

Provincial Officer's Report

DRAFT

Order Number
4260-BHDQHR

Tamlann Investments Limited
85 Lancing Dr Unit Q
Hamilton, Ontario, L8W 2Z9
Canada

Ambi Corporation
5658 Barbara Cres
Burlington, Ontario, L7L 6X3
Canada

7069367 Canada Inc.
757 Victoria Park Ave Suite 1605
Toronto, Ontario, M4C 5N8
Canada

Geoin Investments Limited [REDACTED]
Unit 9 - 33 Oakburn Cres
Toronto, Ontario, M2N 2T5
Canada

C & 3S Investments Limited [REDACTED]
Unit A - 740 Lakeshore Dr E
Mississauga, Ontario, L5E 1C7
Canada

Site
587 Third Line
Oakville, Regional Municipality of Halton

Observations

1. Statement

I, Alisha Benjamin, provincial officer, am issuing this Provincial Officer's Report as requested by the district manager of the Halton-Peel District Office of the Ministry, to provide the background and factual basis for her to issue a preventative measures Order under sections 18 and 196 of the EPA.

2. Definitions

For the purposes of this Provincial Officer's Report, the following capitalized terms shall have the meanings described below:

"Director" means the district manager of the Ministry's Halton-Peel district office, Tina Dufresne, or others acting in this role.

"EPA" means the Environmental Protection Act, R.S.O. 1990, c. E.19.

"MECP 2017 TSS Memo" means the November 6, 2017 memorandum addressed to provincial officer, Alisha Benjamin, written by Luciana Rodrigues, P.Geol., regional hydrogeologist Technical Support Section, Central Region, a copy of which is attached to, and forms part of, this Provincial Officer's Report.

"MECP 2019 TSS Memo" means the July 9, 2019 memorandum addressed to provincial officer, Alisha Benjamin, written by Luciana Rodrigues, P.Geol., regional hydrogeologist Technical Support Section, Central Region, a copy of which is attached to, and forms part of, this Provincial Officer's Report.

"Ministry or MECP" means the ministry of the government of Ontario responsible for the administration of the EPA currently named the Ministry of the Environment, Conservation and Parks and previously the Ministry of the Environment and Climate Change or Ministry of the Environment.

"Order" means Director's Order No. 4260-BHDQHR, as it may be amended.

"Orderees" means the persons named in the Order who are required to carry out the work.

"PHCs" means petroleum hydrocarbon fractions F1 to F4 or one or more of benzene, toluene, ethylbenzene and xylene.

"Provincial Officer's Report" means this provincial officer's report prepared by Alisha Benjamin, which forms part of the Order.

"Residential Neighbourhood" means the residential properties and the municipal roadways and rights of way located hydraulically down gradient and cross gradient of the Site in the vicinity of Weynway Court and Third Line in Oakville.

"Residential Property" means the property municipally described as 575 Third Line, Oakville, Ontario.

"Site" means the property municipally described as 587 Third Line, Oakville, Ontario and legally referred to as Part of Lots 4 & 5, Plan 785, Oakville, Regional Municipality of Halton, Instrument No. 487506; S/T 487506; S/T 119957, being all of PIN 24844-0009 (LT).

"Table 3 Standards" means the Ministry Table 3 Site Condition Standards as outlined in *Soil, Ground water and Sediment Standards for Use Under Part XV.1 of the EPA, dated April 15, 2011*.

3. Description of the Orderees

- i. 7069367 Canada Inc., a corporation incorporated under the laws of Canada, having Ontario Corporation Number 3038280, that has owned the Site since April 6, 2010.
- ii. Ambi Corporation, a corporation incorporated under the laws of Ontario, having Ontario Corporation Number 2170373, that owned the Site from June 4, 2008 to April 6, 2010.
- iii. C & 3S Investments Limited, a corporation incorporated under the laws of Ontario, having Ontario Corporation Number 2153276, that owned the Site from January 22, 2008 to June 4, 2008 and voluntarily dissolved on March 14, 2013. [REDACTED]
- iv. Geoin Investments Inc., a corporation incorporated under the laws of Ontario, having Ontario Corporation Number 2119555, that owned the Site from January 25, 2007 to January 22, 2008 and voluntarily dissolved on March 23, 2012. [REDACTED]
- v. Tamlann Investments Limited, a corporation amalgamated under the laws of Ontario, currently Ontario Corporation Number 1770438, that owned the Site from September 7, 1978 to January 25, 2007 under the names of previous amalgamating companies, Lenalex Holdings Limited and Tamlann Investments Limited.

4. Area Description

The Site is a commercial property approximately 0.3 hectares in size, located on the east side of Third Line, south of Speers Road in the Town of Oakville, Ontario. The Site is zoned commercially and a Petro-Canada gasoline service station, a convenience store and a Tim Horton's restaurant occupy the Site. The Site has operated as a gasoline service station since approximately 1978.

A Residential Neighbourhood located south and southeast of the Site is serviced with municipally supplied drinking water. Homes in the Residential Neighbourhood are generally built with one below grade basement level. A mix of commercial and industrial properties are located north and west of the Site. The Residential Property is the property that is directly southeast of the Site and consists of one above grade level and one below grade level.

Attached hereto, and forming part of this Provincial Officer's Report is a figure outlining the Site and surrounding area.

5. Summary of Events Leading to the Order

In September 2010, owners of a commercial property, which abuts the Site, contacted the Ministry regarding concerns about petroleum hydrocarbons identified in the area. As a result, in January 2011, the Ministry contacted the owner of the Site, 7069367 Canada Inc., and requested information relating to the environmental quality of the Site. From May 2011 to December 2013 the Site owner undertook various environmental assessments to evaluate the Site's soil, groundwater and soil vapour quality.

Results of the Site evaluations reported groundwater and soil concentrations exceeding the Table 3 Standards for PHCs, with PHC fraction 1 and PHC fraction 2 levels in groundwater recorded as high as 16,000 µg/L and 21,000 µg/L, respectively. Liquid petroleum product was also observed in purged groundwater at select monitoring wells. While the Table 3 Standards don't strictly apply, as the Site owner is not in the process of filing a record of site condition, an exceedance of the Table 3 Standards indicates the potential that contaminants exist at concentrations that may result in an adverse effect, as defined in the EPA.

In Summer 2013, the groundwater plume originating at the Site was confirmed to extend onto the Residential Property, and contaminants were present at concentrations exceeding the Table 3 Standards. Vapours can be given off from groundwater contaminated with PHCs, travel through the ground and

potentially enter building spaces through sumps or cracks in the basement foundations. This process is called vapour intrusion. At the request of the Ministry, the Site owner advanced two sub-slab vapour probes into the basement of the Residential Property in Summer 2013 to assess the risk of vapour intrusion to the home. Contaminant concentrations were detected above the soil vapour screening levels, which indicated a potential risk to indoor air quality.

At the request of the Ministry, indoor air quality sampling was completed in February 2015, July 2015, December 2015, and January 2017 at the Residential Property by the Site owner. The Halton Regional Health Unit reviewed the results and concluded that all parameters detected in indoor air during the sampling program were below minimal risk levels, where toxicity reference values were available for comparison, except for 1,2,4 trimethylbenzene which was above the toxicity reference value in the third sampling round. The Halton Regional Health Unit advised that adverse health effects are not expected if the first, second and fourth sampling rounds are representative of the typical indoor air concentrations at the Residential Property.

Results of the environmental assessments completed at the Site and the Residential Property provide an indication of the lateral extent of PHC contamination, however impacts within the Residential Neighbourhood have not been assessed. Concerns arise because PHCs have been found in groundwater at concentrations exceeding the Table 3 Standards and exceeding the GW2 component value. The MECP's GW2 component values are groundwater concentrations derived for the protection of indoor air quality from subsurface vapour intrusion of volatile substances. Generally, when contaminants are present in groundwater above the GW2 component value, there exists the potential for contaminants to migrate, through vapour intrusion into buildings, which may result in an adverse effect.

In May 2019, I issued provincial officer's order No. 0868-BBYRCR which was served on 7069367 Canada Inc, Ambi Corporation and Tamlann Investments Limited. Between May 27, 2019 and June 15, 2019 each ordered party submitted a request for review to the Director. Requests for review outlined parties' concerns should the work outlined in provincial officer's order No. 0868-BBYRCR be required. The Director stayed provincial officer's order No. 0868-BBYRCR on May 31, 2019. A copy of the stay notice was provided to 7069367 Canada Inc, Ambi Corporation and Tamlann Investments Limited, or their legal representative(s).

On March 3, 2020, the Director revoked provincial officer's order No. 0868-BBYRCR. The director decided that it would be appropriate to require two additional parties to carry out the work required by provincial officer's order No. 0868-BBYRCR, in addition to the other orderes. A preventative measures director's order is required to do this. In order to avoid duplication, it was decided to revoke the provincial officer's order as the Order will require the same work.

Three environmental site assessment reports were submitted to the Director as part of the request for review, on behalf of Tamlann Investments Limited. These reports describe sampling and analysis of soil and groundwater at the Site, undertaken between November 2006 and January 2007, while Tamlann Investments Limited owned the property. The MECP hydrogeologist reviewed the additional reports and the conclusions therein. The MECP 2019 TSS Memo concludes that "... petroleum impacted groundwater and soil were likely present at the Site during the time that the 2006 and 2007 investigations were carried out." The MECP 2019 TSS Memo also highlighted that a contaminant of concern, specifically total xylene concentrations in groundwater, were higher at the Site in 2007 (30,200 µg/L) compared to more recent 2017 (720 µg/L) groundwater results.

Ambi Corporation has not provided the MECP with any environmental site assessment reports for review.

The current Site owner has undertaken some work to begin to date the groundwater plume, and this information suggests that the release resulting in the groundwater contamination may be historical, as lead content of the plume implies a fuel product from 1992 or older. Furthermore, during a review of historical files in the local MECP office, record of petroleum impacts on Site were noted as early as 1986. Taking into consideration the additional information provided in the 2006 and 2007 reports, PHC impacts were present at the Site in 2006 and the PHC impacts are likely a result of a (or multiple) historical

release(s). No property boundary controls have been implemented at the Site and accordingly contaminants have migrated off the Site towards the downgradient Residential Neighbourhood during the period of time that the Orderes owned and had management and control of the Site.

MECP hydrogeologists have recommended horizontal and vertical delineation, regular monitoring of the plume, development of a conceptual site model, petroleum product characterization, and development of a contaminant management plan to understand the extent, migration potential and risk of exposure to off-Site receptors. Attached hereto and forming part of this Provincial Officer's Report is the MECP 2017 TSS Memo and the MECP 2019 TSS Memo. To date, the plume has not been delineated past the Site and the Residential Property, nor has the risk to downgradient receptors been evaluated. The current Site owner has indicated it will not carry out any further work on a voluntary basis.

6. Attachments

The following are the attachments to this Provincial Officer's Report:

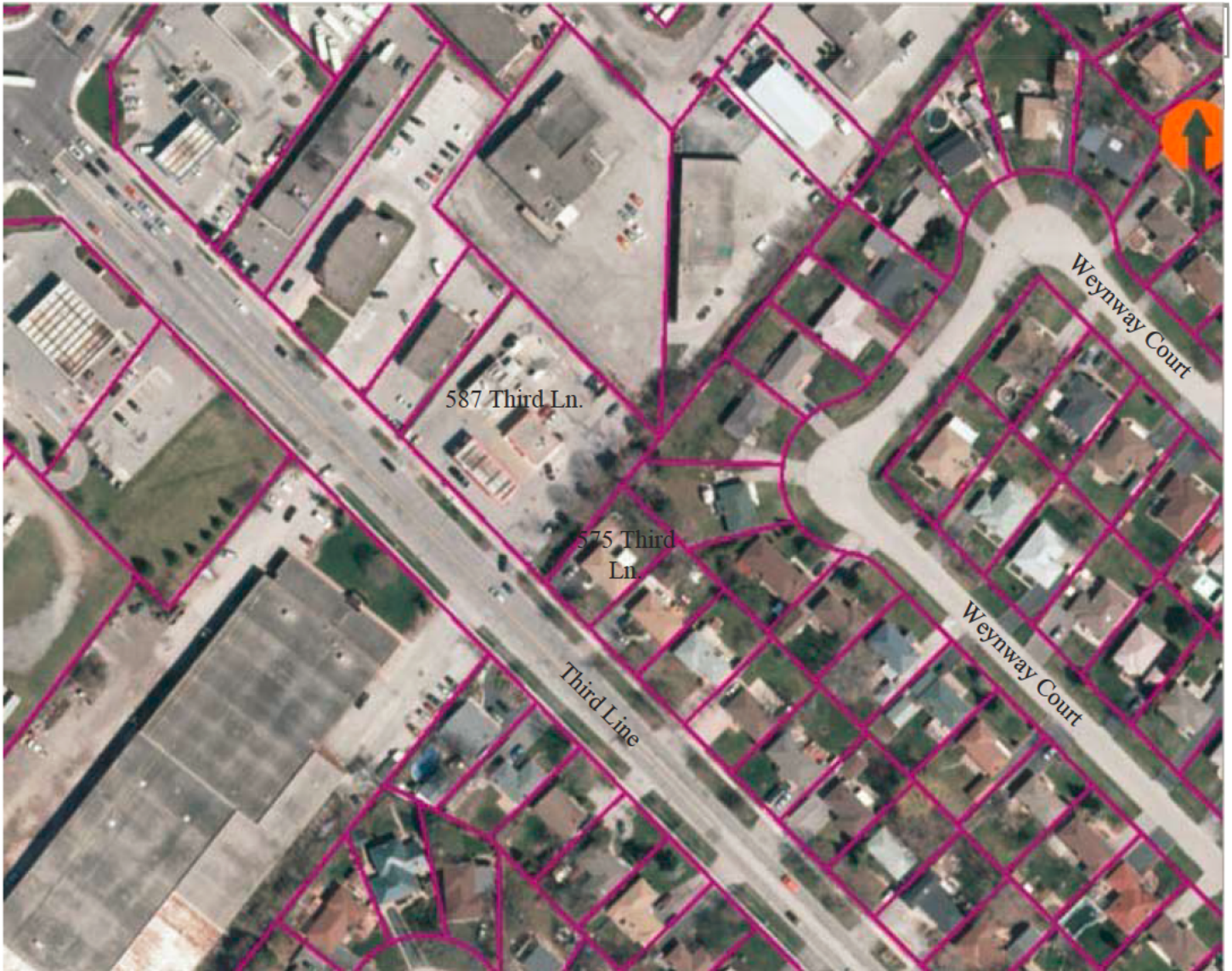
Schedule A: Site Plan (1 page);

Schedule B: MECP 2017 Technical Memo (11 pages)

Schedule C: MECP 2019 Technical Memo (2 pages)

SITE AND SURROUNDING AREA

587 Third Line, Oakville Ontario



Data Sources © Queen's Printer for Ontario, 2018. Imagery Copyright Notices: Ontario Ministry of Natural Resources and Forestry; NASA Landsat Program; First Base Solutions Inc.; Aéro-Photo (1961) Inc.; DigitalGlobe Inc.; U.S. Geological Survey. © Copyright for Ontario Parcel data is held by Queen's Printer for Ontario and its licensors and may not be reproduced without permission.

Map Printed On 2019-04-03 13:03

DRAFT

Ministry of the Environment
and Climate Change

5775 Yonge Street, 8th Floor
North York, Ontario, M2M 4J1
Tel.: (416) 212-6543
Fax: (416) 325-6347

Ministère de l'Environnement et de
l'Action en matière de changement
climatique

5775 rue Yonge, 8th étage
North York, Ontario, M2M 4J1
Tel.: (416) 212-6543
Fax: (416) 325-6347



November 6, 2017

MEMORANDUM

To: Alisha Benjamin
Senior Environmental Officer
Halton-Peel District Office

From: Luciana Rodrigues
Regional Hydrogeologist
Technical Support Section, Central Region

Re: 2017 Groundwater Monitoring Report and 2017 Investigations – Former Rainbow Gas Station,
587 Third Line, Oakville, ON and Residential Property, 575 Third Line, Oakville, ON

1 INTRODUCTION

As requested, I have reviewed the following documents prepared by Kodiak Environmental Limited (Kodiak). The reports and letters provide a summary of groundwater monitoring and sampling results for the gas station located at 587 Third Line, Oakville, Ontario (herein refer to as the "Site") and proposed scope of work for delineation at off-Site residential properties 568 Weynway Court and 569 Third Line, Oakville, Ontario. The purpose of this review is to evaluate and provide comments and recommendations regarding the work presented in the following reports:

- "2017 Groundwater Monitoring Report – 575 and 587 Third Line, Oakville"; prepared by Kodiak, letter dated May 30, 2017.
- "Groundwater Monitoring Report, 575 & 587 Third Line, Oakville, Ontario"; prepared by Kodiak, report dated February 23, 2017.
- "2017 Investigations – Third Line Properties, Oakville"; prepared by Kodiak, letter dated February 23, 2017.
- "Supplemental Vapour Intrusion Investigations – 575 Third Line, Oakville"; prepared by Kodiak, letter dated December 14, 2016.

I have included the following in the **Appendix A** of this memorandum: acronyms used to elaborate this document, associated documents referenced for background site information and drawing¹ of the Site and surrounding properties.

2 BACKGROUND INFORMATION

The following information was obtained from the Kodiak and historical reports prepared by others:

Historical Contamination: In the late 1980's presence of gasoline fumes were identified in the basements at a number of nearby residences and in the trunk sewer line. The contamination was believed to be related to the operations of one or more of the five retail fuel outlets in the immediate

¹Drawing obtained from Kodiak report dated February 23, 2017.

area.

The following immediate actions were taken by the Halton Region and the Town of Oakville: sealing residential basement drains and extracting free product from recovery pumps installed for this purpose. In addition, a subsurface investigation was commissioned by the MOECC and completed by Monenco Consultants Ltd. (Monenco).

Historical Subsurface Investigations: After Monenco's investigation, several subsurface investigations were completed by others. The extent of the groundwater contamination was not completely delineated during any of the subsequent investigations. The investigations indicated that the direction of groundwater flow is to the south, and the potential for impacts extending to the neighbouring residential property (575 Third Line) was identified.

In 2012, investigations concluded that groundwater at 575 Third Line was impacted with PHCs at concentrations exceeding the SCS, as well as the MOECC component value for the groundwater to indoor air pathway, suggestive of potential soil vapour intrusion issues.

Plume Delineation: According to Kodiak, the extent of onsite contamination was reasonably defined by the subsurface investigations. Additionally, it was determined that impacts may also extend below Third Line road, though testing in this area has not been undertaken.

Subsequently subsurface investigations were required by the MOECC and it was concluded by Kodiak that the groundwater impacts likely extend to areas farther south and southeast of the MWs located at the 575 Third Line property.

Indoor Air Sampling: Based on the findings of the 2013 investigations, the MOECC requested that an indoor air testing program be undertaken at the residence located at 575 Third Line. Indoor air sampling was completed in February, July and December 2015, and January 2017. The results were reviewed and assessed by the MOECC Air Analyst and Halton Region Health Department (Health Unit), respectively. The following was concluded by the Health Unit:

- Most of the parameters detected in the residential building during the four sampling events were within the range of background residential indoor air concentrations, where Health Canada study ranges were available for comparison. Additionally, concentrations of 1,2,4- and 1,3,5-trimethylbenzene, 4-ethyltoluene (third round) and 2,2,4-trimethylbenzene (fourth round) were above the study ranges. All parameters, detected in indoor air during the sampling program were below minimal risk levels, where TRVs were available for comparison, except for 1,2,4 trimethylbenzene which was above the TRV in the third sampling round.
- TRVs were not available for F2 C10-C16 (as decane) which was detected above the MOECC criteria in the third sampling round.
- According to the Health Unit, limitations with indoor air sampling are expected due to concentrations that may vary over time and within the home. The Health Unit concluded that adverse health effects are not expected if the first, second and fourth sampling rounds are representative of the typical indoor air concentrations at 575 Third Line residential property.

3 REVIEWER'S ANALYSIS

Based on the information provided in the reports, my analysis is provided below:

Previous MOECC Recommendations: The relevant recommendations (such as an annual monitoring and sampling program, delineation of the offsite groundwater impacts, etc.) made by the previous MOECC hydrogeologists have not been completely addressed.

Hydrogeology: By reviewing the historical reports; it appears that there are two (2) water bearing units (i.e. overburden and bedrock aquifers) present in the study area. These water bearing units have not

been well investigated. Based on the available data, the following were noted as deficiencies:

- Existing MWs were not surveyed at the same time to a common permanent bench mark.
- Some MWs have their well screen straddling the overburden and fractured aquifers.
- Some MWs had the groundwater static level above the top of the well screen during historical monitoring and sampling events.
- Few MWs were used for preparing the groundwater contour map. In particular, it should be clarified if the groundwater elevation of the MWs containing LNAPL was corrected before using the data to elaborate the groundwater contour maps.

Offsite Contamination and Delineation: The LNAPL and dissolved plume(s) have not been fully delineated and have migrated offsite towards residential properties and Third Line located south and west of the Site. The dissolved plume has not stabilized or decreased. Plume migration appears to be offsite, towards the west and south of Third Line. The vertical and horizontal extent of offsite groundwater impacts should be delineated as recommended by the previous MOECC hydrogeologists.

Soil Vapour: An informal comparison of 2017 data with the MOECC Table 3 SCS-GW2² has shown that concentrations of one or more of benzene and PHCs F1 and F2 were detected above the MOECC Table 3 SCS-GW2 component value for residential use in MW206, MW207 and MW213 located at 575 Third Line.

Release of Contaminants to the Environment: Multiple Lines of evidence (such as PIANO analysis, the chemical composition of the current and past gasoline used at the Site, the Site conditions [i.e. geology, hydrogeology, geochemistry, etc.], the Site history, the horizontal and vertical extent of the contamination, etc.) have not been provided to suggest that there is any other source of contamination other than the Site.

4 REVIEWER'S RECOMMENDATIONS

Based on the information provided and my analysis, the following recommendations are provided. Some of the recommendations below have been made by previous MOECC reviewers but have not been addressed to date.

1-OFFSITE DELINEATION, HYDROGEOLOGICAL CSM AND LNAPL CHARACTERIZATION

I agree with the proposed MW locations presented by Kodiak (2017 Investigations, February 23, 2017). It is also recommended that additional MWs should be installed to delineate the horizontal and vertical extent of the offsite plume towards the west and south of Third Line.

Well Installation: During the drilling program, collection of the following is recommended:

- A detailed overburden and bedrock description (i.e. competency of bedrock (i.e. RQD), present or absence of fractures, fissures and/or bedding planes and directions of these features, etc.), should be reported in the borehole log.
- Composite soil samples and long vertical depth intervals such as "0-1.5m bgs" should not be used during the investigation as blending soil from different depths will result in low bias analytical results.
- The selection, handling, preservation and collection of soil samples for laboratory analyses should follow O. Reg. 153/04.
- Selected soil samples should be collected and submitted for analyses of pH and grain size.
- The length of well screen should not be more than 3 m or less than 1.5 m. MWs should be installed

²Exposure pathway due to inhalation of indoor air containing soil vapour from groundwater at water table. Rationale for the Development of soil and ground water standards for use at contaminated sites in Ontario, MOECC, April 15, 2011.

according to Reg. 903 and MOECC BMP³.

- Well screens should not straddle more than one (1) hydrogeological unit and should not be flooded (i.e. groundwater static level above the top of the well screen).
- Measures to limit any cross contamination introduced during the well installation process are critical. Special care should be taken to ensure drilling equipment is clean before each installation.

Well Development: after installation of the new proposed MWs the following is recommended:

- Enough time should be given for bentonite and cement to be cured and settle. Therefore, new proposed wells should not be developed for at least 24 hours as specified in the USEPA-SESD Guidance⁴.
- The requirements outlined in MOECC BMP and O. Reg. 153/04 should be followed for well development. The following guidelines and SOP should also be reviewed and relevant technical guidance followed: USEPA Guideline⁵, USEPA SOP⁶ or USEPA-SESD Guidance.
- Groundwater sampling of newly constructed and developed monitoring wells is expected to occur after the monitoring wells have stabilized and equilibrated with the aquifer. A stabilization period is required prior to sampling to obtain representative samples. The stabilization period varies depending on geological and hydrogeological conditions, drilling and well development methods, etc.. Therefore, groundwater sampling should occur at least two weeks after the well development.

Well Survey: It is recommended that all existing (on and offsite) wells, should be surveyed to a common permanent bench mark. Based on the new survey data, the groundwater elevations should be calculated, and groundwater contour maps presented for the monitoring events. Monitoring well elevations will need to be updated as new wells are added to the monitoring program.

Hydrogeological CSM: It is recommended that a hydrogeological CSM be established before developing and implementing a remedial action plan. Typically a hydrogeological CSM will include, but not limited to, the following:

- Regional physiographic and hydrogeological settings.
- Cross-sections or 3D block model illustrating hydrostratigraphy, well locations, screened intervals and contaminant distribution in soil and groundwater.
- Local hydrogeological features: local aquifers including depth, thickness, lateral continuity, porosity, vertical/horizontal hydraulic conductivity, hydraulic gradient, inferred fractures zones directions and orientation, dynamic between interface zone and more competent bedrock, expected groundwater movement within fractures systems, preferential pathway of the COCs within overburden and fractured aquifer, groundwater velocity and seasonal groundwater trends, etc.
- Interaction between the local aquifers, surface drainage system and underground utilities.
- Groundwater flow directions, groundwater flow conditions (including local flow boundaries, constant head boundaries and aquifer boundaries) and groundwater contaminant plume distribution.
- Survey of DWS wells present within 500 m radius of the Site.
- Groundwater contour maps for deep and shallow aquifers identified at the Site; and a map showing DWS wells, existing and former on- and offsite MWs.

LNAPL Characterization: The following should be completed during the offsite delineation program:

³Test Holes and Dewatering Wells Requirements and Best Management Practices. MOECC. April 2014

⁴Design and Installation of Monitoring Wells. USEPA – SESD Guidance. January 2013.

⁵Monitoring Well Development Guidelines for Superfund Project Managers. Ground Water Forum. USEPA. April 1992

⁶Standard Operating Procedures Monitoring Well Development. USEPA. October 2001.

- LNAPL encountered in an existing MW(s) should be sampled and analysed for PIANO, 2,2,4-trimethylpentane, MMT, TEL, TML, PHCs F1-F4, VOCs and PAH analyses.
- Groundwater sample should be collected below the LNAPL thickness. Field staff should ensure that the groundwater sample does not contain globules of LNAPL.
- A sample of the current gasoline and any other fuel product sold at the Site should be analysed for the same parameters (i.e. PIANO, 2,2,4-trimethylpentane, MMT, TEL, TML, PHCs F1-F4, VOCs and PAH).
- A LNAPL transmissivity testing should be completed in the MWs containing LNAPL.
- LNAPL saturation and residual saturation testing are recommended to be completed during the offsite delineation program.

2-GROUNDWATER SAMPLING AND MONITORING PROGRAM

It is recommended that the following sampling and monitoring program be implemented in order to establish contaminant concentration trends for both on and offsite monitoring locations. An ongoing tri-annual groundwater monitoring and sampling program should be established for the Site and offsite and completed in spring (May/June), summer (August/September) and fall (October/November) with a minimum of 60 days between events.

Sampling: It is recommended that the following be completed and reported on for all future sampling events:

- All on and offsite existing and future proposed MWs should be sampled for PHCs F1-F4, PAHs, VOCs and lead.
- All on and offsite existing and future proposed MWs should also be sampled for 2,2,4-trimethylpentane, MMT, TEL and TML, if these parameters are detected in the LNAPL sample.
- Low-flow sampling is highly recommended. See the ASTM⁷ standard and USEPA⁸ procedure.
- A QA/QC program (i.e. blind duplicates, trip blank, etc.) should be implemented according to the MOECC Protocol⁹.

Monitoring: It is recommended that the following be completed and reported on for all future monitoring events.

- All existing on and offsite MWs and future MWs should be monitored and sampled during the tri-annual groundwater monitoring and sampling program. During the monitoring events, the following should be recorded: well condition, combustive gas headspace readings, groundwater elevations and LNAPL thickness.
- Combustible gas headspace readings within on and offsite catch basins and manholes should be monitored. Additionally, the catch basins and manholes should be inspected for LNAPL presence.
- Interpreted groundwater flow direction(s) and contour maps should be presented in the annual reports.

Well Repair/Decommissioning: It is recommended that monitoring wells be inspected annually for damage. Damaged and “destroyed” MWs should be immediately repaired or decommissioned according to Reg. 903 and the MOECC BMP. Decommissioned wells should be replaced by appropriately placed new MWs, if required.

⁷Standard Practice for Low-Flow Purging and Sampling for Wells and Devices Used for Ground-Water Quality Investigations. American Society for Testing and Materials (ASTM) International. Designation: D 6771-02.

⁸Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedure. EPA-Ground Water Issue. United States Environmental Protection Agency (USEPA). EPA/540/S-95/504. April 1996.

⁹Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act, March 9, 2004, amended as of July 1, 2011.

Reporting Frequency: Future annual monitoring reports should be prepared and stamped by a qualified person and submitted to the MOECC annually.

3-SOIL VAPOUR ASSESSMENT

Kodiak (2016) concluded that there is a potential for vapours to migrate from groundwater to the residential building at 575 Third Line and for concentrations of PHCs to accumulate beneath the building slab. The following are recommended moving forward:

- Future groundwater data from the delineation program and tri-annual groundwater monitoring and sampling program analytical results should be compared to MOECC Table 3 SCS–GW2 component value for residential and industrial uses, where applicable.
- Future soil data results obtained from proposed MWs to be installed within the residential properties (i.e. 568 Weynway Court and 569 Third Line) should be compared to the MOECC Table 3 SCS – SIA component value for residential use.
- If soil and/or groundwater quality data are detected to be above the MOECC Table 3 SCS, a Screening Level Assessment (i.e. Step 2) should be completed as prescribed by the MOECC Draft Technical Guidance¹⁰ (Draft SVI Guidance).

4-CONTAMINANT MANAGEMENT PLAN

A CMP should be prepared as recommended in the MOECC memorandum dated July 22, 2016. Pro-active remedial action should be undertaken in order to prevent further migration of impacted groundwater from the Site to downgradient properties and to mitigate future and/or current risks to downgradient receptors.

5-ADDRESSING PREVIOUS MOECC RECOMMENDATIONS:

The recommendations presented in the MOECC memorandum dated July 14, 2015 and repeated in section 4.2 (Delineation and Management of PHCs/VOCs Impacts) of the MOECC memorandum dated July 22, 2016 are still relevant and should be addressed.

- Recommendations from MOECC memorandum dated July 14, 2015: *“Quarterly vapour monitoring of nearby utility points should be initiated.”*

Kodiak had indicated that, based on elevated vapour levels in monitoring well headspaces, quarterly vapour monitoring should be undertaken at nearby utility points. However, it was not included in the last work program provided to the MOECC.

- Recommendations from MOECC memorandum dated July 22, 2016:

“3.0 The nature of the PHCs/VOCs in the shale bedrock should be characterized to define whether the soil/bedrock matrix is impacted or the impact is in the fractures only. It is highly likely that the historic residual PHCs/VOCs impacts in the fractures (i.e., secondary source) in the bedrock are controlling the existing of PHC plume in the groundwater.

(...)

6.0 A detailed characterization of fracture-controlled bedrock hydrogeology is required to understand the PHCs/VOCs plume behavior and predicted expansion down-gradient to and beyond the Residential Property. Pumping tests, packer tests, and tracer tests using fluorescent dye may help to better determine the nature of fracture flow in the bedrock.

7.0 A Mann-Kendall long-term monitoring optimization (LTMO) and plume stability analysis may be completed using the historic water quality, if available. The LTMO can also reduce the number of monitoring wells and sampling frequency to be required for the sampling program

¹⁰Draft Technical Guidance: Soil Vapour Intrusion Assessment. November 2010.

8.0 The PHCs/VOCs impacts in groundwater at the Site should be managed by an adequate CMP to control the continued migration of contaminants from the Site."

6- FORENSICS ANALYSIS

It is recommended that multiple lines of evidences, (see Morrison¹¹) should be used to determine the age of the contaminations and source(s) of the release(s).

7-DATA EVALUATION AND PRESENTATION:

Annual Monitoring Reports: Future annual monitoring reports should be stand-alone documents and are expected to provide the following information:

- Hydrogeology and Geology discussion.
- Site background information.
- Monitoring and Sampling Methodology.
- Detailed site plan showing monitoring locations, contaminant sources, site facilities, possible receptors and nearby DWS wells.
- Groundwater contour maps for overburden and bedrock aquifers, where applicable.
- Tables and graphics with historical and current groundwater quality data.
- Groundwater monitoring and sampling data from the spring freshet, summer and fall.
- Mann-Kendall Analysis.
- Conclusions and recommendations regarding ongoing monitoring work.
- Certified laboratory analysis reports and chain of custody forms.
- Borehole logs for all existing, former and future installed MWs.

It is recommended that future annual monitoring should be submitted electronically to the MOECC. The annual reports should be prepared and stamped by a Qualified Person.

The first annual groundwater and monitoring sampling program results should be submitted with the offsite delineation information in a single report. The subsequent annual groundwater and monitoring sampling results should be submitted in an individual annual monitoring report as outlined in this memorandum.

Offsite Delineation Report: the following should be included, but not limited to, in the offsite delineation report:

- CSM which should include the regional physiographic and hydrogeological settings, local hydrogeological features (local aquifers, vertical/horizontal hydraulic conductivities, etc.) preferential pathway of the COCs within aquifers, contaminant distribution, survey of DWS wells present within 500 m radius of the Site, and groundwater contour maps.
- Geological cross sections or 3D block model illustrating, hydrostratigraphy units, well locations and screened intervals, groundwater elevations and any important physical features that may interfere with the groundwater and contaminant movements.
- Items 1, 3 throughout 6 of this memorandum should be presented in the offsite delineation report.
- The first annual groundwater and sampling program results should be submitted with the offsite delineation report.

The off-site delineation report should be submitted electronically along with current and historical groundwater quality data. The report should be prepared and stamped by a Qualified Person.

¹¹ Morrison, R.D., 2000. *Environmental Forensics Principles & Applications*, CRC Press LLC.

5 CLOSURE

The purpose of the preceding review is to provide advice to the MOECC regarding groundwater conditions based on the information provided in the above referenced documents. The conclusions, opinions and recommendations of the reviewer (Luciana Rodrigues) are based on the information provided by others, except where herein otherwise specifically noted. The MOECC cannot guarantee that the information that has been provided by others is accurate or complete. A lack of specific comment by the reviewer (Luciana Rodrigues) is not to be construed as endorsing the content or views expressed in the reviewed material.

If you have any questions regarding the above comments and recommendations, do not hesitate to contact the undersigned.



Luciana Rodrigues, P. Geo.
Regional Hydrogeologist

c.c. Regional File: SI HP OA TH 140

e.c.c Cynthia Doughty, M.Sc., P.Geo., Groundwater Team Supervisor (A), Technical Support Section, Central Region
Vincent Bulman, P. Geo., Groundwater Group Leader, Technical Support Section, Central Region
Norman S. Rankin, Counsel, Ministry of the Attorney General, Legal Services Branch, MOECC Operations Division, Central Region

U:\2017 Reviews\Contaminated Sites\Petro Canada - Third Line\M2017_Former Rainbow Gas Station_Final.docx

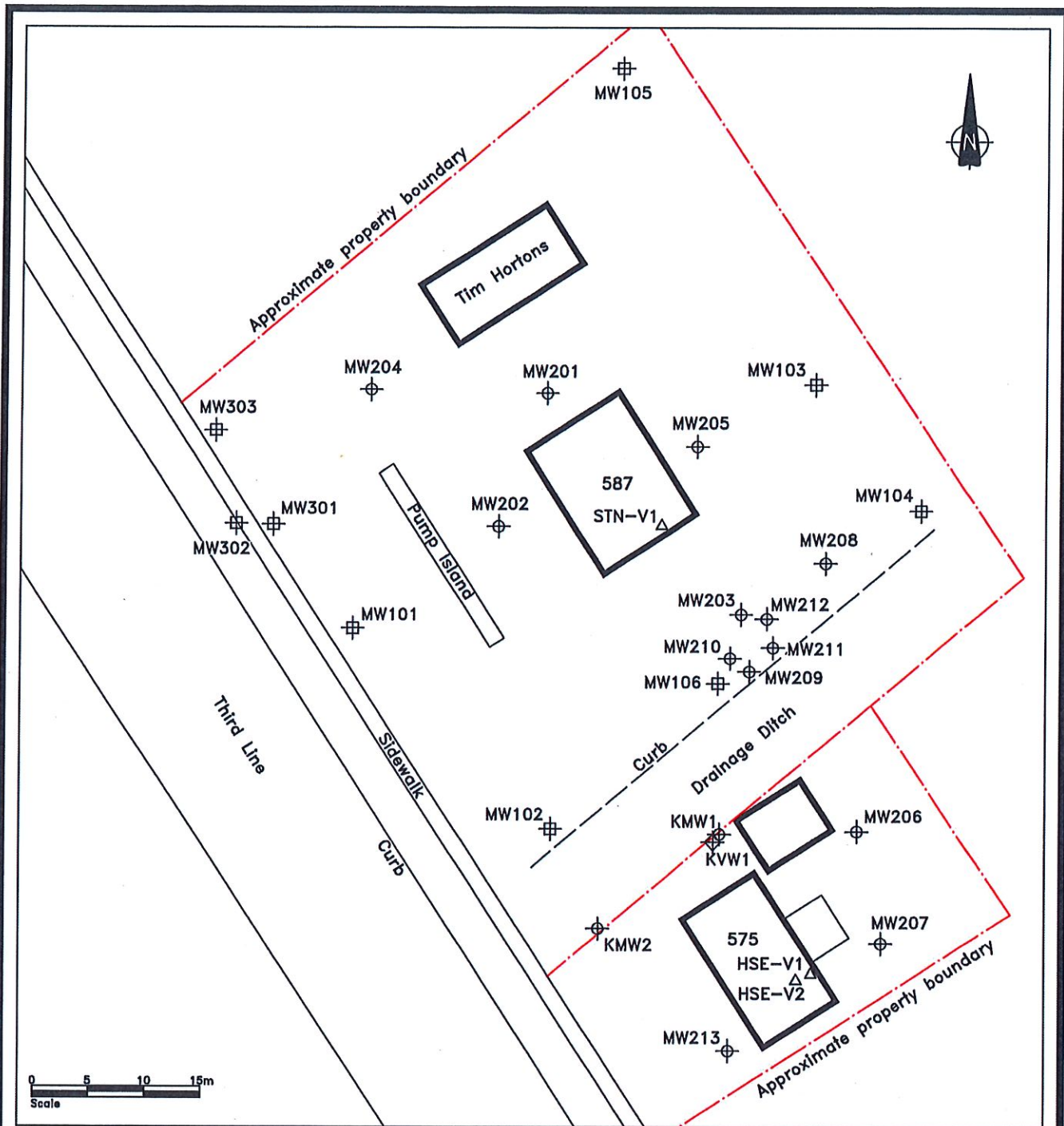
APPENDIX A

Acronyms	Definition
BMP	Best Management Practice
BTEX	Benzene, toluene, ethylbenzene, total xylene
CSM	Conceptual Site Model
CMP	Contaminant Management Plan
COCs	Contaminants of Concern
DWS	Drinking Water Supply
GW2	Exposure pathway due to inhalation of indoor air containing soil vapor from groundwater at water table
LNAPL	Light non-aqueous phase liquid
m bgs	Meter below ground surface
MMT	Methyl cyclopentadienyl manganese tricarbonyl
MOECC	Ontario Ministry of the Environment Climate and Change
MWs	Monitoring wells
Reg. 347	General – Waste Management, R.R.O.1990, Regulation 347
Reg. 903	Wells, R.R.O. 1990, Regulation 903
O. Reg. 153/04	Ontario Regulation 153/04: Records of Site Condition – Part XV.1 of the Act
PAHs	Polycyclic aromatic hydrocarbons
PIANO	n-paraffins, iso-paraffins, aromatics, naphthenes, olefins
PHCs	Petroleum hydrocarbons
PHCs F1-F4	Petroleum hydrocarbon fractions F1 to F4
TEL	Tetraethyl lead
TML	Tetramethyl lead
TRVs	Toxicity Reference Values
RQD	Rock Quality Designation
SCS	Site Condition Standards
SIA	Exposure pathway due to inhalation of indoor air containing soil vapour
TSSA	Technical Standards & Safety Authority
US EPA	United States Environmental Protection Agency
VOCs	Volatile organic compounds

APPENDIX A

Background Documents

- MOECC memorandum, “Review of Indoor Air Investigations at 575 Third Line, Oakville and Historical Environmental Site Assessment Reports for 587 and 575 Third Line, Oakville, Ontario”; prepared by Salah Sharif, dated July 22, 2016.
- “Soil Vapour Intrusion (Preliminary Indoor Air Quality Assessment), 575 Third Line, Oakville, Ontario”; prepared by Kodiak, report dated March 24, 2015.
- MOECC memorandum, “Review of Indoor Air Investigation 575 Third Line, Oakville (IDS Task No. 7035-9VJHA7)”; prepared by Brigid Burke, dated July 24, 2015
- MOECC memorandum, “Review of subsurface investigations and remedial considerations for 575 and 587 Third Line, Oakville, (IDS Task No. 1789-9E8PA5)”; prepared by Brigid Burke, dated January 22, 2014.
- MOECC memorandum, “Review of Subsurface Investigations and Remedial Consideration for 575 and 587 Third Line, Oakville”; prepared by Brigid Burke, dated December 20, 2013.
- “Proposed Treatment Approach to Prevent Migration of Groundwater Contaminated with Petroleum Hydrocarbon Contamination from 587 Third Line to 575 Third Line, Oakville, ON”; prepared by MAAT Environmental Engineering Corp. (MAAT), letter dated November 22, 2013.
- “587-575 Third Line, Oakville-Follow up Investigations”; prepared by Kodiak, letter dated December 4, 2012.
- “587 Third Line” and “Comments on Remediation 575-587 Third Line, Oakville”; prepared by Kodiak, letter and appendix titled dated November 30, 2012.
- “Subsurface Investigations, 587-575 Third Line, Oakville, Ontario”, prepared by Kodiak, report dated August 20, 2012.
- “587 Third Line, Oakville-Offsite Investigations”; prepared by Kodiak, letter dated January 31, 2012.
- “Addressed Comments from Review of Phase I and II Environmental Site Assessment Reports for 587 Third Line, Oakville (IDS Task NO. 2032-8DRK8D)”; prepared by Terrapex, letter dated January 16, 2012.
- “Phase I/II Environmental Site Assessment Report, Final Report, 587 Third Line, Oakville”; prepared by Terrapex Environmental Limited (Terrapex), report dated October 2011.
- MOECC memorandum, “Technical Review of Phase II Environmental Site Assessment Work Plan, 587 Third Line in Oakville, Ontario”; prepared by Christina Trotter, dated September 27, 2011.
- MOECC memorandum, “Review of Environmental Reports for 1494 Wallace Road and 587 Third Line, Oakville (IDS Task No. 2032-8DRL8D)”; prepared by Brigid Burke, dated July 12, 2011.
“Source Identification Study of Gasoline in underground environment, Third Line below Speers Road, Oakville, Ontario”; prepared by Monenco Consultants Limited (Monenco), report dated July 8, 1987.



LEGEND

- ⊕ Monitoring Well Installed by Kodiak
- ⊞ Monitoring Well Installed by Others
- ⊕ Vapour Well
- △ Subslab Vapour Point

NOT FOR ENGINEERING PURPOSES

Kodiak ENVIRONMENTAL LIMITED

Title: Site Plan
575 & 587 Third Line

Figure: 2

Scale: 1:500 (approx)

Project: SHA02-01

Date: February 2017

July 9, 2019

MEMORANDUM

To: Alisha Benjamin
Senior Environmental Officer
Halton-Peel District Office

From: Luciana Rodrigues
Regional Hydrogeologist
Technical Support Section, Central Region

Re: 2006 and 2007 Investigations –587 Third Line, Oakville, ON

1 INTRODUCTION

As requested, I have reviewed the following reports regarding the property located at 587 Third Line, Oakville, Ontario (herein referred to as the "Site"). The reports provide a summary of groundwater and soil sampling results obtained during environmental investigations completed at the Site.

- I. "Phase II Environmental Site Assessment, 587 Third Line, Oakville, Ontario" prepared by CPG-Franz Environmental Inc. (CPG-Franz), dated November 30, 2006.
- II. "Acetone Impacted Soil Removal and Excavation Inspection, 587 Third Line, Oakville, CPG-Franz Project No. 3743"; prepared by CPG-Franz, dated January 11, 2007.
- III. "Environmental Assessment, Groundwater Water Sampling, 587 Third Line, Oakville, Ontario, January 17, 2007"; prepared by Barenco Inc., dated January 17, 2007.

A list of acronyms used in this memorandum is presented in the following table.

Acronyms	Definition
BTEX	Benzene, toluene, ethylbenzene and total xylenes
m bgs	Meter below ground surface
MECP	Ministry of the Environment, Conservation and Parks
MWs	Monitoring wells
PHCs F1-F4	Petroleum hydrocarbon fractions F1 to F4
RDLs	Reportable detection limits
VOCs	Volatile organic compounds

2 REVIEWER'S ANALYSIS

Based on the information provided in the reports, the following were observed during my review:

- I. Soil results:
 - a) In 2006,
 - i. concentration of PHC F1 (61 ug/g) was detected slightly below the current Table 3 SCS¹ (65 ug/g) in soil sample collected at depth of approximately 3 m bgs from MW104 (formerly located near the southwest property boundary of the Site).

¹Table 3 Full Depth Generic Site Condition Standards in a Non-potable Ground Water Condition, Industrial/Commercial/Community Property Use, medium to fine textured soil, July 2011

ii. detection of PHCs F2 and F3 were present in soil samples collected at depth of approximately 2 m bgs from MW101 and MW102 (formerly located west of the pump island and north of the convenience store, respectively).

b) In 2007, petroleum staining and odor were observed in soil sample collected at depth of approximately 4 m bgs from TH1 (formerly located near the south property boundary of the Site).

II. 2007 Groundwater results:

a) RDLs were detected above the former² and current Table 3 SCS for several VOCs in all groundwater samples analyzed.

b) BTEX exceedances³ of the current Table 3 SCS can be observed in analyzed groundwater samples collected from TH1 and TH3 (formerly located near the west property boundary of the Site).

c) 2007 BTEX results were observed to be higher than 2017 BTEX results (e.g., 2007 total xylenes concentration of 30,200 ug/L in historical TH1 versus 2017 total xylenes concentration of 720 ug/L in current MW6, located near the former TH1 location).

3 REVIEWER'S CONCLUSION

Based on historical and current data, my conclusion is that:

I. Although the former Table 3 SCS was less stringent than the current Table 3 SCS, petroleum impacted groundwater and soil were likely present at the Site during the time that 2006 and 2007 investigations were carried out.

4 ADDITIONAL TECHNICAL INFORMATION

The foregoing conclusions may be revisited in light of any additional technical information that is relevant in assisting the assessment of the onsite groundwater impacts.

5 CLOSURE

The purpose of the preceding review is to provide advice to the Halton Peel District of the MECP regarding groundwater conditions based on the information provided in the above referenced documents. The conclusions, opinions and recommendations of the reviewer are based on the information provided by others, except where herein otherwise specifically noted. The MECP cannot guarantee that the information that has been provided by others is accurate or complete. A lack of specific comment by the reviewer is not to be construed as endorsing the content or views expressed in the reviewed material.

If you have any questions regarding the above comments and recommendations, do not hesitate to contact the undersigned.



Luciana Rodrigues, P. Geo.
Regional Hydrogeologist

²Table 3 Full Depth Generic Site Condition Standards in a Non-Potable Groundwater Condition, I/C/C Property Use, medium to fine textured soil, March 2004.

³Benzene, ethylbenzene and total xylenes in groundwater sample collected from TH1, and total xylenes in groundwater sample collected from TH3.