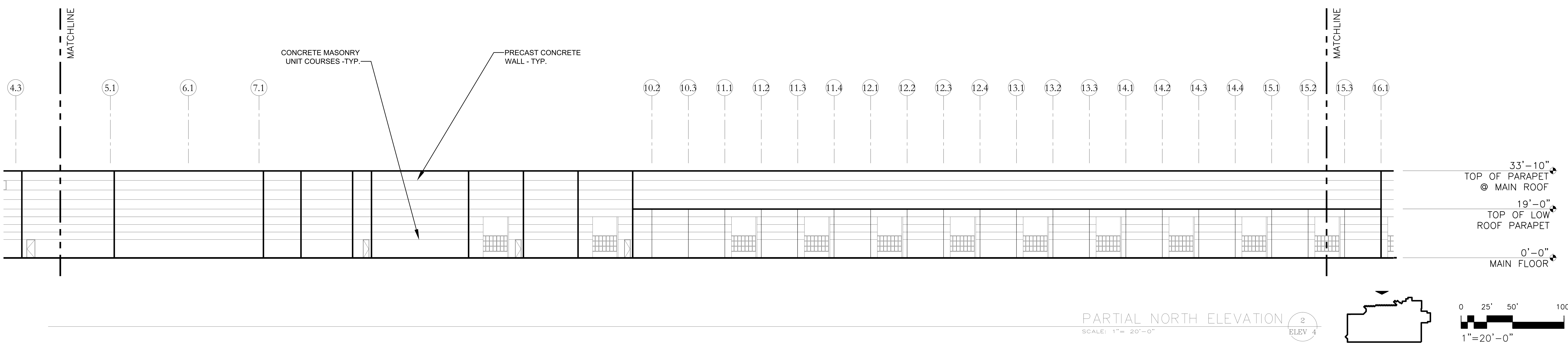
PROJECT TITLE
WINNIPEG TRANSIT EAST GARAGE

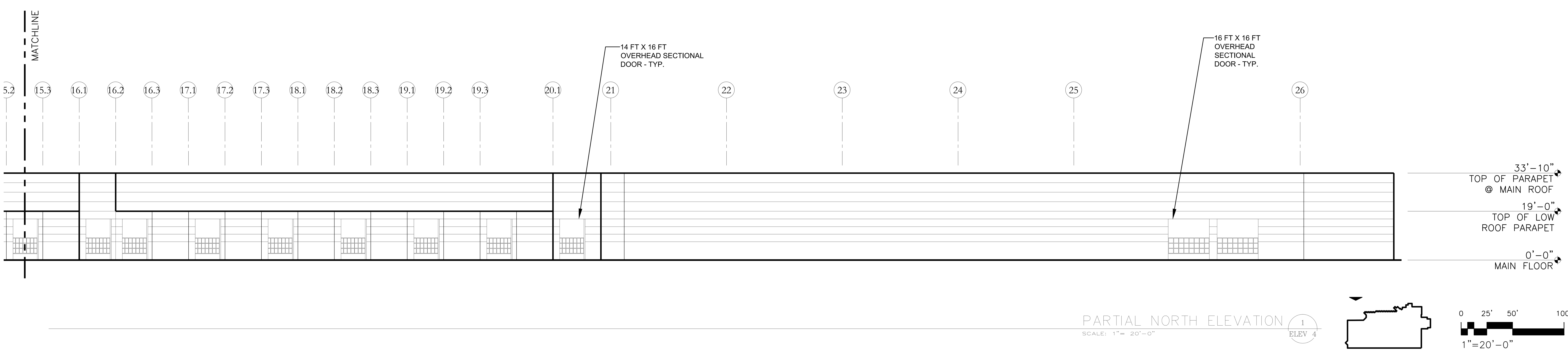
WSP USA Inc.
16200 PARK ROW
SUITE 200
HOUSTON, TEXAS 77084
TEL: (281) 589-5900
FAX: (281) 759-5164

DRAWING TITLE
PARTIAL ELEVATION
WINNIPEG TSG
SOUTH ELEVATION

DRAWING NUMBER
ELEV 3







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DRAWN BY CDE
DATE 20190729
SCALE 22x34 1" = 20'
11 X 17 1" = 40'

PROJECT TITLE
WINNIPEG TRANSIT EAST GARAGE

WSP USA Inc.
16200 PARK ROW
SUITE 200
HOUSTON, TEXAS 77084
TEL: (281) 589-5900
FAX: (281) 759-5164

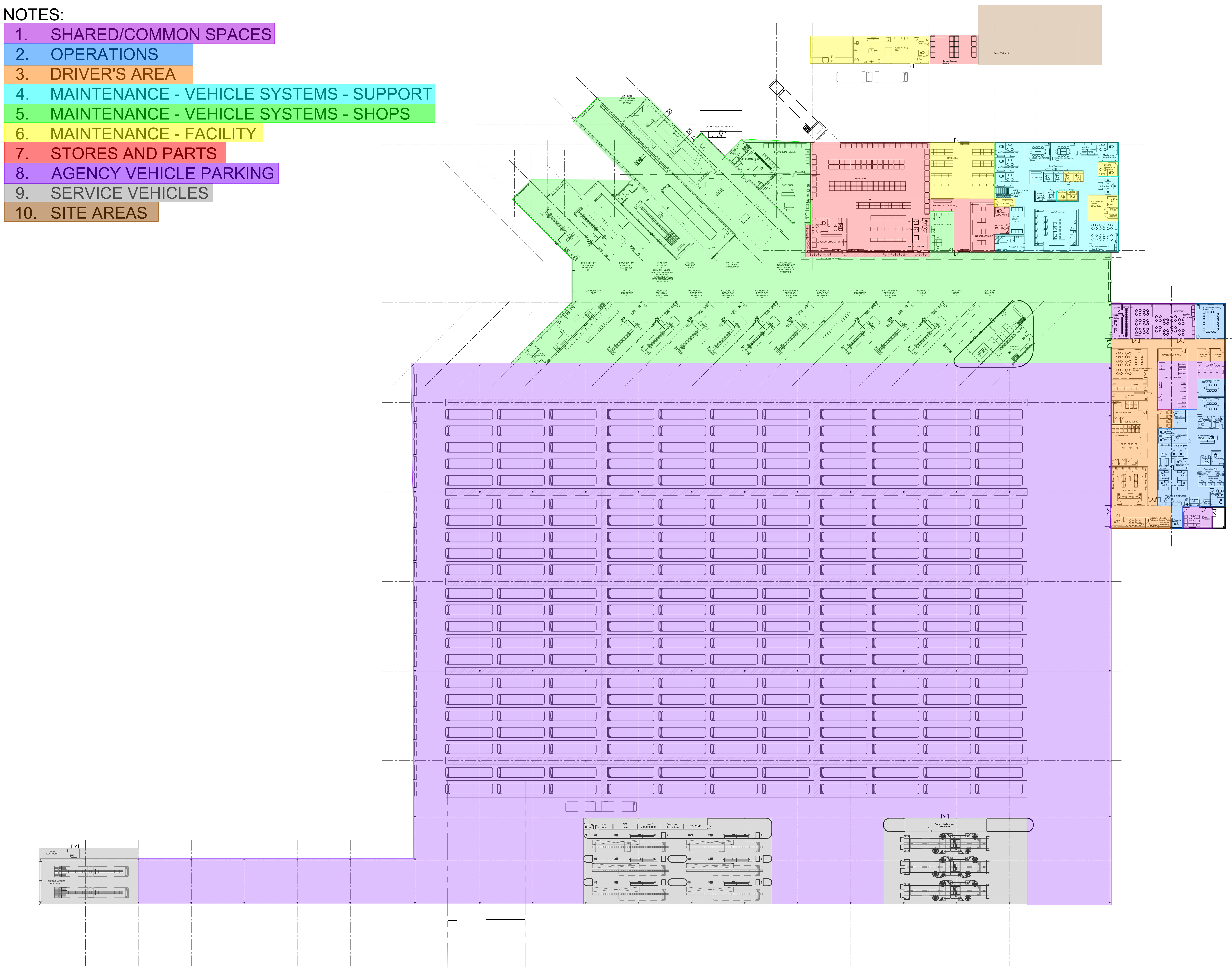
DRAWING TITLE
PARTIAL ELEVATION
WINNIPEG TSG
NORTH ELEVATION

DRAWING NUMBER
ELEV 4

APPENDIX

C FLOOR PLANS

NOTES:
1. SHARED/COMMON SPACES
2. OPERATIONS
3. DRIVER'S AREA
4. MAINTENANCE - VEHICLE SYSTEMS - SUPPORT
5. MAINTENANCE - VEHICLE SYSTEMS - SHOPS
6. MAINTENANCE - FACILITY
7. STORES AND PARTS
8. AGENCY VEHICLE PARKING
9. SERVICE VEHICLES
10. SITE AREAS



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1"=50'-0"

PROJECT NO.	189023
DRAWN BY	CDE
DATE	20190729
SCALE	22x34 1" = 50' 11 X 17 1" = 100'

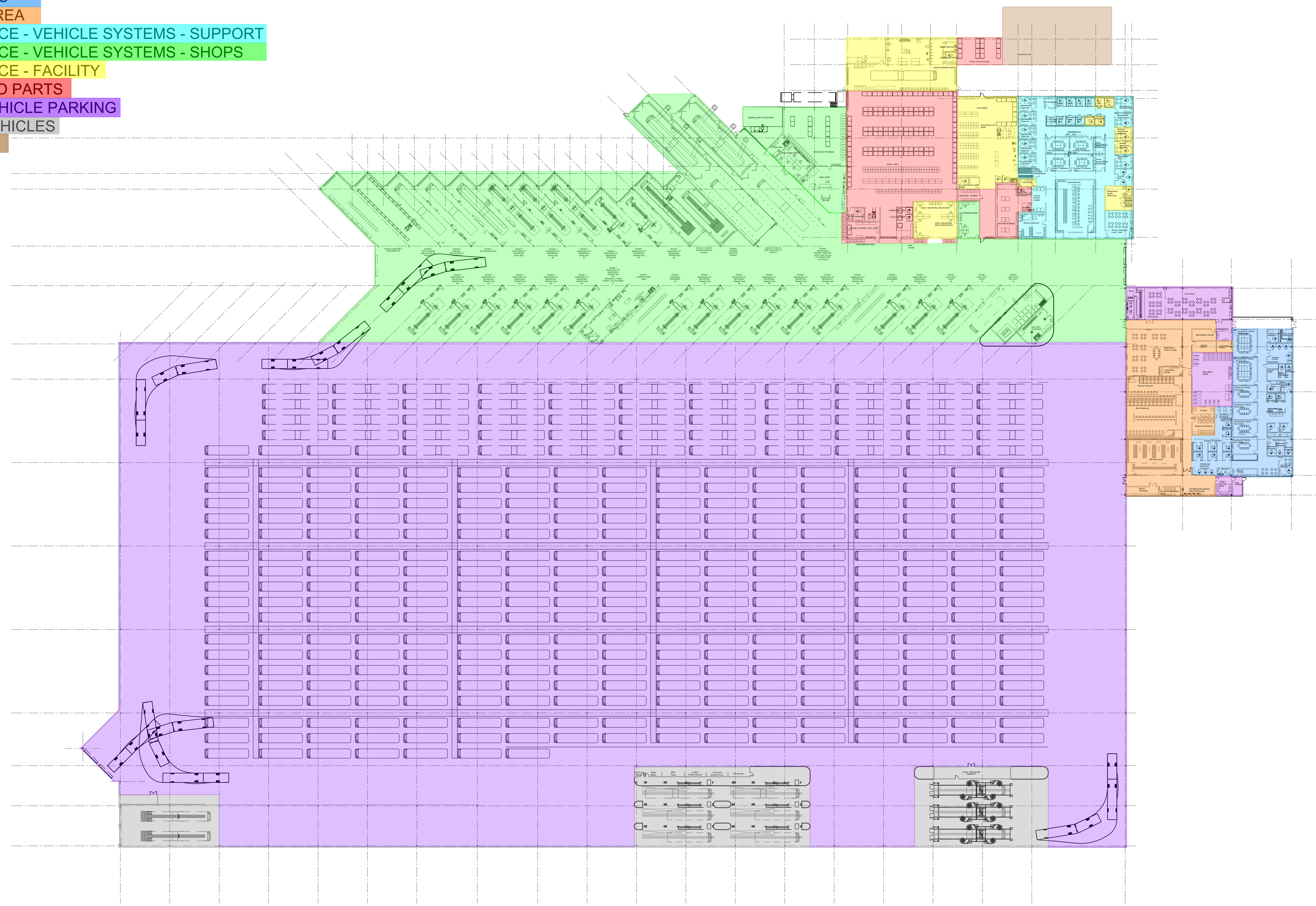
PROJECT TITLE
WINNIPEG TRANSIT EAST GARAGE

WSP USA Inc.
16200 PARK ROW
SUITE 200
HOUSTON, TEXAS 77084
TEL: (281) 589-5900
FAX: (281) 759-5164

DRAWING TITLE
OVERALL PLAN
WINNIPEG TSG
PHASE 1

DRAWING NUMBER
PLAN 1

NOTES:
1. SHARED/COMMON SPACES
2. OPERATIONS
3. DRIVER'S AREA
4. MAINTENANCE - VEHICLE SYSTEMS - SUPPORT
5. MAINTENANCE - VEHICLE SYSTEMS - SHOPS
6. MAINTENANCE - FACILITY
7. STORES AND PARTS
8. AGENCY VEHICLE PARKING
9. SERVICE VEHICLES
10. SITE AREAS



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PROJECT NO.	189023
DRAWN BY	CDE
DATE	20190729
SCALE	22x34 1" = 50' 11 X 17 1" = 100'

PROJECT TITLE
WINNIPEG TRANSIT EAST GARAGE

WSP USA Inc.
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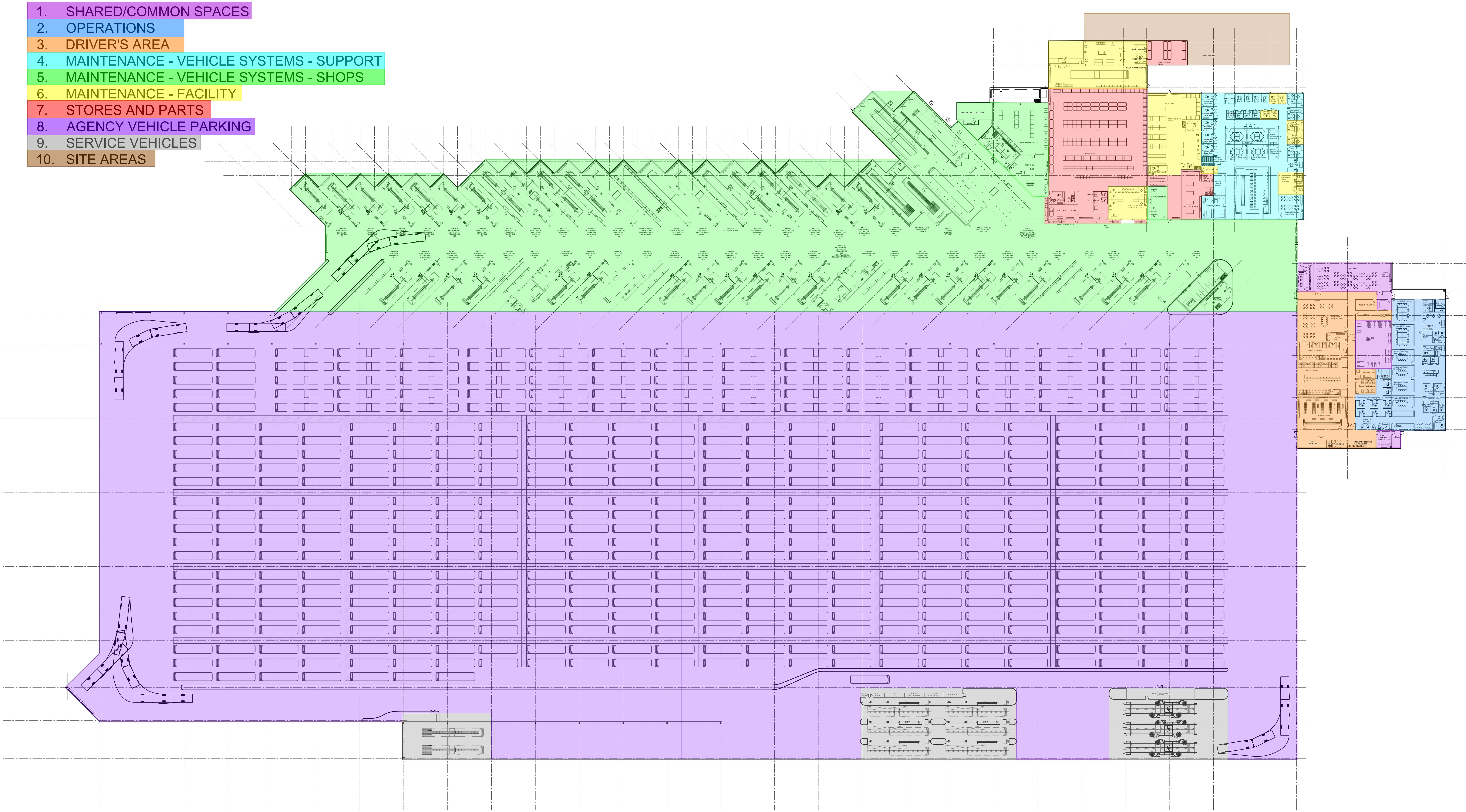
SUITE 200
HOUSTON, TEXAS 77084
TEL: (281) 589-5900
FAX: (281) 759-5164

DRAWING TITLE
OVERALL PLAN
WINNIPEG TSG
PHASE 2

DRAWING NUMBER
PLAN 2

NOTES:
1. SHARED/COMMON SPACES
2. OPERATIONS
3. DRIVER'S AREA
4. MAINTENANCE - VEHICLE SYSTEMS - SUPPORT
5. MAINTENANCE - VEHICLE SYSTEMS - SHOPS
6. MAINTENANCE - FACILITY
7. STORES AND PARTS
8. AGENCY VEHICLE PARKING
9. SERVICE VEHICLES
10. SITE AREAS



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PROJECT NO.	189023
DRAWN BY	CDE
DATE	20190729
SCALE	22x34 1" = 50' 11 X 17 1" = 100'

PROJECT TITLE
WINNIPEG TRANSIT EAST GARAGE

WSP USA Inc.
16200 PARK ROW
SUITE 200
HOUSTON, TEXAS 77084
TEL: (281) 589-5900
FAX: (281) 759-5164

DRAWING TITLE
OVERALL PLAN
WINNIPEG TSG
ALL PHASES

DRAWING NUMBER
PLAN 3

ENLARGED VEHICLE SYSTEMS SUPPORT, STORES, AND SHOPS

SCALE: 1"= 20'-0"

1
PLAN1

PROJECT NO.	189023
DRAWN BY	CDE
DATE	20190729
SCALE	22x34 1" = 20' 11 X 17 1" = 40'

PROJECT TITLE

WINNIPEG TRANSIT EAST GARAGE

WSP USA Inc.
16200 PARK ROW
SUITE 200
HOUSTON, TEXAS 77084
TEL: (281) 589-5900
FAX: (281) 759-5164

DRAWING TITLE

ENLARGED PLAN
WINNIPEG TSG
PHASE 1

DRAWING NUMBER

PLAN 4

ENLARGED VEHICLE SYSTEMS SUPPORT, STORES, AND SHOPS

SCALE: 1"= 20'-0"

1 PLAN1

PROJECT NO. 189023

DRAWN BY CDE

DATE 20190729

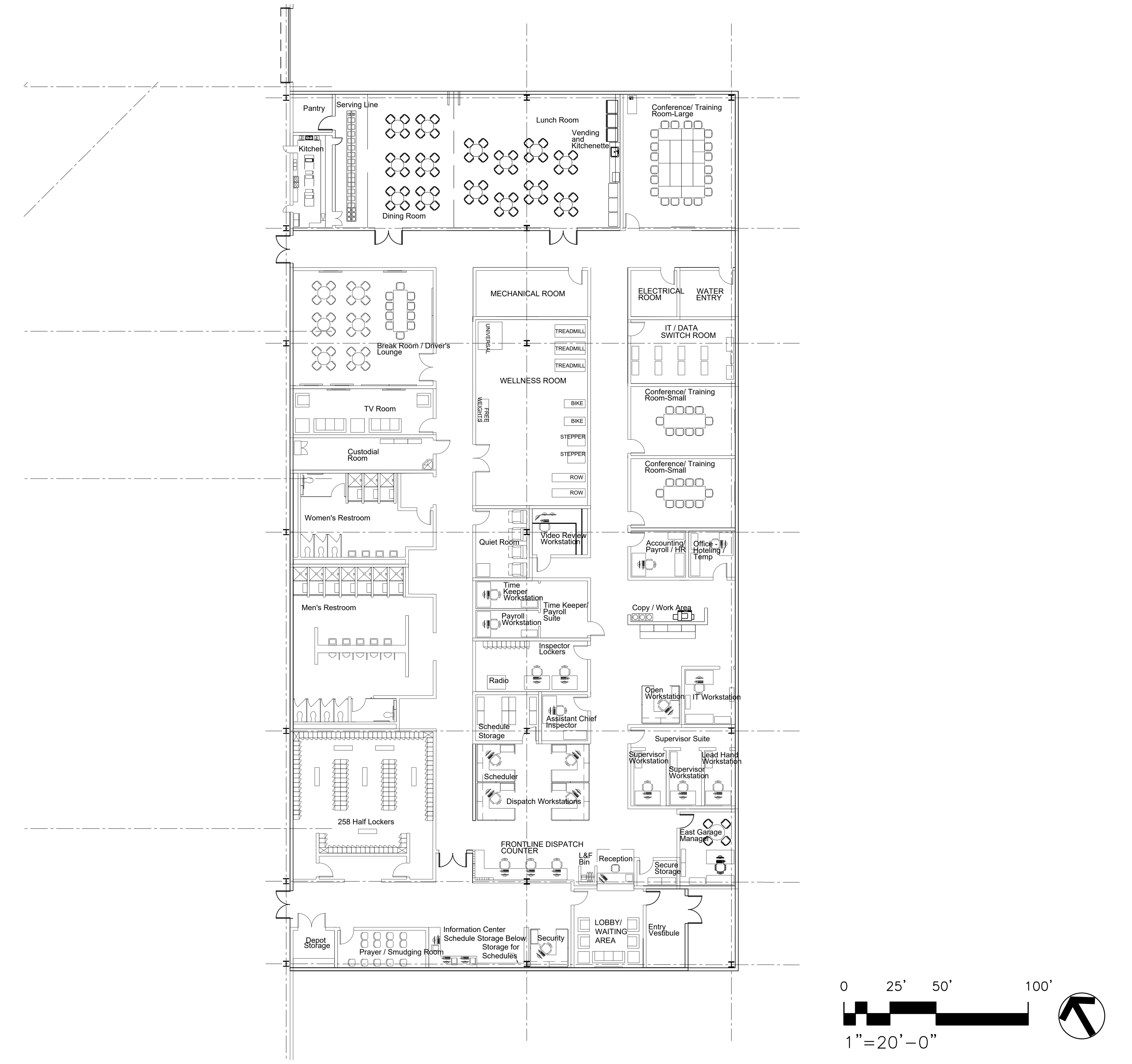
SCALE 22x34 1" = 20' 11 X 17 1" = 40'

PROJECT TITLE WINNIPEG TRANSIT EAST GARAGE

WSP USA Inc.
16200 PARK ROW
SUITE 200
HOUSTON, TEXAS 77084
TEL: (281) 589-5900
FAX: (281) 759-5164

DRAWING TITLE ENLARGED PLAN WINNIPEG TSG ALL PHASES

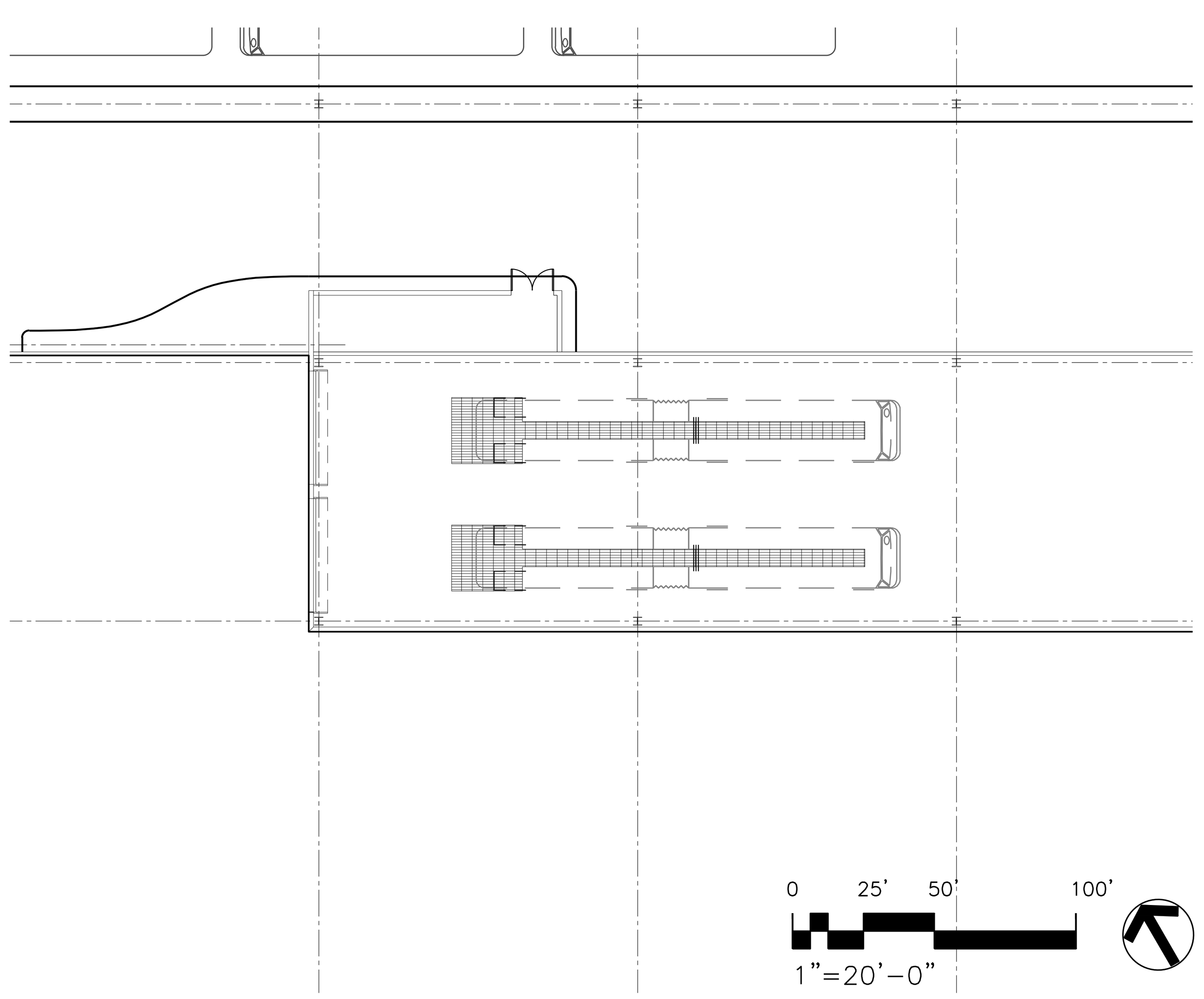
DRAWING NUMBER PLAN 5



ENLARGED DRIVER'S AREA AND OPERATIONS

SCALE: 1"= 20'-0"

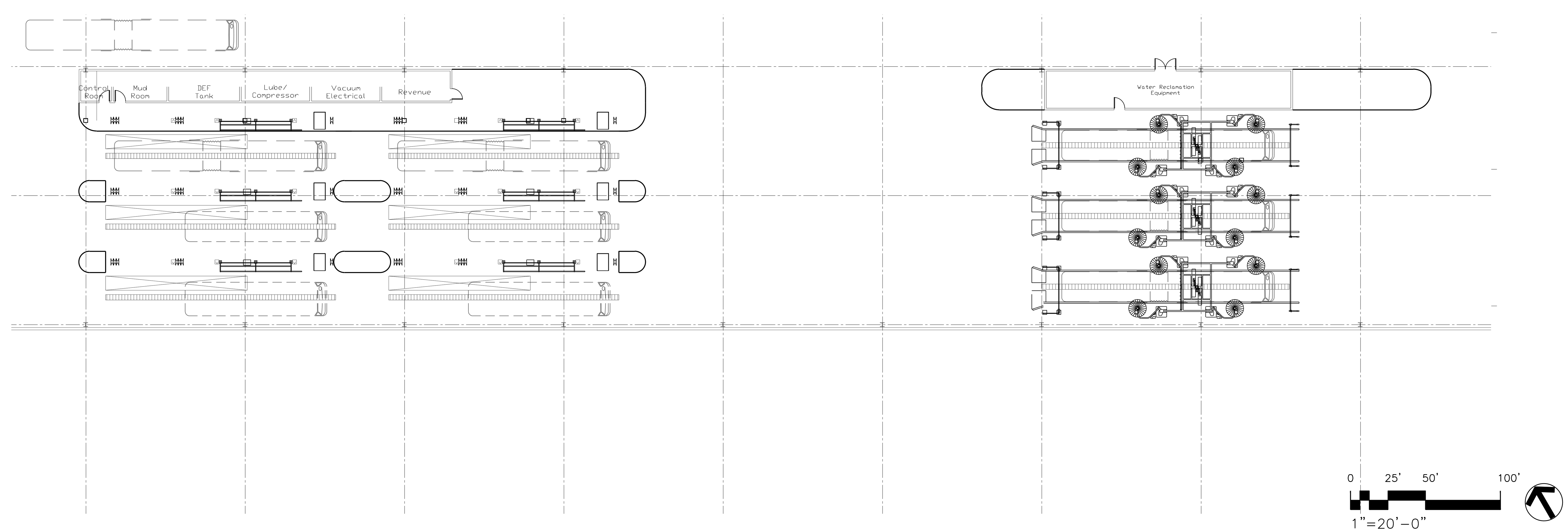
3
PLAN3



ENLARGED CHASSIS WASH

SCALE: 1"= 20'-0"

2
PLAN3



ENLARGED FUEL AND WASH

SCALE: 1"= 20'-0"

1
PLAN3

PROJECT NO.	189023
DRAWN BY	CDE
DATE	20190729
SCALE	22x34 1" = 20' 11 X 17 1" = 40'

PROJECT TITLE

WINNIPEG TRANSIT EAST GARAGE

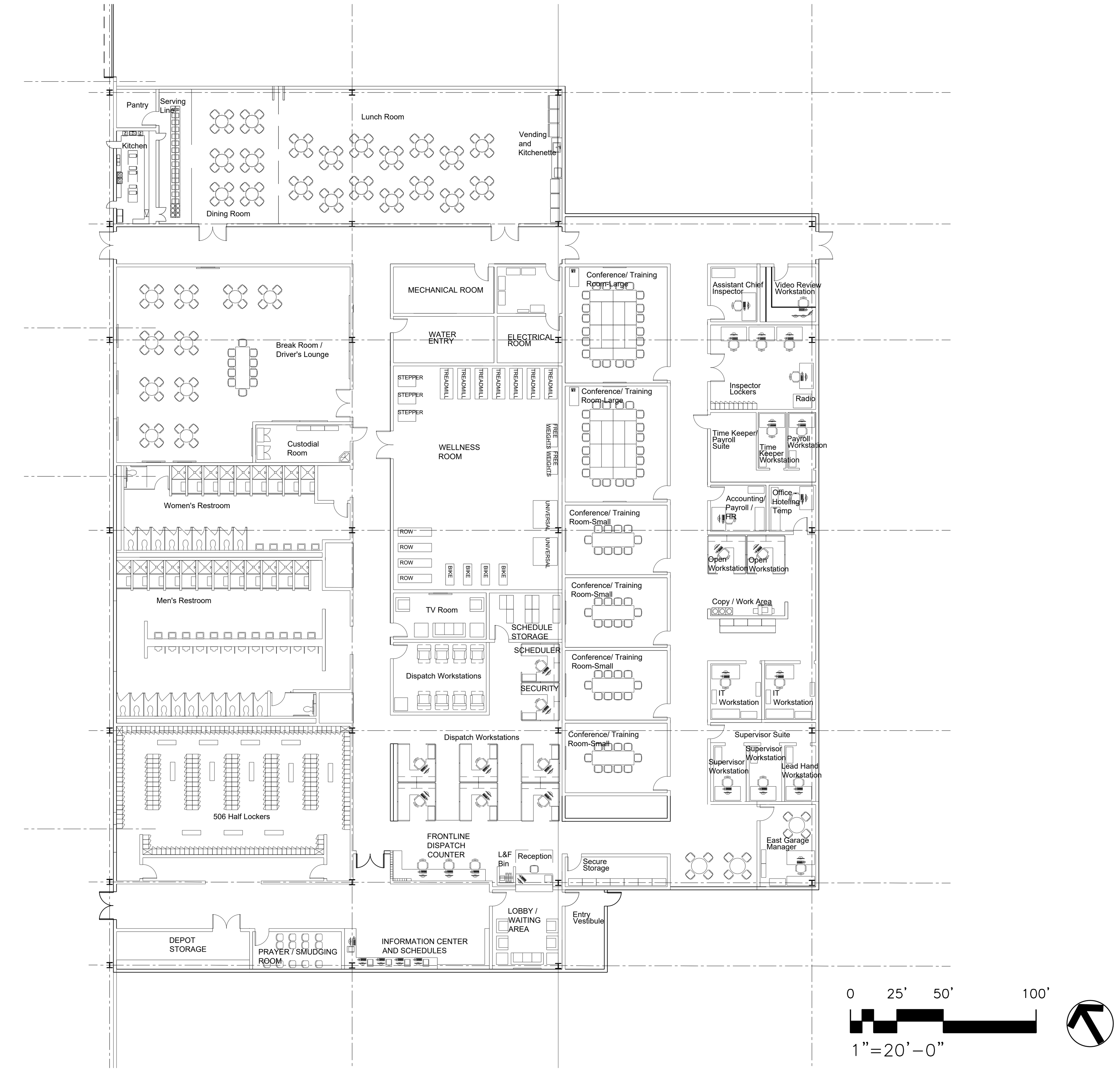
WSP USA Inc.
16200 PARK ROW
SUITE 200
HOUSTON, TEXAS 77084
TEL: (281) 589-5900
FAX: (281) 759-5164

DRAWING TITLE

PARTIAL PLANS
WINNIPEG TSG
PHASE 1

DRAWING NUMBER

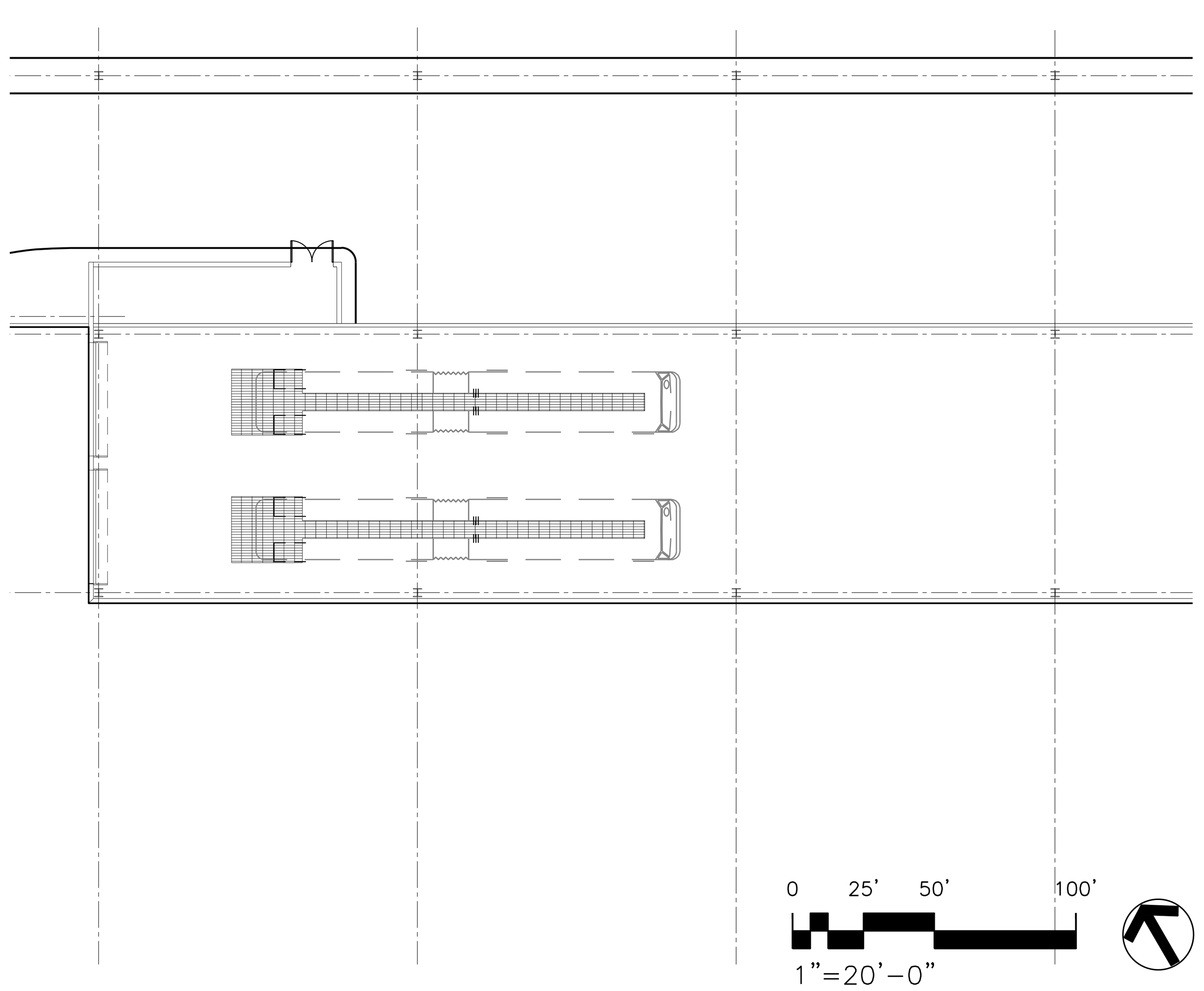
PLAN 6



ENLARGED DRIVER'S AREA AND OPERATIONS

SCALE: 1"= 20'-0"

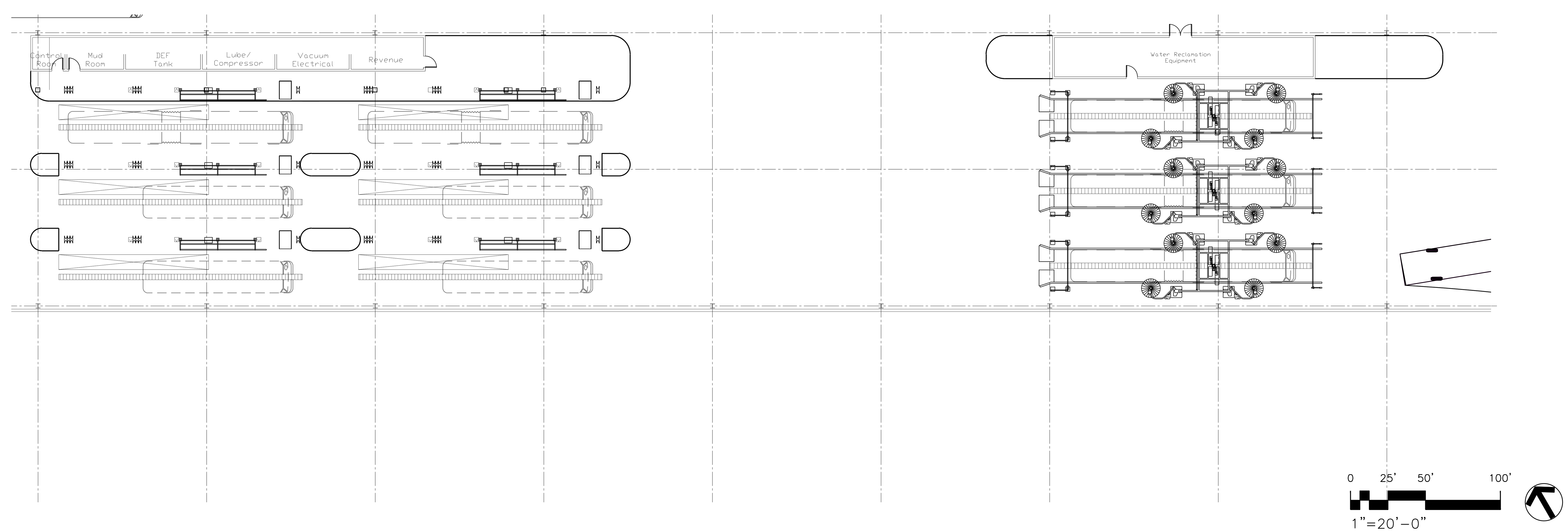
3
PLAN3



ENLARGED CHASSIS WASH

SCALE: 1"= 20'-0"

2
PLAN3



ENLARGED FUEL AND WASH

SCALE: 1"= 20'-0"

1
PLAN3

PROJECT NO.	189023
DRAWN BY	CDE
DATE	20190729
SCALE	22x34 1" = 20' 11 X 17 1" = 40'

PROJECT TITLE

WINNIPEG TRANSIT EAST GARAGE

WSP USA Inc.
16200 PARK ROW
SUITE 200
HOUSTON, TEXAS 77084
TEL: (281) 589-5900
FAX: (281) 759-5164

DRAWING TITLE

PARTIAL PLANS
WINNIPEG TSG
ALL PHASES

DRAWING NUMBER

PLAN 7

WINNIPEG TRANSIT

NORTH GARAGE REPLACEMENT

CLIMATE LENS ASSESSMENT – CLIMATE RESILIENCE

JUNE 08, 2021

CONFIDENTIAL

NORTH GARAGE REPLACEMENT

CLIMATE LENS ASSESSMENT – CLIMATE RESILIENCE

WINNIPEG TRANSIT

FINAL
CONFIDENTIAL

PROJECT NO.: 17M-00063-03
DATE: JUNE 08, 2021

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June 8, 2021	FINAL			
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SIGNATURES

We the undersigned attest that this Resilience Assessment was undertaken using recognized assessment tools and approaches (ISO31000 Standard) and complies with the General Guidance and any relevant sector-specific technical guidance issued by Infrastructure Canada for use under the Climate Lens.

PREPARED BY

June 7 2021

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Date

June 7 2021

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Date

APPROVED BY

June 8, 2021

Elise Paré, P.Eng.
Climate Resilience Qualified Professional

Date

WSP Canada Inc. ("WSP") prepared this report solely for the use of the intended recipient, Winnipeg Transit, in accordance with the professional services agreement between the parties. The report is intended to be used in its entirety. No excerpts may be taken to be representative of the findings in the assessment.

The conclusions presented in this report are based on work performed by trained, professional and technical staff, in accordance with their reasonable interpretation of current and accepted engineering and scientific practices at the time the work was performed.

The content and opinions contained in the present report are based on the observations and/or information available to WSP at the time of preparation, using investigation techniques and engineering analysis methods consistent with those ordinarily exercised by WSP and other engineering/scientific practitioners working under similar conditions, and subject to the same time, financial and physical constraints applicable to this project.

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TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

EXECUTIVE SUMMARY

Winnipeg Transit owns and operates the North Garage, a key maintenance hub for their growing transit fleet. In conjunction with the Zero Emissions Bus Transition Project, Winnipeg Transit is seeking to modernize their bus fleet and maintenance infrastructure to support the next generation of zero-emissions transit vehicles. The existing North Garage is undersized, has reached its design life and is proposed to be relocated from 1520 Main Street to be built in the north end of Winnipeg, adjacent to an arterial roadway. The project is at a conceptual design stage and it is currently assumed the new facility will include:

— Bus storage bay for approximately 225-264 diesel and/or electric battery or electric fuel cell buses;
— Refueling station;
— Bus washing station;
— Maintenance bay;
— Parts storage and receiving area;
— Administrative offices, including reception and kitchen areas; and
— Power required for electric bus charging.

In consultation with Winnipeg Transit and WSP's Transportation Advisory Services, the design consultant on the project, additional assumptions about the project include:

— The building will be a large one to two story warehouse structure, of approximately 28,000 m^2;
— The exterior will be largely hardscaped with minor landscaping;
— The bus garage maintenance areas will include heating to 10°C and ventilation to meet ASHRAE standards. Cooling in the office areas only;
— Solar panels will be on the roof;
— It is currently proposed that the project will meet the requirements of LEED Silver and possible LEED Gold certification.
— Risks relevant to the zero-emissions buses and charging infrastructure are being considered in the *Transition to Zero Emissions Buses Project* assessments.

As the project is in the conceptual design stage, many design decisions have not been confirmed and technologies have not been finalized.

METHODOLOGY FOR RISK ANALYSIS

The Climate Change Resilience Assessment has been conducted using ISO31000:2018 methodology in accordance with the methods and requirements outlined by Infrastructure Canada's Climate Lens guidance. The assessment reviews historical and projected climate data to understand potential vulnerabilities and risks associated with the proposed North Garage Replacement project and recommend adaptation strategies.

The assessment establishes the scope of the project, climate trends and associated risks in terms of likelihood and consequence. The conceptual framework used is based on the fifth IPCC report, stating that risk is defined as being the product of the probability of impacts on the project due to climate hazards and their level of severity. A matrix is used to prioritize the risks according to their risk rating and to propose appropriate risk reduction and adaptation strategies for the project.

CLIMATE PROJECTIONS

Climate change projections for the region were developed considering the RCP8.5 emission scenario, which is a conservative or 'passive' scenario for risk evaluation, avoiding potential under-adaptation. The passive scenario is modelled assuming a 'business-as-usual' approach with no mitigation measures implemented at global scale and a constant increase in GHG emissions until the depletion of fossil fuel stocks. The passive scenario is the trajectory in which most changes are more significant, especially at higher latitudes, where the effects of climate change are more pronounced. Given the current state of global climate negotiations, the passive scenario remains the most likely at this stage, and thus is the scenario chosen for this assessment.

KEY RISKS AND PROPOSED MEASURES

Overall, thirteen low risks, five moderate risks, two high risks and one opportunity were identified.

Extreme temperatures and heatwaves will become more pronounced over the long-term horizons as the number and length of heat waves will increase and projected summer extremes will increase to highs of 39°C. This has the potential to create long-term maintenance concerns for building envelope, building mechanical and electrical systems if not accounted for during design and it is recommended that future temperature projections be considered in design of these systems. The general warming trend may also create an opportunity for reduced heating requirements in the future.

Some climate impacts, such as snowfall, extreme cold, and freeze thaw are expected to decrease or change in frequency in the future, however, risks such as snow loading are still present, and an extreme event could still happen, even if the overall trends are decreasing

Extreme wind, storm activity and freezing rain present risks to the electrical grid. The proposed North Garage will eventually house a fleet of battery electric zero-emissions buses which will rely on the Manitoba Hydro grid for power. A power outage could impact Winnipeg Transit's ability to provide service depending on the length of the outage, the backup power and battery storage available on site and the number of battery electric buses affected making increases in storm activity impacting electrical and communications systems a moderate to high risk. It is recommended that future wind projections be considered in design, and that the required level of transit service during a power outage be determined to plan backup power and energy storage requirements. As transit is an essential service, an emergency preparedness plan is recommended in the event of extended power outages.

Winnipeg is on the northern edge of one of Canada's tornado alleys and a tornado impacting the North Garage would be a low probability, high consequence event. The new garage will likely be considered a 'post-disaster' or 'high importance' meaning that the garage would be essential to the provision of essential transit service following a disaster. Currently, there are no codes or standards required for tornado resilience, so it is recommended that Winnipeg Transit identify the required level of operability for the bus garage following a disaster event.

Generally, it is recommended that the design of Winnipeg Transit's North Garage replacement prepare for future weather conditions by going beyond code requirements and current best practice, as future climate change projections are often not integrated in existing building and infrastructure design criteria.

Risk assessments should be considered an ongoing process and it is recommended that Winnipeg Transit revisit this assessment through design of the new infrastructure as new design information becomes available.

1 INTRODUCTION

1.1 BACKGROUND

Winnipeg Transit is in the conceptual design stages of the North Garage Replacement project (the project) in Winnipeg, Manitoba. The project will relocate and replace the existing North Garage and includes the development of an energy efficient bus storage and maintenance facility with increased bus capacity, designed to accommodate a new fleet of zero-emissions buses, with the required infrastructure for their fueling, maintenance and operation.

Winnipeg Transit is completing a multi-year program developed to support key initiatives in the City of Winnipeg's Climate Action Plan (2018), specifically Action 3.7 to transition the City's transit fleet to zero-emission vehicles, Action 5.2 to improve energy performance of new buildings, and Action 7.1 to implement opportunities to improve Winnipeg's resilience and adaptability to the effects of a changing climate.

The new building will replace an aging transit garage and be designed to meet the growing transit service demands of the City of Winnipeg. The current facility is in overall poor condition and is no longer able to meet Winnipeg Transit's service requirements. The project is looking to increase its climate resilience, considering climate hazards through design upon review of the recommendations of the following report.

1.2 CLIMATE LENS ASSESSMENT OVERVIEW

The Climate Lens process (Infrastructure Canada, 2019) was developed by Infrastructure Canada to help address the climate change impacts and greenhouse gas (GHG) emissions of infrastructure projects in Canada. By incorporating climate considerations during the planning and design of infrastructure projects, the Climate Lens is intended to help assess the impacts of projects, influence the design process, and inform funding decisions. This effort is an essential part of federal and regional governments' strategy to achieve Canada's 2030 GHG reduction target of 30% below 2005 levels, as documented in the Pan-Canadian Framework for Clean Growth and Climate Change (ECCC, 2016).

The Climate Lens consists of two elements: a GHG Mitigation Assessment, and a Climate Change Resilience Assessment. This report provides the Climate Change Resilience Assessment. The GHG Mitigation Assessment has been provided in a separate report.

This report details the findings of the Climate Change Resilience Assessment (CCRA), which reviews current and projected climate hazards as well as the exposure of infrastructure to determine future risks as a result of climate change. By incorporating climate considerations during the conceptual design of the project, this assessment is intended to increase overall resilience of the garage replacement and associated infrastructure.

1.3 APPROACH AND METHODOLOGY

The Climate Change Risk Assessment (CCRA) uses a phased approach developed at WSP based on the ISO31000 standard for risk management to help address the climate change impacts on the project. This approach meets the methods and requirements outlined by the Climate Lens Guidance.

The CCRA is undertaken to identify the key climate and weather-related vulnerabilities of the project, to identify risks and opportunities associated with the identified climate and weather-related risks, and to recommend adaptation measures that may reduce those risks. Since the design of the project is still at the conceptual design stages, the CCRA only provides typical risks associated with a building designed to current codes and standards, subjected to the climate projections for the area. Recommendations should be considered during the development of the design to ensure climate resilience of the infrastructure.

Opportunities to implement control measures, or adaptation strategies, will be proposed for all climate impacts, including design considerations as well as recommendations for operations and maintenance.

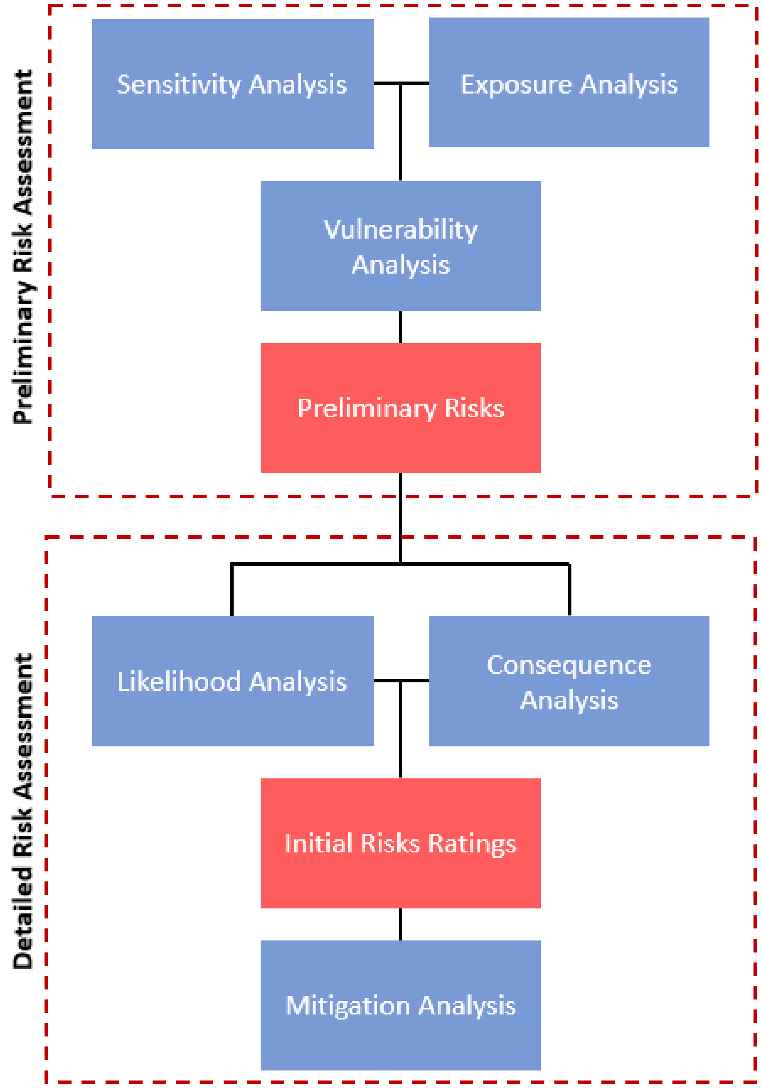

Figure 1 Climate Change Resilience Assessment Process

PRELIMINARY RISK ASSESSMENT

The preliminary risk assessment is a high-level analysis which identifies Project vulnerabilities due to climate change and includes the following steps:

— Identification of relevant climate hazards for the project;
— Likelihood ratings of climate hazards using climate projections give the exposure assessment;
— Potential climate impacts are identified for each project component; and
— Sensitivity and adaptive capacity of each project component is assessed to understand potential vulnerabilities.

DETAILED RISK ASSESSMENT

The detailed risk assessment consists of a high-level qualitative analysis to assign risk ratings for each impact based on the likelihood of impact and severity of each impact as shown in Table 1. Proposed risk mitigation and control measures for each interaction based on input from technical experts, professional judgement, and research.

A more detailed description of the methodology is in Appendix A.

Table 1 Risk Rating Matrix

RISK RATING		SEVERITY OF IMPACT				
		Very Low	**Low**	**Moderate**	**High**	**Very High**
LIKELIHOOD OF IMPACT	**Very High**	Low	Moderate	High	Very High	Very High
	High	Low	Moderate	High	High	Very High
	Moderate	Low	Low	Moderate	High	High
	Low	Very Low	Low	Low	Moderate	Moderate
	Very Low	Very Low	Very Low	Low	Low	Moderate

Source: based on IPCC (2014), adapted by WSP

2 PROJECT DESCRIPTION

Winnipeg Transit owns and operates the North Garage, a key maintenance hub for their growing transit fleet. In conjunction with the Zero Emissions Bus Transition Project, Winnipeg Transit is seeking to modernize their bus fleet and maintenance infrastructure to support the next generation of zero-emissions transit vehicles. The existing North Garage is undersized, has reached its design life and is proposed to be relocated from 1520 Main Street to be built in the north end of Winnipeg, adjacent to an arterial roadway. The project is at a conceptual design stage and it is currently assumed the new facility will include:

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In consultation with Winnipeg Transit and WSP's Transportation Advisory Services, the design consultant on the project, additional assumptions about the project include:

- The building will be a large one to two story warehouse structure, of approximately 28,000 m^2;
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- Solar panels will be on the roof;
- It is currently proposed that the project will meet the requirements of LEED Silver and possible LEED Gold certification.
- Risks relevant to the zero-emissions buses and charging infrastructure are being considered in the *Transition to Zero Emissions Buses Project* assessments.

As the project is in the conceptual design stage, many design decisions have not been confirmed and technologies have not been finalized.

The analysis considers the entire project and was sub-divided into infrastructure components including: the structure, foundation and roof, building envelope, building mechanical, electrical and communications, site civil and the bus maintenance facilities. Design life of mechanical and electrical components are assumed to be approximately 20-25 years, and design life of the envelope and structural elements is assumed to be 60 years.

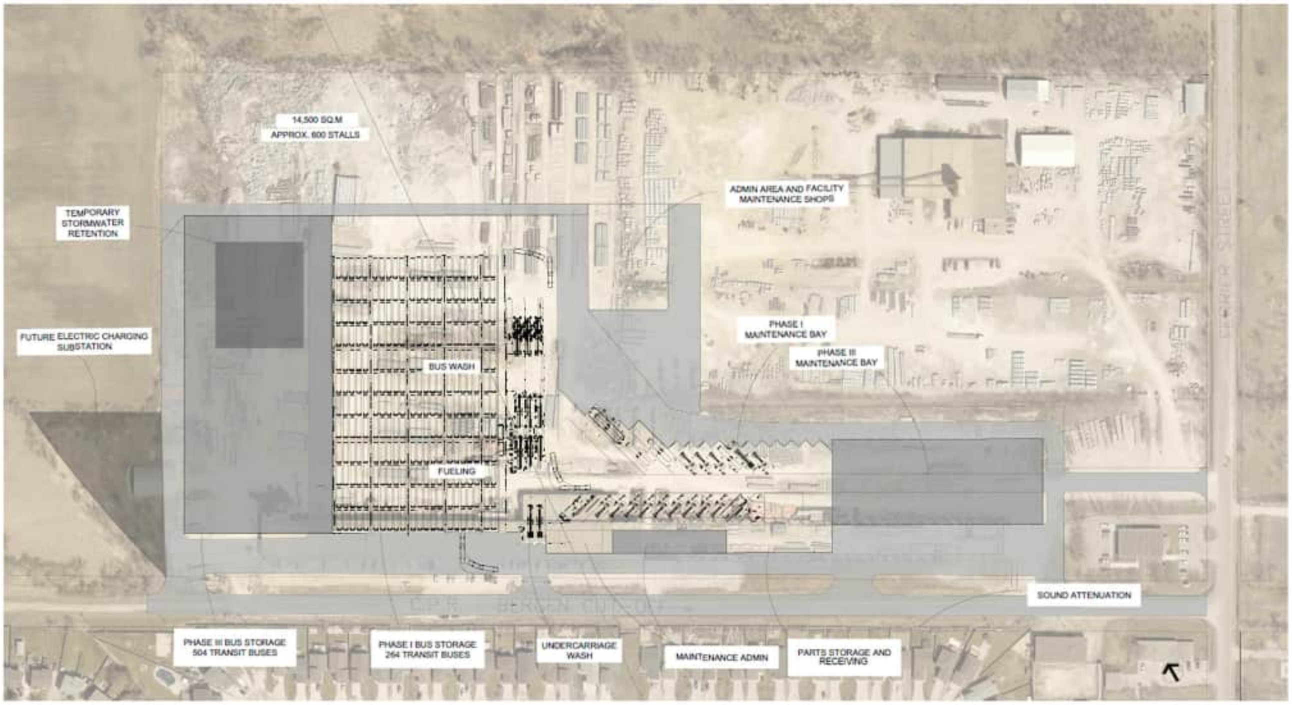

Figure 2 **Winnipeg Transit– Conceptual Site Layout for the North Garage (WSP, 2020)**

3 CLIMATE CHANGE HAZARDS

3.1 IDENTIFICATION OF CLIMATE HAZARDS

A hazard is defined as "the potential occurrence of a natural or human-induced physical event or trend that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources" (IPCC, 2018). A climate hazard is therefore a hazard at least partly linked to one or more climate variables. Some characteristics such as intensity, probability of occurrence, frequency as well as spatial location allow the identification of hazards likely to have an impact in a given context. Climate hazards considered in this assessment are listed in Table 2.

Table 2 Selection of climate hazards

CLIMATE VARIABLE	RELEVANCE TO THE ASSESSMENT
Mean Increase in Temperature	Relevant
Extreme High Temperature	Relevant
Extreme Low Temperature	Relevant
Snow Accumulation	Relevant
Freeze-Thaw Cycles	Relevant
Extreme Precipitation	Relevant
Drought	Relevant
Extreme Wind	Relevant
Tornadoes	Relevant
Freezing Rain	Relevant
Wildfire	Not relevant
Mean Decrease in Temperature	Not relevant
Lightning	Not relevant
Landslides	Not relevant
Riverine Flooding	Not relevant

Other climate hazards were initially considered, but were eliminated for the following reasons:

— **Wildfire:** The project site is located in an urban area with no major forest system in the vicinity and urban or industrial barriers on all sides. This has been assumed to reduce or eliminate the risk of wildfires. It is understood that smoke from wildfires from even those thousands of kilometres away, can impact air quality in Winnipeg, however remote hazards are outside the scope of this assessment, so this will be considered a risk under 'Extreme Heat'. Potential impacts to air quality can be addressed through existing emergency preparedness planning and considered during design.

- **Mean Decrease in Temperature:** The project location is already subject to periods of extreme cold which will likely not be exacerbated by climate change. Additional considerations of mean temperature decreases are discussed in section 3.2.3.
- **Lightning:** An assumption was made that the project would have lightning arrestors based on standard practice which would mitigate or eliminate the risk from lightning. In addition, it is assumed that this building would be relatively low to the ground which reduces the risk further.
- **Landslide(s):** The facility is not located in an area where landslides are a concern due to the extremely flat nature of the terrain.
- **River flooding:** The proposed project site will be located outside of the Red River flood plain.

Figure 3 Satellite view of the project site (red marker) in relation to the Red River (Google Earth, 2020)

Figure 4 Elevation profile of land between the project site and the Red River following the line highlighted in Figure 4 (Google Earth, 2020)

After a large flood devastated Winnipeg in 1950, the provincial government of Manitoba invested heavily in the creation of flood mitigation infrastructure known as the Red River Floodway. The Floodway was originally completed in 1968 and designed for a 1-in-160 year flood event (this was later shown to be a flawed estimation and a 2009 analysis estimated it was actually designed for a 1-in-100 year flood event) (Manitoba Infrastructure, 2016;

Manitoba Water Stewardship, 2010). In 1997 a 1-in-100 year flood event overwhelmed the Floodway and led to the need for emergency diking, evacuation, and flooding of towns and cities surrounding Winnipeg. After the 1997 flood several improvements were added to the Floodway including widening of the channels, bridge modifications, outlet structure expansions, entrance improvements, inlet control structure improvements, and raising and expansion of the west dikes. These improvements raised the theoretical level of protection of the floodway from a 1-in-100 year storm event to a 1-in-700 year storm event.

A flood simulation video was designed to demonstrate a 1-in-700 year flood with the expanded floodway for the purposes of public education and engagement (Manitoba Infrastructure, 2016). A snapshot of the video at the peak of the 700 year flood event is shown below in Figure 5, with the project site shown with a red circle, outside of the flood zone.

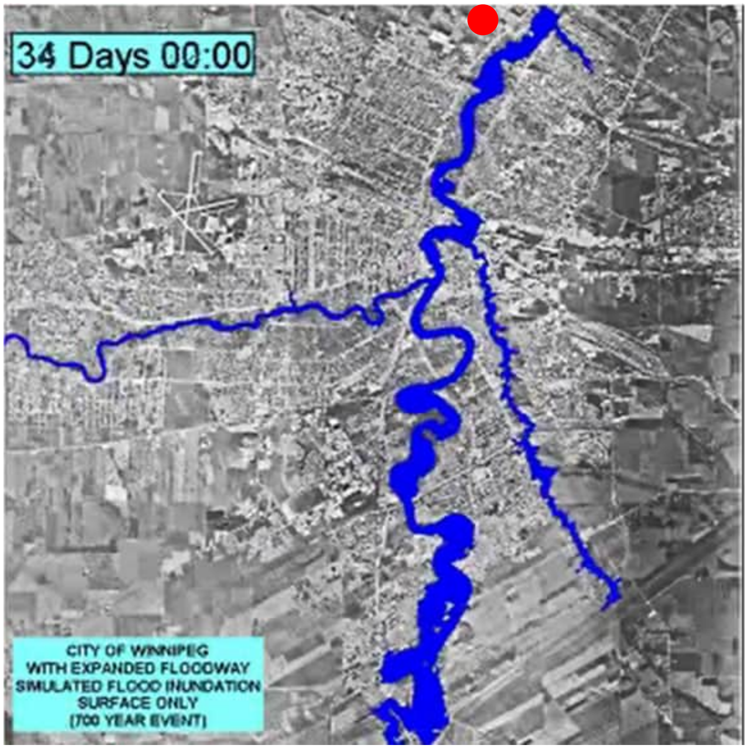

Figure 5 Video snapshot of the simulated flood levels of a 1 in 700-year flood event (Manitoba Infrastructure, 2016)

The distance of the project site away from the river in addition to its position outside both the primary dikes and the simulated 1-in-700 year storm event indicate that, barring a breech of the Red River Floodway, the site will not be exposed to floods and therefore this hazard has not been considered for the assessment.

3.2 CLIMATE PROJECTIONS

Globally, climate change will result in a long-term rise in the average temperature of the Earth. On a local scale, impacts will vary and include shifts in temperature, precipitation, wind, and other weather patterns, including extreme weather events. Climate projections commonly use one of four scenarios, or ‘Representative Concentration Pathways’ (RCPs) which refer to the estimated concentrations of greenhouse gases (GHG) in the atmosphere based on assumptions about human mitigative activities. The most conservative approach is RCP8.5, known as the ‘business-as-usual’ or ‘passive’ scenario. It assumes an approach without any mitigative measures implemented at a global scale and a constant increase in GHG emissions until the depletion of fossil fuel stocks (Figure 6). The passive scenario is the trajectory in which most changes in climate are more significant (Van Vuuren *et al.*, 2011).

The passive scenario (RCP8.5) was selected as the primary scenario for this study to represent future climate conditions for two reasons. First, amongst the readily available climate data, it is the scenario that best represents the ongoing trend in GHG emissions. Second, GHG emissions are one of the major sources of uncertainties regarding climate change projections. As it is necessary to make decisions on infrastructure design today despite this uncertain future, in terms of risk management, the best practice is to take a conservative approach. Within the report, RCP8.5 is shown as the most conservative model, unless otherwise stated.

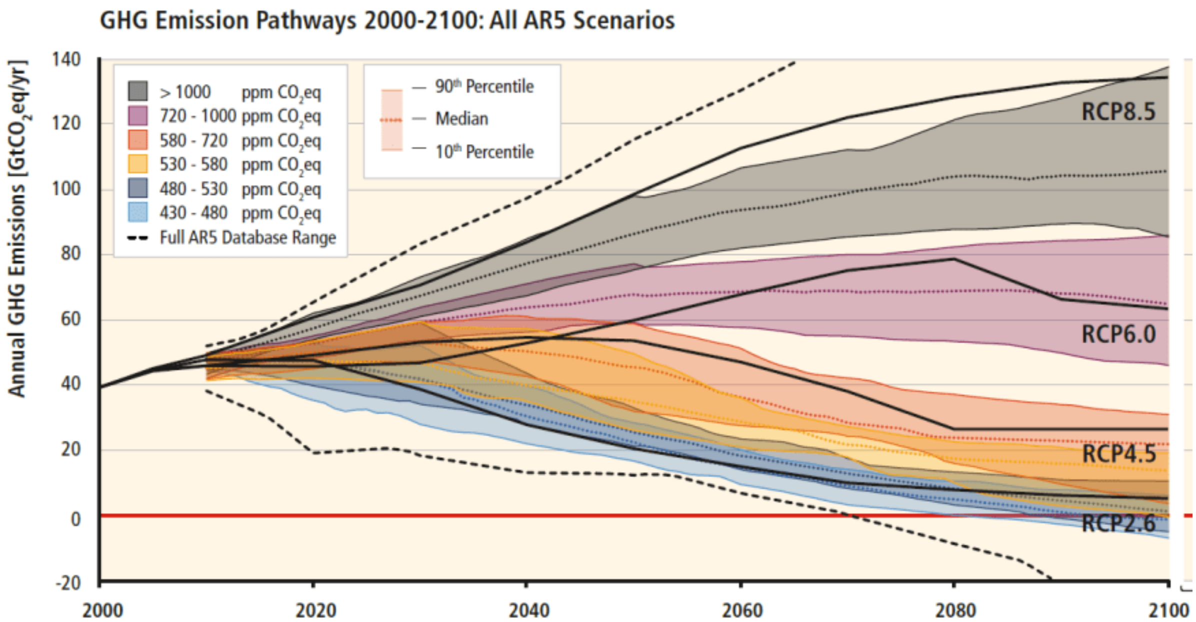

Figure 6 **GHG emissions for each RCP scenario until 2100 (IPCC, Summary Report for Policy Makers, 2014)**

Climate data was obtained from the 1981-2010 Climate Normals for the Winnipeg Richardson Int'l A weather station (ID 5023222) from Environment and Climate Change Canada (ECCC, 2021), the Climate Atlas of Canada (PCC, 2019; Winnipeg Municipality point), the Climate Data portal (CRIM, 2019; Winnipeg downscaled grid point), the IDF-CC tool (Simonovic *et al.*, 2016; Western University, 2018; Station ID:5023261), and scientific and government literature where applicable and available.

The Climate Atlas of Canada has been developed and published by the Prairie Climate Center (PCC) with the collaboration of the University of Manitoba. The PCC is a consortium working on climate change impacts and adaptation and has produced global climate simulations for Canada based on 24 global climate models from the CMIP5 exercise (Climate Model Intercomparison Project, phase 5; Taylor, 2012). These data, originally obtained from the Pacific Climate Impacts Consortium (PCIC), are reliable and recognized by the academic community, by government agencies, and by the engineering community. The users of this platform have access to the evolution of approximately thirty climate indicators and to graphical data.

The Climate Data portal was developed by the Montreal Computer Science Research Center (CRIM) in collaboration with Ouranos, PCIC, ECCC, PCC and Habitat Seven. Its goal is to support decision-makers located across Canada working in a wide range of sectors by providing them with the most up-to-date climate data in user-friendly formats and visualizations. All the results presented also come from a set of 24 climate models by interpolation on a 1/12° grid (~ 10 km x 6 km for the City of Winnipeg) over all of Canada. Each climate model simulates the climate for the historical period 1950-2005 and for plausible futures over the period 2006-2100. This portal is used here to calculate the evolution of climate indicators that are not available on other portals from daily temperature and precipitation data.

The hydrologic tool developed by Western University (IDF-CC v4.5) compiles intensity-duration-frequency (IDF) curve data for various rainfall gauges in Canada. The IDF-CC tool is the result of the use of precipitation data from

ECCC stations, spatial interpolations and future statistics based on 24 global climate models and nine regional models (Western University, 2018). Based on historical statistics and different scenarios of greenhouse gas emissions, IDF curves and their uncertainties are generated for different envisaged futures. This tool provides, among other things, the evolution of the maximum hourly or daily cumulative precipitation with different return periods ranging from 2 to 100 years. Historical IDF curves retained for this assessment are obtained by a Gumbel distribution.

The IDF-CC tool is the only data portal that provides IDF curves that consider climate change across the whole Canadian territory. However, there are methodological limitations associated with a tool providing climate change data at such an important spatial scale. For example, the algorithm considers a stationary relationship between subdaily and daily precipitation events. Therefore, while the outputs of the IDF-CC tool indicate the trend and magnitude of change in extreme short-duration precipitation events, the output should not be relied upon for design purposes without a proper sensitivity analysis specific to the area of the project.

Table 3 presents the data sources of the climate projections with a recent baseline, a near-term horizon, and a long-term horizon. The data sources present climate projections with different statistical variables summarizing the range of values across the climate models (Table 4). For this assessment, two time horizons have been selected. The near-term horizon has been selected to correspond with the expected service life of components such as mechanical and electrical systems which will require planned replacement. The long-term horizon has been selected to correspond to the expected service life of the more permanent assets such as the building structure and major civil systems. Scientific literature included in the report may not align exactly with the near- and long-term horizons or the historic baselines, and where individual dates or projection ranges vary the time periods used have been noted.

Table 3 Time periods of data sources on climate change

DATA SOURCE	HISTORIC BASELINE	NEAR-TERM HORIZON	LONG-TERM HORIZON
Climate Atlas of Canada	1976-2005	2021-2050	2051-2080
Climate data of Canada (CRIM)	1976-2005	2021-2050	2051-2080
IDF-CC Tool	1961-1985*	2021-2050	2051-2080

*This period corresponds to data availability at the weather station selected for this assessment

Table 4 Statistical variables (range) of data sources on climate change

DATA SOURCE	STATISTICAL VARIABLES PRESENTED [RANGE]
Climate Atlas of Canada	Mean [10^{th} percentile, 90^{th} percentile]
Climate data of Canada (CRIM)	Mean [10th percentile, 90th percentile]
IDF-CC Tool	Median [25th percentile, 75th percentile]

3.2.1 MEAN TEMPERATURE

Under RCP8.5, mean temperatures for Winnipeg are projected to increase as compared to the historical baseline. Summer, spring, and autumn temperatures are projected to increase by 4.3-4.5°C by the long-term horizon. The number of cooling degree-days, a representation of how much energy will be required to cool indoor spaces, is projected to increase by 393.1 on average by the long-term horizon. These three temperature variables may be used as indicators for future cooling and energy demands on the building. Rising cooling degree-days and summer temperatures indicate a greater energy requirement to cool buildings while increasing spring and autumn temperatures show that the amount of time a cooling system will need to run throughout the year may be extended. Table 5 summarizes this data.

Table 5 Historic and projected values and trends of warmer mean temperature indicators for Winnipeg under RCP8.5

CLIMATE INDICATOR	HISTORIC BASELINE [RANGE]	NEAR-TERM HORIZON [RANGE]	LONG-TERM HORIZON [RANGE]	MEAN CHANGE	TREND
Mean average summer temperature (°C)	18.6 [17.2, 20.1]	20.7 [19.0, 22.6]	23.0 [20.7, 25.3]	+4.4	↑
Mean average spring temperature (°C)	2.9 [-0.1, 5.8]	5.1 [1.7, 8.4]	7.2 [4.0, 10.5]	+4.3	↑
Mean average autumn temperature (°C)	4.8 [2.8, 6.7]	7.0 [4.8, 9.1]	9.3 [7.0, 11.5]	+4.5	↑
Cooling degree-days	202.2 [114.1, 306.8]	370.9 [224.5, 527.7]	595.3 [357.7, 826.6]	+393.1	↑

3.2.2 EXTREME HIGH TEMPERATURE

Under RCP8.5 extreme high temperatures are projected to increase for Winnipeg. The warmest annual temperature, representing the average highest temperature of the year for the selected time horizon, is projected to increase from a historical baseline of 34.4°C to 39.5°C for the long-term horizon, representing a mean increase of 5°C. The annual number of heat waves is projected to increase by a mean of 4, and the average length of heat waves is projected to increase by 4.1 days for the long-term horizon. These indicators show that extreme temperatures are projected to increase in the future, which may be a concern for the cooling load capacity of the building, the health and safety of staff, and the functionality of other equipment within the building.

Table 6 Historic and projected values and trends of extreme temperature indicators for Winnipeg under RCP8.5

CLIMATE INDICATOR	HISTORIC BASELINE [RANGE]	NEAR-TERM HORIZON [RANGE]	LONG-TERM HORIZON [RANGE]	MEAN CHANGE	TREND
Warmest maximum annual temperature (°C)	34.4 [31.5, 37.5]	36.9 [33.4, 40.4]	39.5 [35.6, 43.4]	+5.0	↑
Number of heat waves	1.9 [0.1, 4.4]	4.2 [1.4, 7.5]	6.0 [2.8, 8.8]	+4.0	↑
Average length of heat waves	3.5 [0.1, 6.3]	5.3 [2.9, 8.2]	7.6 [4.4, 12.4]	+4.1	↑

3.2.3 EXTREME LOW TEMPERATURE

The City of Winnipeg has historically experienced extreme low temperatures during the winter season. Figure 7 shows the extreme minimum temperatures in degrees Celsius (the lowest daily minimum temperature reached during the time period) for the City using data from the Winnipeg Richardson Int'l weather station (Climate ID: 502322; ECCC, 2021). Within the past 30 years shown, the City has reached a lowest temperature of -42 °C (in 1996 and 2007), with an average extreme low temperature of -36°C.

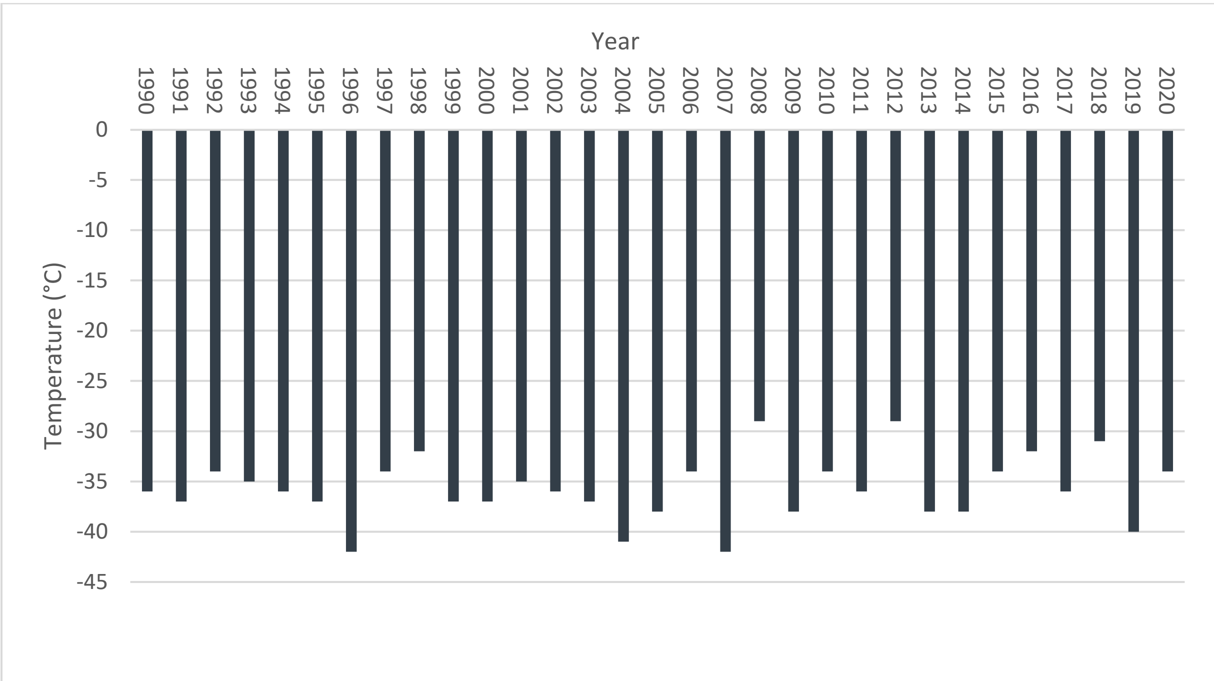

Figure 7 30-year historical extreme minimum temperatures (1990-2020) for the City of Winnipeg (ECCC, 2021)

A contributor to the extreme cold temperatures in the City is the polar vortex, a large area of low pressure and cold air around the North Pole which can become unstable and expand as far south as Florida, USA (UC Davis, 2020). The polar vortex is stable and contained in the northern regions of the globe when the temperature difference between the warmer mid-latitudes and the polar region is large (Figure 8). When these differences are smaller, the jet stream tends to become weaker and more susceptible to twisting and curving (UC Davis, 2020).

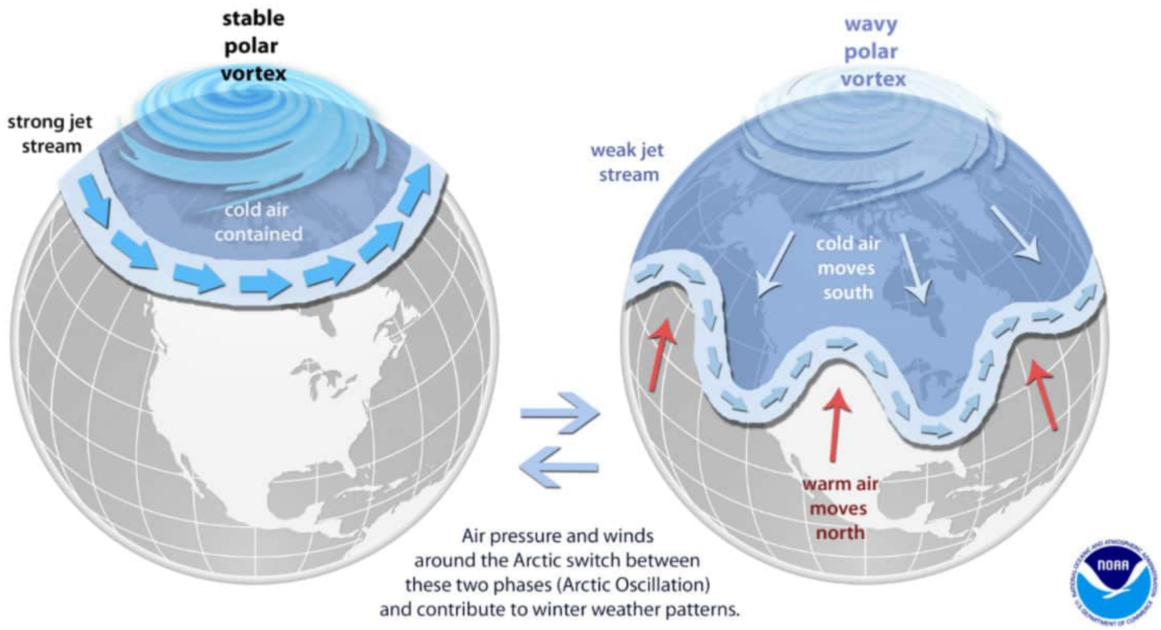

Figure 8 Representation of a stable polar vertex and an oscillating polar vortex (UC Davis, 2020)

Climate change is expected to modify the temperature differential across the mid-latitudes and the polar regions and cause more extreme disturbances. Melting Arctic sea ice is transforming a highly reflective icy surface to a dark absorptive surface. This is causing warming in the higher latitudes and reducing the temperature difference between the warmer mid-latitudes and polar regions, weakening the jet stream and causing the vortex to dip, and bringing polar air farther south. It is expected that climate change will further weaken the polar jet stream and cause more extreme and unusual weather patterns (UC Davis, 2020).

3.2.4 SNOW ACCUMULATION

Without a dedicated study, future snow accumulation projections can be difficult to ascertain as they must factor the interactions between a combination of temperature and precipitating variables. Winter temperature and precipitation variables will be used here as proxies, in combination with previous studies conducted on the area. Extreme minimum temperatures seen in the region from available data until 2010 show the coldest day on record reached lows of -45.0°C in 1966 (ECCC,2021). Under RCP8.5 it is projected that mean average winter temperatures in the City will increase from a historic mean of -15.0°C to -9.1°C (Table 8).

Winnipeg has historically received the bulk of its winter precipitation in the form of snow between the months of November and April, with precipitation occasionally falling as rain during that period (Table 7). The greatest snow depth for the location on record is 91 cm on January 1956.

Winter precipitation is projected to increase from a historical mean average of 65 mm to 75 mm by the long-term horizon (Table 8). While mean average winter temperatures are projected to remain below 0°C, the projected increase indicates that there may be more individual periods during the winter where the temperature is above the freezing mark. When the entire snow season (November to April) is considered, projections show that the shoulder seasons are projected to see increases which would push mean temperatures above the freezing mark. Mean November temperatures are projected to see 90th percentile increases to 2.0°C by the near-term horizon, and a mean increase to 0.2°C by the long-term horizon. Similarly, the 90th percentile March temperatures are projected to increase above 0°C for both the near- and long-term horizons, and April projections indicate that the entire range of models show the mean temperatures for the month increasing over freezing (Table 8). This is consistent with studies that show that snow cover in the agricultural regions of the Prairies is projected to have widespread reductions in the next 50-100 years (using CGM2 climate model and IS92a emissions scenario) (Sauchyn and Kulshreshtha, 2007). Projections for Canada show a decrease in SWEmax (snow-water equivalent maximum) of 2.5 to 5% per decade in the Winnipeg area for the years 2020-2050, further corroborating the downward trend of snow accumulation (Figure 9).

A decrease in snow has already been observed in the province of Manitoba as a whole, A 2020 report on changing winter conditions in northern forests found that in the 1910s the period of sustainable cold (the number of days between the onset and the end of winter) lasted and average of 146 days and has decreased to 126 by the 2010s, largely due to the earlier onset of spring (Garlick, 2019).

Table 7 Historical precipitation and snowfall data for the WINNIPEG RICHARDSON INT'L A station from 1981-2010 inclusive of historical extremes (ECCC, 2021)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Rainfall (mm)	0.2	2.7	9.7	19.2	54.1	90.0	79.5	77.0	45.5	32.7	6.9	1.5	418.9
Precipitation (mm)	19.9	13.8	24.5	30.0	56.7	90.0	79.5	77.0	45.8	37.5	25.0	21.5	521.1
Snowfall (cm)	23.7	12.5	16.5	10.6	2.6	0.0	0.0	0.0	0.3	4.8	19.9	23.0	113.7
Average snow depth (cm)	16	17	10	2	0	0	0	0	0	0	4	10	5
Extreme snow depth (cm)	**91**	89	85	61	18	0	0	0	2	18	55	81	NA
Extreme snow depth date (yyyy)	1956	1956	1956	1956	1967	1955	1955	1955	1984	1971	1955	1955	NA

Table 8 Historic and projected values and trends of snow accumulation indicators for Winnipeg under RCP8.5

CLIMATE INDICATOR	HISTORIC BASELINE [RANGE]	NEAR-TERM HORIZON [RANGE]	LONG-TERM HORIZON [RANGE]	MEAN CHANGE	TREND
Mean average winter temperature (°C)	-15.0 [-18.4, -11.7]	-12.2 [-16.0, -8.6]	-9.1 [-12.9, -5.2]	+5.9	↑
Mean average November temperature (°C)	-4.4 [-8.8, -0.3]	-1.9 [-6.6, 2.0]	0.4 [-3.6, 4.2]	+4.8	↑
Mean average December temperature (°C)	-13.2 [-18.4, -7.9]	-10.1 [-15.2, -5.3]	-7.1 [-12.2, -2.3]	+6.1	↑
Mean average January temperature (°C)	-17.8 [-22.8, -12.8]	-14.8 [-20.1, -9.8]	-11.7 [-16.8, -6.2]	+6.1	↑
Mean average February temperature (°C)	-14.0 [-19.4, -8.6]	-11.6 [-17.1, -5.6]	-8.5 [-14.2, -2.9]	+5.5	↑

CLIMATE INDICATOR	HISTORIC BASELINE [RANGE]	NEAR-TERM HORIZON [RANGE]	LONG-TERM HORIZON [RANGE]	MEAN CHANGE	TREND
Mean average March temperature (°C)	-7.0 [-12.2, -1.8]	-4.4 [-9.9, 1.4]	-1.8 [-7.3, 3.7]	+5.2	↑
Mean average April temperature (°C)	3.9 [-0.4, 7.6]	6.0 [2.1, 10.5]	8.0 [4.1, 12.4]	+4.1	↑
Mean winter precipitation (mm)	65 [39, 95]	72 [42, 105]	77 [46, 113]	+12 (19%)	↑

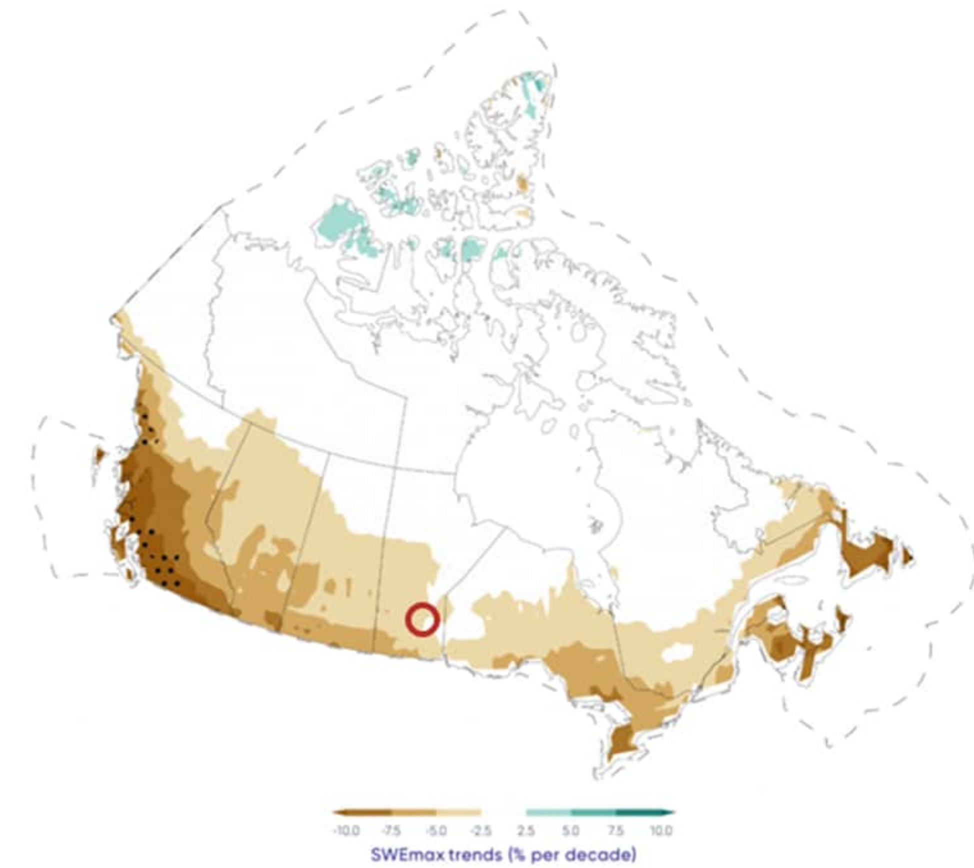

Figure 9 Projected trends in maximum snow water equivalent (snow cover), 2020-2050 (CCCR, 2019)

3.2.5 FREEZE-THAW CYCLES

On an annual scale the number of freeze-thaw cycles (the number of times the air fluctuates between freezing and non-freezing temperatures) is projected to decrease from a historic baseline of 70.4 to 60.9 for the long-term horizon. This represents a decrease of 9.5 freeze-thaw cycles per year. However, when only winter freeze-thaw cycles are considered there will be a mean projected increase of 8.4 cycles for the long-term horizon, an increase from the historic baseline of 8.6 to 17.0. This information is summarized in Table 9. The number of winter freeze-thaw cycles has been presented here separately from the number of annual freeze-thaw cycles as the timing of these events can impact the type and severity of damage done to an asset. For example, plowing activities during the winter period in conjunction with freeze-thaw cycles can increase the damage to paved areas.

Table 9 Historic and projected values and trends of freeze-thaw indicators for Winnipeg under RCP8.5

CLIMATE INDICATOR	HISTORIC BASELINE [RANGE]	NEAR-TERM HORIZON [RANGE]	LONG-TERM HORIZON [RANGE]	MEAN CHANGE	TREND
Number of annual freeze-thaw cycles	70.4 [56.1, 84.7]	64.5 [48.7, 80.9]	60.9 [44.9, 80.9]	-9.5	↓
Number of winter freeze-thaw cycles	8.6 [3.0, 14.8]	12.0 [4.6, 20.5]	17.0 [7.7, 27.0]	+8.4	↑

3.2.6 EXTREME PRECIPITATION

Extreme precipitation IDF indicators were chosen based on climate data within the National Building Code (NBC, 2015) as well as the stormwater guidelines from the City of Winnipeg (City of Winnipeg, 2021). For all examined IDF indicators there is a projected increase in precipitation by the long-term horizon as compared to baseline. It is important to note that for two indicators, 24-hour 2-year return and 24-hour 5-year return events, precipitation intensity is projected to increase more during the near-term horizon as compared to the long-term horizon, which may signify a greater risk in the upcoming years. Table 10 summarizes the historical and projected IDF data for this site.

Table 10 Historic and projected values and trends of extreme precipitation events indicator for Winnipeg under RCP8.5

CLIMATE INDICATOR	HISTORIC BASELINE	NEAR-TERM HORIZON [RANGE]	LONG-TERM HORIZON [RANGE]	MEAN CHANGE	TREND
IDF 15-min, 10-year return period (mm)	25.0	27.2 [24.1, 28.1]	27.2 [22.9, 28.8]	+8.1%	↑
IDF 24-hour, 2-year return period (mm)	41.6	45.1 [38.9, 48.1]	42.9 [38.5, 47.2]	+3.0%	↑
IDF 24-hour, 5-year return period (mm)	56.8	64.2 [55.5, 67.1]	61.5 [53.8, 67.3]	+8.3%	↑
IDF 24-hour, 25-year return period (mm)	79.4	88.3 [84.6, 92.9]	92.9 [77.2, 103.3]	+17.0%	↑
IDF 24-hour, 50-year return period (mm)	88.8	98.4 [91.0, 108.6]	106.6 [86.4, 121.2]	+20.0	↑
IDF 24-hour, 100-year return period (mm)	98.1	107.3 [95.7, 129.8]	119.2 [98.5, 140.2]	+21.5%	↑

3.2.7 DROUGHT

Southern Manitoba and the City of Winnipeg have historically experienced frequent periods of drought. Within the last five years there have been several instances of drought including:

— **2021**, winter and spring precipitation levels in Southern Manitoba were 20% lower than the historic 40-year average, prompting concerns of a severe summer drought (Unger, 2021)
— **2020**, Winnipeg received just half of the annual average precipitation leading to one of the driest years on record (MacKay, 2021)
— **2019**, the first half of the year was the driest on record at the time and received only 91 mm of precipitation (the previous record was set in 1900 at 106.5 mm) (Dacey, 2019)
— **2018**, Manitoba experienced moderate to severe drought conditions during the spring. The month of April received only 1.7 mm of precipitation in Winnipeg, making it the fourth driest month on record (starting in 1872) (Koncan, 2018).

Droughts are associated with a deficit in the water balance, which can be summarized as the difference between precipitation and evaporation. Projections for the City show a decrease in summer precipitation and an increase in summer temperatures which will lead to increased evaporation. Mean average summer temperatures are projected to increase from a historical average of 18.6°C to 23.0°C for the long-term horizon. Mean average summer precipitation is projected to decrease from a historic baseline of 227 mm to 220 mm for the long-term horizon. Table 11 shows a summary of these projections. Even though the likelihood of change in precipitation is low, the combined effect of these two trends will lead to increased instances of drought. Note that though the long-term horizon precipitation projections for the mean average summer precipitation are increased compared to the historic baseline, they are lower than the near-term horizon projections, indicating that the greatest increases in drought may not occur until the later part of the century. These data are consistent with the results of a study conducted on the impacts of climate change on the Assiniboine River Basin, a tributary of the Red River which forks in the City of Winnipeg. The study found that reduced summer precipitation coupled with increased temperatures result in the potential of increased summer droughts. The study also projected an increased water demand for the City in the future (Manitoba Conservation and Water Stewardship and GENIVAR, 2012). This is further corroborated with a study on future drought conditions at the North American scale that projects a mean summer Palmer Drought Severity Index (PDSI) of approximately -2 for Southern Manitoba by the second half of the 21st century under a passive scenario (Cook et al. 2015), compared to a historical summer PDSI of 0.5 for the 1976-2005 period. This suggests that by the 2050s, moderate drought conditions will be the norm, whereas extreme drought levels will occur more frequently.

Table 11 Historic and projected values and trends of drought indicator for Winnipeg under RCP8.5

CLIMATE INDICATOR	HISTORIC BASELINE [RANGE]	NEAR-TERM HORIZON [RANGE]	LONG-TERM HORIZON [RANGE]	MEAN CHANGE	TREND
Mean average summer temperature (°C)	18.6 [17.2, 20.1]	20.7 [19.0, 22.6]	23.0 [20.7, 25.3]	+4.4	↑
Mean average summer precipitation (mm)	227 [131, 337]	230 [125, 343]	220 [118, 345]	-7 (-3.0%)	↓

These findings are further supported by data from National Resources Canada (NRCan) which looked at the projected changes in CMI (Climate Moisture Index) for Canada. CMI is calculated as the difference between annual precipitation and potential evapotranspiration (NRCan, 2018). Positive values indicate wet or moist conditions and negative values indicate dry conditions. Figure 10 show the results of the data which indicate that the region where Winnipeg is located is projected to move from a CMI that is considered moist in 1981-2010, to dry in 2011-2040 and 2041-2070, to very dry in 2071-2100 under RCP.8.5 (NRCan, 2018).

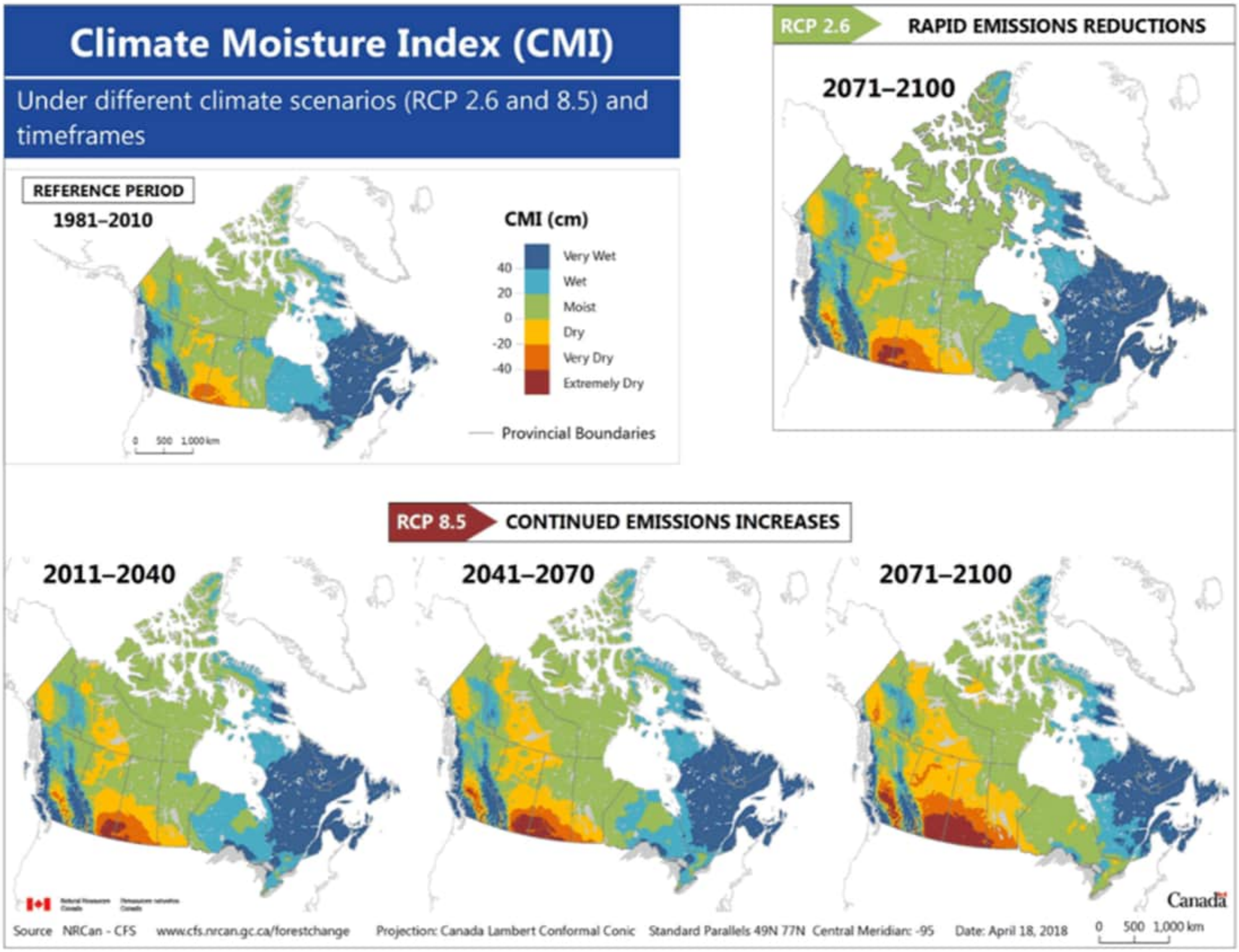

Figure 10 Climate Moisture Index (CMI) for Canada under RCP2.6 and RCP8.5 (NRCan, 2018)

3.2.8 EXTREME WIND

Winnipeg has a windy climate due to its flat Prairie location which offers relatively few natural barriers. The average annual historical wind speed has been 17.1 km/h with a recorded maximum hourly speed of 89 km/h and a recorded maximum gust speed of 129 km/h (ECCC, 2021). Wind is one of the hardest climate change variables to project, both in terms of projection and magnitude. Wind projection is the indirect result of assessing circulation patterns from daily temperature and precipitation outputs from global models.

In Figure 11, the projected evolution of wind speed is shown for the end of the 21st century compared to the most recent period, in winter (DJF) and in summer (JJA). The research shows a projected increase of 5-10% in average wind speeds for the winter months and 0-10% for the summer months. Wind gusts are projected to see an increase of 0-5% for the winter months and a decrease of 0-5% for the summer months.

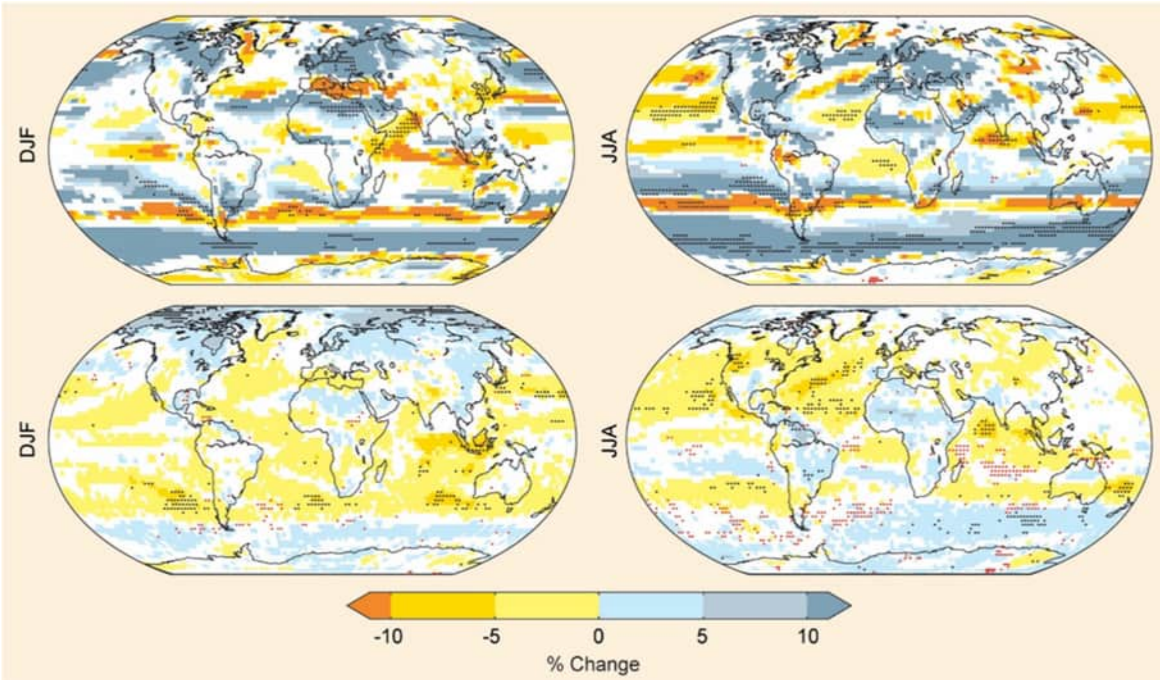

Figure 11 Changes in the mean of the daily averaged wind speeds (top) and wind gusts (bottom) for the period 2081-2100 relative to 1981-2000 (% change) for December to February (left) and June to August (right) (IPCC, 2012)

3.2.9 TORNADOES

Winnipeg is on the northern edge of one of the ‘tornado alleys’ of Canada- areas with frequent historical instances of tornadoes. Figure 12 illustrates all confirmed and probably tornadoes in the country from 1792 to 2009 ranked according to the Fujita Scale (

Table 12). Within the last decade there have been several tornadoes in the vicinity or in the city:

— July 18, 2015, Winnipeg Beach (north of Winnipeg), an unrated tornado with no listed damages;
— September 18, 2011, East of Winnipeg, an unrated tornado with no listed damages;
— June 1, 2009, in the City of Winnipeg, an F0 with no listed damages; and
— June 22, 2007, an F5 tornado hit the nearby town of Elie destroying several houses.

The Province of Manitoba itself averages 7-10 tornadoes per year (University of Winnipeg, 2014).

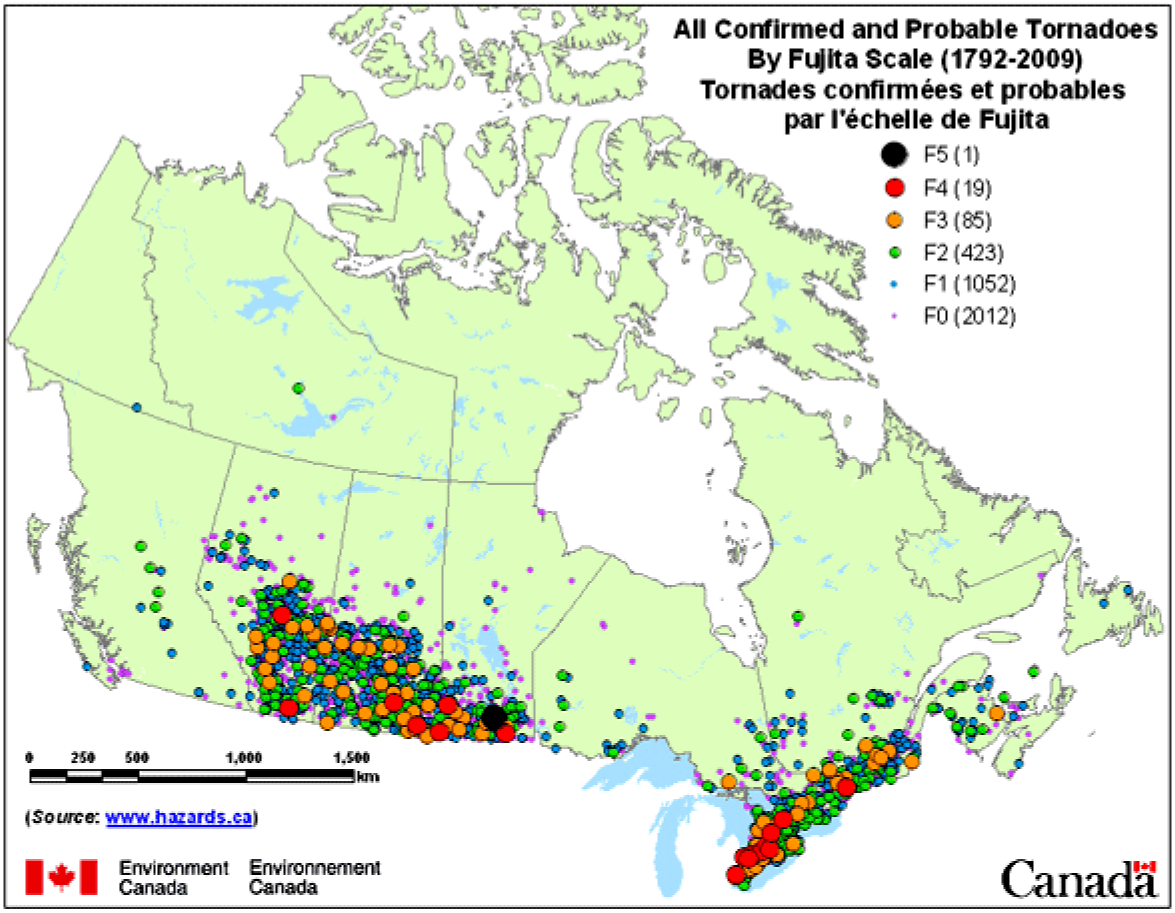

Figure 12 **Confirmed and probable tornadoes by Fujita Scale (1792-2009) (Sills et al., 2012)**

Table 12 Fujita Scale (NOAA, 2019).

CLASS	WIND SPEEDS (KM/H)	OBSERVED DAMAGE
F_0	65-117	**Light Damage.** Some damage to chimneys; branches broken off trees, shallow-rooted trees uprooted, sign boards damaged.
F_1	117-180	**Moderate damage.** Roof surfaces peeled off; mobile homes pushed foundations or overturned; moving autos pushed off road.
F_2	182-252	**Considerable damage.** Roofs torn from frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light objects become projectiles.
F_3	253-333	**Severe damage.** Roofs and some walls torn from well- constructed houses; trains overturned; most trees in forested area uprooted; heavy cars lifted and thrown.
F_4	334-419	**Devastating damage.** Well- constructed houses leveled; structures with weak foundation blown some distance; cars thrown; large missiles generated.
F_5	420-511	**Incredible damage**. Strong frame houses lifted off foundations, carried considerable distances, and disintegrated; auto-sized missiles airborne for several hundred feet or more; trees debarked.

Predicting if and how climate change will impact the frequency and intensity of tornadoes is an ongoing challenge due to their relatively small spatial extension and short duration. As a proxy, researchers may attempt to project the conditions which create tornadoes including warm, moist air, an unstable atmosphere, and wind shear (National Geographic, 2019). Data shows that historically there have been no long-term trends in the frequency of strong tornadoes, but there have been changes in the timing and geographic pattern. Unfortunately, this data is speculative and too uncertain to be used in the context of this assessment for the City of Winnipeg (National Geographic, 2019).

3.2.10 FREEZING RAIN

The City of Winnipeg has historically experienced episodes of freezing rain, including a recent event on January 26th, 2018 that led to a power outage affecting 2,500 customers (CBC News, 2018). However, freezing rain episodes are difficult to model, which leads to weak confidence levels on the evolution of the number, duration, and intensity of ice storms over the coming decades. Lambert and Hansen (2011) evaluated that during the recent past the Winnipeg area has been exposed to five hours of freezing rain per year. For the long-term horizon there is a projected large increase in freezing rain during the months of December, January, and February, a moderate/small increase during the months of November, March, and April, and a decrease or no change for the months of October and May (Lambert and Hansen, 2011).

3.3 EXPOSURE ANALYSIS

Exposure is the presence of people, livelihoods, environmental services and resources, infrastructure, or economic, social, and cultural assets in places which could be adversely affected by a changing climate (IPCC, 2014). The following section determines the exposure of the proposed infrastructure to future climate variables and climate-related hazards.

Table 13 presents probability scores for each of these climate hazards based on an average of the scores of the related climate trends and confidence penalties of climate projections. Confidence penalties are based on the data source and range from a low penalty (-0) to a high penalty (-1). A confidence score may be impacted by the type of projection (e.g. temperature or precipitation data), the time range of the data, the source of the data, the granularity of the data, the number of data points or models used, or the methodology behind the data.

Table 13 Climate hazard probability of change scoring

CLIMATE HAZARD	RELATED CLIMATE VARIABLES	LIKELIHOOD OF CLIMATE TRENDS (-CONFIDENCE PENALTY)	PROBABILITY SCORES FOR CLIMATE HAZARD
Mean temperature	Mean average summer temperature	5 (-0)	**4.75 Very high**
	Mean average spring temperature	4 (-0)	
	Mean average summer temperature	5 (-0)	
	Cooling degree-days	5 (-0)	
Extreme high temperature	Warmest maximum annual temperature	4 (-0)	**4.0 — High**
	Number of heat waves	4 (-0)	
	Average length of heat waves	4 (-0)	
Extreme low temperature	Extreme low temperature	NA*	**NA***
Snow accumulation	Snow water equivalent	5 (-1)	**3.5 — High (Decreasing trend)**
	Mean winter temperature	4 (-0)	
	Mean winter precipitation	3 (-0.5)	
Freeze-thaw cycles (annual)	Freeze-thaw cycles (annual)	3 (-0)	**3.0 — Moderate (Decreasing trend)**
Freeze-thaw cycles (winter)	Freeze-thaw cycles (winter)	4 (-0)	**4.0 — High**
Extreme precipitation	IDF 15-min, 10 year	3 (-1)	**2.8 — Moderate**
	IDF 24-hour, 2 year	3 (-0.5)	
	IDF 24-hour, 5 year	3 (-0.5)	
	IDF 24-hour, 25 year	3 (-0.5)	
	IDF 24-hour, 50 year	4 (-0.5)	
	IDF 24-hour, 100 year	4 (-0.5)	
Drought	Mean average summer temperature	5 (-0)	**3.2— Moderate**
	Mean average summer precipitation (mm)	1 (-0.5)**	
	Climate moisture index	4 (-0.5)	

CLIMATE HAZARD	RELATED CLIMATE VARIABLES	LIKELIHOOD OF CLIMATE TRENDS (-CONFIDENCE PENALTY)	PROBABILITY SCORES FOR CLIMATE HAZARD
Extreme winds	Wind speed	2 (-1)	**1.0 — Very Low**
	Wind gusts	2 (-1)	
Tornadoes	Wind speed	3 (-1)	**2.0 — Low**
Freezing rain	Annual hours of freezing rain	4 (-1)	**3.0 — Moderate**

*There is too much uncertainty and lack of data associated with projecting trends in polar vortex and extreme cold magnitudes or timings to assign a likelihood trend. Qualitative and historical will be used for this risk assessment.

**Statistically there is always the potential likelihood for a climate hazard trend to occur. Because of this, the scale for likelihood of climate trends is set from 1 to 5. The individual likelihood of the climate trend indicator (i.e. mean average summer temperature) will remain at 0.5, but will be taken as a score of 1 when used to calculate the probability score of the hazard (i.e. drought).

4 SUMMARY OF RISKS

Table 14 presents all the potential climate impacts by asset category and associated risk rating. The full risk register is included in Appendix B.

Table 14 Potential climate hazard impact on the North Garage Replacement

CLIMATE HAZARD	POTENTIAL IMPACT	RISK RATING
Extreme Temperatures	Cooling capacity requirements for office space will increase due to an increase in cooling degree days. Outdoor air temperatures, extreme temperatures and heatwaves are all projected to increase over the course of the project's life. The office space will need to be air conditioned during summer heat and may be sensitive to increasing outdoor temperatures if the system is not designed for future temperatures.	Moderate
	Electrical equipment can become less efficient or malfunction in extreme heat. Potential increased risk of malfunction of exterior electrical equipment due to corrosion, premature aging and short circuiting.	Moderate
	Accelerated degradation of building envelope and decreased air quality when combined with high humidity. Increased temperatures could prevent the building envelope from managing heat and humidity if not adequately planned during design, and properly installed and tested during construction. Building materials may expand with heat which can accelerate degradation. Increased humidity can accelerate degradation of materials if they are not selected properly.	Low
	Increased degradation of building components and materials due to material expansion or sun/heat impacts. Extreme summer temperatures are projected to reach 39°C over the long-term. Some types of roof membranes can degrade more rapidly in extreme heat.	Moderate
	Potential impact to solar panel efficiency under high heat conditions as extreme summer temperatures are projected to reach 39°C, and heatwaves are projected to become longer and more frequent.	Low
	Decreased energy demand for heating as general warming trends throughout the year will reduce heating requirements.	Opportunity
	Potential for wildfire smoke to cause decreased air quality for personnel and increased demand on air quality and ventilation systems	Moderate
Freeze-Thaw Cycles	Increasing winter freeze-thaw cycles through the winter months as winter temperatures warm creates potential issues with ice-buildup on structures and damage to hardscaped areas.	Low

CLIMATE HAZARD	POTENTIAL IMPACT	RISK RATING
Snow Accumulation	Potential change in vertical loading on structure. Winter precipitation is projected to increase, but with general warming trends there is a downward trend of snow accumulation, meaning there is a potential for more rain on snow events and wetter, heavier snowfalls in the shoulder season.	**Moderate**
Drought	Drought and municipal water restrictions may impact bus washing operations. Reduced summer precipitation and increased summer temperatures may increase periods of drought in the region which may impact water use restrictions for non-essential uses.	**Low**
	Increased water requirements for landscape irrigation (if present). During summer months, plant health and appearance will be affected by high temperatures and potential imposed water restrictions will also increase the risk of impacting the building landscape.	**Low**
Extreme Precipitation and Pluvial Flooding	Accelerated roof degradation due to overloaded roof drainage system. The historical 15 min storm is projected to increase by 8% over the long-term horizon, making the roof drainage system minorly sensitive to increases in precipitation.	**Low**
	Site is located in a medium density urban area, and the 24-hour 5-year storm event is projected to increase by about 8% over the long-term horizon. There is a minor risk of pluvial flooding of garage if precipitation exceeds capacity of stormwater systems, or site grading is poor.	**Low**
	Risk of sanitary backflow during extreme precipitation events. Backflow events are possible during extreme precipitation events that contribute significant inflow & infiltration and overload the sewer system. The site is located in a medium density residential/industrial area with newer housing developments. If the sewer system was appropriately sized and constructed, it is unlikely to be susceptible to backflow events.	**Low**
	There is potential for an increased risk of pluvial flooding of exterior elements such as access roads or parking stalls. Storm system is open channel ditches bordering the property though increasing the hardscaping will increase runoff and pluvial flooding is possible if the site drainage system is undersized. The 24-hour 5-year storm event is projected to increase by about 8% over the long-term horizon, making the system minorly sensitive to future increases in precipitation.	**Low**
Extreme Winds and Storm Activity	Potential for power and communications system failure due to extreme wind event. As extreme winds and storm events increase, there is potential for impacts to the grid disrupting the infrastructure required to service the fleet. Impact depends on the length of the power outage, backup power and the levels of transit service required.	**Moderate**

CLIMATE HAZARD	POTENTIAL IMPACT	RISK RATING
	Potential for accelerated degradation of building envelope. High winds due to storm activity may increase, creating a potential for wind loading to exceed the design of the cladding or awnings if the impacts of climate change on wind loads for envelope are not considered.	**Low**
	Potential for increased lateral loading affecting building structure. As high winds due to storm activity are projected to increase, there is a potential for wind loading to exceed the threshold design values on the structure if impacts of climate change are not considered.	**Low**
	Increases in extreme winds and storm activity can risk damage and uplift to rooftop solar panels if anchoring system is not designed for extreme wind speeds.	**Low**
Tornadoes	Projections for future tornado activity are not well defined. Winnipeg is located in one of Canada's tornado alleys and has several tornadoes per year of varying magnitudes. Depending on the magnitude of the tornado, there could be significant impacts on the structure and roof of the garage, power and communications system failure. Impact to the garage is a low probability, high consequence event. Currently there are no design standards in Canadian building codes for tornado wind speeds.	**High**
Freezing Rain	Freezing rain has potential to cause power and communications failures. This could impact operations at the bus garage and impact transit service delivery. Freezing rain is projected to increase with climate change. This has potential to cause significant impacts to overhead power lines due to the weight of the ice, or trees falling on lines. High winds can exacerbate the impact.	**High**
	Freezing rain on hardscaping has potential to impact operations. Occurrence of freezing rain is projected to increase, but this can be managed through de-icing operations.	**Low**

5 SUMMARY OF ADAPTATION STRATEGIES

Potential risk reduction and climate adaptation strategies for the design and operation of Winnipeg Transit's North Garage project are presented by asset category. Throughout the recommendations, low carbon resilience options have been identified where possible to help to reduce greenhouse gas emissions.

STRUCTURE, SUBSTRUCTURE & ROOF

- In design, consider roofing materials that are appropriate for changing extreme exterior temperatures. Regular monitoring and maintenance of roof is recommended to address issues as they arise.
- Ensure roof has appropriate drainage and considers increased rainfall volumes due to climate change minimize buildup of water and reduce issues with snow melt and refreeze. Monitor condition of roof/envelope to ensure water damage does not occur.
- Consider predominant wind loading direction and a simple roof design to limit the impacts of drifting snow on the solar panels.
- Ensure proposed solar panels are rated for future wind loads.
- Consider changing snow loads, and possibility for changing snow density in structural design.
- Ensure adequate foundation drainage and sump pump control to manage excess water. Monitor the foundation for cracks. Keep flood mitigation supplies (spill kits/scrubbers) on hand to use in the event of a flood.
- Install backwater valves on all sanitary and storm services with direct connection to building drainage.
- Consider increase frequency of freezing rain events in design.

BUILDING ENVELOPE

- In design, consider building envelope materials that will perform to ensure resistance to increased stress due to heat and humidity, including thermally reflective surfaces for roofs and building facades. A green roof has potential to reduce building cooling loads during extreme summer temperatures.
- Thermal scans during post-construction could be completed to check installation effectiveness. Air tightness testing and remediation plans is recommended as a construction for the contractor to complete to incentivise proper building envelope installation.
- Cladding should be designed considering extreme wind loads. Monitor performance of building envelope following high wind events and replace damaged cladding as necessary.

BUILDING MECHANICAL

- HVAC systems should be designed for future (increased) cooling loads or designed to add capacity for future conditions. Future temperature projections and indoor thermal comfort requirements should be considered in energy modeling and design.
- HVAC systems could be upgraded at a later date if necessary, to increase cooling capacity in a staged approach when it reaches its design life, although integration of an appropriately sized system should be considered during initial design as it will be more expensive to retrofit existing systems.
- Passive cooling strategies could be considered in design of the garage such as strategic shading, window placement, window tinting, tree planting, airflow considerations, strategically placed vegetation, albedo-increasing colour selection, use of prevailing winds in cooling.
- Consider the opportunity for reduced heating requirements in the future, reducing building GHG emissions.
- Consider inclusion of electric or HEPA filters in the ventilation system. HEPA filters may be advisable and will help with smoke management, and management of air-borne illnesses. Alternatives could include a dual stage filter system to minimize the replacement frequency of finer filters during wildfire smoke events.

- Locate critical mechanical and electrical equipment on equipment pads to reduce potential flooding impacts.

CIVIL SERVICING

- Ensure storm drainage design considers increased rainfall volume due to climate change performing a sensitivity analysis on the potential future scenarios in stormwater modelling. Ensure that the stormwater is managed onsite and does not negatively impact adjacent properties.
- Consider reusing water from the stormwater drainage retention basin for irrigation during dry summer months. A stormwater treatment wetland, if feasible, could be used to treat wash water prior to discharge.
- Reducing impermeable hardscaping and using bioswales and rain gardens to encourage infiltration of rainfall, and adoption of nature-based solutions to manage rainwater, would be beneficial to manage water on site during frequent, low intensity storms.
- Ensure timely maintenance and clean out of catch basins and manholes following storms.
- A backflow valve can be installed on sanitary sewer connections to minimize risks of a sewage overflow.

SITE - GENERAL

- A tornado impacting the garage is a low probability, high consequence event for which there is no established design standard. It is recommended that Winnipeg Transit identify the design standard for a Bus Transit garage and determine what level of resilience to achieve with respect to tornado risk.
- Consider drought tolerant plants or xeriscaping in landscaping plan.. Adjust water irrigation schedules.
- Ensure trees nearby site and overhead lines are regularly maintained to remove branches/trees which may fall in a storm and damage the power poles/lines.

ELECTRICAL & COMMUNICATIONS

- Consider the impacts of extreme heat on the electrical transmission and distribution infrastructure of the bus garage to understand whether this could impact transit service delivery.
- Assess whether critical equipment located external to the building is sufficiently resilient to potential increases in temperature.
- Install redundancy, plan for spare parts, install protections as needed to reduce the impact of higher temperatures on electrical and communications equipment. Plan for additional operation and maintenance, and more frequent capital investment for replacement. Ensure the emergency plans consider loss of function of any critical electrical equipment.
- Locate critical electrical equipment on equipment pads to minimize any damage from flooding.
- A generator and /or battery storage is recommended for critical bus garage systems and maintaining a certain level of transit service during power outages. Identifying the required level of service needed during emergency power outages to size the generator and battery storage system is recommended.

BUS MAINTENANCE FACILITIES

- Ensure emergency preparedness planning takes into account power failure and prioritize critical areas for power.
- Plan for annual water restrictions during summer months for non-critical maintenance activities such as bus washing.
- Procedures for snow and ice-management may require updating to managing increased freeze thaw events in winter and potentially wetter, heavier snow events to maintain required service levels.

6 CONCLUSIONS AND RECOMMENDATIONS

The climate change resilience assessment was completed using Infrastructure Canada's Climate Lens Guidance, which follows the methodology of the ISO 31000:2018 standards. This assessment uses historical and projected climate data to provide insight into climate risks that may affect the North Garage Replacement Project and propose possible adaptation strategies.

The proposed Winnipeg Transit North Garage replacement is at an early conceptual design stage and this Climate Change Resilience Assessment has been completed to review potential long-term climate change risks to the proposed infrastructure and to inform design. Overall, thirteen low risks, five moderate risks, two high risks and one opportunity were found.

Extreme temperatures and heatwaves will become more pronounced over the long-term horizons as the number and length of heat waves will increase and projected summer extremes will increase to highs of 39°C. This has the potential to create long-term maintenance concerns for building envelope, building mechanical and electrical systems if not accounted for during design and it is recommended that future temperature projections be considered in design of these systems. The general warming trend may also create an opportunity for reduced heating requirements in the future.

Some climate impacts, such as snowfall, extreme cold, and freeze thaw are expected to decrease or change in frequency in the future, however, risks such as snow loading are still present, and an extreme event could still happen, even if the overall trends are decreasing

Extreme wind, storm activity and freezing rain present risks to the electrical grid. The proposed North Garage will eventually house a fleet of battery electric zero-emissions buses which will rely on the Manitoba Hydro grid for power. A power outage could impact Winnipeg Transit's ability to provide service depending on the length of the outage, the backup power and battery storage available on site and the number of battery electric buses affected making increases in storm activity impacting electrical and communications systems a moderate to high risk. It is recommended that future wind projections be considered in design, and that the required level of transit service during a power outage be determined to plan backup power and energy storage requirements. As transit is an essential service, an emergency preparedness plan is recommended in the event of extended power outages.

Winnipeg is on the northern edge of one of Canada's tornado alleys and a tornado impacting the North Garage would be a low probability, high consequence event. The new garage will likely be considered a 'post-disaster' or 'high importance' meaning that the garage would be essential to the provision of essential transit service following a disaster. Currently, there are no codes or standards for tornado resilience, so it is recommended that Winnipeg Transit identify the required level of operability for the bus garage following a disaster event.

Generally, it is recommended that the design of Winnipeg Transit's North Garage replacement prepare for future weather conditions by going beyond code requirements and current best practice, as future climate change projections are often not integrated in existing building and infrastructure design criteria.

Risk assessments should be considered an ongoing process and it is recommended that Winnipeg Transit revisit this assessment through design of the new infrastructure as new design information becomes available.

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GLOSSARY OF CLIMATE TERMS

Cooling degree-day (CDD): Measure of the number of days during which cooling is required in a year. In Canada, 18 °C is considered the temperature above which cooling is required to maintain comfort inside buildings. Daily cooling degree-days are the number of °C a given day's mean temperature is above 18 °C. For example, if the mean daily temperature is 22 °C, the cooling degree-day value is 4 °C. Annual cooling degree-days are the sum of daily cooling degree-days.

Heating degree-day (HDD): Measure of the number of days during which heating is required in a year. In Canada, 18 °C is considered the temperature below which heating is required to maintain comfort inside buildings. Daily heating degree-days are the number of °C a given day's mean temperature is below 18 °C. For example, if the mean daily temperature is 10 °C, the heating degree-day value is 8 °C. Annual heating degree-days are the sum of daily heating degree-days.

Coldest minimum temperature: The coldest temperature of the year.

Climate: Patterns of variability in atmospheric conditions in a given region over a long period of time, often decades or longer. This is in contrast to weather which describes current atmospheric conditions (i.e. it is currently raining or windy).

Climate change: Any significant long-term change in the expected patterns of average weather of a region over a significant period of time, usually averaged to a minimum of 30 years.

Exposure: Presence of people, livelihoods, assets, services, resources or infrastructure in place in a specific region that could be adversely affected by climate change.

Freeze-thaw cycle: Count of days where maximum temperature is above 0 °C and the minimum temperature is below 0 °C. Under these conditions, it is likely that some water at the surface was both liquid and solid at some point during the day.

Global climate model (GCM): Mathematical representation of the major climate system components and their interactions.

Heat wave: Extended period of extreme heat. A heat wave is usually defined as a period of three or more consecutive days with maximum temperatures above 30 °C.

Heavy precipitation day: A day when the total precipitation (rainfall, hail, or snow) is above a designated mark (10mm or 20mm) in liquid form.

Intensity-duration-frequency (IDF) curve: IDF curve is a representation of the probability that a given rainfall intensity or quantity occurs over a sub-daily time period.

Max 1-day precipitation: The maximum amount of rain or snow that can be accumulated in a 24h-period once a year. This is an indicator of extreme precipitation.

Max 3-day precipitation: The maximum amount of rain or snow that can be accumulated in a 3-day period once a year. This is an indicator of extreme precipitation.

Max 5-day precipitation: The maximum amount of rain or snow that can be accumulated in a 5-day period once a year. This is an indicator of extreme precipitation.

Mean annual temperature: The average temperature over the course of one year.

Mitigation: In the context of this report mitigate means to reduce the severity of a climate risk or impact.

Representative concentration pathways (RCP): A greenhouse gas concentration trajectory scenario adopted by the IPCC. The four scenarios (RCP2.6, RCP4.5, RCP6, and RCP8.5) represent the range of possible climate policy outcomes for the 21st century. RCP2.6, the most optimistic scenario, assumes aggressive mitigation while RCP8.5 is the "business-as-usual" scenario with little or late change.

Resilience: The ability of a system to absorb disturbances while maintaining the same basic structure and ways of functioning.

Return period: Statistical measurement representing the average time between the occurrence of two events. For example, a 100-year return period flood zone is the area that is likely to be flooded every 100 year in average. The reciprocal of return period is the annual frequency of occurrence. A 100-year return flood has 1/100 chance (1% chance) of occurring each year.

Risk: A measure of the expected outcome of an uncertain event, which is estimated by combining an event's likelihood and expected consequences or severity.

Risk rating: The assessment of the level of risk through a pre-defined scale.

Scenario: A plausible representation of future climate that has been constructed for explicit use in investigating the potential impacts of climate change.

Vulnerability: The degree to which a service or an asset can cope with a given climate change impact. It is a function of its exposure, its sensitivity and its adaptive capacity. When infrastructure has insufficient capacity to withstand the projected or anticipated loads that may be placed on it

APPENDIX

A DETAILED METHODOLOGY

APPENDIX

APPROACH

The Climate Change Resilience Assessment (CCRA) is completed to identify the Project's key climate and weather-related vulnerabilities, identify risks and opportunities associated with the identified climate and weather-related risks, and develop control and adaptation measures that may reduce those risks. The CCRA comprises of two phases: (i) a preliminary risk assessment; and (ii) a detailed risk assessment.

This phased approach, shown in Figure 13, developed at WSP based on the ISO31000 standard on risk management is consistent with requirements set out in the Climate Lens Guidance.

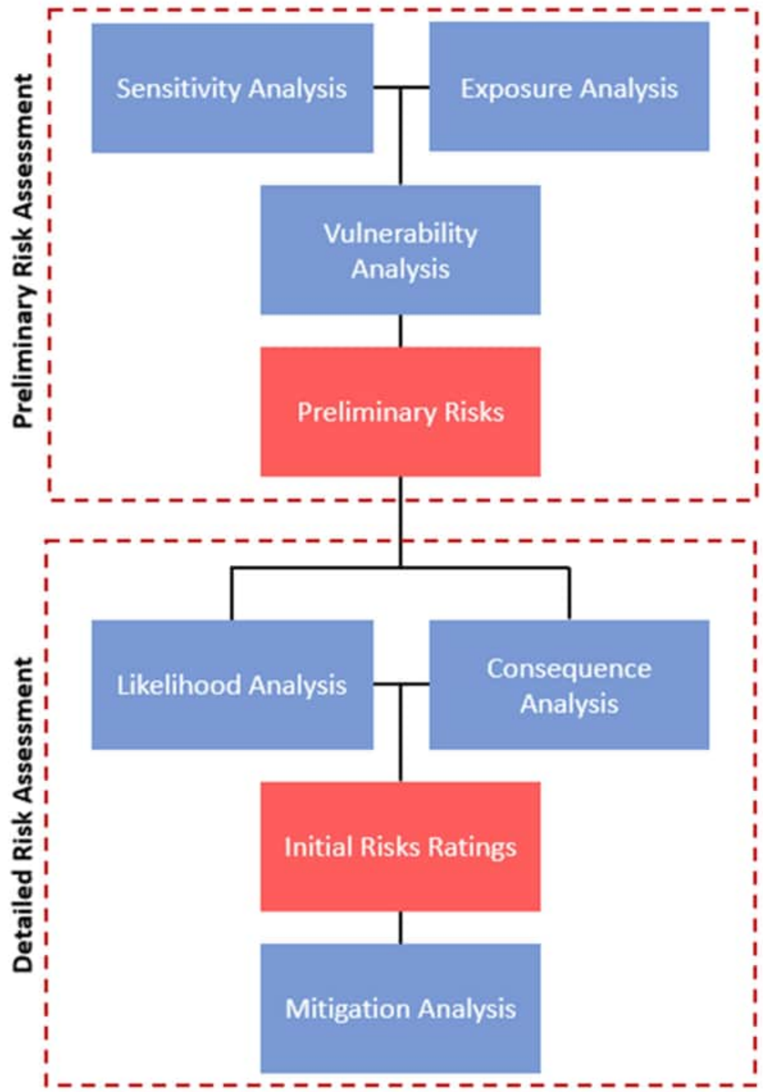


Figure 13 **Climate Change Resilience Assessment Process**

PRELIMINARY RISK ASSESSMENT

The preliminary risk assessment consists of a high-level analysis and identifies a Project's vulnerabilities due to climate change through the following steps:

— Identification of relevant **climate hazards** for the infrastructure project;

— Likelihood ratings of climate hazards using climate projections leading to the **exposure** assessment;

- Potential impacts defined for each infrastructure component cross-referenced with each climate hazards;
- **Sensitivity** assessed for each potential impact considering infrastructure design and thresholds;
- Assessment of the **adaptive capacity** of the infrastructure components;
- The combination, the sensitivity, and the adaptive capacity resulting in the **vulnerability** rating for each potential impact.

EXPOSURE ASSESSMENT

The exposure assessment is based on an assessment of climate data to identify relevant climate hazards and determine the likelihood of occurrence of each climate hazard. As noted in the following table, the likelihood of climate hazards is balanced by the data confidence scoring: if we have a medium confidence in datasets, a penalty of -0.5 is applied to get the final exposure scoring; if the confidence is low, a penalty of -1 is applied.

Table 15 Definitions of levels in exposure assessment

LEVEL	LIKELIHOOD OF CLIMATE HAZARD	DATA CONFIDENCE
1 - Very low	**1 – Very low** Will not happen before the end of the design life Will not have a negative impact before the end of the design life	**Low (-1)** Confidence intervals given by the model ensemble show a variability going against the mean trend
2 - Low	**2 – Low** Will likely happen once within 30 to 50 years Will likely become critical within 30 to 50 years	
3 - Moderate	**3 – Moderate** Will likely happen once within 10 to 30 years Will likely become critical within 10 to 30 years	**Medium (-0.5)** Confidence intervals given by the model ensemble have only one boundary marker going against the mean trend
4 - High	**4 – High** Will likely happen once in 10 years Will likely become critical in 10 years	**High (0)** Confidence intervals are consistent with the mean trend, and the future lower marker is higher than the historical mean values
5 - Very high	**5 – Very high** Will likely happen on a yearly basis or more Will likely become a critical/beneficial factor within less than 10 years	
Opportunity	Consistent with categories above	Consistent with categories above

VULNERABILITY ASSESSMENT

Climate change vulnerability is the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change. Vulnerability is the factor of sensitivity and adaptive capacity of each infrastructure component.

Sensitivity is the degree to which a component is affected by climatic conditions or a specific climate change impact. For example, if a component is affected by sea level rise, how much will it be affected?

Adaptive capacity is the ability of a system to adjust to climate change to avoid potential damage, to take advantage of opportunities, or to cope with the consequences. Adaptive capacity can reduce the vulnerability of infrastructure to a potential impact. This can be achieved by incorporating future climate projections into design criteria to enable infrastructure to adapt to a changing climate. Adaptive capacity can also be achieved by adjusting operations and maintenance procedures to adapt to a changing climate.

The ratings of sensitivity and adaptive capacity have five distinct levels and correspond to the definitions detailed in Table 16.

APPENDIX

Table 16 Definitions of levels for sensitivity and adaptive capacity

LEVEL	SENSITIVITY	ADAPTIVE CAPACITY
1	**1 – Very Low** The likelihood that the project is affected remains minimal.	**1 – Very High** Adaptation measures are very easily implemented and effective.
2	**2 – Low** The likelihood that the main components of the project will be affected by the hazard is minimal. There is a low chance that the secondary components will be affected by the hazard.	**2 – High** Adaptation measures are very easily implemented and effective.
3	**3 – Moderate** There is a low chance that the main components of the project will be affected by the hazard. There is a good chance that the secondary components will be affected by the hazard.	**3 – Moderate** Adaptation measures exist, but their cost, time of implementation or efficiency makes their implementation questionable.
4	**4 – High** There is a high likelihood that the project will be directly affected by the hazard.	**4 – Low** The implementation of adaptation measures is long and inefficient. The cost of implementing accommodation measures is similar to the value of the project.
5	**5 – Very high** There is a very high likelihood that the project will be directly affected by the hazard.	**5 – Very Low** Adaptation measures are non-existent. The cost of implementing adaptation measures exceeds the value of the project.
Opportunity	Consistent with categories above	Consistent with categories above

APPENDIX

Once the levels of sensitivity and adaptive capacity have been defined, the vulnerability rating is developed using the following matrix:

Table 17 Vulnerability Matrix

VULNERABILITY		SENSITIVITY RATING				
		Very Low	**Low**	**Moderate**	**High**	**Very High**
ADAPTIVE CAPACITY RATING	**Very Low**	Very Low	Low	Moderate	High	Very High
	Low	Very Low	Low	Moderate	High	High
	Moderate	Very Low	Low	Low	Moderate	High
	High	Very Low	Very Low	Low	Moderate	Moderate
	Very High	Very Low	Very Low	Low	Low	Moderate

The vulnerability rating determines which risks are assessed in further detail in the detailed risk assessment. As noted in the following table, very low risks do not need to be considered further. Professional judgement is used to determine whether or not low risks need to be considered further. All moderate to very-high risks are assessed in greater detail.

Table 18 Vulnerability Rating Next Steps

RATING	RESULT
1 – Very Low	Event does not need to be considered further
2 – Low	Adaptation and/or mitigation measures likely not required
3 – Moderate	Adaptation and/or mitigation measures are required to decrease the level of risk
4 – High	Adaptation and/or mitigation measures have priority
5 – Very High	Immediate adaptation and/or mitigation measures are required
Opportunity	Measures to implement the recommended opportunity

APPENDIX

DETAILED RISK ASSESSMENT

The first step of the detailed risk assessment is to develop the likelihood rating for each impact. This is determined by cross-referencing the exposure rating with the vulnerability rating as shown in the following table.

Table 19 Likelihood of Impact Matrix

LIKELIHOOD OF IMPACT		VULNERABILITY				
		Very Low	**Low**	**Moderate**	**High**	**Very High**
EXPOSURE	**Very High**	Low	Moderate	High	Very High	Very High
	High	Low	Moderate	High	High	Very High
	Moderate	Low	Low	Moderate	High	High
	Low	Very Low	Low	Low	Moderate	Moderate
	Very Low	Very Low	Very Low	Low	Low	Moderate

Source: based on IPCC (2014), adapted by WSP

Potential impacts identified with a Moderate, High and Very High likelihood are further considered in the detailed risk assessment. The next component of the risk assessment is to determine the severity of the impact. Impact severity is assessed on an economic, social and environmental point of view separately, following the consequence terminology illustrated in the Detailed Consequence Scoring table at the end of the Section. The final severity of impacts is the maximum rating among the three sectors to keep a conservative approach and not to underestimate any significant consequence.

Finally, the risk rating is obtained by cross-referencing the likelihood and the severity of each impact as shown in the Risk Rating Matrix.

Table 20 Risk Rating Matrix

RISK RATING		SEVERITY OF IMPACT				
		Very Low	**Low**	**Moderate**	**High**	**Very High**
LIKELIHOOD OF IMPACT	**Very High**	Low	Moderate	High	Very High	Very High
	High	Low	Moderate	High	High	Very High
	Moderate	Low	Low	Moderate	High	High
	Low	Very Low	Low	Low	Moderate	Moderate
	Very Low	Very Low	Very Low	Low	Low	Moderate

Source: based on IPCC (2014), adapted by WSP

The risks are then prioritized with the same scaling system:

- Very High Risk: immediate control required;
- High Risk: high priority control measures required;
- Moderate Risk: some control required to reduce risks to lower levels;
- Low Risk: control likely not required;
- Very Low Risk: impacts do not require further consideration.
- Positive Impact/Opportunity: Climatic change may equally have a positive effect.

RISK MITIGATION AND CONTROL MEASURES

Based on input from technical experts, professional judgment, and research, risk mitigation and control measures will be proposed for the moderate to very high risks.

Table 21 Evaluation matrix for the climate resilience assessment

DEGREE	EXPOSURE		VULNERABILITY		SEVERITY	RISK
	LIKELIHOOD	CONFIDENCE	SENSITIVITY	ADAPTIVE CAPACITY		
1	Very low	Low (-1)	Very Low	Very High	Very Low	Very Low
	- Will not happen before the end of the design life. - Will not have a negative impact before the end of the design life.	- Data source has certain shortcomings and the projections have relatively large uncertainties. - Results come from the scientific literature and the uncertainty ranges are not specified.	The probability that the project will be affected by the climate hazard is minimal.	- Adaptation measures are very easily implemented and effective.	- May or may not slightly affect people's quality of life - May or may not have limited impacts in intensity and spatially or has no impact at all	- Impacts do not require further consideration
2	Low		Low	High	Low	Low
	- Will likely happen once within 30 to 50 years. - Will likely become critical within 30 to 50 years.		- The probability that the main components of the project will be affected by the climate hazard is minimal. - There is a small chance that the secondary components will be affected by the climate hazard.	- Adaptation measures are easily implemented and effective.	- May temporarily affect people's quality of life - May lead to localized and reversible economic or environmental impacts	- Control measures likely not required
3	Moderate	Medium (-0,5)	Moderate	Moderate	Moderate	Moderate
	- Will likely happen once within 10 to 30 years. - Will likely become critical within 10 to 30 years.	- Data source is reliable, but the projections have relatively large uncertainties. - Data source has certain shortcomings, but projections have relatively small uncertainties.	- There is a low probability that the main components will be affected by the climate hazard. - There is a good chance that the secondary components will be affected by the climate hazard.	- There are adaptation measures, but their cost, the time to implement them or their effectiveness makes their implementation questionable.	- May affect people's quality of life for a long period - May lead to significant, but reversible economic or environmental impacts	- Some control measures required to reduce risks to lower levels
	High		High	Low	High	High

APPENDIX

DEGREE	EXPOSURE		VULNERABILITY		SEVERITY	RISK
	LIKELIHOOD	CONFIDENCE	SENSITIVITY	ADAPTIVE CAPACITY		
4	- Will likely happen once in 10 years. - Will likely become critical in 10 years.	- Results come directly from the scientific literature.	- There is a high probability that the project will be directly affected by the climate hazard.	- The implementation of adaptation measures is long and ineffective. - The cost of implementation is similar to the value of the project.	- May significantly and irreparably affect the quality of life of people - May lead to major or irreversible economic or environmental impacts over the lifespan of the project	- High priority control measures required
	Very High	High (-0)	Very High	Very Low	Very High	Very High
5	- Will likely happen on a yearly basis or more. - Will likely become a critical/beneficial factor within less than 10 years.	- Data source is reliable. - Enough climate models have been used. - Projections have relatively low uncertainties.	- There is a very high probability that the project will be directly affected by the climate hazard.	- Adaptation measures are non-existent. - The cost of implementing adaptation measures exceeds the value of the project.	- May lead to fatalities (direct or indirect) - May lead to major and irreversible economic or environmental impacts for society	- Immediate control measures required
Opportunity	Consistent with categories above	Consistent with categories above	Consistent with categories above	Consistent with categories above	Positive	Opportunity
					- Increase in quality of life - Economic or environmental opportunity	- Measures to grab the recommended opportunity

Source: based on Infrastructure Canada (2019), adapted and completed by WSP

APPENDIX

Table 22 Detailed Consequence Scoring

FACTOR	PEOPLE					ENVIRONMENT	FINANCIAL		
Degree	**Health and safety**	**Social**	**Reputation**	**Quality of service**	**Governance**	**Physical**	**Cost of Restoration**	**Legal/ litigation**	**Economy**
1- Very low	First aid	No tangible impact on society	Localised temporary impact on public opinion	No tangible impact to services	No changes to management required	No adverse effects on natural environment. Localised to point source. No recovery required	Little financial loss or increase in operating expenses	No litigation and/or legal action	No effect on the broader economy
2- Low	Minor injury, medical treatment with/or restricted work.	Localised, temporary social impacts.	Localised, short term impact on public opinion.	Localized or temporary disruption to services.	General concern raised by regulators requiring response action.	Minimal effects on the natural environment. Localised within site boundaries. Recovery measurable within 1 month of impact.	Additional operational costs. Financial loss small, <10% of turnover.	Minimal individual legal action.	Minor effect on the broader economy due to disruption of service provided by the asset.
3 - Moderate	Serious injury or lost work.	Localised, long term social impacts.	Local, long term impact on public opinion with adverse local media coverage.	Localized long-term disruption to services.	Investigation by regulators Changes to management actions required.	Some damage to the environment including local ecosystems. Some remedial action may be required. Recovery in 1 year.	Moderate financial loss, 10-50% of turnover.	Multiple claims and/or litigations.	High impact on the local economy with some effects on the wider economy.
4- High	Major or multiple injuries, permanent injury or disability.	Failure to protect poor or vulnerable groups. National, long term social impacts.	National, short term impact on public opinion; negative national media coverage.	Failure to provide services with long-term region-wide impacts.	Notices issued by regulators for corrective actions. Changes required in management. Senior management responsibility questionable.	Significant effect on the environment and local ecosystems. Remedial action likely to be required. Recovery longer than 1 year. Failure to comply with environmental regulations / consents.	Major financial loss, 50-90% of turnover.	Major litigation and/or legal action by multiple claimants.	Serious effect on the local economy spreading to the wider economy.
5- Very high	Single or multiple fatalities.	Loss of social license to operate. Community protests.	National, long term impact with potential to affect stability of Government.	Permanent disruption and/or termination of services.	Major policy shifts. Change to legislative requirements. Full change of management control.	Very significant loss to the environment. May include localised loss of species, habitats or ecosystems. Extensive remedial action essential to prevent further degradation. Restoration likely to be required. Recovery longer than 1 year. Limited prospect of full recovery.	Extreme financial loss >90% of turnover.	Class action legal action.	Major effect on the local, regional and state economies.

Source: designed by WSP

APPENDIX

B RISK REGISTER

	Exposure				Vulnerability					Risk							Adaptation
					Sensitivity		Adaptive Capacity				Severity of Impact						
ID	**Climate Hazard**	**Likelihood of Climate Hazard Rating**	**Trend**	**Potential Impact**	**Rating**	**Rationale**	**Rating**	**Rationale**	**Vulnerability Rating**	**Likelihood of impact**	**Health and Safety**	**Financial / Economic**	**Environmental**	**Severity Rating**	**Severity Rationale**	**Risk Rating**	**Suggestions for Control Measures**
1	**Extreme Temperatures**	Very High	↑	Cooling capacity requirements for office space will increase due to an increase in cooling degree days.	Moderate	Outdoor air temperatures, extreme temperatures and heatwaves are all projected to increase over the course of the project's life. The office space will need to be air conditioned during summer heat and may be sensitive to increasing outdoor temperatures if the system is not designed for future temperatures.	Low	If the cooling system is not designed for future temperatures, retrofits to increase capacity of cooling systems are expensive to implement if not considered in design.	Moderate	High	Very Low	Low	Very Low	Low	**Health & Safety:** Maintaining appropriate indoor temperatures is important for worker health and safety. **Financial**: Mechanical equipment would be expensive to upgrade and/or expand in the future. **Environmental**: Increased cooling needs would result in additional GHG emissions.	**Moderate**	HVAC systems for the proposed North Garage should be designed future (increased) cooling loads or designed to add capacity for future conditions. Future temperature projections and indoor thermal comfort requirements should be considered in energy modeling. Systems could be upgraded at a later date if necessary, to increase cooling capacity in a staged approach when it reaches its design life, although integration of an appropriately sized system should be considered during initial design as it will be more expensive to retrofit existing systems. Passive cooling strategies could be considered in design of the garage such as strategic shading, window placement, window tinting, tree planting, airflow considerations, strategically placed vegetation, albedo-increasing colour selection, use of prevailing winds in cooling.
2		Very High	↑	Electrical equipment can become less efficient or malfunction in extreme heat. This may impact the efficiency of electrical bus charging. Increased risk of malfunction of exterior electrical equipment due to corrosion, premature aging and short circuiting.	High	Electrical equipment external to the building such as security cameras, lighting, security devices, transformers, and generators, are typically rated to 40 degC. If temperatures are in that range for extended periods of time, there may be some localized failures and reduced performance. Additional stress due to warmer temperatures could result in malfunction or reduced service life.	Moderate	Minor equipment is inexpensive and easy to replace. Major equipment can be more expensive and difficult to replace, and could result in service disruption if replacements are more regularly required.	Moderate	High	Very Low	Low	Very Low	Low	**Financial:** Potential for reduced or loss of service if bus charging infrastructure is impacted. Expensive to replace electrical components.	**Moderate**	Consider the impacts of extreme heat on the electrical transmission and distribution infrastructure of the bus garage to understand whether this could impact delivery of service. Assess whether critical equipment located external to the building is sufficiently resilient to potential increased in temperature (frequency and duration). Install redundancy, plan for spare parts, install protections as needed to reduce the impact of higher temperature. Plan for additional operation and maintenance, and more frequent capital investment for replacement. Ensure the emergency plans consider loss of function of any critical electrical equipment.
3		Very High	↑	Accelerated degradation of building envelope	Low	Increased temperatures could prevent the building envelope from managing heat and humidity if not adequately planned during design, and properly installed and tested during construction. Building materials may expand with heat which can accelerate degradation. Increased humidity can accelerate degradation of materials if they are not selected properly. Cladding is typically designed to withstand extreme temperatures. It is unlikely that the design life will be reduced.	Low	It is expensive and difficult to repair the building envelope (walls, ceilings, roofs). Envelope performance can be specified during the design but is also heavily dependent on the installation by the contractor.	Low	Moderate	Very Low	Low	Very Low	Low	**Health & Safety:** Envelope performance could negatively impact the indoor air quality should significant air leakages, air pollution, cold drafts penetrate inside the building. **Financial:** Retrofitting an existing building is expensive.	**Low**	As this will be new construction, the risk should be low. In design, consider building envelope materials that will perform to ensure resistance to increase stress due to heat and humidity. Thermal scans during post-construction could be completed to check installation effectiveness. Air tightness testing and remediation plans could be added as one of the project requirements and specifications for the contractor to complete to incentivise proper building component installation.
4		Very High	↑	Increased degradation of building components and materials due to material expansion or sun/heat impacts	Moderate	Extreme summer temperatures are projected to reach 39 degC over the long-term. Roof membrane can degrade in extreme heat.	Moderate	Cost of material replacement is moderate, and materials may not be easily replaced.	Low	Moderate	Very Low	Moderate	Very Low	Moderate	**Financial:** Moderate economic impact if building components need to be replaced before expected end of life is reached.	**Moderate**	In design, consider roofing materials that are appropriate for extreme exterior temperatures. Regular monitoring and maintenance of roof is recommended to address issues as they arise.
5		Very High	↑	Potential impact to solar panel efficiency under high heat conditions.	Moderate	Extreme summer temperatures are projected to reach 39 degC, heatwaves are projected to become longer and more frequent. Potential decreased efficiency ofsolar panels at higher temperatures.	Moderate	The garage will not rely on the solar panels as the primary power source.	Low	Moderate	Very Low	Very Low	Very Low	Very Low	**Environmental**: Solar panels have the potential to offset power demand.	**Low**	None
6		High	↑	Decreased energy demand for heating	Moderate	General warming trend throughout the year will reduce heating requirements.	Very High	Existing heating capacity expected to be higher than needed for future climate.	Low	Moderate	Opportunity	Opportunity	Opportunity	Opportunity	**Financial:** Warmer winter temperatures will decrease energy costs.	**Opportunity**	Consider the opportunity for reduced heating requirements in the future.
7		Moderate	↑	Potential for wildfire smoke to cause decreased air quality for personnel and increased demand on air quality and ventilation systems	High	There will be an increased need for filtration of wildfire smoke for outside air entering the building and increased maintenance of air filtration system.	Moderate	Filters are challenging to install retroactively, as HVAC systems must be designed to accommodate higher-grade filtration media.	Moderate	Moderate	Moderate	Moderate	Low	Moderate	**Health & Safety:** Inhaling particulate matter from wildfire smoke can have negative short- and long-term impacts on respiratory and cardiovascular health. **Financial:** Retrofits of HVAC systems to accommodate higher grade filters are expensive. **Environmental**: Increased energy requirements and therefore GHG emissions related to ventilation using higher-grade filtration media.	**Moderate**	Consider inclusion of MERV or HEPA filters in the ventilation system. HEPA filters may be advisable and will help with smoke management, and management of any air-borne illnesses.

Exposure					Vulnerability					Risk							Adaptation
					Sensitivity		Adaptive Capacity				Severity of Impact						
ID	**Climate Hazard**	**Likelihood of Climate Hazard Rating**	**Trend**	**Potential Impact**	**Rating**	**Rationale**	**Rating**	**Rationale**	**Vulnerability Rating**	**Likelihood of impact**	**Health and Safety**	**Financial / Economic**	**Environmental**	**Severity Rating**	**Severity Rationale**	**Risk Rating**	**Suggestions for Control Measures**
8	**Freeze-Thaw Cycles**	Moderate	↑	Increasing winter freeze-thaw cycles through the winter months as winter temperatures warm creates potential issues with ice-buildup on structures and damage to hardscaped areas.	Low	Structures and hardscaping are typically designed to manage freeze and thaw though increased freeze thaw cycles may lead to faster deterioration of building components. Roof drainage can be overloaded resulting in ponding on roof, flooding of rain drainage system, and resulting damage to roof leading to leakage and internal damage. Sensitivity is low because winter temperatures will continue to remain below zero	High	Regular maintenance routines for structures and hardscaping can help adapt to a change in freeze-thaw cycles.	Very Low	Moderate	Low	Low	Low	Low	**Health & Safety:** Increased risk of slips and falls for operations personnel. **Financial**: Increased maintenance for roofs and hardscaped areas. **Environmental**: Increased use of deicing agents.	**Low**	Ensure appropriate roof drainage to minimize buildup of water and reduce issues with snow melting and refreezing. As the facility will receive regular transit vehicles, regular ice-management and de-icing is recommended to maintain service levels.
9	**Snow Accumulation**	High	↓	Change in snow loading on structure.	Moderate	Winter precipitation is projected to increase, but with general warming trends there is a downward trend of snow accumulation. This means there is a potential for more rain on snow events	Moderate	With snow loads decreasing, the roof should have some adaptive capacity should snow density change due to increased rain on snow events.	Low	Moderate	Moderate	Moderate	Low	Moderate	**Health & Safety/Financial:** Strucutral failure presents a signifiant impact both to building occupants and fianncially	**Moderate**	Consider changing snow loads, and possibility for changing snow density in structural design. Consider predominant wind load ing direction and a simple roof design to limit the impacts of drifting snow on the solar panels.
10	**Drought**	Moderate	↑	Drought and water restrictions may impact bus washing operations.	Low	Reduced summer precipitation and increased summer temperatures may Increase periods of drought in the region which may impact water use restrictions for non-essential uses.	High	Bus washing schedules could be managed with water restrictions.	Very Low	High	Very Low	Very Low	Very Low	Very Low	**Financial:** May impact bus maintenance.	**Low**	Plan for annual water restrictions during summer months. Consider a bus washwater / stormwater drainage retention basin or wetland to treat washwater prior to discharge. Stormwater in a retention basin could be used for irrigation during dry summer months.
11		Moderate	↑	Increased need of water for irrigation of landscaping.	Low	During summer months, plant health and appearance will be affected by high temperatures and potential imposed water restrictions will also increase the risk of impacting the building landscape.	Very High	Plan to incorporate drought tolerant plants. Watering schedules can be adjusted.	Very Low	Low	Very Low	Very Low	Low	Low	**Environmental:** Increased water consumption for irrigation.	**Low**	Consider drought tolerant plants or xeriscaping in landscaping plan. Consider large scale rainwater capture for irrigation. Adjust water irrigation schedules.

	Exposure				Vulnerability					Risk							Adaptation
					Sensitivity		Adaptive Capacity					Severity of Impact					
ID	Climate Hazard	Likelihood of Climate Hazard Rating	Trend	Potential Impact	Rating	Rationale	Rating	Rationale	Vulnerability Rating	Likelihood of impact	Health and Safety	Financial / Economic	Environmental	Severity Rating	Severity Rationale	Risk Rating	Suggestions for Control Measures
12	**Extreme Precipitation and Pluvial Flooding**	Moderate	↑	Accelerated degradation of roof	Moderate	Roof drainage can be overloaded resulting in ponding on roof, flooding of rain drainage system, and resulting damage to roof leading to leakage and internal damage. The historical 15 min storm is projected to increase by 8% over the long-term horizon, making the roof drainage system moderately sensitive to increases in precipitation.	Moderate	Design of the roof drainage system should consider future precipitation, as it will be expensive to retrofit once constructed.	Low	Low	Very Low	Low	Very Low	Low	**Financial:** Excess ponding on roof could accelerate its degradation. Cost associated with roof leakage repairs can be high because of the emergency.	**Low**	Ensure roof drainage design considers increased rainfall volumes due to climate change. Monitor condition of roof/envelope to ensure water damage does not occur.
13		Moderate	↑	Risk of pluvial flooding of building if precipitation exceeds capacity of stormwater systems.	Low	Flooding of the garage is possible if the site drainage system is undersized, or site grading is poor. Site is located in a medium density urban area. The 24 hour 5 year storm event is projected to increase by about 8% over the long-term horizon.	Moderate	Retroactive improvements to local drainage including grading changes, sump pumps, foundation drains, or increases to storm pipe conveyance capacity would be expensive and invasive. Storm system is open channel ditches bordering the property. Increasing the hardscaping will increase runoff. Design of drainage systems should consider future precipitatoin.	Low	Low	Low	Moderate	Low	Moderate	**Financial:** Damage caused by flooding is expensive to repair. Replacement of mechanical and electrical equipment is labour intensive, has long lead times and is expensive. **Environmental:** Potential contamination of flood water with diesel or other pollutants.	**Low**	Ensure storm drainage design considers increased rainfall volume due to climate change by using sources such as the IDF_CC tool. Ensure stormwater drainage is managed onsite and does not impact adjacent properties. Ensure timely maintenance and clean out of catch basins and manholes following storms. Locate critical mechanical and electrical equipment on equipment pads. Ensure adequate foundation drainage and sump pump control to manage excess water. Monitor the foundation for cracks. Keep flood mitigation supplies (spill kits/scrubbers) on hand to use in the event of a flood. Install backwater valves on all sanitary and storm services with direct connection to building drainage. Consider a stormwater retention basin to account for the increase in hardscaping and for potential irrigation.
14		Moderate	↑	Risk of sanitary backflow during extreme precipitation events.	Low	Backflow events are possible during extreme precipitation events that contribute signficant inflow & infiltration and overload the sewer system. The site is located in a medium density residential/industrial area with newer housing developments. If the sewer system was appropriately sized and constructed, it is unlikely to be susceptible to backflow events.	High	A relatively new sewer system,appropriately sized and constructed sewer system should be in good condition and have appropriate capacity to accommodate some inflow & infiltration.	Very Low	Low	Low	Moderate	Low	Moderate	**Health & Safety:** A backflow event could result in sewage flooding an occupied area. **Financial:** A storm or sanitary backflow event could cause damage to the building's interior resulting in expensive cleaning and repairs. **Environmental:** A sewage spill could reach the stormwater system or drain on the ground.	**Low**	A backflow valve can be installed on sanitary sewer connection to minimize risks or a sewage overflow. Locate critical mechanical and electrical equipment on equipment pads to minimize any damage from any kind of flooding.
15		Moderate	↑	Increased risk of pluvial flooding of exterior elements (access roads, parking stalls, etc.)	Moderate	Pluvial flooding is possible if the site drainage system is undersized. The 24 hour 5 year storm event is projected to increase by about 8% over the long-term horizon, making the system moderately sensitive to future increases in precipitation.	Moderate	Storm system is open channel ditches bordering the property. Increasing the hardscaping will increase runoff. Design of drainage systems should consider future precipitation.	Low	Low	Low	Low	Low	Low	**Health & Safety:** Flooding on site could temporarily impact operations personnel. **Financial:** Pluvial flooding on site could halt operations and cause damage to exterior elements of the building and prevent access if roadways flooded. **Environmental:** Increased ponding or flow down slope could inundate plants or cause minor erosion.	**Low**	Ensure storm drainage design considers increased rainfall volume due to climate change by using sources such as the IDF_CC tool. Ensure timely maintenance and clean out of catch basins and manholes following storms. Reducing hardscaping and using bioswales and rain gardens to encourage infiltration of rainfall, and adoption of nature-based solutions to manage rainwater, would be beneficial to manage water on site during frequent, low intensity storms.
16	**Extreme Winds and Storm Activity**	Very Low	↑	Power and communications system failure due to extreme wind event	High	As extreme winds and storm events increase, there is potential for impacts to the grid disrupting transit service. Impact depends on the length of the power outage, backup power and the levels of transit service required.	Low	Grid is owned by Manitoba Hydro and impacts will be offsite. Winnipeg Transit has no control over power grid.	High	Low	Moderate	High	Low	High	**Financial:** Power outage could affect ability to provide bus service.	**Moderate**	Generator and /or battery storage is recommended for critical systems. Identifying the required level of service needed during emergency power outages to appropriately size generator and battery storage system is recommended. Ensure emergency preparedness planning takes into account extended power outages and prioritize critical areas for power. Ensure trees nearby site and overhead lines are continuously maintained to remove branches/trees which may fall in a storm and damage the power poles/lines.
17		Very Low	↑	Accelerated degradation of building envelope	Moderate	High winds due to storm activity may increase, there is a potential for wind loading to exceed the design of the cladding if the impacts of climate change on wind loads for envelope are not considered.	Moderate	Selection of appropriate material, resistant to this type of extreme conditions and cladding replacement is recommended at design stage.	Low	Very Low	Low	Moderate	Low	Moderate	**Financial:** Damage to building cladding would be a moderate cost to repair.	**Low**	Cladding should be designed considering future wind loads. Monitor performance of building envelope following high wind events and replace damaged cladding as necessary.
18		Very Low	↑	Increased lateral loading affecting building structure	High	As high winds due to storm activity are projected to increase, there is a potential for wind loading to exceed the threshold design values on the structure if impacts of climate change are not considered.	Low	Structural reinforcements completed post-construction are very expensive.	High	Low	Moderate	Moderate	Low	Moderate	**Financial:** Damage to building structure would impact operations and be a significant cost to repair.	**Low**	Consider future wind projections in structural design criteria. Ensure solar panels are rated for future wind speeds.

	Exposure				Vulnerability					Risk							Adaptation
					Sensitivity		Adaptive Capacity				Severity of Impact						
ID	Climate Hazard	Likelihood of Climate Hazard Rating	Trend	Potential Impact	Rating	Rationale	Rating	Rationale	Vulnerability Rating	Likelihood of impact	Health and Safety	Financial / Economic	Environmental	Severity Rating	Severity Rationale	Risk Rating	Suggestions for Control Measures
19	**Tornadoes**	Low	No trend	Depending on the magnitude of the tornado, there could be significant impacts on the structure and roof of the garage, power and communications system failure.	High	Projections for future tornado activity are not well defined. Winnipeg is located in one of Canada's tornado alleys and has several tornadoes per year of varying magnitudes.	Very Low	National Building Codes do not require the bus garage to be designed for tornado wind speeds.	High	Moderate	Very High	Very High	Very High	Very High	**Health & Safety:** Damage due to a tornado could significantly impact operations personnel. **Financial:** Damage to building structure would be a significant cost to repair.	**High**	A tornado impacting the garage is a low probability, high consequence event for which there isn't an established design standard. It is recommended that Winnipeg Transit identify the required level of operatbility following a disaster for a Bus Transit garage to determine what level of resilience to achieve with respect to tornado risk. An emergency response plan should be in place in the event of a tornado impacting service.
20	**Freezing Rain**	Moderate	↑	Freezing rain has potential to cause power and communications failures. This could impact operations at the bus garage and impact service delivery of the electric battery buses and fuel cell battery electric buses.	High	Freezing rain is projected to increase with climate change. This has potential to cause significant impacts to overhead power lines due to the weight of the ice, or trees falling on lines. High winds can exacerbate the impact.	Low	The grid is owned and operated by Manitoba Hydro. Winnipeg Transit purchases power from Manitoba Hydro and don't have control over their infrastructure.	High	High	Moderate	Moderate	Low	Moderate	**Health & Safety:** Service interruptions due to power outage could impact transit users. **Financial**: Power outage due to freezing rain could significantly impact service delivery.	**High**	Battery storage and backup generator to provide power during power outages for critical bus garage activities should be considered. A study to determine levels of service during a power outage may required to determine sizing requirements for battery storage and generators. As transit is an essnetial service, an emergency response plan is recommended for extended power outages.
21		Moderate	↑	Freezing rain on hardscaping can impact operations.	Low	Occurrence of freezing rain is projected to increase, but this can be managed through deicing operations.	High	Ice buildup can be managed through deicing operatoins.	Very Low	Low	Low	Low	Low	Low	**Health & Safety**: Increased risk of slips and falls for operations personnel. **Financial:** Increased maintenance of hardscaped areas. **Environmental**: Increased salts and deicing chemicals discharged to the environment.	**Low**	As the facility will receive regular transit vehicles, regular ice-management and de-icing is recommended to maintain service levels.

THE BROOKLANDS LANDFILL SITE

LANDFILL NO. 28

A. J.
KULUK
Jan. 31/85

A. J. Kuluk, P. Eng.

C. A. Potter, C.E.T.

Waterworks, Waste and
Disposal Department

City of Winnipeg

December , 1984

TABLE OF CONTENTS

INTRODUCTION

History:

Underwood, McLellan & Associates Ltd. were engaged by the City of Winnipeg to carry out a study of past and present sanitary landfill and dump sites used by the City of Winnipeg. The Brooklands area site was identified as a possible landfill site in the City of Winnipeg Sanitary Landfill Study, November 1975 by Underwood, McLellan & Associates Ltd. The excerpt from their report is included as Appendix A.

The area was investigated by Independent Test Lab Ltd. in 1978 for the proposed Oak Point Highway Imperial Industrial site. The results of their investigation were included in three reports. The site was not developed and remains undeveloped to the present.

Following the Independent Test Lab. Ltd. investigation, the City of Winnipeg commenced a 5-year landfill evaluation program. The Brooklands landfill site was investigated by the Landfill Environmental Section under the terms of reference of the Methane Gas Policy adopted by Council in 1979.

The scope of the investigation by the Landfill Environmental Section at the Brooklands site was as follows:

1) A review of previous reports and investigations.

2) An air photo evaluation.

3) Predrilling assessment & mapping of data.

4) Test drilling 17 test holes and installing 10 gas probes.

5) Monitoring of gas probes and gas chromatograph analysis.

6) Interviews with District #2 & #3 Operations personnel.

The purpose of this report is to summarize findings and evaluations for guidance to the City and private property owners. It should be noted in the assessment herein that the 2-year monitoring period requested by the owner results in interpretations less reliable than the usual 3-year monitoring period utilized by the City of Winnipeg.

Reference:

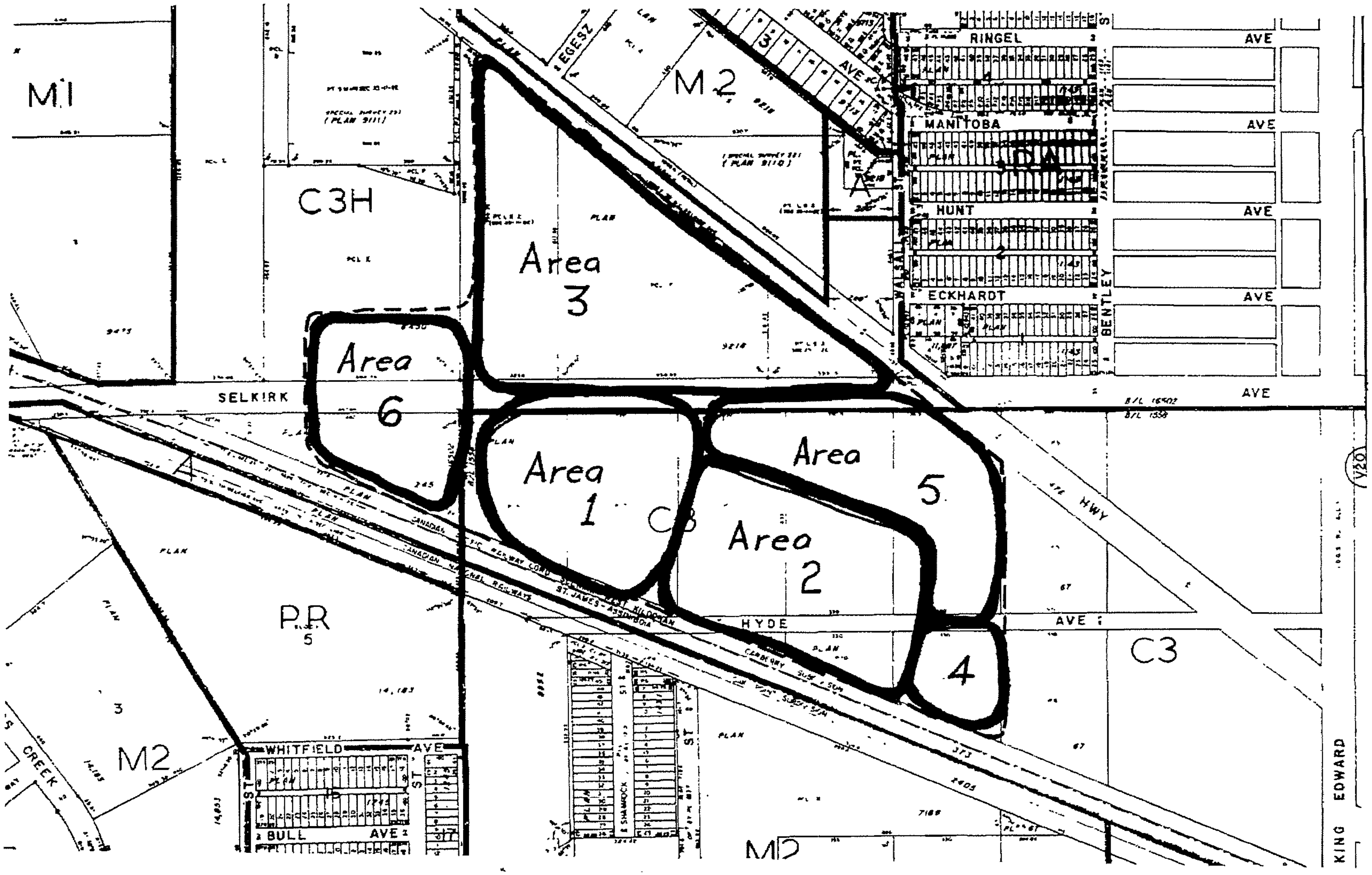
Landfill sites have the potential to produce significant volumes of landfill gas (a mixture composed primarily of equal volumes of methane and carbon dioxide). Methane is an odorless, colorless gas which is explosive when mixed with air in concentrations of 5% to 15% by volume and a source of ignition is present. In addition, another hazard associated with landfill gas is that it can act as an asphyxiant in confined spaces by displacing oxygen.

For reference purposes throughout this report it should be noted that a maximum gas concentration of 20% of the lower explosive limit (L.E.L.) has been adopted as a standard by the City of Winnipeg for evaluating safety relative to methane occurrence. For methane gas, 20% L.E.L. is equal to a concentration of 1% methane by volume.

Investigations and testing by the Landfill Environmental Section have shown that buried topsoil or organic material can produce methane gas.

The term "topsoil" as used by the City within this report refers to soil rich in humus and organic plant residues, usually elluviated; that is, the ultrafine colloidal material and soluable mineral salts have been washed out by percolating water. It is usually dark in color due to the accumulation of large quantities of organic matter. It exhibits characteristics such as high compressibility and elasticity, poor compaction, and variable plasticity.

The consultants' description of soils are quoted as described in their reports.



THE CITY OF WINNIPEG
Landfill Environmental Section
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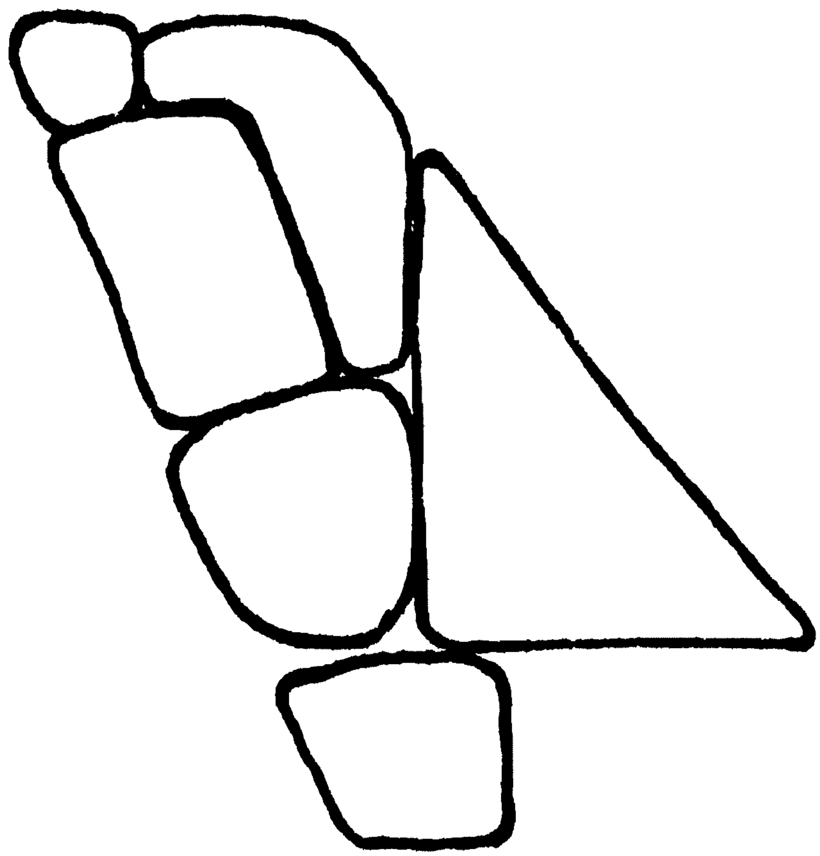
No. 28 Brooklands Landfill Site

Sketch showing Summary Areas
REPORT SUMMARY
Plate 1

CAP-84



SUMMARY OF FINDINGS

The Brooklands landfill site area investigated is a complex fill situation. The variability of filling in this area is shown on the Drawing No. SWD-D-125A. The data obtained for this site allowed for the definition of specific fill types and the most significant areas within the site for methane evaluation. Six areas were identified within the site for detailed methane evaluation. The six areas are described below and shown on Plate 1 in this report.

The areas shown on Plate 1 are as follows:

Area 1: The actual landfill site in P13 & P15, Plan 67.

Area 2: The site of the former Brooklands Speedway.

Area 3: The area north of Selkirk Ave. R.O.W. extending to the Oak Point Hwy.

Area 4: The area of the site, P8, Plan 67, south of the Hyde Ave. R.O.W.

Area 5: The area of the site between the Selkirk and Hyde Ave. R.O.W.'s surrounding the former Brooklands Speedway Site.

Area 6: The portion of the site investigated to the west of the actual landfill site (Area 1).

Area 1: From this investigation, the actual landfill site is now determined to be the area shown on Drawing SWD-D-125. The landfill site was used by the Village of Brooklands during the 1950's for waste disposal. The area is generally filled to a higher elevation than the surrounding terrain. Open hole gas tests (i.e. portable meter testing of gas concentration within a test borehole) by Independent Test Lab Ltd. (I.T.L.) during soil investigations yielded gas concentrations in a number of test holes. The gas concentrations occurred in a range of 1 to 93% L.E.L. (lower explosive limit). The probe OP1 installed in 1978 yielded gas concentrations up to 4% L.E.L..

Gas probes installed by the Landfill Environmental Section at the periphery of Area 1 yielded no detectable methane concentrations during the 2-year monitoring period.

Area 2: The area of the former Brooklands Speedway site was leveled and filled around 1976. The test hole data indicated only one small area to be "refuse-type" fill and the remaining area to be fill over thick organic "topsoil" layers. The fill in this area was identified as containing numerous pockets of organic material and some wood fragments. Our testing of similar conditions has shown that buried topsoil or organic material can produce methane gas.

Open hole gas tests taken during soil investigations by I.T.L. in 1978 indicated a number of gas concentrations in this area ranging from 4% to over 100% L.E.L.. Three probes were installed in the area and monitored by I.T.L. in August 1978. All probes yielded gas concentrations. Gas concentrations in probes OP3 & OP4 exceeded 20% L.E.L..

The Landfill Environmental Section installed probe P17E in this area. No measureable concentrations of methane were detected during the 2-year monitoring period.

Area 3: For the major portion of this area, the existing data were sufficient for evaluation. Further investigation by the Landfill Environmental Section was carried out on a portion of the area containing methane during 1978 soil investigations by I.T.L.. Open hole tests indicated 10 gas concentrations ranging from 1% to 11% L.E.L.. Gas probe OP7 installed and monitored by I.T.L. in August 1978 yielded gas concentrations above 20% L.E.L..

The Landfill Environmental Section installed two gas probes, P7E & P11E, in this area. Trace gas concentrations were detected on two occasions in P7E during two years of monitoring.

A portion of Area 3 at the corner of Selkirk Ave. & Oak Point Hwy. had previously been developed for a gas station. Although the gas station has closed, the building is still on the site. The building has been tested and no gas concentrations have been detected. Fill in this area was examined during Oak Point Hwy. widening. The fill over original topsoil was visibly evident. The results are reported in Site Evaluation - Section F, and shown in photographs - Appendix C.

Area 4: Lot P8, Plan 67, south of Hyde Ave. R.O.W. remains an "unknown" with respect to filling characteristics and methane production. Surface dumping is evident and the area is piled high with debris.

One probe, P16L, was installed by the Landfill Environmental Section in the Hyde Ave. R.O.W. along the north boundary of Area 4. This probe yielded trace methane concentrations on three occasions. The water level indicated was less than 3 feet below ground level.

Due to the "unknown" nature of materials in this area, development in Area 4 will require further investigation and assessment of methane potential by the property owner.

Area 5: The variability of filling of the site is evident in Area 5. The "refuse-type" fill is described as silty clay containing rubble, steel, wire, tin cans & paper. The "cinders-and- ash-type" fill examined contained negligible amounts of organic material. Both of these types occur incidentally throughout the fill in small pockets or layers and as such comprise only a minor component of the overall fill in the area. The fill overlies varying thicknesses of organic topsoil. This organic topsoil is considered to have methane generating potential.

Gas testing of open holes during soil investigations by I.T.L. in 1978 yielded gas concentrations of 1% to 20% L.E.L. in two general areas within Area 5. I.T.L.'s 1978 gas probe OP6 yielded gas concentrations over 20% L.E.L..

The Landfill Environmental Section installed two probes, one in each general area identified by I.T.L.. No detectable gas concentrations were detected in probe P9E. However, during 1982 and 1983 probe P6E yielded consistent gas concentrations, the highest being 20% L.E.L.. Recently, no measureable gas concentrations have been detected in probe P6E.

Area 6: The existing data on this area were considered sufficient for its evaluation. Further investigation of the area by the Landfill Environmental Section was deemed unnecessary. The area was identified as partially filled, and the fill was placed over "topsoil".

CONCLUSIONS

In any of the areas where topsoil or organic material has been buried in fill, or topsoil has been covered by fill, some methane generating potential exists and therefore must be addressed in any development of this site.

The conclusions with respect to the areas identified in the Summary are as follows:

Area 1: The actual landfill site boundary is shown on Drawing no. SWD-D-125. A control zone of 15m has been established around the site. The eastern portion of the landfill site extends beyond City-owned property. All regulations with respect to landfill sites and control zones are applicable to this area.

Area 2, Area 3 and Area 5: These areas do not form part of the actual landfill site. However, these areas are complex fill situations with varying fill types and fill overlying organic topsoil.

The gas concentrations that have been detected within these areas are attributed to the organic topsoil underlying the fill. Engineers and developers will have to address the potential for methane occurrence for any buildings or services proposed within these areas.

Area 4: This area will require additional testing and evaluation to obtain the confidence required as to the methane potential of the area. Until this has been established a control zone of 15m has been placed around Area 4.

Area 6: This area is not considered part of the landfill site and restrictions with respect to landfills are not applicable to this area.

SITE EVALUATION

SECTION A - PREVIOUS REPORTS

SECTION B - AIR PHOTO EVALUATION

SECTION C - PREDRILLING ASSESSMENT & MAPPING

SECTION D - LANDFILL ENVIRONMENTAL SECTION PROGRAM

SECTION E - DRILL REPORTS & MONITORING RESULTS

SECTION F - MISCELLANEOUS

a) Oak Point Hwy. Widening

b) Interview with Operations Personnel

SITE EVALUATION

SECTION A - PREVIOUS REPORTS

a) City of Winnipeg Sanitary Landfill Study
- November, 1975 by Underwood, McLellan & Associates

This report identified this site as Landfill No. 28. Excerpt from report included as Appendix "A".

b) Report on Subsurface Investigation of the Oak Point Highway Industrial Site.
- July, 1978 by Independent Test Lab Ltd.

The scope of this report included an air photo investigation and test drilling 12 test holes, resulting in the identification of four distinct areas of landfill operations.

c) Report No. 2 Subsurface Investigation of the Imperial Airport Industrial Site
- August, 1978 by Independent Test Lab Ltd.

The program associated with this report involved drilling 244 test holes, installing 7 gas probes, monitoring of gas concentrations and surveying topography.

The results indicated three areas of significant methane concentrations and a few other localized deposits where low and trace methane gas concentrations were detected. The probable source of gas production was identified as:

a) "topsoil and garbage landfill"

and b) "natural organics and silts" described as organic muskeg soils with underlying silt layers allowing gas accumulations.

d) Report No. 3 Landfill Classification Study of the Imperial Airport Site

- October, 1978 by Independent Test Lab Ltd.

The scope of this report was to classify the landfills according to a number of factors impacting on the public hazard they present.

A plan for the Brooklands site showing the boundaries of six types of landfill is developed.

Also included in this report are the results of 30 test holes in the expanded site area in the southwest corner (Dwg. No. 16-3-1).

Note: The drawings presented in these reports (b,c,d) are included in Appendix "B".

SITE EVALUATION

SECTION B - AIR PHOTO EVALUATION

The area of landfill site investigation is shown on Location Plan, Figure 1. An air photo evaluation of this area was carried out for the years 1950, 1962, 1968, 1972, 1975 and 1977. The results are interpreted as per attached Figures 2 - 6 inclusive and summarized as follows:

The air photo investigation of the area indicated that virgin terrain of prairie and agricultural fields was systematically surface filled over a number of years, as shown on photos: Area 1 - 1950, Area 4 - 1962-1968, Area 3 - 1968, Area 6 - 1972 and Area 5 - 1977. There were no indications of surface excavations.

An odd feature is apparent as "active" in 1950 and as a remnant in 1962. This feature is composed of long, narrow depressions between parallel, long, narrow spoil piles, possibly representing an early stage of landfilling activity.

Dumping activity appears to have been extended west of the boundary defined by Independent Test Lab Ltd.. Between the years 1968 and 1972 dumping was carried out in the triangularly shaped parcel of land south of the Selkirk Avenue road allowance, north of the C.P.R. right-of-way west of the previously reported boundary.

Figure 6 shows the entire area filled by 1977. Between 1974 and 1977 the site of the Brooklands Speedway (Area 2) was leveled and filled.

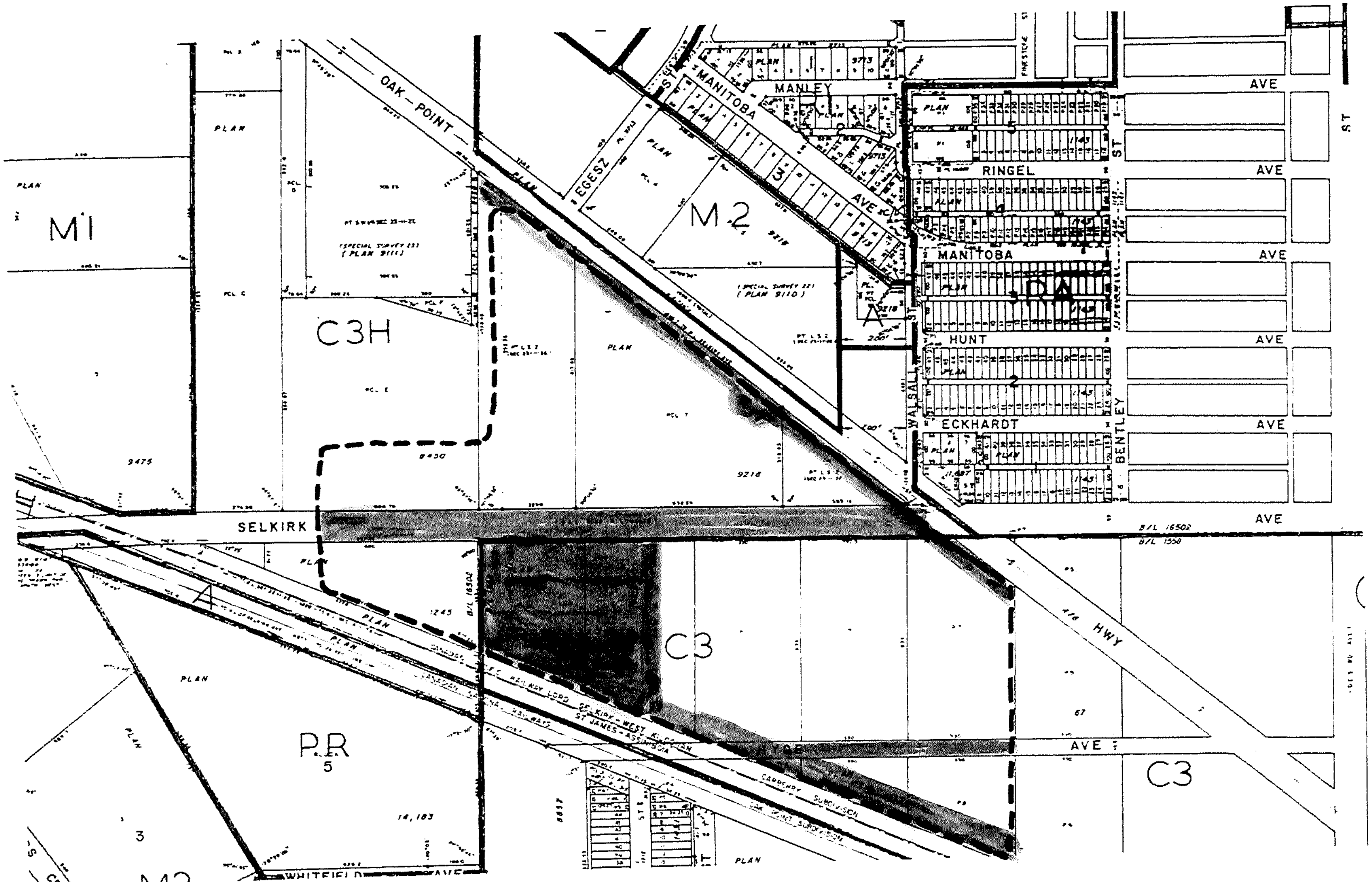


FIGURE 1

No. 28 Brooklands Landfill Site
Location Plan
Area of Investigation Outlined (dashed line)
City of Winnipeg Property (shaded area)

CAP-84

THE CITY OF WINNIPEG
Landfill Environmental Section
Waterworks, Waste and Disposal Division
1500 PLESSIS ROAD BOX 178 TRANSCONA P.O.
WINNIPEG, MANITOBA R2C 2Z9
PHONE 334-4385

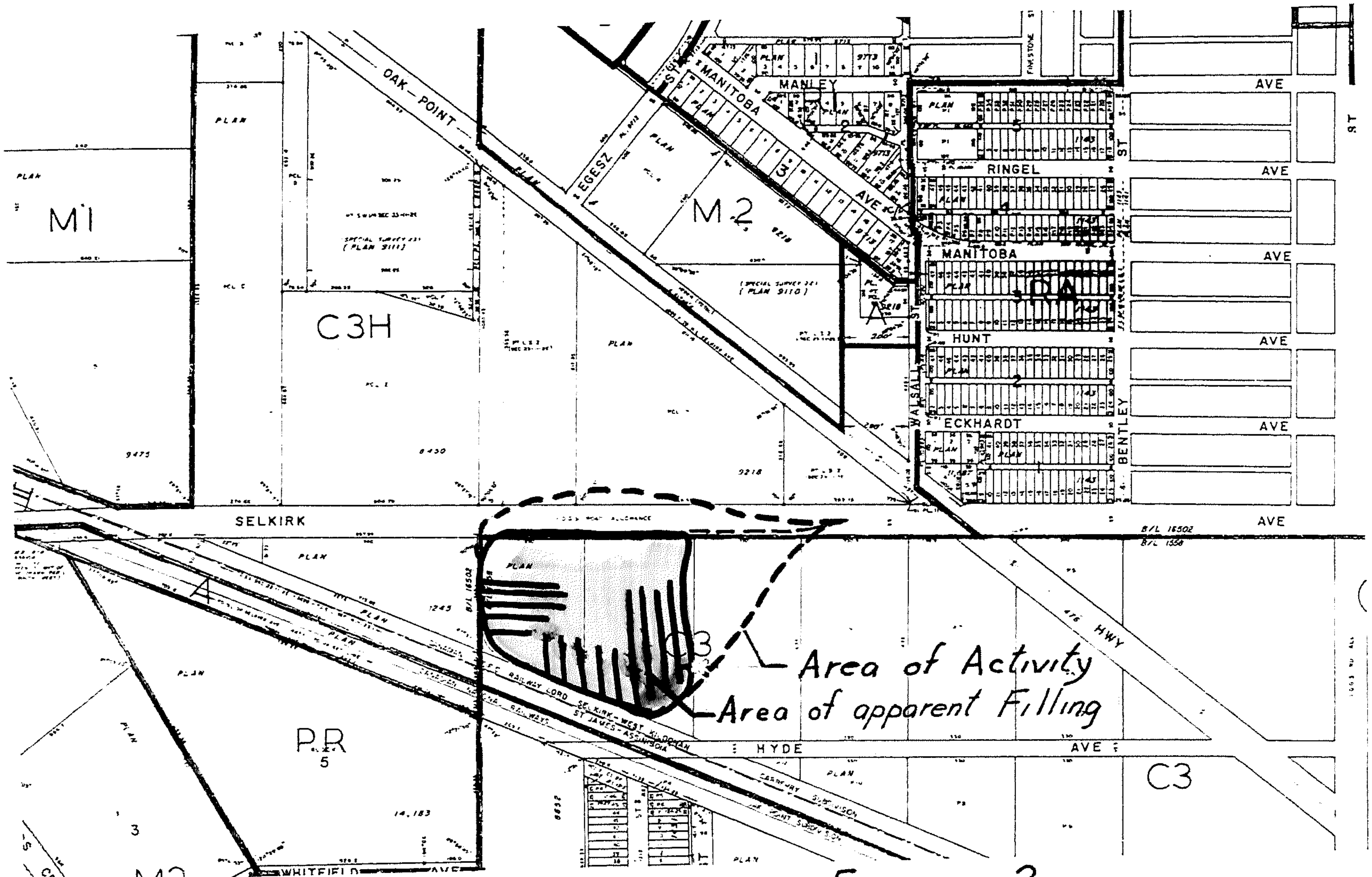


FIGURE 2

No. 28 Brooklands Landfill Site

Air Photo Evaluation

1950

Photos A12667 - 389 & 390

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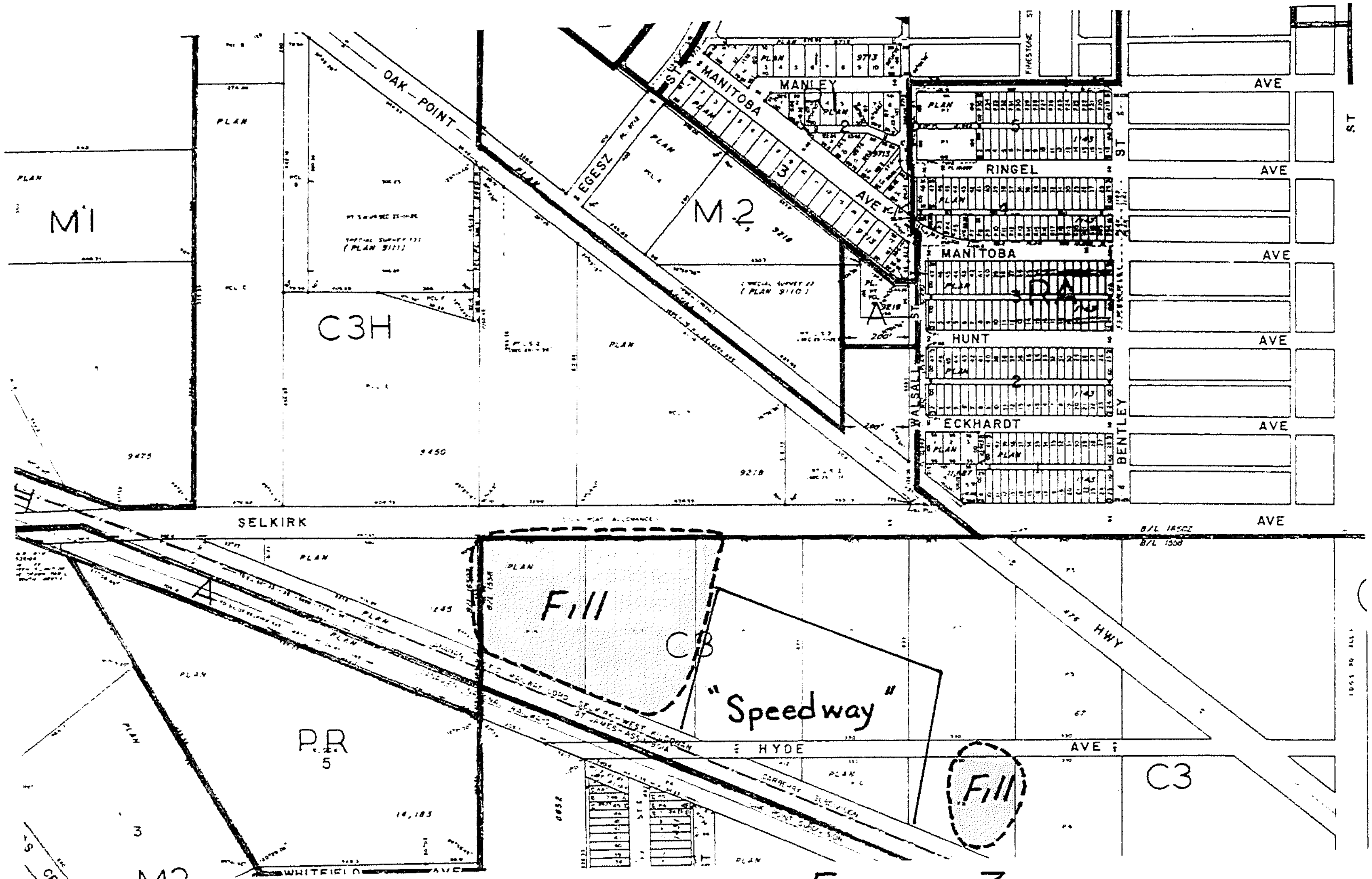

FIGURE 3

No. 28 BrooKlands Landfill Site
Air Photo Evaluation
1962
Air Photos A17707 - 62 & 63

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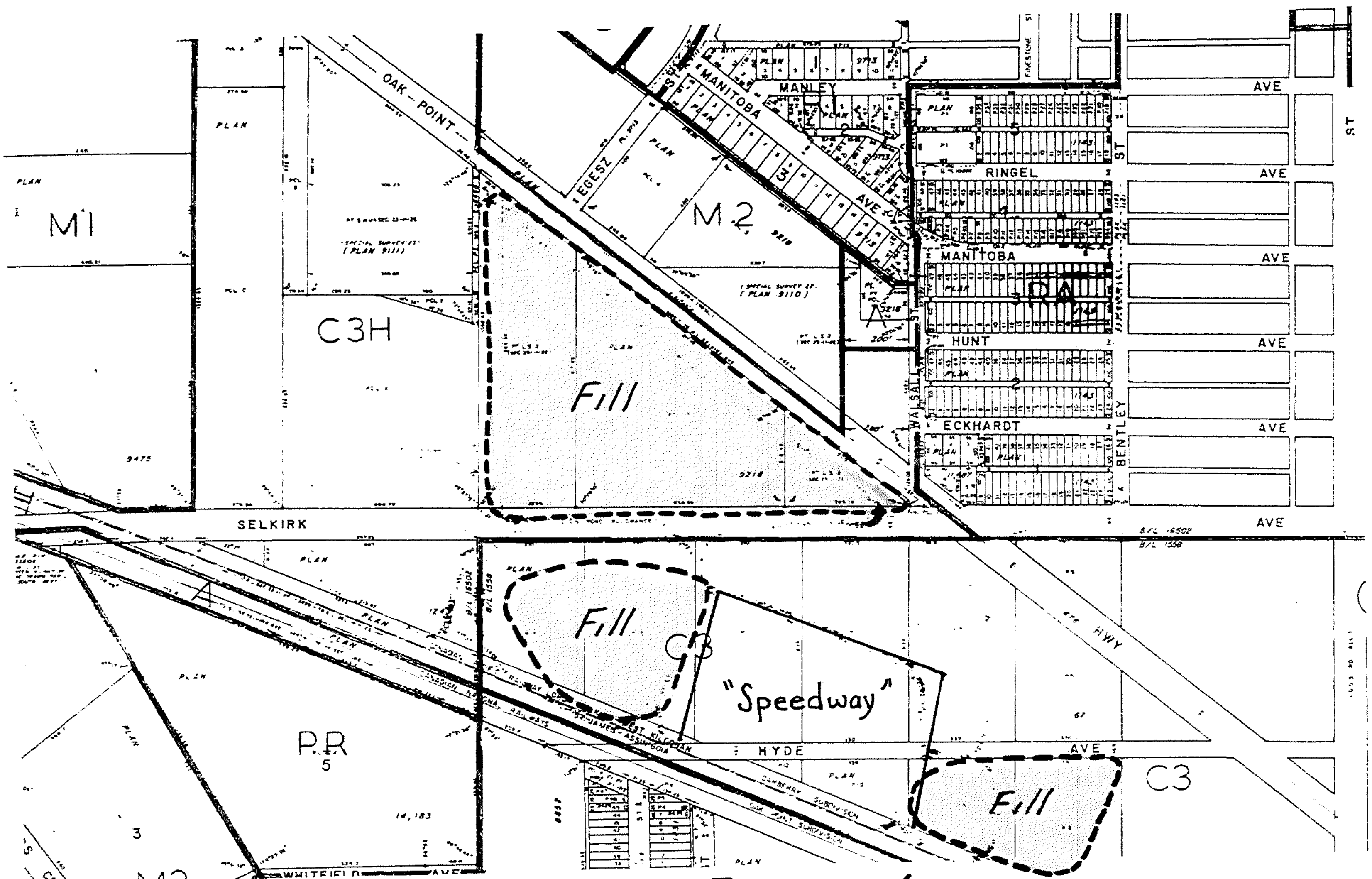

FIGURE 4

No. 28 Brooklands Landfill Site
Air Photo Evaluation
1968
Air Photos A 20411 - 18 & 19

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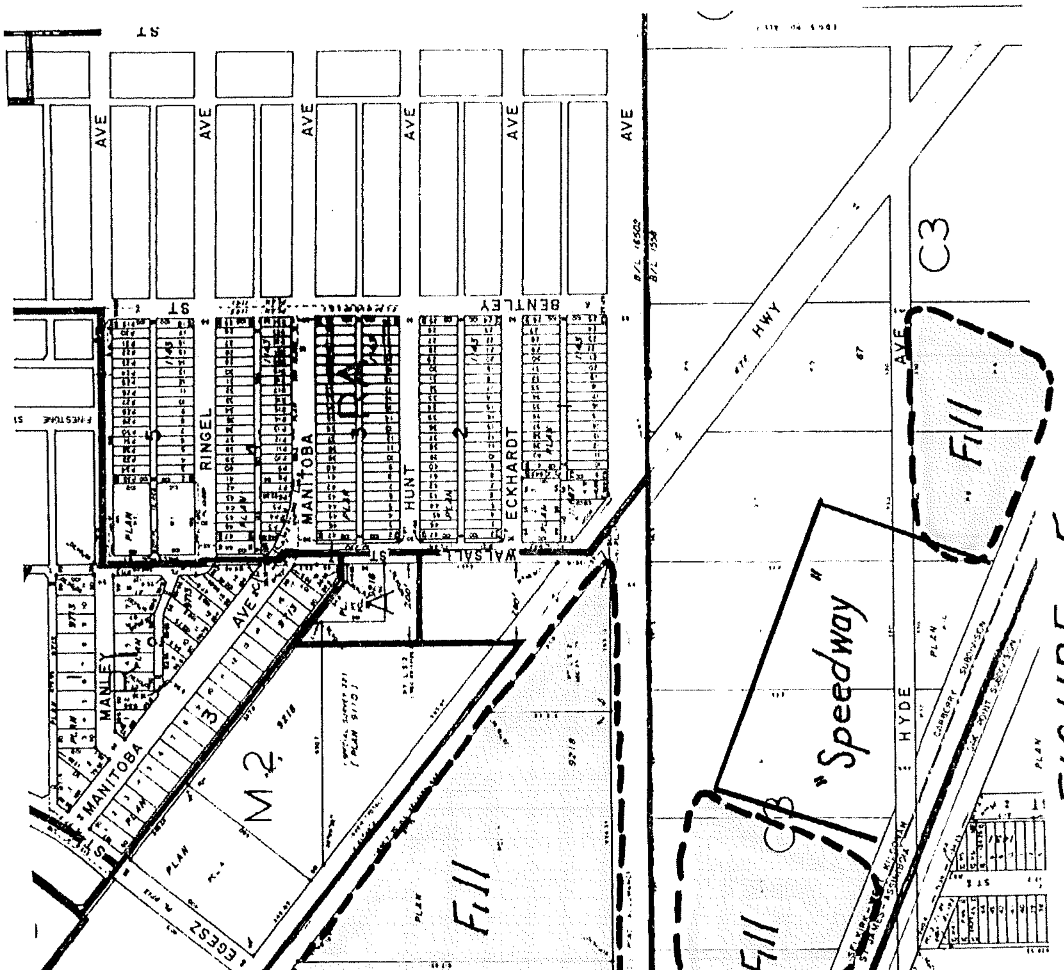

FIGURE 5
No. 28 Brooklands Landfill Site
Air Photo Evaluation
1972
Air Photos A22448 - 27 & 28

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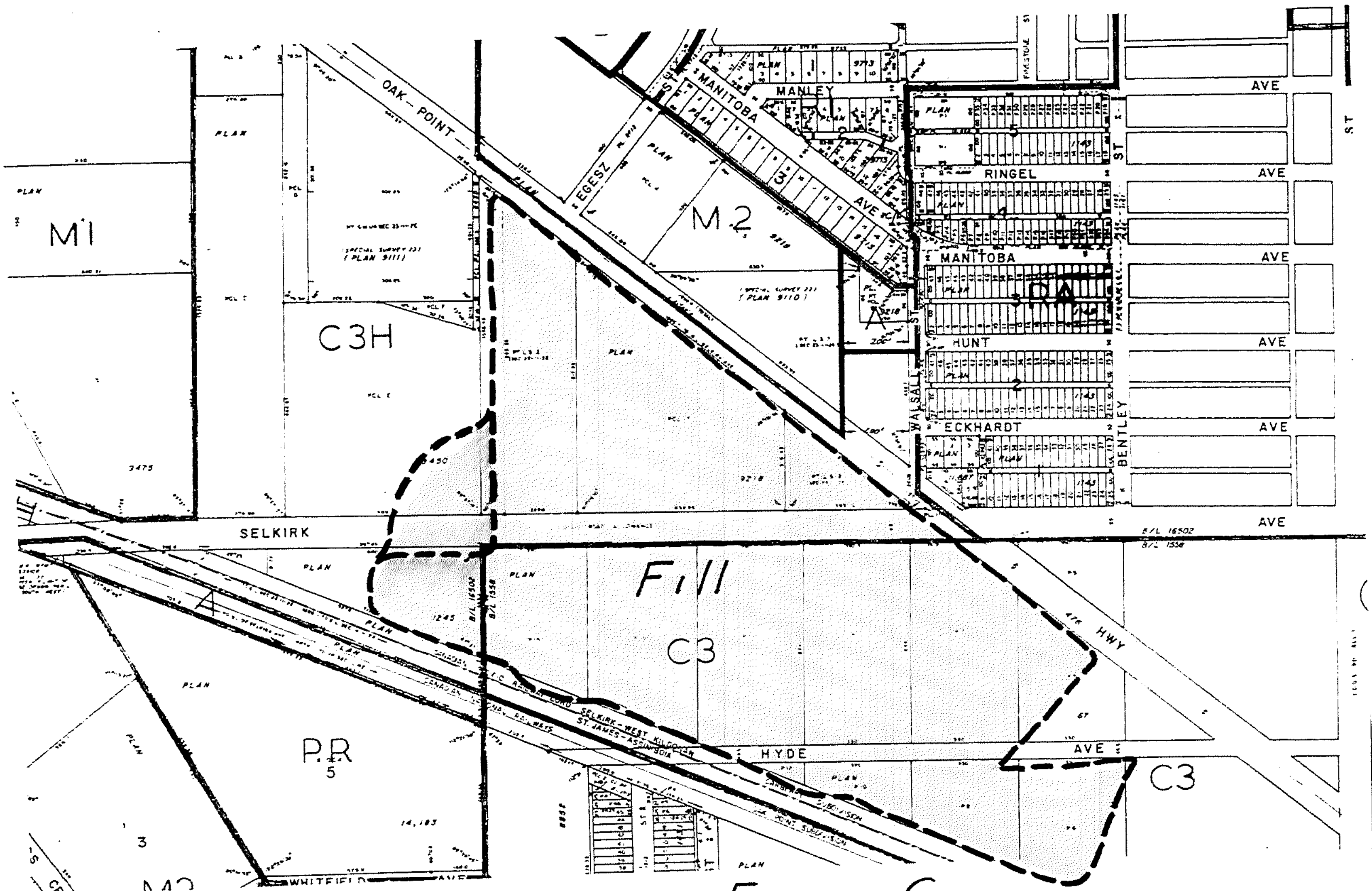

FIGURE 6

No. 28 Brooklands Landfill Site
Air Photo Evaluation
1977
Air Photos A 24650 - 26 & 27

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SITE EVALUATION

SECTION C - PREDRILLING ASSESSMENT & MAPPING

An analysis of plans and data resulted in the development of a composite plan with areas designated in terms of priority for assessment. The plan, Drawing SWD-D-125A is attached.

There are eight areas shaded red, designated as R1 to R8 inclusive representing areas in which refuse material was identified in the fill.

There are three areas shaded orange, designated as G1, G2 and G3 representing areas in which cinders and ash were identified in the fill.

There are six areas shaded blue, designated as B1 to B6 inclusive representing areas in which highly organic fill was identified.

In addition to the areas designated according to type of fill material, there are seven areas shaded green delineating areas of detectable gas concentrations.

The areas identified above were grouped for assessment as follows:

a) G1 and B2
b) R1, R2, R3, R4, B4 and N1
c) R5 and N2
d) R6, G2, B5, N4, and N7
e) R7, G3, B6 and N6
f) B1
g) B3
h) R8 and N3
i) N5

The data available for these groups is presented in the following tables.

TEST HOLE	RELATIVE ELEVATION (ft.) (700+)	DEPTH (ft.)	FILL(F) or REFUSE(R) INTERVAL ....ft. to ....ft.	ELEVATION OF BASE OF FILL OR REFUSE (ft.) (700+)	FILL/REFUSE INTERVAL THICKNESS (ft.)	GAS READING (% LEL)	REMARKS
7	72.6	10	F 0 – 3	69.6	3	3	"Water @ 9'"
8	71.9	10	F 0 – 1.5	70.4	1.5	0	"Water @ 9'"
9	72.8	10	NOT INDICATED		0	0	"Water @ 8'"
25	75.6	19	F 0 – 5	70.6	5		
24	75.7	12	F 0 – 5.5	70.2	5.5		"Organic pockets 5.5 – 7.5"
23	72.9	6.5	F 0 – 4	68.9	4		"Concrete Rubble"
35	75.8	12.5	F 0 – 7	68.8	7	0	
36	76.0	11	F 0 – 7	69.0	7	0	"Organic topsoil 7.0 – 8.5'"
37	71.6	8	NOT INDICATED		0	0	
55	75.5	5	F 0 – 5+		5+	0	"Rubble – refusal @ 5'"
54	75.4	8	F 0 – 5.5	69.9	5.5	0	
53	70.6	6	NOT INDICATED		0		
A4	75.5	11	F 0 – 5	70.5	5		"Stone & brick, clay."
A4			R 5 – 7	68.5	2		"Cinders, cans, tin."

TABLE I – AREA GROUPING a) G1 & B2
SUMMARY OF INDEPENDENT TEST-LAB'S TEST HOLE DATA

TEST HOLE	RELATIVE ELEVATION (ft.) (700+)	DEPTH (ft.)	FILL(F) or REFUSE(R) INTERVAL ....ft. to ....ft.	ELEVATION OF BASE OF FILL OR REFUSE (ft.) (700+)	FILL/REFUSE INTERVAL THICKNESS (ft.)	GAS READING (% LEL)	REMARKS
42	79.6	10	F 0 – 8.5	71.1	8.5	2 – 93	"Peat, tins, rubble"
43	78.8	14	R 0 – 9	69.8	9	8 – 58	"Refuse"
44	77.0	9	F 0 – 6	71.0	6	1	"Topsoil layer"
47	77.8	10.5	F 0 – 7	70.8	7	0	"Rubble"
46	77.1	10	F 0 – 6.5	70.6	6.5	1 – 10	"Organic layer 6.5–7.5" "Mal odor"
45	75.4	12	F 0 – 7.5	67.9	7.5	0	"Layer organic 7.5 – 8.5"
69	77.6	14	R 0 – 10	67.6	10	0	
70	75.5	10.5	F 0 – 6	69.5	6	3	"Rubble"
71	75.4	8	F 0 – 5	70.4	5	–	"Gravel & Cobbles"
18	81.2	13	F 0 – 7	74.2	7	0	"Topsoil layer"
19	78.7	12	F 0 – 5.5	73.2	5.5	0	"Peaty"
20	73.3	8	F 0 – 1	72.3	1	0	"Silt & topsoil layer"
13	74.5	13	F 0 – 10	64.5	10	0	"Water @ 4'"
41	79.6	3	F 0 – 3+		3+	93	"Abondoned. Cables"

Continued on Next Page . . .

TABLE II – AREA GROUPING b) N1, R1 & B4
SUMMARY OF INDEPENDENT TEST-LAB'S TEST HOLE DATA

THE CITY OF WINNIPEG
Landfill Environmental Section

TEST HOLE	RELATIVE ELEVATION (ft.) (700+)	DEPTH (ft.)	FILL(F) or REFUSE(R) INTERVAL ....ft. to ....ft.	ELEVATION OF BASE OF FILL OR REFUSE (ft.) (700+)	FILL/REFUSE INTERVAL THICKNESS (ft.)	GAS READING (% LEL)	REMARKS
48	77.9	14	R 0 – 7	70.9	7	0	"Bedsprings, glass, etc." Caving.
49	77.3	4.5	R 0 – 4.5+		4.5+	0 – 93	"Tin, cables, wood, glass," Refusal.
50	71.7	10	R 0 – 3.5	68.2	3.5	2	"Bricks, porcelain"
77	76.8						
75	75.9	11	R 0 – 6	69.9	6	0	"Refuse – glass, tins." Topsoil layer
74	75.8	7	F 0 – 5 R 5 – 7+		7+		"Refuse mostly metal." Auger refusal cables @ 7'
94	74.6	9	F 0 – 3.5 R 3.5 – 6	68.6	6	0	"Glass & tin."
A10	77.5	15	F 0 – 5	72.5	5		"Silt & clay, stones, organic pockets"
			R 5 – 8.5	69	3.5		"Black organic clay, tin cans, pieces of wood"
A11	74.5	13	F 0 – 6	68.5	6		"Organic layer 6 – 7'"

TABLE II cont'd – AREA GROUPING b) R2, R3 & R4

SUMMARY OF INDEPENDENT TEST-LAB'S TEST HOLE DATA

TEST HOLE	RELATIVE ELEVATION (ft.) (700+)	DEPTH (ft.)	FILL(F) or REFUSE(R) INTERVAL ....ft. to ....ft.	ELEVATION OF BASE OF FILL OR REFUSE (ft.) (700+)	FILL/REFUSE INTERVAL THICKNESS (ft.)	GAS READING (% LEL)	REMARKS
112	74.2	10.5	R 3 – 6	68.2	6	0	"Mal odor, paper, shingles"
111	72.7	9.5	F 0 – 2	70.7	2	1	"Black organic topsoil"
106	73.0	9	F 0 – 3.5	69.5	3.5	0	
105	72.0	9	F 0 – 3	69.0	3	1	"Black topsoil, wood pieces, fibres"
104	71.8	9	F 0 – 3.5	68.3	3.5	0	
103	71.1	9	F 0 – 2	69.1	2	1	"Fibrous black topsoil"
91	72.4	10	F 0 – 5	67.4	5	2	"Layer of topsoil 5–6'; Water @ 5'"
92	72.3	7	F 0 – 7.0	65.3	7.0	0	"Layer of refuse @ 7'"
113	74.0	11.5	F 0 – 5	69.0	5	11	"Highly organic topsoil 5–6'"
114	72.3	10.5	F 0 – 4.5	67.8	4.5		"Layer of topsoil"
115	70.9	11	F 0 – 2.5	68.4	2.5	0	
132							"No data"
131	74.1						"No data"
130	73.0						"No data"
129	73.3	12.5	F 0 – 5	68.3	5	2	"Topsoil layer @ 5'"
128	72.9	13	F 0 – 5.5	67.4	5.5	18	"Rubble, steel & black organic fibrous topsoil"
A5	73	14	F 0 – 5.5	67.5	5.5		"Concrete, stones, wood, large organic pockets."

TABLE III – AREA GROUPING c) R5 & N2
SUMMARY OF INDEPENDENT TEST-LAB'S TEST HOLE DATA

THE CITY OF WINNIPEG
Landfill Environmental Section

TEST HOLE	RELATIVE ELEVATION (ft.) (700+)	DEPTH (ft.)	FILL(F) or REFUSE(R) INTERVAL ....ft. to ....ft.	ELEVATION OF BASE OF FILL OR REFUSE (ft.) (700+)	FILL/REFUSE INTERVAL THICKNESS (ft.)	GAS READING (% LEL)	REMARKS
151	73.1	11.5	R 0 – 4	69.1	4	0	"Tin, paper"
136	73.2	12	F 0 – 5	68.2	5	0	"Ashes overlying topsoil."
102	72.0	10	F 0 – 3	69.0	3	0	
116	72.2	12	F 0 – 4	68.2	4	0	"Topsoil layer."
127	72.9	10.5	F 0 – 5	67.9	5	0 – 19	
158	72.1					0	"No data"
159	72.5	13	F 0 – 4.5	68.0	4.5	1	"Rubble"
Probe OP6	73.1					26 – 50	
115	70.9	11	F 0 – 2.5	68.4	2.5	0	
128	72.9	13	F 0 – 5.5	67.4	5.5	18	"Rubble, steel, black organic fibrous topsoil"

TABLE IV – AREA GROUPING d) R6, G2, B5, N4 & N7

SUMMARY OF INDEPENDENT TEST-LAB'S TEST HOLE DATA

TEST HOLE	RELATIVE ELEVATION (ft.) (700+)	DEPTH (ft.)	FILL(F) or REFUSE(R) INTERVAL ....ft. to ....ft.	ELEVATION OF BASE OF FILL OR REFUSE (ft.) (700+)	FILL/REFUSE INTERVAL THICKNESS (ft.)	GAS READING (% LEL)	REMARKS
162	73.1	12.5	F 0 – 5	68.1	5	0	"Topsoil 5 – 6'"
163	71.3	12.5	F 0 – 5.5	65.8	5.5	0	"Topsoil"
164	72.3						"No data available."
168	73.4						" " "
167	72.4						" " "
166	73.1						" " "
165	72.8						" " "
180	71.6						" " "
181	72.8						" " "
182	72.6						" " "
183	72.5						" " "
187	70.9						" " "
186	72.3						" " "
185	72.7						" " "
184	–						
A7	72.5	14.5	F 0 – 6	66.5	6	–	"Cinders, ashes"

TABLE V – AREA GROUPING e) R7, G3, B6 & N6

SUMMARY OF INDEPENDENT TEST-LAB'S TEST HOLE DATA

THE CITY OF WINNIPEG

Landfill Environmental Section

TEST HOLE	RELATIVE ELEVATION (ft.) (700+)	DEPTH (ft.)	FILL(F) or REFUSE(R) INTERVAL ....ft. to ....ft.	ELEVATION OF BASE OF FILL OR REFUSE (ft.) (700+)	FILL/REFUSE INTERVAL THICKNESS (ft.)	GAS READING (% LEL)	REMARKS
7	72.6	10	F 0 – 3	69.6	3	3	"Water level 9'"
25	75.6	19	F 0 – 5	70.6	5	0	
35	75.8	12.5	F 0 – 7	68.8	7	0	
6	73.7	13	F 0 – 4	69.7	4	0	"Water @ 11'"
26	75.9	10	F 0 – 5.5	70.4	5.5	0	
34	75.6	11.5	F 0 – 7	68.6	7	0	
5	74.8	12.5	F 0 – 4.5	70.3	4.5	0	"Water @ 10'"
27	76.3	13	F 0 – 7.5	68.8	7.5	0	"Dry"
33	75.7	11	F 0 – 6	69.7	6	0	"Fill oxidized"
4	74.8	3.5	F 0 – 3.5+				"Rubble-refusal"
28	77.0	10	F 0 – 8	69.0	8	0	"Dry"
32	75.6	12	F 0 – 7	68.6	7		
3	74.8	12	F 0 – 7	67.8	7	0	"Water @ 12'"
29	75.6	10	F 0 – 8	67.6	8	0	"Dry"
31	72.3	9	F 0 – 3	69.3	3		
A2	75	14	F 0 – 7	68	7		"Organic layer 7 – 8'"
A1	75	15	F 0 – 8	67	8		"Clay, asphalt, brick, stones, tin cans"

TABLE VI – AREA GROUPING f) B1

SUMMARY OF INDEPENDENT TEST-LAB'S TEST HOLE DATA

THE CITY OF WINNIPEG
Landfill Environmental Section

TEST HOLE	RELATIVE ELEVATION (ft.) (700+)	DEPTH (ft.)	FILL(F) or REFUSE(R) INTERVAL ....ft. to ....ft.	ELEVATION OF BASE OF FILL OR REFUSE (ft.) (700+)	FILL/REFUSE INTERVAL THICKNESS (ft.)	GAS READING (% LEL)	REMARKS
250		12.5	FO – 1.5		1.5		
251		11	FO – 1		1		
252		11.5	NOT INDICATED				
253		10	NOT INDICATED				
10	72.8	10	FO – 1	71.8	1	0	"Dry."
11	73.0	14	NOT INDICATED			0	"Water @ 12'"
12	73.8	10.5	NOT INDICATED			0	"Black organic topsoil; Water @ 9.5'"
22	73.3	7.5	FO – 4	69.3	4	0	"Rubble"
21	72.5	8.5	FO – 6	66.5	6	0	
20	73.3	8	FO – 1	72.3	1	–	"Black organic 1.0 – 1"

TABLE VII – AREA GROUPING g) B3

SUMMARY OF INDEPENDENT TEST-LAB'S TEST HOLE DATA

THE CITY OF WINNIPEG
Landfill Environmental Section

TEST HOLE	RELATIVE ELEVATION (ft.) (700+)	DEPTH (ft.)	FILL(F) or REFUSE(R) INTERVAL ....ft. to ....ft.	ELEVATION OF BASE OF FILL OR REFUSE (ft.) (700+)	FILL/REFUSE INTERVAL THICKNESS (ft.)	GAS READING (% LEL)	REMARKS
99	74.4	12.5	FO – 5.5	68.9	5.5	0	
95	75.4	9	FO – 5	70.4	5	1	
96	73.6	10	FO – 3	70.6	3	21	
97	70.7	8	NONE	70.7	–	4	"Topsoil 0 – 2'"
98	73.1	12.5	FO – 4	69.1	4	>100	"Topsoil @ 4'"
120	73.4	9.5	FO – 4	69.4	4	30	"Organic layer 4–6;'foul odor'"
121	71.8	10.5	FO – 1	70.8	1	11	
126	72.9	5	FO – 5+		5+	–	"Refusal on rubble @ 5'"
125	73.0	12.5	FO – 8.5	64.5	8.5	40	"Clay fill w/organic pockets"
124	73.3	12.5	FO – 7	66.3	7	1	
123	72.8	11	FO – 3.5	69.3	3.5	4	
122	71.3						
139	72.5	12.5	FO – 5	67.5	5	0	"Topsoil layer 5 – 6'"
140	72.2	12	FO – 5	67.2	5	0	"Rubble"
A8	73.0	14	FO – 5	68.0	5		"Organic pockets; pieces of wood"
Probes							
3	73.5					50	
4	73.0					36	
5	72.2					12	

TABLE VIII – AREA GROUPING h) R8 & N3
SUMMARY OF INDEPENDENT TEST-LAB'S TEST HOLE DATA

THE CITY OF WINNIPEG
Landfill Environmental Section

TEST HOLE	RELATIVE ELEVATION (ft.) (700+)	DEPTH (ft.)	FILL(F) or REFUSE(R) INTERVAL ....ft. to ....ft.	ELEVATION OF BASE OF FILL OR REFUSE (ft.) (700+)	FILL/REFUSE INTERVAL THICKNESS (ft.)	GAS READING (% LEL)	REMARKS
171	72.7					0	"No data available"
170	73.0					0	" " "
169	73.4						" " "
168	73.4						" " "
177	72.6						" " "
178							" " "
179	72.4					20	" " "
180	71.6					0	" " "
191	72.3					0	" " "
190	72.9					0	" " "
189	70.6						" " "
188	69.4					0	" " "
A6	73	14	F 0 – 5	68	5		"Large organic pockets"

TABLE IX – AREA GROUPING i) N5

SUMMARY OF INDEPENDENT TEST-LAB'S TEST HOLE DATA

THE CITY OF WINNIPEG
Landfill Environmental Section

Predrilling Assessment & Mapping (Cont'd).

It should be noted that the relative elevations used in the assessments were obtained from Independent Test-Lab's Report No.2, Mosaic Site Plan. It was confirmed by I.T.L. that adding 700 ft. to relative elevations will give geodetic elevations.

The assessment of the groups identified in the preceeding tables is presented as follows:

AREA GROUPING a) G1 and B2 - TABLE I

No refuse is indicated in this area. The base of fill occurs at elevation 768.8 feet at its deepest. The original prairie elevation is interpreted from these data to be 769.0 feet. The saturated water level appears to be approximately 6 feet below original prairie level. The fill is all on surface and varies in thickness from 1 1/2 to 7 feet. Only 1 gas concentration measuring 3% L.E.L. was detected. No further investigation was deemed necessary in this area by the Landfill Environmental Section.

AREA GROUPING b) R1, R2, R3, R4, B4 and N1 - TABLE II

The fill indicated in this area includes refuse-type fill as well as gravel, cobbles and rubble as outlined in drawing. This area is at an elevation higher than surrounding area. The surface elevation is an average of 777 + feet compared with surrounding elevation of approximately 773 feet.

There were detectable concentrations of methane gas varying from 1% to 93% L.E.L. which are attributable to refuse deposits in the fill and/or highly organic "topsoil" at the base of fill.

Only one test hole indicated fill material below elevation 767.5 ft. This depth of fill appears to be an isolated occurrence within this area as evidenced by surrounding test hole data and high water table in this area. In test hole #43 a depth of refuse of 9 feet with detectable gas concentrations has a base elevation of 769.8 feet. This is typical throughout the area and confirms the interpretation of no pits and trenches below original prairie grade.

Refuse-type material was identified in sewer trench excavation by inspector, August 16, 1978. Quote as follows:

> "Encountered garbage at approximately 50 feet west of fourth manhole from Oak Point Hwy. & Selkirk Ave. Garbage layer found from approximately 3-8' below ground level (tires, bottles, tin cans, bed-springs, wood, etc.). Tests were taken at the face and bottom of trench where garbage was found. Test results were negative."

This is the area identified as R3 and a gas probe was installed by the Landfill Environmental Section in close proximity to this area. Only a small portion of this area grouping lies outside City-owned property.

AREA GROUPING c) R5 and N2 - TABLE III

In this area grouping there are only two indications of refuse deposits. The site is generally covered with fairly shallow fill (5 ft. or less). A black topsoil layer underlies the fill layer. Detectable gas concentrations vary from 1% to 18% L.E.L.. Water levels indicate the topsoil layer to be saturated.

The base of fill and/or refuse occurs at an elevation between 767.5 feet and 769.0 feet. There is one test hole, #92, where a layer of refuse is indicated at a base elevation of 765.3 feet. This appears to be an isolated occurrence and no detectable concentrations of methane were recorded.

AREA GROUPING d) R6, G2, B5, N4 and N7 - TABLE IV

As shown on drawing SWD-D-125A these are relatively small areas, less than 20,000 ft.^{2} scattered over the northeast portion of the site south of Selkirk Avenue R.O.W.

This area is covered with fill generally less than 5 ft. in depth. There are indications of pockets of refuse material as well as ashes in the fill. In some areas low concentrations of methane were detected.

Probe OP6 measured concentrations up to 50% L.E.L.. However, the major portion of this area of the site showed no measureable gas concentrations. The methane gas concentrations can be attributed to localized deposits in the fill as well as the organic topsoil underlying the fill.

AREA GROUPING e) R7, G3 B6 and N6 - TABLE V

At the time of assessment the major portion of this area was privately owned. The site is piled high with debris (lumber, wooden pallets, construction waste, 45 gal. drums and other metals) - see photos #4 & 5, Appendix C. The site is being used as a disposal area and as such is almost inaccessible for drilling. Therefore, no easement agreement was arranged for this property.

No data were available on previous test holes as indicated on Table V. Therefore, for purposes of assessment much of the site is an "unknown".

The Landfill Environmental Section installed a gas probe P16L between this area and sewer line to monitor gas concentrations. Trace methane concentrations were obtained on three occasions.

AREA GROUPING f) B1 - TABLE VI

This is a small defined area in the northwest portion of the site. The area is covered with organic clay fill to a depth varying from 3 to 8 feet. The lowest elevation of base of fill was 767.6 feet. The original prairie level appears to be approximately elevation 768 feet. The saturated water level occurs at elevation 763 feet (approximately 5 feet below original prairie level).

Only one gas concentration of 3% L.E.L. was detected in this area grouping. Gas generation can be attributed to the organic layer underlying the fill. However, as shown, the test holes in this grouping and surrounding area showed no measureable methane gas concentrations. No further investigation was deemed necessary by the Landfill Environmental Section.

AREA GROUPING g) B3 - TABLE VII

This is a small defined area along the west site boundary on the Selkirk Avenue R.O.W.. Although data are incomplete, the site is very similar to Area Grouping f). The area is covered with an organic clay fill to a depth of 6 feet. No gas concentrations were detected. A gas probe was installed here by the Landfill Environmental Section. The gas probe yielded no detectable gas concentrations.

AREA GROUPING h) R8 and N3 - TABLE VIII

In this area grouping, R8, delineating an area of refuse-type fill is only a small area, approximately 5000 $ft.^2$. The large surrounding area delineates an area of detectable gas concentrations. This area represents the largest area of significant gas concentrations on the site. Gas concentrations in excess of 100% L.E.L. were detected in open hole tests. The probes installed in this area measured consistent gas concentrations (up to 50% L.E.L. in OP3).

As previously reported and as shown in the air photo evaluation, this area was originally the site of the Brooklands Speedway which was leveled and filled between 1974 and 1977. The methane gas concentrations can be attributed to organic "topsoil" underlying fill.

AREA GROUPING i) N5 TABLE IX

As shown on Table IX, no data was available on test drilling in this area. However, the area was designated under the category of an area of detectable gas concentrations. Only one gas concentration of 20% L.E.L. was recorded in the area. Test hole A6 indicated a 5 ft. depth of fill containing large organic pockets. The Landfill Environmental Section drilled a test hole and installed a gas probe in this area. No gas concentrations were detected. According to previous investigations the area filled was low swampy area with relatively deep thicknesses of "topsoil". The methane gas concentration can be attributed to organic topsoil underlying the fill.

SITE EVALUATION

SECTION D - LANDFILL ENVIRONMENTAL PROGRAM

The program of investigation involved the drilling of 17 test holes and the installation of 10 gas probes (see Section G - Drill Reports). The locations are shown on plan Drawing No. SWD-D-125A. The gas probes were monitored over a period of two years. The usual monitoring period for most sites is three years or more. This reduced monitoring period was adopted at the request of the property owner.

The monitoring results, gas concentrations and water levels, are shown in Section F. Also included are the results of August 1978 monitoring of probes installed by Independent Test Lab Ltd.

The monitored gas concentrations during August 1978 by Independent Test Lab Ltd. indicated a number of gas concentrations above 20% of the Lower Explosive Limit (L.E.L.) in 4 of 7 probes, and detectable gas concentrations in the remaining 3 probes.

Of the 10 probes installed by the Landfill Environmental Section in 1982, and monitored over the next two years, only one probe measured concentrations approaching 20% L.E.L.. The remaining probes measured either no detectable gas concentrations or occasional trace gas concentrations.

This investigation indicates two materials as having the potential for methane gas generation within this site. They are 1) topsoil, and 2) refuse & refuse - type fill.

Topsoil occurs in pockets and layers throughout the fill as well as natural topsoil buried by the fill cover.

Refuse & refuse - type fill were identified in "scattered" areas of the site, as well as the the odd occurrence in pockets and layers within the fill.

Based upon the results of this investigation including:

a) the review of previous investigation reports,

b) the assessment of area groupings.

c) the examination of air photos and the historical developement of the site,

d) the interviews with Operations' personnel (included in Section E - Miscellaneous),

six distinct areas were identified for site evaluation. These are the six areas as shown on Plate 1. The evaluations of these six areas are presented in the Summary of Findings, and Conclusions.

A "Zone of Concern" of 15m has been placed around Area 1 and Area 4. This zone of concern is based upon the criteria established in the overall evaluation of landfill & dump sites as part of the City of Winnipeg's 5-year investigation program.

SITE EVALUATION

SECTION E - MISCELLANEOUS

a) Oak Point Hwy. Widening

During the Oak Point Highway widening, an examination was made of the road cut and utility excavations. Photographs of the excavations are included in Appendix C.

The photographs show the fill overlying original topsoil. A light brown silt and/or silty clay is evident below the "topsoil" black organic layer. The fill exposed here is a dry, silty clay; grey and brown, odd stone and rubble, pieces of metal cable and pipe and some fibrous zones. The gas line trench photo shows the cinder ash type fill with some organic pockets.

b) Interviews with Operations Personnel

It was confirmed in interviews with District #2 personnel that the Village of Brooklands operated the area as shown in 1950 air photo as a dump site. It was reported that the site received all types of waste including local garbage and septic wastes from pit privies as well as rubble and inorganic materials. Burning was carried out at the site. The site was closed prior to amalgamation of Brooklands with the City of St. James in 1967. Uncontrolled dumping continued at the site until it was finally capped with clay in approximately 1968.

Interviews with District #3 personnel confirmed that the site was not used as a dump or landfill site while under the jurisdiction of Operations District #3 (1971 to present). However, they were aware that the site was filled; but the filling which took place here appeared no different than numerous other fill oeprations taking place in the Brooklands area.

SITE EVALUATION

SECTION F - MONITORING RESULTS

LEGEND FOR GRAPHICAL PRESENTATION

OF GAS ANALYSES

✚ - gas concentration obtained by gas chromatograph analysis of sample (percent methane by volume in air).

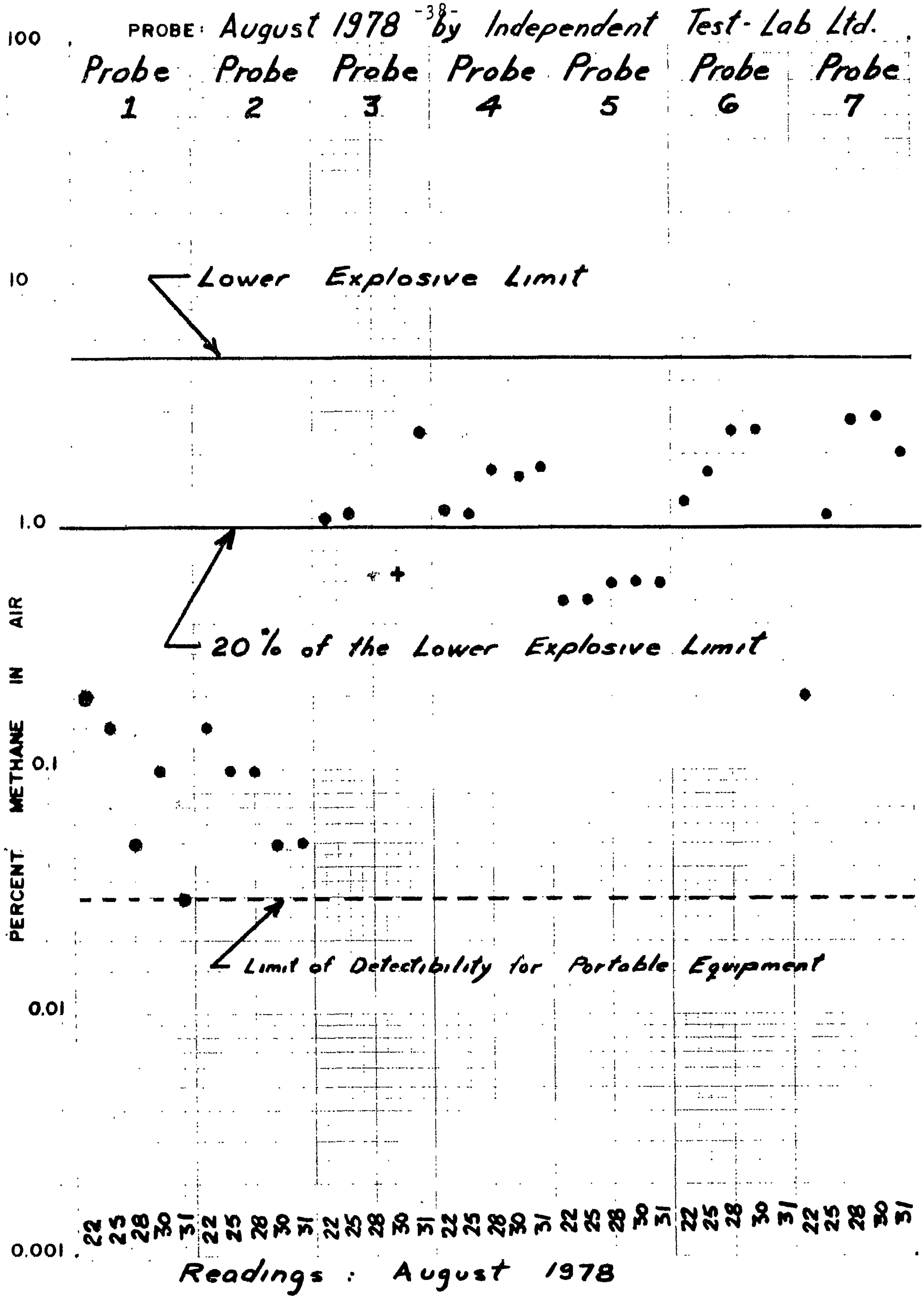
✚↓ - gas concentration less than the limit of detectability by gas chromatograph (in this case, less than 0.003% by volume methane gas in air).

● - gas concentration obtained by portable meter such as MSA Model 40 or Gastech Model NP-204

●↓ - gas concentration less than the limit of detectability by portable meter (in this case, less than 0.03% by volume gas in air).

↑● - gas concentration greater than the upper limit of portable meters such as the MSA Model 40 (in this case, 100% of the lower explosive limit or 5% by volume gas in air).

THE CITY OF WINNIPEG
Landfill Environmental Section
Waterworks, Waste and Disposal Division
1500 PLESSIS ROAD BOX 178 TRANSCONA P.O.
WINNIPEG, MANITOBA R2C 2Z9
PHONE 334-4385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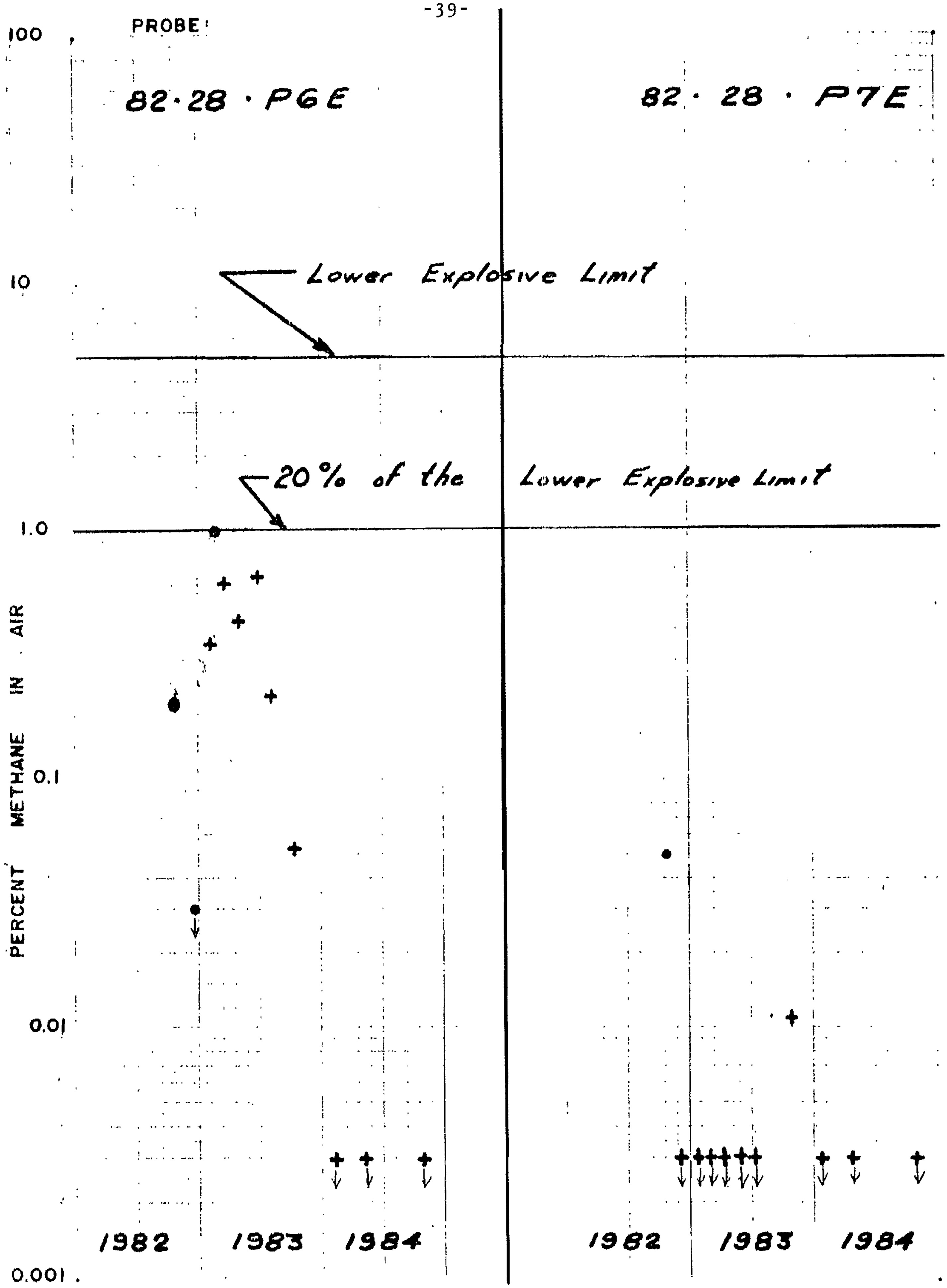
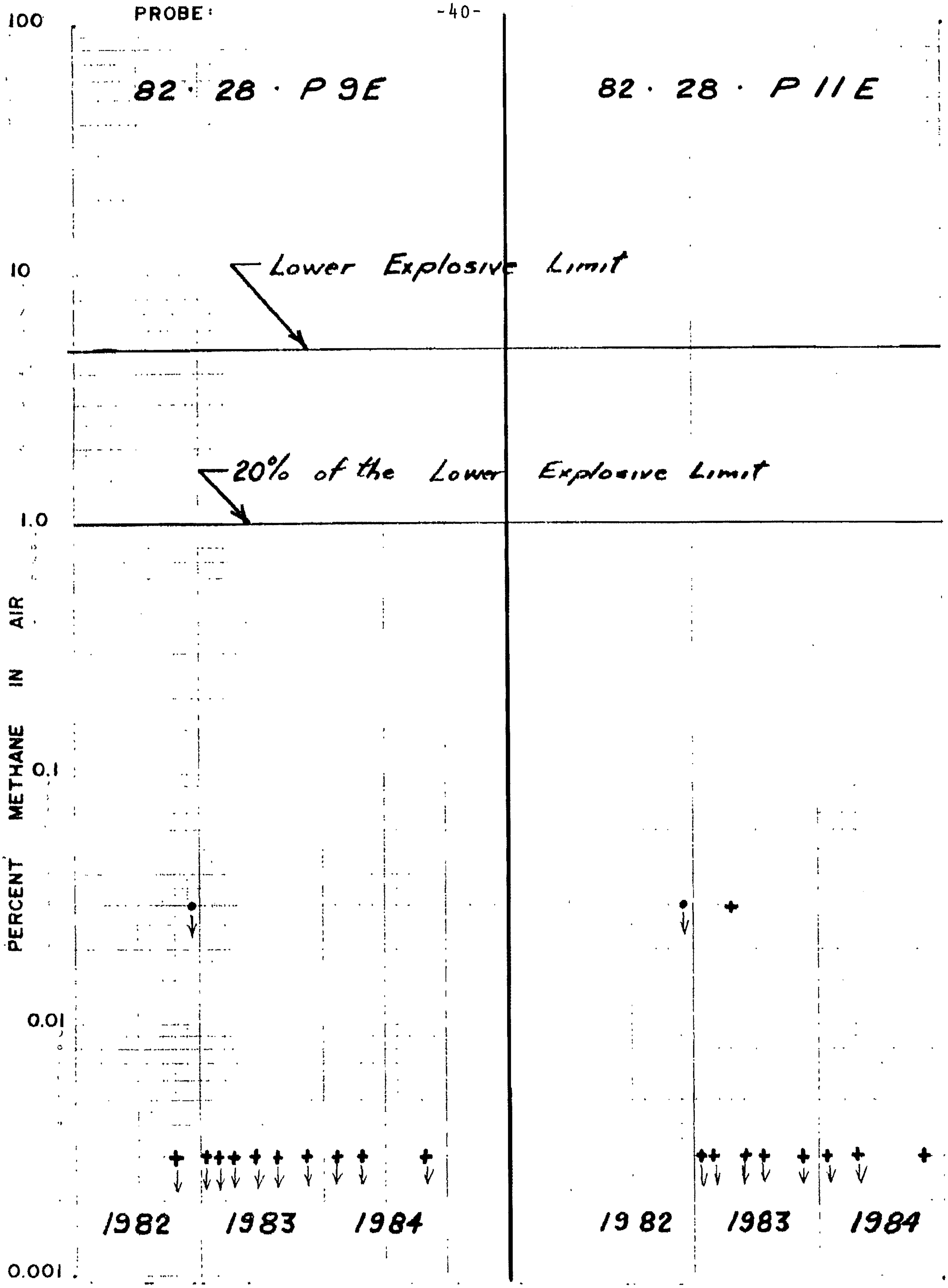
Probe 1
Probe 2
Probe 3
Probe 4
Probe 5
Probe 6
Probe 7
100
10
1.0
0.1
0.01
0.001
Lower Explosive Limit
20% of the Lower Explosive Limit
Limit of Detectibility for Portable Equipment
PERCENT METHANE IN AIR
22 25 28 30 31 22 25 28 30 31 22 25 28 30 31 22 25 28 30 31 22 25 28 30 31 22 25 28 30 31 22 25 28 30 31
Readings : August 1978


PROBE:
82·28 · P6E
82 · 28 · P7E
Lower Explosive Limit
20% of the Lower Explosive Limit
PERCENT METHANE IN AIR
100
10
1.0
0.1
0.01
0.001
1982
1983
1984
1982
1983
1984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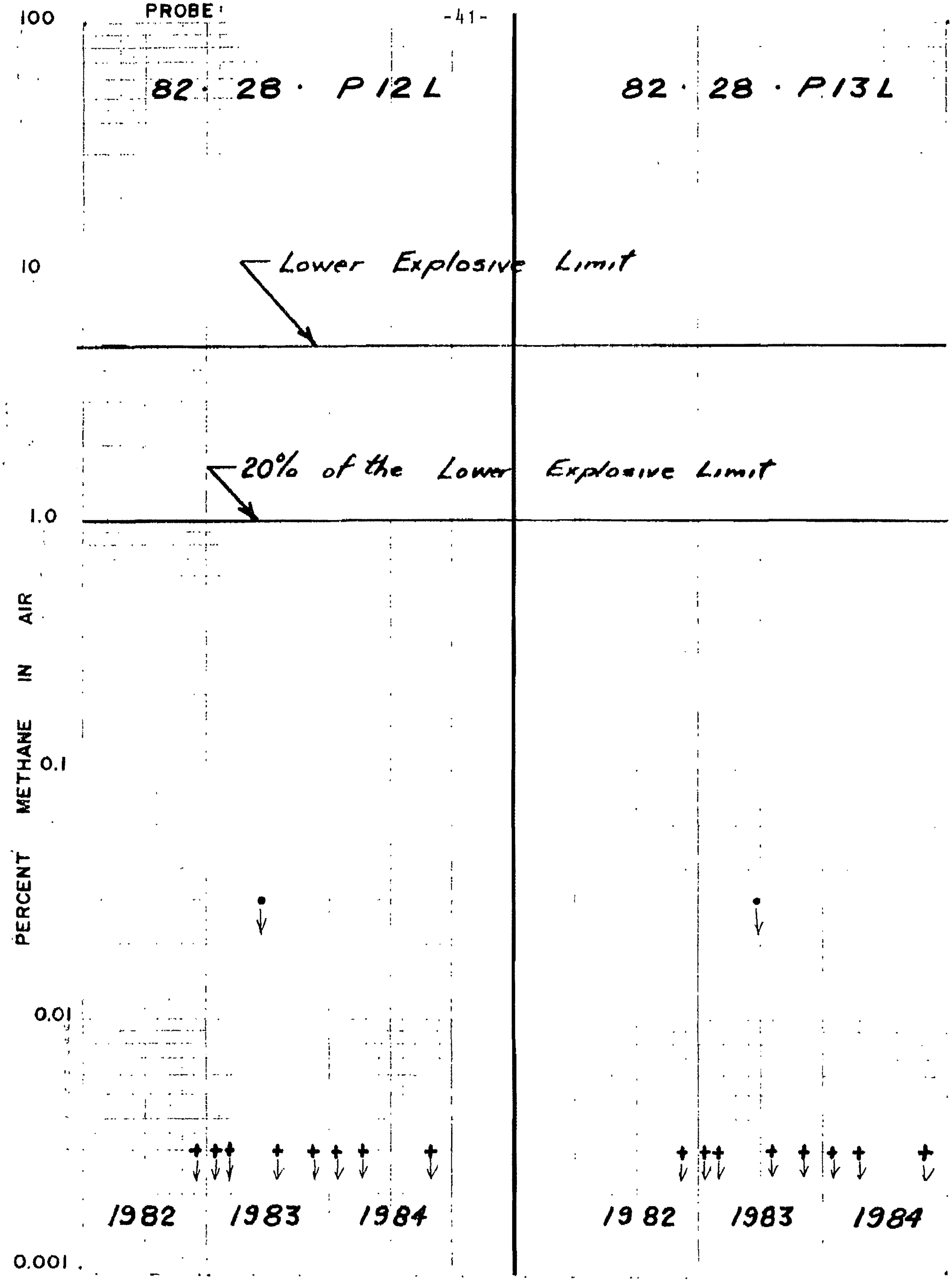
82 · 28 · P 9E
82 · 28 · P 11 E
Lower Explosive Limit
20% of the Lower Explosive Limit
PERCENT METHANE IN AIR
100
10
1.0
0.1
0.01
0.001
1982
1983
1984
1982
1983
1984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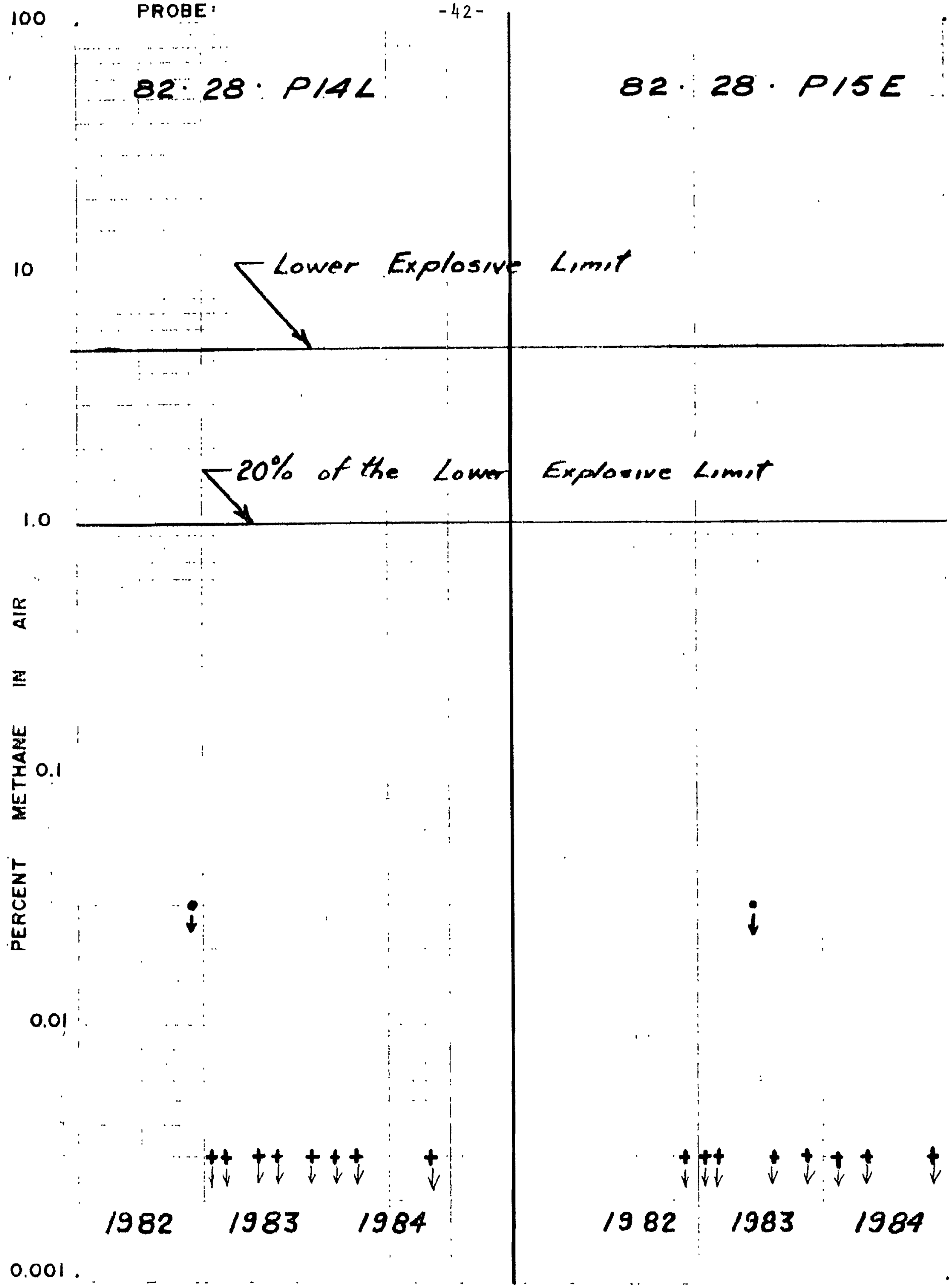
82 · 28 · P12L
82 · 28 · P13L
Lower Explosive Limit
20% of the Lower Explosive Limit
100
10
1.0
0.1
0.01
0.001
PERCENT METHANE IN AIR
1982
1983
1984
1982
1983
1984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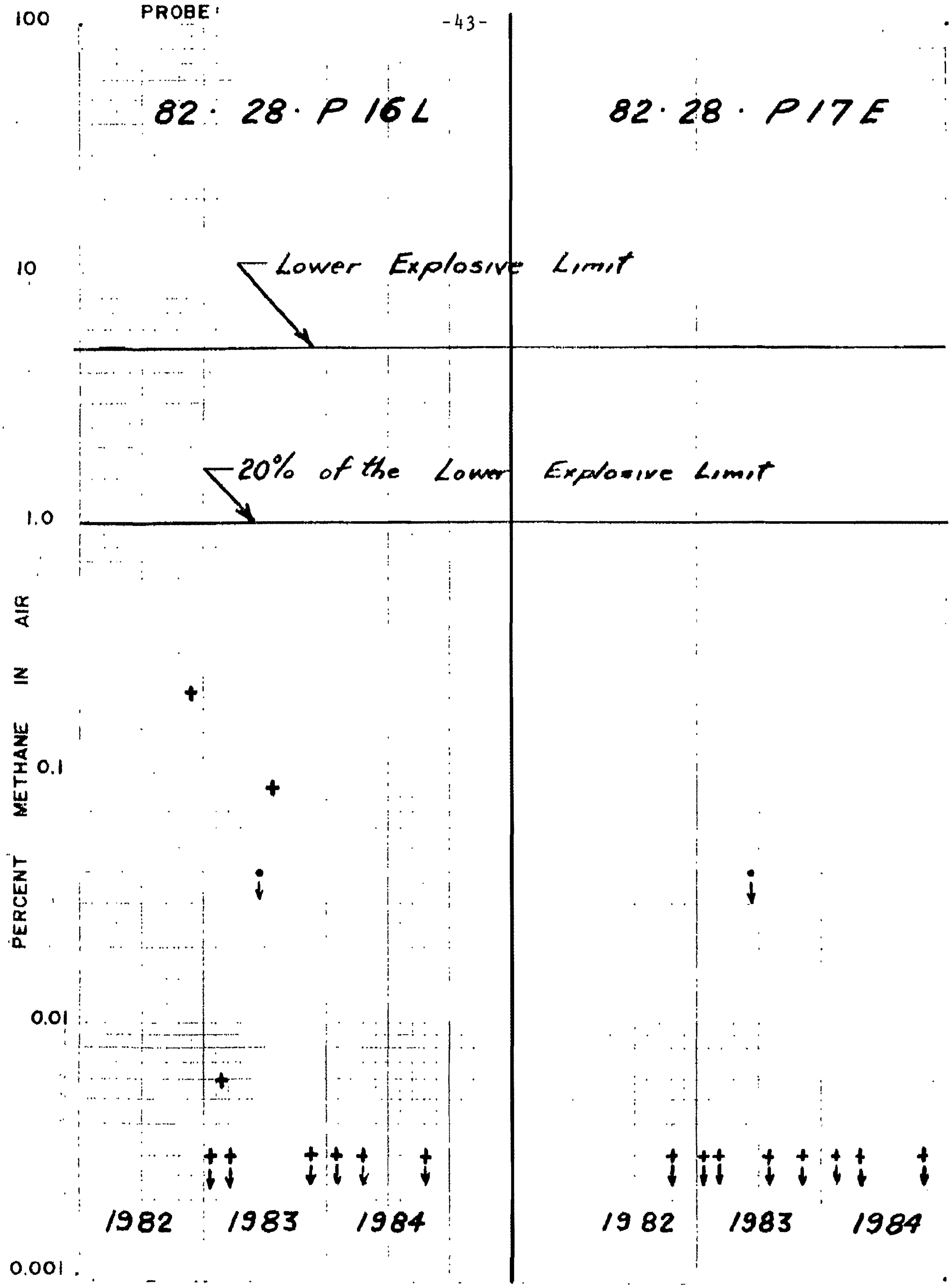
82·28·P14L
82·28·P15E
Lower Explosive Limit
20% of the Lower Explosive Limit
100
10
1.0
0.1
0.01
0.001
PERCENT METHANE IN AIR
1982
1983
1984
1982
1983
1984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82·28·P16L
82·28·P17E
Lower Explosive Limit
20% of the Lower Explosive Limit
PERCENT METHANE IN AIR
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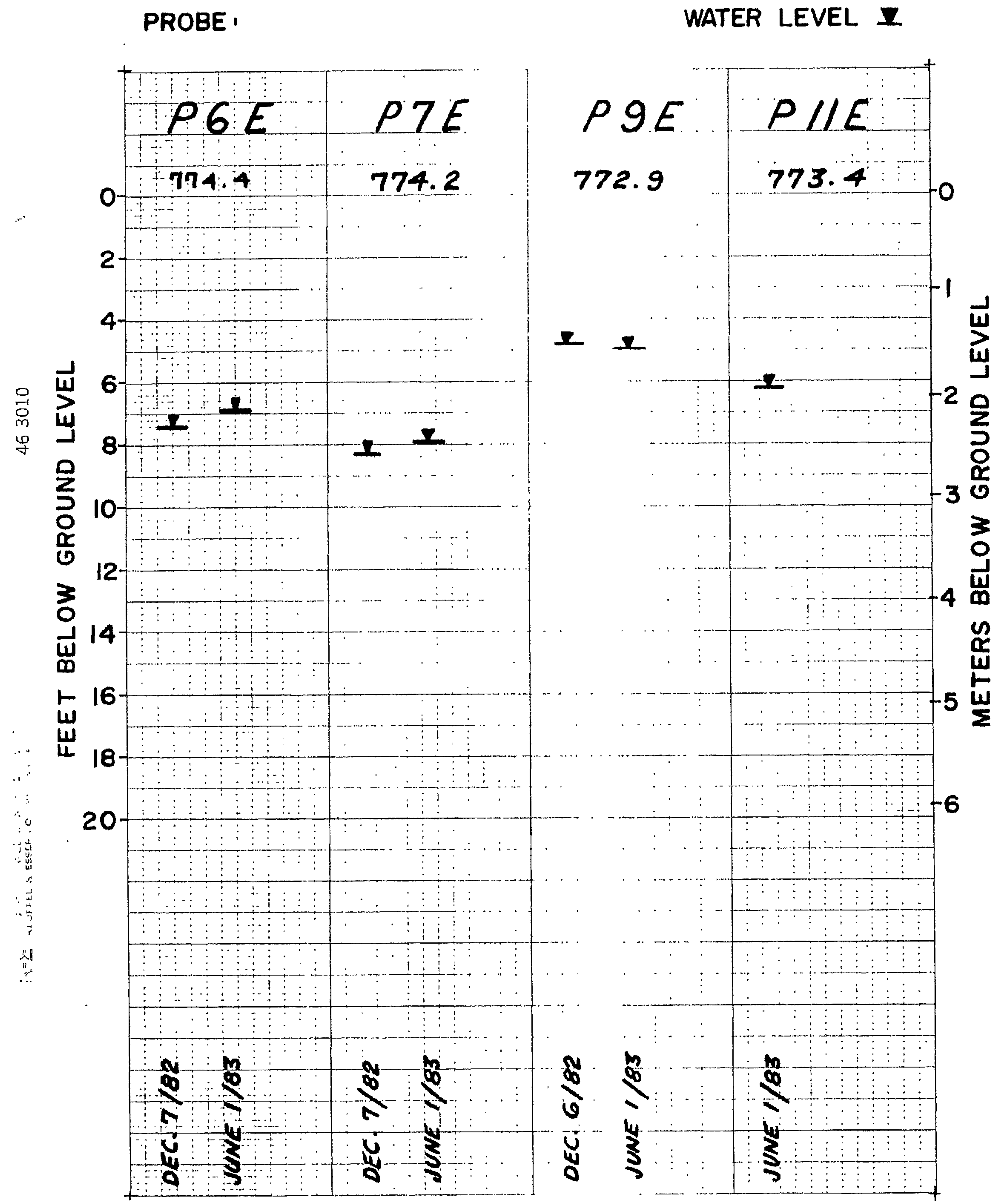
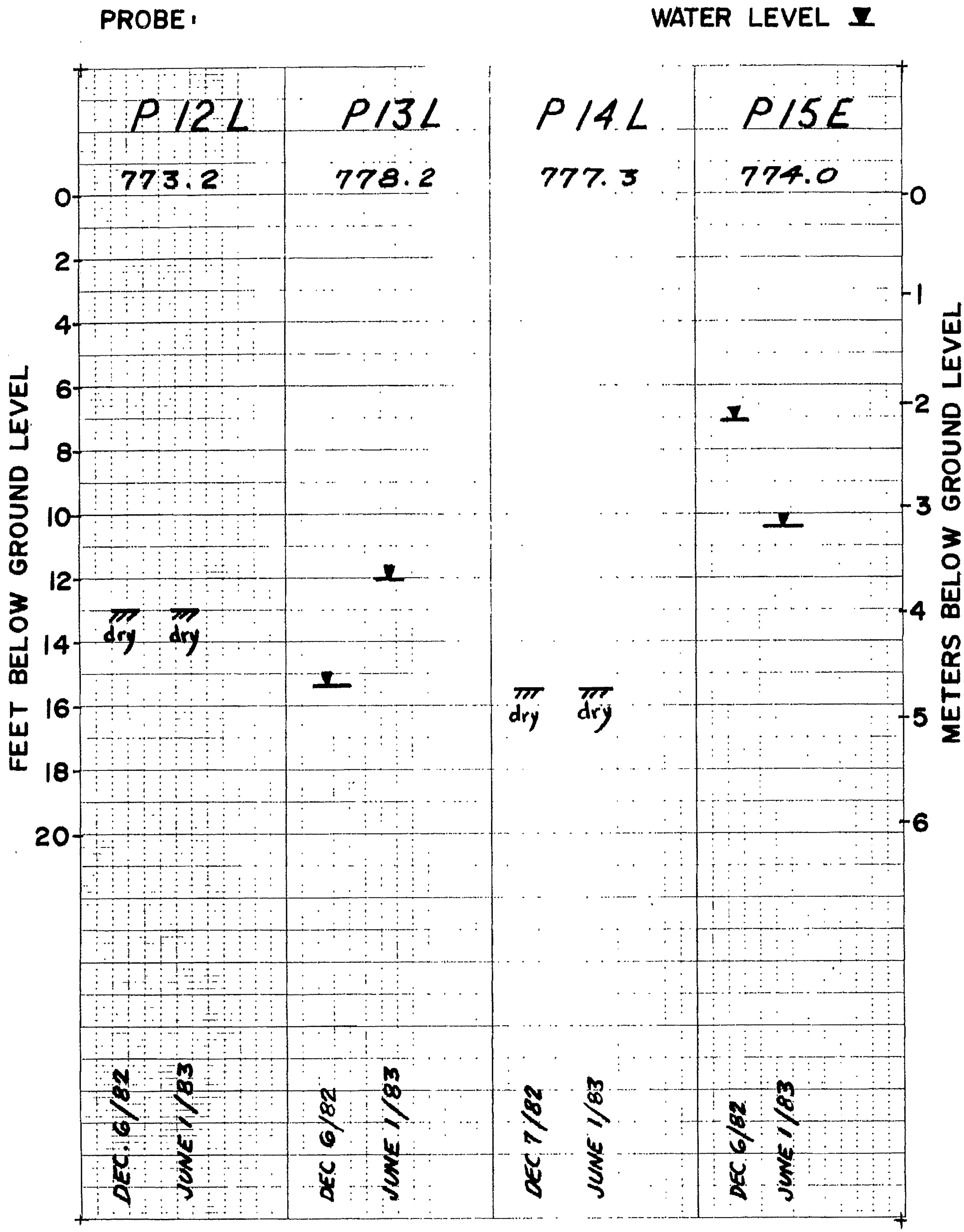
1.0
0.1
0.01
0.001
1982
1983
1984
1982
1983
1984


PROBE:
WATER LEVEL ▼
P6E
P7E
P9E
P11E
774.4
774.2
772.9
773.4
FEET BELOW GROUND LEVEL
0
2
4
6
8
10
12
14
16
18
20
METERS BELOW GROUND LEVEL
0
1
2
3
4
5
6
DEC. 7/82
JUNE 1/83
DEC. 7/82
JUNE 1/83
DEC. 6/82
JUNE 1/83
JUNE 1/83
46 3010

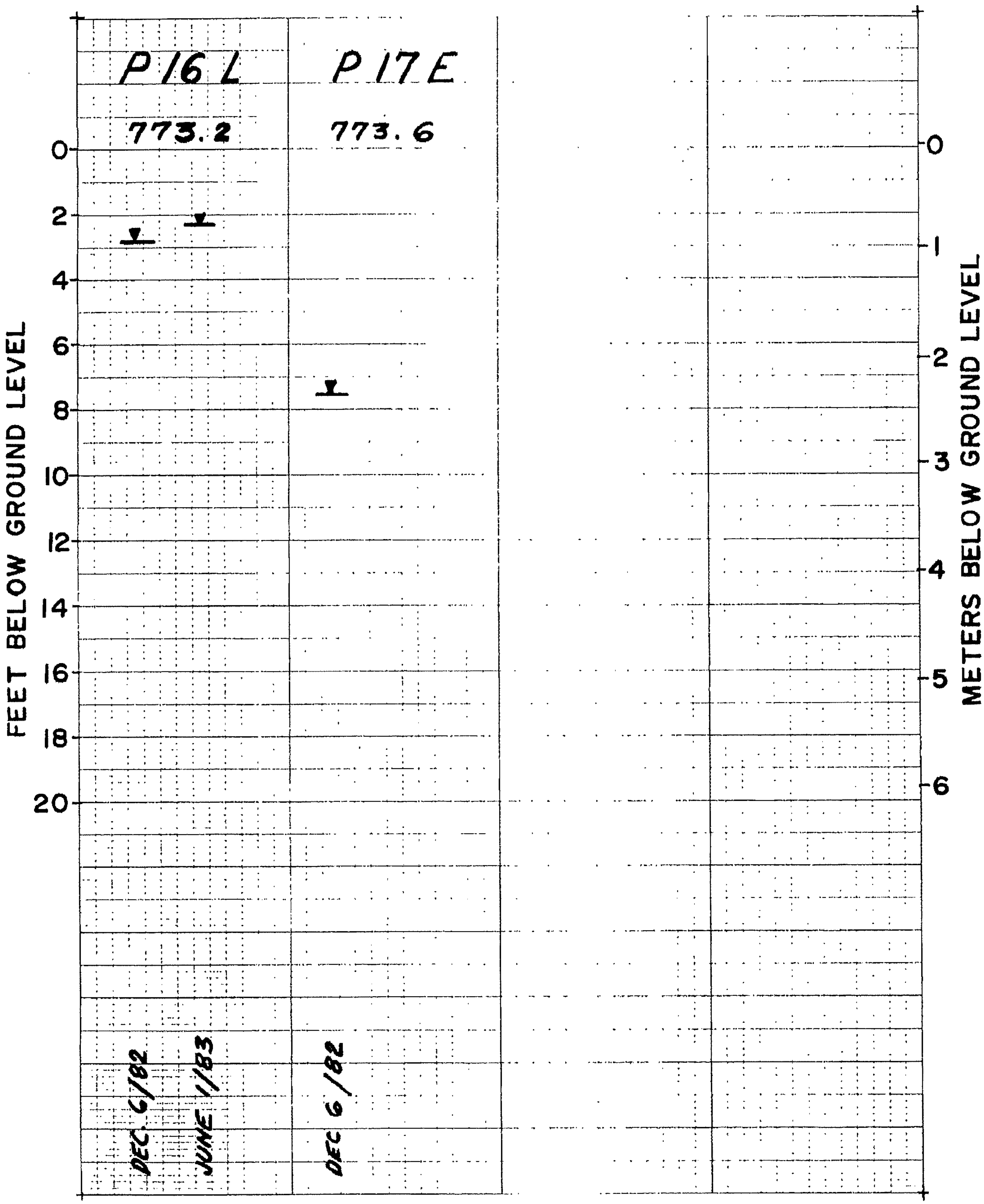


PROBE:
WATER LEVEL
P 12 L
P 13 L
P 14 L
P 15 E
773.2
778.2
777.3
774.0
FEET BELOW GROUND LEVEL
METERS BELOW GROUND LEVEL
0
2
4
6
8
10
12
14
16
18
20
0
1
2
3
4
5
6
dry
dry
dry
dry
DEC. 6/82
JUNE 1/83
DEC 6/82
JUNE 1/83
DEC 7/82
JUNE 1/83
DEC 6/82
JUNE 1/83

46 3010

PROBE:

WATER LEVEL ▼



SITE EVALUATION

SECTION G - DRILL REPORTS

DRILL REPORT

City of Winnipeg
Works and Operations
Waterworks, Waste and Disposal Division
Landfill Environmental Section

Sheet No. ______ of ______
Landfill: Brooklands
Landfill No: 28
Hole/Probe No.: B-1

Contractor: Friesen Drillers
Date: October 21, 1982
Type & Size of Hole: Auger 5"ϕ
Depth: 8 ft.
Water Table ______ /Date: ______

Location: 150' W. of hydro pole, 200' S. of Ro
Coordinates:
Elevations:
Datum used:
Ground Surface:
Top of Probe:

DEPTH M	DEPTH FT.	SOIL PROFILE	DESCRIPTION	REMARKS
	0–3		Fill - brown silty clay	
1	3–5		Clay Loam - dark grey to black, sandy "ashy appearance"	
	5–6		Silt - light brown, soft, moist	
2	6–8		Clay - brown	
3	10			
4	12, 14			
5	16			
6	18, 20			
7	22, 24			
8	26			
9	28, 30			

DRILL REPORT

City of Winnipeg Works and Operations Waterworks, Waste and Disposal Division Landfill Environmental Section	Sheet No. ______ of ______ Landfill: Brooklands Landfill No: 28 Hole/Probe No.: B-2
Contractor: Friesen Drillers Date: October 21, 1982 Type & Size of Hole: Auger 5"⌀ Depth: 8 ft Water Table ______ /Date: ______	Location: 28' W. of B-1 Coordinates: Elevations: Datum used: Ground Surface: Top of Probe:

DEPTH M	DEPTH FT.	SOIL PROFILE	DESCRIPTION	REMARKS
	2		Fill - brown, gravelly, silty clay	
1	4		Clay Loam - dark grey to black	
2	6		Silt - light brown	
	8		Clay - brown	
3	10			
	12			
4	14			
5	16			
	18			
6	20			
	22			
7	24			
8	26			
	28			
9	30			

DRILL REPORT

City of Winnipeg
Works and Operations
Waterworks, Waste and Disposal Division
Landfill Environmental Section

Sheet No. ______ of ______
Landfill: Brooklands
Landfill No: 28
Hole/Probe No.: B-3

Contractor: Friesen Drillers
Date: October 21, 1982
Type & Size of Hole: Auger 5"ø
Depth: 7 ft.
Water Table ______ /Date: ______

Location: 26.5' S of B-4
Coordinates:
Elevations:
Datum used:
Ground Surface:
Top of Probe:

DEPTH M	DEPTH FT.	SOIL PROFILE	DESCRIPTION	REMARKS
			Fill - brown clay	
	2			
1			Black organic layer	
	4		Grey, "ashy" organic loam	
			Silt - light brown, moist	
	6			
2			Clay - brown	
	8			
3	10			
	12			
4	14			
	16			
5	18			
6	20			
	22			
7	24			
8	26			
	28			
9	30			

DRILL REPORT

City of Winnipeg Works and Operations Waterworks, Waste and Disposal Division Landfill Environmental Section	Sheet No. ______ of ______ Landfill: Brooklands Landfill No: 28 Hole/Probe No.: B-4
Contractor: Friesen Drillers Date: October 21, 1982 Type & Size of Hole: Auger 5"ϕ Depth: 7 ft. Water Table ______ /Date: ______	Location: 26.5' N. of B-3, 34.5' NW of B5 Coordinates: ______ Elevations: ______ Datum used: ______ Ground Surface: ______ Top of Probe: ______

DEPTH M	DEPTH FT.	SOIL PROFILE	DESCRIPTION	REMARKS
			Fill - brown clay	
	2			
1			Thin black organic layer,	
	4		grey "ashy" organic loam	
2	6		Silt - light brown, moist	
			Clay - brown	
	8			
3	10			
	12			
4	14			
5	16			
	18			
6	20			
7	22			
	24			
8	26			
	28			
9	30			

DRILL REPORT

City of Winnipeg Works and Operations Waterworks, Waste and Disposal Division Landfill Environmental Section	Sheet No. .... of Landfill: Brooklands Landfill No: 28 Hole/Probe No.: B-5
Contractor: Friesen Drillers Date: October 21, 1982 Type & Size of Hole: Auger 5"φ Depth: 5 ft. Water Table ______ /Date: ____	Location: 8' S. of B-3 Coordinates: Elevations: Datum used: Ground Surface: Top of Probe:

DEPTH M	DEPTH FT.	SOIL PROFILE	DESCRIPTION	REMARKS
	0–4		Fill - brown, sandy, silty clay; gravelly, greyish-brown clay loam layer	
	4–5		Silt - light brown, moist	

Depth scale: M 1–9; FT. 2–30

DRILL REPORT

City of Winnipeg Works and Operations Waterworks, Waste and Disposal Division Landfill Environmental Section	Sheet No. ______ of ______ Landfill: Brooklands Landfill No: 28 Hole/Probe No.: 82·28·P6E
Contractor: Friesen Drillers Date: October 21, 1982 Type & Size of Hole: Auger 5"ø Depth: 13 ft Water Table 7.4' bgl /Date: Dec 7/82 6.9' bgl June 1/83	Location: 835' S of hydro line, 126' NW of B-1 Coordinates: Elevations: Datum used: BM 16-009 = 235.306 Ground Surface: 236.03 Top of Probe: 236.42

DEPTH M	FT.	SOIL PROFILE	DESCRIPTION	REMARKS
	2		Gravel surface Fill - brown, sandy clay	Type B probe installed.
1	4			
2	6		Black organic layer - topsoil	
	8		Silt - light brown, soft, moist - varved silt & clay layers	
3	10		Clay - tan, varved, saturated silt seams	
	12			
4	14			
5	16			
	18			
6	20			
	22			
7	24			
8	26			
	28			
9	30			

DRILL REPORT

City of Winnipeg
Works and Operations
Waterworks, Waste and Disposal Division
Landfill Environmental Section

Sheet No. ______ of ______
Landfill: Brooklands
Landfill No: 28
Hole/Probe No.: 82·28·P7E

Contractor: Friesen Drillers
Date: October 21, 1982
Type & Size of Hole: Auger 5"Ø
Depth: 18 ft.
Water Table 8.3' bgl /Date: Dec 7/82
7.8' bgl June 1/83

Location: 13.5' N. of hydro pole, 6' W. of [illegible] Park.
Coordinates:
Elevations:
Datum used:
Ground Surface: 235.97 m
Top of Probe: 236.42

DEPTH M	DEPTH FT.	SOIL PROFILE	DESCRIPTION	REMARKS
	2		Fill - dark grey charcoal clay fill, gravelly	Type B probe installed.
1	4			
	6		Organic - black topsoil, sandy	
2	8		Silt & silty Clay	
3	10		Clay - tan, medium, plastic varved, becoming stiff.	
	12			
4	14			
	16			
5	18			
6	20			
	22			
7	24			
8	26			
	28			
9	30			

DRILL REPORT

City of Winnipeg Works and Operations Waterworks, Waste and Disposal Division Landfill Environmental Section	Sheet No. ______ of ______ Landfill: Brooklands Landfill No: 28 Hole/Probe No.: B-8
Contractor: Friesen Drillers Date: October 21, 1982 Type & Size of Hole: Auger 5"Ø Depth: 13 ft. Water Table ______ /Date: ______	Location: East side - 73' W. of E P.L. (hydro line) Coordinates: ______ Elevations: ______ Datum used: ______ Ground Surface: ______ Top of Probe: ______

DEPTH M	DEPTH FT.	SOIL PROFILE	DESCRIPTION	REMARKS
1	2, 4		Fill - light brown silt & clay	
	4–6		Dark grey to black sandy, gravelly, organic topsoil	black, "soupy" saturated layer
2	6		Silt - light brown, clayey w/ organic striations	
3, 4	8, 10, 12		Clay - tan, soft, moist, varved, plastic - saturated seams	
5	14, 16			
6	18, 20			
7	22, 24			
8	26			
9	28, 30			

DRILL REPORT

City of Winnipeg Works and Operations Waterworks, Waste and Disposal Division Landfill Environmental Section	Sheet No. ______ of ______ Landfill: Brooklands Landfill No: 28 Hole/Probe No.: 82·28·P9E
Contractor: Friesen Drillers Date: October 21, 1982 Type & Size of Hole: Auger 5"ø Depth: 13 ft Water Table 4.8' bgl /Date: Dec 6/82 4.9' bgl June 1/83	Location: East side, 41' W. of hydro line Coordinates: Elevations: Datum used: Ground Surface: 235.58 m Top of Probe: 236.27

DEPTH M	DEPTH FT.	SOIL PROFILE	DESCRIPTION	REMARKS
	2		Fill - clayey, silt, pockets	Type B probe installed.
1	4			
			Organic layer - black soil	
2	6		Silty Clay - brown	
	8		Clay - tan, medium,	
3	10		- varved grey & tan silt	
	12		seams	
4	14			
5	16			
	18			
6	20			
	22			
7	24			
8	26			
	28			
9	30			

DRILL REPORT

City of Winnipeg
Works and Operations
Waterworks, Waste and Disposal Division
Landfill Environmental Section

Sheet No. ________ of ________
Landfill: Brooklands
Landfill No: 28
Hole/Probe No.: B-10

Contractor: Friesen Drillers
Date: November 18, 1982
Type & Size of Hole: Auger 5" ⌀
Depth: 13 ft.
Water Table ________ /Date: ________

Location: 78.5' N. of P7E
Coordinates: ________
Elevations: ________
Datum used: ________
Ground Surface: ________
Top of Probe: ________

DEPTH M	DEPTH FT.	SOIL PROFILE	DESCRIPTION	REMARKS
1	2, 4		Fill - dark brown, gravelly, clay	
2	6		Silt - brown, clayey, moist	
3	8, 10		Clay - brown, silty, medium	
4	12, 14		Clay - tan, stiff, plastic	
5	16, 18			
6	20			
7	22, 24			
8	26			
9	28, 30			

DRILL REPORT

City of Winnipeg Works and Operations Waterworks, Waste and Disposal Division Landfill Environmental Section	Sheet No. ______ of ______ Landfill: Brooklands Landfill No: 28 Hole/Probe No.: 82·28·P11E
Contractor: Friesen Drillers Date: November 18, 1982 Type & Size of Hole: Auger 5"φ Depth: 13 ft. Water Table 6.2' bgl /Date: June 1/83	Location: 18.5' N. of B10 Coordinates: Elevations: Datum used: Ground Surface: 235.72 m Top of Probe: 236.54

DEPTH M	DEPTH FT.	SOIL PROFILE	DESCRIPTION	REMARKS
	0–4		Fill - rubble, brown clay, stiff, sandy, "wood pieces"	Type B probe installed
	4–5.5		"Clay loam-grey-black "topsoil type"	
	5.5–8		Silt - light brown, slightly clayey, wet	
	8–11		Clay - brown, silty, medium	
	11–13		Clay - tan, stiff, plastic	

DRILL REPORT

City of Winnipeg
Works and Operations
Waterworks, Waste and Disposal Division
Landfill Environmental Section

Sheet No. ______ of ______
Landfill: Brooklands
Landfill No: 28
Hole/Probe No.: 82.28.P12L

Contractor: Friesen Drillers
Date: November 19, 1982
Type & Size of Hole: Auger 5"ϕ
Depth: 13 ft
Water Table dry at 13' bgl /Date: June 1/83

Location: ~500' E of W.P.L. 80' S of hydro line
Coordinates:
Elevations:
Datum used:
Ground Surface: 235.67 m
Top of Probe: 236.24

DEPTH M	DEPTH FT.	SOIL PROFILE	DESCRIPTION	REMARKS
	2		Fill - sandy, gravelly, red, "ash-type" material	Type B probe installed.
1	4		- black peaty clay pockets	
			charcoal clay loam - topsoil	
2	6		Clay - brown, medium, plastic	
	8			
3	10		Clay - tan, medium, plastic	
	12			Note Sewer manhole located ~ 260' east of west P.L.
4	14			
	16			
5				
	18			
6	20			
	22			
7				
	24			
8	26			
	28			
9	30			

DRILL REPORT

City of Winnipeg Works and Operations Waterworks, Waste and Disposal Division Landfill Environmental Section	Sheet No. ______ of ______ Landfill: Brooklands Landfill No: 28 Hole/Probe No.: 82·28·P13L
Contractor: Friesen Drillers Date: November 19, 1982 Type & Size of Hole: Auger 5"φ Depth: 18 ft Water Table 15.4' bgl /Date: Dec 6/82 12.0' bgl June 1/83	300' S. of P12L Location: ______ Coordinates: ______ Elevations: ______ Datum used: ______ Ground Surface: 237.21 m Top of Probe: 237.78

DEPTH M	DEPTH FT.	SOIL PROFILE	DESCRIPTION	REMARKS
	2		Fill - brown clay	Type B probe installed.
1	4			
2	6		Topsoil type material, black organic, sandy, pieces of plastic	
	8			
3	10		Clay - brown, medium to tan, medium, plastic	
	12			
4	14			
5	16			
	18			
6	20			
	22			
7	24			
8	26			
	28			
9	30			

DRILL REPORT

City of Winnipeg Works and Operations Waterworks, Waste and Disposal Division Landfill Environmental Section	Sheet No. ______ of ______ Landfill: Brooklands Landfill No: 28 Hole/Probe No.: 82·28·P14L
Contractor: Friesen Drillers Date: November 19, 1982 Type & Size of Hole: Auger 5" ⌀ Depth: 15 ft. Water Table dry at 15.5' bg //Date: June 1/83	Location: 76' East of hydro pole - West Side 180' N of track ROW Coordinates: Elevations: Datum used: Ground Surface: 236.93 m Top of Probe: 237.73

DEPTH M	DEPTH FT.	SOIL PROFILE	DESCRIPTION	REMARKS
	2		Fill - brown clay	Type B probe installed.
1	4			
	6			
2	8		Topsoil type material - black & grey, clayey - fibrous black striations	
3	10			
	12		Till - brown carbonate gravel, small pebbles, light brown silty clay, gravel & sand.	
4	14			Refusal at 15 ft.
	16			
5	18			
6	20			
	22			
7	24			
8	26			
	28			
9	30			

DRILL REPORT

City of Winnipeg
Works and Operations
Waterworks, Waste and Disposal Division
Landfill Environmental Section

Sheet No. ______ of ______
Landfill: Brooklands
Landfill No: 28
Hole/Probe No.: 82.28. P15E

Contractor: Friesen Drillers
Date: November 24, 1982
Type & Size of Hole: Auger 5"ø
Depth: 13 ft.
Water Table 7.1' bgl /Date: Dec 6/82

Location: West side - 12'E. of hydro line N.S. 20' N. of hydroline Selkirk Ave ROW.
Coordinates:
Elevations:
Datum used:
Ground Surface: 235.91
Top of Probe: 236.67

DEPTH M	DEPTH FT.	SOIL PROFILE	DESCRIPTION	REMARKS
	2		Fill - black organics & dark brown silty clay, some fiber	Type B probe installed.
1				
	4			
	6		Silt - moist, light brown, clayey	
2				
	8		Clay - brown, silty becoming medium, plastic	
3	10			
	12			
4				
	14			
	16			
5				
	18			
6	20			
	22			
7				
	24			
8	26			
	28			
9	30			

DRILL REPORT

City of Winnipeg
Works and Operations
Waterworks, Waste and Disposal Division
Landfill Environmental Section

Sheet No. ______ of ______
Landfill: Brooklands
Landfill No: 28
Hole/Probe No.: 82.28.P16L

Contractor: Friesen Drillers
Date: November 24, 1982
Type & Size of Hole: Auger 5"ϕ
Depth: 18 ft
Water Table 2.8' bgl /Date: Dec 6/82
2.3' bgl June 1/83

Location: East side - Hyde Ave. R.O.W. ~250' W. of E.P.L.
Coordinates:
Elevations:
Datum used:
Ground Surface: 235.66
Top of Probe: 236.32

DEPTH M	DEPTH FT.	SOIL PROFILE	DESCRIPTION	REMARKS
	0–7	Fill	Fill - grey clay Fill - brown silt & silty brown clay Fill - grey, silty & charcoal organic clay loam	Type B probe installed. Saturated at 7'.
	7–18	Clay	Clay - light brown, silty, wet seams, soft, plastic, tan & light brown, "soft"	May be backfill clay for L.D.S sewer along Hyde Ave Water level in borehole 4' bgl

Depth scale: M 1–9; FT. 2–30

DRILL REPORT

City of Winnipeg Works and Operations Waterworks, Waste and Disposal Division Landfill Environmental Section	Sheet No. ______ of ______ Landfill: Brooklands Landfill No: 28 Hole/Probe No.: 82·28·P17E
Contractor: Friesen Drillers Date: November 24, 1982 Type & Size of Hole: Auger 5"ϕ Depth: 13 ft. Water Table 7.5' bgl /Date: Dec 6/82	Location: 49' E. of 10E probe. 44' NW of Manhole, 163' N. of RR Row Coordinates: Elevations: Datum used: Ground Surface: 235.80 m Top of Probe: 236.45

DEPTH M	DEPTH FT.	SOIL PROFILE	DESCRIPTION	REMARKS
	2		Fill - brown clay c/s lt	
1	4			
2	6		Silt - light brown, moist	
	8			
3	10		Clay - silty becoming tan, plastic, medium	
	12			
4	14			
5	16			
	18			
6	20			
	22			
7	24			
8	26			
	28			
9	30			

A P P E N D I X "A"

excerpt from The City of Winnipeg

SANITARY LANDFILL STUDY

November, 1975

by:
Underwood, McLellan & Associates Ltd.

2.28 Brooklands Landfill Site

The Brooklands Landfill Site, located as shown on Plate 4A as site #28 with approximate boundaries as shown on Plate 28, may not be a sanitary landfill site.

Personnel from District 2 revealed through discussions that some existing correspondence indicates the area may have been used as a disposal ground for masonry rubble and other inorganic materials. The discussions also suggested that some domestic wastes may have been dumped in the area.

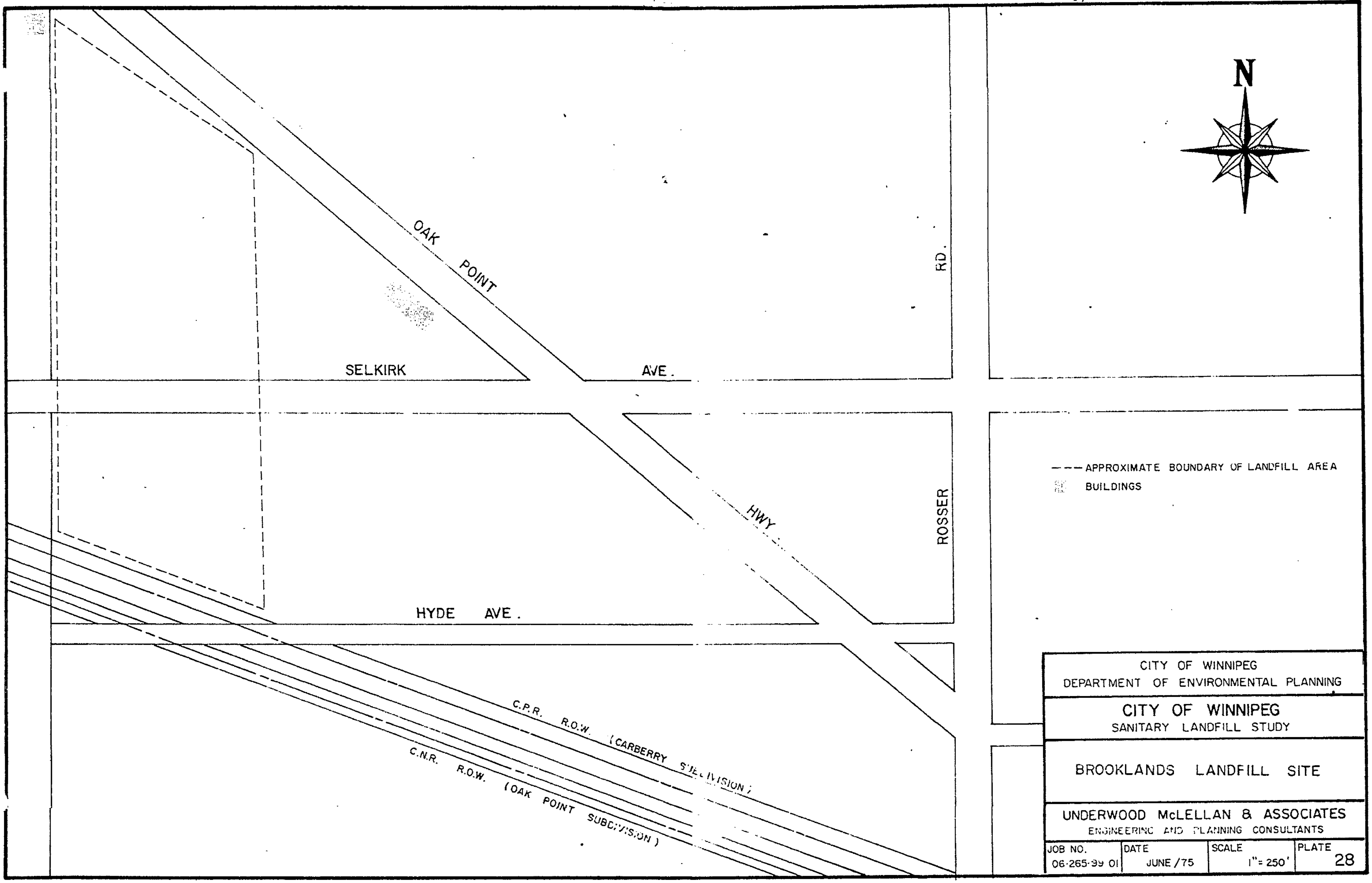
Surficial indications at the site are that dumping of material has been carried out. The ground surface at the site is relatively higher than the surrounding areas and a "No Dumping" sign is posted indicating dumping of sorts has been carried out in the past.

The following considerations are applicable to this site:

1. Determine if the area has been utilized as a sanitary landfill site.

Should the area have been used for garbage disposal, determine the exact boundaries and depth of landfill.

The estimated cost of drilling to a maximum depth of 35 feet with possible installation of a landfill gas probe should sanitary landfill material be encountered is $1,000 - $2,000.


N
OAK POINT HWY
SELKIRK AVE.
HYDE AVE.
ROSSER RD.
C.P.R. R.O.W. (CARBERRY SUBDIVISION)
C.N.R. R.O.W. (OAK POINT SUBDIVISION)
--- APPROXIMATE BOUNDARY OF LANDFILL AREA
BUILDINGS
CITY OF WINNIPEG
DEPARTMENT OF ENVIRONMENTAL PLANNING
CITY OF WINNIPEG
SANITARY LANDFILL STUDY
BROOKLANDS LANDFILL SITE
UNDERWOOD McLELLAN & ASSOCIATES
ENGINEERING AND PLANNING CONSULTANTS
JOB NO. 06-265-99 01
DATE JUNE /75
SCALE 1" = 250'
PLATE 28

APPENDIX B

DRAWINGS FROM PREVIOUS REPORTS

a) Mosaic Site Plan showing Fill Areas and Test Hole Locations

b) Mosaic Site Plan showing Fill Areas and Test Hole Locations

c) Imperial Airport Site - Plan of Landfill Types, Extent and Measured Gas Scope Levels

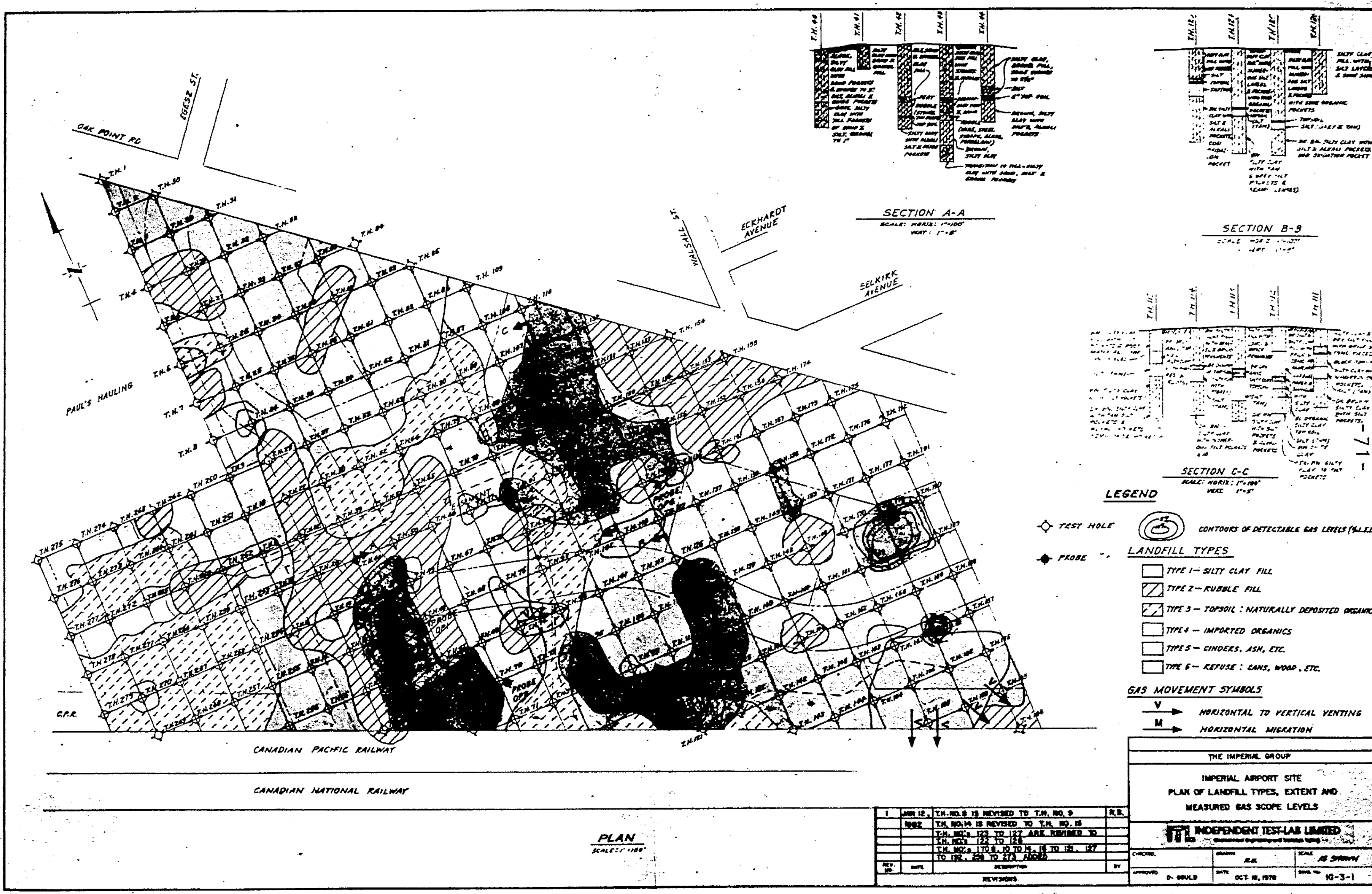
d) Site Location Plan and Contour Plan showing Measured Gas Scope Levels

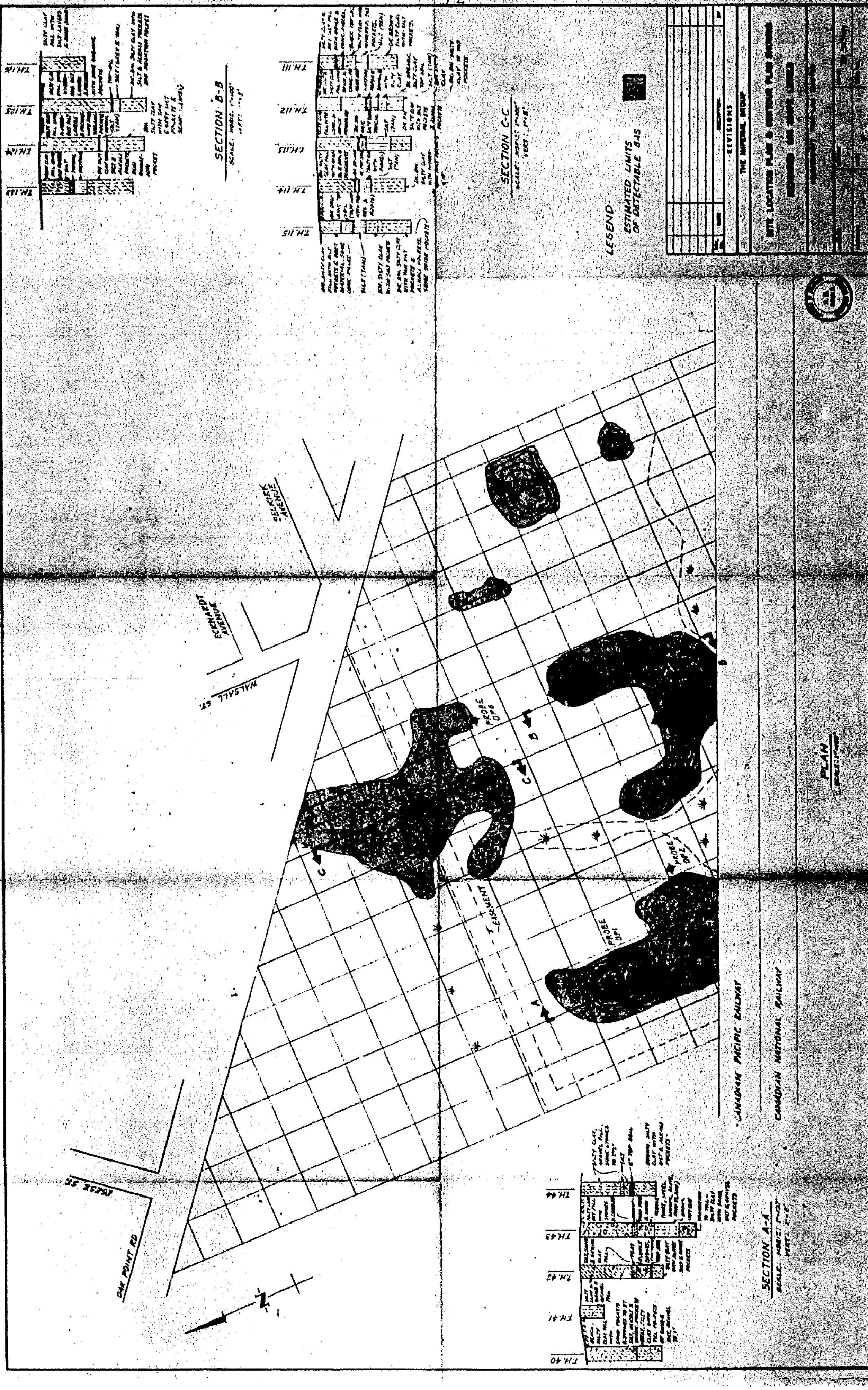
e) Potential Gas Production Levels Base Upon Landfill Classification System DG-1

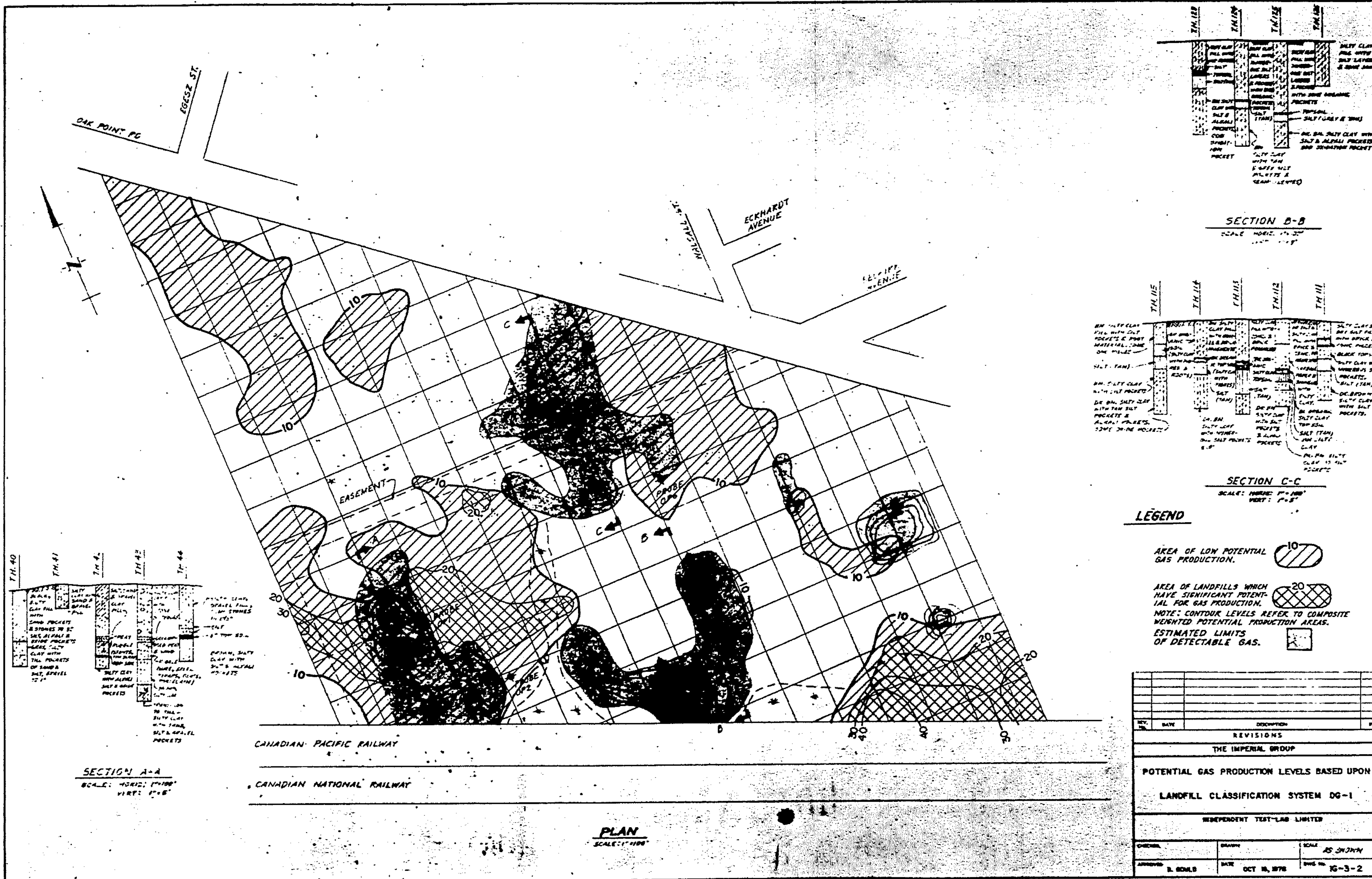
f) Imperial Airport Site - Plan of Landfill Types, Extent and Measured Gas Scope Levels

DATE OF PHOTOGRAPHY . MAY 1978.


THE IMPERIAL GROUP
MOSAIC SITE PLAN SHOWING FILL
AREAS AND TEST HOLE LOCATIONS
TEST-LAB LIMITED
LEGEND


SECTION A-A
SECTION B-B
SECTION C-C
LEGEND
TEST HOLE
PROBE
CONTOURS OF DETECTABLE GAS LEVELS (% L.E.L.)
LANDFILL TYPES
TYPE 1 – SILTY CLAY FILL
TYPE 2 – RUBBLE FILL
TYPE 3 – TOPSOIL : NATURALLY DEPOSITED ORGANICS
TYPE 4 – IMPORTED ORGANICS
TYPE 5 – CINDERS, ASH, ETC.
TYPE 6 – REFUSE : CANS, WOOD, ETC.
GAS MOVEMENT SYMBOLS
V HORIZONTAL TO VERTICAL VENTING
M HORIZONTAL MIGRATION
OAK POINT RD.
EGESZ ST.
WALSALL ST.
ECKHARDT AVENUE
SELKIRK AVENUE
PAUL'S HAULING
C.P.R.
CANADIAN PACIFIC RAILWAY
CANADIAN NATIONAL RAILWAY
PLAN
THE IMPERIAL GROUP
IMPERIAL AIRPORT SITE
PLAN OF LANDFILL TYPES, EXTENT AND
MEASURED GAS SCOPE LEVELS
INDEPENDENT TEST-LAB LIMITED
CHECKED
DRAWN
SCALE AS SHOWN
APPROVED D. GOULD
DATE OCT. 18, 1978
16-3-1
REVISIONS
1 JAN 12, 1982 T.H. NO. 8 IS REVISED TO T.H. NO. 9 R.B.
T.H. NO. 14 IS REVISED TO T.H. NO. 15
T.H. NO's 123 TO 127 ARE RENUMBERED TO
T.H. NO's 122 TO 126
T.H. NO's 1 TO 8, 10 TO 14, 16 TO 121, 127
TO 192, 250 TO 279 ADDED
REV. NO.
DATE
DESCRIPTION
BY

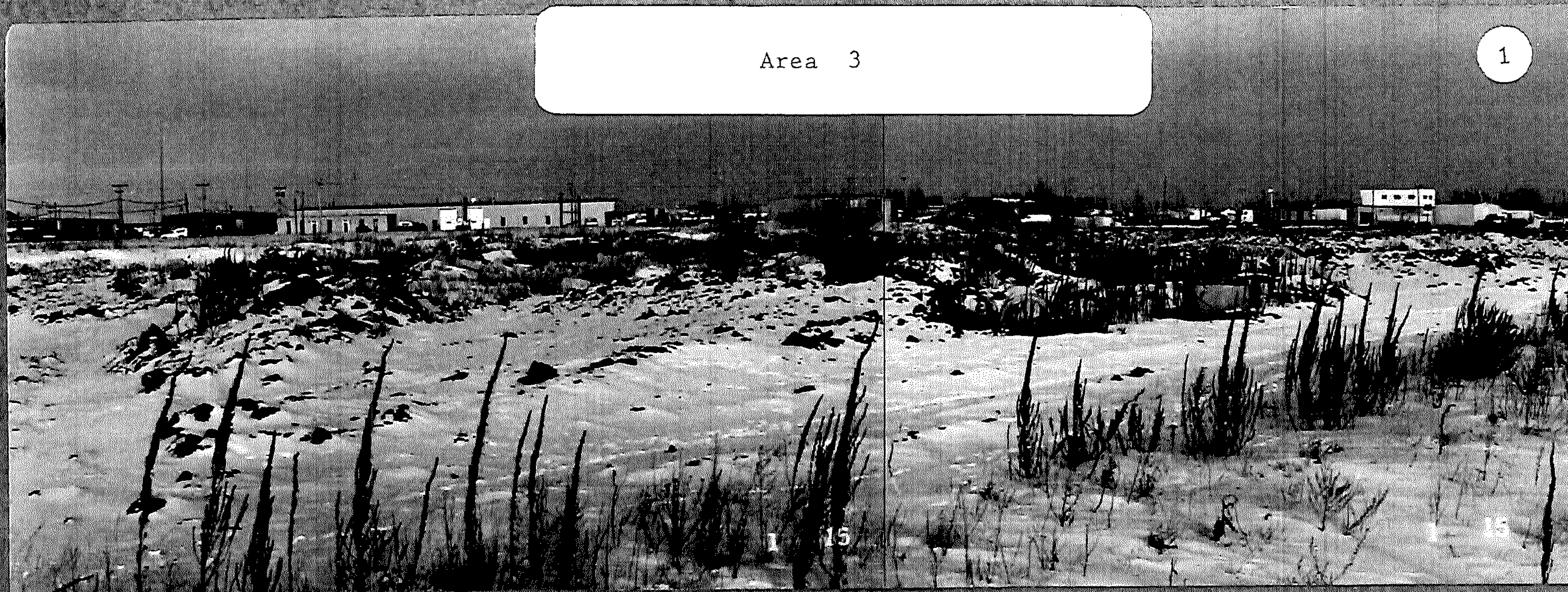

SECTION B-B
SECTION C-C
LEGEND
ESTIMATED LIMITS OF DETECTABLE GAS
REVISIONS
THE IMPERIAL GROUP
SELKIRK AVENUE
ECKHARDT AVENUE
WALSALL ST.
OAK POINT RD
PROBE OP8
PROBE OP2
PROBE OP1
EASEMENT
CANADIAN PACIFIC RAILWAY
CANADIAN NATIONAL RAILWAY
PLAN
SECTION A-A
TH.40
TH.41
TH.42
TH.43
TH.44
TH.111
TH.112
TH.113
TH.114
TH.115


OAK POINT RD
EGESZ ST.
WALSALL ST.
ECKHARDT AVENUE
EASEMENT
PROBE
CANADIAN PACIFIC RAILWAY
CANADIAN NATIONAL RAILWAY
PLAN
SECTION A-A
SECTION B-B
SECTION C-C
LEGEND
AREA OF LOW POTENTIAL GAS PRODUCTION.
AREA OF LANDFILLS WHICH HAVE SIGNIFICANT POTENTIAL FOR GAS PRODUCTION.
NOTE: CONTOUR LEVELS REFER TO COMPOSITE WEIGHTED POTENTIAL PRODUCTION AREAS.
ESTIMATED LIMITS OF DETECTABLE GAS.
REVISIONS
THE IMPERIAL GROUP
POTENTIAL GAS PRODUCTION LEVELS BASED UPON
LANDFILL CLASSIFICATION SYSTEM DG-1
INDEPENDENT TEST-LAB LIMITED
AS SHOWN
OCT 18, 1978
IG-3-2

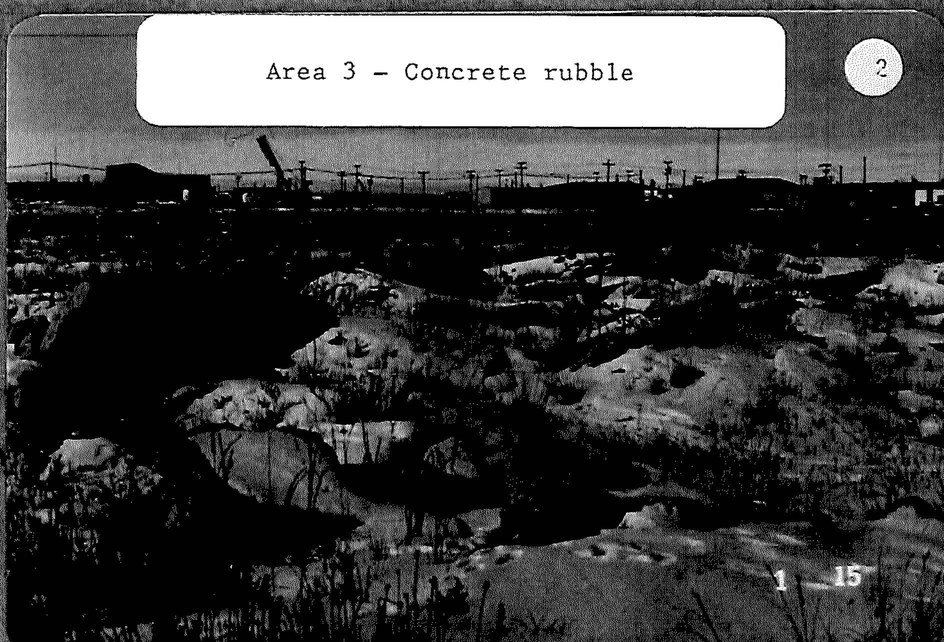
APPENDIX C

PHOTOGRAPHS

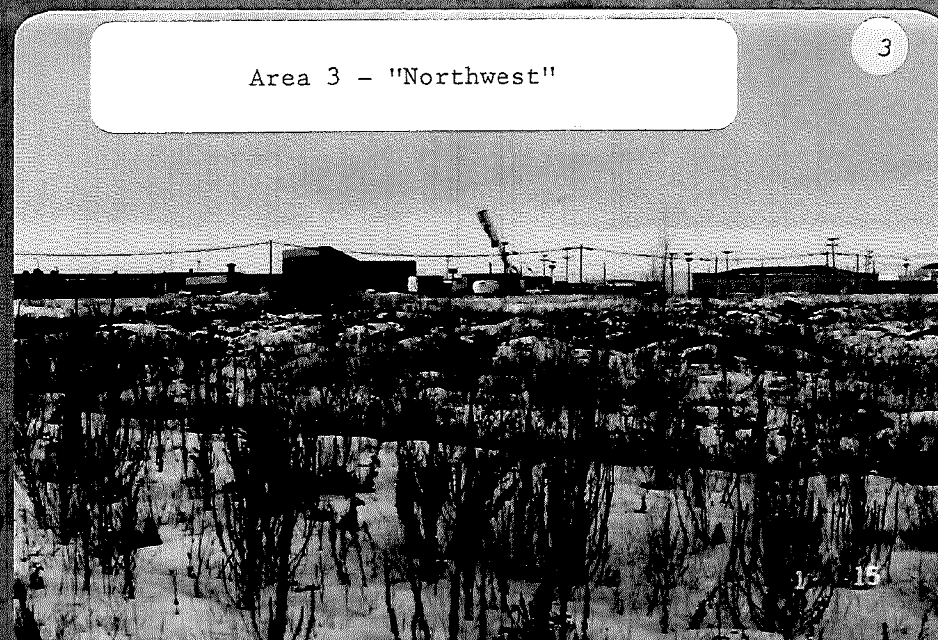
Area 3



Area 3 - Concrete rubble



Area 3 - "Northwest"

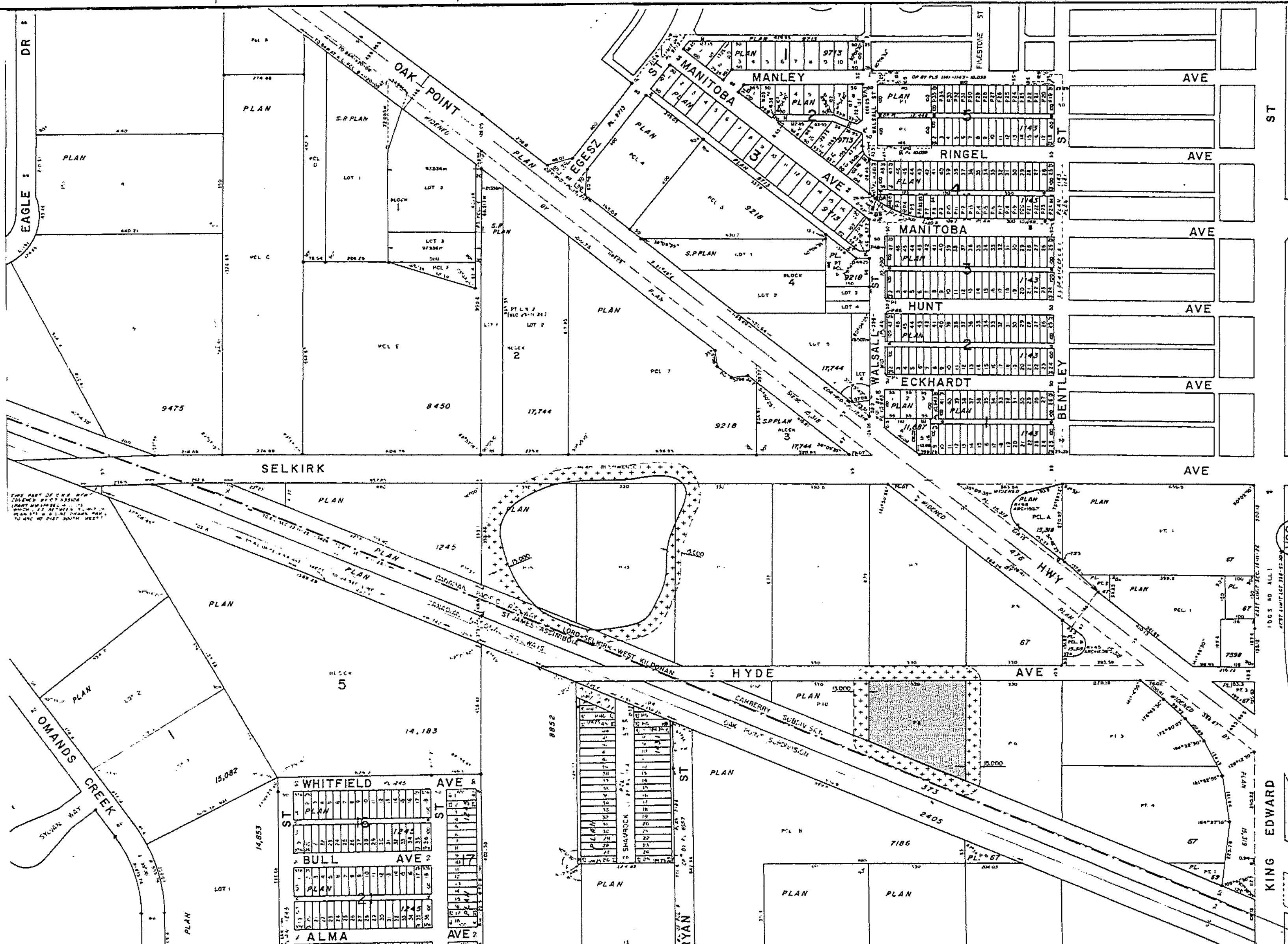


Gas line trench - Cinder, Ash fill

Watermain extension

Road Cut - concrete rubble in fill

141



"WARNING"

THE EXACT BOUNDARY OF REFUSE CAN BE CERTIFIED ONLY BY DETAILED INVESTIGATION. THE EXISTENCE AND EXACT LOCATION OF ALL UNDERGROUND SERVICES INCLUDING NEW CONNECTIONS MUST BE CHECKED WITH THE APPROPRIATE UTILITIES.

LEGEND

CONTROL ZONE

DUMP OR LANDFILL SITE

AREA FOR INVESTIGATION (BY OTHERS)

PRELIMINARY

NO	REVISIONS	DATE	APP

ENGINEER'S SEAL

LANDFILL ENVIRONMENTAL SECTION

DESIGNED BY	DRAWN BY A.D. RAMOS
CHECKED BY C. POTTER	DATE AUG./84
APPROVED BY	DATE

THE CITY OF WINNIPEG

WORKS & OPERATIONS DIVISION

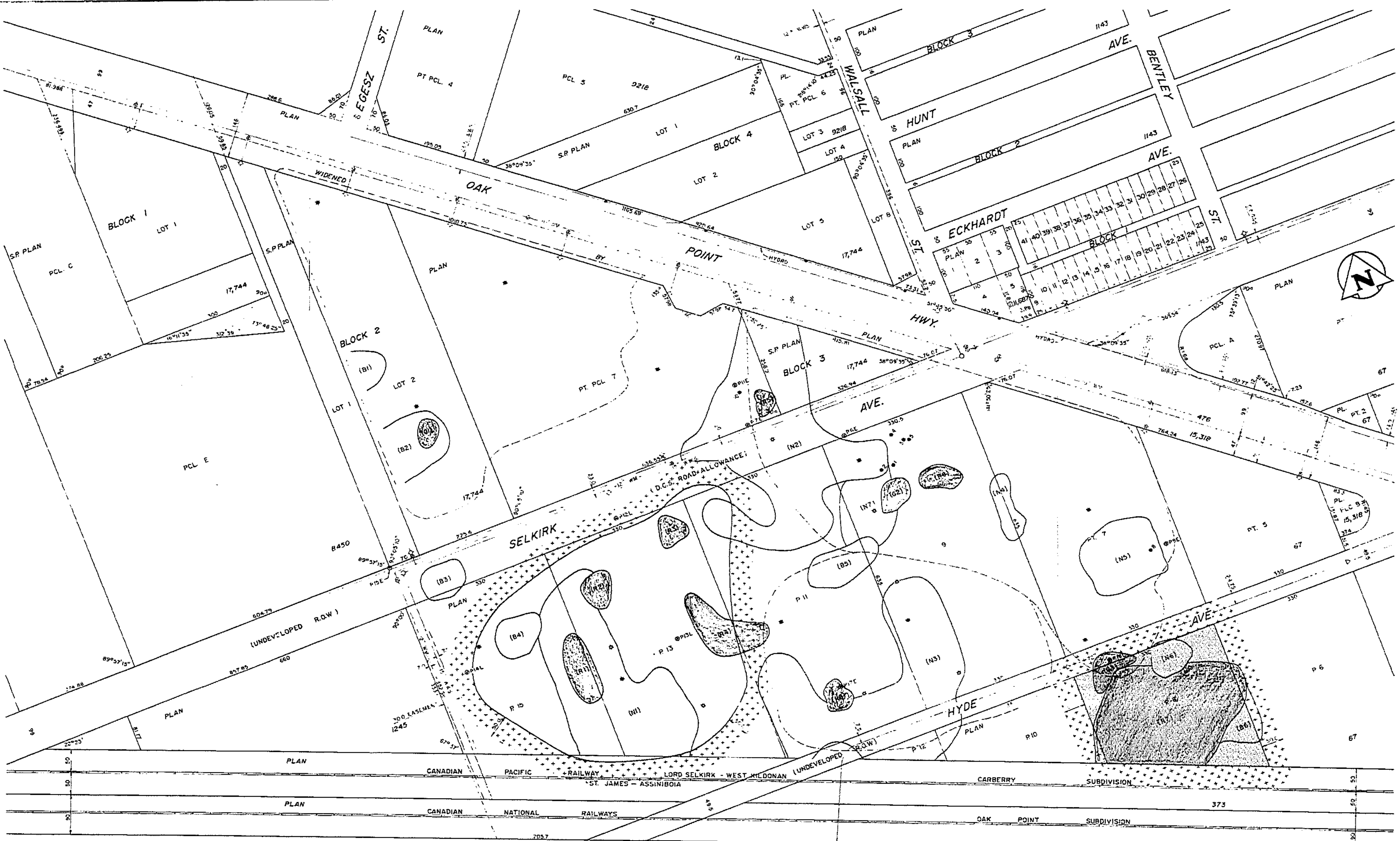
WATERWORKS, WASTE & DISPOSAL DEPARTMENT

NO. 28 BROOKLANDS LANDFILL SITE

RELEASED FOR CONSTRUCTION: DATE:

SCALE: 1:2000

DRAWING NO. SWD-D-125



LEGEND:

- AREA FOR INVESTIGATION (BY OTHERS)
- (7) LOT NUMBER
- TEST HOLE (BY LANDFILL ENVIRONMENTAL SECTION)
- GAS PROBE (BY LANDFILL ENVIRONMENTAL SECTION)
- TEST HOLE (BY OTHERS)
- GAS PROBE (BY OTHERS)
- CONTROL ZONE
- DUMP OR LANDFILL SITE
- (N2) AREA DELINEATED AS CONTOURS OF DETECTABLE GAS CONCENTRATIONS
- (R3) REFUSE
- (G2) CINDERS, ASH
- (B5) IMPORTED ORGANICS

"WARNING"
THE EXACT BOUNDARY OF REFUSE CAN BE CERTIFIED ONLY BY DETAILED INVESTIGATION. THE EXISTENCE AND EXACT LOCATION OF ALL UNDERGROUND SERVICES INCLUDING NEW CONNECTIONS MUST BE CHECKED WITH THE APPROPRIATE UTILITIES.

NO	REVISIONS	DATE	APP

ENGINEER'S SEAL

LANDFILL ENVIRONMENTAL SECTION

DESIGNED BY	DRAWN BY A.D. RAMOS
CHECKED BY C. POTTER	DATE AUG./84
APPROVED BY	DATE

THE CITY OF WINNIPEG
WORKS & OPERATIONS DIVISION
WATERWORKS, WASTE & DISPOSAL DEPARTMENT

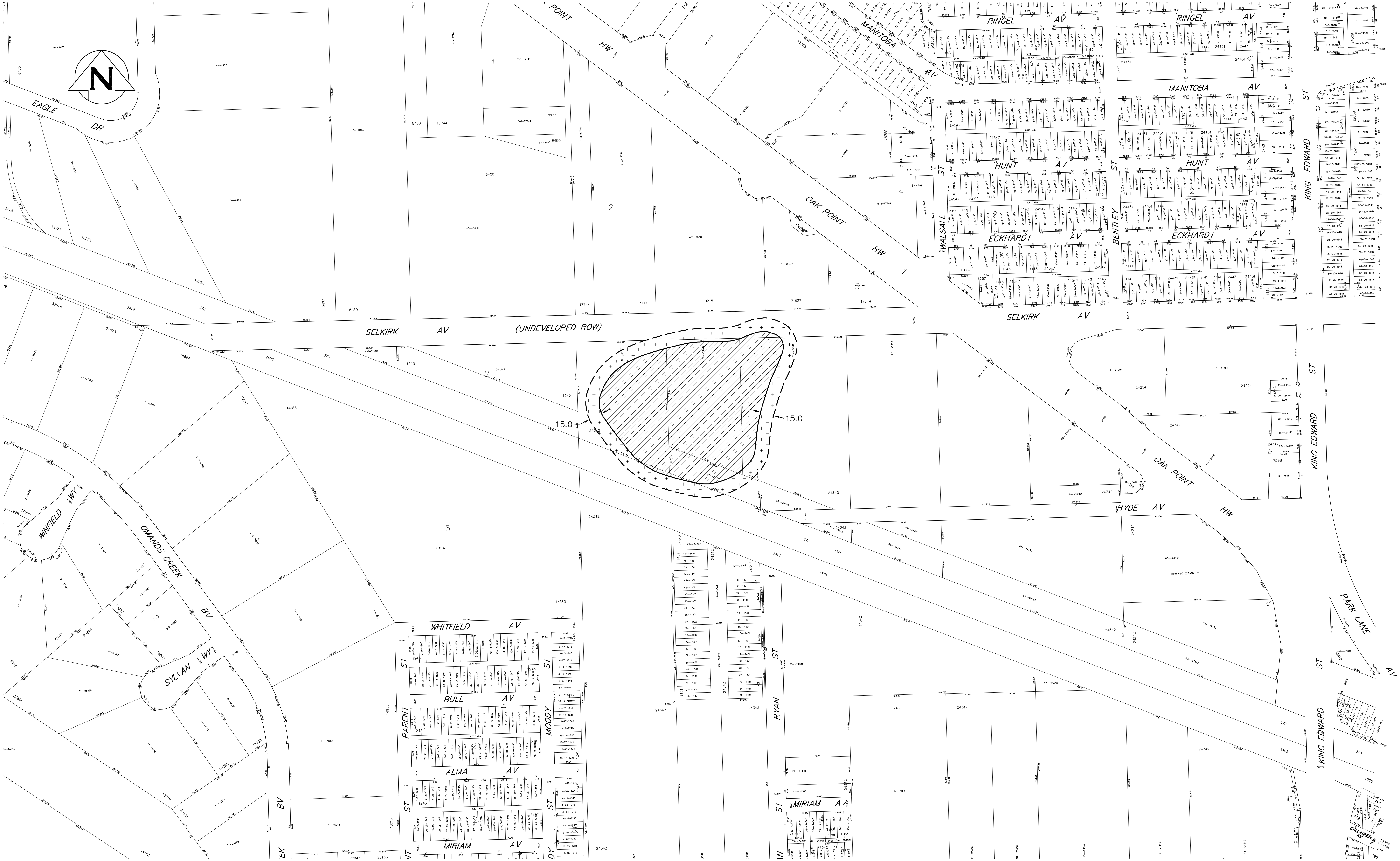
REPO TD 795.7 .K858 99014461
Kuluk, T.J. The Brooklands Landfill site : landfill no. 28 / A.J. Kuluk [et al].

NO. 28 BROOKLANDS LANDFILL SITE DETAIL

RELEASED FOR CONSTRUCTION — DATE

SCALE 1"=100'

DRAWING NO. SWD-D-125A



"WARNING"

THE EXACT BOUNDARY OF REFUSE CAN BE CERTIFIED ONLY BY DETAILED INVESTIGATION. THE EXISTENCE AND EXACT LOCATION OF ALL UNDERGROUND SERVICES INCLUDING NEW CONNECTIONS MUST BE CHECKED WITH THE APPROPRIATE UTILILITIES.

LEGEND

CONTROL ZONE

DUMP OR LANDFILL SITE

METRIC

WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES

B.M. ELEV.	FIELD BOOK #:		
POSTED TO LBIS			
2.	REMOVED LANDFILL BOUNDARY & CONTROL ZONE FOR LOT 61, PLAN NO. 24342 WLTO	03.09.16	WKT
1.	CONVERT TO AUTOCAD DRAWING	OCT 99	D.S.
NO.	REVISIONS	DATE	BY

LANDFILL ENVIRONMENTAL SECTION

DESIGNED BY	CHECKED BY
DRAWN BY D.S.	APPROVED BY C.A.P.
HOR. SCALE 1:2000	RELEASED FOR CONSTRUCTION
VERTICAL	
DATE OCT 99	DATE

ENGINEER'S SEAL

PLOT DATE: 2008 11 27

Winnipeg

THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT
SOLID WASTE DIVISION

NO.28
BROOKLANDS
LANDFILL SITE

SHEET OF

CITY DRAWING NUMBER

SWD-D-125

WINNIPEG TRANSIT

NORTH GARAGE REPLACEMENT

CLIMATE LENS ASSESSMENT - GHG MITIGATION ASSESSMENT

JUNE 03, 2021

CONFIDENTIAL

wsp

NORTH GARAGE REPLACEMENT

CLIMATE LENS ASSESSMENT - GHG MITIGATION

WINNIPEG TRANSIT

FINAL
CONFIDENTIAL

PROJECT NO.: 17M-00063-03
DATE: JUNE 03, 2021

WSP
SUITE 1000
840 HOWE STREET
VANCOUVER, BC, CANADA V6Z 2M1

T: +1 604 685-9381
F: +1 604 683-8655
WSP.COM

SIGNATURES

PREPARED BY

June 03, 2021

Hong Zhang, M.A.Sc., P.Eng.
Senior Air Quality Engineer

Date

REVIEWED BY

June 03, 2021

Anthony Dickinson, M.A.Sc., P.Eng.
Senior Environmental Engineer

Date

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CONTRIBUTORS

CLIENT

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WSP

Project Manager	Grantley King, P.Eng.
GHGMA Lead	Hong Zhang, MASc, P.Eng.
GHGMA Support	Nathan Monash
Senior Review	Anthony Dickinson, MA.Sc., P.Eng.
Transportation Advisor	Sander Quartero

TABLE OF CONTENTS

TABLES

APPENDICES

1 ATTESTATION OF COMPLETENESS

We the undersigned attest that this Greenhouse Gas (GHG) Mitigation Assessment was undertaken using recognized assessment tools and approaches (i.e. ISO 14064-2: Specification with guidance at the project level for quantification, monitoring, and reporting of greenhouse gas emissions reductions or removal enhancements and, if chosen, the *GHG Protocol for Project Accounting*) and complies with the General Guidance and any relevant sector-specific technical guidance issued by Infrastructure Canada for use under the Climate Lens.

Prepared by*:______________________________________ Date: June 03, 2021
Hong Zhang, M.A.Sc., P.Eng.

Attested by*:______________________________________ Date: June 03, 2021
Anthony Dickinson, M.A.Sc., P.Eng.

*GHG Mitigation Assessments must be prepared, a qualified professional (i.e., a professional engineer, or a GHG accounting professional with suitable GHG quantification training or expertise related to the project).

2 EXECUTIVE SUMMARY

Winnipeg Transit is initiating the construction of a new Leadership Energy and Environmental Design (LEED)-certified energy efficient bus storage and maintenance facility to replace the existing 70-year-old North Garage in Winnipeg, Manitoba (the Project, or the North Garage Replacement). The Project requires a Climate Lens Assessment (CLA) during the application/design phase of the Project. The Climate Lens policy was developed under the Investing in Canadian Infrastructure Program (ICIP) to help address the climate change impacts and greenhouse gas (GHG) emissions of infrastructure projects in Canada. WSP Canada Inc. (WSP) was retained by the City to conduct a Climate Lens Assessment, which has two components:

1. The Greenhouse Gas Mitigation Assessment (GHGMA), which estimates the anticipated GHG emissions of an infrastructure project; and
2. The Climate Change Resilience Assessment (CCRA), which employs a risk management approach to anticipate, prevent, withstand, respond to, and recover from a climate change related disruption or impact.

This is the GHGMA Report, which details the Project's GHG emissions inventory in 2030 and over the asset's lifespan, including both construction as well as operations and maintenance (O & M) phases. This report includes a list of GHG emissions sources, and the quantity of emissions anticipated to be released from each source during the asset's lifespan. The anticipated GHG emissions in the year 2030 and cumulatively over the anticipated Project lifespan for the baseline and Project cases are shown in Table 2-1 below.

Table 2-1: Net Reduction in GHG Emissions in 2030 and Cumulative Over 50-Year Lifespan

GHG Mitigation Assessment			
2030 GHG Results (tonnes of CO_2e)		**Lifetime GHG Results (tonnes of CO_2e)**	
Baseline Scenario Emissions in 2030	2,708	Baseline Scenario Emissions, Lifetime (cumulative)	140,982
Estimated Project Emissions in 2030	2,086	Estimated Project Emissions, Lifetime (cumulative)	111,985
Net Emissions Reduction	**623**	**Net Emissions Reduction**	28,996

For the baseline case, 140,982 tonnes of CO_2-equivalent (tCO_2e) emissions are anticipated, spanning 53 years from 2023 to 2075. The Project case is anticipated to emit 111,985 tonnes of CO_2-equivalent (tCO_2e) over the asset lifetime. GHG emissions from construction activities are estimated at 15,236 from 2023 to 2026, which accounts for approximately 14% of total life span emissions. GHG emissions included in the assessment consist of direct, on-site emissions (sometimes called Scope 1) and indirect, off-site emissions associated with purchased electricity consumption (sometimes called Scope 2). Based on this assessment, it is anticipated that in 2030, 2,708 tCO_2e will be emitted for the baseline case and 2,086 t CO_2e will be emitted for the project case.

This Project is anticipated to result in 623 tonnes of CO_2e reduction in 2030 (non-cumulative basis), and a Project lifespan GHG reduction of 28,996 tCO_2e relative to the baseline scenario. The GHG reduction cost for 2030 is 117,283 Federal contribution dollar per tonne of CO_2e removed for the non-cumulative basis. For the Project lifespan, the GHG reduction cost is 6,296 Project dollar per tonne of tCO_2e removed if the funding is approved.

This GHG Assessment has been developed in accordance with CAN/CSA-ISO Standard 14064-2:06 Greenhouse Gases – Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements. In addition, the team has consulted with the World

Resource Institute (WRI)/ World Business Council for Sustainable Development (WBCSD) protocol: The GHG Protocol for Project Accounting and additional resources. The GHG assertions presented in this report have not undergone third-party verification.

3 PROJECT OVERVIEW

Winnipeg Transit is initiating the construction of a new LEED-certified energy efficient bus storage and maintenance facility to replace the existing 70-year-old North Garage Facility in Winnipeg, Manitoba (the Project). The Project aims to support key initiatives in the City of Winnipeg's Climate Action Plan[1], specifically Action 3.7 to transition the City's transit fleet to zero-emission vehicles, Action 5.2 to improve energy performance of new buildings, and Action 7.1 to implement opportunities to improve Winnipeg's resilience and adaptability to the effects of a changing climate.

The current North Garage Facility was operated since 1930's and is functionally obsolete and in poor condition. The facility is beyond its service life and continued operation is not feasible due to constant repairs and high continued maintenance costs. The proposed new building is designed to accommodate increased fleet storage demand to facilitate the transition from a diesel bus fleet to a zero-emission bus fleet.

The Project requires a Climate Lens Assessment during the application/design phase of the Project for shared funding through the ICIP. The Climate Lens policy was developed under the ICIP to help address the climate change impacts and GHG emissions of infrastructure projects in Canada.

4 METHODOLOGY

4.1 QUANTIFICATION PROTOCOL

Quantification of baseline and Project emissions adheres to the six principles for project GHG accounting set out in CAN/CSA-ISO Standard 14064-2[2] and The GHG Protocol for Project Accounting[3]. These include:

- **Relevance:** This GHGMA appropriately reflects the baseline and project case for the Project, and it serves the needs of its owners to communicate GHG emissions impacts of this development. Emissions factors and estimates used are sourced from Canada's National Inventory Report (NIR)[4] or Intergovernmental Panel on Climate Change (IPCC) sources, where possible, and are referenced in detail.
- **Completeness:** WSP has accounted for all significant GHG emission sources and activities within the chosen boundaries, referencing the Climate Lens guidance[5]. Any exclusion of emissions sources is disclosed and justified.

[1] City of Winnipeg, Winnipeg's Climate Action Plan, Planning for Climate Change – Acting for People, Report, May 2018
[2] ISO 14064-2: Specification with Guidance at the Project Level for Quantification, Monitoring, and Reporting of Greenhouse Gas Emission Reductions or Removal Enhancements
[3] World Business Council for Sustainable Development (WBCSD)/World Resources Institute (WRI) – The GHG Protocol for Project Accounting
[4] Environment and Climate Change Canada (ECCC), National Inventory Report 1990-2019: Greenhouse Gas Sources and Sinks in Canada, 2021
[5] Infrastructure Canada, Climate Lens General Guidance, https://www.infrastructure.gc.ca/pub/other-autre/cl-occ-eng.html, accessed in May 2021

- **Consistency:** WSP has completed this assessment using consistent methodologies to enable meaningful comparisons of GHG emissions with other projects and over time. Methodological decisions are transparently documented.
- **Transparency:** WSP has produced this report in a factual and coherent manner. Any assumptions are stated, and calculation methodologies are referenced to ensure transparency.
- **Accuracy:** Quantification of the Project's anticipated baseline and Project emissions is made as accurate as possible, based on available data, emissions factors and estimation methodologies used, recognizing that uncertainties exist due to the early stage of Project development, and the limited emissions factors available for the relevant activities. Where there is uncertainty, a conservative approach has been taken and described.
- **Conservativeness:** Assumptions, estimations, and emissions and conversion factors are selected with the aim of avoiding under-estimating GHG emissions from the Project.

4.2 BOUNDARY OF THE ASSESSMENT

The boundary of the Project for the GHGMA is defined as the activities associated with the construction and O&M of the North Garage Replacement. Emission sources include direct and indirect emissions during the construction and O & M phases.

4.3 PROJECT SCHEDULE AND LIFECYCLE

The assessment considers construction to start in 2023 with an overall completion by the first half of 2026. Lifecycles for the building structural assets have been projected at 35 - 60 years, while mechanical and electrical assets are assumed to have a lifecycle of 20 -25 years. For this project, the GHGMA emissions for construction were quantified for the period of 2023 to the first half of 2026; emissions for the O&M were quantified from the second half of 2026 to the end of 2075 covering the 50-year life span of the project.

4.4 GREENHOUSE GASES CONSIDERED

The assessment considers the seven gases and families of gases defined as GHGs under the United Nations IPCC:

- Carbon dioxide (CO_2);
- Methane (CH_4);
- Nitrous oxide (N_2O);
- Nitrogen Trifluoride (NF_3);
- Hydrofluorocarbons (HFCs – a family of gases);
- Fluorocarbons (PFCs – another family of gases) and
- Sulfur hexafluoride (SF_6).

The majority of the emissions are CO_2. Some amounts of CH_4 and N_2O are anticipated and are quantified where an appropriate emission factors exists to quantify these. All are converted into tonnes of CO_2 equivalent (tCO_2e) using global warming potentials (GWP) sourced from the IPCC 4th Assessment Report (Table 4-1) as required for inventory reporting under the United Nations Framework Convention on Climate Change (UNFCCC) and by Section 46 (S.46) of the Canadian Environmental Protection Act for facility GHG reporting.

Table 4-1 Global Warming Potential (100 year) for the Most Common GHG Species

Greenhouse Gas	Global Warming Potential (100 year)
Carbon dioxide (CO_2)	1
Methane (CH_4)	25
Nitrous oxide (N_2O)	298

In some cases, available emissions factors are provided in units of tCO_2e, encompassing CH_4, N_2O, SF_6 emissions. Trace amounts of NF_3, HFCs, and PFCs are anticipated.

4.5 GHG ASSESSMENT SCENARIOS

Two GHGMA scenarios were conducted, specifically a baseline case and a Project case. The baseline case represents the most likely business as usual (BAU) scenario, which is the construction and operation of a regular building with an equal function to the North Garage Replacement to meet the minimum requirements of the National Building Code and National Energy Code for Buildings (NECB). Manitoba adopted the 2011 NECB as the standard Manitoba Energy Code for Buildings (MECB) in 2014[6] (2014 MECB). Thus, the baseline case represents the application of 2014 MECB for energy efficiency requirements, representing the conditions most like to occur in the absence of the proposed Project.

The Project case is the design and construction of the North Garage Replacement meeting the energy efficient design requirements established by *The Climate Change and Emissions Reduction Act*, Green Building Regulation M.R. 38/2013[7]. The regulation requires building design to be at least 33% more energy efficient than the 1997 NECB, which is equivalent to 10% more energy efficient than the 2011 NECB[8]. The Project case represents the GHG reduction scenario that considered "green" technologies and practices for energy efficiency and energy saving. Methods to quantify anticipated emissions associated with this Baseline case/Project case are described in the following sections.

4.6 EMISSION SCOPES

Anticipated emissions are quantified both for the construction phase and for the O&M phase over the lifespan of the asset. Sources of direct and energy indirect emissions are summarized in Table 4-2.

Table 4-2: Assessment Boundary Emission Sources and Scopes

Source Scope	Construction Phase (2023-mid 2026)	O &M Phase (mid 2026-end 2075)
Scope 1 – Direct Emissions	Construction Activities	- Energy usage for building O & M - Natural gas fired backup generator
Scope 2 – Energy Indirect Emissions	Electricity Consumption	Electricity Consumption
Scope 3 – Other Indirect Emissions	Not Applicable	Not Applicable

[6] Manitoba Office of the Fire Commissioner, Energy Efficiency, https://firecomm.gov.mb.ca/codes_energy.html, accessed in May 2021

[7] *The Climate Change and Emissions Reduction Act*, Green Building Regulation M.R. 38/2013, https://web2.gov.mb.ca/laws/regs/current/_pdf-regs.php?reg=38/2013, accessed in May 2021

[8] Manitoba Green Building Program, Frequently Asked Questions (FAQs), https://www.manitoba.ca/finance/greenbuilding/faq.html#one, accessed in May 2021

4.7 EXCLUSIONS FROM THE ASSESSMENT

Fugitive emissions could result from the use of ozone depleting substances (ODS) in the HVAC system (i.e. refrigerants are used in the heat pumps and air conditioning systems) and/or fire suppression equipment on-site during construction and/or O&M. Given the uncertainty about the types and quantity of ODS and fire suppression equipment that could be used, GHG emissions from loss of ODS and/or fire suppression equipment were excluded from this assessment.

Fugitive emissions of SF_6 from electrical equipment were not included as the equipment has yet to be specified. As the same equipment is expected to be specified for the base case and project case this exclusion will not impact the GHG emission reductions associated with the Project.

Per Climate Lens[5] direction, supply chain emissions were not included. Other supply chain emissions that are not quantified, but could exist for this type of project, include emissions resulting from manufacturing of construction materials (e.g. cement or steel), workers and staff commuting to site, and production and transportation of consumables (e.g. medical supplies). Emissions associated with future major rehabilitative maintenance and/or decommissioning of the Project are also not quantified. No emissions or emissions removals associated with this Project are anticipated to occur outside of Canada.

4.8 DATA COLLECTION AND CALCULATION PROCEDURES

GHG emissions anticipated for the Project were estimated based on currently available information or assumptions. WSP calculated the appropriate GHG emissions using Project activity data and emission factors by applying the following equation:

GHG Emissions = Activity Data × Emission Factor

Equation 1

Activity data associated with construction and O & M activities were provided by the Project team or estimated based on the best available information. There are potential differences between projected and actual emissions which may arise due to actual materials used, activities undertaken during construction and O&M practices. For this study, the GHG emission factors were taken from various sources, such as the IPCC and the latest NIR[4].

4.9 ASSUMPTIONS

The Project is still at the stage of planning, design and procurement. Some specific parameters are still being finalized at this time. As such, availability of data at the current indicative design stage requires that assumptions be made to estimate some activities, yielding results that are associated with greater uncertainty. If greater certainty is desired, the emission estimates may be revisited to incorporate new data following construction. The following sections detail assumptions and methods used for quantifying GHG emissions for the baseline and project cases.

4.9.1 BASELINE SCENARIO

The baseline scenario assumes that the Project does not exist. GHG emissions for the baseline case consists of the following components:

→ Construction
→ Energy usage for building O & M
→ Natural gas fired backup generator

GHG emissions were quantified on an annual basis. Detailed methodology is elaborated below.

4.9.1.1 CONSTRUCTION EMISSIONS

GHG emissions related to construction activities include the use of heavy equipment and electricity for site preparation, structure build up, building plumbing, drainage, mechanical and electrical services. The project is still at the early application stage and a detailed design is not finalized. A detailed equipment list and energy usage demand is not yet available during the current phase of the Project. As a result, construction cost estimates are used as a proxy to calculate emissions.

Emissions from the construction phase were estimated based on cost estimates using an energy intensity index related to construction value. The GHG intensity data was taken from a US EPA study for reducing GHG emissions in the construction sector[9]. The US EPA study characterized the GHG emissions from various construction activities with a five-digit North American Industry Classification System (NAICS) of codes. The emission intensities for the construction industry were evaluated using metric tonnes of CO_2 equivalents per thousand 2002 US dollar (tCO_2e/2002K USD). To convert 2002 USD to 2021 CAD, an exchange rate of 1.57, sourced from the Bank of Canada[10], was used to estimate the CAD in 2002. The 2002 CAD were then adjusted for inflation using the historical price index data from the inflation calculator for the Province of Manitoba[11] to obtain 2021 CAD. Emission parameters used to calculate anticipated emissions are summarized in Table 4-3. The construction emissions were evenly distributed between 2023 and 1st half of 2026.

Table 4-3: Emissions Intensities for Quantifying GHG Emissions from Construction Activity (2023-mid 2026)

Construction Description	2002 NAICS Code	Intensity	Intensity	Cost
		CO_2e tonne/ 2002K USD	CO_2e (tonne)/ 2021K CAD	2021 K CAD
Commercial and institutional building	23622	0.23	0.1056	110,402
Electrical Contractors	23821	0.18	0.0827	5,546
Site preparation contractors	23891	0.36	0.1653	17,332
Other building equipment contractors	23829	0.17	0.0781	3,220

The following is an example calculation for CO_2e emissions from construction emissions:

$$CO_{2e} = 0.1056 \frac{tonne\ CO_{2e}}{2020k\ CAD} * 110{,}402(2021k\ CAD) + 0.0827 \frac{tonne\ CO_{2e}}{2020k\ CAD} * 5{,}546(2021k\ CAD) +$$
$$0.1653 \frac{tonne\ CO_{2e}}{2020k\ CAD} * 17{,}332(2021k\ CAD) + 0.0781 \frac{tonne\ CO_{2e}}{2020k\ CAD} * 3{,}220(2021k\ CAD) = 15{,}236\ tonne\ CO_{2e}$$

[9] US EPA, Potential for Reducing Greenhouse Gas Emissions in the Construction Sector, 2009
[10] Government of Canada, Historical Noon and Closing Rates, https://www.bankofcanada.ca/rates/exchange/legacy-noon-and-closing-rates/, accessed in October 2020
[11] Inflation Calculator, https://inflationcalculator.ca/2021-cpi-and-inflation-rates-for-manitoba/, accessed in May 2021

4.9.1.2 BUILDING ENERGY EMISSIONS

TOTAL ENERGY CONSUMPTION

The proposed North Garage has a building size of 36,460 m^2, consisting of different services areas, such as administration, operation, storage, interior bus parking, service and vehicle maintenance. The baseline case is to be in compliance with the 2011 NECB. The NECB is usually harmonized with the ASHRAE 90.1 standard for building energy efficiency requirements. Due to the early stage of the project, detailed energy data are not readily available. Energy consumption for the new building was estimated with an Energy Use Intensity (EUI) approach. The EUI is used to expresses a building's energy use as a function of its size and building type. To obtain the baseline EUI for the proposed North Garage replacement, the energy consumption obtained from the two existing garages, namely Brandon and Fort Rouge operated by Winnipeg Transit were used.

The Brandon Garage is a 135,000 ft^2 building providing administration, operation, fleet parking and storage functions[12]. The Fort Rouge site functions mainly as vehicle maintenance building. The current Brandon Garage uses natural gas and electricity as the fuel supply for building operations. Annual natural gas and electricity consumption was at 396,907 m^3 and 1,473,120 kWh, respectively. Natural gas consumption was converted to 14,963 GJ using a higher heating value (HHV) of 0.0377 GJ/m^3 obtained from Natural Gas Calculator[13] for the Province of Winnipeg. Based on total energy usage divided by the building size, the EUI for the existing Brandon Garage was estimated at 1.62 GJ/m^2.

The Brandon Garage has incorporated high efficiency heating and lighting systems in the design, which is beyond the minimum energy efficiency requirements stipulated in the 2011 NECB. It has achieved Gold Rating under the LEED Green Building Rating System. A LEED review has identified 48% of energy saving over the 1997 MECB standards. To reflect the energy efficiency improvement in the design of the Brandon Garage to the 1997 MECB, the current EUI was first adjusted at 2.392 GJ/m^2. The adjusted EUI at the 1997 MECB reference standard was then corrected to the 2014 MECB standard[14] due to 26.2% energy improvement requirements. The final baseline EUI for the administration and storage area of the North Garage Replacement was estimated at 1.76 GJ/m^2.

To quantify EUI for the vehicle maintenance area, energy consumption from the Fort Rouge Garage was used. The Fort Rouge Garage was built in the 1970's is 240,000 ft^2 in area. The building EUI was estimated at 6.036 GJ/m^2 using the most recent energy consumption information. To reflect energy efficiency requirement changes in the 1970's design criteria relative to the 2011 NECB standards, the actual EUI was adjusted at 2.64 GJ/m^2 using data obtained from an ASHRAE standard impact study[15] published at a 2018 Building Performance Analysis Conference. The study reported an average energy improvement of 44% due to the application of ASHRAE 90.1-2010 relative to the ASHRAE 90.1-1975. The EUI for the baseline case is higher than the national median energy use of similar properties[16]. Total energy demand for the North Garage operations were estimated using the following equation:

$$E_{demand} = EUI_s * A_s + EUI_M * A_M$$

Equation 2

[12] Canstar Community News, Transit Barely Managing in Garage, Transit 'barely managing' in garage - Winnipeg Free Press, accessed in May 2021

[13] Canadian Energy Partnership for Environmental Innovation (CEPEI) Natural Gas Calculator, Prepared by Ortech

[14] National Research Council Canada, Adaptation Guidelines for the National Energy Code of Canada for Buildings 2011, https://nrc.canada.ca/en/certifications-evaluations-standards/codes-canada/codes-canada-publications/adaptation-guidelines-national-energy-code-canada-buildings-2011, accessed in May 2021

[15] Liu et al., National Impact of ANSI/ASHRAE/IES Standard 90.1-2016, 2018 Building Performance Analysis Conference and SimBuild-co-organized by ASHRAE and IBPSA-USA, Chicago, IL, September 2018

[16] Energy Star, Portfolio Manager Technical Reference, Canadian Energy Use Intensity by Property Type

Where:

E_{demand}	= Total Energy Demand (GJ)
EUI_S	= EUI for the Administration and Fleet Storage Area (excluding Maintenance Area (GJ/m^2)
A_S	= Administration and Fleet Storage Area (excluding Maintenance Area (m^2)
EUI_M	= EUI for the Maintenance Service Area (GJ/m^2)
A_M	= Maintenance Service Area (m^2)

Parameters used to calculate baseline total energy consumed for the proposed North Garage Replacement are summarized in Table 4-4.

Table 4-4: Baseline Energy Usage for the North Garage Replacement

Building Descriptions	Area (m^2)	Baseline EUI (GJ/m^2)	Total Energy Demand (GJ/yr)
Administrative Area	1,039.77	1.76	1,835
Operations Area	670.39	1.76	1,183
Vehicle Maintenance Areas	7,900.01	2.64	20,819
Parts Storage Areas	1,399.96	1.76	2,471
Interior Bus Parking	22,629.97	1.76	39,941
Service Areas	2,819.98	1.76	4,977
Total	**36,460**	-	**71,226**

ENERGY SHARE

To consider the climate change impact on the energy demand for future years, the energy demand for building space heating and cooling during the life span of the project needs to be adjusted. In doing so, the energy share for the building operation was obtained for data analysis. The Proposed North Garage Replacement will use natural gas for space heating and hot water. Electricity will be used for lighting, space cooling, plug load and equipment operation. Currently, natural gas and electricity account for 74% and 26% of total energy consumed at the Brandon Garage. The energy share percent changed to 78% of natural gas and 22% of electricity at the Fort Rouge Garage. To estimate energy use of space heating and cooling for the proposed North Garage Replacement, the energy share obtained from Natural Resources Canada (NRC) for a typical Manitoba building in the transportation and warehouse sector[17] was used. The NRC Energy Use Database covers multiple years of information from 2008 to 2018. To reflect the most recent building design regulation requirements, the average energy share from the most recently available 3-year data period (2016 -2018) were used. Using the above information, 95% of natural gas was used for space heating and 5% was for hot water supply. For electricity consumption, 11.3% of electricity was used for space cooling. The baseline energy share information is shown in Table 4-5.

[17] NRC, National Energy Use Database, Commercial/Institutional Sector Manitoba – Table 9: Transportation and Warehousing Secondary Energy Use and GHG Emissions by End Use, https://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/showTable.cfm?type=CP&sector=com&juris=mb&rn=9&page=0, accessed in May 2021

Table 4-5: Baseline Energy Breakdown for the North Garage Replacement

Building Descriptions	Natural Gas (GJ/yr)		Electricity (GJ/yr)		Electricity (kWh)	
	Space Heating	Hot Water	Space Cooling	Others	Space Cooling	Others
Administrative Area	1,287	68	54	426	42,570	333,804
Operations Area	830	44	35	275	27,447	215,219
Vehicle Maintenance Areas	15,474	821	512	4,012	511,981	4,014,552
Parts Storage Areas	1,732	92	73	573	57,317	449,436
Interior Bus Parking	28,003	1,486	1,182	9,269	926,520	7,265,029
Service Areas	3,490	185	147	1,155	115,456	905,314
Total	**50,816**	**2,697**	**2,004**	**15,710**	**1,681,292**	**13,183,353**

ENERGY USAGE ADJUSTMENTS DUE TO CLIMATE CHANGE IMPACTS

The energy demand for building space heating and cooling was adjusted using heating degree days (HDD) and cooling degree-days (CDD). Each degree centigrade that the average ambient daily temperature is below 18°C represents an HDD. Thus, if the average ambient daily temperature is 10°C this would represent 8 HDD. This value is used to estimate the energy that will be required for space heating. Conversely, each degree centigrade that the average ambient daily temperature is above 18°C represents a CDD. CDD are used to estimate energy requirements for cooling buildings. The HDD and CDD were obtained from the Climate Atlas website for the Municipality of Winnipeg[18] and were adjusted using linear interpretation for future years. Natural gas consumption for hot water and electricity consumption for other building functions/operations remain the same. Baseline energy consumptions for the lifetime of the Project are shown in Table 4-6.

Table 4-6: Lifetime Baseline Building Energy Consumption

Baseline Case Year	Natural Gas Demand (GJ)		Electricity Demand (kWh)	
	Space Heating – HDD Adjusted	Hot water	Cooling -CDD Adjusted	Others
2nd half 2026	25,408	1,349	840,646	6,591,676
2027	50,644	2,697	1,701,321	13,183,353
2028	50,472	2,697	1,721,350	13,183,353
2029	50,301	2,697	1,741,379	13,183,353
2030	50,131	2,697	1,761,408	13,183,353
2031	49,961	2,697	1,796,930	13,183,353
2032	49,792	2,697	1,832,453	13,183,353
2033	49,624	2,697	1,867,975	13,183,353
2034	49,456	2,697	1,903,498	13,183,353
2035	49,288	2,697	1,939,021	13,183,353
2036	49,121	2,697	1,974,543	13,183,353
2037	48,955	2,697	2,010,066	13,183,353
2038	48,789	2,697	2,045,588	13,183,353

[18] Climate atlas, https://climateatlas.ca/map/canada/hdd_2030_85#z=7&lat=51.32&lng=-98.53&city=465, accessed in April 2021

Baseline Case Year	Natural Gas Demand (GJ)		Electricity Demand (kWh)	
	Space Heating – HDD Adjusted	Hot water	Cooling -CDD Adjusted	Others
2039	48,624	2,697	2,081,111	13,183,353
2040	48,459	2,697	2,116,633	13,183,353
2041	48,295	2,697	2,152,156	13,183,353
2042	48,132	2,697	2,187,679	13,183,353
2043	47,969	2,697	2,223,201	13,183,353
2044	47,807	2,697	2,258,724	13,183,353
2045	47,645	2,697	2,294,246	13,183,353
2046	47,483	2,697	2,329,769	13,183,353
2047	47,323	2,697	2,365,292	13,183,353
2048	47,162	2,697	2,400,814	13,183,353
2049	47,003	2,697	2,436,337	13,183,353
2050	46,844	2,697	2,471,859	13,183,353
2051	46,685	2,697	2,507,382	13,183,353
2052	46,527	2,697	2,542,905	13,183,353
2053	46,369	2,697	2,578,427	13,183,353
2054	46,212	2,697	2,613,950	13,183,353
2055	46,056	2,697	2,649,472	13,183,353
2056	45,900	2,697	2,684,995	13,183,353
2057	45,745	2,697	2,720,518	13,183,353
2058	45,590	2,697	2,756,040	13,183,353
2059	45,435	2,697	2,791,563	13,183,353
2060	45,282	2,697	2,827,085	13,183,353
2061	45,128	2,697	2,862,608	13,183,353
2062	44,976	2,697	2,898,130	13,183,353
2063	44,823	2,697	2,933,653	13,183,353
2064	44,672	2,697	2,969,176	13,183,353
2065	44,520	2,697	3,004,698	13,183,353
2066	44,370	2,697	3,040,221	13,183,353
2067	44,219	2,697	3,075,743	13,183,353
2068	44,070	2,697	3,111,266	13,183,353
2069	43,921	2,697	3,146,789	13,183,353
2070	43,772	2,697	3,182,311	13,183,353
2071	43,624	2,697	3,217,834	13,183,353
2072	43,476	2,697	3,253,356	13,183,353
2073	43,329	2,697	3,288,879	13,183,353
2074	43,182	2,697	3,324,402	13,183,353
2075	43,036	2,697	3,359,924	13,183,353

GHG EMISSION QUANTIFICATION FROM BUILDING OPERATION

To estimate GHG emissions from energy consumption for building O & M, energy consumption was multiplied by the corresponding natural gas emission factors and electricity generation intensity. Natural gas emission factors were taken from Tables A6.1-1 and A6.1-3 of the NIR[4]. The natural gas emission factors were in units of g/m^3 and converted to energy basis using HHV of 0.0377 GJ/m^3 taken from the natural gas calculator[13] for the Province of Manitoba. Natural gas emission factors used for GHG quantification are shown in Table 4-7.

Table 4-7: Natural Gas Emission Factors

Energy Type	Emission Factors				
	CO_2	CH_4	N_2O	CO_2e	Unit
Natural Gas	1,886.00	0.037	0.035	1,897.36	g/m^3
	50,026.53	0.98	0.93	50,327.72	g/GJ

The following is an example calculation for CO_2e emissions from natural gas combustion for hot water usage:

$$CO_{2e} = 2{,}697\,\frac{\text{GJ}}{\text{yr}} * 50{,}327.72\,\frac{g}{m^3} * \frac{tonne}{1{,}000{,}000g} = 135.7\ tonne\ CO_{2e}$$

GHG grid electricity generation intensity was taken from Manitoba Hydro's published emission factors[19]. Nearly all the grid connected in Manitoba is generated at hydroelectric generating stations, which resulted in a low emission intensity. To smooth the annual variation of emission factors, an average value of the past 5-year emission intensities was used as shown in Table 4-8.

Table 4-8: Electricity Emission Intensity

Manitoba GHG Emission Intensity	2016	2017	2018	2019	2020	5-yr Average
tonnes CO_2e/GWh	1.15	1.27	0.43	0.88	0.44	0.83

4.9.1.3 BACKUP GENERATOR

A diesel fired generator is used on site as a backup generator. The generator is assumed to be 10 MW with a consumption rate of 184 g/kWh based on CAT Genset Specification[20]. The generator was assumed to be operated on an average of half hour per month, totaling 6 hours per year for monthly inspection and testing of emergency generator[21]. Using a diesel density of 845 g/L[22], annual diesel consumption was estimated at 13,823 at full load. Total GHG emissions from the backup generator were quantified using emission factors taken from Table A.6.1-5 of the latest NIR as shown in Table 4-9 below.

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[19] Manitoba Hydro's Greenhouse Gas Emission Factors, https://www.hydro.mb.ca/environment/pdf/ghg-emission-factors.pdf, accessed in May 2021

[20] CAT G20CM34 Natural Gas Genset Electric Power Generation

[21] National Fire Prevention Association (NFPA), Inspection and Testing of Emergency Generators

[22] US EPA AP 42, Appendix A: Miscellaneous Data and Conversion Factors, https://www.epa.gov/sites/production/files/2020-11/documents/appa.pdf, accessed in May 2021

Table 4-9: Diesel Emission Factors

Diesel Generator	CO_2	CH_4	N_2O	CO_2e	Unit
Emission Factor	2,681.00	0.078	0.022	2,689.51	g/L

The following is an example calculation for CO_2e emissions from diesel generator:

$$CO_{2e} = 2{,}689.51\frac{\text{g}}{\text{L}} * 13{,}823\frac{L}{yr} * \frac{tonne}{1{,}000{,}000g} = 37\ tonne\ CO_{2e}$$

4.9.2 PROJECT SCENARIO

The project case represents the construction and operation of the proposed North Garage Replacement that has considered "green" technologies and practices for energy efficiency and energy savings. GHG emission sources for the project case are identical to the baseline case as illustrated in Section 4.9.1. GHG emissions were quantified on an annual basis. Detailed methodology is elaborated below.

4.9.2.1 CONSTRUCTION EMISSIONS

The method for quantifying GHG emissions from construction activity follows the same approach illustrated in Section 4.9.1.1. Although there are some cost differences between these two cases, construction emission differences are expected to be insignificant.

4.9.2.2 BUILDING ENERGY EMISSION

TOTAL ENERGY CONSUMPTIONS

The Project case is to meet the minimum energy efficient design requirements established by *The Climate Change and Emissions Reduction Act*, Green Building Regulation M.R. 38/2013[23]. The regulation requires building design to have a targeted energy efficiency level at least 33% more energy efficient than the 1997 NECB, which is equivalent to 10% more energy efficient than the 2011 NECB[24]. The Project will implement similar "green" technologies and practices for energy efficiency and energy saving used in the Brandon Garage, which include but are not limited to:

- → Heat recovery ventilation units recovering the heat from exhaust air to preheat supply air
- → Ventilation system controlled by demand and exhaust gases monitoring
- → Overhead doors equipped with air curtains to hold the warm air inside the building
- → Under-slab heating system
- → Wall panels with an R20 insulation value
- → Solar panels to offset grid electricity
- → Natural gas fired backup generator

[23] *The Climate Change and Emissions Reduction Act*, Green Building Regulation M.R. 38/2013, https://web2.gov.mb.ca/laws/regs/current/_pdf-regs.php?reg=38/2013, accessed in May 2021

[24] Manitoba Green Building Program, Frequently Asked Questions (FAQs), https://www.manitoba.ca/finance/greenbuilding/faq.html#one, accessed in May 2021

The above design/practice is beyond the minimum energy efficiency requirements stipulated in the 2011 NECB. To estimate project case of energy improvement, data from the Brandon Garage was used as a reference. The Brandon Garage has a 48% energy saving over the 1997 MECB standards, which is equivalent to 21.8% energy improvement over the 2014 MECB standard[25] due to 26.2% energy improvement requirements of 2014 MECB relative to the 1997 MECB. Parameters used to calculate the Project case energy consumed for the proposed North Garage Replacement are summarized in Table 4-10.

Table 4-10: Project Energy Usage for the North Garage Replacement

Building Descriptions	Area (m^2)	Project EUI (GJ/m^2)	Total Energy Demand (GJ/yr)
Administrative Area	1,039.77	1.38	1,435
Operations Area	670.39	1.38	925
Vehicle Maintenance Areas	7,900.01	2.06	16,280
Parts Storage Areas	1,399.96	1.38	1,932
Interior Bus Parking	22,629.97	1.38	31,234
Service Areas	2,819.98	1.38	3,892
Total	**36,460**	-	**55,699**

ENERGY SHARE

Method for determining energy consumption in space heating and cooling for the Project case followed the same approach illustrated in the baseline case. Table 4-11 summarizes energy usage of space heating and cooling for the Project Case.

Table 4-11: Project Energy Breakdown for the North Garage Replacement

Building Descriptions	Natural Gas (GJ/yr)		Electricity (GJ/yr)		Electricity (kWh)	
	Space Heating	Hot Water	Space Cooling	Others	Space Cooling	Others
Administrative Area	1,006	53	42	333	33,290	261,034
Operations Area	649	34	27	215	21,464	168,301
Vehicle Maintenance Areas	12,101	642	400	3,137	400,370	3,139,379
Parts Storage Areas	1,355	72	57	448	44,822	351,459
Interior Bus Parking	21,899	1,162	924	7,249	724,538	5,681,253
Service Areas	2,729	145	115	903	90,287	707,955
Total	**39,738**	**2,109**	**1,567**	**12,285**	**1,314,770**	**10,309,382**

ENERGY USAGE ADJUSTMENTS DUE TO CLIMATE CHANGE IMPACTS

The impacts of climate change on future energy demand was analyzed using the same approach as stated in the baseline case. Table 4-12 presents lifetime Project energy consumptions.

[25] National Research Council Canada, Adaptation Guidelines for the National Energy Code of Canada for Buildings 2011, https://nrc.canada.ca/en/certifications-evaluations-standards/codes-canada/codes-canada-publications/adaptation-guidelines-national-energy-code-canada-buildings-2011, accessed in May 2021

Table 4-12: Lifetime Project Building Energy Consumption

Project Case Year	Natural Gas Demand (GJ)		Electricity Demand (kWh)	
	Space Heating – HDD Adjusted	Hot water	Space Cooling - CDD Adjusted	Others
2nd half of 2026	19,869	1,055	657,385	5,154,691
2027	39,603	2,109	1,330,433	10,309,382
2028	39,469	2,109	1,346,095	10,309,382
2029	39,336	2,109	1,361,758	10,309,382
2030	39,202	2,109	1,377,421	10,309,382
2031	39,070	2,109	1,405,199	10,309,382
2032	38,937	2,109	1,432,978	10,309,382
2033	38,806	2,109	1,460,757	10,309,382
2034	38,674	2,109	1,488,535	10,309,382
2035	38,543	2,109	1,516,314	10,309,382
2036	38,413	2,109	1,544,093	10,309,382
2037	38,283	2,109	1,571,871	10,309,382
2038	38,153	2,109	1,599,650	10,309,382
2039	38,024	2,109	1,627,429	10,309,382
2040	37,895	2,109	1,655,207	10,309,382
2041	37,767	2,109	1,682,986	10,309,382
2042	37,639	2,109	1,710,765	10,309,382
2043	37,512	2,109	1,738,543	10,309,382
2044	37,385	2,109	1,766,322	10,309,382
2045	37,258	2,109	1,794,101	10,309,382
2046	37,132	2,109	1,821,879	10,309,382
2047	37,006	2,109	1,849,658	10,309,382
2048	36,881	2,109	1,877,437	10,309,382
2049	36,756	2,109	1,905,215	10,309,382
2050	36,632	2,109	1,932,994	10,309,382
2051	36,508	2,109	1,960,773	10,309,382
2052	36,384	2,109	1,988,551	10,309,382
2053	36,261	2,109	2,016,330	10,309,382
2054	36,138	2,109	2,044,109	10,309,382
2055	36,016	2,109	2,071,887	10,309,382
2056	35,894	2,109	2,099,666	10,309,382
2057	35,772	2,109	2,127,445	10,309,382
2058	35,651	2,109	2,155,223	10,309,382
2059	35,531	2,109	2,183,002	10,309,382
2060	35,410	2,109	2,210,781	10,309,382
2061	35,290	2,109	2,238,559	10,309,382

Project Case Year	Natural Gas Demand (GJ)		Electricity Demand (kWh)	
	Space Heating – HDD Adjusted	Hot water	Space Cooling - CDD Adjusted	Others
2062	35,171	2,109	2,266,338	10,309,382
2063	35,052	2,109	2,294,117	10,309,382
2064	34,933	2,109	2,321,895	10,309,382
2065	34,815	2,109	2,349,674	10,309,382
2066	34,697	2,109	2,377,453	10,309,382
2067	34,580	2,109	2,405,231	10,309,382
2068	34,463	2,109	2,433,010	10,309,382
2069	34,346	2,109	2,460,789	10,309,382
2070	34,230	2,109	2,488,567	10,309,382
2071	34,114	2,109	2,516,346	10,309,382
2072	33,998	2,109	2,544,125	10,309,382
2073	33,883	2,109	2,571,903	10,309,382
2074	33,768	2,109	2,599,682	10,309,382
2075	33,654	2,109	2,627,461	10,309,382

GHG EMISSION QUANTIFICATION FROM BUILDING OPERATION

Project case GHG emissions from building operation used the same quantification method illustrated in the baseline case.

4.9.2.3 SOLAR PANELS

Solar Photovoltaics (PV) panels are to be installed at the roof-top of the North Garage facility to offset grid electricity. The roof-top mounted commercial solar energy system is estimated to generate 3,898 MWh electricity annually, which was prorated for building size and solar PV energy generation information from a pre-feasibility study for the Brandon Garage[26]. The lifetime of the solar -energy system is estimated at 30 years with an annual solar degradation rate of 0.8%. For the project, it is expected that solar PV panels will be replaced in 2056 and the same degradation rate will be applied from 2057 onwards. Table 4-13 summarizes the amount of electricity generated during the lifetime of the project.

Table 4-13: Amount of Electricity Generated by Solar PV Panels during Project Lifetime

Year	Electricity Generated by Solar PV Panels (MWh)	Year	Electricity Generated by Solar PV Panels (MWh)
2nd half 2026	1,949	2051	3,189
2027	3,867	2052	3,164
2028	3,836	2053	3,138
2029	3,806	2054	3,113

[26] Core Renewable Energy, City of Winnipeg Transit Bust Electrification Program Solar PV Integration Plan Phase 2, Pre-feasibility Energy Assessment, July 31, 2020

Year	Electricity Generated by Solar PV Panels (MWh)	Year	Electricity Generated by Solar PV Panels (MWh)
2030	3,775	2055	3,088
2031	3,745	2056	3,898
2032	3,715	2057	3,867
2033	3,685	2058	3,836
2034	3,656	2059	3,806
2035	3,627	2060	3,775
2036	3,597	2061	3,745
2037	3,569	2062	3,715
2038	3,540	2063	3,685
2039	3,512	2064	3,656
2040	3,484	2065	3,627
2041	3,456	2066	3,597
2042	3,428	2067	3,569
2043	3,401	2068	3,540
2044	3,374	2069	3,512
2045	3,347	2070	3,484
2046	3,320	2071	3,456
2047	3,293	2072	3,428
2048	3,267	2073	3,401
2049	3,241	2074	3,374
2050	3,215	2075	3,347

4.9.2.4 *BACKUP GENERATOR*

A natural gas fired generator will be used on site as a backup generator for the Project case. The generator is assumed to be 10 MW with a consumption rate of 7.1 BTU/kWh based on CAT Genset Specification[27]. Similar to the baseline case, the generator is assumed to operate an average of half hour per month, totaling 6 hours per year for monthly inspection and testing of the emergency generator[21]. Annual natural gas consumption is estimated at 0.46 GJ at full load. Total GHG emissions from the backup generator were quantified using emission factors shown in Table 4-7 of the report.

[27] CAT G20CM34 Natural Gas Genset Electric Power Generation

5 ESTIMATED BASELINE GHG EMISSIONS

5.1 CONSTRUCTION EMISSIONS

Total baseline construction emissions were estimated at 15,236 tonnes of CO_2e, which accounts for 11% of total emissions over the lifespan of the Project for the baseline case.

5.2 BUILDING ENERGY EMISSIONS

Baseline annual GHG emissions from building operation of the proposed North Garage are shown in Table 5-1.

Table 5-1: Baseline North Garage O & M Emissions

Baseline Case	Natural Gas Emissions	Electricity Emissions	Total Emissions
Year	tonnes CO_2e		
2nd half 2026	1,346.6	6.2	1,352.8
2027	2,684.5	12.4	2,696.9
2028	2,675.9	12.4	2,688.3
2029	2,667.3	12.4	2,679.7
2030	2,658.7	12.5	2,671.2
2031	2,650.2	12.5	2,662.7
2032	2,641.7	12.5	2,654.2
2033	2,633.2	12.6	2,645.7
2034	2,624.7	12.6	2,637.3
2035	2,616.3	12.6	2,628.9
2036	2,607.9	12.6	2,620.5
2037	2,599.5	12.7	2,612.2
2038	2,591.2	12.7	2,603.9
2039	2,582.9	12.7	2,595.6
2040	2,574.6	12.8	2,587.4
2041	2,566.3	12.8	2,579.1
2042	2,558.1	12.8	2,570.9
2043	2,549.9	12.8	2,562.8
2044	2,541.7	12.9	2,554.6
2045	2,533.6	12.9	2,546.5
2046	2,525.5	12.9	2,538.4
2047	2,517.4	13.0	2,530.3

Baseline Case	Natural Gas Emissions	Electricity Emissions	Total Emissions
Year	tonnes CO_2e		
2048	2,509.3	13.0	2,522.3
2049	2,501.3	13.0	2,514.3
2050	2,493.3	13.1	2,506.3
2051	2,485.3	13.1	2,498.4
2052	2,477.3	13.1	2,490.5
2053	2,469.4	13.1	2,482.6
2054	2,461.5	13.2	2,474.7
2055	2,453.6	13.2	2,466.8
2056	2,445.8	13.2	2,459.0
2057	2,438.0	13.3	2,451.2
2058	2,430.2	13.3	2,443.5
2059	2,422.4	13.3	2,435.7
2060	2,414.7	13.4	2,428.0
2061	2,406.9	13.4	2,420.3
2062	2,399.3	13.4	2,412.7
2063	2,391.6	13.4	2,405.0
2064	2,384.0	13.5	2,397.4
2065	2,376.3	13.5	2,389.8
2066	2,368.8	13.5	2,382.3
2067	2,361.2	13.6	2,374.8
2068	2,353.7	13.6	2,367.3
2069	2,346.2	13.6	2,359.8
2070	2,338.7	13.6	2,352.3
2071	2,331.2	13.7	2,344.9
2072	2,323.8	13.7	2,337.5
2073	2,316.4	13.7	2,330.1
2074	2,309.0	13.8	2,322.8
2075	2,301.6	13.8	2,315.4

5.3 BACKUP GENERATOR

Annual emissions from the backup generator were estimated at 0.02 tonnes of CO_2e as shown in Table 5-2, which was treated as negligible emissions.

Table 5-2: Backup Generator Emissions

Energy Type	GHG Emissions				
	CO_2	CH_4	N_2O	CO_{2e}	Unit
Backup Generator	0.0232	4.54E-07	4.30E-07	0.0233	tonnes

5.4 BASELINE ANNUAL AND CUMULATIVE EMISSIONS

Annual and cumulative GHG emissions for the baseline case are shown in Table 5-3. Building O & M emissions represent 88% of the lifetime GHG emissions.

Table 5-3: Baseline Annual and Cumulative Emissions

Baseline Case	Calendar Year	GHG Emissions (tonnes of CO_2e)			
		Construction	O&M	Total	Cumulative Emissions
Construction Year 1	2023	4,353.1		4,353.1	4,353.1
Construction Year 2	2024	4,353.1		4,353.1	8,706.3
Construction Year 3	2025	4,353.1		4,353.1	13,059.4
Construction Year 4 & O & M Year 1	2026	2,176.6	1,352.8	3,547.9	16,607.3
O & M Year 2	2027		2,696.9	2,734.1	19,341.4
O & M Year 3	2028		2,688.3	2,725.5	22,066.9
O & M Year 4	2029	-	2,679.7	2,716.9	24,783.8
O & M Year 5	**2030**	**-**	**2,671.2**	**2,708.4**	**27,492.2**
O & M Year 6	2031	-	2,662.7	2,699.8	30,192.0
O & M Year 7	2032	-	2,654.2	2,691.4	32,883.4
O & M Year 8	2033	-	2,645.7	2,682.9	35,566.3
O & M Year 9	2034	-	2,637.3	2,674.5	38,240.8
O & M Year 10	2035	-	2,628.9	2,666.1	40,906.9
O & M Year 11	2036	-	2,620.5	2,657.7	43,564.6
O & M Year 12	2037	-	2,612.2	2,649.4	46,214.0
O & M Year 13	2038	-	2,603.9	2,641.1	48,855.0
O & M Year 14	2039	-	2,595.6	2,632.8	51,487.8
O & M Year 15	2040	-	2,587.4	2,624.5	54,112.3
O & M Year 16	2041	-	2,579.1	2,616.3	56,728.6
O & M Year 17	2042	-	2,570.9	2,608.1	59,336.7
O & M Year 18	2043	-	2,562.8	2,599.9	61,936.7
O & M Year 19	2044	-	2,554.6	2,591.8	64,528.5
O & M Year 20	2045	-	2,546.5	2,583.7	67,112.1
O & M Year 21	2046	-	2,538.4	2,575.6	69,687.7
O & M Year 22	2047	-	2,530.3	2,567.5	72,255.2
O & M Year 23	2048	-	2,522.3	2,559.5	74,814.7
O & M Year 24	2049	-	2,514.3	2,551.5	77,366.2
O & M Year 25	2050	-	2,506.3	2,543.5	79,909.7
O & M Year 26	2051	-	2,498.4	2,535.6	82,445.3
O & M Year 27	2052	-	2,490.5	2,527.6	84,972.9
O & M Year 28	2053	-	2,482.6	2,519.7	87,492.6

Baseline Case	Calendar Year	GHG Emissions (tonnes of CO_2e)			
		Construction	O&M	Total	Cumulative Emissions
O & M Year 29	2054	-	2,474.7	2,511.9	90,004.5
O & M Year 30	2055	-	2,466.8	2,504.0	92,508.5
O & M Year 31	2056	-	2,459.0	2,496.2	95,004.7
O & M Year 32	2057	-	2,451.2	2,488.4	97,493.1
O & M Year 33	2058	-	2,443.5	2,480.6	99,973.7
O & M Year 34	2059	-	2,435.7	2,472.9	102,446.6
O & M Year 35	2060	-	2,428.0	2,465.2	104,911.8
O & M Year 36	2061	-	2,420.3	2,457.5	107,369.3
O & M Year 37	2062	-	2,412.7	2,449.8	109,819.2
O & M Year 38	2063	-	2,405.0	2,442.2	112,261.4
O & M Year 39	2064	-	2,397.4	2,434.6	114,696.0
O & M Year 40	2065	-	2,389.8	2,427.0	117,123.0
O & M Year 41	2066	-	2,382.3	2,419.5	119,542.5
O & M Year 42	2067	-	2,374.8	2,411.9	121,954.4
O & M Year 43	2068	-	2,367.3	2,404.4	124,358.9
O & M Year 44	2069	-	2,359.8	2,397.0	126,755.8
O & M Year 45	2070	-	2,352.3	2,389.5	129,145.3
O & M Year 46	2071	-	2,344.9	2,382.1	131,527.4
O & M Year 47	2072	-	2,337.5	2,374.7	133,902.0
O & M Year 48	2073	-	2,330.1	2,367.3	136,269.3
O & M Year 49	2074	-	2,322.8	2,359.9	138,629.3
O & M Year 50	2075	-	2,315.4	2,352.6	140,981.9

6 ESTIMATED PROJECT EMISSIONS

6.1 CONSTRUCTION

GHG emissions during the construction phase are identical to the baseline case, which were estimated at 15,236 tCO_2e. Construction emission represents approximately 14% of the emissions over the lifespan of the Project.

6.2 BUILDING ENERGY O & M EMISSIONS

Project annual GHG emissions from building operation of the proposed North Garage are shown in Table 6-1.

Table 6-1: Project North Garage O & M Emissions

Project Case	Natural Gas Emissions	Electricity Emissions	Total Emissions
Year		tonnes CO_2e	
2nd half 2026	1,053.0	4.8	1,057.9
2027	2,099.3	9.7	2,109.0
2028	2,092.5	9.7	2,102.3
2029	2,085.8	9.7	2,095.6
2030	2,079.1	9.7	2,088.9
2031	2,072.4	9.8	2,082.2
2032	2,065.8	9.8	2,075.6
2033	2,059.1	9.8	2,069.0
2034	2,052.5	9.8	2,062.4
2035	2,045.9	9.9	2,055.8
2036	2,039.4	9.9	2,049.3
2037	2,032.8	9.9	2,042.7
2038	2,026.3	9.9	2,036.2
2039	2,019.8	10.0	2,029.8
2040	2,013.3	10.0	2,023.3
2041	2,006.9	10.0	2,016.9
2042	2,000.4	10.0	2,010.5
2043	1,994.0	10.0	2,004.1
2044	1,987.6	10.1	1,997.7
2045	1,981.3	10.1	1,991.4
2046	1,974.9	10.1	1,985.0
2047	1,968.6	10.1	1,978.7
2048	1,962.3	10.2	1,972.4
2049	1,956.0	10.2	1,966.2
2050	1,949.7	10.2	1,959.9
2051	1,943.5	10.2	1,953.7
2052	1,937.3	10.3	1,947.5
2053	1,931.1	10.3	1,941.4
2054	1,924.9	10.3	1,935.2
2055	1,918.7	10.3	1,929.1
2056	1,912.6	10.3	1,923.0
2057	1,906.5	10.4	1,916.9
2058	1,900.4	10.4	1,910.8
2059	1,894.3	10.4	1,904.7
2060	1,888.3	10.4	1,898.7
2061	1,882.2	10.5	1,892.7

Project Case	Natural Gas Emissions	Electricity Emissions	Total Emissions
Year	tonnes CO_2e		
2062	1,876.2	10.5	1,886.7
2063	1,870.2	10.5	1,880.7
2064	1,864.3	10.5	1,874.8
2065	1,858.3	10.6	1,868.9
2066	1,852.4	10.6	1,863.0
2067	1,846.5	10.6	1,857.1
2068	1,840.6	10.6	1,851.2
2069	1,834.7	10.7	1,845.3
2070	1,828.8	10.7	1,839.5
2071	1,823.0	10.7	1,833.7
2072	1,817.2	10.7	1,827.9
2073	1,811.4	10.7	1,822.1
2074	1,805.6	10.8	1,816.4
2075	1,799.9	10.8	1,810.7

6.3 SOLAR PV PANELS

Total amount of electricity generated via a roof-top mounted commercial solar energy system was estimated in the range of 3,000 to 4,000 MWh per year, which could offset approximately 3 tonnes of CO_2e annually from grid electricity.

Table 6-2: Electricity Grid Offset Emissions by Solar PV Panels

Year	GHG Offset by Solar PV Panels (CO_2e)	Year	GHG Offset by Solar PV Panels (CO_2e)
2nd half 2026	1.63	2051	2.66
2027	3.23	2052	2.64
2028	3.20	2053	2.62
2029	3.17	2054	2.60
2030	3.15	2055	2.58
2031	3.12	2056	3.25
2032	3.10	2057	3.23
2033	3.07	2058	3.20
2034	3.05	2059	3.17
2035	3.02	2060	3.15
2036	3.00	2061	3.12
2037	2.98	2062	3.10
2038	2.95	2063	3.07
2039	2.93	2064	3.05

Year	GHG Offset by Solar PV Panels (CO_2e)	Year	GHG Offset by Solar PV Panels (CO_2e)
2040	2.91	2065	3.02
2041	2.88	2066	3.00
2042	2.86	2067	2.98
2043	2.84	2068	2.95
2044	2.81	2069	2.93
2045	2.79	2070	2.91
2046	2.77	2071	2.88
2047	2.75	2072	2.86
2048	2.72	2073	2.84
2049	2.70	2074	2.81
2050	2.68	2075	2.79

6.4 BACKUP GENERATOR

Annual emissions from the backup generator were estimated at 0.02 tonnes of CO_2e, which were insignificant emissions.

6.5 PROJECT ANNUAL AND CUMULATIVE EMISSIONS

Annual and cumulative GHG emissions for the project case are shown in Table 6-3. Building O & M emissions represent 87% of the lifetime GHG emissions, followed by construction emissions, which account for 14% of the total lifetime emissions.

Table 6-3: Project Annual and Cumulative Emissions

Project Case	Calendar Year	GHG Emissions (tonnes of CO_2e)					
		Construction	O&M	Solar PV Panels	NG Generator	Total	Cumulative Emissions
Construction Year 1	2023	4,353.1	-	-		4,353.1	4,353.1
Construction Year 2	2024	4,353.1	-	-		4,353.1	8,706.3
Construction Year 3	2025	4,353.1	-	-		4,353.1	13,059.4
Construction Year 4 & O &M Year 1	2026	2,176.6	1,057.9	-1.6	0.012	3,232.8	16,292.2
O & M Year 2	2027	-	2,109.0	-3.2	0.023	2,105.8	18,398.0
O & M Year 3	2028	-	2,102.3	-3.2	0.023	2,099.1	20,497.1
O & M Year 4	2029	-	2,095.6	-3.2	0.023	2,092.4	22,589.5
O & M Year 5	**2030**	**-**	**2,088.9**	**-3.2**	**0.023**	**2,085.7**	**24,675.2**
O & M Year 6	2031	-	2,082.2	-3.1	0.023	2,079.1	26,754.3
O & M Year 7	2032	-	2,075.6	-3.1	0.023	2,072.5	28,826.8
O & M Year 8	2033	-	2,069.0	-3.1	0.023	2,065.9	30,892.8
O & M Year 9	2034	-	2,062.4	-3.1	0.023	2,059.3	32,952.1
O & M Year 10	2035	-	2,055.8	-3.0	0.023	2,052.8	35,004.9
O & M Year 11	2036	-	2,049.3	-3.0	0.023	2,046.3	37,051.2
O & M Year 12	2037	-	2,042.7	-3.0	0.023	2,039.8	39,091.0

Project Case	Calendar Year	GHG Emissions (tonnes of CO_2e)					
		Construction	O&M	Solar PV Panels	NG Generator	Total	Cumulative Emissions
O & M Year 13	2038	-	2,036.2	-3.0	0.023	2,033.3	41,124.3
O & M Year 14	2039	-	2,029.8	-3.0	0.023	2,026.9	43,151.2
O & M Year 15	2040	-	2,023.3	-2.9	0.023	2,020.4	45,171.6
O & M Year 16	2041	-	2,016.9	-2.9	0.023	2,014.0	47,185.6
O & M Year 17	2042	-	2,010.5	-2.9	0.023	2,007.6	49,193.2
O & M Year 18	2043	-	2,004.1	-2.9	0.023	2,001.3	51,194.5
O & M Year 19	2044	-	1,997.7	-2.8	0.023	1,994.9	53,189.4
O & M Year 20	2045	-	1,991.4	-2.8	0.023	1,988.6	55,178.0
O & M Year 21	2046	-	1,985.0	-2.8	0.023	1,982.3	57,160.3
O & M Year 22	2047	-	1,978.7	-2.8	0.023	1,976.0	59,136.3
O & M Year 23	2048	-	1,972.4	-2.7	0.023	1,969.7	61,106.0
O & M Year 24	2049	-	1,966.2	-2.7	0.023	1,963.5	63,069.5
O & M Year 25	2050	-	1,959.9	-2.7	0.023	1,957.3	65,026.8
O & M Year 26	2051	-	1,953.7	-2.7	0.023	1,951.1	66,977.9
O & M Year 27	2052	-	1,947.5	-2.7	0.023	1,944.9	68,922.8
O & M Year 28	2053	-	1,941.4	-2.6	0.023	1,938.8	70,861.6
O & M Year 29	2054	-	1,935.2	-2.6	0.023	1,932.6	72,794.2
O & M Year 30	2055	-	1,929.1	-2.6	0.023	1,926.5	74,720.7
O & M Year 31	2056	-	1,923.0	-2.6	0.023	1,919.7	76,640.5
O & M Year 32	2057	-	1,916.9	-3.3	0.023	1,913.7	78,554.1
O & M Year 33	2058	-	1,910.8	-3.2	0.023	1,907.6	80,461.7
O & M Year 34	2059	-	1,904.7	-3.2	0.023	1,901.6	82,363.3
O & M Year 35	2060	-	1,898.7	-3.2	0.023	1,895.6	84,258.9
O & M Year 36	2061	-	1,892.7	-3.1	0.023	1,889.6	86,148.5
O & M Year 37	2062	-	1,886.7	-3.1	0.023	1,883.6	88,032.1
O & M Year 38	2063	-	1,880.7	-3.1	0.023	1,877.7	89,909.8
O & M Year 39	2064	-	1,874.8	-3.1	0.023	1,871.8	91,781.6
O & M Year 40	2065	-	1,868.9	-3.0	0.023	1,865.9	93,647.4
O & M Year 41	2066	-	1,863.0	-3.0	0.023	1,860.0	95,507.4
O & M Year 42	2067	-	1,857.1	-3.0	0.023	1,854.1	97,361.5
O & M Year 43	2068	-	1,851.2	-3.0	0.023	1,848.3	99,209.8
O & M Year 44	2069	-	1,845.3	-3.0	0.023	1,842.4	101,052.2
O & M Year 45	2070	-	1,839.5	-2.9	0.023	1,836.6	102,888.9
O & M Year 46	2071	-	1,833.7	-2.9	0.023	1,830.8	104,719.7
O & M Year 47	2072	-	1,827.9	-2.9	0.023	1,825.1	106,544.8
O & M Year 48	2073	-	1,822.1	-2.9	0.023	1,819.3	108,364.1
O & M Year 49	2074	-	1,816.4	-2.8	0.023	1,813.6	110,177.7
O & M Year 50	2075	-	1,810.7	-2.8	0.023	1,807.9	111,985.6

7 ESTIMATED NET REDUCTION IN EMISSIONS

The annual and cumulative emission reduction over the lifetime of the project is summarized in Table 7-1. The Project emissions included energy savings from solar PV panels and from natural gas fired generator.

Table 7-1: Annual and Cumulative Baseline and Project Emissions

Project Phase	Calendar Year	GHG Emissions (tonnes of CO_2e)			
		Baseline	Project	Net Emission Changes	Cumulative Changes
Construction Year 1	2023	4,353.1	4,353.1	0.0	0.0
Construction Year 2	2024	4,353.1	4,353.1	0.0	0.0
Construction Year 3	2025	4,353.1	4,353.1	0.0	0.0
Construction Year 4 and O & M Year 1	2026	3,547.9	3,232.8	-315.1	-315.1
O & M Year 2	2027	2,734.1	2,105.8	-628.3	-943.4
O & M Year 3	2028	2,725.5	2,099.1	-626.4	-1,569.8
O & M Year 4	2029	2,716.9	2,092.4	-624.5	-2,194.3
O & M Year 5	**2030**	**2,708.4**	**2,085.7**	**-622.6**	**-2,817.0**
O & M Year 6	2031	2,699.8	2,079.1	-620.7	-3,437.7
O & M Year 7	2032	2,691.4	2,072.5	-618.9	-4,056.6
O & M Year 8	2033	2,682.9	2,065.9	-617.0	-4,673.6
O & M Year 9	2034	2,674.5	2,059.3	-615.1	-5,288.7
O & M Year 10	2035	2,666.1	2,052.8	-613.3	-5,902.0
O & M Year 11	2036	2,657.7	2,046.3	-611.4	-6,513.4
O & M Year 12	2037	2,649.4	2,039.8	-609.6	-7,123.0
O & M Year 13	2038	2,641.1	2,033.3	-607.8	-7,730.7
O & M Year 14	2039	2,632.8	2,026.9	-605.9	-8,336.7
O & M Year 15	2040	2,624.5	2,020.4	-604.1	-8,940.8
O & M Year 16	2041	2,616.3	2,014.0	-602.3	-9,543.1
O & M Year 17	2042	2,608.1	2,007.6	-600.5	-10,143.5
O & M Year 18	2043	2,599.9	2,001.3	-598.7	-10,742.2
O & M Year 19	2044	2,591.8	1,994.9	-596.9	-11,339.1
O & M Year 20	2045	2,583.7	1,988.6	-595.1	-11,934.1
O & M Year 21	2046	2,575.6	1,982.3	-593.3	-12,527.4
O & M Year 22	2047	2,567.5	1,976.0	-591.5	-13,119.0
O & M Year 23	2048	2,559.5	1,969.7	-589.7	-13,708.7
O & M Year 24	2049	2,551.5	1,963.5	-588.0	-14,296.7
O & M Year 25	2050	2,543.5	1,957.3	-586.2	-14,882.9
O & M Year 26	2051	2,535.6	1,951.1	-584.5	-15,467.3

Project Phase	Calendar Year	GHG Emissions (tonnes of CO_2e)			
		Baseline	Project	Net Emission Changes	Cumulative Changes
O & M Year 27	2052	2,527.6	1,944.9	-582.7	-16,050.1
O & M Year 28	2053	2,519.7	1,938.8	-581.0	-16,631.0
O & M Year 29	2054	2,511.9	1,932.6	-579.2	-17,210.3
O & M Year 30	2055	2,504.0	1,926.5	-577.5	-17,787.8
O & M Year 31	2056	2,496.2	1,919.7	-576.5	-18,364.2
O & M Year 32	2057	2,488.4	1,913.7	-574.7	-18,939.0
O & M Year 33	2058	2,480.6	1,907.6	-573.0	-19,512.0
O & M Year 34	2059	2,472.9	1,901.6	-571.3	-20,083.3
O & M Year 35	2060	2,465.2	1,895.6	-569.6	-20,652.9
O & M Year 36	2061	2,457.5	1,889.6	-567.9	-21,220.8
O & M Year 37	2062	2,449.8	1,883.6	-566.2	-21,787.0
O & M Year 38	2063	2,442.2	1,877.7	-564.5	-22,351.6
O & M Year 39	2064	2,434.6	1,871.8	-562.8	-22,914.4
O & M Year 40	2065	2,427.0	1,865.9	-561.2	-23,475.6
O & M Year 41	2066	2,419.5	1,860.0	-559.5	-24,035.1
O & M Year 42	2067	2,411.9	1,854.1	-557.8	-24,592.9
O & M Year 43	2068	2,404.4	1,848.3	-556.2	-25,149.1
O & M Year 44	2069	2,397.0	1,842.4	-554.5	-25,703.6
O & M Year 45	2070	2,389.5	1,836.6	-552.9	-26,256.4
O & M Year 46	2071	2,382.1	1,830.8	-551.2	-26,807.7
O & M Year 47	2072	2,374.7	1,825.1	-549.6	-27,357.2
O & M Year 48	2073	2,367.3	1,819.3	-548.0	-27,905.2
O & M Year 49	2074	2,359.9	1,813.6	-546.3	-28,451.5
O & M Year 50	2075	2,352.6	1,807.9	-544.7	-28,996.2

8 ESTIMATED COST-PER-TONNE

As shown in Table 7-1, GHG reduction emissions in the year 2030 were expected to be 623 tonnes of CO_2e (non-cumulative). The accumulated GHG reduction in the Project's lifetime is expected to be 28,996 tonnes of CO_2e. If the ICIP funding is approved, the total eligible project costs are 182,557,000 CAD. Of these costs, 73,022,800 CAD are from Federal contribution. The GHG reduction cost for 2030 is 117,283 Federal contribution dollar per tonne of CO_2e removed for the non-cumulative basis. For the Project lifespan, the GHG reduction cost is $6,296 Project dollar per tonnes of CO_2e removed.

9 CONCLUSION

GHG emissions from building operations represent the largest source of GHG emissions for the both baseline case and Project case. This Project is anticipated to result in 623 tonnes of CO_2e reduction in 2030 (non-cumulative basis), and a Project lifespan GHG reduction of 28,996 tCO_2e relative to the baseline scenario. Based on the total eligible project cost of 182,557,000 CAD, the GHG reduction costs for the Project lifespan are as shown in Table 9-1 below.

Table 9-1: Net Reduction in GHG Emissions in 2030 and Cumulative Over 50-Year O & M Lifespan

GHG Mitigation Assessment			
2030 GHG Results (tonnes of CO_2e)		**Lifetime GHG Results (tonnes of CO_2e)**	
Baseline Scenario Emissions in 2030	2,708	Baseline Scenario Emissions, Lifetime (cumulative)	140,982
Estimated Project Emissions in 2030	2,086	Estimated Project Emissions, Lifetime (cumulative)	111, 986
Net Emissions Reduction	623	Net Emissions Reduction	28,996
GHG Reduction Cost for 2030 – non-cumulative basis ($/t$CO_2e$)	$117,283	GHG Reduction Cost for Project Lifespan ($/t CO_2e)	$6,296

A REPORTING INFORMATION

APPENDIX A

No.	ISO14064-2: 2019 Section 6.2 Describe the Project	Declaration
A	Project title, purpose(s) and objectives;	North Garage Replacement Climate Lens Assessment - GHG Mitigation PTIS-0002. The purpose and objectives of the project are to reduce GHG emissions through the construction of a new LEED-certified energy efficient bus storage and maintenance facility to replace the existing 70-year-old North Garage facility that is both functionally obsolete, and beyond its service life. The building will accommodate increased fleet storage capacity and will be designed to facilitate the transition to a zero- emission bus fleet.
B	Type of GHG project; including descriptions of how the project will achieve GHG emission reductions and/or removal enhancements and specific GHGs targeted;	The Project will implement “green” technologies and practices for energy efficiency improvements and energy saving, which include but are not limited to: → Heat recovery ventilation units recovering the heat from exhaust air to preheat supply air → Ventilation system controlled by demand and exhaust gases monitoring → Overhead doors equipped with air curtains to hold the warm air inside the building → Under-slab heating system → Wall panels with an R20 insulation value → Solar PV panels to offset grid electricity → Natural gas fired generator
C	Project location, including organizational, geographic and physical location information, allowing the unique identification and delineation of the specific extent of the project;	The Project is located in Winnipeg, Manitoba, Canada. The facility is operated by the City of Winnipeg.
D	Conditions prior to project initiation;	The current North Garage was in operation since the 1930's. It is in overall poor condition and is no longer able to meet Winnipeg Transit's service requirements (space for growing fleet, electric buses, etc.). Continued maintenance of the building is no longer feasible as there are many issues that require constant repairs and investments with limited long-term value.

APPENDIX A

E	Project technologies, products, services and the expected level of activity;	The project includes the construction and O & M of a new LEED-certified North Garage replacement to accommodate increased fleet storage capability. Construction is scheduled for the three-year period 2023 to the middle of 2026. For this analysis, the lifetime for the GHG mitigation assessment was set as 50 years. Regular maintenance is planned to achieve and extend these projected lifetimes.
F	Aggregated GHG emissions reductions and removal enhancements, stated in tonnes of CO_2e, likely to occur from the GHG project;	28,996 tCO_2e
G	Identification of risks that could substantially affect the project's GHG emissions reductions or removal enhancements and; if applicable, any measures to manage those risks.	Potential risks that could result in significant differences between anticipated and actual emissions include changes to Project construction, operations and/or maintenance activities.
H	Roles and responsibilities, including contact information of the project proponent and other project participants, including the intended users, and roles and contact information for relevant regulator(s) and/or administrators of any GHG programme(s) to which the GHG project subscribes;	This GHG Mitigation Assessment has been completed as part of the Project's Climate Lens submission. Further inquiries can be directed to the following contacts: Hong Zhang WSP Canada Inc. (Prime Consultant) Senior Environmental Engineer 840 Howe Street, Suite 1000 Vancouver, V6Z 2M1 Canada Hong.Zhang@wsp.com (604) 601-6780
I	A summary of environmental impact assessment when such an assessment is required by applicable legislation or regulation;	To be determined once funding is approved.
J	Relevant outcomes from stakeholder consultations and mechanisms for on-going communication;	Public engagement was promoted via different methods through media, internet, and other opportunities to collect feedbacks. Comments and feedback from the stakeholder meeting, public information session, and surveys were received and considered.

APPENDIX A

K	A chronological plan or actual dates and justification for the following: 1) the date of initiating project activities; 2) GHG baseline time period; 3) Date of terminating the project; 4) Frequency of monitoring and reporting and the project period, including relevant project activities in each step of the GHG project cycle, as applicable; 5) Frequency of verification and validation, as applicable	At this time, it is anticipated that construction will begin in 2023 with an overall completion by 1st half of 2026. Operations will commence in 2nd half of 2026, running for 50 years to 2075. Dates for these and other Project and monitoring activities will be refined or further defined in the future.