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**Phase II Environmental Site Assessment &
Supplementary Sampling
Part of Lot 29, Concession 3 Rideau Front
Gloucester, Ontario**



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Submitted to:

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**Phase II Environmental Site Assessment
& Supplementary Sampling
Part of Lot 29, Concession 3 Rideau Front
Gloucester, Ontario**

October 30, 2020
Project: 64438.71

October 30, 2020

File: 64438.71

Thomas Cavanagh Developments
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Ashton, Ontario
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Attention: Matt Nesrallah

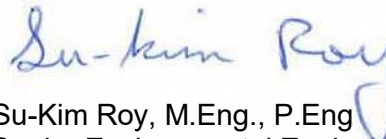
**Re: Phase II Environmental Site Assessment and Supplementary Sampling
Part of Lot 29, Concession 3 (Rideau Front),
Gloucester, Ontario**

Enclosed is GEMTEC's Phase II Environmental Site Assessment report and Supplementary Sampling as per our proposal dated September 3, 2020 and amended by the e-mail proposal for supplemental groundwater sampling on October 16, 2020. The Phase II ESA was completed in general accordance with Canadian Standards Association (CSA) Z769-00 (R2018), and describes the interpreted environmental conditions at the property at the time the investigation was completed.

We trust this information is sufficient for your current needs. If you have any questions or require further information, please contact the undersigned.



Nicole Soucy, M.A.Sc., P.Eng
Environmental Engineer



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NS/SKR

Enclosures

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EXECUTIVE SUMMARY

GEMTEC Consulting Engineers and Scientists Limited (GEMTEC) was retained by Thomas Cavanagh Developments (Cavanaugh) to complete a Phase II Environmental Site Assessment (ESA) for a proposed residential land development project, on the west end of Tullamore Street (the 'subject property') in Gloucester, Ontario.

The Phase II ESA was completed following the recommendations provided in the GEMTEC, 2020, Phase I ESA submitted to Cavanaugh, under separate cover. Supplementary confirmatory groundwater sampling was also completed following review of the initial Phase II ESA results. GEMTEC understands that the Environmental work is required for registration of the next phase of development.

The Phase II ESA was conducted in general accordance with Ontario Regulation 153/04 and the CSA Group standard Z769-00 (R2018), which is the accepted standard of regulatory agencies and financial institutions in the absence of a RSC.

The scope of work as outlined in GEMTEC's proposal included the following:

- Advancement of five boreholes on the subject property, three of which were completed as groundwater monitoring wells to depths of between 1.5 and 6.0 metres below ground surface (m bgs); Note: Due to refusal on bedrock at the time of drilling no boreholes were advanced to 6.0 m bgs, however coring was not required as soil was observed to be wet at the drilling depths and therefore wells were installed once refusal was encountered;
- Collection and analysis of 8 soil samples (including one duplicate sample) analyzed for some or all of the following contaminants of potential concern (COPCs): petroleum hydrocarbons four fractions (PHC F1-F4), volatile organic compounds (VOCs), Polycyclic Aromatic Hydrocarbons (PAHs), metals, inorganics, and pH;
- Collection of three groundwater samples (one from each monitoring well installed) analyzed for some or all of the following COPCs: PHC F1-F4, VOCs, Metals, and PAHs, and one groundwater trip blank for VOCs. Note: following review of the initial groundwater sampling results, additional confirmatory sampling was recommended. Thus, an additional four groundwater samples (one from each monitoring well and one duplicate) were collected from the on-site monitoring wells and submitted for analysis of cobalt concentrations;
- Assessment of soil and groundwater analytical results against applicable provincial quality site condition standards; and,
- Preparation of a Phase II ESA report and update summarizing the purpose, methodology and results of the Phase II ESA and Supplementary Sampling Investigations (this report).

Analytical results were compared to applicable provincial: Ministry of the Environment, Conservation, and Parks, 2011. Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act. Table 2: Full Depth Generic Site Condition Standards

(SCS) in a Potable Ground Water Condition, residential/parkland/institutional (RPI) land use, coarse textured soils.

Based on the analytical results of the Phase II ESA, GEMTEC offers the following summary:

- The overburden observed at the site during the subsurface investigation generally consisted of a layer of brown sandy fill material, underlain by varying thicknesses native deposits of grey silty clay with trace amounts of sand (weathered crust);
- All soil samples submitted for analysis met the MECF Table 2 SCS for all parameters analyzed;
- Groundwater exceedances to the MECF Table 2 SCS for cobalt were observed at MW20-1, and MW20-3 for both rounds of sampling completed in October of 2020 (original as part of the Phase II ESA, and supplemental sampling); and,
- The groundwater sample collected from MW20-2 met the MECF Table 2 SCS for all parameters analyzed during both rounds of sampling completed in October of 2020.

Although cobalt exceedances were observed in two groundwater sampling locations on October 2nd, 2020, it is noted that the cobalt exceedances in groundwater are not consistent with the COPCs associated with the PCAs or APECs identified during the Phase One ESA. Accordingly, the exceedances do not appear to be indicative of any anthropogenic sources based on the reasonable records review and site reconnaissance completed for the property. Based on the results presented above, it is likely that the observed exceedances of cobalt in groundwater may be attributable to the presence of naturally occurring Champlain Sea clay deposits which is consistent with the stratigraphy observed within the screened intervals during borehole advancement and well completion during the intrusive field investigation.

Further to this, it is noted that any domestic water wells in the area advanced as part of the new development would be completed to a much deeper depth than the shallow monitoring wells installed as part of this Phase II ESA, and it is anticipated that the underlying potable water aquifer would have a different groundwater quality signature in comparison to the shallow groundwater aquifer as sampled in this report. Groundwater results presented in this report is only indicative of quality from the shallow groundwater aquifer. Future potable groundwater quality and quantity studies completed as part of the development project should include sampling for cobalt to confirm elevated concentrations are limited to the upper shallow aquifer units where the presence of Champlain Sea Clay deposits were observed.

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1 INTRODUCTION

GEMTEC Consulting Engineers and Scientists Limited (GEMTEC) was retained by Thomas Cavanagh Developments (Cavanaugh) to complete a Phase II Environmental Site Assessment (ESA) for a proposed residential land development project, on the west end of Tullamore Street (the 'subject property') in Gloucesster, Ontario. The location of the subject property is shown on Figure A.1, Appendix A.

The Phase II ESA was completed following the recommendations provided in the GEMTEC, 2020, Phase I ESA submitted to Cavanaugh, under separate cover. Supplementary confirmatory groundwater sampling was also completed following review of the initial Phase II ESA results. GEMTECs understands that the Phase II ESA is required for registration of the next phase of development. As the property will not be changing to a more sensitive land use, the filing of a Record of Site Condition (RSC), as regulated by Ontario Regulation 153/04 under the Environmental Protection Act, is not mandatory. The Phase II ESA was conducted in general accordance with Ontario Regulation 153/04 and the CSA Group standard Z769-00 (R2018), which is the accepted standard of regulatory agencies and financial institutions in the absence of a RSC.

1.1 Site Description

The majority of the subject property consists of brush cleared areas built up with lot fill, an access roadway, and some woodlands. The subject property boundary is shown on Figure A.1, Appendix A.

The subject property is comprised of an irregularly shaped land parcel, and is located at the west end of Tullamore Street off of Albion Road with a total area of approximately 7.96 acres.

1.2 Property Ownership

The subject property is currently undeveloped land, owned by Emerald Creek Properties Inc.

1.3 Current and Proposed Future Uses

It is understood that the property is being considered for development as residential land use and will become part of the Emerald Creek Subdivision.

1.4 Applicable Site Condition Standards

Site Condition Standards (SCS) were selected for the site in accordance with the requirements of Ontario Regulation 153/04, Record of Site Condition – Part XV.1 of the Environmental Protection Act (O. Reg. 153/04, Ministry of Environment and Climate Change (MECP), October 31, 2011), as amended.

The following information was considered in selecting the site condition standards:

- The land use of the subject site is residential;
- The primary source of domestic water in the area is serviced by private groundwater wells. Therefore, a potable groundwater condition will be considered as applicable for the subject property;
- Available bedrock mapping, and results of the boreholes advanced as part of the field program, indicate that more than 2.0 metres of overburden is present on-site;
- The subject site subsurface was observed to be comprised of primarily fill material over silty clay. Due to the large observed variation in stratigraphic units encountered during drilling– the subject site has been classified as a coarse textured soil to be conservative;
- No permanent water bodies are present on the subject property or within 30 metres of the subject property (ESRI, 2011); and,
- The site is not considered to be an environmentally sensitive:
 - The site is not within or adjacent to an area of natural or scientific interest; and,
 - pH values on the subject site are within the accepted range for surface and subsurface soils.

Based on the review of site characteristics, the following provincial standards were considered to be applicable to the soil and groundwater quality results obtained during the investigation:

- MECP, 2011. Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act. Table 2: Full Depth Generic Site Condition Standards (SCS) in a Potable Ground Water Condition, residential/parkland/industrial (RPI) land use, coarse textured soils.

2 BACKGROUND INFORMATION

2.1 Physical Setting

Topographic mapping available through the Ministry of Natural Resources (MNR, 2014), was reviewed to determine topographic features in the vicinity of the subject property and study area. The elevation of the subject property is between 100 m above sea level (m asl) and 105 m asl, and topography at the subject site and surrounding topography generally slopes downward slightly west.

Groundwater flow often reflects topographic features and typically flows toward nearby lakes, rivers and wetland areas. Based on the topography and hydrogeological features in the area, local shallow and regional groundwater flow is anticipated to be west/southwest. Note: Based on the results of the Phase II ESA field investigation and estimated groundwater table elevation results, the local shallow groundwater flow was inferred to be trending southerly.

Surficial and bedrock geology maps of the Ottawa area were reviewed. Based on the review, overburden in the vicinity of the subject property generally consists of nearshore sediments, fine- to medium-grained sand, calcareous and commonly fossiliferous with a thickness of between 6

to 18 metres (ESRI, 2011). The bedrock is mapped as sublithographic to fine crystalline dolostone with minor shale of the Oxford Formation (ESRI, 2011).

2.2 Past Investigations

Two historical reports were available for GEMTEC's review as part of this Phase II ESA.

2.2.1.1 Paterson Group – Hydrogeological Study (2020)

A hydrogeological report entitled “Supplemental Hydrogeological Study: Emerald Creek Estates – Phase 3, Proposed Residential Development, Tullamore Street, Ottawa, Ontario” dated June 18, 2020 completed by Paterson Group was obtained and reviewed. The report was completed to provide a supplemental hydrological assessment on the groundwater quality of the proposed Emerald Creek Phase 3 development. Three previous reports completed by Patterson Group were references in the report – these were not provided to GEMTEC for review. Through the hydrogeological investigation, a test well was constructed to obtain representative groundwater samples for the development. A 6-hour pumping constant rate well development was completed on the well and geochemistry of the groundwater was analyzed. Results of the hydrogeological assessment concluded that the site is considered suitable for development of lots consistent with Phases 1 and 2 of the development.

2.2.2 Phase One Environmental Site Assessment - GEMTEC, 2020

A Phase One ESA was completed for the subject property in 2020 by GEMTEC. The report was entitled “Phase I Environmental Site Assessment, Part of Lot 29, Concession 3 Rideau Front Gloucester, Ontario”.

Through a review of historical information pertaining to the subject site and adjacent properties, GEMTEC identified two areas of potential environmental concern (APECs) at the subject property. The APECs resulted from potentially contaminating activities (PCAs) with a potential to result in contamination in soil and/or groundwater on the subject property. APECs identified at the subject property are summarized below:

APEC 1 – Fill of Unknown Origin on the Subject Property

Fill material of unknown quantity and quality was identified to be present on the subject site. Some of the material is anticipated to be present due the dumping of construction debris, while other fill material was imported to site as lot fill.

APEC 2 – Trans-northern Pipeline

The Trans-northern Pipeline (TNP) is located in close proximity to the subject property. The pipeline runs northwest to southeast on an easement adjacent west to the subject property. Transmission pipelines are regulated by the National Energy Regulator (NER) with a requirement of regulator audits, inspections and incident investigations (Government of Canada, 2020). An oil pipeline running adjacent to the subject property has a potential to fail over time, with the potential

to impact the soil and groundwater quality of the subject property due to the close proximity of the pipeline to the subject property.

Based on the APECs identified, a Phase II ESA was recommended to be completed for the subject property, to investigate soil and groundwater quality in the vicinity of the identified APECs.

3 SCOPE OF THE INVESTIGATION

3.1 Study Objectives and Scope of Work

The objective of the work proposed was to provide subsurface information relative to the potential environmental impacts related to the identified APECs. Environmental sampling was carried out to characterize the quality of soil and groundwater within the subject property APECs. Any deviations from the proposed scope of work have been noted.

The scope of work as outlined in GEMTEC's proposal included the following:

- Advancement of five boreholes on the subject property, three of which were completed as groundwater monitoring wells to depths of between 1.5 and 6.0 metres below ground surface (m bgs); Note: Due to refusal on bedrock at the time of drilling no boreholes were advanced to 6.0 m bgs, however coring was not required as soil was observed to be wet at the drilling depths and therefore wells were installed once refusal was encountered;
- Collection and analysis of 8 soil samples (including one duplicate sample) analyzed for some or all of the following contaminants of potential concern (COPCs): petroleum hydrocarbons four fractions (PHC F1-F4), volatile organic compounds (VOCs), Polycyclic Aromatic Hydrocarbons (PAHs), metals, inorganics, and pH;
- Collection of three groundwater samples (one from each monitoring well installed) analyzed for some or all of the following COPCs: PHC F1-F4, VOCs, Metals, and PAHs, and one groundwater trip blank for VOCs. Note: following review of the initial groundwater sampling results, additional confirmatory sampling was recommended. Thus, an additional four groundwater samples (one from each monitoring well and one duplicate) were collected from the on-site monitoring wells and submitted for analysis of cobalt concentrations;
- Assessment of soil and groundwater analytical results against applicable provincial quality site condition standards; and,
- Preparation of a Phase II ESA report and update summarizing the purpose, methodology and results of the Phase II ESA and Supplementary Sampling Investigations (this report).

3.2 Media Investigated

Boreholes and monitoring wells were advanced on site to assess if soil and groundwater quality at the selected test locations satisfied the applicable MECF SCS for the investigated COPCs. COPCs identified for the site included PHC F1-F4, VOCs, PAHs, metals, and inorganics. The soil sampling program included the collection of a minimum of one representative soil sample from

each borehole for laboratory analysis. One duplicate soil sample was also collected and analysed for Quality Assurance / Quality Control (QA/QC) purposes.

The groundwater investigation program consisted of development of the newly installed wells, the measurement of depth to groundwater table, and collection of groundwater samples for laboratory analysis of COPCs. A groundwater sample trip blank was collected and analysed for QA/QC purposes.

Table 3.1 indicates the rationale for each borehole and monitoring well location and the associated COPCs.

Table 3.1: Summary of Borehole and Monitoring Well Location Rationale.

Borehole ID	Rationale for Location	Media of Concern	COPCs
BH/MW 20-1	This borehole is situated along the western boundary of subject property. It is near the trans northern pipeline. Potential impacts from APEC 2 will be investigated at this location.	Soil and Groundwater	Metals VOCs PHC F1-F4
BH/MW 20-2	This borehole is situated along the western boundary of subject property. It is near the trans northern pipeline. Potential impacts from APEC 1 and APEC 2 will be investigated at this location.	Soil and Groundwater	Metals VOCs PHC F1-F4
BH/MW 20-3	This borehole is situated in the central area of the subject property just north of the construction roadway. Potential impacts from APEC 1 will be investigated at this location.	Soil and Groundwater	Metals& Inorganics PAHs
BH20-4	This borehole is situated in the central area of the subject property just north of the construction roadway. Potential impacts from APEC 1 will be investigated at this location.	Soil	Metals& Inorganics PAHs
BH20-5	This borehole is situated in the central area of the subject property just north of the construction roadway. Potential impacts from APEC 1 will be investigated at this location.	Soil	Metals& Inorganics PAHs

Notes:

PHC F1-F4 – Petroleum Hydrocarbon Four Fractions

VOCs – Volatile Organic Compounds

PAHs – Polycyclic Aromatic Hydrocarbons

Note: One additional soil sample for PHCs F1-F4, VOCs, and Metals was collected from BH20-3 based on visual observations and field screening measurements during drilling.

3.3 Phase I Conceptual Site Model

Based on the historical review and site reconnaissance, GEMTEC (2020) concluded that there is potential for soil or groundwater contamination at the subject property. The Phase One ESA CSM is presented in under separate cover and is summarized as follows:

- Records indicated that twenty wells were identified within the subject area, all were identified as domestic use water wells primarily along Tullamore Street and Ballycastle Crescent;
- The subject property and study area are not serviced with municipal water, sewers, or natural gas – underground hydro is available within the study area;
- Surrounding properties are a mix of undeveloped/ agricultural lands and rural residential;
- The subject property is currently undeveloped with a gravel roadway intersecting the site;
- The subject property is between 100 m asl and 105 m asl and topography at the subject site and surrounding topography generally slopes downward slightly westwards;
- Geology mapping suggests that overburden in the vicinity of the subject property generally consists of nearshore sediments, fine-to medium-grained sand, calcareous and commonly fossiliferous with a thickness of between 6 to 18 metres overlaying sublithographic to fine crystalline dolostone with minor shale;
- Records indicate that the Trans-Northern Pipeline runs northwest to southeast on the west side of the subject property; and,
- Based on the review of records, interviews and the site reconnaissance completed as part of the Phase I ESA, GEMTEC identified three PCAs, resulting in two APECs for the subject property.

Information considered for the development of this CSM was gathered from numerous sources (i.e. aerial photographs, city directories, environmental database searches, physical setting sources, interviews and a site reconnaissance), which reduces the potential for not identifying a former property use or PCA.

3.3.1 PCAs, COPCs and APECs

The Phase One ESA (GEMTEC, 2020) identified several PCAs within the Phase One study area; defined in the Phase One as the area located within a 250 metre radius of the site. A summary of PCAs, as outlined on Table 2 in Schedule D of O.Reg 153/04 and identified in the Phase One ESA is provided in Table 3.2.

Table 3.2: Summary of PCAs identified in the Phase One ESA

PCA Type	Address of PCA	Data Source	Resulted in APEC Rationale	COPCs
30. Importation of Fill Material of Unknown Quality	Part of Lot 29, Concession 3	Site Reconnaissance, Aerial Photograph Review, and Interview	Yes PCA being present on the subject property	Metals & Inorganics PAHs
40. Pesticides (including Herbicides, Fungicides and Anti-Fouling Agents) Manufacturing, Processing, Bulk Storage and Large Scale Application	Estimated: 5335 Bowsesville Road)	Aerial Photographs	No Based on lack of information on adjacent agricultural properties potential use and scale of pesticide and/or herbicides	-
Other – Oil Pipeline	Adjacent west to the subject property (no civic address, owned as easement)	Aerial Photographs, Site Reconnaissance	Yes The Trans-Northern Pipeline transports an average of 27,500 cubic metres of refined fuel products daily. Although, these pipelines are regulated by the National Energy Regulator pipelines have a potential to leak.	Metals VOCs PHC F1-F4

Notes:

- PHC F1-F4 – Petroleum Hydrocarbon Four Fractions
- VOCs – Volatile Organic Compounds
- PAHs – Polycyclic Aromatic Hydrocarbons

4 INVESTIGATION METHODOLOGY

4.1 General

Prior to initiating the intrusive investigation, underground utilities were cleared by the locates subcontractor (Utility Marx) to identify the location of buried utilities on-site. Public and private utilities including telephone, gas, hydro, and municipal services were cleared by Utility Marx.

4.2 Borehole Drilling

The borehole investigation was carried out on September 28th, 2020. At that time, a total of five boreholes (BH20-1 through BH20-5) were advanced on-site, three of which were completed as monitoring wells (MW20-1, MW20-2, and MW20-3). The boreholes were advanced on-site by Strata Drilling Group, of Whitchurch-Stouffville, Ontario, operating under GEMTEC oversight.

Boreholes were advanced using a geoprobe drill rig with shelby tube samplers to depths ranging from 1.5 to 4.9 metres below ground surface (mbgs).

4.3 Monitoring Well Installation

Monitoring wells were installed in three borehole locations to determine static groundwater elevations and to permit the collection of groundwater samples for analytical analysis. Monitoring wells were installed by Strata, who are MECP-licensed well drillers. Monitoring wells were installed manually, by lowering PVC components through the surface drill casing. Wells were labelled as MW 20-1, MW 20-2, and MW 20-3 following the same numbering convention as the boreholes.

Installation of all monitoring wells was completed using a 50-mm diameter 1.53 or 3.05 metre length, flush-threaded PVC screen and risers with a silica sand pack and bentonite seal. Each monitoring well was finished at surface with a flush-mount protective casing. Silica sand was placed around the screened intervals and bentonite hole plug was used to seal the borehole to ground surface. Monitoring well instrumentation details are included on the borehole and monitoring well logs in Appendix B.

4.4 Field Methodology

4.4.1 Soil Sampling

Soil samples were recovered at regular intervals during drilling following the Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario (MOE, 1996). Clean gloves were worn and changed between each sample to prevent cross contamination. Soil samples were collected directly into laboratory-supplied sampling containers.

The soil samples were examined for texture and screened for visual and olfactory evidence of contamination in the field. To assess potentially impacted soil, GEMTEC submitted a minimum of one soil sample per borehole for analysis of COPCs.

Borehole and monitoring well locations were identified as BH/MWX-Y where X indicates the year the borehole / monitoring well was constructed and Y is the identifier. For example, BH/MW20-2 indicates the borehole / monitoring well was constructed in 2020 and is identified as borehole / monitoring well number two.

All samples were stored in laboratory supplied coolers with ice. Samples were submitted to Paracel Laboratories Ltd, of Ottawa, Ontario, under standard chain-of-custody procedures and in accordance with GEMTEC QA/QC procedures. A summary of the soil samples which were collected from each location and submitted for analyses is summarized in Table 4.1.

Table 4.1: Summary of Soil Samples Submitted for Analytical Analysis.

Borehole	Sample	Depth Interval (m bgs)	Soil Description	Analyses
BH20-1	SA3	2.44 – 3.35	Grey sandy clay with cobbles and boulders	PHC F1-F4, VOCs, Metals, pH
BH20-2	SA3	2.44 – 3.05	Grey sandy clay	PHC F1-F4, VOCs, Metals
BH20-3	SA1	0.00 – 1.22	Brown silty sand with gravel (Fill Material)	PAHs, M&I
	SA101 ¹			
	SA2b	1.96 – 2.44	Brown silty sand (Fill Material)	PAHs, M&I
	SA4	3.66 – 4.88	Grey sandy clay	PHC F1-F4, VOCs, Metals
BH20-4	SA1b	1.07 – 1.22	Brown sandy clayey (Fill Material)	PAHs, M&I, pH
BH20-5	SA2	1.22 – 1.52	Brown sandy silt with organics (Fill Material)	PAHs, M&I

Notes: m bgs – metres below ground surface
M&I – Metals and Inorganics
PAHs – Polycyclic Aromatic Hydrocarbons
PHC F1-F4 – Petroleum Hydrocarbon Four Fractions
VOCs – Volatile Organic Compounds
¹ field duplicate QA/QC sample

4.4.2 Field Screening Measurements

Soil samples were screened using an RKI Eagle 2, which operates as a photoionization detector (PID) and combustible gas indicator (CGI), to measure total organic vapours and combustible vapours. Results of field screening and the soil samples submitted to the laboratory for chemical analysis are included on the borehole logs (Appendix B).

The PID was equipped with a 10.6 electron-volt (eV) lamp, which was calibrated with a known concentration of isobutylene. This instrument detects VOCs that emit below an ionization potential of 10.6 eV, which includes a wide range of chemicals such as solvents and fuels. The detection limit of the instrument ranges from 0 to 15,000 ppm, and accuracy is +/- 10% for VOCs in the range of 0 and 2,000 ppm and +/- 20% of the reading above 2,000 ppm. The resolution of this instrument is 0.1 ppm for VOCs in the range of 0 and 1,000 ppm and 1 ppm for readings above 1,000 ppm. The PID provides an indication of organic contamination in soil but does not measure concentrations of individual contaminants.

The CGI detects combustible vapours such as those associated with fuels. This instrument measures a concentration of total combustible gas, calibrated to a known concentration of

hexane. The instrument operates in the methane elimination mode. The detection limit of the instrument ranges from 0 to 11,000 ppm (i.e., 100 % LEL of hexane). The CGI has an accuracy of 25 ppm below 1,000 ppm and 5% of the lower explosive limit (LEL) between 1,000 ppm and 100% LEL. As with the PID, it provides an indication of contamination but not chemical specific concentrations.

There are no regulatory criteria for soil vapours; however, elevated vapour concentrations are generally indicative of the presence of volatile parameters. Concentrations vary with parameter type, concentration and age and the readings are only intended to be used as a field screening tool to provide a qualitative measure of volatile chemical concentrations within the subsurface. The readings do not provide a quantitative measure of analytical results.

The RKI Eagle 2 was obtained by GEMTEC from Maxim Environmental & Safety Inc. (Maxim) for this project. Maxim calibrates instruments on a regular basis to maintain consistent results. Site calibration of the field instrument was completed by GEMTEC field techs each day according to the manufacturer's instructions.

4.4.3 Groundwater Monitoring and Sampling

Prior to groundwater sampling, static groundwater levels were determined using an electronic oil-water interface probe. To ensure no cross contamination between wells, the interface probe was decontaminated with an Alcanox solutions and subsequently distilled water between wells. Due to the dedicated nature of all monitoring well instrumentation (Waterra inertial hand pump and tubing) no decontamination procedures were required during groundwater sampling. All required lengths of tubing for the groundwater sampling were disposed of after usage at each designated well.

Depth to water table readings were recorded and groundwater quality samples were collected from the newly installed wells on October 2nd, 2020, with supplemental sampling being completed on October 22, 2020. Each monitoring well was developed by removing three well volumes or purged dry shortly after wells had been installed by the drilling contractor. A second well purging program was completed prior to initiating the second round of groundwater sampling. Well development/purging activities were performed using dedicated Waterra inertial hand pumps. Groundwater samples were subsequently collected, after allowing for a period of aquifer stabilization, using low-flow sampling techniques to allow for the collection of samples which were representative of formation conditions. Groundwater samples were collected from the monitoring wells directly into laboratory supplied bottles using a peristaltic pump with disposable tubing.

The groundwater samples were collected and stored in dedicated coolers and submitted to Paracel under standard chain-of-custody procedures and in accordance with GEMTEC QA/QC procedures. A summary of the groundwater samples which were collected from each location and submitted for analyses is summarized in Table 4.2.

Table 4.2: Summary of Groundwater Samples Submitted for Analytical Analysis.

Monitoring Well	Screened Interval (mbgs)	Stratigraphic Unit	Date	Analyses
MW20-1	1.83 – 3.35	Overburden	02/10/2020	PHC F1-F4, VOCs, Metals
			22/10/2020	Cobalt
MW20-2	1.52 – 3.05	Overburden	02/10/2020	PHC F1-F4, VOCs, Metals
			22/10/2020	Cobalt
MW20-3	1.93 – 4.98	Overburden	02/10/2020	PAHs, M&I
			22/10/2020	Cobalt
MW20-103			22/10/2020	Cobalt
Trip Blank ¹	-	-	02/10/2020	VOCs

Notes: mbgs – metres below ground surface
 PAHs – Polycyclic Aromatic Hydrocarbons
 VOCs – Volatile Organic Compounds
 PHC F1-F4 – Petroleum Hydrocarbon Four Fractions
 MW20-103 is a duplicate of MW20-3
¹ QA/QC sample

4.5 Laboratory Analytical Program

Soil and groundwater samples were collected directly into laboratory-supplied sampling containers. All samples were stored and shipped in coolers with ice packs. Groundwater and soil samples were submitted to Paracel Laboratories Ltd., a CALA-certified analytical laboratories, under standard chain-of-custody procedures and in accordance with GEMTEC QA/QC procedures.

Paracel is accredited by the Standards Council of Canada (SCC) in cooperation with the Canadian Association of Laboratory Accreditation (CALA) for specific environmental tests listed in the scope of accreditation. They are accredited to the ISO/IEC 17025 (2017) standard and employs in-house quality assurance and quality control programs to govern sample analysis including the analysis of method blanks, spiked blanks, and the analysis of duplicates (10%) for each sample batch.

Copies of the Laboratory Certificates of Analysis are included in Appendix D.

4.6 Surveying

The borehole locations were selected by GEMTEC personnel, and were constrained by accessibility and underground service locations. The ground surface elevations at the location of the boreholes (ground surface) and monitoring wells (with elevations from the PVC risers) were

determined using a Trimble R10 global positioning system. The coordinates of the boreholes are referenced to NAD83 (CSRS) Epoch 2010, vertical network CGVD28 and are considered to be accurate within the tolerance of the instrument. The locations of the boreholes and monitoring wells advanced on-site are shown on Figure A.1 in Appendix A.

4.7 Quality Assurance / Quality Control Program

Quality assurance and quality control of the soil and groundwater samples was maintained by adhering to the following:

- The field investigation was completed under GEMTEC standard operating procedures (SOPs) for intrusive investigations, including soil and groundwater sampling best practices;
- Samples were assigned unique identification numbers, as they were collected, identifying the project number, date, sample location, and depth. The sample numbers were recorded in field notes for each location;
- Sample containers provided by the analytical laboratory were used and laboratory requirements for sample size, container type, preservatives and filtering were maintained;
- Non-disposable sampling equipment was cleaned using Alconox[®] and distilled water following each use to avoid potential cross-contamination;
- A chain-of-custody (COC) form was filled out prior to submitting the selected samples to the laboratory. The COC documented sample movement from time of field collection to receipt at the laboratory and provided a record of sample identification, requested analysis and conditions of samples upon arrival at the laboratory (e.g. temperature, container status, etc.);
- Soil and groundwater samples were selected by the GEMTEC field staff for field duplicate testing. The number of duplicate samples submitted is equivalent to a minimum of 10% of the total number of samples submitted, under accepted standard industry QA/QC practices;
- A VOCs trip blank was transported to the project limits during the groundwater sampling event, and analyzed at the laboratory;
- Field monitoring equipment was calibrated according to industry requirements prior to the site visit and during implementation of the field program as required (i.e., on-site calibration); and,
- Samples were randomly selected by the laboratory for Quality Assurance checks. Generally, one sample for every ten samples submitted is assessed by the laboratory internal QA/QC program. For each parameter, there is an acceptable upper and lower limit for measured concentrations.

5 RESULTS

5.1 Site Stratigraphy

The surficial geology for the site was visually observed and logged during the drilling program. The soil conditions identified in the boreholes advanced as part of this investigation are provided on the Record of Borehole and Monitoring well logs in Appendix B. The borehole logs indicate the subsurface conditions encountered at the specific test locations only, conditions at other than the test locations may vary. Boundaries between zones on the logs are often not distinct, but rather are transitional and have been interpreted based on observations by GEMTEC field personnel. The precision with which subsurface conditions are indicated depends on the method of drilling, the frequency and recovery of samples, the method of sampling, and the uniformity of the subsurface conditions. The following sections present a summary of the subsurface conditions observed in the boreholes advanced during this investigation.

5.1.1 Fill Material

Fill material was encountered at all borehole locations from ground surface. The fill is variable across the site but can generally be described as brown silty sand with varying amounts of organics, gravel and clay. The fill material has a thickness ranging from about 0.6 to 2.2 metres and extends to depths of about 1.2 to 2.6 metres below existing grade. BH20-4 and BH20-5 were terminated in the fill material at a depth of about 1.5 metres below existing grade.

5.1.2 Silty Clay

Native deposits of grey silty clay with trace amounts of sand were encountered in BH20-1, BH20-2, and BH20-3 below the fill material. BH20-1, BH20-2 and BH20-3 were terminated in the fill material at depths of between 3.0 and 5.0 metres below existing grade.

5.2 Soil Field Screening

Soil vapour field screening readings were taken from soil samples following a period of equilibration to ambient temperature, using a combustible gas detector (RKI Eagle combustible gas detector calibrated to hexane standards, with methane elimination enabled). Combustible headspace soil vapour readings ranged from 0 ppm and 115 ppm.

Field screening results are provided with the borehole logs in Appendix B.

5.2.1 Groundwater Elevations and Flow Direction

Groundwater depths were measured directly from the top of pipe in each monitoring well location on October 2nd and 22nd, 2020 using an electronic oil-water interface probe. Measured depths to groundwater table, and estimated groundwater elevations are summarized in Table 5.1.

Table 5.1: Groundwater Levels and Estimated Groundwater Elevations.

Monitoring Well	Material	Groundwater depth (mb casing)		Groundwater elevation (masl)	
		October 2/20	October 22/20	October 2/20	October 22/20
BH20-1 (MW 20-1)	Overburden	2.10	1.90	100.03	100.23
BH20-2 (MW 20-2)	Overburden	2.05	1.88	100.00	100.17
BH20-3 (MW 20-3)	Overburden	3.43	3.23	100.28	100.48

Notes: mbgs – metres below ground surface
masl – metres above sea level

Based on the groundwater table elevations recorded in October of 2020, the local shallow groundwater flow was inferred to be trending southerly.

5.3 Analytical Results

5.3.1 Soil Quality

Analytical results for the soil samples submitted for analyses, and exceedances to the selected Table 2 SCS, are presented in Table C1, Appendix C. A summary of the soil exceedances is provided in Table 5.2. Laboratory certificates of analysis are provided in Appendix D.

Table 5.2: Summary of Soil Sample Analytical Results.

Borehole	Sample	Depth Interval (m bgs)	Soil Description	MECP Table 2 SCS ² Exceedances
BH20-1	SA3	2.44 – 3.35	Grey sandy clay with cobbles and boulders	None
BH20-2	SA3	2.44 – 3.05	Grey sandy clay	None
BH20-3	SA1	0.00 – 1.22	Brown silty sand with gravel (Fill Material)	None
	SA101 ¹			
	SA2b	1.96 – 2.44	Brown silty sand (Fill Material)	None
	SA4	3.66 – 4.88	Grey sandy clay	None
BH20-4	SA1b	1.07 – 1.22	Brown sandy clayey (Fill Material)	None
BH20-5	SA2	1.22 – 1.52	Brown sandy silt with organics (Fill Material)	None

Notes: mbgs – metres below ground surface
Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition. March 2004, amended July 1, 2011. Coarse Textured Soils for Residential/Parkland/Institutional Property Use.
¹ field duplicate QA/QC sample

5.3.2 Groundwater Quality

Analytical results for the groundwater samples submitted for analyses, and exceedances to the Table 2 SCS, are presented in Table C2, Appendix C. A summary of the groundwater exceedances is provided in Table 5.3. Laboratory certificates of analysis are provided in Appendix D.

Table 5.3: Summary of Groundwater Sample Analytical Results.

Monitoring Well	Screened Interval (mbgs)	Stratigraphic Unit	Date	MECP Table 2 SCS Exceedances
MW20-1	1.83 – 3.35	Overburden	02/10/2020	Cobalt
			22/10/2020	Cobalt
MW20-2	1.52 – 3.05	Overburden	02/10/2020	None
			22/10/2020	None
MW20-3	1.93 – 4.98	Overburden	02/10/2020	Cobalt
			22/10/2020	Cobalt
MW20-103			22/10/2020	Cobalt

Notes: mbgs – metres below ground surface

Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition. March 2004, amended July 1, 2011. Coarse Textured Soils for Residential/Parkland/Institutional Property Use.

¹ QA/QC sample

5.4 Quality Assurance/Quality Control

Blind Field Duplicates

A quality assurance/quality control (QA/QC) program was implemented during the investigation. The QA/QC program consisted of the use of industry standard field protocols and the collection of one blind field duplicate. Blind duplicates are submitted for laboratory analysis to evaluate laboratory precision and the field sampling and handling procedures, in addition to sample homogeneity. The relative percent difference (RPD) is defined as the absolute value of the variation between a sample and its duplicate, when compared to the average concentration of the original and the duplicate. It is used to assess the validity of the field and laboratory analytical procedures. The RPD calculation is only applicable when concentrations in the sample and its field duplicate are greater than five times the laboratory reportable detection limit (RDL).

Two parent - duplicate sample set was collected as part of this investigation, BH20-3 SA101 as a duplicate of BH20-3 SA1, and MW20-103 and a duplicate of MW20-3. RPDs were calculated for all parameters where the original and duplicate sample concentrations exceeded five times the

reportable detection limits (RDL). The RPD value ranges for parent – duplicate sets were as follows:

- BH20-3 SA1 & BH20-3 SA101: 2% to 75%;
 - Many of the calculated RPDs including SAR, EC, Arsenic, Barium, Cobalt and Lead were not within the acceptable range for soils (MOE, 2011). These variances are likely due to the natural variability in soil, and it should be noted that none of the parameters were identified as having exceedances to the applicable MECP Table 2 SCS.
- MW20-103 & MW20-3: 4%;
 - Which is within the acceptable range for soils for cobalt (MOE, 2011).

Trip Blanks

Trip blanks are laboratory prepared samples that are transported to the subject property in the same shipping containers used for the transport of the collected groundwater samples. The analysis of trip blanks is completed to determine if sample shipping or storage procedures have possibly influenced the analytical results.

The concentrations of VOC parameters were less than the laboratory reportable detection limits in the trip blank sample, with laboratory detection limits below the applicable Table 2 SCS. These results indicate that the data quality is considered reliable, with no evidence of cross-contamination during groundwater sample transport to the laboratory.

Analytical Laboratory QA/QC

The analytical laboratory completed all analyses in accordance with internal laboratory QA/QC which includes standardized analytical methods and procedures, in accordance with O.Reg 153/04, as amended. GEMTECs review of Paracel's QA/QC certificates indicates that the analytical results fell within acceptable QA/QC limits for constituent recovery as defined by the protocols for the analytical methods for all parameters analyzed, with the exception of exceedances due to matrix interference.

QA/QC Summary

Based on the measures discussed above, considering the inherent heterogeneity of soil and in particular fill material, sample collection and handling protocols are considered acceptable and associated analytical results are considered reliable. The sample collection methods and duplicates do not suggest inconsistencies in the field collection, transport, or in the laboratory analysis methods.

6 CONCLUSIONS AND RECOMMENDATIONS

Based on the analytical results of the Phase II ESA, GEMTEC offers the following conclusions:

- The overburden observed at the site during the subsurface investigation generally consisted of a layer of brown sandy fill material, underlain by varying thicknesses native deposits of grey silty clay with trace amounts of sand (weathered crust);
- All soil samples submitted for analysis met the MECP Table 2 SCS for all parameters analyzed;
- Groundwater exceedances to the MECP Table 2 SCS for cobalt were observed at MW20-1, and MW20-3 for both rounds of sampling completed in October of 2020 (original as part of the Phase II ESA, and supplemental sampling); and,
- The groundwater sample collected from MW20-2 met the MECP Table 2 SCS for all parameters analyzed during both rounds of sampling completed in October of 2020.

Although cobalt exceedances were observed in two groundwater sampling locations on October 2nd, 2020, it is noted that the cobalt exceedances in groundwater are not consistent with the COPCs associated with the PCAs or APECs identified during the Phase One ESA. Accordingly, the exceedances do not appear to be indicative of any anthropogenic sources based on the reasonable records review and site reconnaissance completed for the property. Based on the results presented above, it is likely that the observed exceedances of cobalt in groundwater may be attributable to the presence of naturally occurring Champlain Sea clay deposits which is consistent with the stratigraphy observed within the screened intervals during borehole advancement and well completion during the intrusive field investigation.

Further to this, it is noted that any domestic water wells in the area advanced as part of the new development would be completed to a much deeper depth than the shallow monitoring wells installed as part of this Phase II ESA, and it is anticipated that the underlying potable water aquifer would have a different groundwater quality signature in comparison to the shallow groundwater aquifer as sampled in this report. Groundwater results presented in this report is only indicative of quality from the shallow groundwater aquifer. Future potable groundwater quality and quantity studies completed as part of the development project should include sampling for cobalt to confirm elevated concentrations are limited to the upper shallow aquifer units where the presence of Champlain Sea Clay deposits were observed.

If the monitoring wells installed as part of this Phase II ESA are not longer required it is recommended that they be decommissioned in accordance with O.Reg. 903, as amended.

7 LIMITATION OF LIABILITY

This report and the work referred to herein was completed by GEMTEC Consulting Engineers and Scientists Ltd. (GEMTEC) for Thomas Cavanagh Developments. It is intended for the exclusive use of Thomas Cavanagh Developments. This report may not be relied upon by any

other person or entity without the express written consent of GEMTEC and Thomas Cavanagh Developments. Nothing in this report is intended to provide a legal opinion.

The investigation undertaken by GEMTEC with respect to this report and any conclusions or recommendations made reflect the best judgment of GEMTEC based on the site conditions observed during the investigations undertaken at the date(s) identified in the report and on the information available at the time the report was prepared. Unless otherwise stated, the findings contained in this report cannot be extrapolated or extended to historical or future site conditions, portions of the site that were unavailable for direct investigation, subsurface locations on the site that were not investigated directly, or chemical parameters, materials or analysis which were not addressed. Chemical parameters other than those addressed by the investigation described in this report may exist in soil and groundwater elsewhere on the site, the chemical parameters addressed in the report may exist in soil and groundwater at other locations at the site that were not investigated and concentrations of the chemical parameters addressed which are different than those reported may exist at other locations on the site than those from where the samples were taken.

The aggregate limit of our liability for any claims, damages, injuries, losses and other liabilities on this assignment, including for negligence, errors, and omissions shall not exceed the amount of our Professional Liability Insurance.

8 REFERENCES

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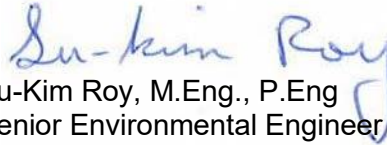
The City of Ottawa (GeoOttawa). 2000, last updated 2017. Accessed: October 2020. Available: <http://maps.ottawa.ca/geottawa/>.

9 CLOSURE

We trust this letter is sufficient for your requirements. If you have any questions concerning this information or if we can be of further service to you on this project, please call us.



Nicole Soucy, M.A.Sc., P.Eng
Environmental Engineer

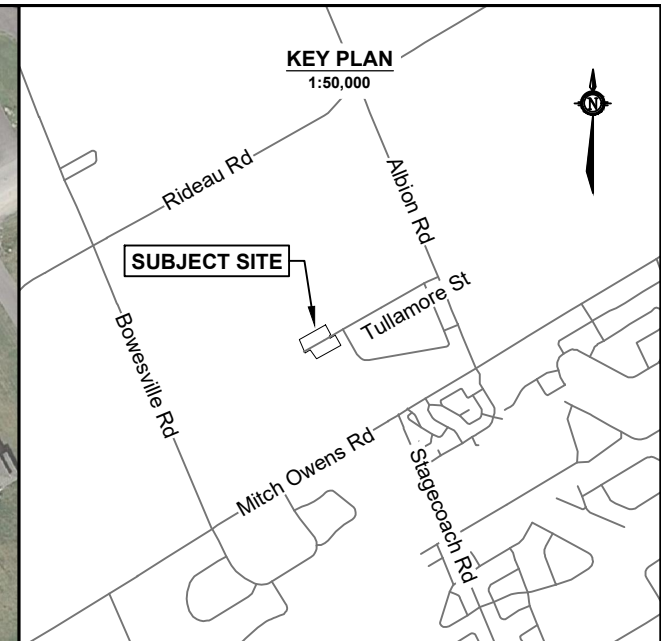


Su-Kim Roy, M.Eng., P.Eng
Senior Environmental Engineer





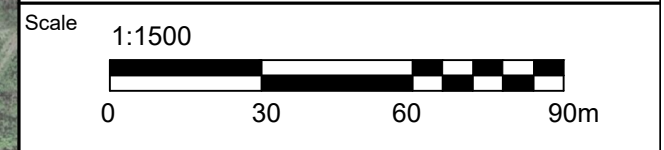
APPENDIX A

Figures



LEGEND

-  **BOREHOLE/ MONITORING WELL**
(current investigation by GEMTEC)
- BH/MW #** ——— BH/MW ID
- XX.XX** ——— GROUND SURFACE ELEVATION, IN METRES
GEODETC DATUM
-  **SUBJECT SITE**




GEMTEC
CONSULTING ENGINEERS
AND SCIENTISTS

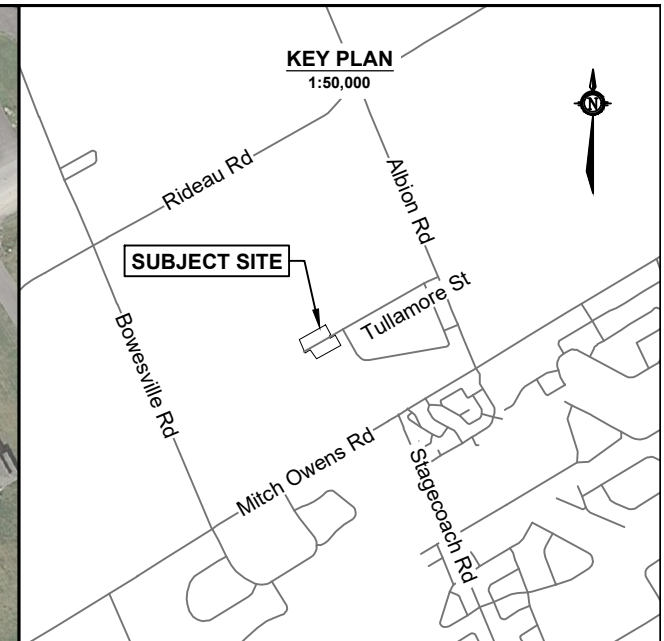
32 Steacie Drive
Ottawa, ON K2K 2A9
Tel: (613) 836-1422
www.gemtec.ca
ottawa@gemtec.ca

Drawing
BOREHOLE AND MONITORING WELL PLAN

Client **THOMAS CAVANAGH
CONSTRUCTION LTD.**

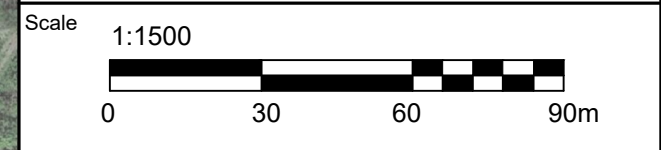
Project 64438.71	SUPPLEMENTAL PHASE II ESA TULLAMORE STREET CONCESSION 3 (RIDEAU FRONT) GLOUCESTER, ONTARIO
Drwn by S.L.	
Chkd by N.S.	

Date OCTOBER, 2020	Rev. 1	FIGURE A.1
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LEGEND

- BOREHOLE/ MONITORING WELL**
(current investigation by GEMTEC)
- BH/MW #** ——— BH/MW ID
- XX.XX** ——— GROUNDWATER ELEVATION, IN METRES
GEODETC DATUM
- SUBJECT SITE
- 80.0** ——— GROUNDWATER ELEVATION (mASL)
- INFERRED GROUNDWATER
FLOW DIRECTION



GEMTEC
CONSULTING ENGINEERS
AND SCIENTISTS

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Ottawa, ON K2K 2A9
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www.gemtec.ca
ottawa@gemtec.ca

Drawing
INFERRED SHALLOW GROUNDWATER FLOW

Client **THOMAS CAVANAGH
CONSTRUCTION LTD.**

Project 64438.71	SUPPLEMENTAL PHASE II ESA TULLAMORE STREET CONCESSION 3 (RIDEAU FRONT) GLOUCESTER, ONTARIO
Drwn by S.L.	
Chkd by N.S.	

Date OCTOBER, 2020	Rev. 1	FIGURE A.2
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APPENDIX B

Borehole and Monitoring Well Logs

RECORD OF BOREHOLE 20-1

CLIENT: Thomas Cavanagh Developments
 PROJECT: Supplemental Phase II ESA
 JOB#: 64438.71
 LOCATION: See Borehole Location Plan, Figure A.1

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Sep 28 2020

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLE DATA				COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m				
0		Ground Surface		102.13								
		Brown Silty Sand with organics (FILL)			1a	TO	0.3					HEX: 30 IBL: 2
					1b	TO	0.25					HEX: 40 IBL: 1
1		Gray Silty Clay		100.91 1.22								
					2	TO	1.04					HEX: 35 IBL: 1
2		Gray Sandy Clay with Cobbles and Boulders (Glacial Till)		99.69 2.44								
					3	TO	0.56					HEX: 115 IBL: 0
3				98.78 3.35								
												Oct 2, 2020: PHC F1-F4, VOCs, Metals, pH. Oct 22, 2020: Cobalt

Bentonite

TOP OF SCREEN
ELEV.: 100.30 m

Filter Sand
51 mm Diameter,
1.51 m Length
Slotted SCH 40
PVC

BOTTOM OF SCREEN
ELEV.: 98.78 m

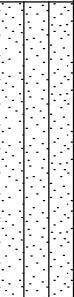
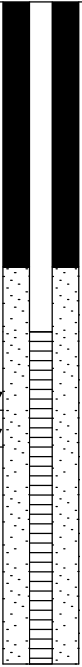

GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEVATION (m)
Oct. 02/20	2.10	100.03
Oct. 22/20	1.90	100.23

ENV - BOREHOLE LOG 64438.71_GNT.GPJ GEMTEC 2018.GDT 27/10/20

RECORD OF BOREHOLE 20-2

CLIENT: Thomas Cavanagh Developments
 PROJECT: Supplemental Phase II ESA
 JOB#: 64438.71
 LOCATION: See Borehole Location Plan, Figure A.1

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Sep 28 2020

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLE DATA					COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES				
0		Ground Surface		102.05									
		Brown Silty Sand with Gravel (FILL)			1a	TO	0.18			HEX: 35 IBL: 0			
					1b	TO	0.51			HEX: 25 IBL: 0			
1					2a	TO	0.15			HEX: 45 IBL: 0			
		Grey Sandy Clay		100.68 1.37	2b	TO	0.74			HEX: 30 IBL: 0			
2					3	TO	0.33			HEX: 65 IBL: 0			
3				99.00 3.05					Oct 2, 2020: PHC F1-F4, VOCs, Metals. Oct 22, 2020: Cobalt				


GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEVATION (m)
Oct. 02/20	2.05	▽ 100.00
Oct. 22/20	1.88	▼ 100.17

ENV - BOREHOLE LOG 64438.71_GNT.GPJ GEMTEC 2018.GDT 27/10/20

RECORD OF BOREHOLE 20-3

CLIENT: Thomas Cavanagh Developments
 PROJECT: Supplemental Phase II ESA
 JOB#: 64438.71
 LOCATION: See Borehole Location Plan, Figure A.1

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Sep 28 2020

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLE DATA				COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m				
0		Ground Surface		103.71								
		Brown Silty Sand with Gravel (FILL)			1	TO	0.76	PAHs, Metals & Inorganics + Dup	HEX: 25 IBL: 0			 <p>Bentonite</p> <p>TOP OF SCREEN ELEV.: 100.26 m</p> <p>Filter Sand 51 mm Diameter, 3.05 m Length Slotted SCH 40 PVC</p> <p>BOTTOM OF SCREEN ELEV.: 98.73 m</p>
1					2a	TO	0.18	PAHs, Metals & Inorganics	HEX: 35 IBL: 0			
2					2b	TO	0.48		HEX: 45 IBL: 0			
					3a	TO	0.25		HEX: 65 IBL: 0			
3		Grey Sandy Clay		101.02 2.69	3b	TO	0.81		HEX: 35 IBL: 0			
4					4	TO	0.36	PHC F1-F4, VOCs, Metals	HEX: 105 IBL: 0			
					5	TO	0					
				98.73 4.98								

GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEVATION (m)
Oct. 02/20	3.43	▽ 100.28
Oct. 22/20	3.23	▼ 100.48

ENV - BOREHOLE LOG 64438.71_GNT.GPJ GEMTEC 2018.GDT 27/10/20

RECORD OF BOREHOLE 20-4

CLIENT: Thomas Cavanagh Developments
 PROJECT: Supplemental Phase II ESA
 JOB#: 64438.71
 LOCATION: See Borehole Location Plan, Figure A.1

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Sep 28 2020

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLE DATA				COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m				
0		Ground Surface		104.05								
		Brown Silty Sand with Gravel (FILL)		103.62	1a	TO	0.43	PAHs, Metals & Inorganics	HEX: 35 IBL: 0			
		Brown Sandy Clay (FILL)		0.43	1b	TO	0.15		HEX: 45 IBL: 0			
1		Brown Silty Sand with Organics (FILL)		102.83					HEX: 10 IBL: 0			
				102.53	2	TO	0.15					
				1.52								

ENV - BOREHOLE LOG 64438.71_GNT.GPJ GEMTEC 2018.GDT 27/10/20

RECORD OF BOREHOLE 20-5

CLIENT: Thomas Cavanagh Developments
 PROJECT: Supplemental Phase II ESA
 JOB#: 64438.71
 LOCATION: See Borehole Location Plan, Figure A.1

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Sep 28 2020

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLE DATA				COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m				
0		Ground Surface		103.17								
		Brown Silty Sandy Clay (FILL)			1	TO	0.76		HEX: 5 IBL: 0			
1		Brown Sandy Silt with Organics (FILL)		101.95 1.22	2	TO	0.15	PAHs, Metals & Inorganics	HEX: 40 IBL: 0			
				101.65 1.52								

ENV - BOREHOLE LOG 64438.71_GNT.GPJ GEMTEC 2018.GDT 27/10/20



APPENDIX C

Soil and Groundwater Analytical Result Summary Tables



APPENDIX D

Laboratory Certificates of Analysis

Certificate of Analysis

GEMTEC Consulting Engineers and Scientists Limited

32 Steacie Drive
Kanata, ON K2K 2A9
Attn: Nicole Soucy

Client PO:
Project: 64438.71
Custody: 130449

Report Date: 5-Oct-2020
Order Date: 29-Sep-2020

Order #: 2040253

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

Parcel ID	Client ID
2040253-01	BH20-1 SA3
2040253-02	BH20-2 SA3
2040253-03	BH20-3 SA1
2040253-04	BH20-3 SA101
2040253-05	BH20-3 SA2b
2040253-06	BH20-3 SA4
2040253-07	BH20-4 SA1b
2040253-08	BH20-5 SA2

Approved By:



Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 05-Oct-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 29-Sep-2020

Client PO:

Project Description: 64438.71

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Boron, available	MOE (HWE), EPA 200.7 - ICP-OES	2-Oct-20	2-Oct-20
Chromium, hexavalent - soil	MOE E3056 - Extraction, colourimetric	30-Sep-20	2-Oct-20
Conductivity	MOE E3138 - probe @25 °C, water ext	1-Oct-20	2-Oct-20
Cyanide, free	MOE E3015 - Auto Colour, water extraction	1-Oct-20	5-Oct-20
Mercury by CVAA	EPA 7471B - CVAA, digestion	1-Oct-20	2-Oct-20
pH, soil	EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext.	30-Sep-20	1-Oct-20
PHC F1	CWS Tier 1 - P&T GC-FID	30-Sep-20	1-Oct-20
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	29-Sep-20	30-Sep-20
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	1-Oct-20	1-Oct-20
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	30-Sep-20	3-Oct-20
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	30-Sep-20	1-Oct-20
SAR	Calculated	2-Oct-20	2-Oct-20
Solids, %	Gravimetric, calculation	30-Sep-20	1-Oct-20

Certificate of Analysis

Report Date: 05-Oct-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 29-Sep-2020

Client PO:

Project Description: 64438.71

Client ID:	BH20-1 SA3	BH20-2 SA3	BH20-3 SA1	BH20-3 SA101
Sample Date:	28-Sep-20 09:00	28-Sep-20 09:00	28-Sep-20 09:00	28-Sep-20 09:00
Sample ID:	2040253-01	2040253-02	2040253-03	2040253-04
MDL/Units	Soil	Soil	Soil	Soil

Physical Characteristics

% Solids	0.1 % by Wt.	90.7	74.8	95.2	91.7
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General Inorganics

SAR	0.01 N/A	-	-	0.11	0.05
Conductivity	5 uS/cm	-	-	244	162
Cyanide, free	0.03 ug/g dry	-	-	<0.03	<0.03
pH	0.05 pH Units	7.96	-	7.51	7.64

Metals

Antimony	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Arsenic	1.0 ug/g dry	3.6	2.8	13.2	7.7
Barium	1.0 ug/g dry	56.2	111	41.3	56.5
Beryllium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Boron	5.0 ug/g dry	5.1	<5.0	6.2	5.6
Boron, available	0.5 ug/g dry	-	-	<0.5	<0.5
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Chromium	5.0 ug/g dry	12.0	22.6	14.0	16.4
Chromium (VI)	0.2 ug/g dry	-	-	<0.2	<0.2
Cobalt	1.0 ug/g dry	4.5	6.8	17.4	10.1
Copper	5.0 ug/g dry	17.9	19.1	20.9	22.2
Lead	1.0 ug/g dry	7.1	5.1	25.9	16.3
Mercury	0.1 ug/g dry	-	-	<0.1	<0.1
Molybdenum	1.0 ug/g dry	1.7	<1.0	4.5	2.6
Nickel	5.0 ug/g dry	9.0	14.1	29.8	19.4
Selenium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Silver	0.3 ug/g dry	<0.3	<0.3	1.8	0.9
Thallium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Uranium	1.0 ug/g dry	1.7	1.4	<1.0	<1.0
Vanadium	10.0 ug/g dry	20.3	36.4	20.5	26.7
Zinc	20.0 ug/g dry	63.8	32.1	43.2	43.0

Volatiles

Acetone	0.50 ug/g dry	<0.50	<0.50	-	-
Benzene	0.02 ug/g dry	<0.02	<0.02	-	-
Bromodichloromethane	0.05 ug/g dry	<0.05	<0.05	-	-
Bromoform	0.05 ug/g dry	<0.05	<0.05	-	-
Bromomethane	0.05 ug/g dry	<0.05	<0.05	-	-
Carbon Tetrachloride	0.05 ug/g dry	<0.05	<0.05	-	-

Certificate of Analysis

Report Date: 05-Oct-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 29-Sep-2020

Client PO:

Project Description: 64438.71

	Client ID:	BH20-1 SA3	BH20-2 SA3	BH20-3 SA1	BH20-3 SA101
	Sample Date:	28-Sep-20 09:00	28-Sep-20 09:00	28-Sep-20 09:00	28-Sep-20 09:00
	Sample ID:	2040253-01	2040253-02	2040253-03	2040253-04
	MDL/Units	Soil	Soil	Soil	Soil
Chlorobenzene	0.05 ug/g dry	<0.05	<0.05	-	-
Chloroform	0.05 ug/g dry	<0.05	<0.05	-	-
Dibromochloromethane	0.05 ug/g dry	<0.05	<0.05	-	-
Dichlorodifluoromethane	0.05 ug/g dry	<0.05	<0.05	-	-
1,2-Dichlorobenzene	0.05 ug/g dry	<0.05	<0.05	-	-
1,3-Dichlorobenzene	0.05 ug/g dry	<0.05	<0.05	-	-
1,4-Dichlorobenzene	0.05 ug/g dry	<0.05	<0.05	-	-
1,1-Dichloroethane	0.05 ug/g dry	<0.05	<0.05	-	-
1,2-Dichloroethane	0.05 ug/g dry	<0.05	<0.05	-	-
1,1-Dichloroethylene	0.05 ug/g dry	<0.05	<0.05	-	-
cis-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	<0.05	-	-
trans-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	<0.05	-	-
1,2-Dichloropropane	0.05 ug/g dry	<0.05	<0.05	-	-
cis-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	<0.05	-	-
trans-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	<0.05	-	-
1,3-Dichloropropene, total	0.05 ug/g dry	<0.05	<0.05	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	-	-
Ethylene dibromide (dibromoethane, 1,2-)	0.05 ug/g dry	<0.05	<0.05	-	-
Hexane	0.05 ug/g dry	<0.05	<0.05	-	-
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	<0.50	<0.50	-	-
Methyl Isobutyl Ketone	0.50 ug/g dry	<0.50	<0.50	-	-
Methyl tert-butyl ether	0.05 ug/g dry	<0.05	<0.05	-	-
Methylene Chloride	0.05 ug/g dry	<0.05	<0.05	-	-
Styrene	0.05 ug/g dry	<0.05	<0.05	-	-
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	<0.05	<0.05	-	-
1,1,1,2,2-Tetrachloroethane	0.05 ug/g dry	<0.05	<0.05	-	-
Tetrachloroethylene	0.05 ug/g dry	<0.05	<0.05	-	-
Toluene	0.05 ug/g dry	<0.05	<0.05	-	-
1,1,1-Trichloroethane	0.05 ug/g dry	<0.05	<0.05	-	-
1,1,2-Trichloroethane	0.05 ug/g dry	<0.05	<0.05	-	-
Trichloroethylene	0.05 ug/g dry	<0.05	<0.05	-	-
Trichlorofluoromethane	0.05 ug/g dry	<0.05	<0.05	-	-
Vinyl chloride	0.02 ug/g dry	<0.02	<0.02	-	-
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g dry	<0.05	<0.05	-	-

Certificate of Analysis

Report Date: 05-Oct-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 29-Sep-2020

Client PO:

Project Description: 64438.71

	Client ID:	BH20-1 SA3	BH20-2 SA3	BH20-3 SA1	BH20-3 SA101
	Sample Date:	28-Sep-20 09:00	28-Sep-20 09:00	28-Sep-20 09:00	28-Sep-20 09:00
	Sample ID:	2040253-01	2040253-02	2040253-03	2040253-04
	MDL/Units	Soil	Soil	Soil	Soil
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	-	-
4-Bromofluorobenzene	Surrogate	93.9%	96.8%	-	-
Dibromofluoromethane	Surrogate	92.2%	93.7%	-	-
Toluene-d8	Surrogate	107%	107%	-	-

Hydrocarbons

F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	-	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	<8	-	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	-	-

Semi-Volatiles

Acenaphthene	0.02 ug/g dry	-	-	<0.02	<0.02
Acenaphthylene	0.02 ug/g dry	-	-	<0.02	<0.02
Anthracene	0.02 ug/g dry	-	-	<0.02	<0.02
Benzo [a] anthracene	0.02 ug/g dry	-	-	<0.02	<0.02
Benzo [a] pyrene	0.02 ug/g dry	-	-	<0.02	<0.02
Benzo [b] fluoranthene	0.02 ug/g dry	-	-	<0.02	<0.02
Benzo [g,h,i] perylene	0.02 ug/g dry	-	-	<0.02	<0.02
Benzo [k] fluoranthene	0.02 ug/g dry	-	-	<0.02	<0.02
Chrysene	0.02 ug/g dry	-	-	<0.02	<0.02
Dibenzo [a,h] anthracene	0.02 ug/g dry	-	-	<0.02	<0.02
Fluoranthene	0.02 ug/g dry	-	-	<0.02	<0.02
Fluorene	0.02 ug/g dry	-	-	<0.02	<0.02
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	-	-	<0.02	<0.02
1-Methylnaphthalene	0.02 ug/g dry	-	-	<0.02	<0.02
2-Methylnaphthalene	0.02 ug/g dry	-	-	<0.02	<0.02
Methylnaphthalene (1&2)	0.04 ug/g dry	-	-	<0.04	<0.04
Naphthalene	0.01 ug/g dry	-	-	<0.01	<0.01
Phenanthrene	0.02 ug/g dry	-	-	<0.02	<0.02
Pyrene	0.02 ug/g dry	-	-	<0.02	<0.02
2-Fluorobiphenyl	Surrogate	-	-	89.6%	89.5%
Terphenyl-d14	Surrogate	-	-	94.1%	90.2%

Certificate of Analysis

Report Date: 05-Oct-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 29-Sep-2020

Client PO:

Project Description: 64438.71

Client ID:	BH20-3 SA2b	BH20-3 SA4	BH20-4 SA1b	BH20-5 SA2
Sample Date:	28-Sep-20 09:00	28-Sep-20 09:00	28-Sep-20 09:00	28-Sep-20 09:00
Sample ID:	2040253-05	2040253-06	2040253-07	2040253-08
MDL/Units	Soil	Soil	Soil	Soil

Physical Characteristics

% Solids	0.1 % by Wt.	91.3	94.4	93.0	80.1
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General Inorganics

SAR	0.01 N/A	0.05	-	0.07	0.22
Conductivity	5 uS/cm	281	-	150	236
Cyanide, free	0.03 ug/g dry	<0.03	-	<0.03	<0.03
pH	0.05 pH Units	6.95	-	7.60	-

Metals

Antimony	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Arsenic	1.0 ug/g dry	2.5	4.1	3.1	3.0
Barium	1.0 ug/g dry	54.2	31.2	54.1	115
Beryllium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Boron	5.0 ug/g dry	<5.0	<5.0	<5.0	<5.0
Boron, available	0.5 ug/g dry	<0.5	-	<0.5	<0.5
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Chromium	5.0 ug/g dry	11.2	12.6	12.9	24.5
Chromium (VI)	0.2 ug/g dry	<0.2	-	<0.2	<0.2
Cobalt	1.0 ug/g dry	4.1	5.3	3.8	5.7
Copper	5.0 ug/g dry	<5.0	17.3	7.8	12.6
Lead	1.0 ug/g dry	4.0	8.5	3.8	6.2
Mercury	0.1 ug/g dry	<0.1	-	<0.1	<0.1
Molybdenum	1.0 ug/g dry	<1.0	1.4	1.2	<1.0
Nickel	5.0 ug/g dry	7.7	11.3	7.5	13.5
Selenium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Silver	0.3 ug/g dry	<0.3	<0.3	<0.3	<0.3
Thallium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Uranium	1.0 ug/g dry	<1.0	1.0	<1.0	<1.0
Vanadium	10.0 ug/g dry	17.4	20.3	25.5	30.9
Zinc	20.0 ug/g dry	<20.0	25.4	<20.0	38.0

Volatiles

Acetone	0.50 ug/g dry	-	<0.50	-	-
Benzene	0.02 ug/g dry	-	<0.02	-	-
Bromodichloromethane	0.05 ug/g dry	-	<0.05	-	-
Bromoform	0.05 ug/g dry	-	<0.05	-	-
Bromomethane	0.05 ug/g dry	-	<0.05	-	-
Carbon Tetrachloride	0.05 ug/g dry	-	<0.05	-	-

Certificate of Analysis

Report Date: 05-Oct-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 29-Sep-2020

Client PO:

Project Description: 64438.71

	Client ID:	BH20-3 SA2b	BH20-3 SA4	BH20-4 SA1b	BH20-5 SA2
	Sample Date:	28-Sep-20 09:00	28-Sep-20 09:00	28-Sep-20 09:00	28-Sep-20 09:00
	Sample ID:	2040253-05	2040253-06	2040253-07	2040253-08
	MDL/Units	Soil	Soil	Soil	Soil
Chlorobenzene	0.05 ug/g dry	-	<0.05	-	-
Chloroform	0.05 ug/g dry	-	<0.05	-	-
Dibromochloromethane	0.05 ug/g dry	-	<0.05	-	-
Dichlorodifluoromethane	0.05 ug/g dry	-	<0.05	-	-
1,2-Dichlorobenzene	0.05 ug/g dry	-	<0.05	-	-
1,3-Dichlorobenzene	0.05 ug/g dry	-	<0.05	-	-
1,4-Dichlorobenzene	0.05 ug/g dry	-	<0.05	-	-
1,1-Dichloroethane	0.05 ug/g dry	-	<0.05	-	-
1,2-Dichloroethane	0.05 ug/g dry	-	<0.05	-	-
1,1-Dichloroethylene	0.05 ug/g dry	-	<0.05	-	-
cis-1,2-Dichloroethylene	0.05 ug/g dry	-	<0.05	-	-
trans-1,2-Dichloroethylene	0.05 ug/g dry	-	<0.05	-	-
1,2-Dichloropropane	0.05 ug/g dry	-	<0.05	-	-
cis-1,3-Dichloropropylene	0.05 ug/g dry	-	<0.05	-	-
trans-1,3-Dichloropropylene	0.05 ug/g dry	-	<0.05	-	-
1,3-Dichloropropene, total	0.05 ug/g dry	-	<0.05	-	-
Ethylbenzene	0.05 ug/g dry	-	<0.05	-	-
Ethylene dibromide (dibromoethane, 1	0.05 ug/g dry	-	<0.05	-	-
Hexane	0.05 ug/g dry	-	<0.05	-	-
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	-	<0.50	-	-
Methyl Isobutyl Ketone	0.50 ug/g dry	-	<0.50	-	-
Methyl tert-butyl ether	0.05 ug/g dry	-	<0.05	-	-
Methylene Chloride	0.05 ug/g dry	-	<0.05	-	-
Styrene	0.05 ug/g dry	-	<0.05	-	-
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	-	<0.05	-	-
1,1,1,2,2-Tetrachloroethane	0.05 ug/g dry	-	<0.05	-	-
Tetrachloroethylene	0.05 ug/g dry	-	<0.05	-	-
Toluene	0.05 ug/g dry	-	<0.05	-	-
1,1,1-Trichloroethane	0.05 ug/g dry	-	<0.05	-	-
1,1,2-Trichloroethane	0.05 ug/g dry	-	<0.05	-	-
Trichloroethylene	0.05 ug/g dry	-	<0.05	-	-
Trichlorofluoromethane	0.05 ug/g dry	-	<0.05	-	-
Vinyl chloride	0.02 ug/g dry	-	<0.02	-	-
m,p-Xylenes	0.05 ug/g dry	-	<0.05	-	-
o-Xylene	0.05 ug/g dry	-	<0.05	-	-

Certificate of Analysis

Report Date: 05-Oct-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 29-Sep-2020

Client PO:

Project Description: 64438.71

	Client ID:	BH20-3 SA2b	BH20-3 SA4	BH20-4 SA1b	BH20-5 SA2
	Sample Date:	28-Sep-20 09:00	28-Sep-20 09:00	28-Sep-20 09:00	28-Sep-20 09:00
	Sample ID:	2040253-05	2040253-06	2040253-07	2040253-08
	MDL/Units	Soil	Soil	Soil	Soil
Xylenes, total	0.05 ug/g dry	-	<0.05	-	-
4-Bromofluorobenzene	Surrogate	-	96.4%	-	-
Dibromofluoromethane	Surrogate	-	93.5%	-	-
Toluene-d8	Surrogate	-	106%	-	-

Hydrocarbons

F1 PHCs (C6-C10)	7 ug/g dry	-	<7	-	-
F2 PHCs (C10-C16)	4 ug/g dry	-	<4	-	-
F3 PHCs (C16-C34)	8 ug/g dry	-	<8	-	-
F4 PHCs (C34-C50)	6 ug/g dry	-	<6	-	-

Semi-Volatiles

Acenaphthene	0.02 ug/g dry	<0.02	-	<0.02	<0.02
Acenaphthylene	0.02 ug/g dry	<0.02	-	<0.02	<0.02
Anthracene	0.02 ug/g dry	<0.02	-	<0.02	<0.02
Benzo [a] anthracene	0.02 ug/g dry	<0.02	-	<0.02	<0.02
Benzo [a] pyrene	0.02 ug/g dry	<0.02	-	<0.02	<0.02
Benzo [b] fluoranthene	0.02 ug/g dry	<0.02	-	<0.02	<0.02
Benzo [g,h,i] perylene	0.02 ug/g dry	<0.02	-	<0.02	<0.02
Benzo [k] fluoranthene	0.02 ug/g dry	<0.02	-	<0.02	<0.02
Chrysene	0.02 ug/g dry	<0.02	-	<0.02	<0.02
Dibenzo [a,h] anthracene	0.02 ug/g dry	<0.02	-	<0.02	<0.02
Fluoranthene	0.02 ug/g dry	<0.02	-	<0.02	<0.02
Fluorene	0.02 ug/g dry	<0.02	-	<0.02	<0.02
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	<0.02	-	<0.02	<0.02
1-Methylnaphthalene	0.02 ug/g dry	<0.02	-	<0.02	<0.02
2-Methylnaphthalene	0.02 ug/g dry	<0.02	-	<0.02	<0.02
Methylnaphthalene (1&2)	0.04 ug/g dry	<0.04	-	<0.04	<0.04
Naphthalene	0.01 ug/g dry	<0.01	-	<0.01	<0.01
Phenanthrene	0.02 ug/g dry	<0.02	-	<0.02	<0.02
Pyrene	0.02 ug/g dry	<0.02	-	<0.02	<0.02
2-Fluorobiphenyl	Surrogate	103%	-	88.9%	99.5%
Terphenyl-d14	Surrogate	103%	-	85.7%	94.4%

Certificate of Analysis

Report Date: 05-Oct-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 29-Sep-2020

Client PO:

Project Description: 64438.71

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
Conductivity	ND	5	uS/cm						
Cyanide, free	ND	0.03	ug/g						
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Metals									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium (VI)	ND	0.2	ug/g						
Chromium	ND	5.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	5.0	ug/g						
Lead	ND	1.0	ug/g						
Mercury	ND	0.1	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	5.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	10.0	ug/g						
Zinc	ND	20.0	ug/g						
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g						
Acenaphthylene	ND	0.02	ug/g						
Anthracene	ND	0.02	ug/g						
Benzo [a] anthracene	ND	0.02	ug/g						
Benzo [a] pyrene	ND	0.02	ug/g						
Benzo [b] fluoranthene	ND	0.02	ug/g						
Benzo [g,h,i] perylene	ND	0.02	ug/g						
Benzo [k] fluoranthene	ND	0.02	ug/g						
Chrysene	ND	0.02	ug/g						
Dibenzo [a,h] anthracene	ND	0.02	ug/g						
Fluoranthene	ND	0.02	ug/g						
Fluorene	ND	0.02	ug/g						
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g						
1-Methylnaphthalene	ND	0.02	ug/g						
2-Methylnaphthalene	ND	0.02	ug/g						
Methylnaphthalene (1&2)	ND	0.04	ug/g						
Naphthalene	ND	0.01	ug/g						
Phenanthrene	ND	0.02	ug/g						
Pyrene	ND	0.02	ug/g						
Surrogate: 2-Fluorobiphenyl	1.27		ug/g		94.9	50-140			
Surrogate: Terphenyl-d14	1.35		ug/g		102	50-140			
Volatiles									
Acetone	ND	0.50	ug/g						
Benzene	ND	0.02	ug/g						
Bromodichloromethane	ND	0.05	ug/g						
Bromoform	ND	0.05	ug/g						
Bromomethane	ND	0.05	ug/g						
Carbon Tetrachloride	ND	0.05	ug/g						

Certificate of Analysis

Report Date: 05-Oct-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 29-Sep-2020

Client PO:

Project Description: 64438.71

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Chlorobenzene	ND	0.05	ug/g						
Chloroform	ND	0.05	ug/g						
Dibromochloromethane	ND	0.05	ug/g						
Dichlorodifluoromethane	ND	0.05	ug/g						
1,2-Dichlorobenzene	ND	0.05	ug/g						
1,3-Dichlorobenzene	ND	0.05	ug/g						
1,4-Dichlorobenzene	ND	0.05	ug/g						
1,1-Dichloroethane	ND	0.05	ug/g						
1,2-Dichloroethane	ND	0.05	ug/g						
1,1-Dichloroethylene	ND	0.05	ug/g						
cis-1,2-Dichloroethylene	ND	0.05	ug/g						
trans-1,2-Dichloroethylene	ND	0.05	ug/g						
1,2-Dichloropropane	ND	0.05	ug/g						
cis-1,3-Dichloropropylene	ND	0.05	ug/g						
trans-1,3-Dichloropropylene	ND	0.05	ug/g						
1,3-Dichloropropene, total	ND	0.05	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Ethylene dibromide (dibromoethane, 1,2-	ND	0.05	ug/g						
Hexane	ND	0.05	ug/g						
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g						
Methyl Isobutyl Ketone	ND	0.50	ug/g						
Methyl tert-butyl ether	ND	0.05	ug/g						
Methylene Chloride	ND	0.05	ug/g						
Styrene	ND	0.05	ug/g						
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g						
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g						
Tetrachloroethylene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
1,1,1-Trichloroethane	ND	0.05	ug/g						
1,1,2-Trichloroethane	ND	0.05	ug/g						
Trichloroethylene	ND	0.05	ug/g						
Trichlorofluoromethane	ND	0.05	ug/g						
Vinyl chloride	ND	0.02	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: 4-Bromofluorobenzene	7.26		ug/g		90.8	50-140			
Surrogate: Dibromofluoromethane	6.71		ug/g		83.9	50-140			
Surrogate: Toluene-d8	8.56		ug/g		107	50-140			

Certificate of Analysis

Report Date: 05-Oct-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 29-Sep-2020

Client PO:

Project Description: 64438.71

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
SAR	0.09	0.01	N/A	0.11			20.0	30	
Conductivity	249	5	uS/cm	244			2.1	5	
Cyanide, free	ND	0.03	ug/g dry	ND			NC	35	
pH	7.95	0.05	pH Units	7.96			0.1	2.3	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND			NC	40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND			NC	30	
F3 PHCs (C16-C34)	ND	8	ug/g dry	ND			NC	30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND			NC	30	
Metals									
Antimony	ND	1.0	ug/g dry	ND			NC	30	
Arsenic	13.9	1.0	ug/g dry	13.2			4.9	30	
Barium	40.0	1.0	ug/g dry	41.3			3.3	30	
Beryllium	ND	0.5	ug/g dry	ND			NC	30	
Boron, available	ND	0.5	ug/g dry	ND			NC	35	
Boron	6.9	5.0	ug/g dry	6.2			11.5	30	
Cadmium	ND	0.5	ug/g dry	ND			NC	30	
Chromium (VI)	ND	0.2	ug/g dry	ND			NC	35	
Chromium	14.1	5.0	ug/g dry	14.0			0.7	30	
Cobalt	17.4	1.0	ug/g dry	17.4			0.4	30	
Copper	20.4	5.0	ug/g dry	20.9			2.4	30	
Lead	26.1	1.0	ug/g dry	25.9			1.1	30	
Mercury	ND	0.1	ug/g dry	ND			NC	30	
Molybdenum	4.7	1.0	ug/g dry	4.5			2.8	30	
Nickel	29.9	5.0	ug/g dry	29.8			0.1	30	
Selenium	ND	1.0	ug/g dry	ND			NC	30	
Silver	1.8	0.3	ug/g dry	1.8			0.6	30	
Thallium	ND	1.0	ug/g dry	ND			NC	30	
Uranium	ND	1.0	ug/g dry	ND			NC	30	
Vanadium	20.3	10.0	ug/g dry	20.5			0.8	30	
Zinc	42.0	20.0	ug/g dry	43.2			2.8	30	
Physical Characteristics									
% Solids	74.4	0.1	% by Wt.	73.6			1.0	25	
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g dry	ND			NC	40	
Acenaphthylene	ND	0.02	ug/g dry	ND			NC	40	
Anthracene	ND	0.02	ug/g dry	ND			NC	40	
Benzo [a] anthracene	ND	0.02	ug/g dry	ND			NC	40	
Benzo [a] pyrene	ND	0.02	ug/g dry	ND			NC	40	
Benzo [b] fluoranthene	ND	0.02	ug/g dry	ND			NC	40	
Benzo [g,h,i] perylene	ND	0.02	ug/g dry	ND			NC	40	
Benzo [k] fluoranthene	ND	0.02	ug/g dry	ND			NC	40	
Chrysene	ND	0.02	ug/g dry	ND			NC	40	
Dibenzo [a,h] anthracene	ND	0.02	ug/g dry	ND			NC	40	
Fluoranthene	ND	0.02	ug/g dry	ND			NC	40	
Fluorene	ND	0.02	ug/g dry	ND			NC	40	
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g dry	ND			NC	40	
1-Methylnaphthalene	ND	0.02	ug/g dry	ND			NC	40	
2-Methylnaphthalene	ND	0.02	ug/g dry	ND			NC	40	
Naphthalene	ND	0.01	ug/g dry	ND			NC	40	
Phenanthrene	ND	0.02	ug/g dry	ND			NC	40	
Pyrene	ND	0.02	ug/g dry	ND			NC	40	
Surrogate: 2-Fluorobiphenyl	1.12		ug/g dry		79.8	50-140			
Surrogate: Terphenyl-d14	1.12		ug/g dry		80.0	50-140			
Volatiles									

Certificate of Analysis

Report Date: 05-Oct-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 29-Sep-2020

Client PO:

Project Description: 64438.71

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Acetone	ND	0.50	ug/g dry	ND			NC	50	
Benzene	ND	0.02	ug/g dry	ND			NC	50	
Bromodichloromethane	ND	0.05	ug/g dry	ND			NC	50	
Bromoform	ND	0.05	ug/g dry	ND			NC	50	
Bromomethane	ND	0.05	ug/g dry	ND			NC	50	
Carbon Tetrachloride	ND	0.05	ug/g dry	ND			NC	50	
Chlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
Chloroform	ND	0.05	ug/g dry	ND			NC	50	
Dibromochloromethane	ND	0.05	ug/g dry	ND			NC	50	
Dichlorodifluoromethane	ND	0.05	ug/g dry	ND			NC	50	
1,2-Dichlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
1,3-Dichlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
1,4-Dichlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
1,1-Dichloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,2-Dichloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
cis-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
trans-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
1,2-Dichloropropane	ND	0.05	ug/g dry	ND			NC	50	
cis-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND			NC	50	
trans-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g dry	ND			NC	50	
Ethylene dibromide (dibromoethane, 1,2-)	ND	0.05	ug/g dry	ND			NC	50	
Hexane	ND	0.05	ug/g dry	ND			NC	50	
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g dry	ND			NC	50	
Methyl Isobutyl Ketone	ND	0.50	ug/g dry	ND			NC	50	
Methyl tert-butyl ether	ND	0.05	ug/g dry	ND			NC	50	
Methylene Chloride	ND	0.05	ug/g dry	ND			NC	50	
Styrene	ND	0.05	ug/g dry	ND			NC	50	
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g dry	ND			NC	50	
Tetrachloroethylene	ND	0.05	ug/g dry	ND			NC	50	
Toluene	ND	0.05	ug/g dry	ND			NC	50	
1,1,1-Trichloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1,2-Trichloroethane	ND	0.05	ug/g dry	ND			NC	50	
Trichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
Trichlorofluoromethane	ND	0.05	ug/g dry	ND			NC	50	
Vinyl chloride	ND	0.02	ug/g dry	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g dry	ND			NC	50	
o-Xylene	ND	0.05	ug/g dry	ND			NC	50	
Surrogate: 4-Bromofluorobenzene	7.98		ug/g dry		94.5	50-140			
Surrogate: Dibromofluoromethane	7.80		ug/g dry		92.4	50-140			
Surrogate: Toluene-d8	9.07		ug/g dry		107	50-140			

Certificate of Analysis

Report Date: 05-Oct-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 29-Sep-2020

Client PO:

Project Description: 64438.71

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
Cyanide, free	0.227	0.03	ug/g	ND	75.7	70-130			
Hydrocarbons									
F1 PHCs (C6-C10)	179	7	ug/g	ND	89.6	80-120			
F2 PHCs (C10-C16)	114	4	ug/g	ND	128	60-140			
F3 PHCs (C16-C34)	287	8	ug/g	ND	131	60-140			
F4 PHCs (C34-C50)	181	6	ug/g	ND	131	60-140			
Metals									
Antimony	42.2	1.0	ug/g	ND	84.2	70-130			
Arsenic	56.4	1.0	ug/g	5.3	102	70-130			
Barium	63.8	1.0	ug/g	16.5	94.5	70-130			
Beryllium	46.1	0.5	ug/g	ND	91.8	70-130			
Boron, available	3.77	0.5	ug/g	ND	75.4	70-122			
Boron	44.2	5.0	ug/g	ND	83.4	70-130			
Cadmium	45.8	0.5	ug/g	ND	91.5	70-130			
Chromium (VI)	0.1	0.2	ug/g	ND	56.5	70-130			QM-05
Chromium	57.3	5.0	ug/g	5.6	103	70-130			
Cobalt	56.3	1.0	ug/g	6.9	98.7	70-130			
Copper	55.9	5.0	ug/g	8.4	95.2	70-130			
Lead	57.5	1.0	ug/g	10.3	94.3	70-130			
Mercury	1.47	0.1	ug/g	ND	98.3	70-130			
Molybdenum	49.8	1.0	ug/g	1.8	96.0	70-130			
Nickel	60.2	5.0	ug/g	11.9	96.6	70-130			
Selenium	46.2	1.0	ug/g	ND	92.2	70-130			
Silver	48.7	0.3	ug/g	0.7	96.0	70-130			
Thallium	45.8	1.0	ug/g	ND	91.4	70-130			
Uranium	49.2	1.0	ug/g	ND	97.8	70-130			
Vanadium	60.8	10.0	ug/g	ND	105	70-130			
Zinc	61.5	20.0	ug/g	ND	88.5	70-130			
Semi-Volatiles									
Acenaphthene	0.184	0.02	ug/g	ND	105	50-140			
Acenaphthylene	0.158	0.02	ug/g	ND	90.4	50-140			
Anthracene	0.163	0.02	ug/g	ND	93.3	50-140			
Benzo [a] anthracene	0.143	0.02	ug/g	ND	81.9	50-140			
Benzo [a] pyrene	0.142	0.02	ug/g	ND	81.3	50-140			
Benzo [b] fluoranthene	0.208	0.02	ug/g	ND	119	50-140			
Benzo [g,h,i] perylene	0.155	0.02	ug/g	ND	88.5	50-140			
Benzo [k] fluoranthene	0.186	0.02	ug/g	ND	106	50-140			
Chrysene	0.180	0.02	ug/g	ND	103	50-140			
Dibenzo [a,h] anthracene	0.152	0.02	ug/g	ND	86.8	50-140			
Fluoranthene	0.164	0.02	ug/g	ND	93.7	50-140			
Fluorene	0.170	0.02	ug/g	ND	97.2	50-140			
Indeno [1,2,3-cd] pyrene	0.155	0.02	ug/g	ND	88.6	50-140			
1-Methylnaphthalene	0.193	0.02	ug/g	ND	110	50-140			
2-Methylnaphthalene	0.214	0.02	ug/g	ND	122	50-140			
Naphthalene	0.189	0.01	ug/g	ND	108	50-140			
Phenanthrene	0.174	0.02	ug/g	ND	99.6	50-140			
Pyrene	0.169	0.02	ug/g	ND	96.5	50-140			
Surrogate: 2-Fluorobiphenyl	1.34		ug/g		95.5	50-140			

Certificate of Analysis

Report Date: 05-Oct-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 29-Sep-2020

Client PO:

Project Description: 64438.71

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<i>Surrogate: Terphenyl-d14</i>	1.31		ug/g		93.7	50-140			
Volatiles									
Acetone	11.5	0.50	ug/g	ND	115	50-140			
Benzene	3.62	0.02	ug/g	ND	90.4	60-130			
Bromodichloromethane	3.17	0.05	ug/g	ND	79.2	60-130			
Bromoform	3.52	0.05	ug/g	ND	88.1	60-130			
Bromomethane	4.38	0.05	ug/g	ND	109	50-140			
Carbon Tetrachloride	3.27	0.05	ug/g	ND	81.7	60-130			
Chlorobenzene	3.71	0.05	ug/g	ND	92.8	60-130			
Chloroform	3.54	0.05	ug/g	ND	88.6	60-130			
Dibromochloromethane	3.52	0.05	ug/g	ND	88.0	60-130			
Dichlorodifluoromethane	3.73	0.05	ug/g	ND	93.2	50-140			
1,2-Dichlorobenzene	3.74	0.05	ug/g	ND	93.4	60-130			
1,3-Dichlorobenzene	3.79	0.05	ug/g	ND	94.9	60-130			
1,4-Dichlorobenzene	3.78	0.05	ug/g	ND	94.5	60-130			
1,1-Dichloroethane	3.71	0.05	ug/g	ND	92.8	60-130			
1,2-Dichloroethane	3.62	0.05	ug/g	ND	90.4	60-130			
1,1-Dichloroethylene	3.55	0.05	ug/g	ND	88.8	60-130			
cis-1,2-Dichloroethylene	3.50	0.05	ug/g	ND	87.4	60-130			
trans-1,2-Dichloroethylene	3.64	0.05	ug/g	ND	91.0	60-130			
1,2-Dichloropropane	3.65	0.05	ug/g	ND	91.2	60-130			
cis-1,3-Dichloropropylene	3.02	0.05	ug/g	ND	75.6	60-130			
trans-1,3-Dichloropropylene	3.09	0.05	ug/g	ND	77.2	60-130			
Ethylbenzene	3.67	0.05	ug/g	ND	91.6	60-130			
Ethylene dibromide (dibromoethane, 1,2-	3.26	0.05	ug/g	ND	81.4	60-130			
Methyl Ethyl Ketone (2-Butanone)	8.53	0.50	ug/g	ND	85.3	50-140			
Methyl Isobutyl Ketone	8.28	0.50	ug/g	ND	82.8	50-140			
Methyl tert-butyl ether	7.84	0.05	ug/g	ND	78.4	50-140			
Methylene Chloride	3.36	0.05	ug/g	ND	84.1	60-130			
Styrene	3.38	0.05	ug/g	ND	84.4	60-130			
1,1,1,2-Tetrachloroethane	3.51	0.05	ug/g	ND	87.7	60-130			
1,1,2,2-Tetrachloroethane	3.31	0.05	ug/g	ND	82.8	60-130			
Tetrachloroethylene	3.68	0.05	ug/g	ND	92.0	60-130			
Toluene	3.68	0.05	ug/g	ND	92.0	60-130			
1,1,1-Trichloroethane	3.36	0.05	ug/g	ND	84.0	60-130			
1,1,2-Trichloroethane	3.49	0.05	ug/g	ND	87.2	60-130			
Trichloroethylene	3.71	0.05	ug/g	ND	92.8	60-130			
Trichlorofluoromethane	3.80	0.05	ug/g	ND	95.0	50-140			
Vinyl chloride	3.85	0.02	ug/g	ND	96.4	50-140			
m,p-Xylenes	7.29	0.05	ug/g	ND	91.2	60-130			
o-Xylene	3.61	0.05	ug/g	ND	90.2	60-130			
<i>Surrogate: 4-Bromofluorobenzene</i>	8.23		ug/g		103	50-140			
<i>Surrogate: Dibromofluoromethane</i>	7.77		ug/g		97.2	50-140			
<i>Surrogate: Toluene-d8</i>	8.28		ug/g		103	50-140			

Certificate of Analysis

Report Date: 05-Oct-2020

Client: **GEMTEC Consulting Engineers and Scientists Limited**

Order Date: 29-Sep-2020

Client PO:

Project Description: **64438.71**

Qualifier Notes:

QC Qualifiers :

QM-05 : The spike recovery was outside acceptance limits for the matrix spike due to matrix interference.

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.

NC: Not Calculated

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.

Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

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.



2040253

No 130449

Client Name: GEMTEC	Project Ref: 64438.71	Page <u>1</u> of <u>1</u>
Contact Name: NS	Quote #:	Turnaround Time <input type="checkbox"/> 1 day <input type="checkbox"/> 3 day <input type="checkbox"/> 2 day <input checked="" type="checkbox"/> Regular
Address: 32 Steacie Dr	PO #:	
Telephone: 613-929-5630	E-mail: nicole.soucy@GEMTEC.ca	
Date Required: _____		

Regulation 153/04		Other Regulation		Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)		Required Analysis												
<input checked="" type="checkbox"/> Table 1	<input type="checkbox"/> Res/Park	<input type="checkbox"/> Med/Fine	<input type="checkbox"/> REG 558	<input type="checkbox"/> PWQO	Matrix	Air Volume	# of Containers	Sample Taken		PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	MnI	PH
<input type="checkbox"/> Table 2	<input type="checkbox"/> Ind/Comm	<input type="checkbox"/> Coarse	<input type="checkbox"/> CCME	<input type="checkbox"/> MISA				Date	Time									
<input type="checkbox"/> Table 3	<input type="checkbox"/> Agri/Other		<input type="checkbox"/> .SU - Sani	<input type="checkbox"/> SU - Storm														
<input type="checkbox"/> Table _____		Mun: _____																
For RSC: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		<input type="checkbox"/> Other: _____																
Sample ID/Location Name																		
1	BH 20-1 SA3			S		2	28/09/20			X	X	X					X	
2	BH 20-2 SA3									X	X	X						
3	BH 20-3 SA1											X					X	
4	BH 20-3 SA101											X					X	
5	BH 20-3 SA2b											X					X	
6	BH 20-3 SA4					↓				X	X	X						
7	BH 20-4 SA1b					↓						X					X	X
8	BH 20-5 SA2					↓						X					X	
9																		
10																		

Comments:		Method of Delivery: PARACEL COURIER	
Relinquished By (Sign): NS	Received By Driver/Depot: A. STONE	Received at Lab: Suneepporn Dokmai	Verified By: [Signature]
Relinquished By (Print): Nicole Soucy	Date/Time: 29/09/20 3:04	Date/Time: Sep 29, 2020 04:38	Date/Time: 9-29-20 16:37
Date/Time: Sept 29/20	Temperature: _____ °C	Temperature: 7.1 °C	pH Verified: <input type="checkbox"/> By: _____

Certificate of Analysis

GEMTEC Consulting Engineers and Scientists Limited

32 Steacie Drive
Kanata, ON K2K 2A9
Attn: Nicole Soucy

Client PO:
Project: 64438.71
Custody: 130455

Report Date: 8-Oct-2020
Order Date: 2-Oct-2020

Order #: 2040668

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

Parcel ID	Client ID
2040668-01	MW20-1
2040668-02	MW20-2
2040668-03	MW20-3
2040668-04	Trip Blank

Approved By:



Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 08-Oct-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 2-Oct-2020

Client PO:

Project Description: 64438.71

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Anions	EPA 300.1 - IC	5-Oct-20	6-Oct-20
Chromium, hexavalent - water	MOE E3056 - colourimetric	3-Oct-20	3-Oct-20
Cyanide, free	MOE E3015 - Auto Colour	7-Oct-20	7-Oct-20
Mercury by CVAA	EPA 245.2 - Cold Vapour AA	5-Oct-20	5-Oct-20
Metals, ICP-MS	EPA 200.8 - ICP-MS	6-Oct-20	6-Oct-20
pH	EPA 150.1 - pH probe @25 °C	7-Oct-20	7-Oct-20
PHC F1	CWS Tier 1 - P&T GC-FID	2-Oct-20	3-Oct-20
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	5-Oct-20	6-Oct-20
REG 153: PAHs by GC-MS	EPA 625 - GC-MS, extraction	5-Oct-20	5-Oct-20
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	2-Oct-20	3-Oct-20

Certificate of Analysis

Report Date: 08-Oct-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 2-Oct-2020

Client PO:

Project Description: 64438.71

Client ID:	MW20-1	MW20-2	MW20-3	Trip Blank
Sample Date:	02-Oct-20	02-Oct-20	02-Oct-20	29-Sep-20
Sample ID:	2040668-01	2040668-02	2040668-03	2040668-04
MDL/Units	Water	Water	Water	Water

General Inorganics

Parameter	MDL/Units	MW20-1	MW20-2	MW20-3	Trip Blank
Cyanide, free	2 ug/L	-	-	<2	-
pH	0.1 pH Units	-	-	6.9	-

Anions

Parameter	MDL/Units	MW20-1	MW20-2	MW20-3	Trip Blank
Chloride	1 mg/L	-	-	57	-

Metals

Parameter	MDL/Units	MW20-1	MW20-2	MW20-3	Trip Blank
Mercury	0.1 ug/L	-	-	<0.1	-
Antimony	0.5 ug/L	<0.5	<0.5	<0.5	-
Arsenic	1 ug/L	1	3	2	-
Barium	1 ug/L	154	155	297	-
Beryllium	0.5 ug/L	<0.5	<0.5	<0.5	-
Boron	10 ug/L	19	20	16	-
Cadmium	0.1 ug/L	0.1	<0.1	<0.1	-
Chromium	1 ug/L	<1	<1	<1	-
Chromium (VI)	10 ug/L	-	-	<10	-
Cobalt	0.5 ug/L	18.7	1.5	5.0	-
Copper	0.5 ug/L	3.2	4.7	1.8	-
Lead	0.1 ug/L	<0.1	0.2	<0.1	-
Molybdenum	0.5 ug/L	17.7	15.5	12.8	-
Nickel	1 ug/L	24	4	8	-
Selenium	1 ug/L	<1	<1	<1	-
Silver	0.1 ug/L	<0.1	<0.1	<0.1	-
Sodium	200 ug/L	43100	104000	31700	-
Thallium	0.1 ug/L	<0.1	<0.1	<0.1	-
Uranium	0.1 ug/L	5.3	3.3	13.9	-
Vanadium	0.5 ug/L	0.7	0.6	0.8	-
Zinc	5 ug/L	<5	6	6	-

Volatiles

Parameter	MDL/Units	MW20-1	MW20-2	MW20-3	Trip Blank
Acetone	5.0 ug/L	<5.0	<5.0	-	<5.0
Benzene	0.5 ug/L	<0.5	<0.5	-	<0.5
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	-	<0.5
Bromoform	0.5 ug/L	<0.5	<0.5	-	<0.5
Bromomethane	0.5 ug/L	<0.5	<0.5	-	<0.5
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	-	<0.2
Chlorobenzene	0.5 ug/L	<0.5	<0.5	-	<0.5
Chloroform	0.5 ug/L	<0.5	<0.5	-	<0.5

Certificate of Analysis

Report Date: 08-Oct-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 2-Oct-2020

Client PO:

Project Description: 64438.71

	Client ID:	MW20-1	MW20-2	MW20-3	Trip Blank
	Sample Date:	02-Oct-20	02-Oct-20	02-Oct-20	29-Sep-20
	Sample ID:	2040668-01	2040668-02	2040668-03	2040668-04
	MDL/Units	Water	Water	Water	Water
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	-	<0.5
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	-	<1.0
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	<0.5
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	<0.5
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	<0.5
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	-	<0.5
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	-	<0.5
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	<0.5
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	<0.5
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	<0.5
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	-	<0.5
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	-	<0.5
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	-	<0.5
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	-	<0.5
Ethylbenzene	0.5 ug/L	<0.5	<0.5	-	<0.5
Ethylene dibromide (dibromoethane, 1,2-)	0.2 ug/L	<0.2	<0.2	-	<0.2
Hexane	1.0 ug/L	<1.0	<1.0	-	<1.0
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	-	<5.0
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	-	<5.0
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	-	<2.0
Methylene Chloride	5.0 ug/L	<5.0	<5.0	-	<5.0
Styrene	0.5 ug/L	<0.5	<0.5	-	<0.5
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	-	<0.5
1,1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	-	<0.5
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	-	<0.5
Toluene	0.5 ug/L	<0.5	<0.5	-	<0.5
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	-	<0.5
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	-	<0.5
Trichloroethylene	0.5 ug/L	<0.5	<0.5	-	<0.5
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	-	<1.0
Vinyl chloride	0.5 ug/L	<0.5	<0.5	-	<0.5
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	-	<0.5
o-Xylene	0.5 ug/L	<0.5	<0.5	-	<0.5
Xylenes, total	0.5 ug/L	<0.5	<0.5	-	<0.5
4-Bromofluorobenzene	Surrogate	110%	111%	-	111%
Dibromofluoromethane	Surrogate	101%	102%	-	100%

Certificate of Analysis

Report Date: 08-Oct-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 2-Oct-2020

Client PO:

Project Description: 64438.71

	Client ID:	MW20-1	MW20-2	MW20-3	Trip Blank
	Sample Date:	02-Oct-20	02-Oct-20	02-Oct-20	29-Sep-20
	Sample ID:	2040668-01	2040668-02	2040668-03	2040668-04
	MDL/Units	Water	Water	Water	Water
Toluene-d8	Surrogate	111%	111%	-	111%

Hydrocarbons

F1 PHCs (C6-C10)	25 ug/L	<25	<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	-	-	<0.05	-
Acenaphthylene	0.05 ug/L	-	-	<0.05	-
Anthracene	0.01 ug/L	-	-	<0.01	-
Benzo [a] anthracene	0.01 ug/L	-	-	<0.01	-
Benzo [a] pyrene	0.01 ug/L	-	-	<0.01	-
Benzo [b] fluoranthene	0.05 ug/L	-	-	<0.05	-
Benzo [g,h,i] perylene	0.05 ug/L	-	-	<0.05	-
Benzo [k] fluoranthene	0.05 ug/L	-	-	<0.05	-
Chrysene	0.05 ug/L	-	-	<0.05	-
Dibenzo [a,h] anthracene	0.05 ug/L	-	-	<0.05	-
Fluoranthene	0.01 ug/L	-	-	<0.01	-
Fluorene	0.05 ug/L	-	-	<0.05	-
Indeno [1,2,3-cd] pyrene	0.05 ug/L	-	-	<0.05	-
1-Methylnaphthalene	0.05 ug/L	-	-	<0.05	-
2-Methylnaphthalene	0.05 ug/L	-	-	<0.05	-
Methylnaphthalene (1&2)	0.10 ug/L	-	-	<0.10	-
Naphthalene	0.05 ug/L	-	-	<0.05	-
Phenanthrene	0.05 ug/L	-	-	<0.05	-
Pyrene	0.01 ug/L	-	-	<0.01	-
2-Fluorobiphenyl	Surrogate	-	-	101%	-
Terphenyl-d14	Surrogate	-	-	107%	-

Certificate of Analysis

Report Date: 08-Oct-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 2-Oct-2020

Client PO:

Project Description: 64438.71

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	ND	1	mg/L						
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 (VI)	ND	10	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	22.3		ug/L		112	50-140			
Surrogate: Terphenyl-d14	21.3		ug/L		107	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						

Certificate of Analysis

Report Date: 08-Oct-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 2-Oct-2020

Client PO:

Project Description: 64438.71

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
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, 1,2)	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	91.3		ug/L		114	50-140			
Surrogate: Dibromofluoromethane	81.9		ug/L		102	50-140			
Surrogate: Toluene-d8	89.4		ug/L		112	50-140			

Certificate of Analysis

Report Date: 08-Oct-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 2-Oct-2020

Client PO:

Project Description: 64438.71

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	95.0	1	mg/L	90.7			4.6	10	
General Inorganics									
Cyanide, free	ND	2	ug/L	ND			NC	20	
pH	8.0	0.1	pH Units	7.9			0.5	3.3	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND			NC	30	
Metals									
Mercury	ND	0.1	ug/L	ND			NC	20	
Antimony	0.91	0.5	ug/L	ND			NC	20	
Arsenic	ND	1	ug/L	ND			NC	20	
Barium	247	1	ug/L	244			1.5	20	
Beryllium	ND	0.5	ug/L	ND			NC	20	
Boron	25	10	ug/L	25			0.0	20	
Cadmium	ND	0.1	ug/L	ND			NC	20	
Chromium (VI)	ND	10	ug/L	ND			NC	20	
Chromium	ND	1	ug/L	ND			NC	20	
Cobalt	ND	0.5	ug/L	ND			NC	20	
Copper	1.86	0.5	ug/L	1.86			0.2	20	
Lead	0.12	0.1	ug/L	ND			NC	20	
Molybdenum	1.07	0.5	ug/L	0.90			17.7	20	
Nickel	ND	1	ug/L	ND			NC	20	
Selenium	ND	1	ug/L	ND			NC	20	
Silver	ND	0.1	ug/L	ND			NC	20	
Sodium	181000	200	ug/L	182000			0.5	20	
Thallium	ND	0.1	ug/L	ND			NC	20	
Uranium	0.6	0.1	ug/L	0.6			0.6	20	
Vanadium	0.99	0.5	ug/L	1.02			3.4	20	
Zinc	21	5	ug/L	22			8.1	20	
Volatiles									
Acetone	ND	5.0	ug/L	ND			NC	30	
Benzene	ND	0.5	ug/L	ND			NC	30	
Bromodichloromethane	ND	0.5	ug/L	ND			NC	30	
Bromoform	ND	0.5	ug/L	ND			NC	30	
Bromomethane	ND	0.5	ug/L	ND			NC	30	
Carbon Tetrachloride	ND	0.2	ug/L	ND			NC	30	
Chlorobenzene	ND	0.5	ug/L	ND			NC	30	
Chloroform	ND	0.5	ug/L	ND			NC	30	
Dibromochloromethane	ND	0.5	ug/L	ND			NC	30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND			NC	30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloropropane	ND	0.5	ug/L	ND			NC	30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Ethylene dibromide (dibromoethane, 1,2)	ND	0.2	ug/L	ND			NC	30	
Hexane	ND	1.0	ug/L	ND			NC	30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND			NC	30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND			NC	30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND			NC	30	

Certificate of Analysis

Report Date: 08-Oct-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 2-Oct-2020

Client PO:

Project Description: 64438.71

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Methylene Chloride	ND	5.0	ug/L	ND			NC	30	
Styrene	ND	0.5	ug/L	ND			NC	30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
Tetrachloroethylene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
Trichloroethylene	ND	0.5	ug/L	ND			NC	30	
Trichlorofluoromethane	ND	1.0	ug/L	ND			NC	30	
Vinyl chloride	ND	0.5	ug/L	ND			NC	30	
m,p-Xylenes	ND	0.5	ug/L	ND			NC	30	
o-Xylene	ND	0.5	ug/L	ND			NC	30	
Surrogate: 4-Bromofluorobenzene	88.2		ug/L		110	50-140			
Surrogate: Dibromofluoromethane	81.6		ug/L		102	50-140			
Surrogate: Toluene-d8	88.6		ug/L		111	50-140			

Certificate of Analysis

Report Date: 08-Oct-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 2-Oct-2020

Client PO:

Project Description: 64438.71

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	101	1	mg/L	90.7	105	77-123			
General Inorganics									
Cyanide, free	29.9	2	ug/L	ND	99.6	70-130			
Hydrocarbons									
F1 PHCs (C6-C10)	1770	25	ug/L	ND	88.6	68-117			
F2 PHCs (C10-C16)	1820	100	ug/L	ND	114	60-140			
F3 PHCs (C16-C34)	4370	100	ug/L	ND	112	60-140			
F4 PHCs (C34-C50)	2670	100	ug/L	ND	108	60-140			
Metals									
Mercury	3.23	0.1	ug/L	ND	108	70-130			
Antimony	45.1	0.5	ug/L	ND	89.8	80-120			
Arsenic	53.0	1	ug/L	ND	106	80-120			
Barium	290	1	ug/L	244	91.8	80-120			
Beryllium	52.3	0.5	ug/L	ND	105	80-120			
Boron	68	10	ug/L	25	84.6	80-120			
Cadmium	47.9	0.1	ug/L	ND	95.7	80-120			
Chromium (VI)	174	10	ug/L	ND	87.0	70-130			
Chromium	57.6	1	ug/L	ND	115	80-120			
Cobalt	57.6	0.5	ug/L	ND	115	80-120			
Copper	53.1	0.5	ug/L	1.86	103	80-120			
Lead	38.5	0.1	ug/L	ND	76.9	80-120			QM-05
Molybdenum	49.0	0.5	ug/L	0.90	96.3	80-120			
Nickel	53.8	1	ug/L	ND	106	80-120			
Selenium	45.0	1	ug/L	ND	89.6	80-120			
Silver	43.2	0.1	ug/L	ND	86.5	80-120			
Sodium	8690	200	ug/L	ND	86.9	80-120			
Thallium	43.3	0.1	ug/L	ND	86.4	80-120			
Uranium	39.4	0.1	ug/L	0.6	77.6	80-120			QM-05
Vanadium	59.9	0.5	ug/L	1.02	118	80-120			
Zinc	65	5	ug/L	22	84.9	80-120			
Semi-Volatiles									
Acenaphthene	5.12	0.05	ug/L	ND	102	50-140			
Acenaphthylene	4.72	0.05	ug/L	ND	94.4	50-140			
Anthracene	4.71	0.01	ug/L	ND	94.2	50-140			
Benzo [a] anthracene	4.51	0.01	ug/L	ND	90.2	50-140			
Benzo [a] pyrene	4.60	0.01	ug/L	ND	92.0	50-140			
Benzo [b] fluoranthene	5.44	0.05	ug/L	ND	109	50-140			
Benzo [g,h,i] perylene	4.90	0.05	ug/L	ND	98.1	50-140			
Benzo [k] fluoranthene	5.02	0.05	ug/L	ND	100	50-140			
Chrysene	5.27	0.05	ug/L	ND	105	50-140			
Dibenzo [a,h] anthracene	5.27	0.05	ug/L	ND	105	50-140			
Fluoranthene	4.84	0.01	ug/L	ND	96.9	50-140			
Fluorene	4.83	0.05	ug/L	ND	96.6	50-140			
Indeno [1,2,3-cd] pyrene	5.50	0.05	ug/L	ND	110	50-140			
1-Methylnaphthalene	5.69	0.05	ug/L	ND	114	50-140			
2-Methylnaphthalene	6.29	0.05	ug/L	ND	126	50-140			
Naphthalene	5.38	0.05	ug/L	ND	108	50-140			

Certificate of Analysis

Report Date: 08-Oct-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 2-Oct-2020

Client PO:

Project Description: 64438.71

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Phenanthrene	4.47	0.05	ug/L	ND	89.4	50-140			
Pyrene	4.86	0.01	ug/L	ND	97.2	50-140			
Surrogate: 2-Fluorobiphenyl	22.8		ug/L		114	50-140			
Surrogate: Terphenyl-d14	22.7		ug/L		113	50-140			
Volatiles									
Acetone	67.8	5.0	ug/L	ND	67.8	50-140			
Benzene	40.1	0.5	ug/L	ND	100	60-130			
Bromodichloromethane	39.9	0.5	ug/L	ND	99.8	60-130			
Bromoform	38.9	0.5	ug/L	ND	97.2	60-130			
Bromomethane	33.5	0.5	ug/L	ND	83.7	50-140			
Carbon Tetrachloride	43.9	0.2	ug/L	ND	110	60-130			
Chlorobenzene	36.9	0.5	ug/L	ND	92.3	60-130			
Chloroform	36.1	0.5	ug/L	ND	90.3	60-130			
Dibromochloromethane	41.4	0.5	ug/L	ND	104	60-130			
Dichlorodifluoromethane	35.6	1.0	ug/L	ND	88.9	50-140			
1,2-Dichlorobenzene	39.0	0.5	ug/L	ND	97.5	60-130			
1,3-Dichlorobenzene	38.3	0.5	ug/L	ND	95.8	60-130			
1,4-Dichlorobenzene	40.3	0.5	ug/L	ND	101	60-130			
1,1-Dichloroethane	37.2	0.5	ug/L	ND	93.1	60-130			
1,2-Dichloroethane	30.7	0.5	ug/L	ND	76.8	60-130			
1,1-Dichloroethylene	39.1	0.5	ug/L	ND	97.8	60-130			
cis-1,2-Dichloroethylene	39.2	0.5	ug/L	ND	97.9	60-130			
trans-1,2-Dichloroethylene	40.9	0.5	ug/L	ND	102	60-130			
1,2-Dichloropropane	40.0	0.5	ug/L	ND	100	60-130			
cis-1,3-Dichloropropylene	42.5	0.5	ug/L	ND	106	60-130			
trans-1,3-Dichloropropylene	39.6	0.5	ug/L	ND	99.0	60-130			
Ethylbenzene	37.3	0.5	ug/L	ND	93.2	60-130			
Ethylene dibromide (dibromoethane, 1,2)	34.3	0.2	ug/L	ND	85.8	60-130			
Hexane	41.6	1.0	ug/L	ND	104	60-130			
Methyl Ethyl Ketone (2-Butanone)	65.0	5.0	ug/L	ND	65.0	50-140			
Methyl Isobutyl Ketone	70.0	5.0	ug/L	ND	70.0	50-140			
Methyl tert-butyl ether	80.2	2.0	ug/L	ND	80.2	50-140			
Methylene Chloride	42.6	5.0	ug/L	ND	107	60-130			
Styrene	34.1	0.5	ug/L	ND	85.2	60-130			
1,1,1,2-Tetrachloroethane	40.1	0.5	ug/L	ND	100	60-130			
1,1,2,2-Tetrachloroethane	40.4	0.5	ug/L	ND	101	60-130			
Tetrachloroethylene	36.2	0.5	ug/L	ND	90.4	60-130			
Toluene	39.3	0.5	ug/L	ND	98.2	60-130			
1,1,1-Trichloroethane	40.2	0.5	ug/L	ND	101	60-130			
1,1,2-Trichloroethane	38.5	0.5	ug/L	ND	96.2	60-130			
Trichloroethylene	37.8	0.5	ug/L	ND	94.4	60-130			
Trichlorofluoromethane	38.6	1.0	ug/L	ND	96.5	60-130			
Vinyl chloride	30.4	0.5	ug/L	ND	76.1	50-140			
m,p-Xylenes	77.8	0.5	ug/L	ND	97.2	60-130			
o-Xylene	37.1	0.5	ug/L	ND	92.8	60-130			
Surrogate: 4-Bromofluorobenzene	78.9		ug/L		98.6	50-140			
Surrogate: Dibromofluoromethane	80.2		ug/L		100	50-140			
Surrogate: Toluene-d8	77.6		ug/L		97.0	50-140			

Certificate of Analysis

Report Date: 08-Oct-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 2-Oct-2020

Client PO:

Project Description: 64438.71

Qualifier Notes:

QC Qualifiers :

QM-05 : The spike recovery was outside acceptance limits for the matrix spike due to matrix interference.

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.

NC: Not Calculated

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.



204568

No 130455

Client Name: GEMTEC	Project Ref: 64438.71	Page <u>1</u> of <u>1</u>
Contact Name: NS	Quote #:	Turnaround Time <input type="checkbox"/> 1 day <input type="checkbox"/> 3 day <input type="checkbox"/> 2 day <input checked="" type="checkbox"/> Regular
Address: 32 Steucie Dr	PO #:	
Telephone: 613-836-1422	E-mail: nicole.sowcy@gemtec.ca	
Date Required: _____		

Regulation 153/04		Other Regulation		Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)			Required Analysis								
<input checked="" type="checkbox"/> Table 1	<input type="checkbox"/> Res/Park <input type="checkbox"/> Med/Fine	<input type="checkbox"/> REG 558	<input type="checkbox"/> PWQO	Matrix	Air Volume	# of Containers	Sample Taken	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	MET
<input type="checkbox"/> Table 2	<input type="checkbox"/> Ind/Comm <input type="checkbox"/> Coarse	<input type="checkbox"/> CCME	<input type="checkbox"/> MISA												
<input type="checkbox"/> Table 3	<input type="checkbox"/> Agri/Other	<input type="checkbox"/> SU - Sani	<input type="checkbox"/> SU - Storm	Mun: _____											
For RSC: <input type="checkbox"/> Yes <input type="checkbox"/> No		<input type="checkbox"/> Other: _____													
Sample ID/Location Name				Date	Time										
1	MW20-1	Gw		Oct 2/20		X	X		X						
2	MW20-2	↓				X	X	NO	X						
3	MW20-3	↓						X						X	
4	Trip Blank	↓		29/08-20				X							
5															
6															
7															
8															
9															
10															

Comments: Jars should have Project ref 64438.71 instead of 64478.71	Method of Delivery: Drop Box	
Shipped By (Sign): <i>Connor Shaw</i>	Received By Driver/Client: <i>CLH</i>	Received at Lab: <i>[Signature]</i>
Shipped By (Print): Connor Shaw	Date/Time: Sept 21/20 12:19	Date/Time: 10-2-20 15:43
Date/Time: 2-Oct-20 12:00 PM	Temperature: 5.4 °C	Temperature: 4.3 °C
pH Verified: <input checked="" type="checkbox"/> By: <i>MA</i>		

Certificate of Analysis

GEMTEC Consulting Engineers and Scientists Limited

32 Steacie Drive
Kanata, ON K2K 2A9
Attn: Nicole Soucy

Client PO:
Project: 64438.71
Custody: 130544

Report Date: 23-Oct-2020
Order Date: 22-Oct-2020

Order #: 2043561

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

Parcel ID	Client ID
2043561-01	MW20-1
2043561-02	MW20-2
2043561-03	MW20-3
2043561-04	MW20-103

Approved By:



Dale Robertson, BSc
Laboratory Director

Any use of these results implies your agreement that our total liability in connection with this work, however arising shall be limited to the amount paid by you for this work, and that our employees or agents shall not under circumstances be liable to you in connection with this work

Certificate of Analysis

Report Date: 23-Oct-2020

Client: **GEMTEC Consulting Engineers and Scientists Limited**

Order Date: 22-Oct-2020

Client PO:

Project Description: **64438.71**

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Metals, ICP-MS	EPA 200.8 - ICP-MS	23-Oct-20	23-Oct-20

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.

Certificate of Analysis

Report Date: 23-Oct-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 22-Oct-2020

Client PO:

Project Description: 64438.71

Sample Results

Cobalt				Matrix: Water
				Sample Date: 22-Oct-20
Parcel ID	Client ID	Units	MDL	Result
2043561-01	MW20-1	ug/L	0.5	15.8
2043561-02	MW20-2	ug/L	0.5	0.8
2043561-03	MW20-3	ug/L	0.5	16.8
2043561-04	MW20-103	ug/L	0.5	16.1

Laboratory Internal QA/QC

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Matrix Blank									
Cobalt	ND	0.5	ug/L						
Matrix Duplicate									
Cobalt	ND	0.5	ug/L	ND			NC	20	
Matrix Spike									
Cobalt	49.1	0.50	ug/L	ND	98.1	80-120			



Parcel ID: 2043561



Parcel Order Number
(Lab Use Only)

2043561

Chain Of Custody
(Lab Use Only)

No 130544

Client Name: <u>Genice</u>	Project Ref: <u>64438.71</u>	Page <u>1</u> of <u>1</u>
Contact Name: <u>Nicole Souy</u>	Quote #:	Turnaround Time <input checked="" type="checkbox"/> 1 day <input type="checkbox"/> 3 day <input type="checkbox"/> 2 day <input type="checkbox"/> Regular
Address: <u>32 Steacie</u>	PO #:	
Telephone:	E-mail: <u>nicole.souy@gensec.ca</u>	
		Date Required: _____

Regulation 153/04		Other Regulation		Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)			Required Analysis											
<input checked="" type="checkbox"/> Table 1	<input type="checkbox"/> Res/Park	<input type="checkbox"/> Med/Fine	<input type="checkbox"/> REG 558	<input type="checkbox"/> PWQO	Matrix	Air Volume	# of Containers	Sample Taken Date Time		PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP				Cobalt	
<input type="checkbox"/> Table 2	<input type="checkbox"/> Ind/Comm	<input type="checkbox"/> Coarse	<input type="checkbox"/> CCME	<input type="checkbox"/> MISA									Hg	CrVI	B (HWS)			
<input type="checkbox"/> Table 3	<input type="checkbox"/> Agri/Other		<input type="checkbox"/> SU - Sani	<input type="checkbox"/> SU - Storm														
<input type="checkbox"/> Table _____		Mun: _____																
For RSC: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		<input type="checkbox"/> Other: _____																
Sample ID/Location Name																		
1	MW 20-1				GW			22-Oct-20										
2	MW 20-2																	
3	MW 20-3																	
4	MW 20-103																	
5																		
6																		
7																		
8																		
9																		
10																		

Comments:			Method of Delivery: <u>Drop Bot</u>		
Relinquished By (Sign): <u>Carl Shaw</u>	Received By Driver/Depot:	Received at Lab: <u>[Signature]</u>	Verified By: <u>[Signature]</u>		
Relinquished By (Print): <u>Connor Shaw</u>	Date/Time:	Date/Time: <u>Oct 22 2020 14:18</u>	Date/Time: <u>10-22-20 16:38</u>		
Date/Time: <u>22-Oct-20 1:30 PM</u>	Temperature: _____ °C	Temperature: <u>23</u> °C	pH Verified: <input checked="" type="checkbox"/> By: <u>MS</u>		