A People Place, A Change of Pace
SHELBURNE
ONTARIO, CANADA

Meeting Date:	Monday, January 27, 2025
To:	Mayor Mills and Members of Council
From:	**Denyse Morrissey, CAO and Stephen Burnett, Municipal Engineer**
Report:	CAO 2025-01
Subject:	**420 Victoria Street Update: Sale and Zoning**

Recommendation

Be it Resolved that Council of the Town of Shelburne:

Receives report CAO2025-01 420 Victoria Street Update: Sale and Zoning for information; and that

Given the significant estimated costs and timelines required by the Town to be able to rezone the property to residential, that the zoning remain as Institutional/Commercial/Industrial (ICI) and that no further costs be allocated to property remediation or rezoning; and that

The property be sold under its current ICI zoning with the restriction that any future buildings will be slab on grade with no basement; and that

The previously recommended sewage servicing allocation of 2 m^3/day in addition to the existing allocation of 1 m^3/day for ICI redevelopment of the site be maintained and that the property is granted Stage 1 priority.

Background

This report provides an update on the status of 420 Victoria Street and the site remediation process in order to sell the property, including that it no longer makes financial or strategic sense for the property to be rezoned by the Town to residential prior to selling.

Past staff reports are:

November 11, 2019 CAO 2019-11 420 Victoria Street Clean-Up Update

Council approved proceeding with the full remediation of the site, completion of a Phase II ESA report and Record of Site Condition (RSC) to support the future surplus and sale of the property for residential use.

June 13, 2022 CAO 2022-08 420 Victoria Street Update – Surplus and Sale

Council approved declaring the property surplus and proposed for future sale following the completion of the RSC which was expected to be completed in spring/early summer of 2023 to support the rezoning to the more stringent residential zoning. The staff report had indicated that additional work was to continue through the fall and winter of 2022/2023 to support the RSC work which was expected to be able to follow a less stringent Tier 1 or 2 RSC process.

The site remediation costs, funded from a capital reserve are summarized:

YEAR	EXPENDITURE
2018	$159,708
2019	$106,142
2020	$415,783
2021	$ 19,623
2022	$100,905
2023	$ 12,843
2024	$ 20,415
Total to Date	$835,419

The sale of the property was intended to offset the estimated site remediation costs incurred to date. Any proceeds from the sale would be allocated back to the capital reserve.

Analysis

To evaluate having the property support potential resident end use continued site work was completed in the fall 2022 and early winter 2023. This process determined that a supplemental Phase II ESA and additional field work and analysis would be required to support the Risk Assessment (RA) required by the MECP to support the eventual RSC.

It was also determined during this time that the more complex Tier 3 RSC would be required by the MECP to address the soil and groundwater impacts if the property zoning was changed to residential use. The environmental assessment consultant, EXP Inc. also noted that the MECP may also require additional testing and documentation requiring more time and costs.

In March 2023 the consultant estimated the cost of the supplemental Phase II ESA and Tier 3 RSC to be in the range of $185,000 to $200,000. It was also indicated that the more complex Tier 3 RSC would take approximately 24 to 30 months to complete and significantly delay the timing to sell the property. The consultant also indicated that there could be more significant capital costs for additional remediation and/or mitigation measures for the change of use to the more stringent residential use.

In December 2023 the Town provided authorization through SBA that a Due Diligence Risk Assessment (DDRA) on the property be completed. The intent of the DDRA was to access any potential human health risks or ecological risks that remain at the site and to determine what risk management measures (RMMs) if any would be required for any party using or purchasing the site in an institutional, commercial or industrial redevelopment capacity. A copy of a letter from SBA, August 2024, summarizing the results of the DDRA and the full DDRA is attached to this report as Appendix 1.

The consultant’s estimated costs for mitigation measures required on the site and five years of soil and groundwater testing was $1,653,100 in addition to the approximate $185,000 to $200,000 for the Tier 3 RSC and RA work. Under this scenario the Town would be required to spend an additional $1.8M to $1.9M to change the use of the property to residential in addition to the approximately $1.0 M spent to date or an overall cost between $2.8M to $2.9M. This scenario also had the Tier 3 - RSC timeline of approximately 24 to 30 months.

Due to these estimated costs to continue accessing the property for resident use that direction was suspended. The following is the summary of the assumptions utilized in the preparation of the DDRA for the future redevelopment of the property:

- The property will be sold without redevelopment or further clean up;
- The property will continue to be zoned and used or redeveloped in an Institutional/Commercial/Industrial capacity and not residential;
- The existing building will be removed;
- Any future buildings will be slab on grade with no basement; and,
- No further potentially environmentally impacting activities will be performed at the site.

The DDRM has identified and recommended the Risk Management Measures (RMMs) that would be required by a future owner to redevelop and utilize the site. The recommended RMMs are the measures that are most frequently utilized for these risks due to their success rates and cost effectiveness.

Based on a review of the DDRM, the recommended RMMs appear to be minimal and already align with restrictions on the site and the standard alterations to a site for redevelopment. The following is a summary of the recommended RMMs required by a future purchaser to redevelop the site:

- Soil cover implementation of a surface barrier upon redevelopment is required. This would be either a hard cap such as asphalt or concrete or a soil cover system in soft landscape areas.

  It is important to note that as part of any site redevelopment, much of this soil cover system would already be installed as part of normal site works in hard areas (ie gravel, concrete, asphalt, etc) and is only a minimal soil increase in the soft scape areas (ie 0.5m depth required in DDRA versus typical 0.3m recommended for typical redevelopment construction and landscaping).

- The purchaser will need to have a Site-Specific Soil and Groundwater Management Plan (SGWMP) prepared by a qualified person for any excavation on site that occurs that is deeper then the soil barrier to make workers during construction are aware of the site conditions.

- Construction of a potable well supply on site is not permitted. As the property is within the urban boundary of the Town, a new private well on the site was already not permitted. The property is currently serviced by the Town's municipal water supply.

Given the significant cost and time required by the Town to be able to rezone the property to residential, it is recommended that the zoning remain as ICI and that no further costs be allocated to remediation or rezoning.

It is further recommended that Council continues with their previous direction and directs staff to proceed with the surplus and sale of the property as an ICI zoned property.

It is recommended that Council maintains the previously recommended sewage servicing allocation of 2 m^3/day in addition to the existing allocation of 1 m^3/day for ICI redevelopment of the site and that the property is granted Stage 1 priority for development.

Financial Impact

As required under Bylaw 6-2008 an independent letter of opinion of the ICI property to establish the minimum value for the disposition of land process will be obtained and likely in February 2025. The estimated cost is $1,000.

Policies & Implications

Property will remain as ICI Zoning

By-law 7-1995: By law to Establish Procedures to Sell or Otherwise Dispose of Real Property

By-law 6-2008 (amending by-law)

Consultation and Communications

Director of Financial Services/Treasurer
Town Planner
Director of Development and Operations

Council Priorities

Council's Priorities has three Pillars - Sustainable, Engaged and Livable.

There is a total of 14 Priorities within the three Pillars. This report aligns with the Sustainable and Livable Pillars within the Priorities of:

SP2 Invest in critical infrastructure and services for the future

L3 Support strong local economy

Supporting Documentation

Appendix 1 – SBA Due Diligence Report Summary, August 28, 2024

Respectfully Submitted:

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Denyse Morrissey, CAO

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Stephen Burnett, P.Eng. Town Engineer; S. Burnett & Associates Limited

August 28, 2024

Town of Shelburne
203 Main Street East
Shelburne, ON L9V 3K7

Attn: Denyse Morrissey, B.A; M.P.A., Chief Administrative Officer

Re: Town of Shelburne, Public Works Building Assessments
420 Victoria Street Due Diligence Report Summary
SBA File No: M16036

Dear Denyse,

The following report is an update on the progress of the 420 Victoria Street Clean-up Project and provides a summary of the technical Due Diligence Risk Assessment (DDRA) provided by EXP Inc. As directed by Town of Shelburne staff, on December 5, 2023, S. Burnett & Associates Limited (SBA) provided authorization for EXP to complete a DDRA on the municipal property known as 420 Victoria Street, Shelburne. This site is known to have some residual environmental impacts from the previous Town and County public works operations. The intent of the DDRA was two-fold:

- To inform the Town what human health risks and ecological risks remain at the site, if any; and,
- What risk management measures (RMMs), if any, would be required for any party to continue using the site in an industrial, commercial, institutional (ICI) redevelopment capacity.

In order to provide a clear scope for EXP to perform the DDRA, the following assumptions were made:

- The property will be sold without redevelopment of further clean-up;
- The site will continue to be used municipally zoned and used or redeveloped in an ICI capacity;
- The existing building will be removed;
- Any future buildings will be slab on grade; and,
- No further potentially environmentally impacting activities will be performed at the site.

1. Risks

EXP reviewed all known documentation on previous site testing and remedial works that have been performed at 420 Victoria Street. The information that was reviewed included reports from other consultants, site and soil investigations performed by EXP, and interviews with Town Staff. The review of this background information has been delineated into the following three categories: Human Health Risks, Ecological Health Risks, and Risks to Aquatic Life.

1.1 Human Health Risks

The human health risks associated with 420 Victoria Street have been identified as those commonly associated with public works facilities that have stored road salts for winter maintenance. The specific risk that was identified is **direct contact with Vinyl Chloride precursors, some heavy metals and sodium impacted groundwater by long-term indoor workers and visitors or trespassers.**

Therefore, Risk Management Measures (RMMs) are recommended and can provide adequate protection to long-term indoor workers and visitors or trespassers.

1.2 Ecological Health Risks

The ecological health risks associated with 420 Victoria Street have also been identified as those commonly associated with public works facilities that have stored road salts for winter maintenance. The specific risk that was identified is **direct contact with salt impacted soils by terrestrial plants and soil invertebrates.**

RMMs are not recommended as the areas of impact that exceed applicable levels are mainly in non-vegetative areas of the Site. RMM's may be required to protect future vegetation plans and can provide adequate protection to terrestrial plants and soil invertebrates.

1.3 Risks to Aquatic Life

The risks to aquatic life associated with 420 Victoria Street have also been identified as those commonly associated with public works facilities that have stored road salts for winter maintenance. The specific risk that was identified is **contact with salt impacted groundwater by ecological receptors.**

RMMs are not recommended as the continued application of road salt closer to the receptor (Besley Drain) is of a higher concern.

2. Risk Management Measures (RMMs)

After the determination of the types of risks present at the site and the potential exposure pathways, EXP has put forward a series of risk management measures (RMMs). The recommended RMMs are the measures that are most frequently utilized for these risks due to their success rates and cost effectiveness. The RMMs have been presented below and apply to the site in whole.

2.1 Soil Cover System

(To be implemented as part of any future development.)

Implementation of a surface barrier upon redevelopment of the site is required. This would be either a hard cap, such as asphalt or concrete; or a soil cover system, also known as soft capping, which is recommended to be put in place once the site is redeveloped. The soil cover system would need to be a minimum of 0.5m thick in areas of parking or grassed landscape. Where trees are planted, the cap should be a minimum 1.5m thickness. This soil cover system creates a large barrier blocking the direct contact exposure pathways.

It is important to note that as part of any site redevelopment, the majority of this soil cover system would be installed as part of normal site works in hard areas and a minimal soil increase in soft areas.

2.2 Site-Specific Soil and Groundwater Management Plan (SGWMP)

A SGWMP prepared by a Qualified Person (QP_{ESA}), should be prepared by the future owner for any excavation work or breech in the future soil barrier at the site. This SGWMP should be available on the site after it has been redeveloped. The SGWMP will document what RMMs have been incorporated into the site and why. It will also explain any associated risks and procedures to follow if an RMM has been compromised, such as excavating soil beyond the depth of the 0.5m cover system.

2.3 Potable Groundwater Use Restriction

A restriction on constructing a potable water well on site should be instituted. The construction of a well would provide access to impacted groundwater, as well as a hole in the soil cover system.

It is important to note that, as this site is within the urban boundary of the Town, new private well construction is not permitted on site and access to the Town's water supply is available.

Based on our review of the DDRA, SBA believes that the additional work required to instigate the RMM recommendations is minimal and already aligns with restrictions on the site and the standard alterations to a site for redevelopment. The only wholly additional item is the inclusion of an SGWMP prepared by a QP_{ESA}. Therefore, SBA recommends continuing with the original Council recommendation for the surplus and sale of the subject property. SBA also recommends that a copy of the finalized DDRA report from EXP be provided to any parties interested in the purchase of this property from the Town so that they are fully aware of the RMMs and their obligations as the purchaser.

We hope you find this report complete and satisfactory. If you have any questions, please do not hesitate to contact our office.

Yours truly,

Stephen Burnett, P.Eng.
Principal
S. Burnett & Associates Limited

Terrance Gole, H.BSc., EP
Environmental Project Manager
S. Burnett & Associates Limited

Incl. Appendix A: 420 Victoria Street, Due Diligence Risk Assessment, prepared by EXP, August 28, 2024

cc: Jim Moss, Director, Development and Operations, Town of Shelburne
Carey Holmes, AMCT, Director of Financial Services / Treasurer, Town of Shelburne
Steve Wever, President, GSP Group
Jennifer Willoughby, Director of Legislative Services / Clerk, Town of Shelburne

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Appendix A

420 Victoria Street – Due Diligence Risk Assessment

Prepared by EXP

August 28, 2024

420 Victoria Street, Shelburne, Ontario

Due Diligence Risk Assessment

Client:
Town of Shelburne
203 Main Street East
Shelburne, ON L9V 3K7

c/o S. Burnett & Associates Limited
190 Memorial Avenue, Unit L
Orillia, ON L3V 5X6

Attention:
Mr. Jim Moss and Mr. Terrance Gole

Type of Document:
Final

Project Name:
420 Victoria Street, Shelburne, Ontario
Due Diligence Risk Assessment

Project Number:
GTR-21020239-E0

EXP Services Inc.
220 Commerce Valley Drive West, Suite 110
Markham, Ontario L3T 0A8
T: 905 695-3217
F: 905 695-0169

Date Submitted:
08-28-2024

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ACRONYMS/DEFINITIONS

All abbreviated terms in the DDRA are defined below.

APEC	Area of Potential Environmental Concern
As	Arsenic
BH	Borehole
BH/MW	Borehole/Monitoring Well
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CCME	Canadian Council of Ministers of the Environment
Cl	Chloride
CN-	Cyanide
COC	Contaminant of Concern
COSSARO	Committee on the Status of Species at Risk in Ontario
Cr (VI)	Hexavalent Chromium
CSA	Canadian Standards Association
DCA	Dichloroethane
DCE	Dichloroethylene
DDRA	Due Diligence Risk Assessment
EC	Electrical Conductivity
ECSM	Ecological Conceptual Site Model
EPC	Exposure Point Concentration
ERA	Ecological Risk Assessment
ESA	Environmental Site Assessment
EXP	EXP Services Inc.
GQG_E	Ecological Health-Based Groundwater Quality Guidelines
GQG_{HH}	Human Health-Based Groundwater Quality Guidelines
Hg	Mercury
HHCSM	Human Health Conceptual Site Model
HHRA	Human Health Risk Assessment
HWS-B	Hot Water Soluble Boron
ICC	Industrial/Commercial/Community
IRSL	InSitu Remediation Services Limited
LOAEL	Lowest Observable Adverse Effects Level
m bgs	Meters Below Ground Surface
MECP	Ministry of the Environment, Conservation and Parks
MGRA	Modified Generic Risk Assessment
MNRF	Ministry of Natural Resources and Forestry
MW	Monitoring Well
Na	Sodium
NAPL	Non-Aqueous Phase Liquids

NOAEL	No Observable Adverse Effects Level
NVCA	Nottawasaga Valley Conservation Authority
OCP	Organochlorine Pesticide
O. Reg. 153/04	Environmental Protection Act, Ontario Regulation 153/04, Records of Site Condition Part XV.I of the Act
ORP	Other Regulated Parameter
PAH	Polycyclic Aromatic Hydrocarbon
PCE	Tetrachloroethylene
PHC	Petroleum Hydrocarbon
QA/QC	Quality Assurance / Quality Control
QP_{ESA}	Qualified Person in Environmental Site Assessment
RA	Risk Assessment
RDL	Reporting Detection Limit
RfC	Reference Concentration
RfD	Reference Dose
RMM	Risk Management Measure
RSC	Record of Site Condition
SAR	Sodium Adsorption Ratio
Sb	Antimony
SCS	Site Condition Standard (Referring to Tables 1 through 9 in O. Reg. 153/04)
Se	Selenium
SGWMP	Soil and Groundwater Management Plan
SQG_E	Ecological Health-Based Soil Quality Guidelines
SQG_{HH}	Human Health-Based Soil Quality Guidelines
TCA	Trichloroethane
TCE	Trichloroethylene
THEM	T. Harris Environmental Management Inc.
TP	Test Pit
TRV	Toxicity Reference Value
URF	Unit Risk Factor
US EPA	United States Environmental Protection Agency
VC	Vinyl Chloride
VECs	Values Ecosystem Criteria
VOC	Volatile Organic Compound

1 Executive Summary

EXP Services Inc. (EXP) was retained by the Town of Shelburne c/o S. Burnett & Associates Limited ('the Client') to conduct a Due Diligence Risk Assessment (DDRA) on the known soil and groundwater impacts identified at the property located at 420 Victoria Street, Shelburne, Ontario (hereinafter referred to as the "site" or "RA Property"). It is EXP's understanding that the DDRA is required for financial due diligence purposes in support of a potential real estate transaction and that a Record of Site Condition (RSC) under Ontario Regulation (O. Reg.) 153/04 is not required at this time.

The site is located on the west side of Victoria Street and approximately 40 metres south of Jeffrey Street, in the Town of Shelburne, Ontario. The site is irregular in shape and measures approximately 0.30 hectares (0.73 acres) in area. The site was first developed as the current public works yard for the County of Dufferin/Town of Shelburne circa 1945. At the time of the investigation, the site was occupied for use as a Public Works Yard with a building on the north-central portion that is currently used for the storage of municipal roadwork equipment and materials. The northeast portion of the site is asphalt paved, the northwest, central and southern portions consist of sand/granular fill, with landscaped areas along the north, west and south boundaries. The site is located in an area of mixed use, with residential land use to the north, east and south and community use (a former Canadian Pacific Railway corridor now used as a recreational trail) followed by commercial/industrial use to the west.

It is understood that the client intends to sell the site without redevelopment; however, the future purchaser may redevelop the site to fit their requirements. It is noted that the current land use is conservatively considered to be industrial (municipally zoned as industrial, commercial, institutional) and it is assumed this will not change upon site redevelopment. The redevelopment plans are not currently known. The existing site building is of single-storey construction.

The applicable Standards for the RA Property were deemed to be Table 2 Site Condition Standards (SCS) for an industrial/commercial/community (ICC) property use with coarse textured soil in a potable groundwater condition (herein referred to as Table 2 SCS). These SCS are established under subsection 169.4(1) of the Environmental Protection Act, and presented in the Ministry of Environment, Conservation and Parks (MECP) document "Soil, Groundwater and Sediment Standards for Use under part XV.1 of the *Environmental Protection Act"*, dated April 15, 2011 ("MECP Standards").

Phase One and Two Environmental Site Assessments (ESAs), remedial activities, and other environmental investigations were conducted at the site between 2018 and 2022 by various consultants including THEM, Insitu Remediation Services Limited (IRSL), Global GPR Services, and most recently EXP, to address the various impacts in soil and groundwater associated with current and former on-site and off-site activities. THEM completed a remediation program to remove PHC impacted soil at the site between 2018 and 2020. While a formal report was not provided, select drawings and laboratory certificates of analysis pertaining to the remedial excavation program were provided to EXP for review. Based on EXP's review of these documents, soils impacted with PHCs likely remain at the site. As some details of the remedial programs are missing, EXP cannot comment on the accuracy or completeness of the remedial work completed by THEM. In addition, in-situ chemical oxidation (ISCO) using catalyzed sodium persulfate was conducted at seven (7) injection points on the northwest corner of the site building by IRSL in January 2020. It is assumed the remediation was to address the potential PHC impacts in soil identified at a depth of 0.3 to 1.6 m bgs beneath the on-site building by Global GPR Services (2019).

The DDRA was based on the results of the Phase Two ESAs and subsurface investigations previously completed by THEM (2019B, 2020A, 2020B, 2020C, 2020D) and EXP (2022B), and on the available limited details of the Remedial Soil Excavation Program completed at the site between 2018 and 2020 by THEM. Following the previous environmental investigations and remedial activities, exceedances of the Table 2 SCS for PHC fractions F1 to F3, benzene, ethylbenzene and xylenes, metals (zinc) and ORPs (HWS-B, EC and SAR) in soil, and VOCs (1,1,1-TCA, 1,1,2-TCA, 1,1-DCA and 1,1-DCE), metals (barium, cobalt and selenium) and ORPs (sodium and chloride) in groundwater remain at the site.

Based on a review of the available soil and groundwater data, the potential for vapour intrusion was identified as a result of volatile soil and groundwater impacts.

The objective of the DDRA is to ascertain whether the environmental impacts present in soil and groundwater at the site may pose potential risks to on-site human and ecological receptors through the continued industrial use and potential future redevelopment of the site.

1.1 Results

Human Health

It is noted that the HHRA has been conducted under the assumption that any potential future industrial/commercial site building(s) will also be of slab-on-grade construction. Based on the information available at this time and the conservative assumptions applied in the DDRA, the results of the HHRA indicate that there may be potential unacceptable risk posed to human health via the following exposure pathway:

- Direct contact with 1,1,2-TCA, 1,1-DCA, 1,1-DCE, VC (future condition), barium, cobalt, selenium, and sodium impacted groundwater by site long-term indoor workers and property visitors/trespassers.

Therefore, RMMs are recommended at the site for the protection of long-term indoor workers and property visitors/trespassers from impacts in groundwater via potable ingestion and dermal contact. RMM recommendations are presented in Section 1.2.

To ensure the assumptions applied in the HHRA remain true, a soil and groundwater management plan (SGWMP) has also been recommended for the site.

Ecological Health

Based on the information available at this time and the conservative assumptions applied in this DDRA, the results of the ERA indicated that there may be unacceptable risk posed to on-site ecological receptors via the following exposure pathways:

- Direct contact with EC and SAR in impacted soil by terrestrial plants and soil invertebrates.

Based on a review of the available data, areas with EC and SAR impacts in soil that exceed the applicable component values are mainly located on unvegetated portions of the site that are either sand/granular fill, asphalt or concrete covered under the current site configuration, and given the lack of distressed vegetation observed in landscaped areas of the site, the potential for unacceptable risks to terrestrial plants and soil invertebrate communities under the current site configuration is considered to be low.

If the site is redeveloped in the future, RMM for the protection of terrestrial plants and soil invertebrates from the EC and SAR impacts identified in on-site soil are recommended, as discussed in Section 1.2.

Off-Site Assessment – Aquatic Life

Based on the current site condition, potentially unacceptable risks were identified for off-site aquatic ecological receptors as a result of sodium and chloride in on-site groundwater migrating to surface water. However, as described in Section 5.7, no RMM are recommended to mitigate this pathway, as on-site RMM are not anticipated to have any material effect on off-site aquatic risks, due to the limited extent of sodium and chloride exceedances above the GW3 component value protective of off-site aquatic receptors and the continued application of road salt between the site and the nearest downgradient surface water body, the Besley Drain.

1.2 Recommendations

EXP recommends that the following RMM be considered, in order to reduce the potential ecological risks identified at this site:

1. **Soil Cover System (to be implemented as part of any future redevelopment)**

   Implementation of a surface barrier upon redevelopment of the site, such as a hard cap (asphalt/concrete) or a soft cap (with minimum thickness of 0.5 m of soil meeting the applicable Table 2 SCS underlain by a demarcation barrier), as appropriate, to block exposure to on-site soils for ecological receptors. In areas where trees are proposed, a 1.5 m soft cap barrier is recommended, with at least 0.5 of soil meeting the applicable Table 2 SCS placed around the root ball. Following the construction of the hard and/or soft cap barriers, it is recommended that the cap barriers be regularly monitored to ensure their integrity and that there is no exposed underlying soil. Maintenance of the soil cover systems will involve the repair of any damage, deterioration or compromises noted during inspection of the future cap barriers**.**

1. **Site-Specific Soil and Groundwater Management Plan**

   For any excavation work or breach in the future soil barrier at the site involving potential contact with or the re-distribution of impacted soil or groundwater, the preparation and implementation of a Soil and Groundwater Management Plan (SGWMP) is recommended. The SGWMP includes requirements for controlling the handling, distribution and disposal of soil and groundwater to ensure that exposure via direct contact pathways by human and ecological receptors is not likely to occur or will be minimized. The SGWMP will also mitigate any off-site migration of soil COCs due to windborne dispersion and groundwater COCs due to run-off at the time of site redevelopment.

   It is recommended that the SGWMP be prepared and implemented under the supervision of a Qualified Person (QP_{ESA}) during any intrusive sub-surface activities that may expose impacted soil or groundwater at the Site.

2. **Potable Groundwater Use Restriction**

   A restriction prohibiting the taking of groundwater from the site for potable use (i.e., prohibiting the construction of potable water wells at the site).

Should any new maximum COC concentrations be identified in soil or groundwater, the conclusions of this DDRA may need to be reviewed and/or revised. In the event a new COC is identified (i.e., chemical parameter with new maximum concentration that now exceeds the applicable SCS), it is recommended that an updated DDRA be conducted.

2 Introduction and Background

EXP was retained by the Town of Shelburne c/o S. Burnett & Associates Limited ('the Client') to conduct a DDRA on the known soil and groundwater impacts identified at the property located at 420 Victoria Street, Shelburne, Ontario (hereinafter referred to as the "site" or "RA Property"). It is EXP's understanding that the DDRA is required for financial due diligence purposes in support of a potential real estate transaction and that a Record of Site Condition (RSC) under Ontario Regulation (O. Reg.) 153/04 is not required at this time.

This report was prepared by EXP for the account of the Town of Shelburne. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. EXP accepts no responsibilities for damages, if any, suffered by any third party as a result of decisions made or actions based on this project.

2.1 Background

The site is located on the west side of Victoria Street and approximately 40 metres (m) south of Jeffrey Street, in the Town of Shelburne, Ontario. The site is irregular in shape and measures approximately 0.30 hectares (0.73 acres) in area. The site was first developed as the current public works yard for the County of Dufferin/Town of Shelburne circa 1945. At the time of the investigation, the site was occupied for use as a Public Works Yard with a building on the north-central portion that is currently used for the storage of municipal roadwork equipment and materials. The northeast portion of the site is asphalt paved, the northwest, central and southern portions consist of sand/granular fill, with landscaped areas along the north, west and south boundaries. No surface water bodies are present at the site.

According to the topographical and geological conditions summarized in recent Phase Two ESA investigation (EXP, 2022B), regional groundwater flow direction is inferred to be northeasterly, towards the Boyne River. However, the localized groundwater flow conditions across the site indicate a groundwater flow to the southeast in the unconfined clayey silt till aquifer. A groundwater contour plan is shown in Figure 4. The nearest surface water body to the site is the Besley Drain, located approximately 515 metres to the southeast. The Besley Drain flows approximately 3,400 m north to northeast before it discharges into the Boyne River northeast of the Site. The Boyne River flows northeast towards Lake Simcoe.

The site was first developed for industrial use as the current public works yard for the County of Dufferin/Town of Shelburne circa 1945. At the time of the investigation, the site was occupied for use as a Public Works Yard with a building on the north-central portion that is currently used for the storage of municipal roadwork equipment and materials. The majority of the site was unpaved, with landscaped areas along the north, west and south boundaries.

It is understood that the client intends to sell the site without redevelopment; however, the future purchaser may redevelop the site to fit their requirements. It is noted that the current land use is conservatively considered to be industrial (municipally zoned as industrial, commercial, institutional) and it is assumed this will not change upon site redevelopment. The redevelopment plans are not currently known. The existing site building is of single-storey construction.

The site is located in a region of mixed residential, community, commercial, and industrial land uses. The site is bound by residential land use to the north, east and south and community use (a former Canadian Pacific Railway corridor now used as a recreational trail) followed by commercial/industrial use to the west. It is noted that groundwater at the site is considered to be potable since the Town of Shelburne supplies drinking water from six (6) municipal supply wells and the site is located within a drinking water protection zone.

Phase One and Two ESAs, remedial activities, and other environmental investigations were conducted at the site between 2018 and 2022 by various consultants including THEM, IRSL, Global GPR Services, and most recently EXP, to address the various impacts in soil and groundwater associated with current and former on-site and off-site activities. THEM completed a remediation program to remove PHC impacted soil at the site between 2018 and 2020. While a formal report was not provided, select drawings and laboratory certificates of analysis pertaining to the remedial excavation program were provided to EXP for review. Based on EXP's review of these documents, soil impacted with PHCs likely remain at the site. As some details of the remedial programs are missing, EXP cannot comment on the accuracy or completeness of the remedial work completed by THEM. In addition, in-situ chemical oxidation (ISCO) using catalyzed sodium persulfate was conducted at seven (7) injection points on the northwest corner of the site building by IRSL in January 2020. It is assumed the remediation was to address the potential PHC impacts in soil identified at a depth of 0.3 to 1.6 m bgs beneath the on-site building by Global GPR Services (2019).

The DDRA was based on the results of the Phase Two ESAs and subsurface investigations previously completed by THEM (2019B, 2020A, 2020B, 2020C, 2020D) and EXP (2022B), and on the available limited details of the Remedial Soil Excavation Program completed at the site between 2018 and 2020 by THEM. Following the previous environmental investigations and remedial activities, exceedances of the Table 2 SCS for PHC fractions F1 to F3, benzene, ethylbenzene and xylenes, metals (zinc) and ORPs (HWS-B, EC and SAR) in soil, and VOCs (1,1,1-TCA, 1,1,2-TCA, 1,1-DCA and 1,1-DCE), metals (barium, cobalt and selenium) and ORPs (sodium and chloride) in groundwater remain at the site.

In addition, given that the minimum depth to groundwater was reported to be 1.16 m bgs, i.e., <3.0 m bgs, the depth to groundwater on the RA Property is inconsistent with the assumptions applied by the MECP in the evaluation of the indoor air vapour intrusion pathway under the Table 2 SCS. The depth to groundwater reflects the distance and opportunity for potential contaminant biodegradation and natural attenuation to occur, which are considered in the modelling of the groundwater to indoor air exposure pathway. Given the minimum depth to groundwater at the site is 1.16 m bgs (<3.0 m bgs), additional screening of groundwater analytical results to Table 6 SCS for a shallow groundwater scenario is required.

2.2 Applicable Site Condition Standards

Analytical results within the previous investigations (see Section 2.3) were assessed against SCS as established under subsection 169.4(1) of the Environmental Protection Act, and presented in the MECP document "Soil, Groundwater and Sediment Standards for Use Under Part XV.1 of the *Environmental Protection Act*", dated April 15, 2011 ("MECP Standards"). Tabulated background SCS (Table 1) applicable to environmentally sensitive sites and effects based generic SCS (Tables 2 to 9) applicable to non-environmentally sensitive sites are provided in the MECP Standards. The effects based SCS (Tables 2 to 9) are protective of human health and the environment for different groundwater conditions (potable and non-potable), land use scenarios (residential, parkland, institutional, commercial, industrial, community and agricultural/other), soil texture (coarse or medium/fine) and restoration depth (full or stratified).

Tables 1 to 9 of the MECP Standards are summarized as follows:

- Table 1 – applicable to sites where background concentrations must be met (full depth), such as sensitive sites where site-specific criteria have not been derived;
- Table 2 – applicable to sites with potable groundwater and full depth restoration;
- Table 3 – applicable to sites with non-potable groundwater and full depth restoration;
- Table 4 – applicable to sites with potable groundwater and stratified restoration;
- Table 5 – applicable to sites with non-potable groundwater and stratified restoration;
- Table 6 – applicable to sites with potable groundwater and shallow soils;
- Table 7 – applicable to sites with non-potable groundwater and shallow soils;
- Table 8 – applicable to sites with potable groundwater and that are within 30 m of a water body; and,
- Table 9 – applicable to sites with non-potable groundwater and that are within 30 m of a water body.

Application of the generic or background SCS to a specific site is based on a consideration of site conditions related to soil pH (*i.e.,* surface and subsurface soil), thickness and extent of overburden material, (*i.e.,* shallow soil conditions), and proximity to an area of environmental sensitivity or of natural significance. For some chemical constituents, consideration is also given to soil textural classification with SCS having been derived for both coarse and medium-fine textured soil conditions.

For the purpose of this DDRA, the Table 2: Full Depth Generic SCS in a Potable Groundwater Condition for an industrial/commercial/community property (ICC) use with coarse textured soil (herein referred to as Table 2 SCS) was selected for the assessment of analytical data for the RA Property based on the following considerations:

- As per Section 41 of O. Reg. 153/04, the site is not identified to be sensitive.
  - The property is not within, adjacent to or within 30 metres of an area of natural significance.
  - Eleven (11) surface soil samples, including two (2) duplicates, were analyzed for pH. The pH of all surface soil samples collected from within 1.5 m bgs was within the range of 5.0 to 9.0, with the exception of one (1) soil sample. The pH of all subsurface soil samples collected below 1.5 m bgs was within the range of 5.0 to 11.0.
    - Sample BH22-4-SS2 (taken at a depth of 0.76 to 1.37 m bgs) had a pH of 9.14, which is slightly above the acceptable range for surface soils. Of the ten (10) surface soil samples and two (2) duplicate surface soil samples analyzed, only one (1) soil sample was outside the acceptable pH range for surface soil. Therefore, this exceedance is not considered representative of the general site conditions and the site is not considered to be a “Sensitive Site” as per O. Reg. 153/04, Section 41. It is noted that the pH exceedance at BH22-4-SS2 has been vertically delineated as the pH of sample BH22-4-SS5 (taken at a depth of 3.05 to 3.66 m bgs) was measured to be 7.78, which is within the acceptable range for subsurface soils.
- As per Section 43.1 of O. Reg. 153/04, a property is considered to be a shallow soil property if 1/3 or more of the property consists of soil equal to or less than 2 metres in depth beneath the soil surface. All the boreholes/monitoring wells advanced at the site indicated an overburden thickness greater than 2 metres and as such, the RA Property is not considered to be a shallow soil property. Bedrock was not encountered on-site to the maximum investigated depth of 9.75 m bgs, but based on MECP well records limestone bedrock in the vicinity of the site is encountered at depths between 16.8 and 24.4 m bgs.
- While the predominant soil type at the site was observed to be clayey silt till, EXP selected the standards for coarse-textured soils to be conservative given that soils above the water table were observed to be silty sand (coarse-textured).
- It is understood that the client intends to sell the site without redevelopment; however, the purchaser will undertake some redevelopment to have the property fit their requirements. It is noted that the current land use is conservatively considered to be industrial and will not change upon site redevelopment. For this reason, EXP has chosen to compare the analytical results to the industrial land use criteria.
- The Town of Shelburne supplies drinking water from six (6) municipal supply wells and the site is located within a drinking water protection zone. As such, the standards in a potable groundwater condition were selected.
- There is no intention to carry out a stratified restoration at the site.

2.3 Previous Environmental Activities

Previous environmental investigations conducted at the site including Phase One and Two ESAs, remedial activities, and other environmental investigations were conducted at the site between 2018 and 2022 by various consultants including THEM, IRSL, Global GPR Services, and most recently EXP, to address the various impacts in soil and groundwater associated with current and former on-site and off-site activities.

The following are brief summaries of the Phase One and Two ESAs, remedial activities, and other environmental investigations provided to EXP to review for the site:

1. **THEM, (THEM, 2018) Survey for Asbestos-Containing Materials, Town of Shelburne, 420 Victoria Street, Shelburne, Ontario, L0N 1S4, dated October 15, 2018.**

An asbestos survey was conducted at the site by THEM, in order to identify any asbestos containing materials within the on-site building. Based on the results of the survey, asbestos containing vinyl floor tiles were identified in the office area and washroom, covering an area of approximately 145 ft2. As the asbestos is considered to be non-friable, it can remain in place until any upgrading maintenance or demolition occurs, which would result in disturbance of the material.

2. **THEM, (THEM, 2019A) Phase One Environmental Site Assessment, 420 Victoria Street, Town of Shelburne, Ontario, L0N 1S4, dated February 4, 2019.**

THEM conducted a Phase One ESA for the site in 2019.

Based on their review, the following environmental concerns were noted at the site:

- The site has been used as a public works yard for many years, including equipment and vehicle storage;
- Salt was stored on-site;
- An un-used underground storage tank (UST) was located at the northeast corner of the site building (reportedly 2,300 L and historically containing diesel fuel but contents unknown at time of Phase One ESA);
- A UST was historically located at the southeast corner of the building (size and contents unknown) based on the site interview;
- A 2,300 L aboveground storage tank (AST) containing diesel fuel was observed on the west side of the site building;
- A 2,300 L AST containing diesel fuel was previously located to the southwest of the site building;
- An 800 L plastic tote for pesticides storage was observed in the building (stored for off-site use);
- Asbestos was identified in floor tiles in the office space and washroom;
- An abandoned/decommissioned municipal water supply well was observed on-site; and,
- A pole mounted transformer was observed near the southeastern site boundary.

In addition, the following environmental concerns were noted off-site:

- A railway line was historically present to the immediate west of the site;
- MacMillan Bloedel Ltd., Shelburne Wood Processing, Inwest Lumber Sales, a wood processing and preservation facility is located approximately 20 west of the site;
- Historical farming occurred within the Phase One Study Area;
- A 2,500 L wood preservative spill occurred at 201 Wellington Street (located adjacent to the west of the site); and,
- A fuel oil UST was located at 151 Centre Street (approximately 240 metres northeast of the site).

THEM also reported two (2) empty ASTs, originating from off-site, that were being stored at the site (south of the building) for future off-site disposal. EXP does not consider this to be an environmental concern given that the tanks were not used on-site, were empty and were only temporarily stored on-site.

3. **THEM, (THEM, 2019B) Phase Two Environmental Site Assessment, 420 Victoria Street, Town of Shelburne, Ontario, dated February 15, 2019.**

THEM completed a Phase Two ESA in 2019 for the site.

The Phase Two ESA consisted of the following:

- Drilling ten (10) boreholes (BH1 to BH10);
- Installing monitoring wells in four of the boreholes (MW1, MW4, MW6 and MW10);
- Analyzing nineteen (19) soil samples for petroleum hydrocarbons (PHCs), polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), organochlorine pesticides (OCPs), metals and inorganics, and/or pH; and,
- Analyzing five (5) groundwater samples for PHCs, PAHs, VOCs, OCPs, metals and/or inorganics.

Based on the results of the investigation, the following information was noted:

- Table 2 Site Condition Standards for a residential property with coarse textured soil were used (Table 2 SCS);
- Soil exceedances of cyanide, electrical conductivity and sodium adsorption ratio were identified;
- Groundwater exceedances of sodium and chloride were identified. Elevated reporting detection limit exceedances were also identified for select metals;
- Based on the drilling investigation, the subsurface conditions consisted of up to 3.0 metres of fill, underlain by sand, silty clay and clay to silt till with some gravel;
- Bedrock was not encountered (maximum borehole depth of 4.57 metres below ground surface (m bgs));
- Groundwater at the site ranged from 0.61 to 1.35 metres below ground surface (m bgs; 98.15 m to 99.14 m (relative)); and,
- Based on groundwater measurements, the interpreted shallow groundwater flow direction was northwest. Regional groundwater flow was interpreted to be to the northeast.

Further investigation and/or remedial activities was recommended to address the exceedances identified.

4. **Global GPR Services, (Global GPR Services, 2019) Subsurface Investigation, Soil Contamination, dated December 5, 2019.**

Based on a GPR scan over the majority of the site, potential petroleum hydrocarbon contamination in soil was identified at a depth of 0.3 to 1.6 m bgs underneath the on-site building and immediately south of the building, and potential sodium contamination in soil was identified at a depth of 0.4 to 0.7 m bgs in the central-eastern portion of the site. In addition, an unknown anomaly was identified in the centre of the site, approximately 0.8 m bgs.

5. **IRSL, (IRSL, 2020) Injection Summary, 420 Victoria Street, Shelburne, ON, dated January 24, 2020.**

An injection program was completed at the site, using catalyzed sodium persulphate, injected in seven (7) locations. A total of 750 kilograms (kg) of catalyzed sodium persulfate was injected with 2,900 litres (L) of water on January 23, 2020. A site plan showing the locations of the injections was not included in this summary letter, however, field documentation provided by S. Burnett and Associates Limited pertaining to this program indicated that the injection wells were located in the northwest corner of the site building and that the remediation was conducted to address soil impacts. It is assumed the soil remediation was to address the potential PHC impacts in soil identified at a depth of 0.3 to 1.6 m bgs beneath the on-site building by Global GPR Services (2019). EXP notes that a remediation report detailing the purpose of the remediation program, scope of work and follow up confirmatory sampling/analytical results was not provided for review.

6. **THEM (THEM, 2020A) Asbestos Bulk Sampling Report, 420 Victoria Street in Shelburne, Ontario, dated March 3, 2020.**

An asbestos survey was conducted at the site by THEM, in order to identify any asbestos containing materials in pipes uncovered during soil remediation. Based on the results of the survey, the cement piping was found to contain asbestos. It was recommended that the pipe and associated debris be immediately cleaned from the area using Type 1 asbestos safety precautions.

7. **THEM (THEM, 2020B) 420 Victoria Street Groundwater Sampling, June 17, 2020, dated August 26, 2020.**

A groundwater sampling program was conducted at the site on June 17, 2020, and included collecting groundwater samples from two (2) existing monitors (BHMW4 and BHMW6) at the site. Two (2) additional existing monitors could not be located and were therefore not sampled (BHMW1 and BHMW10). The groundwater samples were analyzed for PHCs, VOCs, PAHs, metals and inorganics and/or OCPs. Multiple exceedances (measured or elevated RDLs) were identified in BHMW4 (chloride, silver, beryllium, cobalt, mercury, molybdenum, sodium, antimony, selenium, vanadium, and 1,1-dichloroethane), located in the central portion of the site.

8. **THEM (THEM, 2020C) Soil Investigation, along Southern and Western Property Boundary, 420 Victoria Street, Shelburne, dated August 27, 2020.**

A soil sampling program was conducted on March 23, 2020 and consisted of advancing eight (8) boreholes (BH1 to BH8) along the southern and western property boundaries, to a maximum depth of 3 m bgs. The purpose of the sampling program was to investigate electrical conductivity (EC) and sodium adsorption ratio (SAR) exceedances near the neighbouring properties.

Exceedances of EC and SAR above the Table 2 SCS were identified in seven (7) of the eight (8) boreholes, indicating that there is potential for the off-site migration of EC and SAR across the southern and western property boundaries.

9. **THEM (THEM, 2020D) Test Pit Investigation and Sample Analysis (Test Pits 1 to 6), 420 Victoria Street, dated September 18, 2020.**

A test pit sampling program was conducted on December 20, 2019 and consisted of advancing six (6) test pits (Test Pits 1 to 6) across the site to a maximum depth of 0.72 m bgs. Soil samples from the test pits were submitted for analysis of metals & inorganics and/or PHCs/BTEX. Based on the results of the analysis, exceedances of EC, SAR, hot water soluble boron, cyanide, and/or zinc were identified in all the of the test pits. All other tested parameters met the Table 2 SCS.

10. **THEM (THEM, 2020E) Test Pit Investigation and Sample Analysis, 420 Victoria Street, dated September 18, 2020**.

A test pit sampling program was conducted on February 20, 2020, and consisted of advancing two (2) test pits (Test Pits 7 and 8) at the site to a maximum depth of 0.72 m bgs. The test pits were for delineation purposes of zinc, identified near the southern portion of the building. The soil samples collected from the test pits were found to be within the applicable Table 2 SCS.

11. **EXP Services Inc., (EXP, 2022A) Phase One Environmental Site Assessment, 420 Victoria Street, Shelburne, Ontario, dated May 26, 2022.**

EXP conducted a Phase One ESA in 2022 in support of the filing of an RSC for the site.

Based on their review, the following Potentially Contaminating Activities (PCAs) that were thought to contribute to an Area of Potential Environmental Concern (APEC) include:

- Potential for fill material across the site;
- The site has been a public works facility since approximately 1945 (including equipment and vehicle storage and repairs);
- A salt storage pile was historically located on-site;
- Salt storage was observed in the site building during the investigation;
- An un-used UST was previously located at the northeast corner of the site building (reportedly 2,300 L and historically containing diesel fuel but contents unknown);
- A UST was reportedly historically located at the southeast corner of the building (size and contents unknown);
- A 2,300 L AST containing diesel fuel was observed on the west side of the site building;
- An AST was previously located to the south of the site building;
- An 800 L plastic tote for pesticides storage was historically observed in the building (stored for off-site use). It is noted that the exact location of this tote within the site building is unknown;
- A pole-mounted transformer was observed at the southwest of the site;
- Use of a dust suppressant on-site, containing chloride; and,
- Limited documentations supporting a remedial excavation of PHC impacted soil located adjacent to the south of the building was provided to EXP for review. However, insufficient information was available to confirm that all PHC impacted soil has been removed and that the remediation was completed in accordance with O. Reg. 153/04.

In addition, the following off-site PCAs were thought to contribute to an APEC:

- A railway line was historically present to the immediate west of the site;

- MacMilla Bloedel Ltd., Shelburne Wood Processing, Inwest Lumber Sales, a wood processing and preservation facility, has been located at 201 Wellington Street (approximately 20 metres west of the site) since 1988; and,
- A 2,500 L wood preservative spill occurred at 201 Wellington Street (approximately 20 metres west of the site).

Based on the results of the Phase One ESA, the following Areas of Potential Environmental Concern (APECs) were noted at the site:

APEC	Location of APEC on Phase One ESA	PCA	Location of PCA (on-site or off-site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, soil and/or sediment)
A	Entire site	S1 - (30) Importation of Fill Material of Unknown Quality	On-site	PAHs, Metals, Sb, As, Se, Cr(VI), Hg, HWS-B, CN-, EC, SAR	Soil
B	Northern portion of the site	S2 - (52) Storage, maintenance, fuelling and repair of equipment, vehicles, and material used to maintain transportation systems	On-site	PHCs, VOCs, PAHs, Metals	Soil and groundwater
C1	Southern portion of the site	S3a - (48) Salt Manufacturing, Processing and Bulk Storage	On-site	Soil: EC and SAR Groundwater: Na and Cl	Soil and groundwater
C2	Northern portion of the site	S3b - (48) Salt Manufacturing, Processing and Bulk Storage	On-site	Soil: EC and SAR Groundwater: Na and Cl	Soil and groundwater
C3	South of site building	S3c – (other) Dust Suppressant Use (containing chloride)	On-site	Soil: EC and SAR Groundwater: Cl	Soil and groundwater
D	Southwest portion of the site	S4 - (55) Transformer Manufacturing, Processing and Use	On-site	PHCs, PCBs	Soil and groundwater
E1	Northwestern portion of the site	S5a - (28) Gasoline and Associated Products Storage in Fixed Tanks	On-site	PHCs, BTEX, PAHs, Metals	Soil and groundwater
E2	Northwestern portion of the site	S5b - (28) Gasoline and Associated Products Storage in Fixed Tanks	On-site	PHCs, BTEX, PAHs, Metals	Soil and groundwater

APEC	Location of APEC on Phase One ESA	PCA	Location of PCA (on-site or off-site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, soil and/or sediment)
E3	Central portion of the site	S5c - (28) Gasoline and Associated Products Storage in Fixed Tanks	On-site	PHCs, BTEX, PAHs, Metals	Soil and groundwater
E4	North-central portion of the site	S5d - (28) Gasoline and Associated Products Storage in Fixed Tanks	On-site	PHCs, BTEX, PAHs, Metals	Soil and groundwater
F	Northern portion of the site (site building)	S6 - (40) Pesticides (including Herbicides, Fungicides and Anti-Fouling Agents) Manufacturing, Processing, Bulk Storage and Large-Scale Applications	On-site	OCPs	Soil and groundwater
G	South of site building	S7 – (other) Reported PHC remediation	On-site	PHCs/BTEX	Soil
H1	Western portion of the site	S8 - (46) Rail Yards, Tracks and Spurs	Off-site (west adjacent)	PHCs, PAHs, Metals, Sb, As, Se, Cr(VI), Hg, HWS-B, CN-	Soil and groundwater
H2	Western portion of the site	S9a - (59) Wood Treating and Preservative Facility and Bulk Storage of Treated and Preserved Wood Products S9b - (Other) Spill (wood preservative)	Off-site (201 Wellington Street; 20 metres west)	VOCs, Metals, Sb, As, Se	Groundwater

It was noted that the site has previously undergone a Phase Two ESA (THEM, 2019b) which investigated several of the APECs identified by this Phase One ESA, in addition to remediation work. However, a Phase Two ESA, dated within 18 months of the RSC submission, must be completed before the intended RSC can be filed for the site.

12. **EXP Services Inc., (EXP, 2022B) Phase Two Environmental Site Assessment, 420 Victoria Street, Shelburne, Ontario, dated September 29, 2022, revised December 8, 2022.**

- The Phase Two ESA involved the advancement of nineteen (19) exterior boreholes (identified as BH22-5 to BH22-8, BH22-9S, BH22-9D, BH22-10, BH22-11S, BH22-11D, and BH22-12 to BH22-21) and installing groundwater monitors in nine (9) of the exterior boreholes (identified as BH/MW22-5 to BH/MW22-8, BH/MW22-9S, BH/MW22-9D, BH/MW22-10, BH/MW22-11S, and BH/MW22-11D); and advancing four (4) interior boreholes (identified as BH/MW22-1 to BH/MW22-4) and installing groundwater monitors in all of the interior boreholes from July 4 to 8, 2022. A soil and groundwater sampling program was completed. Parameters chosen for analysis were based upon the results of the Phase One ESA completed by EXP, dated May 26, 2022. Groundwater sampling was conducted at all thirteen (13) newly installed monitors on July 20 and 21, 2022.

- Soil samples were analyzed for petroleum hydrocarbons (PHC) fractions F1 to F4, benzene, toluene, ethylbenzene and xylenes (collectively referred to as "BTEX"), volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), metals (including hydride-forming metals), other regulated parameters (ORPs) (hot water-soluble boron (HWS-B), hexavalent chromium (Cr (VI)), mercury (Hg), cyanide (CN-), electrical conductivity (EC), sodium adsorption ratio (SAR) and pH) and/or organochlorine pesticides (OCPs). Groundwater samples were analyzed for PHC fractions F1 to F4, BTEX, VOCs, PAHs, metals (including hydride-forming metals) and/or ORPs (Cr (VI), Hg, CN-, sodium (Na) and chloride (Cl)). The Ontario Regulation (O. Reg.) 153/04 Table 2 Site Condition Standards (SCS) for a residential/parkland/institutional property use and coarse textured soils (hereinafter referred to as the "Table 2 SCS") were deemed appropriate for evaluating conditions at the site.

- The soil samples collected from twenty-one (21) boreholes (BH/MW22-1 to BH/MW22-8, BH/MW22-9D, BH/MW22-10, BH/MW22-11D, and BH22-12 to BH22-21) were within the Table 2 SCS for all of the parameters analyzed with the following exceptions:

  - Two (2) soil samples (BH22-13-SS1B and BH22-13-SS4, at depths ranging from 0.15 to 2.90 metres below ground surface (m bgs)) exhibited concentrations of PHC fractions F2 and/or F3 exceeding the Table 2 SCS;

  - One (1) soil sample (BH22-21-SS1B, at a depth of 0.05 to 0.61 m bgs) exhibited concentrations of zinc exceeding the Table 2 SCS;

  - Two (2) soil samples (BH22-1-SS1B and BH22-10-SS2, at depths ranging from 0.46 to 1.37 m bgs) exhibited concentrations of HWS-B exceeding the Table 2 SCS; and,

  - Ten (10) soil samples (BH22-1-SS1B, BH22-4-SS2, BH22-9D-SS3, BH22-9D-SS5, BH22-10-SS2, BH22-10-SS6, BH22-11D-SS3, BH22-11D-SS5, BH22-21-SS1B and BH22-21-SS4, at depths ranging from 0.05 to 9.75 m bgs) exhibited concentrations of EC and/or SAR exceeding the Table 2 SCS.

- It is further noted that one (1) soil sample collected from BH22-4 (collected at a depth of 0.76 to 1.37 m bgs) exhibited a soil pH value of 9.14, slightly above the acceptable range for non-sensitive sites per O. Reg. 153/04. Of the ten (10) surface soil samples and two (2) duplicate surface soil samples analyzed, only one (1) soil sample was outside the acceptable pH range for surface soil. Therefore, this exceedance is not considered representative of the general site conditions and the site is not considered to be a "Sensitive Site" as per O. Reg. 153/04, Section 41.

- The groundwater samples collected from the thirteen (13) newly installed monitors (BH/MW22-1 to BH/MW22-8, BH/MW22-9S, BH/MW22-9D, BH/MW22-10, BH/MW22-11S and BH/MW22-11D) were within the Table 2 SCS for all of the parameters analyzed with the following exceptions:

  - Three (3) groundwater samples from BH/MW22-2, BH/MW22-3 (and field duplicate BH22D-3) and BH/MW22-4 (with screened intervals of 1.22 to 4.27 m bgs) exhibited concentrations of 1,1,2-trichloroethane, 1,1-dichloroethane and/or 1,1-dichloroethylene exceeding the Table 2 SCS;

  - Three (3) groundwater samples from BH/MW22-2, BH/MW22-9D and BH/MW22-11S (and field duplicate BH22D-11S) (with screened intervals ranging from 1.22 to 9.75 m bgs) exhibited concentrations of cobalt, barium or selenium exceeding the Table 2 SCS; and

- Six (6) groundwater samples from BH/MW22-7, BH/MW22-9S, BH/MW22-9D, BH/MW22-10, BH/MW22-11S and BH/MW22-11D (with screened intervals ranging from 1.22 to 9.75 m bgs) exhibited concentrations of Na and Cl exceeding the Table 2 SCS.

After incorporating the findings of EXP's Phase Two ESA and analytical data from previous environmental investigations, the soil in exceedance of the Table 2 SCS for PHC fractions F1 to F3, benzene, ethylbenzene, xylenes, metals (zinc), ORPs (HWS-B, EC and SAR), and the groundwater in exceedance of the Table 2 SCS for VOCs (1,1,1-TCA, 1,1-DCA and 1,1-DCE), metals (barium, cobalt and selenium) and ORPs (sodium and chloride) must be remediated and/or risk assessed before an RSC can be filed. It is further noted that additional delineation of the identified soil and groundwater exceedances and confirmation of soil pH in the vicinity of BH22-4 will be required to support the remediation or risk assessment approach and future RSC filing.

2.4 Objectives

The objective of the DDRA is to ascertain whether the environmental impacts present in soil and groundwater at the site would pose an unacceptable risk to the on-site human and ecological receptors, assuming the current and continued industrial use of the site. In the event that unacceptable risk is predicted, risk management measures (RMM) for the site will be proposed.

2.5 Scope of Work

The following scope of work was undertaken as part of this assessment:

- Identify the COCs (based on the available data);
- Development of human health and ecological conceptual site models;
- Determine the potential human and ecological receptors;
- Identify the various potential exposure pathways;
- Perform a qualitative assessment of the exposure and the associated potential adverse effects; and,
- Provide recommendations of RMM (if required).

The DDRA is based on the available analytical data and the assumption of continued use of the site as industrial land use under the current site configuration, with the understanding that the site may be redeveloped in the future.

2.6 Due Diligence Risk Assessment Approach

For the purpose of this report, the soil and groundwater data obtained from the site are compared to the human health and ecological based soil and groundwater component values for the relevant exposure pathways identified in the human health (Section 4) and ecological (Section 5) risk assessment sections of this report. These criteria, which are obtained from the 2016 MGRA model (MECP, 2016) and most current MECP Toxicity reference Value Updates (TRV) (MECP, 2022), are the Table 2 Component Criteria that represent the human health/ecological based components of the generic MECP (2011a) Table 2 SCS.

By way of background and context, as part of the derivation of the generic MECP SCS, the MECP has developed risk-based values deemed protective of the various site receptor/exposure pathway scenarios, which are referred to as component values. The various human receptors included in these scenarios include commercial human receptors (e.g., long-term workers). The various ecological receptors include plants, soil invertebrates, and representative mammals and birds (i.e., American woodcock, meadow vole, red-winged blackbird, red fox, short-tailed shrew, and red-tail hawk). Some of the exposure pathways included in the scenarios comprise dermal contact, ingestion, vapour inhalation, and the groundwater migration to surface water. Each of these scenarios is evaluated separately by the MECP for each COC regulated under O. Reg. 153/04.

In the event that a COC concentration exceeds the MECP generic component values, RMM and/or additional lines of evidence supporting a conclusion regarding potential risks will be proposed.

It should be noted that the DDRA will qualitatively assess potential risks to off-site aquatic species.

3 Contaminants of Concern

3.1 Contaminants of Concern Selection Process

For the purpose of this DDRA, and in keeping with O. Reg. 153/04, COCs were identified based on a comparison of the analytical results reported for the soil and groundwater samples obtained from the RA Property against the Table 2 SCS. A soil parameter was selected as a COC if its maximum concentration exceeded the Table 2 SCS.

For groundwater, volatile parameters were also compared to the Table 6 SCS, which is representative of a shallow groundwater scenario. It is noted that in the development of the MECP Table 2 Component Values (i.e., exposure pathway-specific criteria), the MECP considers a depth to groundwater of 3 m bgs, such that sufficient soil is present above the groundwater table to allow for mechanisms such as biodegradation and natural attenuation to occur. These conditions are relevant to the volatilization pathways of volatile parameters in groundwater and as such, in conditions of shallow groundwater (i.e., depth less than 3 m bgs) the Table 2 Component Criteria are often not appropriate for inhalation exposure pathways. The shallowest measured depth to groundwater was noted to be 1.16 m bgs. As the minimum depth to groundwater is less than 3 m bgs, the Table 6 SCS, which consider shallow groundwater conditions, is considered to be more appropriate for the assessment of vapour inhalation pathways at the site. In keeping with the MECP, a groundwater parameter was considered sufficiently volatile if the parameter has a Henry's Law constant greater than $1x10^{-5}$ atm-m^3/mol and/or the vapour pressure is greater than 1.0 Torr. A groundwater parameter was selected as a COC if its maximum concentration exceeded the Table 2 SCS and/or Table 6 SCS (for volatile parameters).

Based on the approach outlined in Section 2.5, the soil and groundwater COC inventories were determined. The soil COC inventory is presented in Table 3-1 and the groundwater inventory is presented in Table 3-2.

Table 3-1: Soil COC Inventory

Parameter	Maximum Concentration (µg/g)	Table 2 SCS (µg/g)	Location of Maximum Exceedance	Depth (m bgs)
PHCs and BTEX				
PHC F1	530	55	RCS-5 (wall)	1.5
PHC F2	490	230	RCS-6 (wall)	1.5
PHC F3	2,200	1,700	BH22-13-SS4	2.29 – 2.90
Benzene	0.5	0.32	S-3 (wall)	1.8
Ethylbenzene	8.37	1.1	RCS-5 (wall)	1.5
Xylenes	43.1	26	RCS-5 (wall)	1.5
Metals and Hydride Forming Metals				
Zinc	676	340	TP 3-1	0.63 (Floor)
ORPs				
HWS-B	2.62	2	BH22-10-SS2	0.76 – 1.37
EC (mS/cm)	17.8	1.4	B22-10 SS6	3.81 – 4.42

Parameter	Maximum Concentration (µg/g)	Table 2 SCS (µg/g)	Location of Maximum Exceedance	Depth (m bgs)
SAR (unitless)	248	12	TP 5-1	0.62 (Floor)

PHC and/or BTEX impacts were identified at depths ranging from 1.5 to 2.1 m bgs in confirmatory soil samples FS-1 (wall), FS-3 (wall), FS-4 (wall), FS-5 (wall), and FS-2 (wall), taken during the previous excavations on the northeastern portion of the site (THEM, 2018-2020). In addition confirmatory soil sample S-5 (wall) was within the Table 2 SCS for PHCs and BTEX at a depth of 1.5 m bgs. These PHC and BTEX exceedances were attributed to the presence of the former UST (located within APEC 4). Based on a review of previous soil remediation documentation, soil excavation programs were completed by THEM between 2018 and 2020; however, full soil remediation reports were not provided for review. It is noted that samples FS-1 (wall), FS-3 (wall), FS-4 (wall), FS-5 (wall), FS-2 (wall), and S-5 (wall) were removed via soil excavation during the remediation programs (THEM, 2018-2020). As such, these soil results are not carried forward in the DDRA.

It is noted that 1,1,1,2-tetrachloroethane, 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, 1,1-dichloroethane, 1,1-dichloroethylene, 1,2-dichloroethane, 1,2-dichloropropane, 1,3-dichloropropene, 1,4-dichlorobenzene, bromomethane, carbon tetrachloride, chloroform, and ethylene dibromide had elevated reporting detection limits (RDLs) above the Table 2 SCS in 2018 (THEM, 2019b) at boreholes BH/MW1 and BH9-2018. It should be noted that the analytical results of the soil samples collected from BH/MW22-1 and BH/MW22-2, located in the vicinity of BH/MW1 and BH9-2018, respectively, indicated non-detect values for the above-noted VOC parameters. As such, VOC exceedances are not anticipated to be present at BH/MW1 and BH9-2018. Furthermore, VOCs were not identified as pCOCs in soil at BH/MW1 and the above-noted parameters have not been detected in soil on-site. As such, they are not carried forward as COCs in soil.

An exceedance of cyanide (CN-) was identified at a depth of 0.0 to 1.52 m bgs in borehole BH2-2018 (south-central portion of the site). As BH2-2018 is located within APEC A and the impact is localized, it is likely that the cyanide impacts identified in soil are associated with the importation of low quality fill material at the site (APEC A). Based on a review of previous soil remediation documentation, it is noted that sample BH2-1 collected from BH2-2018 was remediated via soil excavation (THEM, 2020). The final size of the excavation was estimated to be 2.25 m^2 in area and approximately 1.5 m in depth. Confirmatory soil samples 6-1 and 6-3 (sampling depths unknown) from the walls of the excavation and confirmatory soil sample 6-2 (taken at a depth of 1.5 m bgs) from the floor of the excavation indicated non-detect values for cyanide. As such, cyanide is not carried forward as a COC in soil at BH2-2018.

It is also noted that CN- had elevated RDLs above the Table 2 SCS in 2019 (THEM, 2020e) at test pits TP1, TP3, TP4 and TP5 at a depth of 0.35, 0.63, 0.66, and 0.62 m bgs, respectively. It should be noted that the analytical results of the soil sample collected from BH22-15, located in the vicinity of TP1, were non-detect for CN- with an RDL below the Table 2 SCS from a depth of 0 to 0.61 m bgs; the analytical results of the soil sample collected from BH/MW4, located in the vicinity of TP3 and TP4, were below the Table 2 SCS from a depth of 0 to 1.52 m bgs; and, the analytical results of the soil sample collected from BH22-21, located in the vicinity of TP5, indicated non-detect values for CN- from a depth of 0.05 to 0.61 m bgs. As such, CN- exceedances are not anticipated to be present at TP1, TP3, TP4 and TP5 and CN- is not carried forward as a COC in soil.

It is noted that sample BH22-4-SS2 (taken at a depth of 0.76 to 1.37 m bgs) had a pH of 9.14, which is slightly above the acceptable range for surface soils. Of the ten (10) surface soil samples and two (2) duplicate surface soil samples analyzed, only one (1) soil sample was outside the acceptable pH range for surface soil; therefore, this exceedance is not considered representative of the general site conditions. The site is not considered to be a “Sensitive Site” as per O. Reg. 153/04, Section 41 and the Full Depth Generic Site Condition Standards can be applied to the site. It should be noted that the pH exceedance at BH22-4-SS2 has been vertically delineated as the pH of sample BH22-4-SS5 (taken at a depth of 3.05 to 3.66 m bgs) was measured to be 7.78.

Table 3-2: Groundwater COC Inventory

Parameter	Maximum Concentration (µg/L)	Table 2 SCS (µg/L)	Table 6 SCS (µg/L)	Location of Maximum Exceedance	Screen Interval (m bgs)
VOCs					
1,1,1-Trichloroethane	85.2	200	23	BH22-2	1.22 – 4.27
1,1,2-Trichloroethane	5.17	4.7	0.5	BH22-4	1.22 – 4.27
1,1-Dichloroethane	104	5	5	BH22-4	1.22 – 4.27
1,1-Dichloroethylene	22.8	1.6	0.5	BH22-4	1.22 – 4.27
Vinyl Chloride(1)	2.78	0.5	0.5	-	-
Metals and Hydride Forming Metals					
Barium	3,740	1,000	NA	BH22-9d	8.23 – 9.75
Cobalt	41.7	3.8	NA	BH22-2	1.22 – 4.27
Selenium	25.4	10	NA	BH22-11s	1.22 – 4.27
ORPs					
Sodium	40,300,000	490,000	NA	BH22-11d	8.23 – 9.75
Chloride	56,500,000	790,000	NA	BH22-11d	8.23 – 9.75

(1) Predicted future vinyl chloride concentration, based on the summation of 10% of the maximum concentration of all parent (PCE and TCE) and intermediate compounds (1,1-DCE, cis-1,2-DCE and trans-1,2-DCE) and the maximum concentration of vinyl chloride.

NA – Not applicable.

It is noted that antimony, arsenic, beryllium, cadmium, cobalt, lead, molybdenum, nickel, selenium, silver, thallium, uranium, vanadium and/or Hg had elevated RDLs above the Table 2 SCS during the groundwater sampling event conducted in 2018 (THEM, 2019b) and/or 2020 (THEM, 2020c) at monitoring well BH/MW4 (screened at a depth of 3.05 to 6.10 m bgs). Based on the laboratory certificate of analysis, the RDL exceedances were attributed to sample dilution at the laboratory either because of matrix interference or extremely high conductivity. The groundwater sampling event conducted in 2020 identified cobalt in exceedance of the Table 2 SCS. As such, cobalt is considered as a COC in groundwater. However, it is noted that the groundwater sampling event conducted in 2020 indicated that the concentrations of arsenic, cadmium, lead, nickel, thallium and uranium were at non-detect values with a RDL that meets the Table 2 SCS. As such, it can be concluded that the exceedances of these select parameters are not present in groundwater within BH/MW4. Furthermore, the analytical results of the groundwater samples collected from BH/MW22-9S and BH/MW22-9D (screened at depths ranging from 1.22 to 9.75 m bgs), located in the vicinity of BH/MW4, indicated non-detect values or concentrations below the Table 2 SCS for antimony, beryllium, molybdenum, selenium, silver, vanadium and mercury. As such, these parameters are not anticipated to be present at concentrations above the Table 2 SCS within BH/MW4. Therefore, the above-noted metal parameters are not carried forward as COCs in groundwater, with the exception of cobalt which was identified to exceed the Table 2 SCS during the 2020 groundwater sampling event.

It is noted that hexane had elevated RDLs above the Table 6 SCS but within the Table 2 SCS during the groundwater sampling event conducted in 2020 (THEM, 2020c) at monitoring wells BH/MW4 and BH/MW6 (both screened at a depth of 3.05 to 6.10 m bgs). However, the hexane RDL was within the Table 2 and 6 SCS during the 2018 (THEM, 2019b) groundwater sampling event conducted at BH/MW4 and BH/MW6. As such, as hexane has not been detected at any of the other monitoring wells on-site with all RDLs meeting the Table 2 and 6 SCS, it can be concluded that the RDL exceedances of hexane detected at BH/MW4 and BH/MW6 in 2020 are not representative of groundwater conditions at the site. Therefore, hexane is not anticipated to be present at concentrations above the Table 6 SCS within BH/MW4 and BH/MW6, and is not carried forward as a COC in groundwater.

It is noted that carbon tetrachloride had elevated RDLs above the Table 6 SCS but within the Table 2 SCS during the groundwater sampling event conducted in 2022 (EXP, 2022) at monitoring well BH22-3 (screened at a depth of 1.22 – 4.27 m bgs). These RDL exceedances are attributed to sample dilution at the laboratory due to foaminess. In addition, the RDLs for carbon tetrachloride were within the Table 2 and 6 SCS during the same sampling event at BH22-4, also located within the site building and screened at the same depth. As such, as carbon tetrachloride has not been detected at any of the other monitoring wells on-site with all RDLs meeting the Table 2 and 6 SCS, it can be concluded that the RDL exceedances of carbon tetrachloride detected at BH22-3 in 2022 are not representative of groundwater conditions at the site. Therefore, carbon tetrachloride is not anticipated to be present at concentrations above the Table 6 SCS within BH22-3, and is not carried forward as a COC in groundwater.

No evidence of free product was observed during the investigation.

Although the maximum measured concentration of vinyl chloride (VC) was identified to be below the laboratory limit of detection and the Table 2 SCS, due to the exceedance of 1,1-DCE in groundwater, VC was retained for additional assessment as a COC due to the potential breakdown of intermediate compounds, including 1,1-DCE. It is noted that with the exception of the isolated exceedances of 1,1-DCE in groundwater at the site and one (1) detection of TCE within the Table 2 SCS, all other chlorinated parent/intermediate compounds of vinyl chloride (i.e., cis-1,2-DCE, trans-1,2-DCE and PCE) have not been detected at measured concentrations in groundwater samples collected during past investigations.

Under O.Reg. 153/04, as amended, the MECP framework requires the consideration of the degradation of the parent compounds of VC (i.e., PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, and 1,1-DCE). As such, using the maximum measured concentrations (or maximum RDLs) of the parent and intermediate compounds of VC, a maximum predicted future concentration of VC was calculated for groundwater using the following formula:

Predicted Future [Vinyl Chloride] = ((max[PCE] + max[TCE] + max[cis-1,2-DCE] + max[trans-1,2-DCE] + max[1,1-DCE]) * 10% + max[VC]).

Using the abovementioned formula, the maximum predicted concentration of VC is 2.78 µg/L, which is the concentration used as the EPC in the RA. As such, VC is also retained for further evaluation in the RA.

3.2 Location of Site Impacts

Soil Impacts

Based on a review of the soil analytical data collected from the site by EXP and prior consultants, PHC fractions F1 to F3, benzene, ethylbenzene, xylenes, zinc, and select ORPs (HWS-B, EC and SAR) were identified in soil at concentrations above their respective MECP Table 2 SCS.

Based on review of the THEM (2019B) Phase Two ESA analytical data collected from the site in 2018, and relied upon in EXP's Phase Two ESA (2022), soil exceedances of EC and SAR were identified. EC and/or SAR exceedances of the Table 2 SCS were identified at BH2-2018 (0 – 1.52 m bgs), BH/MW4 (0 – 1.52 m bgs), and BH5-2018 (1.52 – 3.05 m bgs). BH2-2018 is located on the south-central portions of the site, within the former salt storage area. BH/MW4 is located on the central portion of the site, south of the former excavation limit. BH5-2018 is located within the western portion of the former excavation, on the west-central portion of the site.

Based on a review of the THEM (2020C) Test Pit (1-6) Investigation analytical data collected from the site in 2019, and relied upon in EXP's Phase Two ESA (2022), soil exceedances of zinc, HWS-B, EC and SAR were identified. EC and/or SAR exceedances of the Table 2 SCS were identified at TP2 (0.72 m bgs), TP5 (0.62 m bgs), and TP6 (0.58 m bgs). HWS-B, EC and SAR exceedances of the Table 2 SCS were identified at TP1 (0.35 m bgs). Zinc, EC and SAR exceedances of the Table 2 SCS were identified at TP3 (0.63 m bgs) and TP4 (0.66 m bgs). The majority of the EC and SAR exceedances are located across the southern portion of the site, south of the former excavation limit, TP1 is located within the western portion of the former excavation on the west-central portion of the site, and TP4 is located at the southern limit of the former excavation on the central portion of the site. TP3 is located on the central portion of the site, immediately south of the former excavation limit.

Based on review of previous soil remediation documentation related to the soil excavation programs completed at the site by THEM between 2018 and 2020, and relied upon in EXP's Phase Two ESA (2022), soil exceedances of select PHCs, select BTEX, EC and SAR were identified. It is noted that full soil remediation reports were not provided for review. One or more of PHC F1, PHC F2, PHC F3, benzene, ethylbenzene and/or xylenes were found to exceed the Table 2 SCS at 3-2 (unknown), FS-2 (floor) (2.44 m bgs), RCS-5 (wall) (1.5 m bgs), RCS-6 (wall) (1.5 m bgs), S-2 (wall) (2.4 m bgs), S-3 (wall) (1.8 m bgs), FS-4 (wall) (1.8 m bgs), and N3 (wall) (1.8 m bgs). EC and/or SAR exceedances of the Table 2 SCS were identified at 6-1 (unknown), 6-2 (unknown), 6-3 (unknown), 7-1 (unknown), and 7-2 (unknown). It should be noted that the sampling depths and sampling locations are unknown for samples 2-32 and 2CF1; however, these were inferred to be confirmatory soil samples for previous excavations on the northeastern portion of the site. The PHC and BTEX impacts are located on the northeastern portion of the site, within the former excavation boundaries, and are associated with the former UST (APEC E4). The EC and SAR exceedances are located on the south-central portion of the site, within and to the north of the former salt storage area.

Based on review of the THEM (2020A) Soil Investigation analytical data collected from the site in 2020, and relied upon in EXP's Phase Two ESA (2022), soil exceedances of EC and SAR were identified. EC and SAR exceedances of the Table 2 SCS were identified at BH1 (1.52 – 3.05 m bgs), BH2 (1.52 – 3.05 m bgs), BH3 (1.52 – 3.05 m bgs), BH4 (1.52 – 3.05 m bgs), BH5 (1.52 – 3.05 m bgs), and BH7 (1.52 – 3.05 m bgs). The EC and SAR exceedances are located along the southern and southwestern property boundary of the site.

Based on review of the EXP (2022) Phase Two ESA analytical data collected from the site in 2022, soil exceedances of PHCs, zinc, HWS-B, EC and SAR were identified. BH22-13 (0.15 – 0.61 m bgs) was identified to have an exceedance of PHC F2, a deeper sample (2.29 – 2.90 m bgs) collected from BH22-13 was below the Table 2 SCS for PHC F2 but exceeded for PHC F3. BH22-21 (0.05 – 0.61 m bgs) was identified to have exceedances of zinc, EC and SAR, a deeper sample (2.29 – 2.90 m bgs) collected from BH22-21 was below the Table 2 SCS for zinc but continued to exceed for EC and SAR. BH22-10 (0.76 – 1.37 m bgs) was identified to have exceedances of HWS-B and SAR, a deeper sample (3.81 – 4.42 m bgs) collected from BH22-10 was below the Table 2 SCS for HWS-B but exceeded for EC and SAR. A soil exceedance of EC was identified at BH22-1 (0.46 – 0.61 m bgs), and a deeper clean sample was collected at BH22-1 (3.06 – 3.66 m bgs). Soil exceedances of EC and SAR were identified at BH22-9D (6.10 – 6.71 m bgs) and BH22-11D (6.1 – 6.71 m bgs); a deeper clean sample was collected at BH22-9D (9.14 – 9.75 m bgs), and a deeper sample that was clean for SAR but continued to exceed for EC was collected at BH22-11D (9.14 – 9.75 m bgs). BH22-13 is located on the west side of the site building, on the northwest portion of the site. BH22-21 is located on the southwestern portion of the site. BH22-10 is located along the eastern edge of the site, just south of the former excavation limit. The remaining EC and SAR samples collected from the site by EXP in 2020 are located in the northeast portion of the site building (BH22-1), and on the southern portion of the site (BH22-9D and BH22-11D).

The location of the soil impacts are shown on Figures 6A, 6D, 6E, and 6F.

Groundwater Impacts

Based on review of the THEM (2019B) Phase Two ESA analytical data collected from the site in 2018, and relied upon in EXP's Phase Two ESA (2022), chloride was identified at a concentration in excess of the applicable Table 2 SCS in groundwater collected from monitoring well BH/MW1 (screened from 3.05 – 6.10 m bgs). Cobalt, sodium and chloride were identified at concentrations in excess of the applicable Table 2 SCS in groundwater collected from monitoring well BH/MW4 (screened from 3.05 – 6.10 m bgs). BH/MW1 is located on the southwest portion of the site, near the western site boundary. BH/MW4 is located on the central portion of the site, south of the site building and north of the former salt storage area.

Based on review of the THEM (2020B) Groundwater Sampling analytical data collected from the site in 2020, and relied upon in EXP's Phase Two ESA (2022), groundwater exceedances of 1,1-DCA, cobalt, sodium and chloride were identified at concentrations in excess of the applicable Table 2 and/or 6 SCS in groundwater collected from monitoring well BH/MW4 (screened from 3.05 – 6.10 m bgs). BH/MW4 is located on the central portion of the site, south of the site building and north of the former salt storage area.

Based on a review of the Phase Two ESA (EXP, 2022), 1,1,1-TCA was identified at concentrations in excess of the applicable Table 6 SCS (for shallow groundwater) in groundwater collected from monitoring wells BH/MW22-2 and BH/MW22-3 (screened from 1.22 – 4.27 m bgs). Cobalt, 1,1-DCA and 1,1-DCE were identified at concentrations in excess of the applicable Table 2 and/or 6 SCS in groundwater collected from monitoring well BH/MW22-2 (screened from 1.22 – 4.27 m bgs). 1,1-DCE was identified at concentrations in excess of the applicable Table 2 and 6 SCS in groundwater collected from monitoring well BH/MW22-3 (screened from 1.22 – 4.27 m bgs). 1,1,2-TCA, 1,1-DCA and 1,1-DCE were identified at concentrations in excess of the applicable Table 2 and 6 SCS in groundwater collected from monitoring well BH/MW22-4 (screened from 1.22 – 4.27 m bgs). Sodium and chloride were identified at concentrations in excess of the applicable Table 2 SCS in groundwater collected from monitoring well BH/MW22-9s, and continued to exceed in addition to barium at monitoring well BH/MW22-9d (screened from 8.23 – 9.75 m bgs). Sodium exceeded the Table 2 SCS in groundwater at BH/MW22-7 (screened from 1.22 – 4.27 m bgs). Sodium and chloride exceeded the Table 2 SCS in groundwater at BH/MW22-10 (screened from 1.22 – 4.27 m bgs). Selenium, sodium and chloride exceeded the Table 2 SCS in groundwater at BH/MW22-11s (screened from 1.22 – 4.27 m bgs), and sodium and chloride continued to exceed at BH/MW22-11d (screened from 8.23 – 9.75 m bgs). BH/MW22-2, BH/MW22-3 and BH/MW22-4 are all located within the site building, with BH/MW22-2 on the east-central portion, BH/MW22-3 on the southeast portion, and BH/MW22-4 on the southwest portion. BH/MW22-9s and BH/MW22-9d are located on the central portion of the site, north of the former salt storage area. BH/MW22-7 is located on the west-central portion of the site, adjacent to the western site boundary. BH/MW22-10 is located on the east-central portion of the site. BH/MW22-11s and BH/MW22-11d are located on the south-central portion of the site, within the former salt storage area.

The location of the groundwater impacts are shown on Figures 7B, 7D and 7E.

4 Human Health Risk Assessment

4.1 Human Health Conceptual Site Model

A human health conceptual site model (HHCSM) was developed to facilitate the assessment of potential adverse effects at the site. The HHCSM is site specific and assumes the continued use of the site as industrial property. site information is used to identify the relevant site receptors and the complete exposure pathways by which the receptors may be exposed to the COCs present in site media, taking into account the contaminant characteristics and fate and transport mechanisms.

The HHCSM is divided into four (4) components:

- Receptor Characterization;
- Exposure Pathway Analysis;
- Toxicity Assessment; and,
- Risk Characterization

The HHCSM, in the absence of RMM, is shown on Figure 12A. As RMM are recommended for the RA Property (see Section 6), the HHCSM, in the presence of RMM is provided as Figure 12B. The following sections describe each component of the HHCSM.

4.2 Receptor Characterization

The potential human receptors that may be present at the site based on the current and continued use as an industrial property consist of long-term (indoor and outdoor) workers and the property visitor/trespasser. It should be noted that the property visitor/trespasser is not evaluated by the MECP; however, for conservative purposes and to ensure that protection is afforded to sensitive property visitors/trespassers (i.e., pregnant females or toddlers), industrial receptor exposure factors and component values will be applied were applicable (i.e., direct contact exposure pathways). Considering the potential redevelopment of the site, construction/subsurface utility workers (construction workers) are also considered as a potential human receptor that may be present at the site.

The following should be noted:

- It is EXP's understanding that the site will be sold without redevelopment; however, the future purchaser may undertake redevelopment at the site. A future building is assumed to be slab on grade in design, and no additional considerations for the potential presence of a basement or crawlspace have been included in the DDRA at this time;
- Although the MECP does not provide component values protective of human receptors for exposure to volatile groundwater COCs in outdoor air, this exposure pathway is assumed to be negligible and will not be evaluated within the DDRA. Due to exposure durations of on-site receptors (< 10 hours), localized distribution of groundwater impacts, mixing of soil vapour with ambient outdoor air and depth to groundwater, risks via the inhalation of outdoor air impacted with volatile groundwater COCs is considered to be a negligible exposure pathway and is not assessed further in the DDRA;
- The groundwater incidental direct contact pathway is considered incomplete, for all receptors except for the construction/subsurface utility worker (when exposed to pooled groundwater in a trench scenario), and will not be assessed in the DDRA; and,
- As the whole of the site is considered to be characterized by industrial use, a property visitor/trespasser is not anticipated to spend longer durations of time in the site building compared to the long-term (indoor) workers. As such, for the purposes of evaluating potential risks to receptors via indoor air inhalation, the long-term (indoor) worker receptor is considered to be a suitable surrogate for the property visitor/trespasser, due to the greater exposure duration and frequency. Similarly, a property visitor/trespasser is not anticipated to spend longer durations of time outdoors at the site compared to the long-term (outdoor) workers. As such, for the purposes of evaluating potential risks to receptors via outdoor air inhalation, the

long-term (outdoor) worker receptor is considered to be a suitable surrogate for the property visitor/trespasser, due to the greater exposure duration and frequency. As such, indoor and outdoor air exposure to the long term (indoor) worker and property visitor/trespasser and the long term (outdoor) worker and property visitor/trespasser, respectively, will not be assessed separately in the DDRA, and the use of industrial/commercial/community (ICC) land use criteria for the indoor and outdoor air inhalation pathways is considered appropriate.

Therefore, the scope of the DDRA was limited to the assessment of exposure by the property visitor/trespasser, long-term (indoor and outdoor) workers, and construction/subsurface utility workers.

4.3 Exposure Pathway Analysis

An exposure pathway describes the course that the COCs take from the source (*i.e.,* soil and/or groundwater) to a receptor. An exposure pathway links the sources, locations, and types of environmental releases with the receptor locations and activity patterns to determine the significant pathways of human exposure.

Based on the COCs in soil and groundwater (Section 3), property visitors/trespassers, on-site long term workers (indoor and/or outdoor) and construction/subsurface utility workers may potentially be exposed to the COCs via the following exposure pathways:

- Inhalation of indoor air and outdoor (ground level and trench) air (via volatile COCs sourced from soil and/or groundwater);
- Direct contact (incidental ingestion and dermal contact) with groundwater COCs, for the construction/subsurface utility worker only;
- Direct contact (potable ingestion and dermal contact) with groundwater COCs;
- Soil vapour dermal contact; and,
- Direct contact (incidental ingestion, dermal contact, and soil particulate inhalation) with soil COCs.

As soil and groundwater to trench air values protective of construction/subsurface utility workers were unavailable, a quantitative assessment was conducted to evaluate this pathway and is provided in Appendix A. As a conservative measure, all volatile COCs in soil and groundwater were retained for quantitative assessment of this exposure pathway. Component values protective of the groundwater to outdoor air pathway at ground level were also unavailable. However, exposure via this pathway was considered negligible compared to trench air inhalation due to the depth to groundwater, opportunity for attenuation and mixing and dilution with ambient air. Therefore, evaluation of groundwater to trench air is deemed sufficiently protective of outdoor air at ground level and the groundwater to outdoor (ground level) air inhalation was not evaluated in this DDRA. It should be noted that a parameter is considered volatile if the Henry's Law constant is greater than 1.05E-05 atm-m^3/mol at the average groundwater temperature of 15°C and/or the parameter has a vapour pressure greater than 1 Torr (MECP, 2019).

Indoor workers are anticipated to spend negligible time outdoors at the RA Property. Therefore, outdoor air inhalation pathways for soil and groundwater COCs for this receptor are considered incomplete in the DDRA. Likewise, the outdoor workers are anticipated to spend negligible time indoors at the site. Therefore, indoor air pathways from soil and groundwater COCs for this receptor are considered incomplete. Additionally, direct soil contact exposure pathways for the indoor long-term worker were considered incomplete due to the negligible time spent outdoors at the site.

Exposure to groundwater COCs via outdoor air was considered a negligible pathway compared to indoor air inhalation due to the mixing and dilution with ambient air. Therefore, the groundwater to outdoor air exposure pathway was not evaluated further in the DDRA for long-term outdoor workers and property visitors/trespassers.

Furthermore, vapour skin contact with contaminant vapours is also considered negligible (orders of magnitude lower) in comparison to the indoor and outdoor air inhalation pathways. As such, the evaluation of the soil to indoor and outdoor air as well as groundwater to indoor air inhalation pathways are deemed sufficiently protective of the vapour skin contact exposure pathway. Therefore, the vapour skin contact pathway was not evaluated separately in this DDRA.

Based on the current configuration and anticipated future redevelopment, industrial use of the site, the dust inhalation exposure pathway is deemed minimal, which is consistent with the component value applied for assessment of direct contact pathways (which were derived without the dust inhalation pathway). Therefore, the dust inhalation exposure pathway is not assessed separately and S2 (long-term outdoor worker) component values are assumed to be suitable to protect receptors for all direct contact pathways for the long-term outdoor worker and property visitor/trespasser.

The evaluation of the construction/subsurface utility workers via the direct contact pathway (S3) takes into account the dust inhalation exposure pathway.

The maximum soil and groundwater COC concentrations, as presented in Tables 3-1 and 3-2 (Section 3), respectively, were utilized to evaluate the potential exposure to impacts via exposure pathways considered complete at the RA Property.

4.3.1 Direct Contact with Soil COCs

Under the industrial scenario, it was assumed that a property visitor/trespasser could potentially be directly exposed to COCs in soil via dermal contact and incidental ingestion while outdoors. As recommended by the MECP (2011b), the frequency and duration for an industrial scenario was utilized to protect sensitive receptors under the industrial use and it was conservatively assumed that the toddler visitor/trespasser spends 1.5 hours/day, 2 days/week and 39 weeks/year on the site for a duration of 4.5 years. For the composite property visitor/trespasser, it was assumed that they spend 1.5 hours/day, 2 days/week and 39 weeks/year for all life stages on the RA Property throughout a cumulative lifetime of 76 years. As per MECP (2011b) it was assumed that exposure to soil via direct contact would be limited for 3 months of the year and therefore exposure via direct contact is based on a frequency of 39 weeks per year. Due to having a much greater exposure rate, the long-term outdoor worker was evaluated as a surrogate for the toddler and composite site visitor/trespasser.

Through typical outdoor activities, the potential on-site long-term workers may be exposed to impacts in surface soil via dermal contact and incidental ingestion. As per MECP (2011b) it was assumed that exposure to soil via direct contact would be limited for 3 months of the year and therefore exposure via direct contact is based on a frequency of 39 weeks per year. The long-term outdoor worker is assumed to spend 9.8 hours/day on-site, 5 days/week for 39 weeks/year for a total of 56 years (entire adult working lifetime).

It is conservatively estimated that the construction/subsurface utility worker, is exposed to soil via direct contact as per the following exposure frequency and duration:

- 5 days per week;
- 39 weeks per year outdoors; for
- 1.5 years.

There is inherent conservatism built into the HHRA utilizing the MECP approach, including: the assumption that the impacts are present across the entire site; that there are no soil caps or other mitigation measures already in place; and, that 100% of the soil is available via ingestion and dermal contact.

4.3.2 Inhalation of Indoor Air and Outdoor and Trench Air

While spending time outside or within the existing building, the potential on-site long-term workers, construction/subsurface utility workers and property visitors/trespassers may be exposed to volatile COCs via indoor air inhalation and outdoor air inhalation, through the volatilization of soil and groundwater parameters into soil and groundwater vapour, and eventual migration of vapours into the building envelope and/or outdoor air. As indicated in Section 4.3, the groundwater to outdoor air exposure pathway is considered negligible compared to indoor air inhalation due to mixing and dilution with ambient air, as such, this pathway is not evaluated further. Additionally, construction/subsurface utility workers may be exposed to volatile COCs via trench air inhalation while working within a subsurface excavation/trench.

As recommended by the MECP (2011b) and as a conservative measure, for outdoor air inhalation it was assumed that the toddler visitor/trespasser spends 1.5 hours/day, 2 days/week and 39 weeks/year on the site for a duration of 4.5 years. For the composite visitor/trespasser, it was assumed that they spend 1.5 hours/day, 2 days/week and 39 weeks/year for all life stages on the site throughout a cumulative lifetime of 76 years.

As recommended by the MECP (2011b), it is conservatively estimated that the most sensitive receptor for indoor/outdoor air inhalation, the indoor/outdoor long-term worker, is exposed via indoor/outdoor air inhalation as per the following exposure frequency and duration:

- 9.8 hours per day;
- 5 days per week;
- 50 weeks per year indoors; 39 weeks per year outdoors; for
- 56 years.

It is assumed that the property visitor/trespasser receptor spends considerably less time at the RA Property outdoors and inside the site building, than the long-term workers. As such, the evaluation of potential exposures to the long-term workers is considered to be protective of property visitors/trespassers for the purposes of evaluating indoor/outdoor air inhalation exposure.

Where site-specific indoor air concentrations are not available, the MECP recommends the use of soil concentrations to conservatively predict the indoor air levels, through standard vapour intrusion modeling, the application of typical building scenarios based on the Ontario Building Code, and the use of conservative stratigraphic and hydrogeological values based on typical Ontario properties.

A construction/subsurface utility worker was assumed to be indirectly exposed to volatile COCs in soil and groundwater that have volatilized into outdoor air as well as vapours that have accumulated within an open trench/excavation scenario via trench air inhalation.

As recommended by the MECP (2011b), it is conservatively estimated that the construction/subsurface utility worker is exposed to outdoor air inhalation as per the following exposure frequency and duration:

- 7.8 hours per day (assuming 2 of the 9.8 hours per day is spent working within a trench);
- 5 days per week;
- 39 weeks per year outdoors; for
- 1.5 years.

It is estimated that the construction/subsurface utility worker, is exposed to trench air via indirect contact as per the following exposure frequency and duration:

- 2 hours per day while working in a trench;
- 5 days per week;
- 39 weeks per year outdoors; for
- 1.5 years.

Since the MECP has not derived component values protective of the soil or groundwater to trench air exposure pathway, this exposure pathway was quantitatively evaluated in Appendix B. The construction/subsurface utility worker receptor characteristics used for quantitative evaluation of the inhalation of outdoor and trench air sourced from soil or groundwater are provided in Table B-1 (Appendix B). Please refer to Appendix B for a complete discussion of the trench air exposure pathway and quantitative calculations and example calculations provided for the assessment of construction/subsurface utility workers exposed to volatile soil or groundwater COCs via trench air inhalation.

4.3.3 Direct Contact with Groundwater COCs

It is estimated that the site long-term indoor worker is exposed to groundwater COCs via direct contact (i.e., potable ingestion and dermal contact) as per the following exposure frequency and duration:

- 9.8 hours per day;
- 5 days per week;
- 50 weeks per year; for
- 56 years.

It is assumed that the property visitor/trespasser spends considerably less time at the RA Property than the long-term indoor workers. As such, the evaluation of potential exposures to the long-term indoor workers is considered to be protective of property visitors/trespassers for the purposes of evaluating groundwater direct contact exposure.

A construction/subsurface utility worker was assumed to be exposed to COCs in groundwater that has pooled within the bottom of an open trench/excavation via dermal contact and incidental ingestion.

It is conservatively estimated that the construction/subsurface utility worker, is exposed to groundwater via direct contact as per the following exposure frequency and duration:

- 9.8 hours per day (of which approximately 20%, or 2 hours, is considered spent working in a trench);
- 5 days per week;
- 39 weeks per year outdoors; for
- 1.5 years.

The GW1 component value provided by MECP (2016) is protective of exposure via ingestion of potable water and no value is available for incidental groundwater direct contact pathways (i.e., incidental ingestion and dermal contact). As such, this component value was modified to assess potential exposure for construction/subsurface utility workers who may come into incidental contact with groundwater during subsurface activities.

To account for the reduced construction/subsurface utility worker exposure to groundwater via incidental ingestion and direct contact with groundwater, the GW1 component value was modified by a multiplier of 100x. This multiplier was based on the comparison of intake rates of potable water by adults of 2.3 L/day (MECP, 2011b) relative to an assumed incidental intake rate by the construction/subsurface utility worker of 0.005 L/day, based on exposure characteristics presented in US EPA (2014) and assumed construction/subsurface utility worker exposure characteristics. The US EPA Region IV (2014) estimates an incidental ingestion rate of 10 mL/hr for adults while wading. However, this value is considered to be overly conservative for application to a construction/subsurface utility worker working in a trench, given any potentially pooled groundwater in a trench is not as deep as a wading scenario. In addition, as part of construction activity, the trench is anticipated to be dewatered prior to entering and, therefore, the potential incidental ingestion of groundwater will be limited to during trench dewatering activities. As such, an ingestion rate of 0.005 L/d is considered more likely for a construction/subsurface utility worker based on an exposure duration of 0.5 hour and the conservative incidental ingestion rate of 10 mL/hr while wading.

Based on the significant difference in anticipated ingestion rates, the 100x multiplier applied to the GW1 component value for assessment of incidental groundwater contact and ingestion by the construction/subsurface utility worker was deemed to be a suitably conservative estimate, while also providing protection from dermal contact with groundwater while working in the trench below the water table. As such, a 100x multiplier was applied to the GW1 value for the incidental direct contact pathway for the construction/subsurface utility worker.

4.4 Toxicity Assessment

The COCs were evaluated for their toxicity towards humans via the relevant exposure pathways identified in the HHCSM.

Exposure to a chemical, depending on the chemical and exposure route, can elicit either non-carcinogenic (e.g., threshold) or carcinogenic (e.g., non-threshold) effects, or both. For non-carcinogenic exposure, the underlying assumption is that there is a threshold concentration/dose below which there is no potential for adverse effects. Toxicity reference values (TRVs) for non-carcinogenic constituents consisting of reference doses (RfD) and concentrations have been developed for different exposure routes (i.e., oral and inhalation) based on animal and epidemiological studies. The RfD or reference concentration (RfC) is derived from the lowest observable adverse effects level (LOAEL) or no observable adverse effects level (NOAEL), applying order of magnitude modifying and uncertainty factors to account for interspecies and sensitive population variations, study limitations and other uncertainties.

For carcinogenic exposure, the underlying assumption is that there is no threshold concentration or dose below which the risk from developing cancer is zero. The dose response relationship for carcinogenic constituents is described by the cancer slope factor or cancer unit risk factor (URF). The cancer slope factor or cancer potency is the slope of the dose-response curve at very low dose which is derived from animal studies or sensitive population studies applying different low dose extrapolation models (e.g., linear multi-stage, etc.). The URF is defined as the incremental lifetime cancer risk associated with exposure to a chemical.

The TRVs applied in the HHRA were selected from MECP (2011b), which were based on TRVs selected by various credible agencies as well as recent TRV selections by MECP (2022). If sub-chronic TRVs were recommended by MECP, they were utilized to evaluate potential risks for construction/subsurface utility workers.

Uncertainties associated with the estimation of toxicological effects of chemicals on human receptors are inherent in the risk assessment process. For instance, toxicologists rely on animal test results, toxicological models, and epidemiological studies to estimate the effects of chemicals on humans. In addition, the availability of toxicological data is often limited due to the vast number of chemical species and the high cost associated with conducting these studies. To overcome these uncertainties and increased effects to sensitive populations, a number of order-of-magnitude uncertainty factors are typically included during the development of TRVs.

A summary of the TRVs can be found in the MECP *Rationale for the Development of Soil and Groundwater Standards for Use at the Contaminated Sites in Ontario* document (MECP, 2011b), the MGRA model (MECP, 2016), and the recent *MECP TRV Selections* (MECP, 2022).

4.5 Risk Characterization

To assess the potential human health concerns associated with soil and groundwater impacts, the data was first screened against the human-health based soil quality guidelines (SQG_{HH}) and human-health based groundwater quality guidelines (GQG_{HH}) for an industrial use scenario, as selected from the MECP (2011b) Table 2 SCS Full Depth Soil Component Criteria in a Potable Water Scenario for an ICC property use with coarse textured soil, for the relevant exposure pathways identified in Section 4.3.

Tables 4-1 (soil) and 4-2 (groundwater) provide a comparison of the maximum COC concentrations (the worst case found on-site) against the applicable SQG_{HH} and GQG_{HH}.

Table 4-1: SQG$_{HH}$ Values Applied to Site Soil Quality Data for the Industrial Use Scenario

Parameter	Maximum Concentration (µg/g)	Soil Leaching to Potable Groundwater - ICC[1] (µg/g)	Direct Soil Contact – Long-Term Workers[2] (µg/g)	Direct Soil Contact – Construction /Subsurface Utility Workers[3] (µg/g)	Inhalation of Indoor Air Vapours – ICC[4] (µg/g)	Indoor Air Odour- ICC[5] (µg/g)	Inhalation of Outdoor Air Vapours [6] (µg/g)
PHCs and BTEX							
PHC F1	**530**	4,100	47,000	100,000	110	NV	15,000
PHC F2	**490**	4,300	22,000	48,000	380	NV	25,000
PHC F3	2,200	20,000	40,000	260,000	NA	NA	NA
Benzene	**0.5**	0.92	13	480	0.32	3,800	17
Ethylbenzene	**8.37**	1.1	22,000	88,000	34	470	15,000
Xylenes	43.1	120	44,000	88,000	50	2,700	4,900
Metals							
Zinc	676	NV	47,000	47,000	NA	NA	NA
ORPs							
HWS-B[7]	2.62	NV	NV	NV	NA	NA	NA
EC (mS/cm)[7]	17.8	NV	NV	NV	NA	NA	NA
SAR (unitless)[7]	248	NV	NV	NV	NA	NA	NA

[1]MECP component value (S-GW1) protective of soil leaching to potable groundwater and subsequent direct contact (Table 2 SCS).
[2]MECP component value (S2) protective of dermal contact and incidental ingestion of soil applicable to long-term (outdoor) workers (Table 2 SCS).
[3]MECP component value (S3) protective of dermal contact, incidental ingestion and the inhalation of soil particulates to the construction/subsurface utility worker (Table 2 SCS).
[4]MECP component value (S-IA) protective of inhalation of contaminant vapours in indoor air applicable to the site building (ICC land use) (Table 2 SCS).
[5]MECP component value protective of indoor air odour (Table 2 SCS). According to the MECP (2011b), the indoor air inhalation component value (S-IA) is protective of indoor air odour. Therefore, only the indoor air inhalation pathway will be evaluated.
[6]MECP component value (S-OA) protective of inhalation of contaminant vapours in outdoor air applicable for the industrial scenario (Table 2 SCS).
[7]Parameter is not considered toxic to humans and does not pose a concern to human health; as such, human exposure is not considered in the HHRA.
Bold = maximum concentration exceeds one or more component values.
Shaded value indicates component value is exceeded by the maximum concentration.
NA = Not Applicable as the parameter is not considered to be sufficiently volatile
NV = No Value

It is noted that PHC F3, zinc, HWS-B, EC and SAR (as identified in Table 4-1) are not sufficiently volatile, therefore, the MECP has not derived component values protective of the inhalation of contaminant vapours in indoor air (S-IA) and protective of inhalation of contaminant vapours in outdoor air (S-OA). No further assessment for inhalation-based exposure pathways is required for these soil COCs.

It is noted that HWS-B, EC and SAR are not considered toxic to humans and do not pose a concern to human health. As such, human exposure to these COCs is not considered further in the HHRA (as indicated in Table 4-1).

According to MECP (2011b), the indoor air inhalation component value (S-IA) is protective of indoor air odour. Therefore, this pathway is assessed via the indoor air inhalation component value.

Based on the screening of the maximum soil COC concentrations, the following observations were made:

- The maximum concentration of ethylbenzene exceeded the applicable S-GW1 component value, protective of soil leaching to potable groundwater, and no S-GW1 component value was provided for zinc applicable to potable ingestion and dermal contact with groundwater for the long-term indoor and outdoor workers and the property visitor/trespasser; and,
- The maximum concentrations of all soil COCs are below their applicable S2 component values. Therefore, COCs are not present in soil at concentrations for which dermal contact or soil ingestion risks are anticipated for site long-term outdoor workers (and property visitors/trespassers by surrogate);
- The maximum concentrations of all soil COCs are below their applicable S3 component values. Therefore, COCs are not present in soil at concentrations for which dermal contact or soil ingestion risks are anticipated for site construction/subsurface utility workers;
- The maximum concentrations of PHC F1, PHC F2 and benzene exceeded the applicable S-IA component value, protective of indoor air inhalation within the site building for the long-term indoor worker and the property visitor/trespasser; and,
- The maximum concentrations of all volatile soil COCs (PHC F1 to F2, benzene, ethylbenzene and xylenes) are below their applicable S-OA component values. Therefore, volatile COCs are not present in soil at concentrations for which outdoor air inhalation exposure risks are anticipated for site long-term outdoor workers (and property visitors/trespassers by surrogate) and construction/subsurface utility workers.

Based on the screening of the maximum soil COC concentrations against the applicable MECP component values, ethylbenzene is present in soil at a concentration greater than its S-GW1 component value, which is protective of soil leaching to potable groundwater and subsequent ingestion and dermal contact. Despite the exceedance of the S-GW1 component value by ethylbenzene and no available S-GW1 component value for zinc in soil, no exceedances of ethylbenzene or zinc have been identified in groundwater samples collected from the site. Furthermore, there are no active sources of these parameters at the site; therefore, groundwater concentrations are anticipated to be at steady-state. As such, it is concluded that soil leaching of ethylbenzene and zinc is not occurring to the extent that risk would be anticipated for on-site long-term indoor workers (and by surrogate, property visitors/trespassers) from ethylbenzene and zinc leaching from on-site soils to potable groundwater and subsequent ingestion and dermal contact.

Given the exceedance of the S-IA component value for PHC F1, PHC F2 and benzene, protective of occupancy of the industrial use site building (i.e., long-term indoor workers and property visitors/trespassers), additional quantitative evaluation of the indoor air inhalation pathway was conducted and is presented in Appendix A. This evaluation was based on the MECP (2011b) generic slab-on-grade building characteristics, as presented in Table A-5 of Appendix A. Based on the additional quantitative evaluation presented in Appendix A, no unacceptable risk is anticipated to on-site indoor workers and property visitors in the slab-on-grade building via the indoor air inhalation pathway as a result of the PHC F1, PHC F2 and benzene impacts in soil.

Similarly, as the MECP does not provide component values protective of the trench air inhalation exposure pathway for the construction/subsurface utility worker, a quantitative assessment of this exposure pathway will be performed. Please refer to Appendix B for a quantitative risk assessment of construction/subsurface utility workers exposed to trench air impacted with volatile COCs. Based on the quantitative evaluation presented in Appendix B, no unacceptable risk is anticipated to on-site construction/subsurface utility workers via the trench air inhalation pathway as a result of the benzene, ethylbenzene, xylenes, PHC F1 and PHC F2 impacts in soil.

Table 4-2: GQG$_{HH}$ Values Applied to Site Groundwater Quality Data for the Commercial Land Use Scenario

Parameter	Maximum Concentration (µg/L)	GW1 – Site Workers[1] (µg/L)	Groundwater Direct Contact – Modified GW1 – Construction/Subsurface Utility Worker[2] (µg/L)	Groundwater to Indoor Air (Shallow) – ICC[3] (µg/L)	Groundwater to Indoor Air – Site-Specific Values – ICC[4] (µg/L)	ICC GW2 Odour[5] (µg/L)
VOCs						
1,1,1-Trichloroethane	85.2	200	20,000	390	51,000	38,000,000
1,1,2-Trichloroethane	**5.17**	5	500	2.8	200	NV
1,1-Dichloroethane	**104**	5	500	200	25,000	7,000,000
1,1-Dichloroethylene	**22.8**	14	1,400	1.2	120	7,400,000
Vinyl Chloride (future condition)	**2.78**	2	200	0.12	12	44,000,000
Metals and Hydride-forming Metals						
Barium	**3,740**	1,000	100,000	NA	NA	NA
Cobalt	**41.7**	3	300	NA	NA	NA
Selenium	**25.4**	10	1,000	NA	NA	NA
ORPs						
Sodium	**40,300,000**	200,000	20,000,000	NA	NA	NA
Chloride	**56,500,000**	250,000	25,000,000[6]	NA	NA	NA

[1]MECP component value (GW1) protective of potable groundwater ingestion and dermal contact (Table 2 SCS).
[2]Modified MECP component value (GW1) protective of direct groundwater contact (incidental ingestion and dermal contact) for the construction/subsurface utility worker (Table 2 SCS).
[3]MECP component value (GW2) protective of inhalation of indoor air containing soil vapour from groundwater at water table in a shallow groundwater condition (i.e. minimum depth to water < 3 m bgs) (Table 6 SCS).
[4]Modified MECP component value (GW2) protective of inhalation of indoor air containing soil vapour from groundwater at water table assuming a depth to water of 1.16 m and sandy loam soil type.
[5]MECP component value protective of GW2 odour (Table 2 SCS). According to the MECP (2011b), the indoor air containing soil vapour from groundwater component value (GW2) is protective of industrial GW2 odour. Therefore, only the indoor air inhalation pathway will be evaluated.
[6]Chloride is considered non-toxic to humans and the drinking water standards are based on aesthetic criteria objectives (MECP, 2006). As the aesthetic objective for potable water is considered irrelevant for groundwater direct contact by construction/subsurface utility workers at the site, chloride is not evaluated further for this receptor.
Bold = maximum concentration exceeds one or more component values.
Shaded value indicates component value is exceeded by the maximum concentration.
NA = Not Applicable as the parameter is not volatile
NV = No Value

According to MECP (2011b), the indoor air inhalation component value (GW2) is protective of indoor air odour. Therefore, this pathway is assessed via the indoor air inhalation component value for all COCs, including 1,1,2-TCA for which no GW2 odour component value was provided by the MECP.

Chloride is considered non-toxic to humans and the drinking water standards are based on aesthetic criteria objectives (MECP, 2006). The aesthetic objective for potable water is not considered relevant for the incidental groundwater ingestion and direct contact pathways for the construction/subsurface utility worker while working in a trench. As such, chloride is not considered further for this receptor (see Table 4-2).

Based on the screening of the maximum groundwater COC concentrations against their GQG_{HH}, the following observations were made:

- The maximum concentrations of 1,1,2-TCA, 1,1-DCA, 1,1-DCE, VC (future condition), barium, cobalt, selenium, and sodium exceeded their respective GW1 component value protective of groundwater direct contact. Therefore, risks may be present for site long-term indoor workers (and property visitors/trespassers by surrogate) due to potable groundwater ingestion and dermal contact;

- The maximum concentration of sodium exceeded its modified GW1 component value, protective of direct contact (incidental ingestion and dermal contact) for the site construction/subsurface utility worker;

- The maximum concentrations of 1,1,2-TCA, 1,1-DCE and VC (future condition) exceeded their respective Table 6 GW2 component value protective of indoor air inhalation within the site building in a shallow groundwater condition, applicable to the site which has a minimum depth to groundwater < 3 m bgs. Therefore, indoor air inhalation risks may be present within the site building for long-term indoor workers (and property visitors/trespassers by surrogate); and,

- The maximum concentrations of all groundwater COCs were below their respective GW2 Odour component value.

As sodium exceeds its modified GW1 component value, protective of groundwater ingestion by construction/subsurface utility workers and given the highly conservative nature of the GW1 component value, this pathway is further assessed qualitatively. Sodium is non-toxic to humans (MECP, 2006). The drinking water standard for sodium is 200 mg/L and is based on an aesthetic objective. For construction/subsurface utility worker incidental ingestion and dermal contact pathways, the aesthetic objectives for potable water are not considered relevant. However, it is acknowledged that for persons under a sodium restricted diet (e.g. for those suffering from hypertension or congestive heart disease), sodium intake via drinking water may become a significant pathway. MECP (2006) notes that in a normal diet, the intake of sodium from water is only a small fraction of that consumed through food items and therefore a maximum acceptable concentration has not been derived. Given the low toxicity of sodium and that there is minimal potential for exposure to sodium by a construction/subsurface utility worker while working in a trench, no unacceptable risks are anticipated as a result of exposure to sodium-impacted ground water at the site.

Furthermore, no toxicity benchmarks for sodium are available. However, information regarding the dietary reference intakes for sodium is available from the National Academies of Sciences, Engineering and Medicine (2019). According to this reference, the adequate sodium intake per day can range from 110 (for infants) to 1500 milligrams per day (adults). Note that these intakes are not the maximum allowable intakes, rather, they are meant to meet the minimum nutritional needs of each human receptor group. No upper limit value is provided. However, given that the maximum concentration of sodium in ground water is 20,000 mg/L and with the assumption that a construction/subsurface utility worker within a trench may incidentally consume 0.005 litres of water per day, based on incidental splashing (US EPA, 2014), the maximum intake of sodium sourced from ground water would be 100 mg (less than the adequate intake) of sodium. Therefore, the on-site maximum of sodium does not appear to be sufficiently large to pose any toxicity to construction/subsurface utility workers who may incidentally ingest sodium-impacted ground water while working within a trench on-site.

The Table 6 GW2 component values (MECP, 2011b) were used as a preliminary means to predict risks for the indoor air inhalation pathway. Based on the screening of the maximum groundwater COC concentrations against the generic Table 6 GW2 ICC component values, the concentrations of 1,1,2-TCA, 1,1-DCE and VC (future condition) are above their respective component values protective of inhalation of indoor air containing soil vapour sourced from shallow groundwater.

This pathway was further evaluated by using the MGRA model (MECP, 2016) to modify the Table 2 GW2 component values using the characteristics of the RA Property, such as the site-specific depth to groundwater and the observed soil stratigraphy at the site. The following site-specific values were entered into the MGRA model:

- Minimum depth below soil surface to highest annual water table = 1.16 m bgs;

- Soil type – vadose zone: Sandy Loam
- Soil type – capillary fringe: Sandy Loam

The depth of 1.16 m bgs was the minimum depth to groundwater measured by EXP (EXP, 2022) and as such this value was used in the derivation of the site-specific Table 2 GW2 component values. Borehole logs from drilling investigations completed at the site by EXP (2022) and THEM (2019B) indicated soil types above approximately 1.5 m bgs ranged from sand to silty sand to clayey silty sand and soil types below approximately 1.5 m bgs ranged from sand to silty sand to clayey silty sand to sandy silt to clayey silt till to sandy silty clay. As the majority of borehole logs indicate some level of silt to clay is present in sandy soil at the site both at and above the water table, sandy loam was conservatively selected as the vadose zone and capillary fringe soil type used in the derivation of the site specific Table 2 GW2 component values.

Based on the site-specific depth to groundwater and observed soil stratigraphy at the site, the maximum concentration of all volatile groundwater COCs were below their respective site-specific Table 2 GW2 component values, such suggest that no unacceptable risks are anticipated via indoor air inhalation from exposure to 1,1,2-TCA, 1,1-DCE and VC (future condition) in groundwater.

The MGRA input and output spreadsheets for the generic and site-specific scenarios are provided in Appendix C.

Given that the MECP does not provide component values for the assessment of the groundwater to trench air inhalation exposure pathway, a quantitative assessment of this exposure pathway will be performed. Please refer to Appendix B for a quantitative risk assessment of construction/subsurface utility workers exposed to volatile groundwater COC vapours in trench air. Only the maximum concentrations of volatile soil and groundwater COCs (and the associated degradation products of 1,1-DCE) identified at the site were included within the assessment of potential trench air inhalation risks for construction/subsurface utility workers at the site. As such, benzene, ethylbenzene, xylenes, PHC F1 and PHC F2 in soil and 1,1,1-TCA, 1,1,2-TCA, 1,1-DCA, 1,1-DCE and VC (future condition) in groundwater were carried forward for the quantitative evaluation of potential soil vapour inhalation risks.

Based on the results of the trench air inhalation exposure evaluation presented in Appendix B, no potential risks to construction/subsurface utility workers via the inhalation of trench air impacted with soil or groundwater COCs (or 1,1-DCE degradation products) were identified. Therefore, risk management measures are not recommended for the protection of construction/subsurface utility workers via the trench air inhalation pathway.

Based on the screening of the maximum 1,1,2-TCA, 1,1-DCA, 1,1-DCE, VC (future condition), barium, cobalt, selenium, and sodium concentrations in groundwater against their applicable MECP component values, the maximum concentrations of these COCs are above the GW1 component value protective of site long-term indoor workers (and property visitors/trespassers by surrogate). Therefore, 1,1,2-TCA, 1,1-DCA, 1,1-DCE, VC (future condition), barium, cobalt, selenium, and sodium in groundwater may pose unacceptable risks to site long-term indoor workers and property visitors/trespassers via direct contact (intentional ingestion and dermal contact) with impacted groundwater. Therefore, RMMs are recommended at the site for the protection of site long-term indoor workers and property visitors/trespassers from direct contact with impacted groundwater.

4.6 Summary of Potential On-Site Human Health Risks

It is noted that the HHRA has been conducted under the assumption that any potential future industrial/commercial site building(s) will also be of slab-on-grade construction. Based on the information available at this time and the conservative assumptions applied in the DDRA, the results of the HHRA indicate that there may be potential unacceptable risk posed to human health via the following exposure pathway:

- Direct contact with 1,1,2-TCA, 1,1-DCA, 1,1-DCE, VC (future condition), barium, cobalt, selenium, and sodium impacted groundwater by site long-term indoor workers and property visitors/trespassers.

Therefore, RMMs are recommended at the site for the protection of long-term indoor workers and property visitors/trespassers from impacts in groundwater via potable ingestion and dermal contact. RMM recommendations are presented in Section 6.

To ensure the assumptions applied in the HHRA remain true, a soil and groundwater management plan (SGWMP) has also been recommended for the site.

5 Ecological Risk Assessment

5.1 Ecological Conceptual Site Model

Site information is used to identify the relevant site receptors and the complete ecological exposure pathways by which the receptors may be exposed to the COCs present in site media, taking into account the contaminant characteristics and fate and transport mechanisms. The Ecological Conceptual Site Model (ECSM) is divided into four (4) components:

- Receptor Characterization;
- Exposure Pathway Analysis;
- Toxicity Assessment; and,
- Risk Characterization.

The ECSM, in the absence of RMM, is shown on Figure 13A. As RMM are recommended for the RA Property (see Section 6), the ECSM, in the presence of RMM is provided as Figure 13B. The following sections describe each component of the ECSM.

5.2 Receptor Characterization

Based on the data obtained in previous investigations and the current and continued industrial land use, valued ecosystem components (VECs) were identified as potential ecological receptors. The potential terrestrial ecological receptors that are likely to be present based on-site are typical of those found in an urban environment and may consist of terrestrial vegetation (i.e., grass, shrubs), soil invertebrates and birds (i.e., American woodcock), and small mammals (i.e., voles and shrews).

Additionally, various species of fish, invertebrates, amphibians, and aquatic plant species are evaluated to ensure that populations of these groups are able to successfully survive, grow, and reproduce in off-site bodies of surface water that may be influenced by the migration of COCs from on-site soil and groundwater impacts. Semi-aquatic birds such as the Mallard Duck and Canada Goose and semi-aquatic mammals such as the American mink are also identified as potential VECs. All of the above-noted VECs were assessed as a group using MECP (2011b) component values. It is noted that current knowledge and information on the toxicology and exposure characterization for amphibians and reptiles were not considered in the derivation of MECP (2011b) component values.

The potential for the presence of species at risk on-site was determined using the Ministry of Natural Resources and Forestry (MNRF) "Make a Map: Natural Heritage Area" map. The map is divided into 1 square km quadrants in which species at risk can be searched. Quadrants within 250 metres of the site boundaries were searched. As such, two (2) quadrants (17NJ6480 and 17NJ6380) were included in the search. Species at risk were considered to be present if the following criteria were met:

- The species was identified to be threatened or endangered using the *Committee on the Status of Species At Risk in Ontario* (COSSARO) status as a criteria; and,
- The site contains or is within 30 metres of habitat suitable for a species classified as threatened or endangered under Section 7 of the *Endangered Species Act, 2007*.

Based on the above criteria, the following species at risk were identified:

Table 5-1a: Threatened and Endangered Species In and Around the Site

Common Name	Scientific Name	SARO Status	OGF ID	Grid Identifier	Habitat[1]
Bobolink	*Dolichonyx oryzivorus*	Threatened	967974	17NJ6480	The Bobolink may be found in tallgrass prairie and other open meadows, with the mass clearing of native prairies, Bobolinks have moved to primarily living in hayfields.
Massasauga (Great Lakes/ St. Lawrence population)	*Sistrurus catenatus pop. 1*	Threatened	967964	17NJ6380	Massasaugas are found in tall grass prairie, bog, marsh, shoreline, forest and alvar habitats in Ontario. They require open areas to warm themselves in the sun. Massasaugas hibernate underground in crevices in bedrock, sphagnum swamps, tree root cavities and animal burrows where they can get below the frost line but stay above the water table. Ontario populations are found mainly along the eastern shoreline of Georgian Bay on the Bruce Peninsula, with some as far south as the Collingwood area.

[1] Habitat requirements obtained from MECP Ontario Species at Risk website (2019).

Although the endangered/threatened species above was found to be within or adjacent to the 1 km quadrant comprising the site and Phase One Study Area, it was not retained as viable species inhabiting the site, or properties within 250 metres of the site. A rationale is provided for the species at risk in Table 5-1b, below.

Table 5-1b: Rationale for Exclusion of Sensitive Species Habitat

Common Name	Rationale
Bobolink	Given the industrial use of the site and urbanized surrounding properties and lack of suitable habitat (i.e., meadows, hayfields), it is not anticipated the site and immediate surroundings provide a significant habitat for the Bobolink. Therefore, the Bobolink is not assumed to be present on or within close proximity to the site.
Massasauga	Given the industrial use of the site and urbanized surrounding properties and lack of suitable habitat (e.g., tall grass prairie, bog, marsh, shoreline), as well as the shallow water table at the site, it is not anticipated the site and immediate surroundings provide a significant habitat for the Massasauga. In addition, the Ontario population is limited to Collingwood and areas to the north. Therefore, the Massasauga is not assumed to be present on or within close proximity to the site.

5.3 Exposure Pathway Analysis

Soil and groundwater COCs can be taken up directly or indirectly by ecological receptors, as represented by on-site terrestrial plants, soil organisms, and mammals and birds. For the purposes of this Ecological Risk Assessment (ERA), all soil and groundwater COCs are considered to be present at full depth and across the entire aerial extent of the site.

The potential exposure pathways for COCs in soil to ecological receptors include:

- Root uptake from soil and/or root contact with soil by terrestrial vegetation;
- Soil ingestion and direct contact by soil invertebrates and terrestrial mammals and birds;

- Ingestion of impacted food/prey by soil invertebrates and terrestrial mammals and birds;
- Indirect exposure to volatile COCs released from soil and groundwater to outdoor air through atmospheric deposition (plants); and,
- Indirect exposure to volatile COCs released from soil and groundwater to outdoor air through inhalation and dermal contact (soil invertebrates and terrestrial wildlife).

Terrestrial receptors may also be exposed to COCs in soil via the following:

- Inhalation of soil particulates by terrestrial mammals and birds; and,
- Dermal contact by terrestrial mammals and birds.

Although exposure via this second set of pathways may occur, the contribution to the total exposure is thought to be minimal compared with ingestion (Environment Canada, 1994; US EPA, 1999). Therefore, these exposure pathways are not considered further in the ERA.

Plants could potentially be exposed to groundwater COCs via the atmospheric deposition of on-site COCs being transferred to the atmosphere via volatilization; however, exposure via volatilization was considered to be insignificant due to dilution of vapours in outdoor air. Additionally, soil invertebrates and terrestrial wildlife could potentially be exposed to groundwater COCs via inhalation of vapours in outdoor air; however, there is insufficient information to evaluate this pathway for soil invertebrates, inhalation toxicity data for mammalian wildlife are limited for endpoints of interest in the ERA (e.g., reproduction) and little data exists for avian species. It should be noted that, as per MECP (2011b), there is currently insufficient information to add modeling for inhalation exposure of terrestrial wildlife, and it is commonly thought that inhalation exposure are not significant pathways of exposure. Therefore, this pathway was not assessed further in the ERA.

Although groundwater at the RA Property was measured at a depth less than <3.0 m bgs, root uptake of groundwater COCs is not considered a complete exposure pathway as the roots of typical urban vegetation do not extend to the minimum measured depth of on-site groundwater, i.e., 1.16 m bgs. Roots generally remain within the top 1 m of soil which provides the most favorable conditions for root growth (Craul, 1992). Studies have shown that most trees have 80% of their roots within the top 30 cm of soil (Himelick, 1986), while 94% of Kentucky bluegrass roots are found within this area (Stewart et al., 2004). Under nursery conditions, it was demonstrated that the natural root distributions of seven species of trees (Norway, Red and Sugar Maple, Green Ash, Redbud, Ginkgo, Pin Oak) were most developed at 13-38 cm (Watson and Himelick, 1982).

Direct contact with groundwater containing COCs by terrestrial invertebrates is considered an incomplete pathway as these VECs are likely to avoid water-saturated soils at and within the ground water table, as this zone would not have suitable organic substrates or oxygen required for survival. They are generally found within the first 30 cm of soil, where the bulk of plant roots and biological activity takes place. Thus, terrestrial invertebrates are not anticipated to come into contact with groundwater on the site and this exposure pathway was considered to be incomplete in the ERA.

Terrestrial mammals and birds on the site are not anticipated to come into direct contact with groundwater given that the minimum depth to groundwater is 1.16 m bgs. Only terrestrial mammals that burrow have the potential to come into direct contact with groundwater. Potential for direct contact to groundwater by voles and shrews is considered to be minimal as these small mammals have shallow burrows and are likely to avoid water-saturated soils. Short-Tailed Shrews tend to burrow in leaf litter and fallen grasses within 0.1 m of the surface (Ballenger, 2000), while Meadow Voles create shallow surface tunnels or runways and use existing burrows only occasionally. As a result, it is unlikely for terrestrial mammals on the RA property to come into direct contact with groundwater and, therefore, direct contact to this medium was considered an incomplete exposure pathway.

Since on-site ecological receptors are not anticipated to be exposed to groundwater COCs via atmospheric deposition, inhalation of outdoor air and direct contact, indirect exposure to groundwater COCs by on-site ecological receptors via ingestion of terrestrial plants and prey is also considered to be incomplete.

Additionally, the COCs in soil have the potential to leach from soil to groundwater and migrate to the nearest downgradient surface water body, the Besley Drain, located approximately 515 m southeast of the site. COCs from groundwater can directly migrate to a downgradient off-site water body. Therefore, off-site aquatic receptors may be exposed to COCs from the RA Property through the following exposure pathways:

- Root, stem and foliar uptake of surface water by aquatic vegetation;
- Dermal contact and ingestion of surface water by aquatic invertebrates, aquatic birds and mammals, and fish;
- Ingestion of impacted food/prey by aquatic invertebrates, aquatic birds and mammals, and fish; and,
- Gill uptake of surface water by aquatic invertebrates and fish.

The maximum soil and groundwater COC concentrations, as listed in Tables 3-1 and 3-2 (Section 3), were utilized to evaluate the potential exposure to COCs in soil and groundwater on-site.

Evaluation of these on and off-site pathways are presented in Section 5.5.

5.4 Toxicity Assessment

As per MECP (2011b), assessment endpoints are growth, reproduction, and survival for terrestrial plants and invertebrates, and growth, reproduction, and population effects for wildlife (birds and mammals). Benchmarks and exposure limits were derived by MECP (2011b) based on these assessment endpoints and are concentrations or doses that are considered to provide protection to VECs. These benchmarks are equivalent to the ecological based quality guidelines outlined in Section 5.5.

It is noted that the Modified Ecological Protection (MEP) Approach was applied in this DDRA for determining risks to ecological receptors. For COCs in soil with ecological component values (See Section 5.5.1), the MEP approach was applied. This approach is described in Appendix 4 of the MGRA User Guide: A Guide to Using the "Approved Model" (November, 2016) When Submitting a Modified Generic Risk Assessment (MGRA) (MECP, 2016). As described, the MEP approach entails the use of less stringent ecotoxicity values and is considered suitable for use given the industrial use of the site and the highly urban area within which the site is located. For plants and soil invertebrates, under the commercial/industrial land use a new component value (see Section 5.5.1) is used. This value is the industrial component value multiplied by 1.9, which is equivalent to the 75th percentile value for each dose-response data set developed for general model values. With this approach, industrial ecotoxicity values for mammals and birds are multiplied by 1000. This option allows for the establishment of a natural habitat, albeit degraded, which can still support a variety of ecological species. Refer to Appendix C for a copy of the MGRA output modified with the MEP value enabled. Additionally, for component values derived from other jurisdictions other than the MECP (i.e., US EPA), the MEP approach has been applied in the same manner for MECP derived component values (e.g., x 1.9 for plants and soil organisms and x 1,000 for mammals and birds).

5.5 Risk Characterization

To assess the potential ecological concerns associated with soil and groundwater impacts, the soil and groundwater data was screened against the ecological health-based soil quality guidelines (SQG_E) and ecological health-based groundwater quality guidelines (GQG_E) for an industrial land use scenario, as selected from the MECP (2011b) Table 2 SCS Full Depth Soil Component Criteria in a Potable Water Scenario for an ICC property use with coarse textured soil, for the relevant exposure pathways identified in Section 5.3. The ecotoxicity criteria applied to this ERA are values protective of plants and soil invertebrates and mammals and birds as per MECP (2011b).

Tables 5-2 and 5-3 provide a comparison of the maximum COC concentrations against the applicable SQG_E and GQG_E for the relevant ecological receptors.

Table 5-2: SQG$_E$ Values Applied to Site Soil Quality Data for the Industrial Use Scenario

Parameter	Maximum Concentration (µg/g)	Plants and Soil Invertebrates (µg/g)[1]	Mammals and Birds (µg/g)[1]	S-GW3 (µg/g)[2]	Modified S-GW3 (µg/g)[3]
PHCs and BTEX					
PHC F1	**530**	610	NV	55	600
PHC F2	**490**	490	NV	230	2,500
PHC F3	2,200	3,200	NV	NA	NA
Benzene	0.5	340	6,800,000	14	160
Ethylbenzene	8.37	570	38,000,000	17	190
Xylenes	**43.1**	670	47,000,000	26	290
Metals					
Zinc	676	1,100	340,000	NV	NV
ORPs					
HWS-B	2.62	3.8	NA	NV	NV
EC (mS/cm)	**17.8**	2.7	NA	NV	NV
SAR (unitless)	**248**	23	NA	NV	NV

[1]Modified Ecological Protection (MEP). Under this option, ecotoxicity values for plants and soil invertebrates are multiplied by x 1.9. For mammals and birds, the ecotoxicity values are multiplied by x 1000.

[2]MECP component value protective of soil leaching to groundwater and subsequent migration to surface water (Table 2 SCS).

[3]Modified MECP component value (S-GW3) protective of soil leaching to groundwater and subsequent migration to surface water assuming a distance to the nearest downgradient surface water body of 515 meters (the Besley Drain).

Bold = maximum concentration exceeds one or more component values.
Shaded value indicates component value is exceeded by the maximum concentration.
NV = No Value
NA = Not Applicable

There were no applicable component criteria protective of mammals and birds for PHCs, as provided by the MECP (2016). As such, there is a level of uncertainty associated with the potential risk posed to ecological receptors via the applicable soil exposure pathways. However, the Canadian Council of Ministers of the Environment (CCME, 2008) states that this is likely acceptable as most PHCs are readily metabolized by vertebrates, modified into more readily excretable forms and do not tend to accumulate in tissue. Furthermore, no component value is available for the migration of soil COCs to groundwater (S-GW3) for PHC F3 given that this parameter is considered to be insufficiently soluble within this media.

As HWS-B, EC and SAR are of concern to plants and soil invertebrates only, MECP (2016) does not provide a component criteria protective of mammals and birds for these COCs.

Based on the screening of the maximum soil COC concentrations, the following observations were made:

- EC and SAR are present at concentrations greater than the ecological component criteria protective of direct contact with plants and soil invertebrates, which indicates the potential for unacceptable risks to these on-site receptors;

- No soil COCs were identified to exceed the mammals and birds component values, indicating that there is not risk present from soil exposure to terrestrial vertebrates at the site; and,

- PHC F1, PHC F2 and xylenes are present at concentrations that exceed the generic S-GW3 component value, indicating the potential for soil COCs leaching to groundwater and subsequent off-site migration to the Besley Drain. It is noted that no S-GW3 component values were provided for zinc, HWS-B, EC and SAR, precluding these parameters from assessment of off-site migration using S-GW3 component values.

Based on the screening of the maximum soil COC concentrations against the applicable MECP component values, PHC F1, PHC F2 and xylenes are present in soil at concentrations greater than their respective generic S-GW3 component value, which is protective of soil leaching to groundwater and subsequent migration to surface water based on a generic distance to surface water body of 36.5 m. This pathway was evaluated further by modifying the S-GW3 component value to be site-specific using the MECP (2016) MGRA Model. The distance to the closest downgradient surface water body was revised from the generic value of 36.5 metres to 515 m (the Besley Drain southeast of the site). In addition, as described in Section 4.5, 1.16 m bgs was used as the minimum depth to the water table at the site, and sandy loam was used as the vadose and capillary fringe soil type based on subsurface investigations completed by EXP (2022) and THEM (2019B). As presented in Table 5-2, the maximum concentrations of PHC F1, PHC F2 and xylenes in groundwater are within their respective modified S-GW3 component values. In addition, although no S-GW3 component values were available for zinc, HWS-B, EC and SAR in soil, no exceedances of zinc, or boron have been identified in groundwater samples collected from the site. As such, it is concluded that soil leaching of zinc and HWS-B is not occurring to the extent that risk would be anticipated for off-site aquatic receptors from metal and HWS-B impacts in on-site soils. However, it is noted that sodium and chloride exceed their Table 2 SCS in groundwater at the site, indicating that salt-related impacts in soil may be leaching to groundwater at concentrations high enough to result in risks following migration to off-site downgradient water bodies. Risks to off-site aquatic life as a result of salt-related impacts leaching to groundwater and subsequently migrating to the nearest surface water body is further evaluated below, through assessment of the groundwater migration to surface water pathway for sodium and chloride.

The MGRA input and output spreadsheets for the generic and site-specific scenarios are provided in Appendix C.

EC and SAR impacts in soil are widespread across the site, and were identified at twenty-three (23) out of thirty-five (35) sampling locations at concentrations in excess of the applicable plant and soil organism component values. Of these twenty-three (23) component value exceedances, thirteen (13) were located in shallow soil at depths between grade and 1.5 m bgs. The surficial soil exceedance at BH22-1 is located beneath the current site building, and the remaining surficial soil exceedances are located on the central and southern portions of the site in portions of the workyard that are either asphalt paved or covered in sand/granular fill. As the majority of the site outside of the building footprint is either asphalt paved or covered in sand/granular fill, direct contact with on-site soils is anticipated to be limited. As the thin grassy strips along the site boundaries do not show evidence of stressed vegetation, the potential for unacceptable risks to terrestrial plants and soil invertebrate communities under the current site configuration is considered to be low. If the site is redeveloped in the future, RMMs are recommended for the protection of plants and soil organisms from EC and SAR impacts in shallow soil at the site, as outlined in Section 6.

Table 5-3: GQG_E Values Applied to Site Groundwater Quality Data for the Industrial Use Scenario

Parameter	Maximum Concentration (µg/L)	GW3[1] (µg/L)	Modified GW3[2] (µg/L)
VOCs			
1,1,1-Trichloroethane	85.2	11,000	130,000
1,1,2-Trichloroethane	5.17	120,000	1,300,000
1,1-Dichloroethane	104	2,600,000	28,000,000
1,1-Dichloroethylene	22.8	15,000	170,000
Vinyl Chloride (future condition)	2.78	450,000	5,000,000
Metals and Hydride-forming Metals			
Barium	3,740	29,000	320,000
Cobalt	41.7	66	730

Parameter	Maximum Concentration (µg/L)	GW3[1] (µg/L)	Modified GW3[2] (µg/L)
Selenium	25.4	63	700
ORPs			
Sodium	**40,300,000**	2,300,000	25,000,000
Chloride	**56,500,000**	2,300,000	25,000,000

[1]MECP component value protective of groundwater migration to surface water based on the generic distance to the nearest downgradient surface water body of 36.5 m (Table 2 SCS).

[1]MECP component value protective of groundwater migration to surface water based on the site-specific distance to the nearest downgradient surface water body of 515 m (i.e., to the Besley Drain located southeast of the site).

Bold = maximum concentration exceeds one or more component values.
Shaded value indicates component value is exceeded by the maximum concentration.

Based on the screening of maximum groundwater COC concentrations against the applicable MECP component values, sodium and chloride in groundwater exceeded the generic GW3 component value protective of aquatic life via groundwater migration to surface water, based on a distance to the surface water body of 36.5 m. The modified GW3 component value was generated by entering the site-specific distance to the nearest downgradient water body, the Besley Drain, located 515 m southeast of the site into the MECP (2016) MGRA Model. The maximum concentrations of sodium and chloride in groundwater at the site continue to exceed the modified GW3 component value protective of aquatic life via groundwater migration to the Besley Drain. Therefore, risks may be present to off-site aquatic receptors due to salt-related impacts in soil leaching to groundwater and subsequently migrating to surface water as well as sodium and chloride in groundwater migrating to surface water. This is discussed further in Section 5.7.

The generic GW3 component value was also used to evaluate risks to on-site plants via root uptake of COCs in shallow groundwater. As the maximum concentrations of sodium and chloride exceed their respective generic GW3 component value, risks may be present to on-site plants from exposure to sodium and chloride in groundwater. Based on more recent groundwater results collected between 2020 and 2022, groundwater with concentrations of sodium and/or chloride exceeding the GW3 component values was found at adjacent shallow (BH/MW22-11S) and deep monitoring wells (BH/MW22-11D) at one (1) of the fourteen (14) locations sampled. The area of contamination is relatively small, comprising approximately 0.17 ac or 23% of the site, and is located on the southeast portion of the site. The depths to groundwater recorded at these wells range between 1.36 and 2.10 m bgs, which is below the depth at which roots are expected to grow, i.e., the top 1 m of soil, as described in Section 5.3. As such, it is unlikely that terrestrial plants within the area of ground water contamination will be exposed to salt-impacted ground water. As potential future site redevelopment is anticipated to be minor in nature (e.g., modifications to the existing site building), it is not anticipated that site elevations will change following the redevelopment.

5.6 Summary of Potential On-Site Ecological Receptor Risks

Based on the information available at this time and the conservative assumptions applied in this DDRA, the results of the ERA indicated that there may be unacceptable risk posed to on-site ecological receptors via the following exposure pathways:

- Direct contact with EC and SAR in impacted soil by terrestrial plants and soil invertebrates.

Based on a review of the available data, areas with EC and SAR impacts in soil that exceed the applicable component values are mainly located on unvegetated portions of the site that are either sand/granular fill, asphalt or concrete covered under the current site configuration, and given the lack of distressed vegetation observed in landscaped areas of the site, the potential for unacceptable risks to terrestrial plants and soil invertebrate communities under the current site configuration is considered to be low.

If the site is redeveloped in the future, RMM for the protection of terrestrial plants and soil invertebrates from the EC and SAR impacts identified in on-site soil are recommended, as discussed in Section 6.

5.7 Off-Site Assessment

The site is located in an area of primarily mixed residential, community, commercial, and industrial land uses. The nearest off-site ecological receptors include aquatic receptors (various species of fish, invertebrates, amphibians, and aquatic plant species) that may be present in the Besley Drain located approximately 515 m southeast of the site.

As discussed in Section 5.5, the maximum soil COC concentrations were screened against the applicable site-specific modified S-GW3 component values for soil leaching to groundwater and subsequent migration to surface water, applicable to off-site aquatic receptors in the Besley Drain. No S-GW3 component values are available for zinc, HWS-B, EC and SAR in soil. As no exceedances of zinc, or boron have been identified in groundwater samples collected from the site, it is concluded that soil leaching of zinc and HWS-B is not occurring to the extent that risk would be anticipated for off-site aquatic receptors from these on-site soil impacts. However, sodium and chloride exceed their Table 2 SCS in groundwater at the site, indicating that salt-related impacts in soil may be leaching to groundwater and migrating to off-site downgradient water bodies. This risk is further evaluated below, as part of off-site aquatic risks due to migration of sodium and chloride in groundwater.

The maximum groundwater COC concentrations were screened against the site-specific modified GW3 component values for groundwater migration to surface water, applicable to off-site aquatic receptors in the Besley Drain. The maximum concentrations of sodium and chloride in groundwater at the site continue to exceed the modified GW3 component values, as such risks may be present to off-site aquatic receptors.

As sodium and chloride impacts in groundwater have not been delineated along the southeast site boundary, it is possible that sodium and chloride impacted groundwater may be flowing off-site at concentrations and exceeding the modified GW3 component values protective of off-site aquatic receptors in the Besley Drain. However, as discussed in Section 5.5, the component value exceedances are restricted to one (1) of the fourteen (14) locations sampled across the site, to adjacent shallow (BH/MW22-11S) and deep monitoring wells (BH/MW22-11D) located on the southeast portion of the site. As such, only a small portion (approximately 23%) of the site has concentrations of salts in groundwater that are anticipated to pose a concern to receptors within the Besley Drain.

The Besley Drain is part of the Boyne River subwatershed of the Nottawasaga Valley Watershed. According to the *Boyne River Subwatershed Health Check 2023* (NVCA, 2023), stream health within the Boyne River subwatershed is poor, partly due to urban impacts from stormwater ponds, pollutants etc. Groundwater quality within the Boyne River subwatershed is not provincially monitored, however, NVCA acknowledges that groundwater in urban areas is susceptible to chloride due to excessive application of winter salt on roads and parking lots. Given the southeast direction of groundwater flow, several roadways and urbanized areas that undergo winter salting are present in the 515 m between the site and the point of discharge to the Besley Drain. As such, it is unlikely that the limited GW3 exceedances at the site are contributing significantly to elevated levels of salt within the Besley Drain when compared to the continued application of road salt off-site, and therefore any on-site RMMs are not anticipated to have any material effect on off-site risks. As such, no RMM are recommended to mitigate this pathway.

6 Results and Recommendations

6.1 Results

Human Health

It is noted that the HHRA has been conducted under the assumption that any potential future industrial/commercial site building(s) will also be of slab-on-grade construction. Based on the information available at this time and the conservative assumptions applied in the DDRA, the results of the HHRA indicate that there may be potential unacceptable risk posed to human health via the following exposure pathway:

- Direct contact with 1,1,2-TCA, 1,1-DCA, 1,1-DCE, VC (future condition), barium, cobalt, selenium, and sodium impacted groundwater by site long-term indoor workers and property visitors/trespassers.

Therefore, RMMs are recommended at the site for the protection of long-term indoor workers and property visitors/trespassers from impacts in groundwater via potable ingestion and dermal contact. RMM recommendations are presented in Section 6.2.

To ensure the assumptions applied in the HHRA remain true, a soil and groundwater management plan (SGWMP) has also been recommended for the site.

Ecological Health

Based on the information available at this time and the conservative assumptions applied in this DDRA, the results of the ERA indicated that there may be unacceptable risk posed to on-site ecological receptors via the following exposure pathways:

- Direct contact with EC and SAR in impacted soil by terrestrial plants and soil invertebrates.

Based on a review of the available data, areas with EC and SAR impacts in soil that exceed the applicable component values are mainly located on unvegetated portions of the site that are either sand/granular fill, asphalt or concrete covered under the current site configuration, and given the lack of distressed vegetation observed in landscaped areas of the site, the potential for unacceptable risks to terrestrial plants and soil invertebrate communities under the current site configuration is considered to be low.

If the site is redeveloped in the future, RMM for the protection of terrestrial plants and soil invertebrates from the EC and SAR impacts identified in on-site soil are recommended, as discussed in Section 6.2.

Off-Site Assessment – Aquatic Life

Based on the current site condition, potentially unacceptable risks were identified for off-site aquatic ecological receptors as a result of sodium and chloride in on-site groundwater migrating to surface water. However, as described in Section 5.7, no RMM are recommended to mitigate this pathway, as on-site RMM are not anticipated to have any material effect on off-site aquatic risks, due to the limited extent of sodium and chloride exceedances above the GW3 component value protective of off-site aquatic receptors and the continued application of road salt between the site and the nearest downgradient surface water body, the Besley Drain.

6.2 Recommendations

EXP recommends that the following RMM be considered, in order to reduce the potential ecological risks identified at this site:

1. **Soil Cover System (to be implemented as part of any future redevelopment)**

   Implementation of a surface barrier upon redevelopment of the site, such as a hard cap (asphalt/concrete) or a soft cap (with minimum thickness of 0.5 m of soil meeting the applicable Table 2 SCS underlain by a demarcation barrier), as appropriate, to block exposure to on-site soils for ecological receptors. In areas where trees are proposed, a 1.5 m soft cap barrier is recommended, with at least 0.5 of soil meeting the applicable Table 2 SCS placed around the root ball. Following the construction of the hard and/or soft cap barriers, it is recommended that the cap barriers be regularly monitored to ensure their integrity and that there is no exposed underlying soil. Maintenance of the soil cover systems will involve the repair of any damage, deterioration or compromises noted during inspection of the future cap barriers.

2. **Site-Specific Soil and Groundwater Management Plan**

   For any excavation work or breach in the soil barrier at the site involving potential contact with or the re-distribution of impacted soil or groundwater, a Soil and Groundwater Management Plan (SGWMP) is recommended. The SGWMP includes requirements for controlling the handling, distribution and disposal of soil and groundwater to ensure that exposure via direct contact pathways by human and ecological receptors is not likely to occur or will be minimized. The SGWMP will also mitigate any off-site migration of soil COCs due to windborne dispersion and groundwater COCs due to run-off at the time of site redevelopment.

   It is recommended that the SGWMP be prepared and implemented under the supervision of a Qualified Person (QP_{ESA}) during any intrusive sub-surface activities that may expose impacted soil or groundwater at the Site.

3. **Potable Groundwater Use Restriction**

   A restriction prohibiting the taking of groundwater from the site for potable use (i.e., prohibiting the construction of potable water wells at the site).

Should any new maximum COC concentrations be identified in soil or groundwater, the conclusions of this DDRA may need to be reviewed and/or revised. In the event a new COC is identified (i.e., chemical parameter with new maximum concentration that now exceeds the applicable SCS), it is recommended that an updated DDRA be conducted.

7 Closure

We trust this report is satisfactory for your purposes. Should you have any questions, please do not hesitate to contact this office.

Yours truly,

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9 Limitations and Use of Report

BASIS OF REPORT

The Report is based on site conditions known or inferred by the investigation undertaken as of the date of the Report. Should changes occur which potentially impact the condition of the site the recommendations of EXP may require re-evaluation. Where special concerns exist, or the Client has special considerations or requirements, these should be disclosed to EXP to allow for additional or special investigations to be undertaken not otherwise within the scope of investigation conducted for the purpose of the Report.

Where applicable, recommended field services are the minimum necessary to ascertain that construction is being carried out in general conformity with building code guidelines, generally accepted practices and EXP's recommendations. Any reduction in the level of services recommended will result in EXP providing qualified opinions regarding the adequacy of the work. EXP can assist design professionals or contractors retained by the Client to review applicable plans, drawings, and specifications as they relate to the Report or to conduct field reviews during construction.

RELIANCE ON INFORMATION PROVIDED

The evaluation and conclusions contained in the Report are based on conditions in evidence at the time of site inspections and information provided to EXP by the Client and others. The Report has been prepared for the specific site, development, building, design or building assessment objectives and purpose as communicated by the Client. EXP has relied in good faith upon such representations, information and instructions and accepts no responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of any misstatements, omissions, misrepresentation or fraudulent acts of persons providing information. Unless specifically stated otherwise, the applicability and reliability of the findings, recommendations, suggestions or opinions expressed in the Report are only valid to the extent that there has been no material alteration to or variation from any of the information provided to EXP.

STANDARD OF CARE

This report ("Report") has been prepared in a manner consistent with the degree of care and skill exercised by engineering consultants currently practicing under similar circumstances and locale. No other warranty, expressed or implied, is made. Unless specifically stated otherwise, the Report does not contain environmental consulting advice.

COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment form part of the Report. This material includes, but is not limited to, the terms of reference given to EXP by the Client, communications between EXP and the Client, other reports, proposals or documents prepared by EXP for the Client in connection with the site described in the Report. In order to properly understand the suggestions, recommendations and opinions expressed in the Report, reference must be made to the Report in its entirety. EXP is not responsible for use by any party of portions of the Report.

USE OF REPORT

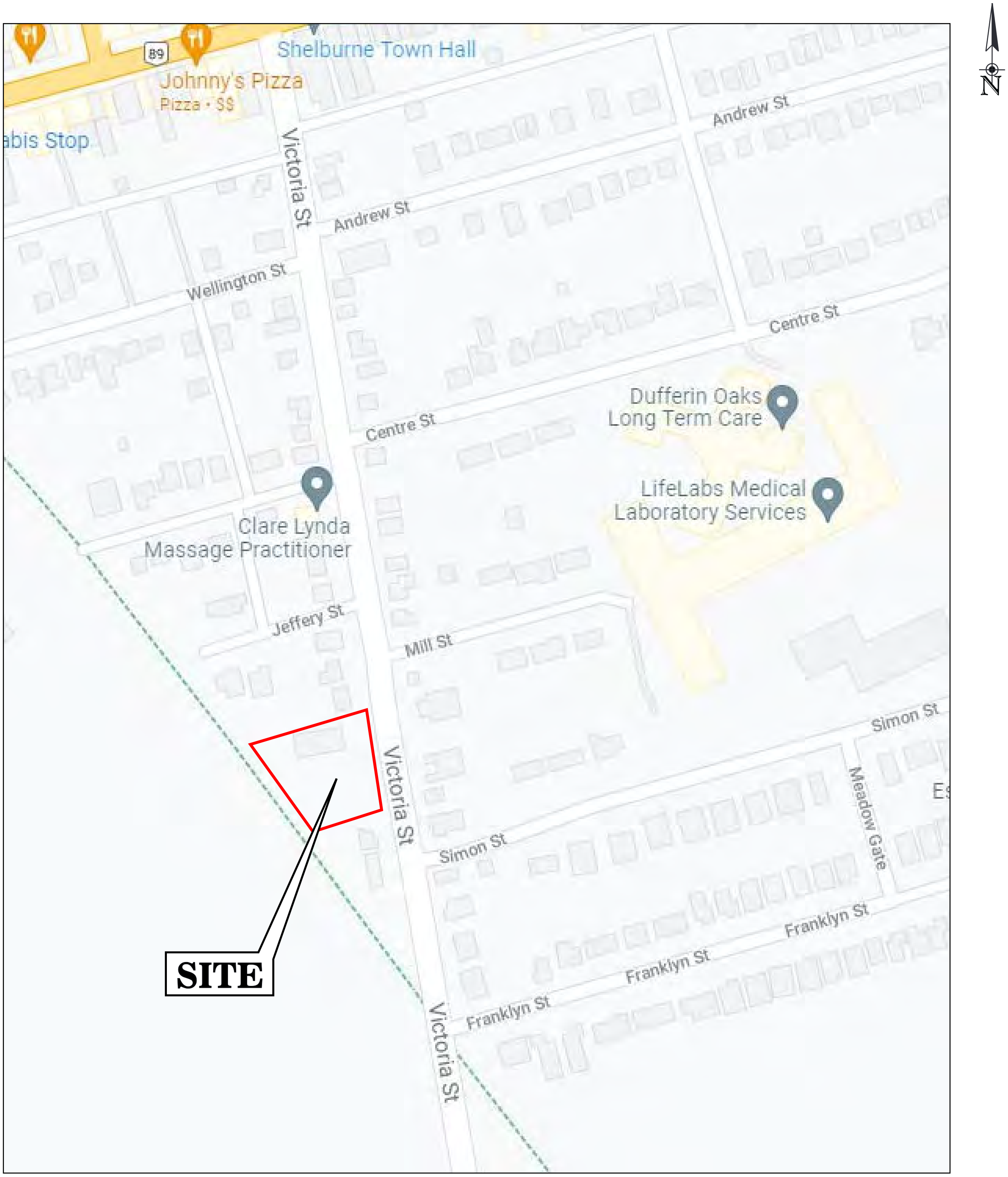
The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. No other party may use or rely upon the Report in whole or in part without the written consent of EXP. Any use of the Report, or any portion of the Report, by a third party are the sole responsibility of such third party. EXP is not responsible for damages suffered by any third party resulting from unauthorised use of the Report.

REPORT FORMAT

Where EXP has submitted both electronic file and a hard copy of the Report, or any document forming part of the Report, only the signed and sealed hard copy shall be the original documents for record and working purposes. In the event of a dispute or discrepancy, the hard copy shall govern. Electronic files transmitted by EXP utilize specific software and hardware systems. EXP makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

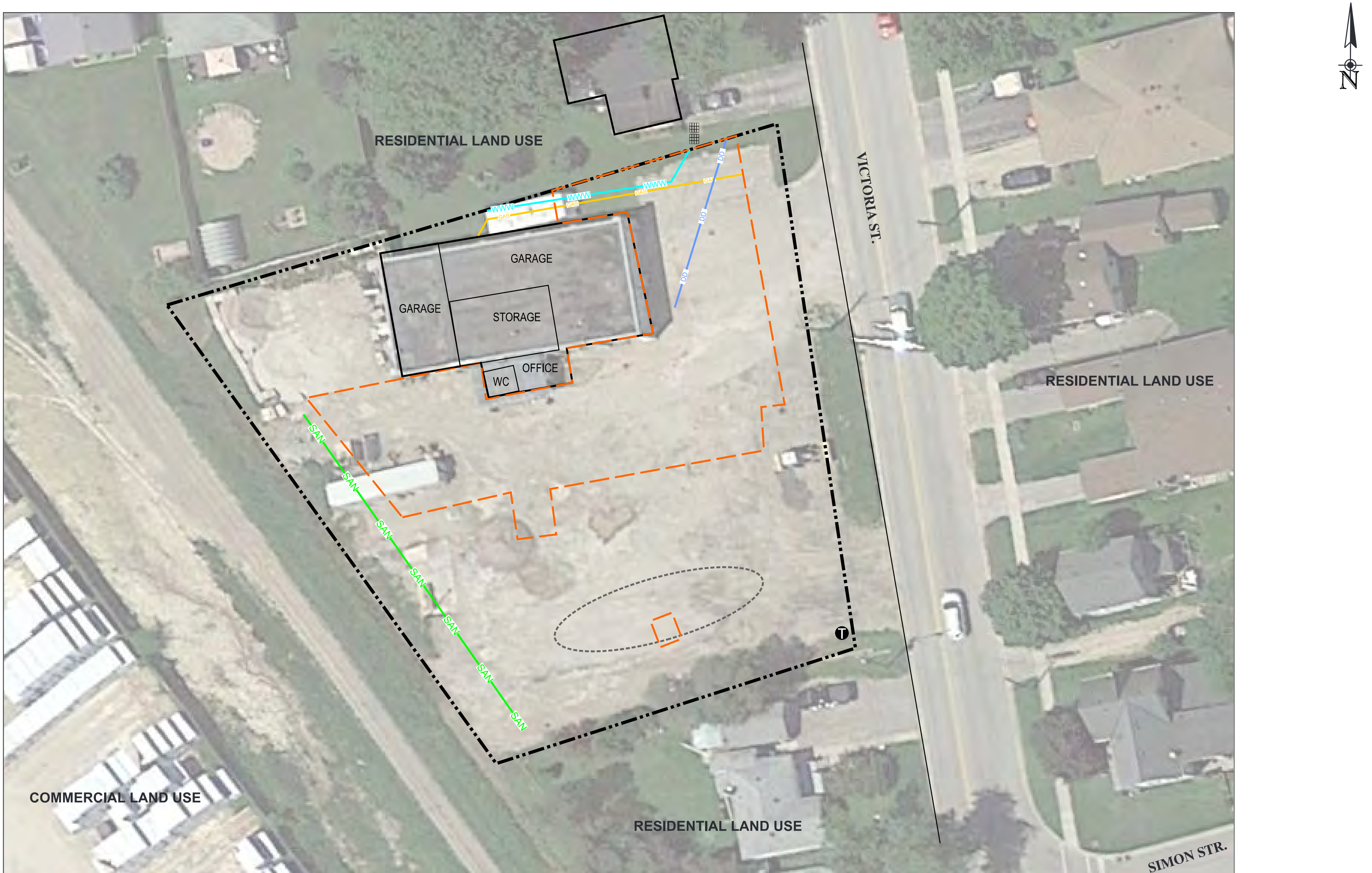
Regardless of format, the documents described herein are EXP's instruments of professional service and shall not be altered without the written consent of EXP.

Figures



SCALE: 0 50 100m	**SOURCE:** **GOOGLE MAPS**	LOCALITY PLAN	FIGURE 1
	LEGEND: SITE BOUNDARY	420 VICTORIA STREET, SHELBURNE, ONTARIO	
exp.	DRAWN BY: K.G. / CHECKED BY: T.N.T.	PROJECT NUMBER: 21020239	

21020239-LOCALITY



SCALE: 0 5 10m

SOURCE:
BASED ON INTERACTIVE MAPS IMAGE, AND FIELD MEASUREMENTS BY EXP STAFF

LEGEND:
- SITE BOUNDARY
- POLE-MOUNTED TRANSFORMER
- FORMER SALT STORAGE
- LIMIT OF EXCAVATION (2018-2020)
- WATER
- DRAIN CLAY PIPE
- GAS
- SANITARY SEWER
- CATCH BASIN

DRAWN BY	CHECKED BY
K.G.	A.F.

SITE AND UTILITY PLAN

FIGURE 2A

420 VICTORIA STREET,
SHELBURNE, ONTARIO

PROJECT NUMBER: 21020239 | DATE: JANUARY 2024

21020239-PH2 SITE PLAN-JAN24:U_SITE PLAN

SCALE: 0 5 10m

SOURCE:
BASED ON INTERACTIVE MAPS IMAGE, AND FIELD MEASUREMENTS BY EXP STAFF

DRAWN BY	CHECKED BY
K.G.	A.F.

21020239-PH2 SITE PLAN-SEP22:SITE PLAN

LEGEND:
- SITE BOUNDARY
- POLE-MOUNTED TRANSFORMER
- FORMER SALT STORAGE
- LIMIT OF EXCAVATION (2018-2020)
- 6-1 CONFIRMATORY SOIL SAMPLE (T. HARRIS, 2018-2020)
- TEST HOLE WITH MONITOR
  BH/MW SERIES (T. HARRIS, 2018)
  BH22 SERIES (EXP, 2022)
- TEST HOLE
  BH1-2018 SERIES (T. HARRIS, 2018)
  BH1 SERIES (T. HARRIS, 2020)
  BH22 SERIES (EXP, 2022)
- TEST PIT
  TP1-TP6 (T. HARRIS, 2019)
  TP7, TP8 (T. HARRIS, 2020)

SITE PLAN

FIGURE 2B

420 VICTORIA STREET,
SHELBURNE, ONTARIO

PROJECT NUMBER: 21020239 | DATE: JANUARY 2024

PCA Source Number	Potentially Contaminating Activity (PCA)
S1	(30) Importation of Fill Material of Unknown Quality
S2	(52) Storage, maintenance, fuelling and repair of equipment, vehicles, and material used to maintain transportation systems
S3a	(48) Salt Manufacturing, Processing and Bulk Storage
S3b	(48) Salt Manufacturing, Processing and Bulk Storage
S3c	(Other) Dust Suppressant Use (containing chloride)
S4	(55) Transformer Manufacturing, Processing and Use
S5a	(28) Gasoline and Associated Products Storage in Fixed Tanks
S5b	(28) Gasoline and Associated Products Storage in Fixed Tanks
S5c	(28) Gasoline and Associated Products Storage in Fixed Tanks
S5d	(28) Gasoline and Associated Products Storage in Fixed Tanks
S6	(40) Pesticides (including Herbicides, Fungicides and Anti-Fouling Agents) Manufacturing, Processing, Bulk Storage and Large-Scale Applications
S7	(Other) Reported PHC Remediation
S8	(46) Rail Yards, Tracks and Spurs
S9a	(59) Wood Treating and Preservative Facility and Bulk Storage of Treated and Preserved Wood Products
S9b	(Other) Spill (wood preservative)
	***De-minimis* PCAs**
S10	(Other) Coal Shed
S11	(28) Gasoline and Associated Products Storage in Fixed Tanks

SCALE:

0 50 100m

SOURCE:

INTERACTIVE MAP - GOOGLE

LEGEND:

SITE BOUNDARY

250 METRE STUDY AREA

S10 PCA NOT RESULTING IN AN APEC

S5a PCA RESULTING IN AN APEC

INFERRED GROUNDWATER FLOW

ABOVEGROUND STORAGE TANK (AST)

UNDEGROUND STORAGE TANK (UST)

PCA - POTENTIALLY CONTAMINATING ACTIVITY
APEC - AREA OF POTENTIAL ENVIRONMENTAL CONCERN
(52) INDICATES ITEM NUMBER OF O. REG. 153/04 SCHEDULE D, TABLE 2

exp.

DRAWN BY	CHECKED BY
K.G.	A.F.

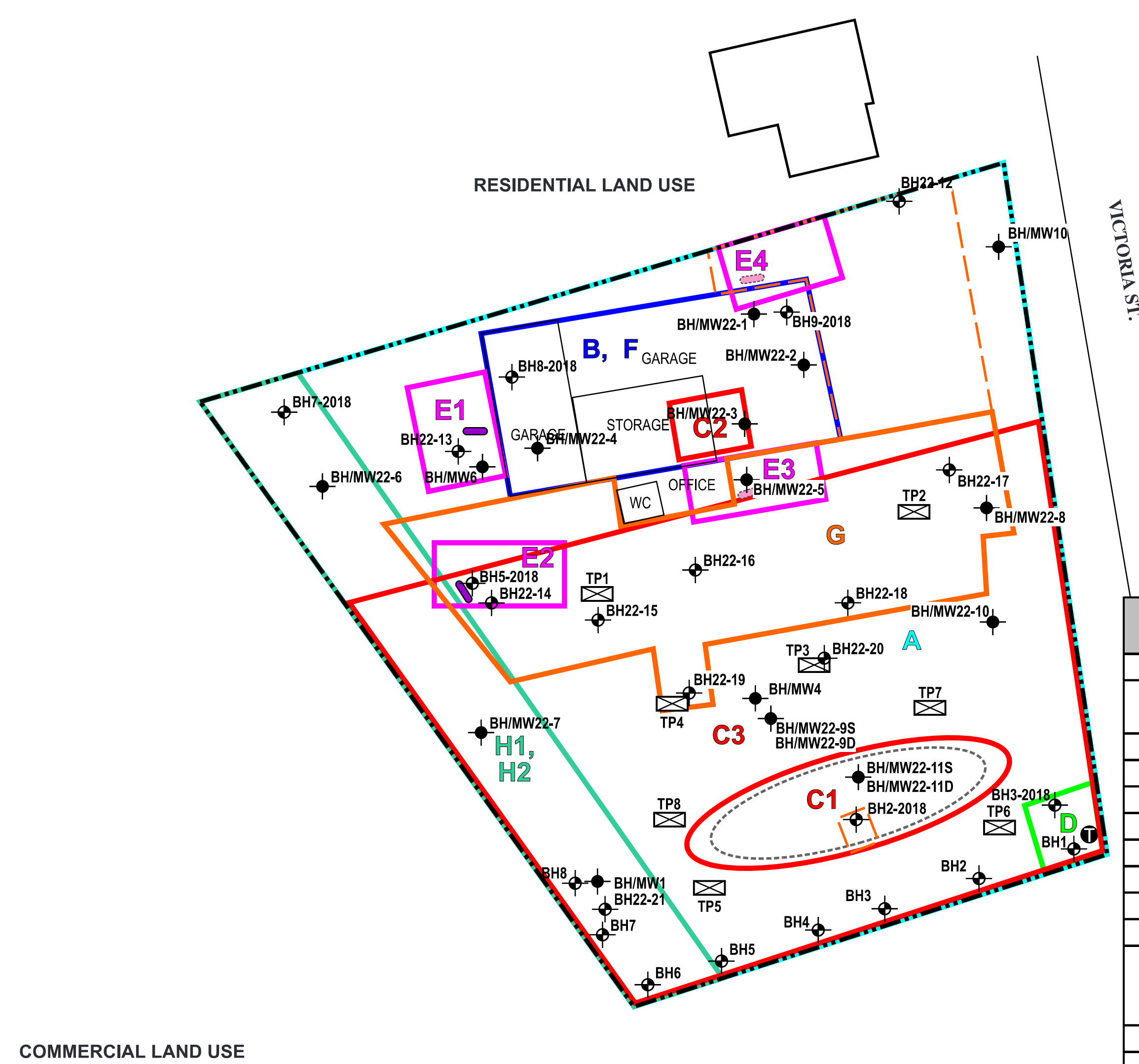
PHASE ONE CONCEPTUAL SITE MODEL

FIGURE 3A

420 VICTORIA STREET, SHELBURNE, ONTARIO

PROJECT NUMBER: 21020239 DATE: AUGUST 2024

21020239 PCA-AUG24



PCA - POTENTIALLY CONTAMINATING ACTIVITY
APEC - AREA OF POTENTIAL ENVIRONMENTAL CONSERN
(52) INDICATES ITEM NUMBER OF O. REG. 153/04 SCHEDULE D, TABLE 2

RESIDENTIAL LAND USE

APEC	PCA Source Number	PCA
A	S1	(30) Importation of Fill Material of Unknown Quality
B	S2	(52) Storage, maintenance, fuelling and repair of equipment, vehicles, and material used to maintain transportation systems
C1	S3a	(48) Salt Manufacturing, Processing and Bulk Storage
C2	S3b	(48) Salt Manufacturing, Processing and Bulk Storage
C3	S3c	(Other) Dust Suppressant Use (containing chloride)
D	S4	(55) Transformer Manufacturing, Processing and Use
E1	S5a	(28) Gasoline and Associated Products Storage in Fixed Tanks
E2	S5b	(28) Gasoline and Associated Products Storage in Fixed Tanks
E3	S5c	(28) Gasoline and Associated Products Storage in Fixed Tanks
E4	S5d	(28) Gasoline and Associated Products Storage in Fixed Tanks
F	S6	(40) Pesticides (including Herbicides, Fungicides and Anti-Fouling Agents) Manufacturing, Processing, Bulk Storage and Large-Scale Applications
G	S7	(Other) Reported PHC Remediation
H1	S8	(46) Rail Yards, Tracks and Spurs
H2	S9a	(59) Wood Treating and Preservative Facility and Bulk Storage of Treated and Preserved Wood Products
	S9b	(Other) Spill (wood preservative)

SCALE: 0 5 10m

SOURCE:
BASED ON INTERACTIVE MAPS IMAGE, AND FIELD MEASUREMENTS BY EXP STAFF

exp.

DRAWN BY	CHECKED BY
K.G.	A.F.

LEGEND:
- SITE BOUNDARY
- POLE-MOUNTED TRANSFORMER
- FORMER SALT STORAGE
- LIMIT OF EXCAVATION (2018-2020)
- ABOVEGROUND STORAGE TANK (AST)
- UNDERGROUND STORAGE TANK (UST)
- TEST HOLE WITH MONITOR
  BH/MW SERIES (T. HARRIS, 2018)
  BH22 SERIES (EXP, 2022)
- TEST HOLE
  BH1-2018 SERIES (T. HARRIS, 2018)
  BH1 SERIES (T. HARRIS, 2020)
  BH22 SERIES (EXP, 2022)
- TEST PIT
  TP1-TP6 (T. HARRIS, 2019)
  TP7, TP8 (T. HARRIS, 2020)

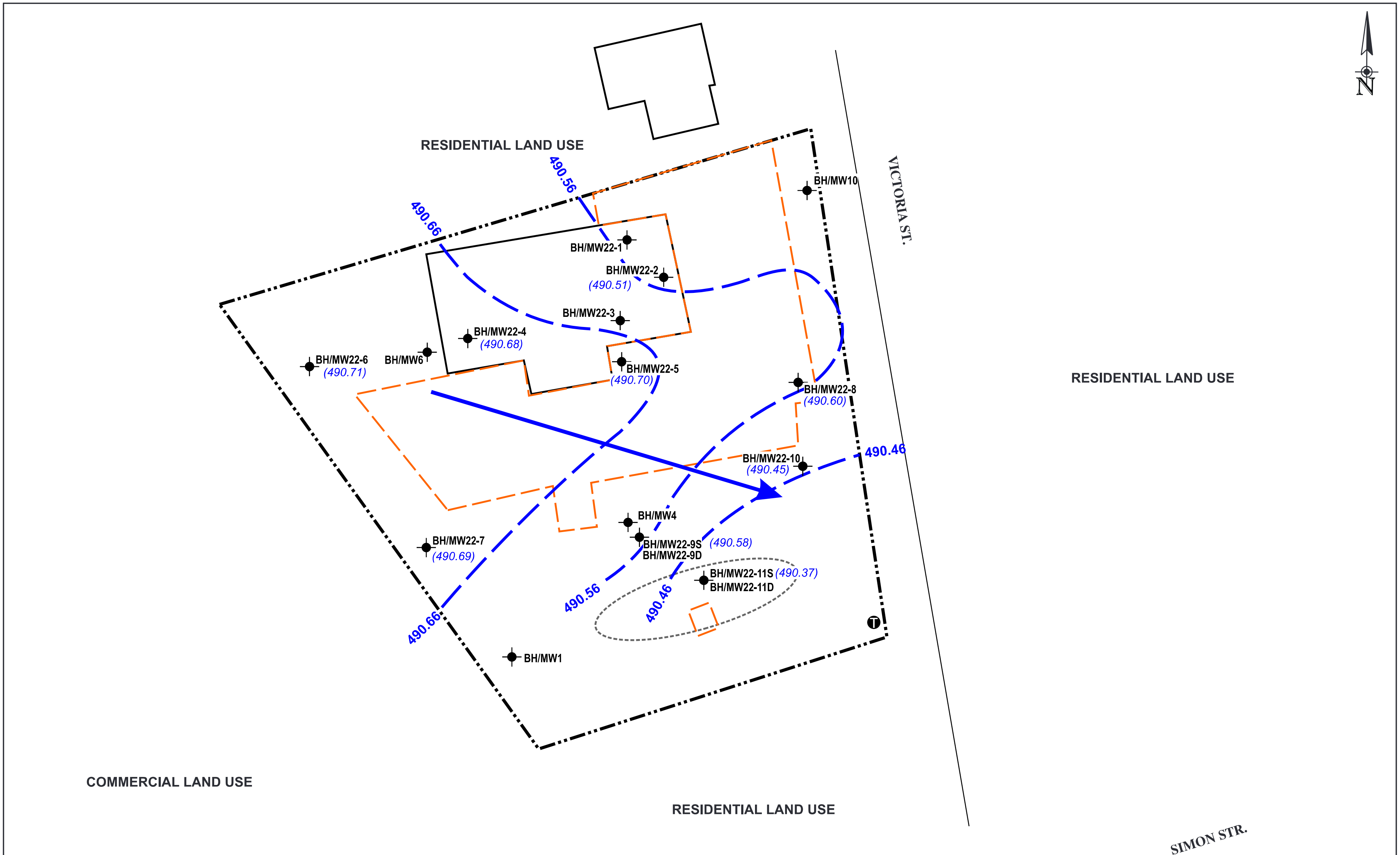
AREAS OF POTENTIAL ENVIRONMENTAL CONCERN

FIGURE 3B

420 VICTORIA STREET,
SHELBURNE, ONTARIO

PROJECT NUMBER: 21020239 | DATE: JANUARY 2024

21020239-PH2 SITE PLAN-JAN24:APEC



SCALE: 0 5 10m

SOURCE:
BASED ON INTERACTIVE MAPS IMAGE, AND FIELD MEASUREMENTS BY EXP STAFF

LEGEND:

SITE BOUNDARY	
POLE-MOUNTED TRANSFORMER	
FORMER SALT STORAGE	
LIMIT OF EXCAVATION (2018-2020)	
TEST HOLE WITH MONITOR	BH/MW SERIES (T. HARRIS, 2018) BH22 SERIES (EXP, 2022)
(100.00)	GROUND WATER ELEVATION (m)
(100.00)*	GROUND WATER ELEVATION NOT USED IN CONTOURING (m)
100.00	GROUND WATER ELEVATION CONTOUR (m)
	GROUND WATER FLOW DIRECTION
(NM)	NOT MONITORED
(NA)	NOT ACCESSIBLE

exp.

DRAWN BY	CHECKED BY
K.G.	A.F.

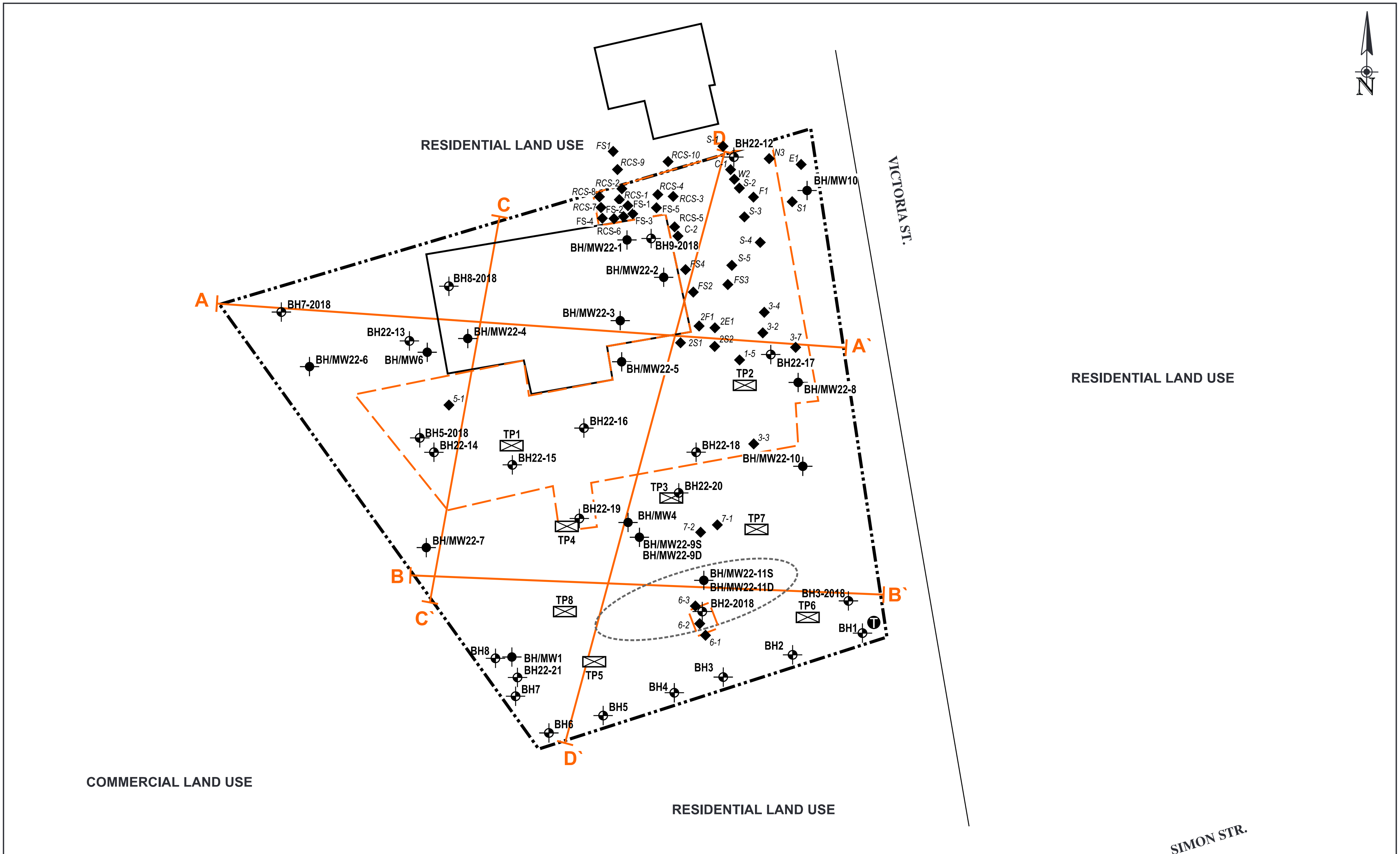
GROUND WATER CONTOUR PLAN (JULY 20 AND 21, 2022)

FIGURE 4

420 VICTORIA STREET, SHELBURNE, ONTARIO

PROJECT NUMBER: 21020239 | DATE: JANUARY 2024

21020239-PH2 SITE PLAN-JAN24:GWC



SCALE: 0 5 10m

SOURCE:
BASED ON INTERACTIVE MAPS IMAGE, AND FIELD MEASUREMENTS BY EXP STAFF

DRAWN BY	CHECKED BY
K.G.	A.F.

LEGEND:

- SITE BOUNDARY
- POLE-MOUNTED TRANSFORMER
- FORMER SALT STORAGE
- LIMIT OF EXCAVATION (2018-2020)
- 6-1 CONFIRMATORY SOIL SAMPLE (T. HARRIS, 2018-2020)
- TEST HOLE WITH MONITOR
  BH/MW SERIES (T. HARRIS, 2018)
  BH22 SERIES (EXP, 2022)
- TEST HOLE
  BH1-2018 SERIES (T. HARRIS, 2018)
  BH1 SERIES (T. HARRIS, 2020)
  BH22 SERIES (EXP, 2022)
- TEST PIT
  TP1-TP6 (T. HARRIS, 2019)
  TP7, TP8 (T. HARRIS, 2020)
- CROSS SECTION LOCATION

CROSS SECTION PLAN

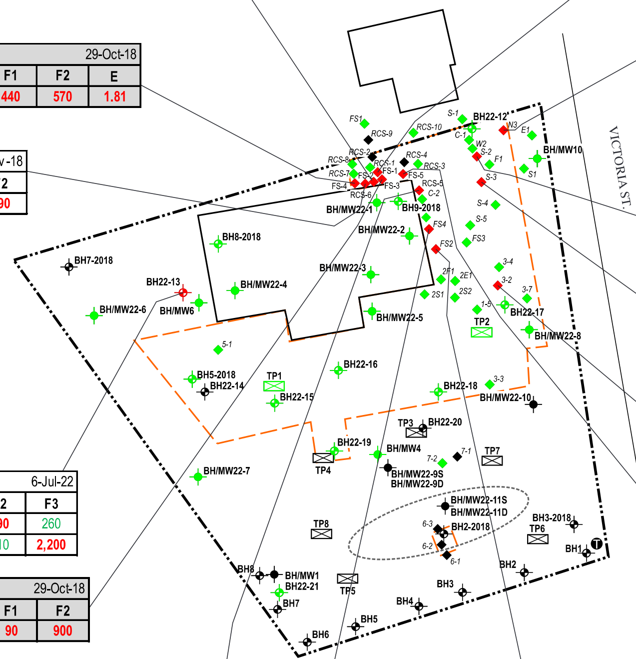
FIGURE 5

420 VICTORIA STREET,
SHELBURNE, ONTARIO

PROJECT NUMBER: 21020239 | DATE: JANUARY 2024

21020239-PH2 SITE PLAN-JAN24:SEC

Location	Sample ID	Depth (mbgs)	Date
BH/MW4	BHMW4-2	1.52 - 3.05	19-Nov-18
	BHMW4-3	3.05 - 4.57	19-Nov-18
BH5-2018	BH5-1	0.0 - 1.52	19-Nov-18
	BH5-2	1.52 - 3.05	19-Nov-18
	~BHMW12	1.52 - 3.05	19-Nov-18
BH/MW6	BHMW6-1	0.0 - 1.52	19-Nov-18
BH8-2018	BH8-1	0.0 - 1.52	19-Nov-18
BH9-2018	BH9-2	1.52 - 3.05	19-Nov-18
BH/MW10	BHMW10-3	3.05 - 4.57	19-Nov-18
TP1	TP 1-1	0.63	20-Dec-19
TP1	TP 1-2	0.35	20-Dec-19
TP2	TP 2-1	0.72	20-Dec-19
1-5	1-5	2.74	20-Feb-20
3-3	3-3	Unknown	27-Feb-20
3-4	3-4	Unknown	27-Feb-20
3-7	3-7	Unknown	27-Feb-20
5-1	5-1	Unknown	4-Mar-20
Unknown	2-32	Unknown	4-Mar-20
7-2	7-2	Unknown	5-Mar-20
RCS-1	RCS-1	2.0	30-Nov-18
RCS-3	RCS-3	2.4	30-Nov-18
RCS-7	RCS-7	1.8	30-Nov-18
RCS-8	RSCS-8	1.8	30-Nov-18
RCS-10	RCS-10	1.8	30-Nov-18
S-1	S-1	1.8	7-Dec-18
S-4	S-4	1.8	7-Dec-18
S-5	S-5	1.5	7-Dec-18
FS1	FS-1	1.8	11-Dec-18
FS3	FS-3	2.1	11-Dec-18
C-1	C-1	2.4	17-Dec-18
C-2	C-2	2.7	17-Dec-18
F1	F1	2.3	26-Mar-19
S1	S1	3.0	26-Mar-19
E1	E1	2.4	26-Mar-19
W2	W2	2.2	26-Mar-19
2S1	2S1	2.1	28-Mar-19
2S2	2S2	1.5	28-Mar-19
2E1	2E1	1.7	28-Mar-19
2F1	2F1	2.4	28-Mar-19
Unknown	2CF1	Unknown	28-Mar-19
BH22-1	BH22-1-SS3	1.52 - 2.13	5-Jul-22
	~BH22-1-SS33	1.52 - 2.13	5-Jul-22
BH22-2	BH22-2-SS3	1.52 - 2.13	5-Jul-22
BH22-3	BH22-3-SS3	1.52 - 2.13	5-Jul-22
BH22-4	BH22-4-SS3	1.52 - 2.13	5-Jul-22
BH22-5	BH22-5-SS2	0.76 - 1.37	7-Jul-22
BH22-6	BH22-6-SS2	0.76 - 1.37	6-Jul-22
BH22-7	BH22-7-SS2	0.76 - 1.37	6-Jul-22
BH22-8	BH22-8-SS3A	1.52 - 1.98	4-Jul-22
BH22-12	BH22-12-SS5	3.05 - 3.66	8-Jul-22
BH22-15	BH22-15-SS3B	1.6 - 2.13	7-Jul-22
BH22-16	BH22-16-SS4	2.29 - 2.90	7-Jul-22
BH22-17	BH22-17-SS4B	2.59 - 2.89	4-Jul-22
BH22-18	BH22-18-SS3	1.52 - 2.13	4-Jul-22
BH22-19	BH22-19-SS3	1.52 - 2.13	7-Jul-22
BH22-21	BH22-21-SS2	0.76 - 1.37	7-Jul-22
	~BH22-21-SS22	0.76 - 1.37	7-Jul-22



FS-1				29-Oct-18
Sample	Depth (mbgs)	F1	F2	F3
FS-1	1.52	**200**	**4,700**	**2,420**

FS-2			29-Oct-18
Sample	Depth (mbgs)	F1	E
FS-2	2.44	**490**	**5.49**

N3		26-Mar-19
Sample	Depth (mbgs)	F2
N3	1.80	**250**

FS-4				29-Oct-18
Sample	Depth (mbgs)	F1	F2	E
FS-4	1.52	**440**	**570**	**1.81**

RCS-6		30-Nov-18
Sample	Depth (mbgs)	F2
RCS-6	1.50	**490**

S-2			7-Dec-18
Sample	Depth (mbgs)	F1	F2
S-2	2.40	**260**	**480**

S-3		7-Dec-18
Sample	Depth (mbgs)	B
S-3	1.80	**0.5**

3-2		27-Feb-20
Sample	Depth (mbgs)	E
3-2	Unknown	**1.25**

BH22-13			6-Jul-22
Sample	Depth (mbgs)	F2	F3
BH22-13-SS1B	0.15 - 0.61	**290**	260
BH22-13-SS4	2.29 - 2.90	<10	**2,200**

FS-3			29-Oct-18
Sample	Depth (mbgs)	F1	F2
FS-3	1.52	**90**	**900**

FS-5						29-Oct-18
Sample	Depth (mbgs)	F1	F2	B	E
FS-5	1.52	**440**	**1,820**	**3.34**	**2.16**

RCS-5						30-Nov-18
Sample	Depth (mbgs)	F1	F2	B	E	X
RCS-5	1.5	**530**	**410**	**0.40**	**8.37**	**43.1**

FS2			11-Dec-18
Sample	Depth (mbgs)	F1	F2
FS-2	2.10	**420**	**950**

FS4		11-Dec-18
Sample	Depth (mbgs)	F2
FS-4	1.80	**470**

Parameter	Abbreviation	Table 2 Soil Standards*
PHC Fraction F1	F1	55
PHC Fraction F2	F2	230
PHC Fraction F3	F3	1,700
Benzene	B	0.32
Ethylbenzene	E	1.1
Xylenes	X	26

SCALE: 0 5 10m

SOURCE:

BASED ON FIELD MEASUREMENTS BY EXP STAFF

exp. DRAWN BY: K.G. CHECKED BY: A.F.

LEGEND:

- SITE BOUNDARY
- POLE-MOUNTED TRANSFORMER
- FORMER SALT STORAGE
- LIMIT OF EXCAVATION (2018-2020)
- 6-1 CONFIRMATORY SOIL SAMPLE (T. HARRIS, 2018-2020)
- TEST HOLE WITH MONITOR: BH/MW SERIES (T. HARRIS, 2018); BH22 SERIES (EXP, 2022)
- TEST HOLE: BH1-2018 SERIES (T. HARRIS, 2018); BH1 SERIES (T. HARRIS, 2020); BH22 SERIES (EXP, 2022)
- TEST PIT: TP1-TP6 (T. HARRIS, 2019); TP7, TP8 (T. HARRIS, 2020)

* STANDARDS APPLIED ARE FOR INDUSTRIAL/ COMMERCIAL/ COMMUNITY PROPERTY USE AND COARSE TEXTURED SOILS

~ - INDICATES FIELD DUPLICATE SAMPLE
mbgs - METRES BELOW GROUND SURFACE
ALL RESULTS IN UNITS OF µg/g UNLESS OTHERWISE NOTED
NA - NOT ANALYZED.

LOCATION WHERE SAMPLE IS WITHIN O.REG. 153/04 TABLE 2 STANDARDS FOR ALL PARAMETERS ANALYZED IS SHOWN IN GREEN
LOCATION WHERE SAMPLE EXCEEDS O.REG. 153/04 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN RED
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **RED BOLD**
CONCENTRATION OF CONTAMINANT WITHIN TABLE 2 STANDARD SHOWN IN TEXT AS GREEN

THE SAMPLES WITH EXCEEDANCES OF THE TABLE 2 STANDARD THAT WERE REMEDIATED VIA SOIL EXCAVATION (T. HARRIS, 2018-2020) ARE SHOWN IN GREY BOXES

BTEX - BENZENE, TOLUENE, ETHYLBENZENE, XYLENES

SOIL ANALYTICAL RESULTS - PETROLEUM HYDROCARBONS AND BTEX

FIGURE 6A

420 VICTORIA STREET, SHELBURNE, ONTARIO

PROJECT NUMBER: 21020239 DATE: JANUARY 2024

21020239-PH2 RESULTS-JAN24: SOIL-BTEX

BH/MW1														19-Nov-18
Sample	Depth (mbgs)	1,1,1,2-TeCA	1,1,2,2-TeCA	1,1,2-TCA	1,1-DCA	1,1-DCE	1,2-DCA	1,2-DCP	1,3-DCP	1,4-DCB	BM	CTC	CHL	EDB
BHMW1-1	0.0 - 1.52	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
BHMW1-3	3.05 - 4.57	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50

BH9-2018														19-Nov-18
Sample	Depth (mbgs)	1,1,1,2-TeCA	1,1,2,2-TeCA	1,1,2-TCA	1,1-DCA	1,1-DCE	1,2-DCA	1,2-DCP	1,3-DCP	1,4-DCB	BM	CTC	CHL	EDB
BH9-1	0.0 - 1.52	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50

Parameter	Abbreviation	Table 2 Soil Standards*
1,1,1,2-Tetrachloroethane	1,1,1,2-TeCA	0.087
1,1,2,2-Tetrachloroethane	1,1,2,2-TeCA	0.05
1,1,2-Trichloroethane	1,1,2-TCA	0.05
1,1-Dichloroethane	1,1-DCA	0.47
1,1-Dichloroethylene	1,1-DCE	0.064
1,2-Dichloroethane	1,2-DCA	0.05
1,2-Dichloropropane	1,2-DCP	0.16
1,3-Dichloropropene	1,3-DCP	0.059
1,4-Dichlorobenzene	1,4-DCB	0.2
Bromomethane	BM	0.05
Carbon Tetrachloride	CTC	0.21
Chloroform	CHL	0.47
Ethylene Dibromide	EDB	0.05

Location	Sample ID	Depth (mbgs)	Date
BH22-1	BH22-1-SS3	1.52 - 2.13	5-Jul-22
	~BH22-1-SS33	1.52 - 2.13	5-Jul-22
BH22-2	BH22-2-SS3	1.52 - 2.13	5-Jul-22
BH22-3	BH22-3-SS3	1.52 - 2.13	5-Jul-22
BH22-4	BH22-4-SS3	1.52 - 2.13	5-Jul-22
BH22-5	BH22-5-SS2	0.76 - 1.37	7-Jul-22

SCALE: 0 5 10m

SOURCE:

BASED ON FIELD MEASUREMENTS BY EXP STAFF

LEGEND:

- SITE BOUNDARY
- POLE-MOUNTED TRANSFORMER
- FORMER SALT STORAGE
- LIMIT OF EXCAVATION (2018-2020)
- 6-1 CONFIRMATORY SOIL SAMPLE (T. HARRIS, 2018-2020)
- TEST HOLE WITH MONITOR: BH/MW SERIES (T. HARRIS, 2018); BH22 SERIES (EXP, 2022)
- TEST HOLE: BH1-2018 SERIES (T. HARRIS, 2018); BH1 SERIES (T. HARRIS, 2020); BH22 SERIES (EXP, 2022)
- TEST PIT: TP1-TP6 (T. HARRIS, 2019); TP7, TP8 (T. HARRIS, 2020)

* STANDARDS APPLIED ARE FOR INDUSTRIAL/ COMMERCIAL/ COMMUNITY PROPERTY USE AND COARSE TEXTURED SOILS

DUP - INDICATES FIELD DUPLICATE SAMPLE
mbgs - METRES BELOW GROUND SURFACE
ALL RESULTS IN UNITS OF µg/g UNLESS OTHERWISE NOTED
NA - NOT ANALYZED.

LOCATION WHERE SAMPLE IS WITHIN O.REG. 153/04 TABLE 3 STANDARDS FOR ALL PARAMETERS ANALYZED IS SHOWN IN GREEN
LOCATION WHERE SAMPLE EXCEEDS O.REG. 153/04 TABLE 3 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN RED
LOCATION WHERE THE LABORATORY RDL FOR THE SOIL SAMPLE EXCEEDS O.REG. 153/02 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN ORANGE.
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 3 STANDARD SHOWN IN TEXT AS **RED BOLD**
CONCENTRATION OF CONTAMINANT WITHIN TABLE 3 STANDARD SHOWN IN TEXT AS GREEN
THE LABORATORY RDL EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **ORANGE BOLD**.
IT SHOULD BE NOTED THAT VOC FIGURES DO NOT INCLUDE LOCATIONS THAT WERE SAMPLED FOR ONLY BTEX. ONLY BTEX ANALYSIS IS INCLUDED IN PHC FIGURE.

exp.

DRAWN BY	CHECKED BY
K.G.	A.F.

SOIL ANALYTICAL RESULTS - VOLATILE ORGANIC COMPOUNDS

FIGURE 6B

420 VICTORIA STREET, SHELBURNE, ONTARIO

PROJECT NUMBER: 21020239 DATE: JANUARY 2024

21020239-PH2 RESULTS-JAN24: SOIL-VOC

Location	Sample ID	Depth (mbgs)	Date
BH2-2018	BH2-2	1.52 - 3.05	19-Nov-18
BH/MW4	BHMW4-1	0.0 - 1.52	19-Nov-18
BH5-2018	BH5-1	0.0 - 1.52	19-Nov-18
BH7-2018	BH7-1	0.0 - 1.52	19-Nov-18
BH22-1	BH22-1-SS1A	0.0 - 0.46	5-Jul-22
BH22-2	BH22-2-SS1B	0.27 - 0.61	5-Jul-22
BH22-3	BH22-3-SS2	0.76 - 1.37	5-Jul-22
BH22-4	BH22-4-SS2	0.76 - 1.37	5-Jul-22
BH22-6	BH22-6-SS1B	0.05 - 0.61	6-Jul-22
	~BH22-6-SS1BB	0.05 - 0.61	6-Jul-22
BH22-7	BH22-7-SS1B	0.03 - 0.61	6-Jul-22
BH22-10	BH22-10-SS2	0.76 - 1.37	4-Jul-22
BH22-13	BH22-13-SS2	0.76 - 1.37	6-Jul-22
	~BH22-13-SS22	0.76 - 1.37	6-Jul-22
BH22-14	BH22-14-SS1B	0.05 - 0.61	6-Jul-22
BH22-21	BH22-21-SS1B	0.05 - 0.61	7-Jul-22

SCALE:

0 5 10m

SOURCE:

BASED ON FIELD MEASUREMENTS BY EXP STAFF

exp.

DRAWN BY	CHECKED BY
K.G.	A.F.

LEGEND:

- SITE BOUNDARY
- POLE-MOUNTED TRANSFORMER
- FORMER SALT STORAGE
- LIMIT OF EXCAVATION (2018-2020)
- 6-1 CONFIRMATORY SOIL SAMPLE (T. HARRIS, 2018-2020)
- TEST HOLE WITH MONITOR: BH/MW SERIES (T. HARRIS, 2018); BH22 SERIES (EXP, 2022)
- TEST HOLE: BH1-2018 SERIES (T. HARRIS, 2018); BH1 SERIES (T. HARRIS, 2020); BH22 SERIES (EXP, 2022)
- TEST PIT: TP1-TP6 (T. HARRIS, 2019); TP7, TP8 (T. HARRIS, 2020)

* STANDARDS APPLIED ARE FOR INDUSTRIAL/ COMMERCIAL/ COMMUNITY PROPERTY USE AND COARSE TEXTURED SOILS

~ - INDICATES FIELD ~LICATE SAMPLE
mbgs - METRES BELOW GROUND SURFACE
ALL RESULTS IN UNITS OF µg/g UNLESS OTHERWISE NOTED
NA - NOT ANALYZED.

LOCATION WHERE SAMPLE IS WITHIN O.REG. 153/04 TABLE 2 STANDARDS FOR ALL PARAMETERS ANALYZED IS SHOWN IN GREEN
LOCATION WHERE SAMPLE EXCEEDS O.REG. 153/04 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN RED
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **RED BOLD**
CONCENTRATION OF CONTAMINANT WITHIN TABLE 2 STANDARD SHOWN IN TEXT AS GREEN

SOIL ANALYTICAL RESULTS - POLYCYCLIC AROMATIC HYDROCARBONS

FIGURE

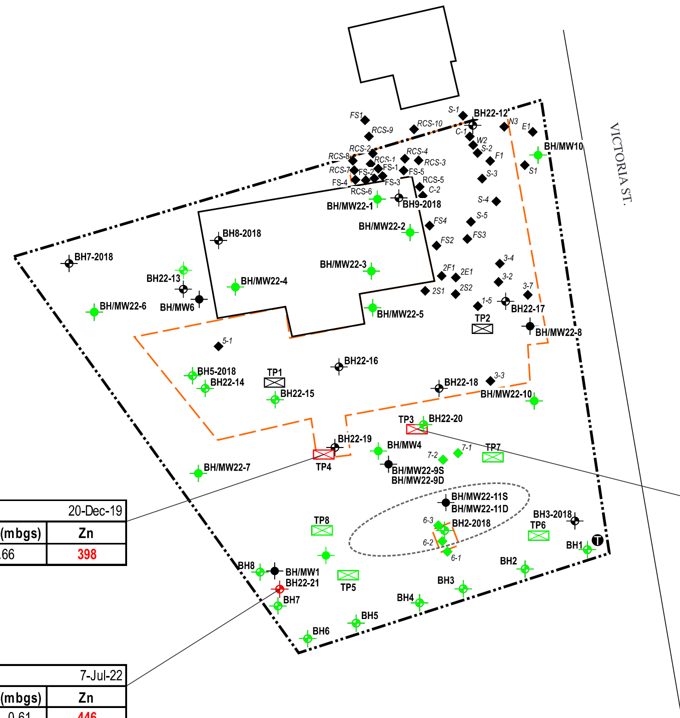
6C

420 VICTORIA STREET,
SHELBURNE, ONTARIO

PROJECT NUMBER: 21020239 DATE: JANUARY 2024

21020239-PH2 RESULTS-JAN24: SOIL-PAH

Location	Sample ID	Depth (mbgs)	Date
BH2-2018	BH2-1	0.0 - 1.52	19-Nov-18
BH/MW4	BHMW4-1	0.0 - 1.52	19-Nov-18
BH5-2018	BH5-2	1.52 - 3.05	19-Nov-18
BH/MW10	BHMW10-1	0.0 - 1.52	19-Nov-18
BH1	BH1-2	1.52 - 3.05	23-Mar-20
BH2	BH2-2	1.52 - 3.05	23-Mar-20
BH3	BH3-2	1.52 - 3.05	23-Mar-20
BH4	BH4-2	1.52 - 3.05	23-Mar-20
BH5	BH5-2	1.52 - 3.05	23-Mar-20
BH6	BH6-2	1.52 - 3.05	23-Mar-20
BH7	BH7-2	1.52 - 3.05	23-Mar-20
BH8	BH8-2	1.52 - 3.05	23-Mar-20
TP5	TP 5-1	0.62	20-Dec-19
TP6	TP 6-1	0.58	20-Dec-19
TP7	TP 7	0.72	20-Feb-20
TP8	TP 8	0.72	20-Feb-20
6-1	6-1	Unknown	5-Mar-20
6-2	6-2	1.5	5-Mar-20
6-3	6-3	Unknown	5-Mar-20
7-1	7-1	Unknown	5-Mar-20
7-2	7-2	Unknown	5-Mar-20
Unknown	2CF1	Unknown	28-Mar-19
BH22-1	BH22-1-SS1B	0.46 - 0.61	5-Jul-22
BH22-2	BH22-2-SS1B	0.27 - 0.61	5-Jul-22
BH22-3	BH22-3-SS2	0.76 - 1.37	5-Jul-22
BH22-4	BH22-4-SS2	0.76 - 1.37	5-Jul-22
BH22-5	BH22-5-SS2	0.76 - 1.37	7-Jul-22
BH22-6	BH22-6-SS1B	0.05 - 0.61	6-Jul-22
BH22-6	~BH22-6-SS1BB	0.05 - 0.61	6-Jul-22
BH22-7	BH22-7-SS2	0.76 - 1.37	6-Jul-22
BH22-10	BH22-10-SS2	0.76 - 1.37	4-Jul-22
BH22-13	BH22-13-SS2	0.76 - 1.37	6-Jul-22
BH22-14	BH22-14-SS2B	0.81 - 1.37	6-Jul-22
BH22-15	BH22-15-SS1	0.0 - 0.61	7-Jul-22
	~BH22-15-SS11	0.0 - 0.61	7-Jul-22
BH22-20	BH22-20-SS4	2.29 - 2.90	7-Jul-22



TP4		20-Dec-19
Sample	**Depth (mbgs)**	**Zn**
TP4-1	0.66	**398**

TP3		20-Dec-19
Sample	**Depth (mbgs)**	**Zn**
TP3-1	0.63	**676**

BH22-21		7-Jul-22
Sample	**Depth (mbgs)**	**Zn**
BH22-21-SS1B	0.05 - 0.61	**446**
BH22-21-SS4	2.29 - 2.90	31

Parameter	Abbreviation	Table 2 Soil Standards*
Zinc	Zn	340

SCALE: 0 5 10m

SOURCE:

BASED ON FIELD MEASUREMENTS BY EXP STAFF

exp.

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K.G.	A.F.

LEGEND:

- SITE BOUNDARY
- POLE-MOUNTED TRANSFORMER
- FORMER SALT STORAGE
- LIMIT OF EXCAVATION (2018-2020)
- 6-1 CONFIRMATORY SOIL SAMPLE (T. HARRIS, 2018-2020)
- TEST HOLE WITH MONITOR: BH/MW SERIES (T. HARRIS, 2018); BH22 SERIES (EXP, 2022)
- TEST HOLE: BH1-2018 SERIES (T. HARRIS, 2018); BH1 SERIES (T. HARRIS, 2020); BH22 SERIES (EXP, 2022)
- TEST PIT: TP1-TP6 (T. HARRIS, 2019); TP7, TP8 (T. HARRIS, 2020)

As = ARSENIC,
Sb = ANTIMONY,
Se = SELENIUM

* STANDARDS APPLIED ARE FOR INDUSTRIAL/ COMMERCIAL/ COMMUNITY PROPERTY USE AND COARSE TEXTURED SOILS

~ INDICATES FIELD DUPLICATE SAMPLE
mbgs - METRES BELOW GROUND SURFACE
ALL RESULTS IN UNITS OF µg/g UNLESS OTHERWISE NOTED
NA - NOT ANALYZED.

LOCATION WHERE SAMPLE IS WITHIN O.REG. 153/04 TABLE 2 STANDARDS FOR ALL PARAMETERS ANALYZED IS SHOWN IN GREEN
LOCATION WHERE SAMPLE EXCEEDS O.REG. 153/04 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN RED
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **RED BOLD**
CONCENTRATION OF CONTAMINANT WITHIN TABLE 2 STANDARD SHOWN IN TEXT AS GREEN

SOIL ANALYTICAL RESULTS – METALS (INCLUDING As, Sb, Se)

FIGURE 6D

420 VICTORIA STREET, SHELBURNE, ONTARIO

PROJECT NUMBER: 21020239 | DATE: JANUARY 2024

21020239-PH2 RESULTS-JAN24: SOIL-MET

BH22-9D			7-Jul-22
Sample	Depth (mbgs)	EC	SAR
BH22-9D-SS3	6.1 - 6.71	**7.09**	**30.4**
BH22-9D-SS5	9.14 - 9.75	1.39	2.67

BH22-1		5-Jul-22
Sample	Depth (mbgs)	EC
BH22-1-SS1B	0.46 - 0.61	**4.61**
BH22-1-SS5	3.05 - 3.66	0.491

TP1			20-Dec-19
Sample	Depth (mbgs)	EC	SAR
TP1-2	0.35	**2.58**	**37.4**

BH/MW4			19-Nov-18
Sample	Depth (mbgs)	EC	SAR
BHMW4-1	0.0 - 1.52	**1.94**	**30.8**

TP3			20-Dec-19
Sample	Depth (mbgs)	EC	SAR
TP3-1	0.63	**1.84**	**23.7**

BH5-2018		19-Nov-18
Sample	Depth (mbgs)	SAR
BH5-2	1.52 - 3.05	**15.0**

7-2			5-Mar-20
Sample	Depth (mbgs)	EC	SAR
7-2	Unknown	**9.20**	**168**

7-1			5-Mar-20
Sample	Depth (mbgs)	EC	SAR
7-1	Unknown	**5.17**	**51.5**

TP4			20-Dec-19
Sample	Depth (mbgs)	EC	SAR
TP4-1	0.66	**12.0**	**184**

BH22-10			4-Jul-22
Sample	Depth (mbgs)	EC	SAR
BH22-10-SS2	0.76 - 1.37	1.07	15
BH22-10-SS6	3.81 - 4.42	**17.8**	**129**

BH22-11D			8-Jul-22
Sample	Depth (mbgs)	EC	SAR
BH22-11D-SS3	6.1 - 6.71	**5.72**	**30.7**
BH22-11D-SS5	9.14 - 9.75	**2.68**	5.78

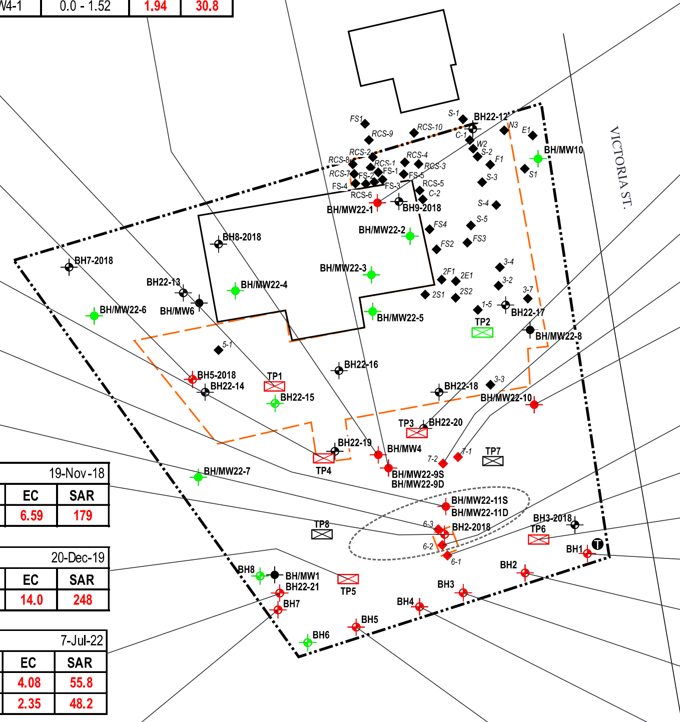
6-2			5-Mar-20
Sample	Depth (mbgs)	EC	SAR
6-2	1.50	**7.86**	**161**

6-3			5-Mar-20
Sample	Depth (mbgs)	EC	SAR
6-3	Unknown	**5.63**	**151**

6-1			5-Mar-20
Sample	Depth (mbgs)	EC	SAR
6-1	Unknown	**3.51**	**43.8**

BH2-2018			19-Nov-18
Sample	Depth (mbgs)	EC	SAR
BH2-1	0.0 - 1.52	**6.59**	**179**

TP6			20-Dec-19
Sample	Depth (mbgs)	EC	SAR
TP6-1	0.58	**4.52**	**77.6**



Location	Sample ID	Depth (mbgs)	Date
BH/MW10	BHMW10-1	0.0 - 1.52	19-Nov-18
TP2	TP2-1	0.72	20-Dec-19
BH6	BH6-2	1.52 - 3.05	23-Mar-20
BH8	BH8-2	1.52 - 3.05	23-Mar-20
Unknown	2CF1	Unknown	28-Mar-19
BH22-2	BH22-2-SS1B	0.27 - 0.61	5-Jul-22
BH22-3	BH22-3-SS2	0.76 - 1.37	5-Jul-22
BH22-4	BH22-4-SS2	0.76 - 1.37	5-Jul-22
	BH22-4-SS5	3.05 - 3.66	5-Jul-22
	BH22-4-SS6	3.81 - 4.42	6-Jul-22
BH22-5	BH22-5-SS2	0.76 - 1.37	7-Jul-22
BH22-6	BH22-6-SS1B	0.05 - 0.61	6-Jul-22
	~BH22-6-SS1BB	0.05 - 0.61	6-Jul-22
BH22-7	BH22-7-SS2	0.76 - 1.37	6-Jul-22
BH22-15	BH22-15-SS11	0.0 - 0.61	7-Jul-22
	~BH22-15-SS11	0.0 - 0.61	7-Jul-22

TP5			20-Dec-19
Sample	Depth (mbgs)	EC	SAR
TP5-1	0.62	**14.0**	**248**

BH1			23-Mar-20
Sample	Depth (mbgs)	EC	SAR
BH1-2	1.52 - 3.05	**2.51**	**71.4**

BH22-21			7-Jul-22
Sample	Depth (mbgs)	EC	SAR
BH22-21-SS1B	0.05 - 0.61	**4.08**	**55.8**
BH22-21-SS4	2.29 - 2.90	**2.35**	**48.2**

BH2			23-Mar-20
Sample	Depth (mbgs)	EC	SAR
BH2-2	1.52 - 3.05	**5.04**	**141**

BH3			23-Mar-20
Sample	Depth (mbgs)	EC	SAR
BH3-2	1.52 - 3.05	**3.77**	**102**

BH7			23-Mar-20
Sample	Depth (mbgs)	EC	SAR
BH7-2	1.52 - 3.05	**2.02**	**48.4**

BH5			23-Mar-20
Sample	Depth (mbgs)	EC	SAR
BH5-2	1.52 - 3.05	**3.18**	**88.1**

BH4			23-Mar-20
Sample	Depth (mbgs)	EC	SAR
BH4-2	1.52 - 3.05	**4.88**	**134**

Parameter	Abbreviation	Table 2 Soil Standards*
Electrical Conductivity	EC	1.4 mS/cm
Sodium Adsorption Ratio	SAR	12

SCALE:
0 5 10m

SOURCE:
BASED ON FIELD MEASUREMENTS BY EXP STAFF

LEGEND:
- SITE BOUNDARY
- POLE-MOUNTED TRANSFORMER
- FORMER SALT STORAGE
- LIMIT OF EXCAVATION (2018-2020)
- 6-1 CONFIRMATORY SOIL SAMPLE (T. HARRIS, 2018-2020)
- TEST HOLE WITH MONITOR: BH/MW SERIES (T. HARRIS, 2018); BH22 SERIES (EXP, 2022)
- TEST HOLE: BH1-2018 SERIES (T. HARRIS, 2018); BH1 SERIES (T. HARRIS, 2020); BH22 SERIES (EXP, 2022)
- TEST PIT: TP1-TP6 (T. HARRIS, 2019); TP7, TP8 (T. HARRIS, 2020)

EC – ELECTRICAL CONDUCTIVITY
SAR – SODIUM ADSORPTION RATIO

* STANDARDS APPLIED ARE FOR INDUSTRIAL/ COMMERCIAL/ COMMUNITY PROPERTY USE AND COARSE TEXTURED SOILS
~ - INDICATES FIELD DUPLICATE SAMPLE
mbgs - METRES BELOW GROUND SURFACE
EC IN UNITS OF mS/cm; SAR IS UNITLESS.
NA - NOT ANALYZED.

LOCATION WHERE SAMPLE IS WITHIN O.REG. 153/04 TABLE 2 STANDARDS FOR ALL PARAMETERS ANALYZED IS SHOWN IN GREEN
LOCATION WHERE SAMPLE EXCEEDS O.REG. 153/04 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN RED
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **RED BOLD**
CONCENTRATION OF CONTAMINANT WITHIN TABLE 2 STANDARD SHOWN IN TEXT AS GREEN
LOCATION WHERE SAMPLE MEET O.REG. 153/04 TABLE 2
CONCENTRATION OF CONTAMINANT MEET O.REG. 153/04 TABLE 2

SOIL ANALYTICAL RESULTS – EC AND SAR

FIGURE 6E

420 VICTORIA STREET, SHELBURNE, ONTARIO

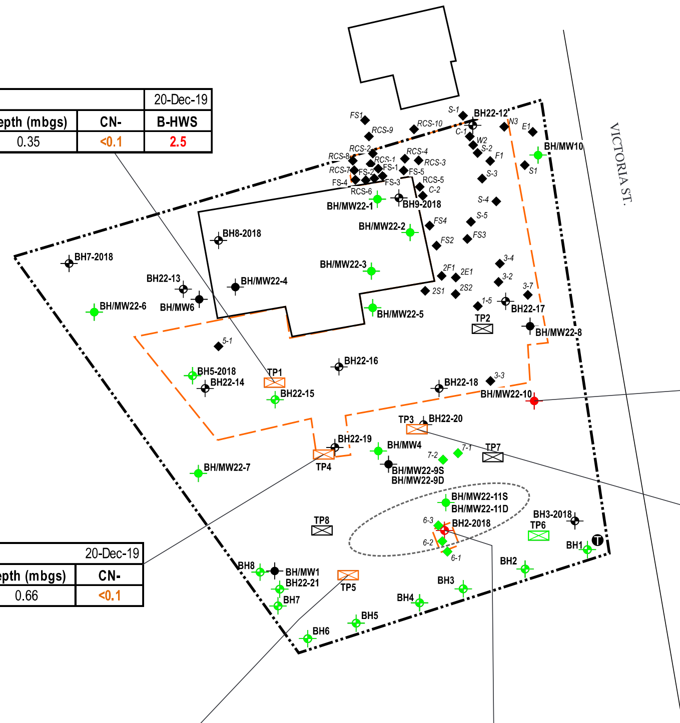
PROJECT NUMBER: 21020239 DATE: JANUARY 2024

exp.

DRAWN BY	CHECKED BY
K.G.	A.F.

21020239-PH2 RESULTS-JAN24: SOIL-EC&SAR

Location	Sample ID	Depth (mbgs)	Date
BH/MW4	BH/MW4-1	0.0 - 1.52	19-Nov-18
BH5-2018	BH5-2	1.52 - 3.05	19-Nov-18
BH/MW10	BHMW10-1	0.0 - 1.52	19-Nov-18
BH1	BH1-2	1.52 - 3.05	23-Mar-20
BH2	BH2-2	1.52 - 3.05	23-Mar-20
BH3	BH3-2	1.52 - 3.05	23-Mar-20
BH4	BH4-2	1.52 - 3.05	23-Mar-20
BH5	BH5-2	1.52 - 3.05	23-Mar-20
BH6	BH6-2	1.52 - 3.05	23-Mar-20
BH7	BH7-2	1.52 - 3.05	23-Mar-20
BH8	BH8-2	1.52 - 3.05	23-Mar-20
TP6	TP6-1	0.58	20-Dec-19
6-1	6-1	Unknown	5-Mar-20
6-2	6-2	1.5	5-Mar-20
6-3	6-3	Unknown	5-Mar-20
7-1	7-1	Unknown	5-Mar-20
7-2	7-2	Unknown	5-Mar-20
Unknown	2CF1	Unknown	28-Mar-19
BH22-1	BH22-1-SS1B	0.46 - 0.61	5-Jul-22
	BH22-1-SS5	3.05 - 3.66	5-Jul-22
BH22-2	BH22-2-SS1B	0.27 - 0.61	5-Jul-22
BH22-3	BH22-3-SS2	0.76 - 1.37	5-Jul-22
BH22-5	BH22-5-SS2	0.76 - 1.37	7-Jul-22
BH22-6	BH22-6-SS1B	0.05 - 0.61	6-Jul-22
	~BH22-6-SS1BB	0.05 - 0.61	6-Jul-22
BH22-7	BH22-7-SS2	0.76 - 1.37	6-Jul-22
BH22-11D	BH22-11D-SS3	6.1 - 6.71	8-Jul-22
BH22-15	BH22-15-SS1	0.0 - 0.61	7-Jul-22
	~BH22-15-SS11	0.0 - 0.61	7-Jul-22
BH22-21	BH22-21-SS1B	0.05 - 0.61	7-Jul-22



TP1			20-Dec-19
Sample	Depth (mbgs)	CN-	B-HWS
TP1-2	0.35	<0.1	**2.5**

BH22-10			4-Jul-22
Sample	Depth (mbgs)	B-HWS	
BH22-10-SS2	0.76 - 1.37	**2.62**	
BH22-10-SS6	3.81 - 4.42	0.1	

TP3		20-Dec-19
Sample	Depth (mbgs)	CN-
TP3-1	0.63	<0.1

TP4		20-Dec-19
Sample	Depth (mbgs)	CN-
TP4-1	0.66	<0.1

TP5		20-Dec-19
Sample	Depth (mbgs)	CN-
TP5-1	0.62	<0.2

BH2-2018		19-Nov-18
Sample	Depth (mbgs)	CN-
BH2-1	0.0 - 1.52	**0.07**

Parameter	Abbreviation	Table 2 Soil Standards*
Hot water-soluble Boron	B-HWS	2 µg/g
Cyanide	CN-	0.051 µg/g

SCALE: 0 5 10m

SOURCE:

BASED ON FIELD MEASUREMENTS BY EXP STAFF

LEGEND:

- SITE BOUNDARY
- POLE-MOUNTED TRANSFORMER
- FORMER SALT STORAGE
- LIMIT OF EXCAVATION (2018-2020)
- CONFIRMATORY SOIL SAMPLE (T. HARRIS, 2018-2020)
- TEST HOLE WITH MONITOR: BH/MW SERIES (T. HARRIS, 2018), BH22 SERIES (EXP, 2022)
- TEST HOLE: BH1-2018 SERIES (T. HARRIS, 2018), BH1 SERIES (T. HARRIS, 2020), BH22 SERIES (EXP, 2022)
- TEST PIT: TP1-TP6 (T. HARRIS, 2019), TP7, TP8 (T. HARRIS, 2020)

HWS-B = HOT WATER SOLUBLE BORON,
CN- = CYANIDE,
Cr(VI) = HEXAVALENT CHROMIUM,
Hg = MERCURY

* STANDARDS APPLIED ARE FOR INDUSTRIAL/ COMMERCIAL/ COMMUNITY PROPERTY USE AND COARSE TEXTURED SOILS

~ - INDICATES FIELD DUPLICATE SAMPLE
mbgs - METRES BELOW GROUND SURFACE
EC IN UNITS OF mS/cm; SAR IS UNITLESS.
NA - NOT ANALYZED.

THE SAMPLES WITH EXCEEDANCES OF THE TABLE 2 STANDARD THAT WERE REMEDIATED VIA SOIL EXCAVATION (T. HARRIS, 2018-2020) ARE SHOWN IN GREY BOXES.

LOCATION WHERE SAMPLE IS WITHIN O.REG. 153/04 TABLE 2 STANDARDS FOR ALL PARAMETERS ANALYZED IS SHOWN IN GREEN
LOCATION WHERE SAMPLE EXCEEDS O.REG. 153/04 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN RED
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **RED BOLD**
CONCENTRATION OF CONTAMINANT WITHIN TABLE 2 STANDARD SHOWN IN TEXT AS GREEN
LOCATION WHERE SAMPLE MEET O.REG. 153/04 TABLE 2 LOCATION WHERE THE LABORATORY RDL FOR THE SOIL SAMPLE EXCEEDS O.REG. 153/02 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN ORANGE.
CONCENTRATION OF CONTAMINANT MEET O.REG. 153/04 TABLE 2 THE LABORATORY RDL EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **ORANGE BOLD**.

SOIL ANALYTICAL RESULTS – HWS-B, Hg, CN-, AND Cr(VI)

FIGURE 6F

420 VICTORIA STREET, SHELBURNE, ONTARIO

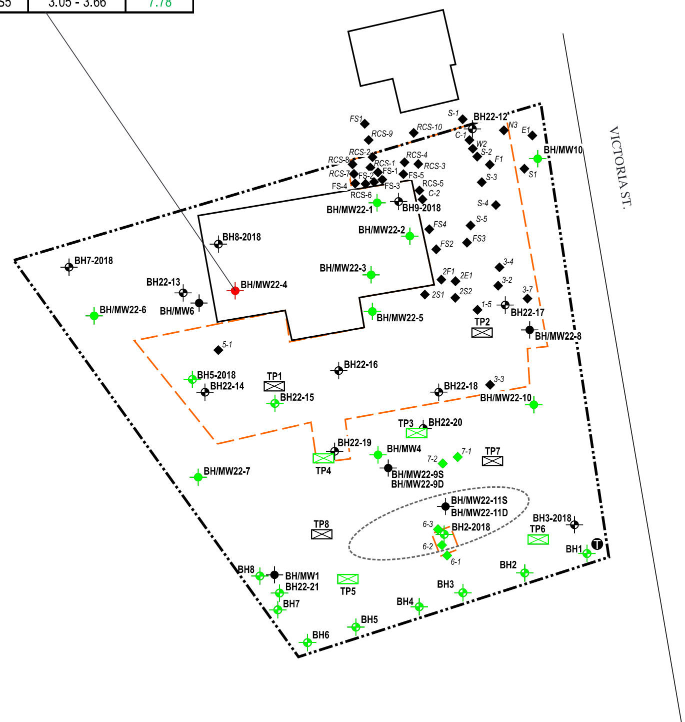
PROJECT NUMBER: 21020239 | DATE: JANUARY 2024

exp.

DRAWN BY	CHECKED BY
K.G.	A.F.

21020239-PH2 RESULTS-JAN24: SOIL-ORP

BH22-4		5-Jul-22
Sample	Depth (mbgs)	pH
BH22-4-SS2	0.76 - 1.37	**9.14**
BH22-4-SS5	3.05 - 3.66	7.78



Location	Sample ID	Depth (mbgs)	Date
BH2-2018	BH2-1	0.0 - 1.52	19-Nov-18
BH/MW4	BH/MW4-1	0.0 - 1.52	19-Nov-18
BH5-2018	BH5-2	1.52 - 3.05	19-Nov-18
BH/MW10	BHMW10-1	0.0 - 1.52	19-Nov-18
	BHMW10-2	1.52 - 3.05	19-Nov-18
BH1	BH1-2	1.52 - 3.05	23-Mar-20
BH2	BH2-2	1.52 - 3.05	23-Mar-20
BH3	BH3-2	1.52 - 3.05	23-Mar-20
BH4	BH4-2	1.52 - 3.05	23-Mar-20
BH5	BH5-2	1.52 - 3.05	23-Mar-20
BH6	BH6-2	1.52 - 3.05	23-Mar-20
BH7	BH7-2	1.52 - 3.05	23-Mar-20
BH8	BH8-2	1.52 - 3.05	23-Mar-20
TP3	TP3-1	0.63	20-Dec-19
TP4	TP4-1	0.66	20-Dec-19
TP5	TP5-1	0.62	20-Dec-19
TP6	TP6-1	0.58	20-Dec-19
6-1	6-1	Unknown	5-Mar-20
6-2	6-2	1.5	5-Mar-20
6-3	6-3	Unknown	5-Mar-20
7-1	7-1	Unknown	5-Mar-20
7-2	7-2	Unknown	5-Mar-20
Unknown	2CF1	Unknown	28-Mar-19
BH22-1	BH22-1-SS1B	0.46 - 0.61	5-Jul-22
BH22-2	BH22-2-SS1B	0.27 - 0.61	5-Jul-22
BH22-3	BH22-3-SS2	0.76 - 1.37	5-Jul-22
BH22-5	BH22-5-SS2	0.76 - 1.37	7-Jul-22
BH22-6	BH22-6-SS1B	0.05 - 0.61	6-Jul-22
	~BH22-6-SS1BB	0.05 - 0.61	6-Jul-22
BH22-7	BH22-7-SS2	0.76 - 1.37	6-Jul-22
BH22-10	BH22-10-SS2	0.76 - 1.37	4-Jul-22
BH22-15	BH22-15-SS1	0.0 - 0.61	7-Jul-22
	~BH22-15-SS11	0.0 - 0.61	7-Jul-22
BH22-21	BH22-21-SS1B	0.05 - 0.61	7-Jul-22

Parameter	Abbreviation	Table 2 Soil Standards*
pH	-	5.0 - 9.0 for surface soils (<1.5 m below soil surface) 5.0 - 11.0 for subsurface soils (>1.5 m below soil surface)

SCALE: 0 5 10m

SOURCE:

BASED ON FIELD MEASUREMENTS BY EXP STAFF

LEGEND:

- SITE BOUNDARY
- POLE-MOUNTED TRANSFORMER
- FORMER SALT STORAGE
- LIMIT OF EXCAVATION (2018-2020)
- CONFIRMATORY SOIL SAMPLE (T. HARRIS, 2018-2020)
- TEST HOLE WITH MONITOR: BH/MW SERIES (T. HARRIS, 2018); BH22 SERIES (EXP, 2022)
- TEST HOLE: BH1-2018 SERIES (T. HARRIS, 2018); BH1 SERIES (T. HARRIS, 2020); BH22 SERIES (EXP, 2022)
- TEST PIT: TP1-TP6 (T. HARRIS, 2019); TP7, TP8 (T. HARRIS, 2020)

* STANDARDS APPLIED ARE FOR INDUSTRIAL/ COMMERCIAL/ COMMUNITY PROPERTY USE AND COARSE TEXTURED SOILS

~ - INDICATES FIELD DUPLICATE SAMPLE
mbgs - METRES BELOW GROUND SURFACE
EC IN UNITS OF mS/cm; SAR IS UNITLESS.
NA - NOT ANALYZED.

LOCATION WHERE SAMPLE IS WITHIN O.REG. 153/04 TABLE 2 STANDARDS FOR ALL PARAMETERS ANALYZED IS SHOWN IN GREEN
LOCATION WHERE SAMPLE EXCEEDS O.REG. 153/04 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN RED
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **RED BOLD**
CONCENTRATION OF CONTAMINANT WITHIN TABLE 2 STANDARD SHOWN IN TEXT AS GREEN

exp.

DRAWN BY	CHECKED BY
K.G.	A.F.

SOIL ANALYTICAL RESULTS – pH

FIGURE 6G

420 VICTORIA STREET, SHELBURNE, ONTARIO

PROJECT NUMBER: 21020239 DATE: JANUARY 2024

21020239-PH2 RESULTS-JAN24: SOIL-pH

Location	Sample ID	Depth (mbgs)	Date
BH/MW1	BH/MW-1	0.0 - 1.52	19-Nov-18
BH/MW4	BH/MW4-2	1.52 - 3.05	19-Nov-18
BH7-2018	BH7-1	0.0 - 1.52	19-Nov-18
BH22-1	BH22-1-SS1B	0.46 - 0.61	5-Jul-22
BH22-2	BH22-2-SS1B	0.27 - 0.61	5-Jul-22
BH22-3	BH22-3-SS2	0.76 - 1.37	5-Jul-22
	~BH22-3-SS22	0.76 - 1.37	5-Jul-22
BH22-4	BH22-4-SS2	0.76 - 1.37	5-Jul-22

SCALE: 0 5 10m

SOURCE:

BASED ON FIELD MEASUREMENTS BY EXP STAFF

exp.

DRAWN BY	CHECKED BY
K.G.	A.F.

LEGEND:

- SITE BOUNDARY
- POLE-MOUNTED TRANSFORMER
- FORMER SALT STORAGE
- LIMIT OF EXCAVATION (2018-2020)
- CONFIRMATORY SOIL SAMPLE (T. HARRIS, 2018-2020)
- TEST HOLE WITH MONITOR BH/MW SERIES (T. HARRIS, 2018) BH22 SERIES (EXP, 2022)
- TEST HOLE BH1-2018 SERIES (T. HARRIS, 2018) BH1 SERIES (T. HARRIS, 2020) BH22 SERIES (EXP, 2022)
- TEST PIT TP1-TP6 (T. HARRIS, 2019) TP7, TP8 (T. HARRIS, 2020)

OCPs - ORGANOCHLORINE PESTICIDES

* STANDARDS APPLIED ARE FOR INDUSTRIAL/ COMMERCIAL/ COMMUNITY PROPERTY USE AND COARSE TEXTURED SOILS

~ - INDICATES FIELD DUPLICATE SAMPLE
mbgs - METRES BELOW GROUND SURFACE
EC IN UNITS OF mS/cm; SAR IS UNITLESS.
NA - NOT ANALYZED.

LOCATION WHERE SAMPLE IS WITHIN O.REG. 153/04 TABLE 2 STANDARDS FOR ALL PARAMETERS ANALYZED IS SHOWN IN GREEN
LOCATION WHERE SAMPLE EXCEEDS O.REG. 153/04 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN RED
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **RED BOLD**
CONCENTRATION OF CONTAMINANT WITHIN TABLE 2 STANDARD SHOWN IN TEXT AS GREEN

SOIL ANALYTICAL RESULTS – OCPs

FIGURE 6H

420 VICTORIA STREET, SHELBURNE, ONTARIO

PROJECT NUMBER: 21020239 | DATE: JANUARY 2024

21020239-PH2 RESULTS-JAN24: SOIL- OCP

Location	Sample ID	Depth (mbgs)	Date
BH3-2018	BH3-1	0.0 - 1.52	19-Nov-18

SCALE: 0 5 10m

SOURCE:

BASED ON FIELD MEASUREMENTS BY EXP STAFF

exp.

DRAWN BY	CHECKED BY
K.G.	A.F.

LEGEND:

- SITE BOUNDARY
- POLE-MOUNTED TRANSFORMER
- FORMER SALT STORAGE
- LIMIT OF EXCAVATION (2018-2020)
- 6-1 CONFIRMATORY SOIL SAMPLE (T. HARRIS, 2018-2020)
- TEST HOLE WITH MONITOR: BH/MW SERIES (T. HARRIS, 2018); BH22 SERIES (EXP, 2022)
- TEST HOLE: BH1-2018 SERIES (T. HARRIS, 2018); BH1 SERIES (T. HARRIS, 2020); BH22 SERIES (EXP, 2022)
- TEST PIT: TP1-TP6 (T. HARRIS, 2019); TP7, TP8 (T. HARRIS, 2020)

PCBs - POLYCHLORINATED BIPHENYLS

* STANDARDS APPLIED ARE FOR INDUSTRIAL/ COMMERCIAL/ COMMUNITY PROPERTY USE AND COARSE TEXTURED SOILS

~ - INDICATES FIELD DUPLICATE SAMPLE
mbgs - METRES BELOW GROUND SURFACE
EC IN UNITS OF mS/cm; SAR IS UNITLESS.
NA - NOT ANALYZED.

LOCATION WHERE SAMPLE IS WITHIN O.REG. 153/04 TABLE 2 STANDARDS FOR ALL PARAMETERS ANALYZED IS SHOWN IN GREEN
LOCATION WHERE SAMPLE EXCEEDS O.REG. 153/04 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN RED
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **RED BOLD**
CONCENTRATION OF CONTAMINANT WITHIN TABLE 2 STANDARD SHOWN IN TEXT AS GREEN

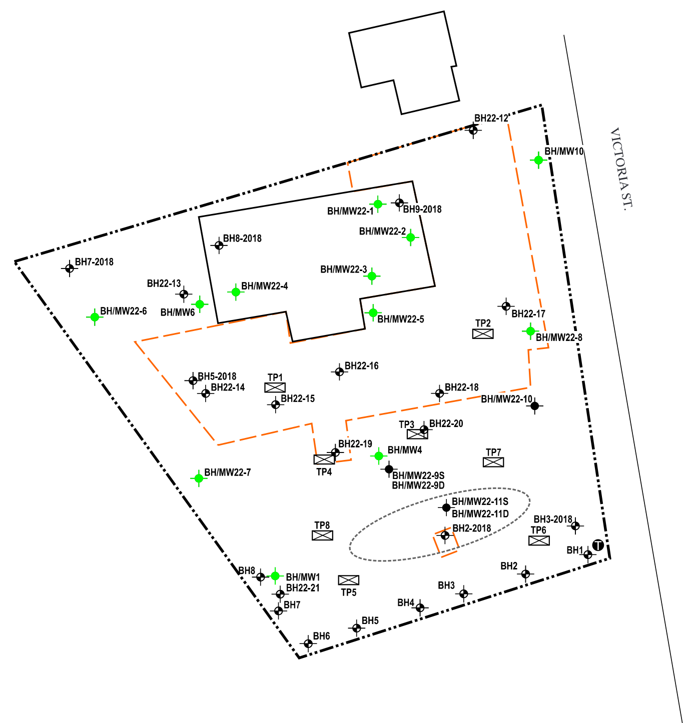
SOIL ANALYTICAL RESULTS – PCBs

FIGURE 6I

420 VICTORIA STREET, SHELBURNE, ONTARIO

PROJECT NUMBER: 21020239 | DATE: JANUARY 2024

21020239-PH2 RESULTS-JAN24: SOIL- PCB



N

Location	Sample ID	Screen Interval (mbgs)	Date
BH/MW1	BHMW1	3.05 - 6.10	23-Nov-18
BH/MW4	BHMW4	3.05 - 6.10	23-Nov-18
	BHMW4	3.05 - 6.10	17-Jun-20
BH/MW6	BHMW6	3.05 - 6.10	23-Nov-18
	BHMW6	3.05 - 6.10	17-Jun-20
BH/MW10	BHMW10	3.05 - 6.10	23-Nov-18
BH/MW22-1	BH22-1	1.22 - 4.27	20-Jul-22
BH/MW22-2	BH22-2	1.22 - 4.27	20-Jul-22
BH/MW22-3	BH22-3	1.22 - 4.27	20-Jul-22
	~BH22D-3	1.22 - 4.27	20-Jul-22
BH/MW22-4	BH22-4	1.22 - 4.27	20-Jul-22
BH/MW22-5	BH22-5	1.22 - 4.27	20-Jul-22
BH/MW22-6	BH22-6	1.22 - 4.27	20-Jul-22
BH/MW22-7	BH22-7	1.22 - 4.27	21-Jul-22
BH/MW22-8	BH22-8	1.52 - 4.57	21-Jul-22

SCALE:

0 5 10m

SOURCE:

BASED ON FIELD MEASUREMENTS BY EXP STAFF

exp.

DRAWN BY	CHECKED BY
K.G.	A.F.

LEGEND:

- SITE BOUNDARY
- POLE-MOUNTED TRANSFORMER
- FORMER SALT STORAGE
- LIMIT OF EXCAVATION (2018-2020)
- TEST HOLE WITH MONITOR
  BH/MW SERIES (T. HARRIS, 2018)
  BH22 SERIES (EXP, 2022)
- TEST HOLE
  BH1-2018 SERIES (T. HARRIS, 2018)
  BH1 SERIES (T. HARRIS, 2020)
  BH22 SERIES (EXP, 2022)
- TEST PIT
  TP1-TP6 (T. HARRIS, 2019)
  TP7, TP8 (T. HARRIS, 2020)

* STANDARDS APPLIED ARE FOR ALL PROPERTY USE AND COARSE TEXTURED SOILS

~ - INDICATES FIELD DUPLICATE SAMPLE
mbgs - METRES BELOW GROUND SURFACE
ALL RESULTS IN UNITS OF µg/L UNLESS OTHERWISE NOTED
NA - NOT ANALYZED.

LOCATION WHERE GROUND WATER SAMPLE IS WITHIN O.REG. 153/04 TABLE 2 STANDARDS FOR ALL PARAMETERS ANALYZED IS SHOWN IN GREEN
LOCATION WHERE GROUND WATR SAMPLE EXCEEDS O.REG. 153/04 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN RED
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **RED BOLD**
CONCENTRATION OF CONTAMINANT WITHIN TABLE 2 STANDARD SHOWN IN TEXT AS GREEN
BTEX - BENZENE, TOLUENE, ETHYLBENZENE, XYLENES

GROUND WATER ANALYTICAL RESULTS - PETROLEUM HYDROCARBONS AND BTEX

FIGURE 7A

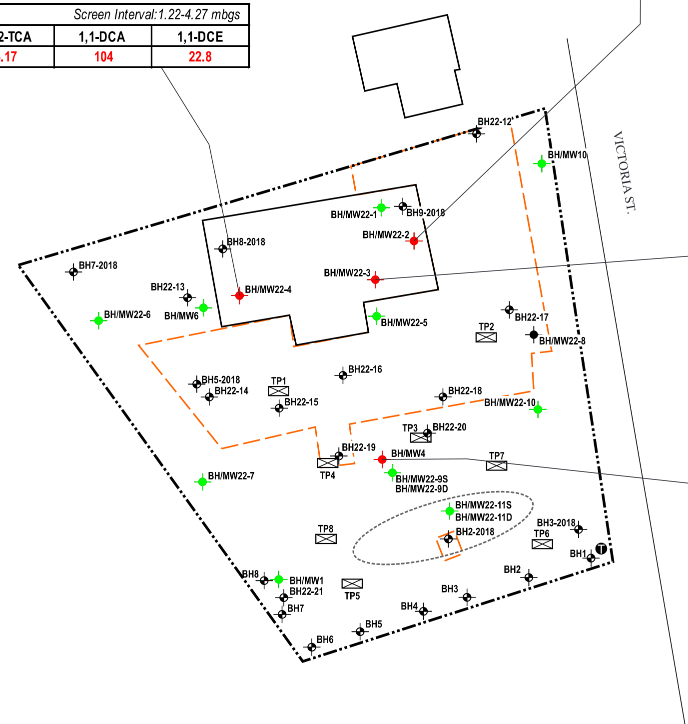
420 VICTORIA STREET, SHELBURNE, ONTARIO

PROJECT NUMBER: 21020239 DATE: JANUARY 2024

21020239-PH2 RESULTS-JAN24: GW-BTEX PRE

BH/MW22-2	*Screen Interval:1.22-4.27 mbgs*	
Date	1,1-DCA	1,1-DCE
20-Jul-22	**8.46**	**13.6**

BH/MW22-4		*Screen Interval:1.22-4.27 mbgs*	
Date	1,1,2-TCA	1,1-DCA	1,1-DCE
20-Jul-22	**5.17**	**104**	**22.8**



BH/MW22-3	*Screen Interval:1.22-4.27 mbgs*
Date	1,1-DCE
20-Jul-22	**3.66**
~20-Jul-22	**4.13**

BH/MW4	*Screen Interval:3.05-6.10 mbgs*
Date	1,1-DCA
23-Nov-18	0.5
17-Jun-20	**12.9**

Location	Sample ID	Screen Interval (mbgs)	Date
BH/MW1	BHMW1	3.05 - 6.10	23-Nov-18
BH/MW6	BHMW6	3.05 - 6.10	23-Nov-18
	BHMW6	3.05 - 6.10	17-Jun-20
BH/MW10	BHMW10	3.05 - 6.10	23-Nov-18
	~BHMW11D	3.05 - 6.10	23-Nov-18
BH/MW22-1	BH22-1	1.22 - 4.27	20-Jul-22
BH/MW22-5	BH22-5	1.22 - 4.27	20-Jul-22
BH/MW22-6	BH22-6	1.22 - 4.27	20-Jul-22
BH/MW22-7	BH22-7	1.22 - 4.27	21-Jul-22
BH/MW22-9S	BH22-9S	1.22 - 4.27	20-Jul-22
BH/MW22-9D	BH22-9D	8.23 - 9.75	20-Jul-22
BH/MW22-10	BH22-10	1.22 - 4.27	21-Jul-22
BH/MW22-11S	BH22-11S	1.22 - 4.27	21-Jul-22

Parameter	Abbreviation	Table 2 Ground Water Standards*
1,1,1-Trichloroethane	1,1,1-TCA	4.7
1,1-Dichloroethane	1,1-DCA	5
1,1-Dichloroethylene	1,1-DCE	2

SCALE:

0 5 10m

SOURCE:

BASED ON FIELD MEASUREMENTS BY EXP STAFF

LEGEND:

SITE BOUNDARY

POLE-MOUNTED TRANSFORMER

FORMER SALT STORAGE

LIMIT OF EXCAVATION (2018-2020)

TEST HOLE WITH MONITOR
BH/MW SERIES (T. HARRIS, 2018)
BH22 SERIES (EXP, 2022)

TEST HOLE
BH1-2018 SERIES (T. HARRIS, 2018)
BH1 SERIES (T. HARRIS, 2020)
BH22 SERIES (EXP, 2022)

TEST PIT
TP1-TP6 (T. HARRIS, 2019)
TP7, TP8 (T. HARRIS, 2020)

*STANDARDS APPLIED ARE FOR ALL PROPERTY USE AND COARSE TEXTURED SOILS

~ - INDICATES FIELD DUPLICATE SAMPLE
mbgs - METRES BELOW GROUND SURFACE
ALL RESULTS IN UNITS OF µg/L UNLESS OTHERWISE NOTED
NA - NOT ANALYZED.

LOCATION WHERE GROUND WATER SAMPLE IS WITHIN O.REG. 153/04 TABLE 2 STANDARDS FOR ALL PARAMETERS ANALYZED IS SHOWN IN GREEN
LOCATION WHERE GROUND WATR SAMPLE EXCEEDS O.REG. 153/04 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN RED
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **RED BOLD**
CONCENTRATION OF CONTAMINANT WITHIN TABLE 2 STANDARD SHOWN IN TEXT AS GREEN.

exp.

DRAWN BY	CHECKED BY
K.G.	A.F.

GROUND WATER ANALYTICAL RESULTS - VOLATILE ORGANIC COMPOUNDS

FIGURE 7B

420 VICTORIA STREET, SHELBURNE, ONTARIO

PROJECT NUMBER: 21020239 DATE: JANUARY 2024

21020239-PH2 RESULTS-JAN24: GW-VOC

Location	Sample ID	Screen Interval (mbgs)	Date
BH/MW1	BHMW1	3.05 -6.10	23-Nov-18
BH/MW4	BHMW4	3.05 -6.10	23-Nov-18
	BHMW4	3.05 -6.10	17-Jun-20
BH/MW6	BHMW6	3.05 -6.10	23-Nov-18
	BHMW6	3.05 -6.10	17-Jun-20
BH/MW22-1	BH22-1	1.22 - 4.27	20-Jul-22
BH/MW22-2	BH22-2	1.22 - 4.27	20-Jul-22
BH/MW22-3	BH22-3	1.22 - 4.27	20-Jul-22
BH/MW22-3	~BH22D-3	1.22 - 4.27	20-Jul-22
BH/MW22-4	BH22-4	1.22 - 4.27	20-Jul-22
BH/MW22-5	BH22-5	1.22 - 4.27	20-Jul-22
BH/MW22-6	BH22-6	1.22 - 4.27	20-Jul-22
BH/MW22-7	BH22-7	1.22 - 4.27	21-Jul-22

SCALE:

0 5 10m

SOURCE:

BASED ON FIELD MEASUREMENTS BY EXP STAFF

exp.

DRAWN BY	CHECKED BY
K.G.	A.F.

LEGEND:

- SITE BOUNDARY
- POLE-MOUNTED TRANSFORMER
- FORMER SALT STORAGE
- LIMIT OF EXCAVATION (2018-2020)
- TEST HOLE WITH MONITOR
  - BH/MW SERIES (T. HARRIS, 2018)
  - BH22 SERIES (EXP, 2022)
- TEST HOLE
  - BH1-2018 SERIES (T. HARRIS, 2018)
  - BH1 SERIES (T. HARRIS, 2020)
  - BH22 SERIES (EXP, 2022)
- TEST PIT
  - TP1-TP6 (T. HARRIS, 2019)
  - TP7, TP8 (T. HARRIS, 2020)

*STANDARDS APPLIED ARE FOR ALL PROPERTY USE AND COARSE TEXTURED SOILS

~ - INDICATES FIELD DUPLICATE SAMPLE
mbgs - METRES BELOW GROUND SURFACE
ALL RESULTS IN UNITS OF µg/L UNLESS OTHERWISE NOTED
NA - NOT ANALYZED.

LOCATION WHERE GROUND WATER SAMPLE IS WITHIN O.REG. 153/04 TABLE 2 STANDARDS FOR ALL PARAMETERS ANALYZED IS SHOWN IN GREEN
LOCATION WHERE GROUND WATR SAMPLE EXCEEDS O.REG. 153/04 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN RED
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **RED BOLD**
CONCENTRATION OF CONTAMINANT WITHIN TABLE 2 STANDARD SHOWN IN TEXT AS GREEN

GROUND WATER ANALYTICAL RESULTS – POLYCYCLIC AROMATIC HYDROCARBONS

FIGURE

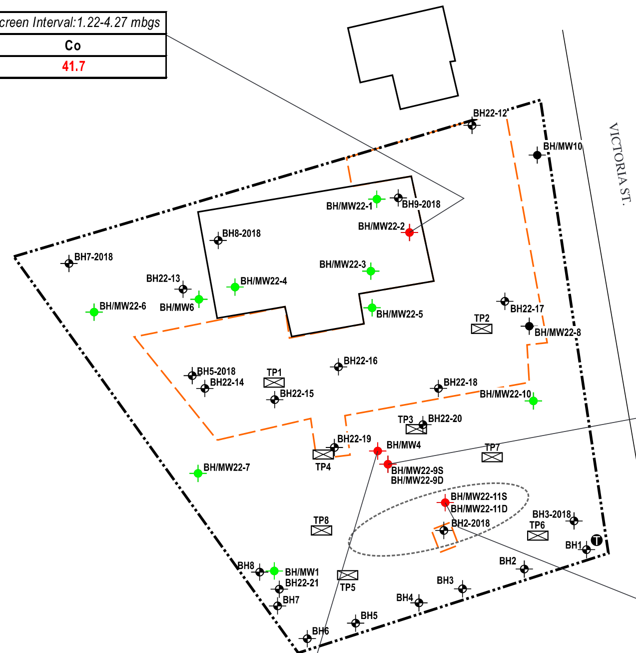
7C

420 VICTORIA STREET, SHELBURNE, ONTARIO

PROJECT NUMBER: 21020239 DATE: JANUARY 2024

21020239-PH2 RESULTS-JAN24:GW-PAH

BH/MW22-2	*Screen Interval:1.22-4.27 mbgs*
Date	**Co**
20-Jul-22	**41.7**



BH/MW22-9D	*Screen Interval:8.23 - 9.75 mbgs*
Date	**Ba**
20-Jul-22	**3,740**

BH/MW22-11S	*Screen Interval:1.22 - 4.27 mbgs*
Date	**Se**
21-Jul-22	**25.4**
~21-Jul-22	**11.6**

Location	Sample ID	Screen Interval (mbgs)	Date
BH/MW1	BHMW1	3.05 - 6.10	23-Nov-18
BH/MW6	BHMW6	3.05 - 6.10	17-Jun-20
BH/MW22-1	BH22-1	1.22 - 4.27	20-Jul-22
BH/MW22-3	BH22-3	1.22 - 4.27	20-Jul-22
	~BH22D-3	1.22 - 4.27	20-Jul-22
BH/MW22-4	BH22-4	1.22 - 4.27	20-Jul-22
BH/MW22-5	BH22-5	1.22 - 4.27	20-Jul-22
BH/MW22-6	BH22-6	1.22 - 4.27	20-Jul-22
BH/MW22-7	BH22-7	1.22 - 4.27	21-Jul-22
BH/MW22-9S	BH22-9S	8.23 - 9.75	20-Jul-22
BH/MW22-10	BH22-10	1.22 - 4.27	21-Jul-22

BH/MW4													*Screen Interval:3.05-6.10 mbgs*
Date	**Sb**	**As**	**Be**	**Cd**	**Co**	**Pb**	**Mo**	**Ni**	**Se**	**Ag**	**Tl**	**U**	**V**
23-Nov-18	<20	<50	<20	<5	<10	<50	<200	<200	<50	<5	<5	<50	<50
17-Jun-20	<10	<20	<5	<2	**4**	<10	<100	<50	<20	<2	<1	<10	<10

Parameter	Abbreviation	Table 2 Ground Water Standards*
Antimony	Sb	6
Arsenic	As	25
Barium	Ba	1000
Beryllium	Be	4
Cadmium	Cd	2.7
Cobalt	Co	3.8
Lead	Pb	10
Molybdenum	Mo	70
Nickel	Ni	100
Selenium	Se	10
Silver	Ag	1.5
Thallium	Tl	2
Uranium	U	20
Vanadium	V	6.2

SCALE: 0 5 10m

SOURCE:

BASED ON FIELD MEASUREMENTS BY EXP STAFF

LEGEND:

- SITE BOUNDARY
- POLE-MOUNTED TRANSFORMER
- FORMER SALT STORAGE
- LIMIT OF EXCAVATION (2018-2020)
- TEST HOLE WITH MONITOR: BH/MW SERIES (T. HARRIS, 2018); BH22 SERIES (EXP, 2022)
- TEST HOLE: BH1-2018 SERIES (T. HARRIS, 2018); BH1 SERIES (T. HARRIS, 2020); BH22 SERIES (EXP, 2022)
- TEST PIT: TP1-TP6 (T. HARRIS, 2019); TP7, TP8 (T. HARRIS, 2020)

As = ARSENIC,
Sb = ANTIMONY,
Se = SELENIUM

*STANDARDS APPLIED ARE FOR ALL PROPERTY USE AND COARSE TEXTURED SOILS

~ - INDICATES FIELD DUPLICATE SAMPLE
mbgs - METRES BELOW GROUND SURFACE
ALL RESULTS IN UNITS OF µg/L UNLESS OTHERWISE NOTED
NA - NOT ANALYZED.

LOCATION WHERE GROUND WATER SAMPLE IS WITHIN O.REG. 153/04 TABLE 2 STANDARDS FOR ALL PARAMETERS ANALYZED IS SHOWN IN GREEN
LOCATION WHERE GROUND WATR SAMPLE EXCEEDS O.REG. 153/04 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN RED
LOCATION WHERE THE LABORATORY RDL FOR THE SOIL SAMPLE EXCEEDS O.REG. 153/02 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN ORANGE.
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **RED BOLD**
CONCENTRATION OF CONTAMINANT WITHIN TABLE 2 STANDARD SHOWN IN TEXT AS GREEN
THE LABORATORY RDL EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **ORANGE BOLD**.

exp.

DRAWN BY	CHECKED BY
K.G.	A.F.

GROUND WATER ANALYTICAL RESULTS – METALS (INCLUDING HYDRIDE-FORMING METALS)

FIGURE 7D

420 VICTORIA STREET, SHELBURNE, ONTARIO

PROJECT NUMBER: 21020239 DATE: JANUARY 2024

21020239-PH2 RESULTS-JAN24: GW-MET

N

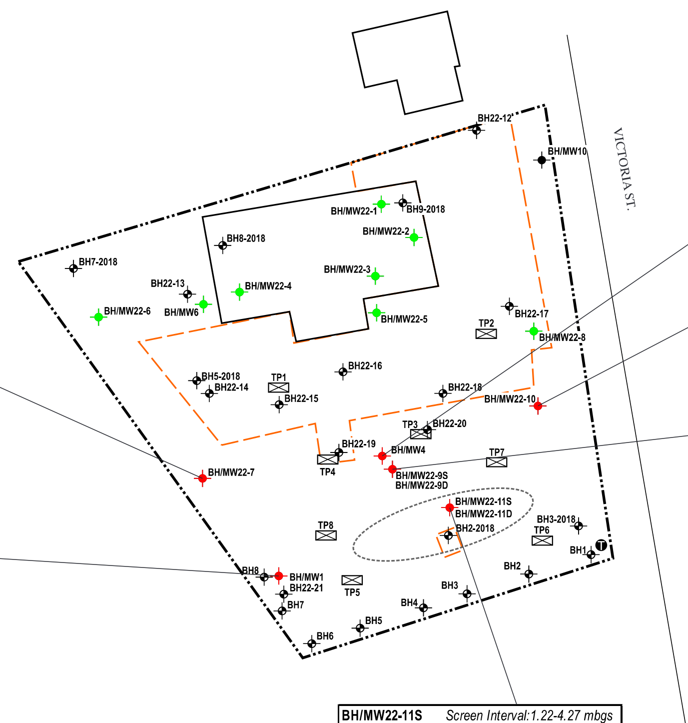
BH/MW4	Screen Interval:3.05-6.10 mbgs	
Date	Na	Cl
23-Nov-18	**24,000,000**	**26,900,000**
17-Jun-20	**13,300,000**	**19,200,000**

BH/MW22-10	Screen Interval:1.22-4.27 mbgs	
Date	Na	Cl
21-Jul-22	**968,000**	**1,210,000**

BH/MW22-9S	Screen Interval:1.22-4.27 mbgs	
Date	Na	Cl
20-Jul-22	**2,640,000**	**3,860,000**
BH/MW22-9D	Screen Interval:8.23-9.75 mbgs	
Date	Na	Cl
20-Jul-22	**6,860,000**	**17,500,000**

BH/MW22-7	Screen Interval:1.22 - 4.27 mbgs
Date	Na
21-Jul-22	**556,000**

BH/MW1	Screen Interval:3.05-6.10 mbgs
Date	Cl
23-Nov-18	**977,000**



BH/MW22-11S	Screen Interval:1.22-4.27 mbgs	
Date	Na	Cl
21-Jul-22	**31,900,000**	**44,100,000**
BH/MW22-11D	Screen Interval:8.23-9.75 mbgs	
Date	Na	Cl
21-Jul-22	**40,300,000**	**56,500,000**

Location	Sample ID	Screen Interval (mbgs)	Date
BH/MW6	BHMW6	3.05 - 6.10	17-Jun-20
BH/MW22-1	BH22-1	1.22 - 4.27	20-Jul-22
BH/MW22-2	BH22-2	1.22 - 4.27	20-Jul-22
BH/MW22-3	BH22-3	1.22 - 4.27	20-Jul-22
	~BH22D-3	1.22 - 4.27	20-Jul-22
BH/MW22-4	BH22-4	1.22 - 4.27	20-Jul-22
BH/MW22-5	BH22-5	1.22 - 4.27	20-Jul-22
BH/MW22-6	BH22-6	1.22 - 4.27	20-Jul-22
BH/MW22-8	BH22-8	1.52 - 4.57	21-Jul-22

Parameter	Abbreviation	Table 2 Ground Water Standards*
Sodium	Na	490,000
Chloride	Cl	790,000

SCALE: 0 5 10m

SOURCE:

BASED ON FIELD MEASUREMENTS BY EXP STAFF

exp.

DRAWN BY	CHECKED BY
K.G.	A.F.

LEGEND:

- SITE BOUNDARY
- POLE-MOUNTED TRANSFORMER
- FORMER SALT STORAGE
- LIMIT OF EXCAVATION (2018-2020)
- TEST HOLE WITH MONITOR
  BH/MW SERIES (T. HARRIS, 2018)
  BH22 SERIES (EXP, 2022)
- TEST HOLE
  BH1-2018 SERIES (T. HARRIS, 2018)
  BH1 SERIES (T. HARRIS, 2020)
  BH22 SERIES (EXP, 2022)
- TEST PIT
  TP1-TP6 (T. HARRIS, 2019)
  TP7, TP8 (T. HARRIS, 2020)

NA = SODIUM,
CL = CHLORIDE

* STANDARDS APPLIED ARE FOR ALL PROPERTY USE AND COARSE TEXTURED SOILS

~ - INDICATES FIELD DUPLICATE SAMPLE
mbgs - METRES BELOW GROUND SURFACE
ALL RESULTS IN UNITS OF µg/L UNLESS OTHERWISE NOTED
NA - NOT ANALYZED.

LOCATION WHERE GROUND WATER SAMPLE IS WITHIN O.REG. 153/04 TABLE 2 STANDARDS FOR ALL PARAMETERS ANALYZED IS SHOWN IN GREEN
LOCATION WHERE GROUND WATR SAMPLE EXCEEDS O.REG. 153/04 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN RED
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **RED BOLD**
CONCENTRATION OF CONTAMINANT WITHIN TABLE 2 STANDARD SHOWN IN TEXT AS GREEN
LOCATION WHERE SAMPLE MEET O.REG. 153/04 TABLE 2 STANDARDS AS PER SECTION 49.1 (1) OF O. REG. 153/04 IS SHOWN IN PURPLE
CONCENTRATION OF CONTAMINANT MEET O.REG. 153/04 TABLE 2 STANDARDS AS PER SECTION 49.1 (1) OF O. REG. 153/04 SHOWN TEXT IN **PURPLE BOLD**

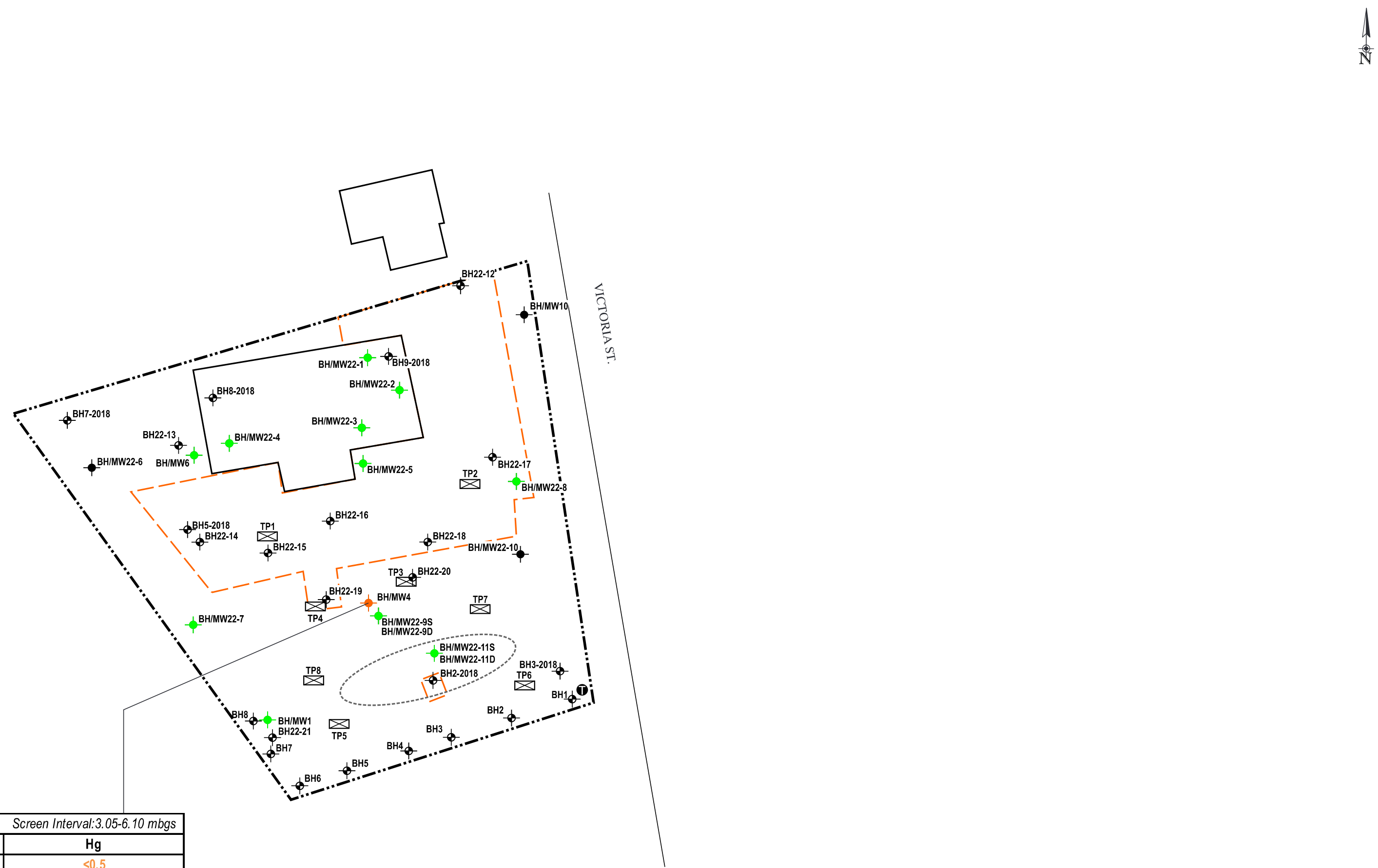
GROUND WATER ANALYTICAL RESULTS – SODIUM AND CHLORIDE

FIGURE 7E

420 VICTORIA STREET, SHELBURNE, ONTARIO

PROJECT NUMBER: 21020239 | DATE: JANUARY 2024

21020239-PH2 RESULTS-JAN24: GW-Na CL



BH/MW4	*Screen Interval:3.05-6.10 mbgs*
Date	**Hg**
23-Nov-18	<0.5
17-Jun-20	<0.5

Location	Sample ID	Screen Interval (mbgs)	Date
BH/MW1	BHMW1	3.05 - 6.10	23-Nov-18
BH/MW6	BHMW6	3.05 - 6.10	17-Jun-20
BH/MW22-1	BH22-1	1.22 - 4.27	20-Jul-22
BH/MW22-2	BH22-2	1.22 - 4.27	20-Jul-22
BH/MW22-3	BH22-3	1.22 - 4.27	20-Jul-22
	~BH22D-3	1.22 - 4.27	20-Jul-22
BH/MW22-4	BH22-4	1.22 - 4.27	20-Jul-22
BH/MW22-5	BH22-5	1.22 - 4.27	20-Jul-22
BH/MW22-6	BH22-6	1.22 - 4.27	20-Jul-22
BH/MW22-7	BH22-7	1.22 - 4.27	21-Jul-22
BH/MW22-9S	BH22-9S	1.22 - 4.27	20-Jul-22
BH/MW22-9D	BH22-9D	8.23 - 9.75	20-Jul-22
BH/MW22-11	BH22-11S	1.22 - 4.27	21-Jul-22
	~BH22D-11S	1.22 - 4.27	21-Jul-22

Parameter	Abbreviation	Table 2 Ground Water Standards*
Mercury	Hg	0.29

SCALE:

0 5 10m

SOURCE:

BASED ON FIELD MEASUREMENTS BY EXP STAFF

exp.

DRAWN BY	CHECKED BY
K.G.	A.F.

LEGEND:

- SITE BOUNDARY
- POLE-MOUNTED TRANSFORMER
- FORMER SALT STORAGE
- LIMIT OF EXCAVATION (2018-2020)
- TEST HOLE WITH MONITOR
  BH/MW SERIES (T. HARRIS, 2018)
  BH22 SERIES (EXP, 2022)
- TEST HOLE
  BH1-2018 SERIES (T. HARRIS, 2018)
  BH1 SERIES (T. HARRIS, 2020)
  BH22 SERIES (EXP, 2022)
- TEST PIT
  TP1-TP6 (T. HARRIS, 2019)
  TP7, TP8 (T. HARRIS, 2020)

CN- = CYANIDE,
Cr(VI) = HEXAVALENT CHROMIUM,
Hg = MERCURY

* STANDARDS APPLIED ARE FOR ALL PROPERTY USE AND COARSE TEXTURED SOILS

~ - INDICATES FIELD DUPLICATE SAMPLE
mbgs - METRES BELOW GROUND SURFACE
ALL RESULTS IN UNITS OF μg/L UNLESS OTHERWISE NOTED
NA - NOT ANALYZED.

LOCATION WHERE GROUND WATER SAMPLE IS WITHIN O.REG. 153/04 TABLE 2 STANDARDS FOR ALL PARAMETERS ANALYZED IS SHOWN IN GREEN
LOCATION WHERE GROUND WATR SAMPLE EXCEEDS O.REG. 153/04 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN RED
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **RED BOLD**
CONCENTRATION OF CONTAMINANT WITHIN TABLE 2 STANDARD SHOWN IN TEXT AS GREEN
LOCATION WHERE THE LABORATORY RDL FOR THE SOIL SAMPLE EXCEEDS O.REG. 153/02 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN ORANGE.
THE LABORATORY RDL EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **ORANGE BOLD**.

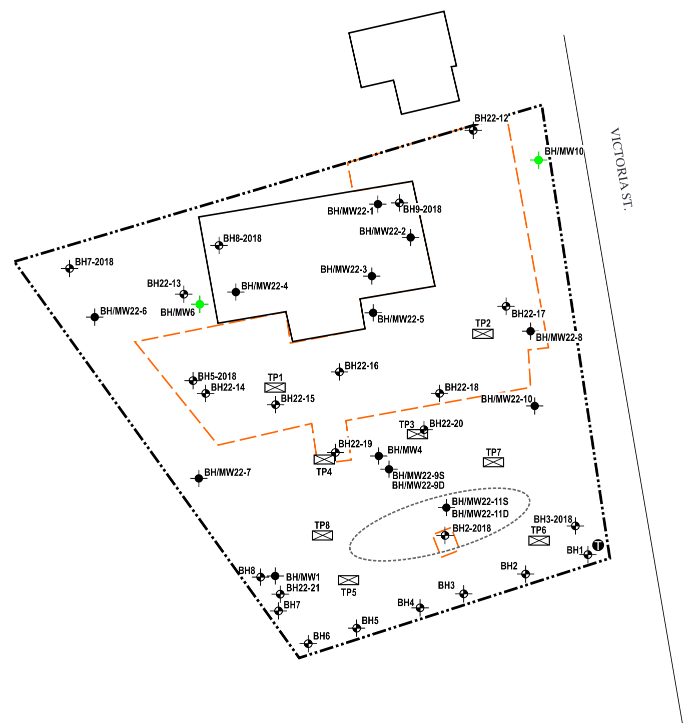
GROUND WATER ANALYTICAL RESULTS - ORPs – Hg, CN-, Cr(VI)

FIGURE 7F

420 VICTORIA STREET, SHELBURNE, ONTARIO

PROJECT NUMBER: 21020239 | DATE: JANUARY 2024

21020239-PH2 RESULTS-JAN24: GW-ORP



Location	Sample ID	Screen Interval (mbgs)	Date
BH/MW6	BHMW6	3.05 - 6.10	17-Jun-20
BH/MW10	BHMW10	3.05 - 6.10	23-Nov-18

SCALE:

0 5 10m

SOURCE:

BASED ON FIELD MEASUREMENTS BY EXP STAFF

LEGEND:

- SITE BOUNDARY
- POLE-MOUNTED TRANSFORMER
- FORMER SALT STORAGE
- LIMIT OF EXCAVATION (2018-2020)
- TEST HOLE WITH MONITOR
  - BH/MW SERIES (T. HARRIS, 2018)
  - BH22 SERIES (EXP, 2022)
- TEST HOLE
  - BH1-2018 SERIES (T. HARRIS, 2018)
  - BH1 SERIES (T. HARRIS, 2020)
  - BH22 SERIES (EXP, 2022)
- TEST PIT
  - TP1-TP6 (T. HARRIS, 2019)
  - TP7, TP8 (T. HARRIS, 2020)

OCPs - ORGANOCHLORINE PESTICIDES

* STANDARDS APPLIED ARE FOR ALL PROPERTY USE AND COARSE TEXTURED SOILS

~ - INDICATES FIELD DUPLICATE SAMPLE
mbgs - METRES BELOW GROUND SURFACE
ALL RESULTS IN UNITS OF µg/L UNLESS OTHERWISE NOTED
NA - NOT ANALYZED.

LOCATION WHERE GROUND WATER SAMPLE IS WITHIN O.REG. 153/04 TABLE 2 STANDARDS FOR ALL PARAMETERS ANALYZED IS SHOWN IN GREEN
LOCATION WHERE GROUND WATR SAMPLE EXCEEDS O.REG. 153/04 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN RED
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **RED BOLD**
CONCENTRATION OF CONTAMINANT WITHIN TABLE 2 STANDARD SHOWN IN TEXT AS GREEN

exp.

DRAWN BY	CHECKED BY
K.G.	A.F.

GROUND WATER ANALYTICAL RESULTS – OCPs

FIGURE 7G

420 VICTORIA STREET, SHELBURNE, ONTARIO

PROJECT NUMBER: 21020239 DATE: JANUARY 2024

21020239-PH2 RESULTS-JAN24: GW-OCP

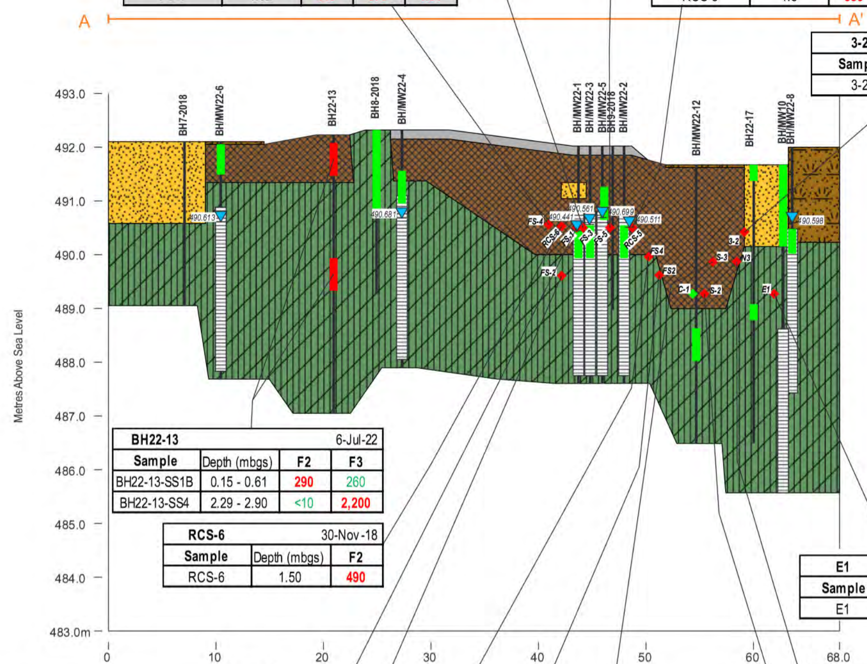
FS-3			29-Oct-18
Sample	Depth (mbgs)	F1	F2
FS-3	1.52	**90**	**900**

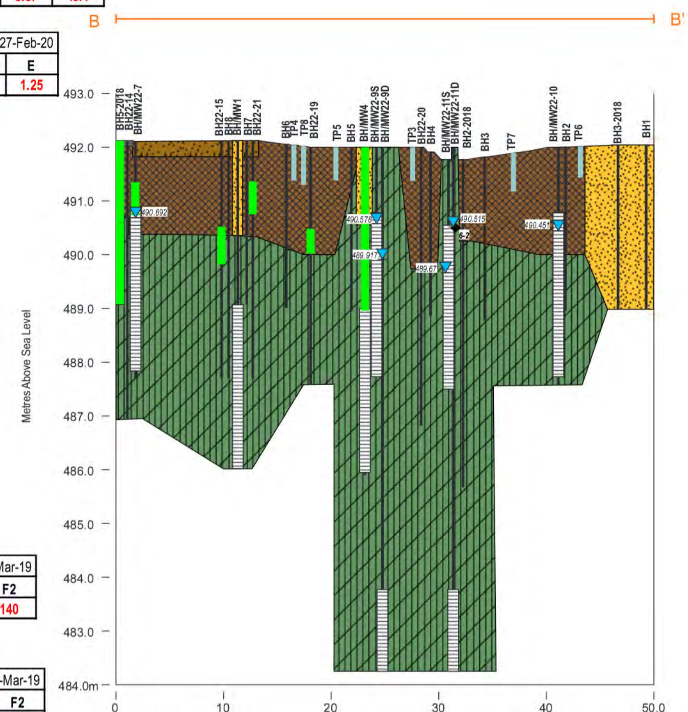
FS-5					29-Oct-18
Sample	Depth (mbgs)	F1	F2	B	E
FS-5	1.52	**440**	**1,820**	**3.34**	**2.16**

FS-4				29-Oct-18
Sample	Depth (mbgs)	F1	F2	E
FS-4	1.52	**440**	**570**	**1.81**

RCS-5						30-Nov-18
Sample	Depth (mbgs)	F1	F2	B	E	X
RCS-5	1.5	**530**	**410**	**0.40**	**8.37**	**43.1**

3-2		27-Feb-20
Sample	Depth (mbgs)	E
3-2	Unknown	**1.25**





BH22-13			6-Jul-22
Sample	Depth (mbgs)	F2	F3
BH22-13-SS1B	0.15 - 0.61	**290**	260
BH22-13-SS4	2.29 - 2.90	<10	**2,200**

RCS-6		30-Nov-18
Sample	Depth (mbgs)	F2
RCS-6	1.50	**490**

E1		26-Mar-19
Sample	Depth (mbgs)	F2
E1	2.40	**140**

N3		26-Mar-19
Sample	Depth (mbgs)	F2
N3	1.80	**250**

FS-1				29-Oct-18
Sample	Depth (mbgs)	F1	F2	F3
FS-1	1.52	**200**	**4,700**	**2,420**

FS-2			29-Oct-18
Sample	Depth (mbgs)	F1	E
FS-2	2.44	**490**	**5.49**

S-3		7-Dec-18
Sample	Depth (mbgs)	B
S-3	1.80	**0.5**

S-2			7-Dec-18
Sample	Depth (mbgs)	F1	F2
S-2	2.40	**260**	**480**

FS4		11-Dec-18
Sample	Depth (mbgs)	F2
FS-4	1.80	**470**

FS2			11-Dec-18
Sample	Depth (mbgs)	F1	F2
FS-2	2.10	**420**	**950**

C-1		17-Dec-18
Sample	Depth (mbgs)	B
C-1	2.40	**0.27**

Parameter	Abbreviation	Table 2 Soil Standards*
PHC Fraction F1	F1	55
PHC Fraction F2	F2	230
PHC Fraction F3	F3	1,700
Benzene	B	0.32
Ethylbenzene	E	1.1
Xylenes	X	26

SCALE:
5 x VERTICAL EXAGGERATION

SOURCE:
BASED ON FIELD MEASUREMENTS BY EXP STAFF

DRAWN BY	CHECKED BY
K.G.	A.F.

exp.

LEGEND:

- TEST HOLE
- SCREEN INTERVAL
- TEST PIT
- GROUND WATER ELEVATION (DATE MEASURED - JULY 20, 21 2022)
- 6-1 ◆ CONFIRMATORY SOIL SAMPLE (T. HARRIS, 2018-2020)
- CONCRETE
- ASPHALT
- TOPSOIL
- FILL
- SILTY SAND/SAND
- CLAYEY SILT/SILTY CLAY/CLAY/SILT TILL

* STANDARDS APPLIED ARE FOR INDUSTRIAL/ COMMERCIAL/ COMMUNITY PROPERTY USE AND COARSE TEXTURED SOILS

~ - INDICATES FIELD DUPLICATE SAMPLE
mbgs - METRES BELOW GROUND SURFACE
ALL RESULTS IN UNITS OF µg/g UNLESS OTHERWISE NOTED
NA - NOT ANALYZED.

LOCATION WHERE SAMPLE IS WITHIN O.REG. 153/04 TABLE 2 STANDARDS FOR ALL PARAMETERS ANALYZED IS SHOWN IN GREEN
LOCATION WHERE SAMPLE EXCEEDS O.REG. 153/04 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN RED
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **RED BOLD**
CONCENTRATION OF CONTAMINANT WITHIN TABLE 2 STANDARD SHOWN IN TEXT AS GREEN

THE SAMPLES WITH EXCEEDANCES OF THE TABLE 2 STANDARD THAT WERE REMEDIATED VIA SOIL EXCAVATION (T. HARRIS, 2018-2020) ARE SHOWN IN GREY BOXES

BTEX - BENZENE, TOLUENE, ETHYLBENZENE, XYLENES

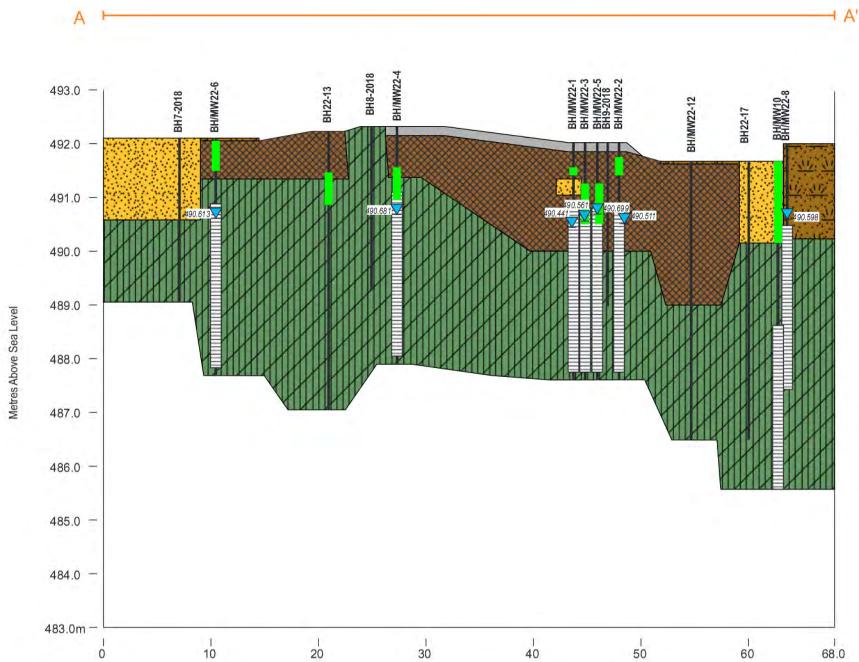
CROSS SECTIONS A-A' AND B-B' SOIL ANALYTICAL RESULTS - PETROLEUM HYDROCARBONS AND BTEX

FIGURE 8A

420 VICTORIA STREET, SHELBURNE, ONTARIO

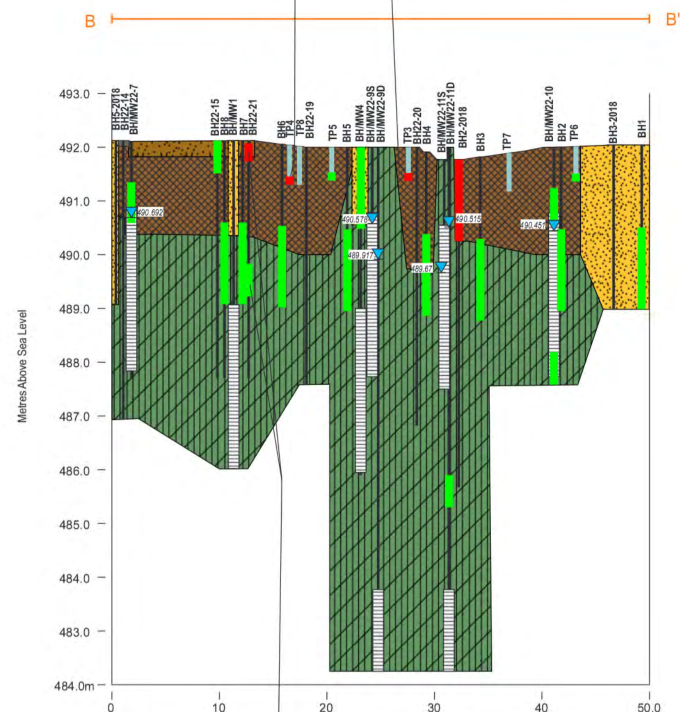
PROJECT NUMBER: 21020239 DATE: JANUARY 2024

21020239-PH2 SEC A_B-JAN24: SOIL-BTEX



TP4		20-Dec-19
Sample	Depth (mbgs)	Zn
TP4-1	0.66	**398**

TP3		20-Dec-19
Sample	Depth (mbgs)	Zn
TP3-1	0.63	**676**



BH22-21		7-Jul-22
Sample	Depth (mbgs)	Zn
BH22-21-SS1B	0.05 - 0.61	**446**
BH22-21-SS4	2.29 - 2.90	31

Parameter	Abbreviation	Table 2 Soil Standards*
Zinc	Zn	340

SCALE:
5 x VERTICAL EXAGGERATION

SOURCE:
BASED ON FIELD MEASUREMENTS BY EXP STAFF

DRAWN BY	CHECKED BY
K.G.	A.F.

exp.

LEGEND:

- TEST HOLE
- SCREEN INTERVAL
- TEST PIT
- GROUND WATER ELEVATION (DATE MEASURED - JULY 20, 21 2022)
- CONCRETE
- ASPHALT
- TOPSOIL
- FILL
- SILTY SAND/SAND
- CLAYEY SILT/SILTY CLAY/CLAY/SILT TILL

As = ARSENIC,
Sb = ANTIMONY,
Se = SELENIUM

* STANDARDS APPLIED ARE FOR INDUSTRIAL/ COMMERCIAL/ COMMUNITY PROPERTY USE AND COARSE TEXTURED SOILS

~ INDICATES FIELD DUPLICATE SAMPLE
mbgs - METRES BELOW GROUND SURFACE
ALL RESULTS IN UNITS OF µg/g UNLESS OTHERWISE NOTED
NA - NOT ANALYZED.

LOCATION WHERE SAMPLE IS WITHIN O.REG. 153/04 TABLE 2 STANDARDS FOR ALL PARAMETERS ANALYZED IS SHOWN IN GREEN
LOCATION WHERE SAMPLE EXCEEDS O.REG. 153/04 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN RED
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **RED BOLD**
CONCENTRATION OF CONTAMINANT WITHIN TABLE 2 STANDARD SHOWN IN TEXT AS GREEN

CROSS SECTIONS A-A' AND B-B' SOIL ANALYTICAL RESULTS – METALS (INCLUDING As, Sb, Se)

FIGURE 8B

420 VICTORIA STREET, SHELBURNE, ONTARIO

PROJECT NUMBER: 21020239 | DATE: JANUARY 2024

21020239-PH2 SEC A_B-JAN24: SOIL-MET

BH6			23-Mar-20
Sample	Depth (mbgs)	EC	SAR
BH6-2	1.52 - 3.05	**1.33**	**11.7**

BH/MW4			19-Nov-18
Sample	Depth (mbgs)	EC	SAR
BHMW4-1	0.0 - 1.52	**1.94**	**30.8**

BH22-10			4-Jul-22
Sample	Depth (mbgs)	EC	SAR
BH22-10-SS2	0.76 - 1.37	1.07	**15**
BH22-10-SS6	3.81 - 4.42	**17.8**	**129**

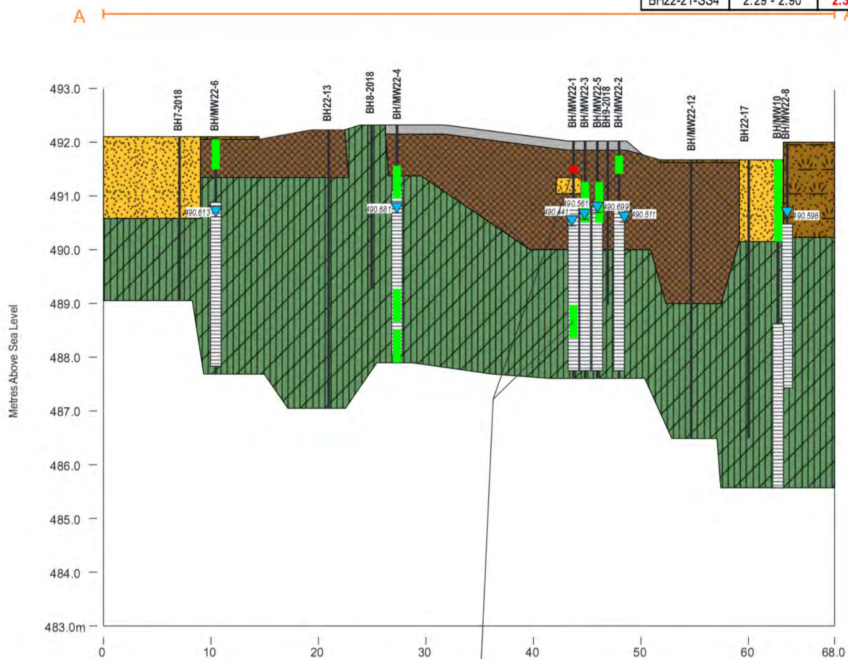
TP6			20-Dec-19
Sample	Depth (mbgs)	EC	SAR
TP6-1	0.58	**4.52**	**77.6**

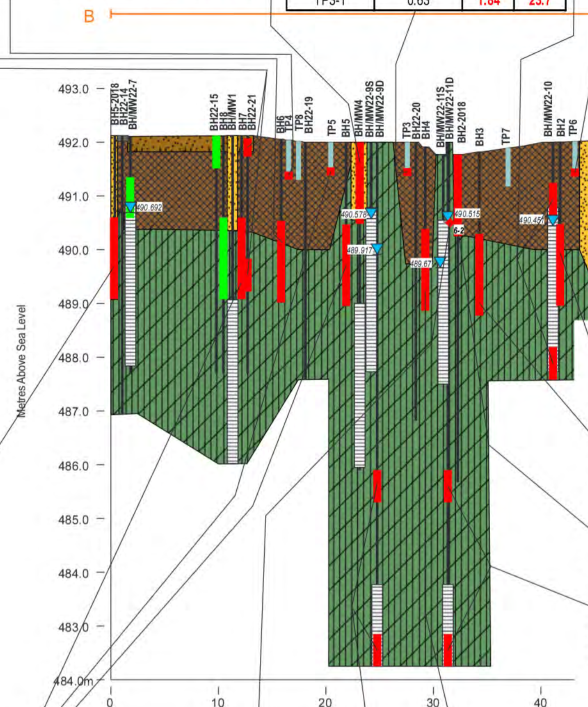
BH22-21			7-Jul-22
Sample	Depth (mbgs)	EC	SAR
BH22-21-SS1B	0.05 - 0.61	**4.08**	**55.8**
BH22-21-SS4	2.29 - 2.90	**2.35**	**48.2**

TP4			20-Dec-19
Sample	Depth (mbgs)	EC	SAR
TP4-1	0.66	**12.0**	**184**

TP3			20-Dec-19
Sample	Depth (mbgs)	EC	SAR
TP3-1	0.63	**1.84**	**23.7**

BH1			23-Mar-20
Sample	Depth (mbgs)	EC	SAR
BH1-2	1.52 - 3.05	**2.51**	**71.4**





BH2			23-Mar-20
Sample	Depth (mbgs)	EC	SAR
BH2-2	1.52 - 3.05	**5.04**	**141**

BH3			23-Mar-20
Sample	Depth (mbgs)	EC	SAR
BH3-2	1.52 - 3.05	**3.77**	**102**

BH2-2018			19-Nov-18
Sample	Depth (mbgs)	EC	SAR
BH2-1	0.0 - 1.52	**6.59**	**179**

BH22-11D			8-Jul-22
Sample	Depth (mbgs)	EC	SAR
BH22-11D-SS3	6.1 - 6.71	**5.72**	**30.7**
BH22-11D-SS5	9.14 - 9.75	**2.68**	5.78

BH22-1		5-Jul-22
Sample	Depth (mbgs)	EC
BH22-1-SS1B	0.46 - 0.61	**4.61**
BH22-1-SS5	3.05 - 3.66	0.491

BH5-2018		19-Nov-18
Sample	Depth (mbgs)	SAR
BH5-2	1.52 - 3.05	**15.0**

6-2			5-Mar-20
Sample	Depth (mbgs)	EC	SAR
6-2	1.50	**7.86**	**161**

BH4			23-Mar-20
Sample	Depth (mbgs)	EC	SAR
BH4-2	1.52 - 3.05	**4.88**	**134**

BH7			23-Mar-20
Sample	Depth (mbgs)	EC	SAR
BH7-2	1.52 - 3.05	**2.02**	**48.4**

BH22-9D			7-Jul-22
Sample	Depth (mbgs)	EC	SAR
BH22-9D-SS3	6.1 - 6.71	**7.09**	**30.4**
BH22-9D-SS5	9.14 - 9.75	1.39	2.67

TP5			20-Dec-19
Sample	Depth (mbgs)	EC	SAR
TP5-1	0.62	**14.0**	**248**

BH5			23-Mar-20
Sample	Depth (mbgs)	EC	SAR
BH5-2	1.52 - 3.05	**3.18**	**88.1**

Parameter	Abbreviation	Table 2 Soil Standards*
Electrical Conductivity	EC	1.4 mS/cm
Sodium Adsorption Ratio	SAR	12

SCALE:
5 x VERTICAL EXAGGERATION

SOURCE:
BASED ON FIELD MEASUREMENTS BY EXP STAFF

DRAWN BY	CHECKED BY
K.G.	A.F.

exp.

LEGEND:
- TEST HOLE
- SCREEN INTERVAL
- TEST PIT
- GROUND WATER ELEVATION (DATE MEASURED - JULY 20, 21 2022)
- CONCRETE
- ASPHALT
- TOPSOIL
- FILL
- SILTY SAND/SAND
- CLAYEY SILT/SILTY CLAY/CLAY/SILT TILL

EC – ELECTRICAL CONDUCTIVITY
SAR – SODIUM ADSORPTION RATIO

* STANDARDS APPLIED ARE FOR INDUSTRIAL/ COMMERCIAL/ COMMUNITY PROPERTY USE AND COARSE TEXTURED SOILS

~ - INDICATES FIELD DUPLICATE SAMPLE
mbgs - METRES BELOW GROUND SURFACE
EC IN UNITS OF mS/cm; SAR IS UNITLESS.
NA - NOT ANALYZED.

LOCATION WHERE SAMPLE IS WITHIN O.REG. 153/04 TABLE 2 STANDARDS FOR ALL PARAMETERS ANALYZED IS SHOWN IN GREEN
LOCATION WHERE SAMPLE EXCEEDS O.REG. 153/04 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN RED
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **RED BOLD**
CONCENTRATION OF CONTAMINANT WITHIN TABLE 2 STANDARD SHOWN IN TEXT AS GREEN
LOCATION WHERE SAMPLE MEET O.REG. 153/04 TABLE 2
CONCENTRATION OF CONTAMINANT MEET O.REG. 153/04 TABLE 2

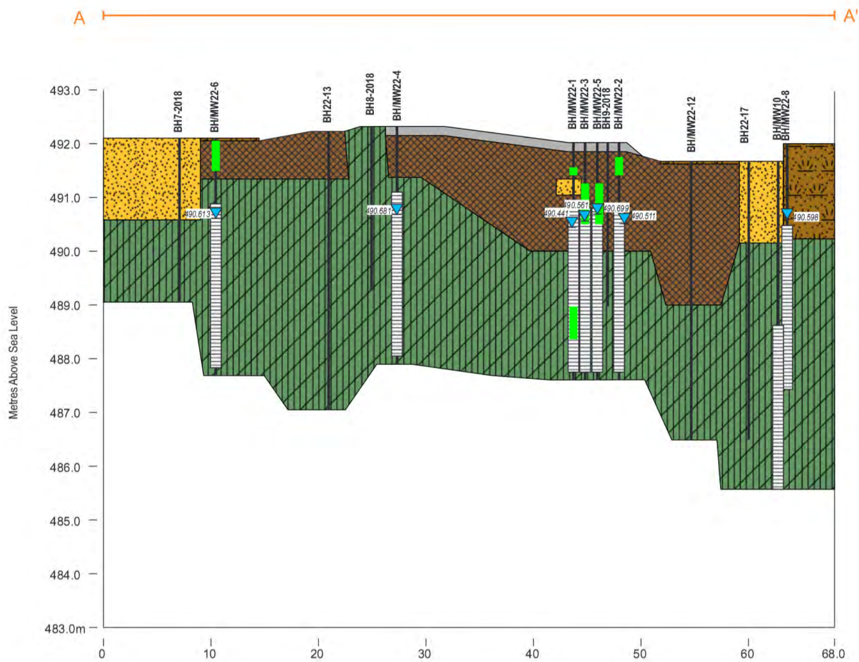
CROSS SECTIONS A-A' AND B-B' SOIL ANALYTICAL RESULTS – EC AND SAR

FIGURE
8C

420 VICTORIA STREET, SHELBURNE, ONTARIO

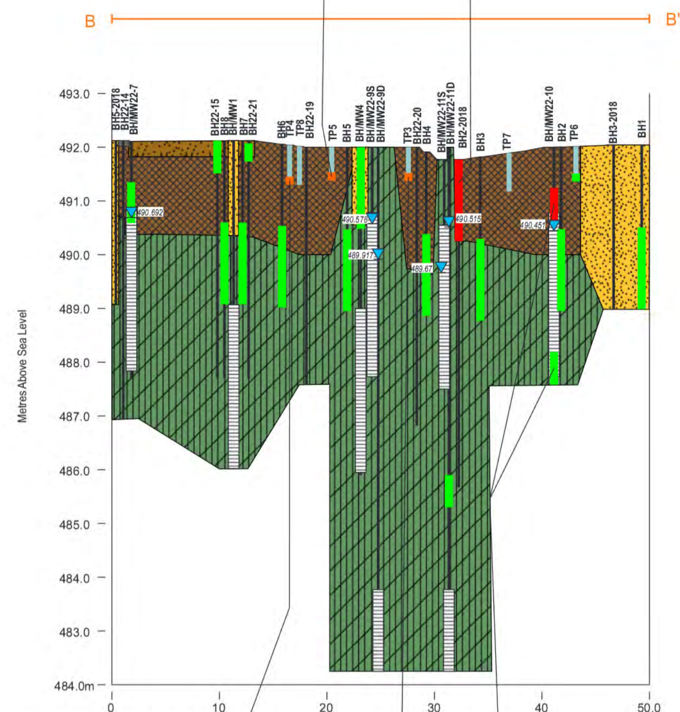
PROJECT NUMBER: 21020239 DATE: JANUARY 2024

21020239-PH2 SEC A_B-JAN24: SOIL-EC&SAR



TP5		20-Dec-19
Sample	Depth (mbgs)	CN-
TP5-1	0.62	**<0.2**

BH2-2018		19-Nov-18
Sample	Depth (mbgs)	CN-
BH2-1	0.0 - 1.52	**0.07**



TP4		20-Dec-19
Sample	Depth (mbgs)	CN-
TP4-1	0.66	**<0.1**

TP3		20-Dec-19
Sample	Depth (mbgs)	CN-
TP3-1	0.63	**<0.1**

BH22-10		4-Jul-22
Sample	Depth (mbgs)	B-HWS
BH22-10-SS2	0.76 - 1.37	**2.62**
BH22-10-SS6	3.81 - 4.42	0.1

Parameter	Abbreviation	Table 2 Soil Standards*
Hot water-soluble Boron	B-HWS	2 µg/g
Cyanide	CN-	0.051 µg/g

SCALE:
5 x VERTICAL EXAGGERATION

SOURCE:
BASED ON FIELD MEASUREMENTS BY EXP STAFF

DRAWN BY	CHECKED BY
K.G.	A.F.

exp.

LEGEND:
- TEST HOLE
- SCREEN INTERVAL
- TEST PIT
- GROUND WATER ELEVATION (DATE MEASURED - JULY 20, 21 2022)
- CONCRETE
- ASPHALT
- TOPSOIL
- FILL
- SILTY SAND/SAND
- CLAYEY SILT/SILTY CLAY/CLAY/SILT TILL

HWS-B = HOT WATER SOLUBLE BORON,
CN- = CYANIDE,
Cr(VI) = HEXAVALENT CHROMIUM,
Hg = MERCURY

* STANDARDS APPLIED ARE FOR INDUSTRIAL/ COMMERCIAL/ COMMUNITY PROPERTY USE AND COARSE TEXTURED SOILS

~ - INDICATES FIELD DUPLICATE SAMPLE
mbgs - METRES BELOW GROUND SURFACE
EC IN UNITS OF mS/cm; SAR IS UNITLESS.
NA - NOT ANALYZED.

THE SAMPLES WITH EXCEEDANCES OF THE TABLE 2 STANDARD THAT WERE REMEDIATED VIA SOIL EXCAVATION (T. HARRIS, 2018-2020) ARE SHOWN IN GREY BOXES.

LOCATION WHERE SAMPLE IS WITHIN O.REG. 153/04 TABLE 2 STANDARDS FOR ALL PARAMETERS ANALYZED IS SHOWN IN GREEN
LOCATION WHERE SAMPLE EXCEEDS O.REG. 153/04 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN RED
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **RED BOLD**
CONCENTRATION OF CONTAMINANT WITHIN TABLE 2 STANDARD SHOWN IN TEXT AS GREEN
LOCATION WHERE SAMPLE MEET O.REG. 153/04 TABLE 2 LOCATION WHERE THE LABORATORY RDL FOR THE SOIL SAMPLE EXCEEDS O.REG. 153/02 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN ORANGE.
CONCENTRATION OF CONTAMINANT MEET O.REG. 153/04 TABLE 2 THE LABORATORY RDL EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **ORANGE BOLD.**

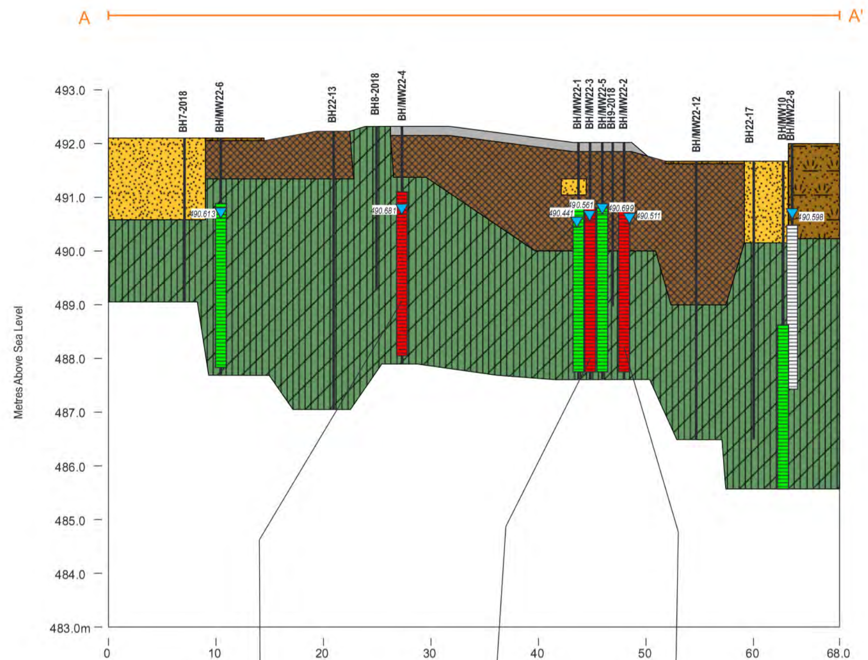
CROSS SECTIONS A-A' AND B-B' SOIL ANALYTICAL RESULTS – HWS-B, Hg, CN-, AND Cr(VI)

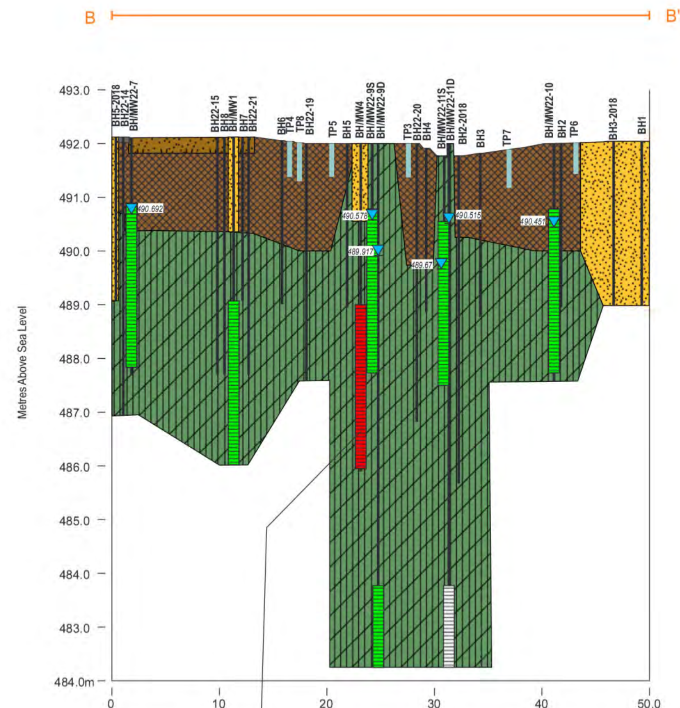
FIGURE **8D**

420 VICTORIA STREET, SHELBURNE, ONTARIO

PROJECT NUMBER: 21020239 | DATE: JANUARY 2024

21020239-PH2 SEC A_B-JAN24: SOIL-ORP





BH/MW22-4	*Screen Interval:1.22-4.27 mbgs*		
Date	**1,1,2-TCA**	**1,1-DCA**	**1,1-DCE**
20-Jul-22	**5.17**	**104**	**22.8**

BH/MW22-3	*Screen Interval:1.22-4.27 mbgs*
Date	**1,1-DCE**
20-Jul-22	**3.66**
~20-Jul-22	**4.13**

BH/MW22-2	*Screen Interval:1.22-4.27 mbgs*	
Date	**1,1-DCA**	**1,1-DCE**
20-Jul-22	**8.46**	**13.6**

BH/MW4	*Screen Interval:3.05-6.10 mbgs*
Date	**1,1-DCA**
23-Nov-18	0.5
17-Jun-20	**12.9**

Parameter	Abbreviation	Table 2 Ground Water Standards*
1,1,1-Trichloroethane	1,1,1-TCA	4.7
1,1-Dichloroethane	1,1-DCA	5
1,1-Dichloroethylene	1,1-DCE	2

SCALE:
5 x VERTICAL EXAGGERATION

SOURCE:
BASED ON FIELD MEASUREMENTS BY EXP STAFF

DRAWN BY	CHECKED BY
K.G.	A.F.

exp.

LEGEND:

- TEST HOLE
- SCREEN INTERVAL
- TEST PIT
- GROUND WATER ELEVATION (DATE MEASURED - JULY 20, 21 2022)
- CONCRETE
- ASPHALT
- TOPSOIL
- FILL
- SILTY SAND/SAND
- CLAYEY SILT/SILTY CLAY/CLAY/SILT TILL

*STANDARDS APPLIED ARE FOR ALL PROPERTY USE AND COARSE TEXTURED SOILS

~ - INDICATES FIELD DUPLICATE SAMPLE
mbgs - METRES BELOW GROUND SURFACE
ALL RESULTS IN UNITS OF µg/L UNLESS OTHERWISE NOTED
NA - NOT ANALYZED.

LOCATION WHERE GROUND WATER SAMPLE IS WITHIN O.REG. 153/04 TABLE 2 STANDARDS FOR ALL PARAMETERS ANALYZED IS SHOWN IN GREEN
LOCATION WHERE GROUND WATR SAMPLE EXCEEDS O.REG. 153/04 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN RED
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **RED BOLD**
CONCENTRATION OF CONTAMINANT WITHIN TABLE 2 STANDARD SHOWN IN TEXT AS GREEN.

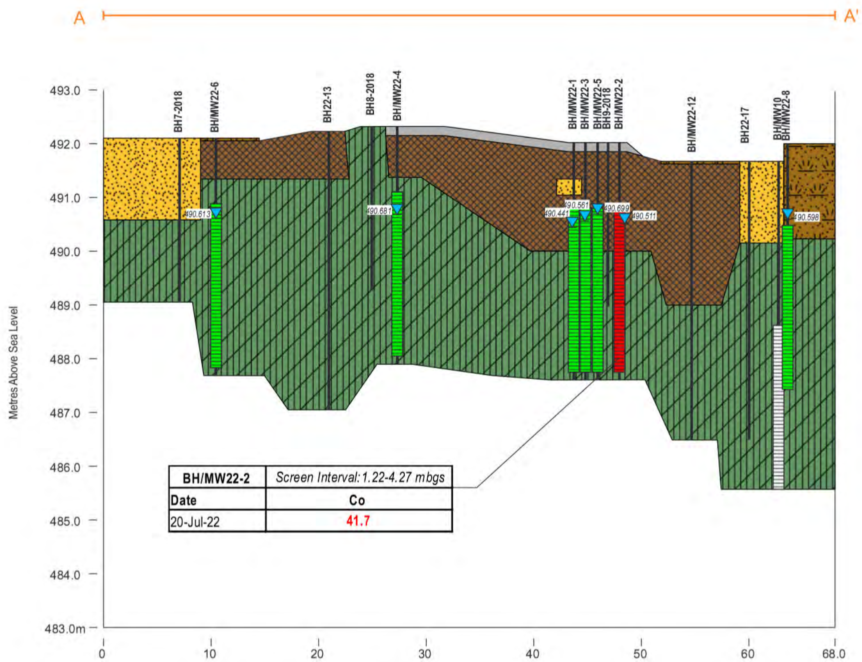
CROSS SECTIONS A-A' AND B-B' GROUND WATER ANALYTICAL RESULTS - VOLATILE ORGANIC COMPOUNDS

FIGURE 9A

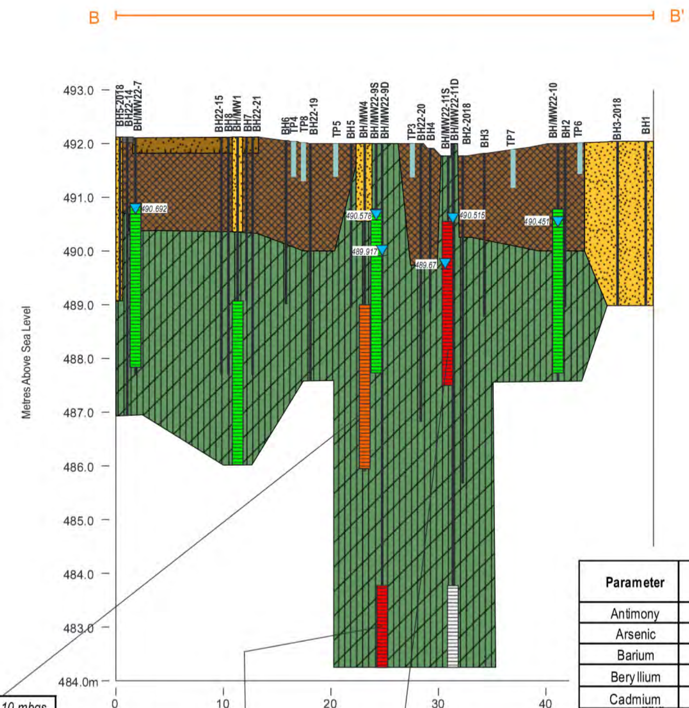
420 VICTORIA STREET,
SHELBURNE, ONTARIO

PROJECT NUMBER: 21020239 | DATE: JANUARY 2024

21020239-PH2 SEC A_B-JAN24: GW-VOC



BH/MW22-2	Screen Interval:1.22-4.27 mbgs
Date	Co
20-Jul-22	**41.7**



BH/MW4												Screen Interval:3.05-6.10 mbgs
Date	Sb	As	Be	Cd	Co	Pb	Mo	Ni	Se	Ag	Tl	U	V
23-Nov-18	<20	<50	<20	<5	<10	<50	<200	<200	<50	<5	<5	<50	<50
17-Jun-20	<10	<20	<5	<2	**4**	<10	<100	<50	<20	<2	<1	<10	<10

BH/MW22-9D	Screen Interval:8.23 - 9.75 mbgs
Date	Ba
20-Jul-22	**3,740**

BH/MW22-11S	Screen Interval:1.22 - 4.27 mbgs
Date	Se
21-Jul-22	**25.4**
~21-Jul-22	**11.6**

Parameter	Abbreviation	Table 2 Ground Water Standards*
Antimony	Sb	6
Arsenic	As	25
Barium	Ba	1000
Beryllium	Be	4
Cadmium	Cd	2.7
Cobalt	Co	3.8
Lead	Pb	10
Molybdenum	Mo	70
Nickel	Ni	100
Selenium	Se	10
Silver	Ag	1.5
Thallium	Tl	2
Uranium	U	20
Vanadium	V	6.2

SCALE:
5 x VERTICAL EXAGGERATION

SOURCE:
BASED ON FIELD MEASUREMENTS BY EXP STAFF

DRAWN BY	CHECKED BY
K.G.	A.F.

exp.

LEGEND:

- TEST HOLE
- SCREEN INTERVAL
- TEST PIT
- GROUND WATER ELEVATION (DATE MEASURED - JULY 20, 21 2022)
- CONCRETE
- ASPHALT
- TOPSOIL
- FILL
- SILTY SAND/SAND
- CLAYEY SILT/SILTY CLAY/CLAY/SILT TILL

As = ARSENIC,
Sb = ANTIMONY,
Se = SELENIUM

*STANDARDS APPLIED ARE FOR ALL PROPERTY USE AND COARSE TEXTURED SOILS

~ - INDICATES FIELD DUPLICATE SAMPLE
mbgs - METRES BELOW GROUND SURFACE
ALL RESULTS IN UNITS OF µg/L UNLESS OTHERWISE NOTED
NA - NOT ANALYZED.

LOCATION WHERE GROUND WATER SAMPLE IS WITHIN O.REG. 153/04 TABLE 2 STANDARDS FOR ALL PARAMETERS ANALYZED IS SHOWN IN GREEN
LOCATION WHERE GROUND WATR SAMPLE EXCEEDS O.REG. 153/04 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN RED
LOCATION WHERE THE LABORATORY RDL FOR THE SOIL SAMPLE EXCEEDS O.REG. 153/02 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN ORANGE.
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **RED BOLD**
CONCENTRATION OF CONTAMINANT WITHIN TABLE 2 STANDARD SHOWN IN TEXT AS GREEN
THE LABORATORY RDL EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **ORANGE BOLD**.

CROSS SECTIONS A-A' AND B-B' GROUND WATER ANALYTICAL RESULTS – METALS (INCLUDING HYDRIDE-FORMING METALS)

FIGURE
9B

420 VICTORIA STREET, SHELBURNE, ONTARIO

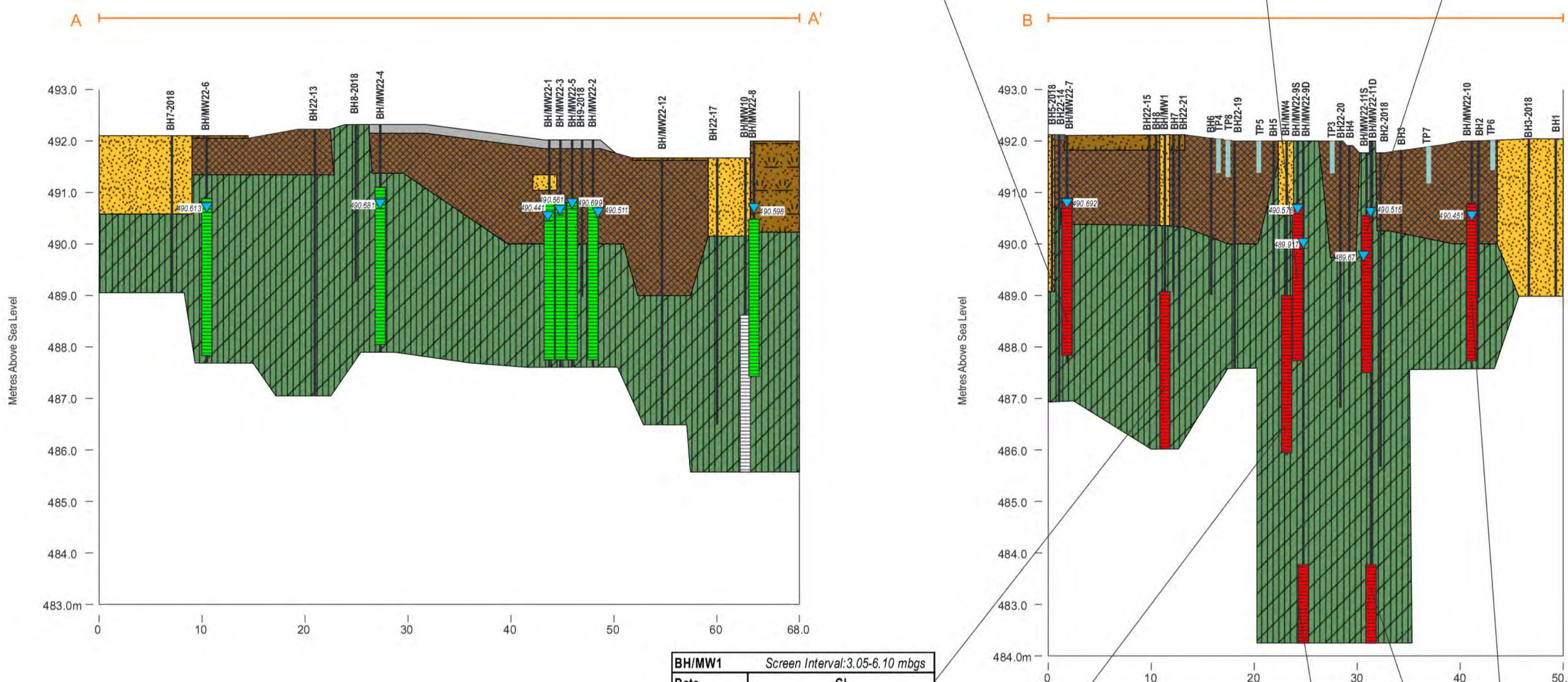
PROJECT NUMBER: 21020239 | DATE: JANUARY 2024

21020239-PH2 SEC A_B-JAN24: GW-MET

BH/MW22-7	Screen Interval:1.22 - 4.27 mbgs
Date	Na
21-Jul-22	**556,000**

BH/MW22-9S	Screen Interval:1.22-4.27 mbgs	
Date	Na	Cl
20-Jul-22	**2,640,000**	**3,860,000**

BH/MW22-11S	Screen Interval:1.22-4.27 mbgs	
Date	Na	Cl
21-Jul-22	**31,900,000**	**44,100,000**



BH/MW1	Screen Interval:3.05-6.10 mbgs
Date	Cl
23-Nov-18	**977,000**

BH/MW22-9D	Screen Interval:8.23-9.75 mbgs	
Date	Na	Cl
20-Jul-22	**6,860,000**	**17,500,000**

BH/MW22-10	Screen Interval:1.22-4.27 mbgs	
Date	Na	Cl
21-Jul-22	**968,000**	**1,210,000**

BH/MW4	Screen Interval:3.05-6.10 mbgs	
Date	Na	Cl
23-Nov-18	**24,000,000**	**26,900,000**
17-Jun-20	**13,300,000**	**19,200,000**

BH/MW22-11D	Screen Interval:8.23-9.75 mbgs	
Date	Na	Cl
21-Jul-22	**40,300,000**	**56,500,000**

Parameter	Abbreviation	Table 2 Ground Water Standards*
Sodium	Na	490,000
Chloride	Cl	790,000

SCALE:
5 x VERTICAL EXAGGERATION

SOURCE:
BASED ON FIELD MEASUREMENTS BY EXP STAFF

DRAWN BY	CHECKED BY
K.G.	A.F.

exp.

LEGEND:
- TEST HOLE
- SCREEN INTERVAL
- TEST PIT
- GROUND WATER ELEVATION (DATE MEASURED - JULY 20, 21 2022)
- CONCRETE
- ASPHALT
- TOPSOIL
- FILL
- SILTY SAND/SAND
- CLAYEY SILT/SILTY CLAY/CLAY/SILT TILL

NA = SODIUM,
CL = CHLORIDE

* STANDARDS APPLIED ARE FOR ALL PROPERTY USE AND COARSE TEXTURED SOILS

~ - INDICATES FIELD DUPLICATE SAMPLE
mbgs - METRES BELOW GROUND SURFACE
ALL RESULTS IN UNITS OF µg/L UNLESS OTHERWISE NOTED
NA - NOT ANALYZED.

LOCATION WHERE GROUND WATER SAMPLE IS WITHIN O.REG. 153/04 TABLE 2 STANDARDS FOR ALL PARAMETERS ANALYZED IS SHOWN IN GREEN
LOCATION WHERE GROUND WATR SAMPLE EXCEEDS O.REG. 153/04 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN RED
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **RED BOLD**
CONCENTRATION OF CONTAMINANT WITHIN TABLE 2 STANDARD SHOWN IN TEXT AS GREEN
LOCATION WHERE SAMPLE MEET O.REG. 153/04 TABLE 2 STANDARDS AS PER SECTION 49.1 (1) OF O. REG. 153/04 IS SHOWN IN PURPLE
CONCENTRATION OF CONTAMINANT MEET O.REG. 153/04 TABLE 2 STANDARDS AS PER SECTION 49.1 (1) OF O. REG. 153/04 SHOWN TEXT IN **PURPLE BOLD**

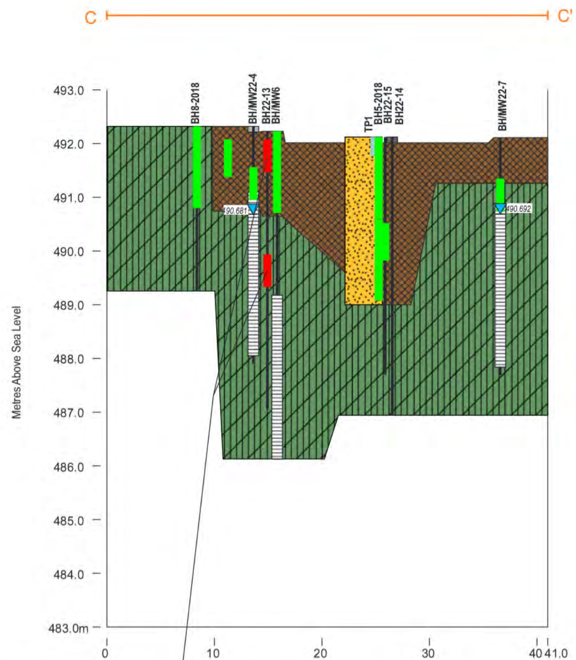
CROSS SECTIONS A-A' AND B-B' GROUND WATER ANALYTICAL RESULTS – SODIUM AND CHLORIDE

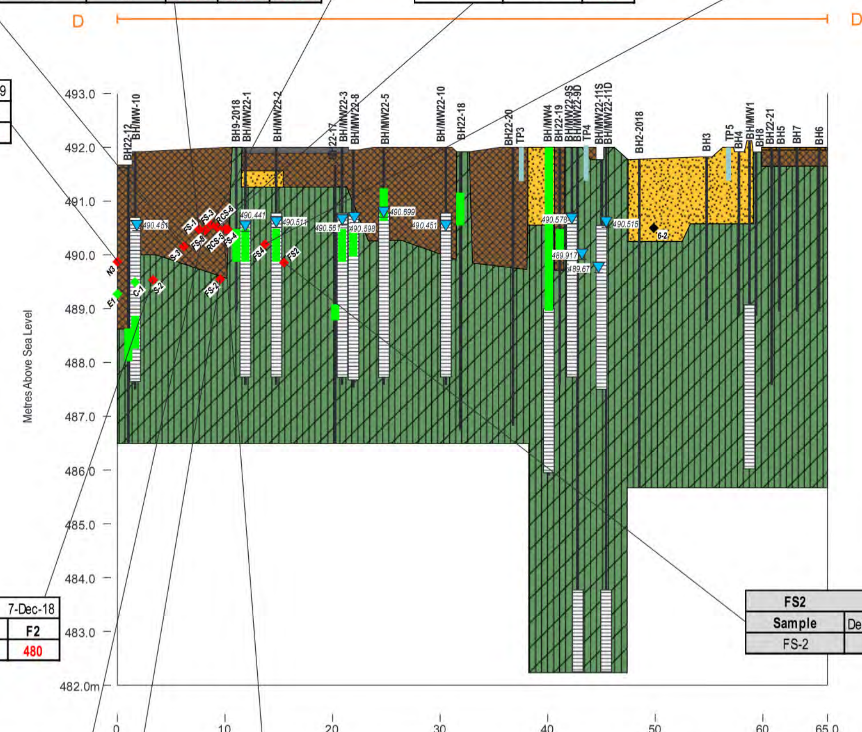
FIGURE 9C

420 VICTORIA STREET, SHELBURNE, ONTARIO

PROJECT NUMBER: 21020239 DATE: JANUARY 2024

21020239-PH2 SEC A_B-JAN24: GW-Na CL





S-3		7-Dec-18
Sample	Depth (mbgs)	B
S-3	1.80	**0.5**

FS-3			29-Oct-18
Sample	Depth (mbgs)	F1	F2
FS-3	1.52	**90**	**900**

FS-4				29-Oct-18
Sample	Depth (mbgs)	F1	F2	E
FS-4	1.52	**440**	**570**	**1.81**

FS-1				29-Oct-18
Sample	Depth (mbgs)	F1	F2	F3
FS-1	1.52	**200**	**4,700**	**2,420**

RCS-6		30-Nov-18
Sample	Depth (mbgs)	F2
RCS-6	1.50	**490**

N3		26-Mar-19
Sample	Depth (mbgs)	F2
N3	1.80	**250**

S-2			7-Dec-18
Sample	Depth (mbgs)	F1	F2
S-2	2.40	**260**	**480**

FS2			11-Dec-18
Sample	Depth (mbgs)	F1	F2
FS-2	2.10	**420**	**950**

BH22-13			6-Jul-22
Sample	Depth (mbgs)	F2	F3
BH22-13-SS1B	0.15 - 0.61	**290**	260
BH22-13-SS4	2.29 - 2.90	<10	**2,200**

FS-5					29-Oct-18
Sample	Depth (mbgs)	F1	F2	B	E
FS-5	1.52	**440**	**1,820**	**3.34**	**2.16**

RCS-5						30-Nov-18
Sample	Depth (mbgs)	F1	F2	B	E	X
RCS-5	1.5	**530**	**410**	**0.40**	**8.37**	**43.1**

FS-2			29-Oct-18
Sample	Depth (mbgs)	F1	E
FS-2	2.44	**490**	**5.49**

Parameter	Abbreviation	Table 2 Soil Standards*
PHC Fraction F1	F1	55
PHC Fraction F2	F2	230
PHC Fraction F3	F3	1,700
Benzene	B	0.32
Ethylbenzene	E	1.1
Xylenes	X	26

SCALE:
5 x VERTICAL EXAGGERATION

SOURCE:
BASED ON FIELD MEASUREMENTS BY EXP STAFF

DRAWN BY	CHECKED BY
K.G.	A.F.

exp.

LEGEND:

- TEST HOLE
- SCREEN INTERVAL
- TEST PIT
- GROUND WATER ELEVATION (DATE MEASURED - JULY 20, 21 2022)
- 6-1 ◆ CONFIRMATORY SOIL SAMPLE (T. HARRIS, 2018-2020)
- CONCRETE
- ASPHALT
- TOPSOIL
- FILL
- SILTY SAND/SAND
- CLAYEY SILT/SILTY CLAY/CLAY/SILT TILL

* STANDARDS APPLIED ARE FOR INDUSTRIAL/ COMMERCIAL/ COMMUNITY PROPERTY USE AND COARSE TEXTURED SOILS

~ - INDICATES FIELD DUPLICATE SAMPLE
mbgs - METRES BELOW GROUND SURFACE
ALL RESULTS IN UNITS OF µg/g UNLESS OTHERWISE NOTED
NA - NOT ANALYZED.

LOCATION WHERE SAMPLE IS WITHIN O.REG. 153/04 TABLE 2 STANDARDS FOR ALL PARAMETERS ANALYZED IS SHOWN IN GREEN
LOCATION WHERE SAMPLE EXCEEDS O.REG. 153/04 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN RED
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **RED BOLD**
CONCENTRATION OF CONTAMINANT WITHIN TABLE 2 STANDARD SHOWN IN TEXT AS GREEN

THE SAMPLES WITH EXCEEDANCES OF THE TABLE 2 STANDARD THAT WERE REMEDIATED VIA SOIL EXCAVATION (T. HARRIS, 2018-2020) ARE SHOWN IN GREY BOXES

BTEX - BENZENE, TOLUENE, ETHYLBENZENE, XYLENES

CROSS SECTIONS C-C' AND D-D' SOIL ANALYTICAL RESULTS - PETROLEUM HYDROCARBONS AND BTEX

FIGURE 10A

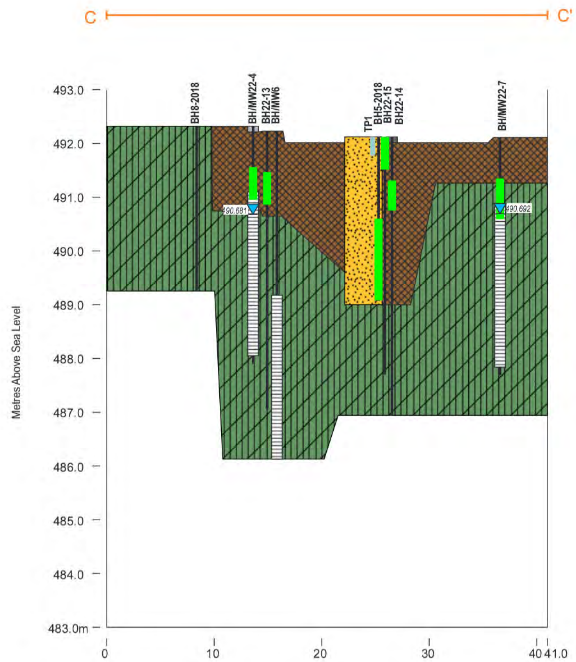
420 VICTORIA STREET, SHELBURNE, ONTARIO

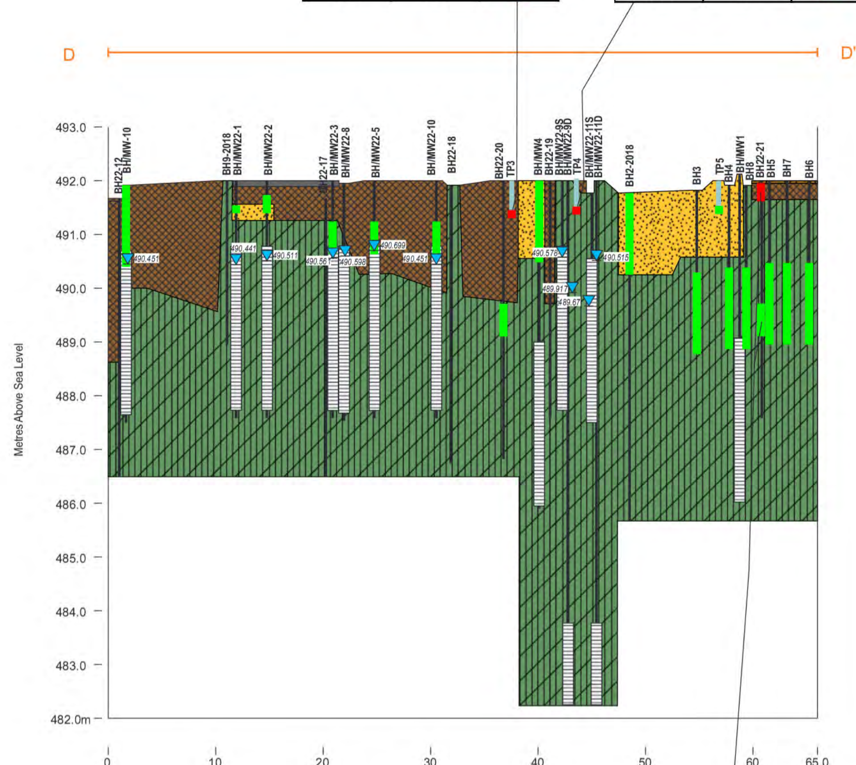
PROJECT NUMBER: 21020239 | DATE: JANUARY 2024

21020239-PH2 SEC C_D-JAN24: SOIL-BTEX

TP3		20-Dec-19
Sample	Depth (mbgs)	Zn
TP3-1	0.63	**676**

TP4		20-Dec-19
Sample	Depth (mbgs)	Zn
TP4-1	0.66	**398**





BH22-21		7-Jul-22
Sample	Depth (mbgs)	Zn
BH22-21-SS1B	0.05 - 0.61	**446**
BH22-21-SS4	2.29 - 2.90	31

Parameter	Abbreviation	Table 2 Soil Standards*
Zinc	Zn	340

SCALE:
5 x VERTICAL EXAGGERATION

SOURCE:
BASED ON FIELD MEASUREMENTS BY EXP STAFF

DRAWN BY	CHECKED BY
K.G.	A.F.

exp.

LEGEND:

- TEST HOLE
- SCREEN INTERVAL
- TEST PIT
- GROUND WATER ELEVATION (DATE MEASURED - JULY 20, 21 2022)
- CONCRETE
- ASPHALT
- TOPSOIL
- FILL
- SILTY SAND/SAND
- CLAYEY SILT/SILTY CLAY/CLAY/SILT TILL

As = ARSENIC,
Sb = ANTIMONY,
Se = SELENIUM

* STANDARDS APPLIED ARE FOR INDUSTRIAL/ COMMERCIAL/ COMMUNITY PROPERTY USE AND COARSE TEXTURED SOILS

~ INDICATES FIELD DUPLICATE SAMPLE
mbgs - METRES BELOW GROUND SURFACE
ALL RESULTS IN UNITS OF µg/g UNLESS OTHERWISE NOTED
NA - NOT ANALYZED.

LOCATION WHERE SAMPLE IS WITHIN O.REG. 153/04 TABLE 2 STANDARDS FOR ALL PARAMETERS ANALYZED IS SHOWN IN GREEN
LOCATION WHERE SAMPLE EXCEEDS O.REG. 153/04 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN RED
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **RED BOLD**
CONCENTRATION OF CONTAMINANT WITHIN TABLE 2 STANDARD SHOWN IN TEXT AS GREEN

CROSS SECTIONS C-C' AND D-D' SOIL ANALYTICAL RESULTS – METALS (INCLUDING As, Sb, Se)

FIGURE 10B

420 VICTORIA STREET, SHELBURNE, ONTARIO

PROJECT NUMBER: 21020239 DATE: JANUARY 2024

21020239-PH2 SEC C_D-JAN24: SOIL-MET

TP1			20-Dec-19
Sample	Depth (mbgs)	EC	SAR
TP1-2	0.35	**2.58**	**37.4**

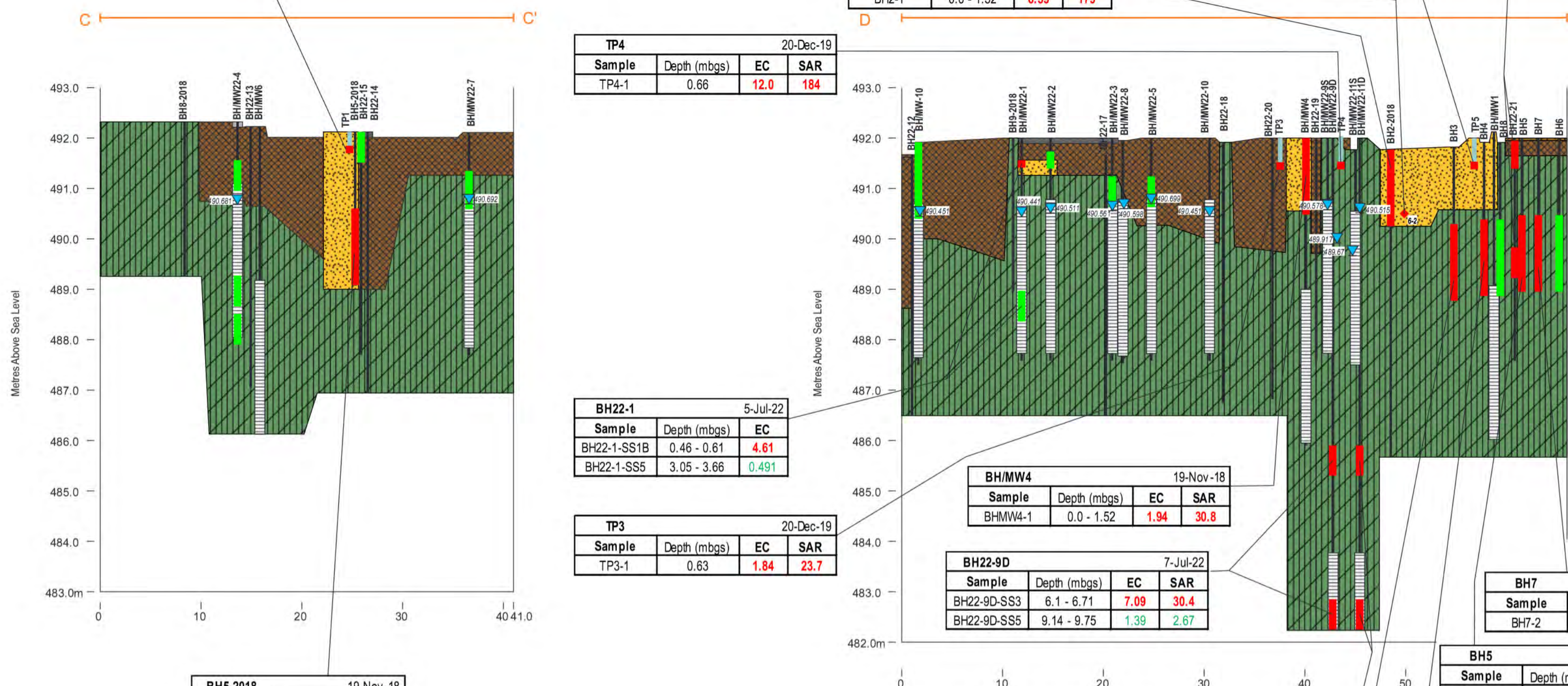
6-2			5-Mar-20
Sample	Depth (mbgs)	EC	SAR
6-2	1.50	**7.86**	**161**

TP5			20-Dec-19
Sample	Depth (mbgs)	EC	SAR
TP5-1	0.62	**14.0**	**248**

BH22-21			7-Jul-22
Sample	Depth (mbgs)	EC	SAR
BH22-21-SS1B	0.05 - 0.61	**4.08**	**55.8**
BH22-21-SS4	2.29 - 2.90	**2.35**	**48.2**

BH2-2018			19-Nov-18
Sample	Depth (mbgs)	EC	SAR
BH2-1	0.0 - 1.52	**6.59**	**179**

TP4			20-Dec-19
Sample	Depth (mbgs)	EC	SAR
TP4-1	0.66	**12.0**	**184**



BH22-1		5-Jul-22
Sample	Depth (mbgs)	EC
BH22-1-SS1B	0.46 - 0.61	**4.61**
BH22-1-SS5	3.05 - 3.66	0.491

BH/MW4			19-Nov-18
Sample	Depth (mbgs)	EC	SAR
BHMW4-1	0.0 - 1.52	**1.94**	**30.8**

TP3			20-Dec-19
Sample	Depth (mbgs)	EC	SAR
TP3-1	0.63	**1.84**	**23.7**

BH22-9D			7-Jul-22
Sample	Depth (mbgs)	EC	SAR
BH22-9D-SS3	6.1 - 6.71	**7.09**	**30.4**
BH22-9D-SS5	9.14 - 9.75	1.39	2.67

BH7			23-Mar-20
Sample	Depth (mbgs)	EC	SAR
BH7-2	1.52 - 3.05	**2.02**	**48.4**

BH5			23-Mar-20
Sample	Depth (mbgs)	EC	SAR
BH5-2	1.52 - 3.05	**3.18**	**88.1**

BH5-2018		19-Nov-18
Sample	Depth (mbgs)	SAR
BH5-2	1.52 - 3.05	**15.0**

BH22-11D			8-Jul-22
Sample	Depth (mbgs)	EC	SAR
BH22-11D-SS3	6.1 - 6.71	**5.72**	**30.7**
BH22-11D-SS5	9.14 - 9.75	**2.68**	5.78

BH4			23-Mar-20
Sample	Depth (mbgs)	EC	SAR
BH4-2	1.52 - 3.05	**4.88**	**134**

BH3			23-Mar-20
Sample	Depth (mbgs)	EC	SAR
BH3-2	1.52 - 3.05	**3.77**	**102**

Parameter	Abbreviation	Table 2 Soil Standards*
Electrical Conductivity	EC	1.4 mS/cm
Sodium Adsorption Ratio	SAR	12

SCALE:
5 x VERTICAL EXAGGERATION

SOURCE:
BASED ON FIELD MEASUREMENTS BY EXP STAFF

DRAWN BY	CHECKED BY
K.G.	A.F.

exp.

LEGEND:
- TEST HOLE
- SCREEN INTERVAL
- TEST PIT
- GROUND WATER ELEVATION (DATE MEASURED - JULY 20, 21 2022)
- CONCRETE
- ASPHALT
- TOPSOIL
- FILL
- SILTY SAND/SAND
- CLAYEY SILT/SILTY CLAY/CLAY/SILT TILL

EC – ELECTRICAL CONDUCTIVITY
SAR – SODIUM ADSORPTION RATIO

* STANDARDS APPLIED ARE FOR INDUSTRIAL/ COMMERCIAL/ COMMUNITY PROPERTY USE AND COARSE TEXTURED SOILS

~ - INDICATES FIELD DUPLICATE SAMPLE
mbgs - METRES BELOW GROUND SURFACE
EC IN UNITS OF mS/cm; SAR IS UNITLESS.
NA - NOT ANALYZED.

LOCATION WHERE SAMPLE IS WITHIN O.REG. 153/04 TABLE 2 STANDARDS FOR ALL PARAMETERS ANALYZED IS SHOWN IN GREEN
LOCATION WHERE SAMPLE EXCEEDS O.REG. 153/04 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN RED
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **RED BOLD**
CONCENTRATION OF CONTAMINANT WITHIN TABLE 2 STANDARD SHOWN IN TEXT AS GREEN
LOCATION WHERE SAMPLE MEET O.REG. 153/04 TABLE 2
CONCENTRATION OF CONTAMINANT MEET O.REG. 153/04 TABLE 2

CROSS SECTIONS C-C' AND D-D' SOIL ANALYTICAL RESULTS – EC AND SAR

FIGURE 10C

420 VICTORIA STREET, SHELBURNE, ONTARIO

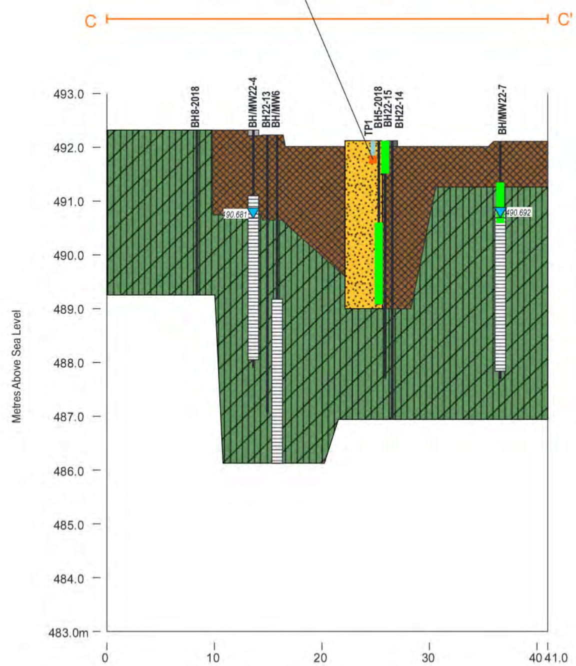
PROJECT NUMBER: 21020239 DATE: JANUARY 2024

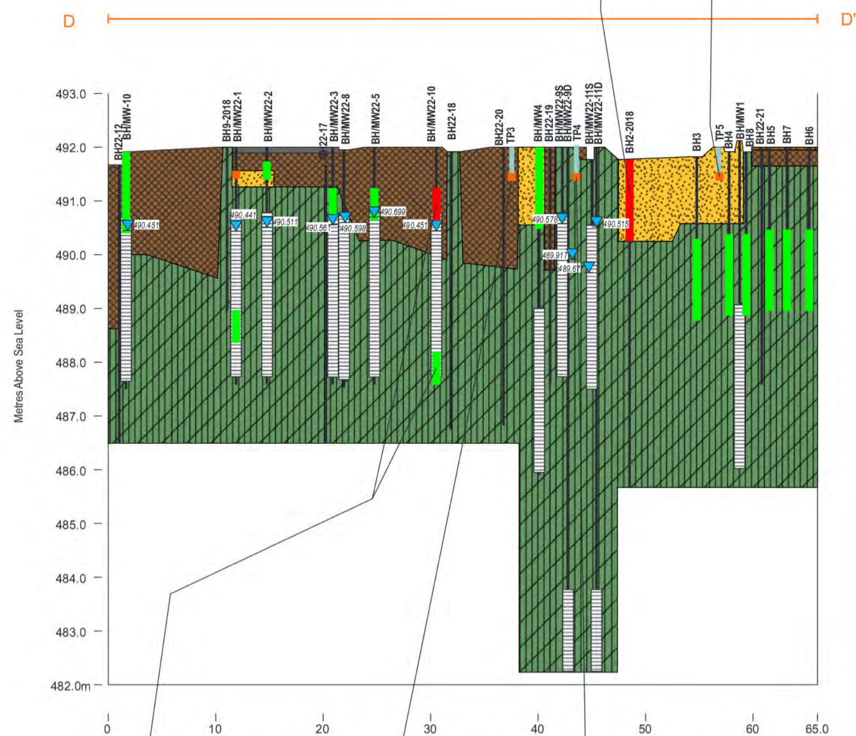
21020239-PH2 SEC C_D-JAN24: SOIL-EC&SAR

TP1			20-Dec-19
Sample	Depth (mbgs)	CN-	B-HWS
TP1-2	0.35	<0.1	2.5

BH2-2018		19-Nov-18
Sample	Depth (mbgs)	CN-
BH2-1	0.0 - 1.52	0.07

TP5		20-Dec-19
Sample	Depth (mbgs)	CN-
TP5-1	0.62	<0.2





BH22-10		4-Jul-22
Sample	Depth (mbgs)	B-HWS
BH22-10-SS2	0.76 - 1.37	2.62
BH22-10-SS6	3.81 - 4.42	0.1

TP3		20-Dec-19
Sample	Depth (mbgs)	CN-
TP3-1	0.63	<0.1

TP4		20-Dec-19
Sample	Depth (mbgs)	CN-
TP4-1	0.66	<0.1

Parameter	Abbreviation	Table 2 Soil Standards*
Hot water-soluble Boron	B-HWS	2 µg/g
Cyanide	CN-	0.051 µg/g

SCALE:
5 x VERTICAL EXAGGERATION

SOURCE:
BASED ON FIELD MEASUREMENTS BY EXP STAFF

DRAWN BY	CHECKED BY
K.G.	A.F.

exp.

LEGEND:
- TEST HOLE
- SCREEN INTERVAL
- TEST PIT
- GROUND WATER ELEVATION (DATE MEASURED - JULY 20, 21 2022)
- CONCRETE
- ASPHALT
- TOPSOIL
- FILL
- SILTY SAND/SAND
- CLAYEY SILT/SILTY CLAY/CLAY/SILT TILL

HWS-B = HOT WATER SOLUBLE BORON,
CN- = CYANIDE,
Cr(VI) = HEXAVALENT CHROMIUM,
Hg = MERCURY

* STANDARDS APPLIED ARE FOR INDUSTRIAL/ COMMERCIAL/ COMMUNITY PROPERTY USE AND COARSE TEXTURED SOILS

~ - INDICATES FIELD DUPLICATE SAMPLE
mbgs - METRES BELOW GROUND SURFACE
EC IN UNITS OF mS/cm; SAR IS UNITLESS.
NA - NOT ANALYZED.

THE SAMPLES WITH EXCEEDANCES OF THE TABLE 2 STANDARD THAT WERE REMEDIATED VIA SOIL EXCAVATION (T. HARRIS, 2018-2020) ARE SHOWN IN GREY BOXES

LOCATION WHERE SAMPLE IS WITHIN O.REG. 153/04 TABLE 2 STANDARDS FOR ALL PARAMETERS ANALYZED IS SHOWN IN GREEN
LOCATION WHERE SAMPLE EXCEEDS O.REG. 153/04 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN RED
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **RED BOLD**
CONCENTRATION OF CONTAMINANT WITHIN TABLE 2 STANDARD SHOWN IN TEXT AS GREEN
LOCATION WHERE SAMPLE MEET O.REG. 153/04 TABLE 2 LOCATION WHERE THE LABORATORY RDL FOR THE SOIL SAMPLE EXCEEDS O.REG. 153/02 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN ORANGE.
CONCENTRATION OF CONTAMINANT MEET O.REG. 153/04 TABLE 2 THE LABORATORY RDL EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **ORANGE BOLD**.

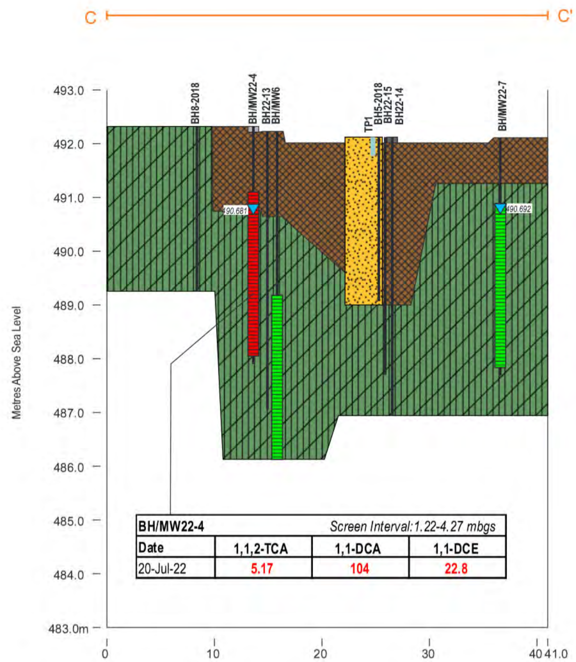
CROSS SECTIONS C-C' AND D-D' SOIL ANALYTICAL RESULTS – HWS-B, Hg, CN-, AND Cr(VI)

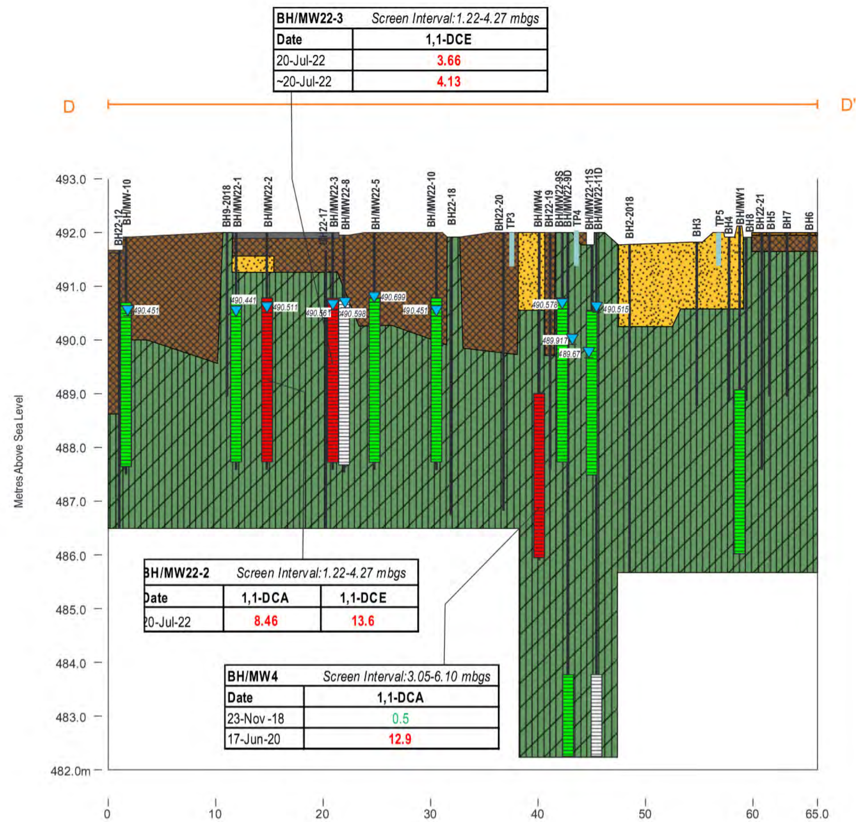
FIGURE
10D

420 VICTORIA STREET, SHELBURNE, ONTARIO

PROJECT NUMBER: 21020239 | DATE: JANUARY 2024

21020239-PH2 SEC C_D-JAN24: SOIL-ORP





Parameter	Abbreviation	Table 2 Ground Water Standards*
1,1,1-Trichloroethane	1,1,1-TCA	4.7
1,1-Dichloroethane	1,1-DCA	5
1,1-Dichloroethylene	1,1-DCE	2

SCALE:
5 x VERTICAL EXAGGERATION

SOURCE:
BASED ON FIELD MEASUREMENTS BY EXP STAFF

DRAWN BY	CHECKED BY
K.G.	A.F.

exp.

LEGEND:
- TEST HOLE
- SCREEN INTERVAL
- TEST PIT
- GROUND WATER ELEVATION (DATE MEASURED - JULY 20, 21 2022)
- CONCRETE
- ASPHALT
- TOPSOIL
- FILL
- SILTY SAND/SAND
- CLAYEY SILT/SILTY CLAY/CLAY/SILT TILL

*STANDARDS APPLIED ARE FOR ALL PROPERTY USE AND COARSE TEXTURED SOILS

~ - INDICATES FIELD DUPLICATE SAMPLE
mbgs - METRES BELOW GROUND SURFACE
ALL RESULTS IN UNITS OF µg/L UNLESS OTHERWISE NOTED
NA - NOT ANALYZED.

LOCATION WHERE GROUND WATER SAMPLE IS WITHIN O.REG. 153/04 TABLE 2 STANDARDS FOR ALL PARAMETERS ANALYZED IS SHOWN IN GREEN
LOCATION WHERE GROUND WATR SAMPLE EXCEEDS O.REG. 153/04 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN RED
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **RED BOLD**
CONCENTRATION OF CONTAMINANT WITHIN TABLE 2 STANDARD SHOWN IN TEXT AS GREEN.

CROSS SECTIONS C-C' AND D-D' GROUND WATER ANALYTICAL RESULTS - VOLATILE ORGANIC COMPOUNDS

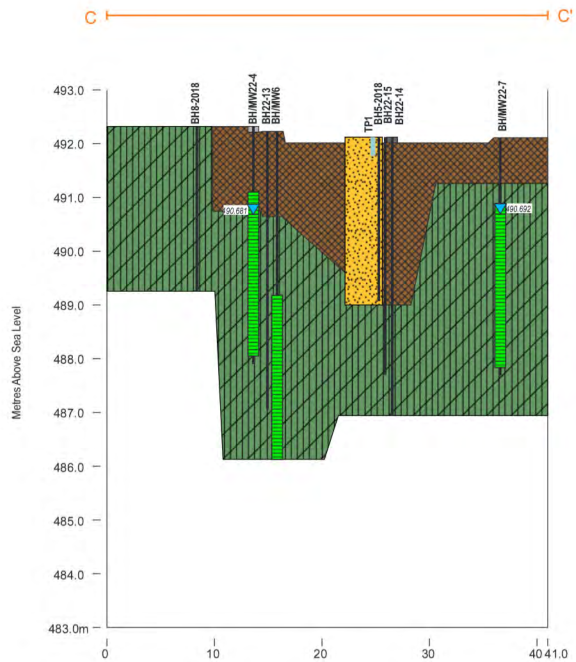
FIGURE 11A

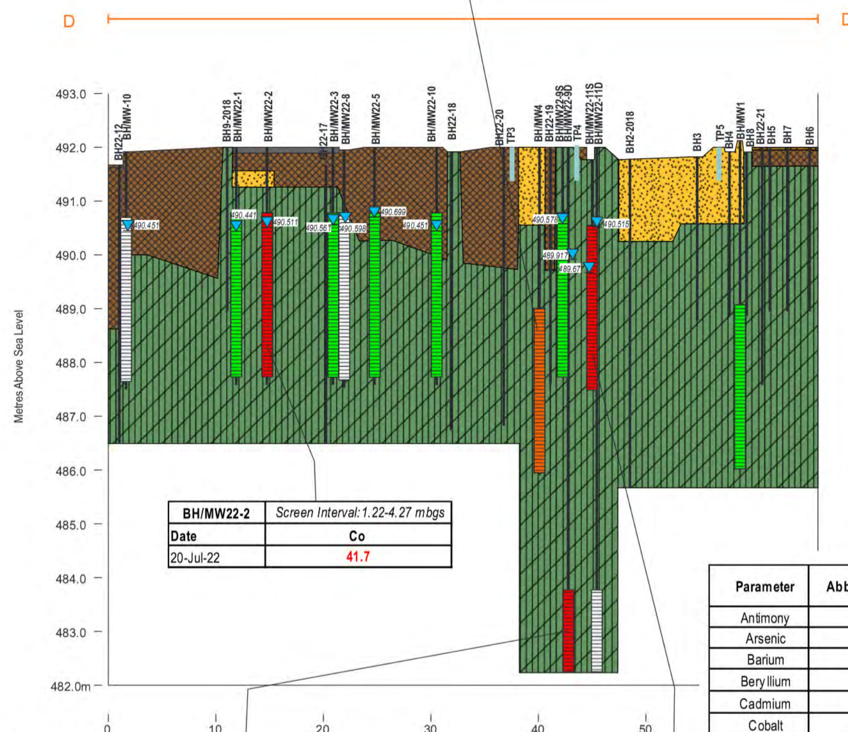
420 VICTORIA STREET, SHELBURNE, ONTARIO

PROJECT NUMBER: 21020239 | DATE: JANUARY 2024

21020239-PH2 SEC C_D-JAN24: GW-VOC

BH/MW4													Screen Interval:3.05-6.10 mbgs
Date	Sb	As	Be	Cd	Co	Pb	Mo	Ni	Se	Ag	Tl	U	V
23-Nov-18	<20	<50	<20	<5	<10	<50	<200	<200	<50	<5	<5	<50	<50
17-Jun-20	<10	<20	<5	<2	**4**	<10	<100	<50	<20	<2	<1	<10	<10





BH/MW22-2	Screen Interval:1.22-4.27 mbgs
Date	Co
20-Jul-22	**41.7**

BH/MW22-9D	Screen Interval:8.23 - 9.75 mbgs
Date	Ba
20-Jul-22	**3,740**

BH/MW22-11S	Screen Interval:1.22 - 4.27 mbgs
Date	Se
21-Jul-22	**25.4**
~21-Jul-22	**11.6**

Parameter	Abbreviation	Table 2 Ground Water Standards*
Antimony	Sb	6
Arsenic	As	25
Barium	Ba	1000
Beryllium	Be	4
Cadmium	Cd	2.7
Cobalt	Co	3.8
Lead	Pb	10
Molybdenum	Mo	70
Nickel	Ni	100
Selenium	Se	10
Silver	Ag	1.5
Thallium	Tl	2
Uranium	U	20
Vanadium	V	6.2

SCALE:
5 x VERTICAL EXAGGERATION

SOURCE:
BASED ON FIELD MEASUREMENTS BY EXP STAFF

DRAWN BY	CHECKED BY
K.G.	A.F.

exp.

LEGEND:

- TEST HOLE
- SCREEN INTERVAL
- TEST PIT
- GROUND WATER ELEVATION (DATE MEASURED - JULY 20, 21 2022)
- CONCRETE
- ASPHALT
- TOPSOIL
- FILL
- SILTY SAND/SAND
- CLAYEY SILT/SILTY CLAY/CLAY/SILT TILL

As = ARSENIC,
Sb = ANTIMONY,
Se = SELENIUM

*STANDARDS APPLIED ARE FOR ALL PROPERTY USE AND COARSE TEXTURED SOILS

~ - INDICATES FIELD DUPLICATE SAMPLE
mbgs - METRES BELOW GROUND SURFACE
ALL RESULTS IN UNITS OF µg/L UNLESS OTHERWISE NOTED
NA - NOT ANALYZED.

LOCATION WHERE GROUND WATER SAMPLE IS WITHIN O.REG. 153/04 TABLE 2 STANDARDS FOR ALL PARAMETERS ANALYZED IS SHOWN IN GREEN
LOCATION WHERE GROUND WATR SAMPLE EXCEEDS O.REG. 153/04 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN RED
LOCATION WHERE THE LABORATORY RDL FOR THE SOIL SAMPLE EXCEEDS O.REG. 153/02 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN ORANGE.
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **RED BOLD**
CONCENTRATION OF CONTAMINANT WITHIN TABLE 2 STANDARD SHOWN IN TEXT AS GREEN
THE LABORATORY RDL EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **ORANGE BOLD**.

CROSS SECTIONS C-C' AND D-D' GROUND WATER ANALYTICAL RESULTS – METALS (INCLUDING HYDRIDE-FORMING METALS)

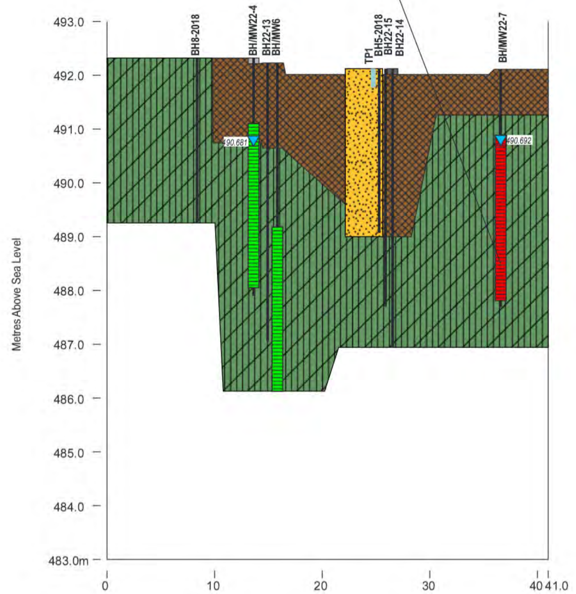
FIGURE 11B

420 VICTORIA STREET, SHELBURNE, ONTARIO

PROJECT NUMBER: 21020239 | DATE: JANUARY 2024

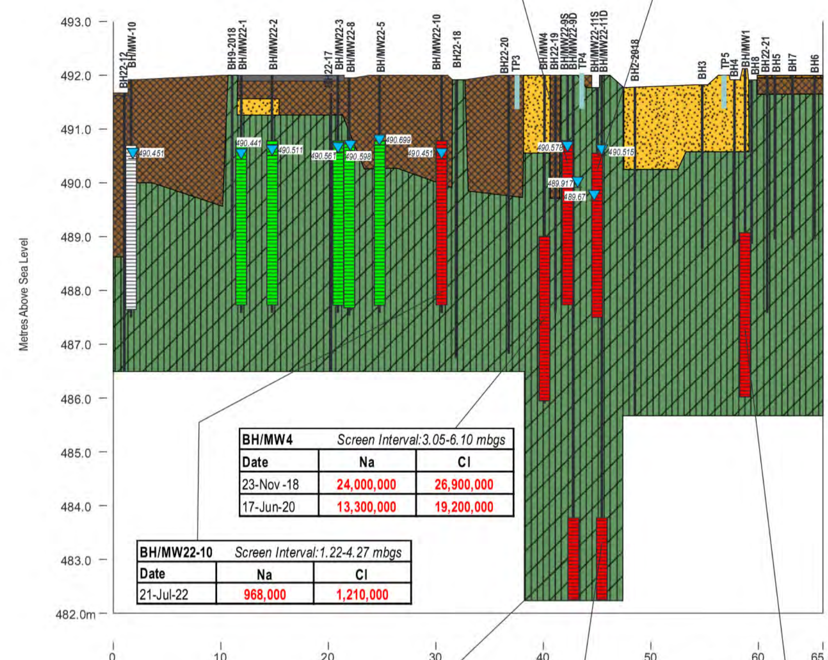
21020239-PH2 SEC C_D-JAN24: GW-MET

BH/MW22-7	*Screen Interval:1.22 - 4.27 mbgs*
Date	Na
21-Jul-22	**556,000**



BH/MW22-9S	*Screen Interval:1.22-4.27 mbgs*	
Date	Na	Cl
20-Jul-22	**2,640,000**	**3,860,000**

BH/MW22-11S	*Screen Interval:1.22-4.27 mbgs*	
Date	Na	Cl
21-Jul-22	**31,900,000**	**44,100,000**



BH/MW4	*Screen Interval:3.05-6.10 mbgs*	
Date	Na	Cl
23-Nov-18	**24,000,000**	**26,900,000**
17-Jun-20	**13,300,000**	**19,200,000**

BH/MW22-10	*Screen Interval:1.22-4.27 mbgs*	
Date	Na	Cl
21-Jul-22	**968,000**	**1,210,000**

BH/MW22-9D	*Screen Interval:8.23-9.75 mbgs*	
Date	Na	Cl
20-Jul-22	**6,860,000**	**17,500,000**

BH/MW1	*Screen Interval:3.05-6.10 mbgs*
Date	Cl
23-Nov-18	**977,000**

BH/MW22-11D	*Screen Interval:8.23-9.75 mbgs*	
Date	Na	Cl
21-Jul-22	**40,300,000**	**56,500,000**

Parameter	Abbreviation	Table 2 Ground Water Standards*
Sodium	Na	490,000
Chloride	Cl	790,000

SCALE:
5 x VERTICAL EXAGGERATION

SOURCE:
BASED ON FIELD MEASUREMENTS BY EXP STAFF

DRAWN BY	CHECKED BY
K.G.	A.F.

exp.

LEGEND:

- TEST HOLE
- SCREEN INTERVAL
- TEST PIT
- GROUND WATER ELEVATION (DATE MEASURED - JULY 20, 21 2022)
- CONCRETE
- ASPHALT
- TOPSOIL
- FILL
- SILTY SAND/SAND
- CLAYEY SILT/SILTY CLAY/CLAY/SILT TILL

NA = SODIUM,
CL = CHLORIDE

* STANDARDS APPLIED ARE FOR ALL PROPERTY USE AND COARSE TEXTURED SOILS

~ - INDICATES FIELD DUPLICATE SAMPLE
mbgs - METRES BELOW GROUND SURFACE
ALL RESULTS IN UNITS OF µg/L UNLESS OTHERWISE NOTED
NA - NOT ANALYZED.

LOCATION WHERE GROUND WATER SAMPLE IS WITHIN O.REG. 153/04 TABLE 2 STANDARDS FOR ALL PARAMETERS ANALYZED IS SHOWN IN GREEN
LOCATION WHERE GROUND WATR SAMPLE EXCEEDS O.REG. 153/04 TABLE 2 STANDARDS FOR AT LEAST ONE PARAMETER IS SHOWN IN RED
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 2 STANDARD SHOWN IN TEXT AS **RED BOLD**
CONCENTRATION OF CONTAMINANT WITHIN TABLE 2 STANDARD SHOWN IN TEXT AS GREEN
LOCATION WHERE SAMPLE MEET O.REG. 153/04 TABLE 2 STANDARDS AS PER SECTION 49.1 (1) OF O. REG. 153/04 IS SHOWN IN PURPLE
CONCENTRATION OF CONTAMINANT MEET O.REG. 153/04 TABLE 2 STANDARDS AS PER SECTION 49.1 (1) OF O. REG. 153/04 SHOWN TEXT IN **PURPLE BOLD**

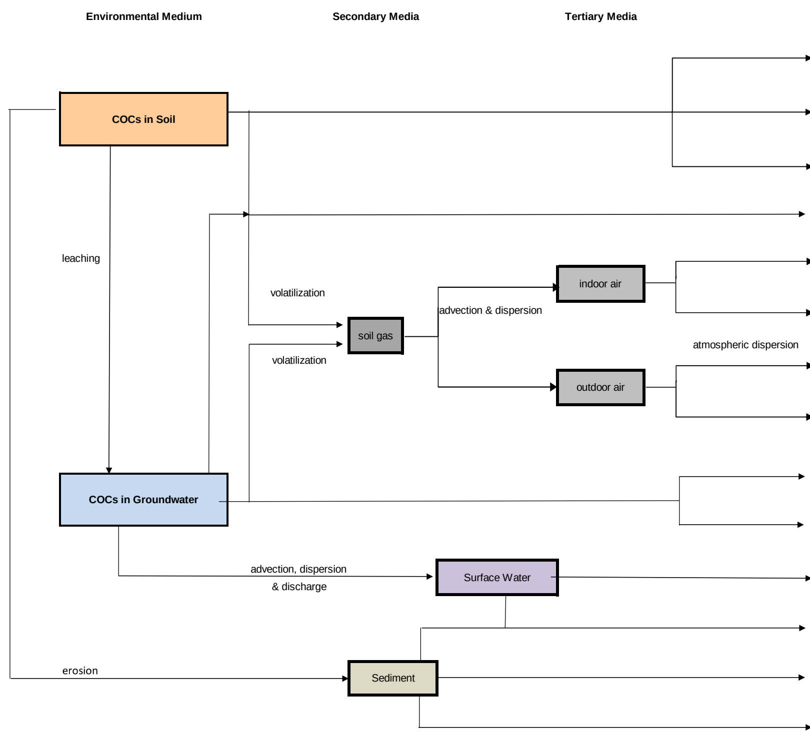
CROSS SECTIONS C-C' AND D-D' GROUND WATER ANALYTICAL RESULTS – SODIUM AND CHLORIDE

FIGURE 11C

420 VICTORIA STREET, SHELBURNE, ONTARIO

PROJECT NUMBER: 21020239 | DATE: JANUARY 2024

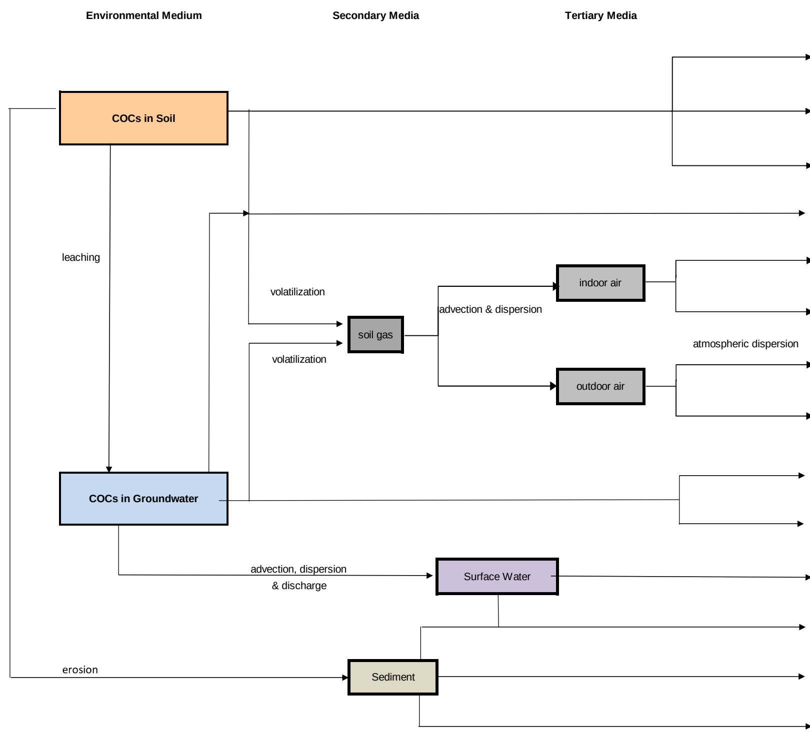
21020239-PH2 SEC C_D-JAN24: GW-Na CL



Receptor/Exposure Pathway	On-Site: Property Visitors/ Property Trespassers - Toddler and Lifetime Composite	On-Site: Indoor Long Term Worker	On-Site: Outdoor Long Term (Maintenance) Worker	On-Site: Construction/ Subsurface Worker
Soil particulate inhalation	V		V	V
Soil dermal contact	V		V	V
Incidental soil ingestion	V		V	V
Ingestion of homegrown garden produce				
Indoor air inhalation	V	V		
Vapour skin contact	V	V		
Vapour skin contact	V		V	V
Outdoor/trench air inhalation	V		V	V
Groundwater dermal contact	V	V		V
Groundwater ingestion	V	V		V
Incidental ingestion and dermal contact of surface water				
Ingestion of fish				
dermal contact				
Incidental ingestion				

Legend:

	Pathway is incomplete
V	Pathway is complete

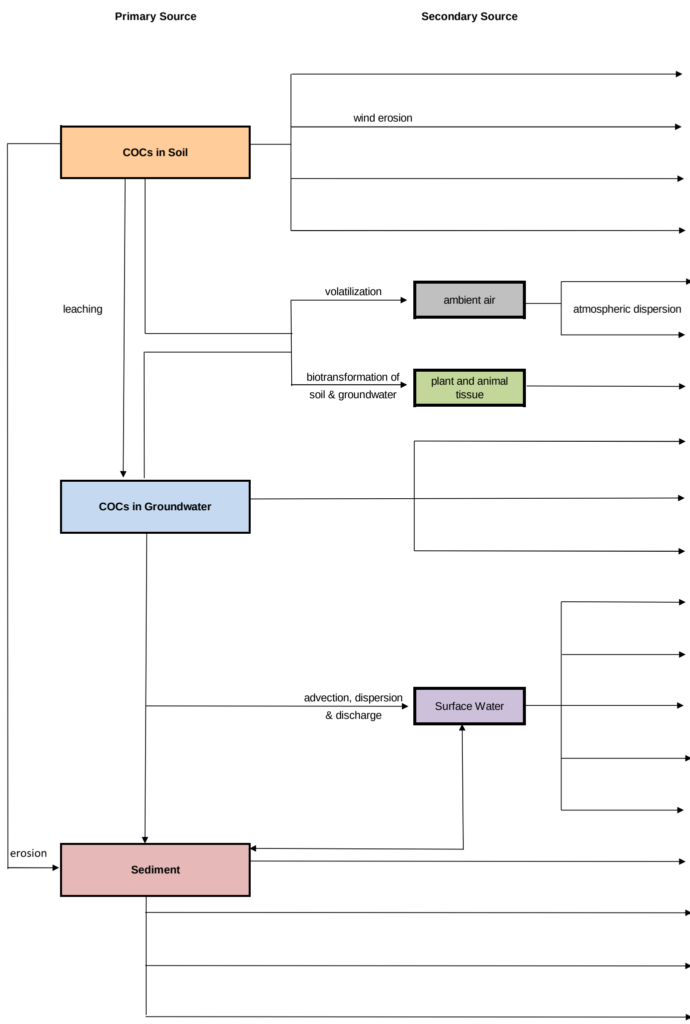


Receptor/Exposure Pathway	On-Site			
	Property Visitors/ Property Trespassers - Toddler and Lifetime Composite	Indoor Long Term Worker	Outdoor Long Term (Maintenance) Worker	Construction/ Subsurface Worker
Soil particulate inhalation	--		--	--
Soil dermal contact	--		--	--
Incidental soil ingestion	--		--	--
Ingestion of homegrown garden produce				
Indoor air inhalation	--	--		
Vapour skin contact	--	--		
Vapour skin contact	--		--	--
Outdoor/trench air inhalation	--		--	--
Groundwater dermal contact	x[1]	x[1]		--
Groundwater ingestion	x[1]	x[1]		--
Incidental ingestion and dermal contact of surface water				
Ingestion of fish				
dermal contact				
Incidental ingestion				

RMM recommended on-Site:
1) Restriction of Potable Water Use
2) A Soil and Groundwater Management Plan to be implemented during Site redevelopment.

Legend:

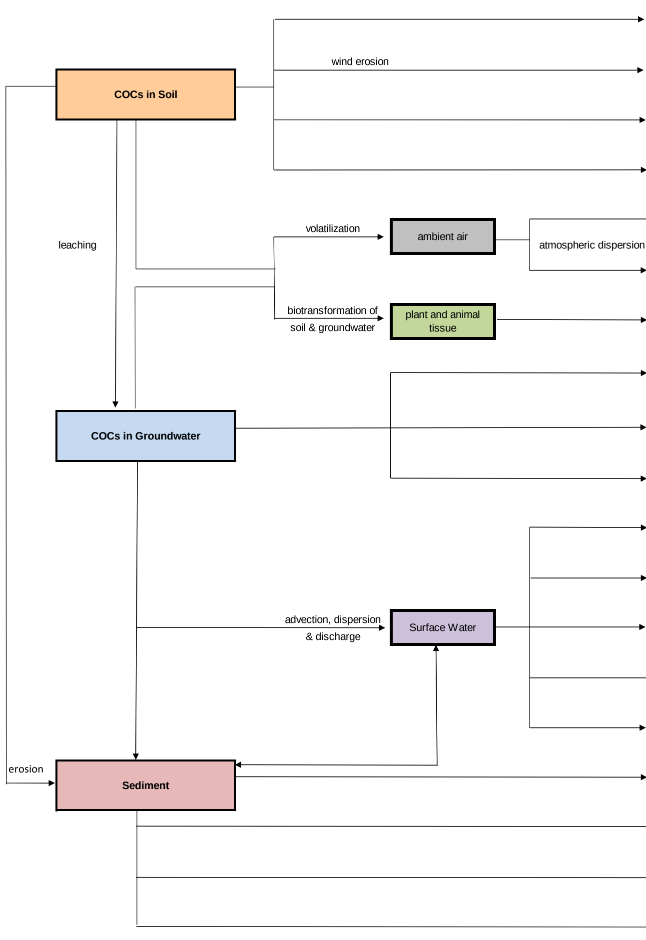
(black)	Pathway is incomplete
x	Pathway is blocked by RMM
--	Pathway is complete but unacceptable risks are not anticipated



Receptor/Exposure Pathway	Terrestrial (On-Site): terrestrial vegetation	Terrestrial (On-Site): soil invertebrates	Terrestrial (On-Site): terrestrial birds and mammals	Aquatic (Off-Site): aquatic vegetation	Aquatic (Off-Site): aquatic invertebrates	Aquatic (Off-Site): aquatic birds and mammals	Aquatic (Off-Site): amphibians	Aquatic (Off-Site): fish
root uptake/contact	V							
soil particle inhalation			V					
dermal contact		V	V					
incidental ingestion		V	V					
stem and foliar uptake	V							
vapour inhalation		V	V					
ingestion of plant and animal tissue		V	V					
root uptake/contact	V							
dermal contact								
incidental ingestion								
root, stem and foliar uptake of surface water				V				
surface water dermal contact					V	V	V	V
surface water ingestion					V	V	V	V
ingestion of plant and animal tissue					V	V	V	V
gill uptake					V		V	V
Stem and Foliar Uptake								
Direct Contact/ Root Uptake								
Direct Contact								
Incidental Ingestion								

Legend:

(black)	Pathway is incomplete
V	Pathway is complete



Receptor/Exposure Pathway	Terrestrial (On-Site): terrestrial vegetation	Terrestrial (On-Site): soil invertebrates	Terrestrial (On-Site): terrestrial birds and mammals	Aquatic (Off-Site): aquatic vegetation	Aquatic (Off-Site): aquatic invertebrates	Aquatic (Off-Site): aquatic birds and mammals	Aquatic (Off-Site): amphibians	Aquatic (Off-Site): fish
root uptake/contact	x(1)							
soil particle inhalation			--					
dermal contact		x(1)	--					
incidental ingestion		x(1)	--					
stem and foliar uptake	--							
vapour inhalation		--	--					
ingestion of plant and animal tissue		--	--					
root uptake/contact								
dermal contact								
incidental ingestion								
root, stem and foliar uptake of surface water				--				
surface water dermal contact					--	--	--	--
surface water ingestion					--	--	--	--
ingestion of plant and animal tissue					--	--	--	--
gill uptake					--		--	--
Stem and Foliar Uptake								
Direct Contact/ Root Uptake								
Direct Contact								
Incidental Ingestion								

RMM required on-Site:
1) Hard cap or fill cap (required in a future Site redevelopment scenario).
2) A Soil and Groundwater Management Plan to be implemented during Site redevelopment.

Legend:

(black cell)	Pathway is incomplete
x	Pathway is blocked by RMM
--	Pathway is complete but unacceptable risks are not anticipated or RMM are not deemed necessary

Tables

Table 1A: Petroleum Hydrocarbons (PHCs) and Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) in Soil

Parameter	Table 2 SCS for I/C/C with Coarse Textured Soil	Units	RDL					
Sample ID				BHMW4-2	BHMW4-3	BH5-1	BH5-2	BHMW6-1
Sample Depth (mbgs)				1.52 - 3.05	3.05 - 4.57	0 - 1.52	1.52 -3.05	0 - 1.52
Lab Work Number				1821180	1821180	1821180	1821180	1821180
Lab ID				1400613	1400614	1400615	1400616	1400617
Sample Collection Date				11/19/2018	11/19/2018	11/19/2018	11/19/2018	11/19/2018
Petroleum Hydrocarbons								
F1 (C6-C10)	55	ug/g	5	<10	<10	10	<10	<10
F1 (C6-C10) - BTEX	55	ug/g	5	<10	<10	<10	<10	<10
F2 (C10-C16)	230	ug/g	10	<10	<10	<10	<10	<10
F3 (C16-C34)	1,700	ug/g	50	150	120	<20	60	<20
F4 (C34-C50)	3,300	ug/g	50	220	250	30	60	30
BTEX								
Benzene	0.32	ug/g	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	1.1	ug/g	0.05	<0.05	<0.05	0.08	<0.05	<0.05
Toluene	6.4	ug/g	0.05	<0.20	<0.20	<0.20	<0.20	<0.20
Xylene Mixture (Total)	26	ug/g	0.05	<0.05	<0.05	0.07	<0.05	<0.05

Legend	
To Be Announced	TBA
Exceeds the Criteria	**Result**
DL > Criteria	Result
Sample removed via remedial excavation	
Criteria	Reg153/04 T2-ICC-Coarse

Table 1A: Petroleum Hydrocarbons (PHCs) and Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) in Soil

Parameter	Table 2 SCS for I/C/C with Coarse Textured Soil	Units	RDL					
				Sample ID				
				Sample Depth (mbgs)				
				Lab Work Number				
				Lab ID				
				Sample Collection Date				
				BH8-1	BH9-2	BHMW10-3	BHMW12-2	TP 1-1
				0 - 1.52	1.52 -3.05	3.05 - 4.57	1.52 -3.05	0.63 (Floor)
				1821180	1821180	1821180	1821180	1923129
				1400619	1400621	1400624	1400625	1473267
				11/19/2018	11/19/2018	11/19/2018	11/19/2018	12/20/2019
Petroleum Hydrocarbons								
F1 (C6-C10)	55	ug/g	5	<10	<10	<10	30	<10
F1 (C6-C10) - BTEX	55	ug/g	5	<10	<10	<10	30	<10
F2 (C10-C16)	230	ug/g	10	<10	<10	<10	<10	<10
F3 (C16-C34)	1,700	ug/g	50	<20	<20	50	<20	20
F4 (C34-C50)	3,300	ug/g	50	40	30	60	40	30
BTEX								
Benzene	0.32	ug/g	0.02	<0.02	<0.02	<0.02	0.03	<0.02
Ethylbenzene	1.1	ug/g	0.05	<0.05	<0.05	<0.05	0.07	<0.05
Toluene	6.4	ug/g	0.05	<0.20	<0.20	<0.20	<0.20	<0.20
Xylene Mixture (Total)	26	ug/g	0.05	<0.05	<0.05	<0.05	0.16	<0.05

Legend	
To Be Announced	TBA
Exceeds the Criteria	**Result**
DL > Criteria	Result
Sample removed via remedial excavation	
Criteria	Reg153/04 T2-ICC-Coarse

Table 1A: Petroleum Hydrocarbons (PHCs) and Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) in Soil

Parameter	Table 2 SCS for I/C/C with Coarse Textured Soil	Units	RDL					
				Sample ID				
				Sample Depth (mbgs)				
				Lab Work Number				
				Lab ID				
				Sample Collection Date				
				TP 1-2	TP 2-1	1-5	3-2	3-3
				0.35 (Wall)	0.72 (Floor)	2.74	Unknown	Unknown
				1923129	1923129	1925963	1926236	1926236
				1473268	1473269	1481069	1481861	1481862
				12/20/2019	12/20/2019	2/20/2020	2/27/2020	2/27/2020
Petroleum Hydrocarbons								
F1 (C6-C10)	55	ug/g	5	<10	20	<10	10	<10
F1 (C6-C10) - BTEX	55	ug/g	5	<10	20	<10	<10	<10
F2 (C10-C16)	230	ug/g	10	<10	80	<10	<10	<10
F3 (C16-C34)	1,700	ug/g	50	260	250	<20	<20	<20
F4 (C34-C50)	3,300	ug/g	50	1300	400	<20	<20	<20
BTEX								
Benzene	0.32	ug/g	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	1.1	ug/g	0.05	<0.05	<0.05	<0.05	**1.25**	0.51
Toluene	6.4	ug/g	0.05	<0.20	<0.20	<0.20	<0.20	<0.20
Xylene Mixture (Total)	26	ug/g	0.05	<0.05	<0.05	<0.05	1.98	0.06

Legend	
To Be Announced	TBA
Exceeds the Criteria	**Result**
DL > Criteria	Result
Sample removed via remedial excavation	
Criteria	Reg153/04 T2-ICC-Coarse

Table 1A: Petroleum Hydrocarbons (PHCs) and Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) in Soil

Parameter	**Table 2 SCS for I/C/C with Coarse Textured Soil**	**Units**	**RDL**					
Sample ID				3-4	3-7	5-1	2-32	7-2
Sample Depth (mbgs)				Unknown	Unknown	Unknown	Unknown	Unknown
Lab Work Number				1926236	1926236	1926607	1926607	1926672
Lab ID				1481863	1481864	1483237	1483238	1483430
Sample Collection Date				2/27/2020	2/27/2020	3/4/2020	3/4/2020	3/5/2020
Petroleum Hydrocarbons								
F1 (C6-C10)	55	ug/g	5	<10	<10	<10	<10	<10
F1 (C6-C10) - BTEX	55	ug/g	5	<10	<10	<10	<10	<10
F2 (C10-C16)	230	ug/g	10	<10	<10	<10	20	<10
F3 (C16-C34)	1,700	ug/g	50	<20	<20	70	90	30
F4 (C34-C50)	3,300	ug/g	50	<20	<20	40	30	100
BTEX								
Benzene	0.32	ug/g	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	1.1	ug/g	0.05	<0.05	0.43	<0.05	<0.05	<0.05
Toluene	6.4	ug/g	0.05	<0.20	<0.20	<0.20	<0.20	<0.20
Xylene Mixture (Total)	26	ug/g	0.05	<0.05	0.16	<0.05	<0.05	<0.05

Legend	
To Be Announced	TBA
Exceeds the Criteria	**Result**
DL > Criteria	Result
Sample removed via remedial excavation	
Criteria	Reg153/04 T2-ICC-Coarse

Table 1A: Petroleum Hydrocarbons (PHCs) and Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) in Soil

Parameter	Table 2 SCS for I/C/C with Coarse Textured Soil	Units	RDL	FS-1 (wall)	FS-2 (floor)	FS-3 (wall)	FS-4 (wall)	FS-5 (wall)
Sample ID				FS-1 (wall)	FS-2 (floor)	FS-3 (wall)	FS-4 (wall)	FS-5 (wall)
Sample Depth (mbgs)				1.52	2.44	1.52	1.52	1.52
Lab Work Number				1819770	1819770	1819770	1819770	1819770
Lab ID				1396148	1396149	1396150	1396151	1396152
Sample Collection Date				10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018
Petroleum Hydrocarbons								
F1 (C6-C10)	55	ug/g	5	~~**200**~~	**490**	~~**90**~~	~~**440**~~	~~**440**~~
F1 (C6-C10) - BTEX	55	ug/g	5	~~**200**~~	**490**	~~**90**~~	~~**440**~~	~~**440**~~
F2 (C10-C16)	230	ug/g	10	~~**4,700**~~	180	~~**900**~~	~~**570**~~	~~**1,820**~~
F3 (C16-C34)	1,700	ug/g	50	~~**2,420**~~	90	~~720~~	~~390~~	~~1,310~~
F4 (C34-C50)	3,300	ug/g	50	~~150~~	60	~~180~~	~~120~~	~~40~~
BTEX								
Benzene	0.32	ug/g	0.02	~~<0.02~~	0.29	~~<0.02~~	~~<0.02~~	~~**3.34**~~
Ethylbenzene	1.1	ug/g	0.05	~~0.38~~	**5.49**	~~<0.05~~	~~**1.81**~~	~~**2.16**~~
Toluene	6.4	ug/g	0.05	~~<0.20~~	0.99	~~<0.20~~	~~<0.20~~	~~<0.20~~
Xylene Mixture (Total)	26	ug/g	0.05	~~0.62~~	21.9	~~0.11~~	~~0.93~~	~~16.5~~

Legend	
To Be Announced	TBA
Exceeds the Criteria	**Result**
DL > Criteria	Result
Sample removed via remedial excavation	
Criteria	Reg153/04 T2-ICC-Coarse

Table 1A: Petroleum Hydrocarbons (PHCs) and Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) in Soil

Parameter	Table 2 SCS for I/C/C with Coarse Textured Soil	Units	RDL	*Sample ID*				
				Sample Depth (mbgs)				
				Lab Work Number				
				Lab ID				
				Sample Collection Date				
				RCS-1 (floor)	RCS-3 (floor)	RCS-5 (wall)	RCS-6 (wall)	RCS-7 (wall)
				2	2.4	1.5	1.5	1.8
				1821797	1821797	1821797	1821797	1821797
				1402411	1402412	1402413	1402414	1402415
				11/30/2018	11/30/2018	11/30/2018	11/30/2018	11/30/2018
Petroleum Hydrocarbons								
F1 (C6-C10)	55	ug/g	5	<10	<10	**580**	<10	<10
F1 (C6-C10) - BTEX	55	ug/g	5	<10	<10	**530**	<10	<10
F2 (C10-C16)	230	ug/g	10	<10	<10	**410**	**490**	<10
F3 (C16-C34)	1,700	ug/g	50	<20	<20	40	30	<20
F4 (C34-C50)	3,300	ug/g	50	50	40	<20	<20	30
BTEX								
Benzene	0.32	ug/g	0.02	<0.02	0.02	**0.4**	<0.02	<0.02
Ethylbenzene	1.1	ug/g	0.05	<0.05	<0.05	**8.37**	0.11	<0.05
Toluene	6.4	ug/g	0.05	<0.20	<0.20	0.36	<0.20	<0.20
Xylene Mixture (Total)	26	ug/g	0.05	<0.05	<0.05	**43.1**	0.08	<0.05

Legend	
To Be Announced	TBA
Exceeds the Criteria	**Result**
DL > Criteria	Result
Sample removed via remedial excavation	
Criteria	Reg153/04 T2-ICC-Coarse

Table 1A: Petroleum Hydrocarbons (PHCs) and Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) in Soil

Parameter	**Table 2 SCS for I/C/C with Coarse Textured Soil**	**Units**	**RDL**					
Sample ID				RCS-8 (wall)	RCS-10 (wall)	S-1 (wall)	S-2 (wall)	S-3 (wall)
Sample Depth (mbgs)				1.8	1.8	1.8	2.4	1.8
Lab Work Number				1821797	1821797	1822175	1822175	1822175
Lab ID				1402416	1402417	1403474	1403475	1403476
Sample Collection Date				11/30/2018	11/30/2018	12/7/2018	12/7/2018	12/7/2018
Petroleum Hydrocarbons								
F1 (C6-C10)	55	ug/g	5	<10	<10	<10	**260**	30
F1 (C6-C10) - BTEX	55	ug/g	5	<10	<10	<10	**260**	30
F2 (C10-C16)	230	ug/g	10	<10	<10	<10	**480**	50
F3 (C16-C34)	1,700	ug/g	50	<20	<20	<20	240	30
F4 (C34-C50)	3,300	ug/g	50	<20	<20	<20	<20	<20
BTEX								
Benzene	0.32	ug/g	0.02	<0.02	<0.02	<0.02	0.08	**0.50**
Ethylbenzene	1.1	ug/g	0.05	<0.05	<0.05	<0.05	0.51	0.37
Toluene	6.4	ug/g	0.05	<0.20	<0.20	<0.20	<0.20	<0.20
Xylene Mixture (Total)	26	ug/g	0.05	<0.05	<0.05	<0.05	0.11	0.39

Legend	
To Be Announced	TBA
Exceeds the Criteria	**Result**
DL > Criteria	Result
Sample removed via remedial excavation	
Criteria	Reg153/04 T2-ICC-Coarse

Table 1A: Petroleum Hydrocarbons (PHCs) and Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) in Soil

Parameter	Table 2 SCS for I/C/C with Coarse Textured Soil	Units	RDL	*Sample ID*				
				Sample Depth (mbgs)				
				Lab Work Number				
				Lab ID				
				Sample Collection Date				
				S-4 (wall)	S-5 (wall)	FS-1 (wall)	FS-2 (wall)	FS-3 (wall)
				1.8	1.5	1.8	2.1	2.1
				1822175	1822175	1822343	1822343	1822343
				1403477	1403478	1403776	1403777	1403778
				12/7/2018	12/7/2018	12/11/2018	12/11/2018	12/11/2018
Petroleum Hydrocarbons								
F1 (C6-C10)	55	ug/g	5	<10	<10	<10	**420**	<10
F1 (C6-C10) - BTEX	55	ug/g	5	<10	<10	<10	**420**	<10
F2 (C10-C16)	230	ug/g	10	<10	<10	<10	**950**	20
F3 (C16-C34)	1,700	ug/g	50	<20	<20	<20	460	<20
F4 (C34-C50)	3,300	ug/g	50	<20	<20	<20	<20	<20
BTEX								
Benzene	0.32	ug/g	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	1.1	ug/g	0.05	0.09	<0.05	<0.05	0.29	<0.05
Toluene	6.4	ug/g	0.05	<0.20	<0.20	<0.20	<0.20	<0.20
Xylene Mixture (Total)	26	ug/g	0.05	0.18	<0.05	<0.05	0.06	<0.05

Legend	
To Be Announced	TBA
Exceeds the Criteria	**Result**
DL > Criteria	Result
Sample removed via remedial excavation	
Criteria	Reg153/04 T2-ICC-Coarse

Table 1A: Petroleum Hydrocarbons (PHCs) and Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) in Soil

Parameter	Table 2 SCS for I/C/C with Coarse Textured Soil	Units	RDL					
				Sample ID				
				Sample Depth (mbgs)				
				Lab Work Number				
				Lab ID				
				Sample Collection Date				
				FS-4 (wall)	C-1 (floor)	C-2 (floor)	F1 (floor)	S1 (wall)
				1.8	2.4	2.7	2.3	3
				1822343	1822600	1822600	1904284	1904284
				1403779	1404507	1404508	1417255	1417256
				12/11/2018	12/17/2018	12/17/2018	3/26/2019	3/26/2019
Petroleum Hydrocarbons								
F1 (C6-C10)	55	ug/g	5	20	<10	<10	<10	<10
F1 (C6-C10) - BTEX	55	ug/g	5	20	<10	<10	<10	<10
F2 (C10-C16)	230	ug/g	10	**470**	<10	<10	<10	<10
F3 (C16-C34)	1,700	ug/g	50	370	<20	<20	<20	<20
F4 (C34-C50)	3,300	ug/g	50	<20	<20	<20	<20	<20
BTEX								
Benzene	0.32	ug/g	0.02	<0.02	0.27	<0.02	<0.02	<0.02
Ethylbenzene	1.1	ug/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Toluene	6.4	ug/g	0.05	<0.20	<0.20	<0.20	<0.20	<0.20
Xylene Mixture (Total)	26	ug/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Legend	
To Be Announced	TBA
Exceeds the Criteria	**Result**
DL > Criteria	Result
Sample removed via remedial excavation	
Criteria	Reg153/04 T2-ICC-Coarse

Table 1A: Petroleum Hydrocarbons (PHCs) and Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) in Soil

Parameter	Table 2 SCS for I/C/C with Coarse Textured Soil	Units	RDL	E1 (wall)	W2 (wall)	N3 (wall)	2S1 (wall)	2S2 (wall)
Sample ID				E1 (wall)	W2 (wall)	N3 (wall)	2S1 (wall)	2S2 (wall)
Sample Depth (mbgs)				2.4	2.2	1.8	2.1	1.5
Lab Work Number				1904284	1904284	1904284	1904479	1904479
Lab ID				1417257	1417258	1417259	1417754	1417755
Sample Collection Date				3/26/2019	3/26/2019	3/26/2019	3/28/2019	3/28/2019
Petroleum Hydrocarbons								
F1 (C6-C10)	55	ug/g	5	<10	<10	<10	<10	30
F1 (C6-C10) - BTEX	55	ug/g	5	<10	<10	<10	<10	30
F2 (C10-C16)	230	ug/g	10	140	<10	**250**	<10	<10
F3 (C16-C34)	1,700	ug/g	50	100	50	160	<20	<20
F4 (C34-C50)	3,300	ug/g	50	<20	1000	<20	<20	<20
BTEX								
Benzene	0.32	ug/g	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	1.1	ug/g	0.05	<0.05	<0.05	<0.05	<0.05	0.23
Toluene	6.4	ug/g	0.05	<0.20	<0.20	<0.20	<0.20	<0.20
Xylene Mixture (Total)	26	ug/g	0.05	<0.05	<0.05	<0.05	<0.05	0.11

Legend	
To Be Announced	TBA
Exceeds the Criteria	**Result**
DL > Criteria	Result
Sample removed via remedial excavation	
Criteria	Reg153/04 T2-ICC-Coarse

Table 1A: Petroleum Hydrocarbons (PHCs) and Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) in Soil

Parameter	Table 2 SCS for I/C/C with Coarse Textured Soil	Units	RDL					
Sample ID				2E1 (wall)	2F1	2CF1	BH22-1-SS3	BH22-1-SS33 (Duplicate of BH22-1 SS3)
Sample Depth (mbgs)				1.7	2.4	Unknown	1.52 - 2.13	1.52 - 2.13
Lab Work Number				1904479	1904479	1904479	22T918345	22T918345
Lab ID				1417756	1417757	1417758	4070379	4070390
Sample Collection Date				3/28/2019	3/28/2019	3/28/2019	07/05/2022	07/05/2022
Petroleum Hydrocarbons								
F1 (C6-C10)	55	ug/g	5	<10	<10	<10	<5	<5
F1 (C6-C10) - BTEX	55	ug/g	5	<10	<10	<10	<5	<5
F2 (C10-C16)	230	ug/g	10	<10	<10	<10	<10	<10
F3 (C16-C34)	1,700	ug/g	50	<20	<20	<20	<50	<50
F4 (C34-C50)	3,300	ug/g	50	<20	<20	<20	<50	<50
BTEX								
Benzene	0.32	ug/g	0.02	<0.02	<0.02	<0.02	-	-
Ethylbenzene	1.1	ug/g	0.05	<0.05	<0.05	<0.05	-	-
Toluene	6.4	ug/g	0.05	<0.20	<0.20	<0.20	-	-
Xylene Mixture (Total)	26	ug/g	0.05	<0.05	<0.05	<0.05	-	-

Legend	
To Be Announced	TBA
Exceeds the Criteria	**Result**
DL > Criteria	Result
Sample removed via remedial excavation	
Criteria	Reg153/04 T2-ICC-Coarse

Table 1A: Petroleum Hydrocarbons (PHCs) and Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) in Soil

Parameter	**Table 2 SCS for I/C/C with Coarse Textured Soil**	**Units**	**RDL**	*Sample ID*				
				Sample Depth (mbgs)				
				Lab Work Number				
				Lab ID				
				Sample Collection Date				
				BH22-2-SS3	BH22-3-SS3	BH22-4-SS3	BH22-5-SS2	BH22-6-SS2
				1.52 - 2.13	1.52 - 2.13	1.52 - 2.13	0.76 - 1.37	0.76 - 1.37
				22T918345	22T918345	22T918345	22T918345	22T918345
				4070383	4070387	4070392	4070437	4070409
				07/05/2022	07/05/2022	07/05/2023	7/7/2022	07/06/2022
Petroleum Hydrocarbons								
F1 (C6-C10)	55	ug/g	5	<5	<5	<5	<5	<5
F1 (C6-C10) - BTEX	55	ug/g	5	<5	<5	<5	<5	<5
F2 (C10-C16)	230	ug/g	10	<10	<10	<10	<10	<10
F3 (C16-C34)	1,700	ug/g	50	<50	<50	<50	<50	<50
F4 (C34-C50)	3,300	ug/g	50	<50	<50	<50	<50	<50
BTEX								
Benzene	0.32	ug/g	0.02	-	-	-	-	<0.02
Ethylbenzene	1.1	ug/g	0.05	-	-	-	-	<0.05
Toluene	6.4	ug/g	0.05	-	-	-	-	<0.05
Xylene Mixture (Total)	26	ug/g	0.05	-	-	-	-	<0.05

Legend	
To Be Announced	TBA
Exceeds the Criteria	**Result**
DL > Criteria	Result
Sample removed via remedial excavation	
Criteria	Reg153/04 T2-ICC-Coarse

Table 1A: Petroleum Hydrocarbons (PHCs) and Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) in Soil

Parameter	Table 2 SCS for I/C/C with Coarse Textured Soil	Units	RDL	*Sample ID*				
				Sample Depth (mbgs)				
				Lab Work Number				
				Lab ID				
				Sample Collection Date				
				BH22-7-SS2	BH22-8-SS3A	BH22-12-SS5	BH22-13-SS1B	BH22-13-SS4
				0.76 - 1.37	1.52 - 1.98	3.05 - 3.66	0.15 - 0.61	2.29 - 2.90
				22T918345	22T918345	22T918345	22T918345	22T918345
				4070421	4070397	4070462	4070402	4070406
				07/06/2022	07/04/2022	07/08/2022	07/06/2022	07/06/2022
Petroleum Hydrocarbons								
F1 (C6-C10)	55	ug/g	5	<5	<5	<5	19	<5
F1 (C6-C10) - BTEX	55	ug/g	5	<5	<5	<5	19	<5
F2 (C10-C16)	230	ug/g	10	<10	<10	<10	**290**	<10
F3 (C16-C34)	1,700	ug/g	50	<50	<50	<50	260	**2,200**
F4 (C34-C50)	3,300	ug/g	50	<50	<50	<50	<50	400
BTEX								
Benzene	0.32	ug/g	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	1.1	ug/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Toluene	6.4	ug/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Xylene Mixture (Total)	26	ug/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Legend	
To Be Announced	TBA
Exceeds the Criteria	**Result**
DL > Criteria	Result
Sample removed via remedial excavation	
Criteria	Reg153/04 T2-ICC-Coarse

Table 1A: Petroleum Hydrocarbons (PHCs) and Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) in Soil

Parameter	Table 2 SCS for I/C/C with Coarse Textured Soil	Units	RDL	*Sample ID*				
				Sample Depth (mbgs)				
				Lab Work Number				
				Lab ID				
				Sample Collection Date				
				BH22-15-SS3B	BH22-16-SS4	BH22-17-SS4B	BH22-18-SS3	BH22-19-SS3
				1.60 - 2.13	2.29 - 2.90	2.59 - 2.89	1.52 - 2.13	1.52 - 2.13
				22T918345	22T918345	22T918345	22T918345	22T918345
				4070434	4070465	4070394	4070399	4070428
				07/07/2022	07/07/2022	07/04/2022	07/04/2022	07/07/2022
Petroleum Hydrocarbons								
F1 (C6-C10)	55	ug/g	5	<5	<5	<5	<5	<5
F1 (C6-C10) - BTEX	55	ug/g	5	<5	<5	<5	<5	<5
F2 (C10-C16)	230	ug/g	10	<10	<10	<10	<10	<10
F3 (C16-C34)	1,700	ug/g	50	<50	<50	<50	<50	<50
F4 (C34-C50)	3,300	ug/g	50	<50	<50	<50	<50	<50
BTEX								
Benzene	0.32	ug/g	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	1.1	ug/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Toluene	6.4	ug/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Xylene Mixture (Total)	26	ug/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Legend	
To Be Announced	TBA
Exceeds the Criteria	**Result**
DL > Criteria	Result
Sample removed via remedial excavation	
Criteria	Reg153/04 T2-ICC-Coarse

Table 1A: Petroleum Hydrocarbons (PHCs) and Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) in Soil

Parameter	Table 2 SCS for I/C/C with Coarse Textured Soil	Units	RDL		
				Sample ID	
				Sample Depth (mbgs)	
				Lab Work Number	
				Lab ID	
				Sample Collection Date	
				BH22-21-SS2	Dup of BH22-21-SS2 (BH22-21-SS22)
				0.76 - 1.37	0.76 - 1.37
				22T918345	22T918345
				4070425	4070426
				07/07/2022	07/07/2022
Petroleum Hydrocarbons					
F1 (C6-C10)	55	ug/g	5	<5	<5
F1 (C6-C10) - BTEX	55	ug/g	5	<5	<5
F2 (C10-C16)	230	ug/g	10	<10	<10
F3 (C16-C34)	1,700	ug/g	50	<50	<50
F4 (C34-C50)	3,300	ug/g	50	<50	<50
BTEX					
Benzene	0.32	ug/g	0.02	<0.02	<0.02
Ethylbenzene	1.1	ug/g	0.05	<0.05	<0.05
Toluene	6.4	ug/g	0.05	<0.05	<0.05
Xylene Mixture (Total)	26	ug/g	0.05	<0.05	<0.05

Legend	
To Be Announced	TBA
Exceeds the Criteria	**Result**
DL > Criteria	Result
Sample removed via remedial excavation	
Criteria	Reg153/04 T2-ICC-Coarse

Table 1B: Volatile Organic Compounds (VOCs) in Soil

Parameter	Table 2 SCS for I/C/C with Coarse Textured Soil	Units	RDL	BHMW1-1	BHMW1-3	BH9-1	BH22-1-SS3	Dup of BH22-1-SS3 (BH22-1-SS33)	BH22-2-SS3	BH22-3-SS3
Sample ID				BHMW1-1	BHMW1-3	BH9-1	BH22-1-SS3	Dup of BH22-1-SS3 (BH22-1-SS33)	BH22-2-SS3	BH22-3-SS3
Sample Depth (mbgs)				0 - 1.52	3.05 - 4.57	0 - 1.52	1.52 - 2.13	1.52 - 2.13	1.52 - 2.13	1.52 - 2.13
Lab Work Number				1821180	1821180	1821180	22T918345	22T918345	22T918345	22T918345
Lab ID				1400607	1400608	1400620	4070379	4070390	4070383	4070387
Sample Collection Date				11/19/2018	11/19/2018	11/19/2018	07/05/2022	07/05/2022	07/05/2022	07/05/2022
Volatile Organic Compounds (VOCs)										
1,1,1,2-Tetrachloroethane	0.087	ug/g	0.50	<0.50	<0.50	<0.50	<0.04	<0.04	<0.04	<0.04
1,1,1-Trichloroethane	6.1	ug/g	0.50	<0.50	<0.50	<0.50	<0.05	<0.05	<0.05	<0.05
1,1,2,2-Tetrachloroethane	0.05	ug/g	0.50	<0.50	<0.50	<0.50	<0.05	<0.05	<0.05	<0.05
1,1,2-Trichloroethane	0.05	ug/g	0.50	<0.50	<0.50	<0.50	<0.04	<0.04	<0.04	<0.04
1,1-Dichloroethane	0.47	ug/g	0.50	<0.50	<0.50	<0.50	<0.02	<0.02	<0.02	<0.02
1,1-Dichloroethylene	0.064	ug/g	0.50	<0.50	<0.50	<0.50	<0.05	<0.05	<0.05	<0.05
1,2-Dichlorobenzene	1.2	ug/g	0.50	<0.50	<0.50	<0.50	<0.05	<0.05	<0.05	<0.05
1,2-Dichloroethane	0.05	ug/g	0.50	<0.50	<0.50	<0.50	<0.03	<0.03	<0.03	<0.03
1,2-Dichloropropane	0.16	ug/g	0.50	<0.50	<0.50	<0.50	<0.03	<0.03	<0.03	<0.03
1,3-Dichlorobenzene	9.6	ug/g	0.50	<0.50	<0.50	<0.50	<0.05	<0.05	<0.05	<0.05
1,3-Dichloropropene	0.059	ug/g	0.50	<0.50	<0.50	<0.50	<0.05	<0.05	<0.05	<0.05
1,4-Dichlorobenzene	0.2	ug/g	0.50	<0.50	<0.50	<0.50	<0.05	<0.05	<0.05	<0.05
Acetone	16	ug/g	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Benzene	0.32	ug/g	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Bromodichloromethane	1.5	ug/g	0.50	<0.50	<0.50	<0.50	<0.05	<0.05	<0.05	<0.05
Bromoform	0.61	ug/g	0.50	<0.50	<0.50	<0.50	<0.05	<0.05	<0.05	<0.05
Bromomethane	0.05	ug/g	0.50	<0.50	<0.50	<0.50	<0.05	<0.05	<0.05	<0.05
Carbon Tetrachloride	0.21	ug/g	0.50	<0.50	<0.50	<0.50	<0.05	<0.05	<0.05	<0.05
Chlorobenzene	2.4	ug/g	0.50	<0.50	<0.50	<0.50	<0.05	<0.05	<0.05	<0.05
Chloroform	0.47	ug/g	0.50	<0.50	<0.50	<0.50	<0.04	<0.04	<0.04	<0.04
Cis- 1,2-Dichloroethylene	1.9	ug/g	0.50	<0.50	<0.50	<0.50	<0.02	<0.02	<0.02	<0.02
Dibromochloromethane	2.3	ug/g	0.50	<0.50	<0.50	<0.50	<0.05	<0.05	<0.05	<0.05
Dichlorodifluoromethane	16	ug/g	0.50	<0.50	<0.50	<0.50	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	1.1	ug/g	0.50	<0.50	<0.50	<0.50	<0.05	<0.05	<0.05	<0.05
Ethylene Dibromide	0.05	ug/g	0.50	<0.50	<0.50	<0.50	<0.04	<0.04	<0.04	<0.04
Methyl Ethyl Ketone	70	ug/g	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Methyl Isobutyl Ketone	31	ug/g	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Methyl tert-butyl Ether	1.6	ug/g	0.50	<0.50	<0.50	<0.50	<0.05	<0.05	<0.05	<0.05
Methylene Chloride	1.6	ug/g	0.50	<0.50	<0.50	<0.50	<0.05	<0.05	<0.05	<0.05
n-Hexane	46	ug/g	0.50	<0.50	<0.50	<0.50	<0.05	<0.05	<0.05	<0.05
Styrene	34	ug/g	0.50	<0.50	<0.50	<0.50	<0.05	<0.05	<0.05	<0.05
Tetrachloroethylene	1.9	ug/g	0.50	<0.50	<0.50	<0.50	<0.05	<0.05	<0.05	<0.05
Toluene	6.4	ug/g	0.20	<0.20	<0.20	<0.20	<0.05	<0.05	<0.05	<0.05
Trans- 1,2-Dichloroethylene	1.3	ug/g	0.50	<0.50	<0.50	<0.50	<0.05	<0.05	<0.05	<0.05
Trichloroethylene	0.55	ug/g	0.50	<0.50	<0.50	<0.50	<0.03	<0.03	<0.03	<0.03
Trichlorofluoromethane	4	ug/g	0.50	<0.50	<0.50	<0.50	<0.05	<0.05	<0.05	<0.05
Vinyl Chloride	0.032	ug/g	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Xylene (Total)	26	ug/g	0.50	<0.50	<0.50	<0.50	<0.05	<0.05	<0.05	<0.05

Legend	
To Be Announced	TBA
Exceeds the Criteria	Result
DL > Criteria	Result
Exceedance not carried	
Criteria	Reg153/04 T2-ICC-Coarse

Table 1B: Volatile Organic Compounds (VOCs) in Soil

Parameter	Table 2 SCS for I/C/C with Coarse Textured Soil	Units	RDL	*Sample ID*	
				Sample Depth (mbgs)	
				Lab Work Number	
				Lab ID	
				Sample Collection Date	
				BH22-4-SS3	BH22-5-SS2
				1.52 - 2.13	0.76 - 1.37
				22T918345	22T918345
				4070392	4070437
				07/05/2022	07/07/2022
Volatile Organic Compounds (VOCs)					
1,1,1,2-Tetrachloroethane	0.087	ug/g	0.50	<0.04	<0.04
1,1,1-Trichloroethane	6.1	ug/g	0.50	<0.05	<0.05
1,1,2,2-Tetrachloroethane	0.05	ug/g	0.50	<0.05	<0.05
1,1,2-Trichloroethane	0.05	ug/g	0.50	<0.04	<0.04
1,1-Dichloroethane	0.47	ug/g	0.50	<0.02	<0.02
1,1-Dichloroethylene	0.064	ug/g	0.50	<0.05	<0.05
1,2-Dichlorobenzene	1.2	ug/g	0.50	<0.05	<0.05
1,2-Dichloroethane	0.05	ug/g	0.50	<0.03	<0.03
1,2-Dichloropropane	0.16	ug/g	0.50	<0.03	<0.03
1,3-Dichlorobenzene	9.6	ug/g	0.50	<0.05	<0.05
1,3-Dichloropropene	0.059	ug/g	0.50	<0.05	<0.05
1,4-Dichlorobenzene	0.2	ug/g	0.50	<0.05	<0.05
Acetone	16	ug/g	0.50	<0.50	<0.50
Benzene	0.32	ug/g	0.02	<0.02	<0.02
Bromodichloromethane	1.5	ug/g	0.50	<0.05	<0.05
Bromoform	0.61	ug/g	0.50	<0.05	<0.05
Bromomethane	0.05	ug/g	0.50	<0.05	<0.05
Carbon Tetrachloride	0.21	ug/g	0.50	<0.05	<0.05
Chlorobenzene	2.4	ug/g	0.50	<0.05	<0.05
Chloroform	0.47	ug/g	0.50	<0.04	<0.04
Cis- 1,2-Dichloroethylene	1.9	ug/g	0.50	<0.02	<0.02
Dibromochloromethane	2.3	ug/g	0.50	<0.05	<0.05
Dichlorodifluoromethane	16	ug/g	0.50	<0.05	<0.05
Ethylbenzene	1.1	ug/g	0.50	<0.05	<0.05
Ethylene Dibromide	0.05	ug/g	0.50	<0.04	<0.04
Methyl Ethyl Ketone	70	ug/g	0.50	<0.50	<0.50
Methyl Isobutyl Ketone	31	ug/g	0.50	<0.50	<0.50
Methyl tert-butyl Ether	1.6	ug/g	0.50	<0.05	<0.05
Methylene Chloride	1.6	ug/g	0.50	<0.05	<0.05
n-Hexane	46	ug/g	0.50	<0.05	<0.05
Styrene	34	ug/g	0.50	<0.05	<0.05
Tetrachloroethylene	1.9	ug/g	0.50	<0.05	<0.05
Toluene	6.4	ug/g	0.20	<0.05	<0.05
Trans- 1,2-Dichloroethylene	1.3	ug/g	0.50	<0.05	<0.05
Trichloroethylene	0.55	ug/g	0.50	<0.03	<0.03
Trichlorofluoromethane	4	ug/g	0.50	<0.05	<0.05
Vinyl Chloride	0.032	ug/g	0.02	<0.02	<0.02
Xylene (Total)	26	ug/g	0.50	<0.05	<0.05

Legend	
To Be Announced	TBA
Exceeds the Criteria	**Result**
DL > Criteria	Result
Exceedance not carried	
Criteria	Reg153/04 T2-ICC-Coarse

Table 1C: Acid/Base/Neutral Compounds (ABNs), Chlorophenols (CPs) and Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

Parameter	Table 2 SCS for I/C/C with Coarse Textured Soil	Units	RDL	*Sample ID*			
				Sample Depth (mbgs)			
				Lab Work Number			
				Lab ID			
				Sample Collection Date			
				BH2-2	BHMW4-1	BH5-1	BH7-1
				1.52 - 3.05	0 - 1.52	0 - 1.52	0 - 1.52
				1821180	1821180	1821180	1821180
				1400610	1400612	1400615	1400618
				11/19/2018	11/19/2018	11/19/2018	11/19/2018
Polycyclic Aromatic Hydrocarbons (PAHs)							
1 and 2 Methlynaphthalene	30	ug/g	0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthene	21	ug/g	0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	0.15	ug/g	0.05	<0.05	<0.05	<0.05	<0.05
Anthracene	0.67	ug/g	0.05	<0.05	<0.05	<0.05	<0.05
Benz(a)anthracene	0.96	ug/g	0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene	0.3	ug/g	0.05	<0.05	<0.05	<0.05	<0.05
Benzo(b)fluoranthene	0.96	ug/g	0.05	<0.05	<0.05	<0.05	<0.05
Benzo(g,h,i)perylene	9.6	ug/g	0.05	<0.05	<0.05	<0.05	<0.05
Benzo(k)fluoranthene	0.96	ug/g	0.05	<0.05	<0.05	<0.05	<0.05
Biphenyl 1,1'-	52	ug/g	0.05	-	<0.06	-	-
Chrysene	9.6	ug/g	0.05	<0.05	<0.05	<0.05	<0.05
Dibenz(a,h)anthracene	0.1	ug/g	0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	9.6	ug/g	0.05	<0.05	<0.05	<0.05	<0.05
Fluorene	62	ug/g	0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-cd)pyrene	0.76	ug/g	0.05	<0.05	<0.05	<0.05	<0.05
Naphthalene	9.6	ug/g	0.05	<0.05	<0.05	<0.05	<0.05
Phenanthrene	12	ug/g	0.05	<0.05	<0.05	0.07	<0.05
Pyrene	96	ug/g	0.05	<0.05	<0.05	<0.05	<0.05

Legend	
To Be Announced	TBA
Exceeds the Criteria	**Result**
DL > Criteria	**Result**
Criteria	Reg153/04 T2-ICC-Coarse

Table 1C: Acid/Base/Neutral Compounds (ABNs), Chlorophenols (CPs) and Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

Parameter	Table 2 SCS for I/C/C with Coarse Textured Soil	Units	RDL	*Sample ID*				
				Sample Depth (mbgs)				
				Lab Work Number				
				Lab ID				
				Sample Collection Date				
				BH22-1-SS1A 0 - 0.46 22T918345 4070365 07/05/2022	BH22-2-SS1B 0.27 - 0.61 22T918345 4070382 07/05/2022	BH22-3-SS2 0.76 - 1.37 22T918345 4070385 07/05/2022	BH22-4-SS2 0.76 - 1.37 22T918345 4070391 07/05/2022	BH22-6-SS1B 0.05 - 0.61 22T918345 4070407 07/06/2022
Polycyclic Aromatic Hydrocarbons (PAHs)								
1 and 2 Methlynaphthalene	30	ug/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthene	21	ug/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	0.15	ug/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Anthracene	0.67	ug/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benz(a)anthracene	0.96	ug/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene	0.3	ug/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(b)fluoranthene	0.96	ug/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(g,h,i)perylene	9.6	ug/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(k)fluoranthene	0.96	ug/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Biphenyl 1,1'-	52	ug/g	0.05	-	-	-	-	-
Chrysene	9.6	ug/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dibenz(a,h)anthracene	0.1	ug/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	9.6	ug/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluorene	62	ug/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-cd)pyrene	0.76	ug/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Naphthalene	9.6	ug/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Phenanthrene	12	ug/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Pyrene	96	ug/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Legend	
To Be Announced	TBA
Exceeds the Criteria	**Result**
DL > Criteria	**Result**
Criteria	Reg153/04 T2-ICC-Coarse

Table 1C: Acid/Base/Neutral Compounds (ABNs), Chlorophenols (CPs) and Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

Parameter	Table 2 SCS for I/C/C with Coarse Textured Soil	Units	RDL	*Sample ID*			
				Sample Depth (mbgs)			
				Lab Work Number			
				Lab ID			
				Sample Collection Date			
				BH22-6-SS1BB (Dup of BH22--6-SS1B)	BH22-7-SS1B	BH22-10-SS2	BH22-13-SS2
				0.05 - 0.61	0.03 - 0.61	0.76 - 1.37	0.76 - 1.37
				22T918345	22T918345	22T918345	22T918345
				4070408	4070420	4070396	4070403
				07/06/2022	07/06/2022	07/04/2022	07/06/2022
Polycyclic Aromatic Hydrocarbons (PAHs)							
1 and 2 Methlynaphthalene	30	ug/g	0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthene	21	ug/g	0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	0.15	ug/g	0.05	<0.05	<0.05	<0.05	<0.05
Anthracene	0.67	ug/g	0.05	<0.05	<0.05	<0.05	<0.05
Benz(a)anthracene	0.96	ug/g	0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene	0.3	ug/g	0.05	<0.05	<0.05	<0.05	<0.05
Benzo(b)fluoranthene	0.96	ug/g	0.05	<0.05	<0.05	<0.05	<0.05
Benzo(g,h,i)perylene	9.6	ug/g	0.05	<0.05	<0.05	<0.05	<0.05
Benzo(k)fluoranthene	0.96	ug/g	0.05	<0.05	<0.05	<0.05	<0.05
Biphenyl 1,1'-	52	ug/g	0.05	-	-	-	-
Chrysene	9.6	ug/g	0.05	<0.05	<0.05	<0.05	<0.05
Dibenz(a,h)anthracene	0.1	ug/g	0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	9.6	ug/g	0.05	<0.05	<0.05	<0.05	<0.05
Fluorene	62	ug/g	0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-cd)pyrene	0.76	ug/g	0.05	<0.05	<0.05	<0.05	<0.05
Naphthalene	9.6	ug/g	0.05	<0.05	<0.05	<0.05	<0.05
Phenanthrene	12	ug/g	0.05	<0.05	<0.05	<0.05	<0.05
Pyrene	96	ug/g	0.05	<0.05	<0.05	<0.05	<0.05

Legend	
To Be Announced	TBA
Exceeds the Criteria	**Result**
DL > Criteria	**Result**
Criteria	Reg153/04 T2-ICC-Coarse

Table 1C: Acid/Base/Neutral Compounds (ABNs), Chlorophenols (CPs) and Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

Parameter	Table 2 SCS for I/C/C with Coarse Textured Soil	Units	RDL	*Sample ID* / *Sample Depth (mbgs)* / *Lab Work Number* / *Lab ID* / *Sample Collection Date*		
				Dup of BH22-13-SS2 (BH22-13-SS22)	BH22-14-SS1B	BH22-21-SS1B
				0.76 - 1.37	0.05 - 0.61	0.05 - 0.61
				22T918345	22T918345	22T918345
				4070405	4070414	4070423
				07/06/2022	07/06/2022	07/07/2022
Polycyclic Aromatic Hydrocarbons (PAHs)						
1 and 2 Methlynaphthalene	30	ug/g	0.05	<0.05	<0.05	0.78
Acenaphthene	21	ug/g	0.05	<0.05	<0.05	0.08
Acenaphthylene	0.15	ug/g	0.05	<0.05	<0.05	<0.05
Anthracene	0.67	ug/g	0.05	<0.05	<0.05	<0.05
Benz(a)anthracene	0.96	ug/g	0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene	0.3	ug/g	0.05	<0.05	<0.05	<0.05
Benzo(b)fluoranthene	0.96	ug/g	0.05	<0.05	<0.05	<0.05
Benzo(g,h,i)perylene	9.6	ug/g	0.05	<0.05	<0.05	<0.05
Benzo(k)fluoranthene	0.96	ug/g	0.05	<0.05	<0.05	<0.05
Biphenyl 1,1'-	52	ug/g	0.05	-	-	-
Chrysene	9.6	ug/g	0.05	<0.05	<0.05	<0.05
Dibenz(a,h)anthracene	0.1	ug/g	0.05	<0.05	<0.05	<0.05
Fluoranthene	9.6	ug/g	0.05	<0.05	<0.05	<0.05
Fluorene	62	ug/g	0.05	<0.05	<0.05	0.31
Indeno(1,2,3-cd)pyrene	0.76	ug/g	0.05	<0.05	<0.05	<0.05
Naphthalene	9.6	ug/g	0.05	<0.05	<0.05	0.06
Phenanthrene	12	ug/g	0.05	<0.05	<0.05	0.36
Pyrene	96	ug/g	0.05	<0.05	<0.05	0.08

Legend	
To Be Announced	TBA
Exceeds the Criteria	**Result**
DL > Criteria	**Result**
Criteria	Reg153/04 T2-ICC-Coarse

Table 1D: Metals, Hydrides and Other Regulated Parameters in Soil

Parameter	Table 2 SCS for I/C/C with Coarse Textured Soil	Units	RDL	Sample ID				
				Sample Depth (mbgs)				
				Lab Work Number				
				Lab ID				
				Sample Collection Date				
				BH2-1	BHMW4-1	BH5-2	BHMW10-1	BHMW10-2
				0 - 1.52	0 - 1.52	1.52 - 3.05	0 - 1.52	1.52 - 3.05
				1821180	1821180	1821180	1821180	1821180
				1400609	1400612	1400616	1400622	1400623
				11/19/2018	11/19/2018	11/19/2018	11/19/2018	11/19/2018
Metals (including Hydride-Forming Metals)								
Acid Extractable Antimony (Sb)	40	ug/g	0.8	<1	<1	<1	<1	-
Acid Extractable Arsenic (As)	18	ug/g	1	3	3	3	2	-
Acid Extractable Barium (Ba)	670	ug/g	2	46	30	36	13	-
Acid Extractable Beryllium (Be)	8	ug/g	0.4	<1	<1	<1	<1	-
Acid Extractable Boron (B)	120	ug/g	5	7	7	6	5	-
Acid Extractable Cadmium (Cd)	1.9	ug/g	0.5	<0.4	<0.4	<0.4	<0.4	-
Acid Extractable Chromium (Cr)	160	ug/g	5	17	13	15	7	-
Acid Extractable Cobalt (Co)	80	ug/g	0.5	5	4	4	2	-
Acid Extractable Copper (Cu)	230	ug/g	1	13	15	12	9	-
Acid Extractable Lead (Pb)	120	ug/g	1	37	10	9	5	-
Acid Extractable Molybdenum (Mo)	40	ug/g	0.5	<1	<1	<1	<1	-
Acid Extractable Nickel (Ni)	270	ug/g	1	10	9	10	5	-
Acid Extractable Selenium (Se)	5.5	ug/g	0.8	<1	<1	<1	<1	-
Acid Extractable Silver (Ag)	40	ug/g	0.5	<0.2	<0.2	<0.2	<0.2	-
Acid Extractable Thallium (Tl)	3.3	ug/g	0.5	<1	<1	<1	<1	-
Acid Extractable Uranium (U)	33	ug/g	0.5	0.6	<0.5	<0.5	<0.5	-
Acid Extractable Vanadium (V)	86	ug/g	0.4	25	18	25	9	-
Acid Extractable Zinc (Zn)	340	ug/g	5	65	28	32	21	-
Other Regulated Parameters								
Hot Water Extractable Boron	2	ug/g	0.1	0.7	<0.5	<0.5	<0.5	-
Soluble (20:1) Chloride (Cl-)	NA	ug/g	0.011	-	-	-	-	-
WAD Cyanide (Free)	0.051	ug/g	0.1	**0.07**	0.03	0.04	<0.03	-
Electrical Conductivity	1.4	mS/cm	0.05	**6.59**	**1.94**	0.96	0.20	-
Hexavalent Chromium (CrVI)	8	ug/g	0.2	2.30	<0.20	<0.20	<0.20	-
Acid Extractable Mercury (Hg)	3.9	ug/g	0.1	<0.1	<0.1	<0.1	<0.1	-
Available (CaCl2) pH	NA	pH	2.00	7.79	7.64	7.07	7.00	7.33
Sodium Adsorption Ratio	12	N/A	0.01	**179**	**30.8**	**15.0**	2.57	-

Legend	
To Be Announced	TBA
Exceeds the Criteria	**Result**
DL > Criteria	Result
Exceedance not carried	
Criteria	Reg153/04 T2-ICC-Coarse

Table 1D: Metals, Hydrides and Other Regulated Parameters in Soil

Parameter	Table 2 SCS for I/C/C with Coarse Textured Soil	Units	RDL	Sample ID					
				Sample Depth (mbgs)					
				Lab Work Number					
				Lab ID					
				Sample Collection Date					
				TP1-2	TP2-1	TP 3-1	TP 4-1	TP 5-1	TP 6-1
				0.35 (Wall)	0.72 (Floor)	0.63 (Floor)	0.66 (Floor)	0.62 (Floor)	0.58 (Floor)
				1923129	1923129	1923129	1923129	1923129	1923129
				1473268	1473269	1473270	1473271	1473272	1473273
				12/20/2019	12/20/2019	12/20/2019	12/20/2019	12/20/2019	12/20/2019
Metals (including Hydride-Forming Metals)									
Acid Extractable Antimony (Sb)	40	ug/g	0.8	<1	<1	<1	<1	<1	<1
Acid Extractable Arsenic (As)	18	ug/g	1	4	2	5	3	3	4
Acid Extractable Barium (Ba)	670	ug/g	2	70	23	71	61	54	52
Acid Extractable Beryllium (Be)	8	ug/g	0.4	<1	<1	<1	<1	<1	<1
Acid Extractable Boron (B)	120	ug/g	5	10	7	15	<5	<5	<5
Acid Extractable Cadmium (Cd)	1.9	ug/g	0.5	<0.4	<0.4	1.0	0.7	0.6	<0.4
Acid Extractable Chromium (Cr)	160	ug/g	5	18	10	74	25	22	39
Acid Extractable Cobalt (Co)	80	ug/g	0.5	5	2	7	6	6	6
Acid Extractable Copper (Cu)	230	ug/g	1	14	9	19	15	13	12
Acid Extractable Lead (Pb)	120	ug/g	1	10	8	27	16	13	10
Acid Extractable Molybdenum (Mo)	40	ug/g	0.5	<1	<1	2	<1	<1	<1
Acid Extractable Nickel (Ni)	270	ug/g	1	10	6	18	12	12	21
Acid Extractable Selenium (Se)	5.5	ug/g	0.8	2	<1	<1	<1	1	<1
Acid Extractable Silver (Ag)	40	ug/g	0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Acid Extractable Thallium (Tl)	3.3	ug/g	0.5	<1	<1	<1	<1	<1	<1
Acid Extractable Uranium (U)	33	ug/g	0.5	0.8	<0.5	0.7	0.6	0.8	<0.5
Acid Extractable Vanadium (V)	86	ug/g	0.4	27	14	39	28	27	26
Acid Extractable Zinc (Zn)	340	ug/g	5	55	28	**676**	**398**	234	200
Other Regulated Parameters									
Hot Water Extractable Boron	2	ug/g	0.1	**2.5**	<0.5	1	<0.5	0.6	<0.5
Soluble (20:1) Chloride (Cl-)	NA	ug/g	0.011	-	-	-	-	-	-
WAD Cyanide (Free)	0.051	ug/g	0.1	<0.1	<0.02	<0.1	<0.1	<0.2	<0.02
Electrical Conductivity	1.4	mS/cm	0.05	**2.58**	0.89	**1.84**	**12.0**	**14.0**	**4.52**
Hexavalent Chromium (CrVI)	8	ug/g	0.2	2.83	0.69	0.97	0.97	1.13	0.29
Acid Extractable Mercury (Hg)	3.9	ug/g	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Available (CaCl2) pH	NA	pH	2.00	-	-	7.40	7.61	6.99	7.59
Sodium Adsorption Ratio	12	N/A	0.01	**37.4**	**17.4**	**23.7**	**184**	**248**	**77.6**

Legend	
To Be Announced	TBA
Exceeds the Criteria	**Result**
DL > Criteria	Result
Exceedance not carried	
Criteria	Reg153/04 T2-ICC-Coarse

Table 1D: Metals, Hydrides and Other Regulated Parameters in Soil

Parameter	Table 2 SCS for I/C/C with Coarse Textured Soil	Units	RDL	Sample ID					
				TP 7	TP 8	BH1-2	BH2-2	BH3-2	BH4-2
Sample Depth (mbgs)				0.72 (Floor)	0.72 (Floor)	1.52 - 3.05	1.52 - 3.05	1.52 - 3.05	1.52 - 3.05
Lab Work Number				1925964	1925964	1927496	1927496	1927496	1927496
Lab ID				1481070	1481071	1485881	1485883	1485885	1485887
Sample Collection Date				2/20/2020	2/20/2020	3/23/2020	3/23/2020	3/23/2020	3/23/2020
Metals (including Hydride-Forming Metals)									
Acid Extractable Antimony (Sb)	40	ug/g	0.8	-	-	<1	<1	<1	<1
Acid Extractable Arsenic (As)	18	ug/g	1	-	-	3	3	3	3
Acid Extractable Barium (Ba)	670	ug/g	2	-	-	44	63	20	29
Acid Extractable Beryllium (Be)	8	ug/g	0.4	-	-	<1	<1	<1	<1
Acid Extractable Boron (B)	120	ug/g	5	-	-	9	9	8	8
Acid Extractable Cadmium (Cd)	1.9	ug/g	0.5	-	-	<0.4	<0.4	<0.4	<0.4
Acid Extractable Chromium (Cr)	160	ug/g	5	-	-	16	16	14	13
Acid Extractable Cobalt (Co)	80	ug/g	0.5	-	-	5	7	6	6
Acid Extractable Copper (Cu)	230	ug/g	1	-	-	11	11	10	10
Acid Extractable Lead (Pb)	120	ug/g	1	-	-	5	5	4	4
Acid Extractable Molybdenum (Mo)	40	ug/g	0.5	-	-	<1	<1	<1	<1
Acid Extractable Nickel (Ni)	270	ug/g	1	-	-	12	12	11	10
Acid Extractable Selenium (Se)	5.5	ug/g	0.8	-	-	<1	<1	<1	<1
Acid Extractable Silver (Ag)	40	ug/g	0.5	-	-	<0.2	<0.2	<0.2	<0.2
Acid Extractable Thallium (Tl)	3.3	ug/g	0.5	-	-	<1	<1	<1	<1
Acid Extractable Uranium (U)	33	ug/g	0.5	-	-	<0.5	<0.5	0.6	<0.5
Acid Extractable Vanadium (V)	86	ug/g	0.4	-	-	23	24	21	19
Acid Extractable Zinc (Zn)	340	ug/g	5	62	59	23	24	21	19
Other Regulated Parameters									
Hot Water Extractable Boron	2	ug/g	0.1	-	-	<0.5	<0.5	<0.5	<0.5
Soluble (20:1) Chloride (Cl-)	NA	ug/g	0.011	-	-	<0.011	<0.011	<0.011	<0.011
WAD Cyanide (Free)	0.051	ug/g	0.1	-	-	-	-	-	-
Electrical Conductivity	1.4	mS/cm	0.05	-	-	**2.51**	**5.04**	**3.77**	**4.88**
Hexavalent Chromium (CrVI)	8	ug/g	0.2	-	-	<0.20	<0.20	<0.20	<0.20
Acid Extractable Mercury (Hg)	3.9	ug/g	0.1	-	-	<0.1	<0.1	<0.1	<0.1
Available (CaCl2) pH	NA	pH	2.00	-	-	7.88	7.71	7.72	7.75
Sodium Adsorption Ratio	12	N/A	0.01	-	-	**71.4**	**141**	**102**	**134**

Legend	
To Be Announced	TBA
Exceeds the Criteria	**Result**
DL > Criteria	Result
Exceedance not carried	
Criteria	Reg153/04 T2-ICC-Coarse

Table 1D: Metals, Hydrides and Other Regulated Parameters in Soil

Parameter	Table 2 SCS for I/C/C with Coarse Textured Soil	Units	RDL						
Sample ID				BH5-2	BH6-2	BH7-2	BH8-2	6-1	6-2
Sample Depth (mbgs)				1.52 - 3.05	1.52 - 3.05	1.52 - 3.05	1.52 - 3.05	Unknown	Unknown (1.5 m floor)
Lab Work Number				1927496	1927496	1927496	1927496	1926671	1926671
Lab ID				1485889	1485891	1485893	1485895	1483426	1483427
Sample Collection Date				3/23/2020	3/23/2020	3/23/2020	3/23/2020	3/5/2020	3/5/2020
Metals (including Hydride-Forming Metals)									
Acid Extractable Antimony (Sb)	40	ug/g	0.8	<1	<1	<1	<1	<1	<1
Acid Extractable Arsenic (As)	18	ug/g	1	4	3	3	3	3	3
Acid Extractable Barium (Ba)	670	ug/g	2	49	67	49	33	32	77
Acid Extractable Beryllium (Be)	8	ug/g	0.4	<1	<1	<1	<1	<1	<1
Acid Extractable Boron (B)	120	ug/g	5	9	10	10	6	<5	7
Acid Extractable Cadmium (Cd)	1.9	ug/g	0.5	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Acid Extractable Chromium (Cr)	160	ug/g	5	15	17	16	14	13	20
Acid Extractable Cobalt (Co)	80	ug/g	0.5	7	7	7	6	4	8
Acid Extractable Copper (Cu)	230	ug/g	1	10	11	11	9	10	16
Acid Extractable Lead (Pb)	120	ug/g	1	5	5	5	5	12	6
Acid Extractable Molybdenum (Mo)	40	ug/g	0.5	<1	<1	<1	<1	<1	<1
Acid Extractable Nickel (Ni)	270	ug/g	1	12	12	12	10	9	17
Acid Extractable Selenium (Se)	5.5	ug/g	0.8	<1	<1	<1	<1	<1	<1
Acid Extractable Silver (Ag)	40	ug/g	0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Acid Extractable Thallium (Tl)	3.3	ug/g	0.5	<1	<1	<1	<1	<1	<1
Acid Extractable Uranium (U)	33	ug/g	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acid Extractable Vanadium (V)	86	ug/g	0.4	24	23	22	22	20	28
Acid Extractable Zinc (Zn)	340	ug/g	5	23	28	24	21	23	36
Other Regulated Parameters									
Hot Water Extractable Boron	2	ug/g	0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Soluble (20:1) Chloride (Cl-)	NA	ug/g	0.011	<0.011	<0.011	<0.011	<0.011	-	-
WAD Cyanide (Free)	0.051	ug/g	0.1	-	-	-	-	<0.02	<0.02
Electrical Conductivity	1.4	mS/cm	0.05	**3.18**	1.33	**2.02**	0.45	**3.51**	**7.86**
Hexavalent Chromium (CrVI)	8	ug/g	0.2	<0.20	<0.20	<0.20	<0.20	<0.2	<0.2
Acid Extractable Mercury (Hg)	3.9	ug/g	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Available (CaCl2) pH	NA	pH	2.00	7.77	7.72	7.78	7.76	7.56	7.65
Sodium Adsorption Ratio	12	N/A	0.01	**88.1**	11.7	**48.4**	3.58	**43.8**	**161**

Legend	
To Be Announced	TBA
Exceeds the Criteria	**Result**
DL > Criteria	Result
Exceedance not carried	
Criteria	Reg153/04 T2-ICC-Coarse

Table 1D: Metals, Hydrides and Other Regulated Parameters in Soil

Parameter	Table 2 SCS for I/C/C with Coarse Textured Soil	Units	RDL	Sample ID					
				Sample Depth (mbgs)					
				Lab Work Number					
				Lab ID					
				Sample Collection Date					
				6-3	7-1	7-2	2CF1	BH22-1-SS1B	BH22-1-SS5
				Unknown	Unknown	Unknown	Unknown	0.46 - 0.61	3.05 - 3.66
				1926671	1926672	1926672	1904479	22T918345	22T918345
				1483428	1483429	1483430	1417758	4070378	4070380
				3/5/2020	3/5/2020	3/5/2020	3/28/2019	07/05/2022	07/05/2022
Metals (including Hydride-Forming Metals)									
Acid Extractable Antimony (Sb)	40	ug/g	0.8	<1	<1	<1	<1	<0.8	-
Acid Extractable Arsenic (As)	18	ug/g	1	4	4	4	2	4	-
Acid Extractable Barium (Ba)	670	ug/g	2	51	51	77	13	51.1	-
Acid Extractable Beryllium (Be)	8	ug/g	0.4	<1	<1	<1	<1	0.5	-
Acid Extractable Boron (B)	120	ug/g	5	7	<5	5	<5	8	-
Acid Extractable Cadmium (Cd)	1.9	ug/g	0.5	<0.4	<0.4	0.5	<0.4	<0.5	-
Acid Extractable Chromium (Cr)	160	ug/g	5	17	22	22	8	14	-
Acid Extractable Cobalt (Co)	80	ug/g	0.5	5	7	6	2	5.1	-
Acid Extractable Copper (Cu)	230	ug/g	1	14	11	15	9	10.7	-
Acid Extractable Lead (Pb)	120	ug/g	1	10	8	11	4	8	-
Acid Extractable Molybdenum (Mo)	40	ug/g	0.5	<1	<1	<1	<1	<0.5	-
Acid Extractable Nickel (Ni)	270	ug/g	1	13	14	12	6	10	-
Acid Extractable Selenium (Se)	5.5	ug/g	0.8	<1	<1	<1	<1	<0.8	-
Acid Extractable Silver (Ag)	40	ug/g	0.5	<0.2	<0.2	<0.2	<0.2	<0.5	-
Acid Extractable Thallium (Tl)	3.3	ug/g	0.5	<1	<1	<1	<1	<0.5	-
Acid Extractable Uranium (U)	33	ug/g	0.5	<0.5	<0.5	0.8	<0.5	0.71	-
Acid Extractable Vanadium (V)	86	ug/g	0.4	24	30	31	13	23.8	-
Acid Extractable Zinc (Zn)	340	ug/g	5	37	49	73	18	37	-
Other Regulated Parameters									
Hot Water Extractable Boron	2	ug/g	0.1	<0.5	<0.5	0.6	<0.5	1.86	<0.10
Soluble (20:1) Chloride (Cl-)	NA	ug/g	0.011	-	-	-	-	-	-
WAD Cyanide (Free)	0.051	ug/g	0.1	<0.02	<0.04	<0.04	<0.03	<0.040	-
Electrical Conductivity	1.4	mS/cm	0.05	**5.63**	**5.17**	**9.20**	0.07	**4.61**	0.491
Hexavalent Chromium (CrVI)	8	ug/g	0.2	<0.2	<0.2	<0.2	<0.20	<0.2	-
Acid Extractable Mercury (Hg)	3.9	ug/g	0.1	<0.1	<0.1	<0.1	<0.1	0.15	-
Available (CaCl2) pH	NA	pH	2.00	7.65	7.37	7.16	7.08	7.55	-
Sodium Adsorption Ratio	12	N/A	0.01	**151**	**51.5**	**168**	0.09	6.83	1.85

Legend	
To Be Announced	TBA
Exceeds the Criteria	**Result**
DL > Criteria	Result
Exceedance not carried	
Criteria	Reg153/04 T2-ICC-Coarse

Table 1D: Metals, Hydrides and Other Regulated Parameters in Soil

Parameter	Table 2 SCS for I/C/C with Coarse Textured Soil	Units	RDL						
Sample ID				BH22-2-SS1B	BH22-3-SS2	BH22-4-SS2	BH22-4-SS5	BH22-4-SS6	BH22-5-SS2
Sample Depth (mbgs)				0.27 - 0.61	0.76 - 1.37	0.76 - 1.37	3.05 - 3.66	3.81 - 4.42	0.76 - 1.37
Lab Work Number				22T918345	22T918345	22T918345	22T918345	22T918345	22T918345
Lab ID				4070382	4070385	4070391	4070393	4070416	4070437
Sample Collection Date				07/05/2022	07/05/2022	07/05/2022	07/05/2022	07/06/2022	07/07/2022
Metals (including Hydride-Forming Metals)									
Acid Extractable Antimony (Sb)	40	ug/g	0.8	<0.8	<0.8	<0.8	-	-	<0.8
Acid Extractable Arsenic (As)	18	ug/g	1	4	3	3	-	-	3
Acid Extractable Barium (Ba)	670	ug/g	2	55.7	39.6	29.1	-	-	29.5
Acid Extractable Beryllium (Be)	8	ug/g	0.4	0.4	<0.4	<0.4	-	-	<0.4
Acid Extractable Boron (B)	120	ug/g	5	7	5	7	-	-	<5
Acid Extractable Cadmium (Cd)	1.9	ug/g	0.5	<0.5	<0.5	<0.5	-	-	<0.5
Acid Extractable Chromium (Cr)	160	ug/g	5	16	13	9	-	-	6
Acid Extractable Cobalt (Co)	80	ug/g	0.5	6	5.8	3.3	-	-	3.3
Acid Extractable Copper (Cu)	230	ug/g	1	10.4	11.3	9.8	-	-	21.2
Acid Extractable Lead (Pb)	120	ug/g	1	8	7	8	-	-	4
Acid Extractable Molybdenum (Mo)	40	ug/g	0.5	<0.5	<0.5	<0.5	-	-	<0.5
Acid Extractable Nickel (Ni)	270	ug/g	1	11	11	5	-	-	5
Acid Extractable Selenium (Se)	5.5	ug/g	0.8	<0.8	<0.8	<0.8	-	-	<0.8
Acid Extractable Silver (Ag)	40	ug/g	0.5	<0.5	<0.5	<0.5	-	-	<0.5
Acid Extractable Thallium (Tl)	3.3	ug/g	0.5	<0.5	<0.5	<0.5	-	-	<0.5
Acid Extractable Uranium (U)	33	ug/g	0.5	<0.50	<0.50	<0.50	-	-	<0.50
Acid Extractable Vanadium (V)	86	ug/g	0.4	28.5	25.1	15.5	-	-	11.7
Acid Extractable Zinc (Zn)	340	ug/g	5	38	28	32	-	-	22
Other Regulated Parameters									
Hot Water Extractable Boron	2	ug/g	0.1	0.19	0.15	0.19	-	-	<0.10
Soluble (20:1) Chloride (Cl-)	NA	ug/g	0.011	-	-	-	-	-	-
WAD Cyanide (Free)	0.051	ug/g	0.1	<0.040	<0.040	<0.040	-	-	<0.040
Electrical Conductivity	1.4	mS/cm	0.05	0.373	0.24	1.24	0.163	0.504	0.085
Hexavalent Chromium (CrVI)	8	ug/g	0.2	<0.2	<0.2	<0.2	-	-	<0.2
Acid Extractable Mercury (Hg)	3.9	ug/g	0.1	0.26	0.19	0.11	-	-	<0.10
Available (CaCl2) pH	NA	pH	2.00	7.68	7.69	~~9.14~~	7.78	-	7.81
Sodium Adsorption Ratio	12	N/A	0.01	2.8	1.98	5.11	1.34	4.27	0.646

Legend	
To Be Announced	TBA
Exceeds the Criteria	**Result**
DL > Criteria	Result
Exceedance not carried	
Criteria	Reg153/04 T2-ICC-Coarse

Table 1D: Metals, Hydrides and Other Regulated Parameters in Soil

Parameter	Table 2 SCS for I/C/C with Coarse Textured Soil	Units	RDL	Sample ID				
				Sample Depth (mbgs)				
				Lab Work Number				
				Lab ID				
				Sample Collection Date				
				BH22-6-SS1B	Duplicate of BH22-6-SS1B (BH22-6-SS1BB)	BH22-7-SS2	BH22-9D-SS3	B22-9D SS5
				0.05 - 0.61	0.05 - 0.61	0.76 - 1.37	6.10 - 6.71	9.14 - 9.75
				22T918345	22T918345	22T918345	22T918345	22T923638
				4070407	4070408	4070421	4070469	4120362
				07/06/2022	07/06/2022	07/06/2022	07/07/2022	07/07/2022
Metals (including Hydride-Forming Metals)								
Acid Extractable Antimony (Sb)	40	ug/g	0.8	<0.8	<0.8	<0.8	-	-
Acid Extractable Arsenic (As)	18	ug/g	1	5	4	2	-	-
Acid Extractable Barium (Ba)	670	ug/g	2	51.8	66.4	15.3	-	-
Acid Extractable Beryllium (Be)	8	ug/g	0.4	<0.4	<0.4	<0.4	-	-
Acid Extractable Boron (B)	120	ug/g	5	7	7	6	-	-
Acid Extractable Cadmium (Cd)	1.9	ug/g	0.5	<0.5	<0.5	<0.5	-	-
Acid Extractable Chromium (Cr)	160	ug/g	5	15	15	8	-	-
Acid Extractable Cobalt (Co)	80	ug/g	0.5	5.6	5.5	3.5	-	-
Acid Extractable Copper (Cu)	230	ug/g	1	16.6	15.8	8.9	-	-
Acid Extractable Lead (Pb)	120	ug/g	1	21	21	3	-	-
Acid Extractable Molybdenum (Mo)	40	ug/g	0.5	<0.5	<0.5	<0.5	-	-
Acid Extractable Nickel (Ni)	270	ug/g	1	11	10	6	-	-
Acid Extractable Selenium (Se)	5.5	ug/g	0.8	<0.8	<0.8	<0.8	-	-
Acid Extractable Silver (Ag)	40	ug/g	0.5	<0.5	<0.5	<0.5	-	-
Acid Extractable Thallium (Tl)	3.3	ug/g	0.5	<0.5	<0.5	<0.5	-	-
Acid Extractable Uranium (U)	33	ug/g	0.5	<0.50	0.52	<0.50	-	-
Acid Extractable Vanadium (V)	86	ug/g	0.4	25.1	24.6	16.6	-	-
Acid Extractable Zinc (Zn)	340	ug/g	5	68	62	14	-	-
Other Regulated Parameters								
Hot Water Extractable Boron	2	ug/g	0.1	0.23	0.3	<0.10	-	-
Soluble (20:1) Chloride (Cl-)	NA	ug/g	0.011	-	-	-	-	-
WAD Cyanide (Free)	0.051	ug/g	0.1	<0.040	<0.040	<0.040	-	-
Electrical Conductivity	1.4	mS/cm	0.05	0.219	0.259	0.15	**7.09**	1.39
Hexavalent Chromium (CrVI)	8	ug/g	0.2	<0.2	<0.2	<0.2	-	-
Acid Extractable Mercury (Hg)	3.9	ug/g	0.1	0.1	0.12	<0.10	-	-
Available (CaCl2) pH	NA	pH	2.00	7.69	7.59	7.71	-	-
Sodium Adsorption Ratio	12	N/A	0.01	1.32	1.42	1.87	**30.4**	2.67

Legend	
To Be Announced	TBA
Exceeds the Criteria	**Result**
DL > Criteria	Result
Exceedance not carried	
Criteria	Reg153/04 T2-ICC-Coarse

Table 1D: Metals, Hydrides and Other Regulated Parameters in Soil

Parameter	Table 2 SCS for I/C/C with Coarse Textured Soil	Units	RDL						
Sample ID				BH22-10-SS2	B22-10 SS6	BH22-11D-SS3	B22-11D SS5	BH22-13-SS2	BH22-14-SS2B
Sample Depth (mbgs)				0.76 - 1.37	3.81 - 4.42	6.1 - 6.71	9.14 - 9.75	0.76 - 1.37	0.81 - 1.37
Lab Work Number				22T918345	22T923638	22T918345	22T923638	22T918345	22T918345
Lab ID				4070396	4120352	4070439	4120363	4070403	4070415
Sample Collection Date				07/04/2022	07/04/2022	07/08/2022	07/08/2022	07/06/2022	07/06/2022
Metals (including Hydride-Forming Metals)									
Acid Extractable Antimony (Sb)	40	ug/g	0.8	<0.8	-	-	-	<0.8	<0.8
Acid Extractable Arsenic (As)	18	ug/g	1	3	-	-	-	3	2
Acid Extractable Barium (Ba)	670	ug/g	2	60.9	-	-	-	42.4	28.4
Acid Extractable Beryllium (Be)	8	ug/g	0.4	0.5	-	-	-	<0.4	<0.4
Acid Extractable Boron (B)	120	ug/g	5	8	-	-	-	6	5
Acid Extractable Cadmium (Cd)	1.9	ug/g	0.5	<0.5	-	-	-	<0.5	<0.5
Acid Extractable Chromium (Cr)	160	ug/g	5	18	-	-	-	12	11
Acid Extractable Cobalt (Co)	80	ug/g	0.5	6.7	-	-	-	5.0	4.1
Acid Extractable Copper (Cu)	230	ug/g	1	12.2	-	-	-	12.8	10.5
Acid Extractable Lead (Pb)	120	ug/g	1	10	-	-	-	19	4
Acid Extractable Molybdenum (Mo)	40	ug/g	0.5	<0.5	-	-	-	<0.5	<0.5
Acid Extractable Nickel (Ni)	270	ug/g	1	13	-	-	-	9	7
Acid Extractable Selenium (Se)	5.5	ug/g	0.8	<0.8	-	-	-	<0.8	<0.8
Acid Extractable Silver (Ag)	40	ug/g	0.5	<0.5	-	-	-	<0.5	<0.5
Acid Extractable Thallium (Tl)	3.3	ug/g	0.5	<0.5	-	-	-	<0.5	<0.5
Acid Extractable Uranium (U)	33	ug/g	0.5	0.79	-	-	-	<0.50	<0.50
Acid Extractable Vanadium (V)	86	ug/g	0.4	31.7	-	-	-	23.5	22.5
Acid Extractable Zinc (Zn)	340	ug/g	5	50	-	-	-	34	19
Other Regulated Parameters									
Hot Water Extractable Boron	2	ug/g	0.1	**2.62**	0.10	-	-	-	-
Soluble (20:1) Chloride (Cl-)	NA	ug/g	0.011	-	-	-	-	-	-
WAD Cyanide (Free)	0.051	ug/g	0.1	<0.040	-	<0.040	-	-	-
Electrical Conductivity	1.4	mS/cm	0.05	1.07	**17.8**	**5.72**	**2.68**	-	-
Hexavalent Chromium (CrVI)	8	ug/g	0.2	<0.2	-	-	-	-	-
Acid Extractable Mercury (Hg)	3.9	ug/g	0.1	0.13	-	-	-	-	-
Available (CaCl2) pH	NA	pH	2.00	7.94	-	-	-	-	-
Sodium Adsorption Ratio	12	N/A	0.01	**15**	**129**	**30.7**	5.78	-	-

Legend	
To Be Announced	TBA
Exceeds the Criteria	**Result**
DL > Criteria	Result
Exceedance not carried	
Criteria	Reg153/04 T2-ICC-Coarse

Table 1D: Metals, Hydrides and Other Regulated Parameters in Soil

Parameter	Table 2 SCS for I/C/C with Coarse Textured Soil	Units	RDL	Sample ID				
				Sample Depth (mbgs)				
				Lab Work Number				
				Lab ID				
				Sample Collection Date				
				BH22-15-SS1	Dup of BH22-15 SS1 (BH22-15-SS11)	BH22-20-SS4	BH22-21-SS1B	BH22-21-SS4
				0 - 0.61	0 - 0.61	2.29 - 2.90	0.05 - 0.61	2.29 - 2.90
				22T918345	22T918345	22T918345	22T918345	22T918345
				4070432	4070433	4070436	4070423	4070427
				07/07/2022	07/07/2022	07/07/2022	07/07/2022	07/07/2022
Metals (including Hydride-Forming Metals)								
Acid Extractable Antimony (Sb)	40	ug/g	0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Acid Extractable Arsenic (As)	18	ug/g	1	2	3	3	4	4
Acid Extractable Barium (Ba)	670	ug/g	2	26.9	36.1	48.9	27	53.1
Acid Extractable Beryllium (Be)	8	ug/g	0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Acid Extractable Boron (B)	120	ug/g	5	<5	5	8	8	9
Acid Extractable Cadmium (Cd)	1.9	ug/g	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acid Extractable Chromium (Cr)	160	ug/g	5	8	9	14	14	14
Acid Extractable Cobalt (Co)	80	ug/g	0.5	3.7	4.3	6.9	5.4	6.4
Acid Extractable Copper (Cu)	230	ug/g	1	14.8	18.4	13	16.6	13.3
Acid Extractable Lead (Pb)	120	ug/g	1	4	4	7	26	5
Acid Extractable Molybdenum (Mo)	40	ug/g	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acid Extractable Nickel (Ni)	270	ug/g	1	6	7	12	11	11
Acid Extractable Selenium (Se)	5.5	ug/g	0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Acid Extractable Silver (Ag)	40	ug/g	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acid Extractable Thallium (Tl)	3.3	ug/g	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acid Extractable Uranium (U)	33	ug/g	0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Acid Extractable Vanadium (V)	86	ug/g	0.4	17.0	19.0	23.0	25.4	20.9
Acid Extractable Zinc (Zn)	340	ug/g	5	21	25	32	**446**	31
Other Regulated Parameters								
Hot Water Extractable Boron	2	ug/g	0.1	<0.10	<0.10	-	0.61	-
Soluble (20:1) Chloride (Cl-)	NA	ug/g	0.011	-	-	-	-	-
WAD Cyanide (Free)	0.051	ug/g	0.1	<0.040	<0.040	-	<0.040	-
Electrical Conductivity	1.4	mS/cm	0.05	0.215	0.27	-	**4.08**	**2.35**
Hexavalent Chromium (CrVI)	8	ug/g	0.2	<0.2	<0.2	-	<0.2	-
Acid Extractable Mercury (Hg)	3.9	ug/g	0.1	<0.10	<0.10	-	<0.10	-
Available (CaCl2) pH	NA	pH	2.00	7.87	7.94	-	7.89	-
Sodium Adsorption Ratio	12	N/A	0.01	3.09	4.31	-	**55.8**	**48.2**

Legend	
To Be Announced	TBA
Exceeds the Criteria	**Result**
DL > Criteria	Result
Exceedance not carried	
Criteria	Reg153/04 T2-ICC-Coarse

Table 1E: Polychlorinated Biphenyls (PCBs) in Soil

Parameter	Table 2 SCS for I/C/C with Coarse Textured Soil	Units	RDL	*Sample ID* *Sample Depth (mbgs)* *Lab Work Number* *Lab Identifier* *Sample Collection Date*
				BH3-1 0 - 1.52 1821180 1400611 11/19/2018
Polychlorinated Biphenyls (PCBs)				
Aroclor 1242	-	ug/g	-	<0.02
Aroclor 1248	-	ug/g	-	<0.02
Aroclor 1254	-	ug/g	-	<0.02
Aroclor 1260	-	ug/g	-	<0.02
Polychlorinated Biphenyls	1.1	ug/g	0.1	<0.02

Legend	
To Be Announced	TBA
Exceeds the Criteria	**Result**
DL > Criteria	**Result**
Criteria	Reg153/04 T2-ICC-Coarse

Table 1F: Organochlorine Pesticides (OCPs) in Soil

Parameter	Table 2 SCS for I/C/C with Coarse Textured Soil	Units	RDL					
				Sample ID				
				Sample Depth (mbgs)				
				Lab Work Number				
				Lab ID				
				Sample Collection Date				
				BH/MW1-1	BH/MW4-2	BH7-1	BH22-1-SS1B	BH22-2-SS1B
				0 - 1.52	1.52 - 3.05	0 - 1.52	0.46 - 0.61	0.27 - 0.61
				1821180	1821180	1821180	22T918345	22T918345
				1400607	1400613	1400618	4070378	4070382
				11/19/2018	11/19/2018	11/19/2018	07/05/2022	07/05/2022
Organic Pesticides								
Hexachloroethane	0.21	ug/g	0.005	<0.01	<0.01	<0.01	<0.005	<0.005
Gamma-Hexachlorocyclohexane	0.056	ug/g	0.005	<0.01	<0.01	<0.002	<0.005	<0.005
Heptachlor	0.19	ug/g	0.005	<0.01	<0.01	<0.002	<0.005	<0.005
Aldrin	0.088	ug/g	0.005	<0.01	<0.01	<0.002	<0.005	<0.005
Heptachlor Epoxide	0.05	ug/g	0.005	<0.01	<0.01	<0.002	<0.005	<0.005
Endosulfan I	-	ug/g	0.005	<0.01	<0.01	<0.002	<0.005	<0.005
Endosulfan II	-	ug/g	0.005	<0.01	<0.01	<0.002	<0.005	<0.005
Endosulfan	0.3	ug/g	0.005	<0.02	<0.02	<0.004	<0.005	<0.005
Alpha-Chlordane	-	ug/g	0.005	<0.01	<0.01	<0.002	<0.005	<0.005
gamma-Chlordane	-	ug/g	0.005	<0.01	<0.01	<0.002	<0.005	<0.005
Chlordane	0.05	ug/g	0.007	<0.03	<0.03	<0.006	<0.007	<0.007
op'-DDE	-	ug/g	0.005	-	-	-	<0.005	<0.005
pp'-DDE	-	ug/g	0.005	-	-	-	<0.005	<0.005
DDE	0.52	ug/g	0.007	<0.01	<0.01	<0.002	<0.007	<0.007
op'-DDD	-	ug/g	0.005	-	-	-	<0.005	<0.005
pp'-DDD	-	ug/g	0.005	-	-	-	<0.005	<0.005
DDD	4.6	ug/g	0.007	<0.01	<0.01	<0.002	<0.007	<0.007
op'-DDT	-	ug/g	0.005	-	-	-	<0.005	<0.005
pp'-DDT	-	ug/g	0.005	-	-	-	<0.005	<0.005
DDT (Total)	1.4	ug/g	0.007	<0.01	<0.01	<0.002	<0.007	<0.007
Dieldrin	0.088	ug/g	0.005	<0.01	<0.01	<0.002	<0.005	<0.005
Endrin	0.04	ug/g	0.005	<0.01	<0.01	<0.002	<0.005	<0.005
Methoxychlor	1.6	ug/g	0.005	<0.01	<0.01	<0.002	<0.005	<0.005
Hexachlorobenzene	0.66	ug/g	0.005	<0.01	<0.01	<0.01	<0.005	<0.005
Hexachlorobutadiene	0.031	ug/g	0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Legend	
To Be Announced	TBA
Exceeds the Criteria	**Result**
DL > Criteria	**Result**
Criteria	Reg153/04 T2-ICC-Coarse

Table 1F: Organochlorine Pesticides (OCPs) in Soil

Parameter	Table 2 SCS for I/C/C with Coarse Textured Soil	Units	RDL	*Sample ID*		
				Sample Depth (mbgs)		
				Lab Work Number		
				Lab ID		
				Sample Collection Date		
				BH22-3-SS2	Dup of BH22-3-SS2 (BH22-3-SS22)	BH22-4-SS2
				0.76 - 1.37	0.76 - 1.37	0.76 - 1.37
				22T918345	22T918345	22T918345
				4070385	4070386	4070391
				07/05/2022	07/05/2022	07/05/2022
Organic Pesticides						
Hexachloroethane	0.21	ug/g	0.005	<0.005	<0.005	<0.005
Gamma-Hexachlorocyclohexane	0.056	ug/g	0.005	<0.005	<0.005	<0.005
Heptachlor	0.19	ug/g	0.005	<0.005	<0.005	<0.005
Aldrin	0.088	ug/g	0.005	<0.005	<0.005	<0.005
Heptachlor Epoxide	0.05	ug/g	0.005	<0.005	<0.005	<0.005
Endosulfan I	-	ug/g	0.005	<0.005	<0.005	<0.005
Endosulfan II	-	ug/g	0.005	<0.005	<0.005	<0.005
Endosulfan	0.3	ug/g	0.005	<0.005	<0.005	<0.005
Alpha-Chlordane	-	ug/g	0.005	<0.005	<0.005	<0.005
gamma-Chlordane	-	ug/g	0.005	<0.005	<0.005	<0.005
Chlordane	0.05	ug/g	0.007	<0.007	<0.007	<0.007
op'-DDE	-	ug/g	0.005	<0.005	<0.005	<0.005
pp'-DDE	-	ug/g	0.005	<0.005	<0.005	<0.005
DDE	0.52	ug/g	0.007	<0.007	<0.007	<0.007
op'-DDD	-	ug/g	0.005	<0.005	<0.005	<0.005
pp'-DDD	-	ug/g	0.005	<0.005	<0.005	<0.005
DDD	4.6	ug/g	0.007	<0.007	<0.007	<0.007
op'-DDT	-	ug/g	0.005	<0.005	<0.005	<0.005
pp'-DDT	-	ug/g	0.005	<0.005	<0.005	<0.005
DDT (Total)	1.4	ug/g	0.007	<0.007	<0.007	<0.007
Dieldrin	0.088	ug/g	0.005	<0.005	<0.005	<0.005
Endrin	0.04	ug/g	0.005	<0.005	<0.005	<0.005
Methoxychlor	1.6	ug/g	0.005	<0.005	<0.005	<0.005
Hexachlorobenzene	0.66	ug/g	0.005	<0.005	<0.005	<0.005
Hexachlorobutadiene	0.031	ug/g	0.01	<0.01	<0.01	<0.01

Legend	
To Be Announced	TBA
Exceeds the Criteria	**Result**
DL > Criteria	**Result**
Criteria	Reg153/04 T2-ICC-Coarse

Table 2E: Organochlorine Pesticides (OCPs) in Groundwater

Parameter	Table 2 SCS for All Property Uses with Coarse Textured Soil	Table 6 SCS for All Property Uses with Coarse Textured Soil	Units	RDL	Sample ID / Sample Depth (mbgs) / Lab Work Number / Lab Identifier / Sample Collection Date	
					BHMW10	BHMW6
					3.05 - 6.10	3.05 - 6.10
					1821763	1932431
					1402334	1499620
					11/23/2018	6/17/2020
Organic Carbon Pesticides						
Aldrin	0.35	0.35	ug/L	0.006	<0.006	<0.006
Chlordane	7	0.06	ug/L	0.018	<0.018	<0.018
a-chlordane	-	-	ug/L	0.006	<0.006	<0.006
g-chlordane	-	-	ug/L	0.006	<0.006	<0.006
DDD	10	-	ug/L	0.006	<0.006	<0.006
DDE	10	10	ug/L	0.006	<0.006	<0.006
DDT	2.8	-	ug/L	0.006	<0.006	<0.006
Dieldrin	0.35	-	ug/L	0.006	<0.006	<0.006
Endosulfan	1.5	0.56	ug/L	0.006	<0.012	<0.006
Endosulfan I	-	-	ug/L	0.006	<0.006	<0.006
Endosulfan II	-	-	ug/L	0.006	<0.006	<0.006
Endrin	0.48	-	ug/L	0.006	<0.006	<0.006
Heptachlor	1.5	0.038	ug/L	0.006	<0.006	<0.006
Heptachlor Epoxide	0.048	0.038	ug/L	0.006	<0.006	<0.006
Hexachlorobenzene	1	1	ug/L	0.006	<0.01	<0.006
Hexachlorobutadiene	0.44	0.012	ug/L	0.006	<0.01	<0.006
Gamma-Hexachlorocyclohexane	1.2	-	ug/L	0.006	<0.006	<0.006
Hexachloroethane	2.1	0.17	ug/L	0.006	<0.01	<0.006
Methoxychlor	6.5	-	ug/L	0.006	<0.006	<0.006

Legend	
To Be Announced	TBA
Exceeds T6 Criteria	**Result**
Exceeds T2 and T6 Criteria	**Result**
DL > T6 Criteria	Result
DL > T2 and T6 Criteria	**Result**
Criteria 1	Reg153/04 T2-ICC-Coarse
Criteria 2	Reg153/04 T6-ICC-Coarse

Appendix A – Soil to Indoor Air Inhalation Evaluation

Appendix A: QUANTITATIVE EVALUATION OF RISKS FROM SOIL TO INDOOR AIR

As the maximum concentration of PHC F1, PHC F2 and benzene in soil exceeded their generic SQG_{HH} protective of indoor air inhalation, a quantitative assessment was conducted to evaluate this pathway for these parameters.

1.1 Receptor Characteristics

Standard indoor worker characteristics and activity patterns (*e.g.,* body weight, time on-site) were used in the exposure assessment. The *Rationale for the Development of Soil and Ground Water Standards for Use at Contaminated Sites in Ontario* (MECP, 2011a) was the key source of indoor worker characteristics and activity patterns used in the current assessment. These values are presented in Table A-1.

1.2 Exposure Estimates

The exposure point concentrations (EPC) for benzene and PHC F1 and F2 subfractions are provided in Table A-2 and are equivalent to the maximum concentrations measured on-site.

Prorated exposure values (expressed as concentrations of COCs in air (μg/m^3)), adjusted for receptor specific exposure conditions, were used to assess exposure and risk.

The chemical and physical properties used in the quantitative exposure estimate calculations are provided in Tables A-3. Site soil properties used for modeling exposure rates, are provided in Table A-4.

1.2.1 Exposure to COCs via Inhalation of Vapours from Soil to Indoor Air

Migration of volatile chemicals from soil to indoor air can create a potential exposure pathway to receptors of concern. The fundamental underlying principle for vapour transport is based on observations that small but persistent pressure differences established between the exterior and interior of buildings may cause infiltration of soil gas through the substructure of buildings. Based on measurements of the advective flow of radon from soil air into buildings, various methodologies have been developed to estimate the entry of vaporized chemicals. The majority of these methodologies are theoretical in nature and have not been extensively validated with empirical data. However, the methodologies can be used to provide a conservative estimate of exposures to vapours from subsurface sources.

The evaluation of the indoor air pathway is based on the vapour intrusion model developed by Johnson and Ettinger (J&E,1991).

Johnson and Ettinger (1991) and Little et al. (1992) reported that the flux of volatile chemicals through the substructure of buildings is based on the concentration and pressure gradients affecting the transport of vapours in the soil adjacent to the substructure. It is assumed a zone (hereafter referred to as the zone of influence) surrounds the substructure of the building, within which vapours will be transported by convection and/or diffusion through the substructure of the building (shown in the schematic diagram below). Hence, the concentration of vapours within the zone of influence arising from a soil or groundwater source can be used to estimate the concentration of vapours inside the building.

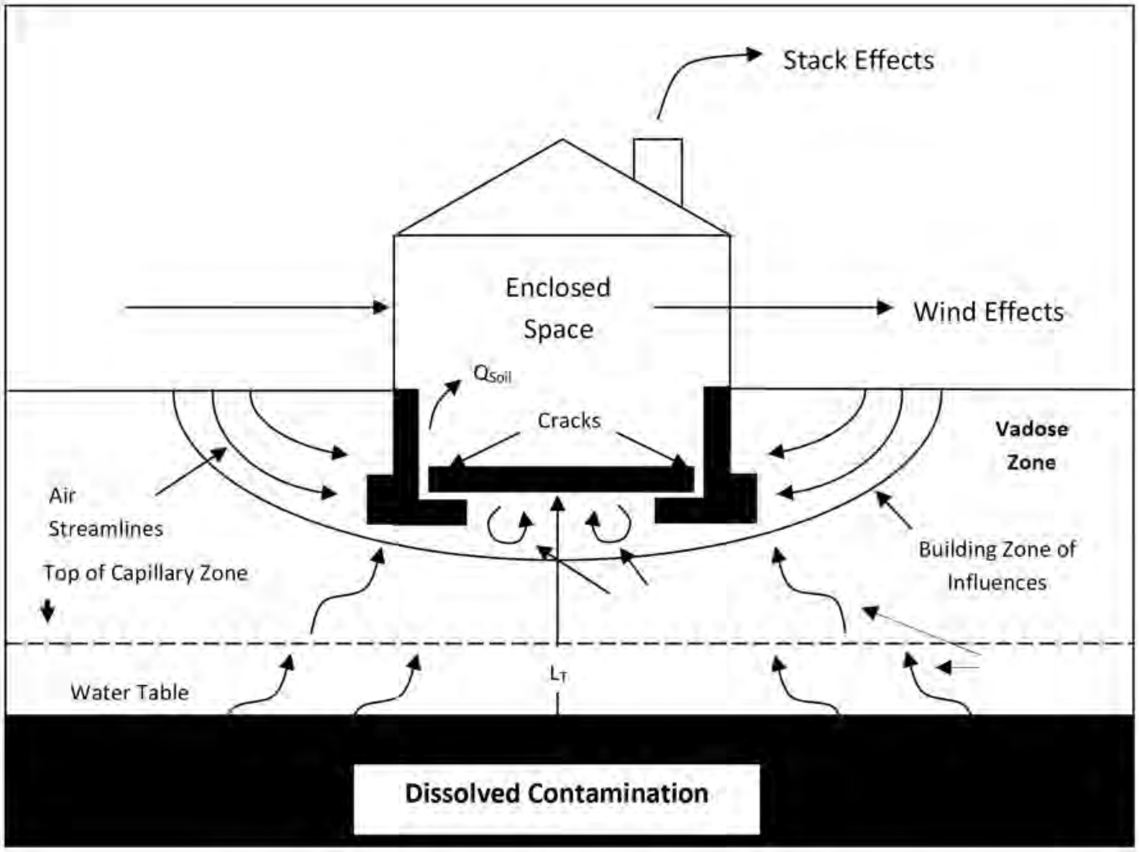


Figure 1: The Vapour Infiltration Pathway (US EPA, 2004)

J&E (1991) developed a heuristic model describing single component chemical transport through one or more soil layers of the unsaturated zone to the indoor air space of an overlying building. The J&E model is a multi-compartment model combining an analytical solution of the one dimensional advective-dispersion equation, describing vapour transport from the unsaturated zone into an overlying building, with a solution of the diffusion equation, describing vapour and liquid diffusive transport through the unsaturated zone from an underlying source, and a steady-state building ventilation mass balance equation. The model calculates the soil gas attenuation factor relating the chemical concentration in soil gas to the concentration in indoor air. The J&E modelling approach has been adapted to describe volatile chemical transport from soil sources assuming linear equilibrium phase partitioning with soil gas.

As cited in MECP Rationale Document (2011a), there are a number of precluding subsurface conditions, which affect the validity of applying the J&E model for different sites. The precluding factors outlined in Section 7.3.3.1 of the Rationale document were reviewed. Based on the site-specific properties of the RA property, the application of the J&E model was reviewed in detail with respect to the bedrock characteristics found on the RA property. These conditions were evaluated based on the slab-on-grade commercial building evaluated by MECP (2011a). Since the interior volume of the site building exceeds the generic MECP slab-on-grade commercial building criteria, the J&E modelling was completed based on the more conservative generic MECP slab-on-grade building. The building characteristics applied in the J&E modeling are presented in Table A-5. The MECP (2011a) commercial building characteristics were considered appropriate for use in this assessment given the intended future building overlying the area of soil impacts is intended to be of slab-on-grade construction and be occupied for industrial use.

The J&E model is not applicable for buildings constructed on media with high gas permeability such as vertically or near-vertically fractured bedrock, karst or cobbles. As discussed in Section 2.2, bedrock was not encountered on-site to the maximum investigated depth of 9.75 m bgs, but is encountered in the vicinity of the site at a minimum depth of 16.8 m bgs. As such, the future building is anticipated to have more than 1 m thickness of soil beneath its slab in all areas before bedrock begins. Therefore, this precluding factor recommended by MECP for the use of J&E model does not apply on the RA property.

Based on the above evaluation, the J&E model is applicable to estimate the vapour infiltration of volatile soil COCs for the current and a potential future slab-on-grade building. For soil parameters that exceeded the S-IA component value (i.e., benzene and PHC F1 and F2), the maximum soil concentrations were used to predict indoor air concentrations for a slab-on-grade building.

For soil COCs, the depth to contamination was set to 1.5 metres below ground surface (m bgs) based on the results in soil samples collected from RCS-5 and FS-2, located within the petroleum-impacted hotspot area, which indicated that the soil impacts resulting in indoor air inhalation risks were limited to below this depth. In addition, the depth below grade to the bottom of the contamination was set to 2.7 m bgs, based on the deeper soil results at C-2. It is noted that one (1) soil sample exceeding the Table 2 SCS for PHC F2 at a depth of 0.15 to 0.61 m bgs was identified at BH22-13; however, this sample was excluded from consideration when determining the depth to contamination at the site as it is within the S-IA component value for PHC F2 and is not anticipated to pose a risk via indoor air inhalation.

Indoor air concentrations sourced from soil were estimated using the J&E model as applied in the US EPA (2004) Excel spreadsheet program "SL-ADV" version 3.1 assuming a finite source. It is acknowledged that the US EPA no longer supports the use of the J&E model for predicting indoor air concentrations based on measured soil concentrations to be consistent with the Office of Solid Waste and Emergency Response (US EPA OSWER, 2015). US EPA OSWER (2015) does not recommend the use of soil data for estimating the potential for vapour intrusion risks due to the potential for vapour loss due to volatilization during soil sampling, preservation and chemical analysis. Furthermore, US EPA OSWER (2015) indicates that there are uncertainties with soil partitioning calculations. In the absence of soil vapour sampling data that can be applied to the future building and reduce the uncertainty in indoor air concentration estimates, the J&E model was applied to predict indoor air concentrations within the future building. However, measures were taken to reduce potential for vapour loss during field programs by collecting samples using generally accepted principles, using appropriate sampling equipment and in accordance with the MOEE (1996) and O. Reg. 153/04 and laboratory analyses were completed in accordance with MECP (2011b) protocols.

Three (3) soil layers were assumed in the J&E modeling. The soil stratigraphy from the ground surface to the bottom of the enclosed space (Soil Stratum A; 11.25 cm) was set as a sandy loam unit based on the observed soil stratigraphy at the site. Soil Stratum B was set to the 30 cm gravel crush base layer beneath the floor slab, following MECP (2011a and 2016) and Soil Stratum C was set to 108.75 cm of sandy loam based on the depth to the top of contamination and the observed soil stratigraphy at the site. Advective transport was evaluated based on the default soil gas flow rate applied by MECP (2011a) for the generic commercial slab-on-grade building with coarse textured soils (9.8 LPM). The soil vapour permeability for coarse soils in a commercial setting was set to 1.78 E-07 cm^2 per MECP (2011a).

Physical and chemical properties of benzene, PHC F1 and PHC F2 are provided in Table A-3. It is noted that the physical and chemical properties of the COCs were updated in the J&E spreadsheet to be consistent with those provided in MECP (2016). A summary of the soil properties applied in the indoor air model is provided in Table A-4.

Predicted soil gas concentrations, attenuation factors and indoor air concentrations calculated for the slab-on-grade building are summarized in Table A-6. In keeping with MECP (2011a), a bioattenuation factor of 10 was applied to the indoor air concentrations predicted by the J&E model, to account for the minimum 1 metre of clean soil below the building to the impacts in soil exceeding the S-IA.

1.2.3 Prorated Exposure Concentrations

Exposure for the indoor air vapour intrusion pathway is calculated as the adjusted or prorated indoor air exposure concentration as follows:

$$EXP_{IA.} = \frac{C_{IA} \times EF}{HPY}$$

where:

EXP_{IA}	=	Prorated indoor air exposure concentration of COCs sourced from soil (mg/m^3)
C_{IA}	=	Indoor air concentration (mg/m^3)
EF	=	Exposure frequency (hr/yr, = 9.8 hr/d x 5 d/wk x 50 wk/yr)
HPY	=	Hours per year (365 d/yr x 24 hr/d)

The prorated exposure concentrations of soil COCs in indoor air for the indoor worker are presented in Table A-8.

1.3 Toxicity Assessment

The COCs were evaluated for their toxicity towards humans via the relevant exposure pathways discussed above. Exposure to a chemical, depending on the chemical and exposure route, can elicit either non-carcinogenic (e.g. threshold) or carcinogenic (e.g. non-threshold) effects, or both. For non-carcinogenic exposure, the underlying assumption is that there is a threshold concentration/dose below which there is no potential for adverse effects. TRVs for non-carcinogenic constituents consisting of reference doses and concentrations have been developed for different exposure routes (i.e. oral and inhalation) based on animal and epidemiological studies. The reference dose or concentration is derived from the LOAEL or NOAEL, applying order of magnitude modifying and uncertainty factors to account for interspecies and sensitive population variations, study limitations and other uncertainties.

For carcinogenic exposure, the underlying assumption is that there is no threshold concentration or dose below which the risk from developing cancer is zero. The dose response relationship for carcinogenic constituents is described by the cancer slope factor or cancer unit risk factor. The cancer slope factor or cancer potency is the slope of the dose-response curve at very low dose which is derived from animal studies or sensitive population studies applying different low dose extrapolation models (e.g. linear multi-stage, etc.). The URF is defined as the incremental lifetime cancer risk associated with exposure to a chemical constituent in ambient air at a concentration of 1 $\mu g/m^3$, or in groundwater at a concentration of 1 µg/L.

The TRVs applied in this evaluation were selected from MECP (2011a, 2016 or 2022), which were based on TRVs selected by various credible agencies as discussed in Section 4.4 of the SLRA.

The TRVs applied in the indoor air inhalation pathway evaluation are presented in Table A-7.

Uncertainties associated with the estimation of toxicological effects of chemicals on human receptors are inherent in the risk assessment process. For instance, toxicologists rely on animal test results, toxicological models, and epidemiological studies to estimate the effects of chemicals on humans. In addition, the availability of toxicological data is often limited due to the vast number of chemical species and the high cost associated with conducting these studies. To overcome these uncertainties and increased effects to sensitive populations, a number of order-of-magnitude uncertainty factors are typically included during the development of TRVs.

1.4 Risk Characterization

The potential for adverse effects from exposure to COCs exhibiting threshold or non-carcinogenic effects was evaluated by calculating the hazard index or hazard quotient (HQ). For the inhalation route, the HQ is calculated as the quotient of the predicted outdoor air concentration and the inhalation RfC.

$$Hazard\ Quotient = \frac{Estimated\ Exposure\ (mg/m^3)}{RFC\ (mg/m^3)}$$

In accordance with the O. Reg. 153/04, an HQ less than 0.2 (0.5 for PHCs) is considered protective of human health, and the associated effects from the COCs via that exposure pathway are considered acceptable.

The potential for adverse effects from exposure to COCs exhibiting non-threshold or carcinogenic effects was evaluated by calculating the incremental lifetime cancer risk (ILCR). For the inhalation routes, the ILCR is the product of the lifetime daily exposure (prorated concentration) and the unit risk cancer potency estimate.

$$ILCR = \ Air\ Concentration\ (mg/m^3)x\ Unit\ Risk(mg/m^3)^{-1}$$

In accordance with the O. Reg. 153/04, an ILCR less than $1x10^{-6}$ is considered protective of human health, and the associated effects from the COC via that exposure pathway are considered acceptable.

It is noted that only benzene, PHC F1 and PHC F2 were carried forward in the current evaluation. As PHC F1 and PHC F2 do not exert carcinogenic effects, an ILCR was only calculated for benzene.

The calculations of HQ and ILCR are presented in Table A-8 for indoor worker exposure to benzene, PHC F1 and PHC F2 in soil via indoor air inhalation. As shown in Table A-8, no unacceptable risks were predicted.

1.5 References

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Tables

Table A-1: Summary of Receptor Characteristics

Exposure Parameter	Indoor Worker	Reference
Age (yr)	>20	MECP (2011a)
Age Group Duration (yr)	56	MECP (2011a)
Body weight (kg)	70.7	MECP (2011a)
Exposure Frequency Indoors (hr/day)	9.8	MECP (2011a)
Exposure Frequency Indoors and Outdoors (d/wk)	5	MECP (2011a)
Exposure Frequency Indoors (wk/yr)	50	MECP (2011a)
Exposure Duration (yr)	56	MECP (2011a)
Averaging Time - non-carcinogens (yr)	56	MECP (2011a)
Averaging Time - carcinogens (yr)	56	MECP (2011a)

Table A-2: Soil COC Exposure Point Concentrations

Contaminant of Concern	Exposure Point Concentration (µg/g)	Basis
BTEX and PHCs		
Benzene	0.5	Maximum Concentration
PHC F1	530	Maximum Concentration
Aliphatic C6-C8	292	CCME Subfraction Concentration[1]
Aliphatic C>8-C10	191	CCME Subfraction Concentration[1]
Aromatic C>8-C10	48	CCME Subfraction Concentration[1]
PHC F2	490	Maximum Concentration
Aliphatic C>10-C12	176	CCME Subfraction Concentration[1]
Aliphatic C>12-C16	216	CCME Subfraction Concentration[1]
Aromatic C>10-C12	44	CCME Subfraction Concentration[1]
Aromatic C>12-C16	54	CCME Subfraction Concentration[1]

[1] Exposure point concentrations for the PHC aliphatic and aromatic subfractions were calculated from the maximum parent fraction concentration and the subfraction mass fractions present in CCME (2008) as cited in MECP (2011).

Table A-3: Summary of Chemical Physical Properties for Soil COCs[1]

Contaminant of Concern	Air Diffusion Coefficient (cm^2/s)	Water Diffusion Coefficient (cm^2/s)	Henry's Law Constant at 15°C (Unitless)	Pure Component Solubility in Water (mg/L)	Organic Carbon Partiton Coefficient (cm^3/g)	Molecular Weight (g/mol)	Octanol Water Partition Coefficient (Log (K_{ow}))
BTEX and PHCs							
Benzene	8.80E-02	9.80E-06	1.46E-01	1.79E+03	3.31E+02	7.81E+01	2.13E+00
PHC F1			5.83E+01			1.11E+02	
Aliphatic C6-C8	5.00E-02	6.00E-06	5.17E+01	5.40E+00	7.96E+03	1.00E+02	3.60E+00
Aliphatic C>8-C10	5.00E-02	6.00E-06	8.28E+01	4.30E-01	6.32E+04	1.30E+02	4.50E+00
Aromatic C>8-C10	5.00E-02	6.00E-06	4.97E-01	6.50E+01	3.17E+03	1.20E+02	3.20E+00
PHC F2			1.99E+02			1.70E+02	
Aliphatic C>10-C12	5.00E-02	6.00E-06	1.24E+02	3.40E-02	5.02E+05	1.60E+02	5.40E+00
Aliphatic C>12-C16	5.00E-02	6.00E-06	5.38E+02	7.60E-04	1.00E+07	2.00E+02	6.70E+00
Aromatic C>10-C12	5.00E-02	6.00E-06	1.45E-01	2.50E+01	5.02E+03	1.30E+02	3.40E+00
Aromatic C>12-C16	5.00E-02	6.00E-06	5.49E-02	5.80E+00	1.00E+04	1.50E+02	3.70E+00

[1] Chemical Physical properties were obtained from MECP (2016).

Table A-4: Summary of Soil Physical Properties

Property/Parameter	Unsaturated Zone				Capillary Fringe	
	Gravel Crush	Reference	Sandy Loam	Reference	Sandy Loam	Reference
Dry bulk density, ρb (g/cm3)	1.60	MECP (2016)	1.62	MECP (2016)	1.62	US EPA (2004)
Total porosity, θT (cm3/cm3)	0.4	MECP (2016)	0.387	MECP (2016)	0.387	US EPA (2004)
Water filled porosity, θw (cm3/cm3)	0.01	MECP (2016)	0.103	MECP (2016)	0.103	US EPA (2004)
Air filled porosity, θa (cm3/cm3)	0.39	Calculated	0.284	Calculated	0.284	Calculated
Fraction organic carbon content, foc (unitless)	0.00	MECP (2016)	0.005	MECP (2016)	-	
Residual water content, θr (cm3/cm3)	-	-	-	-	0.039	US EPA (2004)
Saturated water content, θs (cm3/cm3)	-	-	-	-	0.387	US EPA (2004)
Maximum slope along water retention curve point of inflection, α1 (cm-1)	-	-	-	-	0.02667	US EPA (2004)
Air entry pressure head, h (cm)	-	-	-	-	37.5	Calculated
van Genuchten curve shape parameter, N (unitless)	-	-	-	-	1.449	US EPA (2004)
M (= 1-(1/N), unitless)	-	-	-	-	0.3099	Calculated
Mean grain diameter, D (cm)	-	-	-	-	0.030	US EPA (2004)

exp.

Table A-5: Building Characteristics Applied in Vapour Intrusion Modeling

Parameter	Units	Value
Commercial Slab-on-Grade Building (MECP, 2011)		
Enclosed space floor length	cm	2000
Enclosed space floor width	cm	1500
Enclosed space height	cm	300
Enclosed space floor thickness	cm	11.25
Soil-building pressure differential	$g/cm\text{-}s^2$	20
Floor Wall crack width	cm	0.1
Indoor air exchange rate	1/hr	1
Depth below grade to bottom of enclosed floor space	cm	11.25

Table A-6: Exposure Estimates For the Soil to Indoor Air Pathway

COC	Maximum Soil Concentration (µg/g)	Commercial Slab-on-Grade Building (Finite Source)				
		Predicted Soil Gas Concentration (µg/m^3)	Attenuation Factor (Unitless)	Unadjusted Indoor Air Concentration (µg/m^3)	Bioattenuation Factor[1]	Indoor Air Concentration (µg/m^3)
PHCs						
Benzene	0.5	4.20E+04	-	1.23E+00	10	1.23E-01
PHC F1	530					
Aliphatic C6-C8	292	2.79E+08	-	6.52E+02	10	6.52E+01
Aliphatic C>8-C10	191	3.56E+07	-	3.51E+02	10	3.51E+01
Aromatic C>8-C10	48	1.48E+06	-	1.18E+02	10	1.18E+01
PHC F2	490					
Aliphatic C>10-C12	176	4.22E+06	-	2.12E+02	10	2.12E+01
Aliphatic C>12-C16	216	4.09E+05	2.29E-04	9.37E+01	10	9.37E+00
Aromatic C>10-C12	44	2.53E+05	2.50E-04	6.32E+01	10	6.32E+00
Aromatic C>12-C16	54	5.89E+04	2.77E-04	1.63E+01	10	1.63E+00

[1] A bioattenuation factor of 10 was applied as per MECP (2011) given there is at least 1 metre of clean soil under the proposed building to the depth of contamination.

Table A-7: Summary of Toxicity Reference Values for Soil COCs[1]

COC	Mode of Toxicity	Inhalation Reference Concentration, RfC (mg/m^3)	End point	Reference	Source	Inhalation Unit Risk Factor, URF (mg/m3)[1]	End point	Reference	Source
BTEX and PHCs									
Benzene	Carcinogen	3.00E-02	Decreased lymphocyte count from an occupational epidemiologic study	Rothman et al., 1996	IRIS, 2003; MECP, 2011	2.20E-03	Leukemia in human occupational studies	Rinsky et al., 1981/1987	IRIS, 2000; MECP, 2011
PHC F1									
Aliphatic C6-C8	Threshold	6.00E-01	Nasal epithelial cell hyperplasia in male rats	Biodynamics, 1993; Daughtrey et al., 1999	US EPA PPRTV, 2009; MECP, 2022	NA	-	-	-
Aliphatic C>8-C10	Threshold	1.00E+00	Hepatic and hematological changes	Edwards et al., 1997	TPHCWG, 1997; CCME, 2000; MECP, 2011	NA	-	-	-
Aromatic C>8-C10	Threshold	2.00E-01	Decreased body weight of rats and mice	Edwards et al., 1997	TPHCWG, 1997; CCME, 2000; MECP, 2011	NA	-	-	-
PHC F2									
Aliphatic C>10-C12	Threshold	1.00E+00	Hepatic and hematological changes	Edwards et al., 1997	TPHCWG, 1997; CCME, 2000; MECP, 2011	NA	-	-	-
Aliphatic C>12-C16	Threshold	1.00E+00	Hepatic and hematological changes	Edwards et al., 1997	TPHCWG, 1997; CCME, 2000; MECP, 2011	NA	-	-	-
Aromatic C>10-C12	Threshold	2.00E-01	Decreased body weight of rats and mice	Edwards et al., 1997	TPHCWG, 1997; CCME, 2000; MECP, 2011	NA	-	-	-
Aromatic C>12-C16	Threshold	2.00E-01	Decreased body weight of rats and mice	Edwards et al., 1997	TPHCWG, 1997; CCME, 2000; MECP, 2011	NA	-	-	-

[1] TRVs obtained from MECP (2011), MECP (2016), or MECP (2022), unless otherwise noted.

NA - not applicable

Table A-8: Predicted Risks for Indoor Worker Exposure to COCs in Soil via Indoor Air Inhalation

COC	Commercial Slab-on-Grade Building (Finite Source)			
	Predicted Indoor Air Concentration (mg/m^3)	Prorated Indoor Air Exposure Concentration (mg/m^3)	Hazard Quotient[1]	ILCR[1]
BTEX and PHCs				
Benzene	1.23E-04	3.45E-05	1.15E-03	7.59E-08
PHC F1			5.66E-02	NC
Aliphatic C6-C8	6.52E-02	1.82E-02	3.04E-02	NC
Aliphatic C>8-C10	3.51E-02	9.81E-03	9.81E-03	NC
Aromatic C>8-C10	1.18E-02	3.29E-03	1.64E-02	NC
PHC F2			1.97E-02	NC
Aliphatic C>10-C12	2.12E-02	5.94E-03	5.94E-03	NC
Aliphatic C>12-C16	9.37E-03	2.62E-03	2.62E-03	NC
Aromatic C>10-C12	6.32E-03	1.77E-03	8.84E-03	NC
Aromatic C>12-C16	1.63E-03	4.56E-04	2.28E-03	NC

[1] Bolded values highlighted in gray exceed the target hazard quotient for non-carcinogens of 0.2 (target HQ for PHCs was set at 0.5) or the target incremental lifetime cancer risk for carcinogens of 1 x 10^{-6}.

J&E Model – Input and Output

SL-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (ug/kg)	Chemical
71432	5.00E+02	Benzene

MORE ↓

ENTER Average soil temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_t (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm²)
				Totals must add up to value of L_t (cell G28)					
15	11.25	150	270	11.25	30	108.75			1.78E-07

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm³)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm³/cm³)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm³)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm³/cm³)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm³)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm³/cm³)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
SL	1.62	0.387	0.103	0.005	Gravel	1.6	0.4	0.01	0	SL	1.62	0.387	0.103	0.005

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s²)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
11.25	20	2000	1500	300	0.1	1	9.8

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based soil concentration.

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	Physical state at soil temperature, (S,L,G)
8.80E-02	9.80E-06	5.55E-03	25	7,342	353.24	562.16	3.31E+02	1.79E+03	7.8E-06	3.0E-02	L

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R (μg/kg)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
9.46E+08	138.75	0.284	0.390	0.284	#N/A	#N/A	#N/A	1.78E-07	7,000	5.00E+02	2.50E+05

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
3.00E+06	2.33E-04	11.25	8,071	3.46E-03	1.46E-01	1.77E-04	8.88E-03	2.39E-02	8.88E-03	1.03E-02	138.75	11.25

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
1.66E+00	4.20E+04	0.10	1.63E+02	8.88E-03	7.00E+02	2.09E+128	NA	NA	2.36E+00	2.77E-08	8.73E+07	YES

Finite source indoor attenuation coefficient, $\langle\alpha\rangle$ (unitless)	Mass limit bldg. conc., $C_{building}$ (μg/m^3)	Finite source bldg. conc., $C_{building}$ (μg/m^3)	Final finite source bldg. conc., $C_{building}$ (μg/m^3)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	1.23E+00	NA	1.23E+00	7.8E-06	3.0E-02

END

RESULTS SHEET

RISK-BASED SOIL CONCENTRATION CALCULATIONS:

Indoor exposure soil conc., carcinogen (µg/kg)	Indoor exposure soil conc., noncarcinogen (µg/kg)	Risk-based indoor exposure soil conc., (µg/kg)	Soil saturation conc., C_{sat} (µg/kg)	Final indoor exposure soil conc., (µg/kg)
NA	NA	NA	3.12E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
4.0E-06	3.9E-02

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

SCROLL DOWN TO "END"

END

SL-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (ug/kg)	Chemical
1	2.92E+05	PHC F1 Aliphatic C6-C8

MORE ↓

ENTER Average soil temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_t (cm)	ENTER Depth below grade to bottom of contamination. (enter value of 0 if value is unknown) L_b (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm²)
15	11.25	150	270	11.25	30	108.75			1.78E-07

Totals must add up to value of L_t (cell G28)

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm³)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm³/cm³)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm³)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm³/cm³)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm³)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm³/cm³)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
SL	1.62	0.387	0.103	0.005	Gravel	1.6	0.4	0.01	0	SL	1.62	0.387	0.103	0.005

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s²)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
11.25	20	2000	1500	300	0.1	1	9.8

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based soil concentration.

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	Physical state at soil temperature, (S,L,G)
5.00E-02	6.00E-06	1.22E+00	15	6,895	369.00	508.00	7.96E+03	5.40E+00	0.0E+00	0.0E+00	1.0E+02

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R (µg/kg)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
9.46E+08	138.75	0.284	0.390	0.284	#N/A	#N/A	#N/A	1.78E-07	7,000	2.64E+05	2.50E+05

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} ($atm\text{-}m^3/mol$)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
3.00E+06	2.33E-04	11.25	8,321	1.22E+00	5.17E+01	1.77E-04	5.05E-03	1.36E-02	5.05E-03	5.84E-03	138.75	11.25

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
3.98E+01	2.79E+08	0.10	1.63E+02	5.05E-03	7.00E+02	7.04E+225	NA	NA	1.77E+00	1.98E-07	9.64E+06	YES

Finite source indoor attenuation coefficient, $<\alpha>$ (unitless)	Mass limit bldg. conc., $C_{building}$ ($\mu g/m^3$)	Finite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Final finite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	6.52E+02	NA	6.52E+02	NA	NA

END

RESULTS SHEET

RISK-BASED SOIL CONCENTRATION CALCULATIONS:

Indoor exposure soil conc., carcinogen (µg/kg)	Indoor exposure soil conc., noncarcinogen (µg/kg)	Risk-based indoor exposure soil conc., (µg/kg)	Soil saturation conc., C_{sat} (µg/kg)	Final indoor exposure soil conc., (µg/kg)
NA	NA	NA	2.64E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

SCROLL DOWN TO "END"

END

SL-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (ug/kg)	Chemical
71432	5.00E+02	Benzene

MORE ↓

ENTER Average soil temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_t (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	ENTER Totals must add up to value of L_t (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm²)
15	11.25	150	270	11.25	30	108.75			1.78E-07

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm³)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm³/cm³)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm³)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm³/cm³)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm³)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm³/cm³)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
SL	1.62	0.387	0.103	0.005	Gravel	1.6	0.4	0.01	0	SL	1.62	0.387	0.103	0.005

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s²)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
11.25	20	2000	1500	300	0.1	1	9.8

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based soil concentration.

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)	Physical state at soil temperature, (S,L,G)
8.80E-02	9.80E-06	5.55E-03	25	7,342	353.24	562.16	3.31E+02	1.79E+03	7.8E-06	3.0E-02	L

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R (µg/kg)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
9.46E+08	138.75	0.284	0.390	0.284	#N/A	#N/A	#N/A	1.78E-07	7,000	5.00E+02	2.50E+05

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
3.00E+06	2.33E-04	11.25	8,071	3.46E-03	1.46E-01	1.77E-04	8.88E-03	2.39E-02	8.88E-03	1.03E-02	138.75	11.25

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} (µg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m^3)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
1.66E+00	4.20E+04	0.10	1.63E+02	8.88E-03	7.00E+02	2.09E+128	NA	NA	2.36E+00	2.77E-08	8.73E+07	YES

Finite source indoor attenuation coefficient, <α> (unitless)	Mass limit bldg. conc., $C_{building}$ (µg/m^3)	Finite source bldg. conc., $C_{building}$ (µg/m^3)	Final finite source bldg. conc., $C_{building}$ (µg/m^3)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	1.23E+00	NA	1.23E+00	7.8E-06	3.0E-02

END

RESULTS SHEET

RISK-BASED SOIL CONCENTRATION CALCULATIONS:

Indoor exposure soil conc., carcinogen (µg/kg)	Indoor exposure soil conc., noncarcinogen (µg/kg)	Risk-based indoor exposure soil conc., (µg/kg)	Soil saturation conc., C_{sat} (µg/kg)	Final indoor exposure soil conc., (µg/kg)
NA	NA	NA	3.12E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
4.0E-06	3.9E-02

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

SCROLL DOWN TO "END"

END

SL-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (ug/kg)	Chemical
2	1.91E+05	PHC F1 AliphaticC>8-C10

MORE ↓

ENTER Average soil temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_t (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm²)
15	11.25	150	270	11.25	30	106.75			1.78E-07

Totals must add up to value of L_t (cell G28) (applies to thickness of soil strata A, B and C)

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm³)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm³/cm³)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm³)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm³/cm³)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm³)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm³/cm³)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
SL	1.62	0.387	0.103	0.005	Gravel	1.6	0.4	0.01	0	SL	1.62	0.387	0.103	0.005

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s²)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
11.25	20	2000	1500	300	0.1	1	9.8

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based soil concentration.

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	Physical state at soil temperature, (S,L,G)
5.00E-02	6.00E-06	1.96E+00	15	8,501	423.00	617.20	6.32E+04	4.30E-01	0.0E+00	0.0E+00	1.3E+02

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R ($\mu g/kg$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
9.46E+08	138.75	0.284	0.390	0.284	#N/A	#N/A	#N/A	1.78E-07	7,000	1.42E+05	2.50E+05

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} ($atm\text{-}m^3/mol$)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
3.00E+06	2.33E-04	11.25	10,448	1.96E+00	8.29E+01	1.77E-04	5.05E-03	1.36E-02	5.05E-03	5.84E-03	138.75	11.25

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
3.16E+02	3.56E+07	0.10	1.63E+02	5.05E-03	7.00E+02	7.04E+225	NA	NA	1.77E+00	4.69E-08	4.06E+07	YES

Finite source indoor attenuation coefficient, $\langle\alpha\rangle$ (unitless)	Mass limit bldg. conc., $C_{building}$ ($\mu g/m^3$)	Finite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Final finite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	3.51E+02	NA	3.51E+02	NA	NA

END

RESULTS SHEET

RISK-BASED SOIL CONCENTRATION CALCULATIONS:

Indoor exposure soil conc., carcinogen (µg/kg)	Indoor exposure soil conc., noncarcinogen (µg/kg)	Risk-based indoor exposure soil conc., (µg/kg)	Soil saturation conc., C_{sat} (µg/kg)	Final indoor exposure soil conc., (µg/kg)
NA	NA	NA	1.42E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

SCROLL DOWN TO "END"

END

SL-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (ug/kg)	Chemical
3	4.77E+04	PHC F1 Aromatic C>8-C10

MORE ↓

ENTER Average soil temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_t (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)		ENTER User-defined stratum A soil vapor permeability, k_v (cm²)
				Totals must add up to value of L_t (cell G28)				OR	
15	11.25	150	270	11.25	30	108.75			1.78E-07

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm³)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm³/cm³)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm³)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm³/cm³)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm³)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm³/cm³)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
SL	1.62	0.387	0.103	0.005	Gravel	1.6	0.4	0.01	0	SL	1.62	0.387	0.103	0.005

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s²)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
11.25	20	2000	1500	300	0.1	1	9.8

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based soil concentration.

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3$)$^{-1}$	Reference conc., RfC (mg/m^3)	Physical state at soil temperature, (S,L,G)
5.00E-02	6.00E-06	1.17E-02	15	8,501	423.00	617.20	3.17E+03	6.50E+01	0.0E+00	0.0E+00	1.2E+02

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R ($\mu g/kg$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
9.46E+08	138.75	0.284	0.390	0.284	#N/A	#N/A	#N/A	1.78E-07	7,000	4.77E+04	2.50E+05

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} ($atm\text{-}m^3/mol$)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
3.00E+06	2.33E-04	11.25	10,448	1.17E-02	4.95E-01	1.77E-04	5.05E-03	1.36E-02	5.05E-03	5.84E-03	138.75	11.25

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
1.59E+01	1.48E+06	0.10	1.63E+02	5.05E-03	7.00E+02	7.01E+225	NA	NA	1.77E+00	5.79E-09	3.29E+08	YES

Finite source indoor attenuation coefficient, $<\alpha>$ (unitless)	Mass limit bldg. conc., $C_{building}$ ($\mu g/m^3$)	Finite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Final finite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	1.18E+02	NA	1.18E+02	NA	NA

END

RESULTS SHEET

RISK-BASED SOIL CONCENTRATION CALCULATIONS:

Indoor exposure soil conc., carcinogen (µg/kg)	Indoor exposure soil conc., noncarcinogen (µg/kg)	Risk-based indoor exposure soil conc., (µg/kg)	Soil saturation conc., C_{sat} (µg/kg)	Final indoor exposure soil conc., (µg/kg)
NA	NA	NA	1.04E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

SCROLL DOWN TO "END"

END

SL-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (ug/kg)	Chemical
4	1.76E+05	PHC F2 AliphaticC>10-C12

MORE ↓

ENTER Average soil temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_t (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm²)
15	11.25	150	270	11.25	30	108.75			1.78E-07

Note over stratum thickness columns: Totals must add up to value of L_t (cell G28)

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm³)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm³/cm³)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm³)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm³/cm³)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm³)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm³/cm³)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
SL	1.62	0.387	0.103	0.005	Gravel	1.6	0.4	0.01	0	SL	1.62	0.387	0.103	0.005

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s²)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
11.25	20	2000	1500	300	0.1	1	9.8

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based soil concentration.

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)	Physical state at soil temperature, (S,L,G)
5.00E-02	6.00E-06	2.94E+00	15	10,373	473.00	748.40	5.02E+05	3.40E-02	0.0E+00	7.0E-01	1.6E+02

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R (μg/kg)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
9.46E+08	138.75	0.284	0.390	0.284	#N/A	#N/A	#N/A	1.78E-07	7,000	8.61E+04	2.50E+05

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
3.00E+06	2.33E-04	11.25	12,426	2.94E+00	1.24E+02	1.77E-04	5.05E-03	1.36E-02	5.05E-03	5.84E-03	138.75	11.25

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
2.51E+03	4.22E+06	0.10	1.63E+02	5.05E-03	7.00E+02	7.04E+225	NA	NA	1.77E+00	9.18E-09	2.08E+08	YES

Finite source indoor attenuation coefficient, <α> (unitless)	Mass limit bldg. conc., $C_{building}$ (μg/m^3)	Finite source bldg. conc., $C_{building}$ (μg/m^3)	Final finite source bldg. conc., $C_{building}$ (μg/m^3)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	2.12E+02	NA	2.12E+02	NA	7.0E-01

END

RESULTS SHEET

RISK-BASED SOIL CONCENTRATION CALCULATIONS:

Indoor exposure soil conc., carcinogen (µg/kg)	Indoor exposure soil conc., noncarcinogen (µg/kg)	Risk-based indoor exposure soil conc., (µg/kg)	Soil saturation conc., C_{sat} (µg/kg)	Final indoor exposure soil conc., (µg/kg)
NA	NA	NA	8.61E+04	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	2.9E-01

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

MESSAGE: Risk/HQ or risk-based soil concentration is based on a route-to-route extrapolation.

SCROLL DOWN TO "END"

END

SL-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (ug/kg)	Chemical
[illegible]5	2.16E+05	PHC F2 Aliphatic C>12-C16

MORE ↓

ENTER Average soil temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_t (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm²)
				Totals must add up to value of L_t (cell G28)					
15	11.25	150	270	11.25	30	108.75			1.78E-07

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm³)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm³/cm³)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm³)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm³/cm³)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm³)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm³/cm³)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
SL	1.62	0.387	0.103	0.005	Gravel	1.6	0.4	0.01	0	SL	1.62	0.387	0.103	0.005

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s²)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
11.25	20	2000	1500	300	0.1	1	9.8

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based soil concentration.

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3$)$^{-1}$	Reference conc., RfC (mg/m^3)	Physical state at soil temperature, (S,L,G)
5.00E-02	6.00E-06	1.27E+01	15	14,370	533.00	936.00	1.00E+07	7.60E-04	4.6E-03	1.8E-04	2.0E+02

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R ($\mu g/kg$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
9.46E+08	138.75	0.284	0.390	0.284	#N/A	#N/A	#N/A	1.78E-07	7,000	3.82E+04	2.50E+05

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} ($atm\text{-}m^3/mol$)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
3.00E+06	2.33E-04	11.25	16,569	1.27E+01	5.38E+02	1.77E-04	5.05E-03	1.36E-02	5.05E-03	5.84E-03	138.75	11.25

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
5.01E+04	4.09E+05	0.10	1.63E+02	5.05E-03	7.00E+02	7.04E+225	NA	NA	1.77E+00	2.01E-09	9.50E+08	NO

Finite source indoor attenuation coefficient, $<\alpha>$ (unitless)	Mass limit bldg. conc., $C_{building}$ ($\mu g/m^3$)	Finite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Final finite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
2.29E-04	NA	9.37E+01	9.37E+01	4.6E-03	1.8E-04

END

RESULTS SHEET

RISK-BASED SOIL CONCENTRATION CALCULATIONS:

Indoor exposure soil conc., carcinogen (µg/kg)	Indoor exposure soil conc., noncarcinogen (µg/kg)	Risk-based indoor exposure soil conc., (µg/kg)	Soil saturation conc., C_{sat} (µg/kg)	Final indoor exposure soil conc., (µg/kg)
NA	NA	NA	3.82E+04	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
1.8E-01	5.1E+02

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

MESSAGE: Risk/HQ or risk-based soil concentration is based on a route-to-route extrapolation.

SCROLL DOWN TO "END"

END

SL-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (ug/kg)	Chemical
8	4.41E+04	PHC F2 Aromatic C>10-C12

MORE ↓

ENTER Average soil temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_t (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm²)
15	11.25	150	270	11.25	30	108.75			1.78E-07

Totals must add up to value of L_t (cell G28)

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm³)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm³/cm³)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm³)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm³/cm³)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm³)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm³/cm³)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
SL	1.62	0.387	0.103	0.005	Gravel	1.6	0.4	0.01	0	SL	1.62	0.387	0.103	0.005

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s²)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
11.25	20	2000	1500	300	0.1	1	9.8

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based soil concentration.

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)	Physical state at soil temperature, (S,L,G)
5.00E-02	6.00E-06	3.43E-03	15	10,373	473.00	748.40	5.02E+03	2.50E+01	0.0E+00	3.5E-01	1.3E+02

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R ($\mu g/kg$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
9.46E+08	138.75	0.284	0.390	0.284	#N/A	#N/A	#N/A	1.78E-07	7,000	4.41E+04	2.50E+05

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} ($atm\text{-}m^3/mol$)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
3.00E+06	2.33E-04	11.25	12,426	3.43E-03	1.45E-01	1.77E-04	5.05E-03	1.36E-02	5.05E-03	5.84E-03	138.75	11.25

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
2.51E+01	2.53E+05	0.10	1.63E+02	5.05E-03	7.00E+02	6.94E+225	NA	NA	1.77E+00	1.08E-09	1.77E+09	NO

Finite source indoor attenuation coefficient, $<\alpha>$ (unitless)	Mass limit bldg. conc., $C_{building}$ ($\mu g/m^3$)	Finite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Final finite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
2.50E-04	NA	6.32E+01	6.32E+01	NA	3.5E-01

END

RESULTS SHEET

RISK-BASED SOIL CONCENTRATION CALCULATIONS:

Indoor exposure soil conc., carcinogen (µg/kg)	Indoor exposure soil conc., noncarcinogen (µg/kg)	Risk-based indoor exposure soil conc., (µg/kg)	Soil saturation conc., C_{sat} (µg/kg)	Final indoor exposure soil conc., (µg/kg)
NA	NA	NA	6.30E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	1.7E-01

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

MESSAGE: Risk/HQ or risk-based soil concentration is based on a route-to-route extrapolation.

SCROLL DOWN TO "END"

END

SL-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (µg/kg)	Chemical
7	5.39E+04	PHC F2 Aromatic C>12-C16

MORE ↓

ENTER Average soil temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_t (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm²)
15	11.25	150	270	11.25	30	108.75			1.78E-07

Totals must add up to value of L_t (cell G28)

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm³)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm³/cm³)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm³)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm³/cm³)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm³)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm³/cm³)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
SL	1.62	0.387	0.103	0.005	Gravel	1.6	0.4	0.01	0	SL	1.62	0.387	0.103	0.005

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s²)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
11.25	20	2000	1500	300	0.1	1	9.8

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based soil concentration.

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)	Physical state at soil temperature, (S,L,G)
5.00E-02	6.00E-06	1.30E-03	15	14,370	533.00	936.00	1.00E+04	5.80E+00	2.3E-05	0.0E+00	1.5E+02

END

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R ($\mu g/kg$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
9.46E+08	138.75	0.284	0.390	0.284	#N/A	#N/A	#N/A	1.78E-07	7,000	5.39E+04	2.50E+05

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} ($atm\text{-}m^3/mol$)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
3.00E+06	2.33E-04	11.25	16,569	1.30E-03	5.48E-02	1.77E-04	5.05E-03	1.36E-02	5.05E-03	5.84E-03	138.75	11.25

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
5.01E+01	5.89E+04	0.10	1.63E+02	5.05E-03	7.00E+02	6.77E+225	NA	NA	1.77E+00	2.05E-10	9.32E+09	NO

Finite source indoor attenuation coefficient, $<\alpha>$ (unitless)	Mass limit bldg. conc., $C_{building}$ ($\mu g/m^3$)	Finite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Final finite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
2.77E-04	NA	1.63E+01	1.63E+01	2.3E-05	NA

END

RESULTS SHEET

RISK-BASED SOIL CONCENTRATION CALCULATIONS:

Indoor exposure soil conc., carcinogen (µg/kg)	Indoor exposure soil conc., noncarcinogen (µg/kg)	Risk-based indoor exposure soil conc., (µg/kg)	Soil saturation conc., C_{sat} (µg/kg)	Final indoor exposure soil conc., (µg/kg)
NA	NA	NA	2.91E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
1.5E-04	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

SCROLL DOWN TO "END"

END

Appendix B – Trench Air Inhalation Evaluation

Appendix B: QUANTITATIVE EVALUATION OF RISKS FROM SOIL AND GROUNDWATER TO TRENCH AIR

As soil and groundwater to trench air SQG_{HH} and GQG_{HH} values protective of construction/subsurface workers were unavailable, a quantitative assessment was conducted to evaluate this pathway. Parameters deemed sufficiently volatile were carried forward for assessment of this pathway. COCs are considered volatile if they have a Henry's Law constant greater than 1.0E-05 atm-m3/mol and/or a vapour pressure greater than 1 Torr (MECP, 2019).

1.1 Receptor Characteristics

Standard construction/subsurface worker characteristics and activity patterns (*e.g.,* body weight, time on-site) were used in the exposure assessment. The *Rationale for the Development of Soil and Ground Water Standards for Use at Contaminated Sites in Ontario* (MECP, 2011) was the key source of construction/subsurface worker characteristics and activity patterns used in the current assessment. These values are presented in Table B-1.

Due to the strenuous nature of the activities involved in construction/subsurface work, an elevated breathing rate was assumed for the construction/subsurface worker while at work. As recommended by the US EPA (1997) and applied by the MECP (2011), the breathing rate while working was assumed to be 1.5 m^3/hr.

1.2 Exposure Estimates

The exposure point concentrations (EPC) used in this assessment are provided in Tables B-2 and B-3 for soil and groundwater, respectively, and are equivalent to the maximum concentrations measured on-site for the applicable COCs.

Prorated exposure values (expressed as concentrations of COCs in air (µg/m^3)), adjusted for receptor specific exposure conditions, were used to assess exposure and risk.

The chemical and physical properties used in the quantitative exposure estimate calculations are provided in Tables B-4 and B-5 for soil and groundwater, respectively. Site soil properties and stratigraphy characteristics, used for modeling exposure rates, are provided in Table B-6. The air mixing zone characteristics are provided in Table B-7.

1.2.1 Exposure to COCs via Inhalation of Vapours from Soil to Ambient Air within a Trench

While spending time working within an on-site trench, it was assumed that a construction/subsurface worker would be exposed to COCs via inhalation of vapours migrating from impacted soil. This exposure was predicted using the EPC concentrations of COCs in soil and by estimating the volatilization rates and the effects that they would have on the air concentrations within the trench.

The following COCs were considered in the evaluation of this pathway as they were deemed sufficiently volatile:

- Benzene

- Ethylbenzene
- Xylenes
- PHC fraction F1
- PHC fraction F2

To estimate the concentration of contaminants in trench air, the VF_{TS} were calculated as outlined in ASTM Standard E1739–95 (1995, Reapproved 2010).

The trench was assumed to be 2 m deep x 1 m wide x 13 m long. The wind direction was assumed to be parallel to the length of the trench. The VF_{TS} was calculated for each volatile soil COC as follows:

$$VF_{TS} = \frac{(W_c \times L_c + 2 \times L_c \times D_c + 2 \times W_c \times D_c) \times C \times 2 \times B \times \left[\sqrt{\frac{D_{eff} \times H}{\pi \times (\theta_{ws} + k_{oc} \times f_{oc} \times B + \theta_{as} \times H) \times t}}\right]}{V_t \times A}$$

where:

VF_{TS}	=	Surface soil volatilization factor from trench soils (mg/m^3-air/mg/kg- soil)
W_c	=	Width of trench and contaminant source (100 cm)
L_c	=	Length of trench and contaminant source (1,300 cm)
D_c	=	Depth of trench and contaminant source (200 cm)
C	=	Conversion factor (1,000 cm^3-kg/m^3-g)
B	=	Soil bulk density (1.62 g/cm^3 for sandy loam)
D_{eff}	=	Effective molecular diffusion through soil (cm^2/s; parameter-specific)
H	=	Henry's law constant (unitless; parameter-specific)
π	=	Pi (3.14)
θ_{ws}	=	Volumetric water content in vadose zone soil (0.103 cm^3-water/cm^3 soil)
K_{oc}	=	Organic carbon-water partition coefficient (cm^3/g; parameter-specific)
F_{oc}	=	Fraction organic carbon (0.005; MECP (2011) default value)
θ_{as}	=	Volumetric air content in vadose zone soils (0.284 cm^3-air/cm^3-soil)
t	=	Averaging time for flux (1.03E+07 s for the construction/subsurface worker)
V_t	=	Volume of trench (2.60E+07 cm^3)
A	=	Air exchange rate (3.15E-02 s^{-1})

From the above equation, the effective molecular diffusion through soil (D_{eff}) was calculated as follows:

$$D_{eff} = D^{air} \times \frac{\theta_{as}^{3.33}}{\theta_T^{2}} + \left[\frac{D^{wat}}{H} \times \frac{\theta_{ws}^{3.33}}{\theta_T^{2}}\right]$$

where:

D_{eff}	=	Effective molecular diffusion through soil (cm^2/s)
D^{air}	=	Diffusion coefficient in air (cm^2/s; parameter-specific)
θ_{as}	=	Volumetric air content in vadose zone soils (0.284 cm^3-air/cm^3-soil)
θ_T	=	Total soil porosity (0.387 cm^3/cm^3)
D^{wat}	=	Diffusion coefficient in water (cm^2/s; parameter-specific)
H	=	Henry's law constant (unitless, parameter-specific)
θ_{ws}	=	Volumetric water content in vadose zone soil (0.103 cm^3-water/cm^3-soil)

The air exchange rate (A) is calculated as follows:

$$A = \frac{U_{air}}{Lc}$$

where:

A	=	Air exchange rate (s^{-1})
U_{air}	=	Wind speed through trench (4.10E-01 cm/s)
Lc	=	Length of trench and contaminant source (1,300 cm)

The trench air exchange rate was set to 3.15E-02 s^{-1} for a trench based on an assumed reduced wind speed one-tenth of that of ground level air which is 4.10E+02 cm/s as per MECP (2011). The concentration of contaminant in the air within the trench was then calculated as follows:

$$C_{air} = C_{soil} \times VF_{Ts}$$

where:

C_{air}	=	Concentration of contaminant in air in trench (mg/m^3)
C_{soil}	=	Concentration of contaminant in soil (mg/kg; parameter-specific)
VF_{TS}	=	Surface soil volatilization factor from trench soils (mg/m^3-air/mg/kg- soil; parameter-specific)

The concentration of COCs in trench air sourced from soil is presented in Table B-8.

1.2.2 Exposure to COCs via Inhalation of Vapours from Groundwater to Ambient Air within a Trench

It was conservatively assumed that a construction/subsurface worker working within a trench may be exposed to volatile COCs released from pooled groundwater through trench air inhalation. This exposure rate was predicted by estimating the volatilization rates from the pooled water surface and the ambient air concentration resulting from mixing with air within the trench.

All groundwater COCs, with the exception of barium, cobalt, selenium, sodium and chloride, were considered in the evaluation of this pathway as they were deemed sufficiently volatile. Barium, cobalt, selenium, sodium and chloride are not considered volatile and this pathway is considered incomplete for these parameters.

The trench was assumed to be 2 m deep x 1 m wide x 13 m long. The wind direction was assumed to be parallel to the length of the trench.

The rates at which contaminants are transferred from a body of water to the atmosphere are dependent on the physical and chemical properties of the contaminant, as well as physical characteristics of the water body and the surrounding environment (Lyman et al., 1990). The primary chemical-specific variables are solubility, molecular weight, and vapour pressure, while the main environmental factors are water flow velocity, depth, turbulence, and wind velocity (Lyman et al., 1990).

Several assumptions are made in estimating mass flux rates (i.e., volatilization) of volatile contaminants from pooled water, including:

- Volatilization rates are invariant with water and atmospheric temperature;
- Well mixed conditions with constant contaminant concentrations throughout the depth of the pooled water (assumed depth of 10 cm) and no stratification;
- Wind and water velocities are constant;
- The maximum concentration gradient and therefore maximum mass flux rate between pooled water and the surrounding air (i.e., concentrations of the contaminants in air are negligible and do not impede the rate of volatilization from the water surface); and,
- Stagnant layer interphase mass transport in the which the rate of diffusion through the water – air interface is dependent on the phase exchange coefficients of the contaminants, rather than a vapourization rate from solution with water vapour (Lyman et al., 1990).

Based on the assumption of a well-mixed water body, the rate of chemical mass transport from the aqueous phase (i.e. pooled water) to the atmosphere is a function of the resistance in the gas- and liquid- phase stagnant layers that exist above and below the air-water interface (Lyman et al., 1990). This scenario is known as the two-layer film or resistance concept. The rate of transport across the interfacial layers is a function of the concentration gradient and evaluated using the mass transfer coefficient – linear driving force model. The actual resistance that occurs across the air - water interface is considered to be small or negligible. The water flow velocity and the velocity of the wind blowing across the water surface help to establish the layer thickness and the mass-transfer coefficients (Lyman et al., 1990).

Mixing above the pooled water surface was evaluated by assuming steady-state uniform flow in a hypothetical box volume above the water surface and equating the calculated mass flow from the water surface with the mass flow rate parallel to the water surface. This approach is analogous to the "box model" approach, except in the manner how the mass flux at the water surface is calculated.

The trench air concentration was estimated by equating the emission rate calculated from the two resistance mass transfer model with the steady-state air mass flow rate across the length of the trench. The wind direction was assumed to be parallel to the length of the trench.

The liquid phase mass transfer coefficient was calculated using the Springer et al. (1984) empirical relationship as applied in US EPA (1994) for a quiescent source impoundment as follows:

$$k_l = 2.78\times10^{-6}\times\left(\frac{Dw}{D_{ether}}\right)^{2/3}$$

where:

k_l	=	Liquid-phase mass transfer coefficient (m/s)
D_w	=	Water binary diffusion coefficient (cm^2/s; parameter-specific)
D_{ether}	=	Ether binary diffusion coefficient (9.3E-06 cm^2/s)

The gas phase mass transfer coefficient was calculated from the Mackay and Matasugu (1973) empirical relationship as presented in US EPA (1994) as follows:

$$kg = 4.82 \times 10^{-3} \times U^{0.78} \times \left(\frac{\mu_g}{\rho_g \times D_g} \right)^{-0.67} \times D_e^{-0.11}$$

where:

kg	=	Gas-phase mass transfer coefficient (m/s)
U	=	Wind speed (4.10E-01 m/s)
μ_g	=	Air kinematic viscosity (1.98E-04 g/cm-s)
ρ_g	=	Air density (1.18E-03 g/cm^3)
D_g	=	Air binary diffusion coefficient (cm^2/s; parameter-specific)
D_e	=	Effective diameter of pooled water (4.07) = (4 A/π)1/2, where A (m^2) is the pooled water area (13 m^2)

To account for reduced air flow and mixing within a trench, the wind speed within the trench was reduced to one-tenth of the ground surface wind speed as was done for the soil to trench air modeling as described in Section 1.2.1.

The overall mass transfer coefficient was calculated based on the two resistance interface mass transfer model between the bulk liquid and bulk gas as follows:

$$K_l = \frac{1}{1/k_l + 1/(k_g \times H)}$$

where:

K_L	=	Overall liquid-phase mass transfer coefficient (m/s)
H	=	Dimensionless Henry's law constant (unitless; parameter-specific)
k_g	=	Gas-phase mass transfer coefficient (m/s; parameter-specific)
k_l	=	Liquid-phase mass transfer coefficient (m/s; parameter-specific)

The COC emission flux from the pooled water is calculated as follows:

$$E = C_{GW} \times K \times CF$$

where:

E	=	Emission flux (mg/m^2 -s)
K	=	Overall liquid-phase mass transfer coefficient (m/s)
C_{GW}	=	Concentration of contaminant in groundwater (mg/L)
CF	=	Conversion factor (1,000 L/m^3)

The ambient air concentration was calculated from the air dispersion factor and the air emission factor from the following equation:

$$C_{air} = \frac{E}{DF}$$

where:

$C_{GW\ Trench}$	=	Concentration in trench air from impacted groundwater (mg/m^3)
E	=	Air emissions flux (mg/m^2-s; parameter-specific)
DF	=	Air dispersion factor (m/s)

The air dispersion factor is calculated from the following equation (Meridian Environmental Inc., 2011):

$$DF = \frac{U \times W \times \delta}{A}$$

where:

DF	=	Air dispersion factor (m/s)
U	=	Air velocity (0.41 m/s)
W	=	Width of source-zone area (1 m)
d	=	Mixing zone height (2 m)
A	=	Source area (13 m^2)

Intermediate results calculations and the predicted ambient air concentrations within a trench are presented in Table B-9.

1.2.3 Prorated Exposure Concentrations

The prorated concentration for construction/subsurface worker inhalation exposure to COCs in air sourced from soil or groundwater within the trench is calculated as follows:

$$EXP_{Inh,Trench} = \frac{C_{OA,Trench} \times EF \times INH_{CW}\ x\ ED}{INH_{TRV} \times HPY x\ AP}$$

where:

$EXP_{Inh,\ Trench}$	=	Prorated exposure concentration for COCs in trench air sourced from soil or groundwater (mg/m^3)
C_{Trench}	=	Concentration in trench air from impacted soil or groundwater (mg/m^3)
INH_{CW}	=	Construction/subsurface worker inhalation rate (1.5 m^3/hr)
EF	=	Exposure frequency (hr/yr, = 2 hr/d x 5 d/wk x 39 wk/yr)
INH_{TRV}	=	Assumed inhalation rate for derivation of TRVs (0.83 m^3/hr)
HPY	=	Hours per year (365 d/yr x 24 hr/d)
ED	=	Exposure Duration (1.5 years)
AP	=	Averaging Period (1.5 years for non-cancer; 56 year for cancer)

The prorated exposure concentration of COCs in excavation and trench air from impacted soil and groundwater is presented in Tables B-11 and B-12, respectively.

1.3 Toxicity Assessment

The COCs were evaluated for their toxicity towards humans via the relevant exposure pathways discussed above. Exposure to a chemical, depending on the chemical and exposure route, can elicit either non-carcinogenic (e.g. threshold) or carcinogenic (e.g. non-threshold) effects, or both. For non-carcinogenic exposure, the underlying assumption is that there is a threshold concentration/dose below which there is no potential for adverse effects. TRVs for non-carcinogenic constituents consisting of reference doses and concentrations have been developed for different exposure routes (i.e. oral and inhalation) based on animal and epidemiological studies. The reference dose or concentration is derived from the LOAEL or NOAEL, applying order of magnitude modifying and uncertainty factors to account for interspecies and sensitive population variations, study limitations and other uncertainties.

For carcinogenic exposure, the underlying assumption is that there is no threshold concentration or dose below which the risk from developing cancer is zero. The dose response relationship for carcinogenic constituents is described by the cancer slope factor or cancer unit risk factor. The cancer slope factor or cancer potency is the slope of the dose-response curve at very low dose which is derived from animal studies or sensitive population studies applying different low dose extrapolation models (e.g. linear multi-stage, etc.). The URF is defined as the incremental lifetime cancer risk associated with exposure to a chemical constituent in ambient air at a concentration of 1 μg/m^3, or in groundwater at a concentration of 1 μg/L.

The TRVs applied in this evaluation were selected from MECP (2011, 2016 or 2022), which were based on TRVs selected by various credible agencies as discussed in Section 4.4 of the SLRA.

The TRVs applied in the trench air pathway evaluation are presented in Table B-10. For the aliphatic C6-C8 fraction of PHC F1, a sub-chronic inhalation TRV was recommended by MECP, and was utilized to evaluate potential trench air inhalation risks for the construction/subsurface utility workers.

Uncertainties associated with the estimation of toxicological effects of chemicals on human receptors are inherent in the risk assessment process. For instance, toxicologists rely on animal test results, toxicological models, and epidemiological studies to estimate the effects of chemicals on humans. In addition, the availability of toxicological data is often limited due to the vast number of chemical species and the high cost associated with conducting these studies. To overcome these uncertainties and increased effects to sensitive populations, a number of order-of-magnitude uncertainty factors are typically included during the development of TRVs.

1.4 Risk Characterization

The potential for adverse effects from exposure to COCs exhibiting threshold or non-carcinogenic effects was evaluated by calculating the hazard index or hazard quotient (HQ). For the inhalation route, the HQ is calculated as the quotient of the predicted outdoor air concentration and the inhalation RfC.

$$Hazard\ Quotient = \frac{Estimated\ Exposure\ (mg/m^3)}{RFC\ (mg/m^3)}$$

In accordance with the O. Reg. 153/04, an HQ less than 0.2 (0.5 for PHCs) is considered protective of human health, and the associated effects from the COCs via that exposure pathway are considered acceptable.

The potential for adverse effects from exposure to COCs exhibiting non-threshold or carcinogenic effects was evaluated by calculating the incremental lifetime cancer risk (ILCR). For the inhalation routes, the ILCR is the product of the lifetime daily exposure (prorated concentration) and the unit risk cancer potency estimate.

$$ILCR = \ Air\ Concentration\ (mg/m^3)x\ Unit\ Risk(mg/m^3)^{-1}$$

In accordance with the O. Reg. 153/04, an ILCR less than $1x10^{-6}$ is considered protective of human health, and the associated effects from the COC via that exposure pathway are considered acceptable.

The calculations of HQ and ILCR are presented in Tables B-11 and B-12 for construction/subsurface worker exposure to soil and groundwater COCs via trench air inhalation, respectively.

As shown in Tables B-11 and B-12, no unacceptable risks were predicted for construction/subsurface workers via trench air inhalation as a result of volatile COCs in soil and groundwater.

1.5 References

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Tables

Table B-1: Summary of Receptor Characteristics

Exposure Parameter	Construction/Subsurface Worker	Reference
Age (yr)	>20	MECP (2011)
Age Group Duration (yr)	56	MECP (2011)
Body weight (kg)	70.7	MECP (2011)
Exposure Frequency Outdoors (hr/day)	9.8	MECP (2011)
Exposure Frequency in trench (hr/d)	2	Assumed[1]
Exposure Frequency Indoors and outdoors (d/wk)	5	MECP (2011)
Exposure Frequency Outdoors (wk/yr)	39	MECP (2011)
Exposure Duration (yr)	1.5	MECP (2011)
Inhalation rate (m^3/hr)	1.5	MECP (2011)
Averaging Time - non carcinogens (yr)	1.5	MECP (2011)
Averaging Time - carcinogens (yr)	56	MECP (2011)
Averaging Time for Vapour Flux (s)	1.03E+07	Calculated

'-' - Not applicable.

[1] Based on an assumption that a construction worker will spend 20% of the total time working on-site within a trench.

Table B-2: Soil COC Exposure Point Concentrations

COC	Exposure Point Concentration (µg/g)	Basis
PHCs and BTEX		
Benzene	0.5	Maximum Concentration
Ethylbenzene	8.37	Maximum Concentration
Xylenes	43.1	Maximum Concentration
F1 (C6-C10) - BTEX	530	Maximum Concentration
PHC F1 Aliphatic C6-C8	292	CCME Subfraction[1]
PHC F1 Aliphatic C>8-C10	191	CCME Subfraction[1]
PHC F1 Aromatic C>8-C10	48	CCME Subfraction[1]
F2 (C10-C16)	490	Maximum Concentration
PHC F2 Aliphatic C>10-C12	176	CCME Subfraction[1]
PHC F2 Aliphatic C>12-C16	216	CCME Subfraction[1]
PHC F2 Aromatic C>10-C12	44	CCME Subfraction[1]
PHC F2 Aromatic C>12-C16	54	CCME Subfraction[1]

[1] Exposure point concentrations for the PHC aliphatic and aromatic subfractions were calculated from the maximum parent fraction concentration and the subfraction mass fractions present in CCME (2008) as cited in MECP (2011).

Table B-3: Groundwater COC Exposure Point Concentrations

COC	Exposure Point Concentration (µg/L)	Basis
VOCs		
1,1,1-Trichloroethane	85.2	Maximum Concentration
1,1,2-Trichloroethane	5.17	Maximum Concentration
1,1-Dichloroethane	104	Maximum Concentration
1,1-Dichloroethylene	22.8	Maximum Concentration
Vinyl Chloride (future condition)	2.78	Calculated[1]

[1] Predicted future vinyl chloride concentration, based on the summation of 10% of the maximum concentration of all parent (PCE and TCE) and intermediate compounds (1,1-DCE, cis-1,2-DCE and trans-1,2-DCE) and the maximum concentration of vinyl chloride.

Table B-4: Summary of Chemical Physical Properties for Soil COCs[1]

COC	Air Diffusion Coefficient (cm^2/s)	Water Diffusion Coefficient (cm^2/s)	Henry's Law Constant at 15°C (Unitless)	Pure Component Solubility in Water (mg/L)	Organic Carbon Partiton Coefficient (cm^3/g)	Molecular Weight (g/mol)	Octanol Water Partition Coefficient (Log (K_{ow}))
PHCs and BTEX							
Benzene	8.80E-02	9.80E-06	1.46E-01	1.79E+03	3.31E+02	7.81E+01	2.13E+00
Ethylbenzene	7.50E-02	7.80E-06	1.84E-01	1.69E+02	1.04E+03	1.06E+02	3.15E+00
Xylenes	7.14E-02	9.34E-06	2.80E-01	1.06E+02	8.86E+02	1.06E+02	3.12E+00
F1 (C6-C10) - BTEX			5.83E+01			1.11E+02	
PHC F1 Aliphatic C6-C8	5.00E-02	6.00E-06	5.17E+01	5.40E+00	7.96E+03	1.00E+02	3.60E+00
PHC F1 Aliphatic C>8-C10	5.00E-02	6.00E-06	8.28E+01	4.30E-01	6.32E+04	1.30E+02	4.50E+00
PHC F1 Aromatic C>8-C10	5.00E-02	6.00E-06	4.97E-01	6.50E+01	3.17E+03	1.20E+02	3.20E+00
F2 (C10-C16)			1.99E+02			1.70E+02	
PHC F2 Aliphatic C>10-C12	5.00E-02	6.00E-06	1.24E+02	3.40E-02	5.02E+05	1.60E+02	5.40E+00
PHC F2 Aliphatic C>12-C16	5.00E-02	6.00E-06	5.38E+02	7.60E-04	1.00E+07	2.00E+02	6.70E+00
PHC F2 Aromatic C>10-C12	5.00E-02	6.00E-06	1.45E-01	2.50E+01	5.02E+03	1.30E+02	3.40E+00
PHC F2 Aromatic C>12-C16	5.00E-02	6.00E-06	5.49E-02	5.80E+00	1.00E+04	1.50E+02	3.70E+00

[1] Chemical Physical properties were obtained from MECP (2016).

[2] The air diffusion coefficient was not available by MECP. Anthracene was used as a surrogate.

Table B-5: Summary of Groundwater COC Chemical and Physical Properties[1]

COC	Air Diffusion Coefficient (cm^2/s)	Water Diffusion Coefficient (cm^2/s)	Henry's Law Constant at 15°C (Unitless)	Pure Component Solubility in Water (mg/L)	Organic Carbon Partition Coefficient (cm^3/g)	Molecular Weight (g/mol)	Octanol Water Partition Coefficient (Log K_{ow})
VOC							
1,1,1-Trichloroethane	7.80E-02	8.80E-06	4.60E-01	1.29E+03	9.73E+01	1.33E+02	2.49E+00
1,1,2-Trichloroethane	7.80E-02	8.80E-06	2.00E-02	1.10E+03	1.35E+02	1.33E+02	1.89E+00
1,1-Dichloroethane	7.42E-02	1.05E-05	1.54E-01	5.04E+03	7.01E+01	9.90E+01	1.79E+00
1,1-Dichloroethylene	9.00E-02	1.04E-05	7.63E-01	2.42E+03	7.01E+01	9.69E+01	2.13E+00
Vinyl Chloride (future condition)	1.06E-01	1.23E-06	8.83E-01	8.80E+03	4.75E+01	6.25E+01	1.62E+00

[1] Chemical Physical properties were obtained from MECP (2016).

Table B-6: Summary of Soil Physical Properties

Property/Parameter	Unsaturated Zone		Capillary Fringe	
	Sandy Loam	Reference	Sandy Loam	Reference
Dry bulk density, ρ_b, (g/cm^3)	1.62	MECP (2011)	1.62	MECP (2011)
Total porosity, θ_T (cm^3/cm^3)	0.387	MECP (2011)	0.387	MECP (2011)
Water filled porosity, θ_w, (cm^3/cm^3)	0.103	MECP (2011)	0.103	Calculated[1]
Air filled porosity, θ_a, (cm^3/cm^3)	0.284	MECP (2011)	0.284	Calculated
Fraction organic carbon content, foc (unitless)	0.005	MECP (2011)	-	-
Residual water content, θ_r (cm^3/cm^3)	-	-	0.039	MECP (2011)
Saturated water content, θ_s (cm^3/cm^3)	-	-	0.387	MECP (2011)
Maximum slope along water retention curve point of inflection, α_1 (cm^{-1})	-	-	0.02667	MECP (2011)
Air entry pressure head, h (cm)	-	-	37.5	Calculated
van Genuchten curve shape parameter, N (unitless)	-	-	1.449	MECP (2011)
M (= 1-(1/N), unitless)	-	-	0.3099	Calculated
Mean grain diameter,D, (cm)	-	-	0.030	MECP (2011)

[1] Calculated from the van Genuchten equation (Equation 5 of US EPA 2004) and the USSCS characteristics for a sandy loam soil type as cited in MECP (2011).

Table B-7: Air Mixing Zone Characteristics - Excavation Air Inhalation Scenario (Pooling Scenario)

Characteristic	Value	Reference
Air density at 25°C , ρ_a (g/cm^3)	1.18E-03	Holman (1981)
Air kinematic vicosity at 25°C , μ_a (g/cm-s)	1.98E-04	Holman (1981)
Pooled water area, A (m^2)	13	Calculated
Pooled water effective diameter, D_e (m)	4.07	Calculated, US EPA (1994)
Air Exchange Rate (s^{-1})	3.15E-02	Calculated
Wind speed, U_a (m/s)	4.10E-01	Assumed 1/10 of ground surface wind speed (professional judgment; Meridian Environmental Inc., 2011)
Trench Depth/mixing zone height, δ_a (cm)	200	MECP as Cited in Meridian Environmental Inc. (2011)
Length of trench parallel to air flow, w (cm)	1300	MECP as Cited in Meridian Environmental Inc. (2011)
Width of trench perpendicular to air flow, w (cm)	100	MECP as Cited in Meridian Environmental Inc. (2011)

Table B-8: Exposure Estimates For the Soil to Trench Air Pathway

COC	Maximum Soil Concentation (mg/kg)	Unsaturated Zone Effective Diffusion Coefficient (cm^2/s)	Soil Vapour to Trench Air Volatilization Factor (mg/m^3air /mg/kg soil)	Trench Air Concentration (mg/m^3)
PHCs and BTEX				
Benzene	0.5	8.88E-03	1.03E-02	5.14E-03
Ethylbenzene	8.37	7.57E-03	6.12E-03	5.13E-02
Xylenes	43.1	7.21E-03	7.94E-03	3.42E-01
PHC F1	530.0			
PHC F1 Aliphatic C6-C8	291.5	5.05E-03	2.75E-02	8.01E+00
PHC F1 Aliphatic C>8-C10	190.8	5.05E-03	1.34E-02	2.55E+00
PHC F1 Aromatic C>8-C10	47.7	5.05E-03	4.71E-03	2.25E-01
PHC F2	490.0			
PHC F2 Aliphatic C>10-C12	176.4	5.05E-03	5.92E-03	1.04E+00
PHC F2 Aliphatic C>12-C16	215.6	5.05E-03	2.77E-03	5.97E-01
PHC F2 Aromatic C>10-C12	44.1	5.05E-03	2.03E-03	8.94E-02
PHC F2 Aromatic C>12-C16	53.9	5.05E-03	8.84E-04	4.76E-02

Table B-9: Exposure Estimates for the Groundwater to Trench Air Pathway (Pooling)

COC	Ground Water Concentration (mg/L)	Liquid Phase Mass Transfer Coefficient (m/s)	Gas Phase Mass Transfer Coefficient (m/s)	Overall Mass Transfer Coefficient (m/s)	Air Emission Flux (mg/m^2-s)	Trench Air Concentration (mg/m^3)
VOCs						
1,1,1-Trichloroethane	8.52E-02	2.68E-06	1.23E-03	2.67E-06	2.27E-04	3.60E-03
1,1,2-Trichloroethane	5.17E-03	2.68E-06	1.23E-03	2.42E-06	1.25E-05	1.98E-04
1,1-Dichloroethane	1.04E-01	3.01E-06	1.19E-03	2.97E-06	3.08E-04	4.89E-03
1,1-Dichloroethylene	2.28E-02	3.00E-06	1.36E-03	2.99E-06	6.81E-05	1.08E-03
Vinyl Chloride (future condition)	2.78E-03	7.22E-07	1.52E-03	7.21E-07	2.01E-06	3.18E-05

exp.

Table B-10: Summary of Toxicity Reference Values1

COC	Mode of Toxicity	Inhalation Reference Concentration, RfC (mg/m^3)	End point	Reference	Source	Subchronic Inhalation Reference Concentration, RfC (mg/m3)	End point	Reference	Source	Inhalation Unit Risk Factor, URF $(mg/m^3)^{-1}$	End point	Reference	Source
PHCs and BTEX													
Benzene	Carcinogen	3.00E-02	Decreased lymphocyte count from an occupational epidemiologic study	Rothman et al., 1996	IRIS, 2003; MECP, 2011	NA	-	-	-	2.20E-03	Leukemia in human occupational studies	Rinsky et al., 1981/1987	IRIS, 2000; MECP, 2011
Ethylbenzene	Threshold	1.90E+00	Developmental toxicity in rats following in utero exposure	Andrew et al., 1981; Hardin et al., 1981	TCEQ, 2010; MECP, 2016	NA	-	-	-	NA	-	-	-
Xylenes	Threshold	7.00E-01	CNS effects in humans; irritation of eyes, nose and throat	Uchida et al., 1993	CalEPA ChREL, 2000; MECP, 2011	NA	-	-	-	NA	-	-	-
PHC F1													
PHC F1 Aliphatic C6-C8	Threshold	6.00E-01	Nasal epithelial cell hyperplasia in male rats	Biodynamics, 1993; Daughtrey et al., 1999	US EPA PPRTV, 2009; MECP, 2022	2.70E+01	Abnormal gait, decreased BW, mild atrophy of sciatic and/or tibial nerve & skeletal muscle in male rats	IRDC, 1992a; b	US EPA PPRTV 2009; MECP, 2022	NA	-	-	-
PHC F1 Aliphatic C>8-C10	Threshold	1.00E+00	Hepatic and hematological changes	Edwards et al., 1997	TPHCWG, 1997; CCME, 2000; MECP, 2011	NA	-	-	-	NA	-	-	-
PHC F1 Aromatic C>8-C10	Threshold	2.00E-01	Decreased body weight of rats and mice	Edwards et al., 1997	TPHCWG, 1997; CCME, 2000; MECP, 2011	NA	-	-	-	NA	-	-	-
PHC F2													
PHC F2 Aliphatic C>10-C12	Threshold	1.00E+00	Hepatic and hematological changes	Edwards et al., 1997	TPHCWG, 1997; CCME, 2000; MECP, 2011	NA	-	-	-	NA	-	-	-
PHC F2 Aliphatic C>12-C16	Threshold	1.00E+00	Hepatic and hematological changes	Edwards et al., 1997	TPHCWG, 1997; CCME, 2000; MECP, 2011	NA	-	-	-	NA	-	-	-
PHC F2 Aromatic C>10-C12	Threshold	2.00E-01	Decreased body weight of rats and mice	Edwards et al., 1997	TPHCWG, 1997; CCME, 2000; MECP, 2011	NA	-	-	-	NA	-	-	-
PHC F2 Aromatic C>12-C16	Threshold	2.00E-01	Decreased body weight of rats and mice	Edwards et al., 1997	TPHCWG, 1997; CCME, 2000; MECP, 2011	NA	-	-	-	NA	-	-	-
VOCs													
1,1,1-Trichloroethane	Threshold	1.00E+00	CNS effects in gerbils	Rosengren et al., 1985	CalEPA ChREL, 2000; MECP, 2011	NA	-	-	-	NA	-	-	-
1,1,2-Trichloroethane	Carcinogen	NA	-	-	-	NA	-	-	-	1.60E-02	Hepatocellular carcinomas in mice (derived from oral slope factor)	NCI, 1978	IRIS, 1994; MECP, 2011
1,1-Dichloroethane	Threshold	1.70E-01	Kidney damage in cats	Hofmann et al., 1971	Modified from HEAST, 1984; MECP, 2011	NA	-	-	-	NA	-	-	-
1,1-Dichloroethylene	Threshold	2.00E-01	Increased mortality and hepatic effects in guinea pigs	Prendergast et al., 1967	IRIS, 2002; WHO CICAD, 2003; MECP, 2016	NA	-	-	-	NA	-	-	-
Vinyl Chloride - Continuous Adulthood Exposure (Adult Worker)	Carcinogen	6.00E-02	Liver cell polymorphism in rat feeding study	Til et al., 1983/ 1991	TCEQ, 2009; MECP, 2016	NA	-	-	-	4.40E-03	Liver angiosarcomas, angiomas, hepatomas and neoplasms in rats	Maltoni et al., 1981/ 1984	IRIS, 2000; MECP, 2016

[1] TRVs obtained from MECP (2011, 2016 or 2022) unless otherwise indicated.

NA - not applicable.

Table B-11: Predicted Risks for Construction Worker Exposure to COCs in Soil via Trench Air Inhalation

COC	Predicted Trench Air Concentration (mg/m^3)	Non Cancer Prorated Trench Air Exposure Concentration (mg/m3)	Cancer Prorated Trench Air Exposure Concentration (mg/m3)	Inhalation of Trench Air[1]	
				HQ	ILCR
PHCs and BTEX					
Benzene	5.14E-03	4.12E-04	1.10E-05	1.37E-02	2.43E-08
Ethylbenzene	5.13E-02	4.11E-03	1.10E-04	2.16E-03	NC
Xylenes	3.42E-01	2.74E-02	7.34E-04	3.92E-02	NC
PHC F1				3.18E-01	
PHC F1 Aliphatic C6-C8	8.01E+00	6.42E-01	1.72E-02	2.38E-02	NC
PHC F1 Aliphatic C>8-C10	2.55E+00	2.05E-01	5.48E-03	2.05E-01	NC
PHC F1 Aromatic C>8-C10	2.25E-01	1.80E-02	4.82E-04	9.00E-02	NC
PHC F2				1.86E-01	
PHC F2 Aliphatic C>10-C12	1.04E+00	8.37E-02	2.24E-03	8.37E-02	NC
PHC F2 Aliphatic C>12-C16	5.97E-01	4.78E-02	1.28E-03	4.78E-02	NC
PHC F2 Aromatic C>10-C12	8.94E-02	7.16E-03	1.92E-04	3.58E-02	NC
PHC F2 Aromatic C>12-C16	4.76E-02	3.82E-03	1.02E-04	1.91E-02	NC

[1] Bolded values highlighted in gray exceed the target hazard quotient for non-carcinogens of 0.2 (0.5 for PHCs) for the target incremental lifetime cancer risk for carcinogens of 1E-06.

NC: Not calculated due to no applicable toxicity reference value.

Table B-12: Predicted Risks for Construction Worker Exposure to Ground Water COCs via Trench Air Inhalation

Contaminant of Concern	Predicted Trench Air Concentration (mg/m^3)	Non Cancer Prorated Trench Air Exposure Concentration (mg/m3)	Cancer Prorated Trench Air Exposure Concentration (mg/m^3)	HQ	ILCR
				Trench	Trench
VOCs					
1,1,1-Trichloroethane	3.60E-03	2.89E-04	7.73E-06	2.89E-04	NC
1,1,2-Trichloroethane	1.98E-04	1.59E-05	4.25E-07	NC	6.80E-09
1,1-Dichloroethane	4.89E-03	3.92E-04	1.05E-05	2.31E-03	NC
1,1-Dichloroethylene	1.08E-03	8.65E-05	2.32E-06	4.33E-04	NC
Vinyl Chloride (future condition)	3.18E-05	2.55E-06	6.82E-08	4.25E-05	3.00E-10

[1] Bolded values highlighted in gray exceed the target hazard quotient for non-carcinogens of 0.2 (0.5 for PHCs) or the target incremental lifetime cancer risk for carcinogens of 1E-06.

NC - Not calculated due to no applicable toxicity reference value.

Appendix C – Input and Output MGRA Tables

MGRA (Tier 2) Input

Site Descriptors
(determines correct Table)

IMPORTANT - Ensure that "Analysis Tool Pak" and "Solver Add-in" are activated (Tools/Add-Ins...)

Proposed Land Use	**Industrial/Commercial/Community**
Site Soil Texture	**Coarse**
Is the ground water potable or non-potable?	**Potable**
Is this a stratified clean-up?	**Full Depth**
Is site within 30 m of surface water?	**More than 30 m to surface water**
Is the soil less than 2 m deep?	**More than 2 m**

Does Property Have Property Management Oversight	N

You Are Using Table 2

TIER 2 INPUT PARAMETERS	**Tier 2 Adjustable Values**			**Acceptable Tier 2 Lower Limit**	**Acceptable Tier 2 Upper Limit**	**Default Values**		
Distance from source centre to downgradient surface water body	**36.5**		**m**	36.5	5,000	**36.5**	**m**	
SUBSURFACE PROPERTIES						**Default Values**		
	Coarse Soil Setting	**Medium/Fine Soil Setting**				**Coarse Soil Setting**	**Medium/Fine Soil Setting**	
Fraction of organic carbon (FOC) – water table to soil surface	**0.005**	**0.005**	**g/g**	0.0001	0.02	**0.005**	**0.005**	**g/g**
Fraction of organic carbon (FOC) – in upper 0.5 m	**0.01**	**0.035**	**g/g**	0.0001	0.57	**0.01**	**0.035**	**v/v**
Minimum depth below soil surface to the highest annual water table	**300**		**cm**	0.1	2000	**300**	**cm**	
Soil Type – vadose zone	**Generic Coarse**	**Generic Medium&Fine**	**NOTE** : Soil Type should normally be consistent with Site Soil Texture	From SCS table *		**Generic Coarse**	**Medium&Fine**	
Soil Type – capillary fringe	**Sand**	**Loam**		From SCS table *		**Sand**	**Loam**	
Number of frozen ground days per year	**100**		**days**	50	170	**100**	**days**	
Aquifer horizontal hydraulic conductivity	**3.0E-05**		**m/sec**	1.00E-06	1.00E-03	**3.00E-05**	**m/sec**	
Aquifer hydraulic gradient	**0.003**		**m/m**	0.0001	0.05	**0.003**		
Aquifer dry bulk density	**1.81**		**g/cm³**	1.4	2.00	**1.81**	**g/cm³**	
Aquifer fraction organic carbon	**0.0003**		**g/g**	0.0002	0.01	**0.0003**		
Depth below soil surface to soil vapour measurement	**150**		**cm**	150	2000	**150**	**cm**	

Risk Management/Blocking Pathways

Select "Y" if condition applies

Modified Ecological Protection	Y	This results in use of a multiple of the industrial number of	**1.9**	for plants for residential and of	**1.9**	for industrial, and of a multiple of	**1000**	for mammals and birds

Soil Components for Table 2 - Full Depth, Potable Water Scenario

Coarse Textured Soil — **Industrial/Commercial Land Use (ug/g)**

Chemical Parameter	MOE Soil RL	Mass. PQL	Ont. Soil Bkgrd	Plants & Soil Org.	Mammals & Birds	Soil Contact S2 Risk	Soil Contact S3 Risk	Soil Leaching S-GW1	Soil Leaching S-GW3	Indoor Air S-IA	Indoor Air Odour	Outdoor Air	Free Phase Threshold
Acenaphthene	0.05		0.072		46000000	700	26000	150	560	210	18000	2400	2800
Acenaphthylene	0.05		0.093			70	2600	17	0.15	12		180	2900
Acetone	0.5		0.5		56000	200000	660000	320	16	2600	20000	160000	92000
Aldrin	0.05		0.05	0.17	1200000	4.7	6.3	31	150000		1200000		5000
Anthracene	0.05		0.16	61	470000000	70	2600	51	0.67	270		950	2700
Antimony	1		1.3	76	1500000	63	63						8000
Arsenic	1		18	76	330000	1	39						12000
Barium	5		220	2900	670000	32000	8600						7700
Benzene	0.02		0.02	340	6800000	13	480	0.92	14	0.32	3800	17	5000
Benz[a]anthracene	0.05		0.74	1.9		7	260	190	5.1E+11	1800		600	7600
Benzo[a]pyrene	0.05		0.49	140	46000000	0.7	17	6.6	3.8E+13	5400		68	7600
Benzo[b]fluoranthene	0.05		0.47			7	260	67	7.7E+13	150000		3800	7600
Benzo[ghi]perylene	0.1		0.68	25		70	2600	2200	1.2E+13				7600
Benzo[k]fluoranthene	0.05		0.48	29		7	260	66	2.5E+13	180000		3800	7600
Beryllium	2		2.5	15	780000	320	60						3900
Biphenyl 1,1'-	0.05		0.05			6000	6000	590	190		52		2600
Bis(2-chloroethyl)ether	0.5		0.5			0.44	16	0.0014	92		320		6400
Bis(2-chloroisopropyl)ether	0.5		0.5			8800	8800	12	120		82		11
Bis(2-ethylhexyl)phthalate	5		5	52	140000000	9500	16000	830	2.5E+09				7100
Boron (Hot Water Soluble)*	0.5		0.5	3.8									5000
Boron (total)	5		36		120000	24000	24000						5000
Bromodichloromethane	0.05		0.05			18	660	1.5	50				5500
Bromoform	0.05		0.05			100	3700	2.3	21		980		11000
Bromomethane	0.05		0.05			66	660	0.097	1.4	0.56	130	71	7300
Cadmium	1		1.2	46	1900	7.9	7.9						18000
Carbon Tetrachloride	0.05		0.05	22	880000	150	1500	0.51	2.3	0.21	2200	30	3900
Chlordane	0.05		0.05	4.1	8.5	0.8	30	510	180	110	26000	210	8400
Chloroaniline p-	0.5		0.5	76		320	320	0.66	0.45				6100
Chlorobenzene	0.05		0.05	23		13000	42000	8	2.4	130	360	8900	3700
Chloroform	0.05		0.05	130	830000	3300	22000	2.3	9.5	50	6800	880	6600
Chlorophenol, 2-	0.1		0.1	5.9		660	660	3.7	21				130000
Chromium Total	5		70	950	160000	240000	240000						11000
Chromium VI	0.2		0.66	15	8500000	1300	40						
Chrysene	0.05		2.8	27		70	2600	20	3.6E+11	50000		12000	7700
Cobalt	2		21	150	180000	250	2500						19000
Copper	5		92	430	3100000	1900	1900						
Cyanide (CN-)	0.05		0.051	15	110	320	950	22	0.022				240000
Dibenz[a h]anthracene	0.1		0.16			0.7	26	22	2.4E+13	880000		790	7600
Dibromochloromethane	0.05		0.05			13	490	2.3	48				10000
Dichlorobenzene, 1,2-	0.05		0.05	13		66000	130000	1.2	60	110	770	9200	3100
Dichlorobenzene, 1,3-	0.05		0.05	18		4400	4400	24	59				3300
Dichlorobenzene, 1,4-	0.05		0.05	14		65	2400	0.4	59	0.2	100	18	3000
Dichlorobenzidine, 3,3'-	1		1			0.66	25	0.16	66				5000
Dichlorodifluoromethane	0.05		0.05	150		44000	44000	150	16				710
DDD	0.05		0.05	26		4.6	110	1300	34000000				5000
DDE	0.05		0.05	0.99		3.2	110	1300	310000000				5000
DDT	0.05		1.4	12	1.2	3.2	110	1800	730000000				5000
Dichloroethane, 1,1-	0.05		0.05	32		8800	88000	0.47	1600	58	590	1500	4800
Dichloroethane, 1,2-	0.05		0.05	180	29000	12	450	0.48	180	0.038	3000	1.4	5300
Dichloroethylene, 1,1-	0.05		0.05	190	760000	11000	11000	1.3	11	0.064	860	3600	3900

Soil Components for Table 2 - Full Depth, Potable Water Scenario

Coarse Textured Soil — **Industrial/Commercial Land Use (ug/g)**

Chemical Parameter	MOE Soil RL	Mass. PQL	Ont. Soil Bkgrd	Plants & Soil Org.	Mammals & Birds	Soil Contact S2 Risk	Soil Contact S3 Risk	Soil Leaching S-GW1	Soil Leaching S-GW3	Indoor Air S-IA	Indoor Air Odour	Outdoor Air	Free Phase Threshold
Dichloroethylene, 1,2-cis-	0.05		0.05		940000	440	3700	1.9	130	22		530	4600
Dichloroethylene, 1,2-trans-	0.05		0.05		940000	4400	14000	1.9	220	1.3	160	700	4600
Dichlorophenol, 2,4-	0.1		0.1	6.4		660	660	0.19	46				33000
Dichloropropane, 1,2-	0.05		0.05	95		31	1100	0.54	76	0.16	21	27	2100
Dichloropropene,1,3-	0.05		0.05	95		12	450	0.059	3.8	0.18	78	9	5000
Dieldrin	0.05		0.05	0.17	240000	7.9	16	3.1	0.11				8700
Diethyl Phthalate	0.5		0.5	40	1E+09	790000	1300000	2200	0.07				7600
Dimethylphthalate	0.5		0.5	64		790000	790000	1400	0.023				1800
Dimethylphenol, 2,4-	0.2		0.2			4400	44000	38	390				57000
Dinitrophenol, 2,4-	2		2			320	3200	2	59				13000
Dinitrotoluene, 2,4 & 2,6-	0.5		0.5			1.2	43	0.015	15				3800
Dioxane, 1,4	0.2		0.2		1800	100	3700	7.5	810	1800		57000	82000
Dioxin/Furan (TEQ)		5.4E-07	0.000007		0.099	0.00051	0.0044	0.0018	780	0.043		0.11	7000
Endosulfan	0.04		0.04	0.57	1200	320	790	110	0.46				8700
Endrin	0.04		0.04	0.072	1.1	39	320	18	0.071				5000
Ethylbenzene	0.05		0.05	570	38000000	22000	88000	1.1	17	34	470	15000	2700
Ethylene dibromide	0.05		0.05			0.31	11	0.0048	86	0.0015	7100	0.099	2000
Fluoranthene	0.05		1.1	340	120000000	70	2600	180	40000	6700		4500	7600
Fluorene	0.05		0.12			5600	56000	1100	62				2800
Heptachlor	0.05		0.05	0.76	1100000	0.19	2.3	66	1.8		87000		8300
Heptachlor Epoxide	0.05		0.05			0.14	5.3	6.6	0.0035		40000		5000
Hexachlorobenzene	0.01		0.01	380		0.66	16	2.9	14				9300
Hexachlorobutadiene	0.01		0.01			14	75	0.52	1.6	0.031	980	2.8	8300
Hexachlorocyclohexane Gamma-	0.01		0.01	23		2.5	2.5	11	0.056				5000
Hexachloroethane	0.01		0.01			79	2200	0.49	22	0.21	220	54	9400
Hexane (n)	0.05		0.05			10000	10000	950	54	1.6		160000	1500
Indeno[1 2 3-cd]pyrene	0.1		0.38	1.4		7	260	220	8.6E+13	1200000		7300	7600
Lead	10		120	2100	32000	1000	1000						24000
Mercury	0.1		0.27	95	20000	67	670	550	1.2E+14	3.9		36	34000
Methoxychlor	0.05		0.05		4100000	1.6	1.6	32000	3.9				8000
Methyl Ethyl Ketone	0.5		0.5	130	9900000	64000	64000	160	230	74	3500	44000	26000
Methyl Isobutyl Ketone	0.5		0.5			110000	110000	440	150	31	180	23000	5100
Methyl Mercury **				3	34	9.2	9.2	1	0.0084				1300000
Methyl tert-Butyl Ether (MTBE)	0.05		0.05	95		610	23000	1.6	220	11		170	8000
Methylene Chloride	0.05		0.05	3	400000	150	5500	4.8	7.4	1.6	3100	2200	6400
Methlynaphthalene, 2-(1-) ***	0.05		0.59			560	560	30	76		160		3600
Molybdenum	2		2	76	74000	1200	1200						22000
Naphthalene	0.05		0.09	42	1300000	2800	28000	93	200	9.6	710	270	2800
Nickel	5		82	510	5400000	1200	510						
Pentachlorophenol	0.1		0.1	59	2000000	4.1	50	86	2.9				9200
Petroleum Hydrocarbons F1****	10		25	610		47000	100000	4100	55	110		15000	1700
Aliphatic C6-C8						1400000	1400000	150000	39	76		18000	1700
Aliphatic C>8-C10						28000	280000	20000	230	1200		18000	1700
Aromatic C>8-C10						11000	11000	410	39	69		4900	2900
Petroleum Hydrocarbons F2	10		10	490		22000	48000	4300	230	380		25000	2700
Aliphatic C>10-C12						28000	280000	160000	3.9E+13	450		20000	1700
Aliphatic C>12-C16						28000	280000	3100000	8.5E+13	440		42000	6600
Aromatic C>10-C12						11000	11000	630	42	130		11000	2500
Aromatic C>12-C16						11000	11000	1200	49	590		26000	2200
Petroleum Hydrocarbons F3	50		240	3200		40000	260000	20000					5800

Soil Components for Table 2 - Full Depth, Potable Water Scenario

Coarse Textured Soil — **Industrial/Commercial Land Use (ug/g)**

Chemical Parameter	MOE Soil RL	Mass. PQL	Ont. Soil Bkgrd	Plants & Soil Org.	Mammals & Birds	Soil Contact S2 Risk	Soil Contact S3 Risk	Soil Leaching S-GW1	Soil Leaching S-GW3	Indoor Air S-IA	Indoor Air Odour	Outdoor Air	Free Phase Threshold
Aliphatic C>16-C21						560000	560000	7.8E+09					6700
Aliphatic C>21-C34						560000	560000	1.2E+14					6900
Aromatic C>16-C21						8400	84000	2900					3000
Aromatic C>21-C34						8400	84000	23000					7900
Petroleum Hydrocarbons F4	50		120	6300		42000	400000	1600000					6900
Aliphatic C>34						5600000	5600000	1.2E+20					6900
Aromatic C>34						8400	84000	330000					6900
Phenanthrene	0.05		0.69	24	36000000			17	270				2300
Phenol	0.5		0.5	76	9400	42000	42000	240	46	15000	160000	16000	230000
Polychlorinated Biphenyls	0.3		0.3	63	1100	2.7	4.1	770	9.9E+11	45		120	5000
Pyrene	0.05		1		99000000	700	26000	1700	2600	51000		41000	7700
Selenium	1		1.5	19	5500	1200	1200						
Silver	0.5		0.5	76		490	490						22000
Styrene	0.05		0.05	65		26000	26000	47	66	42	83	3400	3500
Tetrachloroethane, 1,1,1,2-	0.05		0.05			42	1600	0.15	37	0.087		5.1	4400
Tetrachloroethane, 1,1,2,2-	0.05		0.05			5.5	210	0.14	48	0.019	11000	1.6	6700
Tetrachloroethylene	0.05		0.05	65	310000	520	20000	1.9	18	4.5	1500	190	3700
Thallium	1		1	6.8	47000	3.3	33						22000
Toluene	0.2		0.2	950	14000000	18000	180000	6.4	68	99	170	34000	3300
Trichlorobenzene, 1,2,4-	0.05		0.05	57		2200	22000	45	43	3.2	5300	290	3400
Trichloroethane, 1,1,1-	0.05		0.05	67	39000000	440000	1500000	20	9.8	6.1	4700	12000	3700
Trichloroethane, 1,1,2-	0.05		0.05	300		19	720	0.54	120	0.042		2.9	3900
Trichloroethylene	0.05		0.05	380	390000	24	53	0.55	300	0.002	2200	12	4100
Trichlorofluoromethane	0.05		0.25	61		66000	66000	20	4				4400
Trichlorophenol, 2,4,5-	0.1		0.1	19		470	470	9.1	27				14000
Trichlorophenol, 2,4,6-	0.1		0.1	19		72	470	2.1	3.8				13000
Uranium	1		2.8	3800	33000	300	300						40000
Vanadium	10		86	380	18000	160	160						7100
Vinyl Chloride	0.02		0.02	13	12000	0.79	29	0.19	270	0.034	4800	15	6100
Xylene Mixture	0.05		0.05	670	47000000	44000	88000	120	26	50	2700	4900	2300
Zinc	30		290	1100	340000	47000	47000						15000
Electrical Conductivity (mS/cm)			0.73	2.7									
Chloride	5		210					52000	220				3000
Sodium Adsorption Ratio			2.4	23									
Sodium	50		1300										

Groundwater Components for Potable Water Scenario (μg/L)

Coarse Textured Soil

Chemical Parameter	MOE Water RL	Ont. GW Bkgrd	GW1	GW1 Odour	Residential GW2	Industrial GW2	Residential GW2 Odour	Industrial GW2 Odour	GW3	1/2 Solubility
Acenaphthene	1	30	30	67	1100	24000	300000	2000000	6600	2000
Acenaphthylene	1	1.4	3.3		67	1400			1.8	8100
Acetone	30	2700	2700	93000	2400000	52000000	110000000	680000000	130000	500000000
Aldrin	0.01	0.01	0.35	150			1500000	12000000	100000	8.5
Anthracene	0.1	0.1	3		370	9100			2.4	22
Antimony	0.5	1.5	6						20000	12000000
Arsenic	1	13	25						1900	17000000
Barium	2	610	1000						29000	27000000
Benzene	0.5	0.5	5	860	44	830	17000000	100000000	5800	900000
Benz[a]anthracene	0.2	0.2	1		130	3200			1.6E+11	4.7
Benzo[a]pyrene	0.01	0.01	0.01		55	1100			3.4E+12	0.81
Benzo[b]fluoranthene	0.1	0.1	0.1		2100	45000			6.9E+12	0.75
Benzo[ghi]perylene	0.2	0.2	1						3.3E+11	0.13
Benzo[k]fluoranthene	0.1	0.1	0.1		2400	51000			2.3E+12	0.4
Beryllium	0.5	0.5	4						67	75000000
Biphenyl 1,1'-	0.5	0.5	110	0.49			1000	6600	2200	3500
Bis(2-chloroethyl)ether	5	5	0.012	410			810000	5700000	300000	8600000
Bis(2-chloroisopropyl)ether	4	120	120	160			400000	2500000	300000	20000
Bis(2-ethylhexyl)phthalate	10	10	6						1.1E+09	140
Boron (Hot Water Soluble)*										
Boron (total)	10	1700	5000						45000	22000000
Bromodichloromethane	2	2	16						85000	1500000
Bromoform	5	5	25	590			4900000	34000000	37000	1600000
Bromomethane	0.5	0.89	0.89	310	5.8	120	450000	2700000	4000	7600000
Cadmium	0.5	0.5	5						2.7	62000000
Carbon Tetrachloride	0.2	0.2	5	1300	0.79	16	2800000	17000000	2500	400000
Chlordane	0.06	0.06	7	4.2	58	1600	44000	370000	150	28
Chloroaniline p-	10	10	5.9						400	2000000
Chlorobenzene	0.5	0.5	30	46	4100	84000	120000	690000	630	250000
Chloroform	1	2	25	6400	240	4700	11000000	63000000	16000	4000000
Chlorophenol, 2-	2	8.9	8.9						3300	14000000
Chromium Total	10	11	50						810	6000000
Chromium VI	10	25	25						140	6000000
Chrysene	0.1	0.1	0.1		4300	120000			1.1E+11	1
Cobalt	1	3.8	3						66	44000000
Copper	5	5	1000						87	210000000
Cyanide (CN-)	5	5	200						66	500000000
Dibenz[a h]anthracene	0.2	0.2	0.01		2400	37000			6.6E+11	0.52
Dibromochloromethane	2	2	25						82000	1400000
Dichlorobenzene, 1,2-	0.5	0.5	3	54	4600	95000	160000	930000	9600	40000
Dichlorobenzene, 1,3-	0.5	0.5	59						9600	63000
Dichlorobenzene, 1,4-	0.5	0.5	1	7.4	8	150	21000	130000	9600	41000
Dichlorobenzidine, 3,3'-	0.5	0.5	0.025						640	1600
Dichlorodifluoromethane	2	590	590						4400	140000
DDD	0.05	1.8	10						16000000	45
DDE	0.01	10	10						150000000	20
DDT	0.05	0.05	10						240000000	2.8
Dichloroethane, 1,1-	0.5	0.5	5	540	330	6800	1200000	7000000	2600000	2500000
Dichloroethane, 1,2-	0.5	0.5	5	2300	1.6	30	4000000	24000000	250000	2600000
Dichloroethylene, 1,1-	0.5	0.5	14	710	1.7	31	1300000	7400000	15000	1200000
Dichloroethylene, 1,2-cis-	0.5	1.7	20		1.7	31			180000	1800000
Dichloroethylene, 1,2-trans-	0.5	1.7	20	170	1.7	31	260000	1500000	280000	1800000
Dichlorophenol, 2,4-	20	20	0.3						4600	2300000
Dichloropropane, 1,2-	0.5	0.5	5	10	16	330	23000	140000	72000	1400000
Dichloropropene,1,3-	0.5	0.5	0.5	32	5.2	100	86000	520000	3100	1400000
Dieldrin	0.05	0.05	0.35						0.75	130
Diethyl Phthalate	2	30	15000						38	540000
Dimethylphthalate	2	30	15000						38	2000000
Dimethylphenol, 2,4-	10	10	59						39000	3900000
Dinitrophenol, 2,4-	10	10	5.9						11000	1400000
Dinitrotoluene, 2,4 & 2,6-	5	5	0.044						2900	140000
Dioxane, 1,4	2	50	50		1900000	40000000			7300000	500000000
Dioxin/Furan (TEQ)		0.000015	0.000015		0.014	0.37			390	0.1
Endosulfan	0.05	0.05	5.9						1.5	230
Endrin	0.05	0.05	2						0.48	130
Ethylbenzene	0.5	0.5	2.4	31	31000	630000	780000	4600000	2300	85000
Ethylene dibromide	0.2	0.2	0.05	7300	0.25	5.1	27000000	170000000	120000	2000000
Fluoranthene	0.4	0.4	3		2000	54000			41000	130

Groundwater Components for Potable Water Scenario (µg/L)

Coarse Textured Soil

Chemical Parameter	MOE Water RL	Ont. GW Bkgrd	GW1	GW1 Odour	Residential GW2	Industrial GW2	Residential GW2 Odour	Industrial GW2 Odour	GW3	1/2 Solubility
Fluorene	0.5	120	120						400	950
Heptachlor	0.01	0.01	1.5	25			360000	2600000	2.5	90
Heptachlor Epoxide	0.01	0.01	1.5	350			1100000	9200000	0.048	100
Hexachlorobenzene	0.01	0.01	1						290	3.1
Hexachlorobutadiene	0.01	0.01	0.6	29	0.44	8.6	110000	630000	120	1600
Hexachlorocyclohexane Gamma-	0.01	0.01	4						1.2	4000
Hexachloroethane	0.01	0.01	2.1	9.4	94	2000	510000	3400000	6800	25000
Hexane (n)	5	5	890		61	1200			3200	4800
Indeno[1 2 3-cd]pyrene	0.2	0.2	0.1		4100	76000			2.3E+12	0.095
Lead	1	1.9	10						25	4800000
Mercury	0.1	0.1	1		0.29	6.1			1.3E+13	30
Methoxychlor	0.05	0.05	900						6.5	50
Methyl Ethyl Ketone	20	400	1800	20000	470000	2900000	22000000	140000000	1500000	110000000
Methyl Isobutyl Ketone	20	640	3000	640	140000	830000	820000	5000000	580000	9500000
Methyl Mercury **		0.12	0.3						0.15	16000000
Methyl tert-Butyl Ether (MTBE)	2	15	15		190	3700			1300000	26000000
Methylene Chloride	5	5	50	4100	610	11000	6900000	41000000	17000	6500000
Methlynaphthalene, 2-(1-) ***	2	2	12	3.2			6200	38000	1800	12000
Molybdenum	0.5	23	70						9200	38000000
Naphthalene	2	7	59	11	1400	30000	370000	2300000	7800	16000
Nickel	1	14	100						490	210000000
Pentachlorophenol	0.5	0.5	30						62	7000
Petroleum Hydrocarbons F1****	25	180	820		180	3700			750	1900
Aliphatic C6-C8		120	37000		120	2500			590	2700
Aliphatic C>8-C10		76	740		130	2600			510	220
Aromatic C>8-C10		300	300		4200	87000			1800	33000
Petroleum Hydrocarbons F2	100	150	300		2300	47000			970	150
Aliphatic C>10-C12		12	740		84	1700			1.1E+13	17
Aliphatic C>12-C16		0.38	740		19	400			1.2E+12	0.38
Aromatic C>10-C12		300	300		14000	300000			1200	13000
Aromatic C>12-C16		300	300		38000	780000			700	2900
Petroleum Hydrocarbons F3	500	500	1000							4.9E-08
Aliphatic C>16-C21		0.0013	15000							0.0013
Aliphatic C>21-C34		1.2E-08	15000							1.2E-08
Aromatic C>16-C21		220	220							330
Aromatic C>21-C34		3.3	220							3.3
Petroleum Hydrocarbons F4	500	500	1100							3.9E-12
Aliphatic C>34		3.2E-12	150000							3.2E-12
Aromatic C>34		0.18	220							0.18
Phenanthrene	0.1	0.1	1						920	580
Phenol	1	5	890	17000	470000	10000000	17000000	110000000	12000	41000000
Polychlorinated Biphenyls	0.2	0.2	3		7.8	180			2.3E+11	140
Pyrene	0.2	0.2	30		17000	460000			2700	68
Selenium	5	5	10						63	41000000
Silver	0.3	0.3	100						1.5	35000000
Styrene	0.5	0.5	100	5.4	1300	26000	14000	85000	9100	160000
Tetrachloroethane, 1,1,1,2-	0.5	1.1	1.1		3.3	66			25000	540000
Tetrachloroethane, 1,1,2,2-	0.5	0.5	1	3300	3.2	63	8400000	51000000	30000	1400000
Tetrachloroethylene	0.5	0.5	20	440	1.7	31	1100000	6600000	11000	100000
Thallium	0.5	0.5	2						510	13000000
Toluene	0.5	0.8	24	22	82000	1700000	470000	2800000	18000	260000
Trichlorobenzene, 1,2,4-	0.5	0.5	70	190	180	3800	1200000	7300000	4300	25000
Trichloroethane, 1,1,1-	0.5	0.5	200	3000	640	13000	6400000	38000000	11000	650000
Trichloroethane, 1,1,2-	0.5	0.5	5		4.7	91			120000	550000
Trichloroethylene	0.5	0.5	5	1100	1.5	13	2400000	14000000	280000	640000
Trichlorofluoromethane	5	150	150						2500	550000
Trichlorophenol, 2,4,5-	0.2	0.2	8.9						1600	600000
Trichlorophenol, 2,4,6-	0.2	0.2	2						230	400000
Uranium	2	8.9	20						420	
Vanadium	0.5	3.9	6.2						250	43000000
Vinyl Chloride	0.5	0.5	2	5300	0.17	3.1	7600000	44000000	450000	4400000
Xylene Mixture	0.5	72	300	370	7800	160000	5300000	32000000	4200	53000
Zinc	5	160	5000						1100	170000000
Electrical Conductivity (mS/cm)	0.005	0.005								
Chloride	1000	790000	250000						2300000	21000000
Sodium Adsorption Ratio										
Sodium	5000	490000	200000						2300000	220000000

MGRA (Tier 2) Input

IMPORTANT - Ensure that "Analysis Tool Pak" and "Solver Add-in" are activated (Tools/Add-Ins...)

Site Descriptors (determines correct Table)

Proposed Land Use	Industrial/Commercial/Community
Site Soil Texture	Coarse
Is the ground water potable or non-potable?	Potable
Is this a stratified clean-up?	Full Depth
Is site within 30 m of surface water?	More than 30 m to surface water
Is the soil less than 2 m deep?	More than 2 m

Does Property Have Property Management Oversight	N

You Are Using Table 2

TIER 2 INPUT PARAMETERS

	Tier 2 Adjustable Values			Acceptable Tier 2 Lower Limit	Acceptable Tier 2 Upper Limit	Default Values	
Distance from source centre to downgradient surface water body	*515*		m	36.5	5,000	36.5	m

SUBSURFACE PROPERTIES

	Coarse Soil Setting	Medium/Fine Soil Setting	Units	Acceptable Tier 2 Lower Limit	Acceptable Tier 2 Upper Limit	Default Values Coarse Soil Setting	Default Values Medium/Fine Soil Setting	Units
Fraction of organic carbon (FOC) – water table to soil surface	0.005	0.005	g/g	0.0001	0.02	0.005	0.005	g/g
Fraction of organic carbon (FOC) – in upper 0.5 m	0.01	0.035	g/g	0.0001	0.57	0.01	0.035	v/v
Minimum depth below soil surface to the highest annual water table	*116*		cm	0.1	2000	300	cm	
Soil Type – vadose zone	*Sandy Loam*	Generic Medium&Fine		From SCS table *		Generic Coarse	Medium&Fine	
Soil Type – capillary fringe	*Sandy Loam*	Loam		From SCS table *		Sand	Loam	
Number of frozen ground days per year	100		days	50	170	100	days	
Aquifer horizontal hydraulic conductivity	3.0E-05		m/sec	1.00E-06	1.00E-03	3.00E-05	m/sec	
Aquifer hydraulic gradient	0.003		m/m	0.0001	0.05	0.003		
Aquifer dry bulk density	1.81		g/cm^3	1.4	2.00	1.81	g/cm^3	
Aquifer fraction organic carbon	0.0003		g/g	0.0002	0.01	0.0003		
Depth below soil surface to soil vapour measurement	150		cm	150	2000	150	cm	

NOTE : Soil Type should normally be consistent with Site Soil Texture

Risk Management/Blocking Pathways

Select "Y" if condition applies

Modified Ecological Protection	Y	This results in use of a multiple of the industrial number of	1.9	for plants for residential and of	1.9	for industrial, and of a multiple of	1000	for mammals and birds

Soil Components for Table 2 - Full Depth, Potable Water Scenario

Coarse Textured Soil — **Industrial/Commercial Land Use (ug/g)**

Chemical Parameter	MOE Soil RL	Mass. PQL	Ont. Soil Bkgrd	Plants & Soil Org.	Mammals & Birds	Soil Contact S2 Risk	Soil Contact S3 Risk	Soil Leaching S-GW1	Soil Leaching S-GW3	Indoor Air S-IA	Indoor Air Odour	Outdoor Air	Free Phase Threshold
Acenaphthene	0.05		0.072		46000000	700	26000	150	6200	210	18000	2000	3200
Acenaphthylene	0.05		0.23			70	2600	17	1.7	12		150	3100
Acetone	0.5		0.5		56000	200000	660000	430	160	2500	19000	130000	86000
Aldrin	0.05		0.05	0.17	1200000	4.7	6.3	31	210000		1200000		5000
Anthracene	0.05		0.16	61	470000000	70	2600	51	5.8	270		800	3100
Antimony	1		1.3	76	1500000	63	63						9000
Arsenic	1		18	76	330000	1	39						14000
Barium	5		220	2900	670000	32000	8600						8600
Benzene	0.02		0.02	340	6800000	13	480	0.93	160	0.32	3800	18	5200
Benz[a]anthracene	0.05		0.74	1.9		7	260	190	5.8E+10	1800		520	8000
Benzo[a]pyrene	0.05		0.49	140	46000000	0.7	17	6.6	4.2E+14	5400		84	8000
Benzo[b]fluoranthene	0.05		0.47			7	260	67	8.6E+14	150000		4500	8000
Benzo[ghi]perylene	0.1		0.68	25		70	2600	2200	1.4E+14				8000
Benzo[k]fluoranthene	0.05		0.48	29		7	260	66	2.8E+14	180000		4600	8000
Beryllium	2		2.5	15	780000	320	60						4400
Biphenyl 1,1'-	0.05		0.05			6000	6000	590	2100		52		2900
Bis(2-chloroethyl)ether	0.5		0.5			0.44	16	0.0016	1000		310		6600
Bis(2-chloroisopropyl)ether	0.5		0.5			8800	8800	13	1300		80		11
Bis(2-ethylhexyl)phthalate	5		5	52	140000000	9500	16000	830	1.1E+09				7300
Boron (Hot Water Soluble)*	0.5		0.5	3.8									5600
Boron (total)	5		36		120000	24000	24000						5600
Bromodichloromethane	0.05		0.05			18	660	1.6	550				6000
Bromoform	0.05		0.05			100	3700	2.5	240		970		12000
Bromomethane	0.05		0.05			66	660	0.1	16	0.57	130	91	7800
Cadmium	1		1.2	46	1900	7.9	7.9						21000
Carbon Tetrachloride	0.05		0.05	22	880000	150	1500	0.54	27	0.22	2300	38	4400
Chlordane	0.05		0.05	4.1	8.5	0.8	30	510	370	110	26000	180	8800
Chloroaniline p-	0.5		0.5	76		320	320	0.67	4.9				6500
Chlorobenzene	0.05		0.05	23		13000	42000	8.1	27	140	360	7900	4000
Chloroform	0.05		0.05	130	830000	3300	22000	2.5	100	50	6700	1100	7000
Chlorophenol, 2-	0.1		0.1	5.9		660	660	3.7	230				130000
Chromium Total	5		70	950	160000	240000	240000						12000
Chromium VI	0.2		0.66	15	8500000	1300	40						
Chrysene	0.05		2.8	27		70	2600	20	3.8E+10	50000		11000	8000
Cobalt	2		21	150	180000	250	2500						21000
Copper	5		92	430	3100000	1900	1900						
Cyanide (CN-)	0.05		0.051	15	110	320	950	25	0.24				230000
Dibenz[a h]anthracene	0.1		0.16			0.7	26	22	2.7E+14	880000		1100	8000
Dibromochloromethane	0.05		0.05			13	490	2.5	530				11000
Dichlorobenzene, 1,2-	0.05		0.05	13		66000	130000	1.2	670	120	770	7700	3500
Dichlorobenzene, 1,3-	0.05		0.05	18		4400	4400	24	660				3600
Dichlorobenzene, 1,4-	0.05		0.05	14		65	2400	0.41	660	0.21	100	15	3300
Dichlorobenzidine, 3,3'-	1		1			0.66	25	0.16	730				5000
Dichlorodifluoromethane	0.05		0.05	150		44000	44000	180	210				840
DDD	0.05		0.05	26		4.6	110	1300	18000000				5000
DDE	0.05		0.05	0.99		3.2	110	1300	170000000				5000
DDT	0.05		1.4	12	1.2	3.2	110	1800	110000000				5000
Dichloroethane, 1,1-	0.05		0.05	32		8800	88000	0.49	17000	57	590	1900	5100
Dichloroethane, 1,2-	0.05		0.05	180	29000	12	450	0.5	2000	0.037	3000	1.5	5600
Dichloroethylene, 1,1-	0.05		0.05	190	760000	11000	11000	1.4	130	0.066	890	4600	4300

Soil Components for Table 2 - Full Depth, Potable Water Scenario

Coarse Textured Soil — **Industrial/Commercial Land Use (ug/g)**

Chemical Parameter	MOE Soil RL	Mass. PQL	Ont. Soil Bkgrd	Plants & Soil Org.	Mammals & Birds	Soil Contact S2 Risk	Soil Contact S3 Risk	Soil Leaching S-GW1	Soil Leaching S-GW3	Indoor Air S-IA	Indoor Air Odour	Outdoor Air	Free Phase Threshold
Dichloroethylene, 1,2-cis-	0.05		0.05		940000	440	3700	2	1500	22		660	4900
Dichloroethylene, 1,2-trans-	0.05		0.05		940000	4400	14000	2	2500	1.4	160	890	5000
Dichlorophenol, 2,4-	0.1		0.1	6.4		660	660	0.19	520				33000
Dichloropropane, 1,2-	0.05		0.05	95		31	1100	0.56	840	0.16	21	30	2100
Dichloropropene,1,3-	0.05		0.05	95		12	450	0.06	42	0.2	78	9.8	5300
Dieldrin	0.05		0.05	0.17	240000	7.9	16	3.1	1.2				9200
Diethyl Phthalate	0.5		0.5	40	1E+09	790000	1300000	2300	0.78				7900
Dimethylphthalate	0.5		0.5	64		790000	790000	1500	0.25				1700
Dimethylphenol, 2,4-	0.2		0.2			4400	44000	38	4400				57000
Dinitrophenol, 2,4-	2		2			320	3200	2.1	650				13000
Dinitrotoluene, 2,4 & 2,6-	0.5		0.5			1.2	43	0.015	170				4200
Dioxane, 1,4	0.2		0.2		1800	100	3700	11	8300	1700		46000	76000
Dioxin/Furan (TEQ)		5.4E-07	0.000007		0.099	0.00051	0.0044	0.0018	480	0.043		0.09	7300
Endosulfan	0.04		0.04	0.57	1200	320	790	110	3.8				9200
Endrin	0.04		0.04	0.072	1.1	39	320	18	0.76				5000
Ethylbenzene	0.05		0.05	570	38000000	22000	88000	1.1	190	34	470	14000	3000
Ethylene dibromide	0.05		0.05			0.31	11	0.005	950	0.0016	7000	0.084	2000
Fluoranthene	0.05		1.1	340	120000000	70	2600	180	110000	6700		4000	8000
Fluorene	0.05		0.12			5600	56000	1100	660				3100
Heptachlor	0.05		0.05	0.76	1100000	0.19	2.3	66	7.5		87000		8800
Heptachlor Epoxide	0.05		0.05			0.14	5.3	6.6	0.039		40000		5000
Hexachlorobenzene	0.01		0.01	380		0.66	16	2.9	150				9900
Hexachlorobutadiene	0.01		0.01			14	75	0.52	18	0.032	980	2.3	8700
Hexachlorocyclohexane Gamma-	0.01		0.01	23		2.5	2.5	11	0.63				5000
Hexachloroethane	0.01		0.01			79	2200	0.49	250	0.21	220	46	10000
Hexane (n)	0.05		0.05			10000	10000	1100	730	2		190000	1700
Indeno[1 2 3-cd]pyrene	0.1		0.38	1.4		7	260	220	9.7E+14	1200000		9600	8000
Lead	10		120	2100	32000	1000	1000						27000
Mercury	0.1		0.27	95	20000	67	670	550	1.3E+15	3.9		30	37000
Methoxychlor	0.05		0.05		4100000	1.6	1.6	32000	20				8400
Methyl Ethyl Ketone	0.5		0.5	130	9900000	64000	64000	200	2400	70	3300	38000	25000
Methyl Isobutyl Ketone	0.5		0.5			110000	110000	430	1600	30	180	21000	5200
Methyl Mercury **				3	34	9.2	9.2	1	0.094				1300000
Methyl tert-Butyl Ether (MTBE)	0.05		0.05	95		610	23000	1.5	2400	11		210	7900
Methylene Chloride	0.05		0.05	3	400000	150	5500	5.2	82	1.6	3100	2700	6600
Methlynaphthalene, 2-(1-) ***	0.05		0.59			560	560	30	850		160		3900
Molybdenum	2		2	76	74000	1200	1200						24000
Naphthalene	0.05		0.09	42	1300000	2800	28000	93	2200	9.6	710	230	3000
Nickel	5		82	510	5400000	1200	510						
Pentachlorophenol	0.1		0.1	59	2000000	4.1	50	86	33				9700
Petroleum Hydrocarbons F1****	10		25	610		47000	100000	4100	600	120		16000	1900
Aliphatic C6-C8						1400000	1400000	150000	440	78		23000	1900
Aliphatic C>8-C10						28000	280000	20000	1500	1200		22000	1900
Aromatic C>8-C10						11000	11000	410	440	73		4300	3100
Petroleum Hydrocarbons F2	10		10	490		22000	48000	4300	2500	390		22000	3000
Aliphatic C>10-C12						28000	280000	160000	3E+12	490		19000	1900
Aliphatic C>12-C16						28000	280000	3100000	9.7E+14	450		35000	6800
Aromatic C>10-C12						11000	11000	630	470	140		9600	2700
Aromatic C>12-C16						11000	11000	1200	540	590		22000	2500
Petroleum Hydrocarbons F3	50		240	3200		40000	260000	20000					6100

Soil Components for Table 2 - Full Depth, Potable Water Scenario

Coarse Textured Soil — **Industrial/Commercial Land Use (ug/g)**

Chemical Parameter	MOE Soil RL	Mass. PQL	Ont. Soil Bkgrd	Plants & Soil Org.	Mammals & Birds	Soil Contact S2 Risk	Soil Contact S3 Risk	Soil Leaching S-GW1	Soil Leaching S-GW3	Indoor Air S-IA	Indoor Air Odour	Outdoor Air	Free Phase Threshold
Aliphatic C>16-C21						560000	560000	7.8E+09					6900
Aliphatic C>21-C34						560000	560000	1.2E+14					7200
Aromatic C>16-C21						8400	84000	2900					3300
Aromatic C>21-C34						8400	84000	23000					8200
Petroleum Hydrocarbons F4	50		120	6300		42000	400000	1600000					7200
Aliphatic C>34						5600000	5600000	1.2E+20					7200
Aromatic C>34						8400	84000	330000					7200
Phenanthrene	0.05		0.69	24	36000000			17	2300				2600
Phenol	0.5		0.5	76	9400	42000	42000	240	520	15000	160000	18000	230000
Polychlorinated Biphenyls	0.3		0.3	63	1100	2.7	4.1	770	1.1E+13	45		100	5000
Pyrene	0.05		1		99000000	700	26000	1700	7400	51000		36000	8000
Selenium	1		1.5	19	5500	1200	1200						
Silver	0.5		0.5	76		490	490						25000
Styrene	0.05		0.05	65		26000	26000	48	740	43	83	2900	3800
Tetrachloroethane, 1,1,1,2-	0.05		0.05			42	1600	0.15	410	0.099		5.1	4800
Tetrachloroethane, 1,1,2,2-	0.05		0.05			5.5	210	0.14	530	0.019	11000	1.3	7100
Tetrachloroethylene	0.05		0.05	65	310000	520	20000	2	200	4.5	1500	230	4100
Thallium	1		1	6.8	47000	3.3	33						24000
Toluene	0.2		0.2	950	14000000	18000	180000	6.5	760	99	170	36000	3500
Trichlorobenzene, 1,2,4-	0.05		0.05	57		2200	22000	45	480	3.2	5300	240	3800
Trichloroethane, 1,1,1-	0.05		0.05	67	39000000	440000	1500000	21	110	6.2	4700	16000	4100
Trichloroethane, 1,1,2-	0.05		0.05	300		19	720	0.55	1400	0.044		2.6	4300
Trichloroethylene	0.05		0.05	380	390000	24	53	0.57	3400	0.002	2200	15	4500
Trichlorofluoromethane	0.05		0.25	61		66000	66000	22	50				4900
Trichlorophenol, 2,4,5-	0.1		0.1	19		470	470	9.2	300				14000
Trichlorophenol, 2,4,6-	0.1		0.1	19		72	470	2.1	42				13000
Uranium	1		2.8	3800	33000	300	300						46000
Vanadium	10		86	380	18000	160	160						8000
Vinyl Chloride	0.02		0.02	13	12000	0.79	29	0.2	3200	0.036	5000	19	6600
Xylene Mixture	0.05		0.05	670	47000000	44000	88000	120	290	50	2700	5000	2500
Zinc	30		290	1100	340000	47000	47000						17000
Electrical Conductivity (mS/cm)			0.73	2.7									
Chloride	5		210					83000	2200				2700
Sodium Adsorption Ratio			2.4	23									
Sodium	50		1300										

Groundwater Components for Potable Water Scenario (µg/L)

Coarse Textured Soil

Chemical Parameter	MOE Water RL	Ont. GW Bkgrd	GW1	GW1 Odour	Residential GW2	Industrial GW2	Residential GW2 Odour	Industrial GW2 Odour	GW3	1/2 Solubility
Acenaphthene	1	30	30	67	31	15000	8300	1300000	73000	2000
Acenaphthylene	1	1.4	3.3		1.8	1200			20	8100
Acetone	30	2700	2700	93000	150000	34000000	6900000	440000000	1400000	500000000
Aldrin	0.01	0.01	0.35	150			24000	3300000	140000	8.5
Anthracene	0.1	0.1	3		12	3300			20	22
Antimony	0.5	1.5	6						220000	12000000
Arsenic	1	13	25						21000	17000000
Barium	2	610	1000						320000	27000000
Benzene	0.5	0.5	5	860	0.17	300	67000	36000000	65000	900000
Benz[a]anthracene	0.2	0.2	1		7	1200			1.8E+10	4.7
Benzo[a]pyrene	0.01	0.01	0.01		5.7	810			3.9E+13	0.81
Benzo[b]fluoranthene	0.1	0.1	0.1		150	26000			7.7E+13	0.75
Benzo[ghi]perylene	0.2	0.2	1						3.7E+12	0.13
Benzo[k]fluoranthene	0.1	0.1	0.1		180	31000			2.6E+13	0.4
Beryllium	0.5	0.5	4						750	75000000
Biphenyl 1,1'-	0.5	0.5	110	0.49			24	9100	24000	3500
Bis(2-chloroethyl)ether	5	5	0.012	410			44000	2500000	3400000	8600000
Bis(2-chloroisopropyl)ether	4	120	120	160			8000	3600000	3400000	20000
Bis(2-ethylhexyl)phthalate	10	10	6						460000000	140
Boron (Hot Water Soluble)*										
Boron (total)	10	1700	5000						500000	22000000
Bromodichloromethane	2	2	16						940000	1500000
Bromoform	5	5	25	590			54000	21000000	410000	1600000
Bromomethane	0.5	0.5	0.89	310	0.2	450	15000	10000000	45000	7600000
Cadmium	0.5	0.5	5						30	62000000
Carbon Tetrachloride	0.2	0.2	5	1300	0.028	64	100000	68000000	28000	400000
Chlordane	0.06	0.06	7	4.2	0.85	430	640	100000	310	28
Chloroaniline p-	10	10	5.9						4500	2000000
Chlorobenzene	0.5	0.5	30	46	140	280000	4000	2300000	7000	250000
Chloroform	1	2	25	6400	10	16000	480000	220000000	170000	4000000
Chlorophenol, 2-	2	8.9	8.9						37000	14000000
Chromium Total	10	11	50						9000	6000000
Chromium VI	10	25	25						1500	6000000
Chrysene	0.1	0.1	0.1		170	39000			1.2E+10	1
Cobalt	1	3.8	3						730	44000000
Copper	5	5	1000						970	210000000
Cyanide (CN-)	5	5	200						730	500000000
Dibenz[a h]anthracene	0.2	0.2	0.01		260	35000			7.4E+12	0.52
Dibromochloromethane	2	2	25						910000	1400000
Dichlorobenzene, 1,2-	0.5	0.5	3	54	150	280000	5100	2700000	110000	40000
Dichlorobenzene, 1,3-	0.5	0.5	59						110000	63000
Dichlorobenzene, 1,4-	0.5	0.5	1	7.4	0.26	480	690	390000	110000	41000
Dichlorobenzidine, 3,3'-	0.5	0.5	0.025						7000	1600
Dichlorodifluoromethane	2	590	590						49000	140000
DDD	0.05	1.8	10						8500000	45
DDE	0.01	10	10						79000000	20
DDT	0.05	0.05	10						34000000	2.8
Dichloroethane, 1,1-	0.5	0.5	5	540	11	25000	40000	25000000	28000000	2500000
Dichloroethane, 1,2-	0.5	0.5	5	2300	0.07	79	180000	63000000	2800000	2600000
Dichloroethylene, 1,1-	0.5	0.5	14	710	0.075	120	50000	29000000	170000	1200000
Dichloroethylene, 1,2-cis-	0.5	0.5	20		0.075	120			2000000	1800000
Dichloroethylene, 1,2-trans-	0.5	0.5	20	170	0.075	120	8500	5900000	3100000	1800000
Dichlorophenol, 2,4-	20	20	0.3						51000	2300000
Dichloropropane, 1,2-	0.5	0.5	5	10	0.58	1100	830	450000	800000	1400000
Dichloropropene,1,3-	0.5	0.5	0.5	32	0.16	330	2600	1700000	34000	1400000
Dieldrin	0.05	0.05	0.35						8.1	130
Diethyl Phthalate	2	30	15000						420	540000
Dimethylphthalate	2	30	15000						420	2000000
Dimethylphenol, 2,4-	10	10	59						440000	3900000
Dinitrophenol, 2,4-	10	10	5.9						130000	1400000
Dinitrotoluene, 2,4 & 2,6-	5	5	0.044						32000	140000
Dioxane, 1,4	2	50	50		190000	26000000			81000000	500000000
Dioxin/Furan (TEQ)		0.000015	0.000015		0.0002	0.13			240	0.1
Endosulfan	0.05	0.05	5.9						12	230
Endrin	0.05	0.05	2						5.2	130
Ethylbenzene	0.5	0.5	2.4	31	110	240000	2700	1800000	25000	85000
Ethylene dibromide	0.2	0.2	0.05	7300	0.0033	6.2	350000	210000000	1300000	2000000
Fluoranthene	0.4	0.4	3		80	17000			110000	130

Groundwater Components for Potable Water Scenario (µg/L)

Coarse Textured Soil

Chemical Parameter	MOE Water RL	Ont. GW Bkgrd	GW1	GW1 Odour	Residential GW2	Industrial GW2	Residential GW2 Odour	Industrial GW2 Odour	GW3	1/2 Solubility
Fluorene	0.5	120	120						4200	950
Heptachlor	0.01	0.01	1.5	25			3500	1100000	10	90
Heptachlor Epoxide	0.01	0.01	1.5	350			17000	2800000	0.53	100
Hexachlorobenzene	0.01	0.01	1						3200	3.1
Hexachlorobutadiene	0.01	0.01	0.6	29	0.012	34	2900	2500000	1300	1600
Hexachlorocyclohexane Gamma-	0.01	0.01	4						13	4000
Hexachloroethane	0.01	0.01	2.1	9.4	0.17	1800	900	3000000	76000	25000
Hexane (n)	5	5	890		0.41	400			35000	4800
Indeno[1 2 3-cd]pyrene	0.2	0.2	0.1		360	56000			2.6E+13	0.095
Lead	1	1.9	10						280	4800000
Mercury	0.1	0.1	1		0.0047	23			1.4E+14	30
Methoxychlor	0.05	0.05	900						33	50
Methyl Ethyl Ketone	20	400	1800	20000	21000	2200000	970000	100000000	17000000	110000000
Methyl Isobutyl Ketone	20	640	3000	640	5200	1000000	31000	6200000	6500000	9500000
Methyl Mercury **		0.12	0.3						1.7	16000000
Methyl tert-Butyl Ether (MTBE)	2	8.6	15		8.6	8900			14000000	26000000
Methylene Chloride	5	5	50	4100	26	38000	300000	130000000	190000	6500000
Methlynaphthalene, 2-(1-) ***	2	2	12	3.2			150	77000	21000	12000
Molybdenum	0.5	23	70						100000	38000000
Naphthalene	2	4.4	59	11	4.4	4300	1100	320000	87000	16000
Nickel	1	14	100						5500	210000000
Pentachlorophenol	0.5	0.5	30						700	7000
Petroleum Hydrocarbons F1****	25	25	820		0.45	1600			7800	1900
Aliphatic C6-C8		0.3	37000		0.3	1100			6500	2700
Aliphatic C>8-C10		0.31	740		0.31	1100			3300	220
Aromatic C>8-C10		10	300		10	36000			20000	33000
Petroleum Hydrocarbons F2	100	100	300		5.7	20000			11000	150
Aliphatic C>10-C12		0.21	740		0.21	760			8.7E+11	17
Aliphatic C>12-C16		0.048	740		0.048	170			1.4E+13	0.38
Aromatic C>10-C12		36	300		36	110000			13000	13000
Aromatic C>12-C16		95	300		95	250000			7800	2900
Petroleum Hydrocarbons F3	500	500	1000							4.9E-08
Aliphatic C>16-C21		0.0013	15000							0.0013
Aliphatic C>21-C34		1.2E-08	15000							1.2E-08
Aromatic C>16-C21		220	220							330
Aromatic C>21-C34		3.3	220							3.3
Petroleum Hydrocarbons F4	500	500	1100							3.9E-12
Aliphatic C>34		3.2E-12	150000							3.2E-12
Aromatic C>34		0.18	220							0.18
Phenanthrene	0.1	0.1	1						7900	580
Phenol	1	5	890	17000	48000	6500000	1800000	70000000	140000	41000000
Polychlorinated Biphenyls	0.2	0.2	3		0.11	89			2.6E+12	140
Pyrene	0.2	0.2	30		620	140000			7700	68
Selenium	5	5	10						700	41000000
Silver	0.3	0.3	100						17	35000000
Styrene	0.5	0.5	100	5.4	43	85000	480	270000	100000	160000
Tetrachloroethane, 1,1,1,2-	0.5	0.5	1.1		0.073	210			280000	540000
Tetrachloroethane, 1,1,2,2-	0.5	0.5	1	3300	0.11	93	300000	75000000	340000	1400000
Tetrachloroethylene	0.5	0.5	20	440	0.075	120	37000	26000000	120000	100000
Thallium	0.5	0.5	2						5600	13000000
Toluene	0.5	0.8	24	22	320	610000	1800	1000000	200000	260000
Trichlorobenzene, 1,2,4-	0.5	0.5	70	190	3	6800	20000	13000000	48000	25000
Trichloroethane, 1,1,1-	0.5	0.5	200	3000	23	51000	230000	150000000	130000	650000
Trichloroethane, 1,1,2-	0.5	0.5	5		0.17	200			1300000	550000
Trichloroethylene	0.5	0.5	5	1100	0.053	50	87000	54000000	3100000	640000
Trichlorofluoromethane	5	150	150						28000	550000
Trichlorophenol, 2,4,5-	0.2	0.2	8.9						18000	600000
Trichlorophenol, 2,4,6-	0.2	0.2	2						2500	400000
Uranium	2	8.9	20						4600	
Vanadium	0.5	3.9	6.2						2800	43000000
Vinyl Chloride	0.5	0.5	2	5300	0.0075	12	340000	170000000	5000000	4400000
Xylene Mixture	0.5	26	300	370	26	62000	18000	12000000	46000	53000
Zinc	5	160	5000						13000	170000000
Electrical Conductivity (mS/cm)	0.005	0.005								
Chloride	1000	790000	250000						25000000	21000000
Sodium Adsorption Ratio										
Sodium	5000	490000	200000						25000000	220000000