February 3, 2022

Project No. 21508791-1620

Imperial Oil Limited
505 Quarry Park Blvd SE
Calgary, Alberta
T2C 5N1

2021 GROUNDWATER MONITORING AND SAMPLING REPORT
BELLMAN DRIVE, OTTAWA, ONTARIO
SAP NO. 88009282

INTRODUCTION

Golder Associates Ltd. (Golder) was retained by Imperial Oil Limited (Imperial) to conduct a groundwater monitoring program at the former heating oil storage station located at Bellman Drive, Ottawa, Ontario (the Site) (Figures 1 to 2). The fieldwork was conducted on December 9, 2021.

SCOPE OF WORK

Groundwater

- Monitoring of four on-site groundwater monitoring wells (MW20-01 to MW20-04) for depth to groundwater and the thickness, if present, of light non-aqueous phase liquid (LNAPL).
- Collecting groundwater samples from four on-site monitoring wells (MW20-01 to MW20-04) using the low-flow sampling method. Submitting samples for laboratory analysis of benzene, toluene, ethylbenzene, xylenes (BTEX), petroleum hydrocarbon (PHC) fractions F1 to F4, and polycyclic aromatic hydrocarbons (PAHs).
- Comparing the groundwater analytical results to the following standards:
  - Ontario Ministry of the Environment (MOE, now Ministry of the Environment, Conservation and Parks [MECP]) standards considered to be applicable at the Site: Table 3 of the MECP document titled "Soil, Ground Water, and Sediment Standards for Use Under Part XV.1 of the *Environmental Protection Act*," dated April 15, 2011. More specifically, these are referred to as the Table 3 Full Depth Generic Site Condition Standards for all types of land use in medium and fine textured soil for non-potable groundwater conditions.

GROUNDWATER METHODOLOGY

Depth to Groundwater and LNAPL Thickness

- Depth to groundwater was measured and, if present, the thickness of LNAPL using an oil/water interface probe. If LNAPL is detected, then its presence is confirmed visually using a bailer. Prior to use in each well, the interface probe was cleaned using a phosphate-free detergent and water solution and rinsed with

distilled water to minimize the potential for cross-contamination. Depth to groundwater measurements were taken from the riser.

Low-Flow Sampling

- Groundwater samples were collected using the low-flow sampling method. Water was pumped from each well, at a rate of 0.25 litres per minute (L/min), using high density polyethylene (HDPE) tubing connected to a peristaltic pump with a portion of silicon tubing. Routine water quality indicator parameters were measured during pumping using a multi-parameter water quality meter and flow through cell. The parameters measured included dissolved oxygen, electrical conductivity, pH, oxidation reduction/redox potential, temperature and turbidity. Calibration of the meter was completed as per the manufacturer's instructions. Purged water was retained on-site in a 205-litre (L) drum for future off-site disposal.
- Five samples, including one field duplicate, and four groundwater samples were collected on December 9, 2021. One field blank and one trip blank were also submitted for analysis.

Laboratory Analysis of Groundwater Samples

- The samples were submitted under chain-of-custody to Bureau Veritas Laboratories (BVL) in Mississauga, Ontario, a Standards Council of Canada (SCC) accredited laboratory, for analysis of one or more of BTEX, PHC Fractions F1 to F4, and PAHs.
- Groundwater samples collected for BTEX and PHC Fraction F1 analysis were placed in 40-millilitre (mL) clear glass vials provided by the laboratory and preserved with sodium bisulphate as a microbial inhibitor. The groundwater samples for PHC Fractions F2 to F4 and PAH analysis were placed in 250-mL amber glass bottles and preserved with sodium bisulphate.
- All sample containers were placed in an ice-filled cooler immediately following sampling and transported to BVL for chemical analysis.

Waste Removal

- Badger Daylighting of Ottawa, Ontario, an MECP licensed waste hauler, was used to collect approximately 40 L of purged groundwater from the Site on December 10, 2021. The liquid was disposed of at Tomlinson Environmental Services Ltd. located in Ottawa, Ontario, an MECP approved waste receiver.

RESULTS

Groundwater

LNAPL Occurrence (Date; Observations)

- December 9, 2021; Not detected in any of the monitoring wells (Table 1).

Groundwater Monitoring (Date; Depth to Groundwater Range; Groundwater Direction)

- December 9, 2021; Depth to groundwater level ranged from 1.37 to 1.80 metres below ground surface (Table 1); groundwater flow direction was inferred to the southeast (Figure 3).

Groundwater Analytical Results (Date; Parameters; No. of wells)

- December 9, 2021; BTEX and PHC Fractions F1 to F4; no exceedances were identified (Figure 4, Table 2).
- December 9, 2021; PAHs; no exceedances were identified (Figure 5, Table 3).

FIELD AND LABORATORY QUALITY ASSURANCE / QUALITY CONTROL

- Copies of the associated laboratory certificates of analysis are provided in Appendix A.
- A quality assurance/quality control (QA/QC) program was followed to minimize and quantify impacts introduced during sample collection, handling, shipping and analysis. As part of the QA/QC program, sampling protocols included minimizing sample handling, submitting field QA/QC samples, using dedicated non-contaminating sampling equipment, using sample-specific identification and labelling procedures, and using chain-of-custody records. A discussion of the QA/QC program is included in Appendix B.
- Based on the data quality review, the data presented in this report are considered reliable.

CLOSURE

We trust the information provided herein meets your requirements. If you have any questions about the contents of the letter, please contact the undersigned.

Yours truly,

Golder Associates Ltd.

Stephanie Moloughney, B.Sc., OCGC
Environmental Scientist

Rachel Laurin, M.Sc., PMP
Project Manager

Sandra Carrelas, M.E.Sc., P.Eng.
Principal, Senior Geo-Environmental Engineer

SM/RL/SC/hf

Attachments: Limitation of Liability, Scope of Report and Third Party Reliance
Figures
Tables
Appendix A: Laboratory Certificates of Analysis and Data Quality Review Checklists
Appendix B: Quality Assurance/Quality Control

LIMITATIONS OF LIABILITY, SCOPE OF REPORT AND THIRD PARTY RELIANCE

This report has been prepared and the work referred to in this report has been undertaken by Golder Associates Ltd. for Imperial Oil Limited. It is intended for the sole and exclusive use of Imperial Oil Limited, its affiliated companies and partners and their respective insurers, agents, employees and advisors (collectively, “Imperial Oil”). Any use, reliance on or decision made by any person other than Imperial Oil based on this report is the sole responsibility of such other person. Imperial Oil and Golder Associates Ltd. make no representation or warranty to any other person with regard to this report and the work referred to in this report, and they accept no duty of care to any other person or any liability or responsibility whatsoever for any losses, expenses, damages, fines, penalties or other harm that may be suffered or incurred by any other person as a result of the use of, or reliance on, any decision made or any action taken based on this report or the work referred to in this report.

The investigation undertaken by Golder Associates Ltd. with respect to this report and any conclusions or recommendations made in this report reflect Golder Associates Ltd.’s judgement based on the site conditions observed at the time of the site inspection on the date(s) set out in this report, and on information available at the time of preparation of this report. This report has been prepared for specific application to this site and it is based, in part, upon visual observation of the site, subsurface investigation at discrete locations and depths, and specific analysis of specific chemical parameters and materials during a specific time interval, all as described in this report.

Unless otherwise stated, the findings cannot be extended to previous or future site conditions, portions of the site which were unavailable for direct investigation, subsurface locations which were not investigated directly, or chemical parameters, materials or analysis which were not addressed. Substances other than those addressed by the investigation described in this report may exist within the site, substances addressed by the investigation may exist in areas of the site not investigated and concentrations of substances addressed which are different than those reported may exist in areas other than the locations from which samples were taken.

If site conditions or applicable standards change or if any additional information becomes available at a future date, modifications to the findings, conclusions and recommendations in this report may be necessary.

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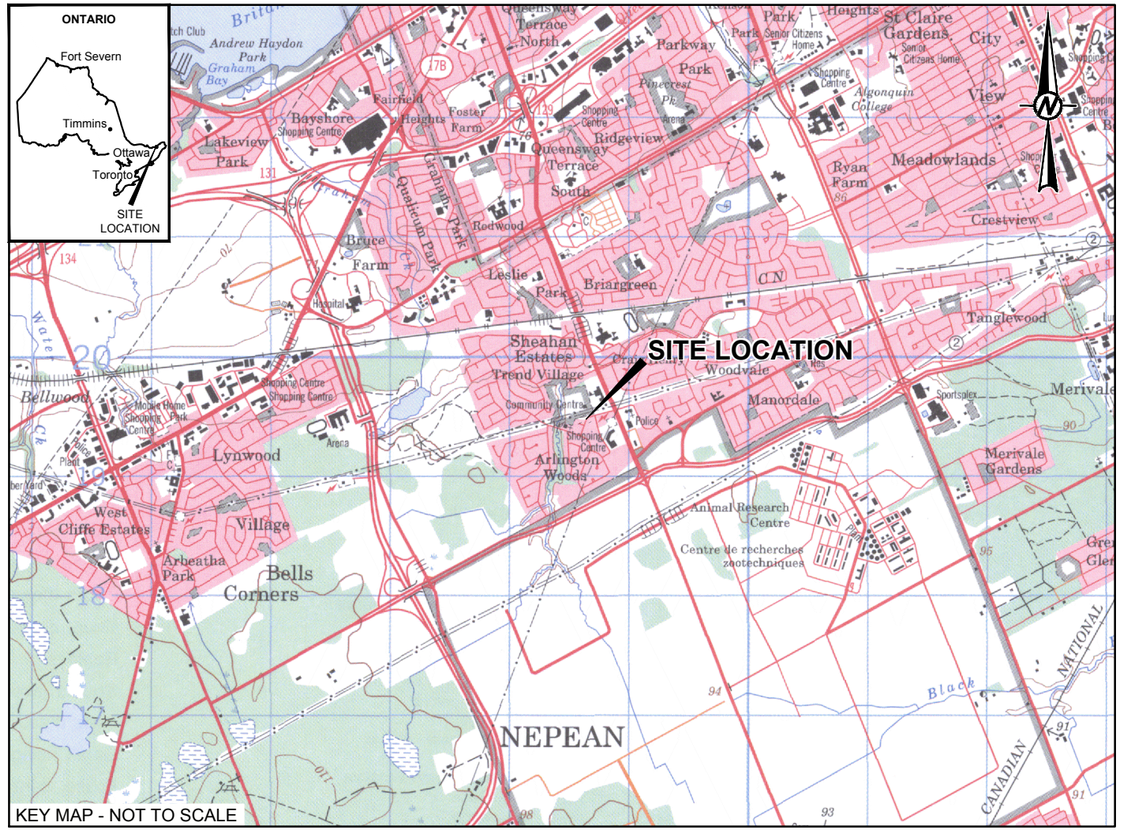

KEY MAP - NOT TO SCALE

LEGEND

PROPERTY BOUNDARY

REFERENCE

ORIGINAL DRAWING OBTAINED FROM J.D.BARNES LIMITED; REFERENCE No.: 20-10-125-00; SCALE: 1:100; DATE: SEPTEMBER 16, 2020.

BING IMAGERY SUPPLIED BY AUTODESK AND MICROSOFT © 2022 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS.

TOPOGRAPHIC MAP 31G05 OBTAINED FROM Canmatrix. © 1998 HER MAJESTY THE QUEEN IN RIGHT OF CANADA. DEPARTMENT OF NATURAL RESOURCES. PROJECTION: TRANSVERSE MERCATOR; DATUM: NAD83; COORDINATE SYSTEM: UTM ZONE 18.

0 50 100
(APPROX.) METRES

CLIENT
IMPERIAL OIL LIMITED

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2022-02-02
DESIGNED	SMoloughney
PREPARED	WLee
REVIEWED	RLaurin
APPROVED	SCarrelas

PROJECT
FORMER HEATING OIL STORAGE STATION
BELLMAN DRIVE
OTTAWA, ONTARIO

TITLE
SITE LOCATION PLAN

PROJECT NO.	PHASE-TASK	REV.	FIGURE
20144014	1620-2116	0	1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25 mm

0

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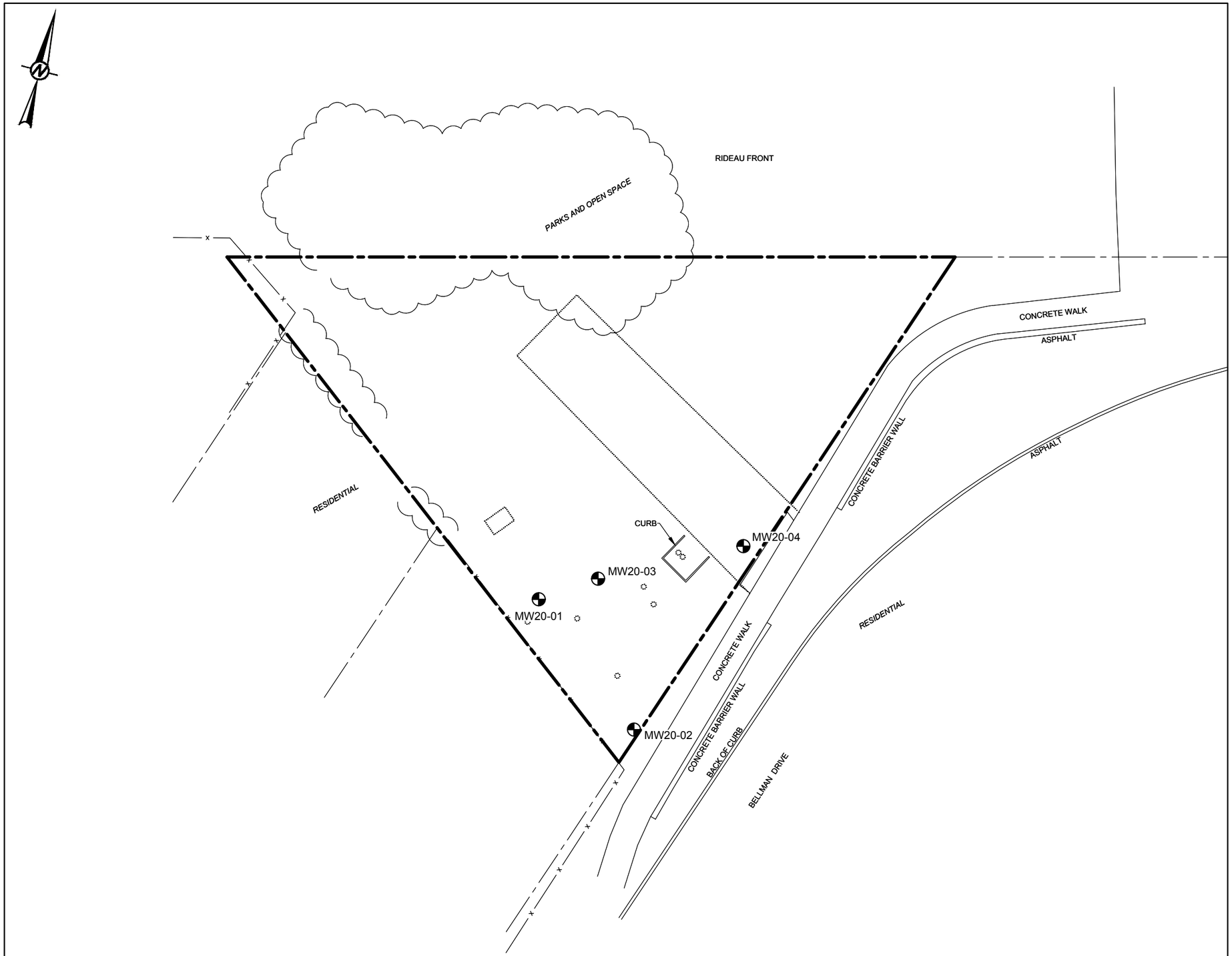


LEGEND

- PROPERTY BOUNDARY
- FENCELINE
- FORMER FACILITY
- TREELINE
- BOREHOLE LOCATION COMPLETED AS A MONITORING WELL

REFERENCE

ORIGINAL DRAWING OBTAINED FROM J.D.BARNES LIMITED; REFERENCE NO.: 20-10-125-00; SCALE: 1:100; DATE: SEPTEMBER 16, 2020.

ADDITIONAL INFORMATION OBTAINED FROM AQUA TERRE; DWG No.: SITE_03455-T1; SCALE: 1:250; DATE: MARCH 16, 2004.

0 5 10
1:200 METRES

CLIENT
IMPERIAL OIL LIMITED

PROJECT
FORMER HEATING OIL STORAGE STATION
BELLMAN DRIVE
OTTAWA, ONTARIO

TITLE
SITE PLAN WITH MONITORING WELL LOCATIONS

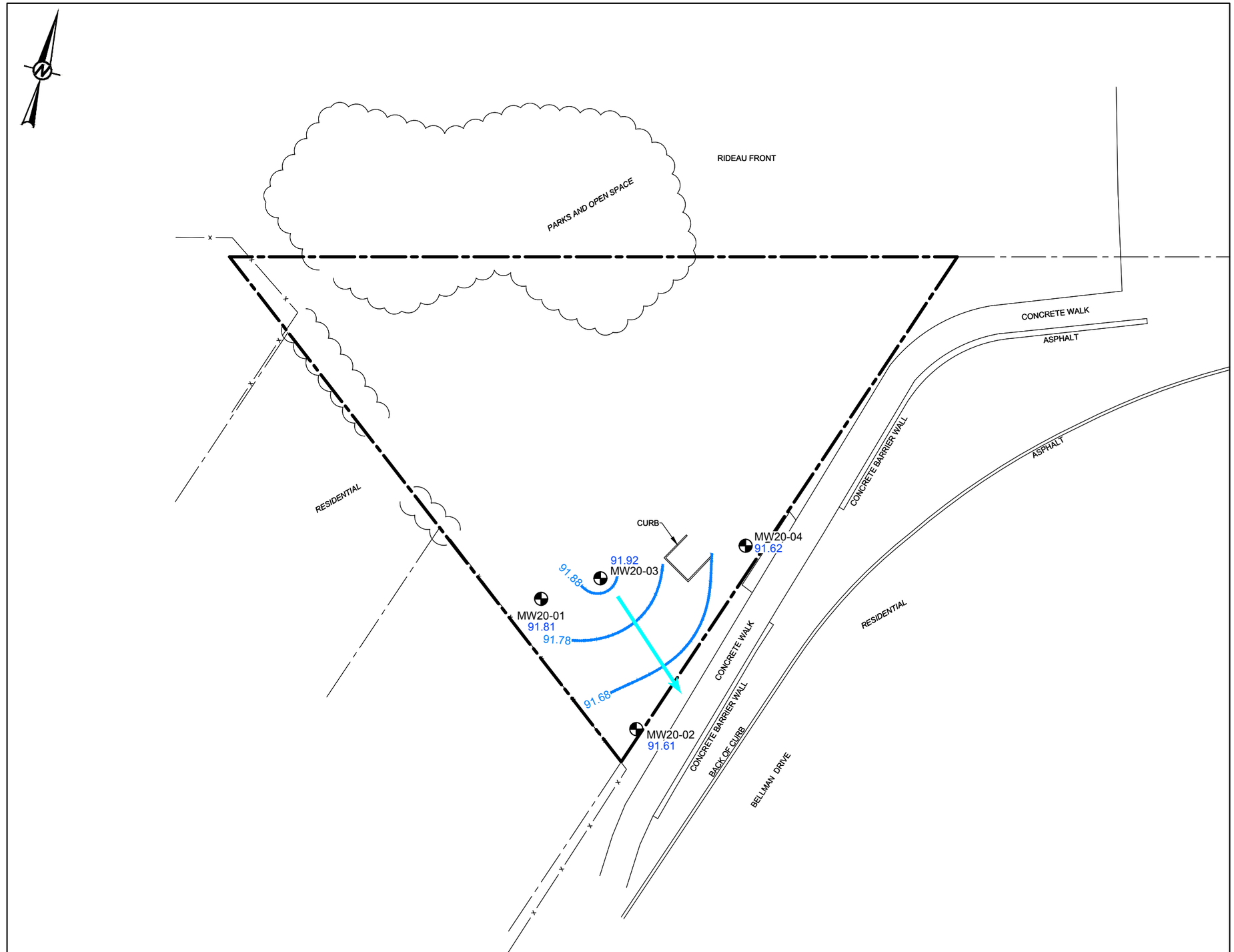
CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2022-02-02
DESIGNED	SMoloughney
PREPARED	WLee
REVIEWED	RLaurin
APPROVED	SCarrelas

PROJECT NO.	PHASE-TASK	REV.	FIGURE
20144014	1620-2116	0	2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25 mm



LEGEND

- PROPERTY BOUNDARY
- x FENCELINE
- 91.68 GROUNDWATER CONTOUR (m)
- TREELINE
- BOREHOLE LOCATION COMPLETED AS A MONITORING WELL
- 91.81 GROUNDWATER ELEVATION (m)
- DIRECTION OF GROUNDWATER FLOW

LIST OF APPLICABLE ABBREVIATIONS

m METRE

NOTE

ELEVATIONS ARE BASED ON A GEODETIC DATUM (N.C.C. #001196530024) WITH AN ELEVATION OF 86.536 m. (J.D. BARNES, 2020)

REFERENCE

ORIGINAL DRAWING OBTAINED FROM J.D.BARNES LIMITED; REFERENCE NO.: 20-10-125-00; SCALE: 1:100; DATE: SEPTEMBER 16, 2020.

ADDITIONAL INFORMATION OBTAINED FROM AQUA TERRE; DWG No.: SITE_03455-T1; SCALE: 1:250; DATE: MARCH 16, 2004.

0 5 10
1:200 METRES

CLIENT
IMPERIAL OIL LIMITED

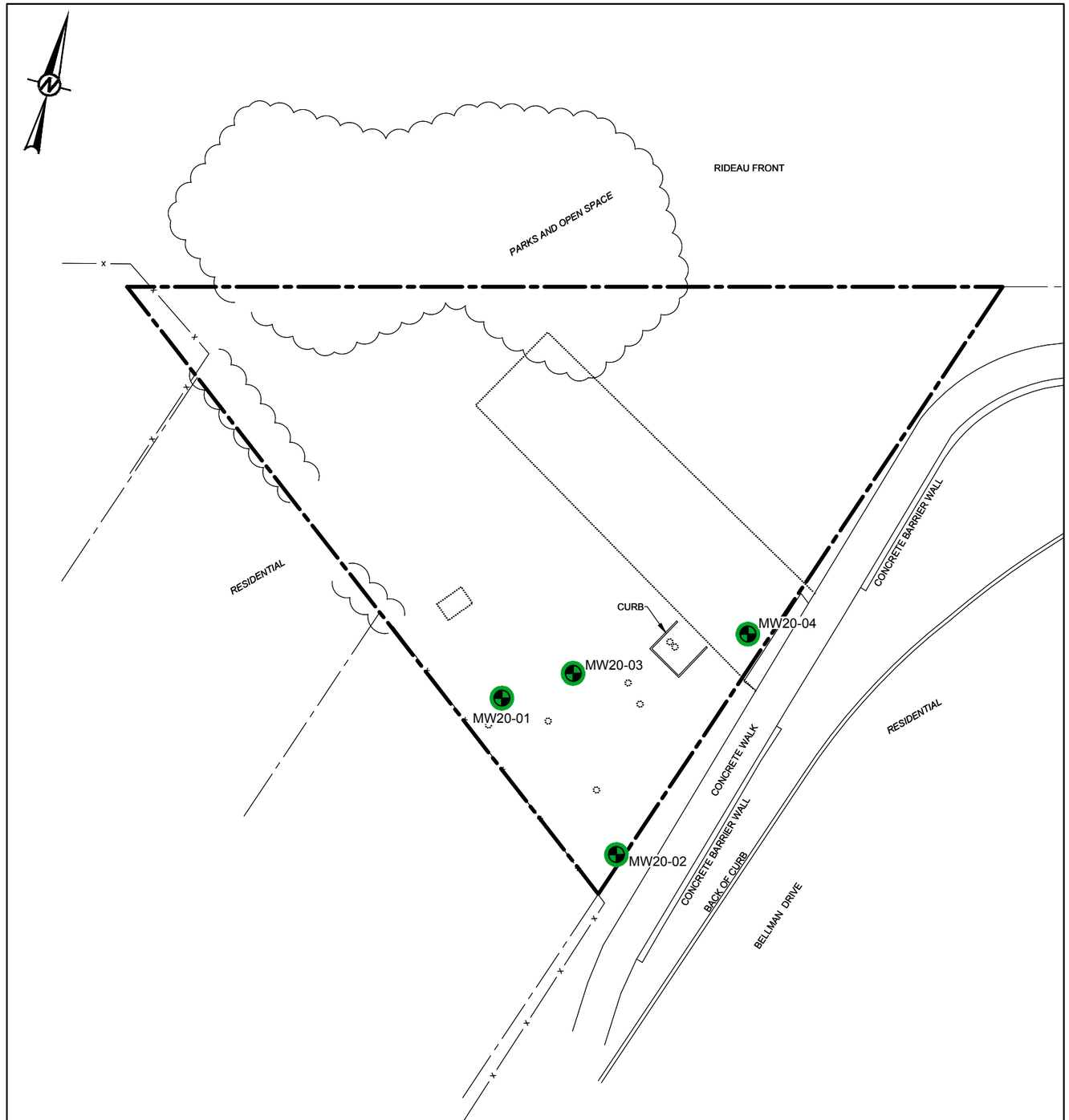
PROJECT
FORMER HEATING OIL STORAGE STATION
BELLMAN DRIVE
OTTAWA, ONTARIO

TITLE
GROUNDWATER ELEVATIONS
December 9, 2021

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2022-02-02
DESIGNED	SMoloughney
PREPARED	WLee
REVIEWED	RLaurin
APPROVED	SCarrelas

PROJECT NO.	PHASE-TASK	REV.	FIGURE
20144014	1620-2116	0	3



MW20-01							Screen Interval: 1.5 - 4.5 mbgs	
Date	**B**	**T**	**E**	**X**	**F1**	**F2**	**F3**	**F4**
14-Sep-20	<0.20	<0.20	<0.20	<0.40	<25	<100	<200	<200
14-Sep-20 (DUP)	<0.20	<0.20	<0.20	<0.40	<25	<100	<200	<200
9-Dec-21	<0.20	<0.20	<0.20	<0.40	<25	<100	<200	<200

MW20-02							Screen Interval: 1.5 - 4.5 mbgs	
Date	**B**	**T**	**E**	**X**	**F1**	**F2**	**F3**	**F4**
14-Sep-20	<0.20	<0.20	<0.20	<0.40	<25	<100	<200	<200
9-Dec-21	<0.20	<0.20	<0.20	<0.40	<25	<100	<200	<200

MW20-03							Screen Interval: 1.5 - 4.5 mbgs	
Date	**B**	**T**	**E**	**X**	**F1**	**F2**	**F3**	**F4**
14-Sep-20	<0.20	<0.20	<0.20	<0.40	<25	<100	<200	<200
9-Dec-21	<0.20	<0.20	<0.20	<0.40	<25	<100	230	<200

MW20-04							Screen Interval: 1.5 - 4.5 mbgs	
Date	**B**	**T**	**E**	**X**	**F1**	**F2**	**F3**	**F4**
14-Sep-20	<0.20	<0.20	<0.20	<0.40	<25	<100	<200	<200
9-Dec-21	<0.20	<0.20	<0.20	<0.40	<25	<100	<200	<200
9-Dec-21 (DUP)	<0.20	<0.20	<0.20	<0.40	<25	<100	<200	<200

ONTARIO STANDARDS

PARAMETERS	B	T	E	X	F1	F2	F3	F4
CRITERIA[a]	430	18,000	2,300	4,200	750[b]	150	500	500
RDL	0.20	0.20	0.20	0.40	25	100	200	200
UNITS	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L

(a) O.REG 153 (2011) TABLE 3 FULL DEPTH GENERIC SITE CONDITION STANDARDS FOR ALL TYPES OF PROPERTY USE FOR GROUNDWATER IN MEDIUM AND FINE TEXTURED SOIL IN IN A NON-POTABLE GROUND WATER CONDITION.

(b) F1 FRACTION DOES NOT INCLUDE BTEX; HOWEVER, THE PROPONENT HAS THE CHOICE AS TO WHETHER OR NOT TO SUBTRACT BTEX FROM THE ANALYTICAL RESULT.

LIST OF APPLICABLE ABBREVIATIONS

<	LESS THAN
µg/L	MICROGRAMS PER LITRE
B	BENZENE
T	TOLUENE
E	ETHYLBENZENE
X	XYLENES
F1	PETROLEUM HYDROCARBON FRACTION 1 (C_6-C_{10}) LESS BTEX
F2	PETROLEUM HYDROCARBON FRACTION 2 (C_{10}-C_{16})
F3	PETROLEUM HYDROCARBON FRACTION 3 (C_{16}-C_{34})
F4	PETROLEUM HYDROCARBON FRACTION 4 (C_{34}-C_{50})
mbgs	METRES BELOW GROUND SURFACE
O.REG	ONTARIO REGULATION
RDL	REPORTABLE DETECTION LIMIT

LEGEND

- PROPERTY BOUNDARY
- FENCELINE
- FORMER FACILITY
- TREELINE
- BOREHOLE LOCATION COMPLETED AS A MONITORING WELL

NOTES

1. LOCATIONS WHERE CURRENT GROUNDWATER SAMPLE MEETS APPLICABLE GUIDELINES/STANDARDS FOR ALL PARAMETERS ANALYZED SHOWN IN **GREEN.**
2. LOCATIONS WHERE CURRENT GROUNDWATER SAMPLE EXCEEDS APPLICABLE GUIDELINES/STANDARDS FOR AT LEAST ONE OF THE PARAMETERS ANALYZED SHOWN IN **RED.**
3. EXCEEDANCES OF APPLICABLE GUIDELINES/STANDARDS IN TEXT ARE SHOWN IN **RED.**
4. LOCATION WHERE NO SAMPLES WERE TAKEN IN THE CURRENT SAMPLING EVENT SHOWN IN **BLACK**.

REFERENCE

ORIGINAL DRAWING OBTAINED FROM J.D.BARNES LIMITED; REFERENCE NO.: 20-10-125-00; SCALE: 1:100; DATE: SEPTEMBER 16, 2020.

ADDITIONAL INFORMATION OBTAINED FROM AQUA TERRE; DWG No.: SITE_03455-T1; SCALE: 1:250; DATE: MARCH 16, 2004.

0 5 10
1:200 METRES

CLIENT
IMPERIAL OIL LIMITED

PROJECT
FORMER HEATING OIL STORAGE STATION
BELLMAN DRIVE
OTTAWA, ONTARIO

TITLE
GROUNDWATER ANALYTICAL RESULTS - BTEX AND PHC FRACTIONS F1 - F4

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2022-02-02
DESIGNED	SMoloughney
PREPARED	WLee
REVIEWED	RLaurin
APPROVED	SCarrelas

PROJECT NO.	PHASE-TASK	REV.	FIGURE
20144014	1620-2116	0	4

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

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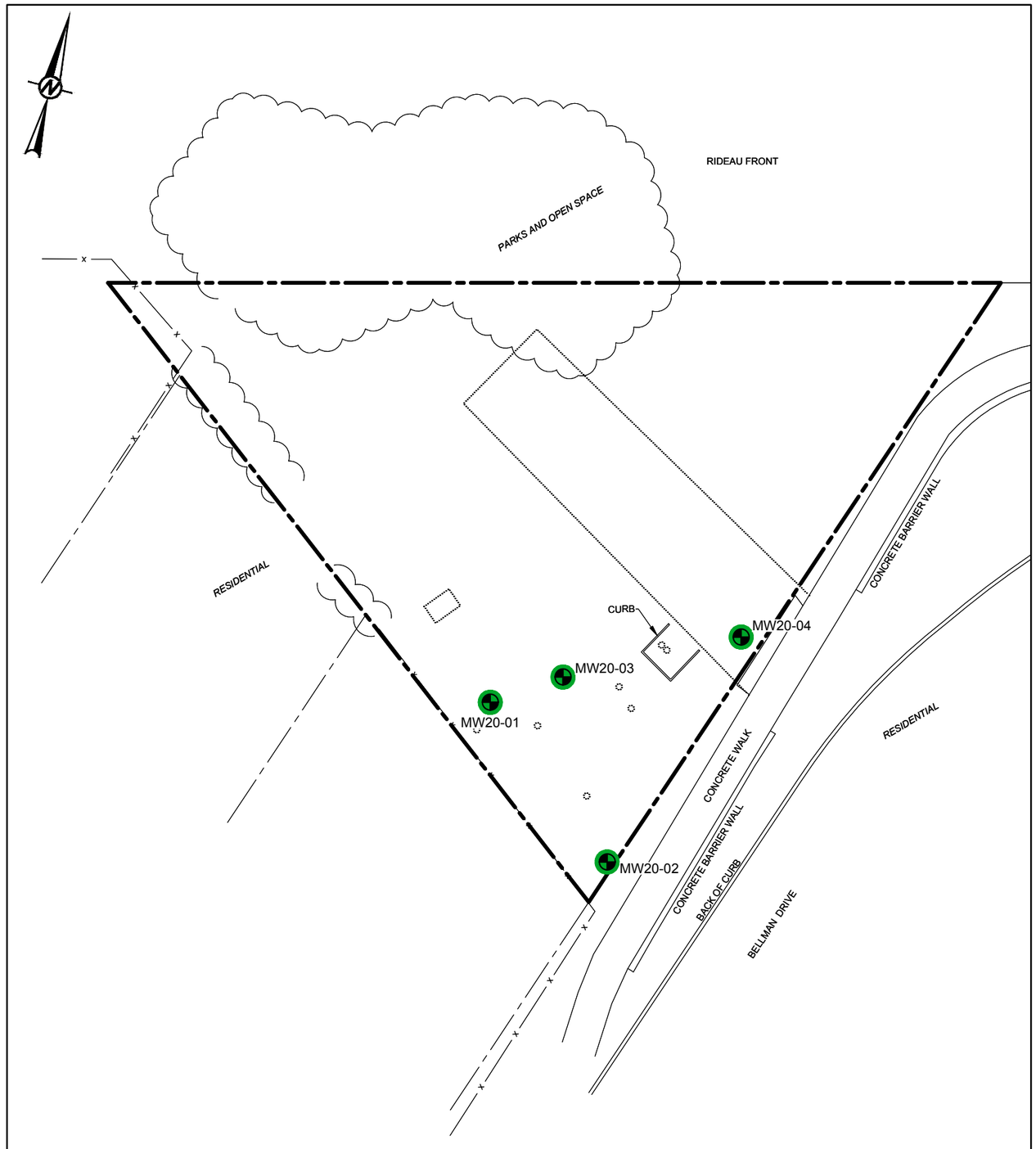

MW20-01																		Screen Interval: 1.5 - 4.5 mbgs
Date	**ANPTH**	**ANPTHL**	**ATRC**	**B(a)A**	**B(a)P**	**B(b+j)F**	**B(g,h,i)P**	**B(k)F**	**CHRY**	**D(a,h)A**	**FLATH**	**FLR**	**I(1,2,3-cd)P**	**1-MNPT**	**2-MNPT**	**1-,2-MNPT**	**NPT**	**PHNTR**	**PYR**
14-Sep-20	<0.050	<0.050	<0.050	-	-	-	-	-	-	-	<0.050	<0.050	-	<0.050	<0.050	<0.071	<0.050	0.072	-
14-Sep-20 (DUP)	<0.050	<0.050	<0.050	-	-	-	-	-	-	-	<0.050	<0.050	-	<0.050	<0.050	<0.071	<0.050	0.070	-
9-Dec-21	<0.050	<0.050	<0.050	<0.050	<0.0090	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.071	<0.050	<0.030	<0.050

MW20-02																		Screen Interval: 1.5 - 4.5 mbgs
Date	**ANPTH**	**ANPTHL**	**ATRC**	**B(a)A**	**B(a)P**	**B(b+j)F**	**B(g,h,i)P**	**B(k)F**	**CHRY**	**D(a,h)A**	**FLATH**	**FLR**	**I(1,2,3-cd)P**	**1-MNPT**	**2-MNPT**	**1-,2-MNPT**	**NPT**	**PHNTR**	**PYR**
14-Sep-20	0.35	<0.050	<0.050	-	-	-	-	-	-	-	<0.050	<0.30	-	<0.050	<0.050	<0.071	<0.10	<0.030	-
9-Dec-21	<0.050	<0.050	<0.050	<0.050	<0.0090	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.071	<0.050	<0.030	<0.050

MW20-03																		Screen Interval: 1.5 - 4.5 mbgs
Date	**ANPTH**	**ANPTHL**	**ATRC**	**B(a)A**	**B(a)P**	**B(b+j)F**	**B(g,h,i)P**	**B(k)F**	**CHRY**	**D(a,h)A**	**FLATH**	**FLR**	**I(1,2,3-cd)P**	**1-MNPT**	**2-MNPT**	**1-,2-MNPT**	**NPT**	**PHNTR**	**PYR**
14-Sep-20	0.16	<0.050	<0.050	-	-	-	-	-	-	-	<0.050	<0.10	-	0.10	<0.050	0.10	<0.10	0.076	-
9-Dec-21	<0.050	<0.050	<0.050	<0.050	<0.0090	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.071	<0.050	<0.030	<0.050

MW20-04																		Screen Interval: 1.5 - 4.5 mbgs
Date	**ANPTH**	**ANPTHL**	**ATRC**	**B(a)A**	**B(a)P**	**B(b+j)F**	**B(g,h,i)P**	**B(k)F**	**CHRY**	**D(a,h)A**	**FLATH**	**FLR**	**I(1,2,3-cd)P**	**1-MNPT**	**2-MNPT**	**1-,2-MNPT**	**NPT**	**PHNTR**	**PYR**
14-Sep-20	0.27	<0.050	<0.050	-	-	-	-	-	-	-	<0.050	<0.10	-	<0.050	<0.050	<0.071	<0.20	0.16	-
9-Dec-21	0.080	<0.050	<0.050	<0.050	<0.0090	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.071	<0.050	<0.030	<0.050
9-Dec-21 (DUP)	0.076	<0.050	<0.050	<0.050	<0.0090	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.071	<0.050	<0.030	<0.050

ONTARIO STANDARDS

PARAMETERS	ANPTH	ANPTHL	ATRC	B(a)A	B(a)P	B(b+j)F	B(g,h,i)P	B(k)F	CHRY	D(a,h)A	FLATH	FLR	I(1,2,3-cd)P	1-MNPT	2-MNPT	1-,2-MNPT	NPT	PHNTR	PYR
CRITERIA[a]	1,700	1.8	2.4	4.7	0.81	0.75[b]	0.2	0.4	1	0.52	130	400	0.2	1,800[c]	1,800[c]	1,800[c]	6,400	580	68
RDL	0.050	0.050	0.050	0.050	0.0090	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.071	0.050	0.030	0.050
UNITS	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L

(a) O.REG 153 (2011) TABLE 3 FULL DEPTH GENERIC SITE CONDITION STANDARDS FOR ALL TYPES OF PROPERTY USE FOR GROUNDWATER IN MEDIUM AND FINE TEXTURED SOIL IN IN A NON-POTABLE GROUND WATER CONDITION.

(b) THE LABORATORY CANNOT RESOLVE THE DIFFERENCE BETWEEN BENZO(b)FLUORANTHENE AND BENZO(j)FLUORANTHENE; THEREFORE, THEY ARE REPORTED TOGETHER. FOR COMPARISON PURPOSES THE STANDARD FOR BENZO(b)FLUORANTHENE HAS BEEN COMPARED TO THE RESULTS REPORTED FOR BENZO(b,j)FLUORANTHENE.

(c) THE METHYL NAPHTHALENE STANDARDS ARE APPLICABLE TO BOTH 1-METHYL NAPHTHALENE AND 2-METHYL NAPHTHALENE, WITH THE PROVISION THAT IF BOTH ARE DETECTED THE SUM OF THE TWO MUST NOT EXCEED THE STANDARD.

LIST OF APPLICABLE ABBREVIATIONS

<	LESS THAN	ATRC	ANTHRACENE	FLR	FLUORENE
µg/L	MICROGRAMS PER LITRE	B(a)A	BENZO(a)ANTHRACENE	I(1,2,3-cd)P	INDENO(1,2,3-CD)PYRENE
-	NOT AVAILABLE OR NO DATA	B(a)P	BENZO(a)PYRENE	mbgs	METRES BELOW GROUND SURFACE
1-MNPT	1-METHYLNAPHTHALENE	B(b+j)F	BENZO(b+j)FLUORANTHENE	NPT	NAPHTHALENE
1-, 2-MNPT	SUM OF 1-METHYLNAPHTHALENE AND 2-METHYLNAPHTHALENE	B(g,h,i)P	BENZO(g,h,i)PERYLENE	O.REG	ONTARIO REGULATION
		B(k)F	BENZO(k)FLUORANTHENE	PHNTR	PHENANTHRENE
2-MNPT	2-METHYLNAPHTHALENE	D(a,h)A	DIBENZ(a,h)ANTHRACENE	PYR	PYRENE
ANPTH	ACENAPHTHENE	FLATH	FLUORANTHENE	RDL	REPORTABLE DETECTION LIMIT
ANPTHL	ACENAPHTHYLENE				

LEGEND

- PROPERTY BOUNDARY
- FENCELINE
- FORMER FACILITY
- TREELINE
- BOREHOLE LOCATION COMPLETED AS A MONITORING WELL

0 5 10
1:200 METRES

NOTES

1. LOCATIONS WHERE CURRENT GROUNDWATER SAMPLE MEETS APPLICABLE GUIDELINES/STANDARDS FOR ALL PARAMETERS ANALYZED SHOWN IN **GREEN.**
2. LOCATIONS WHERE CURRENT GROUNDWATER SAMPLE EXCEEDS APPLICABLE GUIDELINES/STANDARDS FOR AT LEAST ONE OF THE PARAMETERS ANALYZED SHOWN IN **RED.**
3. EXCEEDANCES OF APPLICABLE GUIDELINES/STANDARDS IN TEXT ARE SHOWN IN **RED.**
4. LOCATION WHERE NO SAMPLES WERE TAKEN IN THE CURRENT SAMPLING EVENT SHOWN IN **BLACK**.

REFERENCE

ORIGINAL DRAWING OBTAINED FROM J.D.BARNES LIMITED; REFERENCE NO.: 20-10-125-00; SCALE: 1:100; DATE: SEPTEMBER 16, 2020.

ADDITIONAL INFORMATION OBTAINED FROM AQUA TERRE; DWG No.: SITE_03455-T1; SCALE: 1:250; DATE: MARCH 16, 2004.

CLIENT
IMPERIAL OIL LIMITED

PROJECT
FORMER HEATING OIL STORAGE STATION
BELLMAN DRIVE
OTTAWA, ONTARIO

TITLE
GROUNDWATER ANALYTICAL RESULTS - POLCYCLIC AROMATIC HYDROCARBONS

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2022-02-02
DESIGNED	SMoloughney
PREPARED	WLee
REVIEWED	RLaurin
APPROVED	SCarrelas

PROJECT NO.	PHASE-TASK	REV.	FIGURE
20144014	1620-2116	0	5

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25 mm

Table 1
Summary of Groundwater Field Monitoring Results
Bellman Drive, Ottawa, Ontario
Imperial Oil Limited

Well ID	Screen Interval (m)	Top of PVC Elevation[(a)] (m)	Ground Elevation[(a)] (m)	Monitoring Date	Depth to Groundwater (mbtoc)	Depth to Groundwater (mbgs)	Groundwater Elevation[(a)] (masl)	LNAPL Thickness (mm)
MW20-01	1.5 - 4.5	93.33	93.45	14-Sep-20	1.93	2.05	91.40	n/d
				9-Dec-21	1.52	1.65	91.81	n/d
MW20-02	1.5 - 4.5	93.29	93.40	14-Sep-20	1.93	2.04	91.36	n/d
				9-Dec-21	1.69	1.80	91.61	n/d
MW20-03	1.5 - 4.5	93.29	93.50	14-Sep-20	1.91	1.70	91.59	n/d
				9-Dec-21	1.58	1.37	91.92	n/d
MW20-04	1.5 - 4.5	93.26	93.41	14-Sep-20	1.98	1.83	91.28	n/d
				9-Dec-21	1.65	1.50	91.62	n/d

Notes:
[(a)] Groundwater elevations are relative to the geodetic benchmark (N.C.C. #001196530024) with an elevation of 86.536 m. Survey performed by J.D. Barnes on September 18, 2020.
m - metres
mbgs - metres below ground surface
mbtoc - metres below top of casing
mm - millimetres
n/d - not detected
PVC - polyvinyl chloride pipe

Table 2
Summary of Groundwater Analytical Results - BTEX and PHC Fractions F1 to F4
Bellman Drive, Ottawa, Ontario
Imperial Oil Limited

			Sample Location	**MW20-01**	**MW20-02**	**MW20-03**	**MW20-04**	
			Sample ID	MW20-01	MW20-02	MW20-03	MW20-04	DUP A
			BVL Sample ID	RIF859	RIF860	RIF861	RIF862	RIF863
			BVL Job Number	C1Y7485	C1Y7485	C1Y7485	C1Y7485	C1Y7485
			Sample Date	09-Dec-21	09-Dec-21	09-Dec-21	09-Dec-21	09-Dec-21
Parameters	**Units**	**RDL**	**Criteria[a]**					
Benzene	µg/L	0.20	430	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	0.20	18,000	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	0.20	2,300	<0.20	<0.20	<0.20	<0.20	<0.20
Xylenes	µg/L	0.40	4,200	<0.40	<0.40	<0.40	<0.40	<0.40
F1 (C_6-C_{10}) - BTEX	µg/L	25	750[b]	<25	<25	<25	<25	<25
F2 (C_{10}-C_{16})	µg/L	100	150	<100	<100	<100	<100	<100
F3 (C_{16}-C_{34})	µg/L	200	500	<200	<200	230	<200	<200
F4 (C_{34}-C_{50})	µg/L	200	500	<200	<200	<200	<200	<200

Notes:

[a] O.Reg 153 (2011) Table 3 Full Depth Generic Site Condition Standards for all types of property use for groundwater in medium and fine textured soil in in a non-potable ground water condition

[b] F1 fraction does not include BTEX; however, the proponent has the choice as to whether or not to subtract BTEX from the analytical result.

Bold/Underlined - value exceeds criteria/standard

BTEX - benzene, toluene, ethylbenzene, xylenes

BVL - Bureau Veritas Laboratories

F1, F2, F3, F4 - petroleum hydrocarbon fractions 1, 2, 3 and 4

O.Reg. - Ontario Regulation

RDL - reportable detection limit

µg/L - micrograms per litre

< - less than

Table 3
Summary of Groundwater Analytical Results - Polycylic Aromatic Hydrocarbons
Bellman Drive, Ottawa, Ontario
Imperial Oil Limited

			Sample Location	MW20-01	MW20-02	MW20-03	MW20-04	
			Sample ID	MW20-01	MW20-02	MW20-03	MW20-04	DUP A
			BVL Sample ID	RIF859	RIF860	RIF861	RIF862	RIF863
			BVL Job Number	C1Y7485	C1Y7485	C1Y7485	C1Y7485	C1Y7485
			Sample Date	09-Dec-21	09-Dec-21	09-Dec-21	09-Dec-21	09-Dec-21
Parameters	**Units**	**RDL**	**Criteria[a]**					
Acenaphthene	µg/L	0.050	1,700	<0.050	<0.050	<0.050	0.080	0.076
Acenaphthylene	µg/L	0.050	1.8	<0.050	<0.050	<0.050	<0.050	<0.050
Anthracene	µg/L	0.050	2.4	<0.050	<0.050	<0.050	<0.050	<0.050
Benzo(a)anthracene	µg/L	0.050	4.7	<0.050	<0.050	<0.050	<0.050	<0.050
Benzo(a)pyrene	µg/L	0.0090	0.81	<0.0090	<0.0090	<0.0090	<0.0090	<0.0090
Benzo(b/j)fluoranthene	µg/L	0.050	0.75[b]	<0.050	<0.050	<0.050	<0.050	<0.050
Benzo(g,h,i)perylene	µg/L	0.050	0.2	<0.050	<0.050	<0.050	<0.050	<0.050
Benzo(k)fluoranthene	µg/L	0.050	0.4	<0.050	<0.050	<0.050	<0.050	<0.050
Chrysene	µg/L	0.050	1	<0.050	<0.050	<0.050	<0.050	<0.050
Dibenzo(a,h)anthracene	µg/L	0.050	0.52	<0.050	<0.050	<0.050	<0.050	<0.050
Fluoranthene	µg/L	0.050	130	<0.050	<0.050	<0.050	<0.050	<0.050
Fluorene	µg/L	0.050	400	<0.050	<0.050	<0.050	<0.050	<0.050
Indeno(1,2,3-cd)pyrene	µg/L	0.050	0.2	<0.050	<0.050	<0.050	<0.050	<0.050
1-Methylnaphthalene	µg/L	0.050	1,800[c]	<0.050	<0.050	<0.050	<0.050	<0.050
2-Methylnaphthalene	µg/L	0.050	1,800[c]	<0.050	<0.050	<0.050	<0.050	<0.050
Methylnaphthalene, 2-(1-)	µg/L	0.071	1,800[c]	<0.071	<0.071	<0.071	<0.071	<0.071
Naphthalene	µg/L	0.050	6,400	<0.050	<0.050	<0.050	<0.050	<0.050
Phenanthrene	µg/L	0.030	580	<0.030	<0.030	<0.030	<0.030	<0.030
Pyrene	µg/L	0.050	68	<0.050	<0.050	<0.050	<0.050	<0.050

Notes:

[a] O.Reg 153 (2011) Table 3 Full Depth Generic Site Condition Standards for all types of property use for groundwater in medium and fine textured soil in in a non-potable ground water condition

[b] The laboratory cannot resolve the difference between benzo(b)fluoranthene and benzo(j)fluoranthene; therefore, they are reported together. For comparison purposes the standard for benzo(b)fluoranthene has been compared to the results reported for benzo(b,j)fluoranthene.

[c] The methyl naphthalene standards are applicable to both 1-methyl naphthalene and 2-methyl naphthalene, with the provision that if both are detected the sum of the two must not exceed the standard.

Bold/Underlined - value exceeds criteria/standard

BVL - Bureau Veritas Laboratories

n/s - no standard

O.Reg. - Ontario Regulation

RDL - reportable detection limit

µg/L - micrograms per litre

< - less than

APPENDIX A

Laboratory Certificates of Analysis and Data Quality Review Checklists

Task Order#: 20144014-1620-7777
Site#: N/A
Site Location: N/A;BELLMAN DRIVE, OTTAWA, ONTARIO
Project #: 20144014-1620-2107
Your C.O.C. #: 89849

Attention: Rachel Laurin

Golder Associates Ltd
7250, rue du Mile End
3e etage
Montreal, QC
Canada H2R 3A4

Report Date: 2021/12/21
Report #: R6932367
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1Y7479
Received: 2021/12/13, 14:25

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Laboratory Method	Analytical Method
Methylnaphthalene Sum	1	CAM SOP-00301	EPA 8270D m
Petroleum Hydro. CCME F1 & BTEX in Water	2	CAM SOP-00315	CCME PHC-CWS m
Petroleum Hydrocarbons F2-F4 in Water (1)	1	CAM SOP-00316	CCME PHC-CWS m
PAH Compounds in Water by GC/MS (SIM)	1	CAM SOP-00318	EPA 8270D m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard. All samples were analyzed within hold time unless otherwise flagged.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Bureau Veritas Laboratories conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following “Alberta Environment’s Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003”. Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Task Order#: 20144014-1620-7777
Site#: N/A
Site Location: N/A;BELLMAN DRIVE, OTTAWA, ONTARIO
Project #: 20144014-1620-2107
Your C.O.C. #: 89849

Attention: Rachel Laurin

Golder Associates Ltd
7250, rue du Mile End
3e etage
Montreal, QC
Canada H2R 3A4

Report Date: 2021/12/21
Report #: R6932367
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1Y7479
Received: 2021/12/13, 14:25

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Gina Baybayan, Project Manager
Email: Gina.Baybayan@bureauveritas.com
Phone# (905)817-5766

==========

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Bureau Veritas Job #: C1Y7479
Report Date: 2021/12/21

Golder Associates Ltd
Task Order#: 20144014-1620-7777
Site#: N/A
Site Location: N/A;BELLMAN DRIVE, OTTAWA, ONTARIO
Project #: 20144014-1620-2107

O.REG 153 PHCS IN WATER (WATER)

Bureau Veritas ID		RIF835		
Sampling Date		2021/12/09 14:30		
COC Number		89849		
	UNITS	**F.BLANK**	**RDL**	**QC Batch**
Benzene	ug/L	<0.20	0.20	7726696
Toluene	ug/L	<0.20	0.20	7726696
Ethylbenzene	ug/L	<0.20	0.20	7726696
o-Xylene	ug/L	<0.20	0.20	7726696
p+m-Xylene	ug/L	<0.40	0.40	7726696
Total Xylenes	ug/L	<0.40	0.40	7726696
F1 (C6-C10)	ug/L	<25	25	7726696
F1 (C6-C10) - BTEX	ug/L	<25	25	7726696
F2 (C10-C16 Hydrocarbons)	ug/L	<100	100	7728972
F3 (C16-C34 Hydrocarbons)	ug/L	<200	200	7728972
F4 (C34-C50 Hydrocarbons)	ug/L	<200	200	7728972
Reached Baseline at C50	ug/L	Yes		7728972
Extraction Surrogate Recovery (%)				
D10-o-Xylene	%	100		7726696
o-Terphenyl	%	105		7728972
Instrument Surrogate Recovery (%)				
1,4-Difluorobenzene	%	103		7726696
4-Bromofluorobenzene	%	112		7726696
D4-1,2-Dichloroethane	%	105		7726696

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Bureau Veritas Job #: C1Y7479
Report Date: 2021/12/21

Golder Associates Ltd
Task Order#: 20144014-1620-7777
Site#: N/A
Site Location: N/A;BELLMAN DRIVE, OTTAWA, ONTARIO
Project #: 20144014-1620-2107

PETROLEUM HYDROCARBONS (CCME)

Bureau Veritas ID		RIF836		
Sampling Date		2021/12/09 14:35		
COC Number		89849		
	UNITS	**TRIP BLANK**	**RDL**	**QC Batch**
Benzene	ug/L	<0.20	0.20	7726696
Toluene	ug/L	<0.20	0.20	7726696
Ethylbenzene	ug/L	<0.20	0.20	7726696
o-Xylene	ug/L	<0.20	0.20	7726696
p+m-Xylene	ug/L	<0.40	0.40	7726696
Total Xylenes	ug/L	<0.40	0.40	7726696
F1 (C6-C10)	ug/L	<25	25	7726696
F1 (C6-C10) - BTEX	ug/L	<25	25	7726696
Extraction Surrogate Recovery (%)				
D10-o-Xylene	%	100		7726696
Instrument Surrogate Recovery (%)				
1,4-Difluorobenzene	%	101		7726696
4-Bromofluorobenzene	%	91		7726696
D4-1,2-Dichloroethane	%	108		7726696

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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O.REG 153 PAHS (WATER)

Bureau Veritas ID		RIF835		
Sampling Date		2021/12/09 14:30		
COC Number		89849		
	UNITS	**F.BLANK**	**RDL**	**QC Batch**
Methylnaphthalene, 2-(1-)	ug/L	<0.071	0.071	7721971
Acenaphthene	ug/L	<0.050	0.050	7728968
Acenaphthylene	ug/L	<0.050	0.050	7728968
Anthracene	ug/L	<0.050	0.050	7728968
Benzo(a)anthracene	ug/L	<0.050	0.050	7728968
Benzo(a)pyrene	ug/L	<0.0090	0.0090	7728968
Benzo(b/j)fluoranthene	ug/L	<0.050	0.050	7728968
Benzo(g,h,i)perylene	ug/L	<0.050	0.050	7728968
Benzo(k)fluoranthene	ug/L	<0.050	0.050	7728968
Chrysene	ug/L	<0.050	0.050	7728968
Dibenzo(a,h)anthracene	ug/L	<0.050	0.050	7728968
Fluoranthene	ug/L	<0.050	0.050	7728968
Fluorene	ug/L	<0.050	0.050	7728968
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	0.050	7728968
1-Methylnaphthalene	ug/L	<0.050	0.050	7728968
2-Methylnaphthalene	ug/L	<0.050	0.050	7728968
Naphthalene	ug/L	<0.050	0.050	7728968
Phenanthrene	ug/L	<0.030	0.030	7728968
Pyrene	ug/L	<0.050	0.050	7728968
Extraction Surrogate Recovery (%)				
D10-Anthracene	%	123		7728968
D14-Terphenyl (FS)	%	108		7728968
D8-Acenaphthylene	%	99		7728968

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas Job #: C1Y7479
Report Date: 2021/12/21

Golder Associates Ltd
Task Order#: 20144014-1620-7777
Site#: N/A
Site Location: N/A;BELLMAN DRIVE, OTTAWA, ONTARIO
Project #: 20144014-1620-2107

TEST SUMMARY

Bureau Veritas ID: RIF835
Sample ID: F.BLANK
Matrix: Water

Collected: 2021/12/09
Relinquished: 2021/12/09
Received: 2021/12/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	7721971	N/A	2021/12/20	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Water	HSGC/MSFD	7726696	N/A	2021/12/16	Domnica Andronescu
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	7728972	2021/12/15	2021/12/16	Anna Stuglik-Rolland
PAH Compounds in Water by GC/MS (SIM)	GC/MS	7728968	2021/12/15	2021/12/16	Jonghan Yoon

Bureau Veritas ID: RIF836
Sample ID: TRIP BLANK
Matrix: Water

Collected: 2021/12/09
Relinquished: 2021/12/09
Received: 2021/12/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Water	HSGC/MSFD	7726696	N/A	2021/12/16	Domnica Andronescu

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	4.0°C

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7726696	DAN	Method Blank	1,4-Difluorobenzene	2021/12/16		104	%	70 - 130
			4-Bromofluorobenzene	2021/12/16		81	%	70 - 130
			D10-o-Xylene	2021/12/16		103	%	70 - 130
			D4-1,2-Dichloroethane	2021/12/16		101	%	70 - 130
			Benzene	2021/12/16	<0.20		ug/L	
			Toluene	2021/12/16	<0.20		ug/L	
			Ethylbenzene	2021/12/16	<0.20		ug/L	
			o-Xylene	2021/12/16	<0.20		ug/L	
			p+m-Xylene	2021/12/16	<0.40		ug/L	
			Total Xylenes	2021/12/16	<0.40		ug/L	
			F1 (C6-C10)	2021/12/16	<25		ug/L	
			F1 (C6-C10) - BTEX	2021/12/16	<25		ug/L	
7728968	JYO	Method Blank	D10-Anthracene	2021/12/15		124	%	50 - 130
			D14-Terphenyl (FS)	2021/12/15		111	%	50 - 130
			D8-Acenaphthylene	2021/12/15		88	%	50 - 130
			Acenaphthene	2021/12/15	<0.050		ug/L	
			Acenaphthylene	2021/12/15	<0.050		ug/L	
			Anthracene	2021/12/15	<0.050		ug/L	
			Benzo(a)anthracene	2021/12/15	<0.050		ug/L	
			Benzo(a)pyrene	2021/12/15	<0.0090		ug/L	
			Benzo(b/j)fluoranthene	2021/12/15	<0.050		ug/L	
			Benzo(g,h,i)perylene	2021/12/15	<0.050		ug/L	
			Benzo(k)fluoranthene	2021/12/15	<0.050		ug/L	
			Chrysene	2021/12/15	<0.050		ug/L	
			Dibenzo(a,h)anthracene	2021/12/15	<0.050		ug/L	
			Fluoranthene	2021/12/15	<0.050		ug/L	
			Fluorene	2021/12/15	<0.050		ug/L	
			Indeno(1,2,3-cd)pyrene	2021/12/15	<0.050		ug/L	
			1-Methylnaphthalene	2021/12/15	<0.050		ug/L	
			2-Methylnaphthalene	2021/12/15	<0.050		ug/L	
			Naphthalene	2021/12/15	<0.050		ug/L	
			Phenanthrene	2021/12/15	<0.030		ug/L	
			Pyrene	2021/12/15	<0.050		ug/L	
7728972	AS2	Method Blank	o-Terphenyl	2021/12/15		106	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2021/12/15	<100		ug/L	
			F3 (C16-C34 Hydrocarbons)	2021/12/15	<200		ug/L	
			F4 (C34-C50 Hydrocarbons)	2021/12/15	<200		ug/L	
7726696	DAN	LCS	1,4-Difluorobenzene	2021/12/16		96	%	70 - 130
			4-Bromofluorobenzene	2021/12/16		106	%	70 - 130
			D10-o-Xylene	2021/12/16		99	%	70 - 130
			D4-1,2-Dichloroethane	2021/12/16		95	%	70 - 130
			Benzene	2021/12/16		110	%	50 - 140
			Toluene	2021/12/16		106	%	50 - 140
			Ethylbenzene	2021/12/16		118	%	50 - 140
			o-Xylene	2021/12/16		111	%	50 - 140
			p+m-Xylene	2021/12/16		114	%	50 - 140
			F1 (C6-C10)	2021/12/16		95	%	60 - 140
7728968	JYO	LCS	D10-Anthracene	2021/12/15		125	%	50 - 130
			D14-Terphenyl (FS)	2021/12/15		104	%	50 - 130
			D8-Acenaphthylene	2021/12/15		95	%	50 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Acenaphthene	2021/12/15		96	%	50 - 130
			Acenaphthylene	2021/12/15		96	%	50 - 130
			Anthracene	2021/12/15		96	%	50 - 130
			Benzo(a)anthracene	2021/12/15		98	%	50 - 130
			Benzo(a)pyrene	2021/12/15		99	%	50 - 130
			Benzo(b/j)fluoranthene	2021/12/15		95	%	50 - 130
			Benzo(g,h,i)perylene	2021/12/15		98	%	50 - 130
			Benzo(k)fluoranthene	2021/12/15		102	%	50 - 130
			Chrysene	2021/12/15		100	%	50 - 130
			Dibenzo(a,h)anthracene	2021/12/15		103	%	50 - 130
			Fluoranthene	2021/12/15		96	%	50 - 130
			Fluorene	2021/12/15		96	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2021/12/15		96	%	50 - 130
			1-Methylnaphthalene	2021/12/15		91	%	50 - 130
			2-Methylnaphthalene	2021/12/15		101	%	50 - 130
			Naphthalene	2021/12/15		94	%	50 - 130
			Phenanthrene	2021/12/15		98	%	50 - 130
			Pyrene	2021/12/15		96	%	50 - 130
7728972	AS2	LCS	o-Terphenyl	2021/12/15		108	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2021/12/15		102	%	60 - 130
			F3 (C16-C34 Hydrocarbons)	2021/12/15		103	%	60 - 130
			F4 (C34-C50 Hydrocarbons)	2021/12/15		103	%	60 - 130

LCS: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Brad Newman, B.Sc., C.Chem., Scientific Service Specialist

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam A Bureau Veritas Group Company

6740 Campobello Road
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Toll Free: 1-800-563-6266

EXXONMOBIL/IMPERIAL OIL - MAXXAM CHAIN-OF-CUSTODY RECORD

20144014-1620 2107

Page 1 of 1

C of C # 89849

INVOICE INFORMATION	REPORT INFORMATION
Company Name: ☒ Imperial Oil ☐ ExxonMobil	Company Name: Golder Associates
Contact Name: Imperial Account Payable	Contact Name: Rachel Laurin
Address: 102, 2535 - 3rd Ave SE Calgary AB T2A 7W5	Address: 7250 rue du Mile End, 3e étage, Montreal, Que, CA H2R 3A4
Email: CanadaAccountsPayableInvoice@Golder.Com	Email: Rachel_Laurin@golder.com
Ph: 4032995600	Ph: 514 237 4292
Sampler Name (Print): Colleen Chapmon	Consultant Project #: 20144014-1620-2107

ANALYSIS REQUESTED

	FIELD SAMPLE ID	MATRIX: GROUND WATER	MATRIX: SURFACE WATER	MATRIX: SOIL	MATRIX: OTHER	# CONTAINERS	SAMPLING: DATE (YYYY/MM/DD)	SAMPLING: TIME (24 HR)	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	BTEX	F1	F2-F4	OIL & GREASE – TOTAL / MINERAL (SPECIFY)	VOC	PCB	PAH	LEAD	ICP METALS	ICPMS METALS (REG 153)	MERCURY	SAR / CRVI (SPECIFY)	BORON HOT WATER SOLUBLE	IGNITABILITY	REG 558 - INORGANICS	REG 558 - PCB LEACHATE	REG 558 - BENZENE / VOLATILES (SPECIFY)	REG 558 - B(a)P / SEMI-VOLATILES (SPECIFY)	Limited Sample
1	F. Blank				X	4	2021/12/09	14:36			X	X	X				X												X
2	Trip Blank				X	2	2021/12/09	14:35			X	X																	X
3																													
4																													
5																													
6																													
7																													
8																													
9																													
10																													

IOL SITE LOCATION: Bellman dr. Ottawa, ON

IOL PROJECT # (if applicable):

MAXXAM TASK ORDER # OR SERVICE ORDER # + LINE ITEM: 20144014-1620-7777

REGULATORY CRITERIA / DETECTION LIMITS: ☒ Reg 153 Table 3 ☐ 2004 ☒ 2011 ☐ RSC (please indicate which Reg. version and if RSC required) ☐ PWQO ☐ ODWS ☐ Other

SPECIAL INSTRUCTIONS: IES A2601436 SAP#88009282 [illegible]

JARS USED & NOT SUBMITTED Enter N/A for Water: N/A

TURNAROUND TIME: Standard (5 days) ☒; Rush (3 days) ☐ (2 days) ☐ (1 day) ☐ (same day) ☐

Date Required:

	YES	NO	COOLER ID # 1			
SEAL PRESENT	✓		TEMP °C	3	4	5
SEAL INTACT	✓					
COOLING MEDIA PRESENT	✓			1	2	3

	YES	NO	COOLER ID #			
SEAL PRESENT			TEMP °C			
SEAL INTACT						
COOLING MEDIA PRESENT				1	2	3

	YES	NO	COOLER ID #			
SEAL PRESENT			TEMP °C			
SEAL INTACT						
COOLING MEDIA PRESENT				1	2	3

RELINQUISHED BY:		DATE:	TIME (24 HR)	RECEIVED BY:		DATE:	TIME (24 HR)
1. C Chapmen	Colleen Chapmen	2021/12/09	16:05	1. Kavithaselvan	[signature]	2021/12/13	14.25
2.				2.			
3.				3.			

LAB USE ONLY
MAXXAM JOB #: C1Y7479
SAMPLES: LABELED BY: KTN; VERIFIED BY: NP4

COC -1012 (04/2016) IOL - ON

White: Maxxam Yellow: Client

DATA QUALITY REVIEW CHECKLIST - IMPERIAL OIL PROJECTS

Consultant: Golder Associates

Sampling Date: December 9, 2021

Location: Bellman Drive, Ottawa, ON

Laboratory: Bureau Veritas Mississauga

Consultant Project Number: 20144014-1620

Sample Submission Number: C1Y7479

Are All Laboratory QC Within Acceptance Criteria (Yes, No, Not Applicable)?

	Yes	No	NA	Comments
Instrument Surrogate Recovery	X			All laboratory QC results are within
Extraction Surrogate Recovery	X			acceptance criteria.
Method Blank Concentration	X			
Matrix Duplicate RPD			X	
Matrix Spike Recovery			X	
Lab Control Sample Recovery	X			

Are All Field QC Samples Within Alert Limits (Yes, No, Not Applicable)?

	Yes	No	NA	Comments
Field Blank Concentration	X			All field QC samples are within
Trip Blank Concentration	X			alert limits.
Field Duplicate RPD			X	

Has CoA been signed off (Yes/No)?:	Yes
Has lab warranted all tests were in statistical control in CoA (Yes/No)?:	Yes
Has lab warranted all tests were analyzed following SOP's in CoA (Yes/No)?:	Yes
Were all samples analyzed within hold times (Yes/No)?:	Yes
All volatiles samples methanol extracted (if required) within 24 hours (Yes/No)?:	n/a
Is Chain of Custody completed and signed (Yes/No)?:	Yes
Were sample temperatures acceptable when they reached lab (Yes/No)?:	Yes

Is data considered to be reliable (Yes/No/Suspect)?: Yes

If answer is "No", describe and provide rationale:

Data Reviewed by (Print): Amanda Newberry

Data Reviewed by (Signature): Amanda Newberry

Date: January 4, 2022

Task Order#: 20144014-1620-7777
Site#: N/A
Site Location: N/A;BELLMAN DRIVE, OTTAWA, ONTARIO
Project #: 20144014-1620-2107
Your C.O.C. #: 89848

Attention: Rachel Laurin

Golder Associates Ltd
7250, rue du Mile End
3e etage
Montreal, QC
Canada H2R 3A4

Report Date: 2021/12/17
Report #: R6924843
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1Y7485
Received: 2021/12/13, 14:25

Sample Matrix: Water
Samples Received: 5

Analyses	Quantity	Laboratory Method	Analytical Method
Methylnaphthalene Sum	5	CAM SOP-00301	EPA 8270D m
Petroleum Hydro. CCME F1 & BTEX in Water	5	CAM SOP-00315	CCME PHC-CWS m
Petroleum Hydrocarbons F2-F4 in Water (1)	5	CAM SOP-00316	CCME PHC-CWS m
PAH Compounds in Water by GC/MS (SIM)	5	CAM SOP-00318	EPA 8270D m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard. All samples were analyzed within hold time unless otherwise flagged.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Bureau Veritas Laboratories conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following “Alberta Environment’s Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003”. Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

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Task Order#: 20144014-1620-7777
Site#: N/A
Site Location: N/A;BELLMAN DRIVE, OTTAWA, ONTARIO
Project #: 20144014-1620-2107
Your C.O.C. #: 89848

Attention: Rachel Laurin

Golder Associates Ltd
7250, rue du Mile End
3e etage
Montreal, QC
Canada H2R 3A4

Report Date: 2021/12/17
Report #: R6924843
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1Y7485
Received: 2021/12/13, 14:25

Encryption Key

Gina Baybayan
Project Manager
17 Dec 2021 12:57:15

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Gina Baybayan, Project Manager
Email: Gina.Baybayan@bureauveritas.com
Phone# (905)817-5766

==========

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Bureau Veritas Job #: C1Y7485
Report Date: 2021/12/17

Golder Associates Ltd
Task Order#: 20144014-1620-7777
Site#: N/A
Site Location: N/A;BELLMAN DRIVE, OTTAWA, ONTARIO
Project #: 20144014-1620-2107

O.REG 153 PHCS IN WATER (WATER)

Bureau Veritas ID		RIF859	RIF860	RIF861	RIF862	RIF863		
Sampling Date		2021/12/09 13:30	2021/12/09 12:36	2021/12/09 14:05	2021/12/09 11:45	2021/12/09 11:45		
COC Number		89848	89848	89848	89848	89848		
	UNITS	**MW20-01**	**MW20-02**	**MW20-03**	**MW20-04**	**DUP A**	**RDL**	**QC Batch**
Benzene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	7726696
Toluene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	7726696
Ethylbenzene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	7726696
o-Xylene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	7726696
p+m-Xylene	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	7726696
Total Xylenes	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	7726696
F1 (C6-C10)	ug/L	<25	<25	<25	<25	<25	25	7726696
F1 (C6-C10) - BTEX	ug/L	<25	<25	<25	<25	<25	25	7726696
F2 (C10-C16 Hydrocarbons)	ug/L	<100	<100	<100	<100	<100	100	7725535
F3 (C16-C34 Hydrocarbons)	ug/L	<200	<200	230	<200	<200	200	7725535
F4 (C34-C50 Hydrocarbons)	ug/L	<200	<200	<200	<200	<200	200	7725535
Reached Baseline at C50	ug/L	Yes	Yes	Yes	Yes	Yes		7725535
Extraction Surrogate Recovery (%)								
D10-o-Xylene	%	101	102	104	103	101		7726696
o-Terphenyl	%	100	103	99	103	97		7725535
Instrument Surrogate Recovery (%)								
1,4-Difluorobenzene	%	103	103	104	104	103		7726696
4-Bromofluorobenzene	%	102	99	95	97	101		7726696
D4-1,2-Dichloroethane	%	108	109	108	109	108		7726696

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Bureau Veritas Job #: C1Y7485
Report Date: 2021/12/17

Golder Associates Ltd
Task Order#: 20144014-1620-7777
Site#: N/A
Site Location: N/A;BELLMAN DRIVE, OTTAWA, ONTARIO
Project #: 20144014-1620-2107

O.REG 153 PAHS (WATER)

Bureau Veritas ID		RIF859	RIF860	RIF861	RIF862	RIF863		
Sampling Date		2021/12/09 13:30	2021/12/09 12:36	2021/12/09 14:05	2021/12/09 11:45	2021/12/09 11:45		
COC Number		89848	89848	89848	89848	89848		
	UNITS	**MW20-01**	**MW20-02**	**MW20-03**	**MW20-04**	**DUP A**	**RDL**	**QC Batch**
Methylnaphthalene, 2-(1-)	ug/L	<0.071	<0.071	<0.071	<0.071	<0.071	0.071	7721971
Acenaphthene	ug/L	<0.050	<0.050	<0.050	0.080	0.076	0.050	7725533
Acenaphthylene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7725533
Anthracene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7725533
Benzo(a)anthracene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7725533
Benzo(a)pyrene	ug/L	<0.0090	<0.0090	<0.0090	<0.0090	<0.0090	0.0090	7725533
Benzo(b/j)fluoranthene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7725533
Benzo(g,h,i)perylene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7725533
Benzo(k)fluoranthene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7725533
Chrysene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7725533
Dibenzo(a,h)anthracene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7725533
Fluoranthene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7725533
Fluorene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7725533
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7725533
1-Methylnaphthalene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7725533
2-Methylnaphthalene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7725533
Naphthalene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7725533
Phenanthrene	ug/L	<0.030	<0.030	<0.030	<0.030	<0.030	0.030	7725533
Pyrene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7725533
Extraction Surrogate Recovery (%)								
D10-Anthracene	%	61	87	93	102	104		7725533
D14-Terphenyl (FS)	%	62	104	99	97	101		7725533
D8-Acenaphthylene	%	83	89	86	88	92		7725533

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Bureau Veritas Job #: C1Y7485
Report Date: 2021/12/17

Golder Associates Ltd
Task Order#: 20144014-1620-7777
Site#: N/A
Site Location: N/A;BELLMAN DRIVE, OTTAWA, ONTARIO
Project #: 20144014-1620-2107

TEST SUMMARY

Bureau Veritas ID: RIF859
Sample ID: MW20-01
Matrix: Water

Collected: 2021/12/09
Relinquished: 2021/12/09
Received: 2021/12/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	7721971	N/A	2021/12/16	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Water	HSGC/MSFD	7726696	N/A	2021/12/16	Domnica Andronescu
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	7725535	2021/12/14	2021/12/15	Anna Stuglik-Rolland
PAH Compounds in Water by GC/MS (SIM)	GC/MS	7725533	2021/12/14	2021/12/15	Jonghan Yoon

Bureau Veritas ID: RIF860
Sample ID: MW20-02
Matrix: Water

Collected: 2021/12/09
Relinquished: 2021/12/09
Received: 2021/12/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	7721971	N/A	2021/12/16	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Water	HSGC/MSFD	7726696	N/A	2021/12/16	Domnica Andronescu
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	7725535	2021/12/14	2021/12/15	Anna Stuglik-Rolland
PAH Compounds in Water by GC/MS (SIM)	GC/MS	7725533	2021/12/14	2021/12/15	Jonghan Yoon

Bureau Veritas ID: RIF861
Sample ID: MW20-03
Matrix: Water

Collected: 2021/12/09
Relinquished: 2021/12/09
Received: 2021/12/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	7721971	N/A	2021/12/16	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Water	HSGC/MSFD	7726696	N/A	2021/12/16	Domnica Andronescu
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	7725535	2021/12/14	2021/12/15	Anna Stuglik-Rolland
PAH Compounds in Water by GC/MS (SIM)	GC/MS	7725533	2021/12/14	2021/12/15	Jonghan Yoon

Bureau Veritas ID: RIF862
Sample ID: MW20-04
Matrix: Water

Collected: 2021/12/09
Relinquished: 2021/12/09
Received: 2021/12/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	7721971	N/A	2021/12/16	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Water	HSGC/MSFD	7726696	N/A	2021/12/16	Domnica Andronescu
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	7725535	2021/12/14	2021/12/15	Anna Stuglik-Rolland
PAH Compounds in Water by GC/MS (SIM)	GC/MS	7725533	2021/12/14	2021/12/15	Jonghan Yoon

Bureau Veritas ID: RIF863
Sample ID: DUP A
Matrix: Water

Collected: 2021/12/09
Relinquished: 2021/12/09
Received: 2021/12/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	7721971	N/A	2021/12/16	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Water	HSGC/MSFD	7726696	N/A	2021/12/16	Domnica Andronescu
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	7725535	2021/12/14	2021/12/15	Anna Stuglik-Rolland
PAH Compounds in Water by GC/MS (SIM)	GC/MS	7725533	2021/12/14	2021/12/15	Jonghan Yoon

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	4.0°C

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7725533	JYO	Method Blank	D10-Anthracene	2021/12/15		108	%	50 - 130
			D14-Terphenyl (FS)	2021/12/15		110	%	50 - 130
			D8-Acenaphthylene	2021/12/15		84	%	50 - 130
			Acenaphthene	2021/12/15	<0.050		ug/L	
			Acenaphthylene	2021/12/15	<0.050		ug/L	
			Anthracene	2021/12/15	<0.050		ug/L	
			Benzo(a)anthracene	2021/12/15	<0.050		ug/L	
			Benzo(a)pyrene	2021/12/15	<0.0090		ug/L	
			Benzo(b/j)fluoranthene	2021/12/15	<0.050		ug/L	
			Benzo(g,h,i)perylene	2021/12/15	<0.050		ug/L	
			Benzo(k)fluoranthene	2021/12/15	<0.050		ug/L	
			Chrysene	2021/12/15	<0.050		ug/L	
			Dibenzo(a,h)anthracene	2021/12/15	<0.050		ug/L	
			Fluoranthene	2021/12/15	<0.050		ug/L	
			Fluorene	2021/12/15	<0.050		ug/L	
			Indeno(1,2,3-cd)pyrene	2021/12/15	<0.050		ug/L	
			1-Methylnaphthalene	2021/12/15	<0.050		ug/L	
			2-Methylnaphthalene	2021/12/15	<0.050		ug/L	
			Naphthalene	2021/12/15	<0.050		ug/L	
			Phenanthrene	2021/12/15	<0.030		ug/L	
			Pyrene	2021/12/15	<0.050		ug/L	
7725535	AS2	Method Blank	o-Terphenyl	2021/12/14		103	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2021/12/14	<100		ug/L	
			F3 (C16-C34 Hydrocarbons)	2021/12/14	<200		ug/L	
			F4 (C34-C50 Hydrocarbons)	2021/12/14	<200		ug/L	
7726696	DAN	Method Blank	1,4-Difluorobenzene	2021/12/16		104	%	70 - 130
			4-Bromofluorobenzene	2021/12/16		81	%	70 - 130
			D10-o-Xylene	2021/12/16		103	%	70 - 130
			D4-1,2-Dichloroethane	2021/12/16		101	%	70 - 130
			Benzene	2021/12/16	<0.20		ug/L	
			Toluene	2021/12/16	<0.20		ug/L	
			Ethylbenzene	2021/12/16	<0.20		ug/L	
			o-Xylene	2021/12/16	<0.20		ug/L	
			p+m-Xylene	2021/12/16	<0.40		ug/L	
			Total Xylenes	2021/12/16	<0.40		ug/L	
			F1 (C6-C10)	2021/12/16	<25		ug/L	
			F1 (C6-C10) - BTEX	2021/12/16	<25		ug/L	
7725533	JYO	LCS	D10-Anthracene	2021/12/15		109	%	50 - 130
			D14-Terphenyl (FS)	2021/12/15		102	%	50 - 130
			D8-Acenaphthylene	2021/12/15		96	%	50 - 130
			Acenaphthene	2021/12/15		99	%	50 - 130
			Acenaphthylene	2021/12/15		94	%	50 - 130
			Anthracene	2021/12/15		95	%	50 - 130
			Benzo(a)anthracene	2021/12/15		94	%	50 - 130
			Benzo(a)pyrene	2021/12/15		90	%	50 - 130
			Benzo(b/j)fluoranthene	2021/12/15		106	%	50 - 130
			Benzo(g,h,i)perylene	2021/12/15		76	%	50 - 130
			Benzo(k)fluoranthene	2021/12/15		96	%	50 - 130
			Chrysene	2021/12/15		97	%	50 - 130
			Dibenzo(a,h)anthracene	2021/12/15		64	%	50 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Fluoranthene	2021/12/15		112	%	50 - 130
			Fluorene	2021/12/15		99	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2021/12/15		76	%	50 - 130
			1-Methylnaphthalene	2021/12/15		111	%	50 - 130
			2-Methylnaphthalene	2021/12/15		98	%	50 - 130
			Naphthalene	2021/12/15		94	%	50 - 130
			Phenanthrene	2021/12/15		103	%	50 - 130
			Pyrene	2021/12/15		113	%	50 - 130
7725535	AS2	LCS	o-Terphenyl	2021/12/14		107	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2021/12/14		100	%	60 - 130
			F3 (C16-C34 Hydrocarbons)	2021/12/14		99	%	60 - 130
			F4 (C34-C50 Hydrocarbons)	2021/12/14		98	%	60 - 130
7726696	DAN	LCS	1,4-Difluorobenzene	2021/12/16		96	%	70 - 130
			4-Bromofluorobenzene	2021/12/16		106	%	70 - 130
			D10-o-Xylene	2021/12/16		99	%	70 - 130
			D4-1,2-Dichloroethane	2021/12/16		95	%	70 - 130
			Benzene	2021/12/16		110	%	50 - 140
			Toluene	2021/12/16		106	%	50 - 140
			Ethylbenzene	2021/12/16		118	%	50 - 140
			o-Xylene	2021/12/16		111	%	50 - 140
			p+m-Xylene	2021/12/16		114	%	50 - 140
			F1 (C6-C10)	2021/12/16		95	%	60 - 140

LCS: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

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Bureau Veritas Job #: C1Y7485
Report Date: 2021/12/17

Golder Associates Ltd
Task Order#: 20144014-1620-7777
Site#: N/A
Site Location: N/A;BELLMAN DRIVE, OTTAWA, ONTARIO
Project #: 20144014-1620-2107

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Brad Newman, B.Sc., C.Chem., Scientific Service Specialist

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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DATA QUALITY REVIEW CHECKLIST - IMPERIAL OIL PROJECTS

Consultant: Golder Associates

Sampling Date: December 9, 2021

Location: Bellman Drive, Ottawa, ON

Laboratory: Bureau Veritas Mississauga

Consultant Project Number: 20144014-1620

Sample Submission Number: C1Y7485

Are All Laboratory QC Within Acceptance Criteria (Yes, No, Not Applicable)?

	Yes	No	NA	Comments
Instrument Surrogate Recovery	X			All laboratory QC results are within
Extraction Surrogate Recovery	X			acceptance criteria.
Method Blank Concentration	X			
Matrix Duplicate RPD			X	
Matrix Spike Recovery			X	
Lab Control Sample Recovery	X			

Are All Field QC Samples Within Alert Limits (Yes, No, Not Applicable)?

	Yes	No	NA	Comments
Field Blank Concentration			X	All field QC samples are within
Trip Blank Concentration			X	alert limits.
Field Duplicate RPD	X			

Has CoA been signed off (Yes/No)?:	Yes
Has lab warranted all tests were in statistical control in CoA (Yes/No)?:	Yes
Has lab warranted all tests were analyzed following SOP's in CoA (Yes/No)?:	Yes
Were all samples analyzed within hold times (Yes/No)?:	Yes
All volatiles samples methanol extracted (if required) within 24 hours (Yes/No)?:	n/a
Is Chain of Custody completed and signed (Yes/No)?:	Yes
Were sample temperatures acceptable when they reached lab (Yes/No)?:	Yes

Is data considered to be reliable (Yes/No/Suspect)?: Yes

If answer is "No", describe and provide rationale:

Data Reviewed by (Print): Amanda Newberry

Data Reviewed by (Signature): Amanda Newberry

Date: January 4, 2022

APPENDIX B

Quality Control/Quality Assurance

QUALITY ASSURANCE/QUALITY CONTROL

In conjunction with the field investigations completed to date, a quality assurance/quality control (QA/QC) program was implemented to ensure the integrity of the groundwater sampling and analytical testing results.

1.0 FIELD PROGRAM

Sampling activities were completed in accordance with Golder's Technical Field Procedures by trained Golder personnel. Field activities were documented in field notes and results were recorded on standard field forms. Field equipment involved in the sampling and monitoring of groundwater were decontaminated in accordance with Golder's Technical Procedures. Groundwater samples were collected using appropriate handling protocols and were placed in sample containers provided by Bureau Veritas Laboratories (BVL).

Re-useable field equipment involved in collecting samples was decontaminated between each sampling location. Groundwater samples were not directly contacted by hand. To help prevent cross-contamination, a new pair of clean nitrile gloves was used for the collection of each sample.

Samples were given unique identification numbers and the sampling containers were preserved in ice-filled coolers. Samples were logged onto formal chain-of-custody documents and transported to BVL's Mississauga Environmental Laboratory for chemical analysis. BVL is accredited by the Standards Council of Canada (SCC).

One field duplicate groundwater sample was submitted for analysis of benzene, toluene, ethylbenzene, xylenes (BTEX), petroleum hydrocarbon (PHC) fractions F1 to F4, and polycyclic aromatic hydrocarbons (PAHs). One field blank and one trip blank were submitted for analysis, to evaluate the potential for cross-contamination during the sampling and transportation of the samples.

2.0 LABORATORY PROGRAM

The laboratory QA/QC program included adherence to laboratory sampling and analysis protocols (e.g., hold times, sample containers, preservatives, detection limits and approved methodology) and the analysis of laboratory method blanks, laboratory sample duplicates, surrogate recovery and chemical spikes.

The laboratory method blank analysis results were used to detect interferences or impurities introduced by the laboratory equipment, reagents, or solvents. Surrogate recovery is analyzed by spiking samples with known quantities of surrogate chemicals which have similar chemical properties to the parameters being analyzed. The reported recovery provides an indication of the analytical method accuracy for that sample. Matrix spikes were conducted by adding known concentrations of the analyte of interest to a sample to evaluate the effects of the sample matrix on the test method. The analysis of selected samples in duplicate is used to evaluate the reproducibility of the test method.

3.0 DATA RECEPTION

Once laboratory analytical results were received, Golder completed a review of field and laboratory quality. This included review of laboratory QC performance to confirm results are within acceptance criteria, as well as evaluation of field duplicate and blank results to confirm they were within alert limits. Upon receipt of the analytical results, relative percent difference (RPD) values between the original samples and their blind field duplicates were calculated as follows:

$$RPD\% = \frac{|S - D|}{\frac{1}{2}(S + D)} \times 100$$

Where: RPD = relative percent difference

S = sample value

D = blind field duplicate or replicate value.

Since analytical error increases near the reportable detection limit (RDL), the RPD was only calculated where the concentrations of both the original and blind field duplicate samples were greater than five times the RDL. The calculated RPDs were then compared to parameter specific alert limits.

Exceedances of the QC acceptance or alert criteria were investigated with the laboratory and, if warranted, a corrective action report was requested from the laboratory.

4.0 DATA QUALITY REVIEW RESULTS

Results of the data quality review are summarized in Table B1. The RPD calculations and QC results are presented in Tables B2 to B5.

One groundwater field duplicate, one field blank and one trip blank were submitted to the laboratory as part of the groundwater QC program.

Based on the data quality review, no data quality issues were identified. All duplicated parameters, field blank and trip blank concentrations were within acceptable RPD alert limits. The data presented in this report are considered to be reliable.

5.0 SUMMARY OF RESULTS

Based on the review of the QA/QC results, the data presented in this report are considered to be reliable.

Table B1
Summary of Quality Control Sample Results
Bellman Drive, Ottawa, Ontario
Imperial Oil Limited

BVL Job Number	Matrix	BVL Sample ID Affected	Test Affected	Data Quality Issue	Comments
C1Y7479	Water	n/a	n/a	No data quality issues were identified.	The data are considered reliable.
C1Y7485	Groundwater	n/a	n/a	No data quality issues were identified.	The data are considered reliable.

Notes:

BVL - Bureau Veritas Laboratories

n/a - not applicable

Table B2
Summary of Groundwater Field Duplicate Sample Results - BTEX and PHC Fractions F1 to F4
Bellman Drive, Ottawa, Ontario
Imperial Oil Limited

Sample Location	Units	Alert Limit	RDL	MW20-04	DUP A	RPD %
Sample Collection Date				09-Dec-21	09-Dec-21	
BVL Sample ID				RIF862	RIF863	
Benzene	µg/L	>80%	0.20	<0.20	<0.20	n/c
Toluene	µg/L	>80%	0.20	<0.20	<0.20	n/c
Ethylbenzene	µg/L	>80%	0.20	<0.20	<0.20	n/c
Xylenes (Total)	µg/L	>80%	0.40	<0.40	<0.40	n/c
F1 (C_6-C_{10}) - BTEX	µg/L	>80%	25	<25	<25	n/c
F2 (C_{10}-C_{16})	µg/L	>80%	100	<100	<100	n/c
F3 (C_{16}-C_{34})	µg/L	>80%	200	<200	<200	n/c
F4 (C_{34}-C_{50})	µg/L	>80%	200	<200	<200	n/c

Notes:

Bold/Underlined - value exceeds alert limit

BTEX - benzene, toluene, ethylbenzene, xylenes

BVL - Bureau Veritas Laboratories

F1, F2, F3, F4 - petroleum hydrocarbon fractions 1, 2, 3 and 4

n/c - not calculated

RDL - reportable detection limit

RPD - relative percent difference

µg/L - micrograms per litre

> - greater than

< - less than

RPD is not calculated if either the original or field duplicate sample has a result less than 5X the RDL

Table B3
Summary of Groundwater Field Duplicate Sample Results - Polycyclic Aromatic Hydrocarbons
Bellman Drive, Ottawa, Ontario
Imperial Oil Limited

Sample Location	Units	Alert Limit	RDL	MW20-04	DUP A	RPD %
Sample Collection Date				09-Dec-21	09-Dec-21	
BVL Sample ID				RIF862	RIF863	
Acenaphthene	µg/L	>80%	0.050	0.080	0.076	n/c
Acenaphthylene	µg/L	>80%	0.050	<0.050	<0.050	n/c
Anthracene	µg/L	>80%	0.050	<0.050	<0.050	n/c
Benzo(a)anthracene	µg/L	>80%	0.050	<0.050	<0.050	n/c
Benzo(a)pyrene	µg/L	>80%	0.0090	<0.0090	<0.0090	n/c
Benzo(b/j)fluoranthene	µg/L	>80%	0.050	<0.050	<0.050	n/c
Benzo(g,h,i)perylene	µg/L	>80%	0.050	<0.050	<0.050	n/c
Benzo(k)fluoranthene	µg/L	>80%	0.050	<0.050	<0.050	n/c
Chrysene	µg/L	>80%	0.050	<0.050	<0.050	n/c
Dibenzo(a,h)anthracene	µg/L	>80%	0.050	<0.050	<0.050	n/c
Fluoranthene	µg/L	>80%	0.050	<0.050	<0.050	n/c
Fluorene	µg/L	>80%	0.050	<0.050	<0.050	n/c
Indeno(1,2,3-cd)pyrene	µg/L	>80%	0.050	<0.050	<0.050	n/c
1-Methylnaphthalene	µg/L	>80%	0.050	<0.050	<0.050	n/c
2-Methylnaphthalene	µg/L	>80%	0.050	<0.050	<0.050	n/c
Methylnaphthalene, 2-(1-)	µg/L	>80%	0.071	<0.071	<0.071	n/c
Naphthalene	µg/L	>80%	0.050	<0.050	<0.050	n/c
Phenanthrene	µg/L	>80%	0.030	<0.030	<0.030	n/c
Pyrene	µg/L	>80%	0.050	<0.050	<0.050	n/c

Notes:

Bold/Underlined - value exceeds alert limit

BVL - Bureau Veritas Laboratories

n/c - not calculated

RDL - reportable detection limit

RPD - relative percent difference

µg/L - micrograms per litre

> - greater than

< - less than

RPD is not calculated if either the original or field duplicate sample has a result less than 5X the RDL

Table B4
Summary of Groundwater Field Blank and Trip Blank Sample Results - BTEX and PHC Fractions F1 to F4
Bellman Drive, Ottawa, Ontario
Imperial Oil Limited

Sample ID	Units	Alert Limit	RDL	Field Blank	Do the Results Exceed the Alert Limit?	Trip Blank	Do the Results Exceed the Alert Limit?
Sample Collection Date				9-Dec-21		9-Dec-21	
BVL Sample ID				RIF835		RIF836	
Benzene	µg/L	>5X RDL	0.20	<0.20	no	<0.20	no
Toluene	µg/L	>5X RDL	0.20	<0.20	no	<0.20	no
Ethylbenzene	µg/L	>5X RDL	0.20	<0.20	no	<0.20	no
Xylenes (Total)	µg/L	>5X RDL	0.40	<0.40	no	<0.40	no
F1 (C_6-C_{10}) - BTEX	µg/L	>2X RDL	25	<25	no	<25	no
F2 (C_{10}-C_{16})	µg/L	>2X RDL	100	<100	no	-	n/a
F3 (C_{16}-C_{34})	µg/L	>2X RDL	200	<200	no	-	n/a
F4 (C_{34}-C_{50})	µg/L	>2X RDL	200	<200	no	-	n/a

Notes:

Bold/Underlined - value exceeds alert limit

BVL - Bureau Veritas Laboratories

n/a - not applicable

RDL - reportable detection limit

µg/L - micrograms per litre

- not analyzed

> - greater than

< - less than

Table B5
Summary of Groundwater Field Blank Sample Results - Polycyclic Aromatic Hydrocarbons
Bellman Drive, Ottawa, Ontario
Imperial Oil Limited

Sample ID	Units	Alert Limit	RDL	Field Blank	Do the Results Exceed the Alert Limit?
Sample Collection Date				9-Dec-21	
BVL Sample ID				RIF835	
Acenaphthene	µg/L	>5X RDL	0.050	<0.050	no
Acenaphthylene	µg/L	>5X RDL	0.050	<0.050	no
Anthracene	µg/L	>5X RDL	0.050	<0.050	no
Benzo(a)anthracene	µg/L	>5X RDL	0.050	<0.050	no
Benzo(a)pyrene	µg/L	>5X RDL	0.0090	<0.0090	no
Benzo(b/j)fluoranthene	µg/L	>5X RDL	0.050	<0.050	no
Benzo(g,h,i)perylene	µg/L	>5X RDL	0.050	<0.050	no
Benzo(k)fluoranthene	µg/L	>5X RDL	0.050	<0.050	no
Chrysene	µg/L	>5X RDL	0.050	<0.050	no
Dibenzo(a,h)anthracene	µg/L	>5X RDL	0.050	<0.050	no
Fluoranthene	µg/L	>5X RDL	0.050	<0.050	no
Fluorene	µg/L	>5X RDL	0.050	<0.050	no
Indeno(1,2,3-cd)pyrene	µg/L	>5X RDL	0.050	<0.050	no
1-Methylnaphthalene	µg/L	>5X RDL	0.050	<0.050	no
2-Methylnaphthalene	µg/L	>5X RDL	0.050	<0.050	no
Methylnaphthalene, 2-(1-)	µg/L	>5X RDL	0.071	<0.071	no
Naphthalene	µg/L	>5X RDL	0.050	<0.050	no
Phenanthrene	µg/L	>5X RDL	0.030	<0.030	no
Pyrene	µg/L	>5X RDL	0.050	<0.050	no

Notes:

Bold/Underlined - value exceeds alert limit

BVL - Bureau Veritas Laboratories

RDL - reportable detection limit

µg/L - micrograms per litre

> - greater than

< - less than