



May 10, 2019

Imperial Oil Limited
505 Quarry Park Blvd S.E.
Calgary, AB
T2C 5N1

These documents and the information contained therein are confidential, property of Imperial Oil Limited and any disclosure of same is governed by the provisions of each of the applicable provincial and territorial freedom of information legislation, the Privacy Act (Canada) 1980-81-82-83, c.111, Sch. II "1", and the Access to Information Act (Canada) 1980-81-82-83, c.111, Sch. I "1", as such legislation may be amended from time to time.

Re: 1490 Richmond Road, Ottawa, Ontario
Supplemental Phase II Environmental Site Assessment Update

1.0 INTRODUCTION

EXP Energy Services Ltd. (EXP) was retained by Imperial Oil Limited (Imperial) to conduct an update to the Supplemental Phase II Environmental Site Assessment (ESA) for the property located at 1490 Richmond Road, Ottawa, Ontario ("Site").

The objective of the Supplemental Phase II ESA Update was to obtain current site condition data in support of filing a Record of Site Condition with the MECP. The current site condition data will supplement information presented in the report prepared by EXP entitled *Supplemental Phase II ESA, 1490 and 1508 Richmond Road, Ottawa, Ontario*, dated June 26, 2018. The Supplemental Phase II ESA Update was conducted in accordance with mandatory requirements for Phase II ESA as defined by Ontario Regulation 153/04 and in accordance with generally accepted professional practices. In addition, a Risk Assessment (RA) in compliance with mandatory requirements for RA as defined by Ontario Regulation 153/04 has been filed for and accepted by the MECP for the Site.

The Supplemental Phase II ESA Update includes a revised Conceptual Site Model (CSM), updated to include additional ground water sampling data from March 13, 2019.

EXP performed the work in accordance with generally accepted professional practices. Subject to this standard of care, EXP makes no express or implied warranties regarding its services and no third party beneficiaries are intended. Limitation of liability, scope of report and third party reliance are outlined in Appendix A.



2.0 GROUND WATER MONITORING AND SAMPLING

Results from the March 2019 ground water monitoring and sampling program conducted at the Site are included as Appendix B.

Purge water collected from the monitor during sampling activities was collected and disposed of at the Veolia ES Canada Industrial Services Inc. facility in Ottawa, Ontario (MECP Registration A710141). Waste disposal information is provided in Appendix C.

3.0 SITE SURVEY

The boundaries of the Site and the adjacent property at 1508 Richmond Road were surveyed by an Ontario Land Surveyor. EXP supervised surveyors from O'Sullivan, Vollebekk Ltd. on March 26, 2019. A copy of the survey plan is included as Appendix D.

4.0 MAXIMUM CONTAMINANT CONCENTRATION

Soil and ground water sampling data collected at the Site from 2005 to 2019 was reviewed and maximum concentrations were determined for all parameters sampled. The parameters included petroleum hydrocarbons (PHC), volatile organic compounds (VOC), polycyclic aromatic hydrocarbons (PAH), metals including hydride forming (arsenic, selenium and antimony). Summary tables with maximum soil and ground water concentrations for all parameters sampled at the Site are provided as Appendix E.

5.0 CONCEPTUAL SITE MODEL

The Phase Two conceptual site model (CSM) developed for the Site using information collected during previous investigations was updated with the 2019 ground water monitoring and sampling results (discussed in Section 2.0). The updated CSM is provided as Appendix F.

6.0 CLOSURE

We trust this report meets your current needs. If you require further information pertaining to this investigation, please do not hesitate to contact the undersigned.

Sincerely,

EXP Energy Services Ltd.



Sana Khan, P.Eng.
Project Manager



Karen Obukuro, P.Eng.
Team Lead/Project Manager



Attachments:

Appendix A	Limitation of Liability, Scope of Report and Third Party Reliance
Appendix B	2019 Ground Water Monitoring and Sampling Program Report
Appendix C	Residue Management
Appendix D	Survey
Appendix E	Maximum Concentration Tables
Appendix F	Conceptual Site Model

7.0 REFERENCES

EXP Energy Services Ltd., *Supplemental Phase II Environmental Site Assessment, 1490 and 1508 Richmond Road, Ottawa, Ontario*, dated June 26, 2018

Appendix A – Limitation of Liability, Scope of Report and Third Party Reliance

LIMITATION 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 EXP Energy Services Ltd. (EXP) for Imperial Oil Limited. It is intended for the sole and exclusive use of Imperial Oil Limited, its affiliated companies and partners and the respective insurers, agents, employees and advisors (collectively, "Imperial"). Any use, reliance on or decision made by any person other than Imperial based on this report is the sole responsibility of such other person. Imperial and EXP 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, 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 EXP with respect to this report and any conclusions or recommendations made in this report reflect EXP's judgment 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 the 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.

Other than by Imperial, copying or distribution of this report or the use of or reliance on the information contained herein, in whole or in part, is not permitted without the express written permission of EXP. Nothing in this report is intended to constitute or provide a legal opinion.

**Appendix B –
2019 Ground Water Monitoring and Sampling Program
Report**



May 9, 2019

Imperial Oil Limited
505 Quarry Park Blvd. SE
P.O. Box 2480, Station M
Calgary, AB
T2C 5N1

These documents and the information contained therein are confidential, property of Imperial Oil Limited and any disclosure of same is governed by the provisions of each of the applicable provincial and territorial freedom of information legislation, the Privacy Act (Canada) 1980-81-82-83, c.111, Sch. II "1", and the Access to Information Act (Canada) 1980-81-82-83, c.111, Sch. I "1", as such legislation may be amended from time to time.

2019 Ground Water Monitoring and Sampling Program Report

Site Address: 1490 Richmond Road, Ottawa, Ontario

Imperial Site Number: 300977

Project Number: 01093

Facility Type: Multi-unit commercial plaza

Limitation of liability, scope of report and third-party reliance: Appendix A

Sampling Event(s): March 2019

SCOPE OF WORK

- Monitor one select monitor (MW-38), as shown on Figure 1, for subsurface vapour concentrations, water levels and the presence or absence of phase-separated liquid petroleum
- Collect ground water samples from MW-38 and submit to the laboratory for analysis of volatile organic compounds (VOCs), and petroleum hydrocarbon fractions (PHC) F1
- Compare the ground water analytical results to the applicable Ontario Regulation 153/04 standards. For this site, Ontario Regulation 153/04 Table 3 standards for an industrial/commercial/community property use with coarse textured soils and non-potable ground water use were selected

RESULTS

- **Ground Water Monitoring (Date - Depth to Ground Water Range; Ground Water Direction)**
 - **March 11, 2019** – 3.40 mbgs; northwesterly based on data from site and adjacent property at 1508 Richmond Rd, Ottawa (EXP, 2017) (Table 1)
- **Monitoring Well Headspace Vapour (Date - Range)**
 - **March 13, 2019** – 30 ppm (Table 1)
- **Liquid Petroleum Occurrence (Date - Observations)**
 - **March 13, 2019** – no measurable liquid petroleum (Figures 2 & 3 and Table 1)
- **Ground Water Analytical Exceedances (Date - Wells)**
 - **March 13, 2019** – MW-38 (Figure 3 and Table 2)

**THIS REPORT CONTAINS PROVISIONS LIMITING LIABILITY, THE SCOPE OF THE REPORT AND
THIRD PARTY RELIANCE**

METHODOLOGY

Subsurface Vapour Concentrations

All measurements of petroleum vapours in the monitor riser were made with an RKI Eagle 2 in methane elimination mode. Immediately after removing the well cap, the collection tube of the RKI Eagle 2 was inserted into the riser and the peak instrument reading was recorded.

Combustible Gas Detector Calibrations

RKI Eagle 2 calibration is checked on a daily basis in the field using a standard gas comprised of a known concentration of hexane in air (15% LEL). If the instrument readings are within $\pm 10\%$ of the standard gas value, then the instrument is deemed to be calibrated, however if the readings are greater than $\pm 10\%$ of the standard gas value then the instrument is re-calibrated prior to use.

Depth to Ground Water and Free Product Thickness

All measurements of depth to ground water and presence or absence of phase-separated liquid petroleum are made with a Solinst Model 122 oil/water interface probe. Both the probe and the measuring tape that come into contact with liquids within a monitor are cleaned with phosphate-free soap and tap water, rinsed with distilled water and then finally rinsed with methanol after each measurement. For all monitors in which phase-separated liquid petroleum is detected with the interface probe, the presence of liquid petroleum is verified with a bailer. For all monitors in which phase-separated liquid petroleum is not detected with the interface probe but that have a petroleum vapour reading of 5% LEL or higher, a bailer is used to check the monitor for the presence of phase-separated liquid petroleum. If there is measurable or observable phase-separated liquid petroleum in the bailer, then a ground water sample is not submitted for laboratory analysis from this location.

Ground Water Sampling Methodology

Ground water samples were collected from MW-38 on March 13, 2019 using a low-flow sampling technique. This technique involves pumping ground water at low rates, typically less than 500 mL per minute, to minimize drawdown.

Prior to collecting the ground water samples, the monitor was purged with the low flow sampling equipment and field parameters (turbidity, dissolved oxygen, conductivity, temperature, pH and oxidation reduction potential) were monitored until stable readings were achieved. These parameters are considered to be stable when three consecutive readings met the following conditions:

- Turbidity – within 10% for values greater than 5 nephelometric turbidity units (NTU), or three values are less than 5 NTU
- Dissolved oxygen – within 10% for values greater than 0.5 mg/L, or three values are less than 0.5 mg/L
- Conductivity – within 3%
- Temperature – $\pm 1^{\circ}\text{C}$
- pH - ± 0.1 unit
- Oxidation reduction potential - ± 10 millivolts

When stabilization occurs, equilibrium between ground water within a monitor and the surrounding formation water is attained. As such, samples collected when stabilization occurs are considered to be representative of formation water.

Purge water collected from the monitors during sampling activities was disposed of at the Veolia ES Canada Industrial Services Inc. facility in Ottawa, Ontario, a Ministry of the Environment, Conservation and Parks (MECP) approved waste receiver.

Laboratory Analysis of Samples

Samples were collected in the appropriate sample containers, using the appropriate preservatives. All sample bottles were supplied by the laboratory. The ground water samples were placed into a cooler with ice at less than 10°C immediately after they were collected. The samples were submitted to the Mississauga facility of Maxxam Analytics, a Standards Council of Canada accredited laboratory. Analytical methods used are referenced in the certificates of analysis presented in Appendix B.

Quality Assurance and Quality Control Program

A quality assurance and quality control (QA/QC) program was implemented to reduce and quantify potential issues introduced during sample collection. All work was carried out following the quality management, control and assurance procedures outlined in Appendix C. A discussion of the laboratory and field QA/QC program is also provided in Appendix C. In summary, no QA/QC issues were identified that would materially affect the overall conclusions of the ground water monitoring and sampling assessment described in this report.

CLOSURE

We trust this report meets your current needs. If you require further information pertaining to this investigation, please do not hesitate to contact the undersigned.

Sincerely,

EXP Energy Services Ltd.


Sana Khan, P.Eng.
Project Manager




Karen Obukuro, P.Eng.
Team/Lead Project Manager



Attachments:

Figure 1 - Site Plan

Figure 2 - Ground Water Analytical Results – Petroleum Hydrocarbons

Figure 3 - Ground Water Analytical Results – Volatile Organic Compounds

EXP Energy Services Ltd.

*2019 Ground Water Monitoring and Sampling Program
1490 Richmond Road, Ottawa, Ontario
Imperial Site Number: 300977
Project Number: 01093
May 9, 2019*

Table 1 - Ground Water Monitoring Data

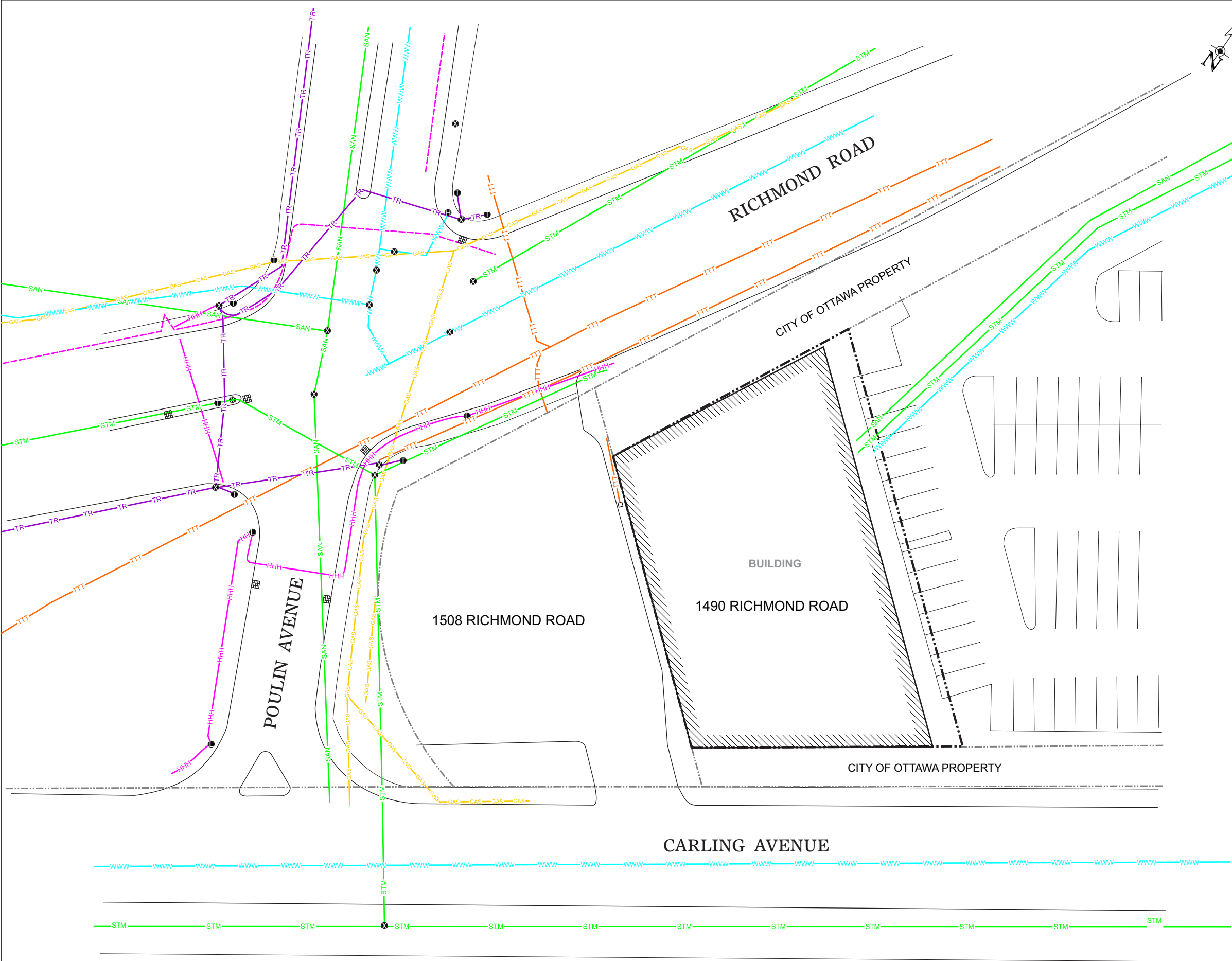
Table 2 - Ground Water Chemical Analysis - Petroleum Related Parameters and Volatile Organic Compounds

Appendix A - Limitation of Liability, Scope of Report and Third Party Reliance

Appendix B - Laboratory Certificates of Analysis

Appendix C - Quality Management, Control and Assurance

Figures



LEGEND:

- RSC PROPERTY BOUNDARY
- ADJACENT BOUNDARY
- CATCH BASIN
- MANHOLE
- TRAFFIC LIGHT
- LIGHT STANDARD
- FIRE HYDRANT
- STM
- SAN
- WWW
- GAS
- TTT
- HHH
- TR
- ABANDONED UTILITY

SOURCE:

BASED ON SURVEY PLANS BY ANNIS, O'SULLIVAN, VOLLEBEKK LTD. DATED SEP.27, 2007, FEB. 2, 2012, AND JUNE 10, 2013, CITY OF OTTAWA PUBLIC WORKS SERVICES DRAWINGS G-A-17 AND G-B-01 DATED JULY 2007, DRAWING H36J-3, 'CARLING AVENUE RECONSTRUCTION & WIDENING' DR170 SHT14 CITY OF OTTAWA DATED APR. 1960, IMAGE BY GOOGLE EARTH NOVEMBER. 30, 2008 LOCATES BY: PROMARK TELECON ON JUL. 14, 2011, CITY OF OTTAWA ON JUL. 14, 2011, ROGERS LOCATES ON JUL. 13, 2011, BLACK & MACDONALD ON JUL. 7, 2011, AND FIELD MEASUREMENTS BY EXP STAFF

SCALE:

0101020m

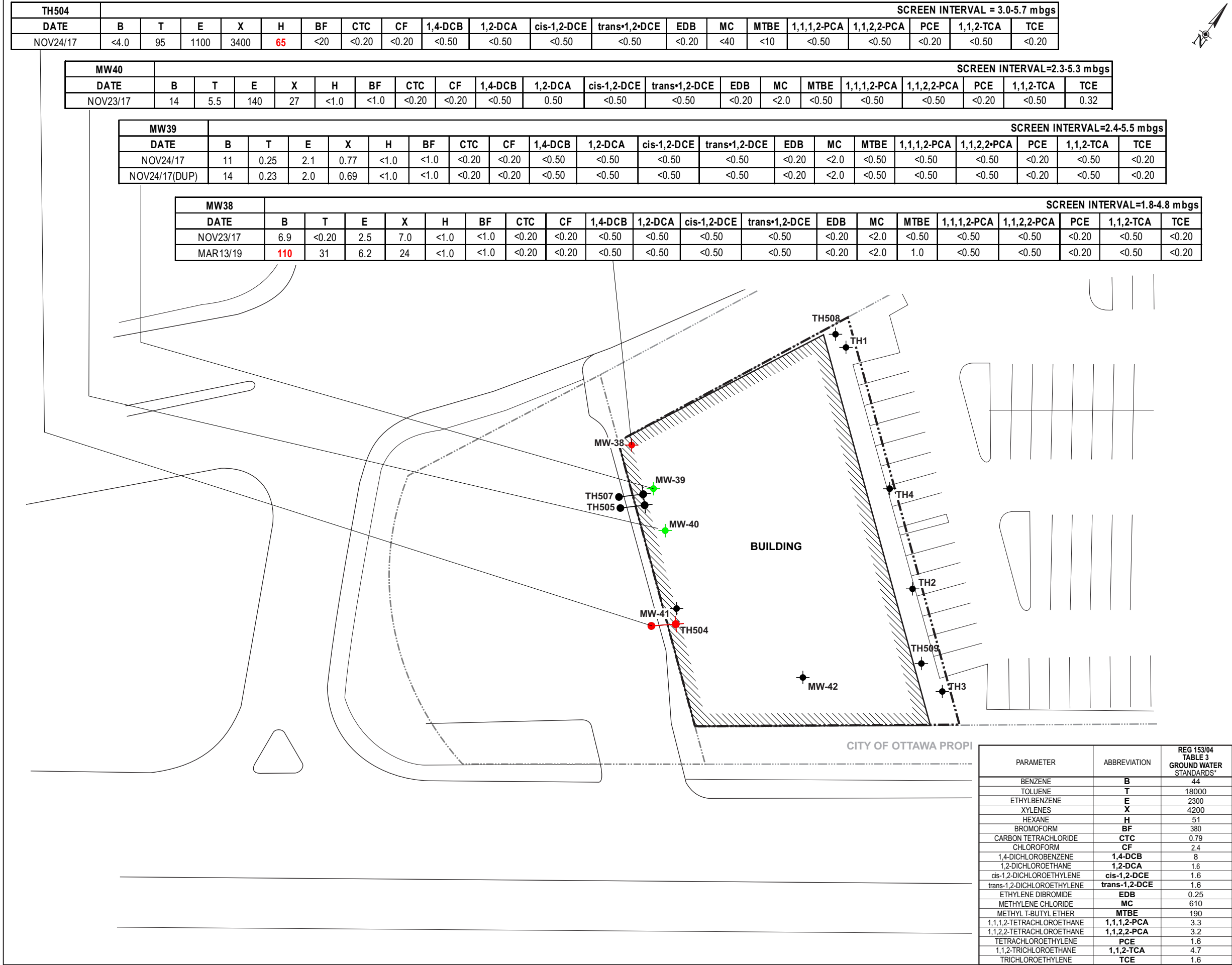
DRAWN BY	CHECKED BY
K.G.	S.K.

SITE PLAN

FIGURE 1

1490 RICHMOND ROAD
OTTAWA, ONTARIO

PROJECT NUMBER: 01093	DATE: FEBRUARY 2019
-----------------------	---------------------



Tables

GROUND WATER MONITORING AND ELEVATION DATA									Table 1
1490 Richmond Road, Ottawa, Ontario									Page 1 of 1
Monitor	Top of Pipe Elevation (m)	Ground Surface Elevation (m)	Screen Interval (mbgs)	Date	Petroleum Vapour Concentrations	Liquid Petroleum Thickness (m)*	Water Depth (mbgs)	Water Table Elevation (m)	
MW38	76.10	76.15	1.8 to 4.8	15-Mar-18 17-Sep-18 11-Mar-19	nd 125 30	nd nd nd	2.76 3.37 3.40	73.39 72.78 72.75	
MW39	76.10	76.15	2.4 to 5.5	15-Mar-18 17-Sep-18 11-Mar-19	nd nm nm	nd nm nm	2.67 nm nm	73.48 n/a n/a	
MW40	76.12	76.17	2.3 to 5.3	15-Mar-18 17-Sep-18 11-Mar-19	nd nm nm	nd nm nm	2.55 nm nm	73.62 n/a n/a	
MW41	76.09	76.14	1.8 to 4.9	15-Mar-18 17-Sep-18 11-Mar-19	nd nm nm	nd nm nm	2.50 nm nm	73.64 n/a n/a	
MW42	76.00	76.14	1.2 to 4.3	15-Mar-18 17-Sep-18 11-Mar-19	na nm nm	na nm nm	na nm nm	n/a n/a n/a	
TH1	75.83	75.90	1.2 to 4.3	15-Mar-18 17-Sep-18 11-Mar-19	na nm nm	na nm nm	na nm nm	n/a n/a n/a	
TH2	75.90	75.98	1.2 to 4.3	15-Mar-18 17-Sep-18 11-Mar-19	na nm nm	na nm nm	na nm nm	n/a n/a n/a	
TH3	76.02	76.07	1.2 to 4.3	15-Mar-18 17-Sep-18 11-Mar-19	na nm nm	na nm nm	na nm nm	n/a n/a n/a	
TH4	75.85	75.93	1.2 to 4.3	15-Mar-18 17-Sep-18 11-Mar-19	na nm nm	na nm nm	na nm nm	n/a n/a n/a	
TH504	77.04	77.23	3.0 to 5.7	15-Mar-18 17-Sep-18 11-Mar-19	nd nm nm	nd nm nm	3.62 nm nm	73.61 n/a n/a	
TH505	77.02	77.08	9.5 to 10.8	15-Mar-18 17-Sep-18 11-Mar-19	210 nm nm	nd nm nm	11.35 nm nm	65.73 n/a n/a	
TH507	76.98	77.08	13.0 to 14.4	15-Mar-18 17-Sep-18 11-Mar-19	50 nm nm	nd nm nm	13.05 nm nm	64.03 nm n/a	
TH508	75.86	75.96	23.5 to 25.0	15-Mar-18 17-Sep-18 11-Mar-19	20 nm nm	nd nm nm	9.63 nm nm	66.33 n/a n/a	
TH509	75.98	76.08	11.3 to 12.8	15-Mar-18 17-Sep-18 11-Mar-19	nd nm nm	nd nm nm	11.05 nm nm	65.03 n/a n/a	
Note: All measurements shown in metres (m), unless otherwise noted Relative elevations shown above were determined from local benchmark (bottom of lower brick on the northwest corner of the building) with a geodetic elevation of 77.57 (Annis, O'Sullivan, Vollebekk Ltd., 2007) nd means "not detected"; nm means "not monitored"; na means "not accessible"; n/a means "not applicable"; mbgs means "metres below ground surface" Vapour concentrations measured using RKI Eagle 2 operated in methane elimination mode Petroleum vapour concentrations <500 ppmv shown in parts per million volume (ppmv), >500 ppmv shown in percent of lower explosive limit (% LEL) *If liquid petroleum was measured, the water table elevations were corrected assuming a liquid petroleum specific gravity of 0.75 MW30 and MW40 Series installed in 1999 (Aqua Terre) TH1 Series installed in 2007 (Barenco) TH500 Series installed in 2014 (EXP)									

GROUND WATER CHEMICAL ANALYSIS - Petroleum Related Parameters and Volatile Organic Compounds

1490 Richmond Road, Ottawa, Ontario

Sample	Monitor					
Screen Interval (mbgs)	MW-38					Ontario Regulation 153/04
Sample Date	1.8 to 4.8					Table 3
Maxxam I.D.	13-Mar-19					Ground Water
Maxxam Job #	JFC938					Standards*
Analysis Date	B968420					
	18,22-Mar-19					
PARAMETERS						
<u>Volatile Organic Compounds</u>						
Acetone	<10					130000
Benzene	110					44
Bromodichloromethane	<0.50					85000
Bromoform	<1.0					380
Bromomethane	<0.50					5.6
Carbon Tetrachloride	<0.20					0.79
Chlorobenzene	2.2					630
Chloroform	<0.20					2.4
Dibromochloromethane	<0.50					82000
Dichlorobenzene, - 1,2	1.9					4600
Dichlorobenzene, - 1,3	<0.50					9600
Dichlorobenzene, - 1,4	<0.50					8
Dichlorodifluoromethane (FREON 12)	<1.0					4400
Dichloroethane, - 1,1	<0.20					320
Dichloroethane, - 1,2	<0.50					1.6
Dichloroethylene, - 1,1	<0.20					1.6
Dichloroethylene, <i>cis</i> - 1,2	<0.50					1.6
Dichloroethylene, <i>trans</i> - 1,2	<0.50					1.6
Dichloropropane, - 1,2	<0.20					16
Dichloropropene, - 1,3 (total**)	<0.50					5.2
Ethylbenzene	6.2					2300
Ethylene Dibromide	<0.20					0.25
Hexane	<1.0					51
Methylene Chloride	<2.0					610
Methyl Isobutyl Ketone	<5.0					140000
Methyl Ethyl Ketone	<10					470000
Methyl t-Butyl Ether	1.0					190
Styrene	<0.50					1300
Tetrachloroethane, - 1,1,1,2	<0.50					3.3
Tetrachloroethane, - 1,1,2,2	<0.50					3.2
Tetrachloroethylene	<0.20					1.6
Toluene	31					18000
Trichloroethane, - 1,1,1	<0.20					640
Trichloroethane, - 1,1,2	<0.50					4.7
Trichloroethylene	<0.20					1.6
Vinyl Chloride	<0.20					0.5
Xylenes	24					4200
Trichlorofluoromethane (FREON 11)	<0.50					2500
<u>Petroleum Hydrocarbons</u>						
F1 (C6 to C10 - BTEX)	120					750
F2 (C10 to C16)	na					150
F3 (C16 to C34)	na					500
F4 (C34 to C50)	na					500

Analysis by Maxxam Analytics

All results in ppb (ug/L); mbgs means "metres below ground surface"; <RDL means not detected at reporting detection limit (RDL); na means "not analysed"

RDL are shown for non-detected results; for RDL of reportable results, see the respective laboratory certificate of analysis (refer to Maxxam Job #)

* Standards shown are for all types of property use and coarse textured soils in a non-potable ground water condition

** Sum of *cis*-1,3 and *trans*-1,3 dichloropropene concentrationsExceedances of Table 3 standards are shown in **bold**

Appendix A – Limitation of Liability, Scope of Report and Third Party Reliance

LIMITATION 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 EXP Energy Services Ltd. (EXP) for Imperial Oil Limited. It is intended for the sole and exclusive use of Imperial Oil Limited, its affiliated companies and partners and the respective insurers, agents, employees and advisors (collectively, "Imperial"). Any use, reliance on or decision made by any person other than Imperial based on this report is the sole responsibility of such other person. Imperial and EXP 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, 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 EXP with respect to this report and any conclusions or recommendations made in this report reflect EXP's judgment 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 the 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.

Other than by Imperial, copying or distribution of this report or the use of or reliance on the information contained herein, in whole or in part, is not permitted without the express written permission of EXP. Nothing in this report is intended to constitute or provide a legal opinion.

Appendix B – Laboratory Certificates of Analysis

Attached are copies of the original Certificates of Analysis provided by the laboratory. The data contained in these analyses is to be read only in conjunction with the report to which it is attached. For interpretation of the chemical data, see the attached text.

Since the laboratory data contains scientific terms and references, only trained persons familiar with sampling and laboratory methods should attempt to interpret the data contained in the Certificates of Analysis.

Attention: Sana Khan

EXP Energy Services Ltd.
220 Commerce Valley Dr. W
Suite 110
Markham, ON
CANADA L3T 0A8

Task Order#: 4410S37879
Line Item: 10
Site#: JF.00446
Site Location: N/A;1508 RICHMOND ROAD, OTTAWA, ON
Project #: 01093
Your C.O.C. #: 7071SS-02-01

Report Date: 2019/05/01
Report #: RS692637
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B968395

Received: 2019/03/15, 15:53

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Laboratory Method	Primary Reference
1,3-Dichloropropene Sum	2		EPA 8260C m
Petroleum Hydro. CCME F1 & BTEX in Water	2	CAM SOP-0031S	CCME PHC-CWS m
Volatile Organic Compounds in Water	2	CAM SOP-00228	EPA 8260C m

Remarks:

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

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam 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.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam 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 Maxxam, unless otherwise agreed in writing. Maxxam 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 Maxxam, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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.

Maxxam Job #: B968395
Report Date: 2019/05/01

EXP Energy Services Ltd.
Task Order#: 4410537879, Line Item: 10
Site#: JF.00446
Site Location: N/A;1508 RICHMOND ROAD, OTTAWA, ON
Project #: 01093

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		JFC866	JFC867		
Sampling Date		2019/03/13 13:00	2019/03/13 14:00		
COC Number		707155-02-01	707155-02-01		
	UNITS	F.BLANK	TRIP BLANK	RDL	QC Batch
F1 (C6-C10)	ug/L	<25	<25	25	6022361
F1 (C6-C10) - BTEX	ug/L	<25	<25	25	6022361
Instrument Surrogate Recovery (%)					
1,4-Difluorobenzene	%	100	98		6022361
4-Bromofluorobenzene	%	100	101		6022361
D10-Ethylbenzene	%	105	104		6022361
D4-1,2-Dichloroethane	%	102	100		6022361
RDL = Reportable Detection Limit QC Batch = Quality Control Batch					

Maxxam Job #: B968395
Report Date: 2019/05/01

EXP Energy Services Ltd.
Task Order#: 4410537879, Line Item: 10
Site#: JF.00446
Site Location: N/A;1508 RICHMOND ROAD, OTTAWA, ON
Project #: 01093

O.REG 153 VOCs BY HS (WATER)

Maxxam ID		JFC866	JFC867		
Sampling Date		2019/03/13 13:00	2019/03/13 14:00		
COC Number		707155-02-01	707155-02-01		
	UNITS	F.BLANK	TRIP BLANK	RDL	QC Batch
1,1,1-Trichloroethane	ug/L	<0.20	<0.20	0.20	6020542
1,1,2-Trichloroethane	ug/L	<0.50	<0.50	0.50	6020542
Trichloroethylene	ug/L	<0.20	<0.20	0.20	6020542
Trichlorofluoromethane (FREON 11)	ug/L	<0.50	<0.50	0.50	6020542
Vinyl Chloride	ug/L	<0.20	<0.20	0.20	6020542
p+m-Xylene	ug/L	<0.20	<0.20	0.20	6020542
o-Xylene	ug/L	<0.20	<0.20	0.20	6020542
Total Xylenes	ug/L	<0.20	<0.20	0.20	6020542
Instrument					
Surrogate Recovery (%)					
4-Bromofluorobenzene	%	90	89		6020542
D4-1,2-Dichloroethane	%	120	119		6020542
D8-Toluene	%	87	88		6020542
RDL = Reportable Detection Limit					
QC Batch = Quality Control Batch					

Maxxam Job #: B968395
Report Date: 2019/05/01

EXP Energy Services Ltd.
Task Order#: 4410537879, Line Item: 10
Site#: JF.00446
Site Location: N/A;1508 RICHMOND ROAD, OTTAWA, ON
Project #: 01093

GENERAL COMMENTS

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

Package 1	1.7°C
-----------	-------

Revised Report (2019/05/01): Total 1, 3-dichloropropene results has been include in this CofA.

Results relate only to the items tested.

Maxxam Job #: B968395
Report Date: 2019/05/01

EXP Energy Services Ltd.
Task Order#: 4410537879, Line Item: 10
Site#: JF.00446
Site Location: N/A;1508 RICHMOND ROAD, OTTAWA, ON
Project #: 01093

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
				D8-Toluene	2019/03/21		103	%	70 - 130
				Acetone (2-Propanone)	2019/03/21		109	%	60 - 140
				Benzene	2019/03/21		94	%	70 - 130
				Bromodichloromethane	2019/03/21		100	%	70 - 130
				Bromoform	2019/03/21		102	%	70 - 130
				Bromomethane	2019/03/21		99	%	60 - 140
				Carbon Tetrachloride	2019/03/21		100	%	70 - 130
				Chlorobenzene	2019/03/21		95	%	70 - 130
				Chloroform	2019/03/21		99	%	70 - 130
				Dibromochloromethane	2019/03/21		97	%	70 - 130
				1,2-Dichlorobenzene	2019/03/21		96	%	70 - 130
				1,3-Dichlorobenzene	2019/03/21		92	%	70 - 130
				1,4-Dichlorobenzene	2019/03/21		95	%	70 - 130
				Dichlorodifluoromethane (FREON 12)	2019/03/21		94	%	60 - 140
				1,1-Dichloroethane	2019/03/21		100	%	70 - 130
				1,2-Dichloroethane	2019/03/21		101	%	70 - 130
				1,1-Dichloroethylene	2019/03/21		96	%	70 - 130
				cis-1,2-Dichloroethylene	2019/03/21		97	%	70 - 130
				trans-1,2-Dichloroethylene	2019/03/21		97	%	70 - 130
				1,2-Dichloropropane	2019/03/21		99	%	70 - 130
				cis-1,3-Dichloropropene	2019/03/21		92	%	70 - 130
				trans-1,3-Dichloropropene	2019/03/21		92	%	70 - 130
				Ethylbenzene	2019/03/21		93	%	70 - 130
				Ethylene Dibromide	2019/03/21		98	%	70 - 130
				Hexane	2019/03/21		103	%	70 - 130
				Methylene Chloride(Dichloromethane)	2019/03/21		107	%	70 - 130
				Methyl Ethyl Ketone (2-Butanone)	2019/03/21		106	%	60 - 140
				Methyl Isobutyl Ketone	2019/03/21		118	%	70 - 130
				Methyl t-butyl ether (MTBE)	2019/03/21		92	%	70 - 130
				Styrene	2019/03/21		109	%	70 - 130
				1,1,1,2-Tetrachloroethane	2019/03/21		101	%	70 - 130
				1,1,2,2-Tetrachloroethane	2019/03/21		106	%	70 - 130
				Tetrachloroethylene	2019/03/21		97	%	70 - 130
				Toluene	2019/03/21		95	%	70 - 130
				1,1,1-Trichloroethane	2019/03/21		99	%	70 - 130
				1,1,2-Trichloroethane	2019/03/21		99	%	70 - 130
				Trichloroethylene	2019/03/21		99	%	70 - 130
				Trichlorofluoromethane (FREON 11)	2019/03/21		98	%	70 - 130
				Vinyl Chloride	2019/03/21		100	%	70 - 130
				p+m-Xylene	2019/03/21		97	%	70 - 130
				o-Xylene	2019/03/21		98	%	70 - 130
6022361	H_W	LCS		1,4-Difluorobenzene	2019/03/18		100	%	70 - 130
				4-Bromofluorobenzene	2019/03/18		102	%	70 - 130
				D10-Ethylbenzene	2019/03/18		101	%	70 - 130
				D4-1,2-Dichloroethane	2019/03/18		102	%	70 - 130
				F1 (C6-C10)	2019/03/18		92	%	70 - 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.

70755

ANALYSIS REQUESTED

DATA QUALITY REVIEW CHECKLIST - IMPERIAL OIL PROJECTS

Consultant: EXP Energy Services Ltd.

Sampling Date: March 13, 2019

Location: 1490 Richmond Road, Ottawa, ON

Laboratory : Maxxam Analytics

Consultant Project Number: 01093

Sample Submission Number: B968395

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

	Yes	No	NA	Comments
Instrument Surrogate Recovery	X			All laboratory QC met acceptance criteria
Extraction Surrogate Recovery			X	
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 alert limits
Trip Blank Concentration	X			
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 48 hours (Yes/No)?:

Not Required

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)?: Yes

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

Data Reviewed by: Alicia Sales de Andrade
(Print)

Data Reviewed by: 
(Signature)

Date: May 1, 2019

Attention: Sana Khan

EXP Energy Services Ltd.
220 Commerce Valley Dr. W
Suite 110
Markham, ON
CANADA L3T 0A8

Task Order#: 4410S37879

Line Item: 10

Site#: JF.00446

Site Location: N/A;1508 RICHMOND ROAD, OTTAWA, ON

Project #: 01093

Your C.O.C. #: 707155-01-01

Report Date: 2019/05/01

Report #: RS692665

Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B968420

Received: 2019/03/15, 15:53

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Laboratory Method	Primary Reference
1,3-Dichloropropene Sum	1		EPA 8260C m
Petroleum Hydro. CCME F1 & BTEX in Water	1	CAM SOP-0031S	CCME PHC-CWS m
Volatile Organic Compounds in Water	1	CAM SOP-00228	EPA 8260C m

Remarks:

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

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam 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.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam 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 Maxxam, unless otherwise agreed in writing. Maxxam 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 Maxxam, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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.

Maxxam Job #: B968420
Report Date: 2019/05/01

EXP Energy Services Ltd.
Task Order#: 4410537879, Line Item: 10
Site#: JF.00446
Site Location: N/A;1508 RICHMOND ROAD, OTTAWA, ON
Project #: 01093

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		JFC938	JFC938		
Sampling Date		2019/03/13 10:00	2019/03/13 10:00		
COC Number		707155-01-01	707155-01-01		
	UNITS	MW38	MW38 Lab-Dup	RDL	QC Batch
F1 (C6-C10)	ug/L	290	280	25	6022361
F1 (C6-C10) - BTEX	ug/L	120	110	25	6022361
Instrument Surrogate Recovery (%)					
1,4-Difluorobenzene	%	98	99		6022361
4-Bromofluorobenzene	%	103	104		6022361
D10-Ethylbenzene	%	105	105		6022361
D4-1,2-Dichloroethane	%	101	103		6022361
RDL = Reportable Detection Limit QC Batch = Quality Control Batch Lab-Dup = Laboratory Initiated Duplicate					

Maxxam Job #: B968420
Report Date: 2019/05/01

EXP Energy Services Ltd.
Task Order#: 4410537879, Line Item: 10
Site#: JF.00446
Site Location: N/A;1508 RICHMOND ROAD, OTTAWA, ON
Project #: 01093

O.REG 153 VOCs BY HS (WATER)

Maxxam ID		JFC938			JFC938		
Sampling Date		2019/03/13 10:00			2019/03/13 10:00		
COC Number		707155-01-01			707155-01-01		
	UNITS	MW38	RDL	QC Batch	MW38 Lab-Dup	RDL	QC Batch
Toluene	ug/L	31	0.20	6020542	30	0.20	6020542
1,1,1-Trichloroethane	ug/L	<0.20	0.20	6020542	<0.20	0.20	6020542
1,1,2-Trichloroethane	ug/L	<0.50	0.50	6020542	<0.50	0.50	6020542
Trichloroethylene	ug/L	<0.20	0.20	6020542	<0.20	0.20	6020542
Trichlorofluoromethane (FREON 11)	ug/L	<0.50	0.50	6020542	<0.50	0.50	6020542
Vinyl Chloride	ug/L	<0.20	0.20	6020542	<0.20	0.20	6020542
p+m-Xylene	ug/L	18	0.20	6020542	17	0.20	6020542
o-Xylene	ug/L	6.2	0.20	6020542	6.1	0.20	6020542
Total Xylenes	ug/L	24	0.20	6020542	23	0.20	6020542
Instrument							
Surrogate Recovery (%)							
4-Bromofluorobenzene	%	99		6020542	98		6020542
D4-1,2-Dichloroethane	%	104		6020542	103		6020542
D8-Toluene	%	89		6020542	90		6020542
RDL = Reportable Detection Limit QC Batch = Quality Control Batch Lab-Dup = Laboratory Initiated Duplicate							

Maxxam Job #: B968420
Report Date: 2019/05/01

EXP Energy Services Ltd.
Task Order#: 4410537879, Line Item: 10
Site#: JF.00446
Site Location: N/A;1508 RICHMOND ROAD, OTTAWA, ON
Project #: 01093

GENERAL COMMENTS

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

Package 1	1.7°C
-----------	-------

Revised Report (2019/05/01): Total 1, 3-dichloropropene results has been included in this CofA.

Sample JFC938 [MW38] : F1/BTEX analysis :- The BTEX results used for the F1-BTEX calculation were obtained from Headspace-GC analysis

Results relate only to the items tested.

Maxxam Job #: B968420
Report Date: 2019/05/01

EXP Energy Services Ltd.
Task Order#: 4410537879, Line Item: 10
Site#: JF.00446
Site Location: N/A;1508 RICHMOND ROAD, OTTAWA, ON
Project #: 01093

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
				Bromodichloromethane	2019/03/21	NC		%	30
				Bromoform	2019/03/21	NC		%	30
				Bromomethane	2019/03/21	NC		%	30
				Carbon Tetrachloride	2019/03/21	NC		%	30
				Chlorobenzene	2019/03/21	13		%	30
				Chloroform	2019/03/21	NC		%	30
				Dibromochloromethane	2019/03/21	NC		%	30
				1,2-Dichlorobenzene	2019/03/21	11		%	30
				1,3-Dichlorobenzene	2019/03/21	NC		%	30
				1,4-Dichlorobenzene	2019/03/21	NC		%	30
				Dichlorodifluoromethane (FREON 12)	2019/03/21	NC		%	30
				1,1-Dichloroethane	2019/03/21	NC		%	30
				1,2-Dichloroethane	2019/03/21	NC		%	30
				1,1-Dichloroethylene	2019/03/21	NC		%	30
				cis-1,2-Dichloroethylene	2019/03/21	NC		%	30
				trans-1,2-Dichloroethylene	2019/03/21	NC		%	30
				1,2-Dichloropropane	2019/03/21	NC		%	30
				cis-1,3-Dichloropropene	2019/03/21	NC		%	30
				trans-1,3-Dichloropropene	2019/03/21	NC		%	30
				Ethylbenzene	2019/03/21	3.4		%	30
				Ethylene Dibromide	2019/03/21	NC		%	30
				Hexane	2019/03/21	NC		%	30
				Methylene Chloride(Dichloromethane)	2019/03/21	NC		%	30
				Methyl Ethyl Ketone (2-Butanone)	2019/03/21	NC		%	30
				Methyl Isobutyl Ketone	2019/03/21	NC		%	30
				Methyl t-butyl ether (MTBE)	2019/03/21	12		%	30
				Styrene	2019/03/21	NC		%	30
				1,1,1,2-Tetrachloroethane	2019/03/21	NC		%	30
				1,1,2,2-Tetrachloroethane	2019/03/21	NC		%	30
				Tetrachloroethylene	2019/03/21	NC		%	30
				Toluene	2019/03/21	3.0		%	30
				1,1,1-Trichloroethane	2019/03/21	NC		%	30
				1,1,2-Trichloroethane	2019/03/21	NC		%	30
				Trichloroethylene	2019/03/21	NC		%	30
				Trichlorofluoromethane (FREON 11)	2019/03/21	NC		%	30
				Vinyl Chloride	2019/03/21	NC		%	30
				p+m-Xylene	2019/03/21	3.6		%	30
				o-Xylene	2019/03/21	2.1		%	30
				Total Xylenes	2019/03/21	3.2		%	30
6022361	H_W	RPD	[JFC938-02]	F1 (C6-C10)	2019/03/18	1.1		%	30
				F1 (C6-C10) - BTX	2019/03/18	4.0		%	30
6020542	BG1	Matrix Spike	[JFC938-01]	4-Bromofluorobenzene	2019/03/21		105	%	70 - 130
				D4-1,2-Dichloroethane	2019/03/21		103	%	70 - 130
				D8-Toluene	2019/03/21		100	%	70 - 130
				Acetone (2-Propanone)	2019/03/21		110	%	60 - 140
				Benzene	2019/03/21		92	%	70 - 130
				Bromodichloromethane	2019/03/21		96	%	70 - 130
				Bromoform	2019/03/21		104	%	70 - 130
				Bromomethane	2019/03/21		97	%	60 - 140
				Carbon Tetrachloride	2019/03/21		92	%	70 - 130
				Chlorobenzene	2019/03/21		97	%	70 - 130
				Chloroform	2019/03/21		95	%	70 - 130

Maxxam Job #: B968420
Report Date: 2019/05/01

EXP Energy Services Ltd.
Task Order#: 4410537879, Line Item: 10
Site#: JF.00446
Site Location: N/A;1508 RICHMOND ROAD, OTTAWA, ON
Project #: 01093

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6022361	H_W	LCS	Dichlorodifluoromethane (FREON 12)	2019/03/21		94	%	60 - 140
			1,1-Dichloroethane	2019/03/21		100	%	70 - 130
			1,2-Dichloroethane	2019/03/21		101	%	70 - 130
			1,1-Dichloroethylene	2019/03/21		96	%	70 - 130
			cis-1,2-Dichloroethylene	2019/03/21		97	%	70 - 130
			trans-1,2-Dichloroethylene	2019/03/21		97	%	70 - 130
			1,2-Dichloropropane	2019/03/21		99	%	70 - 130
			cis-1,3-Dichloropropene	2019/03/21		92	%	70 - 130
			trans-1,3-Dichloropropene	2019/03/21		92	%	70 - 130
			Ethylbenzene	2019/03/21		93	%	70 - 130
			Ethylene Dibromide	2019/03/21		98	%	70 - 130
			Hexane	2019/03/21		103	%	70 - 130
			Methylene Chloride(Dichloromethane)	2019/03/21		107	%	70 - 130
			Methyl Ethyl Ketone (2-Butanone)	2019/03/21		106	%	60 - 140
			Methyl Isobutyl Ketone	2019/03/21		118	%	70 - 130
			Methyl t-butyl ether (MTBE)	2019/03/21		92	%	70 - 130
			Styrene	2019/03/21		109	%	70 - 130
			1,1,1,2-Tetrachloroethane	2019/03/21		101	%	70 - 130
			1,1,2,2-Tetrachloroethane	2019/03/21		106	%	70 - 130
			Tetrachloroethylene	2019/03/21		97	%	70 - 130
			Toluene	2019/03/21		95	%	70 - 130
			1,1,1-Trichloroethane	2019/03/21		99	%	70 - 130
			1,1,2-Trichloroethane	2019/03/21		99	%	70 - 130
			Trichloroethylene	2019/03/21		99	%	70 - 130
			Trichlorofluoromethane (FREON 11)	2019/03/21		98	%	70 - 130
			Vinyl Chloride	2019/03/21		100	%	70 - 130
			p+m-Xylene	2019/03/21		97	%	70 - 130
			o-Xylene	2019/03/21		98	%	70 - 130
			1,4-Difluorobenzene	2019/03/18		100	%	70 - 130
			4-Bromofluorobenzene	2019/03/18		102	%	70 - 130
			D10-Ethylbenzene	2019/03/18		101	%	70 - 130
			D4-1,2-Dichloroethane	2019/03/18		102	%	70 - 130
			F1 (C6-C10)	2019/03/18		92	%	70 - 130

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

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.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

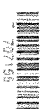
Maxxam

6740 Campbell Road
Mississauga, Ontario L5N 2L8
www.maxxam.ca

Phone: (905) 817-5700
Fax: (905) 817 5777
Toll Free: 800-563-6266

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

Page 1 of 1
C of C # 707155.0-01



INVOICE INFORMATION

Company Name: Imperial Oil Limited and McCall Frontenac Petroe

Contact Name:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

REPORT INFORMATION

Company Name: EXP Energy Services Ltd

Contact Name:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

Address:

DATA QUALITY REVIEW CHECKLIST - IMPERIAL OIL PROJECTS

Consultant: EXP Energy Services Ltd.

Sampling Date: March 13, 2019

Location: 1490 Richmond Road, Ottawa, ON

Laboratory : Maxxam Analytics

Consultant Project Number: 01093

Sample Submission Number: B968420

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

	Yes	No	NA	Comments
Instrument Surrogate Recovery	X			All laboratory QC met acceptance criteria
Extraction Surrogate Recovery			X	
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	No field QC samples were submitted
Trip Blank Concentration			X	
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 48 hours (Yes/No)?:

Not Required

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)?:

Yes

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

Data Reviewed by: Alicia Sales de Andrade
(Print)

Data Reviewed by: 
(Signature)

Date: April 24, 2019

Appendix C – Quality Management, Control and Assurance

QUALITY MANAGEMENT, CONTROL AND ASSURANCE

Project Quality Management

The field work documented in this report and the preparation of this report were overseen by a Qualified Person, as defined in Ontario Regulation 153/04, as amended (Regulation 153/04).

Sampling analysis was performed using generally accepted principles and with appropriate sampling equipment. Written field and laboratory sampling procedures for ground water developed by EXP Energy Services Ltd. (EXP) were used to ensure consistency in sample collection and preparation of samples for submission to the laboratory.

The staff involved in the field sampling have participated in regular, ongoing training programs and were qualified and experienced in collecting, describing, and preparing environmental samples for laboratory analysis.

Laboratory analysis was performed using generally accepted principles in accordance with the *Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act*, March 9, 2004 amended as of July 1, 2011 (Protocol).

Data quality objectives for the parameters of concern were set to meet acceptable RDLs to achieve the goal of defining areas where such parameters are present at levels in excess of applicable generic standards, as defined in Regulation 153/04. Sampling programs included providing written instruction to the analytical laboratory describing the required analyses on the Chain of Custody prepared and delivered with the samples.

The laboratory has a standing contract with Imperial which sets out specific data quality requirements.

Field Quality Assurance/ Quality Control

The ground water sampling plan was prepared and executed based on previous assessment work including the findings of the previous environmental assessments conducted for the site, and on professional judgment at the time of the investigation.

Field observations were made and documented in a field book in accordance with generally accepted practices and with the procedures developed and utilized by EXP.

EXP field sampling Quality Assurance and Quality Control (QA/QC) protocols are tailored to the investigation and include:

- The collection of at least one field duplicate sample for every ten samples or less (where three or more such samples are collected)
- For ground water samples, the collection of samples directly into vials with Teflon-lined lids or bottles containing an appropriate preservative, where required
- For ground water samples analysed for dissolved metals, including mercury and hexavalent chromium, filtration of the sample in the field using a 45 micron disposable filter prior to collection in a bottle containing preservative
- For ground water samples analysed for benzo(a)pyrene, where deemed necessary by the Qualified Person overseeing this work, the collection of an additional bottle for laboratory filtration prior to analysis
- The immediate placement, upon collection, of ground water samples into a cooler with free ice to lower the temperature to less than 10° C
- For ground water sampling, the use of dedicated sampling equipment at different monitors (including the use of dedicated tubing when low flow ground water sampling techniques are used)
- Ensuring that neither the bare hand nor latex glove comes into contact with the ground water as it is being placed into the sample container
- The inclusion of one ground water field blank and trip blank per submission for all parameters in ground water except pH and electrical conductivity. The field blanks are prepared in the field during the sample collection process using laboratory-supplied water and returned to the laboratory for analysis as part of the submission. The trip blanks are prepared by the laboratory, kept in the cooler on ice for the duration of the sampling event and returned to the laboratory unopened for analysis as part of the submission
- All samples were shipped to the laboratory in custody sealed coolers, filled with ice at less than 10° C
- All sample shipments are accompanied by standard chain of custody forms

The results of the field duplicate sample are presented along with the tabulated data in this appendix. Tabulated data are presented to a maximum of two significant digits.

Laboratory Quality Assurance/Quality Control

All laboratory analyses were completed by the Mississauga facility of Maxxam Analytics (Maxxam). This Maxxam laboratory has been accredited by the Standards Council of Canada (SCC) for all of the parameters that were analysed in accordance with the latest version of the International Standard ISO/IEC 17025 – “*General Requirement for the Competence of Testing and Calibration Laboratories*”. Maxxam performed the work

following formal written methods and procedures. These methods include all the minimum requirements as specified in the Protocol.

EXP has accepted the data provided by Maxxam based on the assurance from Maxxam that, as a minimum, the following requirements have been met and documentation to demonstrate compliance can be produced on request:

- The method performance criteria identified in the Protocol were met
- Sample storage requirements, pre-analysis processing techniques, and holding times for all sample types as identified in the Protocol were met following receipt and sign-off of the samples from EXP staff
- The results of all laboratory QC samples were within statistically determined control limits and if not, reasons were provided
- Surrogate recoveries for organic analyses were monitored and recorded
- Details on the precision and accuracy of the data have been recorded and retained and are available from the laboratory should they be required as a result of a Ministry of the Environment, Conservation and Parks (MECP) audit
- The analytical data were reported without blank correction (unless the correction was clearly identified on the Certificate of Analysis)
- All laboratory QA/QC sample data, including method blanks, matrix spikes, matrix duplicates, laboratory control samples, and surrogate recoveries, were included in the Certificate of Analysis

All Certificates of Analysis were reviewed by the Qualified Person to ensure that data quality objectives have been met and that any anomalies have been identified. A data quality review checklist has been prepared by an EXP staff member under the supervision of the Qualified Person for each laboratory submission. The checklist is appended with each Certificate of Analysis. All Certificates of Analysis meet the requirements under Section 47(3) of Regulation 153/04.

Quality Assurance/Quality Control Program

The laboratory QA/QC program consisted of one or more of the following analysis: a) instrument and extraction surrogate recoveries for soil and/or ground water samples that were analysed and b) the analysis of a method blank, laboratory duplicate, matrix spike and/or laboratory control samples for the analytical batches that were analysed. The laboratory QA/QC results are included in the certificates of analysis. As indicated, no laboratory QA/QC issues were identified that would have a material effect on the interpretation of results presented in this report.

The ground water field QA/QC program consisted of the following submission for laboratory analysis: one field blank and one trip blank for VOC and PHC fractions F1

The ground water field blank and trip blank data were compared to the alert limits and are provided in Table C-1. All of the results were within the alert limits.

No field or laboratory QA/QC issues were identified that would affect the overall conclusions presented in this report. Overall, the results reported are considered to be reliable.

GROUND WATER CHEMICAL ANALYSIS - Petroleum Related Parameters and Volatile Organic Compounds

Field Blank and Trip Blank
1490 Richmond Road, Ottawa, Ontario

Sample Sample Date Maxxam I.D. Maxxam Job #	F.BLANK 13-Mar-19 JFC866 B968395	TRIP BLANK 13-Mar-19 JFC867 B968395				Alert Limit
PARAMETERS						
<u>Volatile Organic Compounds</u>						
Acetone	<10	<10				1X RDL
Benzene	<0.20	<0.20				1X RDL
Bromodichloromethane	<0.50	<0.50				1X RDL
Bromoform	<1.0	<1.0				1X RDL
Bromomethane	<0.50	<0.50				1X RDL
Carbon Tetrachloride	<0.20	<0.20				1X RDL
Chlorobenzene	<0.20	<0.20				1X RDL
Chloroform	<0.20	<0.20				1X RDL
Dibromochloromethane	<0.50	<0.50				1X RDL
Dichlorobenzene, - 1,2	<0.50	<0.50				1X RDL
Dichlorobenzene, - 1,3	<0.50	<0.50				1X RDL
Dichlorobenzene, - 1,4	<0.50	<0.50				1X RDL
Dichlorodifluoromethane (FREON 12)	<1.0	<1.0				1X RDL
Dichloroethane, - 1,1	<0.20	<0.20				1X RDL
Dichloroethane, - 1,2	<0.50	<0.50				1X RDL
Dichloroethylene, - 1,1	<0.20	<0.20				1X RDL
Dichloroethylene, <i>cis</i> - 1,2	<0.50	<0.50				1X RDL
Dichloroethylene, <i>trans</i> - 1,2	<0.50	<0.50				1X RDL
Dichloropropane, - 1,2	<0.20	<0.20				1X RDL
Dichloropropene, - 1,3 (total*)	<0.50	<0.50				1X RDL
Ethylbenzene	<0.20	<0.20				1X RDL
Ethylene Dibromide	<0.20	<0.20				1X RDL
Hexane	<1.0	<1.0				1X RDL
Methylene Chloride	<2.0	<2.0				1X RDL
Methyl Isobutyl Ketone	<5.0	<5.0				1X RDL
Methyl Ethyl Ketone	<10	<10				1X RDL
Methyl t-Butyl Ether	<0.50	<0.50				1X RDL
Styrene	<0.50	<0.50				1X RDL
Tetrachloroethane, - 1,1,1,2	<0.50	<0.50				1X RDL
Tetrachloroethane, - 1,1,2,2	<0.50	<0.50				1X RDL
Tetrachloroethylene	<0.20	<0.20				1X RDL
Toluene	<0.20	<0.20				1X RDL
Trichloroethane, - 1,1,1	<0.20	<0.20				1X RDL
Trichloroethane, - 1,1,2	<0.50	<0.50				1X RDL
Trichloroethylene	<0.20	<0.20				1X RDL
Vinyl Chloride	<0.20	<0.20				1X RDL
Xylenes	<0.20	<0.20				1X RDL
Trichlorofluoromethane (FREON 11)	<0.50	<0.50				1X RDL
<u>Petroleum Hydrocarbons</u>						
F1 (C6 to C10 - BTX)	<25	<25				2X RDL
F2 (C10 to C16)	na	na				2X RDL
F3 (C16 to C34)	na	na				2X RDL
F4 (C34 to C50)	na	na				2X RDL

Analysis by Maxxam Analytics

All results in ppb (ug/L) unless otherwise indicated; <RDL means not detected at reporting detection limit (RDL); na means "not analysed"

RDL are shown for non-detected results; for RDL of reportable results, see the respective laboratory certificate of analysis (refer to Maxxam Job #)

* Sum of *cis*-1,3 and *trans*-1,3 dichloropropene concentrations

Exceedances of alert limits are shown in **bold**

Appendix C – Residue Management

RESIDUE MANAGEMENT - SUBJECT WASTE GENERATION SUMMARY

1490 and 1508 Richmond Road, Ottawa, Ontario

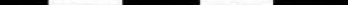
Matrix	Waste Type	MECP Waste Class	Quantity	Date Generated	Waste Manifest Number	Receiver
Water	Water containing light fuels	221L – Light Fuels	120 Litres	December 8, 2017	SK44997-2	Veolia ES Canada Industrial Services Inc. 4140 Belgreen Drive, Ottawa, Ontario MECP Registration No. A710141
Water	Water containing light fuels	221L – Light Fuels	40 Litres	March 14, 2019	ES34607-2	Veolia ES Canada Industrial Services Inc. 4140 Belgreen Drive, Ottawa, Ontario MECP Registration No. A710141

Appendix D – Survey

PART 1 Plan of
PART OF LOT 21
Concession 1 (Ottawa Front)
Geographic Township of Nepean
CITY OF OTTAWA

Scale 1 : 250

10 7.5 5.0 2.5 0 5 10 Metres



DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND
CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

I CERTIFY THAT:

1. This survey and plan are correct and in accordance with the Surveys Act, the Surveyors Act, the Land Titles Act and the regulations made under them.
2. The survey was completed on the 26th day of March, 2019.

Notes & Legend

□	Denotes	Survey Monument Planted
■	"	Survey Monument Found
SIB	"	Standard Iron Bar
SSIB	"	Short Standard Iron Bar
IB	"	Iron Bar
CC	"	Cut Cross
(WIT)	"	Witness
(AOG)	"	Annis, O'Sullivan, Vollebekk Ltd.
Meas.	"	Measured
(P1)	"	Plan 4R-20752
(P2)	"	Plan by (AOG) dated June 10, 2013
BF	"	Board Fence
○ UP	"	Utility Pole
○ AN	"	Anchor
○ LS	"	Light Standard

1. REGISTERED RIGHTS-OF-WAY/EASEMENTS
Instrument OC714379 describes a right - of - access over the lands included within PIN 03962-0373 in favour of the Part 1 Plan 4R-20782 lands until such time as a risk assessment / record of site condition is completed for the Part 1 Plan 4R-20782 lands. (Description added May 29, 2019)

2. PROPERTY IMPROVEMENTS
The stucco finish of 1490 Richmond Road aligns with the southeasterly property line at the most easterly property corner but extends up 0.03 metres beyond the property line into Part 2 Plan 4R-5836 at the most southerly property corner; and an overhead sign extends up to 0.12 metres beyond this property line.

3. COMPLIANCE WITH MUNICIPAL ZONING BYLAWS
Compliance is not certified by this report.

4. ADDITIONAL REMARKS
The subject property comprises all of PIN 039262-0388 and part of PIN 03962-0373. The area of the subject property is 2580.9 square metres.



THIS PLAN IS NOT VALID UNLESS
IT IS AN EMBOSSED ORIGINAL
COPY ISSUED BY THE SURVEYOR

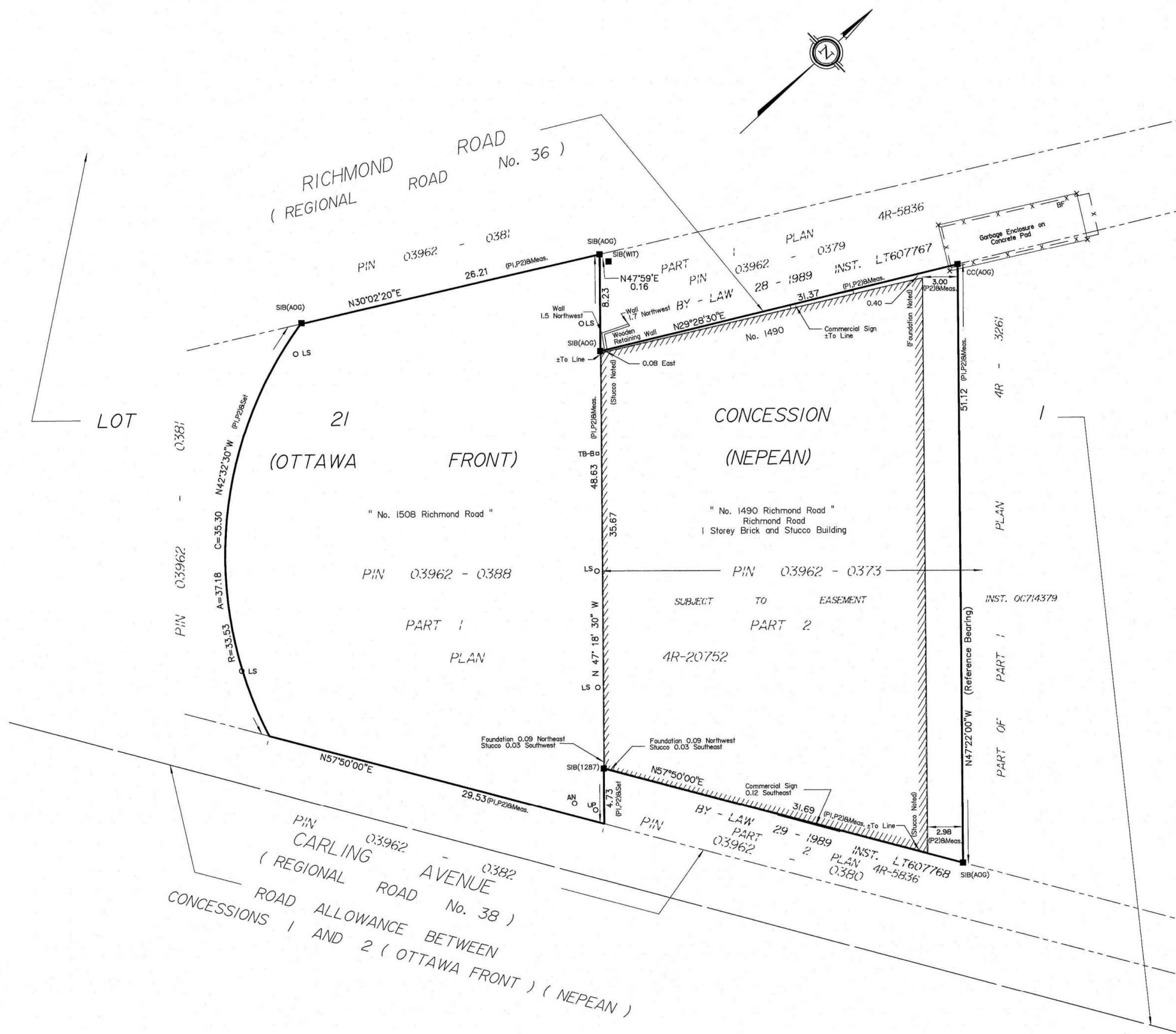
In accordance with
Regulation 1026, Section 29 (3)

© Annis, O'Sullivan, Vollebakk Ltd. 2019. "THIS PLAN IS PROTECTED BY COPYRIGHT"

ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
14 Concourse Gate, Suite 500
Nepean, Ont. K2E 7S6
Phone: (613) 727-0850 / Fax: (613) 727-1079
Email: Nepean@aovltd.com

**Ontario
Land Surveyors**

Job No. 17701-19 EXP PHL21 CI OF NP O F



Appendix E – Maximum Concentration Tables

TABLE E-1: MAXIMUM CONCENTRATION IN SOIL
1490 Richmond Road, Ottawa, ON

Contaminant Identifier	Contaminant Name	Maximum Measured Concentration	Units	MECP Table 3 SCS Industrial/Commercial/Community Use and Coarse Textured Soil	Retained as a contaminat for Risk Assessment (Y/N)	Property Specific Standard
VOCs						
67641	Acetone	<0.50	µg/g	16	N	-
71432	Benzene	2.1	µg/g	0.32	Y	11
75274	Bromodichloromethane	<0.050	µg/g	18	N	-
75252	Bromoform	<0.050	µg/g	0.61	Y	550
74839	Bromomethane	<0.050	µg/g	0.05	N	-
56235	Carbon Tetrachloride	<0.050	µg/g	0.21	Y	55
108907	Chlorobenzene	<0.050	µg/g	2.4	N	-
67663	Chloroform	<0.050	µg/g	0.47	Y	330
124481	Dibromochloromethane	<0.050	µg/g	13	N	-
95501	1,2-Dichlorobenzene	0.31	µg/g	6.8	N	-
541731	1,3-Dichlorobenzene	<0.050	µg/g	9.6	N	-
106467	1,4-Dichlorobenzene	0.061	µg/g	0.2	Y	0.48
75718	Dichlorodifluoromethane	<0.050	µg/g	16	N	
75343	1,1-Dichloroethane	<0.050	µg/g	17	N	
107062	1,2-Dichloroethane	<0.050	µg/g	0.05	Y	0.13
75354	1,1-Dichloroethylene	<0.050	µg/g	0.064	N	-
156592	cis-1,2-Dichloroethylene	<0.050	µg/g	55	Y	55
156605	trans-1,2-Dichloroethylene	<0.050	µg/g	1.3	Y	55
78875	1,2-Dichloropropane	<0.050	µg/g	0.16	N	-
542756	1,3-Dichloropropene	<0.050	µg/g	0.18	N	-
100414	Ethylbenzene	4.7	µg/g	9.5	Y	187
106934	Ethylene Dibromide	<0.050	µg/g	0.05	Y	1.1
110543	n-Hexane	2.6	µg/g	46	Y	96.8
75092	Methylene Chloride	<0.050	µg/g	1.6	Y	1100
108101	Methyl Isobutyl Ketone	<0.50	µg/g	31	N	-
78933	Methyl Ethyl Ketone (2-Butanone)	<0.50	µg/g	70	N	-
1634044	Methyl t-Butyl Ether (MTBE)	0.12	µg/g	11	Y	1100
100425	Styrene	<0.050	µg/g	34	N	-
630206	1,1,1,2-Tetrachloroethane	<0.050	µg/g	0.087	Y	5.5
79345	1,1,2,2-Tetrachloroethane	<0.050	µg/g	0.05	Y	0.077
127184	Tetrachloroethylene	<0.050	µg/g	4.5	Y	5.5
108883	Toluene	<0.5	µg/g	68	Y	352
71556	1,1,1,-Trichloroethane	<0.050	µg/g	6.1	N	-
79005	1,1,2-Trichloroethane	<0.050	µg/g	0.05	Y	0.11
79016	Trichloroethylene	<0.050	µg/g	0.91	Y	55
75014	Vinyl Chloride	<0.020	µg/g	0.032	N	-
1330207	Total Xylenes	22	µg/g	26	Y	1045
79694	Trichlorofluoromethane	<0.050	µg/g	4	N	-
PHCs						
PHC	PHC F1	1600	µg/g	55	Y	3630
PHC	PHC F2	1600	µg/g	230	Y	1760
PHC	PHC F3	3700	µg/g	1700	Y	11000
PHC	PHC F4	630	µg/g	3300	Y	8030
PAHs						
83329	Acenaphthene	<0.020	µg/g	96	N	-
208968	Acenaphthylene	0.0093	µg/g	0.15	N	-
120127	Anthracene	0.019	µg/g	0.67	N	-
71432	Benzo(a)anthracene	0.019	µg/g	0.96	N	-
56553	Benzo(a)pyrene	0.012	µg/g	0.3	N	-
205992	Benzo(b/j)fluoranthene	0.015	µg/g	0.96	N	-
191242	Benzo(g,h,i)perylene	0.011	µg/g	9.6	N	-
207089	Benzo(k)fluoranthene	<0.0050	µg/g	0.96	N	-
18540299	Chrysene	0.014	µg/g	9.6	N	-
53703	Dibenzo(a,h)anthracene	<0.0050	µg/g	0.1	N	-
206440	Fluoranthene	0.049	µg/g	9.6	N	-
86737	Fluorene	0.036	µg/g	62	N	-
193395	Indeno(1,2,3-cd)pyrene	0.0056	µg/g	0.76	N	-
91576	1-Methylnaphthalene	0.37	µg/g	76	N	-
91576	2-Methylnaphthalene	0.34	µg/g	76	N	-
91576	2- and 1-Methylnaphthalene	0.59	µg/g	76	N	-
91203	Naphthalene	0.27	µg/g	9.6	N	-
85018	Phenanthrene	0.098	µg/g	12	N	-
129000	Pyrene	0.066	µg/g	96	N	-
Metals, Hydride Forming (As, Sn, Sb)						
7440360	Antimony (Sb)	<0.20	µg/g	40	N	-
7440382	Arsenic (As)	1.7	µg/g	18	N	-
7440393	Barium (Ba)	130	µg/g	670	N	-
7440417	Beryllium (Be)	0.29	µg/g	8	N	-
7440428	Boron (B)	<5.0	µg/g	120	N	-
7440439	Cadmium (Cd)	<0.10	µg/g	1.9	N	-
16065831	Chromium (Cr)	21	µg/g	160	N	-
7440484	Cobalt (Co)	6.8	µg/g	80	N	-
7440508	Copper (Cu)	16	µg/g	230	N	-
7439921	Lead (Pb)	12	µg/g	120	Y	561
7439987	Molybdenum (Mo)	0.57	µg/g	40	N	-
7440020	Nickel (Ni)	14	µg/g	270	N	-
7782492	Selenium (Se)	<0.50	µg/g	5.5	N	-
7440224	Silver (Ag)	<0.20	µg/g	5.5	N	-
7440280	Thallium	0.14	µg/g	3.3	N	-
7440611	Uranium	0.46	µg/g	33	N	-
7440622	Vanadium (V)	30	µg/g	86	N	-
7440666	Zinc (Zn)	41	µg/g	340	N	-

Parameters included in risk assessment

TABLE E-2: MAXIMUM CONCENTRATION IN GROUNDWATER

1490 Richmond Road, Ottawa, ON

Contaminant Identifier	Contaminant Name	Maximum Measured Concentration	Units	MECP Table 3 SCS Industrial/Commercial/Community Use and Coarse Textured Soil	Retained as a contaminat for Risk Assessment (Y/N)	Property Specific Standard
VOCs						
67641	Acetone	<5000	µg/L	13000	N	-
71432	Benzene	3200	µg/L	44	Y	9460
75274	Bromodichloromethane	<50	µg/L	85000	N	-
75252	Bromoform	<100	µg/L	380	Y	550
74839	Bromomethane	<5	µg/L	5.6	N	-
56235	Carbon Tetrachloride	<50	µg/L	0.79	Y	55
108907	Chlorobenzene	<50	µg/L	630	N	-
67663	Chloroform	<50	µg/L	2.4	Y	330
124481	Dibromochloromethane	<100	µg/L	82000	N	-
95501	1,2-Dichlorobenzene	<100	µg/L	4600	N	-
541731	1,3-Dichlorobenzene	<100	µg/L	9600	N	-
106467	1,4-Dichlorobenzene	<100	µg/L	8	Y	550
75718	Dichlorodifluoromethane	<50	µg/L	4400	N	-
75343	1,1-Dichloroethane	<50	µg/L	320	N	-
107062	1,2-Dichloroethane	<100	µg/L	1.6	Y	500
75354	1,1-Dichloroethylene	<0.50	µg/L	1.6	N	-
156592	cis-1,2-Dichloroethylene	<50	µg/L	1.6	Y	55
156605	trans-1,2-Dichloroethylene	<50	µg/L	1.6	Y	55
78875	1,2-Dichloropropane	<10	µg/L	16	N	-
542756	1,3-Dichloropropene	<3	µg/L	5.2	N	-
542756	cis-1,3-Dichloropropene	<3	µg/L	5.2	N	-
542756	trans-1,3-Dichloropropene	<3	µg/L	5.2	N	-
100414	Ethylbenzene	1900	µg/L	2300	Y	5390
106934	Ethylene Dibromide	<1	µg/L	0.25	Y	1.1
110543	n-Hexane	140	µg/L	51	Y	275
75092	Methylene Chloride	<300	µg/L	610	Y	1100
108101	Methyl Isobutyl Ketone	<3000	µg/L	140000	N	-
78933	Methyl Ethyl Ketone (2-Butanone)	<3000	µg/L	470000	N	-
1634044	Methyl t-Butyl Ether (MTBE)	<100	µg/L	190	Y	1100
100425	Styrene	<50	µg/L	1300	N	-
630206	1,1,1,2-Tetrachloroethane	<5	µg/L	3.3	Y	5.5
79345	1,1,2,2-Tetrachloroethane	<20	µg/L	3.2	Y	22
127184	Tetrachloroethylene	<5	µg/L	1.6	Y	5.5
108883	Toluene	250	µg/L	18000	Y	29700
71556	1,1,1,-Trichloroethane	<50	µg/L	640	N	-
79005	1,1,2-Trichloroethane	<100	µg/L	4.7	Y	110
79016	Trichloroethylene	<50	µg/L	1.6	Y	55
75014	Vinyl Chloride	<0.5	µg/L	0.5	N	-
1330207	Total Xylenes	6300	µg/L	4200	Y	29700
79694	Trichlorofluoromethane	<25	µg/L	2500	N	-
PHCs						
PHC	PHC F1	6000	µg/L	750	Y	34100
PHC	PHC F2	2300	µg/L	150	Y	2640
PHC	PHC F3	33000	µg/L	500	Y	36300
PHC	PHC F4	2800	µg/L	500	Y	3080
PAHs						
83329	Acenaphthene	0.13	µg/L	600	N	-
208968	Acenaphthylene	0.094	µg/L	1.8	N	-
120127	Anthracene	<0.05	µg/L	2.4	N	-
71432	Benzo(a)anthracene	<0.05	µg/L	4.7	N	-
56553	Benzo(a)pyrene	<0.01	µg/L	0.81	N	-
205992	Benzo(b/j)fluoranthene	<0.05	µg/L	0.75	N	-
191242	Benzo(g,h,i)perylene	<0.05	µg/L	0.2	N	-
207089	Benzo(k)fluoranthene	<0.05	µg/L	0.4	N	-
18540299	Chrysene	<0.05	µg/L	1	N	-
53703	Dibenzo(a,h)anthracene	<0.05	µg/L	0.52	N	-
206440	Fluoranthene	<0.05	µg/L	130	N	-
86737	Fluorene	0.12	µg/L	400	N	-
193395	Indeno(1,2,3-cd)pyrene	<0.050	µg/L	0.2	N	-
91576	1-Methylnaphthalene	11	µg/L	1800	N	-
91576	2-Methylnaphthalene	15	µg/L	1800	N	-
91576	2- and 1-Methylnaphthalene	26	µg/L	1800	N	-
91203	Naphthalene	120	µg/L	1400	N	-
85018	Phenanthrene	0.052	µg/L	580	N	-
129000	Pyrene	<0.050	µg/L	68	N	-
Metals, Hydride Forming (As, Se, Sb)						
7440360	Antimony (Sb)	0.67	µg/L	20000	N	-
7440382	Arsenic (As)	12	µg/L	1900	N	-
7440393	Barium (Ba)	360	µg/L	29000	N	-
7440417	Beryllium (Be)	<0.50	µg/L	67	N	-
7440428	Boron (B)	240	µg/L	45000	N	-
7440439	Cadmium (Cd)	<0.10	µg/L	2.7	N	-
16065831	Chromium (Cr)	7.2	µg/L	810	N	-
7440484	Cobalt (Co)	0.79	µg/L	66	N	-
7440508	Copper (Cu)	<1.0	µg/L	87	N	-
7439921	Lead (Pb)	2.5	µg/L	25	N	-
7439987	Molybdenum (Mo)	0.99	µg/L	9200	N	-
7440020	Nickel (Ni)	2.3	µg/L	490	N	-
7782492	Selenium (Se)	<2.0	µg/L	63	N	-
7440224	Silver (Ag)	<0.10	µg/L	1.5	N	-
7440235	Sodium	110000	µg/L	2300000	N	-
7440280	Thallium	<0.050	µg/L	510	N	-
7440611	Uranium	0.64	µg/L	420	N	-
7440622	Vanadium (V)	1.5	µg/L	250	N	-
7440666	Zinc (Zn)	<5.0	µg/L	1100	N	-

Appendix – F

Conceptual Site Model

Table of Contents

Table of Contents	i
List of Figures	ii
1 Site Description and Background.....	1
1.1 Potentially Contaminating Activities (PCA).....	2
1.2 Subsurface Structures and Utilities	4
1.3 Stratigraphy	4
1.4 Applicable Site Condition Standards	6
1.5 Areas Where Soil Has Been Brought From Another Property	6
1.6 Locations of Building and Structures	7
1.7 Areas and Distribution of Contamination on the Phase II Property	7
1.8 Mechanism of Discharge of Contaminants.....	10
1.9 Migration of Contaminants.....	10
1.10 Climatic and Meteorological Conditions Affecting Migration	12
1.11 Soil Vapour Intrusion	12
1.12 Receptors and Pathways.....	13
2 References	13

List of Figures

Figure 1	Locality Plan
Figure 2	Site Plan
Figure 3	Phase I Conceptual Site Model
Figure 4-1	Ground Water Contour Plan - Overburden (September 19-20, 2007)
Figure 4-2	Ground Water Contour Plan - Overburden (November 12, 2012)
Figure 4-3	Ground Water Contour Plan - Overburden (May 22, 2013)
Figure 4-4	Ground Water Contour Plan - Overburden (November 20, 2017)
Figure 4-5	Ground Water Contour Plan - Bedrock (September 19-20, 2007)
Figure 4-6	Ground Water Contour Plan - Bedrock (November 12, 2012)
Figure 4-7	Ground Water Contour Plan - Bedrock (May 22, 2013)
Figure 4-8	Ground Water Contour Plan - Bedrock (November 20, 2017)
Figure 4-9	Ground Water Contour Plan – Bedrock deep (May 21, 2014)
Figure 4-10	Ground Water Contour Plan – Bedrock deep (November 20, 2017)
Figure 5	Soil Analytical Results – Petroleum Related Parameters
Figure 6	Soil Analytical Results – Volatile Organic Compounds
Figure 7	Soil Analytical Results – Lead
Figure 8	Ground Water Analytical Results – Petroleum Hydrocarbons
Figure 8 - 1	Ground Water Analytical Results – Petroleum Hydrocarbons – Post RA
Figure 9	Ground Water Analytical Results – Volatile Organic Compounds
Figure 9 - 1	Ground Water Analytical Results – Volatile Organic Compounds – Post RA
Figure 10	Ground Water Analytical Results – Lead

- Figure 11** Conceptual Site Model – Areas of Potential Environmental Concern
- Figure 12** Phase II Conceptual Site Model – Cross Section Plan
- Figure 13** Phase II Conceptual Site Model – Cross Section A-A' – Soil Analytical Results - Petroleum Hydrocarbons
- Figure 14** Phase II Conceptual Site Model – Cross Section B-B' – Soil Analytical Results - Petroleum Hydrocarbons
- Figure 15** Phase II Conceptual Site Model – Cross Section A-A' – Soil Analytical Results – Volatile Organic Compounds
- Figure 16** Phase II Conceptual Site Model – Cross Section B-B' – Soil Analytical Results – Volatile Organic Compounds
- Figure 17** Phase II Conceptual Site Model – Cross Section A-A' – Ground Water Analytical Results - Petroleum Hydrocarbons
- Figure 18** Phase II Conceptual Site Model – Cross Section B-B' – Ground Water Analytical Results - Petroleum Hydrocarbons
- Figure 19** Phase II Conceptual Site Model – Cross Section A-A' – Ground Water Analytical Results – Volatile Organic Compounds
- Figure 20** Phase II Conceptual Site Model – Cross Section B-B' – Ground Water Analytical Results – Volatile Organic Compounds
- Figure 21** Human Health Conceptual Site Model without Risk Management Measures
- Figure 22** Ecological Conceptual Site Model without Risk Management Measures
- Figure 23** Human Health Conceptual Site Model with Risk Management Measures
- Figure 24** Ecological Conceptual Site Model with Risk Management Measures

1 Site Description and Background

The property municipally addressed as 1490 Richmond Road is located on the south side of Richmond Road, east of Poulin Avenue in the City of Ottawa. The portion of the property for which the record of site condition (RSC) is being filed will herein be referred to as the 'RSC property'.

The RSC property is located on the southeast corner of Richmond Road and Poulin Avenue in Ottawa, Ontario with the following legal description:

PCL 21-1, SEC NP-10F; PT LT 21, CON 10F, PART 1, 4R3261, EXCEPT PTS 1,2, 4R5836; NEPEAN. S/T AN EASEMENT IN FAVOUR OF PART OF LT 21 CON 1, OF, AS IN NP42228 EXCEPT CR405004 OVER PART 1 PLAN 4R3261 EXCEPT PARTS 1 AND 2 PLAN 4R5836 AS IN OC714379 with PIN 03962-0373 (LT) and municipal address of 1490 Richmond Road, Ottawa.

The RSC property is part of a larger parcel of land with the legal description noted above and designated as Part 2 on Plan 4R-20752.

The property has an area of 1326.4 metres square (0.13264 hectare). A locality plan is provided as Figure 1 and a site plan is provided as Figure 2.

Currently a commercial single storey multi-tenant building is present on the RSC property. According to the Phase I ESA, the RSC property was first developed for commercial land use between the mid 1970s and mid 1980s. Prior to this time, the property was used for agricultural/other purposes. The adjacent property to the west is municipally addressed as 1508 Richmond Road. The property is currently vacant and was formerly occupied by a petroleum retail facility. The land use to the north and east is commercial and the property use to the south is residential.

A risk assessment (RA) was filed and accepted for the RSC property and the adjacent property at 1508 Richmond Road. The RSC property with the adjacent property at 1508 Richmond Road comprise of the Phase I and II ESA and RA property.

A Phase II conceptual site model (CSM) was developed for the RSC property using information collected during previous Phase I ESA and Phase II ESA investigations. Where relevant, information pertaining to the adjacent property at 1508 Richmond Road is provided. The CSM is a simplification of reality, which aims to identify the potentially contaminating activities (PCA), areas of potential environmental concern (APEC), contaminant transport and exposure pathways, and receptors. The CSM is a compilation of narrative description, diagrams, cross-sections and figures illustrating the current condition of the Phase II property as well as the intended future use.

1.1 Potentially Contaminating Activities (PCA)

The RSC property is an operating commercial retail plaza. The adjacent property (1508 Richmond Road) to the west is currently vacant but was formerly occupied by a gasoline service station (circa 1930s to the 1990s). The gas station was decommissioned in the late 1990s. The historical gas station configuration from the 1970s onwards is known but infrastructure details prior to this time were not available. Circa 1970s to the late 1990s, four single walled steel underground storage tanks (USTs) were present on the adjacent property. Three of the USTs were aligned between two pump islands, located west of the kiosk, and one UST was located to the east of the kiosk. All four USTs were reported to have a capacity of 22,000 litres and were used to store gasoline. The vent pipes from all USTs extended to the east property line, adjacent to the RSC property. The USTs were removed in 1997 and at that time all tanks were reported to be constructed of steel and in good to excellent condition; the product piping lines were also reported to be constructed of steel and in poor to good condition (Aqua Terre, 1997).

Nine PCAs (S1 to S9) were identified within the Phase I Study Area (250 m radius from the RSC property). One on-site PCA (S1) was identified related to the importation of fill of unknown quality. Off-site PCA within the Phase I Study Area were identified as petroleum storage and handling and fill of unknown quality on the former gasoline service station at 1508 Richmond Road (S2 and S3); and accidental spill of diesel that occurred in the area of Richmond Road and Carling Avenue (S4). The off-site PCAs (S5 through S9) within the Phase I Study Area are considered *de minimis*, and do not contribute to an APEC on-site. These PCAs are presented in Table 2 below, with rationale for their exclusion.

The PCAs identified by S1 to S4 resulted in APECs on the RSC property. All other PCAs identified are located off-site, and they are not considered to contribute to APECs on-site.

The PCAs that contribute to an APEC are summarized in Table 1, named and numbered as per Schedule D of O. Reg. 153/04. Potential COCs (pCOCs) associated with the importation of fill material of unknown quality include polycyclic aromatic hydrocarbons (PAHs) and metals (including hydride-forming metals) in soil. The pCOCs associated with gasoline and associated product storage in fixed tanks include petroleum hydrocarbons (PHCs), benzene, toluene, ethylbenzene and xylenes (BTEX), volatile organic compounds (VOC) and PAH.

The locations of all PCAs and APECs are shown on Figures 3 and 11, respectively. Off-site PCAs that are considered to be *de minimis* are shown in green on Figure 3.

Table 1. Areas of Potential Environmental Concern

Area of Potential Environmental Concern	Location of Area of Potential Environmental Concern on Phase One property	Potentially Contaminating Activity ¹	Location of PCA (on-Site or off-Site)	Contaminants of Potential Concern	Media Potentially Impacted (Ground water, soil and/or sediment)
APEC A1	Entire Phase I property	S1: (30) Importation of fill material of unknown quality	On-Site	PAH, metals	Soil
APEC A2	West side of Phase I property	S2: (30) Importation of fill material of unknown quality	Off-site	PAHs, metals	Soil
APEC A2	West side of Phase I property	S3: (28) Gasoline and associated product storage in fixed tanks	Off-site	PHCs, BTEX, VOC, PAH	Soil, ground water
APEC A3	Northeast corner of Phase I property	S4: (28) Gasoline and associated product storage in fixed tanks	Off-site	PHCs, BTEX, VOC, PAH	Ground water

¹PCA name and number as listed in Table 2 of Schedule D of O. Reg. 153/04.
Metals include hydride-forming metals (arsenic, antimony, selenium).

Table 2. Rationale for PCAs considered to be of *de minimis* concern to the Site

PCA	Source and PCA Number ¹	Address	Rationale for Exclusion
Dry cleaning business	S5: Operation of dry cleaning equipment (where chemicals are used)	2648 Priscilla Street/1463 Richmond Road	The property is located 100 metres north and cross gradient of the Phase I property (RSC property) based on ground water flow to the north/northeast. Based on the distance from the Phase I property and its cross gradient location from the Phase I property, this source is considered to be of <i>de minimis</i> concern
Historical gasoline service station (c.1956 to 2016)	S6: (28) Gasoline and associated product storage in fixed tanks	2599 Carling Avenue	The property is located 188 metres down gradient of the Phase I property (RSC property) based on ground water flow to the north/northeast. Based on the distance from the Phase I property and its downgradient location from the Phase I property, this source is considered to be of <i>de minimis</i> concern

PCA	Source and PCA Number ¹	Address	Rationale for Exclusion
Historical automotive repair facility (c.1993 to 2016)	S7: (10) Commercial autobody shops	2589 Bond Street	The property is located 247 m downgradient of the Phase I property (RSC property) based on ground water flow to the north/northeast. Based on the distance from the Phase I property and its downgradient location from the Phase I property, this source is considered to be of <i>de minimis</i> concern
Current automotive repair facility	S8: (10) Commercial autobody shops	365 Forest Street	The property is located 200 m downgradient of the Phase I property (RSC property) based on ground water flow to the north/northeast. Based on the distance from the Phase I property and its downgradient location from the Phase I property, this source is considered to be of <i>de minimis</i> concern
Historical gasoline service station (c.1960 to 1994)	S9: (28) Gasoline and associated product storage in fixed tanks	1420 Richmond Road	The property is located 230 m downgradient of the Phase I property (RSC property) based on ground water flow to the north/northeast. Based on the distance from the Phase I property and its downgradient location from the Phase I property, this source is considered to be of <i>de minimis</i> concern

1.2 Subsurface Structures and Utilities

Utilities are shown on Figure 2. Storm sewers, sanitary sewers and water mains are located in utility trenches that are located on the RSC property as well as hydraulically up gradient and down gradient of the RSC property. The effect of utilities on migration of COC is discussed in Section 1.9.

1.3 Stratigraphy

Geology

The RSC property is located in the physiographic region known as the Ottawa Valley Clay Plains. The subsurface soils are composed of silty clay overlying limestone bedrock (Physiography of Southern Ontario, Chapman and Putnam, 1984).

According to the Geological Survey of Canada map of the area (Southern Ontario, 1:1000000 Scale, Sheet 30S, Map 2418), the underlying bedrock geology comprises limestone and shale.

Soil on RSC property is predominantly native sand and silty sand overlain by gravel which is present at depths of up to 2 metres under the floor slab of the building. Bedrock is present at approximately 6 metres below the floor slab. A CSM cross section aerial plan (Figure 12) and cross-sections of the RSC property (Figures 13 to 20) were developed showing the stratigraphy of the property. Based on grain size analysis, soil at the RSC property was classified to be coarse grained.

Regional Hydrogeology

The Ottawa River is located approximately 900 metres to the northwest of the RSC property. Storm water drains from the RSC property to catch basins along Carling Avenue and Richmond Road, and eventually discharges into the Ottawa River.

Hydrogeology

During investigations completed between 2007 and 2017, ground water levels were measured between 2.5 and 4.7 mbgs in overburden monitors and between 3.7 and 12.7 mbgs in bedrock piezometers on the RSC property and the adjacent property at 1508 Richmond Road.

Ground water contours were prepared using measurements taken from monitors and piezometers located on the RSC property and adjacent property at 1508 Richmond Road. Based on the ground water elevations measured in 2017 and based on previously collected data from 2007, 2011, 2012, 2013 and 2014 the ground water flow direction in both the overburden and bedrock was determined to be to the north/northeast. As the ground water flow direction in both the overburden and the bedrock is similar and there appears to be no hydraulic disconnect in the ground water from overburden to bedrock, the ground water in the overburden and bedrock is considered to be in hydraulic continuity and therefore one continuous unit.

Based on the ground water contours developed in 2007, 2011, 2012, 2013, 2014 and 2017, lateral hydraulic gradients were calculated to be approximately 0.03 m/m and 0.09 m/m in the overburden and bedrock, respectively. Ground water contour plans are provided as Figures 4-1 to 4-10.

During a previous investigation (EXP, 2012/2013) on 1508 Richmond Road, vertical gradients were calculated using ground water depths measured in the monitor/piezometer pairs TH303/TH302, TH104/TH204 and MW-43/TH202. The gradients were 0.3 m/m, 0.2 m/m and 0.4 m/m, respectively in November 2012 and 0.3 m/m, 0.1 m/m and 0.4 m/m, respectively in May 2013. During the 2014 investigation, a vertical gradient was calculated to be 0.7 m/m in the piezometer pair TH505/TH507 on the RSC property (EXP, 2014). During the 2017 investigation, vertical gradients were calculated using ground water depths measured in monitor/piezometer pairs TH303/TH302 and TH104/TH204 at 1508 Richmond

Road; the gradients were 1.3 m/m and 0.5 m/m, respectively (EXP, 2017). All vertical gradients measured at the RSC property and at 1508 Richmond Road were downwards.

The hydraulic conductivities in the bedrock and overburden were calculated using data collected in 2007 (Barenco, 2008). Average values for hydraulic conductivity were calculated to be 1.6×10^{-5} cm/s in overburden and 1.4×10^{-5} cm/s in bedrock for an average of 1.5×10^{-5} cm/s. Based on the average hydraulic conductivity of 1.5×10^{-5} cm/s, average lateral hydraulic gradient of 0.09 m/m and the literature effective porosity of 0.2 in limestone, Darcy's Law calculations indicate the ground water velocity is approximately 2.1 metres per year in the bedrock. Based on the average hydraulic conductivity of 1.5×10^{-5} cm/s, average lateral hydraulic gradient of 0.03 m/m, and the literature effective porosity of 0.4 in clay, Darcy's Law calculations indicate the ground water velocity is approximately 0.3 metres per year in the overburden.

1.4 Applicable Site Condition Standards

The RSC property is not considered environmentally sensitive as none of the conditions as defined under Section 41 or 43.1 of Regulation 153/04 apply to the RSC property, and the use of the generic standards is therefore appropriate for assessment purposes.

Based on the current land use and zoning of the RSC property, the availability of municipal water in the surrounding area, and the soil texture, the RSC property is classified as having industrial/commercial/ community property use with non-potable ground water. Thus, Ontario Regulation 153/04 Table 3 Standards for industrial/commercial/ community property use and coarse textured soils are appropriate for evaluating soil and ground water conditions at the RSC property.

1.5 Areas Where Soil Has Been Brought From Another Property

A single storey, slab on grade building is situated on the RSC property, covering most of the surface area of the property. According to the Phase I ESA, the RSC property was first developed for commercial land use between the mid 1970s and mid 1980s. Prior to this time, the property was used for agricultural/other purposes. Based on subsurface investigations conducted at the RSC property from 2005 to 2014, there is a sand and gravel fill and gravel present under the building foundation. Underlying the sand and gravel are silty sand soils. The sand and gravel fill directly beneath the building contained a higher percentage of gravel and was not considered soil for sampling purposes. Representative samples of the finer fill material, located at the interface with the silty sand unit, were collected and submitted for analysis of the potential contaminants of concern associated with the importation of fill of unknown quality (Table 1). Worst case fill samples were also collected from the adjacent property at 1508 Richmond Road and submitted for analysis of the contaminants of concern for fill of unknown quality. All samples were within the applicable Table 3 Standards.

1.6 Locations of Building and Structures

A single storey, slab on grade, commercial building is present on the RSC property and it occupies the majority of the site as shown in Figure 2.

1.7 Areas and Distribution of Contamination on the Phase II Property

Soil

Soil exceedances of benzene and PHC F1 to F3 have been identified under the west and south portion of the building on the RSC property. Soil exceedances of benzene were found at depths of 2.4 to 5.5 mbgs and soil exceedances of PHC F1 to F3 at depths of 2.4 to 3.1 mbgs and were vertically delineated to depths ranging from 3.6 to 4.9. Benzene was not vertically delineated in the overburden at TH411 (4.9 to 5.5 mbgs) as shown in Figure 16. As the sample is located less than one metre above the bedrock, it is assumed the impact extends to bedrock.

In soil, benzene and PHC F1 to F3 were identified as COC based on exceedances of the Table 3 standards at the RSC property.

The following parameters were not detected above the Table 3 Standards in soil at the RSC property but were carried forward as COC in the risk assessment because they were detected at a measured concentration or elevated RDL above the Table 3 Standards on the adjacent property at 1508 Richmond Road:

- Toluene, Ethylbenzene and Xylenes
- Hexane
- 1,4-dichlorobenzene,
- 1,2-dichloroethane,
- 1,1,2,2-tetrachloroethane
- 1,1,2-trichloroethane,
- lead
- PHC F4

Soil analytical data for the COC is provided on plan view in Figures 5 and 6 and on cross sections in Figures 13 to 16.

Ground Water

Ground water exceedances of benzene, xylenes, hexane, chloroform and PHC F1 to F4 have been identified under the building on the RSC property.

During the risk assessment of the property, parameters with RDL exceedances were considered COC if an RDL exceedance was observed during the two most recent sampling events. In instances where the results from the two most recent ground water sampling events met the Table 3 Standards, the parameter was excluded.

Ground water exceedances based on elevated RDL were identified for the following parameters:

- Carbon tetrachloride
- 1,4-dichlorobenzene
- 1,2-dichloroethane
- Cis-1,2-dichloroethylene
- Trans-1,2-dichloroethylene
- Ethylene dibromide
- 1,1,1,2-tetrachloroethane
- 1,1,2,2-tetrachloroethane
- Tetrachloroethylene
- 1,1,2-trichloroethane
- Trichloroethylene.

The following parameters were not detected above the Table 3 Standards in ground water at the RSC property but were carried forward as COC in the risk assessment because they were detected at a measured concentration or elevated RDL above the Table 3 Standards on the adjacent property at 1508 Richmond Road:

- Bromoform
- Ethylbenzene
- Methylene chloride
- Methyl-t-butyl ether
- Toluene

Ground water analytical data for the COC is provided on plan view in Figures 8 and 9 and on cross sections in Figures 17 to 20.

For some parameters (ethylene dibromide, 1,1,1,2-tetrachlorethane, 1,1,2,2-tetrachloroethane and tetrachloroethylene) in ground water that were considered COC based on elevated RDL, the maximum concentrations were determined based on selected sampling data considered representative of site conditions. Historical elevated RDL values for these parameters were not considered representative of the site conditions, when during other events the RDL was established to be lower. The elevated RDL that were not used to determine the site maximum concentration are shown in blue text in Figure 9.

Vertical delineation of PHC F1 to F4 in ground water is achieved based on the results at TH505 (screen interval at 9.5 to 10.8 mbgs). Vertical delineation of xylenes, hexane, chloroform and VOC based on elevated RDL is demonstrated by TH505 (9.5 to 10.8 mbgs).

Angled piezometers TH505 and TH507 were installed under the building for the purpose of demonstrating vertical delineation of the COC on the RSC property. It should be noted that virtually all of RSC property is occupied by a retail building. Standard drilling and HQ/PQ bedrock coring techniques for vertical delineation into bedrock under the building could not be employed because such drill rigs are very large and could not fit into the building. A novel alternative approach was employed utilizing an angle-drilling PQ coring technique with the drill rig located outside the building. Due to limitations of the angle drilling technique, coring into bedrock and the site conditions, the deepest extent of drilling achievable into bedrock under the building was 14.4 mbgs in TH507. The piezometer was installed with a screen interval of 13.0 to 14.4 mbgs, which was shallower than planned, and vertical delineation was not achieved for benzene. Two additional piezometers, TH508 (screen interval 23.5 to 25.0 mbgs) and TH509 (screen interval 11.3 to 12.8 mbgs), were installed outside the north and southeast corners of the retail building with the objective of demonstrating vertical delineation of benzene in the ground water on the RSC property. Ground water samples collected from these monitors were within the applicable Table 3 Standards for all parameters analyzed including benzene.

Additionally, vertical delineation of all COC in ground water is demonstrated at the upgradient source area in monitor TH506 (screen interval 23.2 to 24.7 mbgs) on the adjacent property at 1508 Richmond Road, and all COC except benzene are vertically delineated at TH507, therefore sufficient information is available to demonstrate that vertical delineation has been achieved for the RSC property. Based on these results, benzene in ground water is vertically delineated at 23.2 mbgs.

No free product has been observed in any of the monitors or piezometers sampled on the RSC property during any of the sampling events completed between 2005 and 2019. Thus, it is the opinion of the QP_{ESA} that free product is not present in ground water on the RSC property.

The distribution of the soil and ground water COC present at a concentration greater than the applicable Table 3 Standard, for each medium in which the contaminant is present on RSC property, are provided on plan view in Figures 5, 6, 8 and 9 and on cross-sections in Figures 12 to 20.

The current areas where COCs are present at concentrations above the Table 3 SCS are identified as areas of contamination (AOC) and are shown on Figures 5, 6, 8 and 9.

It is noted that additional ground water samples were collected in November 2017 and March 2019, after the acceptance of the risk assessment by the MECP for the Phase II property. The results from these sampling events are shown separately on Figures 8-1 and 9-1.

Table 4 provides a summary of the AOCs.

Table 4: AOC Summary Table

AOC	Location of AOC	Source	COCs in excess of Table 3 SCS	Medium
AOC	Western part of site	Attributed to APEC A2 / PCA S3	Benzene, PHC F1 to F3	Soil
AOC	Entire site (except southeast corner)	Attributed to APEC A2 / PCA S3	PHC F1 to F4	Ground Water
AOC	Entire site (except eastern boundary of site)	Attributed to APEC A2 / PCA S3	Benzene, xylenes, hexane, chloroform and VOCs based on elevated RDL (carbon tetrachloride, 1,4-DCB, 1,2-DCA, cis-1,2-DCE, trans-1,2-DCE, EDB, 1,1,1,2-PCA, 1,1,2,2-PCA, PCA, 1,1,2-TCA and TCE)	Ground Water

1.8 Mechanism of Discharge of Contaminants

It appears likely that the contaminants are present on the RSC property as a result of ground water migration from the adjacent property at 1508 Richmond and the historical use of that property as a gas station.

1.9 Migration of Contaminants

The building on the RSC property is serviced by municipal water and sewer lines, which enter the northeast corner of the building and are assumed to run under the floor slab. Since samples collected from the ground water monitors in the vicinity of the northeast corner of the building (TH1, TH2) are within the Table 3 Standards for petroleum related parameters,

these utility lines are not expected to be a preferential pathway for off-site migration of COC. No other underground utilities are expected to be deep enough to impact ground water flow.

There is potential for soil vapour intrusion of contaminants into the building through heating/ventilation systems, foundations and via subsurface utilities. Vapour intrusion is discussed in Section 1.11.

Migration of COC between the 1508 Richmond Road property and the RSC property is likely facilitated by fill material surrounding the building on the RSC property, in addition to fill that was used during the installation and decommissioning of the underground storage tanks, pump island and kiosk of the former gas station on 1508 Richmond Road.

Both MW31 and MW32 (off-site and north of the RSC property) were sampled in May 2011 for BTEX and PHC F1 to F4. All petroleum related parameters met their respective 2011 Standards with the exception of benzene at MW31, reported to be 50 µg/L, which is slightly above the Standard of 44 µg/L. PHC F2 to F4 were non-detectable in both monitors. Concentrations of PHC F1 met the Table 3 Standard of 750 µg/L. Thus, with the exception of benzene, the May 2011 data confirms that COC migrating in ground water from either the 1508 Richmond Road property and/or the RSC property, onto the boulevard north of the RSC property, do not exceed the applicable Table 3 Standards. Since all sources of petroleum hydrocarbons on 1508 Richmond Road were removed in 1998, concentrations of benzene in ground water on the RSC property are anticipated to continue to decrease. However, benzene impacted ground water exceeding Table 3 Standards may possibly migrate off-site to MW31 and MW32.

1,2-DCA has historically exceeded the Table 3 Standard based on measured concentrations or elevated RDL in monitors on both the 1508 Richmond Road property and the RSC property, and in off-site monitor MW32. Ground water sampling completed in November 2012 and June 2013 showed measured exceedances of 1,2-DCA on 1508 Richmond Road. Thus, off-site migration of this COC at concentrations above the Table 3 Standards is possible.

Although the elevated RDL for chloroform exceeded the Table 3 Standard in several monitors during 2005 and 2007 sampling events, this parameter has not been detected on either the 1508 Richmond Road property and/or the RSC property, other than one detection in July 2007 in MW42, located on the southeastern portion of the RSC property. Thus, it is assumed, based on prior laboratory reports (2008 data), that the high RDLs were a consequence of matrix interference and not indicative of the actual presence of this COC. In addition, July 2007 results from monitors (TH1, TH2, TH3, and TH4) located downgradient to MW42 show no chloroform exceedances. Thus, it is not anticipated that chloroform will migrate off-site at concentrations exceeding the Table 3 Standard in the future. The results from supplemental sampling between June 2013 and November 2017 also support this conclusion. Analytical results for chloroform were all within the Table 3 Standard on the RSC property (MW38 to MW41). All monitors sampled on the 1508 Richmond Road property were within the Table 3 Standard.

Bromoform, carbon tetrachloride, trans-1,2-dichloroethylene, ethylene dibromide, methylene chloride, 1,1,1,2-tetrachloroethane, 1,1,2,2-tetrachloroethane and 1,1,2-trichloroethane have never been detected on either the 1508 Richmond Road property or the RSC property. MTBE, 1,4-dichlorobenzene, tetrachloroethylene, trichloroethylene and cis-1,2-dichloroethylene have been detected, but all measured concentrations were below the Table 3 SCS. However, RDL exceedances have been observed at multiple monitors for these COC on 1508 Richmond Road and the RSC property (MW38 to MW41) with the exception of MTBE, which exceeded the RDL at the 1508 Richmond Road property only. In July 2007, samples collected from TH1 to TH4, located downgradient of monitors MW38 to MW 41, were below the Table 3 Standards for these COC. In addition, all samples collected in November 2017 were all below the Table 3 SCS. Thus, it is not anticipated that these COC will migrate off-site at concentrations exceeding their respective Table 3 Standards in the future.

1.10 Climatic and Meteorological Conditions Affecting Migration

During investigations completed between 2007 and 2017, ground water levels were measured between 2.5 and 4.7 mbgs in overburden monitors and between 3.7 and 12.7 mbgs in bedrock piezometers at the RSC property and adjacent property at 1508 Richmond Road. The inferred ground water direction was northerly to northwesterly during all investigations. Since there has been little variation in measured ground water levels and inferred ground water flow directions, temporal variability in ground water flow direction due to climatic and meteorological conditions is not expected to have a significant influence on distribution and migration of contaminants.

1.11 Soil Vapour Intrusion

In 2013, soil vapour samples were collected from two vapour probes (VP101 and VP102) and four sub-slab probes (SSV101 to SSV104) located in the building on the RSC property. Soil vapour samples were also collected from two vapour probes (VP103 and VP104) located on 1508 Richmond Road, adjacent to the building on the RSC property. The soil vapour samples were submitted for laboratory analysis of VOC and petroleum hydrocarbon fractions (PHC) F1 and F2.

Soil vapour analytical results were compared to soil vapour screening levels (SVSL) for a commercial slab-on-grade building calculated using the Ontario Ministry of Environment Modified Generic Risk Assessment (Tier 2) Spreadsheet Model (April 15, 2011) (MGRA).

Results of the soil vapour chemical analysis for the vapour probes were either non-detectable or within the applicable SVSL for all parameters analysed, however the RDL for ethylene dibromide, 1,2-dichloroethane, 1,1,2-trichloroethane and 1,1,2,2-tetrachloroethane were above the applicable SVSL due to sample dilution during one or both of the sampling events. Based on comparison of the soil vapour analytical results to the MGRA (Tier 2) Spreadsheet Model (November 1, 2016), all results were within the applicable SVSL,

however the RDL for ethylene dibromide and 1,1,2,2-tetrachlorethane were above the applicable SVSL due to sample dilution during one or both of the sampling events.

The results of the soil vapour chemical analysis for the sub slab vapour pins were all within the applicable SVSL (2011 and 2016) for all parameters analysed.

1.12 Receptors and Pathways

The selection of human receptors is based on the current and intended future land use of the RSC property. No redevelopment of the RSC property is planned at this time and therefore, the receptors include adult indoor worker and site visitors, in addition to maintenance workers and construction/utility workers, who might be on-site during and after development. The selection of ecological receptors takes into consideration the location of the RSC in a suburban area and the distance from surface water bodies.

Exposure routes for humans include direct contact with soil and ground water (for subsurface outdoor workers), and inhalation of vapours both inside and outside buildings. Exposure routes to ecological receptors on-site include direct contact and uptake of soil contaminants by plants, soil invertebrates, mammals and birds off-site aquatic receptors through direct contact with contaminants in surface water due to leaching or migration of contaminants from soil/ground water to surface water. Figures 21 and 22 summarise the human and ecological receptors and exposure pathways without risk management measures in place for the RSC property and Figures 23 and 24 summarise the human and ecological receptors and exposure pathways with risk management measures in place for the RSC property.

2 References

- Aqua Terre Solutions Inc., *Monitoring of Petroleum Equipment Removal and Intrusive Site Assessment at 1508 Richmond Road in Ottawa, Ontario*, December 15, 1997
- Barenco Inc. *Phase II Environmental Assessment, 1508 and Part of 1490 Richmond Road, Ottawa, Ontario*, April 10, 2008
- Canadian Standards Association, *Z769 Standard, Phase II Environmental Site Assessment*, 2000
- Chapman, L.J. and D.F. Putnam, *The Physiography of Southern Ontario*, Third Edition, Ontario Ministry of Natural Resources, 1984
- EXP Energy Services Ltd., *Supplemental Phase II Environmental Site Assessment, 1508 Richmond Road, Ottawa, Ontario*, February 24, 2012

EXP Energy Services Ltd., *Phase II Environmental Site Assessment, 1508 and Part of 1490 Richmond Road, Ottawa, Ontario*, November 14, 2013

EXP Energy Services Ltd., *Supplemental Phase II Environmental Site Assessment, 1490 and 1508 Richmond Road, Ottawa, Ontario*, December 18, 2014

EXP Energy Services Ltd., *Supplemental Phase II Environmental Site Assessment, 1490 and 1508 Richmond Road, Ottawa, Ontario*, June 26, 2018

EXP Energy Services Ltd., *Supplemental Phase II Environmental Site Assessment Update, 1490 and 1508 Richmond Road, Ottawa, Ontario*, May 10, 2019

EXP Energy Services Ltd., *Phase I Environmental Site Assessment, 1490 and 1508 Richmond Road, Ottawa, Ontario* March 21, 2018

Freeze, R.A. and J.A. Cherry, *Groundwater*, Prentice-Hall of Canada Ltd., 1979

Geological Survey of Canada, Southern Ontario, 1:1000000 Scale, Sheet 30S, Map 1355A, 1971

Heath, R.C., *Basic Ground-Water Hydrology*, U.S. Geological Survey Water-Supply Paper 2220, 1983

Ontario Regulation 153/04 made under Part XV.1 of the *Environmental Protection Act*, April 15, 2011

Ontario Ministry of the Environment and Climate Change, *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act*, April 15, 2011

Ontario Ministry of the Environment and Climate Change, *Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario*, December 1996

Ontario Ministry of the Environment and Climate Change, *Protocol for Analytical Methods used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act* (March 9, 2004), as amended July 1, 2011

Ontario Ministry of Natural Resources and Forestry; Biodiversity Explorer website (<https://www.ontario.ca/environment-and-energy/make-natural-heritage-area-map>)



SCALE:



SOURCE:

MAPART PUBLISHING 2005

LOCALITY PLAN

FIGURE

1

1490 RICHMOND ROAD
OTTAWA, ONTARIO

PROJECT NUMBER: 01093

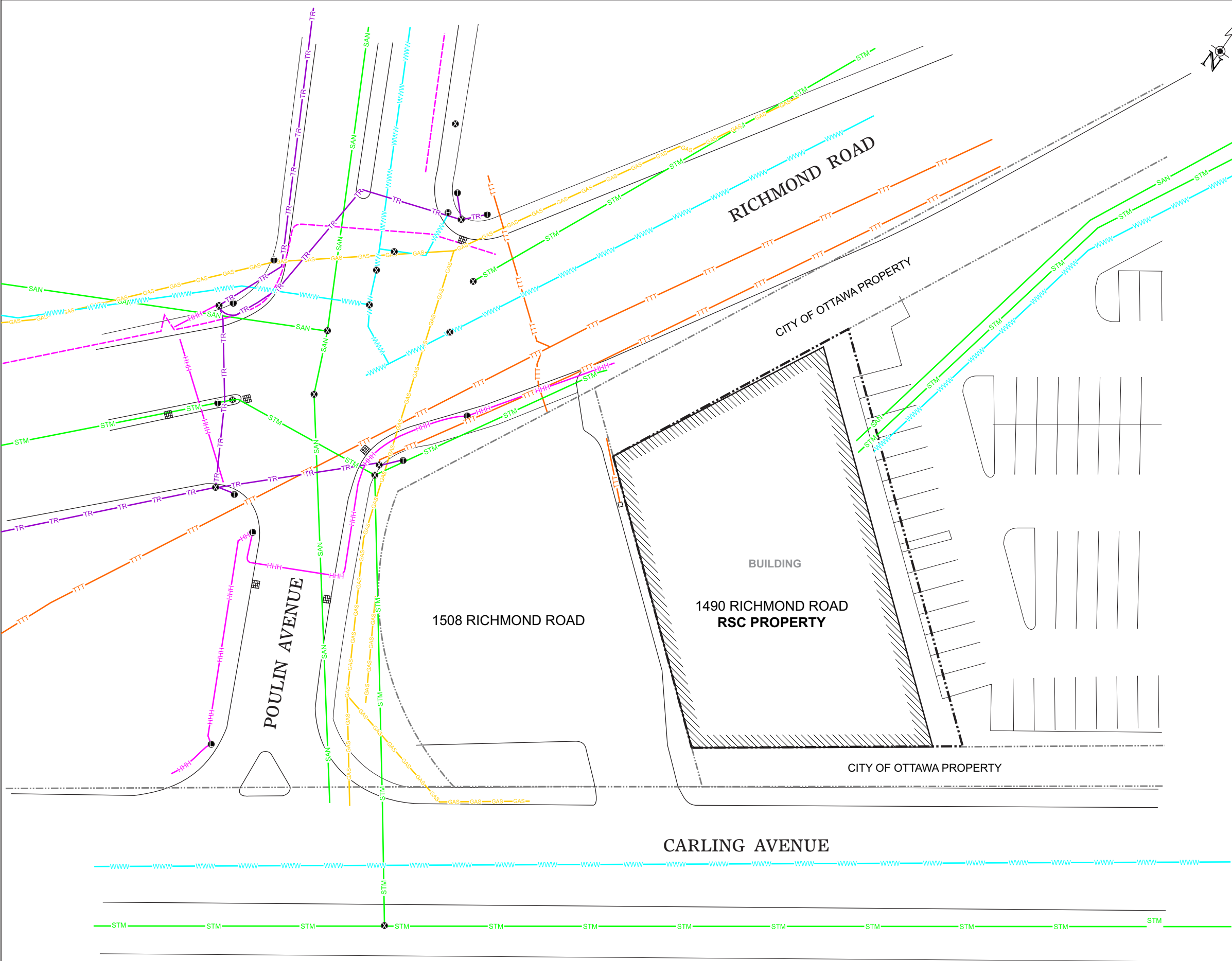


DRAWN BY

CHECKED BY

J.D.H.

S.K.



LEGEND:

- RSC PROPERTY BOUNDARY
- ADJACENT BOUNDARY
- CATCH BASIN
- MANHOLE
- TRAFFIC LIGHT
- LIGHT STANDARD
- FIRE HYDRANT
- STM
- SAN
- WWW
- GAS
- TTT
- HHH
- TR
- ABANDONED UTILITY

SOURCE:

BASED ON SURVEY PLANS BY ANNIS, O'SULLIVAN, VOLLEBEKK LTD. DATED SEP.27, 2007, FEB. 2, 2012, AND JUNE 10, 2013, CITY OF OTTAWA PUBLIC WORKS SERVICES DRAWINGS G-A-17 AND G-B-01 DATED JULY 2007, DRAWING H36J-3, 'CARLING AVENUE RECONSTRUCTION & WIDENING' DR170 SHT14 CITY OF OTTAWA DATED APR. 1960, IMAGE BY GOOGLE EARTH NOVEMBER. 30, 2008 LOCATES BY: PROMARK TELECON ON JUL. 14, 2011, CITY OF OTTAWA ON JUL. 14, 2011, ROGERS LOCATES ON JUL. 13, 2011, BLACK & MACDONALD ON JUL. 7, 2011, AND FIELD MEASUREMENTS BY EXP STAFF

SCALE:

0101020m

DRAWN BY

K.G.

CHECKED BY

S.K.

SITE PLAN

FIGURE 2

1490 RICHMOND ROAD
OTTAWA, ONTARIO

PROJECT NUMBER: 01093

DATE: FEBRUARY 2019



SCALE:
0 50 100m

SOURCE:

BASED ON GOOGLE EARTH IMAGE
DATED OCT. 9, 2016 AND FIELD
OBSERVATIONS BY EXP STAFF

exp.	DRAWN BY	CHECKED BY
	K.G.	S.K.

LEGEND:

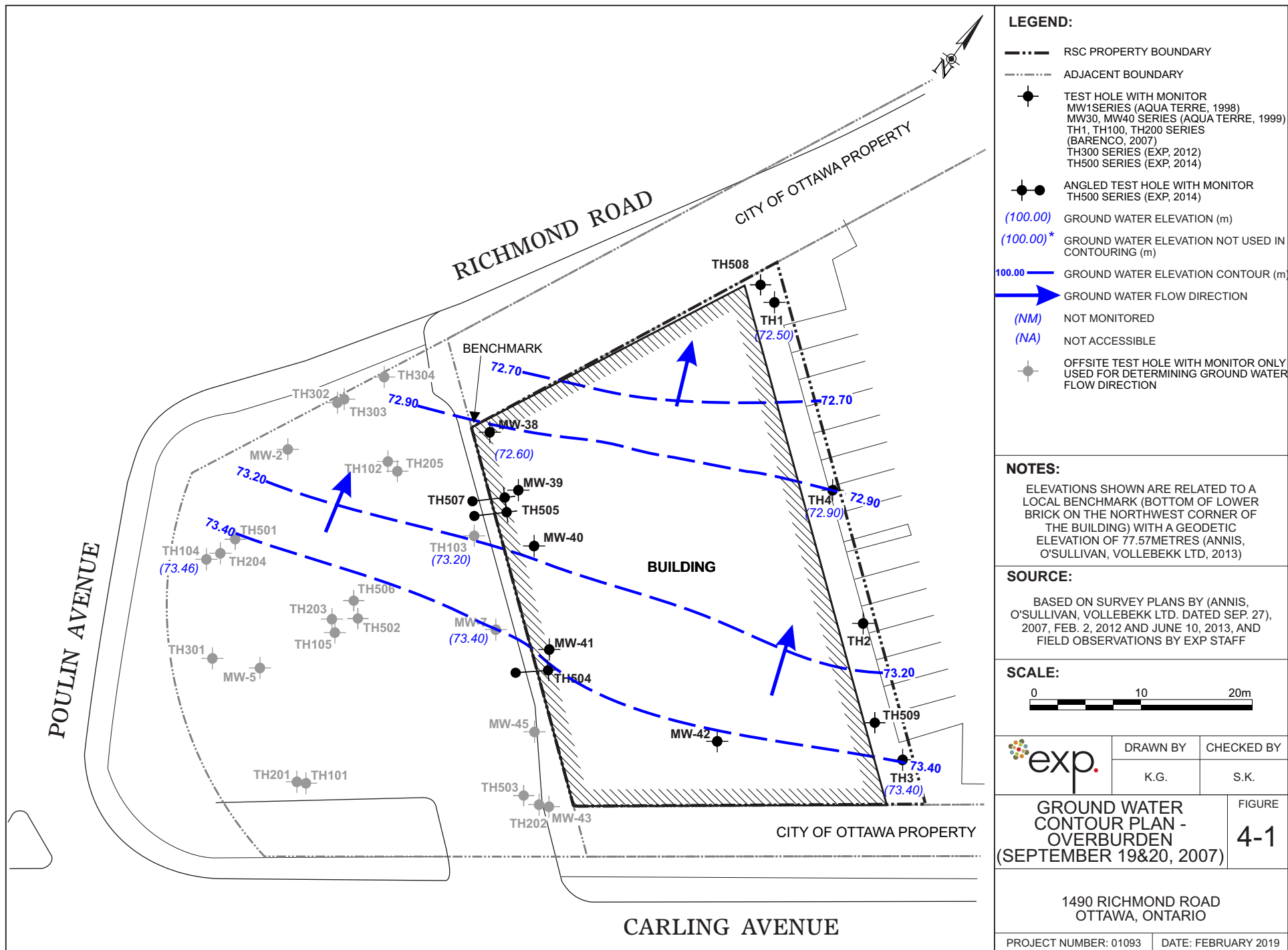
- RSC PROPERTY BOUNDARY
- 250 METRE RADIUS PHASE 1 STUDY AREA
- HISTORICAL UNDERGROUND STORAGE TANK
- OVERBURDEN GROUND WATER FLOW DIRECTION (EXP, NOV. 20, 2017)
- BEDROCK GROUND WATER FLOW DIRECTION (EXP, NOV. 20, 2017)

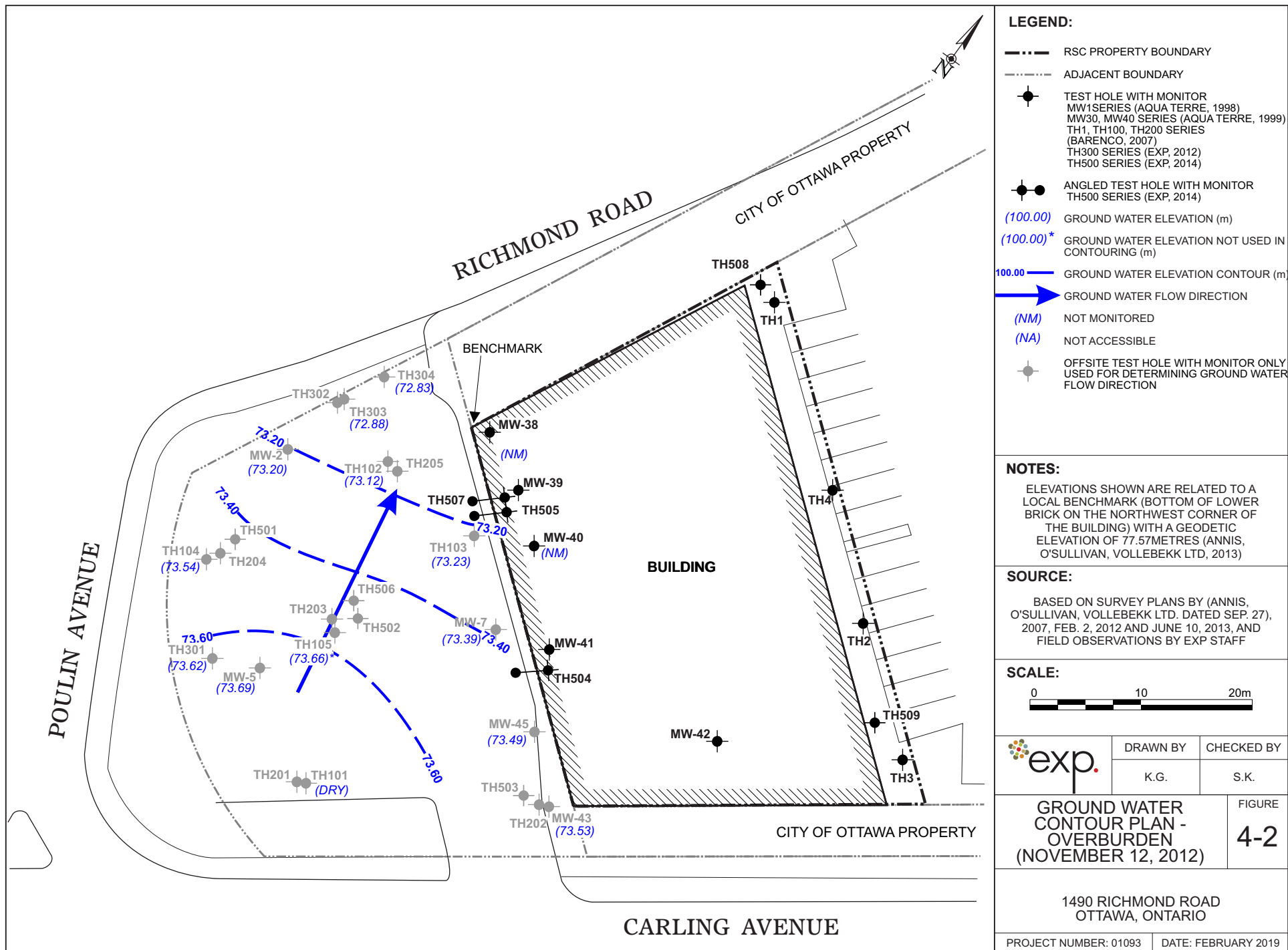
SEE FIGURE 9 FOR APECs

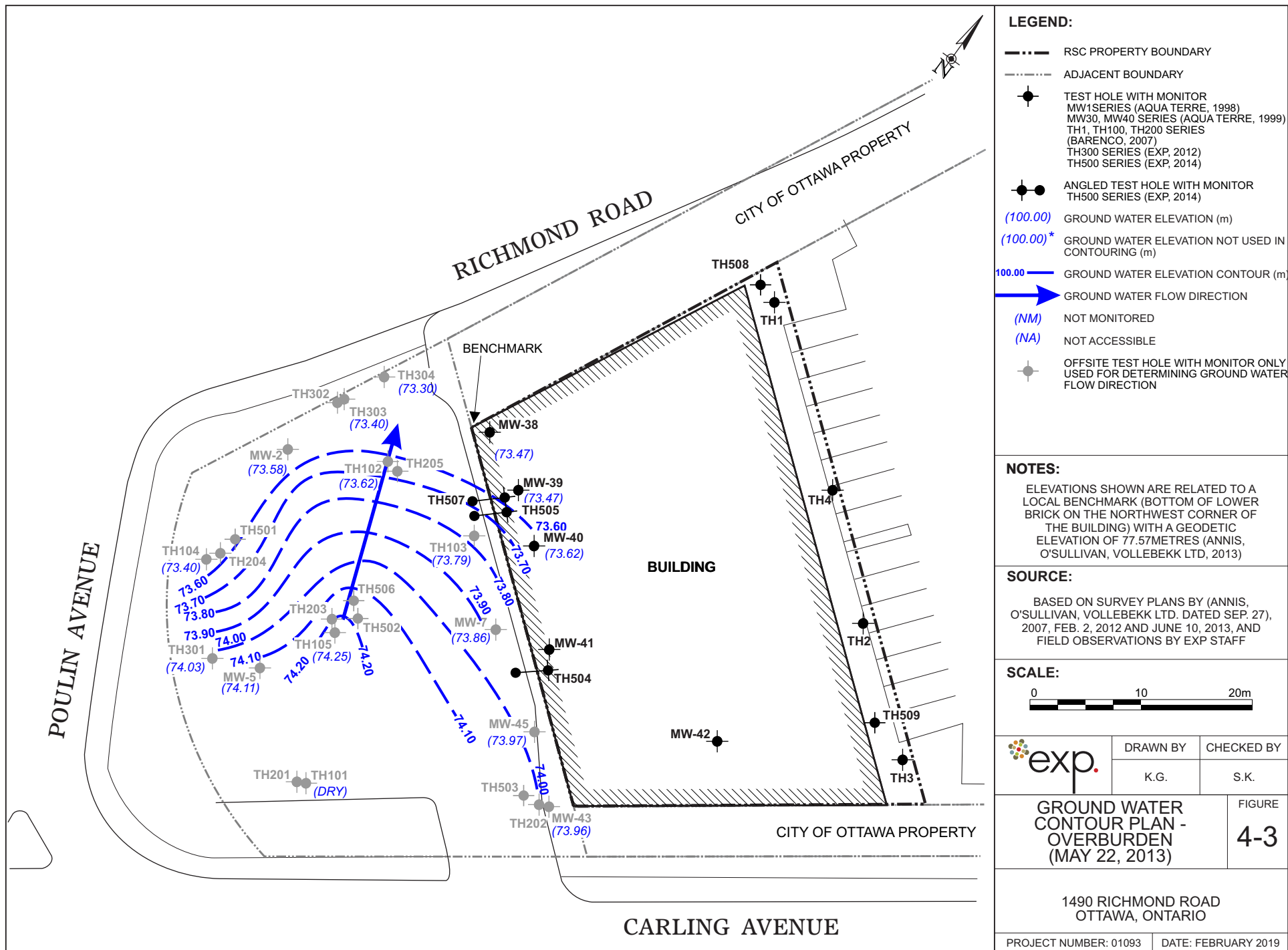
- S1** POTENTIALLY CONTAMINATING ACTIVITY (PCA)
RED INDICATES PCA CONTRIBUTING TO AN APEC
APEC AREA OF POTENTIAL ENVIRONMENTAL CONCERN
GREEN INDICATES PCA IS CONSIDERED TO BE *De Minimis*
(28) INDICATES ITEM NUMBER OF O. REG. 153/04 SCHEDULE D, TABLE 2; WHERE THE ACTIVITY IS NOT LISTED, IT IS IDENTIFIED AS "OTHER".

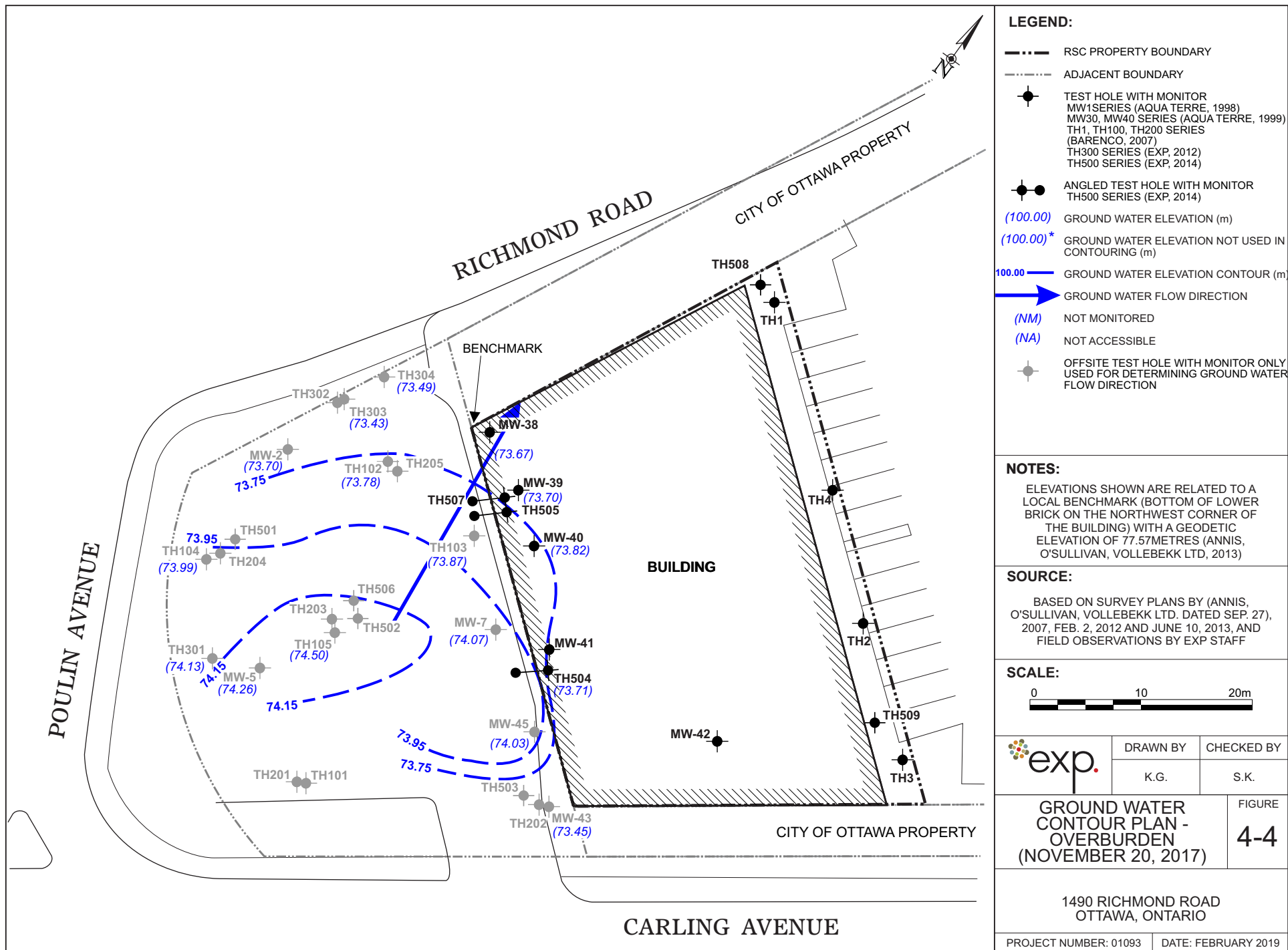
PCA Source Number	POTENTIALLY CONTAMINATING ACTIVITY (PCA)
S1	(30)IMPORTATION OF FILL MATERIAL OF UNKNOWN QUALITY
S2	(30)IMPORTATION OF FILL MATERIAL OF UNKNOWN QUALITY
S3	(28) GASOLINE AND ASSOCIATED PRODUCTS STORAGE IN FIXED TANKS
S4	(28) GASOLINE AND ASSOCIATED PRODUCTS STORAGE IN FIXED TANKS
De-minimis PCAs	
S5	(37)OPERATION OF DRY CLEANING EQUIPMENT (WHERE CHEMICALS ARE USED)
S6	(28) GASOLINE AND ASSOCIATED PRODUCTS STORAGE IN FIXED TANKS
S7	(10)COMMERCIAL AUTO BODY SHOPS
S8	(10)COMMERCIAL AUTO BODY SHOPS
S9	(28) GASOLINE AND ASSOCIATED PRODUCTS STORAGE IN FIXED TANKS

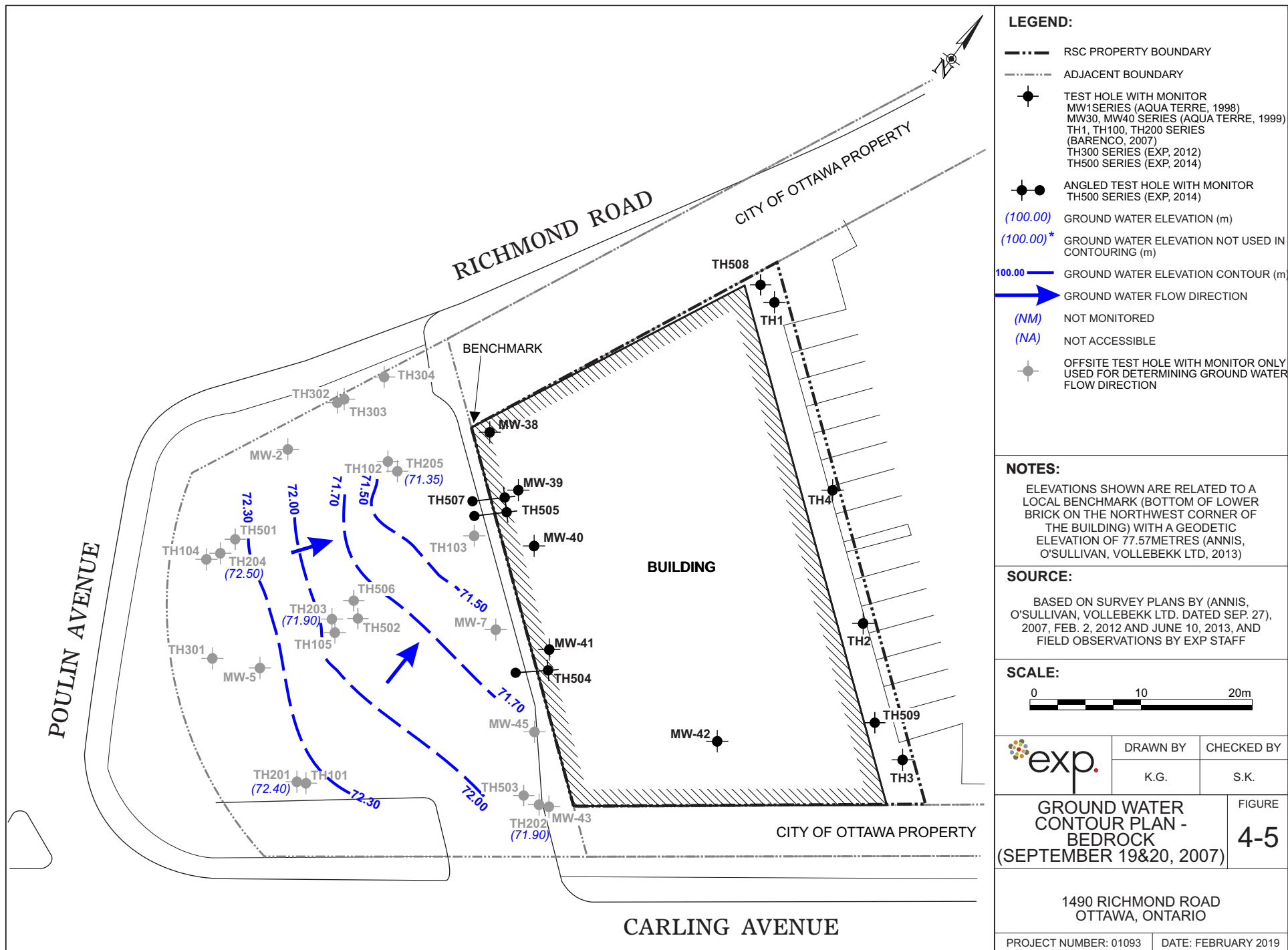
PHASE 1 CONCEPTUAL SITE MODEL	FIGURE 3
	1490 RICHMOND ROAD OTTAWA, ONTARIO
PROJECT NUMBER: 01093 DATE: FEBRUARY 2019	

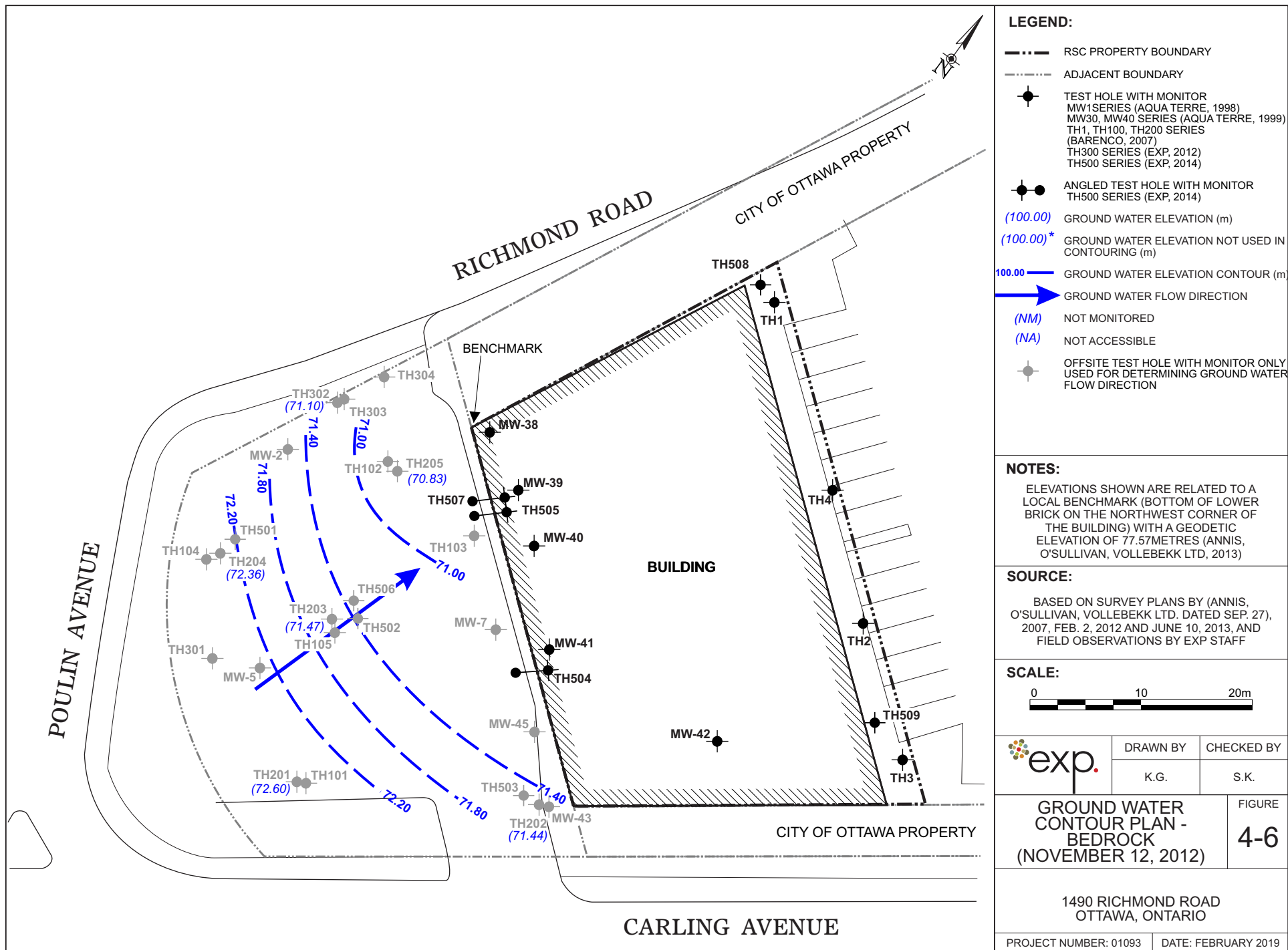


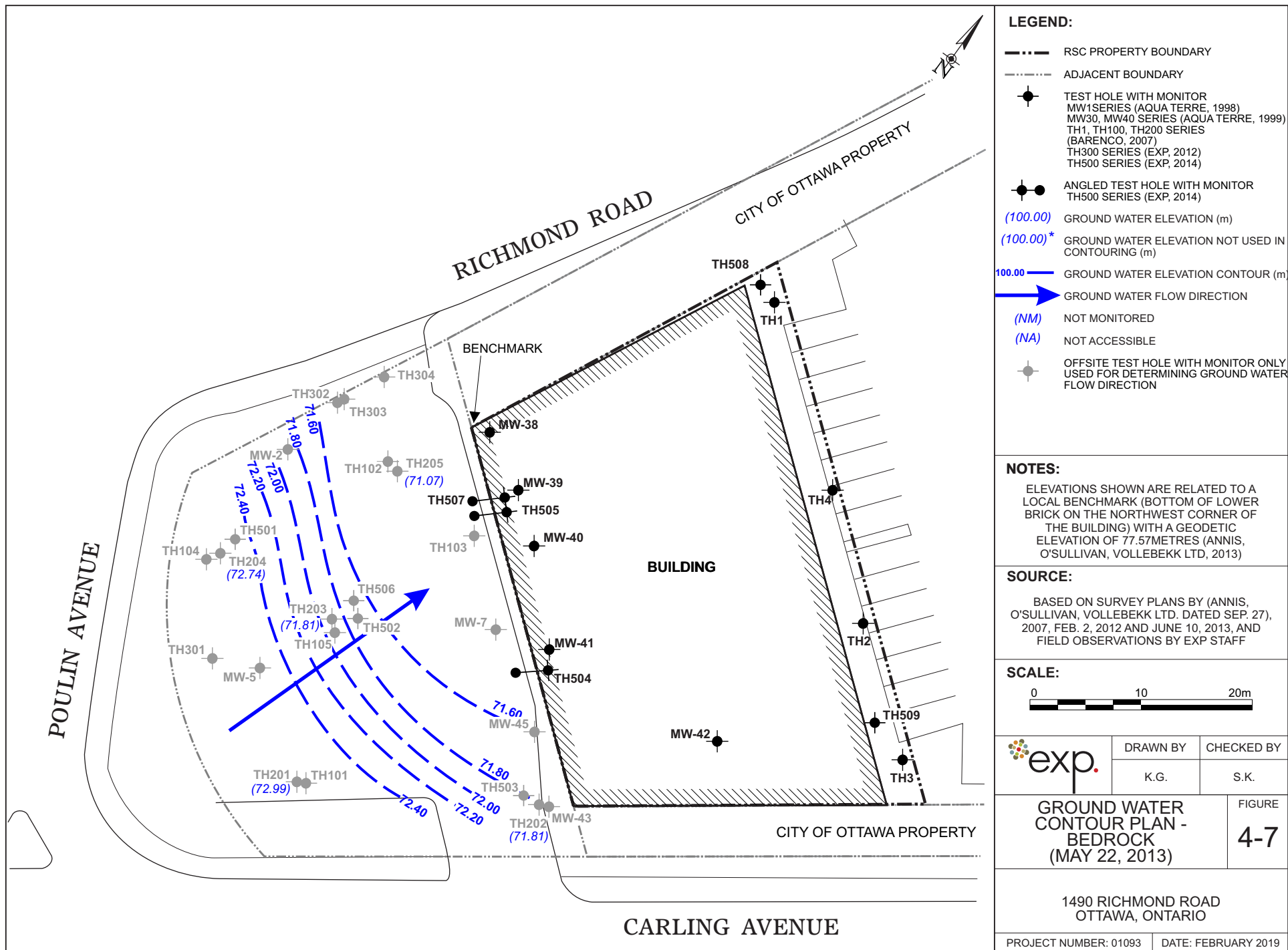


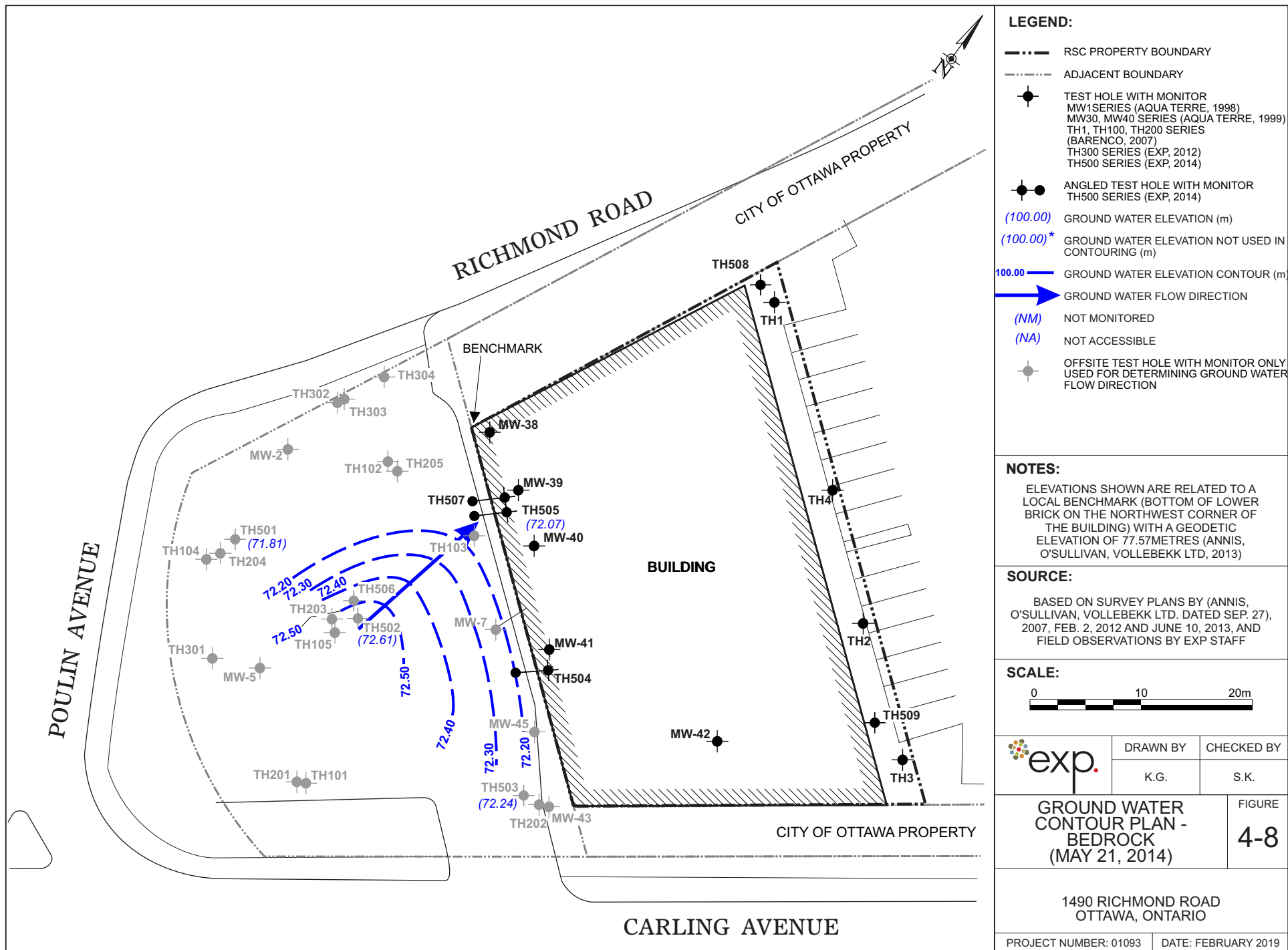


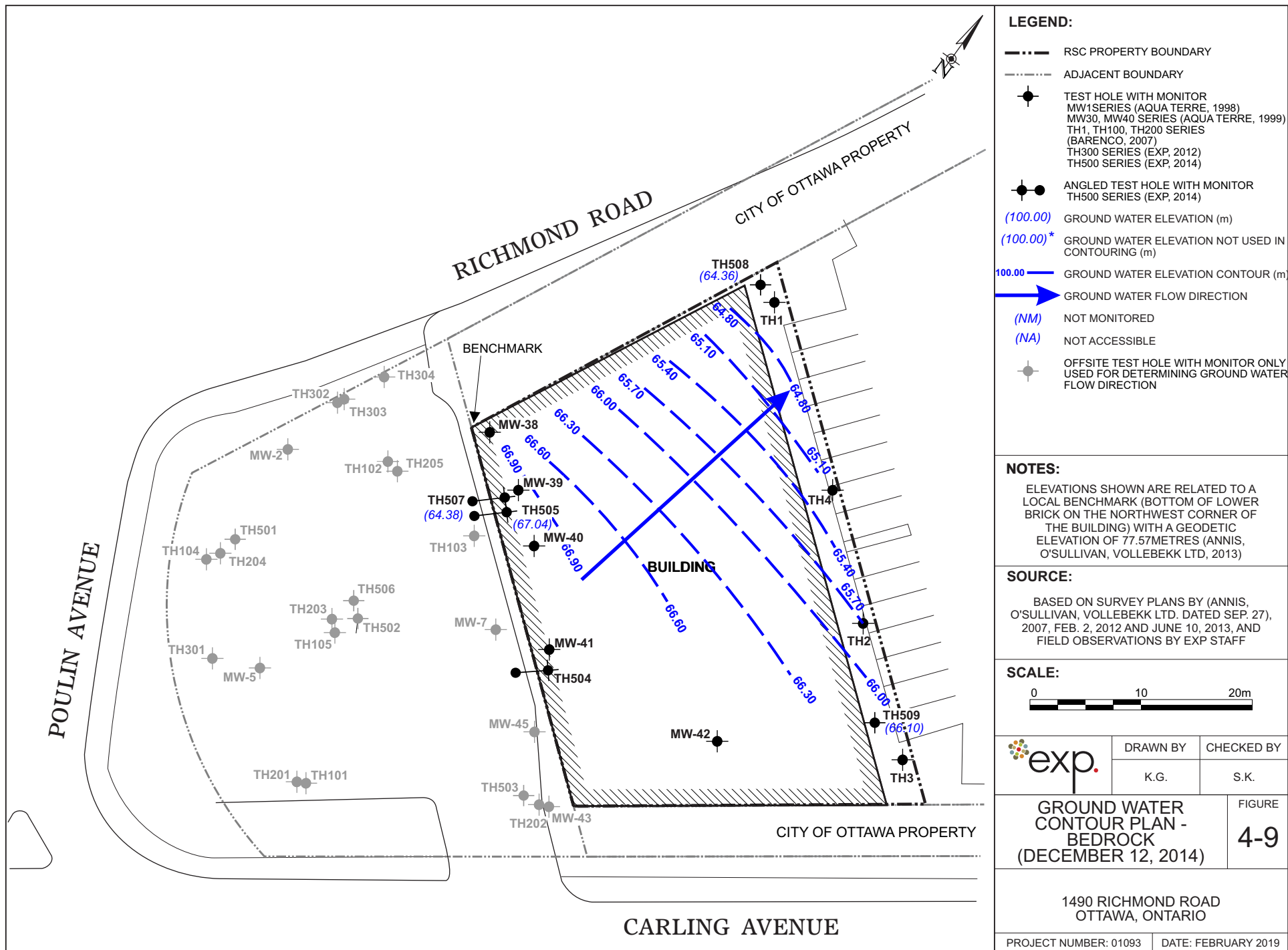


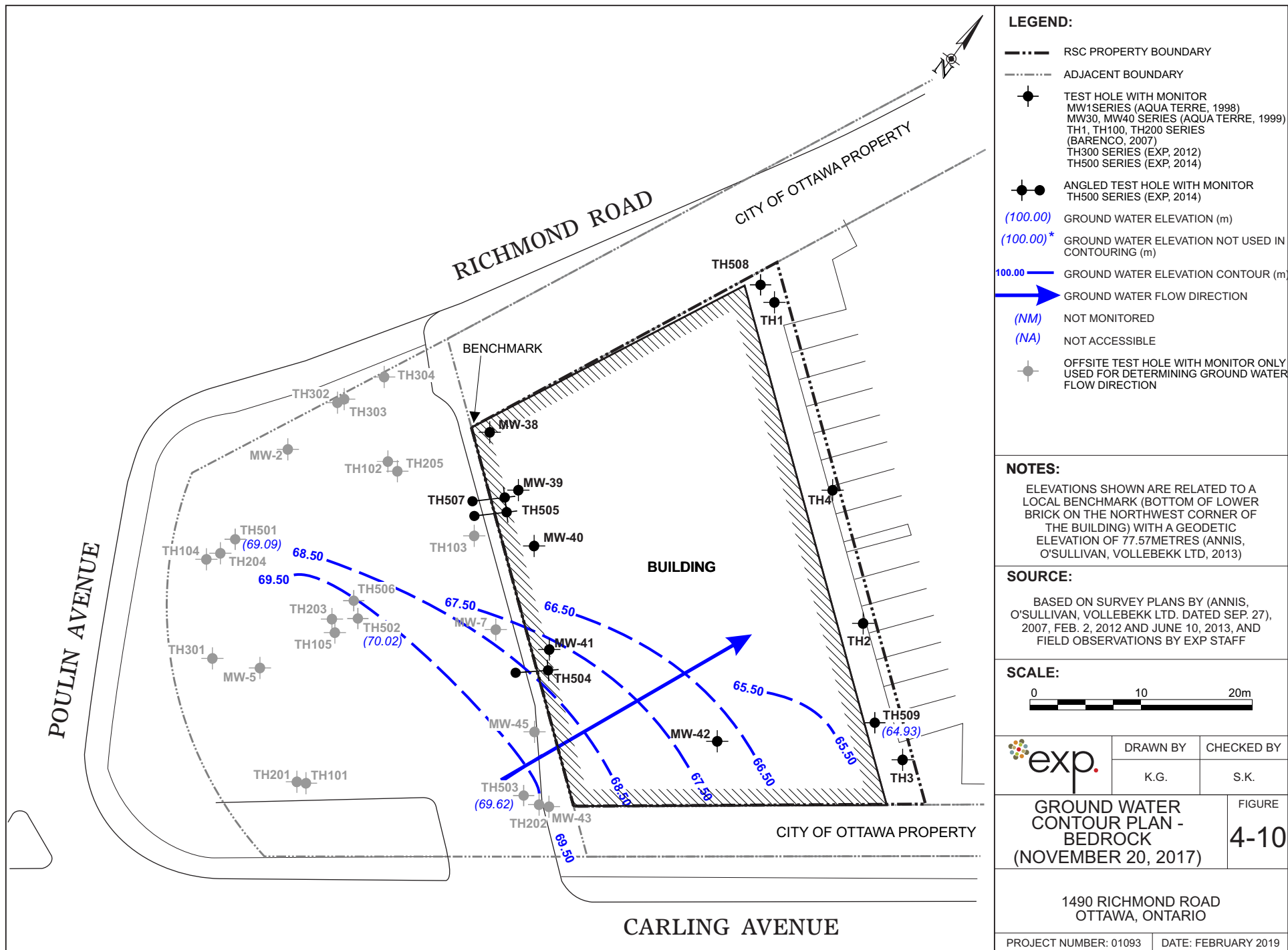












TH5	JUL04/07			
DEPTH (mbgs)	F1	F2	F3	F4
2.5-3.1	600	510	1200	120
4.3-4.9	<10	<10	<10	<10

TH1	JUL04/07			
DEPTH (mbgs)	F1	F2	F3	F4
3.7-4.3	<10	<10	<10	<10
4.3-4.9	<10	<10	<10	<10

TH4	JUL05/07			
DEPTH (mbgs)	F1	F2	F3	F4
2.7-3.4	<10	<10	<10	<10
2.7-3.4(DUP)	<10	<10	<10	<10
3.4-4.0	<10	<10	<10	<10
4.0-4.6	<10	<10	<10	<10

TH410	MAY14/13			
DEPTH (mbgs)	F1	F2	F3	F4
2.4-3.0	1600	260	230	<50
3.6-4.2	<10	<10	<50	<50

TH411	MAY14/13			
DEPTH (mbgs)	F1	F2	F3	F4
2.4-3.0	270	200	3700	360
4.9-5.5	<10	<10	<50	<50

TH6	JUL04/07			
DEPTH (mbgs)	F1	F2	F3	F4
2.6-3.2	<10	<10	<10	<10
3.8-4.4	<10	<10	<10	<10

TH7	JUL18/07			
DEPTH (mbgs)	F1	F2	F3	F4
2.4-3.0	100	790	760	340
2.4-3.0(DUP)	150	1600	1400	630
4.9-5.4	<10	<10	<10	<10

TH2	JUL04/07			
DEPTH (mbgs)	F1	F2	F3	F4
3.7-4.3	<10	<10	<10	<10
4.3-4.9	<10	<10	<10	<10

TH8	JUL18/07			
DEPTH (mbgs)	F1	F2	F3	F4
3.7-4.3	<10	<10	<10	<10
4.3-4.9	<10	<10	<10	<10

TH3	JUL04/07			
DEPTH (mbgs)	F1	F2	F3	F4
3.4-4.0	<10	<10	<10	<10
3.4-4.0(DUP)	<10	<10	<10	<10
4.0-4.6	<10	<10	<10	<10

PARAMETER	ABBREVIATION	REG 153/04 TABLE 3 STANDARDS*
F1 (C ₆ -C ₁₀) - BTEX	F1	55
F2 (C ₁₀ -C ₁₆)	F2	230
F3 (C ₁₆ -C ₃₄)	F3	1700
F4 (C ₃₄ -C ₆₀)	F4	3300

LEGEND:

RSC PROPERTY BOUNDARY

ADJACENT BOUNDARY

TEST HOLE
TH5-TH8 (BARENCO, 2007)
TH400 SERIES (EXP, 2013)

TEST HOLE WITH MONITOR
MW30, MW40 SERIES (AQUA TERRE, 1999)
TH1 SERIES (BARENCO, 2007)
TH500 SERIES (EXP, 2014)

VAPOUR PROBE
VP101-VP104 (EXP, 2013)

SUB-SLAB VAPOUR PROBE
SSV-101-SSV-104 (EXP, 2013)

ANGLED TEST HOLE WITH MONITOR
TH500 SERIES (EXP, 2014)

AREA OF CONTAMINATION

LOCATION WHERE ALL SOIL SAMPLES MEET
REG 153/04 TABLE 3 STANDARDS FOR ALL
PARAMETERS THAT WERE ANALYSED

LOCATION WHERE AT LEAST ONE SOIL
SAMPLE EXCEEDS REG 153/04 TABLE 3
STANDARDS FOR AT LEAST ONE PARAMETER
ANALYSED

LOCATION WHERE NO SOIL SAMPLE WAS
ANALYSED

EXCEEDANCES OF REG 153/04 TABLE 3
STANDARDS

ALL ANALYTICAL RESULTS ARE IN
MICROGRAMS PER GRAM (µg/g), DRY WEIGHT
BASIS
'DEPTH(m)' MEANS DEPTH IN METRES BELOW
GROUND SURFACE
'-' MEANS NOT ANALYSED OR NOT
APPLICABLE
'NM' MEANS NOT MEASURED
'<RDL' MEANS NOT DETECTED AT REPORTING
DETECTION LIMIT (RDL)
'RDL' ARE SHOWN FOR NON-DETECTED
RESULTS. FOR RDL OF REPORTABLE
RESULTS, SEE APPLICABLE DATA TABLE
(DUP) REPRESENTS FIELD DUPLICATE OF
PRECEDING SAMPLE

*STANDARDS SHOWN ARE FOR
INDUSTRIAL/COMMERCIAL/COMMUNITY
PROPERTY USE AND COARSE TEXTURED
SOILS IN A NON-POTABLE GROUND WATER
CONDITION

SOURCE:

BASED ON SURVEY PLANS BY ANNIS,
O'SULLIVAN, VOLLEBEKK LTD. DATED SEPT. 27,
2007, FEB. 2, 2012 AND JUNE 10, 2013, AND
FIELD OBSERVATIONS BY EXP STAFF

SCALE:

01020m

exp.

DRAWN BY
K.G.

CHECKED BY
S.K.

SOIL
ANALYTICAL RESULTS -
PETROLEUM HYDROCARBONS

FIGURE
5

1490 RICHMOND ROAD
OTTAWA, ONTARIO

PROJECT NUMBER: 01093

DATE: FEBRUARY 2019

01093-RSC 1490 RESULTS-FEB19:SOIL PHC

TH4	JUL05/07								
DEPTH (mbgs)	B	T	E	X	H	1,4-DBC	1,2-DCA	1,1,2,2-PCA	1,1,2-TCA
2.7-3.4	<0.002	<0.002	<0.002	<0.002	-	-	-	-	-
2.7-3.4(DUP)	<0.002	<0.002	<0.002	<0.002	-	-	-	-	-
3.4-4.0	<0.002	<0.002	<0.002	<0.002	-	-	-	-	-
4.0-4.6	<0.002	<0.002	<0.002	<0.002	-	-	-	-	-

TH1	JUL04/07								
DEPTH (mbgs)	B	T	E	X	H	1,4-DBC	1,2-DCA	1,1,2,2-PCA	1,1,2-TCA
3.7-4.3	<0.002	<0.002	<0.002	<0.002	-	-	-	-	-
4.3-4.9	<0.002	<0.002	<0.002	<0.002	-	-	-	-	-

TH5	JUL04/07								
DEPTH (mbgs)	B	T	E	X	H	1,4-DBC	1,2-DCA	1,1,2,2-PCA	1,1,2-TCA
2.5-3.1	0.6	<0.5	4.7	15	-	-	-	-	-
4.3-4.9	2.1	<0.1	1.1	2.6	-	-	-	-	-

TH410	MAY14/13								
DEPTH (mbgs)	B	T	E	X	H	1,4-DBC	1,2-DCA	1,1,2,2-PCA	1,1,2-TCA
2.4-3.0	<0.02	<0.020	0.29	0.66	2.6	<0.050	<0.050	<0.050	<0.050
3.6-4.2	0.77	<0.020	0.24	<0.020	<0.050	<0.050	<0.050	<0.050	<0.050

TH411	MAY14/13								
DEPTH (mbgs)	B	T	E	X	H	1,4-DBC	1,2-DCA	1,1,2,2-PCA	1,1,2-TCA
2.4-3.0	0.56	0.14	3.4	13	2.3	0.061	<0.050	<0.050	<0.050
4.9-5.5	1.5	<0.020	0.52	0.55	<0.50	<0.050	<0.050	<0.050	<0.050

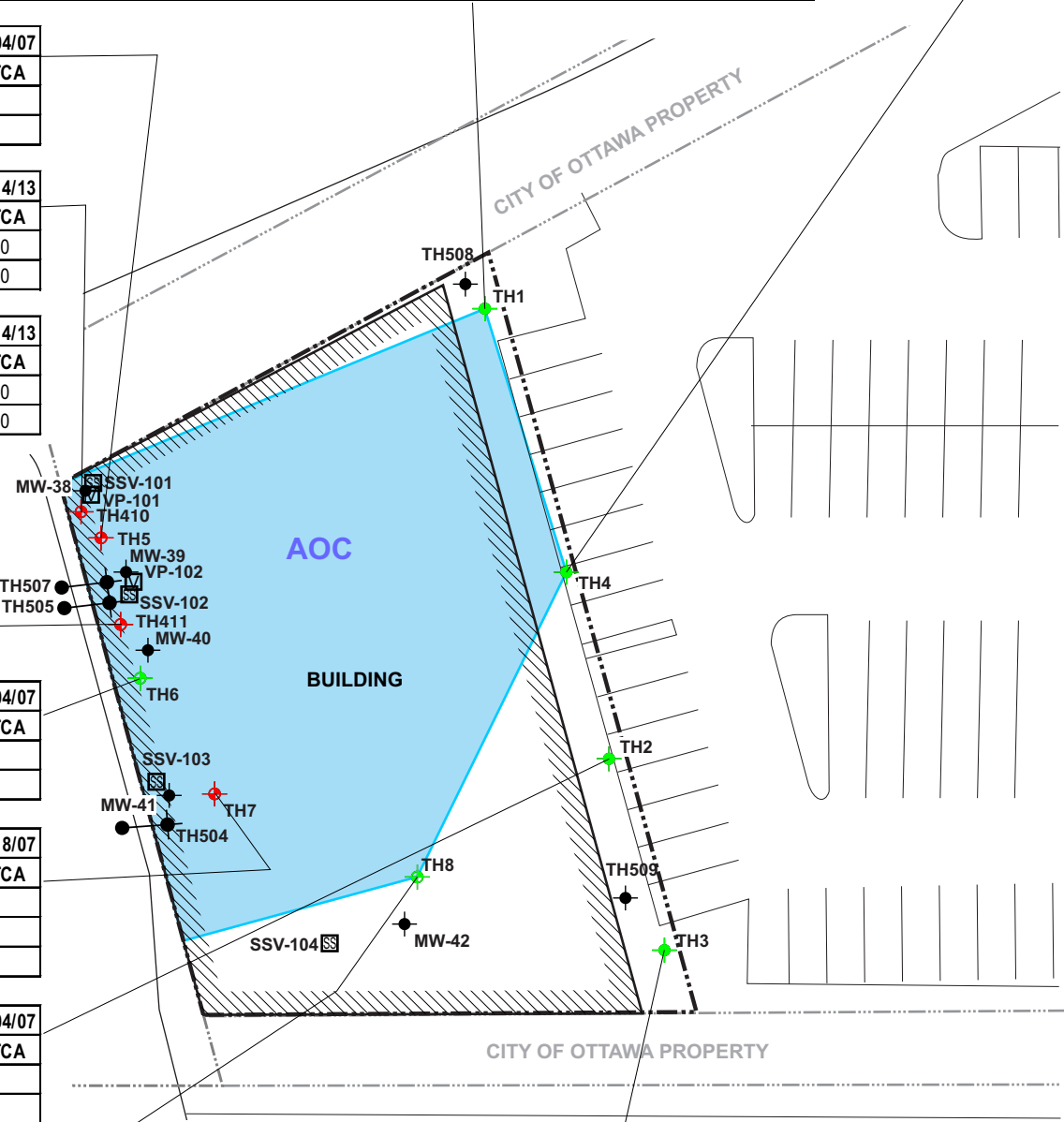
TH6	JUL04/07								
DEPTH (mbgs)	B	T	E	X	H	1,4-DBC	1,2-DCA	1,1,2,2-PCA	1,1,2-TCA
2.6-3.2	0.019	0.002	0.066	0.092	-	-	-	-	-
3.8-4.4	0.3	<0.1	0.8	1.5	-	-	-	-	-

TH7	JUL18/07								
DEPTH (mbgs)	B	T	E	X	H	1,4-DBC	1,2-DCA	1,1,2,2-PCA	1,1,2-TCA
2.4-3.0	0.5	0.1	0.04	8.3	-	-	-	-	-
2.4-3.0(DUP)	0.57	0.20	0.37	22	-	-	-	-	-
4.9-5.4	0.3	<0.02	0.03	0.09	-	-	-	-	-

TH2	JUL04/07								
DEPTH (mbgs)	B	T	E	X	H	1,4-DBC	1,2-DCA	1,1,2,2-PCA	1,1,2-TCA
3.7-4.3	<0.002	<0.020	<0.020	<0.020	-	-	-	-	-
4.3-4.9	0.002	<0.020	<0.020	<0.020	-	-	-	-	-

TH8	JUL18/07								
DEPTH (mbgs)	B	T	E	X	H	1,4-DBC	1,2-DCA	1,1,2,2-PCA	1,1,2-TCA
3.7-4.3	<0.02	<0.02	<0.02	<0.02	-	-	-	-	-
4.3-4.9	<0.02	<0.02	<0.02	<0.02	-	-	-	-	-

TH3									JUL04/07
DEPTH (mbgs)	B	T	E	X	H	1,4-DBC	1,2-DCA	1,1,2,2-PCA	1,1,2-TCA
3.4-4.0	0.002	0.003	<0.002	<0.002	-	-	-	-	-
3.4-4.0(DUP)	0.002	0.002	<0.002	<0.002	-	-	-	-	-
4.0-4.6	<0.002	<0.002	<0.002	<0.002	-	-	-	-	-



PARAMETER	ABBREVIATION	REG 153/04 TABLE 3 STANDARDS*
BENZENE	B	0.32
TOLUENE	T	68
ETHYLBENZENE	E	9.5
XYLENES	X	26
HEXANE	H	46
1,4-DICHLOROBENZENE	1,4-DCB	0.2
1,2-DICHLOROETHANE	1,2-DCA	0.05
1,1,2,2-TETRACHLOROETHANE	1,1,2,2-PCA	0.05
1,1,2-TRICHLOROETHANE	1,1,2-TCA	0.05

LEGEND:

- RSC PROPERTY BOUNDARY
- - - - - ADJACENT BOUNDARY
- ⊕ TEST HOLE
TH5-TH8 (BARENCO, 2007)
TH400 SERIES (EXP, 2013)
- ⊕ TEST HOLE WITH MONITOR
MW30, MW40 SERIES (AQUA TERRE, 1999)
TH1 SERIES (BARENCO, 2007)
TH500 SERIES (EXP, 2014)
- ☑ VAPOUR PROBE
VP101-VP104 (EXP, 2013)
- ☑ SUB-SLAB VAPOUR PROBE
SSV-101-SSV-104 (EXP, 2013)
- ⊕ ANGLED TEST HOLE WITH MONITOR
TH500 SERIES (EXP, 2014)
- AREA OF CONTAMINATION

- ☑ LOCATION WHERE ALL SOIL SAMPLES MEET
REG 153/04 TABLE 3 STANDARDS FOR ALL
PARAMETERS THAT WERE ANALYSED
- ☑ LOCATION WHERE AT LEAST ONE SOIL
SAMPLE EXCEEDS REG 153/04 TABLE 3
STANDARDS FOR AT LEAST ONE PARAMETER
ANALYSED
- ☑ LOCATION WHERE NO SOIL SAMPLE WAS
ANALYSED
- TEXT EXCEEDANCES OF REG 153/04 TABLE 3
STANDARDS

ALL ANALYTICAL RESULTS ARE IN
MICROGRAMS PER GRAM (µg/g), DRY WEIGHT
BASIS
'DEPTH(m)' MEANS DEPTH IN METRES BELOW
GROUND SURFACE
'-' MEANS NOT ANALYSED OR NOT
APPLICABLE
'NM' MEANS NOT MEASURED
'<RDL' MEANS NOT DETECTED AT REPORTING
DETECTION LIMIT (RDL)
'RDL' ARE SHOWN FOR NON-DETECTED
RESULTS: FOR RDL OF REPORTABLE
RESULTS: SEE APPLICABLE DATA TABLE
(DUP) REPRESENTS FIELD DUPLICATE OF
PRECEDING SAMPLE

*STANDARDS SHOWN ARE FOR
INDUSTRIAL/COMMERCIAL/COMMUNITY
PROPERTY USE AND COARSE TEXTURED
SOILS IN A NON-POTABLE GROUND WATER
CONDITION

SOURCE:

BASED ON SURVEY PLANS BY ANNIS,
O'SULLIVAN, VOLLEBEKK LTD. DATED SEPT. 27,
2007, FEB. 2, 2012 AND JUNE 10, 2013, AND
FIELD OBSERVATIONS BY EXP STAFF

SCALE:



DRAWN BY
K.G.

CHECKED BY
S.K.

SOIL
ANALYTICAL RESULTS -
VOLATILE ORGANIC
COMPOUNDS

FIGURE
6

1490 RICHMOND ROAD
OTTAWA, ONTARIO

PROJECT NUMBER: 01093 DATE: FEBRUARY 2019

MW38	SCREEN INTERVAL: 1.8-4.8 mbgs			
DATE	F1	F2	F3	F4
NOV29/05	<2000	530	230	<100
JUL19/07	<500	<100	<100	<100
MAY24/11	320	<100	<100	<100
OCT19/12	890	300	<100	<100
NOV13/12	<250	290	<100	<100
JUN05/13	740	350	<200	<200

TH505	SCREEN INTERVAL = 9.5-10.8 mbgs			
DATE	F1	F2	F3	F4
MAY22/14	85	<100	<200	<200
JUN10/14	-	-	-	-
JUN26/14	-	-	-	-

MW40	SCREEN INTERVAL: 2.3-5.3 mbgs			
DATE	F1	F2	F3	F4
NOV29/05	6000	2300	1600	<100
NOV29/05(DUP1	5400	2100	2500	160
JUL20/07	2900	1000	320	<100
MAY24/11	2500	1900	600	<100
MAY24/11(DUP)	3200	1800	330	<100
JAN20/12	-	-	-	<100
OCT19/12	1000	330	<100	<100
JUN06/13	2100	940	<200	<200

MW41	SCREEN INTERVAL: 1.8-4.9 mbgs			
DATE	F1	F2	F3	F4
NOV29/05	2400	1700	680	<100
JUL20/07	2100	510	180	<100

TH504	SCREEN INTERVAL = 3.0-5.7 mbgs			
DATE	F1	F2	F3	F4
MAY22/14	5000	1700	<200	<200
MAY22/14(DUP)	5300	1800	<200	<200

TH2	SCREEN INTERVAL: 1.8-4.9 mbgs			
DATE	F1	F2	F3	F4
JUL19/07	<100	<100	230	2600
JUL19/07(DUP)	<100	<100	<100	160

MW42	SCREEN INTERVAL: 1.2-4.3 mbgs			
DATE	F1	F2	F3	F4
NOV29/05	<100	<100	<100	<100
JUL19/07	<100	<100	<100	<100

MW39	SCREEN INTERVAL: 2.4-5.5 mbgs			
DATE	F1	F2	F3	F4
NOV29/05	<2000	1600	33000	2800
JUL19/07	<1000	260	2400	<100
JUL19/07(DUP)	<2000	310	1600	100
MAY24/11	<500	440	9300	1100
JAN20/12	-	-	-	-
OCT19/12	3100	590	<100	<100
OCT19/12(DUP)	3300	740	<100	<100
JUN06/13	<130	470	<200	<200
JUN06/13(DUP)	<130	450	<200	<200

TH508	SCREEN INTERVAL = 23.5-25.0 mbgs			
DATE	F1	F2	F3	F4
DEC10/14	<25	<100	<200	<200

TH1	SCREEN INTERVAL: 1.8-4.9 mbgs			
DATE	F1	F2	F3	F4
JUL19/07	<100	<100	<100	<100

TH4	SCREEN INTERVAL: 1.7-4.7 mbgs			
DATE	F1	F2	F3	F4
JUL19/07	<100	<100	<100	<100
MAY24/11	<100	<100	<100	<100

TH3	SCREEN INTERVAL: 1.4-4.4 mbgs			
DATE	F1	F2	F3	F4
JUL19/07	<100	<100	<100	<100

TH509	SCREEN INTERVAL = 11.3-12.8 mbgs			
DATE	F1	F2	F3	F4
DEC10/14	<25	<100	<200	<200
DEC10/14(DUP)	<25	<100	<200	<200

PARAMETER	ABBREVIATION	REG 153/04 TABLE 3 STANDARDS*
F1 (C ₆ -C ₁₀) - BTEX	F1	750
F2 (C ₁₀ -C ₁₆)	F2	150
F3 (C ₁₆ -C ₃₄)	F3	500
F4 (C ₃₄ -C ₆₀)	F4	500

LEGEND:

RSC PROPERTY BOUNDARY

ADJACENT BOUNDARY

TEST HOLE WITH MONITOR
MW30, MW40 SERIES (AQUA TERRE, 1999)
TH1 SERIES (BARENCO, 2007)
TH500 SERIES (EXP, 2014)

ANGLED TEST HOLE WITH MONITOR
TH500 SERIES (EXP, 2014)

AREA OF CONTAMINATION

MONITOR LOCATION WHERE GROUND WATER
SAMPLE MEETS REG 153/04 TABLE 3
STANDARDS FOR ALL PARAMETERS THAT WERE
ANALYSED

MONITOR LOCATION WHERE GROUND WATER
SAMPLE EXCEEDS REG 153/04 TABLE 3
STANDARDS FOR AT LEAST ONE PARAMETER
ANALYSED

MONITOR LOCATION WITH MEASURABLE OR
OBSERVABLE LIQUID PETROLEUM DURING THE
MOST RECENT GROUND WATER SAMPLING
EVENT

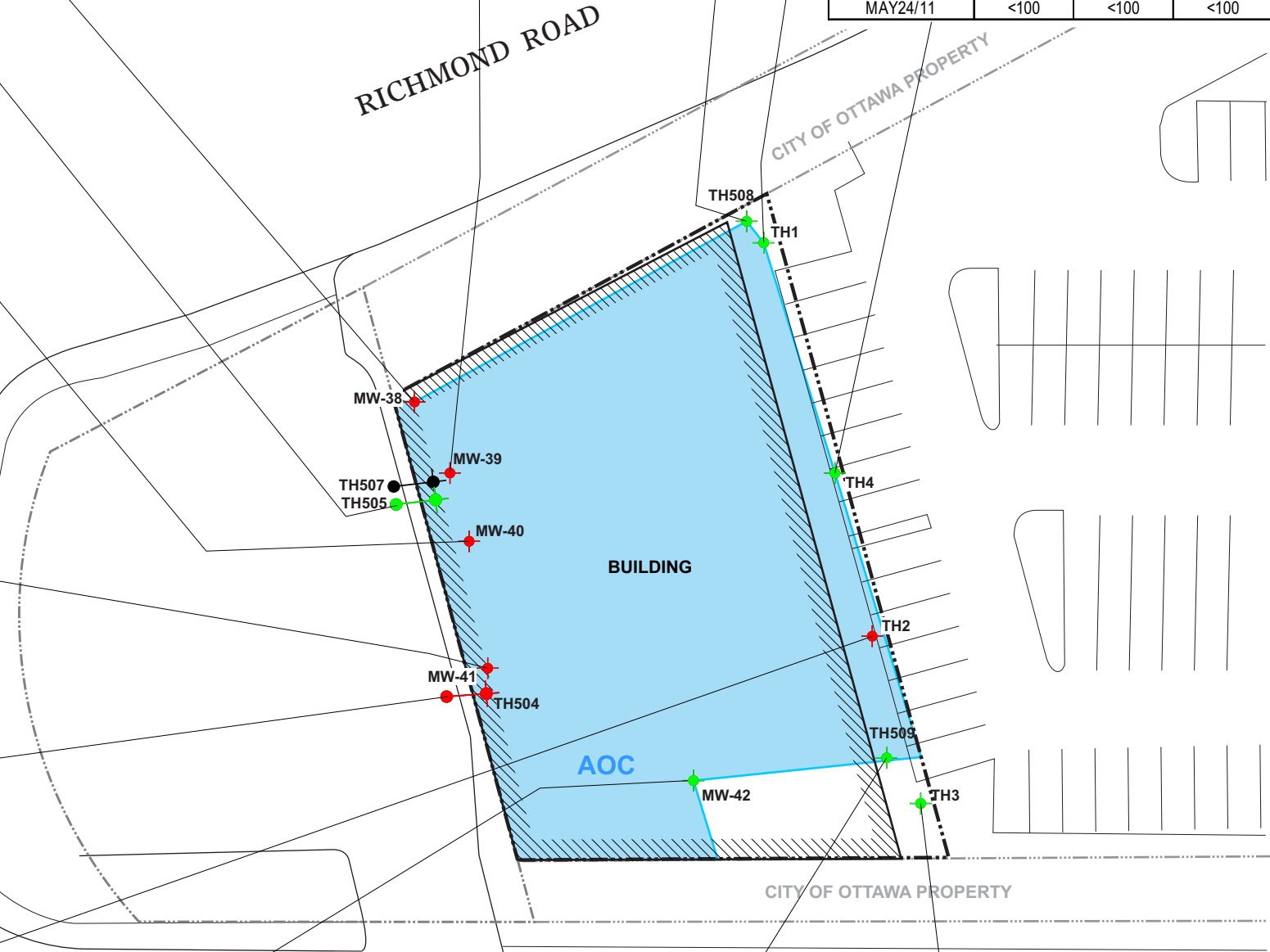
MONITOR LOCATION WHERE NO GROUND
WATER SAMPLE SUBMITTED FOR ANALYSIS

TEXT EXCEEDANCES OF REG 153/04 TABLE 3
STANDARDS

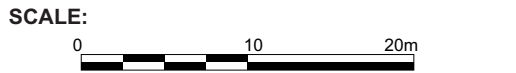
TEXT LIQUID PETROLEUM THICKNESS [IN METRES(m)]

ALL ANALYTICAL RESULTS ARE IN MICROGRAMS
PER LITRE (µg/L)
'mbgs' MEANS METRES BELOW GROUND
SURFACE
'-' MEANS NOT ANALYSED OR NOT APPLICABLE
'NM' MEANS NOT MEASURED
'<RDL' MEANS NOT DETECTED AT REPORTING
DETECTION LIMIT (RDL)
'RDL' ARE SHOWN FOR NON-DETECTED
RESULTS; FOR RDL OF REPORTABLE RESULTS,
SEE APPLICABLE DATA TABLE
(DUP) REPRESENTS FIELD DUPLICATE OF
PRECEDING SAMPLE

*STANDARDS SHOWN ARE FOR ALL TYPES OF
PROPERTY USE AND COARSE TEXTURED SOILS
IN A NON-POTABLE GROUND WATER CONDITION



SOURCE:
BASED ON SURVEY PLANS BY ANNIS,
O'SULLIVAN, VOLLEBEKK LTD. DATED SEPT. 27,
2007, FEB. 2, 2012 AND JUNE 10, 2013, AND
FIELD OBSERVATIONS BY EXP STAFF



	DRAWN BY	CHECKED BY
	K.G.	S.K.

GROUND WATER
ANALYTICAL RESULTS -
PETROLEUM HYDROCARBONS

FIGURE
8

1490 RICHMOND ROAD
OTTAWA, ONTARIO

PROJECT NUMBER: 01093 DATE: FEBRUARY 2019

MW38	SCREEN INTERVAL=1.8-4.8 mbgs			
DATE	F1	F2	F3	F4
NOV23/17	<25	<100	<200	<200
MAR13/19	120	-	-	-

MW39	SCREEN INTERVAL=2.4-5.5 mbgs			
DATE	F1	F2	F3	F4
NOV24/17	<25	<100	<200	<200
NOV24/17(DUP)	<25	<100	<200	<200

TH504	SCREEN INTERVAL = 3.0-5.7 mbgs			
DATE	F1	F2	F3	F4
NOV24/17	4800	1300	320	<200

MW40	SCREEN INTERVAL=2.3-5.3 mbgs			
DATE	F1	F2	F3	F4
NOV23/17	290	120	<200	<200

PARAMETER	ABBREVIATION	REG 153/04 TABLE 3 STANDARDS*
F1 (C ₆ -C ₁₀) - BTEX	F1	750
F2 (C ₁₀ -C ₁₆)	F2	150
F3 (C ₁₆ -C ₃₄)	F3	500
F4 (C ₃₄ -C ₆₀)	F4	500

LEGEND:

- RSC PROPERTY BOUNDARY
- ADJACENT BOUNDARY
- TEST HOLE WITH MONITOR
MW30, MW40 SERIES (AQUA TERRE, 1999)
TH1 SERIES (BARENCO, 2007)
TH500 SERIES (EXP, 2014)
- ANGLED TEST HOLE WITH MONITOR
TH500 SERIES (EXP, 2014)
- AREA OF CONTAMINATION

- MONITOR LOCATION WHERE GROUND WATER SAMPLE MEETS **REG 153/04 TABLE 3** STANDARDS FOR ALL PARAMETERS THAT WERE ANALYSED
- MONITOR LOCATION WHERE GROUND WATER SAMPLE EXCEEDS **REG 153/04 TABLE 3** STANDARDS FOR AT LEAST ONE PARAMETER ANALYSED
- MONITOR LOCATION WITH MEASURABLE OR OBSERVABLE LIQUID PETROLEUM DURING THE MOST RECENT GROUND WATER SAMPLING EVENT
- MONITOR LOCATION WHERE NO GROUND WATER SAMPLE SUBMITTED FOR ANALYSIS

TEXT EXCEEDANCES OF **REG 153/04 TABLE 3** STANDARDS

TEXT LIQUID PETROLEUM THICKNESS [IN METRES(m)]

ALL ANALYTICAL RESULTS ARE IN MICROGRAMS PER LITRE (µg/L)
'mbgs' MEANS METRES BELOW GROUND SURFACE
'-' MEANS NOT ANALYSED OR NOT APPLICABLE
'NM' MEANS NOT MEASURED
'<RDL' MEANS NOT DETECTED AT REPORTING DETECTION LIMIT (RDL)
'RDL' ARE SHOWN FOR NON-DETECTED RESULTS; FOR RDL OF REPORTABLE RESULTS, SEE APPLICABLE DATA TABLE
(DUP) REPRESENTS FIELD DUPLICATE OF PRECEDING SAMPLE

*STANDARDS SHOWN ARE FOR ALL TYPES OF PROPERTY USE AND COARSE TEXTURED SOILS IN A NON-POTABLE GROUND WATER CONDITION

SOURCE:

BASED ON SURVEY PLANS BY ANNIS, O'SULLIVAN, VOLLEBEKK LTD. DATED SEPT. 27, 2007, FEB. 2, 2012 AND JUNE 10, 2013, AND FIELD OBSERVATIONS BY EXP STAFF

SCALE:

0 10 20m



DRAWN BY	CHECKED BY
K.G.	S.K.

GROUND WATER ANALYTICAL RESULTS - PETROLEUM HYDROCARBONS - POST RISK ASSESSMENT

FIGURE 8-1

1490 RICHMOND ROAD
OTTAWA, ONTARIO

PROJECT NUMBER: 01093	DATE: FEBRUARY 2019
-----------------------	---------------------

MW38		SCREEN INTERVAL=1.8-4.8 mbgs																		
DATE	B	T	E	X	H	BF	CTC	CF	1,4-DCB	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	EDB	MC	MTBE	1,1,1,2-PCA	1,1,2,2-PCA	PCE	1,1,2-TCA	TCE
NOV29/05	1700	<40	260	740	-	<40	<20	<20	<40	<60	<20	<20	<40	<100	<40	<20	<20	<20	<40	<20
JUL19/07	530	<20	43	56	-	<20	<10	<10	<20	<10	<10	<10	<20	<50	<20	<10	<20	<10	<20	<10
JAN17/08	-	-	-	-	-	-	-	-	-	<20	<3	<3	<1	-	-	<3	<5	<3	<5	<3
MAY24/11	79	3.9	78	190	-	-	<0.20	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
OCT19/12	2000	64	1900	520	-	-	<0.20	-	-	0.51	-	-	-	-	-	-	-	-	-	-
NOV13/12	2100	35	660	300	-	-	<0.20	-	-	<0.60	-	-	-	-	-	-	-	-	-	-
JUN05/13	690	8.4	390	390	20	<5.0	<0.20	<2.0	<5.0	<0.50	0.58	<0.50	<0.20	<20	<5.0	<0.50	<0.50	<0.20	<0.50	0.30

MW39																		SCREEN INTERVAL=2.4-5.5 mbgs					
DATE	B	T	E	X	H	BF	CTC	CF	1,4-DCB	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	EDB	MC	MTBE	1,1,1,2-PCA	1,1,2,2-PCA	PCE	1,1,2-TCA	TCE			
NOV29/05	3200	110	380	1300	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
JUL19/07	210	<40	21	120	-	<10	<5	<5	<10	<5	<5	<5	<10	<30	<10	<5	<10	<5	<10	<5			
JUL19/07(DUP)	1300	92	310	750	-	<50	<30	<30	<50	<30	<30	<30	<50	<100	<50	<30	<50	<30	<50	<30			
JAN17/08	-	-	-	-	-	-	-	-	<100	<20	<20	<20	<1	-	-	<1	<2	<1	<40	<20			
MAY24/11	810	10	340	350	-	-	<0.20	-	-	<0.2	-	-	-	-	-	-	-	-	-	-			
JAN18_20/12	-	-	-	-	-	-	<25	-	-	<50	-	-	-	-	-	-	-	-	-	-			
OCT19/12	1400	62	1800	1600	-	-	<0.20	-	-	<0.50	-	-	-	-	-	-	-	-	-	-			
OCT19/12(DUP)	1400	64	1900	1600	-	-	<0.20	-	-	<0.50	-	-	-	-	-	-	-	-	-	-			
JUN06/13	1500	50	990	640	<20	<20	<0.20	<0.90	1.5	<0.50	1.4	<0.50	<0.20	<40	<10	<0.50	<0.50	<0.20	<0.50	<0.20			
JUN06/13(DUP)	1500	48	930	600	<20	<20	<0.20	<0.90	1.5	<0.50	1.4	<0.50	<0.20	<40	<10	<0.50	<0.50	<0.20	<0.50	<0.20			

MW40										SCREEN INTERVAL=2.3-5.3 mbgs										
DATE	B	T	E	X	H	BF	CTC	CF	1,4-DCB	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	EDB	MC	MTBE	1,1,1,2-PCA	1,1,2,2-PCA	PCE	1,1,2-TCA	TCE
NOV29/05	2000	220	1600	6000	-	<100	<50	<50	<100	<70	<50	<50	<100	<300	<100	<50	<50	<50	<100	<50
NOV29/05(DUP1)	1700	250	1700	6300	-	<100	<50	<50	<100	<70	<50	<50	<100	<300	<100	<50	<50	<50	<100	<50
JUL20/07	750	150	580	4600	-	<100	<50	<50	<100	<50	<50	<50	<100	<300	<100	<50	<100	<50	<100	<50
MAY24/11	470	44	310	3300	-	-	-	-	<90	<10	<10	<1	-	-	-	<1	<20	<1	<20	<10
MAY24/11(DUP)	430	48	1000	2300	-	-	<0.20	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
JAN18_20/12	-	-	-	-	-	-	<0.20	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
OCT19/12	500	8.2	640	670	-	-	<25	-	-	<50	-	-	-	-	-	-	-	-	-	-
JUN06/13	610	27	1200	1500	60	-	<0.20	-	-	<0.50	-	-	-	-	-	-	-	-	-	-

MW41	SCREEN INTERVAL=1.8-4.9 mbgs																			
DATE	B	T	E	X	H	BF	CTC	CF	1,4-DCB	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	EDB	MC	MTBE	1,1,1,2-PCA	1,1,2,2-PCA	PCE	1,1,2-TCA	TCE
NOV29/05	630	98	620	2200	-	<40	<20	<20	<40	<30	<20	<20	<40	<100	<40	<20	<20	<20	<40	<20
JUL20/07	390	120	900	3300	-	<100	<50	<50	<100	<50	<50	<50	<100	<300	<100	<50	<100	<50	<100	<50
JAN17/08	-	-	-	-	-	-	-	-	<10	<50	<50	<50	<1	-	-	<1	<2	<1	<100	<50

MW42	SCREEN INTERVAL=1.2-4.3 mbgs																			
DATE	B	T	E	X	H	BF	CTC	CF	1,4-DCB	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	EDB	MC	MTBE	1,1,1,2-PCA	1,1,2,2-PCA	PCE	1,1,2-TCA	TCE
NOV29/05	<0.1	<0.2	<0.1	<0.1	-	<0.2	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.2	<0.5	<0.2	<0.1	<0.1	<0.1	<0.2	<0.1
JUL19/07	<0.2	<0.2	<0.4	<0.2	-	<0.4	<0.2	4.4	<0.4	<0.2	<0.2	<0.2	<0.2	<0.4	<10	<0.2	<0.2	<0.4	<0.2	<0.4

TH504	SCREEN INTERVAL = 3.0-5.7 mbgs																			
DATE	B	T	E	X	H	BF	CTC	CF	1,4-DCB	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	EDB	MC	MTBE	1,1,1,2-PCA	1,1,2,2-PCA	PCE	1,1,2-TCA	TCE
MAY22/14	69	100	1000	3000	140	<50	<0.20	<0.20	<0.50	<0.50	<0.50	<0.50	<0.20	<100	<25	<0.50	<0.50	<0.20	<0.50	<0.20
MAY22/14(DUP)	71	100	1100	3100	130	<50	<0.20	<0.20	<0.50	<0.50	<0.50	<0.50	<0.20	<100	<25	<0.50	<0.50	<0.20	<0.50	<0.20

TH505	SCREEN INTERVAL = 9.5-10.8 mbgs																			
DATE	B	T	E	X	H	BF	CTC	CF	1,4-DCB	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	EDB	MC	MTBE	1,1,1,2-PCA	1,1,2,2-PCA	PCE	1,1,2-TCA	TCE
MAY22/14	61	36	33	100	1.1	<1.0	<0.20	<0.20	<0.50	<0.50	<0.50	<0.50	<0.20	<2.0	<2.5	<0.50	<0.50	<0.20	<0.50	<0.20
JUN10/14	130	110	72	180	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
JUN26/14	140	25	84	170	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TH507	SCREEN INTERVAL = 13.0-14.4 mbgs																			
DATE	B	T	E	X	H	BF	CTC	CF	1,4-DCB	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	EDB	MC	MTBE	1,1,1,2-PCA	1,1,2,2-PCA	PCE	1,1,2-TCA	TCE
JUL31/14	250	120	170	280	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TH508	SCREEN INTERVAL = 23.5-25.0 mbgs																			
DATE	B	T	E	X	H	BF	CTC	CF	1,4-DCB	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	EDB	MC	MTBE	1,1,1,2-PCA	1,1,2,2-PCA	PCE	1,1,2-TCA	TCE
DEC10/14	3.1	0.45	1.9	0.75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TH509	SCREEN INTERVAL = 11.3-12.8 mbgs																			
DATE	B	T	E	X	H	BF	CTC	CF	1,4-DCB	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	EDB	MC	MTBE	1,1,1,2-PCA	1,1,2,2-PCA	PCE	1,1,2-TCA	TCE
DEC10/14	<0.20	<0.20	<0.20	<0.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DEC10/14(DUP)	<0.20	<0.20	<0.20	<0.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

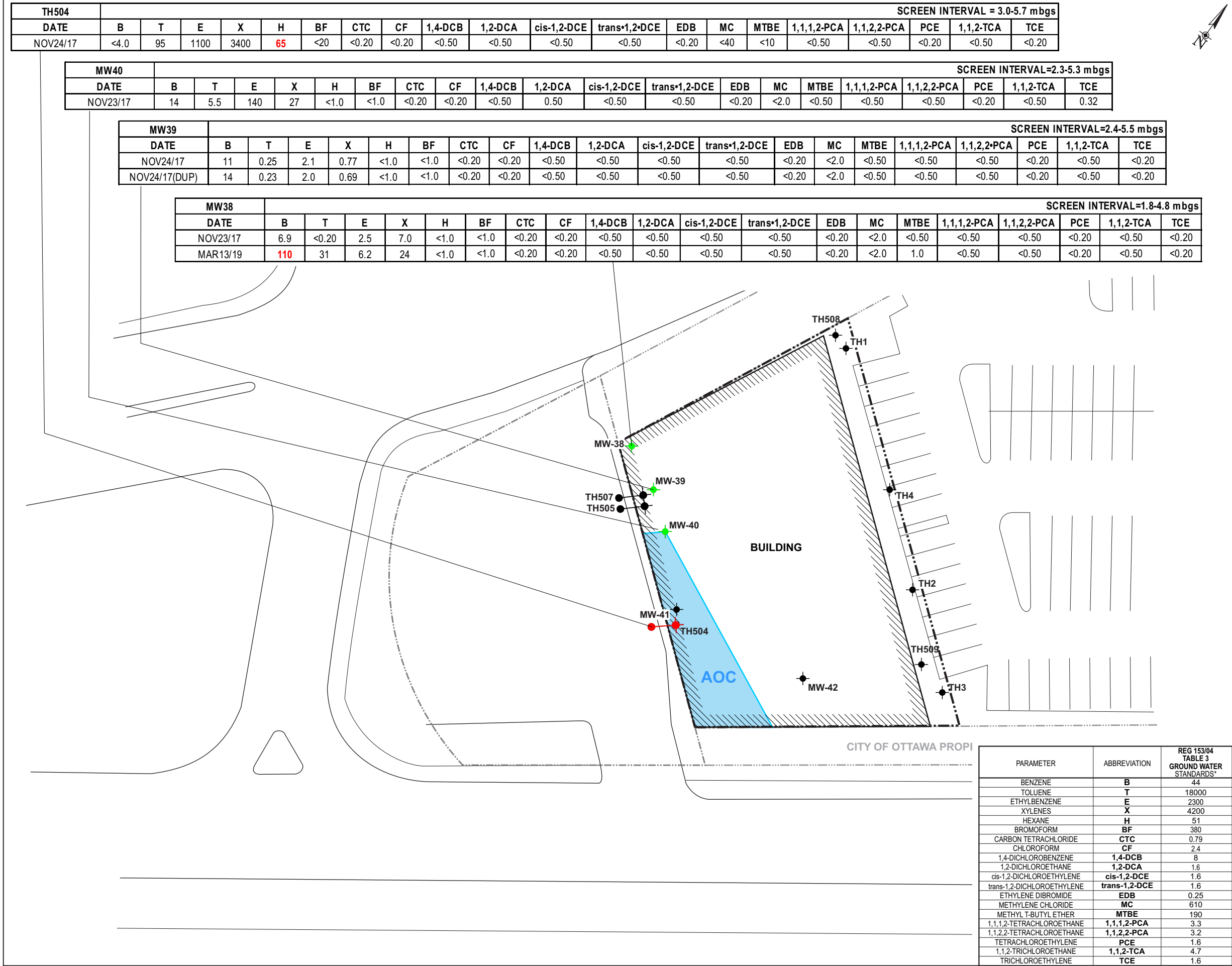


TH1	SCREEN INTERVAL=1.8-4.9 mbgs																			
DATE	B	T	E	X	H	BF	CTC	CF	1,4-DCB	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	EDB	MC	MTBE	1,1,1,2-PCA	1,1,2,2-PCA	PCE	1,1,2-TCA	TCE
JUL19/07	<0.1	<0.2	<0.1	<0.1	-	<0.2	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.2	<0.5	8.	<0.1	<0.2	<0.1	<0.1	<0.1

TH2	SCREEN INTERVAL=1.8-4.9 mbgs																			
DATE	B	T	E	X	H	BF	CTC	CF	1,4-DCB	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	EDB	MC	MTBE	1,1,1,2-PCA	1,1,2,2-PCA	PCE	1,1,2-TCA	TCE
JUL19/07	<0.1	<0.2	<0.1	<0.1	-	<0.2	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.2	<0.5	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1
JUL19/07(DUP)	<0.1	<0.2	<0.1	<0.1	-	<0.2	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.2	<0.5	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1

TH3	SCREEN INTERVAL=1.4-4.4 mbgs																			
DATE	B	T	E	X	H	BF	CTC	CF	1,4-DCB	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	EDB	MC	MTBE	1,1,1,2-PCA	1,1,2,2-PCA	PCE	1,1,2-TCA	TCE
JUL19/07	<0.1	0.3	<0.1	<0.1	-	<0.2	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.2	<0.5	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1

TH4	SCREEN INTERVAL=1.7-4.7 mbgs																				
DATE	B	T	E	X	H	BF	CTC	CF	1,4-DCB	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	EDB	MC	MTBE	1,1,1,2-PCA	1,1,2,2-PCA	PCE	1,1,1,2-TCA	TCE	
JUL19/07	<0.1	<0.2	<0.1	<0.1	-	<0.2	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.2	<0.5	-	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1
MAY24/11	<0.2	<0.2	<0.2	<0.4	-	-	<0.2	-	-	<0.5	-	-	<0.2	-	-	-	-	-	-	-	-



MW38	SCREEN INTERVAL=1.8-4.8 mbgs
DATE	Pb
NOV29/05	<0.5
JUL19/07	<0.5
MAY24/11	-
OCT19/12	-
NOV13/12	-
JUN05/13	<0.50

MW39	SCREEN INTERVAL=2.4-5.5 mbgs
DATE	Pb
NOV29/05	2.5
JUL19/07	0.6
JUL19/07(DUP)	0.8
MAY24/11	-
JAN20/12	-
OCT19/12	-
OCT19/12(DUP)	-
JUN06/13	<0.50
JUN06/13(DUP)	<0.50

MW40	SCREEN INTERVAL=2.3-5.3 mbgs
DATE	Pb
NOV29/05	1.1
NOV29/05(DUP1)	1.4
JUL20/07	1.3
MAY24/11	-
MAY24/11(DUP)	-
JAN20/12	-
OCT19/12	-
JUN06/13	<0.50

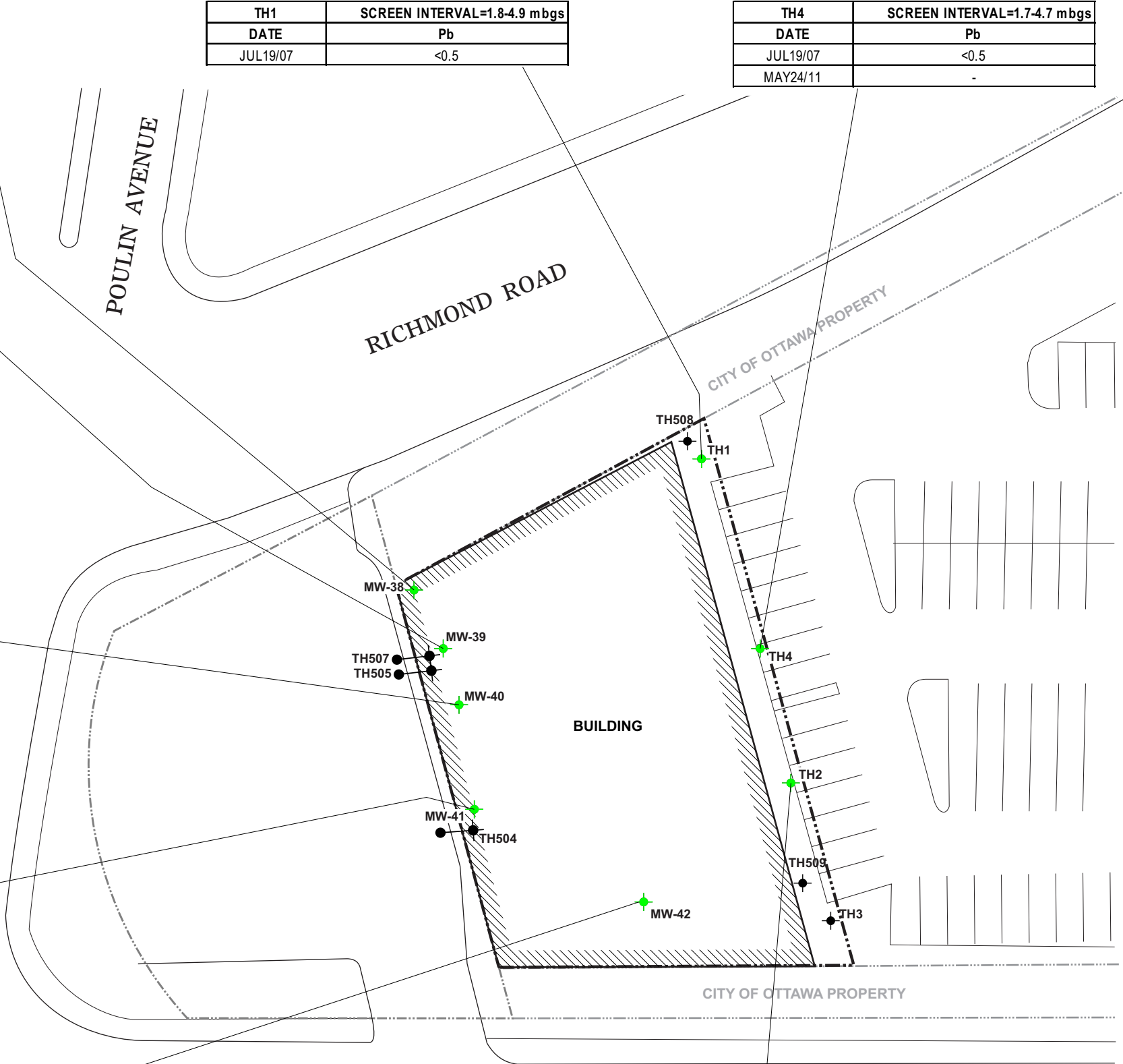
MW41	SCREEN INTERVAL=1.8-4.9 mbgs
DATE	Pb
NOV29/05	<0.5
JUL20/07	-

MW42	SCREEN INTERVAL=1.2-4.3 mbgs
DATE	Pb
NOV29/05	<0.5
JUL19/07	-

TH1	SCREEN INTERVAL=1.8-4.9 mbgs
DATE	Pb
JUL19/07	<0.5

TH4	SCREEN INTERVAL=1.7-4.7 mbgs
DATE	Pb
JUL19/07	<0.5
MAY24/11	-

TH2	SCREEN INTERVAL=1.8-4.9 mbgs
DATE	Pb
JUL19/07	<0.5
JUL19/07(DUP)	<0.5



LEGEND:

RSC PROPERTY BOUNDARY

ADJACENT BOUNDARY

TEST HOLE WITH MONITOR
MW30, MW40 SERIES (AQUA TERRE, 1999)
TH1 SERIES (BARENCO, 2007)
TH500 SERIES (EXP, 2014)

ANGLED TEST HOLE WITH MONITOR
TH500 SERIES (EXP, 2014)

MONITOR LOCATION WHERE GROUND WATER
SAMPLE MEETS **REG 153/04 TABLE 3**
STANDARDS FOR ALL PARAMETERS THAT WERE
ANALYSED

MONITOR LOCATION WHERE GROUND WATER
SAMPLE EXCEEDS **REG 153/04 TABLE 3**
STANDARDS FOR AT LEAST ONE PARAMETER
ANALYSED

MONITOR LOCATION WITH MEASURABLE OR
OBSERVABLE LIQUID PETROLEUM DURING THE
MOST RECENT GROUND WATER SAMPLING
EVENT

MONITOR LOCATION WHERE NO GROUND
WATER SAMPLE SUBMITTED FOR ANALYSIS

TEXT

EXCEEDANCES OF **REG 153/04 TABLE 3**
STANDARDS

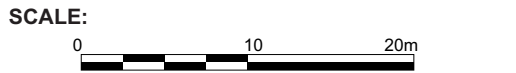
TEXT

LIQUID PETROLEUM THICKNESS [IN METRES(m)]

ALL ANALYTICAL RESULTS ARE IN MICROGRAMS
PER LITRE (µg/L)
'mbgs' MEANS METRES BELOW GROUND
SURFACE
'-' MEANS NOT ANALYSED OR NOT APPLICABLE
'NM' MEANS NOT MEASURED
'<RDL' MEANS NOT DETECTED AT REPORTING
DETECTION LIMIT (RDL)
'RDL' ARE SHOWN FOR NON-DETECTED
RESULTS; FOR RDL OF REPORTABLE RESULTS,
SEE APPLICABLE DATA TABLE
(DUP) REPRESENTS FIELD DUPLICATE OF
PRECEDING SAMPLE

*STANDARDS SHOWN ARE FOR ALL TYPES OF
PROPERTY USE AND COARSE TEXTURED SOILS
IN A NON-POTABLE GROUND WATER CONDITION

SOURCE:
BASED ON SURVEY PLANS BY ANNIS,
O'SULLIVAN, VOLLEBEKK LTD. DATED SEPT. 27,
2007, FEB. 2, 2012 AND JUNE 10, 2013, AND
FIELD OBSERVATIONS BY EXP STAFF



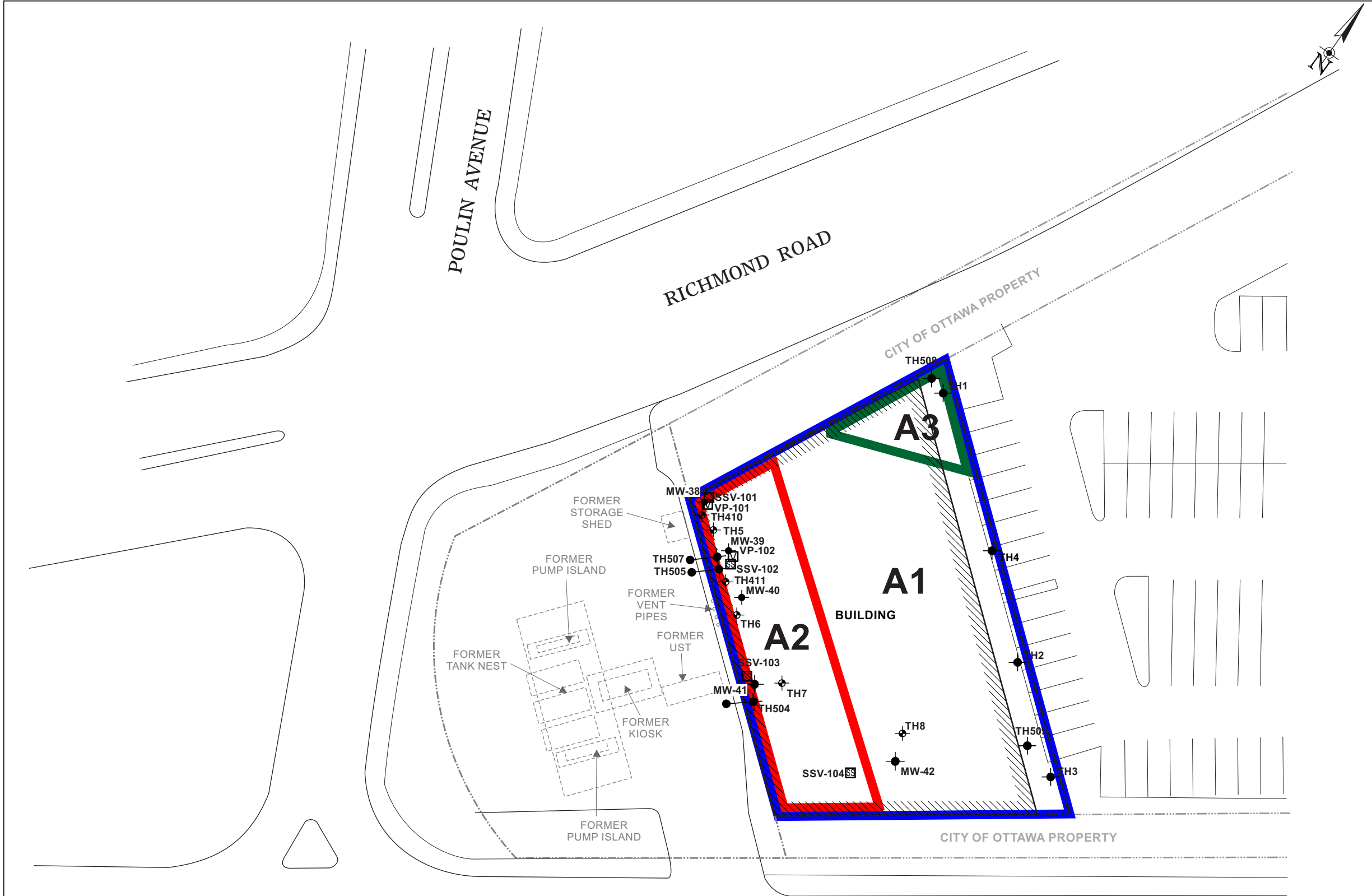
	DRAWN BY	CHECKED BY
	K.G.	S.K.

GROUND WATER
ANALYTICAL RESULTS -
LEAD

FIGURE
10

1490 RICHMOND ROAD OTTAWA, ONTARIO	
PROJECT NUMBER: 01093	DATE: FEBRUARY 2019

PARAMETER	ABBREVIATION	REG 153/04 TABLE 3 STANDARDS*
LEAD	Pb	25



LEGEND:

- RSC PROPERTY BOUNDARY
- ADJACENT BOUNDARY
- TEST HOLE
TH5-TH8 (BARENCO, 2007)
TH400 SERIES (EXP, 2013)
- TEST HOLE WITH MONITOR
MW30, MW40 SERIES (AQUA TERRE, 1999)
TH1 SERIES (BARENCO, 2007)
TH500 SERIES (EXP, 2014)
- VAPOUR PROBE
VP101-VP104 (EXP, 2013)
- SUB-SLAB VAPOUR PROBE
SSV-101-SSV-104 (EXP, 2013)
- ANGLED TEST HOLE WITH MONITOR
TH500 SERIES (EXP, 2014)
- FORMER FEATURES
- APEC
AREA OF POTENTIAL ENVIRONMENTAL CONCERN
- (28)
INDICATES ITEM NUMBER OF O. REG. 153/04 SCHEDULE D, TABLE 2
SEE FIGURE 3 FOR PCA

SOURCE:

BASED ON SURVEY PLANS BY ANNIS, O'SULLIVAN, VOLLEBEKK LTD. DATED SEPT. 27, 2007, FEB. 2, 2012 AND JUNE 10, 2013, AND FIELD OBSERVATIONS BY EXP STAFF

SCALE:

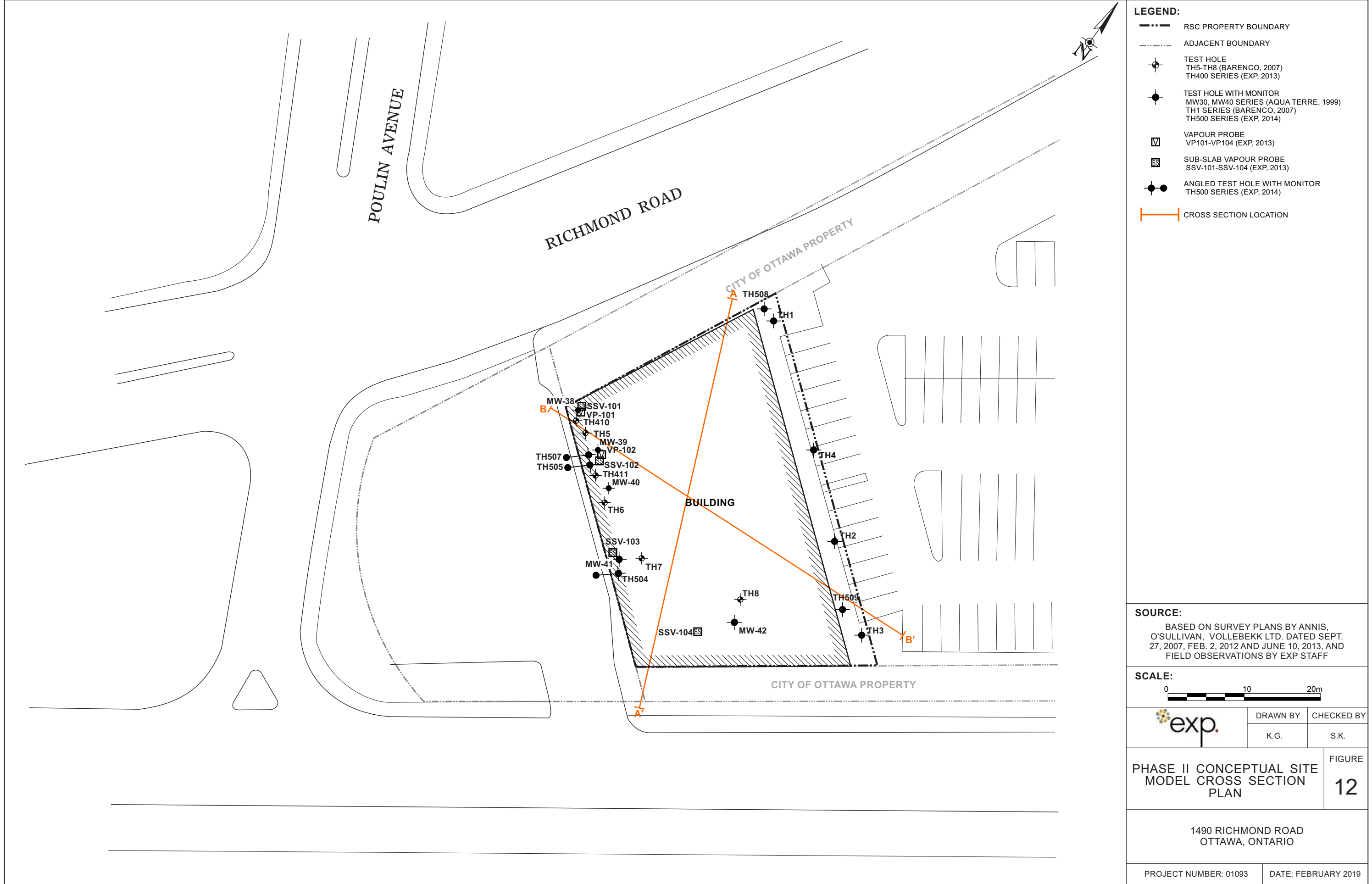
0 10 20m

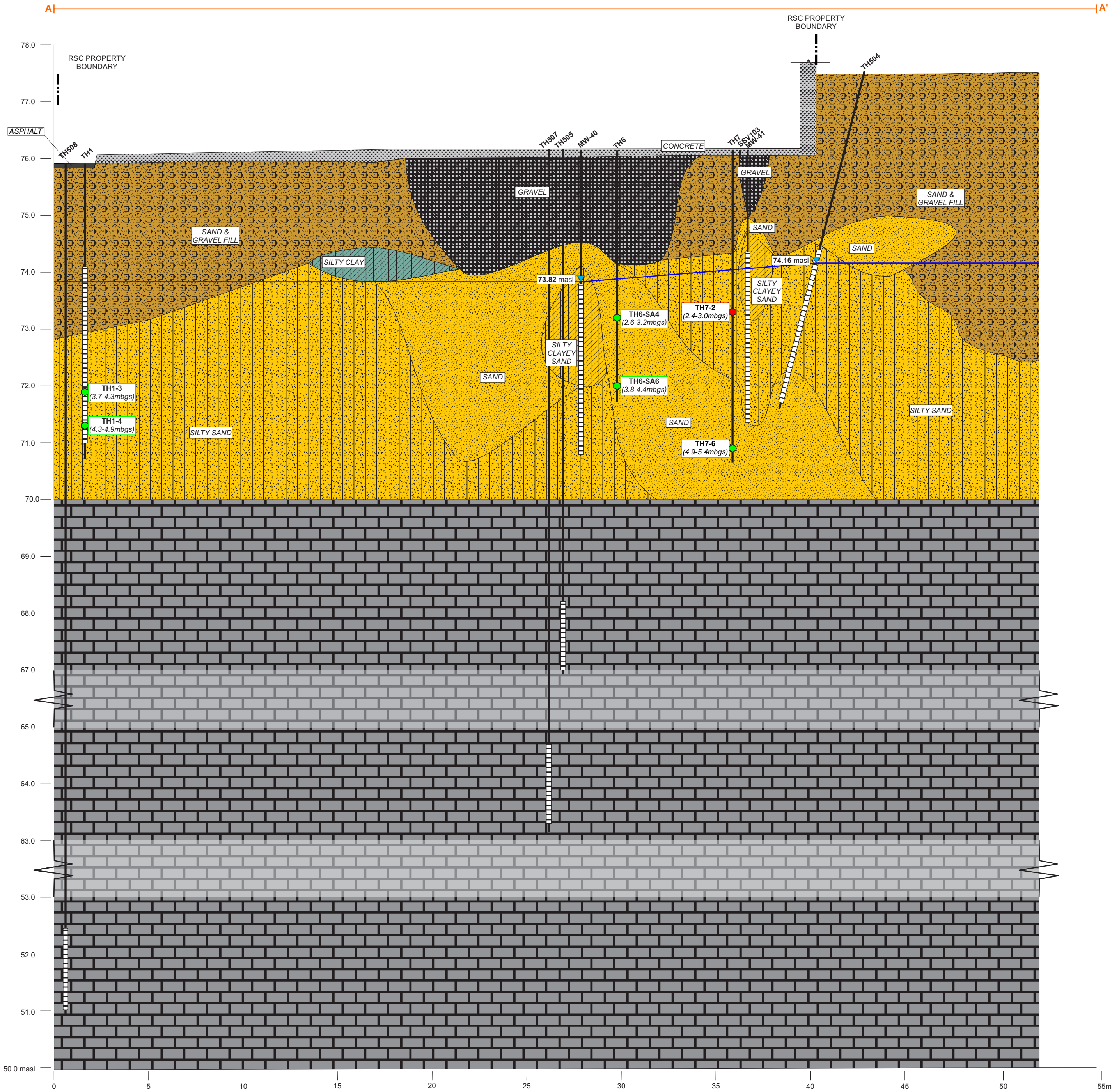
DRAWN BY	CHECKED BY
K.G.	S.K.

CONCEPTUAL SITE MODEL AREAS OF POTENTIAL ENVIRONMENTAL CONCERN	FIGURE
	11

1490 RICHMOND ROAD OTTAWA, ONTARIO	
PROJECT NUMBER: 01093	DATE: FEBRUARY 2019

APEC	PCA Source Number	POTENTIALLY CONTAMINATING ACTIVITY (PCA)
A1	S1	(30)IMPORTATION OF FILL MATERIAL OF UNKNOWN QUALITY
A2	S2	(30)IMPORTATION OF FILL MATERIAL OF UNKNOWN QUALITY
A2	S3	(28) GASOLINE AND ASSOCIATED PRODUCTS STORAGE IN FIXED TANKS
A3	S4	(28) GASOLINE AND ASSOCIATED PRODUCTS STORAGE IN FIXED TANKS





TH1	JUL04/07			
DEPTH (mbgs)	F1	F2	F3	F4
3.7-4.3	<10	<10	<10	<10
4.3-4.9	<10	<10	<10	<10

TH6	JUL04/07			
DEPTH (mbgs)	F1	F2	F3	F4
2.6-3.2	<10	<10	<10	<10
3.8-4.4	<10	<10	<10	<10

TH7	JUL18/07			
DEPTH (mbgs)	F1	F2	F3	F4
2.4-3.0	100	790	760	340
2.4-3.0(DUP)	150	1600	1400	630
4.9-5.4	<10	<10	<10	<10

SCALE:
2X VERTICAL EXAGGERATION

SOURCE:
BASED ON FIELD MEASUREMENTS
BY EXP STAFF

DRAWN BY
K.G.

CHECKED BY
S.K.

NOTES:
ANALYTICAL CONCENTRATIONS OF SOIL AND/OR GROUND WATER SAMPLES SHOWN ARE PROVIDED WITHIN THE PHASE II ENVIRONMENTAL SITE ASSESSMENT REPORT TABLES AND FIGURES.

LEGEND:

TEST HOLE

SCREEN INTERVAL

GROUND WATER ELEVATION (NOV. 20, 2017)

SAND

SAND & GRAVEL FILL

SILTY SAND

SILTY CLAYEY SAND

SILTY CLAY

CONCRETE

GRAVEL

ASPHALT

LIMESTONE

- LOCATION WHERE ALL SOIL SAMPLES MEET REG 153/04 TABLE 3 STANDARDS FOR ALL PARAMETERS THAT WERE ANALYSED
- LOCATION WHERE AT LEAST ONE SOIL SAMPLE EXCEEDS REG 153/04 TABLE 3 STANDARDS FOR AT LEAST ONE PARAMETER ANALYSED
- TEXT EXCEEDANCES OF REG 153/04 TABLE 3 STANDARDS

ALL ANALYTICAL RESULTS ARE IN MICROGRAMS PER GRAM (µg/g), DRY WEIGHT BASIS
'DEPTH(m)' MEANS DEPTH IN METRES BELOW GROUND SURFACE
'-' MEANS NOT ANALYSED OR NOT APPLICABLE
'NM' MEANS NOT MEASURED
'<RDL' MEANS NOT DETECTED AT REPORTING DETECTION LIMIT (RDL)
'RDL' ARE SHOWN FOR NON-DETECTED RESULTS; FOR RDL OF REPORTABLE RESULTS, SEE APPLICABLE DATA TABLE
(DUP) REPRESENTS FIELD DUPLICATE OF PRECEDING SAMPLE
*STANDARDS SHOWN ARE FOR INDUSTRIAL/COMMERCIAL/COMMUNITY PROPERTY USE AND COARSE TEXTURED SOILS IN A NON-POTABLE GROUND WATER CONDITION

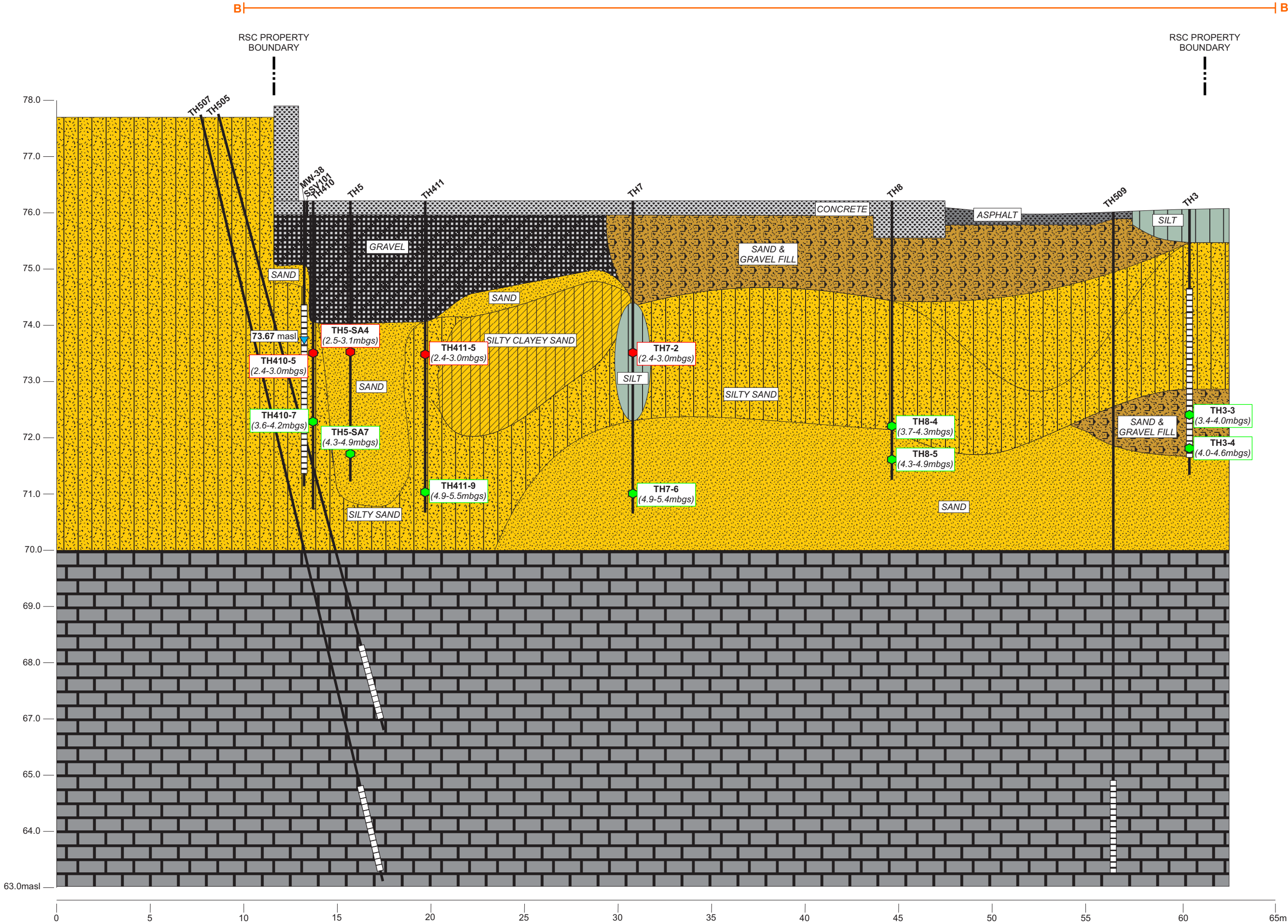
PARAMETER	ABBREVIATION	REG 153/04 TABLE 3 SOIL STANDARDS*
F1 (C ₁ -C ₁₀) - BTX	F1	55
F2 (C ₁ -C ₁₀)	F2	230
F3 (C ₁ -C ₁₀)	F3	1700
F4 (C ₁ -C ₁₀)	F4	3300

PHASE II CONCEPTUAL SITE MODEL
CROSS SECTION A-A' - SOIL ANALYTICAL RESULTS - PETROLEUM HYDROCARBONS

FIGURE 13

1490 RICHMOND ROAD
OTTAWA, ONTARIO

PROJECT NUMBER: 01093 DATE: FEBRUARY 2019



TH410	MAY14/13				
DEPTH (mbgs)	F1	F2	F3	F4	Pb
2.4-3.0	1600	260	230	<50	2.9
3.6-4.2	<10	<10	<50	<50	3.5

TH411	MAY14/13				
DEPTH (mbgs)	F1	F2	F3	F4	Pb
2.4-3.0	270	200	3700	360	4.3
4.9-5.5	<10	<10	<50	<50	4.7

TH3	JUL04/07				
DEPTH (mbgs)	F1	F2	F3	F4	Pb
3.4-4.0	<10	<10	<10	<10	<5
3.4-4.0(DUP)	<10	<10	<10	<10	<5
4.0-4.6	<10	<10	<10	<10	<5

TH5	JUL04/07				
DEPTH (mbgs)	F1	F2	F3	F4	Pb
2.5-3.1	600	510	1200	120	12
4.3-4.9	<10	<10	<10	<10	<5

TH7	JUL18/07				
DEPTH (mbgs)	F1	F2	F3	F4	Pb
2.4-3.0	100	790	760	340	7
2.4-3.0(DUP)	150	1600	1400	630	7
4.9-5.4	<10	<10	<10	<10	5

TH8	JUL18/07				
DEPTH (mbgs)	F1	F2	F3	F4	Pb
3.7-4.3	<10	<10	<10	<10	6
4.3-4.9	<10	<10	<10	<10	8

SCALE:
3X VERTICAL EXAGGERATION

SOURCE:
BASED ON FIELD MEASUREMENTS
BY EXP STAFF

exp.

DRAWN BY
K.G.

CHECKED BY
S.K.

NOTES:
ANALYTICAL CONCENTRATIONS OF SOIL AND/OR GROUND WATER SAMPLES SHOWN ARE PROVIDED WITHIN THE PHASE II ENVIRONMENTAL SITE ASSESSMENT REPORT TABLES AND FIGURES.

LEGEND:

TEST HOLE

SCREEN INTERVAL

GROUND WATER ELEVATION (NOV. 20, 2017)

SAND

SAND & GRAVEL FILL

SILTY SAND

SILTY CLAYEY SAND

SILT

ASPHALT

CONCRETE

GRAVEL

LIMESTONE

●

LOCATION WHERE ALL SOIL SAMPLES MEET **REG 153/04 TABLE 3** STANDARDS FOR ALL PARAMETERS THAT WERE ANALYSED

●

LOCATION WHERE AT LEAST ONE SOIL SAMPLE EXCEEDS **REG 153/04 TABLE 3** STANDARDS FOR AT LEAST ONE PARAMETER ANALYSED

TEXT EXCEEDANCES OF **REG 153/04 TABLE 3** STANDARDS

ALL ANALYTICAL RESULTS ARE IN MICROGRAMS PER GRAM (µg/g), DRY WEIGHT BASIS

DEPTH(m) MEANS DEPTH IN METRES BELOW GROUND SURFACE

“-” MEANS NOT ANALYSED OR NOT APPLICABLE

“NM” MEANS NOT MEASURED

“<RDL” MEANS NOT DETECTED AT REPORTING DETECTION LIMIT (RDL)

“RDL” ARE SHOWN FOR NON-DETECTED RESULTS; FOR RDL OF REPORTABLE RESULTS, SEE APPLICABLE DATA TABLE

(DUP) REPRESENTS FIELD DUPLICATE OF PRECEDING SAMPLE

*STANDARDS SHOWN ARE FOR INDUSTRIAL/COMMERCIAL/COMMUNITY PROPERTY USE AND COARSE TEXTURED SOILS IN A NON-POTABLE GROUND WATER CONDITION

PARAMETER

ABBREVIATION

REG 153/04 TABLE 3 SOIL STANDARDS*

F1 (C₁-C₁) - BTX	F1	55
F2 (C₂-C₂)	F2	230
F3 (C₃-C₃)	F3	1700
F4 (C₄-C₄)	F4	3300

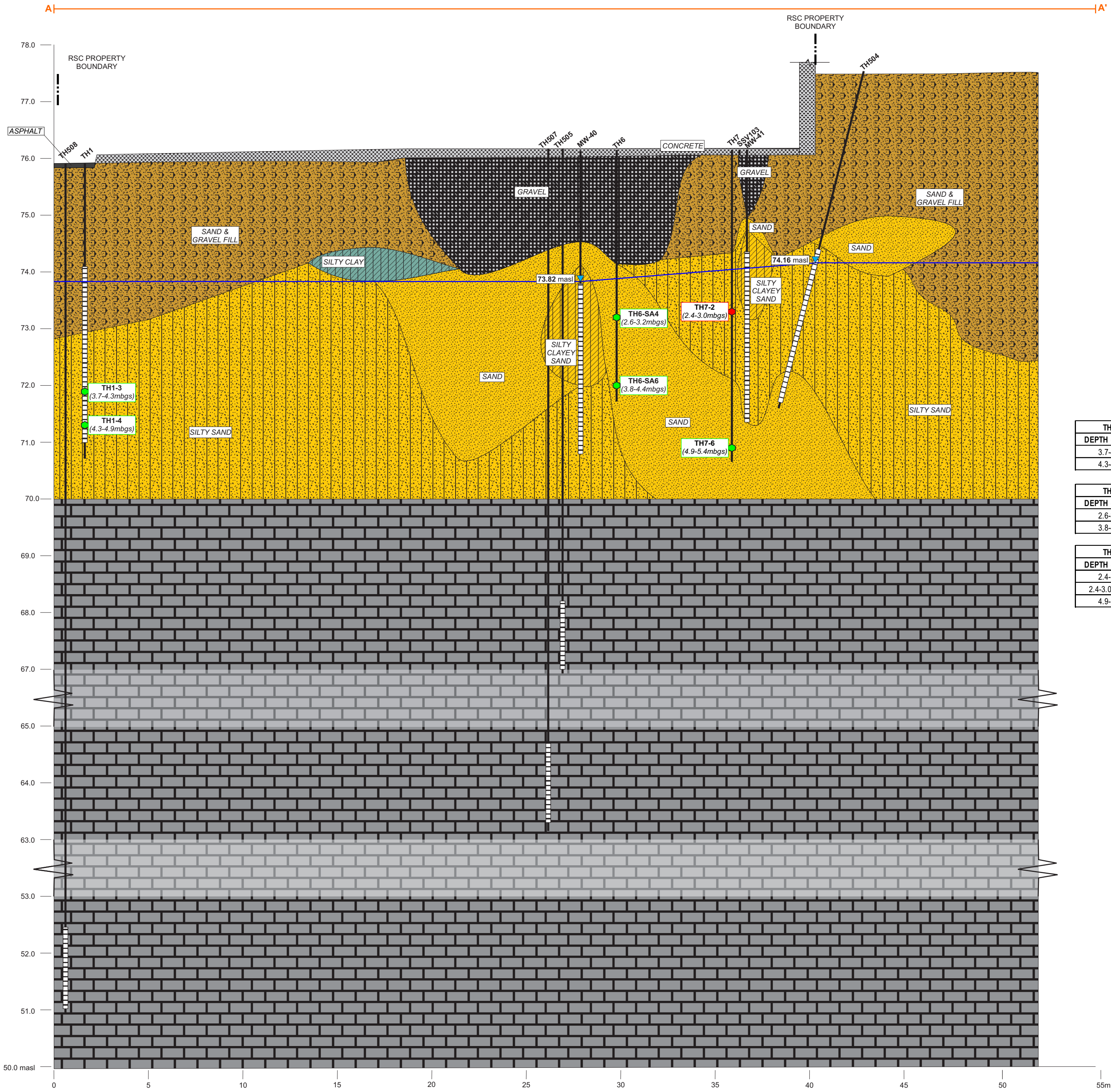
PHASE II CONCEPTUAL SITE MODEL
CROSS SECTION B-B' - SOIL ANALYTICAL RESULTS - PETROLEUM HYDROCARBONS

FIGURE
14

1490 RICHMOND ROAD
OTTAWA, ONTARIO

PROJECT NUMBER: 01093
DATE: FEBRUARY 2019

01093-RSC 1490 XSECB-FEB19/SOIL.PET



TH1		JUL04/07							
DEPTH (mbgs)	B	T	E	X	H	1,4-DBC	1,2-DCA	1,1,2,2-PCA	1,1,2-TCA
3.7-4.3	<0.002	<0.002	<0.002	<0.002	-	-	-	-	-
4.3-4.9	<0.002	<0.002	<0.002	<0.002	-	-	-	-	-

TH6		JUL04/07							
DEPTH (mbgs)	B	T	E	X	H	1,4-DBC	1,2-DCA	1,1,2,2-PCA	1,1,2-TCA
2.6-3.2	0.019	0.002	0.066	0.062	-	-	-	-	-
3.8-4.4	0.3	<0.1	0.8	1.5	-	-	-	-	-

TH7		JUL18/07							
DEPTH (mbgs)	B	T	E	X	H	1,4-DBC	1,2-DCA	1,1,2,2-PCA	1,1,2-TCA
2.4-3.0	0.5	0.1	0.04	8.3	-	-	-	-	-
2.4-3.0(DUP)	0.57	0.20	0.37	22	-	-	-	-	-
4.9-5.4	0.3	<0.02	0.03	0.09	-	-	-	-	-

PARAMETER	ABBREVIATION	REG 153/04 TABLE 3 STANDARDS*
BENZENE	B	0.32
TOLUENE	T	68
ETHYLBENZENE	E	9.5
XYLENES	X	26
HEXANE	H	46
1,4-DICHLOROEBENZENE	1,4-DCB	0.2
1,2-DICHLOROETHANE	1,2-DCA	0.05
1,1,2,2-TETRACHLOROETHANE	1,1,2,2-PCA	0.05
1,1,2-TRICHLOROETHANE	1,1,2-TCA	0.05

PHASE II CONCEPTUAL SITE MODEL
CROSS SECTION A-A' - SOIL ANALYTICAL RESULTS - VOLATILE ORGANIC COMPOUNDS

FIGURE 15

1490 RICHMOND ROAD
OTTAWA, ONTARIO

PROJECT NUMBER: 01093

DATE: FEBRUARY 2019

SCALE:
2X VERTICAL EXAGGERATION

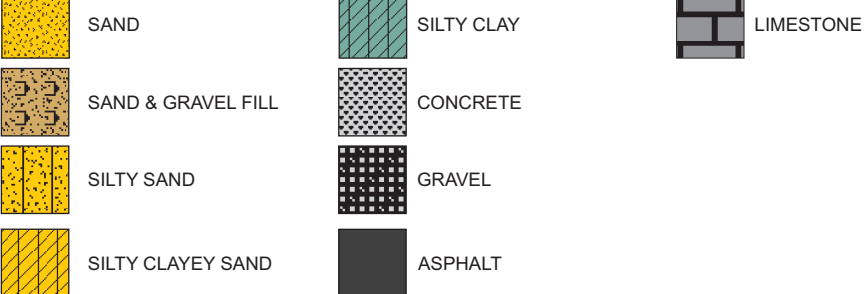
SOURCE:
BASED ON FIELD MEASUREMENTS
BY EXP STAFF



DRAWN BY	CHECKED BY
K.G.	S.K.

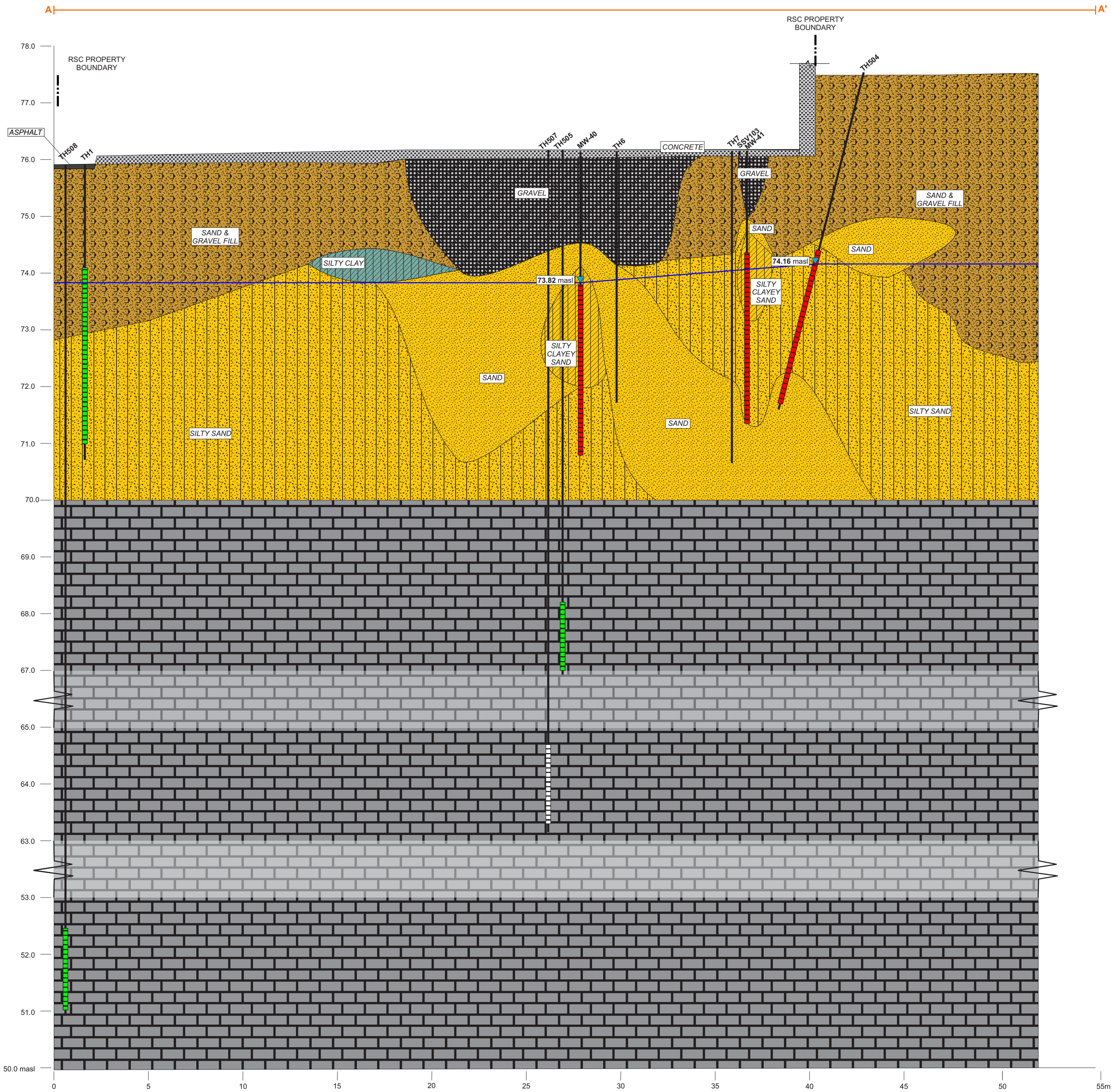
NOTES:
ANALYTICAL CONCENTRATIONS OF SOIL AND/OR GROUND WATER SAMPLES SHOWN ARE PROVIDED WITHIN THE PHASE II ENVIRONMENTAL SITE ASSESSMENT REPORT TABLES AND FIGURES.

LEGEND:
TEST HOLE
SCREEN INTERVAL
GROUND WATER ELEVATION (NOV. 20, 2017)



● LOCATION WHERE ALL SOIL SAMPLES MEET REG 153/04 TABLE 3 STANDARDS FOR ALL PARAMETERS THAT WERE ANALYSED
● LOCATION WHERE AT LEAST ONE SOIL SAMPLE EXCEEDS REG 153/04 TABLE 3 STANDARDS FOR AT LEAST ONE PARAMETER ANALYSED
TEXT EXCEEDANCES OF REG 153/04 TABLE 3 STANDARDS

ALL ANALYTICAL RESULTS ARE IN MICROGRAMS PER GRAM (µg/g), DRY WEIGHT BASIS
DEPTH(m) MEANS DEPTH IN METRES BELOW GROUND SURFACE
- MEANS NOT ANALYSED OR NOT APPLICABLE
NM MEANS NOT MEASURED
NDL MEANS NOT DETECTED AT REPORTING DETECTION LIMIT (RDL)
RDL ARE SHOWN FOR NON-DETECTED RESULTS; FOR RDL OF REPORTABLE RESULTS, SEE APPLICABLE DATA TABLE
(DUP) REPRESENTS FIELD DUPLICATE OF PRECEDING SAMPLE
*STANDARDS SHOWN ARE FOR INDUSTRIAL/COMMERCIAL/COMMUNITY PROPERTY USE AND COARSE TEXTURED SOILS IN A NON-POTABLE GROUND WATER CONDITION



TH1	SCREEN INTERVAL: 1.8-4.9 mbgs			
DATE	F1	F2	F3	F4
JUL19/07	<100	<100	<100	<100

TH504	SCREEN INTERVAL = 3.0-5.7 mbgs			
DATE	F1	F2	F3	F4
MAY22/14	5000	1700	<200	<200
MAY22/14(DUP)	5300	1800	<200	<200

TH505	SCREEN INTERVAL = 9.5-10.8 mbgs			
DATE	F1	F2	F3	F4
MAY22/14	85	<100	<200	<200
JUN10/14	-	-	-	-
JUN26/14	-	-	-	-

TH508	SCREEN INTERVAL = 23.5-25.0 mbgs			
DATE	F1	F2	F3	F4
DEC10/14	<25	<100	<200	<200

MW40	SCREEN INTERVAL: 2.3-5.3 mbgs			
DATE	F1	F2	F3	F4
NOV29/05	6000	2300	1600	<100
NOV29/05(DUP1)	5400	2100	2500	160
JUL20/07	2900	1000	320	<100
MAY24/11	2500	1900	600	<100
MAY24/11(DUP)	3200	1800	330	<100
JAN20/12	-	-	-	<100
OCT19/12	1000	330	<100	<100
JUN06/13	2100	940	<200	<200

MW41	SCREEN INTERVAL: 1.8-4.9 mbgs			
DATE	F1	F2	F3	F4
NOV29/05	2400	1700	680	<100
JUL20/07	2100	510	180	<100

PARAMETER	ABBREVIATION	REG 153/04 TABLE 3 STANDARDS*
F1 (C ₁ -C ₁₀) - BTEx	F1	750
F2 (C ₁₁ -C ₂₀)	F2	150
F3 (C ₂₁ -C ₄₀)	F3	500
F4 (C ₄₁ -C ₆₀)	F4	500

PHASE II CONCEPTUAL SITE MODEL
CROSS SECTION A-A' - GROUND WATER ANALYTICAL RESULTS - PETROLEUM HYDROCARBONS

FIGURE
17

1490 RICHMOND ROAD
OTTAWA, ONTARIO

PROJECT NUMBER: 01093 DATE: FEBRUARY 2019

SCALE:
2X VERTICAL EXAGGERATION

SOURCE:
BASED ON FIELD MEASUREMENTS
BY EXP STAFF

DRAWN BY
K.G.

CHECKED BY
S.K.

NOTES:
ANALYTICAL CONCENTRATIONS OF SOIL AND/OR GROUND WATER SAMPLES SHOWN ARE PROVIDED WITHIN THE PHASE II ENVIRONMENTAL SITE ASSESSMENT REPORT TABLES AND FIGURES.

LEGEND:

TEST HOLE

SCREEN INTERVAL

GROUND WATER ELEVATION (NOV. 20, 2017)

SAND

SAND & GRAVEL FILL

SILTY SAND

SILTY CLAYEY SAND

SILTY CLAY

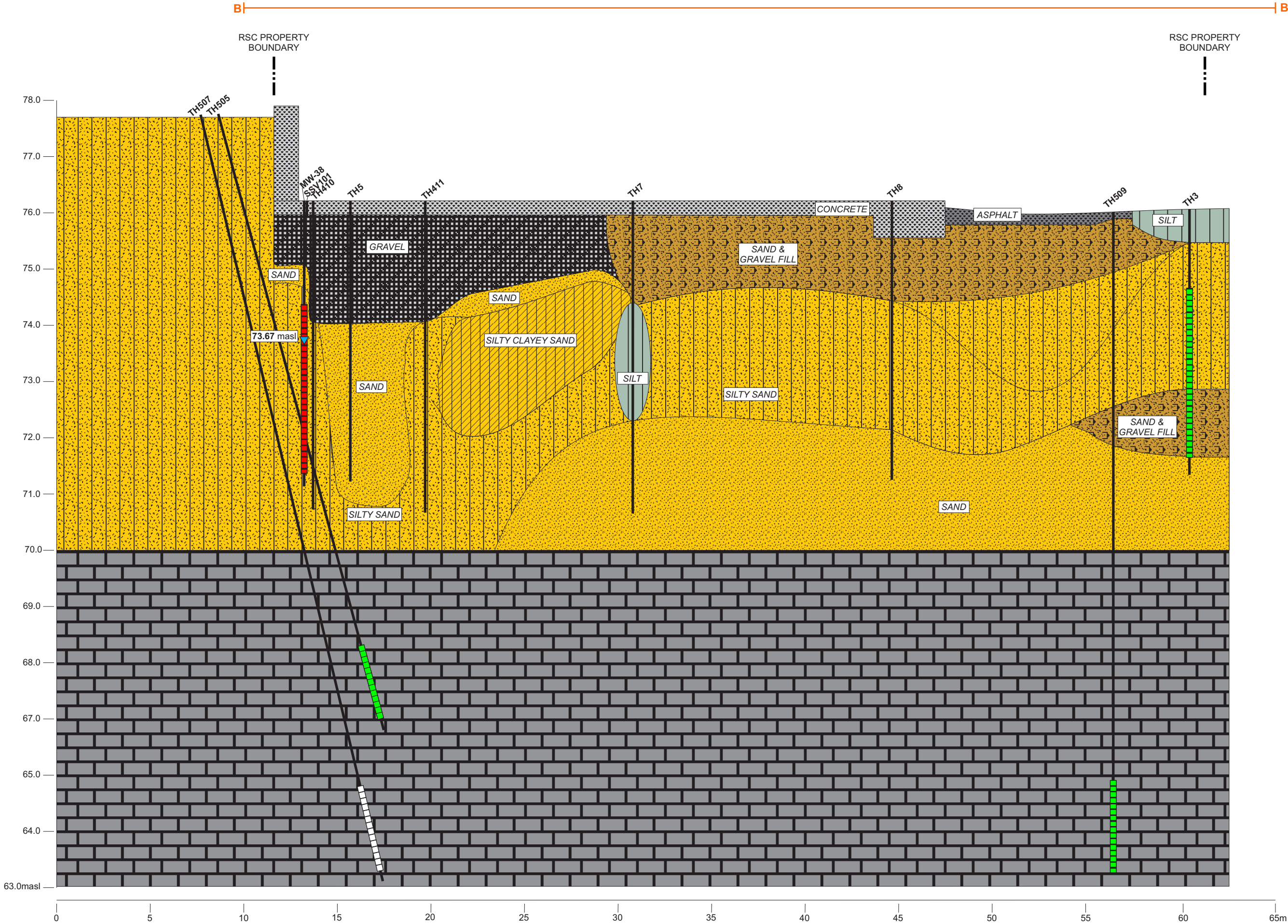
CONCRETE

GRAVEL

ASPHALT

LIMESTONE

MONITOR LOCATION WHERE GROUND WATER SAMPLE MEETS REG 153/04 TABLE 3 STANDARDS FOR ALL PARAMETERS THAT WERE ANALYSED
MONITOR LOCATION WHERE GROUND WATER SAMPLE EXCEEDS REG 153/04 TABLE 3 STANDARDS FOR AT LEAST ONE PARAMETER ANALYSED
EXCEEDANCES OF REG 153/04 TABLE 3 STANDARDS
ALL ANALYTICAL RESULTS ARE IN MICROGRAMS PER LITRE (µg/L)
mbgs* MEANS METRES BELOW GROUND SURFACE
- MEANS NOT ANALYSED OR NOT APPLICABLE
NM MEANS NOT MEASURED
*RDL MEANS NOT DETECTED AT REPORTING DETECTION LIMIT (RDL)
RDL ARE SHOWN FOR NON-DETECTED RESULTS; FOR RDL OF REPORTABLE RESULTS, SEE APPLICABLE DATA TABLE (DUP) REPRESENTS FIELD DUPLICATE OF PRECEDING SAMPLE
*STANDARDS SHOWN ARE FOR ALL TYPES OF PROPERTY USE AND COARSE TEXTURED SOILS IN A NON-POTABLE GROUND WATER CONDITION



TH505	SCREEN INTERVAL = 9.5-10.8 mbgs			
DATE	F1	F2	F3	F4
MAY22/14	85	<100	<200	<200
JUN10/14	-	-	-	-
JUN26/14	-	-	-	-

MW38	SCREEN INTERVAL=1.8-4.8 mbgs			
DATE	F1	F2	F3	F4
NOV29/05	<2000	530	230	<100
JUL19/07	<500	<100	<100	<100
MAY24/11	320	<100	<100	<100
OCT19/12	890	300	<100	<100
NOV13/12	<250	290	<100	<100
JUN05/13	740	350	<200	<200

TH3	SCREEN INTERVAL=1.4-4.4 mbgs			
DATE	F1	F2	F3	F4
JUL19/07	<100	<100	<100	<100

TH509	SCREEN INTERVAL = 11.3-12.8 mbgs			
DATE	F1	F2	F3	F4
DEC10/14	<25	<100	<200	<200
DEC10/14(DUP)	<25	<100	<200	<200

SCALE:
3X VERTICAL EXAGGERATION

SOURCE:
BASED ON FIELD MEASUREMENTS
BY EXP STAFF

DRAWN BY
K.G.

CHECKED BY
S.K.

NOTES:
ANALYTICAL CONCENTRATIONS OF SOIL AND/OR GROUND WATER SAMPLES SHOWN ARE PROVIDED WITHIN THE PHASE II ENVIRONMENTAL SITE ASSESSMENT REPORT TABLES AND FIGURES.

LEGEND:

TEST HOLE

SCREEN INTERVAL

GROUND WATER ELEVATION
(NOV. 20, 2017)

SAND

SAND & GRAVEL FILL

SILTY SAND

SILTY CLAYEY SAND

SILT

ASPHALT

CONCRETE

GRAVEL

LIMESTONE

MONITOR LOCATION WHERE GROUND WATER SAMPLE MEETS REG 153/04 TABLE 3 STANDARDS FOR ALL PARAMETERS THAT WERE ANALYSED

MONITOR LOCATION WHERE GROUND WATER SAMPLE EXCEEDS REG 153/04 TABLE 3 STANDARDS FOR AT LEAST ONE PARAMETER ANALYSED

EXCEEDANCES OF REG 153/04 TABLE 3 STANDARDS

ALL ANALYTICAL RESULTS ARE IN MICROGRAMS PER LITRE (µg/L)

'mbgs' MEANS METRES BELOW GROUND SURFACE

'-' MEANS NOT ANALYSED OR NOT APPLICABLE

'NM' MEANS NOT MEASURED

'RDL' MEANS NOT DETECTED AT REPORTING DETECTION LIMIT (RDL)

'RDL' ARE SHOWN FOR NON-DETECTED RESULTS; FOR RDL OF REPORTABLE RESULTS, SEE APPLICABLE DATA TABLE (DUP) REPRESENTS FIELD DUPLICATE OF PRECEDING SAMPLE

*STANDARDS SHOWN ARE FOR ALL TYPES OF PROPERTY USE AND COARSE TEXTURED SOILS IN A NON-POTABLE GROUND WATER CONDITION

PARAMETER	ABBREVIATION	REG 153/04 TABLE 3 STANDARDS*
F1 (C ₁ -C ₁₀) - BTEX	F1	750
F2 (C ₁₁ -C ₁₄)	F2	150
F3 (C ₁₅ -C ₂₄)	F3	500
F4 (C ₂₅ -C ₃₀)	F4	500

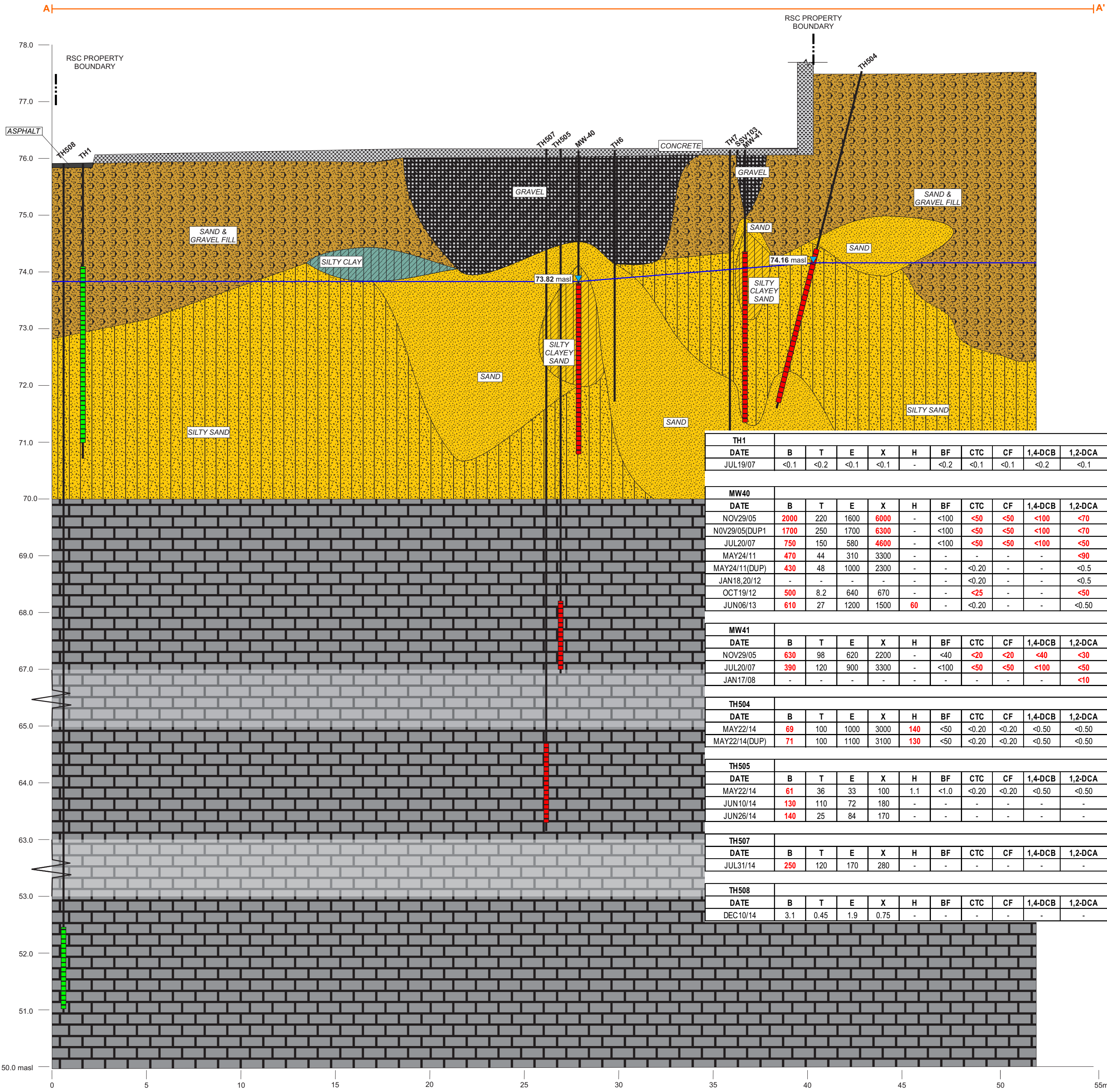
PHASE II CONCEPTUAL SITE MODEL
CROSS SECTION B-B' - GROUND WATER ANALYTICAL RESULTS - PETROLEUM HYDROCARBONS

FIGURE
18

1490 RICHMOND ROAD
OTTAWA, ONTARIO

PROJECT NUMBER: 01093

DATE: FEBRUARY 2019



TH1	SCREEN INTERVAL=1.8-4.9 mbgs																			
DATE	B	T	E	X	H	BF	CTC	CF	1,4-DCB	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	EDB	MC	MTBE	1,1,1,2-PCA	1,1,2,2-PCA	PCE	1,1,2-TCA	TCE
JUL19/07	<0.1	<0.2	<0.1	<0.1	-	<0.2	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.2	<0.5	8.	<0.1	<0.2	<0.1	<0.1	<0.1

MW40	SCREEN INTERVAL=2.3-5.3 mbgs																			
DATE	B	T	E	X	H	BF	CTC	CF	1,4-DCB	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	EDB	MC	MTBE	1,1,1,2-PCA	1,1,2,2-PCA	PCE	1,1,2-TCA	TCE
NOV29/05	2000	220	1600	6000	-	<100	<50	<50	<100	<70	<50	<50	<100	<300	<100	<50	<50	<50	<100	<50
NOV29/05(DUP1)	1700	250	1700	6300	-	<100	<50	<50	<100	<70	<50	<50	<100	<300	<100	<50	<50	<50	<100	<50
JUL20/07	750	150	580	4600	-	<100	<50	<50	<100	<50	<50	<50	<100	<300	<100	<50	<100	<50	<100	<50
MAY24/11	470	44	310	3300	-	-	-	-	-	<90	<10	<10	<1	-	-	<1	<20	<1	<20	<10
MAY24/11(DUP)	430	48	1000	2300	-	-	<0.20	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
JAN18,20/12	-	-	-	-	-	-	<0.20	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
OCT19/12	500	8.2	640	670	-	-	<25	-	-	<50	-	-	-	-	-	-	-	-	-	-
JUN06/13	610	27	1200	1500	60	-	<0.20	-	-	<0.50	-	-	-	-	-	-	-	-	-	-

MW41	SCREEN INTERVAL=1.8-4.9 mbgs																			
DATE	B	T	E	X	H	BF	CTC	CF	1,4-DCB	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	EDB	MC	MTBE	1,1,1,2-PCA	1,1,2,2-PCA	PCE	1,1,2-TCA	TCE
NOV29/05	630	98	620	2200	-	<40	<20	<20	<40	<30	<20	<20	<40	<100	<40	<20	<20	<20	<40	<20
JUL20/07	390	120	900	3300	-	<100	<50	<50	<100	<50	<50	<50	<100	<300	<100	<50	<100	<50	<100	<50
JAN17/08	-	-	-	-	-	-	-	-	-	<10	<50	<50	<1	-	-	<1	<2	<1	<100	<50

TH504	SCREEN INTERVAL = 3.0-5.7 mbgs																			
DATE	B	T	E	X	H	BF	CTC	CF	1,4-DCB	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	EDB	MC	MTBE	1,1,1,2-PCA	1,1,2,2-PCA	PCE	1,1,2-TCA	TCE
MAY22/14	69	100	1000	3000	140	<50	<0.20	<0.20	<0.50	<0.50	<0.50	<0.50	<0.20	<100	<25	<0.50	<0.50	<0.20	<0.50	<0.20
MAY22/14(DUP)	71	100	1100	3100	130	<50	<0.20	<0.20	<0.50	<0.50	<0.50	<0.50	<0.20	<100	<25	<0.50	<0.50	<0.20	<0.50	<0.20

TH505	SCREEN INTERVAL = 9.5-10.8 mbgs																			
DATE	B	T	E	X	H	BF	CTC	CF	1,4-DCB	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	EDB	MC	MTBE	1,1,1,2-PCA	1,1,2,2-PCA	PCE	1,1,2-TCA	TCE
MAY22/14	61	36	33	100	1.1	<1.0	<0.20	<0.20	<0.50	<0.50	<0.50	<0.50	<0.20	<2.0	<2.5	<0.50	<0.50	<0.20	<0.50	<0.20
JUN10/14	130	110	72	180	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
JUN26/14	140	25	84	170	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TH507	SCREEN INTERVAL = 13.0-14.4 mbgs																			
DATE	B	T	E	X	H	BF	CTC	CF	1,4-DCB	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	EDB	MC	MTBE	1,1,1,2-PCA	1,1,2,2-PCA	PCE	1,1,2-TCA	TCE
JUL31/14	250	120	170	280	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TH508	SCREEN INTERVAL = 23.5-25.0 mbgs																			
DATE	B	T	E	X	H	BF	CTC	CF	1,4-DCB	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	EDB	MC	MTBE	1,1,1,2-PCA	1,1,2,2-PCA	PCE	1,1,2-TCA	TCE
DEC10/14	3.1	0.45	1.9	0.75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

PARAMETER	ABBREVIATION	REG 153/04 TABLE 3 GROUND WATER STANDARDS
BENZENE	B	44
TOLUENE	T	18000
ETHYL BENZENE	E	2300
XYLENES	X	4200
HEXANE	H	51
BROMOFORM	BF	380
CARBON TETRACHLORIDE	CTC	0.79
CHLOROPFORM	CF	2.4
1,4-DICHLOROBENZENE	1,4-DCB	8
1,2-DICHLOROETHANE	1,2-DCA	1.6
cis-1,2-DICHLOROETHYLENE	cis-1,2-DCE	1.6
trans-1,2-DICHLOROETHYLENE	trans-1,2-DCE	1.6
ETHYLENE DIBROMIDE	EDB	0.25
METHYLENE CHLORIDE	MC	610
METHYL TERTIARY ETHER	MTBE	190
1,1,1,2-TETRACHLOROETHANE	1,1,1,2-PCA	3.3
1,1,2,2-TETRACHLOROETHANE	1,1,2,2-PCA	3.2
TETRACHLOROETHYLENE	PCE	1.6
1,1,2-TRICHLOROETHYLENE	1,1,2-TCA	4.7
TRICHLOROETHYLENE	TCE	1.6

PHASE II CONCEPTUAL SITE MODEL
CROSS SECTION A-A' - GROUND WATER ANALYTICAL RESULTS - VOLATILE ORGANIC COMPOUNDS

1490 RICHMOND ROAD
OTTAWA, ONTARIO

PROJECT NUMBER: 01093 DATE: FEBRUARY 2019

SCALE:
2X VERTICAL EXAGGERATION

SOURCE:
BASED ON FIELD MEASUREMENTS
BY EXP STAFF

exp.

DRAWN BY
K.G.

CHECKED BY
S.K.

NOTES:
ANALYTICAL CONCENTRATIONS OF SOIL AND/OR GROUND WATER SAMPLES SHOWN ARE PROVIDED WITHIN THE PHASE II ENVIRONMENTAL SITE ASSESSMENT REPORT TABLES AND FIGURES.

LEGEND:

TEST HOLE

SCREEN INTERVAL

GROUND WATER ELEVATION (NOV. 20, 2017)

SAND

SAND & GRAVEL FILL

SILTY SAND

SILTY CLAYEY SAND

SILTY CLAY

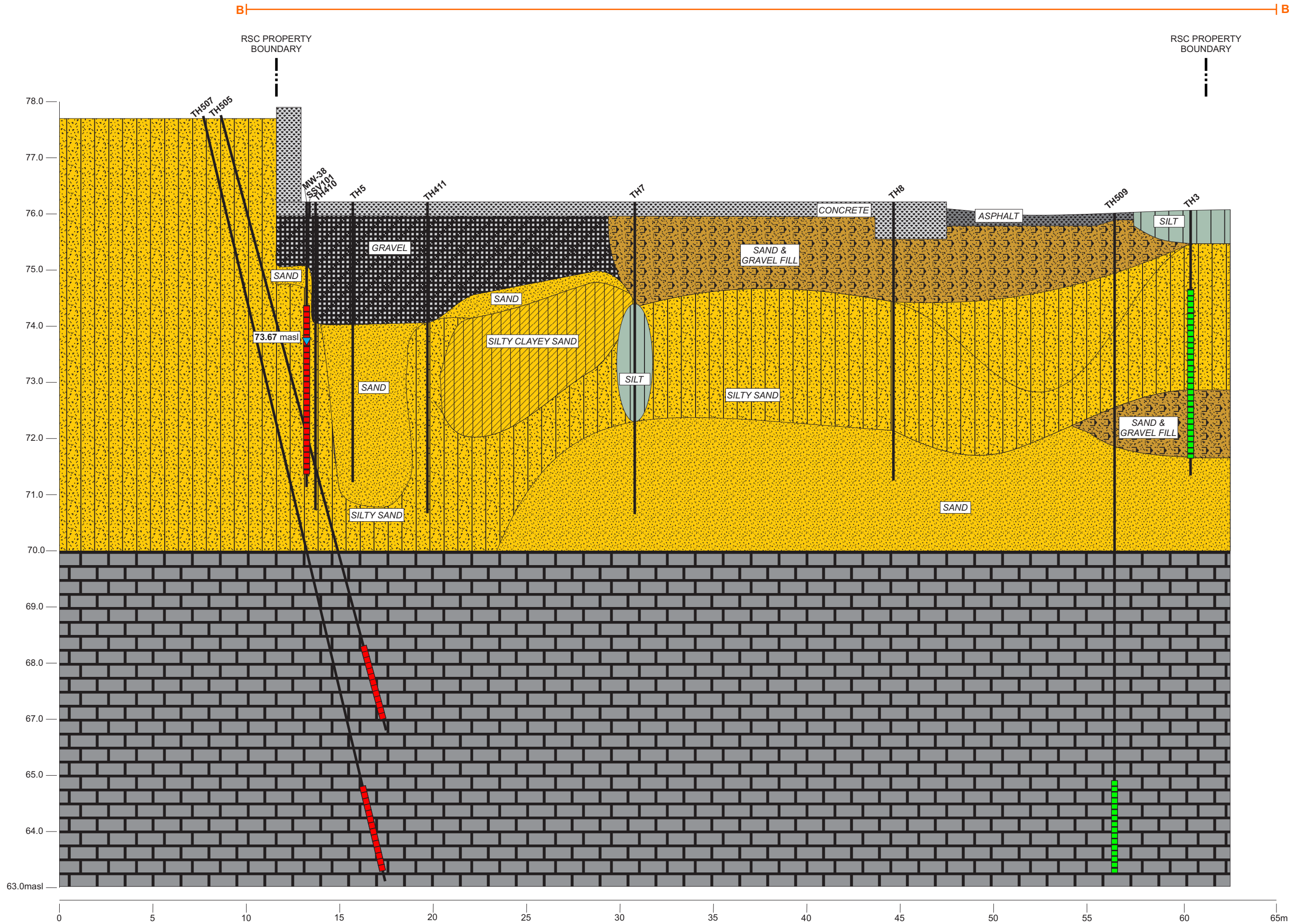
CONCRETE

GRAVEL

ASPHALT

LIMESTONE

MONITOR LOCATION WHERE GROUND WATER SAMPLE MEETS REG 153/04 TABLE 3 STANDARDS FOR ALL PARAMETERS THAT WERE ANALYSED
MONITOR LOCATION WHERE GROUND WATER SAMPLE EXCEEDS REG 153/04 TABLE 3 STANDARDS FOR AT LEAST ONE PARAMETER ANALYSED
EXCEEDANCES OF REG 153/04 TABLE 3 STANDARDS
ELEVATED RDL ABOVE REG 153/04 TABLE 3 STANDARDS NOT USED IN DETERMINING MAXIMUM SITE CONCENTRATION BECAUSE DURING OTHER SAMPLING EVENTS AT THE SAME LOCATION, THE RDL WAS ESTABLISHED TO BE LOWER
ALL ANALYTICAL RESULTS ARE IN MICROGRAMS PER LITRE (µg/L)
"mbgs" MEANS METRES BELOW GROUND SURFACE
"-" MEANS NOT ANALYSED OR NOT APPLICABLE
"NM" MEANS NOT MEASURED
"RDL" MEANS NOT DETECTED AT REPORTING DETECTION LIMIT (RDL)
"RDL" ARE SHOWN FOR NON-DETECTED RESULTS; FOR RDL OF REPORTABLE RESULTS, SEE APPLICABLE DATA TABLE
(DUP) REPRESENTS FIELD DUPLICATE OF PRECEDING SAMPLE
*STANDARDS SHOWN ARE FOR ALL TYPES OF PROPERTY USE AND COARSE TEXTURED SOILS IN A NON-POTABLE GROUND WATER CONDITION



PARAMETER	ABBREVIATION	REG 153/04 TABLE 3 GROUND WATER STANDARDS
BENZENE	B	44
TOLUENE	T	18000
ETHYLBENZENE	E	2300
XYLENES	X	4200
HEXANE	H	51
BROMOFORM	BF	380
CARBON TETRACHLORIDE	CTC	0.79
CHLOROFORM	CF	2.4
1,4-DICHLOROBENZENE	1,4-DCB	8
1,2-DICHLOROETHANE	1,2-DCA	1.6
cis-1,2-DICHLOROETHYLENE	cis-1,2-DCE	1.6
trans-1,2-DICHLOROETHYLENE	trans-1,2-DCE	1.6
ETHYLENE DIBROMIDE	EDB	0.25
METHYLENE CHLORIDE	MC	610
METHYL T-BUTYL ETHER	MTBE	190
1,1,1,2-TETRACHLOROETHANE	1,1,1,2-PCA	3.3
1,1,2,2-TETRACHLOROETHANE	1,1,2,2-PCA	3.2
TETRACHLOROETHYLENE	PCE	1.6
1,1,2-TRICHLOROETHANE	1,1,2-TCA	4.7
TRICHLOROETHYLENE	TCE	1.6

TH3		SCREEN INTERVAL=1.4-4.4 mbgs																		
DATE	B	T	E	X	H	BF	CTC	CF	1,4-DCB	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	EDB	MC	MTBE	1,1,1,2-PCA	1,1,2,2-PCA	PCE	1,1,2-TCA	TCE
JUL19/07	<0.1	0.3	<0.1	<0.1	-	<0.2	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.2	<0.5	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1

MW38		SCREEN INTERVAL=1.8-4.8 mbgs																		
DATE	B	T	E	X	H	BF	CTC	CF	1,4-DCB	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	EDB	MC	MTBE	1,1,1,2-PCA	1,1,2,2-PCA	PCE	1,1,2-TCA	TCE
NOV29/05	1700	<40	260	740	-	<40	<20	<20	<40	<60	<20	<20	<40	<100	<40	<20	<20	<20	<40	<20
JUL19/07	530	<20	43	56	-	<20	<10	<10	<20	<10	<10	<10	<20	<50	<20	<10	<20	<10	<20	<10
JAN17/08	-	-	-	-	-	-	-	-	-	<20	<3	<3	<1	-	-	<3	<5	<3	<5	<3
MAY24/11	79	3.9	78	190	-	-	<0.20	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
OCT19/12	2000	64	1900	520	-	-	<0.20	-	-	0.51	-	-	-	-	-	-	-	-	-	-
NOV13/12	2100	35	660	300	-	-	<0.20	-	-	<0.60	-	-	-	-	-	-	-	-	-	-
JUN05/13	690	8.4	390	390	20	<5.0	<0.20	<2.0	<5.0	<0.50	0.58	<0.50	<0.20	<20	<5.0	<0.50	<0.50	<0.20	<0.50	0.30

TH505		SCREEN INTERVAL = 9.5-10.8 mbgs																		
DATE	B	T	E	X	H	BF	CTC	CF	1,4-DCB	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	EDB	MC	MTBE	1,1,1,2-PCA	1,1,2,2-PCA	PCE	1,1,2-TCA	TCE
MAY22/14	61	36	33	100	1.1	<1.0	<0.20	<0.20	<0.50	<0.50	<0.50	<0.50	<0.20	<2.0	<2.5	<0.50	<0.50	<0.20	<0.50	<0.20
JUN10/14	130	110	72	180	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
JUN26/14	140	25	84	170	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TH507		SCREEN INTERVAL = 13.0-14.4 mbgs																		
DATE	B	T	E	X	H	BF	CTC	CF	1,4-DCB	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	EDB	MC	MTBE	1,1,1,2-PCA	1,1,2,2-PCA	PCE	1,1,2-TCA	TCE
JUL31/14	250	120	170	280	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TH509		SCREEN INTERVAL = 11.3-12.8 mbgs																		
DATE	B	T	E	X	H	BF	CTC	CF	1,4-DCB	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	EDB	MC	MTBE	1,1,1,2-PCA	1,1,2,2-PCA	PCE	1,1,2-TCA	TCE
DEC10/14	<0.20	<0.20	<0.20	<0.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DEC10/14(DUP)	<0.20	<0.20	<0.20	<0.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SCALE:
3X VERTICAL EXAGGERATION

SOURCE:
BASED ON FIELD MEASUREMENTS
BY EXP STAFF

DRAWN BY
K.G.

CHECKED BY
S.K.

NOTES:
ANALYTICAL CONCENTRATIONS OF SOIL AND/OR GROUND WATER SAMPLES SHOWN ARE PROVIDED WITHIN THE PHASE II ENVIRONMENTAL SITE ASSESSMENT REPORT TABLES AND FIGURES.

LEGEND:
TEST HOLE
SCREEN INTERVAL
GROUND WATER ELEVATION (NOV. 20, 2017)

SAND
SAND & GRAVEL FILL
SILTY SAND
SILTY CLAYEY SAND

SILT
ASPHALT
CONCRETE
GRAVEL

LIMESTONE

MONITOR LOCATION WHERE GROUND WATER SAMPLE MEETS REG 153/04 TABLE 3 STANDARDS FOR ALL PARAMETERS THAT WERE ANALYSED

MONITOR LOCATION WHERE GROUND WATER SAMPLE EXCEEDS REG 153/04 TABLE 3 STANDARDS FOR AT LEAST ONE PARAMETER ANALYSED

TEXT
EXCEEDANCES OF REG 153/04 TABLE 3 STANDARDS
ELEVATED RDL ABOVE REG 153/04 TABLE 3 STANDARDS NOT USED IN DETERMINING MAXIMUM SITE CONCENTRATION BECAUSE DURING OTHER SAMPLING EVENTS AT THE SAME LOCATION, THE RDL WAS ESTABLISHED TO BE LOWER
ALL ANALYTICAL RESULTS ARE IN MICROGRAMS PER LITRE (µg/L)
"mbgs" MEANS METRES BELOW GROUND SURFACE
"- " MEANS NOT ANALYSED OR NOT APPLICABLE
"NM" MEANS NOT MEASURED
"<RDL" MEANS NOT DETECTED AT REPORTING DETECTION LIMIT (RDL)
"RDL" ARE SHOWN FOR NON-DETECTED RESULTS; FOR RDL OF REPORTABLE RESULTS, SEE APPLICABLE DATA TABLE
"(DUP)" REPRESENTS FIELD DUPLICATE OF PRECEDING SAMPLE
*STANDARDS SHOWN ARE FOR ALL TYPES OF PROPERTY USE AND COARSE TEXTURED SOILS IN A NON-POTABLE GROUND WATER CONDITION

PHASE II CONCEPTUAL SITE MODEL CROSS SECTION B-B' - GROUND WATER ANALYTICAL RESULTS - VOLATILE ORGANIC COMPOUNDS

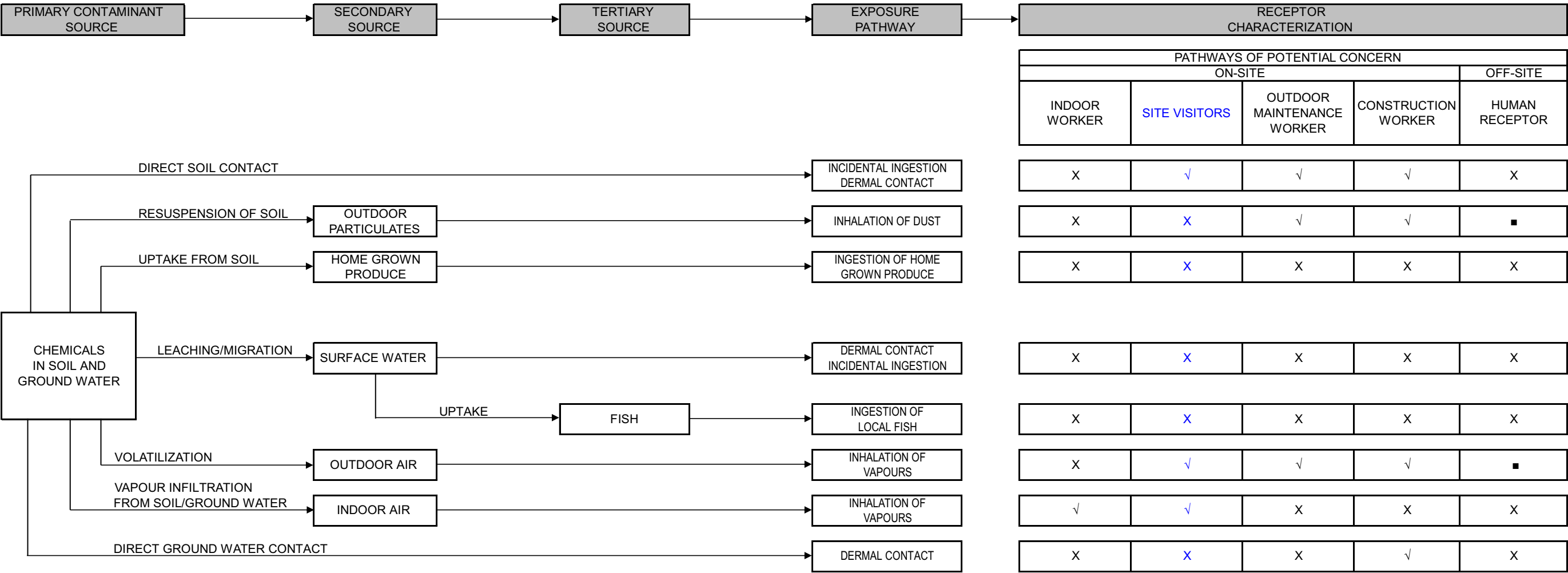
1490 RICHMOND ROAD
OTTAWA, ONTARIO

PROJECT NUMBER: 01093
DATE: FEBRUARY 2019

FIGURE
20

01093-RSC 1490 XSECB-FEB19:GW VOC

HUMAN HEALTH CONCEPTUAL SITE MODEL



NOTE:

	DRAWN BY	CHECKED BY
	K.G.	S.K.

- ✓
- INDICATES PATHWAY IS COMPLETE AND WAS ASSESSED IN THE HHRA
- X
- INDICATES PATHWAY IS NOT COMPLETE AND WAS NOT ASSESSED IN THE HHRA
-
- INDICATES PATHWAY IS COMPLETE BUT WAS NOT ASSESSED IN THE HHRA

HUMAN HEALTH CONCEPTUAL
SITE MODEL WITHOUT RISK
MANAGEMENT MEASURES

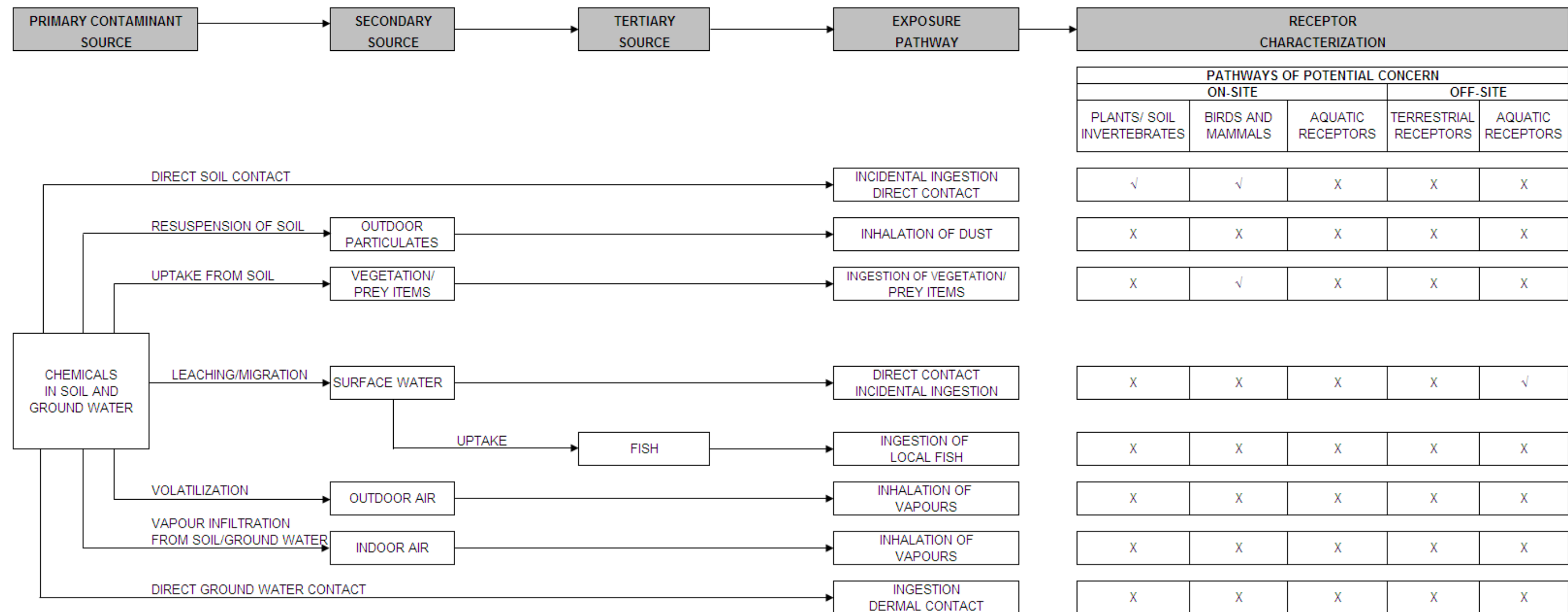
FIGURE

21

1490 RICHMOND ROAD
OTTAWA, ONTARIO

PROJECT NUMBER: 01093

DATE: FEBRUARY 2019



NOTE:

✓
X

INDICATES PATHWAY IS COMPLETE AND WAS ASSESSED IN THE ERA
INDICATES PATHWAY IS NOT COMPLETE AND WAS NOT ASSESSED IN THE ERA



DRAWN BY	CHECKED BY
K.G.	S.K.

ECOLOGICAL CONCEPTUAL
SITE MODEL WITHOUT
RISK MANAGEMENT MEASURES

FIGURE

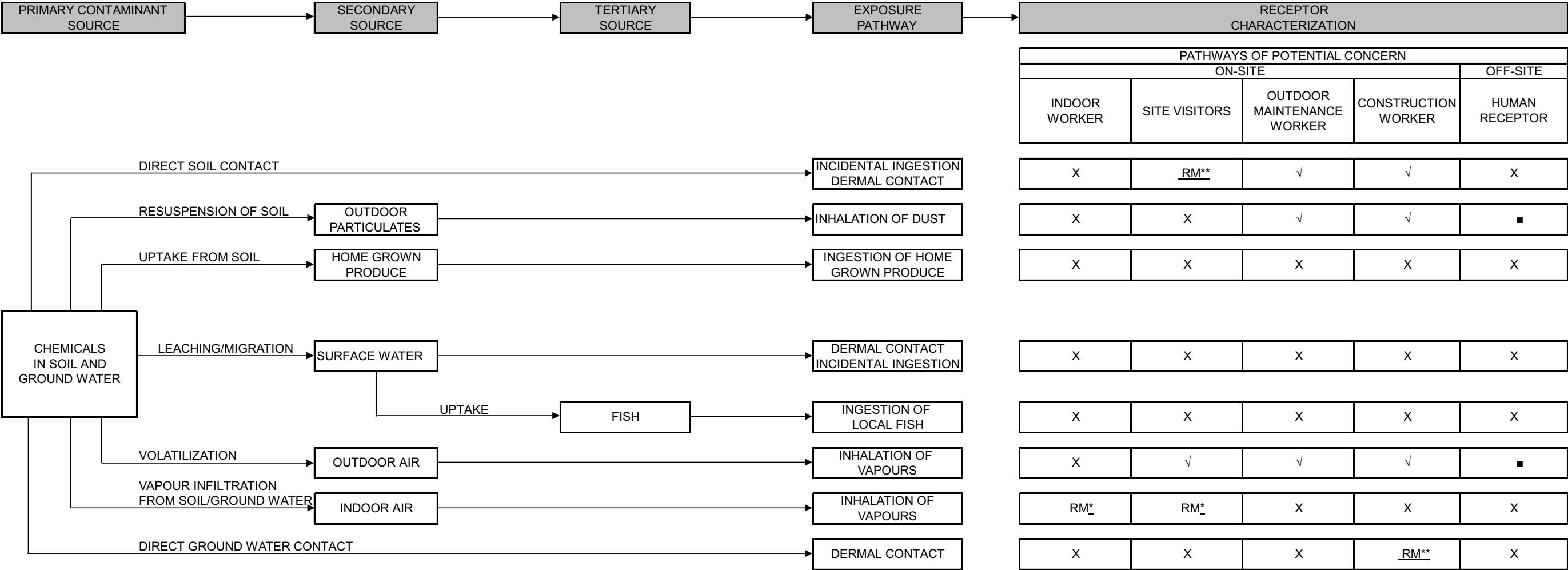
22

1490 RICHMOND ROAD
OTTAWA, ONTARIO

PROJECT NUMBER: 01093

DATE: FEBRUARY 2019

HUMAN HEALTH CONCEPTUAL SITE MODEL With RMM



ECOLOGICAL CONCEPTUAL SITE MODEL With RMM

