REMEDIAL ACTION PLAN
1545 WOODROFFE AVENUE, OTTAWA, ONTARIO

Project No.: CCO-21-2432-06

Prepared for:

Circle K Stores and Alimentation Couche-Tard
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McINTOSH PERRY

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1.0 PROPERTY DESCRIPTION AND OWNERSHIP

McIntosh Perry was retained to prepare a Remedial Action Plan (RAP) for the property addressed as 1545 Woodroffe Avenue, Ottawa, Ontario ("the Site"). It is our understanding that the Site is currently occupied by an active retail fuel outlet, car wash, and convenience store, as well as a vacant commercial building (former Tim Horton's restaurant). The site is proposed to be redeveloped with a retail fuel outlet, car wash, and commercial building. While this does not represent a change to a more sensitive land use, a Record of Site Condition will not be required. However, based on a Phase Two ESA completed by McIntosh Perry and on historical data by others, contaminated soil and groundwater at the Site will need to be remediated concurrently with redevelopment.

The legal description of the Site is as follows:

PCL 30-2, SEC NEPEAN-1 RIDEAU FRONT; PT ROAD ALLOWANCE BTN LTS 30 & 31, CON 1 RIDEAU FRONT, PART 1, 4R3336; NEPEAN
PIN: 04657-0590

CONSOLIDATION OF VARIOUS PROPERTIES PART OF LOT 30, CONCESSION 1, RIDEAU FRONT AS IN CR362577 AND PART 1 ON PLAN 5R4787 EXCEPT PART 1 PLAN

PIN: 04657-0604

MP was retained to complete this RAP by Circle K Stores and Alimentation Couche-Tard (Circle K). Circle K Stores Inc. is the current registered owner of the Site. MP's primary contact for the Site is Mr. Joel John (Real Estate Development Manager, Circle K – Central Canada Division) and can be contacted at joel.john@circlek.com .

1.1 Rationale for RAP

As part of the City of Ottawa's Site Plan approval process for the redevelopment of the site, the following comments were received from the City of Ottawa's Environmental Remediation Unit:

Due to the presence of contamination on-site, completion of a remedial program or a risk assessment / risk management program is required. A Remedial Action Plan (RAP) shall be submitted for the City's review. The RAP shall address the presence of PHC/VOC contaminated groundwater on-site.

Due to the potential for off-site migration of contaminated groundwater towards the municipal ROW, inclusion of an Off-Site Management Agreement will be required as a condition of approval.

Consequently, McIntosh Perry was retained to prepare this RAP on behalf of the applicant (Circle K).

2.0 PROJECT DESCRIPTION

The Site is currently used as a retail fuel outlet, car wash, and convenience store, and includes a vacant commercial building (former Tim Horton's restaurant) (considered commercial land use under O.Reg. 153/04 as amended). The layout of the Site is shown on Figure 2 and the Study Area and Surrounding Land Use are shown on Figure 3.

It is understood that the Client intends to redevelop the Site with a similar development (car wash, retail fuel outlet, and commercial building), although in a different configuration. The proposed redevelopment does not represent a change to a more sensitive land use, and, as such, a Record of Site Condition (RSC) will not be required prior to the re-development of the Site in accordance with Ontario Regulation (O. Reg.) 153/04 (as amended).

2.1 Applicable Site Condition Standards

The following parameters were used to select the most appropriate Site Condition Standards for the Site:

- The intended use of the Site is commercial;
- The Site is serviced by the City of Ottawa municipal water distribution system. Therefore, non-potable ground water standards are applicable to the Site;
- Based on the drilling results of this Phase Two ESA, bedrock is situated greater than 2 m below ground surface (mbgs). As such, the Site is not considered to be located in an area with shallow soil;
- The Site is not located within 30 m of a water body. Nepean creek, a tributary of the Rideau River, is the nearest water body and is located approximately 2.1 kilometres (km) northeast of the Site, at its closest point;
- The Site is not located within, adjacent to, or within 30 m of any areas of natural significance (e.g., Provincially Significant Wetland, Area of Natural and Scientific Interest, etc.);
- The Site is not located within, adjacent to, or within 30 m of any areas of natural significance (e.g., Provincially Significant Wetland, Area of Natural and Scientific Interest, etc.);
- In the absence of grain size analysis results at the time of writing this report, McIntosh perry has conservatively assumed that coarse-grained Site Condition Standards apply

Given the above-noted information, it was determined that the applicable Ontario Ministry of the Environment, Conservation and Parks (MECP) standards are those outlined in Table 3 (Full Depth Generic Site Condition Standards in coarse textured soil and in a non-potable groundwater condition for Industrial/Commercial/ Community land uses) in the document entitled "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act" prepared by the former Ontario Ministry of the Environment (present-day MECP), dated April 15, 2011 (Table 3 Standards).

2.2 Environmental Site Conditions

The environmental condition of soil and groundwater at the Site, as characterized by the Phase Two ESA completed by McIntosh Perry, are summarized as follows:

2.2.1 Soil Quality

The soil samples submitted for laboratory analyses were as follows:

Table 1: Soil Sample Summary

BH ID	Sample ID	Approx. Depth/ Stratigraphy	Chemical Analysis	Rationale
BH21-1 (MW)	BH1-SS4	3.05-3.66 mbgs; silty clay	PHCs	Address APECs 2 and 4
BH21-2 (MW)	BH2-Fill	Surface fill	VOCs, metals and inorganics, PAHs	Address APEC 3
BH21-2 (MW)	BH2-SS4	3.05-3.66 mbgs; silty clay	PHCs	Address APECs 2 and 4
BH21-3 (MW)	BH3-SS7	4.57-5.18 mbgs; silty clay	PHCs	Address APECs 1, 2 and 4
BH21-5 (MW)	BH5-SS5	4.57-5.18 mbgs; silty clay	PHCs	Address APECs 1, 2, 4 and 5
BH21-6 (MW)	BH6-SS2	0.76-1.37 mbgs; silty clay	VOCs, metals and inorganics, PAHs	Address APECs 1 - 4
BH21-6 (MW)	BH6-SS8	5.33-5.94 mbgs; silty clay	PHCs	Address APECs 1, 2 and 4
BH21-7	BH7-SS1	0-0.61 mbgs; fill-silty sand	VOCs, metals and inorganics	Address APECs 1 - 5
BH21-7	BH7-SS2	0.76-1.37 mbgs; fill-silty sand	PAHs	Address APECs 1 - 5
BH21-7	BH7-SS4	2.29-2.90 mbgs; silty sand	VOCs, metals and inorganics, PHCs, PAHs	Address APECs 1, 2, 4 and 5
Soil-Dup	BH7-SS4	2.29-2.90 mbgs; silty sand	PHCs	QA/QC
BH21-8	BH8-SS2	1.52-2.13 mbgs; silty sand	VOCs, metals and inorganics, PAHs	Address APECs 1, 2 and 4

These samples were selected as “worst case”, based on the results of field screening and on anticipated contaminant characteristics and depths. Each of the above-noted samples were submitted for laboratory analyses of select parameters, including VOCs inclusive of BTEX, PHCs, metals and inorganics and PAHs. Detailed analytical results are provided in the McIntosh Perry’s 2021 Phase Two ESA.

Metals and Inorganics

Analytical results for the soil samples collected and submitted for analysis of metals and inorganics indicate parameters which, in some cases, exceed laboratory detection limits but are below the applicable MECP SCS with the following exceptions:

- BH2-FILL: Table 1 SCS exceedance of SAR
- BH6-SS2: Table 1 SCS exceedance of SAR, Table 1 SCS exceedance of barium, Table 3 SCS exceedance of EC
- BH7-SS1: Table 1 SCS exceedance of SAR, Table 1 SCS exceedance of barium
- BH8-SS2: Table 1 SCS exceedance of SAR

The SAR and EC exceedances in the soil samples are expected to be the results of the application of road salt for de-icing purposes for pedestrian and vehicular safety and do not represent a significant risk to the soil structure at such ratios. The Table 1 SCS exceedances of SAR, EC and barium are used to determine the proper off-site disposal options for any excess soils generated on-site.

PHCs (F1-F4)

Analytical results for all soil samples analyzed for PHCs indicate that all sample results were below the reported laboratory detection limits and therefore, in compliance with MECP *Table 3* and Table 1 Site Condition Standards.

VOCs

Analytical results for all soil samples analyzed for VOCs indicate that sample results were below the reported laboratory detection limits and therefore, in compliance with MECP *Table 3* and Table 1 Site Condition Standards with the exception of the following:

- BH6-SS8: Exceedance of Table 1 SCS for ethylbenzene, toluene and xylene

These Table 1 SCS exceedances of ethylbenzene, toluene and xylene in the soil sampled from BH-6 are applicable in the determination of the proper off-site disposal options for excess soils generated on-site.

PAHs

Analytical results for all soil samples analyzed for PAHs indicate that all concentrations were below the reported laboratory detection limits and therefore, in compliance with MECP *Table 3* and Table 1 Site Condition Standards.

2.2.2 Groundwater Quality

The groundwater samples collected for this Phase Two ESA and submitted for laboratory analyses were as follows:

Table 2: Phase Two ESA Groundwater Sample Summary				
BH ID	**Sample ID**	**Approx. Depth/ Screened Interval**	**Chemical Analysis**	**Rationale**
BH21-1 (MW)	BHMW1	3.96 – 7.01	Metals and inorganics, PHCs, PAHs, VOCs	Address APECs 2 - 4
BH21-2 (MW)	BHMW2	4.55 – 7.6	Metals and inorganics, PHCs, PAHs, VOCs	Address APECs 2 - 4
BH21-3 (MW)	BHMW3	2.85 – 5.9	Metals and inorganics, PHCs, PAHs, VOCs	Address APECs 1 - 4
BH21-5 (MW)	BHMW5	3.05 – 6.1	Metals and inorganics, PHCs, PAHs, VOCs	Address APECs 1 - 3 and 5
BH21-6 (MW)	BHMW6	3.05 – 6.1	Metals and inorganics, PHCs, PAHs, VOCs	Address APECs 1 - 3 and 5
BH21-3 (MW)	DUP	2.85 – 5.9	Metals and inorganics, PHCs, PAHs, VOCs	QA/QC

All groundwater analysis results were compared to Table 3 Full Depth Generic Site Condition Standards in a non-potable groundwater condition.

The groundwater samples collected for the 2016 WSP Groundwater Report and submitted for laboratory analyses were as follows:

Table 3: 2016 WSP Groundwater Report Sample Summary				
BH ID	**Sample ID**	**Approx. Depth/ Screened Interval**	**Chemical Analysis**	**Rationale**
BH-5	BH-5	1.8 - 4.6	PHCs and VOCs	Selected Location
BH-8	BH-6	4.5 - 6.0	PHCs and VOCs	Selected Location
BH-11	BH-11	3.1 - 6.1	PHCs and VOCs	Selected Location
BH-12	BH-12	3.0 - 6.0	PHCs and VOCs	Selected Location
BH-13	BH-13	3.7 - 6.1	PHCs and VOCs	Selected Location
BH-13	BH-13 (Duplicate)	3.7 - 6.1	PHCs and VOCs	QA/QC

All groundwater analysis results from the 2016 WSP Groundwater Report were compared to Table 3 Full Depth Generic Site Condition Standards in a non-potable groundwater condition.

The groundwater samples collected for the 2021 McIntosh Perry Groundwater Quality Testing Report and submitted for laboratory analyses were as follows:

Table 4: 2021 McIntosh Perry Groundwater Quality Testing Report Sample Summary

BH ID	Sample ID	Approx. Depth/ Screened Interval	Chemical Analysis	Rationale
BH-5	BH-5	1.8 - 4.6	PHCs and BTEX	2015 Parsons Supplementary Phase Two ESA and 2016 WSP Groundwater Report
BH-6	BH-6	4.6 - 6.1	PHCs and BTEX	2015 Parsons Supplementary Phase Two ESA and 2016 WSP Groundwater Report
BH-6	BH-6 (Duplicate)	4.6 - 6.1	PHCs and BTEX	QA/QC
BH-7	BH-7	1.9 - 4.7	PHCs and BTEX	2015 Parsons Supplementary Phase Two ESA and 2016 WSP Groundwater Report
BH-8	BH-8	4.5 - 6.0	PHCs and BTEX	2015 Parsons Supplementary Phase Two ESA and 2016 WSP Groundwater Report
BH-9	BH-9	5.8 - 7.3	PHCs and BTEX	2015 Parsons Supplementary Phase Two ESA and 2016 WSP Groundwater Report
BH-11	BH-11	3.1 - 6.1	PHCs and BTEX	2015 Parsons Supplementary Phase Two ESA and 2016 WSP Groundwater Report
BH-13	BH-13	3.7 - 6.1	PHCs and BTEX	2015 Parsons Supplementary Phase Two ESA and 2016 WSP Groundwater Report
BH-14	BH-14	3.7 - 6.1	PHCs and BTEX	2015 Parsons Supplementary Phase Two ESA and 2016 WSP Groundwater Report
BH-15	BH-15	3.0 - 6.1	PHCs and BTEX	2015 Parsons Supplementary Phase Two ESA and 2016 WSP Groundwater Report

All groundwater analysis results from the 2121 McIntosh Perry Groundwater Quality Testing Report were compared to Table 3 Full Depth Generic Site Condition Standards in a non-potable groundwater condition.

PHCs (F1-F4)

All concentrations of PHCs in the groundwater samples submitted for laboratory analysis during this Phase Two ESA were below the reported laboratory detection limits and therefore, in compliance with MECP Table 3 SCS with the exception of the following:

- BH21-6(MW): Exceedance of Table 3 SCS for PHC fractions 1 and 2 (PHCs F1-F2)

All concentrations of PHCs in the groundwater samples submitted for laboratory analysis during the 2016 WSP Groundwater Report were in compliance with MECP Table 3 SCS with the exception of the following:

- BH-5: Exceedance of Table 3 SCS for PHC F1 to F4
- BH-8: Exceedance of Table 3 SCS for PHC F1 to F4
- BH-11: Exceedance of Table 3 SCS for PHC F1 and F2
- BH-12: Exceedance of Table 3 SCS for PHC F1 to F3
- BH-13: Exceedance of Table 3 SCS for PHC F1, F2 and F4
- BH-13 (Duplicate): Exceedance of Table 3 SCS for PHC F1, F2 and F4

All concentrations of PHCs in the groundwater samples submitted for laboratory analysis during the 2021 McIntosh Perry Groundwater Quality Testing Report were in compliance with MECP Table 3 SCS with the exception of the following:

- BH-5: Exceedance of Table 3 SCS for PHC F2
- BH-6: Exceedance of Table 3 SCS for PHC F1 to F3
- BH-6 (Duplicate): Exceedance of Table 3 SCS for PHC F1 to F3
- BH-8: Exceedance of Table 3 SCS for PHC F1 and F2
- BH-11: Exceedance of Table 3 SCS for PHC F1 and F2

VOCs

All concentrations of VOCs in the groundwater samples submitted for laboratory analysis during this Phase Two ESA were in compliance with MECP Table 3 SCS with the exception of the following:

- BH21-6(MW): Exceedance of Table 3 SCS for xylenes.

All concentrations of VOCs in the groundwater samples submitted for laboratory analysis during the 2016 WSP Groundwater Report were in compliance with MECP Table 3 SCS with the exception of the following:

- BH-5: Exceedance of Table 3 SCS for benzene and tetrachloroethane (1,1,1,2-)
- BH-8: Exceedance of Table 3 SCS for tetrachloroethane (1,1,1,2-)
- BH-11: Exceedance of Table 3 SCS for xylenes
- BH-12: Exceedance of Table 3 SCS for benzene, ethylbenzene, tetrachloroethane (1,1,1,2-) and xylenes

As the majority of the significant VOC exceedances occurred in BTEX parameters during previous reports, the 2021 McIntosh Perry Groundwater Quality Testing Report analyzed only BTEX parameters. All concentrations of BTEX in the groundwater samples submitted for laboratory analysis in compliance with MECP Table 3 SCS.

Metals and Inorganics

All concentrations of metals and inorganics in the groundwater samples submitted for laboratory analysis during this Phase Two ESA were below the *Table 3 SCS*.

PAHs

All concentrations of PAHs in the groundwater samples submitted for laboratory analysis during this Phase Two ESA were below the *Table 3 SCS*.

2.3 Record of Site Condition

As per the requirements of O.Reg. 153/04 (as amended), the proposed redevelopment of the Site does not represent a change to a more sensitive land use, and accordingly, a Record of Site Condition is not required under O.Reg. 153/04. However, it is our understanding that the City of Ottawa requires the Site to be remediated to generic Site Condition Standards for the proposed future use.

3.0 REMEDIAL ACTION PLAN AND SOIL MANAGEMENT

The following sections outline the proposed remedial approach to the Site.

3.1 Soil Remediation

- Existing groundwater monitoring wells at the Site will be decommissioned by McIntosh Perry or a qualified subcontractor in accordance with O.Reg. 903.
- It is our understanding that the existing Site buildings are to be demolished. The deconstructed building will be hauled off-Site as construction and demolition debris.
- Following building demolition, site preparation, and stabilization as required, contaminated soil will be excavated and hauled off-site for disposal at a licensed waste disposal facility. It is expected due to site space constraints that stockpiling of soil will not occur, but instead soil will be loaded directly into trucks. The Contractor will maintain and provide records of the volume and destination of all soil hauled off-Site in accordance with O.Reg. 406/19.
- When all suspected contaminated soil has been removed and/or when final excavation depth has been reached, McIntosh Perry will complete a confirmatory soil sampling program. Soil samples will be collected according to the confirmatory sample density requirements outlined in O.Reg. 153/04. Samples will be submitted for all Contaminants of Concern identified by the Phase Two ESA.
- A remediation report will be prepared following the completion of soil and groundwater remediation at the Site.

3.2 Groundwater Remediation

- Based on a review of groundwater analytical results by McIntosh Perry and others, the majority of groundwater impacts at the Site are located in the areas of existing soil contamination, areas of removals of existing infrastructure such as pumps and tanks, or areas of proposed new tanks, where contaminated groundwater will be excavated and disposed of off-site concurrently with the contaminated soil matrix.
- Prior to construction, McIntosh Perry will undertake a hydraulic conductivity testing program to establish probable groundwater infiltration volumes based on anticipated excavation dimensions. The need for a Permit To Take Water (PTTW) for construction dewatering will be established, and if required, McIntosh Perry will undertake the application process. It is considered likely that a PTTW will be required, given the coarse sand layer underlying the silty clay at the Site.
- Based on the requirement for a PTTW and estimated dewatering volumes and groundwater quality, McIntosh Perry will work with Circle K to develop a specification for a dewatering contractor with the capabilities to treat groundwater to Ottawa Sewer Use Bylaw (OSUB) standards using a pump-and-treat unit with a mobile Environmental Compliance Approval (ECA) and will undertake any sampling required pre- and post-discharge to comply with the mobile ECA requirements and sewer use agreement.

- For the duration of excavation below the water table, groundwater will be directed to an excavation sump, from which it will be pumped by a submersible pump to the pump-and-treat unit, from which it will be discharged to the City of Ottawa sewer system (storm sewer system if possible).
- Following the completion of the excavation and once the existing grade at the Site has been re-established, up to four (4) groundwater monitoring wells up to six (6) metres in depth will be installed for the purposes of long-term monitoring of groundwater quality.
- If, following the completion of the soil and groundwater remediation at the Site, it is apparent that contaminated groundwater remains in City of Ottawa property (Woodroffe Avenue or Medhurst Drive rights-of-way), an agreement to manage off-site impacts will be established with the City of Ottawa.

3.3 Importation of Soil

Given that the footprint of the proposed development will encompass the majority of the Site, it is expected that the requirements for the importation of soil will be relatively minor. However, any soil to be imported to the Site must be in compliance with applicable Site Condition Standards. The Contractor or the Contractor's Qualified Person must provide, to the satisfaction of the Owner, the source and quantity of any soil to be imported, including analytical test results in accordance with O.Reg. 406/19 stockpile or in-situ sampling frequency guidelines, demonstrating that the soil to be imported meets the applicable SCS.

3.4 Risk Assessment and Risk Management

Based on the observations to date and the proposed remediation plans noted above, the redevelopment of the Site should result in a fairly significant reduction in soil and groundwater impacts. As no change in land use is expected and the property will remain as an active gas station, full remediation and the completion of a Record of Site Condition is not required.

There may be ongoing exceedances of the soil and groundwater SCS on the property and near the property boundaries which can be addressed by reviewing risk (Section 4) and developing risk management measures (Section 5). Such measures are designed primarily to prevent exposure to impacted material.

4.0 RISK ASSESSMENT

4.1 Preliminary

For the purposes of assessing the human health and ecological risks of environmental contamination, a risk is considered to exist when one or more ***sources, pathways***, and ***receptors*** are present. Through our involvement with the Site (Phase One and Two ESAs and review of other environmental documentation), the following sources, pathways, and receptors have been identified for the Site.

4.2 Sources

The source of impacts are petroleum hydrocarbons from the operation of the Site as a retail fuel outlet, as noted in Sections 1 and 2 above. Soil and groundwater impacts (concentrations above SCS) are present on the Site in the subsurface as noted in the Phase Two ESA (McIntosh Perry, November 2021).

It is our opinion that although variations were noted between the 2016 and 2021 groundwater analytical results, the PHC plume in groundwater is stable as PHC concentrations in groundwater are relatively low and do not appear to be increasing. Furthermore, the proposed redevelopment of the property will result in a decrease in contaminant concentrations .

4.3 Receptors

The following potential human health and ecological receptors have been identified for the Site:

- Workers within the commercial units;
- Visitors/customers within the commercial units;
- Workers within service trenches during utility reconstruction work along adjacent roads or within the parking lot of the Site;
- Residents in surrounding houses;
- Potential well water users in the area of the Site;
- Terrestrial and burrowing wildlife in the vicinity of the Site; and,
- Plant life (shrubs and trees) in the vicinity of the Site.

4.4 Pathways

This section examines the pathways between the identified source (PHC in soil and groundwater) and the receptors identified above.

Soil/Groundwater To Commercial Indoor Air (Workers within commercial units, visitors/customers within commercial units)

Based on a review of the Modified Generic Risk Assessment model published by MECP under O.Reg. 153/04 (as amended), certain pathways are identified as “drivers” for the soil, groundwater, and sediment standards made under O.Reg. 153/04 as amended. The “driver” is the pathway of greatest concern or risk for a given contaminant to a given receptor. For the noted PHC contaminants in soil and groundwater, the pathways

driving the Standards are soil/groundwater-to-indoor-air. In the case of volatile compounds, the contaminants have the potential to volatilize, move upward through the pore space of the soil, through cracks in floor slabs.

The Site is to be redeveloped with new buildings with potential occupants (restaurant, retail store). These new buildings will be of slab-on-grade construction with no basements and a sealed slab. Furthermore, the occupied on-Site buildings will be distant from the present areas of greatest subsurface impact (southwest corner), which will be partially remediated during redevelopment. Therefore, the soil or groundwater to indoor air pathway is not considered to represent an unacceptable risk to workers within the commercial units or to the visitors/customers.

Soil/Groundwater To Residential Indoor Air (residents in surrounding houses)

The areas of soil/groundwater impact that have been identified at the Site appear to decrease in strength from the southwest corner in all directions including towards the residential area to the north and east.

For the noted PHC contaminants in soil and groundwater, the pathways driving the Standards are soil/groundwater-to-indoor-air. In the case of volatile compounds, the contaminants have the potential to volatilize, move upward through the pore space of the soil, through cracks in floor slabs.

The residential buildings are located off-Site to the north and east. The nearest exceedance were noted in groundwater at BH21-8, located about 25 m from the nearest residence. The observed concentrations were about twice the generic SCS. With natural attenuation and partial remediation during redevelopment, off-site impacts are unlikely. Therefore, the soil or groundwater to indoor air pathway is not considered to represent an unacceptable risk to nearby residents.

Workers In Service Trenches

While the exact depth for the service trenches along Woodroffe Avenue and Medhurst Drive are not currently known, in the event that work is completed on these services, it is most likely that the depth of service trenches will remain above the water table.

It is possible that impacted soil, vapour and/or impacted groundwater may be encountered by workers within on- and off-Site service trenches. However, the impact of elevated contaminant concentrations can be easily mitigated by measures outlined in following sections.

It is noted that the Site owner will enter into an *Off-Site Management Agreement* with the City of Ottawa as a condition of approval.

Potential Water Well Users

The Site and surrounding properties are all serviced by City of Ottawa municipal water service, and based on the results of the Phase One ESA, there are currently no water well users in the vicinity of the Site. As such, the risk to potential water well users is considered to be negligible.

Ecological Receptors

The potential pathway between the source and aquatic receptors is nonexistent as there are no nearby surface water bodies. Based on groundwater contour mapping completed at the Site, groundwater is interpreted to flow in a northwesterly direction. There are no surface water bodies for at least 500 m in this direction.

Due to the built-up nature of the Site and surrounding areas, ecological receptors are considered to be limited. It is further noted that contaminant concentrations in analyzed shallow soil samples were in compliance with the SCS, and are not considered to represent a risk to vegetation with shallow roots or burrowing wildlife which encounter soil above the water table. It is further noted that it is unlikely that vegetation of even the largest trees at the site would extend fully into the long-term water table, instead extracting moisture from the unsaturated zone.

4.5 Summary

Based on the above risk assessment, the following risks are identified based on the source, receptors, and exposure pathways identified:

- Risk to workers and visitors/customers within the commercial units from the soil/groundwater to indoor air pathway is considered negligible based on the evaluation of the soil, groundwater, soil vapour and indoor air results.
- Risk to residents in surrounding houses from the soil/groundwater to indoor air pathway is considered unlikely. The evaluation of risk for the residential homes is based on the projection of on-site results to off-site receptors and is considered overestimated.
- The potential exists for worker exposure to impacted soil, vapour and/or impacted groundwater during underground service reconstruction along neighbouring roads. Although exposure is considered to have the potential to occur in a limited area only, risk management measures have been developed and are discussed in following sections.
- Risk to surrounding water well users is considered negligible due to the availability of municipally treated water within the vicinity of the Site, and the absence of surrounding water well users identified by the Phase One ESA.
- Risks to ecological receptors are considered to be negligible due to the built-up area of the Site and the lack of SCS exceedances in soil samples at the Site.

5.0 RISK MANAGEMENT PLAN

5.1 Worker Protection

As noted above, there is the potential that workers on underground service projects along Woodroffe Avenue or Medhurst Drive may be exposed to impacted soil, vapour or groundwater within service trench excavations. The following risk management measures are recommended if the City of Ottawa undertakes work in the road allowance near the Site. The following is proposed prior to the undertaking of any such project:

- Drill a borehole within the City of Ottawa right-of-way in the area of the project, collect soil samples, and analyze for VOCs, including BTEX and PHC F1
- Install a monitoring well and a soil vapour probe
- Analyze groundwater and soil vapour samples for VOCs, including BTEX and PHC F1
- Measure the groundwater level in the monitoring well and compare to the proposed project depth
- If VOCs are detected in groundwater at concentrations exceeding the SCS and groundwater is likely to be encountered during excavation:
    - A combustible gas indicator (CGI) and photoionization detector (PID) should be used to monitor vapour levels within any service trench excavation prior to worker entry; VOC levels should be compared to occupational health and safety levels, and respiration protection should be provided if necessary.
    - Workers contacting groundwater should use nitrile gloves and eye protection
    - A mobile pump-and-treat unit, capable of treating VOCs to levels in compliance with City of Ottawa Sewer Use By-law levels, should be used during construction dewatering, if elevated VOC levels are encountered in groundwater that is to be pumped.

It is our understanding that these recommendations will form a component of an agreement to manage off-site contamination with the City of Ottawa.

5.2 Ongoing Monitoring

The risk assessment that has been completed to-date is based on current conditions at the Site, as of summer 2021. In order to verify the assumptions that have been made and to identify any long-term concentration trends or changes to contaminant levels that may impact these assumptions, it is recommended that ongoing monitoring of groundwater at the Site be completed as part of the annual Contaminant Management Plan for the Site (as per TSSA requirements).

6.0 CLOSURE

We trust that this information is satisfactory for your present requirements. Should you have any questions or require additional information, please do not hesitate to contact the undersigned.

Respectfully submitted,

McIntosh Perry

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