2019 Groundwater Sampling Update
191 Lees Avenue
Ottawa, Ontario

Revision: 0 (FINAL)

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EXECUTIVE SUMMARY

Geofirma Engineering Ltd. was retained by the City of Ottawa to complete an inventory of existing groundwater monitoring wells and conduct groundwater sampling at 191 Lees Avenue Ottawa, Ontario, including select monitoring wells on adjacent lands. The work was completed to determine the current condition of groundwater monitoring wells and to provide an updated summary of groundwater chemistry for the study area.

The 191 Lees Avenue property is located immediately south of the Queensway (Highway 417) where Lees Avenue crosses over the highway. The property is the former site of a manufactured gas plant that operated from the early 1920s to 1957. Subsurface investigations at the site were completed during 1986-1987 following the discovery of coal tar in the nearby Rideau River. These studies indicated elevated concentrations of polycyclic aromatic hydrocarbons (PAHs) and benzene, toluene, ethylbenzene and xylene (BTEX) in the soil and groundwater beneath the site, thought to originate from potentially contaminating activities associated with the manufactured gas plant. Visual evidence of coal tar, a non aqueous phase liquid (NAPL), was also observed in soil and groundwater samples during these early studies.

Geofirma completed Phase 1 Environmental Site Assessment (ESA), Phase 2 ESA and a Supplementary Phase 2 ESA and Remedial Options Assessment (ROA) for the site in 2012. The 2012 studies confirmed the persistence of NAPL coal tar, PAHs and BTEX as contaminants of concern (COC) for the site. A Conceptual Site Model (CSM) was developed for the site, and several potential remedial options were evaluated. Geofirma also conducted a review and evaluation of the Lees Avenue Leachate Treatment System (located east of the Confederation Line) in 2015 and provided short-term and long-term recommendations for the treatment system. The current treatment system has been in operation since 1986 when the OC Transpo corridor was constructed.

Construction activities related to the Ottawa Light Rail Transit (OLRT) Confederation Line have occurred on site since 2014, including; the demolition/construction of the OC Transpo Lees Station, Confederation Line rail upgrades and construction of a new parking lot at 193 Lees Avenue. During OLRT construction activities, four monitoring wells (MW12-03, MW12-04, MW12-06 and MW12-17) were reportedly damaged/abandoned and later reinstated in 2019 by OLRT following completion of construction work at the site.

The overall findings of this 2019 site investigation at 191 Lees Avenue are as follows:

- A total of 39 monitoring wells were included in the site inventory, 12 of which could not be located and are assumed to be destroyed and/or decommissioned. Of the 27 wells that were located, 6 wells were noted to be dry or contained insufficient water for sampling purposes, and one well was observed to be completely blocked. Therefore, a total of 20 monitoring wells were sampled by Geofirma as part of the 2019 investigation.

- Various repairs are required for 13 monitoring wells located on site and new Waterra™ tubing and foot valves were installed in 10 monitoring wells prior to groundwater sampling activities.

- Water levels were collected at accessible monitoring wells to map groundwater elevations and determine flow directions for the site. Groundwater flow at the site continues to be directed towards a localized drawdown caused by a groundwater collection and treatment system located

at the transit station.

- Elevation surveying of the four recently reinstated monitoring wells (MW12-03, MW12-04, MW12-06 and MW12-17) is recommended to verify the elevation data for these wells.

- Purging and groundwater sampling was completed at 20 monitoring wells at the site. Low-flow sampling techniques were used to collect samples at wells containing sufficient water for parameter stabilization. Low-yielding wells were sampled using dedicated 5/8-inch tubing and Waterra™ foot valves.

- All wells were purged of three well volumes, or three times dry with Waterra™ inertial hand pumps prior to sampling. Visual and olfactory evidence of coal tar contamination was observed in purge water from three monitoring wells (MW12-09, MW12-10 and MW12-13). All purge water produced during the groundwater monitoring investigation was containerized on site by Geofirma personnel and subsequently disposed of at a licensed facility by Drain-All Ltd. on October 30, 2019.

- A total of 23 groundwater samples were submitted for laboratory analysis, including two field duplicates and one laboratory prepared trip blank. All groundwater samples were analysed for typical coal gasification plant waste chemicals, including; metals, cyanide, PAHs, VOCs and PHCs.

- Of the 20 wells sampled in 2019, eight wells had groundwater concentrations of cyanide, metals (silver and sodium), VOCs (BTEX and styrene), PAHs and/or PHCs that exceeded MECP Table 3 standards. Groundwater exceedances near the historical NAPL source zone on the east side of the Confederation Line included PAH, PHC, BTEX, sodium, silver, and styrene. There was one cyanide exceedance noted on the land west of the Confederation Line, yet all other samples collected from this area met applicable standards.

- Due to changes in the monitoring network since 2012, only one well (MW12-11) outside of the 191 Lees Avenue property was sampled in 2019. Contaminant concentrations at MW12-11 were lower in 2019 than in 2012, with only one PAH parameter in exceedance of applicable site standards.

- A comparison of 2012 and 2019 groundwater chemistry showed PAH and PHC-F1/BTEX concentrations are generally consistent with historical groundwater results and confirm that coal gasification plant waste chemicals remain contaminants of concern for the site. Additional analyses of VOCs and F2-F4 PHCs in 2019 indicate that styrene and F2 PHCs are also contaminants of concern for the site.

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1 INTRODUCTION

Geofirma Engineering Ltd. (Geofirma) was retained by the City of Ottawa (the city) to inspect the existing network of groundwater monitoring wells at the 191 Lees Avenue site, including select wells on adjacent lands (study area) and complete a round of groundwater sampling. The 2019 groundwater sampling was intended to provide an updated summary of groundwater chemistry for the study area.

1.1 Background and Previous Work

The study area is located immediately south of the Queensway (Highway 417), where Lees Avenue crosses over the highway (Figure A.1). The property is the former site of a manufactured gas plant that operated from the early 1920s to 1957 (Intera, 1988). Subsurface investigations at the site in 1986 (Conestoga Rovers & Associates 1986a, 1986b) and 1987 (Intera, 1987) were completed following the discovery of coal tar in the nearby Rideau River. These studies indicated the presence of polycyclic aromatic hydrocarbons (PAHs) and benzene, toluene, ethylbenzene and xylene (BTEX) in the soil and groundwater beneath the site, thought to originate from potentially contaminating activities associated with the manufactured gas plant. Visual evidence of coal tar, a non aqueous phase liquid (NAPL), was also observed in soil and groundwater samples during these early studies.

Since provincial environmental quality guidelines and standards for coal gasification wastes were not available at the time of the early investigations, there was considerable uncertainty in the environmental condition of the site in accordance with current Ministry of Environment (now MECP) guidance and regulations (MOE, 2011a and 2011b). To address these concerns, Geofirma completed Phase 1 and Phase 2 Environmental Site Assessments (ESAs) in 2012 (Geofirma 2012a, 2012b). The 2012 studies confirmed the persistence of NAPL coal tar, PAHs and BTEX as contaminants of concern (COC) for the site. Geofirma also completed a Supplementary Phase 2 ESA and Remedial Options Assessment (ROA) in 2013 (Geofirma, 2013). As part of the supplementary work, a Conceptual Site Model (CSM) was developed for the site, and several potential remedial options were evaluated.

Construction activities related to the Ottawa Light Rail Transit (OLRT) Confederation Line have occurred on site between 2014 and 2019; specifically, the demolition and subsequent construction of the OC Transpo Lees Station and associated OC Transpo Confederation Line rail upgrades. The grassy area west of the Lees Station and the parking lot to the east of the Confederation Line were used as staging areas by the Ottawa Light Rail Transit Constructors (OLRT-C), which is the construction arm of the Rideau Transit Group (RTG).

During OLRT construction activities, four monitoring wells (MW12-03, MW12-04, MW12-06 and MW12-17) were reportedly damaged/abandoned and later reinstated by OLRT-C in March 2019 following the well details provided in the original borehole logs. At the time of this study, the newly installed monitoring wells have not been surveyed into the existing site datum.

1.2 Objectives and Scope of Work

The objective of the 2019 sampling program was to inspect and update the inventory of groundwater monitoring wells at the study area and to complete a single round of groundwater monitoring from accessible wells.

To fulfill the project objectives, the scope of work completed by Geofirma Engineering Ltd. included the following activities:

- Review of background information, including previous environmental reports and other relevant documentation;
- Conduct a survey and inspection of the existing groundwater monitoring well network on site;
- Collect static water levels at accessible groundwater sampling locations identified during the monitoring well inventory;
- Groundwater sampling from accessible monitoring wells and submission to a licensed laboratory for cyanide, metals, polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs) and petroleum hydrocarbons (PHCs);
- Containerize all purge water accumulated during groundwater monitoring activities and disposed of off-site using a licensed disposal contractor at an MECP-licensed waste disposal facility.
- Compare current groundwater conditions to historical 2012 conditions applying the Ministry of Environment, Conservation and Parks (MECP) Ontario Regulation (O. Reg) 153/04 Table 3 standards.
- Preparation of a final report summarizing monitoring well status, site-wide flow conditions, and groundwater quality.

2 FIELD METHODOLOGY

Field activities at the Lees Avenue site were conducted by Geofirma personnel between August 16 and October 30, 2019. Field activities included the following:

- Inspection and inventory of existing monitoring wells at the site;
- Water level measurements for determination of groundwater flow direction;
- Well purging and groundwater sampling;
- Disposal of purge water; and
- Implementation of quality assurance/quality control (QA/QC) program;

2.1 Inspection and Inventory of Existing Monitoring Wells

Inspection and inventory of existing groundwater monitoring wells at the site was completed by Geofirma personnel on August 16, 2019. The survey was conducted to locate historical monitoring wells on the site, record their condition, and determine whether the wells could be used for subsequent groundwater sampling. All well locations are presented in Figure A.2, attached

2.2 Groundwater Elevation Survey

Static water levels in all accessible monitoring wells were measured between September 24-25, 2019, prior to well purging and groundwater sampling. Water levels were measured relative to the top of PVC riser using an electronic water level tape that was decontaminated between wells. Water level measurements were completed for a total of 26 monitoring wells.

Recorded water level depths were converted to groundwater elevations using surveyed elevations of well risers from the 2012 report (Geofirma, 2012b). For reporting purposes, water levels were interpreted according to the hydrostratigraphic units outlined in the Geofirma (2012b and 2013) reports, which correspond to the main stratigraphic units at the site: fill, shallow alluvium, deep alluvium, and shale bedrock.

Re-surveying of the four recently reinstated monitoring wells (MW12-03, MW12-04, MW12-06 and MW12-17) is required to verify the elevation data for these wells.

2.3 Well Purging and Groundwater Sample Collection

Groundwater sampling was conducted at the Lees Ave site by Geofirma personnel between October 2-7, 2019.

All monitoring wells were purged of three well volumes or three times dry in order to reduce groundwater turbidity and to remove fine-grained sediments that may have accumulated inside the well casing over time. Purging was conducted using dedicated 5/8” LDPE tubing and foot valve. The foot valve was positioned at the bottom of each well and was agitated during pumping to disturb and extract any sediment. The outlet was directed into a graduated 20 L pail for cumulative purge volume measurements. All purge water was containerized on site, and later disposed of at an MECP-licensed waste disposal facility using a licensed contractor (Drain All Ltd.).

A total of 39 monitoring wells were included in the inventory completed by Geofirma personnel at the Lees Avenue site. Of the 39 wells, 12 monitoring wells could not be located, one monitoring well was blocked (MW12-16) and six monitoring wells (BH-001, OW109B, OW110B, OW116C, MW12-06, and MW12-07) were either dry or contained insufficient water to sample. Therefore, a total of 20 monitoring wells were sampled by Geofirma during the site groundwater monitoring investigation.

Low-flow sampling was the primary sampling method used to avoid excess sediment in the groundwater samples, like previous methods during historical monitoring rounds. Low-yield monitoring wells were sampled directly using 5/8" LDPE tubing with Waterra™ foot valves as there was insufficient water for parameter stabilization to occur. Of the 20 monitoring wells sampled, 11 were sampled using low-flow sampling techniques and the remaining 9 wells were sampled using the Waterra™ inertial hand pumps. All monitoring well locations and associated sampling techniques (Low-flow vs Waterra™ inertial hand pump) are shown in Figure A.2, attached.

The low flow method was employed to collect samples that were free of suspended fine-grained particles (which can sorb otherwise immobile contaminants) and to minimize the potential loss of any volatile constituents. Sampling was accomplished using a Master flow peristaltic pump with a Horiba U-52 multi-parameter meter and flow through cell, following low-flow parameter stabilization methods. Field parameters were recorded at each sample location, and included: pH, temperature, electrical conductivity, dissolved oxygen, redox potential and turbidity. Low-flow purging was conducted at a flowrate of approximately 0.2 litres per minute or less depending on observed drawdown conditions, and generally following guidance presented in the "Low Flow Purging and Sampling Procedure for the Collection of Groundwater Samplings from Monitoring Wells" (USEPA, 2010). Final field parameter readings collected at each sample location are provided in Table B.3, Appendix B.

The 20 groundwater samples (plus duplicates) collected for laboratory analysis were transferred directly to appropriate containers, supplied by the analytical laboratory (Paracel). Samples were stored in coolers with ice packs and delivered to the laboratory under chain-of-custody procedures. All samples were collected, transported and transferred to Paracel under proper chain of custody procedures.

2.4 Disposal of Purge Water

All purge water produced during the groundwater monitoring investigation was containerized on-site by Geofirma personnel and subsequently disposed of at a licensed facility by Drain-All Ltd. on October 30, 2019.

2.5 Quality Assurance/Quality Control Program

Geofirma maintains a Quality Management System (QMS), which is certified and registered as ISO9001:2015. All relevant Geofirma QMS Procedures, Work Instructions and Field Protocols were strictly adhered to during the completion of the assignment. The QA/QC program also included internal laboratory QC performed by Paracel Laboratories of Ottawa, Ontario. The sampling QA/QC program also included collection and analysis of two field duplicates and one laboratory-provided trip blank.

3 RESULTS

3.1 Condition of Existing Groundwater Monitoring Wells

A total of 39 monitoring wells were included in the inventory completed by Geofirma personnel in the study area. Of the 39 wells, 12 monitoring wells could not be located, and 13 wells were identified as requiring repairs. Issues observed in the 13 wells needing repairs included an assortment of the following: broken/missing well caps, bent PVC risers, cracked flush mount lids, sheared off flush-mount bolts and sediment filled casings. New LDPE Tubing (both 5/8" and ¼" diameter) and Waterra™ foot valves were installed in 10 of the monitoring wells on site prior to groundwater sampling.

A total of 12 wells were not located during the inventory. Five of these wells (OW507A, OW507B, OW507C, OW112A and OW112B) were located on MTO land adjacent to the Queensway (Highway 417) and the Lees Avenue Bridge and were decommissioned during recent highway expansion and associated bridge construction. E115A was in the vicinity of the new Lees Station and is thought to have been destroyed/decommissioned during OLRT construction activities. Four wells (OW122A, OW122B, OW122C and MW12-12) are within the parking lot located at 193 Lees Avenue and are assumed to have been destroyed/decommissioned during the parking lot construction in 2014. Monitoring wells MW12-02 and E-006 could not be located by Geofirma personnel during the site survey.

Four monitoring wells (MW12-03, MW12-04, MW12-06 and MW12-17) were reportedly damaged/abandoned during OLRT construction activities; yet were later reinstated by OLRT-C in March 2019, following the well details provided in the original borehole logs. The newly installed monitoring wells have yet to be surveyed into the existing site datum.

A complete inventory detailing the condition of monitoring wells at the Lees Avenue site is provided in Table B.2, attached.

3.2 Groundwater Elevations and Flow Directions

Water levels in all accessible groundwater monitoring wells were measured on September 24 and 25, 2019. Water levels were measured using an electronic water level tape and were recorded relative to the top of the PVC risers (TOR). Groundwater elevations were calculated for the accessible wells using the measured water depths and site datum for the TOR elevations. Calculated elevations in meters Above Sea Level (m ASL) are summarized in Table B.1, attached.

Groundwater flow at the Lees Avenue site is generally directed towards the groundwater collection system at the OLRT station. The lowest water levels at the site were around 50 m ASL, the approximate elevation of the water collection system at the OLRT station (Geofirma, 2013). Water levels increase radially outwards from the OLRT station from 50 m ASL to approximately 55 m ASL, the approximate elevation of underground parking garages at nearby apartment buildings to the south and west of the site. This flow pattern is consistent with the groundwater flow system observed in the 2013 report.

Water levels from the monitoring wells screened within the deep alluvium are plotted and contoured in Figure A.3, showing the horizontal flow field towards the OLRT station in this unit. Flow patterns for the other units (fill, shallow alluvium, till, shale bedrock) are not shown, as there were insufficient number of water level measurements to interpret flow patterns in these units.

3.3 Groundwater Quality

3.3.1 Applicable Site Standards

Groundwater quality data were compared to the applicable provincial standards from the Ontario Ministry of the Environment (MOE), now Ministry of the Environment, Conservation and Parks (MECP), Soil, Ground Water and Sediment Standards for Use under Part XV.1 of the *Environmental Protection Act*, Table 3 values (MOE, 2011b). Coarse grained soils in a non-potable groundwater condition was assumed, as these values have historically been applied at the site (Geofirma, 2012a, 2012b, 2013).

3.3.2 Field Evidence of NAPL Contamination

Visual and olfactory evidence of NAPL contamination was observed in purge water collected during sampling at three locations (MW12-10, MW12-13, and MW12-09). At MW12-09 and MW12-13, the purge water had a strong organic odour and a strong oily sheen. Purge water from MW12-10 had a strong organic odour and was black for the first 20 L purged.

3.3.3 Groundwater Quality Results

Field parameters collected during groundwater sampling are attached in Table B.3.The results of the groundwater laboratory analysis for cyanide/metals, VOCs, and PHCs/PAHs are summarized in Tables B.4, B.5 and B.6 respectively, in Appendix B. Complete laboratory certificates of analysis are included in Appendix C.

A review of the groundwater analytical results from the 2019 sampling for the site indicates the following:

- Low concentrations of metals and cyanide were sporadically detected in groundwater samples. Reported MECP Table 3 exceedances include; one sodium exceedance (MW12-13), one exceedance of silver (OW111A) and two cyanide exceedances (MW12-05 and OW111B). The exceedances were generally located within the historical NAPL source zone on the east side of the Confederation Line, except for a cyanide exceedance (MW12-05) located to the west of the Confederation Line.

- Detectable concentrations of VOC parameters, specifically; benzene, ethylbenzene, styrene toluene, and xylenes were reported at five locations on site. Reported exceedances of VOC parameters include; three exceedances of benzene and ethylbenzene (MW12-09, MW12-10, and MW12-13), one exceedances of styrene (MW12-09) and two exceedances of total xylenes (MW12-09 and MW12-13). Elevated method detection limits (MDL) for several VOC parameters exceeded the Table 3 standards for samples from MW12-09, MW12-10 and MW12-13. All locations reported with elevated/exceedances of VOC parameters are within the historical NAPL source zone on the east side of the Confederation Line.

- PHCs were reported to exceed MECP Table 3 standards at several locations, including; PHC F1 fractions at four locations (MW12-09, MW12-10, MW12-13 and MW12-14), and PHC F2 fractions at two locations (MW12-09 and MW12-13). All locations reported with exceedances of PHC parameters are located within the historical NAPL source zone on the east side of the Confederation Line. F3 and F4 PHCs were not detected in any of the groundwater samples collected in 2019.

- PAH parameters exceeded MECP Table 3 standards at seven locations (MW12-09, MW12-10, MW12-11, MW12-13, MW12-14, OW111A and OW111B), all of which are located with the historical NAPL source zone east of the Confederation Line.

Laboratory testing for typical coal gasification plant waste chemicals shows that PAH and PHC-F1/BTEX remain the chemicals of concerns at the site. All PAH/BTEX exceedances were reported in monitoring wells east of the OLRT Confederation Line within the inferred historical NAPL source zone area identified in 2012 (Geofirma, 2013). These results are consistent with the findings from Geofirma's 2012 and 2013 reports.

The 2019 sampling program also included analysis of VOCs and F2-F4 PHCs which were not analyzed in 2012. The additional analysis showed that F2 PHCs and styrene are also present in concentrations above Table 3 standards in groundwater east of the OLRT Confederation Line and are contaminants of concern for the site.

3.3.3.1 *Comparison of 2012 and 2019 Groundwater Quality*

Results from the 2019 round of sampling were compared with results from groundwater sampling events that took place in the study area in May and October of 2012 (Geofirma, 2012b and 2013). The purpose of the comparison was to evaluate potential changes in groundwater chemistry, specifically F1 PHC, PAH and BTEX concentrations between 2012-2019.

Comparison of 2012 and 2019 groundwater quality data shows that F1 PHC, PAH and BTEX concentrations are generally stable or decreasing outside of the inferred coal tar source zone east of the OLRT Confederation Line. At many of the wells (e.g. MW12-15, MW12-18), PAH and BTEX concentrations decreased from low-detections to non-detects during this seven-year period. MW12-11 was the only monitoring well outside of the City-owned property at 191 Lees Avenue that was included in the 2019 sampling program. The 2019 results show that contaminant concentrations at MW12-11 were lower than in 2012, with only one PAH parameter (Acenaphthylene) in exceedance of the applicable site standards.

Monitoring wells located within the inferred coal tar source zone had varying increases and decreases of F1 PHC, PAH and BTEX parameter concentrations between 2012 and 2019. An example of this variability can be observed while comparing results from MW12-09; 2019 PHC F1 fractions were noted to be above the May 2012 value, yet well below the concentration reported in October 2012. Similarly, PAH and VOCs concentrations from 2019 were reportedly lower in some parameters (benzene, anthracene) yet increased in others (ethylbenzene, total xylenes etc.).

Specific concentration increases may be attributed to the sampling method, rather than actual changes in groundwater chemistry. Some wells (MW12-14 & OW111B) yielded insufficient water for low-flow sampling and were therefore sampled via Waterra™ inertial hand pumps. These samples were noted to be silty, and suspended sediment is known to cause elevated PAH concentrations due to sorption of PAHs to the fine-grained solids.

Monitoring well MW12-13 is the only well installed in the shallow fill that was sampled in 2019 and is located within the footprint of the former gas relief holding plant (Geofirma, 2013). Comparison of groundwater quality data from 2012 and 2019 shows similar or higher levels of PHCs and PAHs in

MW12-13, including notably higher F1 PHC, benzene, ethylbenzene, and toluene concentrations in 2019.

Overall, the 2019 PAH/BTEX concentrations on site are generally considered to be stable when compared to the 2012 groundwater results, including within the coal tar source zone east of the Confederation Line. PAH/BTEX continue to be contaminants of concern at the site.

The 2019 and historical 2012 groundwater laboratory analyses are summarized in Tables B.4, B.5 and B.6 respectively, in Appendix B.

3.3.4 Quality Assurance/Quality Control for Groundwater Analyses

Laboratory analyses in the current and historical 2012 investigation were completed by Paracel Laboratories, a CALA (Canadian Association for Laboratory Accreditation)-certified laboratory. Paracel completed all analyses in accordance with internal laboratory QC programs that included referenceable standardized analytical methods and procedures and use of laboratory quality control samples. Certificates of quality control were provided by Paracel for all completed analyses. These certificates summarize standardized analytical methods, and the laboratory's results for laboratory QA/QC samples including replicate samples, process blanks, standard surrogate additions and matrix spikes. Complete laboratory analytical reports for Geofirma's October 2019 sampling program are provided in Appendix C. Laboratory field blank and blind duplicate analyses are included on the summary analytical tables in Appendix B.

Geofirma's review of Paracel QA/QC certificates indicates that all analytical results fell within acceptable QA/QC limits for constituent recovery as defined by the protocols for the analytical methods.

Quality assurance and quality control (QA/QC) was assessed using field duplicates, a laboratory trip blank and internal laboratory QC measures.

Relative percent differences (RPD) were calculated for the two blind duplicate groundwater samples collected at MW12-05 and MW12-13. The sets of duplicates and the original samples were collected at the same time during sampling and were analyzed at Paracel. RPD was calculated for the sets of duplicate samples using the following equation:

$$RPD = \frac{|X_1 - X_2|}{\bar{X}}$$

where: X_1= concentration of original sample

X_2 = concentration of duplicate sample

$\bar{X}$ = average concentration of original and duplicate sample

COCs with average concentrations less than 5x method detection limit (MDL) were not included in the calculations, since small changes in concentration at such low concentrations could result in large recorded RPD values.

Average calculated RPDs for detectable concentrations of COCs ranged from 3.2 to 17.1 %, with an

average of 7.4 %. Some variability is to be expected, and these recorded low RPD values indicate that the analytical lab was able to reproduce the measurements at an acceptable precision for this study.

No volatile compounds were detected in the laboratory provided trip blank, indicating that no cross-contamination of the samples occurred during the sampling, storage, transportation and analysis.

Method detection limits (MDLs) for five of the samples were increased by Paracel because the samples were diluted in anticipation of high expected concentrations. As a result, non-detect MDLs of several of the volatile and semi-volatile analytes for these five samples exceeded the MECP Table 3 Standards. Sample MW12-04 was also noted to be frozen upon being received by the laboratory, yet the sample containers were not damaged and sample quality was not impacted.

4 CONCLUSIONS

The following conclusions are based on results from the monitoring well inventory and groundwater sampling that was completed by Geofirma between August-October 2019:

- A total of 39 monitoring wells were included in the site inventory. 12 of which could not be located and are assumed to be destroyed or decommissioned. Of the 27 wells that were located, six were noted to be dry or contain minimal water (insufficient for sampling) and one was observed to be completely blocked; thereby bringing the total number of monitoring wells sampled by Geofirma in 2019 to 20. Various repairs are required for 13 monitoring wells, and new Waterra™ tubing and foot valves were installed in 10 monitoring wells prior to sampling.

- Groundwater elevations are generally consistent with elevations observed in previous studies at the site, including the 2012 study by Geofirma. Groundwater flow in the deep alluvium unit is directed towards the groundwater collection system at the LRT station. The four recently reinstated monitoring wells must be surveyed into the site datum to ensure the accuracy of the water level elevations reported on-site.

- Low-flow groundwater sampling was completed on 11 of the 20 monitoring wells, where there was sufficient water to allow for parameter stabilization. Direct sampling from the remaining 9 wells was completed using dedicated Waterra™ inertial hand pumps.

- All purge water produced during the groundwater monitoring investigation was containerized by Geofirma personnel and subsequently disposed of at a licensed facility by Drain-All Ltd. on October 30, 2019. visual and olfactory evidence of NAPL contamination was observed in purge water from three monitoring wells (MW12-09, MW12-10, and MW12-13) during sampling.

- Of the 20 wells that were sampled in 2019, 8 wells had concentrations of cyanide, metals (sodium and silver), VOC's, PAHs and/or PHCs that exceed MECP Table 3 standards. All noted PAH and PHC-F1/BTEX exceedances were located near the historical NAPL source zone on the east side of the Confederation Line. There was one cyanide exceedance noted in one monitoring well located on the land west of the Confederation Line, yet all other samples collected from this area met applicable standards.

- Only one well (MW12-11) outside of the 191 Lees Avenue property was sampled in 2019. Contaminant concentrations at MW12-11 were lower in 2019 than in 2012, with only one PAH parameter (Acenaphthylene) exceeding applicable site standards.

- Comparison of groundwater quality data from 2012 and 2019 show that COC concentrations are generally stable or decreasing across the site. Diminishing concentrations are observed in monitoring wells outside of the historical NAPL source zone, including several wells where concentrations have decreased from low-level detections to non-detects.

- PHC and PAH concentrations in MW12-13 were generally higher in 2019 than 2012, including notably higher concentrations of F1 PHC, benzene, ethylbenzene, and toluene. Monitoring well MW12-13 was the only well in the shallow fill that was sampled in 2019 and is located within the footprint of the former gas relief holding plant.

5 CLOSURE

This report has been prepared for the exclusive use of the City of Ottawa using a methodology for conducting environmental monitoring and reporting that is acceptable within the profession. Data obtained from groundwater monitoring wells as well as observations made with respect to site conditions, represent the conditions at the time of sampling or observation and as such can be expected to be variable with respect to location and time. Results of monitoring of this type should in no way be construed as a warranty that the site is compliant with applicable legislation.

Geofirma has exercised professional judgement in collecting and analysing the information and in formulating recommendations based on the results of the study. The evaluation and conclusions contained in the report have been prepared based on conditions in evidence at the time of site monitoring activities and based on information provided to Geofirma. Accordingly, Geofirma cannot accept responsibility for any deficiency, misstatement or inaccuracy contained in this report because of misstatements, omissions, misrepresentations, or fraudulent acts of persons providing information.

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Respectfully submitted,

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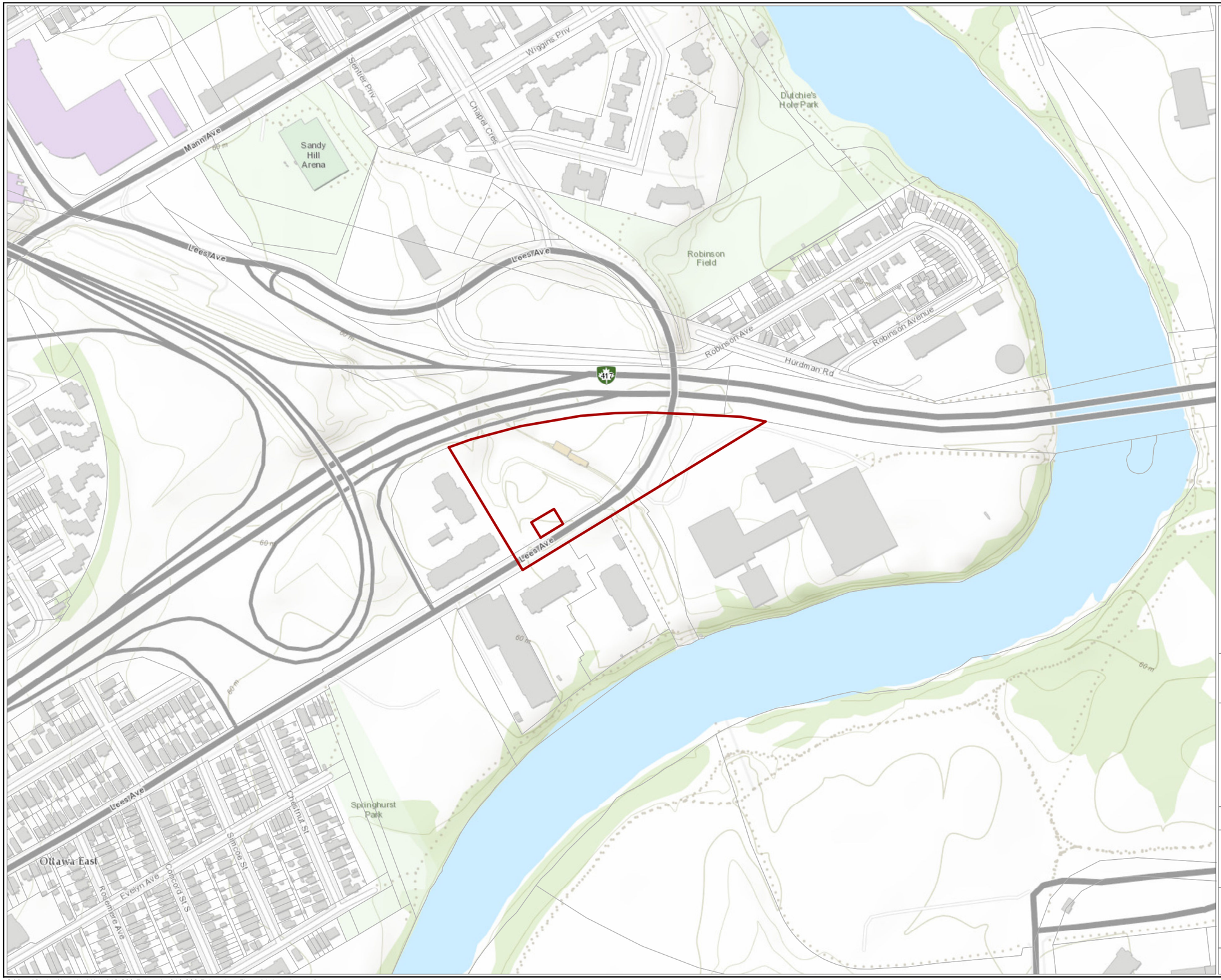
APPENDIX A: Report Figures



LEGEND

- Study Area
- City of Ottawa Property Parcel Fabric

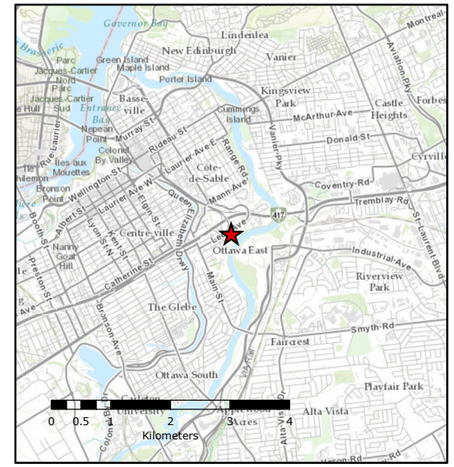


Figure A.1
Site Location

Scale 1:4,000

0 25 50 100 150 200
Meters

N

Projection: NAD 83 MTM Zone 9
Source: City of Ottawa, Geobase Canada

Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

PROJECT No. 18-200-7

PROJECT

2019 Groundwater Sampling Update
191 Lees Avenue, Ottawa

DESIGN: ADG
CAD/GIS: ADG
CHECK: SNS
REV: 0

DATE: 2020-04-23

Geofirma Engineering Ltd

G:\Data\Project\LeesAve\Maps\18-200-7_LeesAve\18-200-7_LeesAve_FigureA1_Location.mxd

LEGEND

- Study Area
- City of Ottawa Property Parcel Fabric
- Groundwater Treatment System

Monitoring Well Sampling Method

- Direct, with Waterra
- Low-Flow with Peristaltic
- Blocked
- Dry, Insufficient Water
- Not Located

Figure A.2
Monitoring Wells
Sampled by Geofirma 2019

Scale 1:1,100

0 10 20 40 60 80
Meters

N

Projection: NAD 83 MTM Zone 9
Source: City of Ottawa, Geobase Canada

PROJECT No. 18-200-7

PROJECT
2019 Groundwater Sampling Update
191 Lees Avenue, Ottawa

DESIGN: ADG
CAD/GIS: ADG
CHECK: SNS
REV: 0

DATE: 2020-04-23

Geofirma Engineering Ltd

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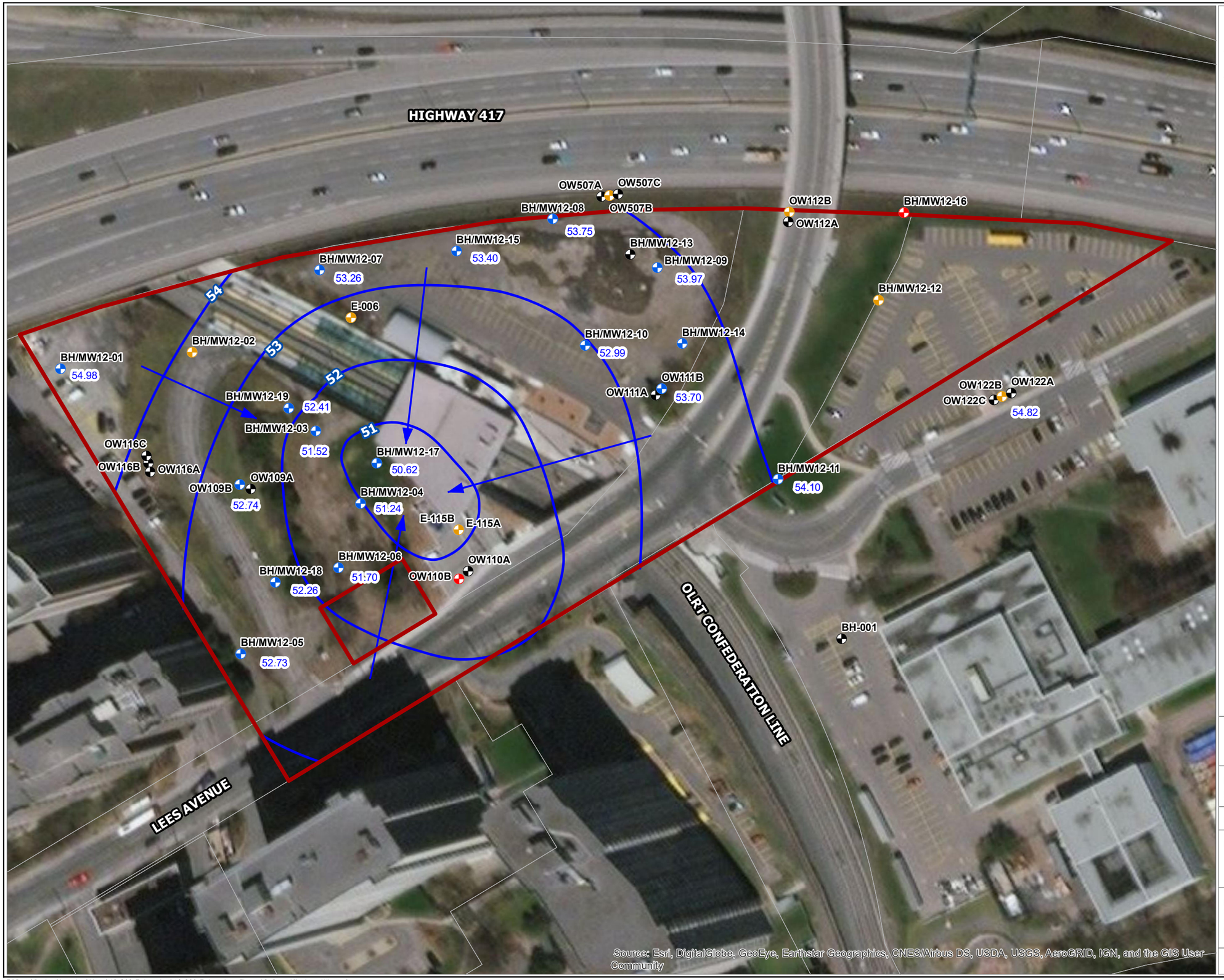

LEGEND

- Study Area
- City of Ottawa Property Fabric
- Deep Alluvium Monitoring Well
- Deep Alluvium - Dry/Blocked
- Deep Alluvium - Not Located
- Other Monitoring Wells
- 54 — Interpreted Groundwater Elevation Contour (mASL)
- Interpreted Direction of Groundwater Flow
- (54.02) Water Level (mASL)

Figure A.3
Groundwater Elevation Contours and Flow Direction in the Deep Alluvium Unit, September 24, 2019

Scale 1:1,100

0 10 20 40 60 80
Meters

Projection: NAD 83 MTM Zone 9
Source: City of Ottawa, Geobase Canada

N

PROJECT No. 18-200-7

PROJECT
2019 Groundwater Sampling Update
191 Lees Avenue, Ottawa

DESIGN: ADG
CAD/GIS: ADG
CHECK: SNS
REV: 0

DATE: 2020-09-08

Geofirma Engineering Ltd

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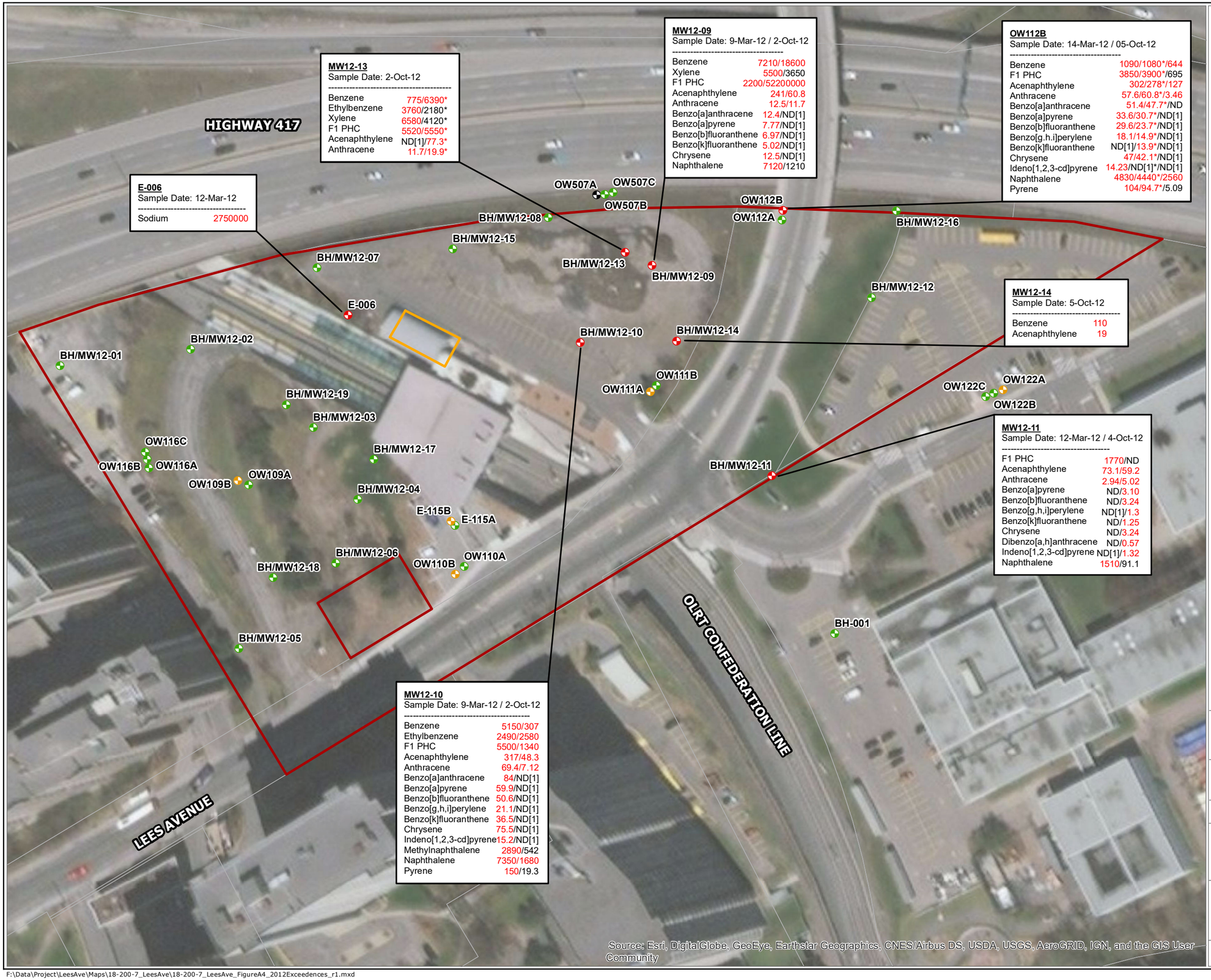

LEGEND

- Study Area
- City of Ottawa Property Parcel Fabric
- Groundwater Treatment System
- Monitoring Well Sampled - Exceedences in 2012
- Monitoring Well Sampled - No Exceedences in 2012
- Monitoring Well Dry/Insufficient Water or Blocked
- Monitoring Well Not Located

MECP TABLE 3 STANDARDS

Benzene	44
Ethylbenzene	2300
Xylene	4200
F1 PHC	750
Acenaphthylene	1.8
Anthracene	2.4
Benzo[a]anthracene	4.7
Benzo[a]pyrene	0.81
Benzo[b]fluoranthene	0.75
Benzo[g,h,i]perylene	0.2
Benzo[k]fluoranthene	0.4
Chrysene	1
Dibenzo[a,h]anthracene	0.52
Indeno[1,2,3-cd]pyrene	0.2
Methynaphthalene	1800
Naphthalene	1400
Pyrene	68
Sodium	2300000

Notes:
All units are µg/L
* = duplicate sample results
[1] = lab detection above MECP

Figure A.4
2012 Groundwater Exceedences

Scale 1:1,100

0 10 20 40 60 80
Meters

N

Projection: NAD 83 MTM Zone 9
Source: City of Ottawa, Geobase Canada

PROJECT No. 18-200-7

PROJECT
2019 Groundwater Sampling Update
191 Lees Avenue, Ottawa

DESIGN: ADG
CAD/GIS: ADG
CHECK: SNS
REV: 0

DATE: 2020-09-25

Geofirma Engineering Ltd

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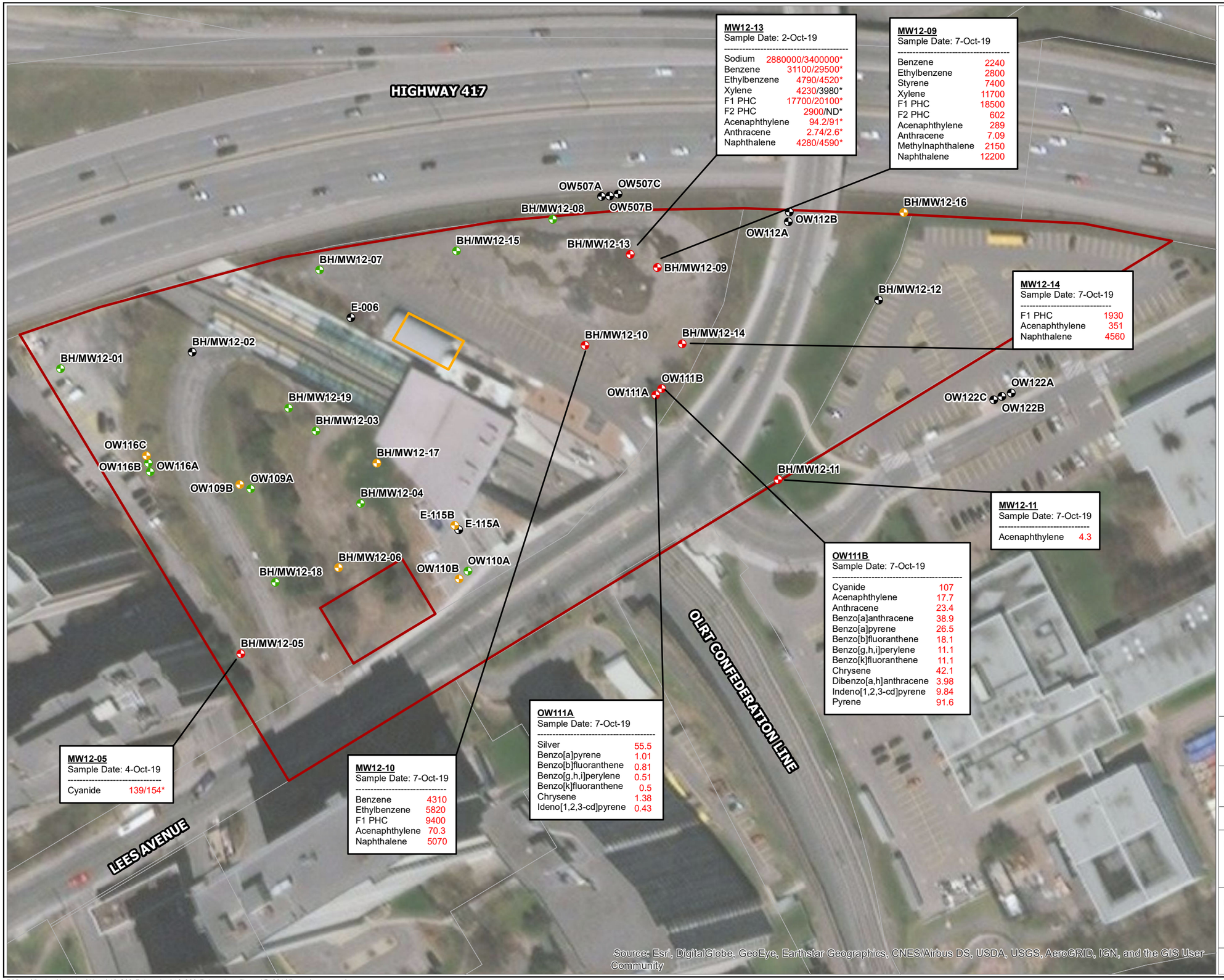

LEGEND

- Study Area
- City of Ottawa Property Parcel Fabric_2017
- Groundwater Treatment System
- Monitoring Well Sampled - Exceedences in 2019
- Monitoring Well Sampled - No Exceedences in 2019
- Monitoring Well Dry/Insufficient Water or Blocked
- Monitoring Well Not Located

MECP TABLE 3 STANDARDS	
Cyanide	66
Silver	1.5
Sodium	2300000
Benzene	44
Ethylbenzene	2300
Styrene	1300
Xylene	4200
F1 PHC	750
F2 PHC	150
Acenaphthylene	1.8
Anthracene	2.4
Benzo[a]anthracene	4.7
Benzo[a]pyrene	0.81
Benzo[b]fluoranthene	0.75
Benzo[g,h,i]perylene	0.2
Benzo[k]fluoranthene	0.4
Chrysene	1
Dibenzo[a,h]anthracene	0.52
Indeno[1,2,3-cd]pyrene	0.2
Methynaphthalene	1800
Naphthalene	1400
Pyrene	68

Notes:
All units are µg/L
* = duplicate sample results

Figure A.5
2019 Groundwater Exceedences

Scale 1:1,100
0 10 20 40 60 80
Meters

N

Projection: NAD 83 MTM Zone 9
Source: City of Ottawa, Geobase Canada

PROJECT No. 18-200-7

PROJECT
2019 Groundwater Sampling Update
191 Lees Avenue, Ottawa

DESIGN: ADG
CAD/GIS: ADG
CHECK: SNS
REV: 0

DATE: 2020-06-01

Geofirma Engineering Ltd

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APPENDIX B: Report Tables

Table B.1 Measured Groundwater Depths and Elevations, September 24 and 25, 2019

Monitoring Well ID	Ground Surface Elevation (m ASL)	Top of Well PVC Riser Elevation (m ASL)	Measurement Date	Water Level Depth (m BTR)	Water Level Elevation (m ASL)	Hydrostratigraphic Unit
MW12-01	59.19	59.06	24-Sep-19	4.08	54.98	Deep Alluvium
MW12-02	53.98	53.82	--	not located	--	Deep Alluvium
MW12-03	59.55	60.50	24-Sep-19	8.98	51.52	Deep Alluvium
MW12-04	59.69	60.50	24-Sep-19	9.25	51.25	Deep Alluvium
MW12-05	58.37	58.26	24-Sep-19	5.53	52.73	Deep Alluvium
MW12-06	59.54	60.37	24-Sep-19	8.71	51.66	Deep Alluvium
MW12-07	59.41	59.29	24-Sep-19	6.03	53.26	Deep Alluvium
MW12-08	59.69	59.50	24-Sep-19	5.75	53.75	Deep Alluvium
MW12-09	59.99	59.87	24-Sep-19	5.90	53.97	Deep Alluvium
MW12-10	60.22	60.13	24-Sep-19	7.15	52.99	Deep Alluvium
MW12-11	62.22	63.08	24-Sep-19	8.98	54.10	Deep Alluvium
MW12-12	60.92	61.65	--	not located	--	Deep Alluvium
MW12-13	59.81	59.73	24-Sep-19	3.11	56.62	Fill
MW12-14	60.47	60.42	25-Sep-19	6.56	53.86	Deep Alluvium
MW12-15	59.50	59.39	24-Sep-19	5.98	53.41	Deep Alluvium
MW12-16	61.02	61.88	--	blocked	--	Deep Alluvium
MW12-17	59.16	60.10	24-Sep-19	9.49	50.62	Deep Alluvium/Till
MW12-18	59.59	60.70	25-Sep-19	8.44	52.26	Deep Alluvium
MW12-19	59.05	60.14	24-Sep-19	7.74	52.41	Deep Alluvium
BH-001	61.92	61.80	24-Sep-19	0.30	61.50	Shallow Alluvium
E-006	59.37	59.26	--	not located	--	Deep Alluvium
E-115A	60.07	59.94	--	not located	--	Deep Alluvium
OW109A	59.80	59.89	25-Sep-19	9.02	50.88	Shale Bedrock
OW109B	59.80	60.23	24-Sep-19	7.49	52.74	Deep Alluvium
OW110A	60.18	60.57	03-Oct-19	8.00	52.57	Shale Bedrock
OW110B	60.22	60.44	--	dry	--	Deep Alluvium
OW111A	60.93	61.42	24-Sep-19	7.40	54.02	Shale Bedrock
OW111B	60.93	61.22	24-Sep-19	7.52	53.70	Deep Alluvium
OW112A	60.75	61.28	--	not located	--	Shale Bedrock
OW112B	60.76	61.41	--	not located	--	Deep Alluvium
OW116A	55.69	56.04	24-Sep-19	2.71	53.33	Shale Bedrock
OW116B	56.03	56.07	24-Sep-19	2.71	53.37	Till
OW116C	55.59	56.28	24-Sep-19	3.00	53.28	Shallow Alluvium
OW122A	--	--	--	not located	--	Shale Bedrock
OW122B	61.45	61.85	--	not located	--	Deep Alluvium
OW122C	61.45	61.70	--	not located	--	Shallow Alluvium
OW507C	59.13	59.63	--	not located	--	Shallow Alluvium
OW507B	59.17	59.63	--	not located	--	Deep Alluvium
OW507A	59.17	59.58	--	not located	--	Shale Bedrock

Notes:

All measurments in metres (m) unless stated otherwise

-- = not measured or cannot be calculated

mBTR = metres below top of riser

mASL = metres above sea level

Ground surface and top of riser elevations from Geofirma, 2012

Table B.2: Monitoring Well Inventory

Monitoring Well ID	Comments	MW Repair Required	MW Not Sampled
MW12-01	Flush mount missing bolt	X	
MW12-02	Could not locate flush mount, under coarse grained fill material - could try metal detector		X
MW12-03	No issues identified, installed new waterra tubing and foot valve		
MW12-04	No issues identified, installed new waterra tubing and foot valve		
MW12-05	Flush mount full of bentonite. Was able to clear bentonite from flush mount casing and PVC riser. Flush mount requires repair, and new well cap, installed new waterra tubing and foot valve	X	
MW12-06	No issues identified, installed new waterra tubing and foot valve, dry/insufficient water for sampling		X
MW12-07	No issues identified		
MW12-08	Bentonite within flush mount, installed new waterra tubing and foot valve	X	
MW12-09	Bolt sheared from flush mount, had to drill through top of metal casing to access well, installed new waterra tubing and foot valve	X	
MW12-10	Missing bolt for flush mount, installed new waterra tubing and foot valve	X	
MW12-11	No issues identified		
MW12-12	Could not locate well, flush mount in grassy area adjacent to new parking lot		X
MW12-13	Well found under patch of asphalt, flush mount full of water, needs to be replaced	X	
MW12-14	No issues identified		
MW12-15	No issues identified, installed new waterra tubing and foot valve		
MW12-16	Stick-up with no lock or well cap, ash/white powder observed within casing and appears to have been dumped into well, ash/powder needs to be cleared, could not sample	X	X
MW12-17	No issues identified		
MW12-18	No issues identified		
MW12-19	PVC cap labelled MW12-21 yet is located where MW12-19 should be		
E-006	Could not locate, within vegetation next to transitway		X
E-115A	Likely destroyed, within footprint of new LRT station		X
OW109A	No issues identified		
OW109B	No issues identified		X
OW110A	No issues identified		
OW110B	No issues identified, dry/insufficient water for sampling		X
OW111A	No issues identified		
OW111B	Waterra stuck in well, able to get water level but will need to remove Waterra tubing prior to groundwater sampling	X	
OW112A	Presumed Decommissioned		X
OW112B	Presumed Decommissioned		X
OW116A	Stick-up, missing metal cover and well cap	X	
OW116B	Stick-up, missing metal cover and well cap	X	
OW116C	Stick-up, missing metal cover and well cap, dry/insufficient water for sampling	X	X
OW122A	Could not locate, may have been destroyed during parking lot construction		X
OW122B	Could not locate, may have been destroyed during parking lot construction		X
OW122C	Could not locate, may have been destroyed during parking lot construction	X	X
OW507C	Presumed Decommissioned		X
OW507B	Presumed Decommissioned		X
OW507A	Presumed Decommissioned		X
BH-001	Flush mount on top of casing is cracked, inside of casing is full of sediment, installed new waterra tubing and foot valve, dry/insufficient water	X	X

Table B.3 - Groundwater Field Parameters

Parameter Date Sampled>	Units	MW12-01 07-Oct-19	MW12-03* 04-Oct-19	MW12-04* 04-Oct-19	MW12-05 04-Oct-19	MW12-07* 07-Oct-19	MW12-09 07-Oct-19
Elapsed Time	min	27	-	-	45	-	30
Flow Rate	L/min	0.2	-	-	0.2	-	0.2
Purged Volume	L	30.5	18.5	3	32	16	60
pH	--	6.69	7.04	6.86	7.45	6.56	7.23
Electrical Conductivity (EC)	mS/cm	8.35	2.15	3.06	11.6	9.67	8.18
Dissolved Oxygen (DO)	mg/L	0	1.61	1.17	0	1.56	0
Temperature	°C	14.9	12.45	11.65	10.4	14.5	12.7
Oxidation Reduction Potential (ORP)	mV	-47	193	148	-72	52	-219
Turbidity	NTU	61	551	861	149	34	119

Notes:

- The values shown above are the measurements collected prior to groundwater sampling

* Well sampled via Waterra inertial hand pump

Table B.3 - Groundwater Field Parameters

Parameter Date Sampled>	Units	MW12-08 02-Oct-19	MW12-10 07-Oct-19	MW12-11 07-Oct-19	MW12-13 02-Oct-19	MW12-14* 07-Oct-19	MW12-15 02-Oct-19
Elapsed Time	min	24	27	30	21	-	27
Flow Rate	L/min	0.15	0.2	0.13	0.2	-	0.13
Purged Volume	L	58	56	34	19	9	60
pH	--	7.25	7.05	7.03	7.06	7.18	6.86
Electrical Conductivity (EC)	mS/cm	4.55	8.72	8.87	21.1	10.6	3.41
Dissolved Oxygen (DO)	mg/L	0	0	0	0	1.93	0
Temperature	°C	14.8	12.6	15.9	16.9	17.47	13.6
Oxidation Reduction Potential (ORP)	mV	-59	-324	-74	-82	-31	-61
Tubidity	NTU	410	9	155	106	570	54

Notes:

- The values shown above are the measurements collected prior to groundwater sampling

* Well sampled via Waterra inetrial hand pump

Table B.3 - Groundwater Field Parameters

Parameter Date Sampled>	Units	MW12-18* 04-Oct-19	MW12-19* 04-Oct-19	OW 109A* 04-Oct-19	OW110A 03-Oct-19	OW111A* 07-Oct-19	OW111B* 07-Oct-19
Elapsed Time	min	-	-	-	21	-	-
Flow Rate	L/min	-	-	-	0.16	-	-
Purged Volume	L	9	2.5	23	122	51	7
pH	--	7.44	7	8.24	7.51	8.18	7.24
Electrical Conductivity (EC)	mS/cm	3.18	11.1	4.31	4.59	6.37	5.61
Dissolved Oxygen (DO)	mg/L	1.24	0.61	0	0	0	0.61
Temperature	°C	10	10.81	9.5	13.3	16.1	14.44
Oxidation Reduction Potential (ORP)	mV	129	13	-148	-163	-92	34
Tubidity	NTU	445	185	213	64	0	584

Notes:

- The values shown above are the measurements collected prior to groundwater sampling

* Well sampled via Waterra inetrial hand pump

Table B.3 - Groundwater Field Parameters

Parameter Date Sampled>	Units	OW116A 03-Oct-19	OW116B 03-Oct-19
Elapsed Time	min	33	33
Flow Rate	L/min	0.2	0.2
Purged Volume	L	115	83
pH	--	8.9	8.94
Electrical Conductivity (EC)	mS/cm	1.21	1.24
Dissolved Oxygen (DO)	mg/L	0	0
Temperature	°C	12.3	11.4
Oxidation Reduction Potential (ORP)	mV	-255	-263
Tubidity	NTU	103	22

Notes:

- The values shown above are the measurements collected prior to groundwater sampling

* Well sampled via Waterra inetrial hand pump

Table B.4 Groundwater Analytical Results - Cyanide and Metals

Parameter	MECP Table 3 Standards	E-006 [2]	E-115 [3]	MW12-01		MW12-02 [2]	MW12-03		MW12-04	
Date Sampled (d/m/y)>	(µg/L)	12-Mar-12	14-Mar-12	14-Mar-12	07-Oct-19	14-Mar-12	14-Mar-12	04-Oct-19	14-Mar-12	04-Oct-19
General Inorganics										
Cyanide, free	66	<2	<2	<2	5	<2	<2	<2	<2	4
Metals										
Mercury	0.29	--	<0.1	--	<0.1	--	--	<0.1	--	<0.1
Antimony	20000	<0.5	<0.5	0.7	<0.5	<0.5	0.6	0.6	0.5	<0.5
Arsenic	1900	<1	<1	<1	<1	<1	2	<1	<1	<1
Barium	29000	92	181	123	36	49	38	29	20	54
Beryllium	67	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Boron	45000	73	147	176	132	26	128	102	169	151
Cadmium	2.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	810	8	13	10	<1	16	10	<1	9	<1
Cobalt	66	1.3	1	3.3	<0.5	0.9	1.6	2.1	4.5	0.8
Copper	87	3.8	0.7	2.1	<0.5	1.1	1.2	3.8	1.8	3.9
Lead	25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	9200	2.9	2.2	16.8	0.6	6	4.9	3.2	5.5	1
Nickel	490	14	4	17	3	6	8	13	26	3
Selenium	63	<1	<1	<1	<1	<1	<1	<1	2	<1
Silver	1.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sodium	2300000	2,750,000	351000	1690000	1250000	222000	64100	51200	182000	448000
Thallium	510	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Uranium	420	0.6	1.5	4.1	<0.1	1	1.9	2.4	4.1	0.5
Vanadium	250	<0.5	7.3	1.4	0.7	4.3	12.4	<0.5	11.9	<0.5
Zinc	1100	<5	<5	<5	<5	<5	6	22	9	<5

Table B.4 Groundwater Analytical Results - Cyanide and Metals

Parameter	MECP Table 3 Standards (µg/L)	MW12-05			MW12-06 [4]	MW12-07		MW12-08		MW12-09		MW12-10	
Date Sampled (d/m/y)>		12-Mar-12	04-Oct-19	Duplicate 04-Oct-19	12-Mar-12	12-Mar-12	07-Oct-19	12-Mar-12	02-Oct-19	09-Mar-12	07-Oct-19	09-Mar-12	07-Oct-19
General Inorganics													
Cyanide, free	66	10	**139**	**154**	5	<2	<2	<2	<2	<2	<2	<2	<2
Metals													
Mercury	0.29	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1
Antimony	20000	0.6	<0.5	<0.5	<0.5	0.6	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5
Arsenic	1900	<1	<1	<1	<1	2	<1	2	<1	<1	<1	1	<1
Barium	29000	42	45	47	63	162	38	162	52	49	36	58	49
Beryllium	67	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Boron	45000	65	56	53	86	56	62	56	54	65	46	56	63
Cadmium	2.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	810	8	<1	<1	13	16	<1	16	<1	8	<1	28	<1
Cobalt	66	1.8	0.7	0.8	0.9	1.5	<0.5	1.5	<0.5	0.6	<0.5	0.7	<0.5
Copper	87	2.1	<0.5	<0.5	1.3	1.1	<0.5	1.1	<0.5	0.9	<0.5	1.1	<0.5
Lead	25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	9200	21.5	2.8	2.9	0.8	7.7	<0.5	7.7	1.1	1.8	<0.5	0.9	<0.5
Nickel	490	10	3	3	5	9	2	9	1	6	<1	6	1
Selenium	63	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Silver	1.5	<0.1	<0.1	0.1	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sodium	2300000	1980000	1740000	1890000	1590000	1200000	1660000	1200000	615000	1160000	1370000	1460000	1390000
Thallium	510	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Uranium	420	3.7	1.3	1.1	0.2	2.8	0.1	2.8	1.6	0.5	<0.1	<0.1	<0.1
Vanadium	250	0.9	1.6	1.7	2.8	3.9	<0.5	3.9	<0.5	2.4	1.3	8.5	6.8
Zinc	1100	5	<5	<5	<5	5	<5	5	<5	<5	<5	<5	<5

Table B.4 Groundwater Analytical Results - Cyanide and Metals

Parameter	MECP Table 3 Standards	MW12-11		MW12-12 [2]	MW12-13		MW12-14	MW12-15	MW12-18	MW12-19	OW109A		OW110A
Date Sampled (d/m/y)>	(µg/L)	12-Mar-12	07-Oct-19	12-Mar-12	02-Oct-19	Duplicate 02-Oct-19	07-Oct-19	02-Oct-19	04-Oct-19	04-Oct-19	14-Mar-12	04-Oct-19	03-Oct-19
General Inorganics													
Cyanide, free	66	<2	<2	<2	18	19	29	<2	5	29	6	27	8
Metals													
Mercury	0.29	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Antimony	20000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5
Arsenic	1900	<1	<1	<1	2	3	<1	<1	<1	<1	<1	<1	<1
Barium	29000	57	40	41	98	108	53	35	31	24	185	66	81
Beryllium	67	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Boron	45000	264	102	44	377	396	64	46	54	138	481	279	176
Cadmium	2.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1
Chromium	810	12	<1	12	<1	<1	<1	<1	<1	<1	9	<1	<1
Cobalt	66	0.7	<0.5	0.9	0.5	0.6	<0.5	<0.5	<0.5	5.3	0.8	1	<0.5
Copper	87	0.9	<0.5	19.5	<0.5	<0.5	<0.5	<0.5	1.9	1.3	0.8	<0.5	<0.5
Lead	25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	9200	0.9	<0.5	4.3	0.5	<0.5	0.8	1.2	7.9	1.5	1.2	1.4	0.6
Nickel	490	6	1	7	<1	<1	1	1	2	11	3	7	1
Selenium	63	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1
Silver	1.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sodium	2300000	374000	1450000	1360000	**2880000**	**3400000**	1890000	415000	1780000	116000	698000	656000	617000
Thallium	510	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.3	<0.1	<0.1	<0.1
Uranium	420	0.3	0.9	13.8	0.3	0.2	3.6	0.6	0.8	0.5	0.1	<0.1	<0.1
Vanadium	250	6.9	<0.5	2.3	8.2	9	5	<0.5	<0.5	5.4	1.6	<0.5	<0.5
Zinc	1100	6	<5	<5	<5	<5	<5	<5	<5	<5	8	<5	<5

Table B.4 Groundwater Analytical Results - Cyanide and Metals

Parameter	MECP Table 3 Standards (µg/L)	OW111A	OW111B	OW112A [3]	OW112B [3]		OW116A		OW116B	OW116C [4]	OW122B [2]
Date Sampled (d/m/y)>		07-Oct-19	07-Oct-19	12-Mar-12	14-Mar-12	Duplicate 14-Mar-12	13-Mar-12	03-Oct-19	03-Oct-19	14-Mar-12	13-Mar-12
General Inorganics											
Cyanide, free	66	<2	**107**	<2	<2	<2	<2	<2	<2	<2	<2
Metals											
Mercury	0.29	<0.1	<0.1	--	--	--	--	<0.1	<0.1	--	--
Antimony	20000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Arsenic	1900	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Barium	29000	1130	89	5130	41	40	393	425	358	23	37
Beryllium	67	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Boron	45000	426	56	278	61	57	840	833	841	88	579
Cadmium	2.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	810	<1	<1	1	9	8	12	<1	<1	19	10
Cobalt	66	<0.5	7.6	1.3	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	0.6
Copper	87	<0.5	0.8	16.5	0.8	0.8	<0.5	<0.5	<0.5	1.7	1.4
Lead	25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	9200	3.6	1.4	<0.5	2.7	2.8	<0.5	0.5	<0.5	1.1	0.8
Nickel	490	2	22	5	5	5	<1	<1	<1	6	6
Selenium	63	<1	8	<1	<1	<1	<1	<1	<1	<1	<1
Silver	1.5	**55.5**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sodium	2300000	1240000	874000	1300000	911000	889000	313000	209000	211000	1980000	241000
Thallium	510	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Uranium	420	<0.1	9.5	<0.1	0.2	0.2	<0.1	<0.1	<0.1	<0.1	<0.1
Vanadium	250	<0.5	<0.5	1.9	1.3	1.4	3.6	<0.5	<0.5	3.6	2.5
Zinc	1100	<5	<5	<5	6	<5	<5	<5	6	5	<5

Table B.4 Groundwater Analytical Results - Cyanide and Metals

Parameter	MECP Table 3 Standards (µg/L)	OW122C [2]		OW507B [3]		OW507C [3]
Date Sampled (d/m/y)>		13-Mar-12	13-Mar-12	16-Apr-12	16-Apr-12	16-Apr-12
General Inorganics						
Cyanide, free	66	<2	<2	<2	<2	<2
Metals						
Mercury	0.29	<0.1	<0.1	<0.1	<0.1	<0.1
Antimony	20000	0.8	0.7	<0.5	<0.5	<0.5
Arsenic	1900	<1	<1	<1	<1	<1
Barium	29000	45	46	99	96	12
Beryllium	67	<0.5	<0.5	<0.5	<0.5	<0.5
Boron	45000	364	390	40	42	67
Cadmium	2.7	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	810	7	7	6	7	13
Cobalt	66	<0.5	<0.5	<0.5	<0.5	4.1
Copper	87	0.7	0.7	<0.5	0.5	2.6
Lead	25	<0.1	<0.1	0.2	0.2	0.3
Molybdenum	9200	5.7	5.6	0.8	0.7	8.3
Nickel	490	2	2	3	3	143
Selenium	63	1	1	<1	<1	14
Silver	1.5	<0.1	<0.1	<0.1	<0.1	<0.1
Sodium	2300000	185000	182000	154000	157000	1050000
Thallium	510	<0.1	<0.1	<0.1	<0.1	0.2
Uranium	420	0.1	0.1	<0.1	<0.1	1.6
Vanadium	250	1.6	1.6	3.3	3.5	14.3
Zinc	1100	<5	<5	<5	<5	6

Table B.5 Groundwater Analytical Results - Volatiles (VOCs)

Parameter	MECP Table 3 Standards	BH-001 [4]	E-006 [2]		E-115A [3]			MW12-01			MW12-02 [2]	
Date Sampled (d/m/y)>	(µg/L)	04-Oct-04	12-Mar-12	05-Oct-12	14-Mar-12	02-Oct-12	Duplicate 02-Oct-12	14-Mar-12	03-Oct-12	07-Oct-19	14-Mar-12	02-Oct-12
Acetone	130000	--	--	--	--	--	--	--	--	<5.0	--	--
Benzene	44	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane	85000	--	--	--	--	--	--	--	--	<0.5	--	--
Bromoform	380	--	--	--	--	--	--	--	--	<0.5	--	--
Bromomethane	5.6	--	--	--	--	--	--	--	--	<0.5	--	--
Carbon Tetrachloride	0.79	--	--	--	--	--	--	--	--	<0.2	--	--
Chlorobenzene	630	--	--	--	--	--	--	--	--	<0.5	--	--
Chloroform	2.4	--	--	--	--	--	--	--	--	<0.5	--	--
Dibromochloromethane	82000	--	--	--	--	--	--	--	--	<0.5	--	--
Dichlorodifluoromethane	4400	--	--	--	--	--	--	--	--	<1.0	--	--
1,2-Dichlorobenzene	4600	--	--	--	--	--	--	--	--	<0.5	--	--
1,3-Dichlorobenzene	9600	--	--	--	--	--	--	--	--	<0.5	--	--
1,4-Dichlorobenzene	8	--	--	--	--	--	--	--	--	<0.5	--	--
1,1-Dichloroethane	320	--	--	--	--	--	--	--	--	<0.5	--	--
1,2-Dichloroethane	1.6	--	--	--	--	--	--	--	--	<0.5	--	--
1,1-Dichloroethylene	1.6	--	--	--	--	--	--	--	--	<0.5	--	--
cis-1,2-Dichloroethylene	1.6	--	--	--	--	--	--	--	--	<0.5	--	--
trans-1,2-Dichloroethylene	1.6	--	--	--	--	--	--	--	--	<0.5	--	--
1,2-Dichloropropane	16	--	--	--	--	--	--	--	--	<0.5	--	--
cis-1,3-Dichloropropylene	NV	--	--	--	--	--	--	--	--	<0.5	--	--
trans-1,3-Dichloropropylene	NV	--	--	--	--	--	--	--	--	<0.5	--	--
1,3-Dichloropropene, total	5.2	--	--	--	--	--	--	--	--	<0.5	--	--
Ethylbenzene	2300	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylene dibromide (dibromoethane, 1,2-)	0.25	--	--	--	--	--	--	--	--	<0.2	--	--
Hexane	51	--	--	--	--	--	--	--	--	<1.0	--	--
Methyl Ethyl Ketone (2-Butanone)	470000	--	--	--	--	--	--	--	--	<5.0	--	--
Methyl Isobutyl Ketone	140000	--	--	--	--	--	--	--	--	<5.0	--	--
Methyl tert-butyl ether	190	--	--	--	--	--	--	--	--	<2.0	--	--
Methylene Chloride	610	--	--	--	--	--	--	--	--	<5.0	--	--
Styrene	1300	--	--	--	--	--	--	--	--	<0.5	--	--
1,1,1,2-Tetrachloroethane	3.3	--	--	--	--	--	--	--	--	<0.5	--	--
1,1,2,2-Tetrachloroethane	3.2	--	--	--	--	--	--	--	--	<0.5	--	--
Tetrachloroethylene	1.6	--	--	--	--	--	--	--	--	<0.5	--	--
Toluene	18000	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	640	--	--	--	--	--	--	--	--	<0.5	--	--
1,1,2-Trichloroethane	4.7	--	--	--	--	--	--	--	--	<0.5	--	--
Trichloroethylene	1.6	--	--	--	--	--	--	--	--	<0.5	--	--
Trichlorofluoromethane	2500	--	--	--	--	--	--	--	--	<1.0	--	--
Vinyl Chloride	0.5	--	--	--	--	--	--	--	--	<0.5	--	--
m/p-Xylene	NV	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5
o-Xylene	NV	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5
Xylenes, total	4200	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5

Table B.5 Groundwater Analytical Results - Volatiles (VOCs)

Parameter	MECP Table 3 Standards	MW12-03			MW12-04			MW12-05			
Date Sampled (d/m/y)>	(µg/L)	14-Mar-12	03-Oct-12	04-Oct-19	14-Mar-12	03-Oct-12	04-Oct-19	12-Mar-12	03-Oct-12	04-Oct-19	Duplicate 04-Oct-19
Acetone	130000	--	--	<5.0	--	--	<5.0	--	--	<5.0	<5.0
Benzene	44	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane	85000	--	--	<0.5	--	--	<0.5	--	--	<0.5	<0.5
Bromoform	380	--	--	<0.5	--	--	<0.5	--	--	<0.5	<0.5
Bromomethane	5.6	--	--	<0.5	--	--	<0.5	--	--	<0.5	<0.5
Carbon Tetrachloride	0.79	--	--	<0.2	--	--	<0.2	--	--	<0.2	<0.2
Chlorobenzene	630	--	--	<0.5	--	--	<0.5	--	--	<0.5	<0.5
Chloroform	2.4	--	--	<0.5	--	--	<0.5	--	--	<0.5	<0.5
Dibromochloromethane	82000	--	--	<0.5	--	--	<0.5	--	--	<0.5	<0.5
Dichlorodifluoromethane	4400	--	--	<1.0	--	--	<1.0	--	--	<1.0	<1.0
1,2-Dichlorobenzene	4600	--	--	<0.5	--	--	<0.5	--	--	<0.5	<0.5
1,3-Dichlorobenzene	9600	--	--	<0.5	--	--	<0.5	--	--	<0.5	<0.5
1,4-Dichlorobenzene	8	--	--	<0.5	--	--	<0.5	--	--	<0.5	<0.5
1,1-Dichloroethane	320	--	--	<0.5	--	--	<0.5	--	--	<0.5	<0.5
1,2-Dichloroethane	1.6	--	--	<0.5	--	--	<0.5	--	--	<0.5	<0.5
1,1-Dichloroethylene	1.6	--	--	<0.5	--	--	<0.5	--	--	<0.5	<0.5
cis-1,2-Dichloroethylene	1.6	--	--	<0.5	--	--	<0.5	--	--	<0.5	<0.5
trans-1,2-Dichloroethylene	1.6	--	--	<0.5	--	--	<0.5	--	--	<0.5	<0.5
1,2-Dichloropropane	16	--	--	<0.5	--	--	<0.5	--	--	<0.5	<0.5
cis-1,3-Dichloropropylene	NV	--	--	<0.5	--	--	<0.5	--	--	<0.5	<0.5
trans-1,3-Dichloropropylene	NV	--	--	<0.5	--	--	<0.5	--	--	<0.5	<0.5
cis-1,3-Dichloropropylene	NV	--	--	<0.5	--	--	<0.5	--	--	<0.5	<0.5
trans-1,3-Dichloropropylene	NV	--	--	<0.5	--	--	<0.5	--	--	<0.5	<0.5
1,3-Dichloropropene, total	5.2	--	--	<0.5	--	--	<0.5	--	--	<0.5	<0.5
Ethylbenzene	2300	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylene dibromide (dibromoethane, 1,2-)	0.25	--	--	<0.2	--	--	<0.2	--	--	<0.2	<0.2
Hexane	51	--	--	<1.0	--	--	<1.0	--	--	<1.0	<1.0
Methyl Ethyl Ketone (2-Butanone)	470000	--	--	<5.0	--	--	<5.0	--	--	<5.0	<5.0
Methyl Isobutyl Ketone	140000	--	--	<5.0	--	--	<5.0	--	--	<5.0	<5.0
Methyl tert-butyl ether	190	--	--	<2.0	--	--	<2.0	--	--	<2.0	<2.0
Methylene Chloride	610	--	--	<5.0	--	--	<5.0	--	--	<5.0	<5.0
Styrene	1300	--	--	<0.5	--	--	<0.5	--	--	<0.5	<0.5
1,1,1,2-Tetrachloroethane	3.3	--	--	<0.5	--	--	<0.5	--	--	<0.5	<0.5
1,1,2,2-Tetrachloroethane	3.2	--	--	<0.5	--	--	<0.5	--	--	<0.5	<0.5
Tetrachloroethylene	1.6	--	--	<0.5	--	--	<0.5	--	--	<0.5	<0.5
Toluene	18000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	640	--	--	<0.5	--	--	<0.5	--	--	<0.5	<0.5
1,1,2-Trichloroethane	4.7	--	--	<0.5	--	--	<0.5	--	--	<0.5	<0.5
Trichloroethylene	1.6	--	--	<0.5	--	--	<0.5	--	--	<0.5	<0.5
Trichlorofluoromethane	2500	--	--	<1.0	--	--	<1.0	--	--	<1.0	<1.0
Vinyl Chloride	0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	<0.5
m/p-Xylene	NV	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
o-Xylene	NV	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylenes, total	4200	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Table B.5 Groundwater Analytical Results - Volatiles (VOCs)

Parameter	MECP Table 3 Standards	MW12-06 [4]		MW12-07			MW12-08			MW12-09		
Date Sampled (d/m/y)>	(µg/L)	12-Mar-12	02-Oct-12	12-Mar-12	04-Oct-12	07-Oct-19	09-Mar-12	02-Oct-12	02-Oct-19	09-Mar-12	02-Oct-12	07-Oct-19
Acetone	130000	--	--	--	--	<5.0	--	--	<5.0	--	--	<250
Benzene	44	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**7210**	**18600**	**2240**
Bromodichloromethane	85000	--	--	--	--	<0.5	--	--	<0.5	--	--	<25
Bromoform	380	--	--	--	--	<0.5	--	--	<0.5	--	--	<25
Bromomethane	5.6	--	--	--	--	<0.5	--	--	<0.5	--	--	<25 [1]
Carbon Tetrachloride	0.79	--	--	--	--	<0.2	--	--	<0.2	--	--	<10 [1]
Chlorobenzene	630	--	--	--	--	<0.5	--	--	<0.5	--	--	<25
Chloroform	2.4	--	--	--	--	<0.5	--	--	<0.5	--	--	<25 [1]
Dibromochloromethane	82000	--	--	--	--	<0.5	--	--	<0.5	--	--	<25
Dichlorodifluoromethane	4400	--	--	--	--	<1.0	--	--	<1.0	--	--	<50
1,2-Dichlorobenzene	4600	--	--	--	--	<0.5	--	--	<0.5	--	--	<25
1,3-Dichlorobenzene	9600	--	--	--	--	<0.5	--	--	<0.5	--	--	<25
1,4-Dichlorobenzene	8	--	--	--	--	<0.5	--	--	<0.5	--	--	<25 [1]
1,1-Dichloroethane	320	--	--	--	--	<0.5	--	--	<0.5	--	--	<25
1,2-Dichloroethane	1.6	--	--	--	--	<0.5	--	--	<0.5	--	--	<25 [1]
1,1-Dichloroethylene	1.6	--	--	--	--	<0.5	--	--	<0.5	--	--	<25 [1]
cis-1,2-Dichloroethylene	1.6	--	--	--	--	<0.5	--	--	<0.5	--	--	<25 [1]
trans-1,2-Dichloroethylene	1.6	--	--	--	--	<0.5	--	--	<0.5	--	--	<25 [1]
1,2-Dichloropropane	16	--	--	--	--	<0.5	--	--	<0.5	--	--	<25 [1]
cis-1,3-Dichloropropylene	NV	--	--	--	--	<0.5	--	--	<0.5	--	--	<25
trans-1,3-Dichloropropylene	NV	--	--	--	--	<0.5	--	--	<0.5	--	--	<25
1,3-Dichloropropene, total	5.2	--	--	--	--	<0.5	--	--	<0.5	--	--	<25 [1]
Ethylbenzene	2300	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	956	1860	**2800**
Ethylene dibromide (dibromoethane, 1,2-)	0.25	--	--	--	--	<0.2	--	--	<0.2	--	--	<10 [1]
Hexane	51	--	--	--	--	<1.0	--	--	<1.0	--	--	<50
Methyl Ethyl Ketone (2-Butanone)	470000	--	--	--	--	<5.0	--	--	<5.0	--	--	<250
Methyl Isobutyl Ketone	140000	--	--	--	--	<5.0	--	--	<5.0	--	--	<250
Methyl tert-butyl ether	190	--	--	--	--	<2.0	--	--	<2.0	--	--	<100
Methylene Chloride	610	--	--	--	--	<5.0	--	--	<5.0	--	--	<250
Styrene	1300	--	--	--	--	<0.5	--	--	<0.5	--	--	**7400**
1,1,1,2-Tetrachloroethane	3.3	--	--	--	--	<0.5	--	--	<0.5	--	--	<25 [1]
1,1,2,2-Tetrachloroethane	3.2	--	--	--	--	<0.5	--	--	<0.5	--	--	<25 [1]
Tetrachloroethylene	1.6	--	--	--	--	<0.5	--	--	<0.5	--	--	<25 [1]
Toluene	18000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	13000	3850	5630
1,1,1-Trichloroethane	640	--	--	--	--	<0.5	--	--	<0.5	--	--	<25
1,1,2-Trichloroethane	4.7	--	--	--	--	<0.5	--	--	<0.5	--	--	<25 [1]
Trichloroethylene	1.6	--	--	--	--	<0.5	--	--	<0.5	--	--	<25 [1]
Trichlorofluoromethane	2500	--	--	--	--	<1.0	--	--	<1.0	--	--	<50
Vinyl Chloride	0.5	--	--	--	--	<0.5	--	--	<0.5	--	--	<25 [1]
m/p-Xylene	NV	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3680	2250	8190
o-Xylene	NV	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1820	1400	3500
Xylenes, total	4200	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**5500**	3650	**11700**

Table B.5 Groundwater Analytical Results - Volatiles (VOCs)

Parameter	MECP Table 3 Standards	MW12-10			MW12-11			MW12-12 [2]		MW12-13			
Date Sampled (d/m/y)>	(µg/L)	09-Mar-12	02-Oct-12	07-Oct-19	12-Mar-12	04-Oct-12	07-Oct-19	12-Mar-12	04-Oct-12	02-Oct-12	Duplicate 02-Oct-12	02-Oct-19	Duplicate 02-Oct-19
Acetone	130000	--	--	<250	--	--	<5.0	--	--	--	--	<500	<500
Benzene	44	**5150**	**307**	**4310**	30	<0.05	<0.5	38.4	<0.05	**775**	**6390**	**31100**	**29500**
Bromodichloromethane	85000	--	--	<25	--	--	<0.5	--	--	--	--	<50	<50
Bromoform	380	--	--	<25	--	--	<0.5	--	--	--	--	<50	<50
Bromomethane	5.6	--	--	<25 [1]	--	--	<0.5	--	--	--	--	<50 [1]	<50 [1]
Carbon Tetrachloride	0.79	--	--	<10 [1]	--	--	<0.2	--	--	--	--	<50 [1]	<50 [1]
Chlorobenzene	630	--	--	<25	--	--	<0.5	--	--	--	--	<50	<50
Chloroform	2.4	--	--	<25 [1]	--	--	<0.5	--	--	--	--	<50 [1]	<50 [1]
Dibromochloromethane	82000	--	--	<25	--	--	<0.5	--	--	--	--	<50	<50
Dichlorodifluoromethane	4400	--	--	<50	--	--	<1.0	--	--	--	--	<100	<100
1,2-Dichlorobenzene	4600	--	--	<25	--	--	<0.5	--	--	--	--	<50	<50
1,3-Dichlorobenzene	9600	--	--	<25	--	--	<0.5	--	--	--	--	<50	<50
1,4-Dichlorobenzene	8	--	--	<25 [1]	--	--	<0.5	--	--	--	--	<50 [1]	<50 [1]
1,1-Dichloroethane	320	--	--	<25	--	--	<0.5	--	--	--	--	<50	<50
1,2-Dichloroethane	1.6	--	--	<25 [1]	--	--	<0.5	--	--	--	--	<50 [1]	<50 [1]
1,1-Dichloroethylene	1.6	--	--	<25 [1]	--	--	<0.5	--	--	--	--	<50 [1]	<50 [1]
cis-1,2-Dichloroethylene	1.6	--	--	<25 [1]	--	--	<0.5	--	--	--	--	<50 [1]	<50 [1]
trans-1,2-Dichloroethylene	1.6	--	--	<25 [1]	--	--	<0.5	--	--	--	--	<50 [1]	<50 [1]
1,2-Dichloropropane	16	--	--	<25 [1]	--	--	<0.5	--	--	--	--	<50 [1]	<50 [1]
cis-1,3-Dichloropropylene	NV	--	--	<25	--	--	<0.5	--	--	--	--	<50	<50
trans-1,3-Dichloropropylene	NV	--	--	<25	--	--	<0.5	--	--	--	--	<50	<50
1,3-Dichloropropene, total	5.2	--	--	<25 [1]	--	--	<0.5	--	--	--	--	<50 [1]	<50 [1]
Ethylbenzene	2300	**2490**	**2580**	**5820**	510	<0.05	8	6.8	<0.05	**3760**	**2180**	**4790**	**4520**
Ethylene dibromide (dibromoethane, 1,2-)	0.25	--	--	<25 [1]	--	--	<0.2	--	--	--	--	<20 [1]	<20 [1]
Hexane	51	--	--	<50	--	--	<1.0	--	--	--	--	<100 [1]	<100 [1]
Methyl Ethyl Ketone (2-Butanone)	470000	--	--	<250	--	--	<5.0	--	--	--	--	<500	<500
Methyl Isobutyl Ketone	140000	--	--	<250	--	--	<5.0	--	--	--	--	<500	<500
Methyl tert-butyl ether	190	--	--	<100	--	--	<2.0	--	--	--	--	<200 [1]	<200 [1]
Methylene Chloride	610	--	--	<250	--	--	<5.0	--	--	--	--	<500	<500
Styrene	1300	--	--	186	--	--	<0.5	--	--	--	--	1100	1050
1,1,1,2-Tetrachloroethane	3.3	--	--	<25 [1]	--	--	<0.5	--	--	--	--	<50 [1]	<50 [1]
1,1,2,2-Tetrachloroethane	3.2	--	--	<25 [1]	--	--	<0.5	--	--	--	--	<50 [1]	<50 [1]
Tetrachloroethylene	1.6	--	--	<25 [1]	--	--	<0.5	--	--	--	--	<50 [1]	<50 [1]
Toluene	18000	4490	275	1140	17	<0.05	<0.5	<0.5	<0.05	958	1210	6700	6490
1,1,1-Trichloroethane	640	--	--	<25	--	--	<0.5	--	--	--	--	<50	<50
1,1,2-Trichloroethane	4.7	--	--	<25 [1]	--	--	<0.5	--	--	--	--	<50 [1]	<50 [1]
Trichloroethylene	1.6	--	--	<25 [1]	--	--	<0.5	--	--	--	--	<50 [1]	<50 [1]
Trichlorofluoromethane	2500	--	--	<50	--	--	<1.0	--	--	--	--	<100	<100
Vinyl Chloride	0.5	--	--	<25 [1]	--	--	<0.5	--	--	--	--	<50 [1]	<50 [1]
m/p-Xylene	NV	1170	1530	2300	317	<0.05	<0.5	4.7	<0.05	4120	2480	2570	2380
o-Xylene	NV	878	1010	1590	218	<0.05	<0.5	1.0	<0.05	2460	1640	1660	1590
Xylenes, total	4200	2050	2540	3880	535	<0.05	<0.5	5.7	<0.05	**6580**	4120	**4230**	3980

Table B.5 Groundwater Analytical Results - Volatiles (VOCs)

Parameter	MECP Table 3 Standards	MW12-14		MW12-15		MW12-16 [5]	MW12-17 [4]	MW12-18		MW12-19	
Date Sampled (d/m/y)>	(µg/L)	05-Oct-12	07-Oct-19	02-Oct-12	02-Oct-19	02-Oct-12	05-Oct-12	03-Oct-12	04-Oct-19	03-Oct-12	04-Oct-19
Acetone	130000	--	<5.0	--	<5.0	--	--	--	<5.0	--	<5.0
Benzene	44	**110**	2.8	<0.05	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane	85000	--	<0.5	--	<0.5	--	--	--	<0.5	--	<0.5
Bromoform	380	--	<0.5	--	<0.5	--	--	--	<0.5	--	<0.5
Bromomethane	5.6	--	<0.5	--	<0.5	--	--	--	<0.5	--	<0.5
Carbon Tetrachloride	0.79	--	<0.2	--	<0.2	--	--	--	<0.2	--	<0.2
Chlorobenzene	630	--	<0.5	--	<0.5	--	--	--	<0.5	--	<0.5
Chloroform	2.4	--	<0.5	--	<0.5	--	--	--	<0.5	--	<0.5
Dibromochloromethane	82000	--	<0.5	--	<0.5	--	--	--	<0.5	--	<0.5
Dichlorodifluoromethane	4400	--	<1.0	--	<1.0	--	--	--	<1.0	--	<1.0
1,2-Dichlorobenzene	4600	--	<0.5	--	<0.5	--	--	--	<0.5	--	<0.5
1,3-Dichlorobenzene	9600	--	<0.5	--	<0.5	--	--	--	<0.5	--	<0.5
1,4-Dichlorobenzene	8	--	<0.5	--	<0.5	--	--	--	<0.5	--	<0.5
1,1-Dichloroethane	320	--	<0.5	--	<0.5	--	--	--	<0.5	--	<0.5
1,2-Dichloroethane	1.6	--	<0.5	--	<0.5	--	--	--	<0.5	--	<0.5
1,1-Dichloroethylene	1.6	--	<0.5	--	<0.5	--	--	--	<0.5	--	<0.5
cis-1,2-Dichloroethylene	1.6	--	<0.5	--	<0.5	--	--	--	<0.5	--	<0.5
trans-1,2-Dichloroethylene	1.6	--	<0.5	--	<0.5	--	--	--	<0.5	--	<0.5
1,2-Dichloropropane	16	--	<0.5	--	<0.5	--	--	--	<0.5	--	<0.5
cis-1,3-Dichloropropylene	NV	--	<0.5	--	<0.5	--	--	--	<0.5	--	<0.5
trans-1,3-Dichloropropylene	NV	--	<0.5	--	<0.5	--	--	--	<0.5	--	<0.5
1,3-Dichloropropene, total	5.2	--	<0.5	--	<0.5	--	--	--	<0.5	--	<0.5
Ethylbenzene	2300	657	113	<0.05	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylene dibromide (dibromoethane, 1,2-)	0.25	--	<0.2	--	<0.2	--	--	--	<0.2	--	<0.2
Hexane	51	--	<1.0	--	<1.0	--	--	--	<1.0	--	<1.0
Methyl Ethyl Ketone (2-Butanone)	470000	--	<5.0	--	<5.0	--	--	--	<5.0	--	<5.0
Methyl Isobutyl Ketone	140000	--	<5.0	--	<5.0	--	--	--	<5.0	--	<5.0
Methyl tert-butyl ether	190	--	<2.0	--	<2.0	--	--	--	<2.0	--	<2.0
Methylene Chloride	610	--	<5.0	--	<5.0	--	--	--	<5.0	--	<5.0
Styrene	1300	--	190	--	<0.5	--	--	--	<0.5	--	<0.5
1,1,1,2-Tetrachloroethane	3.3	--	<0.5	--	<0.5	--	--	--	<0.5	--	<0.5
1,1,2,2-Tetrachloroethane	3.2	--	<0.5	--	<0.5	--	--	--	<0.5	--	<0.5
Tetrachloroethylene	1.6	--	<0.5	--	<0.5	--	--	--	<0.5	--	<0.5
Toluene	18000	45.5	53.2	<0.05	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	640	--	<0.5	--	<0.5	--	--	--	<0.5	--	<0.5
1,1,2-Trichloroethane	4.7	--	<0.5	--	<0.5	--	--	--	<0.5	--	<0.5
Trichloroethylene	1.6	--	<0.5	--	<0.5	--	--	--	<0.5	--	<0.5
Trichlorofluoromethane	2500	--	<1.0	--	<1.0	--	--	--	<1.0	--	<1.0
Vinyl Chloride	0.5	--	<0.5	--	<0.5	--	--	--	<0.5	--	<0.5
m/p-Xylene	NV	168	315	<0.05	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5
o-Xylene	NV	692	120	<0.05	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5
Xylenes, total	4200	860	436	<0.05	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5

Table B.5 Groundwater Analytical Results - Volatiles (VOCs)

Parameter	MECP Table 3 Standards	OW109A			OW110A		OW111A	OW111B		OW112A [3]		
Date Sampled (d/m/y)>	(µg/L)	14-Mar-12	03-Oct-12	04-Oct-19	02-Oct-12	03-Oct-19	07-Oct-19	09-Oct-12	07-Oct-19	12-Mar-12	02-Oct-12	Duplicate 02-Oct-12
Acetone	130000	--	--	<5.0	--	<5.0	<5.0	--	<5.0	--	--	--
Benzene	44	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	34.3	<0.5	<0.5	<0.05	<0.05
Bromodichloromethane	85000	--	--	<0.5	--	<0.5	<0.5	--	<0.5	--	--	--
Bromoform	380	--	--	<0.5	--	<0.5	<0.5	--	<0.5	--	--	--
Bromomethane	5.6	--	--	<0.5	--	<0.5	<0.5	--	<0.5	--	--	--
Carbon Tetrachloride	0.79	--	--	<0.2	--	<0.2	<0.2	--	<0.2	--	--	--
Chlorobenzene	630	--	--	<0.5	--	<0.5	<0.5	--	<0.5	--	--	--
Chloroform	2.4	--	--	<0.5	--	<0.5	<0.5	--	<0.5	--	--	--
Dibromochloromethane	82000	--	--	<0.5	--	<0.5	<0.5	--	<0.5	--	--	--
Dichlorodifluoromethane	4400	--	--	<1.0	--	<1.0	<1.0	--	<1.0	--	--	--
1,2-Dichlorobenzene	4600	--	--	<0.5	--	<0.5	<0.5	--	<0.5	--	--	--
1,3-Dichlorobenzene	9600	--	--	<0.5	--	<0.5	<0.5	--	<0.5	--	--	--
1,4-Dichlorobenzene	8	--	--	<0.5	--	<0.5	<0.5	--	<0.5	--	--	--
1,1-Dichloroethane	320	--	--	<0.5	--	<0.5	<0.5	--	<0.5	--	--	--
1,2-Dichloroethane	1.6	--	--	<0.5	--	<0.5	<0.5	--	<0.5	--	--	--
1,1-Dichloroethylene	1.6	--	--	<0.5	--	<0.5	<0.5	--	<0.5	--	--	--
cis-1,2-Dichloroethylene	1.6	--	--	<0.5	--	<0.5	<0.5	--	<0.5	--	--	--
trans-1,2-Dichloroethylene	1.6	--	--	<0.5	--	<0.5	<0.5	--	<0.5	--	--	--
1,2-Dichloropropane	16	--	--	<0.5	--	<0.5	<0.5	--	<0.5	--	--	--
cis-1,3-Dichloropropylene	NV	--	--	<0.5	--	<0.5	<0.5	--	<0.5	--	--	--
trans-1,3-Dichloropropylene	NV	--	--	<0.5	--	<0.5	<0.5	--	<0.5	--	--	--
1,3-Dichloropropene, total	5.2	--	--	<0.5	--	<0.5	<0.5	--	<0.5	--	--	--
Ethylbenzene	2300	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	6.9	<0.5	<0.5	<0.05	<0.05
Ethylene dibromide (dibromoethane, 1,2-)	0.25	--	--	<0.2	--	<0.2	<0.2	--	<0.2	--	--	--
Hexane	51	--	--	<1.0	--	<1.0	<1.0	--	<1.0	--	--	--
Methyl Ethyl Ketone (2-Butanone)	470000	--	--	<5.0	--	<5.0	<5.0	--	<5.0	--	--	--
Methyl Isobutyl Ketone	140000	--	--	<5.0	--	<5.0	<5.0	--	<5.0	--	--	--
Methyl tert-butyl ether	190	--	--	<2.0	--	<2.0	<2.0	--	<2.0	--	--	--
Methylene Chloride	610	--	--	<5.0	--	<5.0	<5.0	--	<5.0	--	--	--
Styrene	1300	--	--	<0.5	--	<0.5	<0.5	--	<0.5	--	--	--
1,1,1,2-Tetrachloroethane	3.3	--	--	<0.5	--	<0.5	<0.5	--	<0.5	--	--	--
1,1,2,2-Tetrachloroethane	3.2	--	--	<0.5	--	<0.5	<0.5	--	<0.5	--	--	--
Tetrachloroethylene	1.6	--	--	<0.5	--	<0.5	<0.5	--	<0.5	--	--	--
Toluene	18000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1	<0.5	<0.5	<0.05	<0.05
1,1,1-Trichloroethane	640	--	--	<0.5	--	<0.5	<0.5	--	<0.5	--	--	--
1,1,2-Trichloroethane	4.7	--	--	<0.5	--	<0.5	<0.5	--	<0.5	--	--	--
Trichloroethylene	1.6	--	--	<0.5	--	<0.5	<0.5	--	<0.5	--	--	--
Trichlorofluoromethane	2500	--	--	<1.0	--	<1.0	<1.0	--	<1.0	--	--	--
Vinyl Chloride	0.5	--	--	<0.5	--	<0.5	<0.5	--	<0.5	--	--	--
m/p-Xylene	NV	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.4	<0.5	<0.5	<0.05	<0.05
o-Xylene	NV	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.7	<0.5	<0.5	<0.05	<0.05
Xylenes, total	4200	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	7.1	<0.5	<0.5	<0.05	<0.05

Table B.5 Groundwater Analytical Results - Volatiles (VOCs)

Parameter	MECP Table 3 Standards	OW112B [3]			OW116A			OW116B		OW116C [4]		OW122B [2]	
Date Sampled (d/m/y)>	(µg/L)	14-Mar-12	Duplicate 14-Mar-12	05-Oct-12	13-Mar-12	02-Oct-12	03-Oct-19	02-Oct-12	03-Oct-19	14-Mar-12	03-Oct-12	13-Mar-12	04-Oct-12
Acetone	130000	--	--	--	--	--	<5.0	--	<5.0	--	--	--	--
Benzene	44	**1090**	**1080**	**644**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane	85000	--	--	--	--	<0.5	<0.5	--	<0.5	--	--	--	--
Bromoform	380	--	--	--	--	<0.5	<0.5	--	<0.5	--	--	--	--
Bromomethane	5.6	--	--	--	--	<0.5	<0.5	--	<0.5	--	--	--	--
Carbon Tetrachloride	0.79	--	--	--	--	<0.2	<0.2	--	<0.2	--	--	--	--
Chlorobenzene	630	--	--	--	--	<0.5	<0.5	--	<0.5	--	--	--	--
Chloroform	2.4	--	--	--	--	<0.5	<0.5	--	<0.5	--	--	--	--
Dibromochloromethane	82000	--	--	--	--	<0.5	<0.5	--	<0.5	--	--	--	--
Dichlorodifluoromethane	4400	--	--	--	--	<1.0	<1.0	--	<1.0	--	--	--	--
1,2-Dichlorobenzene	4600	--	--	--	--	<0.5	<0.5	--	<0.5	--	--	--	--
1,3-Dichlorobenzene	9600	--	--	--	--	<0.5	<0.5	--	<0.5	--	--	--	--
1,4-Dichlorobenzene	8	--	--	--	--	<0.5	<0.5	--	<0.5	--	--	--	--
1,1-Dichloroethane	320	--	--	--	--	<0.5	<0.5	--	<0.5	--	--	--	--
1,2-Dichloroethane	1.6	--	--	--	--	<0.5	<0.5	--	<0.5	--	--	--	--
1,1-Dichloroethylene	1.6	--	--	--	--	<0.5	<0.5	--	<0.5	--	--	--	--
cis-1,2-Dichloroethylene	1.6	--	--	--	--	<0.5	<0.5	--	<0.5	--	--	--	--
trans-1,2-Dichloroethylene	1.6	--	--	--	--	<0.5	<0.5	--	<0.5	--	--	--	--
1,2-Dichloropropane	16	--	--	--	--	<0.5	<0.5	--	<0.5	--	--	--	--
cis-1,3-Dichloropropylene	NV	--	--	--	--	<0.5	<0.5	--	<0.5	--	--	--	--
trans-1,3-Dichloropropylene	NV	--	--	--	--	<0.5	<0.5	--	<0.5	--	--	--	--
1,3-Dichloropropene, total	5.2	--	--	--	--	<0.5	<0.5	--	<0.5	--	--	--	--
Ethylbenzene	2300	553	569	2030	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylene dibromide (dibromoethane, 1,2-)	0.25	--	--	--	--	<0.2	<0.2	--	<0.2	--	--	--	--
Hexane	51	--	--	--	--	<1.0	<1.0	--	<1.0	--	--	--	--
Methyl Ethyl Ketone (2-Butanone)	470000	--	--	--	--	<5.0	<5.0	--	<5.0	--	--	--	--
Methyl Isobutyl Ketone	140000	--	--	--	--	<5.0	<5.0	--	<5.0	--	--	--	--
Methyl tert-butyl ether	190	--	--	--	--	<2.0	<2.0	--	<2.0	--	--	--	--
Methylene Chloride	610	--	--	--	--	<5.0	<5.0	--	<5.0	--	--	--	--
Styrene	1300	--	--	--	--	<0.5	<0.5	--	<0.5	--	--	--	--
1,1,1,2-Tetrachloroethane	3.3	--	--	--	--	<0.5	<0.5	--	<0.5	--	--	--	--
1,1,2,2-Tetrachloroethane	3.2	--	--	--	--	<0.5	<0.5	--	<0.5	--	--	--	--
Tetrachloroethylene	1.6	--	--	--	--	<0.5	<0.5	--	<0.5	--	--	--	--
Toluene	18000	3950	3900	965	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	640	--	--	--	--	<0.5	<0.5	--	<0.5	--	--	--	--
1,1,2-Trichloroethane	4.7	--	--	--	--	<0.5	<0.5	--	<0.5	--	--	--	--
Trichloroethylene	1.6	--	--	--	--	<0.5	<0.5	--	<0.5	--	--	--	--
Trichlorofluoromethane	2500	--	--	--	--	<1.0	<1.0	--	<1.0	--	--	--	--
Vinyl Chloride	0.5	--	--	--	--	<0.5	<0.5	--	<0.5	--	--	--	--
m/p-Xylene	NV	1580	1600	494	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
o-Xylene	NV	830	836	1460	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylenes, total	4200	2410	2430	<1250	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Table B.5 Groundwater Analytical Results - Volatiles (VOCs)

Parameter	MECP Table 3 Standards	OW122C [2]			OW507C [3]		OW507B [3]			Trip Blank
Date Sampled (d/m/y)>	(µg/L)	13-Mar-12	Duplicate 13-Mar-12	04-Oct-12	16-Apr-12	29-Oct-12	16-Apr-12	29-Oct-12	Duplicate 16-Apr-12	27-Sep-19
Acetone	130000	--	--	--	--	--	--	--	--	<5.0
Benzene	44	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane	85000	--	--	--	--	--	--	--	--	<0.5
Bromoform	380	--	--	--	--	--	--	--	--	<0.5
Bromomethane	5.6	--	--	--	--	--	--	--	--	<0.5
Carbon Tetrachloride	0.79	--	--	--	--	--	--	--	--	<0.2
Chlorobenzene	630	--	--	--	--	--	--	--	--	<0.5
Chloroform	2.4	--	--	--	--	--	--	--	--	<0.5
Dibromochloromethane	82000	--	--	--	--	--	--	--	--	<0.5
Dichlorodifluoromethane	4400	--	--	--	--	--	--	--	--	<1.0
1,2-Dichlorobenzene	4600	--	--	--	--	--	--	--	--	<0.5
1,3-Dichlorobenzene	9600	--	--	--	--	--	--	--	--	<0.5
1,4-Dichlorobenzene	8	--	--	--	--	--	--	--	--	<0.5
1,1-Dichloroethane	320	--	--	--	--	--	--	--	--	<0.5
1,2-Dichloroethane	1.6	--	--	--	--	--	--	--	--	<0.5
1,1-Dichloroethylene	1.6	--	--	--	--	--	--	--	--	<0.5
cis-1,2-Dichloroethylene	1.6	--	--	--	--	--	--	--	--	<0.5
trans-1,2-Dichloroethylene	1.6	--	--	--	--	--	--	--	--	<0.5
1,2-Dichloropropane	16	--	--	--	--	--	--	--	--	<0.5
cis-1,3-Dichloropropylene	NV	--	--	--	--	--	--	--	--	<0.5
trans-1,3-Dichloropropylene	NV	--	--	--	--	--	--	--	--	<0.5
cis-1,3-Dichloropropylene	NV	--	--	--	--	--	--	--	--	<0.5
trans-1,3-Dichloropropylene	NV	--	--	--	--	--	--	--	--	<0.5
1,3-Dichloropropene, total	5.2	--	--	--	--	--	--	--	--	<0.5
Ethylbenzene	2300	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylene dibromide (dibromoethane, 1,2-)	0.25	--	--	--	--	--	--	--	--	<0.2
Hexane	51	--	--	--	--	--	--	--	--	<1.0
Methyl Ethyl Ketone (2-Butanone)	470000	--	--	--	--	--	--	--	--	<5.0
Methyl Isobutyl Ketone	140000	--	--	--	--	--	--	--	--	<5.0
Methyl tert-butyl ether	190	--	--	--	--	--	--	--	--	<2.0
Methylene Chloride	610	--	--	--	--	--	--	--	--	<5.0
Styrene	1300	--	--	--	--	--	--	--	--	<0.5
1,1,1,2-Tetrachloroethane	3.3	--	--	--	--	--	--	--	--	<0.5
1,1,2,2-Tetrachloroethane	3.2	--	--	--	--	--	--	--	--	<0.5
Tetrachloroethylene	1.6	--	--	--	--	--	--	--	--	<0.5
Toluene	18000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	640	--	--	--	--	--	--	--	--	<0.5
1,1,2-Trichloroethane	4.7	--	--	--	--	--	--	--	--	<0.5
Trichloroethylene	1.6	--	--	--	--	--	--	--	--	<0.5
Trichlorofluoromethane	2500	--	--	--	--	--	--	--	--	<1.0
Vinyl Chloride	0.5	--	--	--	--	--	--	--	--	<0.5
m/p-Xylene	NV	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
o-Xylene	NV	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylenes, total	4200	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Table B.6 Groundwater Analytical Results - Petroleum Hydrocarbons (PHCs) and Semi-Volatiles (PAHs)

Parameter	MECP Table 3 Standards (µg/L)	BH-001 [4]	E-006 [2]		E-115A [3]			MW12-01		
Date Sampled (d/m/y)>		04-Oct-04	12-Mar-12	05-Oct-12	14-Mar-12	02-Oct-12	Duplicate 02-Oct-12	14-Mar-12	03-Oct-12	07-Oct-19
Hydrocarbons (PHCs)										
F1 PHCs (C6-C10)	750	<25	<25	<25	<25	<25	<25	<25	<25	<25
F2 PHCs (C10-C16)	150	--	--	--	--	--	--	--	--	<100
F3 PHCs (C16-C34)	500	--	--	--	--	--	--	--	--	<100
F4 PHCs (C34-C50)	500	--	--	--	--	--	--	--	--	<100
Semi-Volatiles										
Acenaphthene	600	<0.25	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	1.8	<0.25	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Anthracene	2.4	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo[a]anthracene	4.7	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo[a]pyrene	0.81	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo[b]fluoranthene	0.75	<0.25	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[g,h,i]perylene	0.2	<0.25 [1]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[k]fluoranthene	0.4	<0.25	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chrysene	1	<0.25	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dibenzo[a,h]anthracene	0.52	<0.25	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	130	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluorene	400	<0.25	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno[1,2,3-cd]pyrene	0.2	<0.25 [1]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1-Methylnaphthalene	1800	<0.25	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2-Methylnaphthalene	1800	<0.25	<0.05	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Methylnaphthalene (1&2)	1800	<0.05	<0.1	0.13	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Naphthalene	1400	<0.25	0.54	0.25	0.31	<0.05	<0.05	0.27	<0.05	0.07
Phenanthrene	580	<0.25	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Pyrene	68	0.07	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Table B.6 Groundwater Analytical Results - Petroleum Hydrocarbons (PHCs) and Semi-Volatiles (PAHs)

Parameter	MECP Table 3 Standards (µg/L)	MW12-02 [3]		MW12-03			MW12-04			MW12-05			
Date Sampled (d/m/y)>		14-Mar-12	02-Oct-12	14-Mar-12	03-Oct-12	04-Oct-19	14-Mar-12	03-Oct-12	04-Oct-19	12-Mar-12	03-Oct-12	04-Oct-19	Duplicate 04-Oct-19
Hydrocarbons (PHCs)													
F1 PHCs (C6-C10)	750	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
F2 PHCs (C10-C16)	150	--	--	--	--	<100	--	--	<100	--	--	<100	<100
F3 PHCs (C16-C34)	500	--	--	--	--	<100	--	--	<100	--	--	<100	<100
F4 PHCs (C34-C50)	500	--	--	--	--	<100	--	--	<100	--	--	<100	<100
Semi-Volatiles													
Acenaphthene	600	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	1.8	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.12
Anthracene	2.4	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	0.04
Benzo[a]anthracene	4.7	<0.01	<0.01	0.06	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.08
Benzo[a]pyrene	0.81	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.06
Benzo[b]fluoranthene	0.75	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[g,h,i]perylene	0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06
Benzo[k]fluoranthene	0.4	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chrysene	1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.07
Dibenzo[a,h]anthracene	0.52	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	130	<0.01	<0.01	<0.01	<0.01	0.04	<0.01	<0.01	<0.01	0.08	<0.01	<0.01	0.09
Fluorene	400	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.08	<0.05	<0.05	<0.05
Indeno[1,2,3-cd]pyrene	0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1-Methylnaphthalene	1800	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	0.14
2-Methylnaphthalene	1800	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.08	<0.05	<0.05	<0.05	<0.05	0.08
Methylnaphthalene (1&2)	1800	<0.10	<0.10	<0.10	0.11	<0.10	<0.10	0.14	<0.10	<0.10	<0.10	<0.10	0.22
Naphthalene	1400	<0.05	<0.05	0.06	<0.05	0.24	<0.05	0.1	0.23	0.12	0.09	<0.05	0.49
Phenanthrene	580	<0.05	<0.05	0.07	<0.05	<0.05	0.08	<0.05	<0.05	0.62	<0.05	<0.05	0.14
Pyrene	68	<0.01	0.01	0.16	<0.01	0.06	0.05	<0.01	<0.01	0.08	<0.01	<0.01	0.16

Table B.6 Groundwater Analytical Results - Petroleum Hydrocarbons (PHCs) and Semi-Volatiles (PAHs)

Parameter	MECP Table 3 Standards (µg/L)	MW12-06 [4]		MW12-07			MW12-08			MW12-09		
Date Sampled (d/m/y)>		12-Mar-12	03-Oct-12	12-Mar-12	04-Oct-12	07-Oct-19	09-Mar-12	02-Oct-12	02-Oct-19	09-Mar-12	02-Oct-12	07-Oct-19
Hydrocarbons (PHCs)												
F1 PHCs (C6-C10)	750	<25	<25	<25	<25	<25	<25	<25	<25	**2200**	**52200000**	**18500**
F2 PHCs (C10-C16)	150	--	--	--	--	<100	--	--	<100	--	--	**602**
F3 PHCs (C16-C34)	500	--	--	--	--	<100	--	--	<100	--	--	<100
F4 PHCs (C34-C50)	500	--	--	--	--	<100	--	--	<100	--	--	<100
Semi-Volatiles												
Acenaphthene	600	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<2.5	<50	11.5
Acenaphthylene	1.8	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	<0.05	<0.05	**241**	**60.8**	**289**
Anthracene	2.4	<0.01	<0.01	0.03	<0.01	<0.01	0.03	<0.01	<0.01	**12.5**	**11.7**	**7.09**
Benzo[a]anthracene	4.7	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**12.4**	<10 [1]	<1
Benzo[a]pyrene	0.81	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**7.77**	<10 [1]	<1 [1]
Benzo[b]fluoranthene	0.75	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**6.97**	<50 [1]	<5 [1]
Benzo[g,h,i]perylene	0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<2.5 [1]	<50 [1]	<5 [1]
Benzo[k]fluoranthene	0.4	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**5.02**	<50 [1]	<5 [1]
Chrysene	1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**12.5**	<50 [1]	<5 [1]
Dibenzo[a,h]anthracene	0.52	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<2.5 [1]	<50 [1]	<5 [1]
Fluoranthene	130	<0.01	<0.01	<0.05	<0.01	<0.01	0.06	0.02	<0.01	12.1	15	7.1
Fluorene	400	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	42.8	<50 [1]	59.6
Indeno[1,2,3-cd]pyrene	0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<2.5 [1]	<50 [1]	<5 [1]
1-Methylnaphthalene	1800	<0.05	<0.05	0.08	<0.05	<0.05	0.08	<0.05	<0.05	447	132	806
2-Methylnaphthalene	1800	<0.05	<0.05	0.11	<0.05	<0.05	0.09	0.06	<0.05	842	212	1340
Methylnaphthalene (1&2)	1800	<0.10	<0.10	0.19	<0.10	<0.10	0.17	<0.10	<0.10	1320	344	**2150**
Naphthalene	1400	0.63	0.29	0.53	0.15	0.08	0.43	0.12	<0.05	**7120**	1210	**12200**
Phenanthrene	580	0.12	<0.05	0.17	0.08	<0.05	0.15	<0.05	<0.05	50.3	<50	43.3
Pyrene	68	0.05	0.02	0.08	<0.01	<0.01	0.09	0.03	<0.01	20	23.1	10.9

Table B.6 Groundwater Analytical Results - Petroleum Hydrocarbons (PHCs) and Semi-Volatiles (PAHs)

Parameter	MECP Table 3 Standards (µg/L)	MW12-10			MW12-11			MW12-13				MW12-14	
Date Sampled (d/m/y)>		09-Mar-12	02-Oct-12	07-Oct-19	12-Mar-12	04-Oct-12	07-Oct-19	02-Oct-12	Duplicate 02-Oct-12	02-Oct-19	Duplicate 02-Oct-19	05-Oct-12	07-Oct-19
Hydrocarbons (PHCs)													
F1 PHCs (C6-C10)	750	**5500**	**1340**	**9400**	**1770**	<25	<25	**5520**	**5550**	**17700**	**20100**	<25	**1930**
F2 PHCs (C10-C16)	150	--	--	<100	--	--	<100	--	--	**2900**	<100	--	<100
F3 PHCs (C16-C34)	500	--	--	<100	--	--	<100	--	--	<100	<100	--	<100
F4 PHCs (C34-C50)	500	--	--	<100	--	--	<100	--	--	<100	<100	--	<100
Semi-Volatiles													
Acenaphthene	600	128	36.3	84	2.76	2.72	1.26	<50	<50	11.9	12.8	<5	23.1
Acenaphthylene	1.8	**317**	**48.3**	**70.3**	**73.1**	**59.2**	**4.3**	<50 [1]	**77.3**	**94.2**	**91**	**19.0**	**351**
Anthracene	2.4	**69.4**	**7.12**	2.4	**2.94**	**5.02**	0.48	**11.7**	**19.9**	**2.74**	**2.6**	<1	2.09
Benzo[a]anthracene	4.7	**84**	<5 [1]	<1	<0.05	3.38	0.58	<10 [1]	<10 [1]	<1	<1.00	<1	<1.00
Benzo[a]pyrene	0.81	**59.9**	<5 [1]	<1 [1]	<0.05	**3.10**	0.37	<10 [1]	<10 [1]	<1 [1]	<1 [1]	<1 [1]	<1 [1]
Benzo[b]fluoranthene	0.75	**50.6**	<25 [1]	<5 [1]	<0.25	**3.24**	0.26	<50 [1]	<50 [1]	<5 [1]	<5 [1]	<5 [1]	<5 [1]
Benzo[g,h,i]perylene	0.2	**21.1**	<25 [1]	<5 [1]	<0.25[1]	**1.30**	0.17	<50 [1]	<50 [1]	<5 [1]	<5 [1]	<5 [1]	<5 [1]
Benzo[k]fluoranthene	0.4	**36.5**	<25 [1]	<5 [1]	<0.25	**1.25**	0.15	<50 [1]	<50 [1]	<5 [1]	<5 [1]	<5 [1]	<5 [1]
Chrysene	1	**75.5**	<25 [1]	<5 [1]	<0.25	**3.24**	0.63	<50 [1]	<50 [1]	<5 [1]	<5 [1]	<5 [1]	<5 [1]
Dibenzo[a,h]anthracene	0.52	<2.50[1]	<25 [1]	<5 [1]	<0.25	**0.57**	0.05	<50 [1]	<50 [1]	<5 [1]	<5 [1]	<5 [1]	<5 [1]
Fluoranthene	130	90.8	12	2.78	3.07	6.14	0.97	21.2	24.6	2.35	1.98	<1	3.83
Fluorene	400	140	25.1	31	13.4	12.6	1.47	<50	<50	21.3	20.4	<5	50.2
Indeno[1,2,3-cd]pyrene	0.2	**15.2**	<25 [1]	<5 [1]	<2.5 [1]	**1.32**	0.14	<50 [1]	<50 [1]	<5 [1]	<5 [1]	<5 [1]	<5 [1]
1-Methylnaphthalene	1800	1040	247	660	148	98.5	3.74	163	277	350	366	38.8	890
2-Methylnaphthalene	1800	**1850**	295	477	142	7.73	0.66	240	301	226	237	37.6	542
Methylnaphthalene (1&2)	1800	**2890**	542	1140	290	106	4.4	404	578	576	603	76.4	1430
Naphthalene	1400	**7350**	**1680**	**5070**	**1,510**	91.1	6.72	800	981	**4280**	**4590**	631	**4560**
Phenanthrene	580	300	45.5	20.2	15.8	13.1	1.02	53.9	69	16.1	15.4	<5	20.3
Pyrene	68	**150**	19.3	4.03	4.82	11.9	1.73	30.4	40.8	3.1	2.67	<1	6.36

Table B.6 Groundwater Analytical Results - Petroleum Hydrocarbons (PHCs) and Semi-Volatiles (PAHs)

Parameter	MECP Table 3 Standards (µg/L)	MW12-15		MW12-16 [5]	MW12-17 [4]	MW12-18		MW12-19		OW109A		
Date Sampled (d/m/y)>		02-Oct-12	02-Oct-19	02-Oct-12	05-Oct-12	03-Oct-12	04-Oct-19	03-Oct-12	04-Oct-19	14-Mar-12	03-Oct-12	04-Oct-19
Hydrocarbons (PHCs)												
F1 PHCs (C6-C10)	750	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
F2 PHCs (C10-C16)	150	--	<100	--	--	--	<100	--	<100	--	--	<100
F3 PHCs (C16-C34)	500	--	<100	--	--	--	<100	--	<100	--	--	<100
F4 PHCs (C34-C50)	500	--	<100	--	--	--	<100	--	<100	--	--	<100
Semi-Volatiles												
Acenaphthene	600	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	1.8	0.19	<0.05	0.14	<0.05	<0.05	<0.05	0.1	<0.05	0.21	<0.05	<0.05
Anthracene	2.4	0.05	<0.01	0.03	<0.01	0.02	<0.01	0.03	<0.01	<0.01	<0.01	<0.01
Benzo[a]anthracene	4.7	0.23	<0.01	<0.01	<0.01	0.09	<0.01	0.09	<0.01	<0.01	<0..01	<0.01
Benzo[a]pyrene	0.81	0.19	<0.01	<0.01	<0.01	0.04	<0.01	0.05	<0.01	<0.01	<0.01	<0.01
Benzo[b]fluoranthene	0.75	0.21	<0.05	<0.05	<0.05	0.09	<0.05	0.09	<0.05	<0.05	<0.01	<0.05
Benzo[g,h,i]perylene	0.2	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[k]fluoranthene	0.4	0.12	<0.05	<0.05	<0.05	0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chrysene	1	0.22	<0.05	<0.05	<0.05	0.06	<0.05	0.08	<0.05	<0.05	<0.05	<0.05
Dibenzo[a,h]anthracene	0.52	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	130	0.42	0.04	0.05	<0.01	0.12	<0.01	0.09	<0.01	<0.01	<0.01	<0.01
Fluorene	400	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno[1,2,3-cd]pyrene	0.2	0.09	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1-Methylnaphthalene	1800	0.09	0.06	0.19	0.12	0.09	<0.05	0.06	<0.05	<0.05	0.10	<0.05
2-Methylnaphthalene	1800	0.12	<0.05	0.2	0.17	0.09	<0.05	0.08	<0.05	<0.05	0.14	<0.05
Methylnaphthalene (1&2)	1800	0.21	<0.10	0.39	0.29	0.18	<0.10	0.14	<0.10	<0.10	0.24	<0.10
Naphthalene	1400	0.38	<0.05	0.76	0.91	0.18	<0.05	0.24	<0.05	0.81	0.29	<0.05
Phenanthrene	580	0.06	<0.05	0.1	<0.05	0.2	<0.05	0.11	<0.05	0.09	<0.05	<0.05
Pyrene	68	0.45	0.03	0.06	<0.01	0.12	<0.01	0.11	<0.01	<0.01	<0.01	<0.01

Table B.6 Groundwater Analytical Results - Petroleum Hydrocarbons (PHCs) and Semi-Volatiles (PAHs)

Parameter	MECP Table 3 Standards (µg/L)	OW110A		OW111A	OW111B		OW112A [3]			OW112B [3]		
Date Sampled (d/m/y)>		02-Oct-12	03-Oct-19	07-Oct-19	09-Oct-12	07-Oct-19	12-Mar-12	02-Oct-12	Duplicate 02-Oct-12	14-Mar-12	Duplicate 14-Mar-12	05-Oct-12
Hydrocarbons (PHCs)												
F1 PHCs (C6-C10)	750	<25	<25	<25	<25	<25	<25	<25	<25	**3850**	**3900**	695
F2 PHCs (C10-C16)	150	--	<100	<100	--	<100	--	--	--	--	--	--
F3 PHCs (C16-C34)	500	--	<100	<100	--	<100	--	--	--	--	--	--
F4 PHCs (C34-C50)	500	--	<100	<100	--	<100	--	--	--	--	--	--
Semi-Volatiles												
Acenaphthene	600	<0.05	<0.05	0.13	<0.05	1.44	<0.05	0.07	0.08	<12	<12	<10
Acenaphthylene	1.8	<0.05	<0.05	1.41	0.80	**17.7**	<0.05	0.23	0.23	**302**	**278**	**127**
Anthracene	2.4	<0.01	<0.01	0.67	0.02	**23.4**	0.03	0.09	0.11	**57.6**	**60.8**	**3.46**
Benzo[a]anthracene	4.7	<0.01	<0.01	1.47	0.04	**38.9**	<0.01	0.15	0.20	**51.4**	**47.7**	<2
Benzo[a]pyrene	0.81	<0.01	<0.01	**1.01**	<0.01	**26.5**	<0.01	0.09	0.12	**33.6**	**30.7**	<2 [1]
Benzo[b]fluoranthene	0.75	<0.01	<0.05	**0.81**	<0.05	**18.1**	<0.05	0.08	0.10	**29.6**	**23.7**	<10 [1]
Benzo[g,h,i]perylene	0.2	<0.05	<0.05	**0.51**	<0.05	**11.1**	<0.05	<0.05	<0.05	**18.1**	**14.9**	<10 [1]
Benzo[k]fluoranthene	0.4	<0.05	<0.05	**0.5**	<0.05	**11.1**	<0.05	<0.05	0.08	<12 [1]	**13.9**	<10 [1]
Chrysene	1	<0.05	<0.05	**1.38**	<0.05	**42.1**	<0.05	0.12	0.17	**47**	**42.1**	<10 [1]
Dibenzo[a,h]anthracene	0.52	<0.05	<0.05	0.16	<0.05	**3.98**	<0.05	<0.05	<0.05	<12 [1]	<12 [1]	<10 [1]
Fluoranthene	130	<0.01	<0.01	1.76	0.06	50	0.05	0.10	0.14	59.4	54	<2
Fluorene	400	<0.05	<0.05	0.69	0.07	12.3	<0.05	0.12	0.12	111	101	20.1
Indeno[1,2,3-cd]pyrene	0.2	<0.05	<0.05	**0.43**	<0.05	**9.84**	<0.05	<0.05	<0.05	**14.3**	<12 [1]	<10 [1]
1-Methylnaphthalene	1800	<0.05	<0.05	2.63	2.50	11.1	0.09	0.23	0.27	623	581	312
2-Methylnaphthalene	1800	0.09	<0.05	3.03	0.36	6.53	0.11	0.30	0.34	701	657	212
Methylnaphthalene (1&2)	1800	0.13	<0.10	5.66	2.86	17.6	0.2	0.53	0.61	1320	1240	524
Naphthalene	1400	0.21	<0.05	9.78	2.24	13.3	0.58	0.46	0.47	**4830**	**4440**	**2560**
Phenanthrene	580	<0.05	<0.05	2.47	0.11	82.6	0.1	0.34	0.43	195	179	18.4
Pyrene	68	<0.05	<0.01	3.03	0.09	**91.6**	0.07	0.21	0.28	**104**	**94.7**	5.09

Table B.6 Groundwater Analytical Results - Petroleum Hydrocarbons (PHCs) and Semi-Volatiles (PAHs)

Parameter	MECP Table 3 Standards (µg/L)	OW116A				OW116B		OW116C [4]		OW122B [2]	
Date Sampled (d/m/y)>		13-Mar-12	02-Oct-12	Duplicate 02-Oct-12	03-Oct-19	02-Oct-12	03-Oct-19	14-Mar-12	03-Oct-12	13-Mar-12	04-Oct-12
Hydrocarbons (PHCs)											
F1 PHCs (C6-C10)	750	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
F2 PHCs (C10-C16)	150	--	--	--	<100	--	<100	--	--	--	--
F3 PHCs (C16-C34)	500	--	--	--	<100	--	<100	--	--	--	--
F4 PHCs (C34-C50)	500	--	--	--	<100	--	<100	--	--	--	--
Semi-Volatiles											
Acenaphthene	600	<0.05	0.07	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	1.8	<0.05	0.23	0.23	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Anthracene	2.4	0.03	0.09	0.11	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01
Benzo[a]anthracene	4.7	<0.01	0.15	0.20	<0.01	<0..01	0.05	<0.01	<0.01	<0.01	<0.01
Benzo[a]pyrene	0.81	<0.01	0.09	0.12	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo[b]fluoranthene	0.75	<0.05	0.08	0.10	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[g,h,i]perylene	0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[k]fluoranthene	0.4	<0.05	<0.05	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chrysene	1	<0.05	0.12	0.17	<0.05	<0.05	0.06	<0.05	<0.05	<0.05	<0.05
Dibenzo[a,h]anthracene	0.52	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	130	0.05	0.10	0.14	0.04	<0.01	0.05	0.04	<0.01	<0.01	<0.01
Fluorene	400	<0.05	0.12	0.12	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno[1,2,3-cd]pyrene	0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1-Methylnaphthalene	1800	0.09	0.23	0.27	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2-Methylnaphthalene	1800	0.11	0.30	0.34	<0.05	0.07	<0.05	0.05	0.05	<0.05	<0.05
Methylnaphthalene (1&2)	1800	0.2	0.53	0.61	<0.10	0.11	<0.10	<0.10	<0.10	<0.10	<0.10
Naphthalene	1400	0.58	0.46	0.47	<0.05	0.77	0.08	0.18	0.3	0.39	0.63
Phenanthrene	580	0.1	0.34	0.43	<0.05	<0.05	<0.05	0.07	<0.05	<0.05	<0.05
Pyrene	68	0.07	0.21	0.28	0.03	<0.05	0.04	0.05	<0.01	<0.01	<0.01

Table B.6 Groundwater Analytical Results - Petroleum Hydrocarbons (PHCs) and Semi-Volatiles (PAHs)

Parameter	MECP Table 3 Standards (µg/L)	OW122C [2]			OW507C [3]		OW507B [3]		
Date Sampled (d/m/y)>		13-Mar-12	Duplicate 13-Mar-12	04-Oct-12	16-Apr-12	29-Oct-12	19-Apr-12	Duplicate 19-Apr-12	29-Oct-12
Hydrocarbons (PHCs)									
F1 PHCs (C6-C10)	750	<25	<25	<25	<25	<25	<25	<25	<25
F2 PHCs (C10-C16)	150	--	--	--	--	--	--	--	--
F3 PHCs (C16-C34)	500	--	--	--	--	--	--	--	--
F4 PHCs (C34-C50)	500	--	--	--	--	--	--	--	--
Semi-Volatiles									
Acenaphthene	600	<0.05	<0.05	<0.05	--	0.25	<0.05	<0.05	<0.05
Acenaphthylene	1.8	<0.05	**5.47**	<0.05	0.94	0.77	<0.05	<0.05	<0.05
Anthracene	2.4	<0.01	0.06	<0.01	0.02	0.03	<0.01	<0.01	<0.01
Benzo[a]anthracene	4.7	<0.01	<0.01	<0.01	<0.01	>0.01	<0.01	<0.01	<0.01
Benzo[a]pyrene	0.81	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo[b]fluoranthene	0.75	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[g,h,i]perylene	0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[k]fluoranthene	0.4	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chrysene	1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dibenzo[a,h]anthracene	0.52	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	130	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01
Fluorene	400	<0.05	0.28	<0.05	0.13	0.08	<0.05	<0.05	<0.05
Indeno[1,2,3-cd]pyrene	0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1-Methylnaphthalene	1800	<0.05	0.14	<0.05	0.1	0.05	<0.05	<0.05	0.06
2-Methylnaphthalene	1800	<0.05	0.17	<0.05	0.08	0.05	0.6	0.07	0.15
Methylnaphthalene (1&2)	1800	<0.10	0.31	<0.10	0.18	0.10	<0.10	0.11	0.21
Naphthalene	1400	0.64	13.9	0.84	0.36	0.08	0.67	0.66	0.26
Phenanthrene	580	<0.05	0.38	<0.05	0.08	0.06	<0.05	<0.05	<0.05
Pyrene	68	<0.01	0.04	<0.01	0.03	0.03	<0.01	<0.01	0.04

Notes for Groundwater Analytical Results
Tables B.4 - B.6

Notes:

N/A = Not analysed by the lab
NV = No Value
All units are µg/L unless otherwise noted
< 0.1 = not detected above laboratory detection limit
MECP = Soil, Groundwater and Sediment Standards for use under Part XV.1 of the Environmental Protection Act, April 2011
Table 3: Full Depth Background Site Condition Standards in a Non-Potable Ground Water Condition, coarse

Bold/ highlight	= Indicates concentrations which exceed MECP 2011 Table 3 Standards
[1]	= Indicates minimum detection limits (MDL) above MECP Table 3 Standards
[2]	= Could not locate well in 2019
[3]	= Well likely destroyedédecommissioned prior to 2019
[4]	= Dry/insufficient water in 2019
[5]	= Well in need of repair, could not be sampled in 2019

APPENDIX C: Laboratory Analytical Reports

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Certificate of Analysis

Geofirma Engineering Ltd.

1 Raymond St.,Suite 200
Ottawa, ON K1R1A2
Attn: Tim Galt

Client PO:
Project: 18-200-7/ Lees Avenue
Custody:

Report Date: 17-Oct-2019
Order Date: 8-Oct-2019

Order #: 1941231

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1941231-01	MW12-08
1941231-02	MW12-13
1941231-03	MW12-15
1941231-04	OW116A
1941231-05	OW116B
1941231-06	OW110A
1941231-07	MW12-03
1941231-08	MW12-04
1941231-09	MW12-05
1941231-10	MW12-18
1941231-11	MW12-19
1941231-12	OW109A
1941231-13	MW12-01
1941231-14	MW12-07
1941231-15	MW12-09
1941231-16	MW12-10
1941231-17	MW12-11
1941231-18	MW12-14
1941231-19	OW111A
1941231-20	OW111B
1941231-21	MWD1
1941231-22	MWD2
1941231-23	Trip Blank

Approved By: Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis
Client: Geofirma Engineering Ltd.
Client PO:

Report Date: 17-Oct-2019
Order Date: 8-Oct-2019
Project Description: 18-200-7/ Lees Avenue

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Cyanide, free	MOE E3015 - Auto Colour	9-Oct-19	10-Oct-19
Mercury by CVAA	EPA 245.2 - Cold Vapour AA	9-Oct-19	9-Oct-19
Metals, ICP-MS	EPA 200.8 - ICP-MS	9-Oct-19	9-Oct-19
PHC F1	CWS Tier 1 - P&T GC-FID	9-Oct-19	10-Oct-19
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	10-Oct-19	16-Oct-19
REG 153: PAHs by GC-MS	EPA 625 - GC-MS, extraction	15-Oct-19	15-Oct-19
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	9-Oct-19	10-Oct-19

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Client: Geofirma Engineering Ltd.

Client PO:

Report Date: 17-Oct-2019

Order Date: 8-Oct-2019

Project Description: 18-200-7/ Lees Avenue

	Client ID:	MW12-08	MW12-13	MW12-15	OW116A
	Sample Date:	02-Oct-19 09:00	02-Oct-19 09:00	02-Oct-19 09:00	03-Oct-19 09:00
	Sample ID:	1941231-01	1941231-02	1941231-03	1941231-04
	MDL/Units	Water	Water	Water	Water
General Inorganics					
Cyanide, free	2 ug/L	<2	18	<2	<2
Metals					
Mercury	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Antimony	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Arsenic	1 ug/L	<1	2	<1	<1
Barium	1 ug/L	52	98	35	425
Beryllium	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Boron	10 ug/L	54	377	46	833
Cadmium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Chromium	1 ug/L	<1	<1	<1	<1
Cobalt	0.5 ug/L	<0.5	0.5	<0.5	<0.5
Copper	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Lead	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Molybdenum	0.5 ug/L	1.1	0.5	1.2	0.5
Nickel	1 ug/L	1	<1	1	<1
Selenium	1 ug/L	<1	<1	<1	<1
Silver	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Sodium	200 ug/L	615000	2880000	415000	209000
Thallium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Uranium	0.1 ug/L	1.6	0.3	0.6	<0.1
Vanadium	0.5 ug/L	<0.5	8.2	<0.5	<0.5
Zinc	5 ug/L	<5	<5	<5	<5
Volatiles					
Acetone	5.0 ug/L	<5.0	<500 [1]	<5.0	<5.0
Benzene	0.5 ug/L	<0.5	31100	<0.5	<0.5
Bromodichloromethane	0.5 ug/L	<0.5	<50.0 [1]	<0.5	<0.5
Bromoform	0.5 ug/L	<0.5	<50.0 [1]	<0.5	<0.5
Bromomethane	0.5 ug/L	<0.5	<50.0 [1]	<0.5	<0.5
Carbon Tetrachloride	0.2 ug/L	<0.2	<20.0 [1]	<0.2	<0.2
Chlorobenzene	0.5 ug/L	<0.5	<50.0 [1]	<0.5	<0.5
Chloroform	0.5 ug/L	<0.5	<50.0 [1]	<0.5	<0.5
Dibromochloromethane	0.5 ug/L	<0.5	<50.0 [1]	<0.5	<0.5
Dichlorodifluoromethane	1.0 ug/L	<1.0	<100 [1]	<1.0	<1.0
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<50.0 [1]	<0.5	<0.5
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<50.0 [1]	<0.5	<0.5

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	Client ID:	MW12-08	MW12-13	MW12-15	OW116A
	Sample Date:	02-Oct-19 09:00	02-Oct-19 09:00	02-Oct-19 09:00	03-Oct-19 09:00
	Sample ID:	1941231-01	1941231-02	1941231-03	1941231-04
	MDL/Units	Water	Water	Water	Water
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<50.0 [1]	<0.5	<0.5
1,1-Dichloroethane	0.5 ug/L	<0.5	<50.0 [1]	<0.5	<0.5
1,2-Dichloroethane	0.5 ug/L	<0.5	<50.0 [1]	<0.5	<0.5
1,1-Dichloroethylene	0.5 ug/L	<0.5	<50.0 [1]	<0.5	<0.5
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<50.0 [1]	<0.5	<0.5
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<50.0 [1]	<0.5	<0.5
1,2-Dichloropropane	0.5 ug/L	<0.5	<50.0 [1]	<0.5	<0.5
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<50.0 [1]	<0.5	<0.5
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<50.0 [1]	<0.5	<0.5
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<50.0 [1]	<0.5	<0.5
Ethylbenzene	0.5 ug/L	<0.5	4790	<0.5	<0.5
Ethylene dibromide (dibromoethan	0.2 ug/L	<0.2	<20.0 [1]	<0.2	<0.2
Hexane	1.0 ug/L	<1.0	<100 [1]	<1.0	<1.0
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<500 [1]	<5.0	<5.0
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<500 [1]	<5.0	<5.0
Methyl tert-butyl ether	2.0 ug/L	<2.0	<200 [1]	<2.0	<2.0
Methylene Chloride	5.0 ug/L	<5.0	<500 [1]	<5.0	<5.0
Styrene	0.5 ug/L	<0.5	1100	<0.5	<0.5
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<50.0 [1]	<0.5	<0.5
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<50.0 [1]	<0.5	<0.5
Tetrachloroethylene	0.5 ug/L	<0.5	<50.0 [1]	<0.5	<0.5
Toluene	0.5 ug/L	<0.5	6700	<0.5	<0.5
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<50.0 [1]	<0.5	<0.5
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<50.0 [1]	<0.5	<0.5
Trichloroethylene	0.5 ug/L	<0.5	<50.0 [1]	<0.5	<0.5
Trichlorofluoromethane	1.0 ug/L	<1.0	<100 [1]	<1.0	<1.0
Vinyl chloride	0.5 ug/L	<0.5	<50.0 [1]	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	<0.5	2570	<0.5	<0.5
o-Xylene	0.5 ug/L	<0.5	1660	<0.5	<0.5
Xylenes, total	0.5 ug/L	<0.5	4230	<0.5	<0.5
4-Bromofluorobenzene	Surrogate	113%	101%	114%	108%
Dibromofluoromethane	Surrogate	96.4%	77.6%	83.5%	85.2%
Toluene-d8	Surrogate	95.3%	92.8%	93.3%	95.2%
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	17700	<25	<25
F2 PHCs (C10-C16)	100 ug/L	<100	2900	<100	<100

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	Client ID:	MW12-08	MW12-13	MW12-15	OW116A
	Sample Date:	02-Oct-19 09:00	02-Oct-19 09:00	02-Oct-19 09:00	03-Oct-19 09:00
	Sample ID:	1941231-01	1941231-02	1941231-03	1941231-04
	MDL/Units	Water	Water	Water	Water
F3 PHCs (C16-C34)	100 ug/L	<100	<100	<100	<100
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	<100
Semi-Volatiles					
Acenaphthene	0.05 ug/L	<0.05	11.9	<0.05	<0.05
Acenaphthylene	0.05 ug/L	<0.05	94.2	<0.05	<0.05
Anthracene	0.01 ug/L	<0.01	2.74	<0.01	<0.01
Benzo [a] anthracene	0.01 ug/L	<0.01	<1.00 [1]	<0.01	<0.01
Benzo [a] pyrene	0.01 ug/L	<0.01	<1.00 [1]	<0.01	<0.01
Benzo [b] fluoranthene	0.05 ug/L	<0.05	<5.00 [1]	<0.05	<0.05
Benzo [g,h,i] perylene	0.05 ug/L	<0.05	<5.00 [1]	<0.05	<0.05
Benzo [k] fluoranthene	0.05 ug/L	<0.05	<5.00 [1]	<0.05	<0.05
Chrysene	0.05 ug/L	<0.05	<5.00 [1]	<0.05	<0.05
Dibenzo [a,h] anthracene	0.05 ug/L	<0.05	<5.00 [1]	<0.05	<0.05
Fluoranthene	0.01 ug/L	<0.01	2.35	0.04	0.04
Fluorene	0.05 ug/L	<0.05	21.3	<0.05	<0.05
Indeno [1,2,3-cd] pyrene	0.05 ug/L	<0.05	<5.00 [1]	<0.05	<0.05
1-Methylnaphthalene	0.05 ug/L	<0.05	350	0.06	<0.05
2-Methylnaphthalene	0.05 ug/L	<0.05	226	<0.05	<0.05
Methylnaphthalene (1&2)	0.10 ug/L	<0.10	576	<0.10	<0.10
Naphthalene	0.05 ug/L	<0.05	4280	<0.05	<0.05
Phenanthrene	0.05 ug/L	<0.05	16.1	<0.05	<0.05
Pyrene	0.01 ug/L	<0.01	3.10	0.03	0.03
2-Fluorobiphenyl	Surrogate	114%	97.6%	98.6%	92.7%
Terphenyl-d14	Surrogate	107%	131%	97.5%	104%

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	Client ID:	OW116B	OW110A	MW12-03	MW12-04
	Sample Date:	03-Oct-19 09:00	03-Oct-19 09:00	04-Oct-19 09:00	04-Oct-19 09:00
	Sample ID:	1941231-05	1941231-06	1941231-07	1941231-08
	MDL/Units	Water	Water	Water	Water
General Inorganics					
Cyanide, free	2 ug/L	<2	8	<2	4
Metals					
Mercury	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Antimony	0.5 ug/L	<0.5	<0.5	0.6	<0.5
Arsenic	1 ug/L	<1	<1	<1	<1
Barium	1 ug/L	358	81	29	54
Beryllium	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Boron	10 ug/L	841	176	102	151
Cadmium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Chromium	1 ug/L	<1	<1	<1	<1
Cobalt	0.5 ug/L	<0.5	<0.5	2.1	0.8
Copper	0.5 ug/L	<0.5	<0.5	3.8	3.9
Lead	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Molybdenum	0.5 ug/L	<0.5	0.6	3.2	1.0
Nickel	1 ug/L	<1	1	13	3
Selenium	1 ug/L	<1	<1	<1	<1
Silver	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Sodium	200 ug/L	211000	617000	51200	448000
Thallium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Uranium	0.1 ug/L	<0.1	<0.1	2.4	0.5
Vanadium	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Zinc	5 ug/L	6	<5	22	<5
Volatiles					
Acetone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Benzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Chloroform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5

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Project Description: 18-200-7/ Lees Avenue

	Client ID:	OW116B	OW110A	MW12-03	MW12-04
	Sample Date:	03-Oct-19 09:00	03-Oct-19 09:00	04-Oct-19 09:00	04-Oct-19 09:00
	Sample ID:	1941231-05	1941231-06	1941231-07	1941231-08
	MDL/Units	Water	Water	Water	Water
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylene dibromide (dibromoethar	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Hexane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	<2.0
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Xylenes, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
4-Bromofluorobenzene	Surrogate	103%	108%	108%	110%
Dibromofluoromethane	Surrogate	90.0%	93.1%	91.1%	92.7%
Toluene-d8	Surrogate	95.1%	95.1%	95.9%	96.1%
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	<25	<25	<25

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Project Description: 18-200-7/ Lees Avenue

	Client ID:	OW116B	OW110A	MW12-03	MW12-04
	Sample Date:	03-Oct-19 09:00	03-Oct-19 09:00	04-Oct-19 09:00	04-Oct-19 09:00
	Sample ID:	1941231-05	1941231-06	1941231-07	1941231-08
	MDL/Units	Water	Water	Water	Water
F2 PHCs (C10-C16)	100 ug/L	<100	<100	<100	<100
F3 PHCs (C16-C34)	100 ug/L	<100	<100	<100	<100
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	<100
Semi-Volatiles					
Acenaphthene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Anthracene	0.01 ug/L	<0.01	<0.01	<0.01	<0.01
Benzo [a] anthracene	0.01 ug/L	0.05	<0.01	<0.01	<0.01
Benzo [a] pyrene	0.01 ug/L	<0.01	<0.01	<0.01	<0.01
Benzo [b] fluoranthene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Benzo [g,h,i] perylene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Benzo [k] fluoranthene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Chrysene	0.05 ug/L	0.06	<0.05	<0.05	<0.05
Dibenzo [a,h] anthracene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Fluoranthene	0.01 ug/L	0.05	<0.01	0.04	<0.01
Fluorene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Indeno [1,2,3-cd] pyrene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
1-Methylnaphthalene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
2-Methylnaphthalene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Methylnaphthalene (1&2)	0.10 ug/L	<0.10	<0.10	<0.10	<0.10
Naphthalene	0.05 ug/L	0.08	<0.05	0.24	0.23
Phenanthrene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Pyrene	0.01 ug/L	0.04	<0.01	0.06	<0.01
2-Fluorobiphenyl	Surrogate	95.5%	99.1%	98.1%	98.0%
Terphenyl-d14	Surrogate	105%	111%	105%	100%

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Client PO:

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Project Description: 18-200-7/ Lees Avenue

	Client ID:	MW12-05	MW12-18	MW12-19	OW109A
	Sample Date:	04-Oct-19 09:00	04-Oct-19 09:00	04-Oct-19 09:00	04-Oct-19 09:00
	Sample ID:	1941231-09	1941231-10	1941231-11	1941231-12
	MDL/Units	Water	Water	Water	Water
General Inorganics					
Cyanide, free	2 ug/L	139	5	29	27
Metals					
Mercury	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Antimony	0.5 ug/L	<0.5	<0.5	0.6	<0.5
Arsenic	1 ug/L	<1	<1	<1	<1
Barium	1 ug/L	45	31	24	66
Beryllium	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Boron	10 ug/L	56	54	138	279
Cadmium	0.1 ug/L	<0.1	<0.1	0.1	<0.1
Chromium	1 ug/L	<1	<1	<1	<1
Cobalt	0.5 ug/L	0.7	<0.5	5.3	1.0
Copper	0.5 ug/L	<0.5	1.9	1.3	<0.5
Lead	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Molybdenum	0.5 ug/L	2.8	7.9	1.5	1.4
Nickel	1 ug/L	3	2	11	7
Selenium	1 ug/L	<1	<1	<1	<1
Silver	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Sodium	200 ug/L	1740000	1780000	116000	656000
Thallium	0.1 ug/L	<0.1	<0.1	0.3	<0.1
Uranium	0.1 ug/L	1.3	0.8	0.5	<0.1
Vanadium	0.5 ug/L	1.6	<0.5	5.4	<0.5
Zinc	5 ug/L	<5	<5	<5	<5
Volatiles					
Acetone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Benzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Chloroform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5

Certificate of Analysis

Client: Geofirma Engineering Ltd.

Client PO:

Report Date: 17-Oct-2019

Order Date: 8-Oct-2019

Project Description: 18-200-7/ Lees Avenue

	Client ID:	MW12-05	MW12-18	MW12-19	OW109A
	Sample Date:	04-Oct-19 09:00	04-Oct-19 09:00	04-Oct-19 09:00	04-Oct-19 09:00
	Sample ID:	1941231-09	1941231-10	1941231-11	1941231-12
	MDL/Units	Water	Water	Water	Water
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylene dibromide (dibromoethar	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Hexane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	<2.0
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Xylenes, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
4-Bromofluorobenzene	Surrogate	108%	111%	116%	107%
Dibromofluoromethane	Surrogate	89.1%	87.8%	84.3%	80.9%
Toluene-d8	Surrogate	95.2%	95.7%	95.2%	95.2%
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	<25	<25	<25

Certificate of Analysis

Client: Geofirma Engineering Ltd.

Client PO:

Report Date: 17-Oct-2019

Order Date: 8-Oct-2019

Project Description: 18-200-7/ Lees Avenue

	Client ID:	MW12-05	MW12-18	MW12-19	OW109A
	Sample Date:	04-Oct-19 09:00	04-Oct-19 09:00	04-Oct-19 09:00	04-Oct-19 09:00
	Sample ID:	1941231-09	1941231-10	1941231-11	1941231-12
	MDL/Units	Water	Water	Water	Water
F2 PHCs (C10-C16)	100 ug/L	<100	<100	<100	<100
F3 PHCs (C16-C34)	100 ug/L	<100	<100	<100	<100
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	<100
Semi-Volatiles					
Acenaphthene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Anthracene	0.01 ug/L	<0.01	<0.01	<0.01	<0.01
Benzo [a] anthracene	0.01 ug/L	<0.01	<0.01	<0.01	<0.01
Benzo [a] pyrene	0.01 ug/L	<0.01	<0.01	<0.01	<0.01
Benzo [b] fluoranthene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Benzo [g,h,i] perylene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Benzo [k] fluoranthene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Chrysene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Dibenzo [a,h] anthracene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Fluoranthene	0.01 ug/L	<0.01	<0.01	<0.01	<0.01
Fluorene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Indeno [1,2,3-cd] pyrene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
1-Methylnaphthalene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
2-Methylnaphthalene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Methylnaphthalene (1&2)	0.10 ug/L	<0.10	<0.10	<0.10	<0.10
Naphthalene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Phenanthrene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Pyrene	0.01 ug/L	<0.01	<0.01	<0.01	<0.01
2-Fluorobiphenyl	Surrogate	98.0%	92.1%	92.7%	90.1%
Terphenyl-d14	Surrogate	109%	113%	102%	108%

Certificate of Analysis

Client: Geofirma Engineering Ltd.

Client PO:

Report Date: 17-Oct-2019

Order Date: 8-Oct-2019

Project Description: 18-200-7/ Lees Avenue

	Client ID:	MW12-01	MW12-07	MW12-09	MW12-10
	Sample Date:	07-Oct-19 09:00	07-Oct-19 09:00	07-Oct-19 09:00	07-Oct-19 09:00
	Sample ID:	1941231-13	1941231-14	1941231-15	1941231-16
	MDL/Units	Water	Water	Water	Water
General Inorganics					
Cyanide, free	2 ug/L	5	<2	<2	<2
Metals					
Mercury	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Antimony	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Arsenic	1 ug/L	<1	<1	<1	<1
Barium	1 ug/L	36	38	36	49
Beryllium	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Boron	10 ug/L	132	62	46	63
Cadmium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Chromium	1 ug/L	<1	<1	<1	<1
Cobalt	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Copper	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Lead	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Molybdenum	0.5 ug/L	0.6	<0.5	<0.5	<0.5
Nickel	1 ug/L	3	2	<1	1
Selenium	1 ug/L	<1	<1	<1	<1
Silver	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Sodium	200 ug/L	1250000	1660000	1370000	1390000
Thallium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Uranium	0.1 ug/L	<0.1	0.1	<0.1	<0.1
Vanadium	0.5 ug/L	0.7	<0.5	1.3	6.8
Zinc	5 ug/L	<5	<5	<5	<5
Volatiles					
Acetone	5.0 ug/L	<5.0	<5.0	<250 [1]	<250 [1]
Benzene	0.5 ug/L	<0.5	<0.5	2240	4310
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<25.0 [1]	<25.0 [1]
Bromoform	0.5 ug/L	<0.5	<0.5	<25.0 [1]	<25.0 [1]
Bromomethane	0.5 ug/L	<0.5	<0.5	<25.0 [1]	<25.0 [1]
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<10.0 [1]	<10.0 [1]
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<25.0 [1]	<25.0 [1]
Chloroform	0.5 ug/L	<0.5	<0.5	<25.0 [1]	<25.0 [1]
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<25.0 [1]	<25.0 [1]
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<50.0 [1]	<50.0 [1]
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<25.0 [1]	<25.0 [1]
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<25.0 [1]	<25.0 [1]

Certificate of Analysis
Client: Geofirma Engineering Ltd.
Client PO:

Report Date: 17-Oct-2019
Order Date: 8-Oct-2019
Project Description: 18-200-7/ Lees Avenue

	Client ID:	MW12-01	MW12-07	MW12-09	MW12-10
	Sample Date:	07-Oct-19 09:00	07-Oct-19 09:00	07-Oct-19 09:00	07-Oct-19 09:00
	Sample ID:	1941231-13	1941231-14	1941231-15	1941231-16
	MDL/Units	Water	Water	Water	Water
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<25.0 [1]	<25.0 [1]
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<25.0 [1]	<25.0 [1]
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<25.0 [1]	<25.0 [1]
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<25.0 [1]	<25.0 [1]
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<25.0 [1]	<25.0 [1]
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<25.0 [1]	<25.0 [1]
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<25.0 [1]	<25.0 [1]
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<25.0 [1]	<25.0 [1]
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<25.0 [1]	<25.0 [1]
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<25.0 [1]	<25.0 [1]
Ethylbenzene	0.5 ug/L	<0.5	<0.5	2800	5820
Ethylene dibromide (dibromoethar	0.2 ug/L	<0.2	<0.2	<10.0 [1]	<10.0 [1]
Hexane	1.0 ug/L	<1.0	<1.0	<50.0 [1]	<50.0 [1]
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<250 [1]	<250 [1]
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<250 [1]	<250 [1]
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<100 [1]	<100 [1]
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<250 [1]	<250 [1]
Styrene	0.5 ug/L	<0.5	<0.5	7400	186
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<25.0 [1]	<25.0 [1]
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<25.0 [1]	<25.0 [1]
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<25.0 [1]	<25.0 [1]
Toluene	0.5 ug/L	<0.5	<0.5	5630	1140
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<25.0 [1]	<25.0 [1]
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<25.0 [1]	<25.0 [1]
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<25.0 [1]	<25.0 [1]
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<50.0 [1]	<50.0 [1]
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<25.0 [1]	<25.0 [1]
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	8190	2300
o-Xylene	0.5 ug/L	<0.5	<0.5	3500	1590
Xylenes, total	0.5 ug/L	<0.5	<0.5	11700	3880
4-Bromofluorobenzene	Surrogate	113%	120%	90.7%	94.4%
Dibromofluoromethane	Surrogate	78.4%	83.9%	83.2%	86.3%
Toluene-d8	Surrogate	93.1%	92.6%	91.9%	93.6%
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	<25	18500	9400

Certificate of Analysis

Client: Geofirma Engineering Ltd.

Client PO:

Report Date: 17-Oct-2019

Order Date: 8-Oct-2019

Project Description: 18-200-7/ Lees Avenue

	Client ID:	MW12-01	MW12-07	MW12-09	MW12-10
	Sample Date:	07-Oct-19 09:00	07-Oct-19 09:00	07-Oct-19 09:00	07-Oct-19 09:00
	Sample ID:	1941231-13	1941231-14	1941231-15	1941231-16
	MDL/Units	Water	Water	Water	Water
F2 PHCs (C10-C16)	100 ug/L	<100	<100	602	<100
F3 PHCs (C16-C34)	100 ug/L	<100	<100	<100	<100
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	<100
Semi-Volatiles					
Acenaphthene	0.05 ug/L	<0.05	<0.05	11.5	84.0
Acenaphthylene	0.05 ug/L	<0.05	<0.05	289	70.3
Anthracene	0.01 ug/L	<0.01	<0.01	7.09	2.40
Benzo [a] anthracene	0.01 ug/L	<0.01	<0.01	<1.00 [1]	<1.00 [1]
Benzo [a] pyrene	0.01 ug/L	<0.01	<0.01	<1.00 [1]	<1.00 [1]
Benzo [b] fluoranthene	0.05 ug/L	<0.05	<0.05	<5.00 [1]	<5.00 [1]
Benzo [g,h,i] perylene	0.05 ug/L	<0.05	<0.05	<5.00 [1]	<5.00 [1]
Benzo [k] fluoranthene	0.05 ug/L	<0.05	<0.05	<5.00 [1]	<5.00 [1]
Chrysene	0.05 ug/L	<0.05	<0.05	<5.00 [1]	<5.00 [1]
Dibenzo [a,h] anthracene	0.05 ug/L	<0.05	<0.05	<5.00 [1]	<5.00 [1]
Fluoranthene	0.01 ug/L	<0.01	<0.01	7.10	2.78
Fluorene	0.05 ug/L	<0.05	<0.05	59.6	31.0
Indeno [1,2,3-cd] pyrene	0.05 ug/L	<0.05	<0.05	<5.00 [1]	<5.00 [1]
1-Methylnaphthalene	0.05 ug/L	<0.05	<0.05	806	660
2-Methylnaphthalene	0.05 ug/L	<0.05	<0.05	1340	477
Methylnaphthalene (1&2)	0.10 ug/L	<0.10	<0.10	2150	1140
Naphthalene	0.05 ug/L	0.07	0.08	12200	5070
Phenanthrene	0.05 ug/L	<0.05	<0.05	43.3	20.2
Pyrene	0.01 ug/L	<0.01	<0.01	10.9	4.03
2-Fluorobiphenyl	Surrogate	104%	114%	121%	91.8%
Terphenyl-d14	Surrogate	105%	113%	107%	109%

Certificate of Analysis
Client: Geofirma Engineering Ltd.
Client PO:

Report Date: 17-Oct-2019
Order Date: 8-Oct-2019
Project Description: 18-200-7/ Lees Avenue

	Client ID:	MW12-11	MW12-14	OW111A	OW111B
	Sample Date:	07-Oct-19 09:00	07-Oct-19 09:00	07-Oct-19 09:00	07-Oct-19 09:00
	Sample ID:	1941231-17	1941231-18	1941231-19	1941231-20
	MDL/Units	Water	Water	Water	Water
General Inorganics					
Cyanide, free	2 ug/L	<2	29	<2	107
Metals					
Mercury	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Antimony	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Arsenic	1 ug/L	<1	<1	<1	<1
Barium	1 ug/L	40	53	1130	89
Beryllium	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Boron	10 ug/L	102	64	426	56
Cadmium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Chromium	1 ug/L	<1	<1	<1	<1
Cobalt	0.5 ug/L	<0.5	<0.5	<0.5	7.6
Copper	0.5 ug/L	<0.5	<0.5	<0.5	0.8
Lead	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Molybdenum	0.5 ug/L	<0.5	0.8	3.6	1.4
Nickel	1 ug/L	1	1	2	22
Selenium	1 ug/L	<1	<1	<1	8
Silver	0.1 ug/L	<0.1	<0.1	55.5	<0.1
Sodium	200 ug/L	1450000	1890000	1240000	874000
Thallium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Uranium	0.1 ug/L	0.9	3.6	<0.1	9.5
Vanadium	0.5 ug/L	<0.5	5.0	<0.5	<0.5
Zinc	5 ug/L	<5	<5	<5	<5
Volatiles					
Acetone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Benzene	0.5 ug/L	<0.5	2.8	<0.5	<0.5
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Chloroform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5

Certificate of Analysis

Report Date: 17-Oct-2019

Client: Geofirma Engineering Ltd.

Order Date: 8-Oct-2019

Client PO:

Project Description: 18-200-7/ Lees Avenue

	Client ID:	MW12-11	MW12-14	OW111A	OW111B
	Sample Date:	07-Oct-19 09:00	07-Oct-19 09:00	07-Oct-19 09:00	07-Oct-19 09:00
	Sample ID:	1941231-17	1941231-18	1941231-19	1941231-20
	MDL/Units	Water	Water	Water	Water
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5 ug/L	8.0	113	<0.5	<0.5
Ethylene dibromide (dibromoethar	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Hexane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	<2.0
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Styrene	0.5 ug/L	<0.5	190	<0.5	<0.5
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Toluene	0.5 ug/L	<0.5	53.2	<0.5	<0.5
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	<0.5	315	<0.5	<0.5
o-Xylene	0.5 ug/L	<0.5	120	<0.5	<0.5
Xylenes, total	0.5 ug/L	<0.5	436	<0.5	<0.5
4-Bromofluorobenzene	Surrogate	112%	98.1%	112%	109%
Dibromofluoromethane	Surrogate	86.8%	85.9%	85.6%	86.1%
Toluene-d8	Surrogate	93.6%	95.8%	93.8%	93.7%

Hydrocarbons

Certificate of Analysis

Report Date: 17-Oct-2019

Client: Geofirma Engineering Ltd.

Order Date: 8-Oct-2019

Client PO:

Project Description: 18-200-7/ Lees Avenue

	Client ID:	MW12-11	MW12-14	OW111A	OW111B
	Sample Date:	07-Oct-19 09:00	07-Oct-19 09:00	07-Oct-19 09:00	07-Oct-19 09:00
	Sample ID:	1941231-17	1941231-18	1941231-19	1941231-20
	MDL/Units	Water	Water	Water	Water
F1 PHCs (C6-C10)	25 ug/L	<25	1930	<25	<25
F2 PHCs (C10-C16)	100 ug/L	<100	<100	<100	<100
F3 PHCs (C16-C34)	100 ug/L	<100	<100	<100	<100
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	<100
Semi-Volatiles					
Acenaphthene	0.05 ug/L	1.26	23.1	0.13	1.44
Acenaphthylene	0.05 ug/L	4.30	351	1.41	17.7
Anthracene	0.01 ug/L	0.48	2.09	0.67	23.4
Benzo [a] anthracene	0.01 ug/L	0.58	<1.00 [1]	1.47	38.9
Benzo [a] pyrene	0.01 ug/L	0.37	<1.00 [1]	1.01	26.5
Benzo [b] fluoranthene	0.05 ug/L	0.26	<5.00 [1]	0.81	18.1
Benzo [g,h,i] perylene	0.05 ug/L	0.17	<5.00 [1]	0.51	11.1
Benzo [k] fluoranthene	0.05 ug/L	0.15	<5.00 [1]	0.50	11.1
Chrysene	0.05 ug/L	0.63	<5.00 [1]	1.38	42.1
Dibenzo [a,h] anthracene	0.05 ug/L	0.05	<5.00 [1]	0.16	3.98
Fluoranthene	0.01 ug/L	0.97	3.83	1.76	50.0
Fluorene	0.05 ug/L	1.47	50.2	0.69	12.3
Indeno [1,2,3-cd] pyrene	0.05 ug/L	0.14	<5.00 [1]	0.43	9.84
1-Methylnaphthalene	0.05 ug/L	3.74	890	2.63	11.1
2-Methylnaphthalene	0.05 ug/L	0.66	542	3.03	6.53
Methylnaphthalene (1&2)	0.10 ug/L	4.40	1430	5.66	17.6
Naphthalene	0.05 ug/L	6.72	4560	9.78	13.3
Phenanthrene	0.05 ug/L	1.02	20.3	2.47	82.6
Pyrene	0.01 ug/L	1.73	6.36	3.03	91.6
2-Fluorobiphenyl	Surrogate	86.7%	112%	87.9%	108%
Terphenyl-d14	Surrogate	112%	128%	109%	104%

Certificate of Analysis
Client: Geofirma Engineering Ltd.
Client PO:

Report Date: 17-Oct-2019
Order Date: 8-Oct-2019
Project Description: 18-200-7/ Lees Avenue

	Client ID:	MWD1	MWD2	Trip Blank	-
	Sample Date:	02-Oct-19 09:00	04-Oct-19 09:00	27-Sep-19 09:00	-
	Sample ID:	1941231-21	1941231-22	1941231-23	-
	MDL/Units	Water	Water	Water	-
General Inorganics					
Cyanide, free	2 ug/L	19	154	-	-
Metals					
Mercury	0.1 ug/L	<0.1	<0.1	-	-
Antimony	0.5 ug/L	<0.5	<0.5	-	-
Arsenic	1 ug/L	3	<1	-	-
Barium	1 ug/L	108	47	-	-
Beryllium	0.5 ug/L	<0.5	<0.5	-	-
Boron	10 ug/L	396	53	-	-
Cadmium	0.1 ug/L	<0.1	<0.1	-	-
Chromium	1 ug/L	<1	<1	-	-
Cobalt	0.5 ug/L	0.6	0.8	-	-
Copper	0.5 ug/L	<0.5	<0.5	-	-
Lead	0.1 ug/L	<0.1	<0.1	-	-
Molybdenum	0.5 ug/L	<0.5	2.9	-	-
Nickel	1 ug/L	<1	3	-	-
Selenium	1 ug/L	<1	<1	-	-
Silver	0.1 ug/L	<0.1	0.1	-	-
Sodium	200 ug/L	3400000	1890000	-	-
Thallium	0.1 ug/L	<0.1	<0.1	-	-
Uranium	0.1 ug/L	0.2	1.1	-	-
Vanadium	0.5 ug/L	9.0	1.7	-	-
Zinc	5 ug/L	<5	<5	-	-
Volatiles					
Acetone	5.0 ug/L	<500 [1]	<5.0	<5.0	-
Benzene	0.5 ug/L	29500	<0.5	<0.5	-
Bromodichloromethane	0.5 ug/L	<50.0 [1]	<0.5	<0.5	-
Bromoform	0.5 ug/L	<50.0 [1]	<0.5	<0.5	-
Bromomethane	0.5 ug/L	<50.0 [1]	<0.5	<0.5	-
Carbon Tetrachloride	0.2 ug/L	<20.0 [1]	<0.2	<0.2	-
Chlorobenzene	0.5 ug/L	<50.0 [1]	<0.5	<0.5	-
Chloroform	0.5 ug/L	<50.0 [1]	<0.5	<0.5	-
Dibromochloromethane	0.5 ug/L	<50.0 [1]	<0.5	<0.5	-
Dichlorodifluoromethane	1.0 ug/L	<100 [1]	<1.0	<1.0	-
1,2-Dichlorobenzene	0.5 ug/L	<50.0 [1]	<0.5	<0.5	-

Certificate of Analysis

Client: Geofirma Engineering Ltd.

Client PO:

Report Date: 17-Oct-2019

Order Date: 8-Oct-2019

Project Description: 18-200-7/ Lees Avenue

	Client ID:	MWD1	MWD2	Trip Blank	-
	Sample Date:	02-Oct-19 09:00	04-Oct-19 09:00	27-Sep-19 09:00	-
	Sample ID:	1941231-21	1941231-22	1941231-23	-
	MDL/Units	Water	Water	Water	-
1,3-Dichlorobenzene	0.5 ug/L	<50.0 [1]	<0.5	<0.5	-
1,4-Dichlorobenzene	0.5 ug/L	<50.0 [1]	<0.5	<0.5	-
1,1-Dichloroethane	0.5 ug/L	<50.0 [1]	<0.5	<0.5	-
1,2-Dichloroethane	0.5 ug/L	<50.0 [1]	<0.5	<0.5	-
1,1-Dichloroethylene	0.5 ug/L	<50.0 [1]	<0.5	<0.5	-
cis-1,2-Dichloroethylene	0.5 ug/L	<50.0 [1]	<0.5	<0.5	-
trans-1,2-Dichloroethylene	0.5 ug/L	<50.0 [1]	<0.5	<0.5	-
1,2-Dichloropropane	0.5 ug/L	<50.0 [1]	<0.5	<0.5	-
cis-1,3-Dichloropropylene	0.5 ug/L	<50.0 [1]	<0.5	<0.5	-
trans-1,3-Dichloropropylene	0.5 ug/L	<50.0 [1]	<0.5	<0.5	-
1,3-Dichloropropene, total	0.5 ug/L	<50.0 [1]	<0.5	<0.5	-
Ethylbenzene	0.5 ug/L	4520	<0.5	<0.5	-
Ethylene dibromide (dibromoethar	0.2 ug/L	<20.0 [1]	<0.2	<0.2	-
Hexane	1.0 ug/L	<100 [1]	<1.0	<1.0	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<500 [1]	<5.0	<5.0	-
Methyl Isobutyl Ketone	5.0 ug/L	<500 [1]	<5.0	<5.0	-
Methyl tert-butyl ether	2.0 ug/L	<200 [1]	<2.0	<2.0	-
Methylene Chloride	5.0 ug/L	<500 [1]	<5.0	<5.0	-
Styrene	0.5 ug/L	1050	<0.5	<0.5	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<50.0 [1]	<0.5	<0.5	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<50.0 [1]	<0.5	<0.5	-
Tetrachloroethylene	0.5 ug/L	<50.0 [1]	<0.5	<0.5	-
Toluene	0.5 ug/L	6490	<0.5	<0.5	-
1,1,1-Trichloroethane	0.5 ug/L	<50.0 [1]	<0.5	<0.5	-
1,1,2-Trichloroethane	0.5 ug/L	<50.0 [1]	<0.5	<0.5	-
Trichloroethylene	0.5 ug/L	<50.0 [1]	<0.5	<0.5	-
Trichlorofluoromethane	1.0 ug/L	<100 [1]	<1.0	<1.0	-
Vinyl chloride	0.5 ug/L	<50.0 [1]	<0.5	<0.5	-
m,p-Xylenes	0.5 ug/L	2380	<0.5	<0.5	-
o-Xylene	0.5 ug/L	1590	<0.5	<0.5	-
Xylenes, total	0.5 ug/L	3980	<0.5	<0.5	-
4-Bromofluorobenzene	Surrogate	102%	108%	110%	-
Dibromofluoromethane	Surrogate	73.3%	85.8%	85.7%	-
Toluene-d8	Surrogate	93.2%	94.4%	95.2%	-

Hydrocarbons

Certificate of Analysis
Client: Geofirma Engineering Ltd.
Client PO:

Report Date: 17-Oct-2019
Order Date: 8-Oct-2019
Project Description: 18-200-7/ Lees Avenue

	Client ID:	MWD1	MWD2	Trip Blank	-
	Sample Date:	02-Oct-19 09:00	04-Oct-19 09:00	27-Sep-19 09:00	-
	Sample ID:	1941231-21	1941231-22	1941231-23	-
	MDL/Units	Water	Water	Water	-
F1 PHCs (C6-C10)	25 ug/L	20100	<25	-	-
F2 PHCs (C10-C16)	100 ug/L	<100	<100	-	-
F3 PHCs (C16-C34)	100 ug/L	<100	<100	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	<100	-	-
Semi-Volatiles					
Acenaphthene	0.05 ug/L	12.8	<0.05	-	-
Acenaphthylene	0.05 ug/L	91.0	0.12	-	-
Anthracene	0.01 ug/L	2.60	0.04	-	-
Benzo [a] anthracene	0.01 ug/L	<1.00 [1]	0.08	-	-
Benzo [a] pyrene	0.01 ug/L	<1.00 [1]	0.06	-	-
Benzo [b] fluoranthene	0.05 ug/L	<5.00 [1]	<0.05	-	-
Benzo [g,h,i] perylene	0.05 ug/L	<5.00 [1]	0.06	-	-
Benzo [k] fluoranthene	0.05 ug/L	<5.00 [1]	<0.05	-	-
Chrysene	0.05 ug/L	<5.00 [1]	0.07	-	-
Dibenzo [a,h] anthracene	0.05 ug/L	<5.00 [1]	<0.05	-	-
Fluoranthene	0.01 ug/L	1.98	0.09	-	-
Fluorene	0.05 ug/L	20.4	<0.05	-	-
Indeno [1,2,3-cd] pyrene	0.05 ug/L	<5.00 [1]	<0.05	-	-
1-Methylnaphthalene	0.05 ug/L	366	0.14	-	-
2-Methylnaphthalene	0.05 ug/L	237	0.08	-	-
Methylnaphthalene (1&2)	0.10 ug/L	603	0.22	-	-
Naphthalene	0.05 ug/L	4590	0.49	-	-
Phenanthrene	0.05 ug/L	15.4	0.14	-	-
Pyrene	0.01 ug/L	2.67	0.16	-	-
2-Fluorobiphenyl	Surrogate	118%	101%	-	-
Terphenyl-d14	Surrogate	119%	106%	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
Cyanide, free	ND	2	ug/L						
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
Metals									
Mercury	ND	0.1	ug/L						
Antimony	ND	0.5	ug/L						
Arsenic	ND	1	ug/L						
Barium	ND	1	ug/L						
Beryllium	ND	0.5	ug/L						
Boron	ND	10	ug/L						
Cadmium	ND	0.1	ug/L						
Chromium	ND	1	ug/L						
Cobalt	ND	0.5	ug/L						
Copper	ND	0.5	ug/L						
Lead	ND	0.1	ug/L						
Molybdenum	ND	0.5	ug/L						
Nickel	ND	1	ug/L						
Selenium	ND	1	ug/L						
Silver	ND	0.1	ug/L						
Sodium	ND	200	ug/L						
Thallium	ND	0.1	ug/L						
Uranium	ND	0.1	ug/L						
Vanadium	ND	0.5	ug/L						
Zinc	ND	5	ug/L						
Semi-Volatiles									
Acenaphthene	ND	0.05	ug/L						
Acenaphthylene	ND	0.05	ug/L						
Anthracene	ND	0.01	ug/L						
Benzo [a] anthracene	ND	0.01	ug/L						
Benzo [a] pyrene	ND	0.01	ug/L						
Benzo [b] fluoranthene	ND	0.05	ug/L						
Benzo [g,h,i] perylene	ND	0.05	ug/L						
Benzo [k] fluoranthene	ND	0.05	ug/L						
Chrysene	ND	0.05	ug/L						
Dibenzo [a,h] anthracene	ND	0.05	ug/L						
Fluoranthene	ND	0.01	ug/L						
Fluorene	ND	0.05	ug/L						
Indeno [1,2,3-cd] pyrene	ND	0.05	ug/L						
1-Methylnaphthalene	ND	0.05	ug/L						
2-Methylnaphthalene	ND	0.05	ug/L						
Methylnaphthalene (1&2)	ND	0.10	ug/L						
Naphthalene	ND	0.05	ug/L						
Phenanthrene	ND	0.05	ug/L						
Pyrene	ND	0.01	ug/L						
Surrogate: 2-Fluorobiphenyl	*21.5*		*ug/L*		*107*	*50-140*			
Surrogate: Terphenyl-d14	*20.7*		*ug/L*		*104*	*50-140*			
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						

Certificate of Analysis
Client: Geofirma Engineering Ltd.
Client PO:

Report Date: 17-Oct-2019
Order Date: 8-Oct-2019
Project Description: 18-200-7/ Lees Avenue

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Ethylene dibromide (dibromoethane	ND	0.2	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	*94.1*		*ug/L*		*118*	*50-140*			
Surrogate: Dibromofluoromethane	*63.0*		*ug/L*		*78.7*	*50-140*			
Surrogate: Toluene-d8	*76.3*		*ug/L*		*95.4*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
Cyanide, free	ND	2	ug/L	ND				20	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND				30	
Metals									
Mercury	ND	0.1	ug/L	ND				20	
Antimony	0.77	0.5	ug/L	0.65			16.9	20	
Arsenic	ND	1	ug/L	ND			0.0	20	
Barium	23.1	1	ug/L	24.5			6.1	20	
Beryllium	ND	0.5	ug/L	ND			0.0	20	
Boron	136	10	ug/L	138			1.2	20	
Cadmium	0.15	0.1	ug/L	0.12			22.9	20	QR-01
Chromium	ND	1	ug/L	ND			0.0	20	
Cobalt	5.15	0.5	ug/L	5.27			2.2	20	
Copper	1.37	0.5	ug/L	1.33			3.0	20	
Lead	ND	0.1	ug/L	ND			0.0	20	
Molybdenum	1.51	0.5	ug/L	1.52			1.0	20	
Nickel	10.4	1	ug/L	10.6			2.6	20	
Selenium	ND	1	ug/L	ND			0.0	20	
Silver	ND	0.1	ug/L	ND			0.0	20	
Sodium	112000	200	ug/L	116000			3.0	20	
Thallium	0.33	0.1	ug/L	0.31			6.6	20	
Uranium	0.6	0.1	ug/L	0.5			4.8	20	
Vanadium	5.38	0.5	ug/L	5.39			0.2	20	
Zinc	ND	5	ug/L	ND			0.0	20	
Volatiles									
Acetone	ND	5.0	ug/L	ND				30	
Benzene	ND	0.5	ug/L	ND				30	
Bromodichloromethane	ND	0.5	ug/L	ND				30	
Bromoform	ND	0.5	ug/L	ND				30	
Bromomethane	ND	0.5	ug/L	ND				30	
Carbon Tetrachloride	ND	0.2	ug/L	ND				30	
Chlorobenzene	ND	0.5	ug/L	ND				30	
Chloroform	ND	0.5	ug/L	ND				30	
Dibromochloromethane	ND	0.5	ug/L	ND				30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND				30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,1-Dichloroethane	ND	0.5	ug/L	ND				30	
1,2-Dichloroethane	ND	0.5	ug/L	ND				30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND				30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
1,2-Dichloropropane	ND	0.5	ug/L	ND				30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
Ethylbenzene	ND	0.5	ug/L	ND				30	
Ethylene dibromide (dibromoethane	ND	0.2	ug/L	ND				30	
Hexane	ND	1.0	ug/L	ND				30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND				30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND				30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND				30	
Methylene Chloride	ND	5.0	ug/L	ND				30	
Styrene	ND	0.5	ug/L	ND				30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Tetrachloroethylene	ND	0.5	ug/L	ND				30	
Toluene	ND	0.5	ug/L	ND				30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND				30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND				30	
Trichloroethylene	ND	0.5	ug/L	ND				30	
Trichlorofluoromethane	ND	1.0	ug/L	ND				30	
Vinyl chloride	ND	0.5	ug/L	ND				30	
m,p-Xylenes	ND	0.5	ug/L	ND				30	
o-Xylene	ND	0.5	ug/L	ND				30	
Surrogate: 4-Bromofluorobenzene	*90.4*		*ug/L*		*113*	*50-140*			
Surrogate: Dibromofluoromethane	*64.8*		*ug/L*		*81.0*	*50-140*			
Surrogate: Toluene-d8	*78.1*		*ug/L*		*97.7*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
Cyanide, free	29.4	2	ug/L	ND	98.1	70-130			
Hydrocarbons									
F1 PHCs (C6-C10)	1710	25	ug/L		85.7	68-117			
F2 PHCs (C10-C16)	1620	100	ug/L		101	60-140			
F3 PHCs (C16-C34)	4130	100	ug/L		105	60-140			
F4 PHCs (C34-C50)	2190	100	ug/L		88.4	60-140			
Metals									
Mercury	3.05	0.1	ug/L	ND	102	70-130			
Antimony	41.8		ug/L	0.65	82.3	80-120			
Arsenic	52.3		ug/L	ND	103	80-120			
Barium	70.8		ug/L	24.5	92.5	80-120			
Beryllium	40.1		ug/L	ND	80.2	80-120			
Boron	173		ug/L	138	71.1	80-120			QM-07
Cadmium	41.6		ug/L	0.12	83.0	80-120			
Chromium	60.1		ug/L	ND	119	80-120			
Cobalt	52.0		ug/L	5.27	93.5	80-120			
Copper	46.2		ug/L	1.33	89.8	80-120			
Lead	37.4		ug/L	ND	74.7	80-120			QM-07
Molybdenum	46.9		ug/L	1.52	90.8	80-120			
Nickel	55.9		ug/L	10.6	90.6	80-120			
Selenium	47.9		ug/L	ND	94.6	80-120			
Silver	43.4		ug/L	ND	86.8	80-120			
Sodium	124000		ug/L	116000	83.9	80-120			
Thallium	41.3		ug/L	0.31	82.0	80-120			
Uranium	43.4		ug/L		86.9	80-120			
Vanadium	50.1		ug/L		100	80-120			
Zinc	48		ug/L		95.9	80-120			
Semi-Volatiles									
Acenaphthene	4.72	0.05	ug/L		94.5	50-140			
Acenaphthylene	4.30	0.05	ug/L		86.1	50-140			
Anthracene	4.91	0.01	ug/L		98.2	50-140			
Benzo [a] anthracene	4.37	0.01	ug/L		87.4	50-140			
Benzo [a] pyrene	4.48	0.01	ug/L		89.7	50-140			
Benzo [b] fluoranthene	5.99	0.05	ug/L		120	50-140			
Benzo [g,h,i] perylene	4.46	0.05	ug/L		89.3	50-140			
Benzo [k] fluoranthene	4.17	0.05	ug/L		83.4	50-140			
Chrysene	5.41	0.05	ug/L		108	50-140			
Dibenzo [a,h] anthracene	3.71	0.05	ug/L		74.2	50-140			
Fluoranthene	4.30	0.01	ug/L		86.0	50-140			
Fluorene	4.38	0.05	ug/L		87.6	50-140			
Indeno [1,2,3-cd] pyrene	4.06	0.05	ug/L		81.2	50-140			
1-Methylnaphthalene	5.53	0.05	ug/L		111	50-140			
2-Methylnaphthalene	5.95	0.05	ug/L		119	50-140			
Naphthalene	4.80	0.05	ug/L		96.1	50-140			
Phenanthrene	4.45	0.05	ug/L		89.0	50-140			
Pyrene	4.37	0.01	ug/L		87.4	50-140			
Surrogate: 2-Fluorobiphenyl	*20.9*		*ug/L*		*104*	*50-140*			
Volatiles									
Acetone	53.7	5.0	ug/L		53.7	50-140			
Benzene	39.9	0.5	ug/L		99.7	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Bromodichloromethane	33.2	0.5	ug/L		82.9	60-130			
Bromoform	35.8	0.5	ug/L		89.5	60-130			
Bromomethane	34.3	0.5	ug/L		85.8	50-140			
Carbon Tetrachloride	32.7	0.2	ug/L		81.6	60-130			
Chlorobenzene	39.2	0.5	ug/L		98.0	60-130			
Chloroform	36.2	0.5	ug/L		90.4	60-130			
Dibromochloromethane	34.7	0.5	ug/L		86.8	60-130			
Dichlorodifluoromethane	36.6	1.0	ug/L		91.4	50-140			
1,2-Dichlorobenzene	35.6	0.5	ug/L		89.0	60-130			
1,3-Dichlorobenzene	35.2	0.5	ug/L		88.0	60-130			
1,4-Dichlorobenzene	37.2	0.5	ug/L		93.0	60-130			
1,1-Dichloroethane	37.3	0.5	ug/L		93.3	60-130			
1,2-Dichloroethane	29.9	0.5	ug/L		74.8	60-130			
1,1-Dichloroethylene	38.5	0.5	ug/L		96.2	60-130			
cis-1,2-Dichloroethylene	39.5	0.5	ug/L		98.7	60-130			
trans-1,2-Dichloroethylene	38.5	0.5	ug/L		96.2	60-130			
1,2-Dichloropropane	40.5	0.5	ug/L		101	60-130			
cis-1,3-Dichloropropylene	32.7	0.5	ug/L		81.7	60-130			
trans-1,3-Dichloropropylene	31.8	0.5	ug/L		79.4	60-130			
Ethylbenzene	35.8	0.5	ug/L		89.5	60-130			
Ethylene dibromide (dibromoethane	37.7	0.2	ug/L		94.3	60-130			
Hexane	32.9	1.0	ug/L		82.2	60-130			
Methyl Ethyl Ketone (2-Butanone)	92.3	5.0	ug/L		92.3	50-140			
Methyl Isobutyl Ketone	92.0	5.0	ug/L		92.0	50-140			
Methyl tert-butyl ether	75.9	2.0	ug/L		75.9	50-140			
Methylene Chloride	41.3	5.0	ug/L		103	60-130			
Styrene	35.2	0.5	ug/L		87.9	60-130			
1,1,1,2-Tetrachloroethane	36.8	0.5	ug/L		91.9	60-130			
1,1,2,2-Tetrachloroethane	50.4	0.5	ug/L		126	60-130			
Tetrachloroethylene	36.0	0.5	ug/L		90.0	60-130			
Toluene	38.5	0.5	ug/L		96.3	60-130			
1,1,1-Trichloroethane	31.2	0.5	ug/L		78.0	60-130			
1,1,2-Trichloroethane	42.0	0.5	ug/L		105	60-130			
Trichloroethylene	30.6	0.5	ug/L		76.4	60-130			
Trichlorofluoromethane	27.9	1.0	ug/L		69.8	60-130			
Vinyl chloride	29.9	0.5	ug/L		74.8	50-140			
m,p-Xylenes	79.9	0.5	ug/L		99.9	60-130			
o-Xylene	37.2	0.5	ug/L		93.0	60-130			

Qualifier Notes:

Login Qualifiers :

Container(s) - Bottle and COC sample ID don't match -
Applies to samples: OW110A, MW12-03, MW12-04, MW12-18, MW12-19, MW12-07, MW12-14

Sample - Received frozen -
Applies to samples: MW12-04

Sample Qualifiers :

1 : Elevated detection limit due to dilution required because of high target analyte concentration.

QC Qualifiers :

QM-07 : The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on other acceptable QC.

QR-01 : Duplicate RPD is high, however, the sample result is less than 10x the MDL.

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.
- F1 range corrected for BTEX.
- F2 to F3 ranges corrected for appropriate PAHs where available.
- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.
- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.
- When reported, data for F4G has been processed using a silica gel cleanup.

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Chain of Custody
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Page 1 of 3

Client Name: Geofirma	Project Reference: 18-200-7	**Turnaround Time:**	
Contact Name: Tim Galt	Quote #: City of Ottawa Project (Erin Tait)	☐ 1 Day	☐ 3 Day
Address: 1 Raymond Suite 200 Ottawa On K1R 1A2	PO #: N/A	☐ 2 Day	☑ Regular
Telephone: 613-858-0169	Email Address: tgalt@geofirma.com, ssterling@geofirma.com	Date Required:	

Criteria: ☑ O. Reg. 153/04 (As Amended) Table 3 ☐ RSC Filing ☐ O. Reg. 558/00 ☐ PWQO ☐ CCME ☐ SUB (Storm) ☐ SUB (Sanitary) Municipality: _____ ☐ Other: _____

Matrix Type: S (Soil Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

Required Analyses

Paracel Order Number: 1941231

	Sample ID/Location Name		Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	Cyanide
1	MW12-08	BGM 459	GW		7	2-Oct-19		☑	☑	☑	☑	☑	☐	☐	☑
2	MW12-13	460	GW		7	2-Oct-19		☑	☑	☑	☑	☐	☐	☐	☑
3	MW12-15	461	GW		7	2-Oct-19		☑	☑	☑	☑	☐	☐	☐	☑
4	OW116A	462	GW		7	3-Oct-19		☑	☑	☑	☑	☐	☐	☐	☑
5	OW116B	463	GW		7	3-Oct-19		☑	☑	☑	☑	☐	☐	☐	☑
6	OW110A	464	GW		7	3-Oct-19		☑	☑	☑	☑	☐	☐	☐	☑
7	MW12-03	465	GW		7	4-Oct-19		☑	☑	☑	☑	☐	☐	☐	☑
8	MW12-04	466	GW		7	4-Oct-19		☑	☑	☑	☑	☐	☐	☐	☑
9	MW12-05	467	GW		7	4-Oct-19		☑	☑	☑	☑	☐	☐	☐	☑
10	MW12-18	468	GW		7	4-Oct-19		☑	☑	☑	☑	☐	☐	☐	☑

Comments: No lab for PAH work on OW 111A #7, 8, 10, 11, 14, 18 ID start with BH/MW
PAH bottle frozen Run PAH with qualifier Follow Sample ID's from COC as per Tim

Method of Delivery:

Relinquished By (Sign):	Received by Driver/Depot:	Received at Lab:	Verified By:
Relinquished By (Print): Tim Galt	Date/Time:	Date/Time: Oct 8/19	Date/Time: 15-3-19 16:02
Date/Time: 8-Oct-19 / 11:30	Temperature: _____ °C	Temperature: 11.0 °C 17:53	pH Verified ☑ By: MA

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Chain of Custody
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Client Name: Geofirma	Project Reference: 18-200-7	**Turnaround Time:**	
Contact Name: Tim Galt	Quote #: City of Ottawa Project (Erin Tait)	☐ 1 Day	☐ 3 Day
Address: 1 Raymond Suite 200 Ottawa On K1R 1A2	PO #: N/A	☐ 2 Day	☑ Regular
Telephone: 613-858-0169	Email Address: tgalt@geofirma.com, ssterling@geofirma.com	Date Required:	

Criteria: ☑ O. Reg. 153/04 (As Amended) Table 3 ☐ RSC Filing ☐ O. Reg. 558/00 ☐ PWQO ☐ CCME ☐ SUB (Storm) ☐ SUB (Sanitary) Municipality: _____ ☐ Other: _____

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

Required Analyses

Paracel Order Number: 1941231

	Sample ID/Location Name		Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	Cyanide						
1	MW12-19 ✓	BGM 469	GW		7	4-Oct-19		☑	☑	☑	☑	☑	☐	☐	☑	☐	☐	☐	☐	☐	☐
2	OW109A	470	GW		7	4-Oct-19		☑	☑	☑	☑	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐
3	MW12-01	471	GW		7	7-Oct-19		☑	☑	☑	☑	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐
4	MW12-07 ✓	472	GW		7	7-Oct-19		☑	☑	☑	☑	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐
5	MW12-09	473	GW		7	7-Oct-19		☑	☑	☑	☑	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐
6	MW12-10	474	GW		7	7-Oct-19		☑	☑	☑	☑	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐
7	MW12-11	475	GW		7	7-Oct-19		☑	☑	☑	☑	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐
8	MW12-14 ✓	476	GW		7	7-Oct-19		☑	☑	☑	☑	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐
9	OW111A	477	GW		7	7-Oct-19		☑	☑	☑	☑	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐
10	OW111B	478	GW		7	7-Oct-19		☑	☑	☑	☑	☑	☐	☐	☑	☐	☐	☐	☐	☐	☐

Comments:

Method of Delivery: Walk-in

Relinquished By (Sign): KD	Received by Driver/Depot:	Received at Lab: SCT 8/10	Verified By:
Relinquished By (Print): Tim Galt	Date/Time:	Date/Time: 8-Oct-19 11:53a	Date/Time: 15-3-19 16:51
Date/Time: 8-Oct-19 / 11:30	Temperature: ____ °C	Temperature: 11.0 °C	pH Verified ☐ By: MA

Paracel ID: 1941231

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Chain of Custody (Lab Use Only)

Page 3 of 3

Client Name: Geofirma	Project Reference: 18-200-7	**Turnaround Time:**	
Contact Name: Tim Galt	Quote #: City of Ottawa Project (Erin Tait)	☐ 1 Day	☐ 3 Day
Address: 1 Raymond Suite 200 Ottawa On K1R 1A2	PO #: N/A	☐ 2 Day	☑ Regular
Telephone: 613-858-0169	Email Address: tgalt@geofirma.com, ssterling@geofirma.com	Date Required:	

Criteria: ☑ O. Reg. 153/04 (As Amended) Table 3 ☐ RSC Filing ☐ O. Reg. 558/00 ☐ PWQO ☐ CCME ☐ SUB (Storm) ☐ SUB (Sanitary) Municipality: _____ ☐ Other: _____

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

Required Analyses

Paracel Order Number: 1941231

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	Cyanide
1	MWD1 BGM 479	GW		7	OCT 02,2019		☑	☑	☑	☑	☑	☐	☐	☑
2	MWD2 480	GW		7	Oct 04 2019		☑	☑	☑	☑	☑	☐	☐	☑
3	Trip Blank 481	GW		1	Sept 30, 2019		☐	☑	☐	☐	☐	☐	☐	☐
4							☐	☐	☐	☐	☐	☐	☐	☐
5							☐	☐	☐	☐	☐	☐	☐	☐
6							☐	☐	☐	☐	☐	☐	☐	☐
7							☐	☐	☐	☐	☐	☐	☐	☐
8							☐	☐	☐	☐	☐	☐	☐	☐
9							☐	☐	☐	☐	☐	☐	☐	☐
10							☐	☐	☐	☐	☐	☐	☐	☐

Comments:

Method of Delivery: Walk-in

Relinquished By (Sign):	Received by Driver/Depot:	Received at Lab: Oct 8/19 1:53a	Verified By:
Relinquished By (Print): Tim Galt	Date/Time:	Date/Time:	Date/Time: 10-3-19 16:50
Date/Time: 8-Oct-19 / 11:30	Temperature: _____ °C	Temperature: 11.0 °C	pH Verified ☐ By: