GEMTEC
www.gemtec.ca

Phase Two
Environmental Site Assessment
Perth Golf Course
141 Peter Street
Perth, Ontario

GEMTEC
www.gemtec.ca

Submitted to:

Caivan (Perth GC) Limited
2934 Baseline Road, Suite 302
Ottawa, Ontario
K2H 1B2

Phase Two Environmental Site Assessment

Perth Golf Course
141 Peter Street
Perth, Ontario

April 8, 2022
Project: 100737.002

experience • knowledge • integrity

GEMTEC Consulting Engineers and Scientists Limited
32 Steacie Drive
Ottawa, ON, Canada
K2K 2A9

April 8, 2022

File: 100737.002

Caivan (Perth GC) Limited
2934 Baseline Road, Suite 302
Ottawa, Ontario
K2H 1B2

Attention: Hugo Lalonde – Director, Land Development

Re: Phase Two Environmental Site Assessment
Proposed Residential Development
141 Peter Rd.
Perth, Ontario

Enclosed is GEMTEC Consulting Engineers and Scientists Limited's Phase Two Environmental Site Assessment report for the above-noted project. The Phase Two ESA and reporting was based on the original scope of work presented in our proposal dated December 14, 2021. This report was prepared by Luca Fiorindi B.A, Dip., with senior review performed by Brenda Thom, M.Sc. (Eng.), P.Eng., $QP_{ESA.}$

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

Luca Fiorindi. B.A., Dip.
Jr. Environmental Technologist

Brenda Thom, M.SC.(Eng.), P.Eng. QP_{ESA}
Senior Environmental Engineer

Enclosures
\\Lucid\Drawings and Files\Projects\100700\100737.002\Deliverables\Phase Two ESA\100737.002_PhaseTwoESA_RPT01_V01_2022-04-08.docx

EXECUTIVE SUMMARY

GEMTEC Consulting Engineers and Scientists Limited (GEMTEC) was retained by Caivan (Perth GC) Limited to complete a Phase Two Environmental Site Assessment (ESA) for the western portion of the property located 141 Peter Road in Perth, Ontario. The Phase Two ESA was completed to address recommendations resulting from the GEMTEC 2022 Phase One ESA completed and submitted to Caivan (Perth GC) Limited, under separate cover. This Phase Two ESA has been completed in accordance with the requirements for Phase Two ESAs as defined in Part VII and Schedule E of Ontario Regulation (O.Reg.) 153/04, as amended by O.Reg. 511/09, for the purpose of obtaining a Records of Site Condition.

The Site occupies the western portion of the municipal address of 141 Peter Street, located at the western edge of urban development in the Town of Perth, Ontario. The Site has been subject to commercial development since approximately 1966 when the golf course is first visible in the aerial photographs. The Phase One ESA resulted in the identification of two areas of potential environmental concern (APECs) on the Site. The Site has undergone little to no changes since 1987.

The geology at the Site can be generally described as 0.1 m of topsoil, underlain by native deposits of weathered silty clay crust, silty sand, and glacial till, overlying Precambrian bedrock. Groundwater flow direction within the shallow bedrock beneath the Site varies, generally following the local topography and emptying into the closest waterbody (Tay River to the north or Grant's Creek Wetland to the south).

Based on the available mapping, Grants Creek Wetland, a provincially significant wetland is present within 30 m of the Site to the south and west, making the Site environmentally sensitive. Therefore, the applicable site condition standards according to Ontario Regulation 153/04, are Table 1: Full Depth Background Site Condition Standards.

However, should the proposed development area be adjusted to be greater than 30 m of the wetland, then the applicable site condition standards would be Table 6 SCS in a shallow soil, potable groundwater condition for industrial/commercial/community land use in coarse soils.

A total of thirty soil samples (including four duplicate samples) and sixteen groundwater samples (including two duplicate groundwater samples and two groundwater trip blanks) were collected from the sampling locations and submitted to Paracel Laboratories for analysis of selected parameters. Contaminants of potential environmental concern, as identified in the Phase One ESA (GEMTEC, 2022) included at least one of metals and inorganics, PAHs (where fill is identified only), PHCs (F1 to F4) and BTEX, and OC Pesticides at each location.

Analytical results indicated that the Site does not currently meet the applicable MECP Table 1 site condition standards (SCS) for soil and groundwater for metals. As such the soil exceedances

identified in the five sampling locations (22-208, 22-212, 22-211, 22-223 and 22-224), and halfway to the next clean sampling location must be either removed or remediated.

Although groundwater metals concentrations exceed Table 1 SCS, based on the hydrogeological investigation completed concurrently with the Phase Two investigation, a layer of clay is present on the bottom of the wetland, significantly reducing the inflow of groundwater into the wetland. This clay layer greatly reduces the risk of contaminant migration into the wetland, despite the concentrations greater than the Table 1 SCS.

Should any of the soil on-site be deemed excess (cannot be re-used on-site), the volume of that excess soil will determine further sampling requirements for soil characterization for potential off-site re-use locations.

Soil Summary

One or both of barium and vanadium concentrations greater than the Table 1 SCS were identified in silty clay materials in several boreholes (22-205 SS1, 22-223 SS1, 22-226 SS2). Based on the silty clay sampled, these elevated concentrations were attributed to the Champlain Sea deposits which Stirling et al. demonstrated contain naturally occurring elevated concentrations of several metal parameters. Therefore, the concentrations identified in the three boreholes, greater than the Table 1 SCS, but less than the regional background values, were not identified as exceedances. Soil samples did not meet the applicable MECP Table 1 SCS in 5 boreholes for one or more of the following parameters: antimony, barium, chromium, and uranium.

Soil samples met the applicable MECP Table 6 SCS for all parameters analyzed, with the exception of vanadium in BH22-226 SS2; however, the Table 6 SCS is equal to the Table 1 SCS for vanadium. Therefore, the identified vanadium exceedance is likely attributed to the naturally occurring elevated concentration.

Should any of the soil on-site be deemed excess (cannot be re-used on-site), the volume of that excess soil will determine further sampling requirements for soil characterization for potential off-site re-use locations.

Groundwater Summary

Groundwater samples did not meet the applicable MECP Table 1 SCS for one or more of cobalt copper, nickel, and uranium at seven sampling locations (22-201, 22-208, 22-216, 22-221A, 22-222A, 22-223, 22-225A and 22-228A).

Two sampling locations (22-224 and 22-225A) contained concentrations of cobalt greater than the Table 6 SCS and one location (22-228A) contained concentrations of uranium greater than the Table 6 SCS.

Although groundwater metals concentrations exceed Table 1 and Table 6 SCS, based on the hydrogeological investigation completed concurrently with the Phase Two investigation, a layer of clay is present on the bottom of the wetland, significantly reducing the inflow of groundwater into the wetland. This clay layer greatly reduces the risk of contaminant migration into the wetland, despite the concentrations greater than the Table 1 and 6 SCS.

Recommendations

The Phase Two ESA was completed to investigate the areas of potential environmental concern identified in GEMTEC's 2022 Phase One ESA. The Phase Two ESA identified concentrations of several metal parameters in both soil and groundwater greater than the Table 1 SCS, which was the selected standards based on the proximity of the provincially significant wetland, Grants Creek Wetland to the Site. GEMTEC recommends the following actions to manage the Table 1 SCS exceedances:

- Remove the soil and groundwater exceedances from the Site;
- Remediate the soil and groundwater exceedances on the Site;
- Complete a risk assessment to determine if the parameters present in concentrations greater than the Table 1 SCS would pose an increased risk to the environment and/ or human health;
- Move the proposed development to a distance greater than 30 m from the edge of the Grants Creek Wetland.

Should the development be moved to a distance greater than 30 m from the wetland, the applicable standard would be Table 6 SCS. Although groundwater does contain concentrations of certain metals parameters greater than the Table 6 SCS, a clay layer present over the base of the wetland significantly decreases the flow of groundwater into the wetland, reducing the risk of contaminant transport into the wetland.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

GEMTEC Consulting Engineers and Scientists Limited
32 Steacie Drive
Ottawa, ON, Canada
K2K 2A9
613.836.1422
ottawa@gemtec.ca
www.gemtec.ca

1.0 INTRODUCTION

GEMTEC Consulting Engineers and Scientists Limited (GEMTEC) was retained by Caivan (Perth GC) Limited to complete a Phase Two Environmental Site Assessment (ESA) on the western portion of the property at 141 Peter Street, Perth, Ontario, the portion of the property for the proposed residential development, hereafter referred to as “Site”. The Site’s approximate boundaries and location are provided on Figure 1 in Appendix A.

The Phase Two ESA was completed following a Phase One ESA completed by GEMTEC in March 2022. Based on the results of the Phase One ESA investigation, one area of potential environmental concern (APEC) was identified across the Site.

This Phase Two ESA has been completed in accordance with the requirements for Phase Two ESAs as defined in Part VII and Schedule E of Ontario Regulation 153/04, as amended by O. Reg. 511/09, for the purpose of obtaining a Record of Site Condition for the Site, as the property use is changing from commercial to residential, a more sensitive land use.

1.1 Site Description

The Site consists of the western portion of the property at the municipal address of 141 Peter Street, consisting of a 9-hole section of the golf course. The approximate extents of which are as follows:

- Bounded to the north by the Tay River;
- Bounded to the east by wooded area and the original 9 hole golf course;
- Bounded to the south by forested land and the Grant’s Creek Wetland; and
- Bounded to the west by agricultural land.

The Site has an approximate area of 48 hectares (118 acres). The Site location and layout are illustrated on Figure 1. in Appendix A

The Site was first developed sometime around 1890 as agricultural land. Land use surrounding the Site was developed as a golf course between 1966 and 1995, as visible in the aerial photographs from the Phase One ESA investigation. There are no existing buildings on-Site. Land use and development has remained the same post 1995.

1.2 Property Ownership

The Site is currently owned by Caivan (Perth GC) Limited with a proposed residential subdivision for the future use of the Site.

1.3 Current and Proposed Future Uses

The Site is currently comprised of the western portion of the Perth golf course and some undeveloped forested land, previously used for agricultural purposes. It has been assumed the Site will be limited to the proposed residential development lands on the western portion of the golf course. Therefore, the scope of work developed to support this Phase Two ESA does not include the portion of the golf course that encompasses the original 9 hole golf course, the eastern portion of the golf course, as it is our assumption that this will remain a commercial land use.

The following is known about the Site and project:

- The Site is located south of the Tay River and west of Peter Street in Perth, Ontario;
- The Site is currently a commercial development (the Perth Golf Club); and,
- Based on the plans provided by Caivan (Perth GC) Limited, the proposed development will consist of single detached houses, townhouses, and high-density housing, storm water management ponds, a new pumping station, and new community parks.

1.4 Applicable Site Condition Standards

1.4.1 On-Site Re-Use Soil and Groundwater Quality Standards

Site Condition Standards (SCS) were selected for the Site in accordance with the requirements of O.Reg. 153/04, as amended. The selection of applicable SCS for comparison to analytical data was based on a review of various Site characteristics, which will need to be considered for the proposed property use.

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

- Land Use: The current land use is classified as commercial as per the golf course. Future land use will be classified as residential. The Site will be changing to a more sensitive land use.
- Soil Texture: Based on visual observations made during the field program and grain size analysis completed on samples submitted as part of the geotechnical investigation completed concurrently, coarse grained soils are present on-site. Coarse textured soil is defined by Section 42(1) of O. Reg.153/04 as “soil that contains 50 percent or more by mass of particles that are greater than 75 micrometres in mean diameter”. Accordingly, coarse textured soils have been considered applicable for the Site.
- Soil Thickness and Proximity to Water Body: For the purposes of selection of the appropriate provincial standard, Section 43.1 of O. Reg.153/04 identifies specific SCS be applied if any of the following circumstances exist:

    (a) The property is a shallow soil property (i.e., at least 1/3 or more of the property area contains less than 2 metres depth of overburden); or

(b) The property includes all or part of a water body or is adjacent to a water body or includes land that is within 30 metres of a water body.

Based on a review of the surficial and bedrock geology maps of the area, and results obtained from the intrusive investigation, the Site is considered a shallow soil property as bedrock at depth of 2.0 metres or less was identified across the majority of the Site. Furthermore, the Site does include a water body or is it located within 30 metres of a water body (no proposed residential development will occur within 30 meters of a water body).

- Groundwater Use: Based on previous development plans for connections to the Perth municipal sewer and water supply systems, it has been assumed that the water supply for the proposed residential development will be from the municipal system and not groundwater. Through review of the Ontario Water Well records, no potable domestic wells were identified within 250 m the of the Site. Accordingly, the Site has been considered to be situated within a non-potable water well zone.

- Environmentally Sensitive Site: Environmental sensitivity is considered in the selection of appropriate provincial standards for comparison. Section 41 of O. Reg.153/04 states that a property is to be considered environmentally sensitive if any of the following are applicable:

  (1) The property is,

  (i) Within an area of natural significance;

  (ii) Includes or is adjacent to an area of natural significance or part of such an area; or

  (iii) Includes land that is within 30 metres of an area of natural significance or part of such an area;

  (2) The soil at the property has a pH value as follows:

  (i) For surface soil, less than 5 or greater than 9;

  (ii) For sub surface soil, less than 5 or greater than 11; or

  (3) A qualified person is of the opinion that, given the characteristics of the property and the certifications the qualified person would be required to make in a record of site condition in relation to the property as specified in Schedule A, it is appropriate to apply this section to the property.

  The Site is considered to be environmentally sensitive as the Site is within 30 m of the provincially significant wetland of Grants Creek Wetland, present to the south and west of the Site.

Based on the review of Site characteristics and use of the property as a commercial golf course, the following provincial standards were considered applicable to the soil quality results obtained during this Phase Two ESA investigation:

- MECP, 2011. Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act. Table 1: Full Depth Background Site Condition Standards (SCS) for Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use and coarse textured soils (Table 1 SCS).

Should the proposed development be adjusted to be greater than 30 m from the Grants Creek Wetland, the applicable standards would be:

- MECP, 2011. Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act. Table 6: Generic Site Condition Standards (SCS) for Shallow Soils in a Potable Groundwater Condition for Industrial/Commercial/Community Property Use and coarse textured soils (Table 6 SCS).

Based on the review of Site characteristics, with the provincially significant wetland of Grants Creek Wetland within 30 m of the proposed development and use of the property as a commercial golf course, the following provincial standards were considered applicable to the water quality results obtained during the Phase Two ESA investigation:

- MECP, 2011. Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act. Table 1: Full Depth Background Site Condition Standards (SCS) for Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use and coarse textured soils (Table 1 SCS)

Subsequently, should the proposed development be adjusted to be located greater than 30 m from the wetland, the applicable standards would be:

- MECP, 2011. Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act. Table 6: Generic Site Condition Standards (SCS) for Shallow Soils in a Potable Ground Water Condition, All Types of Property Use (Table 6 SCS).

For future planning purposes, both the Table 1 SCS and Table 6 SCS have been included in the comparison of analytical results.

2.0 BACKGROUND INFORMATION

2.1 Physical Setting

Topographic mapping available through the Ontario Basic Mapping (OBM, 2012) and the Ministry of Natural Resources and Forestry (MNR, 2014), was reviewed to determine topographic features in the vicinity of the Site. The Site has an elevation between 135 and 137 metres above sea level and surrounding topography is relatively flat but generally slopes in a southerly direction towards Grant's Creek Wetland. However, based on information provided by the concurrent

hydrogeological study completed by GEMTEC, there is a watershed drainage divide along the long axis of the Site, as shown on Figure 2 in Appendix A, which divides the surface water flow to the Tay River north of the divide, and to the Grants Creek Wetland south of the divide.

Groundwater flow often reflects topographic features and typically flows toward nearby lakes, drains, rivers and wetland areas. Based on the topography of the area, it is expected that the local shallow groundwater flow will trend south towards Grant's Creek Wetland.

Surficial soil and bedrock geology maps of the area indicate that the overburden in the study area and the vicinity of the study area generally consists of till, bedrock drift and organic deposits. The bedrock is mapped as late felsic plutonic rocks granitic gneisses with metasedimentary xenoliths, migmatites, injection gneisses, pegmatites.

2.2 Past Investigations

Historical environmental site assessment reports for the Site and surrounding areas were provided to GEMTEC for review. Pertinent historical review information used to inform the Phase One ESA completed by GEMTEC in 2022 and was presented under separate cover. Information used in the development of the present Phase Two ESA field investigation is summarized in sections 2.2.1 and 2.2.2.

2.2.1 Phase I Environmental Site Assessment – Paterson Group (dated May 2021)

A Phase I ESA was completed by Paterson Group Inc. (Paterson) for the whole golf course property (including the Site) entitled "Phase I Environmental Site Assessment, 141 Peter Street, Perth, Ontario", dated May 5, 2021. A summary of the report is presented below.

Four (4) potentially contaminating activities (PCAs) were identified on the golf course property, resulting in areas of potential environmental concern (APECs) on the golf course property. Accordingly, at the time of the historical Phase I ESA, a Phase II ESA was recommended for the golf course property. As per Column A of Table 2 of the O.Reg. 153/04, as amended, the following PCAs that were found to generate APECs on the golf course property were:

- PCA 28 – "Gasoline and Associated Products Storage in Fixed Tanks," associated with the presence of 3 ASTs on the golf course property (APECs 1 and 2).
- PCA 40 – "Pesticides (including Herbicides, Fungicides and Anti-Fouling Agents) Manufacturing, Processing, Bulk Storage and Large-Scale Applications," associated with the storage and application of pesticides and herbicides on the golf course property (APECs 3 and 4).
- PCA 52 – "Storage, maintenance, fuelling and repair of equipment, vehicles, and material used to maintain transportation systems," associated with the equipment repair garage on the golf course property (APEC 5).

- PCA 55 – “Transformer Manufacturing, Processing and Use,” associated with the presence of a pole-mounted transformer located at the entrance to the golf course property (APEC 6).

Based on a review of the boundaries of the golf course property versus the boundaries of the Site, consisting of the western portion of the golf course, the PCAs and APECs identified in this historical Phase I ESA that apply to the Site are:

- PCA 40 – “Pesticides (including Herbicides, Fungicides and Anti-Fouling Agents) Manufacturing, Processing, Bulk Storage and Large-Scale Applications,” associated with the storage and application of pesticides and herbicides on the golf course fairways and greens on the Site (APEC1); and

2.2.2 Phase One Environmental Site Assessment, 141 Peter Road – GEMTEC (dated March 2022)

A Phase One ESA was completed by GEMTEC in 2022 for the Site, consisting of the western portion of the property located at 141 Peter Road, Perth, Ontario. The report was entitled “Phase One Environmental Site Assessment, Proposed Residential Development, 141 Peter Rd., Perth, Ontario” (GEMTEC 2022 Phase One ESA)

A review of historical information pertaining to the Site and adjacent properties identified the following:

- 30. Importation of Fill Material of Unknown Origin: Fill of unknown origin was observed in several areas across the Site.
- 40. Pesticides (including Herbicides, Fungicides and Anti-Fouling Agents) Manufacturing, Processing, Bulk Storage and Large-Scale Applications: The Site is currently used commercially as a golf course and has wide scale application of the abovementioned.

After reviewing the historical documentation concerning the Site, the two of the PCAs identified in GEMTEC’s Phase One ESA the review to areas of potential environmental concern (APECs) on the Site: fill of unknown quality potentially uses during development of the golf course, and the application of pesticides and herbicides on the fairways and greens of the golf course. The APECs and associated contaminants of potential concern (COPCs) are summarized below.

APEC 1 – Pesticides (including Herbicides, Fungicides and Anti-Fouling Agents) Manufacturing, Processing, Bulk Storage and Large-Scale Applications

Historical golf course with landscaped fairways and greens of the golf course with large scale application of pesticides and herbicides. Soil and groundwater expected to be impacted with organochlorines (OC) pesticides.

APEC 2 – Importation of Fill Material of Unknown Quality

Fill of unknown origin was observed in several areas across the Site, likely used for maintenance of the golf course. Soil and groundwater expected to be impacted with metals and inorganics (M&I), polycyclic aromatic hydrocarbons (PAHs), and petroleum hydrocarbon four fractions (PHC F1 to F4).

3.0 SCOPE OF THE INVESTIGATION

3.1 Overview of the Site Investigation

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 APECs. Any deviations from the proposed scope of work have been noted.

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

- Prepare a sampling and analysis plan to document the purpose, rationale, number and location of samples to be recovered as part of the Phase Two ESA;
- Coordinate the environmental sampling program with the GEMTEC geotechnical team. Advance up to 30 boreholes within the project limits, 12 of which will be completed as monitoring wells;
- During drilling, collect soil samples from each of the proposed boreholes for chemical analyses – and submit a total of 30 bulk/duplicate soil samples (26 bulk samples, 4 duplicate samples) for analytical analysis of COPCs identified within the Phase I ESA.
- Following installation, development and purging of the shallow monitoring wells, collect 16 groundwater samples (12 samples, 2 duplicates, 2 trip blanks) for COPCs identified within the Phase I ESA.
- Collect Quality Assurance / Quality Control (QA/QC) duplicate samples at a frequency of approximately 10% throughout the field program, in compliance with regulatory requirements and standard industry practice for COPCs identified in the Phase One ESA.
- Compare the results to applicable (MECP regulatory provincial standards and guidance documents as per O.Reg. 153/04 standards. Preliminary recommendations with respect to the management and/or disposal of excess materials during project implementation will also be included; and,
- Prepare a Phase Two ESA report for the project summarizing the findings and providing conclusions and recommendations (this report).

3.2 Media Investigated

Boreholes were advanced on-Site to assess the soil and groundwater conditions against the applicable MECP SCS for the Site. COPCs identified in the Phase One ESA (GEMTEC, 2022) for soil and groundwater included: metals and inorganics, PAHs, PHC F1 to F4, BTEX, and OC Pesticides. The Phase Two ESA at this Site was completed concurrently with the geotechnical and hydrogeological investigations. The field programs for all three investigations were combined to provide cost savings and efficiencies. The soil sampling program included the submission of a minimum of one representative soil sample from each borehole, where overburden thickness permitted, and 4 duplicate soil samples, for laboratory analysis of the COPCs.

The groundwater investigation program consisted of the measurement of depth to groundwater from all 12 monitoring wells (the shallow well installed in a next well configuration) and the development, purging and sampling of groundwater for laboratory analysis of the COPCs. Duplicate groundwater samples were collected and analysed for QA/QC purposes. Two groundwater trip/field blanks were collected for volatile parameters for QA/QC purposes.

3.3 Waterbodies and Areas of Natural and Scientific Interest

No provincially significant wetlands (PSWs) or areas of natural and scientific interest (ANSIs) were identified on the Site. However, the Nation Heritage Information Centre (NHIC) mapping identifies the provincially significant Grant's Creek Wetland present south and west of the Site along with a water bird nesting area and six species at risk in the area. The location of the Grants Creek Wetland, and the 30 m buffer from the wetland, is presented on Figure 2 in Appendix A.

A topography map based on Ontario Basic Mapping is provided as Figure 1, Appendix A. The Site has a relatively flat topography and is at an elevation of approximately 137 metres above sea level (mASL). Surrounding topography is relatively flat but generally slopes southerly direction towards Grant's Creek Wetland. The Tay River is present to the north of the Site.

Groundwater flow often reflects topographic features and typically flows toward nearby lakes, drains, rivers and wetland areas. Based on the topography of the area, it is expected that the local shallow groundwater flow will trend south towards Grant's Creek Wetland. However, groundwater flow to the north, towards the Tay River is also anticipated for areas on the northern portion of the Site.

3.4 PCAs, COPCs and APECs

The Phase One ESA conducted in March, 2022 (GEMTEC, 2022) identified a total of four PCAs within the Phase One study area, which was defined as the area located within a 250 metre radius of the Site, subsequently resulting in one APEC across the whole Site. A summary of PCAs and APEC, as outlined on Table 2 in Schedule D of O.Reg. 153/04, and as identified in the Phase One ESA, are provided in Table 3.1 and Table 3.2 below.

Table 3.1: Summary of Potentially Contaminating Activities

Address / Location	Distance from the Site	PCA #	Description	PCA Resulted in APEC / No APEC	Rationale	Material of Concern	Contaminants of Concern
Across the Site	0 m	40.	The study area surrounding the Site consists of agricultural areas to the north, the west, and the south of the phase one property. It is anticipated that large-scale application of pesticides was / is carried out on the agricultural lands.	Yes APEC 1	Modern agricultural practices are known to apply pesticides directly to crop land. Crops grown (corn, soy, wheat) within the region are not known to require heavy application of pesticides.	Soil Groundwater	OC Pesticides
Clubhouse and Maintenance building	50 m East	28.	One AST containing premium gasoline just west of the Clubhouse at the southeastern extent of the Site.	No	Based on anticipated groundwater flow, the COC is not likely to result in an APEC on the Site.	N/A	N/A
Across the Site	0 m	30.	Fill of unknown origin was observed across the Site used for maintenance of greens	Yes APEC 1	Due to close proximity/presence on site,and amount	Soil Groundwater	M & I, PAHs
Maintenance building	50 m North	52.	Associated with the golf course equipment repair garage and golf course cart oil changes east of the Site	No	The PCA was identified within the 250 m radius of the Site in the study area but is outside of the Site bounds.	N/A	N/A

Notes:
M & I – Metals and inorganics
PHCs – Petroleum hydrocarbons
BTEX – Benzene, toluene, ethylbenzene, xylene
OC Pesticides – Organochlorine pesticides
PAHs -

Table 3.2: Summary of Areas of Potential Environmental Concern

Location of area of potential environmental concern on phase one property	Location of PCA (on-site or off-site)	Area of potential environmental concern	APEC #	Potentially contaminating activity	Contaminants of potential concern	Media potentially Impacted (Ground water, soil and/or sediment)
On-site property, parts of the golf course., Assumed widespread application of pesticides.	On-Site	Pesticides (including Herbicides, Fungicides and Anti-Fouling Agents) Manufacturing, Processing, Bulk Storage and Large-Scale Applications	1	40. Pesticides (including Herbicides, Fungicides and Anti-Fouling Agents) Manufacturing, Processing, Bulk Storage and Large-Scale Applications	OC Pesticides	Soil Groundwater
Across the Site used for maintenance of golf course	On-Site	Fill of Unknown Quality	1	30. Importation of Fill Material of Unknown Quality	Metals and inorganics, PAHs, PHC F1 to F4, BTEX	Soil Groundwater

Notes:
PHC F1 to F4 – Petroleum hydrocarbon four fractions
BTEX – Benzene, toluene, ethylbenzene, xylene
PAHs – Polycyclic Aromatic Hydrocarbons

4.0 INVESTIGATION METHOD

4.1 General

Prior to any intrusive investigation, underground utility locates were completed by a licensed locator. USL of Ottawa, Ontario, was contracted to identify the location of all underground buried utilities at the Site. Utilities including telephone, gas, hydro, municipal services and private utilities were cleared through these services.

GEMTEC completed the Phase Two ESA field program concurrently with the geotechnical drilling field program at the Site in January 2022. Soil samples were collected for the COPCs identified in the Phase One ESA (metals and inorganics, PAHs, PHC F1 to F4, BTEX and OC pesticides), including the minimum suite of parameters identified in O.Reg. 406/19, to provide a preliminary characterization for potential excess soils characterization. Groundwater was sampled from the installed shallow monitoring wells across the Site and submitted for laboratory analyses of the COPCs.

The fieldwork for this investigation was carried out between January 4 and February 2, 2022. During that time, 33 boreholes (numbered 22-201, 22-202, 22-203, 22-203A, 22-205 to 22-214, 22-214A, 22-214B, 22-215, 22-216, 22-218, 22-219, 22-220, 22-221, 22-221A, 22-222, 22-222A, 22-223, 22-224, 22-225, 22-225A, 22-226, 22-227, 22-228, 22-228A, 22-229, and 22-230) were advanced at the Site and monitoring wells installed. ***Note:*** *Boreholes 22-204 and 22-217 were deleted from the program. Boreholes 22-229 and 22-230 were not within the scope of the Phase Two ESA.*

4.2 Borehole Drilling

- The boreholes were advanced, within the overburden, to depths ranging from about 0.3 to 8.0 metres below ground surface (m bgs). Upon reaching practical auger refusal in boreholes 22-201, 22-203A, 22-208, 22-214, 22-216, 22-221, 22-222 to 22-225, and 22-228, the boreholes were then advanced into the bedrock using rotary diamond drilling techniques while retrieving HQ sized bedrock core. These boreholes were advanced to total depths ranging from approximately 5.8 to 12.3 m bgs.
- Boreholes 22-214A, 22-214B, 22-221A, 22-225A, and 22-228A were advanced adjacent to boreholes 22-214, 22-221, 22-225, and 22-228, respectively, for the installation of multi-level monitoring wells.

The boreholes were advanced using a track mounted hollow stem auger drill rig supplied and operated by CCC Geotechnical and Environmental Drilling of Ottawa, Ontario.

Soil samples were recovered using a 50-millimetre diameter split barrel sampler that was decontaminated between each sampling interval.

4.3 Monitoring Well Installation

Monitoring wells were installed in boreholes 22-201, 22-203A, 22-205, 22-208, 22-214, 22-214B, 22-216, 22-221, 22-221A, 22-222, 22-222A, 22-223, 22-224, 22-225, 22-225A, 22-228, and 22-228A for subsequent measurement of the groundwater level, groundwater sampling and hydraulic conductivity testing. The following monitoring wells were sampled as part of the Phase Two ESA investigation: 22-201, 22-203A, 22-205, 22-208, 22-214, 22-216, 22-221A, 22-222A, 22-223, 22-224, 22-225A, and 22-228A, all corresponding to the shallow monitoring wells.

4.4 Field Methodology

4.4.1 Field Screening Measurements

Samples were inspected in the field for visual, tactile and olfactory evidence of impact. GEMTEC field personnel visually classified and logged the subsurface conditions encountered at each sampling location at the time of the field work. Following a period of equilibration to ambient temperature, collected soil samples were analyzed in the field for combustible and total organic vapour concentration using an RKI Eagle 2 Gas Monitor calibrated to hexane and isobutylene, respectively, operated in methane elimination mode.

Soil vapours were screened for fifteen borehole locations 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 5 ppm and 115 ppm.

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

4.4.2 Soil Sampling

All soil samples from the boreholes advanced on the Site were collected via a 50 mm diameter split-spoon. Samples were split, with a portion transferred immediately into laboratory supplied containers, and placed in a cooler. If sufficient soil was recovered, the remainder of the collected soil was placed in a re-sealable bag to allow for field screening measurements. Clean gloves were worn and changed between each sample and the split barrel sampler was washed and rinsed between each sampling event. Soil samples were inspected in the field for visual, tactile and olfactory evidence of impact.

Soil samples are identified as BHXX-YYY where X indicates the year the borehole was constructed, and Y is the borehole identifier. For example, BH22-201 indicates the borehole was constructed in 2022 and is identified as borehole number 201.

A total of 30 soil samples (26 bulk samples and 4 duplicate samples) were collected and stored in laboratory provided coolers with ice and/ or ice packs and shipped to the laboratory for analysis. Samples were submitted to Paracel Laboratories of Ottawa, Ontario (a CALA-certified analytical

laboratory), under standard chain-of-custody protocols and in accordance with GEMTEC QA/QC procedures.

Borehole stratigraphic logs are included in Appendix B

4.4.3 Groundwater Elevation Monitoring

On February 9th and 16th, 2022, groundwater levels were recorded in all available installed monitoring wells to determine static groundwater elevations on-site. Static groundwater levels were measured relative to Top of PVC Riser (TOPVC) using an electronic water level tape. The water level meter probe was decontaminated between wells by scrubbing with soapy water (water and alconox solution) and rinsed with de-ionised water. Static groundwater levels were recorded to the nearest 0.01 m.

4.4.4 Groundwater Sampling

Each monitoring well was developed by removing a minimum of three well volumes or to dry three times from each location shortly after wells had been installed by the drilling contractor. Well development 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 dedicated disposable tubing.

Groundwater samples are identified as BHXX-Y where X indicates the year the borehole was constructed and YYY is the borehole identifier. For example, BH22-201 indicates the borehole was constructed in 2022 and is identified as borehole number 201.

A total of 14 groundwater samples, including: one sample from each of the 12 shallow installed wells and 2 duplicate groundwater samples were collected and stored in laboratory provided coolers with ice and/ or ice packs and shipped to the laboratory for analysis. Samples were submitted to Paracel Laboratories under standard chain-of-custody protocols and in accordance with GEMTEC QA/QC procedures.

4.5 Laboratory Analytical Program

Soil and groundwater samples were collected directly into laboratory-supplied sampling containers and stored and shipped to the analytical laboratory in dedicated coolers with ice and/ or ice packs to maintain required sample storage temperatures. Samples were submitted to Paracel Laboratories Ltd., of Ottawa, Ontario, a CALA-certified analytical laboratory, under standard chain-of-custody procedures and in accordance with GEMTEC's internal QA/QC procedures. Complete laboratory certificates of analysis for the 2022 field sampling program are included in Appendix D.

4.6 Surveying

The borehole locations were selected by GEMTEC to investigate the APECs identified on-site while considering constraints imposed by accessibility and underground utility limitations. The borehole locations were selected by GEMTEC and positioned on site relative to existing features. The ground surface elevations at the borehole locations, and top of pipe elevations in each monitoring well, were determined using precision GPS survey equipment. The elevations are referenced to geodetic datum NAD83 (CSRS) Epoch 2010, vertical network CGVD1928

4.7 Quality Assurance / Quality Control Program

Soil and groundwater samples were collected directly into laboratory-supplied sampling containers. All samples were stored and shipped in dedicated coolers and were submitted to Paracel Laboratories Ltd., under standard chain-of-custody procedures and in accordance with GEMTEC QA/QC protocols.

Equipment cleaning procedures for soil sampling consisted of manual cleaning of split spoons. Following each split spoon sample all loose soils were removed from the spoons by heavy brush. Following the removal of loose soils, split spoons were washed with alconox detergent prior to being rinsed thoroughly with deionised water rinse. If visual or olfactory evidence of contamination was noted during the advancement of a particular borehole, all drilling equipment including auger flights and split spoons were decontaminated between wells with soapy water (water and alconox solution) and then rinsed with deionised water prior to use at the next borehole.

The soil sampling program included the submission of a minimum of one representative overburden/fill soil sample from each borehole location, where overburden thickness permitted, for laboratory analysis of the identified COPCs. A total of 4 duplicate samples were collected and submitted to Paracel Laboratories Ltd. for metals and inorganics, BTEX, PHC F1 to F4, PAHs and OC Pesticides.

Prior to groundwater sampling, static groundwater levels were determined using an electronic water level tape. To ensure no cross contamination between wells, the water level meter probe and wetted tape length was decontaminated between wells with soapy water (water and alconox solution) and then rinsed with deionised water. During low flow groundwater sampling, a multiparameter unit, Horiba U-52, was used to determine stabilization of field parameters.

Due to the dedicated nature of all monitoring well sampling instrumentation (Waterra inertial hand pump, ¼-inch and ¾-inch tubing) no decontamination procedures were required during groundwater sampling. All required lengths of tubing for the groundwater sampling (both ¼-inch and ¾-inch tubing) were disposed of after usage at each designated well. New tubing (both ¼-inch and ¾-inch) was used for groundwater sampling at each well. Standard field protocols were strictly adhered to in effort to prevent the contamination of sampling equipment (peristaltic pump) during the groundwater sampling program.

Field quality control measures employed during the Phase Two ESA investigations consisted of the collection of field duplicate QA/QC sample for metals and inorganics, BTEX, PHC F1 to F4, PAHs, and OC Pesticides in groundwater. Duplicate groundwater samples were submitted to Paracel Laboratories Ltd. for analysis of selected parameters at a minimum rate of one field duplicate per 10 samples collected. The field duplicate samples were assessed by calculating the relative percent difference and comparing the results to the acceptance criteria. In addition to the duplicate samples, two laboratory prepared groundwater trip blanks were prepared, carried to Site during sampling, submitted to laboratory under the same conditions as the groundwater samples and analyzed for BTEX and PHC F1.

5.0 REVIEW AND EVALUATION

5.1 Site Stratigraphy

The surficial geology for the Site was obtained from the Geotechnical Investigation report completed for the Site conducted by GEMTEC (2022) entitled "*Geotechnical Investigation, Proposed Residential Development 141 Peter Street Ottawa, Ontario*".

The soil, bedrock and groundwater conditions identified in the boreholes are presented on the borehole logs in Appendix B. The logs indicate the subsurface conditions at the specific test locations only. Boundaries between zones on the logs are often not distinct, but rather are transitional and have been interpreted. The precision with which subsurface conditions are indicated depends on the method of exploration, the frequency and recovery of samples, the method of sampling, and the uniformity of the subsurface conditions. Subsurface conditions at locations other than the borehole locations may vary from the conditions encountered in the boreholes. The following presents an overview of the subsurface conditions encountered in the boreholes advanced as part of this investigation.

5.1.1 Summary of Subsurface Conditions

A surficial layer of topsoil was encountered at ground surface at boreholes 22-201 to 22-230, with the exception of 22-206. Topsoil ranges in thickness from 30 to 180 millimetres.

Fill material was encountered below the topsoil between about 0.8 and 2.3 metres depth in five (5) of the borehole locations. Fill material is variable across the site but consists of silty sand with trace gavel and organic material.

Silty sand deposits were encountered below the topsoil and fill material, in boreholes 22-201, 22-208, and 22-214. The deposits range in depth from 0.3 to 0.8 metres below existing grade.

Silty clay deposits were encountered below the topsoil in boreholes 22-205, 22-207, 22-215, 22-216, 22-218, 22-221, 22-223, and 22-226. The weathered silty clay crust extends to depths ranging from about 0.6 to 2.3 metres below the existing ground surface.

Native deposits of glacial till were encountered below the topsoil, fill material, silty sand, and silty clay, where encountered, in all the borehole, except boreholes 22-208, 22-218, 22-223, and 22-229, at depths ranging from about 0.1 to 2.3 metres below existing grade. Glacial till is a heterogeneous mixture of all grain sizes; however, at this Site, the glacial till can be described as brown to grey silty sand to silty, clayey sand with varying amounts of gravel, cobbles and boulders. The glacial till was not fully penetrated in all the test holes but was proven to depths ranging from about 0.4 to 8.0 metres below existing grade.

Precambrian bedrock was encountered at borehole locations: 22-201, 22-203A, 22-208, 22-214, 22-216, 22-221A, 22-222, 22-223, 22-224, 22-225, and 22-228 at depths ranging from about 0.3 to 6.4 metres below surface grade and cored using rotary diamond drilling techniques while retrieving HQ sized bedrock core. The bedrock was cored to a depth of between 3.3 and 12.3 metres below surface grade.

5.2 Groundwater Elevations and Flow Direction

Groundwater elevations presented below were calculated based on depth to groundwater measurements collected on February 9, 2022, and February 16, 2022, and the measured ground surface or top of pipe elevation recorded during the survey of the sample locations.

Groundwater depths were measured directly from the top of each monitoring well casing using an electronic contact water level tape. Depth measurements were converted to groundwater elevations by subtracting the measured depth from the elevation of the top of each monitoring well riser. Measured groundwater depth and elevation are presented in Table 5.1 below.

Table 5.1: Groundwater Levels Feb. 9, 2022 & Feb. 16, 2022

Monitoring Well ID	Material	Screened Interval (m bgs)	Groundwater elevation (m asl) Feb 9, 2022	Groundwater depth (m bgs) Feb 9, 2022	Groundwater elevation (m asl) Feb 16, 2022	Groundwater depth (m bgs) Feb 16, 2022
22-201	Overburden	3.05 – 6.10	135.131	0.867	135.2	0.81
22-203A	Bedrock	3.18 – 6.22	134.676	1.237	134.8	1.14
22-205	Overburden	3.05 – 6.10	134.871	0.446	135.0	0.34
22-208	Bedrock	3.05 – 6.07	134.774	2.709	134.8	2.70
22-214	Bedrock	5.30 – 6.85	135.960	1.957	136.1	1.81
22-214B	Overburden	1.50 – 4.55	136.111	1.693	136.1	1.70
22-216	Bedrock	2.75 – 5.79	133.890	0.731	133.9	0.73

Monitoring Well ID	Material	Screened Interval (m bgs)	Groundwater elevation (m asl) Feb 9, 2022	Groundwater depth (m bgs) Feb 9, 2022	Groundwater elevation (m asl) Feb 16, 2022	Groundwater depth (m bgs) Feb 16, 2022
22-221	Bedrock	3.25 – 6.30	134.149	0.482	134.2	0.40
22-221A	Overburden	0.80 – 1.42	134.151	0.567	134.2	0.52
22-222	Bedrock	4.57 – 6.10	134.534	1.093	134.6	1.04
22-222A	Bedrock	1.20 – 3.73	134.427	1.302	134.5	1.20
22-223	Bedrock	9.05 – 12.09	134.302	0.315	134.4	0.23
22-224	Overburden	1.52 – 4.60	135.099	0.540	135.1	0.49
22-225	Bedrock	2.97 – 6.02	134.111	0.828	134.2	0.72
22-225A	Overburden	0.90 – 1.37	134.116	0.854	134.2	0.78
22-228	Bedrock	4.60 – 7.65	134.331	4.146	134.4	4.12
22-228A	Bedrock	4.60 – 7.65	134.413	4.032	134.5	3.98

Notes:
M bgs – meters below ground surface
M asl – meters above surface level

The groundwater elevations contours (dated February 16, 2022) are presented on Figure 3 in Appendix A. As provided, the horizontal flow direction appears to be influenced by the local topography.

The groundwater elevations are the highest at the topographic highs within the central and western portions of the Site, with radial flow from the topographic highs. There appears to be a groundwater divide running roughly east-west across the Site controlled by the topographic ridges. As such, groundwater on the northern portion of the Site would flow north towards the Tay River, whereas groundwater flow on the southern portion of the Site would flow south towards the Grant's Creek Wetland.

5.3 Groundwater Hydraulic Gradients

Vertical hydraulic gradients, as calculated between monitoring well pairs, are summarized below:

- 22-214B to 22-214 = 0.15 (m, + Downward, - Upward)
- 22-221A to 22-221 = 0.00 (m, + Downward, - Upward)

- 22-222A to 22-222 = -0.11 (m, + Downward, - Upward)
- 22-225A to 22-225 = 0.01 (m, + Downward, - Upward)
- 22-228A to 22-228 = 0.08 (m, + Downward, - Upward)

The average vertical hydraulic gradient through the 2022 groundwater measurements was approximately 0.026 m/m downward.

5.4 Analytical Results

5.4.1 Soil Quality

Soil samples were selected for laboratory analysis based on the combustible headspace gas readings, visual, olfactory and tactile evidence of impact, and presence of fill material. A total of 30 soil samples (including 4 duplicates) were submitted to Paracel Laboratories, a CALA accredited laboratory, for analysis of the COPCs. Exceedances to the selected MECP Table 1 SCS and Table 6 SCS are summarized in Table 5.2 below and are presented in Figure 4 of Appendix A.

Table 5.2: Summary of Soil Sampling Analytical Results

Location ID	Sample ID	Depth Interval (mbgs)	Analytical Analysis	MECP Table 1	MECP Table 6 ICC
BH22-201	**SS1**	0 – 0.61	BTEX, M & I, PHCs (F1-F4)	None	None
BH22-202	**SS3**	1.52 - 2.13	BTEX, M & I, PHCs (F1-F4)	None	None
BH22-203	**SS1**	0 – 0.61	BTEX, M & I, PHCs (F1-F4)	None	None
BH22-205	**SS1**	0 – 0.61	BTEX, M & I, PHCs (F1-F4)	Barium*	None
BH22-206	**SA1**	0 – 0.61	BTEX, PAHs, PHCs (F1-F4), M & I, OCPs	None	None
	SA2	0.76 – 1.40	BTEX, M & I, PHCs (F1-F4), OCPs	None	None
BH22-207	**SS 2**	0.79 – 1.40	BTEX, M & I, PHCs (F1-F4)	None	None
	SS 102	Duplicate of SS2	BTEX, M & I, PHCs (F1-F4)	None	None
BH22-208	**SS1**	0 – 0.24	BTEX, M & I, PHCs (F1-F4)	Chromium	None

Location ID	Sample ID	Depth Interval (mbgs)	Analytical Analysis	MECP Table 1	MECP Table 6 ICC
BH22-209	**SS1**	0 – 0.61	BTEX, M & I, PHCs (F1-F4)	None	None
BH22-210	**SS2**	0.79 – 1.40	BTEX, M & I, PHCs (F1-F4)	None	None
BH22-212	**SS1**	0 – 0.61	BTEX, PHCs (F1-F4), M & I, PAHs, OCPs	Barium	None
BH22-213	**SS1**	0 – 0.61	BTEX, M & I, PHCs (F1-F4)	None	None
BH22-214	**SS2**	0.76 – 1.37	BTEX, M & I, PHCs (F1-F4)	None	None
BH22-215	**SS3**	1.52 – 2.13	BTEX, M & I, PHCs (F1-F4)	None	None
BH22-216	**SS1**	0 – 0.61	BTEX, M & I, PHCs (F1-F4)	None	None
BH22-219	**SS1**	0 – 0.61	BTEX, OCPs, PHCs (F1-F4), M & I,	None	None
	SS101	Duplicate of SS1	BTEX, M & I, PHCs (F1-F4),	None	None
BH22-220	**SS1**	0 – 0.61	BTEX, M & I, PHCs (F1-F4)	None	None
BH22-221	**SS1**	0 – 0.61	BTEX, M & I, PHCs (F1-F4)	Antimony	None
BH22-222	**SS2**	0.76 – 1.37	BTEX, M & I, PHCs (F1-F4)	None	None
	SS102	Duplicate of SS2	BTEX, M & I, PHCs (F1-F4)	None	None
BH22-223	**SS1**	0 – 0.61	BTEX, M & I, PHCs (F1-F4), OCPs	Barium*	None
	SS101	Duplicate of SS1	BTEX, M & I, PHCs (F1-F4), OCPs	Barium*, Uranium	None
BH22-224	**SS1**	0 – 0.61	BTEX, M & I, PHCs (F1-F4), OCPs	Barium	None
BH22-225	**SS1**	0 – 0.61	BTEX, M & I, PHCs (F1-F4)	None	None
BH22-226	**SS1**	0 – 0.61	BTEX, M & I, PHCs (F1-F4), OCPs	None	None

Location ID	Sample ID	Depth Interval (mbgs)	Analytical Analysis	MECP Table 1	MECP Table 6 ICC
	SS2	0.76 – 1.37	BTEX, M & I, PHCs (F1-F4), OCPs	Barium*, Vanadium*	Vanadium*
BH22-227	**SS1**	0 – 0.61	BTEX, M & I, PHCs (F1-F4), OCPs	None	None
BH22-228	**SS1**	0 – 0.61	BTEX, M & I, PHCs (F1-F4), OCPs	None	None

Notes:
PHCs – Petroleum hydrocarbons
VOCs – Volatile organic compounds
BTEX – Benzene, toluene, ethylbenzene, xylene
M&I – Metals and Inorganics
None – No exceedances
* - Sampled from possible Champlain Sea clays with naturally elevated metals concentrations
MECP Table 1: Full Depth Background Site Condition Standards for Soil for Residential/Parkland/Institutional/Industrial/Commercial/Community (RPI/ICC) land use. (MECP, 2011)
MECP Table 6 ICC SCS: Table 6: Generic Site Condition Standards (SCS) or Shallow Soils in a Potable Ground Water Condition, Industrial/Commercial/Community (ICC) land use, coarse textured soils. (MECP, 2011).

Elevated concentrations of barium, and vanadium were observed in samples containing native clays (i.e., Champlain Sea clays), and were also compared to concentrations presented in the 2017 document entitled 'Elevated Background Metals Concentrations in Champlain Sea Clay – Ottawa Region' (Sterling, et al., 2017).

Reliance on the Ottawa proposed geo-regional metals, as presented in the 2017 Sterling et al., study is justified as the MECP has recommended that future updates to the Site Condition Standards (MOE, 2011) should consider geo-regional approaches. As such, GEMTEC has consulted the above referenced document in our assessment when concentrations of naturally occurring metals were determined to exceed MECP SCS. Based on this geo-regional approach, the observed MECP exceedance for barium (at BH22-205 SS1, BH22-223 SS1, BH22-226 SS2) and vanadium (BH22-226 SS2) should not be considered to be contamination for soils remaining within the project limits, but of naturally occurring elevated concentrations.

5.4.2 Groundwater Quality

Well screens were sealed in the overburden at boreholes 22-201, 22-205, 22-214B, 22-221A, 22-224, and 22-225A and in the bedrock at boreholes 22-203A, 22-208, 22-214, 22-216, 22-221, 22-222, 22-222A, 22-223, 22-225, 22-228 and 22-228A, for measurement of the groundwater levels and to allow for the collection of groundwater samples. Nested wells (22-214 and 22-214B, 22-221 and 22-221A, 22-225 and 22-225A, and 22-228 and 22-228A) had a shallow and deep

well screen installed. The groundwater collected for this Phase Two ESA investigation was sampled from the shallow well of each well pairing.

Groundwater samples were collected from the monitoring wells directly into laboratory supplied bottles using a peristaltic pump with dedicated disposable tubing. A total of 16 groundwater samples (including two duplicates, and two groundwater trip blanks) were submitted to Paracel Laboratories for analysis of the selected parameters. The groundwater samples submitted for analyses and the analytical parameters are summarized in Table 6.4. and are presented in Figure 5 of Appendix A.

Table 5.3: Summary of Groundwater Sampling Analytical Results

Sample ID	Groundwater Elevation (mASL) Feb 9 2022	Parameters Analyzed	MECP Table 1 All Types	MECP Table 6 All Types
BH22-201	1.75	PHCs (F1 – F4), BTEX, M & I	Nickel	None
BH22-203A	2.03	PHCs (F1 – F4), BTEX, M & I	None	None
Dup 1 (Duplicate of BH22-203A)	-	PHCs (F1 – F4), BTEX, M & I	None	None
BH22-205	0.45	PHCs (F1 – F4), BTEX, M & I	None	None
BH22-208	3.58	PHCs (F1 – F4), BTEX, M & I	Copper	None
BH22-214	1.85	PHCs (F1 – F4), BTEX, M & I, OCPs	None	None
BH22-216	1.62	PHCs (F1 – F4), BTEX, M & I	Uranium	None
BH22-221A	1.34	PHCs (F1 – F4), BTEX, M & I	Copper	None
BH22-222A	1.98	PHCs (F1 – F4), BTEX, M & I	Copper Uranium	None
BH22-223	0.14	PHCs (F1 – F4), BTEX, M & I, OCPs	Uranium	None
BH22-224	0.20	PHCs (F1 – F4), BTEX, M & I, OCPs	Cobalt	Cobalt
Dup 2 (Duplicate of BH22-224)	-	PHCs (F1 – F4), BTEX, M & I, OCPs	Cobalt	Cobalt
BH22-225A	0.69	PHCs (F1 – F4), BTEX, M & I	Cobalt	Cobalt

Sample ID	Groundwater Elevation (mASL) Feb 9 2022	Parameters Analyzed	MECP Table 1 All Types	MECP Table 6 All Types
BH22-228A	4.06	PHCs (F1 – F4), BTEX, M & I, OCPs	Copper Uranium	Uranium

Notes:
PHCs (F1-F4) – Petroleum hydrocarbons four fractions
BTEX – Benzene, toluene, ethylbenzene, xylene
M&I – Metals and Inorganics
OCPs – Organochlorine pesticides
None – No exceedances
MECP Table 1: Full Depth Background Site Condition Standards for Soil All Types of Property Use. (MECP, 2011)
MECP Table 6 ICC SCS: Table 6: Generic Site Condition Standards (SCS) or Shallow Soils in a Potable Ground Water Condition, All Types of Property Use, coarse textured soils. (MECP, 2011).

5.5 Quality Assurance and Quality Control Results

A quality assurance/quality control (QA/QC) program was implemented during the Phase Two ESA field investigations as described in Section 4.7. The QA/QC program consisted of the use of standard in-house field protocols as developed by GEMTEC and as per standard industry practice. The QA/QC program also included internal laboratory QA/QC completed by Paracel Laboratories of Ottawa, Ontario.

The GEMTEC QA/QC program consisted of standard sampling protocols and the collection and submission of blind field duplicate soil and groundwater samples. Blind duplicate samples were collected at a minimum frequency of one in 10 samples. Duplicate sample results are presented in the summary analytical tables in Appendix C. Two duplicate groundwater samples, one per sampling event, were collected for groundwater. Four duplicate samples were collected for soil, a minimum of 10% of total samples taken.

Laboratory analyses were completed by Paracel Laboratories, a CALA-certified laboratory. Paracel completed all analyses in accordance with internal laboratory QC programs that include standardized analytical methods and procedures, in accordance with O.Reg. 153/04, as amended. Quality Assurance Reports were provided by Paracel for all completed analyses. These certificates summarize the laboratory results for laboratory QA/QC samples including matrix spikes, spiked blanks, method blanks and relative percent difference (RPD). Complete laboratory certificates of analysis are provided in Appendix C.

There were no additional notes or revisions to the soil or the groundwater samples by Paracel Laboratories Ltd.

GEMTECs review of Paracel's QA/QC certificates indicates that analytical results fell within acceptable QA/QC limits for constituent recovery as defined by the protocols for the analytical methods for almost all parameters analyzed. In a few cases, the parameters were slightly outside of the required limits for analytical protocol; however, these result sets were accepted based on batch results.

GEMTECs QA/QC plan included submission of soil and groundwater duplicates, in order to determine the precision of the analytical methods and field sampling procedures. Duplicate samples and their corresponding original sample are as follows.

- Groundwater – BH22-203 and duplicate sample BH22-203 (Dup 1) submitted for metals, PHC F1-F4, BTEX, VOCs, pH, EC; and,
- Groundwater – BH22-224 and duplicate sample BH22-224 (Dup 2) submitted for metals, PHC F1-F4, BTEX, VOCs, pH, EC; and OC Pesticides
- Soil – BH22-207 SS2 and duplicate sample BH22-207 SS102 submitted for metals, PHC F1-F4, BTEX, VOCs, and OC Pesticides
- Soil – BH22-219 SS1 and duplicate sample BH22-219 SS101 submitted for metals, PHC F1-F4, BTEX, VOCs, and OC Pesticides
- Soil – BH22-222 SS1 and duplicate sample BH22-222 SS101 submitted for metals, PHC F1-F4, BTEX, VOCs, and OC Pesticides
- Soil – BH22-223 SS2 and duplicate sample BH22-223 SS102 submitted for metals, PHC F1-F4, BTEX, VOCs, and OC Pesticides

Precision is determined by the relative percent difference (RPD) between the set of duplicate samples and was calculated as follows:

$$\text{RPD} = \frac{(\text{x1} - \text{x2})}{\left(\frac{\text{x1} + \text{x2}}{2}\right)} \text{ X } 100$$

Where: X1 is the concentration of the original sample

X2 is the concentration of the duplicate sample

X3 is the average concentration of the original and duplicate sample

RPD values for homogeneous samples are generally considered acceptable if they are less than 30%. Furthermore, since the uncertainty associated with a value increases dramatically as the result approaches the MDL, the MECP (formerly MOE) recommends completing RPD calculations only if the average of the duplicate and parent sample is greater than five times the MDL (5x MDL) (MOE, 2004).

RPD values were calculated using the equation provided for all duplicate parameters sampled where the average of the parent and duplicate samples were at least 5x the MDL. Using this approach, the calculated groundwater RPD value for BH22-203 and BH22-203 (Dup 1) ranged from 0% and 4%, those for BH22-224 and BH22-224 (Dup 2) ranged from 0% to 4.7%.

The calculated soil RPD values for BH22-207 SS2 and BH22-207 SS102 ranged from 0% to 23.9%; for BH22-219 SS1 and BH22-219 SS102 ranged from 0% to 15.6%; for BH22-222 SS2 and BH22-222 SS102 ranged from 0% and 55.9% and for BH22-223 SS1 and BH22-223 SS102 ranged from 0% and 33.3%. The RPD values calculated as part of this QA/QC program exceeded MECP guidelines for the parameters Barium and Nickel in BH22-222 and BH22-223. This is attributed to the heterogeneity of soil and not representative of the sampling procedures followed during the sampling program.

6.0 SUMMARY AND DISCUSSION

Based on GEMTEC's understanding of the proposed development at this time, due to portions of the Site being present within 30 m of the Grants Creek Wetland, the applicable site condition standards are the background standards of Table 1 SCS, the most stringent of the standards. The Table 6 SCS for ICC property use have also been used for comparison purposes to the analytical results to identify areas where soil and groundwater would require remediation should the proposed development be adjusted to be greater than 30 m from the Grant Creek Wetland.

Should any of the soil on-site be deemed excess (cannot be re-used on-site), the volume of that excess soil will determine further sampling requirements for soil characterization for potential off-site re-use locations, as the Table 1 SCS exceedances mean the soil cannot be classified as clean fill. A summary of the observed exceedances is provided in Sections 6.1.and 6.2.

6.1 Soil Quality Results

Due to exceedances of chromium, barium, antimony and uranium in the till layer, the soil in the proximity of borehole locations 22-208, 22-212, 22-211, 22-223 and 22-224, and halfway to the next sampling location, cannot be used on-site during development, and cannot be present on the Site to obtain a Record of Site Condition.

- Although barium and vanadium exceedances were identified in other borehole locations on-site, the soil sampled was from a silty clay layer, which could be Champlain Sea clays. Based on the regional background values calculated by Stirling et al., the barium and vanadium concentrations are below the regional values, and can be considered to be naturally elevated concentrations.

6.2 Groundwater Quality Results

A comparison of the analytical results to the MECP Table 1 SCS identified an exceedance of one or more metals in BH22-201, BH22-208, BH22-221, BH22-222, BH22-223, BH22-224, BH22-224 (Dup) and BH22-228.

- All parameters analyzed for groundwater samples collected from the monitoring wells met the MECP Table 6 SCS with the exception of cobalt concentrations in BH22-224 (its duplicate DUP2), BH22-225A and the uranium concentration in groundwater from BH22-228A.
- If the on-site monitoring wells are no longer required they should be decommissioned in accordance with O.Reg. 903, as amended.

6.3 Phase Two Conceptual Site Model

6.3.1 Physical Setting of Phase Two Property

A topographic map based on Ontario Base Mapping was reviewed for the Site (OBM, 2004). The Site has an elevation between 135 and 137 metres above sea level. The topography of the surrounding area is relatively flat but generally slopes southerly direction towards Grant's Creek Wetland.

Surficial soil and bedrock geology maps of the area indicate that the overburden in the study area and the vicinity of the study area generally consists of till, bedrock drift and organic deposits. The bedrock is mapped as late felsic plutonic rocks granitic gneisses with metasedimentary xenoliths, migmatites, injection gneisses, pegmatites.

6.3.2 Site Stratigraphy

Site stratigraphy at the Site, generally consists of up to 0.1 m of topsoil, underlain by 0.5 to 0.6 m of fill material (silty sand with trace gravel and organics), 0.5 to 1 m of silty sand and or silt clay, 5 – 8 m of glacial till, and at least 3 to 6 m of Precambrian bedrock.

6.3.3 Hydrogeological Characteristics

The Site is located within the Grant's Creek Wetland catchment, within the larger hydrogeological region known as the Tay River watershed. (MOE, 2003). There appears to be a watershed drainage divide across the Site, with water flowing to the north towards the Tay River and water at the southern end of the Site flowing to the south towards Grant's Creek Wetland.

To date, seventeen (17) groundwater monitoring wells have been advanced at the site and are identified as, 22-201, 22-203A, 22-205, 22-208, 22-214, 22-214B, 22-216, 22-221, 22-221A, 22-222, 22-222A, 22-223, 22-224, 22-225, 22-225A, 22-228, and 22-228A, as illustrated on Figure 1 of Appendix A. Based on groundwater elevations obtained during the Phase Two ESA (presented in Table 6.1), groundwater flow is interpreted to vary across the Site, following the topography and ultimately flowing into two separate waterbodies, the Tay River to the north and the Grant's Creek Wetland to the south, as illustrated on Figure 2 of Appendix A.

Table 6.1: Groundwater Levels Feb. 9, 2022 & Feb. 16, 2022

Monitoring Well ID	Material	Screened Interval (m bgs)	Groundwater elevation (m asl) Feb 9, 2022	Groundwater depth (m bgs) Feb 9, 2022	Groundwater elevation (m asl) Feb 16, 2022	Groundwater depth (m bgs) Feb 16, 2022
22-201	Overburden	3.05 – 6.10	135.131	0.867	135.2	0.81
22-203A	Bedrock	3.18 – 6.22	134.676	1.237	134.8	1.14
22-205	Overburden	3.05 – 6.10	134.871	0.446	135.0	0.34
22-208	Bedrock	3.05 – 6.07	134.774	2.709	134.8	2.70
22-214	Bedrock	5.30 – 6.85	135.960	1.957	136.1	1.81
22-214B	Overburden	1.50 – 4.55	136.111	1.693	136.1	1.70
22-216	Bedrock	2.75 – 5.79	133.890	0.731	133.9	0.73
22-221	Bedrock	3.25 – 6.30	134.149	0.482	134.2	0.40
22-221A	Overburden	0.80 – 1.42	134.151	0.567	134.2	0.52
22-222	Bedrock	4.57 – 6.10	134.534	1.093	134.6	1.04
22-222A	Bedrock	1.20 – 3.73	134.427	1.302	134.5	1.20
22-223	Bedrock	9.05 – 12.09	134.302	0.315	134.4	0.23
22-224	Overburden	1.52 – 4.60	135.099	0.540	135.1	0.49
22-225	Bedrock	2.97 – 6.02	134.111	0.828	134.2	0.72
22-225A	Overburden	0.90 – 1.37	134.116	0.854	134.2	0.78
22-228	Bedrock	4.60 – 7.65	134.331	4.146	134.4	4.12
22-228A	Bedrock	4.60 – 7.65	134.413	4.032	134.5	3.98

Notes:
M bgs – meters below ground surface
M asl – meters above surface level

Vertical hydraulic gradients, as calculated between monitoring well pairs, are summarized below:

- 22-214B to 22-214 = 0.15 (m, + Downward, - Upward)
- 22-221A to 22-221 = 0.00 (m, + Downward, - Upward)
- 22-222A to 22-222 = -0.11 (m, + Downward, - Upward)
- 22-225A to 22-225 = 0.01 (m, + Downward, - Upward)
- 22-228A to 22-228 = 0.08 (m, + Downward, - Upward)

The average vertical hydraulic gradient through the 2022 groundwater measurements was approximately 0.026 m/m downward.

6.3.4 Approximate Depth to Bedrock

Based on the boreholes advanced as part of the investigation completed at the Phase Two property, the bedrock depth ranged from approximately 0.30 to 6.40 m bgs with an average depth of 0.68 mbgs.

6.3.5 Approximate Depth to Water Table

Based on groundwater levels measured on February 9, 2022 and February 16, 2022, the depth to the water table at the Site ranged from 0.45 m bgs to 4.15 m bgs on February 9th, and from 0.23 m bgs to 4.12 m bgs on February 16th, 2022. Groundwater elevations ranged from 133.9 m asl to 136.1 m asl on both February 9th and 16th, 2022.

6.3.6 Applicability of Section 41 and 43.1 of the Regulation

The Site is not part of, adjacent to an area of natural scientific interest. However, the Site is within 30 m of a provincially significant wetland, Grants Creek Wetland. Therefore, although the pH analytical results indicate that the soil pH values measured in surface soil samples collected from depths of less than 1.5 mbgs were within the acceptable range of 5 to 9, the Site is considered to be environmentally sensitive and the Table 1 SCS are to be applied. Subsequently, the Site is considered to be a shallow soil property, as more than 1/3 of the area of the Site consists of soil less than 2 m in depth beneath the soil surface.

6.3.7 Fill Material

Fill material was encountered below the topsoil between the ground surface and approximately 0.8 m bgs in one of the borehole locations. Fill material consisted of very loose to loose, dark brown to brown silty sand with some gravel.

The source of the fill material on the Site is unknown.

6.3.8 Proposed Buildings and Other Structures

Based on the plans provided by Caivan (Perth GC) Limited, the proposed development will consist of single detached houses, townhouses, and high-density housing, storm water management ponds, a new pumping station, and new community parks.

6.3.9 Environmental Conditions

Based on the findings of the Phase One and Phase Two ESA reports, the applicable Site Condition Standards for the intended future use of the site are the Table 7 Generic Site Condition Standards for Shallow Soils in a Potable Ground Water Condition, Residential/Parkland/Institutional land use (RPI) Course Textured Soils (MOE, 2011a), and the Table 1: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Full Depth Background Site Condition Standards for Soil for Residential/Parkland/ Institutional/Industrial/Commercial/Community Property Use.

6.3.10 Media Investigated

Boreholes were advanced across the Site to assess the soil and groundwater conditions at the test locations in comparison to the applicable MECP Table 1 and Table 6 SCS. The boreholes were advanced using a track mounted hollow stem auger drill rig supplied and operated by CCC Geotechnical and Environmental Drilling of Ottawa, Ontario

The soil sampling program included the submission of a minimum of one representative soil sample from each borehole, where overburden thickness permitted, for laboratory analysis of the identified COPCs. Duplicate soil samples were collected and analysed for QA/QC purposes at a minimum frequency of one in 10 samples, for a total of 4 duplicate soil samples.

The groundwater investigation program consisted of the completion of twelve boreholes as monitoring wells, the development of all wells following drilling, the measurement of depth to groundwater table from all twelve monitoring well locations, and the collection of groundwater samples for laboratory analysis of the identified COPCs. Duplicate groundwater samples were collected and analysed for QA/QC purposes at a minimum frequency of one in 10 samples, for a total of two field duplicate groundwater samples. Two trip blanks were also included as part of the QA/QC program, brought to Site during each day of sampling, and submitted for laboratory analysis of VOCs.

6.3.10.1 Soil Quality

Soil samples were selected for analytical analysis based on field screening indications including combustible headspace gas readings, visual, olfactory and tactile evidence of impact, and observations of the presence of fill material.

Soil vapours were screened for fifteen borehole locations 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 10 ppm and 35 ppm.

A total of thirty soil samples (twenty-six bulk samples and four duplicate samples) were submitted to Paracel Laboratories (a CALA accredited laboratory) in Ottawa, Ontario, for analysis of the selected parameters. A summary of the analytical soil sampling results is presented in Appendix C.

One or both of barium and vanadium concentrations greater than the Table 1 SCS were identified in silty clay materials in several boreholes (22-205 SS1, 22-223 SS1, 22-226 SS2). Based on the silty clay sampled, these elevated concentrations were attributed to the Champlain Sea deposits which Stirling et al. demonstrated contain naturally occurring elevated concentrations of several metal parameters. Therefore, the concentrations identified in the three boreholes, greater than the Table 1 SCS, but less than the regional background values, were not identified as exceedances. Soil samples did not meet the applicable MECP Table 1 SCS in 5 boreholes for one or more of the following parameters: antimony, barium, chromium, and uranium.

Soil samples met the applicable MECP Table 6 SCS for all parameters analyzed, with the exception of vanadium in BH22-226 SS2; however, the Table 6 SCS is equal to the Table 1 SCS for vanadium. Therefore, the identified vanadium exceedance is likely attributed to the naturally occurring elevated concentration.

6.3.10.2 Groundwater Quality

To date, twelve (12) groundwater monitoring wells were installed at the Site and are identified as, 22-201, 22-203A, 22-205, 22-208, 22-214, 22-216, 22-221A, 22-222A, 22-223, 22-224, 22-225A, and 22-228A, as illustrated on Figure 1 of Appendix A. The depth to the static groundwater table in each monitoring well was measured using a Heron Instruments oil/water interface meter.

Groundwater samples were collected from the monitoring wells and placed directly into laboratory supplied bottles using a peristaltic pump with disposable tubing. Groundwater samples were collected from each monitoring well and submitted to Paracel Laboratories for analysis of the selected parameters.

A summary of the analytical groundwater sampling results is presented in Appendix C.

Groundwater samples did not meet the applicable MECP Table 1 SCS for one or more of cobalt copper, nickel, and uranium at 7 sampling locations (22-201, 22-208, 22-216, 22-221A, 22-222A, 22-223, 22-225A and 22-228A). Two sampling locations (22-224 and 22-225A) contained concentrations of cobalt greater than the Table 6 SCS and one location (22-228A) contained concentrations of uranium greater than the Table 6 SCS.

6.3.11 Areas Where Contaminants Are Present

The results of the soil and groundwater quality investigation completed as part of the Phase Two ESA identified the presence of metals in soils and groundwater with concentrations exceeding the MECP Table 1 and Table 6 SCS.

The results of the soil and groundwater investigation completed also identified the presence of one or more regulated parameters with concentrations exceeding the MECP Table 1 standards. At least one of five metals (antimony, barium, chromium, cobalt, copper, nickel and uranium) were found in exceedance in soil at BH22-208, BH22-212, BH22-221, 22-223, and BH22-224 and in groundwater at BH22-201, BH22-208, BH22-216, BH22-221, BH22-222, BH22-223, BH22-224 BH22-225, and BH22-228.

6.3.12 Distribution of Contaminants

Based on GEMTEC's understanding of the proposed development at this time, the soil around the Table 1 SCS exceedances, and halfway to the next clean sampling location, can not be used on-site during development. Should any of the on-site soil be deemed excess (cannot be re-used on-site), the volume of that excess soil will determine if additional sampling requirements for soil characterization for potential off-site re-use locations is required, as the Table 1 SCS exceedances mean the soil cannot be classified as clean fill. The locations of the soil samples with concentrations greater than Table 1 SCS are presented on the cross section on Figures 6 and 7 in Appendix A.

Additionally, groundwater contamination is present on-site due to metals concentrations greater than the Table 1 SCS in multiple locations. The groundwater was sampled from screens ranging in depth from 134.26 m asl to 122.53 m asl.

7.0 CONCLUSIONS AND RECOMMENDATIONS

Based on a review of GEMTEC's 2022 Phase One ESA findings (presented under separate cover), and completion of the Phase Two ESA investigations described herein, the following provides a summary of the conclusions regarding the proposed residential development on the western portion of the property at 141 Peter Road in Perth, Ontario.

The Site consists of the western portion of the property with municipal address 141 Peter Street, Perth, Ontario, located at the western edge of Perth, a town in Lanark County Ontario. The Site has been subject to agricultural use since the late 1800's and commercial development since sometime between 1966 and 1995. Two APECs were identified across the Site:

- **APEC 1**: Pesticides (including herbicides, fungicides and anti-fouling agents) manufacturing, processing, bulk storage and large-scale applications
- **APEC 2**: Fill of unknown origin on the Site.

The Site is currently part of a golf course and undeveloped forested land associated with municipal address 141 Peter Road. The Site has undergone no significant changes since 1987.

The geology at the Site can be generally described as 0.1 m of topsoil, underlain by native deposits of weathered silty clay crust, silty sand, and glacial till, overlying Precambrian bedrock. Groundwater flow direction within the shallow bedrock beneath the Site varies, generally following the local topography and emptying into the closest waterbody (north to the Tay River or south to Grant's Creek Wetland).

Based on the available mapping, Grants Creek Wetland, a provincially significant wetland is present within 30 m of the Site to the south and west, making the Site environmentally sensitive. Therefore, the applicable site condition standards according to O.Reg. 153/04, are Table 1: Full Depth Background Site Condition Standards.

However, should the proposed development be adjusted to be greater than 30 m of the wetland, then the applicable site condition standards would be Table 6 SCS in a shallow soil, potable groundwater condition for industrial/commercial/community land use in coarse soils.

A total of thirty soil samples (including twenty-six bulk soil samples and four duplicate samples) and sixteen groundwater samples (including two duplicate groundwater samples and two groundwater trip blanks) were collected from the sampling locations and submitted to Paracel Laboratories for analysis of selected parameters. Contaminants of potential environmental concern, as identified in the Phase One ESA (GEMTEC, 2022) included metals and inorganics, PAHs (where fill is identified only), PHCs (F1 to F4) and BTEX, and OC Pesticides.

Analytical results indicated that the Site does not currently meet the applicable MECP Table 1 SCS for soil and groundwater for metals. As such the soil exceedances identified in the five sampling locations (22-208, 22-212, 22-211, 22-223 and 22-224), and halfway to the next clean sampling location must be either removed or remediated.

Although groundwater metals concentrations exceed Table 1 SCS, based on the hydrogeological investigation completed concurrently with the Phase Two investigation, a layer of clay is present on the bottom of the wetland, significantly reducing the inflow of groundwater into the wetland. This clay layer greatly reduces the risk of contaminant migration into the wetland, despite the concentrations greater than the Table 1 SCS.

Should any of the soil on-site be deemed excess (cannot be re-used on-site), the volume of that excess soil will determine further sampling requirements for soil characterization for potential off-site re-use locations.

Recommendations

The Phase Two ESA was completed to investigate the areas of potential environmental concern identified in GEMTEC's 2022 Phase One ESA. The Phase Two ESA identified concentrations of several metal parameters in both soil and groundwater greater than the Table 1 SCS, which was the selected standards based on the proximity of the provincially significant wetland, Grants Creek Wetland to the Site. GEMTEC recommends the following actions to manage the Table 1 SCS exceedances:

- Remove the soil and groundwater exceedances from the Site;
- Remediate the soil and groundwater exceedances on the Site;
- Complete a risk assessment to determine if the parameters present in concentrations greater than the Table 1 SCS would pose an increased risk to the environment and/ or human health;
- Move the proposed development to a distance greater than 30 m from the edge of the Grants Creek Wetland.

Should the development be moved to a distance greater than 30 m from the wetland, the applicable standard would be Table 6 SCS. Although groundwater does contain concentrations of certain metals parameters greater than the Table 6 SCS, a clay layer present over the base of the wetland significantly decreases the flow of groundwater into the wetland, reducing the risk of contaminant transport into the wetland.

8.0 REFERENCES

Environmental Systems Research Institute (ESRI). 2011. ArcGIS Desktop: Release 10. Redlands, CA: Environmental Systems Research Institute.

GEMTEC. February 2022. Geotechnical Investigation, Proposed Residential Development, 141 Peter Road, Perth, Ontario. File 100737.002

GEMTEC. March 2022. Phase One Environmental Site Assessment, 141 Peter Road, Perth, Ontario. File 100737.002

Geography Network Canada (GNC). October 2004. Ontario Basic Mapping Accessed: February 2022, and March 2022. Available: http://www.geographynetwork.ca/website/obm/viewer.htm.Google Earth™ Satellite Imagery, 2022

Laboratory Services Branch, Ministry of the Environment (MOE). Protocol for Analytical Methods Used in the Assessment of properties Under Part XV.1 of the Environmental Protection Act. March 9, 2004, as amended July 1, 2011.

Ministry of Natural Resources and Forestry (MNR). Ontario Map Viewer, Official Geographic Names, Administrative Boundaries and Topography. 2020. Accessed March 2022.

Ministry of the Environment, Conservation and Parks (MECP) Table 1: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, March 2004, amended July 1, 2011. Full Depth Background Site Condition Standards for Soil for all Property Use.

Ministry of the Environment, Conservation and Parks (MECP) Table 7: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, March 2004, amended July 1, 2011. Full Depth Generic Site Condition Standards for Shallow Soils in a Non-Potable Groundwater Condition for Residential/Parkland/Institutional Property Use with Coarse Textured Soils.

Ministry of the Environment, Conservation and Parks (MECP) Table 7: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, March 2004, amended July 1, 2011. Generic Site Condition Standards for Shallow Soils in a Non-Potable Ground Water Condition for All Types of Property Use with coarse textured soils.

Ontario Ministry of the Environment and Climate Change (MOE). Guidance on sampling and analytical methods for use at contaminated sites in Ontario. Revised December 1996.

Ontario Ministry of the Environment. January 1, 2014. Ontario Regulation 153/04, Made under the Environmental Protection Act, Part XV.1 – Records of Site Condition.

Ontario Ministry of the Environment (MOE). Soil, Groundwater and Sediment Standards for use under part XV.1 of the Environmental Protection Act. April 15, 2011.

9.0 LIMITATION OF LIABILITY

This report was prepared and the work referred to within it has been undertaken by GEMTEC Consulting Engineers and Scientists Ltd for Caivan (Perth GC) Limited It is intended for the exclusive use of Caivan (Perth GC) Limited. This report may not be relied upon by any other person or entity without the express written consent of GEMTEC, and Caivan (Perth GC) Limited. 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 in this report reflect the best judgements 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. This report has been prepared for the application noted and it is based, in part, on visual observations made at the site, subsurface investigations at discrete locations and depths and laboratory analyses of specific chemical parameters and material during a specific time interval, all as described in the report. Unless otherwise stated, the findings contained in this report cannot be extrapolated or extended to previous 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.

Should new information become available during future work, including excavations, borings or other studies, GEMTEC should be requested to review the information and, if necessary, re-assess the conclusions presented herein.

10.0 CLOSURE

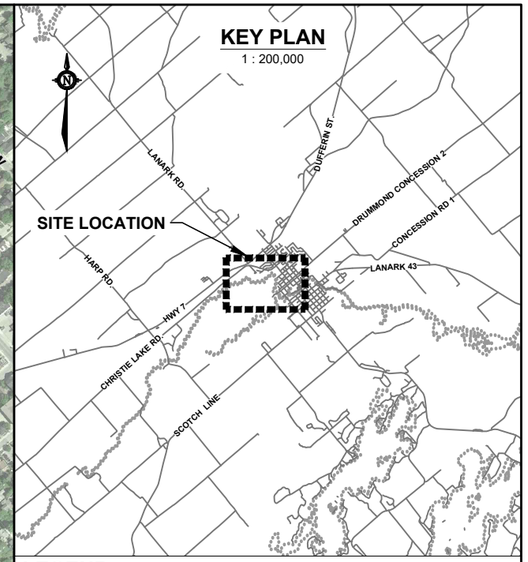
We trust this report provides sufficient information for your present purposes. If you have any questions concerning this report, please do not hesitate to contact our office.

Luca Fiorindi. B.A., Dip.
Jr. Environmental Technologist

Brenda Thom, M.SC.(Eng.), P.Eng., QP_{ESA}
Senior Environmental Engineer

APPENDIX A

Figures



LEGEND

BH/ PH/ HA # ← BOREHOLE/ PROBEHOLE/ HAND AUGERHOLE ID

XX.XX ← GROUND SURFACE ELEVATION, IN METRES GEODETIC DATUM

- **BOREHOLE LOCATION** (current investigation by GEMTEC)
- **BOREHOLE** (previous investigation by GEMTEC)
- **PROBEHOLE** (previous investigation by GEMTEC)
- **HAND AUGERHOLE** (previous investigation by GEMTEC)
- **HAND AUGER HOLE** (previous investigation by GEMTEC, 2018)
- **APPROXIMATE SITE BOUNDARY**
- **APPROXIMATE PHASE TWO ESA BOUNDARY**
- **A A' CROSS SECTION LOCATION**

Scale 1:7500

0 150 300 450m

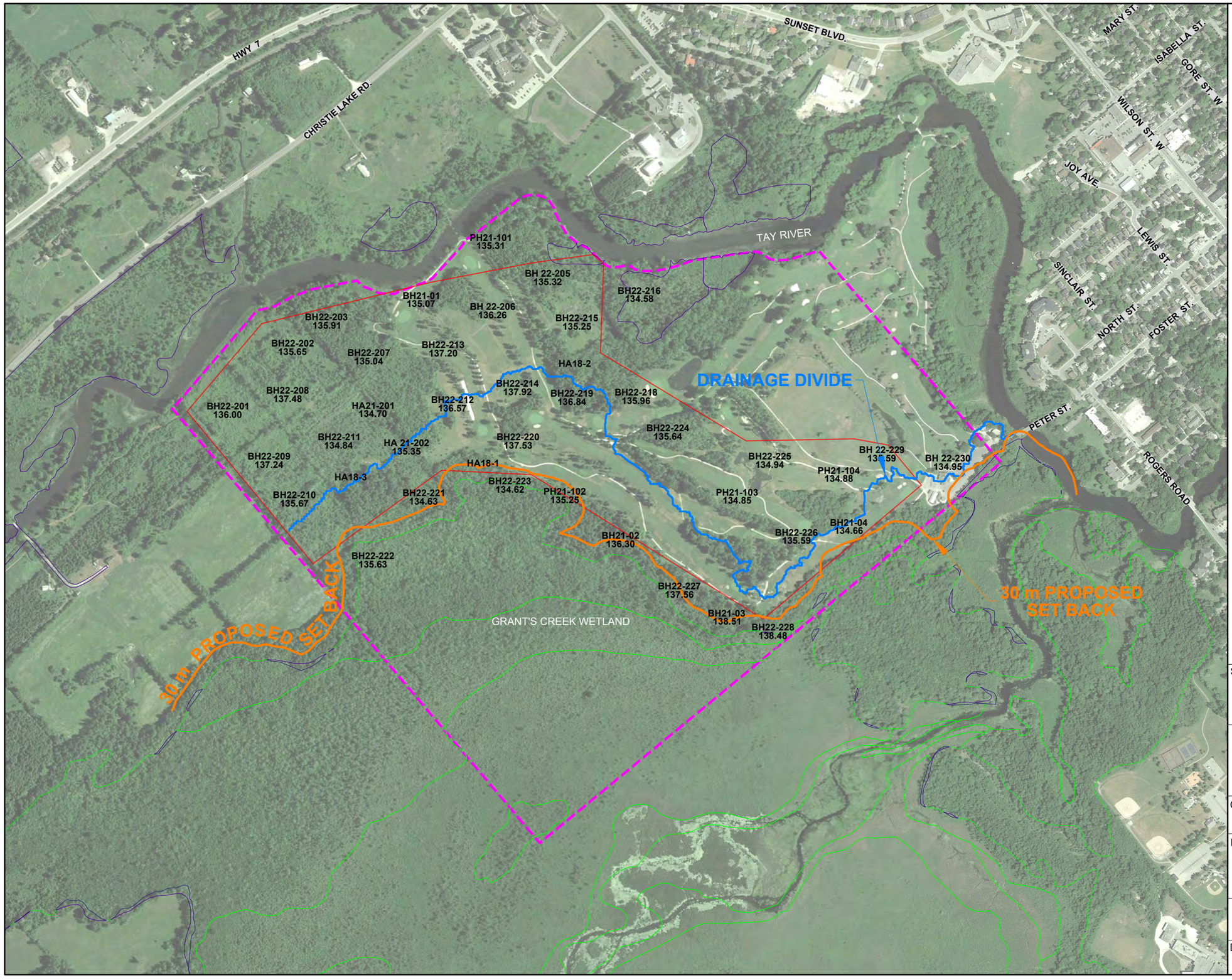
GEMTEC
Consulting Engineers and Scientists
32 Steacie Drive
Ottawa, ON K2K 2A9
Tel: (613) 836-1422
www.gemtec.ca
ottawa@gemtec.ca

Client	Project
CAIVAN (PERTH GC) LIMITED	100737.002

Location: PHASE TWO ENVIRONMENTAL SITE ASSESSMENT, PERTH GOLF COURSE, 151 PETER STREET, PERTH, ONTARIO

Drwn by	Chkd by	
S.L.	B.T.	BOREHOLE AND MONITORING WELL LOCATION PLAN

Date	Rev.	
APRIL, 2022	0	**FIGURE 1**



LEGEND

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE PHASE TWO ESA BOUNDARY
- WATERSHED DRAINAGE DIVIDE
- PROVINCIALLY EVALUATED WETLAND (ONTARIO MINISTRY OF NATURAL RESOURCES AND FORESTRY, OMNRF)
- UNEVALUATED WETLAND (ONTARIO MINISTRY OF NATURAL RESOURCES AND FORESTRY, OMNRF)

Scale 1:7500

0 150 300 450m

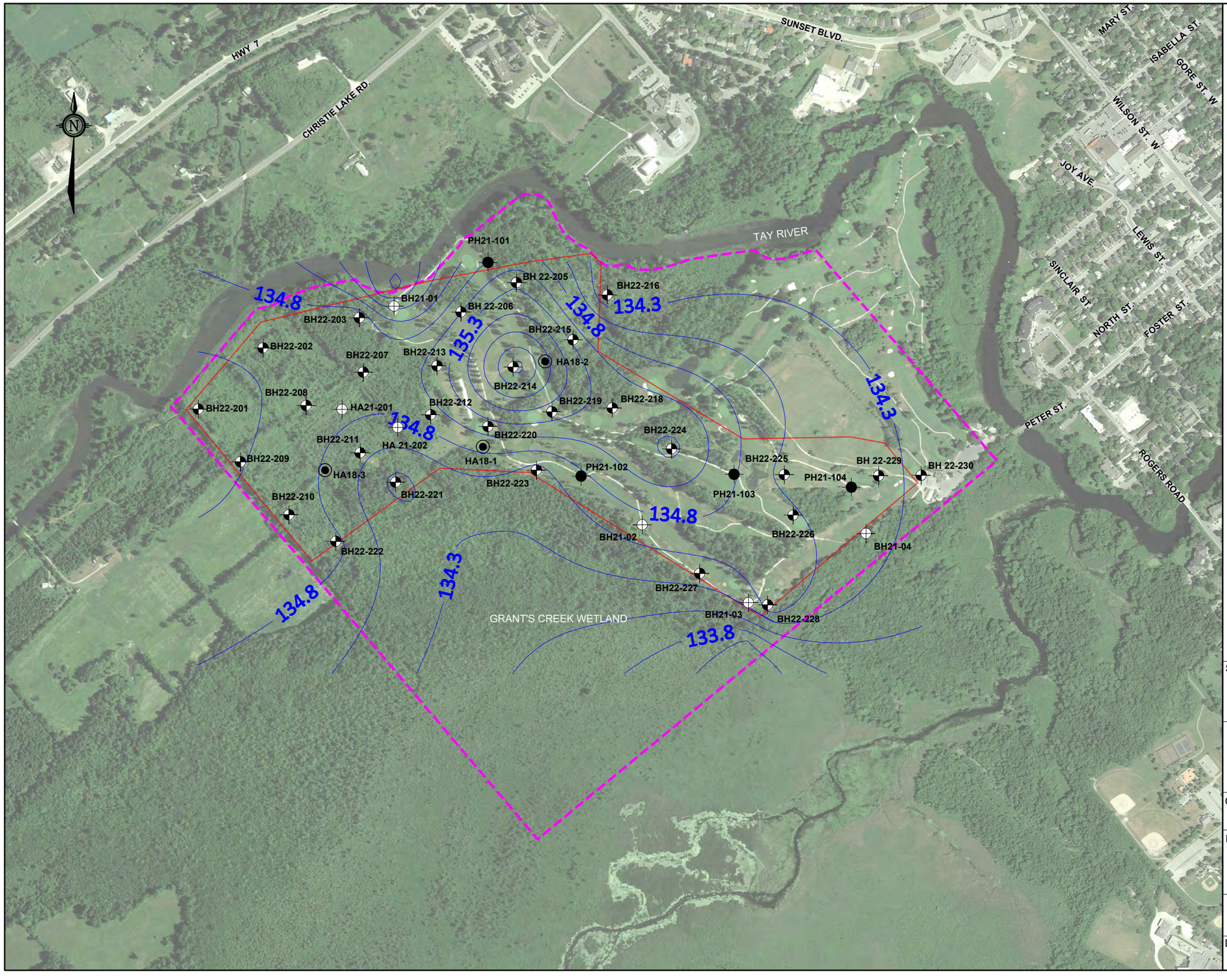
GEMTEC
CONSULTING ENGINEERS AND SCIENTISTS
32 Steacie Drive
Ottawa, ON K2K 2A9
Tel: (613) 836-1422
www.gemtec.ca
ottawa@gemtec.ca

Client	Project
CAIVAN (PERTH GC) LIMITED	100737.002

Location: PHASE TWO ENVIRONMENTAL SITE ASSESSMENT, PERTH GOLF COURSE, 151 PETER STREET, PERTH, ONTARIO

Drwn by	Chkd by	
S.L.	B.T.	PSW AND BUFFER DISTANCES

Date	Rev.	
APRIL, 2022	0	**FIGURE 2**



LEGEND

BH/ PH/ HA # ← BOREHOLE/ PROBEHOLE/ HAND AUGERHOLE ID

- **BOREHOLE LOCATION** (current investigation by GEMTEC)
- **BOREHOLE** (previous investigation by GEMTEC)
- **PROBEHOLE** (previous investigation by GEMTEC)
- **HAND AUGERHOLE** (previous investigation by GEMTEC)
- **HAND AUGER HOLE** (previous investigation by GEMTEC, 2018)
- **APPROXIMATE SITE BOUNDARY**
- **APPROXIMATE PHASE TWO ESA BOUNDARY**
- 100 WATER LEVEL CONTOUR, IN METRES

Scale 1:7500

0 150 300 450m

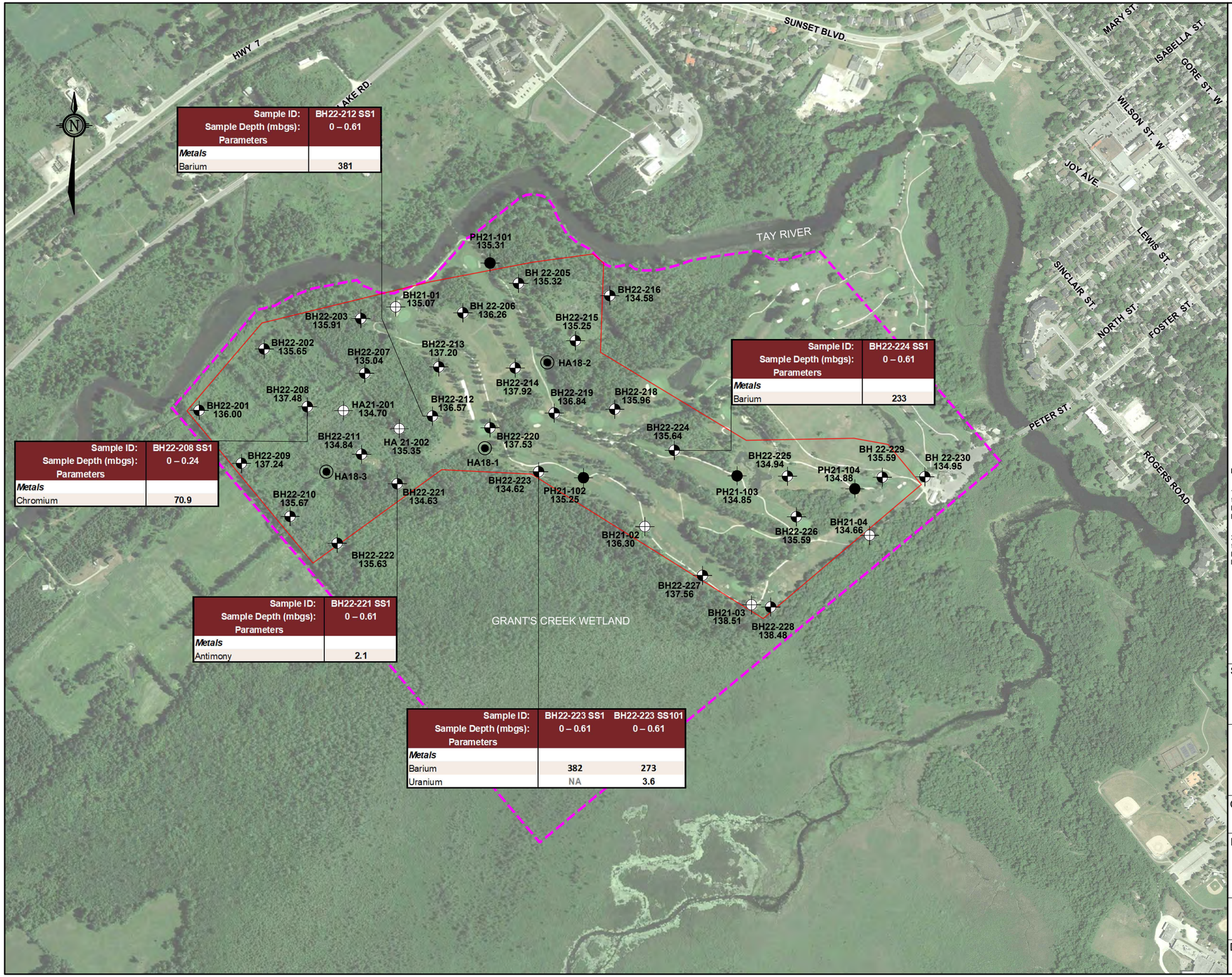
GEMTEC
Consulting Engineers and Scientists
32 Steacie Drive
Ottawa, ON K2K 2A9
Tel: (613) 836-1422
www.gemtec.ca
ottawa@gemtec.ca

Client	Project
CAIVAN (PERTH GC) LIMITED	100737.002

Location: PHASE TWO
ENVIRONMENTAL SITE ASSESSMENT
PERTH GOLF COURSE
151 PETER STREET
PERTH, ONTARIO

Drwn by	Chkd by	
S.L.	B.T.	GROUNDWATER ELEVATION CONTOURS

Date	Rev.	
APRIL, 2022	0	**FIGURE 3**



Sample ID:	BH22-212 SS1
Sample Depth (mbgs):	0 – 0.61
Parameters	
Metals	
Barium	381

Sample ID:	BH22-224 SS1
Sample Depth (mbgs):	0 – 0.61
Parameters	
Metals	
Barium	233

Sample ID:	BH22-208 SS1
Sample Depth (mbgs):	0 – 0.24
Parameters	
Metals	
Chromium	70.9

Sample ID:	BH22-221 SS1
Sample Depth (mbgs):	0 – 0.61
Parameters	
Metals	
Antimony	2.1

Sample ID:	BH22-223 SS1	BH22-223 SS101
Sample Depth (mbgs):	0 – 0.61	0 – 0.61
Parameters		
Metals		
Barium	382	273
Uranium	NA	3.6

LEGEND

BH/ PH/ HA # ← BOREHOLE/ PROBEHOLE/ HAND AUGERHOLE ID

- **BOREHOLE LOCATION** (current investigation by GEMTEC)
- **BOREHOLE** (previous investigation by GEMTEC)
- **PROBEHOLE** (previous investigation by GEMTEC)
- **HAND AUGERHOLE** (previous investigation by GEMTEC)
- **HAND AUGER HOLE** (previous investigation by GEMTEC, 2018)
- **APPROXIMATE SITE BOUNDARY**
- **APPROXIMATE PHASE TWO ESA BOUNDARY**

Parameters	MECP Table 1[1]	MECP Table 6 ICC[2]
Metals		
Antimony	1.3	40
Barium	220	670
Chromium	70	160
Uranium	2.5	33
Vanadium	86	86

Notes:

1 - MECP Table 1: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Full Depth Background Site Condition Standards for Soil for Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use.

2 - MECP Table 6: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Full Depth Generic Site Condition Standards for Shallow Soils in a Potable Groundwater Condition for Industrial/Commercial/Community Property Use with Coarse Textured Soils.

Bold - Exceeds MECP Table 1 RPI/ICC Coarse

Italics - Exceeds MECP Table 6 ICC Coarse

Scale 1:7500

0 150 300 450m

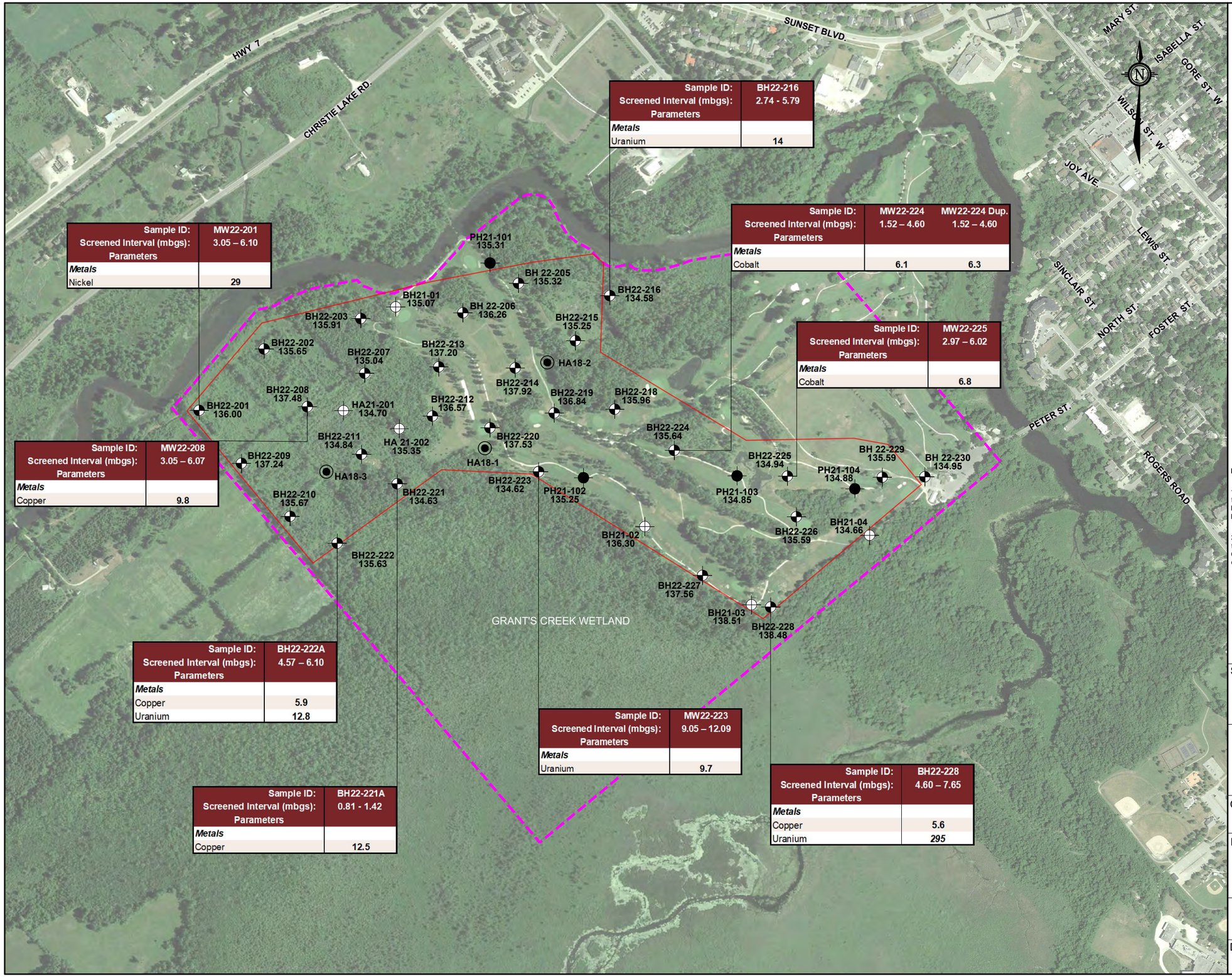
GEMTEC
Consulting Engineers and Scientists
32 Steacie Drive
Ottawa, ON K2K 2A9
Tel: (613) 836-1422
www.gemtec.ca
ottawa@gemtec.ca

Client	Project
CAIVAN (PERTH GC) LIMITED	100737.002

Location: PHASE TWO ENVIRONMENTAL SITE ASSESSMENT, PERTH GOLF COURSE, 151 PETER STREET, PERTH, ONTARIO

Drwn by	Chkd by	
S.L.	B.T.	SOIL EXCEEDANCES

Date	Rev.	
APRIL, 2022	0	**FIGURE 4**



Sample ID:	BH22-216
Screened Interval (mbgs):	2.74 - 5.79
Parameters	
Metals	
Uranium	14

Sample ID:	MW22-201
Screened Interval (mbgs):	3.05 – 6.10
Parameters	
Metals	
Nickel	29

Sample ID:	MW22-224	MW22-224 Dup.
Screened Interval (mbgs):	1.52 – 4.60	1.52 – 4.60
Parameters		
Metals		
Cobalt	6.1	6.3

Sample ID:	MW22-225
Screened Interval (mbgs):	2.97 – 6.02
Parameters	
Metals	
Cobalt	6.8

Sample ID:	MW22-208
Screened Interval (mbgs):	3.05 – 6.07
Parameters	
Metals	
Copper	9.8

Sample ID:	BH22-222A
Screened Interval (mbgs):	4.57 – 6.10
Parameters	
Metals	
Copper	5.9
Uranium	12.8

Sample ID:	MW22-223
Screened Interval (mbgs):	9.05 – 12.09
Parameters	
Metals	
Uranium	9.7

Sample ID:	BH22-221A
Screened Interval (mbgs):	0.81 - 1.42
Parameters	
Metals	
Copper	12.5

Sample ID:	BH22-228
Screened Interval (mbgs):	4.60 – 7.65
Parameters	
Metals	
Copper	5.6
Uranium	*295*

LEGEND

BH/ PH/ HA # ← BOREHOLE/ PROBEHOLE/ HAND AUGERHOLE ID

- **BOREHOLE LOCATION** (current investigation by GEMTEC)
- **BOREHOLE** (previous investigation by GEMTEC)
- **PROBEHOLE** (previous investigation by GEMTEC)
- **HAND AUGERHOLE** (previous investigation by GEMTEC)
- **HAND AUGER HOLE** (previous investigation by GEMTEC, 2018)

APPROXIMATE SITE BOUNDARY

APPROXIMATE PHASE TWO ESA BOUNDARY

Parameters	MECP Table 1[1]	MECP Table 6[2]
Metals		
Cobalt	3.8	4
Copper	5	69
Nickel	14	100
Uranium	8.9	20

Notes:

1 - MECP Table 1: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Full Depth Background Site Condition Standards for Soil for Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use.

2 - MECP Table 6: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Generic Site Condition Standards for Shallow Soils in a Potable Ground Water Condition for All Types of Property Use.

Bold - Exceeds MECP Table 1 RPI/ICC Coarse

Italics - Exceeds MECP Table 6 Potable Water Coarse

Scale 1:7500

0 150 300 450m

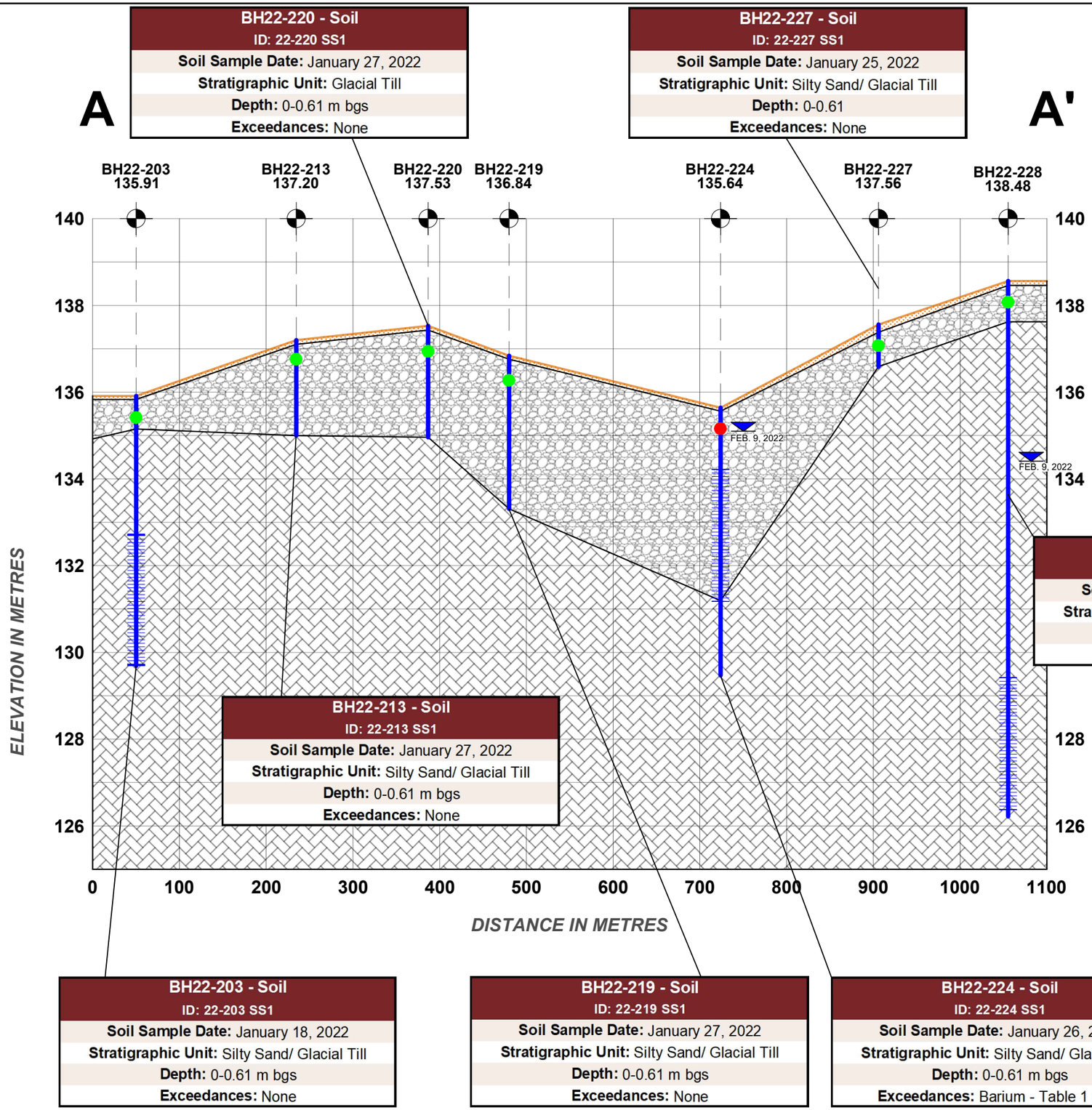
GEMTEC
Consulting Engineers and Scientists
32 Steacie Drive
Ottawa, ON K2K 2A9
Tel: (613) 836-1422
www.gemtec.ca
ottawa@gemtec.ca

Client	Project
CAIVAN (PERTH GC) LIMITED	100737.002

Location: PHASE TWO ENVIRONMENTAL SITE ASSESSMENT, PERTH GOLF COURSE, 151 PETER STREET, PERTH, ONTARIO

Drwn by	Chkd by	
S.L.	B.T.	GROUNDWATER EXCEEDANCES

Date	Rev.	
APRIL, 2022	0	**FIGURE 5**



BH22-220 - Soil
ID: 22-220 SS1
Soil Sample Date: January 27, 2022
Stratigraphic Unit: Glacial Till
Depth: 0-0.61 m bgs
Exceedances: None

BH22-227 - Soil
ID: 22-227 SS1
Soil Sample Date: January 25, 2022
Stratigraphic Unit: Silty Sand/ Glacial Till
Depth: 0-0.61
Exceedances: None

BH22-228 - Soil
ID: 22-228 SS1
Soil Sample Date: January 28, 2022
Stratigraphic Unit: Silty Sand/ Glacial Till
Depth: 0-0.61
Exceedances: None

BH22-213 - Soil
ID: 22-213 SS1
Soil Sample Date: January 27, 2022
Stratigraphic Unit: Silty Sand/ Glacial Till
Depth: 0-0.61 m bgs
Exceedances: None

BH22-203 - Soil
ID: 22-203 SS1
Soil Sample Date: January 18, 2022
Stratigraphic Unit: Silty Sand/ Glacial Till
Depth: 0-0.61 m bgs
Exceedances: None

BH22-219 - Soil
ID: 22-219 SS1
Soil Sample Date: January 27, 2022
Stratigraphic Unit: Silty Sand/ Glacial Till
Depth: 0-0.61 m bgs
Exceedances: None

BH22-224 - Soil
ID: 22-224 SS1
Soil Sample Date: January 26, 2022
Stratigraphic Unit: Silty Sand/ Glacial Till
Depth: 0-0.61 m bgs
Exceedances: Barium - Table 1 SCS

LEGEND

- **BOREHOLE LOCATION** (current investigation by GEMTEC)
- BH # — BOREHOLE ID
- XX.XX — GROUND SURFACE ELEVATION, IN METRES GEODETIC DATUM
- GROUNDWATER LEVEL (DATE: MONTH DAY, YEAR)
- TOPSOIL
- GLACIAL TILL
- PRE-CAMBRIAN IGNEOUS BEDROCK
- WELL SCREEN
- SAMPLE LOCATION (NO EXCEEDANCES)
- SAMPLE LOCATION (WITH EXCEEDANCES)

Horizontal Scale
1:5000
0 100 200 300m

Vertical Scale
1:100
0 2 4 6m

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

Client	Project
CAIVAN (PERTH GC) LIMITED	100737.002

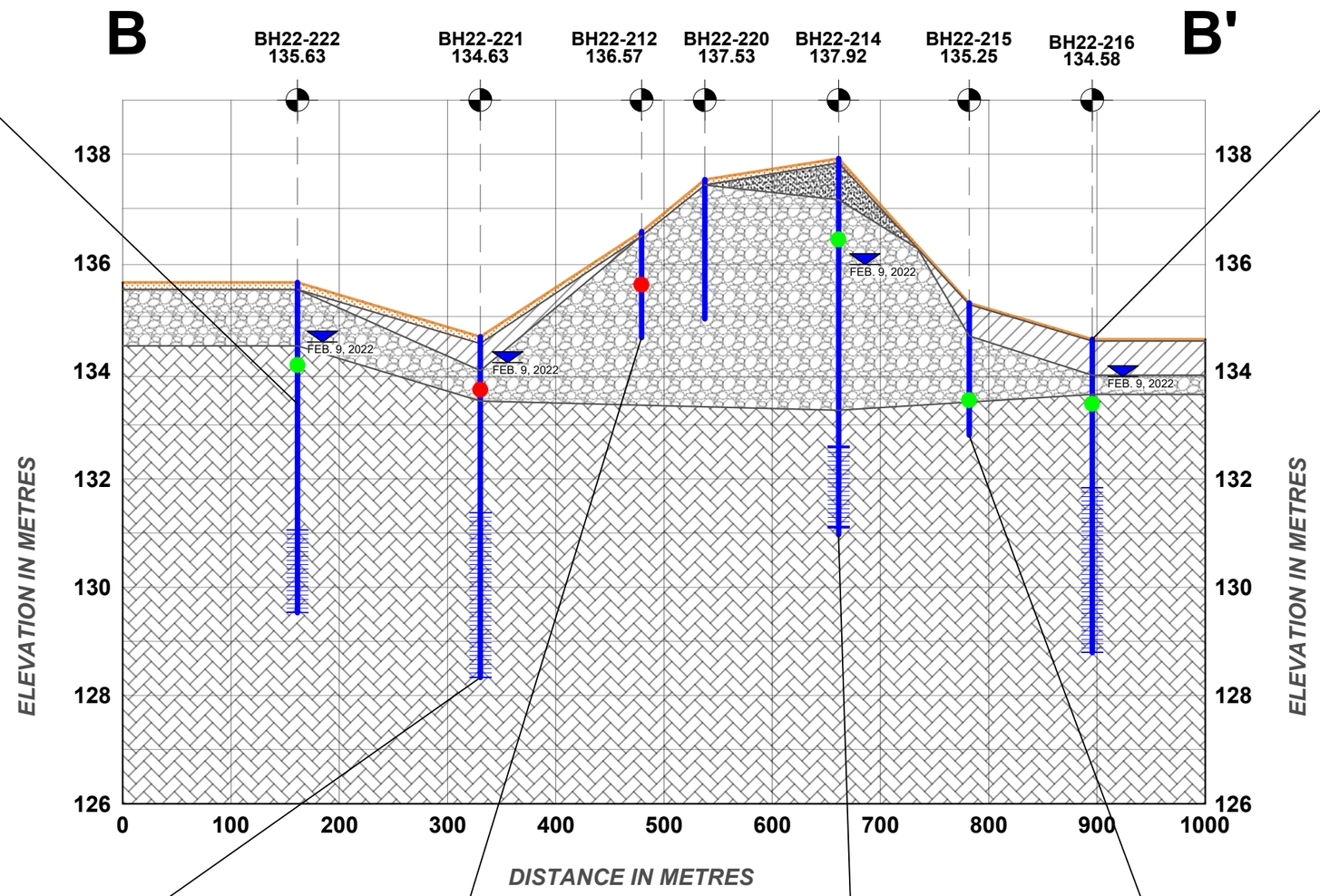
Location: PHASE TWO ENVIRONMENTAL SITE ASSESSMENT, PERTH GOLF COURSE, 151 PETER STREET, PERTH, ONTARIO

Drwn by	Chkd by	
S.L.	B.T.	CROSS-SECTION A - A' SOIL QUALITY EXCEEDANCES

Date	Rev.	
APRIL, 2022	0	**FIGURE 6**

BH22-222 - Soil
ID: 22-222 SS2
Soil Sample Date: January 13, 2022
Stratigraphic Unit: Silty Sand/ Glacial Till
Depth: 0.76-1.37 m bgs
Exceedances: None

BH22-216 - Soil
ID: 22-216 SS1
Soil Sample Date: January 6, 2022
Stratigraphic Unit: Silty Clay/ Weathered Crust
Depth: 0-0.61 m bgs
Exceedances: None



BH22-221 - Soil
ID: 22-221 SS1
Soil Sample Date: January 12, 2022
Stratigraphic Unit: Silty Clay/Weathered Crust
Depth: 0-0.61 m bgs
Exceedances: Antimony - Table 1 SCS

BH22-212 - Soil
ID: 22-212 SS1
Soil Sample Date: January 27, 2022
Stratigraphic Unit: Silty Sand/Glacial Till
Depth: 0-0.61 m bgs
Exceedances: Barium - Table 1 SCS

BH22-214 - Soil
ID: 22-214 SS2
Soil Sample Date: January 6, 2022
Stratigraphic Unit: Silty Sand/ Glacial Till
Depth: 0.76-1.37 m bgs
Exceedances: None

BH22-215 - Soil
ID: 22-215 SS3
Soil Sample Date: January 6, 2022
Stratigraphic Unit: Glacial Till
Depth: 1.52-2.13 m bgs
Exceedances: None

LEGEND

- **BOREHOLE LOCATION** (current investigation by GEMTEC)
- BH # — BOREHOLE ID
- XX.XX — GROUND SURFACE ELEVATION, IN METRES GEODETIC DATUM
- GROUNDWATER LEVEL (DATE: MONTH DAY, YEAR)
- TOPSOIL
- SILTY SAND
- SILTY CLAY
- GLACIAL TILL
- PRE-CAMBRIAN IGNEOUS BEDROCK
- WELL SCREEN
- SAMPLE LOCATION (NO EXCEEDANCES)
- SAMPLE LOCATION (WITH EXCEEDANCES)

Horizontal Scale
1:5000
0 100 200 300m

Vertical Scale
1:100
0 2 4 6m

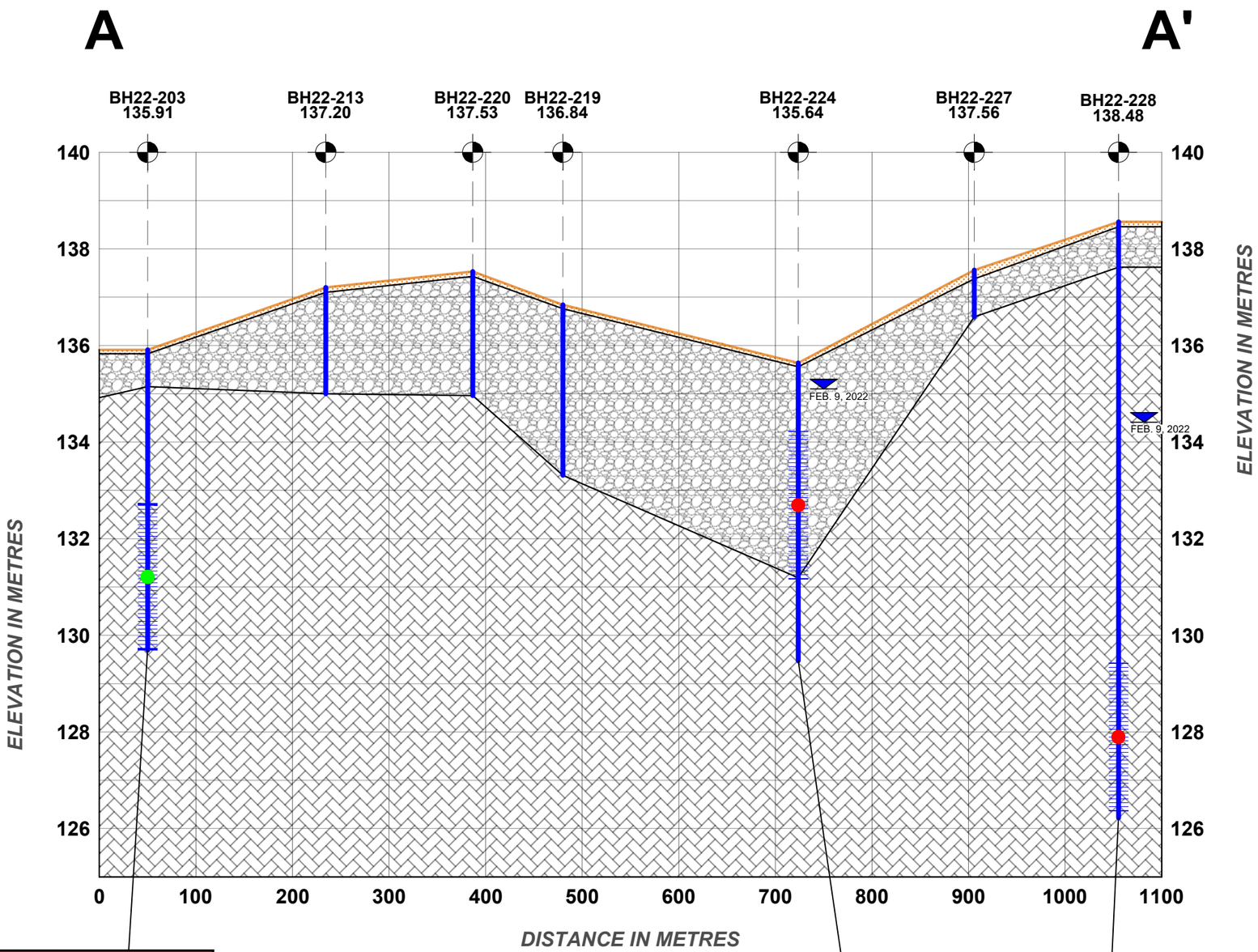
GEMTEC
Consulting Engineers and Scientists
32 Steacie Drive
Ottawa, ON K2K 2A9
Tel: (613) 836-1422
www.gemtec.ca
ottawa@gemtec.ca

Client	Project
CAIVAN (PERTH GC) LIMITED	100737.002

Location: PHASE TWO ENVIRONMENTAL SITE ASSESSMENT, PERTH GOLF COURSE, 151 PETER STREET, PERTH, ONTARIO

Drwn by	Chkd by	
S.L.	B.T.	CROSS-SECTION B - B' SOIL QUALITY EXCEEDANCES

Date	Rev.	
APRIL, 2022	0	**FIGURE 6**



BH/MW 22-203 - Groundwater
ID: BH22-203
GW Sample Date: February 8, 2022
Stratigraphic Unit: Bedrock
Screen Depth: m bgs
Exceedances: None

BH/MW 22-224 - Groundwater	BH/MW 22-224 - Groundwater
ID: BH22-224	ID: DUP 2
GW Sample Date: February 8, 2022	**GW Sample Date:** February 8, 2022
Stratigraphic Unit: Bedrock	**Stratigraphic Unit:** Bedrock
Screen Depth: 1.52 – 4.60 m bgs	**Screen Depth:** 1.52 – 4.60 m bgs
Exceedances: Cobalt - Table 1 & 6 SCS	**Exceedances:** Cobalt - Table 1 & 6 SCS

BH/MW 22-228 - Groundwater
ID: BH22-228
GW Sample Date: February 8, 2022
Stratigraphic Unit: Bedrock
Screen Depth: 4.60 – 7.65 m bgs
Exceedances: Copper, Uranium - Table 1 SCS, Uranium - Table 6 SCS

LEGEND

BOREHOLE LOCATION
(current investigation by GEMTEC)

BH # ← BOREHOLE ID
XX.XX ← GROUND SURFACE ELEVATION, IN METRES GEODETIC DATUM

GROUNDWATER LEVEL
(DATE: MONTH DAY, YEAR)

TOPSOIL

GLACIAL TILL

PRE-CAMBRIAN IGNEOUS BEDROCK

WELL SCREEN

SAMPLE LOCATION
(NO EXCEEDANCES)

SAMPLE LOCATION
(WITH EXCEEDANCES)

Horizontal Scale
1:5000
0 100 200 300m

Vertical Scale
1:100
0 2 4 6m

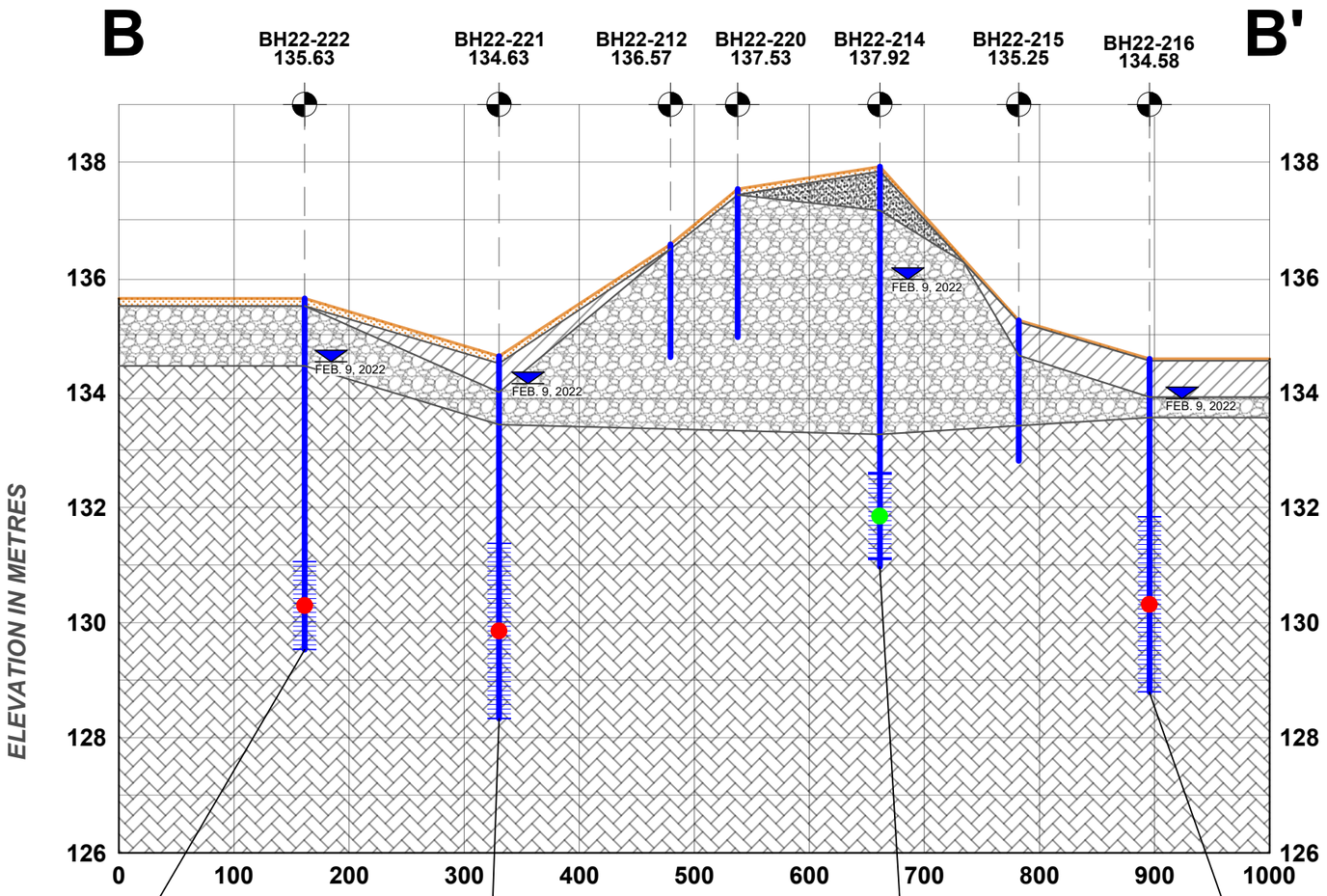
GEMTEC
Consulting Engineers and Scientists
32 Steacie Drive
Ottawa, ON K2K 2A9
Tel: (613) 836-1422
www.gemtec.ca
ottawa@gemtec.ca

Client	Project
CAIVAN (PERTH GC) LIMITED	100737.002

Location: PHASE TWO
ENVIRONMENTAL SITE ASSESSMENT
PERTH GOLF COURSE
151 PETER STREET
PERTH, ONTARIO

Drwn by	Chkd by	
S.L.	B.T.	CROSS-SECTION A - A' GROUNDWATER QUALITY EXCEEDANCES

Date	Rev.	
APRIL, 2022	0	**FIGURE 8**



BH/MW 22-222 - Groundwater
ID: BH22-222A
GW Sample Date: February 8, 2022
Stratigraphic Unit:
Screen Depth: 4.57 – 6.10 m bgs
Exceedances: Copper, Uranium **-** Table 1 SCS

BH/MW 22-221 - Groundwater
ID: BH22-221
GW Sample Date: February 8, 2022
Stratigraphic Unit: Glacial Till
Screen Depth: 0.81 - 1.42 m bgs
Exceedances: Copper **-** Table 1 SCS

BH/MW 22-214 - Groundwater
ID: BH22-214
GW Sample Date: February 8, 2022
Stratigraphic Unit: Bedrock
Screen Depth: m bgs
Exceedances: None

BH/MW 22-216 - Groundwater
ID: BH22-216
GW Sample Date: February 8, 2022
Stratigraphic Unit: Bedrock
Screen Depth: 2.74 - 5.79 m bgs
Exceedances: Uranium **-** Table 1 SCS

LEGEND

BOREHOLE LOCATION
(current investigation by GEMTEC)

BH # ← BOREHOLE ID
XX.XX ← GROUND SURFACE ELEVATION, IN METRES GEODETIC DATUM

GROUNDWATER LEVEL
(DATE: MONTH DAY, YEAR)

TOPSOIL

SILTY SAND

SILTY CLAY

GLACIAL TILL

PRE-CAMBRIAN IGNEOUS BEDROCK

WELL SCREEN

SAMPLE LOCATION
(NO EXCEEDANCES)

SAMPLE LOCATION
(WITH EXCEEDANCES)

Horizontal Scale
1:5000
0 100 200 300m

Vertical Scale
1:100
0 2 4 6m

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

Client	Project
CAIVAN (PERTH GC) LIMITED	100737.002

Location: PHASE TWO
ENVIRONMENTAL SITE ASSESSMENT
PERTH GOLF COURSE
151 PETER STREET
PERTH, ONTARIO

Drwn by	Chkd by	
S.L.	B.T.	CROSS-SECTION B - B' GROUNDWATER QUALITY EXCEEDANCES

Date	Rev.	
APRIL, 2022	0	**FIGURE 9**

APPENDIX B

Borehole and Monitoring Well Logs

RECORD OF BOREHOLE 22-201

CLIENT: Caivan Communities
PROJECT: Proposed Residential Development, Perth Golf, 141 Peter Street, Perth, Ontario
JOB#: 100737.002
LOCATION: See Site Plan, Figure 1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jan 18 2022

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
0		Ground Surface		136.00									
0	Power Auger / Hollow Stem Auger (210mm OD)	TOPSOIL Loose, brown SILTY SAND		0.10 135.24	1	SS	150	5	BTEX, OCPs, PHC F1-F4, M & I				
1	Power Auger / Hollow Stem Auger (210mm OD)	Very loose to compact, grey brown SILTY SAND, some gravel, with cobbles and boulders (GLACIAL TILL)		0.76	2	SS	305	2					Bentonite seal
2	Power Auger / Hollow Stem Auger (210mm OD)				3	SS	280	18					
3	Power Auger / Hollow Stem Auger (210mm OD)				4	SS	255	16					Filter sand TOP OF SCREEN ELEV.: 132.95 m
3	Power Auger / Hollow Stem Auger (210mm OD)	Compact to very dense, grey brown to grey SILTY SAND, some gravel, with cobbles and boulders (GLACIAL TILL)		133.10 2.90	5	SS	150	>50 for 100 mm	Groundwater : PHCs (F1 - F4), BTEX, M & I				
5	Power Auger / Hollow Stem Auger (210mm OD)				6	SS	125	>50 for 100 mm					50 millimetre well screen
6	Power Auger / Hollow Stem Auger (210mm OD)				7	SS	230	>50 for 180 mm					BOTTOM OF SCREEN ELEV.: 129.90 m
7	Diamond Rotary Core HQ (89mm OD)	Slightly weathered to fresh, fine grained, medium strong, greenish grey to pinkish grey Precambrian BEDROCK		129.57 6.43	8	RC		TCR = 98%; SCR = 89%; RQD = 89%					Bentonite
	Diamond Rotary Core HQ (89mm OD)	End of Borehole		128.53 7.47									

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEVATION (m)
Feb. 09/22	0.87 ▽	135.13
Feb. 16/22	0.81 ▼	135.19

GEMTEC
Consulting Engineers and Scientists

LOGGED: CS
CHECKED: WAM

ENV - BOREHOLE LOG 100737.002_GINT_BOREHOLE LOGS.GPJ GEMTEC 2018.GDT 4/8/22

RECORD OF BOREHOLE 22-202

CLIENT: Caivan Communities
PROJECT: Proposed Residential Development, Perth Golf, 141 Peter Street, Perth, Ontario
JOB#: 100737.002
LOCATION: See Site Plan, Figure 1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jan 14 2022

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		Ground Surface		135.65									
0	Power Auger / Hollow Stem Auger (210mm OD)	TOPSOIL		0.10									
		Very loose, brown SILTY SAND, some gravel, with cobbles and boulders (GLACIAL TILL)			1	SS	150	2		H - 20, I - 0			
1					2	SS	255	2		H - 0, I - 0			
				134.13									
		Compact to very dense, grey SILTY SAND, some clay, trace gravel, with cobbles and boulders (GLACIAL TILL)		1.52	3	SS	455	18	BTEX, PHCs (F1-F4), M & I	H - 0, I - 0			
2					4	SS	75	>50 for 130 mm		H - 0, I - 0			
3					5	SS	255	>50 for 130 mm		H - 0, I - 0			
4					6	SS	280	>50 for 100 mm		H - 45, I - 0			Native backfill
					7	SS	150	>50 for 100 mm		H - 30, I - 0			
5					8	SS	75	>50 for 150 mm		H - 0, I - 0			
6					9	SS	205	>50 for 75 mm		H - 5, I - 0			
7					10	SS	180	>50 for 75 mm		H - 0, I - 0			
		End of Borehole Auger Refusal		128.16 7.49									

GEMTEC
Consulting Engineers and Scientists

LOGGED: CS
CHECKED: WAM

ENV - BOREHOLE LOG 100737.002_GINT_BOREHOLE LOGS.GPJ GEMTEC 2018.GDT 4/8/22

RECORD OF BOREHOLE 22-203A

CLIENT: Caivan Communities
PROJECT: Proposed Residential Development, Perth Golf, 141 Peter Street, Perth, Ontario
JOB#: 100737.002
LOCATION: See Site Plan, Figure 1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jan 20 2022

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		Ground Surface		135.91									
0	Wash Casing HW (114mm OD)	TOPSOIL		0.08									
		Brown SILTY SAND, some gravel, with cobbles and boulders (GLACIAL TILL)			1	SS	330	7	BTEX, PHCs (F1-F4), M & I	H - 0, I - 0			
				135.15									
		Slightly weathered to fresh, fine grained, very strong, greenish grey to pink Precambrian BEDROCK		0.76	2	SS	75	>50 for 75 mm					
1					1	RC							
	Diamond Rotary Core HQ (89mm OD)				2	RC		TCR = 100%; SCR = 87%; RQD = 0%					Bentonite seal
2								TCR = 100%; SCR = 91%; RQD = 91%					
3					3	RC		TCR = 100%; SCR = 87%; RQD = 95%					Filter sand TOP OF SCREEN ELEV.: 132.73 m
4													50 millimetre well screen
5					4	RC		TCR = 98%; SCR = 60%; RQD = 60%	Groundwater : PHCs (F1 - F4), BTEX, M & I				
6					5	RC		TCR = 100%; SCR = 100%; RQD = 88%					
				129.69									BOTTOM OF SCREEN ELEV.: 129.69 m
		End of Borehole		6.22									

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEVATION (m)
Feb. 09/22	1.24 ▽	134.67
Feb. 16/22	1.14 ▼	134.77

GEMTEC
Consulting Engineers and Scientists

LOGGED: BWW
CHECKED: WAM

ENV - BOREHOLE LOG 100737.002_GINT_BOREHOLE LOGS.GPJ GEMTEC 2018.GDT 4/8/22

RECORD OF BOREHOLE 22-205

CLIENT: Caivan Communities
PROJECT: Proposed Residential Development, Perth Golf, 141 Peter Street, Perth, Ontario
JOB#: 100737.002
LOCATION: See Site Plan, Figure 1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jan 10 2022

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
0	Power Auger / Hollow Stem Auger (210mm OD)	Ground Surface		135.32									
		TOPSOIL											
		Stiff to very stiff, grey brown SILTY CLAY (WEATHERED CRUST)		0.10	1	SS	355	4	BTEX, PHCs (F1-F4), M & I	H - 0, I - 0			Bentonite seal
				134.56									
1		Compact to very dense, grey SILTY SAND, some gravel, with cobbles and boulders (GLACIAL TILL)		0.76	2	SS	100	20					Filter sand
					3	SS	510	20		H - 0, I - 0			
2													Bentonite seal
					4	SS	405	26		H - 5, I - 0			
3													Filter sand
					5	SS	455	81		H - 10, I - 0			TOP OF SCREEN ELEV.: 132.22 m
4					6	SS	455	84		H - 10, I - 0			
					7	SS	455	77	Groundwater : PHCs (F1 – F4), BTEX, M & I	H - 0, I - 0			50 millimetre well screen
5					8	SS	510	82		H - 5, I - 0			
6				129.17	9	SS	50	>50 for 50 mm		H - 0, I - 0			BOTTOM OF SCREEN ELEV.: 129.17 m
		End of Borehole Auger Refusal		6.15									

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEVATION (m)
Feb. 09/22	0.45 ▽	134.87
Feb. 16/22	0.34 ▼	134.98

GEMTEC
Consulting Engineers and Scientists

LOGGED: CS/ML
CHECKED: WAM

ENV - BOREHOLE LOG 100737.002_GINT_BOREHOLE LOGS.GPJ GEMTEC 2018.GDT 4/8/22

RECORD OF BOREHOLE 22-206

CLIENT: Caivan Communities
PROJECT: Proposed Residential Development, Perth Golf, 141 Peter Street, Perth, Ontario
JOB#: 100737.002
LOCATION: See Site Plan, Figure 1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jan 20 2022

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
0		Ground Surface		136.26									
0	Power Auger / Hollow Stem Auger (210mm OD)	Very loose to loose, dark brown to brown silty sand, some gravel (FILL MATERIAL)			1	SS	330	4	BTEX, PHCs (F1-F4), M & I, PAHs, OCPs				
				135.50									
1		Loose to compact, grey brown SILTY SAND, trace to some gravel, with cobbles and boulders (GLACIAL TILL)		0.76	2	SS	455	5	BTEX, PHCs (F1-F4), M & I, OCPs				
2					3	SS	355	10					
				133.97									
		Very dense, grey brown to grey SILTY SAND, some gravel, with cobbles and boulders (GLACIAL TILL)		2.29	4	SS	610	57					
3					5	SS	405	>50 for 130 mm					
4	Wash Casing / HW (114mm OD)				6	RC	150	DD					Native backfill
					7	SS	50	>50					
5					8	RC	255	for 75 mm					
					9	RC	150	DD					
6					10	RC	75	DD					
					11	SS	125	>50 for 50 mm					
7					12	RC	75	DD					
					13	SS	150	>50 for 75 mm					
				128.28									
		End of Borehole Sampler Refusal		7.98									

GEMTEC
Consulting Engineers and Scientists

LOGGED: BWW/CS
CHECKED: WAM

RECORD OF BOREHOLE 22-207

CLIENT: Caivan Communities
PROJECT: Proposed Residential Development, Perth Golf, 141 Peter Street, Perth, Ontario
JOB#: 100737.002
LOCATION: See Site Plan, Figure 1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jan 12 2022

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		Ground Surface		135.04									
0	Power Auger / Hollow Stem Auger (210mm OD)	TOPSOIL		134.91									
		Stiff to very stiff, grey brown SILTY CLAY (WEATHERED CRUST)		0.13	1	SS	100	9		H - 0, I - 0			
				134.28									
1		Loose to very dense, brown SILTY SAND, some clay and gravel, with cobbles and boulders (GLACIAL TILL)		0.76	2	SS	510	8	BTEX, PHCs (F1-F4), M & I	H - 0, I - 0			
					3	SS	455	13		H - 0, I - 0			Native backfill
2					4	SS	50	10		H - 0, I - 0			
3					5	SS	180	>50 for 50 mm		H - 0, I - 0			
		End of Borehole Auger Refusal		131.69 3.35									

GEMTEC
Consulting Engineers and Scientists

LOGGED: CS
CHECKED: WAM

ENV - BOREHOLE LOG 100737.002_GINT_BOREHOLE LOGS.GPJ GEMTEC 2018.GDT 4/8/22

RECORD OF BOREHOLE 22-208

CLIENT: Caivan Communities
PROJECT: Proposed Residential Development, Perth Golf, 141 Peter Street, Perth, Ontario
JOB#: 100737.002
LOCATION: See Site Plan, Figure 1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jan 12 2022

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
0	Power Auger (210mm OD)	Ground Surface		137.48									
		TOPSOIL		0.08	1	SS	100	>50	BTEX, PHCs (F1-F4), M & I	H - 0, I - 0			
		Very dense, brown SILTY SAND, with organics		137.18									
		Slightly weathered to fresh, fine grained, very strong, pinkish grey Precambrian BEDROCK		0.30									
1	Hollow Stem Auger				2	RC		TCR = 100%; SCR = 63%; RQD = 67%					Bentonite seal
2	Diamond Rotary Core HQ (89mm OD)				3	RC		TCR = 95%; SCR = 43%; RQD = 59%					Filter sand
3													TOP OF SCREEN ELEV.: 134.46 m
4					4	RC		TCR = 100%; SCR = 86%; RQD = 86%	Groundwater : PHCs (F1 – F4), BTEX, M & I				
5					5	RC		TCR = 100%; SCR = 96%; RQD = 96%					50 millimetre well screen
6		End of Borehole		131.41 6.07									BOTTOM OF SCREEN ELEV.: 131.41 m

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEVATION (m)
Feb. 09/22	2.71 ▽	134.77
Feb. 16/22	2.70 ▼	134.78

GEMTEC
Consulting Engineers and Scientists

LOGGED: CS
CHECKED: WAM

ENV - BOREHOLE LOG 100737.002_GINT_BOREHOLE LOGS.GPJ GEMTEC 2018.GDT 4/8/22

RECORD OF BOREHOLE 22-209

CLIENT: Caivan Communities
PROJECT: Proposed Residential Development, Perth Golf, 141 Peter Street, Perth, Ontario
JOB#: 100737.002
LOCATION: See Site Plan, Figure 1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jan 14 2022

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		Ground Surface		137.24									
0	Power Auger / Hollow Stem Auger (210mm OD)	TOPSOIL		137.09									
		Loose to compact, brown SILTY SAND, trace to some gravel, with cobbles and boulders (GLACIAL TILL)		0.15	1	SS	355	8	BTEX, PHCs (F1-F4), M & I	H - 30, I - 0			Native backfill
1					2	SS	330	12		H - 30, I - 0			
		End of Borehole Auger Refusal		135.97 1.27									

GEMTEC
Consulting Engineers and Scientists

LOGGED: CS
CHECKED: WAM

ENV - BOREHOLE LOG 100737.002_GINT_BOREHOLE LOGS.GPJ GEMTEC 2018.GDT 4/8/22

RECORD OF BOREHOLE 22-210

CLIENT: Caivan Communities
PROJECT: Proposed Residential Development, Perth Golf, 141 Peter Street, Perth, Ontario
JOB#: 100737.002
LOCATION: See Site Plan, Figure 1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jan 14 2022

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		Ground Surface		135.67									
0	Power Auger / Hollow Stem Auger (210mm OD)	TOPSOIL Very loose, brown SILTY SAND, trace to some gravel, with cobbles and boulders (GLACIAL TILL)		0.10	1	SS	150	3		H - 30, I - 0			
1					2	SS	125	3	BTEX, PHCs (F1-F4), M & I	H - 40, I - 0			
2					3	SS	355	2		H - 40, I - 0			Native backfill
					4	SS	405	1		H - 40, I - 0			
3					5	SS	50	>50 for 100 mm		H - 35, I - 0			
		End of Borehole Auger Refusal		132.47 3.20									

GEMTEC
Consulting Engineers and Scientists

LOGGED: CS
CHECKED: WAM

ENV - BOREHOLE LOG 100737.002_GINT_BOREHOLE LOGS.GPJ GEMTEC 2018.GDT 4/8/22

RECORD OF BOREHOLE 22-212

CLIENT: Caivan Communities
PROJECT: Proposed Residential Development, Perth Golf, 141 Peter Street, Perth, Ontario
JOB#: 100737.002
LOCATION: See Site Plan, Figure 1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jan 11 2022

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		Ground Surface		136.57									
0	Power Auger / Hollow Stem Auger (210mm OD)	TOPSOIL Very loose, brown SILTY SAND, some gravel, with cobbles and boulders (GLACIAL TILL)		0.08 135.96	1	SS	430	3	BTEX, PHCs (F1-F4), M & I, OCPs	H - 0, I - 0			
1		Dense, brown to grey SILTY SAND, some gravel, with cobbles and boulders (GLACIAL TILL)		0.61	2	SS	535	34		H - 0, I - 0			Native backfill
					3	SS	510	45		H - 0, I - 0			
		End of Borehole Auger Refusal		134.61 1.96									

GEMTEC
Consulting Engineers and Scientists

LOGGED: CS
CHECKED: WAM

ENV - BOREHOLE LOG 100737.002_GINT_BOREHOLE LOGS.GPJ GEMTEC 2018.GDT 4/8/22

RECORD OF BOREHOLE 22-213

CLIENT: Caivan Communities
PROJECT: Proposed Residential Development, Perth Golf, 141 Peter Street, Perth, Ontario
JOB#: 100737.002
LOCATION: See Site Plan, Figure 1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jan 11 2022

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	SAMPLE DATA: TYPE	SAMPLE DATA: RECOVERY (mm)	SAMPLE DATA: BLOWS/0.3m	SAMPLE DATA: LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		Ground Surface		137.20									
0	Power Auger / Hollow Stem Auger (210mm OD)	TOPSOIL		0.10									
		Loose to very dense, brown SILTY SAND, some gravel, with cobbles and boulders (GLACIAL TILL)			1	SS	305	8	BTEX, PHCs (F1-F4), M & I	H - 0, I - 0			
1					2	SS	50	6		H - 0, I - 0			Native backfill
					3	SS	330	>50 for 75 mm		H - 0, I - 0			
2				134.99									
		End of Borehole Auger Refusal		2.21									

LOGGED: CS/ML
CHECKED: WAM

GEMTEC
Consulting Engineers and Scientists

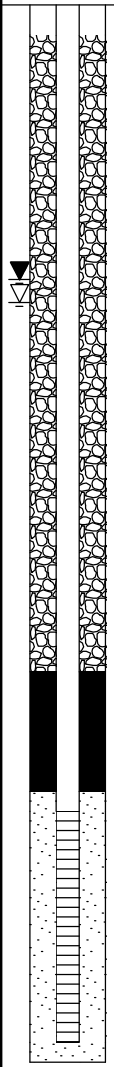
ENV - BOREHOLE LOG 100737.002_GINT_BOREHOLE LOGS.GPJ GEMTEC 2018.GDT 4/8/22

RECORD OF BOREHOLE 22-214

CLIENT: Caivan Communities
PROJECT: Proposed Residential Development, Perth Golf, 141 Peter Street, Perth, Ontario
JOB#: 100737.002
LOCATION: See Site Plan, Figure 1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jan 5 2022

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)
		Ground Surface		137.92								
0	Power Auger / Hollow Stem Auger (210mm OD)	TOPSOIL Brown SILTY SAND		0.08	1	SS	480	8				
				137.16								
1		Loose, grey brown to grey SILTY SAND, some gravel, with cobbles and boulders (GLACIAL TILL)		0.76	2	SS	305	7	BTEX, PHCs (F1-F4), M & I			
2					3	SS	430	9				
				135.63								
		Compact to very dense, grey brown to grey SILTY SAND, some gravel, with cobbles and boulders (GLACIAL TILL)		2.29	4	SS	455	29				
3					5	SS	280	59				
4					6	SS	535	68				
					7	SS	180	>50 for 50 mm				
				133.27								
5	Diamond Rotary Core / HQ (89mm OD)	Slightly weathered to fresh, fine grained, very strong, red to grey Precambrian BEDROCK		4.65	8	SS		TCR = 100%; SCR = 84%; RQD = 68%				
6					9	SS		TCR = 84%; SCR = 64%; RQD = 75%	Groundwater : PHCs (F1 – F4), BTEX, M & I, OCPs			
				130.96								
		End of Borehole		6.96								



GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEVATION (m)
Feb. 09/22	1.96 ▽	135.96
Feb. 16/22	1.81 ▼	136.11

GEMTEC
Consulting Engineers and Scientists

LOGGED: CS
CHECKED: WAM

ENV - BOREHOLE LOG 100737.002_GINT_BOREHOLE LOGS.GPJ GEMTEC 2018.GDT 4/8/22

RECORD OF BOREHOLE 22-215

CLIENT: Caivan Communities
PROJECT: Proposed Residential Development, Perth Golf, 141 Peter Street, Perth, Ontario
JOB#: 100737.002
LOCATION: See Site Plan, Figure 1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jan 6 2022

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		Ground Surface		135.25									
0	Power Auger / Hollow Stem Auger (108mm OD)	TOPSOIL		0.05									
		Stiff to very stiff, grey brown SILTY CLAY (WEATHERED CRUST)		134.64	1	SS	230	4		H - 0, I - 0			
1		Very loose, brown SILTY SAND, some gravel, with cobbles and boulders (GLACIAL TILL)		0.61	2	SS	405	3		H - 5, I - 0			Native backfill
		Dense to very dense, some gravel, with cobbles and boulders (GLACIAL TILL)		133.88 1.37	3	SS	455	35	BTEX, PHCs (F1-F4), M & I	H - 20, I - 0			
2					4	SS	75	>50 for 150 mm		H - 0, I - 0			
		End of Borehole Auger Refusal		132.81 2.44									

GEMTEC
Consulting Engineers and Scientists

LOGGED: CS
CHECKED: WAM

ENV - BOREHOLE LOG 100737.002_GINT_BOREHOLE LOGS.GPJ GEMTEC 2018.GDT 4/8/22

RECORD OF BOREHOLE 22-216

CLIENT: Caivan Communities
PROJECT: Proposed Residential Development, Perth Golf, 141 Peter Street, Perth, Ontario
JOB#: 100737.002
LOCATION: See Site Plan, Figure 1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jan 6 2022

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
0	Power Auger Hollow Stem Auger (210mm OD)	Ground Surface		134.58									
		TOPSOIL		0.03									
		Stiff to very stiff, grey brown SILTY CLAY (WEATHERED CRUST)		133.97	1	SS	405	3	BTEX, PHCs (F1-F4), M & I	H - 0, I - 0			
		Very loose, brown SILTY SAND, some gravel, with cobbles and boulders (GLACIAL TILL)		0.61 133.56	2	SS	50	1		H - 0, I - 0			
1	Diamond Rotary Core HQ (89mm OD)	Slightly weathered to fresh, fine grained, very strong, greenish grey to pink Precambrian BEDROCK		1.02	3	RC		TCR = 100%; SCR = 0%; RQD = 57%					Bentonite seal
2					4	RC		TCR = 94%; SCR = 69%; RQD = 74%					Filter sand TOP OF SCREEN ELEV.: 131.84 m
3					5	RC		TCR = 100%; SCR = 96%; RQD = 96%	Groundwater : PHCs (F1 – F4), BTEX, M & I				
4					6	RC		TCR = 95%; SCR = 88%; RQD = 88%					50 millimetre well screen
5		End of Borehole		128.79 5.79									BOTTOM OF SCREEN ELEV.: 128.79 m

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEVATION (m)
Feb. 09/22	0.69 ▽	133.89
Feb. 16/22	0.73 ▼	133.85

GEMTEC
Consulting Engineers and Scientists

LOGGED: CS/ML
CHECKED: WAM

ENV - BOREHOLE LOG 100737.002_GINT_BOREHOLE LOGS.GPJ GEMTEC 2018.GDT 4/8/22

RECORD OF BOREHOLE 22-219

CLIENT: Caivan Communities
PROJECT: Proposed Residential Development, Perth Golf, 141 Peter Street, Perth, Ontario
JOB#: 100737.002
LOCATION: See Site Plan, Figure 1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jan 5 2022

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		Ground Surface		136.84									
0	Power Auger / Hollow Stem Auger (210mm OD)	TOPSOIL		0.08									
		Loose to compact, grey brown SILTY SAND, some gravel, with cobbles and boulders (GLACIAL TILL)			1	SS	180	5	BTEX, PHCs (F1-F4), M & I, OCPs				
1					2	SS	230	20					
				135.32									
		Compact to very dense, grey SILTY SAND, some gravel, with cobbles and boulders (GLACIAL TILL)		1.52	3	SS	280	19					Native backfill
2					4	SS	455	65					
3					5	SS	405	84					
				133.31									
		End of Borehole Auger Refusal		3.53									

GEMTEC
Consulting Engineers and Scientists

LOGGED: CS
CHECKED: WAM

RECORD OF BOREHOLE 22-220

CLIENT: Caivan Communities
PROJECT: Proposed Residential Development, Perth Golf, 141 Peter Street, Perth, Ontario
JOB#: 100737.002
LOCATION: See Site Plan, Figure 1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jan 7 2022

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		Ground Surface		137.53									
0	Power Auger / Hollow Stem Auger (210mm OD)	TOPSOIL		0.10									
		Loose, brown SILTY SAND, trace gravel, with cobbles and boulders (GLACIAL TILL)			1	SS	455	9	BTEX, PHCs (F1-F4), M & I	H - 0, I - 0			
1					2	SS	480	9		H - 115, I - 0			Native backfill
				136.01									
		Loose to very dense, brown SILTY CLAYEY SAND, trace gravel, with cobbles and boulders (GLACIAL TILL)		1.52	3	SS	405	5		H - 0, I - 0			
2					4	SS	100	>50 for 100 mm		H - 0, I - 0			
		End of Borehole Auger Refusal		134.96 2.57									

GEMTEC
Consulting Engineers and Scientists

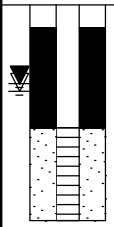
LOGGED: CS/ML
CHECKED: WAM

RECORD OF BOREHOLE 22-221A

CLIENT: Caivan Communities
PROJECT: Proposed Residential Development, Perth Golf, 141 Peter Street, Perth, Ontario
JOB#: 100737.002
LOCATION: See Site Plan, Figure 1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jan 12 2022

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		Ground Surface		134.72									
0	Power Auger Hollow Stem Auger (210mm OD)	TOPSOIL		134.59									
		Stiff to very stiff, grey brown SILTY CLAY (WEATHERED CRUST)		0.13	1	SS	255	2	BTEX, PHCs (F1-F4), M & I	H - 0, I - 0			
				134.11									
1		Very dense, brown SILTY SAND, some gravel, with cobbles and boulders (GLACIAL TILL)		0.61	2	SS	75	>50	Groundwater : PHCs (F1 - F4), BTEX, M & I	H - 0, I - 0			
					3	RC		TCR = 50%; SCR = 50%; RQD = 50%					
					4	RC		TCR = 97%; SCR = 85%; RQD = 88%					
					5	RC		TCR = 100%; SCR = 93%; RQD = 95%					
					6	RC		TCR = 100%; SCR = 95%; RQD = 91%					
					7	RC		TCR = 100%; SCR = 100%; RQD = 100%					
		End of Borehole Soil stratigraphy from 0.00 to 1.42 metres inferred from Borehole 22-221		133.30 1.42									



Bentonite seal

TOP OF SCREEN ELEV.: 133.91 m
50 millimetre well screen

BOTTOM OF SCREEN ELEV.: 133.30 m

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEVATION (m)
Feb. 09/22	0.57 ▽	134.15
Feb. 16/22	0.52 ▼	134.20

GEMTEC
Consulting Engineers and Scientists

LOGGED: CS
CHECKED: WAM

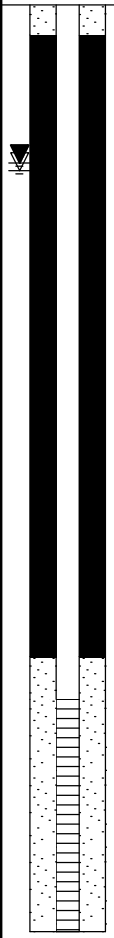
ENV - BOREHOLE LOG 100737.002_GINT_BOREHOLE LOGS.GPJ GEMTEC 2018.GDT 4/8/22

RECORD OF BOREHOLE 22-222

CLIENT: Caivan Communities
PROJECT: Proposed Residential Development, Perth Golf, 141 Peter Street, Perth, Ontario
JOB#: 100737.002
LOCATION: See Site Plan, Figure 1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jan 13 2022

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
0	Power Auger Hollow Stem Auger (210mm OD)	Ground Surface		135.63									
		TOPSOIL		0.10									
		Loose to very loose, brown SILTY SAND, some gravel, with cobbles and boulders (GLACIAL TILL)			1	SS	150	9					
1					2	SS	380	3	BTEX, PHCs (F1-F4), M & I				
				134.46									
		Slightly weathered to fresh, fine grained, very strong, light grey to pinkish grey Precambrian BEDROCK		1.17	3	RC		TCR = 69%; SCR = 44%; RQD = 25%					
2	Diamond Rotary Core HQ (89mm OD)				4	RC		TCR = 100%; SCR = 96%; RQD = 86%					
3													
				132.05									
		Slightly weathered to fresh, fine grained, very strong, greyish pink to light pink Precambrian BEDROCK		3.58	5	RC		TCR = 100%; SCR = 93%; RQD = 93%					
4													
5					6	RC		TCR = 98%; SCR = 51%; RQD = 71%					
					7	RC			Groundwater : PHCs (F1 - F4), BTEX, M & I				
6				129.53									
		End of Borehole		6.10				TCR = 100%; SCR = 6%; RQD = 0%					



GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEVATION (m)
Feb. 09/22	1.09	134.54
Feb. 16/22	1.04	134.59

GEMTEC
Consulting Engineers and Scientists

LOGGED: CS
CHECKED: WAM

ENV - BOREHOLE LOG 100737.002_GINT_BOREHOLE LOGS.GPJ GEMTEC 2018.GDT 4/8/22

RECORD OF BOREHOLE 22-223

CLIENT: Caivan Communities
PROJECT: Proposed Residential Development, Perth Golf, 141 Peter Street, Perth, Ontario
JOB#: 100737.002
LOCATION: See Site Plan, Figure 1

SHEET: 1 OF 2
DATUM: CGVD28
BORING DATE: Jan 25 2022

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		Ground Surface		134.62									
0	Power Auger Hollow Stem Auger (210mm OD)	TOPSOIL		134.47									
		Stiff to very stiff, grey brown SILTY CLAY (WEATHERED CRUST)		0.15	1	SS	405	8	BTEX, PHCs (F1-F4), M & I, OCPs	H - 0, I - 0			
1					2	SS	355	8		H - 0, I - 0			
				133.33									
	Diamond Rotary Core HQ (89mm OD)	Slightly weathered to fresh, fine grained, pink and grey Precambrian BEDROCK		1.29	3	RC		TCR = 83%; SCR = 83%; RQD = 0%					
2					4	RC		TCR = 100%; SCR = 100%; RQD = 100%					
3					5	RC		TCR = 100%; SCR = 93%; RQD = 90%					
4					6	RC		TCR = 97%; SCR = 97%; RQD = 97%					Bentonite seal
5					7	RC		TCR = 100%; SCR = 97%; RQD = 97%					
6					8	RC		TCR = 85%; SCR = 14%; RQD = 14%					
7					9	RC		TCR = 90%; SCR = 67%; RQD = 73%					
8				126.67	10	RC		TCR =					
		Fresh, fine grained, pink and greenish grey Precambrian BEDROCK		7.95									
9													

GEMTEC
Consulting Engineers and Scientists

LOGGED: CS
CHECKED: WAM

RECORD OF BOREHOLE 22-223

CLIENT: Caivan Communities
PROJECT: Proposed Residential Development, Perth Golf, 141 Peter Street, Perth, Ontario
JOB#: 100737.002
LOCATION: See Site Plan, Figure 1

SHEET: 2 OF 2
DATUM: CGVD28
BORING DATE: Jan 25 2022

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	SAMPLE DATA: TYPE	SAMPLE DATA: RECOVERY (mm)	SAMPLE DATA: BLOWS/0.3m	SAMPLE DATA: LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
10				124.62	11	RC		97%; SCR = 78%; RQD = 78% TCR = 100%; SCR = 90%; RQD = 90%	Groundwater : PHCs (F1 - F4), BTEX, M & I, OCPs				TOP OF SCREEN ELEV.: 125.58 m
		Fresh, fine grained, pink and greenish grey Precambrian BEDROCK		10.00									
11					12	RC		TCR = 97%; SCR = 86%; RQD = 80%					50 millimetre well screen
12				122.53	13	RC		TCR = 100%; SCR = 22%; RQD = 0%					BOTTOM OF SCREEN ELEV.: 122.53 m
		End of Borehole		12.09									

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEVATION (m)
Feb. 09/22	0.31 ▽	134.31
Feb. 16/22	0.23 ▼	134.39

GEMTEC
Consulting Engineers and Scientists

LOGGED: CS
CHECKED: WAM

ENV - BOREHOLE LOG 100737.002_GINT_BOREHOLE LOGS.GPJ GEMTEC 2018.GDT 4/8/22

RECORD OF BOREHOLE 22-224

CLIENT: Caivan Communities
PROJECT: Proposed Residential Development, Perth Golf, 141 Peter Street, Perth, Ontario
JOB#: 100737.002
LOCATION: See Site Plan, Figure 1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jan 5 2022

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		Ground Surface		135.64									
0	Power Auger / Hollow Stem Auger (210mm OD)	TOPSOIL		0.08									Filter sand
		Very loose, grey brown SILTY SAND, some gravel, with cobbles and boulders (GLACIAL TILL)			1	SS	255	4	BTEX, PHCs (F1-F4), M & I, OCPs				Native backfill
1					2	SS	150	4					Bentonite seal
				134.12									Filter sand
		Compact to very dense, grey brown to grey SILTY SAND, some gravel, with cobbles and boulders (GLACIAL TILL)		1.52	3	SS	150	13					TOP OF SCREEN ELEV.: 134.22 m
2					4	SS	405	22					
3					5	SS	380	>50					50 millimetre well screen
4					6	SS	330	39	Groundwater : PHCs (F1 - F4), BTEX, M & I, OCPs				
				131.19									
	Diamond Rotary Core HQ (89mm OD)	Slightly weathered to fresh, fine grained, very strong, pinkish grey Precambrian BEDROCK		4.45	7	RC		TCR = 43%; SCR = 43%; RQD = 0%					BOTTOM OF SCREEN ELEV.: 131.17 m
5					8	RC		TCR = 100%; SCR = 100%; RQD = 88%					Bentonite backfill
6				129.47									
		End of Borehole		6.17									

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEVATION (m)
Feb. 09/22	0.54 ▽	135.10
Feb. 16/22	0.49 ▼	135.15

GEMTEC
Consulting Engineers and Scientists

LOGGED: CS/ML
CHECKED: WAM

ENV - BOREHOLE LOG 100737.002_GINT_BOREHOLE LOGS.GPJ GEMTEC 2018.GDT 4/8/22

RECORD OF BOREHOLE 22-225A

CLIENT: Caivan Communities
PROJECT: Proposed Residential Development, Perth Golf, 141 Peter Street, Perth, Ontario
JOB#: 100737.002
LOCATION: See Site Plan, Figure 1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jan 4 2022

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		Ground Surface		134.97									
0	Power Auger Hollow Stem Auger (210mm OD)	TOPSOIL		134.82									
		Loose, grey brown SILTY SAND, some gravel, with cobbles and boulders (GLACIAL TILL)		0.15	1	SS	205	6	BTEX, PHCs (F1-F4), M & I				Filter sand
													Bentonite seal
1					2	SS	150	5	Groundwater : PHCs (F1 - F4), BTEX, M & I				Filter sand TOP OF SCREEN ELEV.: 134.06 m
					3	RC		TCR =					
		End of Borehole Auger Refusal Soil and bedrock stratigraphy from 0.00 to 1.37 metres inferred from Borehole 22-225		133.60 1.37	4	RC		95%; SCR = 82%; RQD = 45% TCR = 98%; SCR = 96%; RQD = 86%					BOTTOM OF SCREEN ELEV.: 133.60 m
					5	RC		TCR = 100%; SCR = 86%; RQD = 66%					
					6	RC		TCR = 98%; SCR = 85%; RQD = 66%					

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEVATION (m)
Feb. 09/22	0.85 ▽	134.12
Feb. 16/22	0.78 ▼	134.19

GEMTEC
Consulting Engineers and Scientists

LOGGED: CS
CHECKED: WAM

RECORD OF BOREHOLE 22-226

CLIENT: Caivan Communities
PROJECT: Proposed Residential Development, Perth Golf, 141 Peter Street, Perth, Ontario
JOB#: 100737.002
LOCATION: See Site Plan, Figure 1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jan 5 2022

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		Ground Surface		135.59									
0	Power Auger / Hollow Stem Auger (210mm OD)	TOPSOIL		0.08									
		Stiff to very stiff, grey brown SILTY CLAY (WEATHERED CRUST)			1	SS	305	5	BTEX, PHCs (F1-F4), M & I, OCPs				
1					2	SS	610	10	BTEX, PHCs (F1-F4), M & I, OCPs				
					3	SS	610	3					Native backfill
2				133.30									
		Compact to very dense, brown SILTY SAND, some gravel, with cobbles and boulders (GLACIAL TILL)		2.29	4	SS	25	21					
3					5	SS	75	>50 for 75 mm					
		End of Borehole Auger Refusal		132.24 3.35									

GEMTEC
Consulting Engineers and Scientists

LOGGED: CS
CHECKED: WAM

ENV - BOREHOLE LOG 100737.002_GINT_BOREHOLE LOGS.GPJ GEMTEC 2018.GDT 4/8/22

RECORD OF BOREHOLE 22-227

CLIENT: Caivan Communities
PROJECT: Proposed Residential Development, Perth Golf, 141 Peter Street, Perth, Ontario
JOB#: 100737.002
LOCATION: See Site Plan, Figure 1

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Jan 26 2022

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	SAMPLE DATA: TYPE	SAMPLE DATA: RECOVERY (mm)	SAMPLE DATA: BLOWS/0.3m	SAMPLE DATA: LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
	Hollow Stem Auger (210mm OD)	Ground Surface		137.56									
0	Power Auger	TOPSOIL		137.38									
		Compact to very dense, brown SILTY SAND, some gravel, with cobbles and boulders (GLACIAL TILL)		0.18	1	SS	355	14	BTEX, PHCs (F1-F4), M & I, OCPs	H - 0, I - 0			Native backfill
					2	SS	150	>50 for 100 mm		H - 0, I - 0			
		End of Borehole Auger Refusal		136.59 0.97									

GEMTEC
Consulting Engineers and Scientists

LOGGED: CS
CHECKED: WAM

ENV - BOREHOLE LOG 100737.002_GINT_BOREHOLE LOGS.GPJ GEMTEC 2018.GDT 4/8/22

RECORD OF BOREHOLE 22-228A

CLIENT: Caivan Communities
PROJECT: Proposed Residential Development, Perth Golf, 141 Peter Street, Perth, Ontario
JOB#: 100737.002
LOCATION: See Site Plan, Figure 1

SHEET: 1 OF 3
DATUM: CGVD28
BORING DATE: Feb 2 2022

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
0	Power Auger / Hollow Stem Auger (210mm OD)	Ground Surface		138.45									
		TOPSOIL		0.10									Native backfill
		Compact to very dense, brown SILTY SAND, some gravel, with cobbles and boulders (GLACIAL TILL)			1	SS	255	16	BTEX, PHCs (F1-F4), M & I, OCPs	H - 65, I - 1			
				137.51	2	SS	100	>50 for 75 mm		H - 80, I - 2			
1		Slightly weathered to fresh, fine grained, very strong, pinkish grey Precambrian BEDROCK		0.94	3	RC		TCR = 100%; SCR = 77%; RQD = 69%					
					4	RC							
					5	RC							
2					6	RC							Bentonite seal
					7	RC		TCR = 100%; SCR = 19%; RQD = 0%					
3					8	RC							
					9	RC		TCR = 94%; SCR = 17%; RQD = 0%					
4	Diamond Rotary Core / HQ (89mm OD)				10	RC							Filter sand
					11	RC		TCR = 100%; SCR = 53%; RQD = 57%					TOP OF SCREEN ELEV.: 133.85 m
5					12	RC		TCR = 92%; SCR = 51%; RQD = 51%	Groundwater : PHCs (F1 - F4), BTEX, M & I, OCPs				
6					13	RC		TCR = 100%; SCR = 74%; RQD = 64%					50 millimetre well screen
7					14	RC							
					15	RC		TCR = 80%; SCR = 70%; RQD = 70%					
		End of Borehole Soil and bedrock stratigraphy from 0.00 to 7.65 metres inferred from Borehole 22-228		130.80 7.65	16	RC							BOTTOM OF SCREEN ELEV.: 130.80 m
					17	RC		TCR = 100%; SCR = 65%;					

GEMTEC
Consulting Engineers and Scientists

LOGGED: CS
CHECKED: WAM

ENV - BOREHOLE LOG 100737.002_GINT_BOREHOLE LOGS.GPJ GEMTEC 2018.GDT 4/8/22

RECORD OF BOREHOLE 22-228A

CLIENT: Caivan Communities
PROJECT: Proposed Residential Development, Perth Golf, 141 Peter Street, Perth, Ontario
JOB#: 100737.002
LOCATION: See Site Plan, Figure 1

SHEET: 2 OF 3
DATUM: CGVD28
BORING DATE: Feb 2 2022

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	SAMPLE DATA: TYPE	SAMPLE DATA: RECOVERY (mm)	SAMPLE DATA: BLOWS/0.3m	SAMPLE DATA: LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
					18	RC		RQD = 65% TCR = 97% SCR = 69% RQD = 98% TCR = 100% SCR = 95% RQD = 95% TCR = 100% SCR = 68% RQD = 65% TCR = 100% SCR = 17% RQD = 0% TCR = 100% SCR = 100% RQD = 100% TCR = 96% SCR = 94% RQD = 94% TCR = 97% SCR = 43% RQD = 37% TCR = 100% SCR = 63% RQD = 41% TCR = 100% SCR = 0%; RQD = 0% TCR = 100% SCR				
					19	RC							
					20	RC							
					21	RC							
					22	RC							
					23	RC							

GEMTEC
Consulting Engineers and Scientists

LOGGED: CS
CHECKED: WAM

RECORD OF BOREHOLE 22-228A

CLIENT: Caivan Communities
PROJECT: Proposed Residential Development, Perth Golf, 141 Peter Street, Perth, Ontario
JOB#: 100737.002
LOCATION: See Site Plan, Figure 1

SHEET: 3 OF 3
DATUM: CGVD28
BORING DATE: Feb 2 2022

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	SAMPLE DATA: TYPE	SAMPLE DATA: RECOVERY (mm)	SAMPLE DATA: BLOWS/0.3m	SAMPLE DATA: LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
								55% RQD = 61% TCR = 100%; SCR = 57% RQD = 83% TCR = 100%; SCR = 86% RQD = 86% TCR = 100%; SCR = 38%; RQD = 50%				

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEVATION (m)
Feb. 09/22	4.04 ▽	134.41
Feb. 16/22	3.98 ▼	134.47

GEMTEC
Consulting Engineers and Scientists

LOGGED: CS
CHECKED: WAM

APPENDIX C

Analytical Summary Tables

GEMTEC
Consulting Engineers and Scientists

Table C1: Summary of Analytical Results in Soil
Metals
Phase Two Environmental Site Assessment
Perth, Ontario

Sample ID Depth (m bgs) Lab Job # Sampling Date	MECP TABLE 6 STANDARD	MECP TABLE 1 STANDARD	REPORTING LIMIT	UNITS	22-201 SS1 0-0.61 2205344-02 01/18/2022	22-202 SS3 1.52-2.13 2205344-11 01/14/2022	22-203 SS1 0-0.61 2205344-03 01/18/2022	22-205 SS1 0-0.61 2206357-07 01/27/2022	22-206 SA2 0.76-1.37 2206479-01 01/26/2022	22-207 SS2 0.76-1.37 2205344-04 01/12/2022	22-207 SS102 Duplicate of 22-207 SS2 2205344-05 01/12/2022
Metals											
Antimony	40	1.3	1	µg/g	1	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Arsenic	18	18	1	µg/g	1.8	1.3	2.7	2.2	1.3	1.5	1.6
Barium	670	220	1	µg/g	60.2	134	213	**271**	93.3	114	145
Beryllium	8	2.5	0.5	µg/g	ND (0.5)	ND (0.5)	0.7	0.6	ND (0.5)	ND (0.5)	ND (0.5)
Boron (Total)	120	36	5	µg/g	ND (5.0)	ND (5.0)	6.8	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Cadmium	1.9	1.2	0.5	µg/g	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	0.7	ND (0.5)	ND (0.5)
Chromium	160	70	5	µg/g	11.8	13.5	47	28.7	14.3	20	21
Cobalt	80	21	1	µg/g	2.9	4	10.7	7.6	4.5	4.2	5.2
Copper	230	92	5	µg/g	5.8	7.7	15.2	13.5	9.6	9.2	9.6
Lead	120	120	1	µg/g	8.6	2	8.7	8	2.7	3	3.6
Molybdenum	40	2	1	µg/g	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Nickel	270	82	5	µg/g	5.4	7.1	22.3	14	9.2	8.2	9.7
Selenium	5.5	1.5	1	µg/g	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Silver	40	0.5	0.3	µg/g	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)
Thallium	3.3	1	1	µg/g	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Uranium	33	2.5	1	µg/g	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Vanadium	86	86	10	µg/g	18.7	20.1	57	44.3	22.9	24.4	29.8
Zinc	340	290	20	µg/g	24.3	ND (20.0)	52.6	42.9	265	21.5	25.6

Notes:
'NV ' : No Standard established
'NA': Parameter not analyzed

MECP Table 1: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Full Depth Background Site Condition Standards for Soil for Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use.

MECP Table 6: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Full Depth Generic Site Condition Standards for Shallow Soils in a Potable Groundwater Condition for Industrial/Commercial/Community Property Use with Coarse Textured Soils.

100	Exceeds MECP Table 1 Standards
100	Exceeds MECP Table 6 Standards

Table C1: Summary of Analytical Results in Soil
Metals
Phase Two Environmental Site Assessment
Perth, Ontario

Sample ID Depth (m bgs) Lab Job # Sampling Date	MECP TABLE 6 STANDARD	MECP TABLE 1 STANDARD	REPORTING LIMIT	UNITS	22-208 SS1 0-0.61 2205344-06 01/12/2022	22-209 SS1 0-0.61 2205344-07 01/14/2022	22-210 SS2 0.76-1.37 2205344-08 01/14/2022	22-212 SS1 0-0.61 2206357-12 01/27/2022	22-213 SS1 0-0.61 2206357-01 01/27/2022	22-214 SS2 0.76-1.37 2203418-01 01/06/2022	22-215 SS3 1.52-2.13 2203418-02 01/06/2022
Metals											
Antimony	40	1.3	1	µg/g	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND(1.0)	ND(1.0)
Arsenic	18	18	1	µg/g	4.4	1.8	2.6	3.4	2.2	1.3	1.2
Barium	670	220	1	µg/g	86	73.3	127	**381**	152	78.0	89.2
Beryllium	8	2.5	0.5	µg/g	0.7	ND (0.5)	ND (0.5)	1	ND (0.5)	ND(0.5)	ND(0.5)
Boron (Total)	120	36	5	µg/g	ND (5.0)	ND (5.0)	ND (5.0)	8	6.4	ND(5.0)	ND(5.0)
Cadmium	1.9	1.2	0.5	µg/g	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND(0.5)	ND(0.5)
Chromium	160	70	5	µg/g	**70.9**	16.4	41.7	50.1	25	14.4	12.6
Cobalt	80	21	1	µg/g	16.8	5.1	7.3	14.2	7.7	4.7	4.0
Copper	230	92	5	µg/g	44.1	7.1	15.9	27.3	15.6	9.2	7.3
Lead	120	120	1	µg/g	12.1	7.2	3.3	7.3	4.9	2.2	2.1
Molybdenum	40	2	1	µg/g	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND(1.0)	ND(1.0)
Nickel	270	82	5	µg/g	28.7	7.9	16.9	28.1	14.7	7.7	6.4
Selenium	5.5	1.5	1	µg/g	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND(1.0)	ND(1.0)
Silver	40	0.5	0.3	µg/g	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND(0.3)	ND(0.3)
Thallium	3.3	1	1	µg/g	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND(1.0)	ND(1.0)
Uranium	33	2.5	1	µg/g	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND(1.0)	ND(1.0)
Vanadium	86	86	10	µg/g	54.4	26.8	46.7	64.2	39.1	24.7	19.9
Zinc	340	290	20	µg/g	38.3	28.4	31.2	66.5	32.6	ND(20.0)	ND(20.0)

Notes:
'NV ' : No Standard established
'NA': Parameter not analyzed

MECP Table 1: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Full Depth Background Site Condition Standards for Soil for Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use.

MECP Table 6: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Full Depth Generic Site Condition Standards for Shallow Soils in a Potable Groundwater Condition for Industrial/Commercial/Community Property Use with Coarse Textured Soils.

100	Exceeds MECP Table 1 Standards
100	Exceeds MECP Table 6 Standards

Table C1: Summary of Analytical Results in Soil
Metals
Phase Two Environmental Site Assessment
Perth, Ontario

Sample ID Depth (m bgs) Lab Job # Sampling Date	MECP TABLE 6 STANDARD	MECP TABLE 1 STANDARD	REPORTING LIMIT	UNITS	22-216 SS1 0-0.61 2203418-03 01/06/2022	22-219 SS1 0-0.61 2206357-08 01/27/2022	22-219 SS101 Duplicate of 22-219 SS1 2206357-09 01/27/2022	22-220 SS1 0-0.61 2206357-11 01/27/2022	22-221 SS1 0-0.61 2205344-01 01/12/2022	22-222 SS2 0.76-1.37 2205344-10 01/13/2022	22-222 SS102 Duplicate of 22-222 SS2 2205344-9 01/13/2022
Metals											
Antimony	40	1.3	1	µg/g	ND(1.0)	ND (1.0)	ND (1.0)	ND (1.0)	2.1	ND (1.0)	ND (1.0)
Arsenic	18	18	1	µg/g	2.3	1.2	1.3	2	2.5	1.6	3.2
Barium	670	220	1	µg/g	167	43.2	46.7	127	208	85.7	146
Beryllium	8	2.5	0.5	µg/g	0.6	ND (0.5)	ND (0.5)	ND (0.5)	0.8	ND (0.5)	0.6
Boron (Total)	120	36	5	µg/g	5.3	ND (5.0)	ND (5.0)	ND (5.0)	6	ND (5.0)	8.1
Cadmium	1.9	1.2	0.5	µg/g	ND(0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Chromium	160	70	5	µg/g	28.3	13.6	17.2	24.2	31	15.8	25.6
Cobalt	80	21	1	µg/g	6.2	4.5	5.5	6.8	6.3	4.2	7.3
Copper	230	92	5	µg/g	11.3	ND (5.0)	ND (5.0)	11.6	13.2	10.8	17.8
Lead	120	120	1	µg/g	3.7	2.8	3.4	3.8	6.1	2.4	5.3
Molybdenum	40	2	1	µg/g	ND(1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Nickel	270	82	5	µg/g	13.1	6.5	7.6	12.8	14.6	8.5	15.1
Selenium	5.5	1.5	1	µg/g	ND(1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Silver	40	0.5	0.3	µg/g	ND(0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)
Thallium	3.3	1	1	µg/g	ND(1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Uranium	33	2.5	1	µg/g	ND(1.0)	ND (1.0)	ND (1.0)	ND (1.0)	1.3	ND (1.0)	ND (1.0)
Vanadium	86	86	10	µg/g	40.2	22.1	27.9	36.5	39.4	24.2	41.3
Zinc	340	290	20	µg/g	28.9	ND (20.0)	ND (20.0)	26.1	54.3	ND (20.0)	25.3

Notes:

'NV ' : No Standard established
'NA': Parameter not analyzed

MECP Table 1: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Full Depth Background Site Condition Standards for Soil for Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use.

MECP Table 6: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Full Depth Generic Site Condition Standards for Shallow Soils in a Potable Groundwater Condition for Industrial/Commercial/Community Property Use with Coarse Textured Soils.

100	Exceeds MECP Table 1 Standards
100	Exceeds MECP Table 6 Standards

Table C1: Summary of Analytical Results in Soil
Metals
Phase Two Environmental Site Assessment
Perth, Ontario

Sample ID Depth (m bgs) Lab Job # Sampling Date	MECP TABLE 6 STANDARD	MECP TABLE 1 STANDARD	REPORTING LIMIT	UNITS	22-223 SS1 0-0.61 2206357-06 01/25/2022	22-223 SS101 Duplicate of 22-223 SS1 2206357-10 01/25/2022	22-224 SS1 0-0.61 2206357-03 01/26/2022	22-225 SS1 0-0.61 2206357-04 01/26/2022	22-226 SS1 0-0.61 2206357-02 01/26/2022	22-226 SS2 0.76-1.37 2206479-03 01/26/2022	22-227 SS1 0-0.61 2206357-05 01/25/2022	22-228 SS1 0-0.61 2206479-04 01/28/2022
Metals												
Antimony	40	1.3	1	µg/g	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Arsenic	18	18	1	µg/g	3.6	2.6	2.4	1.4	2.2	3.6	1.5	1.7
Barium	670	220	1	µg/g	**382**	**273**	**233**	115	188	**475**	96.3	175
Beryllium	8	2.5	0.5	µg/g	1	0.8	0.7	ND (0.5)	0.6	1.3	ND (0.5)	0.5
Boron (Total)	120	36	5	µg/g	8.4	7	6.5	ND (5.0)	ND (5.0)	7.8	ND (5.0)	ND (5.0)
Cadmium	1.9	1.2	0.5	µg/g	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Chromium	160	70	5	µg/g	58.4	43.3	39.6	12.1	32.5	66.2	21	29.9
Cobalt	80	21	1	µg/g	17.1	13.3	11.3	3.3	11.1	17.2	6.9	9.5
Copper	230	92	5	µg/g	31.8	24.4	21.3	7.2	12	32.3	8.1	31.5
Lead	120	120	1	µg/g	8.3	8.1	7.5	2	5.6	9.1	6.5	6.7
Molybdenum	40	2	1	µg/g	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Nickel	270	82	5	µg/g	33.7	24.4	22.7	6.5	16.8	37.0	10.3	13.6
Selenium	5.5	1.5	1	µg/g	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Silver	40	0.5	0.3	µg/g	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)
Thallium	3.3	1	1	µg/g	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Uranium	33	2.5	1	µg/g	1.8	**3.6**	ND (1.0)	ND (1.0)	1.1	1.3	ND (1.0)	1.1
Vanadium	86	86	10	µg/g	84.5	62.2	58.5	20.8	50.8	***86.2***	33.1	36.8
Zinc	340	290	20	µg/g	103	90.9	75.6	ND (20.0)	62.6	112	43.2	66.4

Notes:
'NV ' : No Standard established
'NA': Parameter not analyzed

MECP Table 1: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Full Depth Background Site Condition Standards for Soil for Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use.

MECP Table 6: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Full Depth Generic Site Condition Standards for Shallow Soils in a Potable Groundwater Condition for Industrial/Commercial/Community Property Use with Coarse Textured Soils.

100	Exceeds MECP Table 1 Standards
100	Exceeds MECP Table 6 Standards

GEMTEC
Consulting Engineers and Scientists

Table C2: Summary of Analytical Results in Soil
PAHs
Phase Two Environmental Site Assessment
Perth, Ontario

Sample ID Depth (m bgs) Lab Job # Sampling Date	MECP TABLE 6 STANDARD	MECP TABLE 1 STANDARD	REPORTING LIMIT	UNITS	22-206 SA1 0-0.61 2206479-02 01/26/2022
Semi-Volatile Organic Compounds (SVOCs)					
Acenaphthene	21	0.072	0.02	µg/g	ND (0.02)
Acenaphthylene	0.15	0.093	0.02	µg/g	ND (0.02)
Anthracene	0.67	0.16	0.02	µg/g	ND (0.02)
Benzo[a]anthracene	0.96	0.36	0.02	µg/g	ND (0.02)
Benzo[a]pyrene	0.3	0.3	0.02	µg/g	ND (0.02)
Benzo[b]fluoranthene	0.96	0.47	0.02	µg/g	ND (0.02)
Benzo[g,h,i]perylene	9.6	0.68	0.02	µg/g	ND (0.02)
Benzo[k]fluoranthene	0.96	0.48	0.02	µg/g	ND (0.02)
Chrysene	9.6	2.8	0.02	µg/g	ND (0.02)
Dibenzo[a,h]anthracene	0.1	0.1	0.02	µg/g	ND (0.02)
Fluoranthene	9.6	0.56	0.02	µg/g	ND (0.02)
Fluorene	62	0.12	0.02	µg/g	ND (0.02)
Indeno [1,2,3-cd] pyrene	0.76	0.23	0.02	µg/g	ND (0.02)
1-Methylnaphthalene	NV	NV	0.02	µg/g	ND (0.02)
2-Methylnaphthalene	NV	NV	0.02	µg/g	ND (0.02)
Methylnaphthalene (1&2)	30	0.59	0.04	µg/g	ND (0.04)
Naphthalene	9.6	0.09	0.01	µg/g	ND (0.01)
Phenanthrene	12	0.69	0.02	µg/g	ND (0.02)
Pyrene	96	1	0.02	µg/g	ND (0.02)

Notes:

'NV ' : No Standard established

'NA': Parameter not analyzed

MECP Table 1: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Full Depth Background Site Condition Standards for Soil for Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use.

MECP Table 6: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Full Depth Generic Site Condition Standards for Shallow Soils in a Potable Groundwater Condition for Industrial/Commercial/Community Property Use with Coarse Textured Soils.

100	Exceeds MECP Table 1 Standards
100	Exceeds MECP Table 6 Standards

Table C3: Summary of Analytical Results in Soil
PHCs and BTEX
Phase Two Environmental Site Assessment
Perth, Ontario

Sample ID Depth (m bgs) Lab Job # Sampling Date	MECP TABLE 6 STANDARD	MECP TABLE 1 STANDARD	REPORTING LIMIT	UNITS	22-201 SS1 0-0.61 2205344-02 01/18/2022	22-202 SS3 1.52-2.13 2205344-11 01/14/2022	22-203 SS1 0-0.61 2205344-03 01/18/2022	22-205 SS1 0-0.61 2206357-07 01/27/2022	22-206 SA2 0.76-1.37 2206479-01 01/26/2022	22-207 SS 2 0.76-1.37 2205344-04 01/12/2022	22-207 SS102 Duplicate of 22-207 SS2 2205344-05 01/12/2022
Petroleum Hydrocarbon Compounds (PHCs)											
F1 (C6-C10)	55	25	7	µg/g	ND (7)	ND (7)	ND (7)	ND (7)	ND (7)	ND (7)	ND (7)
F2 (C10-C16)	230	10	4	µg/g	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)
F3 (C16-C34)	1700	240	8	µg/g	89	ND (8)	17	ND (8)	ND (8)	ND (8)	ND (8)
F4 (C34-C50)	3300	120	6	µg/g	43	ND (6)	21	ND (6)	ND (6)	ND (6)	ND (6)
Volatile Organic Compounds (VOCs)											
Benzene	0.32	0.02	0.02	µg/g	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Ethylbenzene	1.1	0.05	0.05	µg/g	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Toluene	6.4	0.2	0.05	µg/g	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
m-Xylene & p-Xylene	NV	NV	0.05	µg/g	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
o-Xylene	NV	NV	0.05	µg/g	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Total Xylenes	26	0.05	0.05	µg/g	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)

Notes:

'NV ' : No Standard established

'NA': Parameter not analyzed

MECP Table 1: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Full Depth Background Site Condition Standards for Soil for Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use.

MECP Table 6: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Full Depth Generic Site Condition Standards for Shallow Soils in a Potable Groundwater Condition for Industrial/Commercial/Community Property Use with Coarse Textured Soils.

100	Exceeds MECP Table 1 Standards
100	Exceeds MECP Table 6 Standards

Table C3: Summary of Analytical Results in Soil
PHCs and BTEX
Phase Two Environmental Site Assessment
Perth, Ontario

Sample ID Depth (m bgs) Lab Job # Sampling Date	MECP TABLE 6 STANDARD	MECP TABLE 1 STANDARD	REPORTING LIMIT	UNITS	22-208 SS 1 0-0.61 2205344-06 01/12/2022	22-209 SS1 0-0.61 2205344-07 01/14/2022	22-210 SS2 0.76-1.37 2205344-08 01/14/2022	22-212 SS1 0-0.61 2206357-12 01/27/2022	22-213 SS1 0-0.61 2206357-01 01/27/2022	22-214 SS2 0.76-1.37 2203418-01 1-6-2022	22-215 SS3 1.52-2.13 2203418-02 1-6-2022
Petroleum Hydrocarbon Compounds (PHCs)											
F1 (C6-C10)	55	25	7	µg/g	ND (7)	ND (7)	ND (7)	ND (7)	ND (7)	ND (7)	ND (7)
F2 (C10-C16)	230	10	4	µg/g	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	N/A	ND (4)
F3 (C16-C34)	1700	240	8	µg/g	41	55	ND (8)	ND (8)	ND (8)	N/A	ND (8)
F4 (C34-C50)	3300	120	6	µg/g	11	32	ND (6)	ND (6)	ND (6)	N/A	ND (6)
Volatile Organic Compounds (VOCs)											
Benzene	0.32	0.02	0.02	µg/g	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Ethylbenzene	1.1	0.05	0.05	µg/g	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Toluene	6.4	0.2	0.05	µg/g	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
m-Xylene & p-Xylene	NV	NV	0.05	µg/g	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
o-Xylene	NV	NV	0.05	µg/g	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Total Xylenes	26	0.05	0.05	µg/g	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)

Notes:

'NV ' : No Standard established

'NA': Parameter not analyzed

MECP Table 1: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Full Depth Background Site Condition Standards for Soil for Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use.

MECP Table 6: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Full Depth Generic Site Condition Standards for Shallow Soils in a Potable Groundwater Condition for Industrial/Commercial/Community Property Use with Coarse Textured Soils.

100	Exceeds MECP Table 1 Standards
100	Exceeds MECP Table 6 Standards

Table C3: Summary of Analytical Results in Soil
PHCs and BTEX
Phase Two Environmental Site Assessment
Perth, Ontario

Sample ID Depth (m bgs) Lab Job # Sampling Date	MECP TABLE 6 STANDARD	MECP TABLE 1 STANDARD	REPORTING LIMIT	UNITS	22-216 SS1 0-0.61 2203418-03 1-6-2022	22-219 SS1 0-0.61 2206357-08 01/27/2022	22-219 SS101 Duplicate of 22-219 SS1 2206357-09 01/27/2022	22-220 SS1 0-0.61 2206357-11 01/27/2022	22-221 SS1 0-0.61 2205344-01 01/12/2022	22-222 SS2 0.76-1.37 2205344-10 01/13/2022	22-222 SS102 Duplicate of 22-222 SS2 2205344-09 01/13/2022
Petroleum Hydrocarbon Compounds (PHCs)											
F1 (C6-C10)	55	25	7	µg/g	ND (7)	ND (7)	ND (7)	ND (7)	ND (7)	ND (7)	ND (7)
F2 (C10-C16)	230	10	4	µg/g	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)
F3 (C16-C34)	1700	240	8	µg/g	ND (8)	ND (8)	ND (8)	ND (8)	31	ND (8)	ND (8)
F4 (C34-C50)	3300	120	6	µg/g	ND (6)	ND (6)	ND (6)	ND (6)	41	ND (6)	ND (6)
Volatile Organic Compounds (VOCs)											
Benzene	0.32	0.02	0.02	µg/g	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Ethylbenzene	1.1	0.05	0.05	µg/g	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Toluene	6.4	0.2	0.05	µg/g	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
m-Xylene & p-Xylene	NV	NV	0.05	µg/g	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
o-Xylene	NV	NV	0.05	µg/g	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Total Xylenes	26	0.05	0.05	µg/g	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)

Notes:

'NV ' : No Standard established

'NA': Parameter not analyzed

MECP Table 1: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Full Depth Background Site Condition Standards for Soil for Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use.

MECP Table 6: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Full Depth Generic Site Condition Standards for Shallow Soils in a Potable Groundwater Condition for Industrial/Commercial/Community Property Use with Coarse Textured Soils.

100	Exceeds MECP Table 1 Standards
100	Exceeds MECP Table 6 Standards

Table C3: Summary of Analytical Results in Soil
PHCs and BTEX
Phase Two Environmental Site Assessment
Perth, Ontario

Sample ID Depth (m bgs) Lab Job # Sampling Date	MECP TABLE 6 STANDARD	MECP TABLE 1 STANDARD	REPORTING LIMIT	UNITS	22-223 SS1 0-0.61 2206357-06 01/25/2022	22-223 SS101 Duplicate of 22-223 SS1 2206357-10 01/25/2022	22-224 SS1 0-0.61 2206357-03 01/26/2022	22-225 SS1 0-0.61 2206357-04 01/26/2022	22-226 SS1 0-0.61 2206357-02 01/26/2022	22-226 SS2 0.76-1.37 2206479-03 01/26/2022	22-227 SS1 0-0.61 2206357-05 01/25/2022	22-228 SS1 0-0.61 2206479-04 1-28-2022
Petroleum Hydrocarbon Compounds (PHCs)												
F1 (C6-C10)	55	25	7	µg/g	ND (7)	ND (7)	ND (7)	ND (7)	ND (7)	ND (7)	ND (7)	ND (7)
F2 (C10-C16)	230	10	4	µg/g	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)
F3 (C16-C34)	1700	240	8	µg/g	ND (8)	ND (8)	ND (8)	ND (8)	ND (8)	ND (8)	ND (8)	ND (8)
F4 (C34-C50)	3300	120	6	µg/g	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)
Volatile Organic Compounds (VOCs)												
Benzene	0.32	0.02	0.02	µg/g	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Ethylbenzene	1.1	0.05	0.05	µg/g	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Toluene	6.4	0.2	0.05	µg/g	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
m-Xylene & p-Xylene	NV	NV	0.05	µg/g	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
o-Xylene	NV	NV	0.05	µg/g	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Total Xylenes	26	0.05	0.05	µg/g	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)

Notes:

'NV ' : No Standard established

'NA': Parameter not analyzed

MECP Table 1: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Full Depth Background Site Condition Standards for Soil for Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use.

MECP Table 6: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Full Depth Generic Site Condition Standards for Shallow Soils in a Potable Groundwater Condition for Industrial/Commercial/Community Property Use with Coarse Textured Soils.

100	Exceeds MECP Table 1 Standards
100	Exceeds MECP Table 6 Standards

Table C4: Summary of Analytical Results in Soil
OC Pesticides
Phase Two Environmental Site Assessment
Perth, Ontario

Sample ID Depth (m bgs) Sampling Date	MECP TABLE 6 STANDARD	MECP TABLE 1 STANDARD	REPORTING LIMIT	UNITS	22-206 SA2 0.76-1.37 1/26/2022	22-212 SS1 0-0.61 01/27/2022	22-219 SS1 0-0.61 01/27/2022	22-223 SS1 0-0.61 01/25/2022	22-223 SS101 Duplicate of 22-223 SS1 01/25/2022
Organochlorine Pesticides									
Aldrin	0.088	0.05	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
gamma-hexachlorocyclohexane	0.056	0.01	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
a-chlordane	NV	NV	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Chlordane (Total)	0.05	0.05	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
g-chlordane	NV	NV	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
op-DDD	NV	NV	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
pp-DDD	NV	NV	0.02	µg/g	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Total DDD	4.6	0.05	0.02	µg/g	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
o,p-DDE	NV	NV	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
pp-DDE	NV	NV	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Total DDE	0.52	0.05	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
op-DDT	NV	NV	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
pp-DDT	NV	NV	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Total DDT	1.4	1.4	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Dieldrin	0.088	0.05	0.02	µg/g	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Endosulfan I	NV	NV	0.02	µg/g	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Endosulfan II	NV	NV	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Endosulfan (Total)	0.3	0.04	0.02	µg/g	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Endrin	0.04	0.04	0.02	µg/g	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Heptachlor	0.19	0.05	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Heptachlor Epoxide	0.05	0.05	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Hexachlorobenzene	0.66	0.01	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Hexachlorobutadiene	0.031	0.01	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Hexachloroethane	0.21	0.01	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Methoxychlor	1.6	0.05	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)

Notes:

'NV ' : No Standard established

'NA': Parameter not analyzed

MECP Table 1: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Full Depth Background Site Condition Standards for Soil for Re

MECP Table 6: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Full Depth Generic Site Condition Standards for Shallow Soils

100	Exceeds MECP Table 1 Standards
100	Exceeds MECP Table 6 Standards

GEMTEC
Consulting Engineers and Scientists

Table 4: Summary of Analytical Results in Soil
OC Pesticides
Proposed Residential Development
Perth, Ontario

Sample ID Depth (m bgs) Sampling Date	MECP TABLE 6 STANDARD	MECP TABLE 1 STANDARD	REPORTING LIMIT	UNITS	22-224 SS1 0-0.61 01/26/2022	22-226 SS1 0-0.61 01/26/2022	22-226 SS2 0.76-1.37 01/26/2022	22-227 SS1 0-0.61 01/25/2022	22-228 SS1 0-0.61 1/28/2022
Organochlorine Pesticides									
Aldrin	0.088	0.05	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
gamma-hexachlorocyclohexane	0.056	0.01	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
a-chlordane	NV	NV	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Chlordane (Total)	0.05	0.05	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
g-chlordane	NV	NV	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
op-DDD	NV	NV	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
pp-DDD	NV	NV	0.02	µg/g	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Total DDD	4.6	0.05	0.02	µg/g	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
o,p-DDE	NV	NV	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
pp-DDE	NV	NV	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Total DDE	0.52	0.05	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
op-DDT	NV	NV	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
pp-DDT	NV	NV	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Total DDT	1.4	1.4	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Dieldrin	0.088	0.05	0.02	µg/g	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Endosulfan I	NV	NV	0.02	µg/g	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Endosulfan II	NV	NV	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Endosulfan (Total)	0.3	0.04	0.02	µg/g	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Endrin	0.04	0.04	0.02	µg/g	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Heptachlor	0.19	0.05	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Heptachlor Epoxide	0.05	0.05	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Hexachlorobenzene	0.66	0.01	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Hexachlorobutadiene	0.031	0.01	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Hexachloroethane	0.21	0.01	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Methoxychlor	1.6	0.05	0.01	µg/g	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)

Notes:

'NV ' : No Standard established

'NA': Parameter not analyzed

MECP Table 1: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Full Depth Background Site Condition Standards for Soil for Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use.

MECP Table 6: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Full Depth Generic Site Condition Standards for Shallow Soils in a Potable Groundwater Condition for Industrial/Commercial/Community Property Use with Coarse Textured Soils

100	Exceeds MECP Table 1 Standards
100	Exceeds MECP Table 6 Standards

GEMTEC
Consulting Engineers and Scientists

Table 5: Summary of Analytical Results in Groundwater
Metals and Inorganics
Proposed Residential Development
Perth, Ontario

Sample ID Sampling Date	MECP TABLE 6 STANDARD	MECP TABLE 1 STANDARD	REPORTING LIMIT	UNITS	BH22-201 8-Feb-2022	BH22-203A 8-Feb-2022	DUP 1 Duplicate of BH22-203A 8-Feb-2022	BH22-205 8-Feb-2022	BH22-208 8-Feb-2022	BH22-214 8-Feb-2022	BH22-216 8-Feb-2022	BH22-221A 8-Feb-2022
Metals and Inorganics												
Antimony	6	1.5	0.5	µg/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Arsenic	25	13	1	µg/L	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)
Barium	1,000	610	1	µg/L	106	113	114	125	67	130	76	32
Beryllium	4	0.5	0.5	µg/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Boron (Total)	5,000	1,700	10	µg/L	104	59	59	48	23	ND (10)	24	ND (10)
Cadmium	2	0.5	0.1	µg/L	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)
Chromium	50	11	1	µg/L	ND (1)	ND (1)	ND (1)	ND (1)	1	ND (1)	ND (1)	ND (1)
Cobalt	4	3.8	0.5	µg/L	2.3	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	1.2
Copper	69	5	0.5	µg/L	4.2	1.7	3.2	ND (0.5)	**7.8**	1.2	1.5	**12.5**
Lead	10	1.9	0.1	µg/L	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	0.2	ND (0.1)	ND (0.1)	ND (0.1)
Molybdenum	70	23	0.5	µg/L	5.6	3.5	3.5	9.9	0.6	2	1.4	2.3
Nickel	100	14	1	µg/L	**29**	2	2	ND (1)	2	ND (1)	ND (1)	2
Selenium	10	5	1	µg/L	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)
Silver	1	0.3	0.1	µg/L	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)
Thallium	2	0.5	0.1	µg/L	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)
Vanadium	6	3.9	0.5	µg/L	ND (0.5)	1.5	1.5	0.6	1.5	ND (0.5)	1.1	ND (0.5)
Zinc	890	160	5	µg/L	8	5	6	ND (5)	9	ND (5)	ND (5)	ND (5)
pH	5 to 9	7-9	0.1	pH Units	7.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sodium	490,000	490,000	200	µg/L	36,400	12,900	12,400	13,700	5,600	6,630	6,320	13,100
Uranium	20	8.9	0.1	µg/L	0.8	8	8.1	0.4	1	0.7	**14**	1.4

Notes:

'NV ' : No Standard established

'NA': Parameter not analyzed

MECP Table 1: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Full Depth Background Site Condition Standards for Soil for Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use.

MECP Table 6: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Generic Site Condition Standards for Shallow Soils in a Potable Ground Water Condition for All Types of Property Use.

100	Exceeds MECP Table 1 Standards
100	Exceeds MECP Table 6 Standards

GEMTEC
Consulting Engineers and Scientists

Table 5: Summary of Analytical Results in Groundwater
Metals and Inorganics
Proposed Residential Development
Perth, Ontario

Sample ID Sampling Date	MECP TABLE 6 STANDARD	MECP TABLE 1 STANDARD	REPORTING LIMIT	UNITS	BH22-222A 8-Feb-2022	BH22-223 8-Feb-2022	BH22-224 8-Feb-2022	DUP 2 Duplicate of BH22-224 8-Feb-2022	BH22-225A 9-Feb-2022	BH22-228A 8-Feb-2022
Metals and Inorganics										
Antimony	6	1.5	0.5	µg/L	ND (0.5)	1.2	ND (0.5)	ND (0.5)	ND (0.5)	1
Arsenic	25	13	1	µg/L	ND (1)	1	2	1	ND (1)	3
Barium	1,000	610	1	µg/L	55	80	320	316	365	454
Beryllium	4	0.5	0.5	µg/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Boron (Total)	5,000	1,700	10	µg/L	21	183	13	12	ND (10)	69
Cadmium	2	0.5	0.1	µg/L	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)
Chromium	50	11	1	µg/L	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)
Cobalt	4	3.8	0.5	µg/L	0.9	0.6	**6.1**	**6.3**	**6.8**	0.7
Copper	69	5	0.5	µg/L	**5.9**	2	2.5	ND (0.5)	4.4	**5.6**
Lead	10	1.9	0.1	µg/L	0.2	ND (0.1)	ND (0.1)	ND (0.1)	0.1	0.2
Molybdenum	70	23	0.5	µg/L	5.5	8.6	2.8	2.8	1.7	7
Nickel	100	14	1	µg/L	1	4	10	10	6	3
Selenium	10	5	1	µg/L	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)
Silver	1	0.3	0.1	µg/L	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)
Thallium	2	0.5	0.1	µg/L	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)
Vanadium	6	3.9	0.5	µg/L	ND (0.5)	2	ND (0.5)	ND (0.5)	ND (0.5)	0.5
Zinc	890	160	5	µg/L	6	12	ND (5)	ND (5)	ND (5)	11
pH	5 to 9	7-9	0.1	pH Units	N/A	N/A	N/A	N/A	N/A	N/A
Sodium	490,000	490,000	200	µg/L	15,500	40,900	18,700	18,000	4,700	23,300
Uranium	20	8.9	0.1	µg/L	**12.8**	**9.7**	2.1	2.2	1.6	**295**

Notes:

'NV ' : No Standard established

'NA': Parameter not analyzed

MECP Table 1: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Full Depth Background Site Condition Standards for Soil for Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use.

MECP Table 6: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Generic Site Condition Standards for Shallow Soils in a Potable Ground Water Condition for All Types of Property Use.

100	Exceeds MECP Table 1 Standards
100	Exceeds MECP Table 6 Standards

GEMTEC
Consulting Engineers and Scientists

Table 6: Summary of Analytical Results in Groundwater
PHCs and BTEX
Proposed Residential Development
Perth, Ontario

Sample ID Sampling Date	MECP TABLE 6 STANDARD	MECP TABLE 1 STANDARD	REPORTING LIMIT	UNITS	BH22-201 8-Feb-2022	BH22-203A 8-Feb-2022	DUP 1 Duplicate of BH22-203A 8-Feb-2022	BH22-205 8-Feb-2022	BH22-208 8-Feb-2022	BH22-214 8-Feb-2022
Petroleum Hydrocarbon Compounds (PHCs)										
F1 (C6-C10)	420	420	25	µg/L	ND (25)	ND (25)	ND (25)	ND (25)	ND (25)	ND (25)
F2 (C10-C16)	150	150	100	µg/L	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)
F3 (C16-C34)	500	500	250	µg/L	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)
F4 (C34-C50)	500	500	250	µg/L	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)
Volatile Organic Compounds (VOCs)										
Benzene	0.5	0.5	0.5	µg/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Ethylbenzene	2.4	0.5	0.5	µg/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Toluene	24	0.8	0.5	µg/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
m-Xylene & p-Xylene	NV	NV	0.4	µg/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
o-Xylene	NV	NV	0.3	µg/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Total Xylenes	72	72	0.5	µg/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)

Notes:

'NV ' : No Standard established

'NA': Parameter not analyzed

MECP Table 1: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Full Depth Background Site Condition Standards for Soil for Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use.

MECP Table 6: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Generic Site Condition Standards for Shallow Soils in a Potable Ground Water Condition for All Types of Property Use.

100	Exceeds MECP Table 1 Standards
100	Exceeds MECP Table 6 Standards

GEMTEC
Consulting Engineers and Scientists

Table 6: Summary of Analytical Results in Groundwater
PHCs and BTEX
Proposed Residential Development
Perth, Ontario

Sample ID Sampling Date	MECP TABLE 6 STANDARD	MECP TABLE 1 STANDARD	REPORTING LIMIT	UNITS	BH22-216 8-Feb-2022	BH22-221A 8-Feb-2022	BH22-222A 8-Feb-2022	BH22-223 8-Feb-2022	BH22-224 8-Feb-2022	DUP 2 Duplicate of BH22-224 8-Feb-2022
Petroleum Hydrocarbon Compounds (PHCs)										
F1 (C6-C10)	420	420	25	µg/L	ND (25)	ND (25)	ND (25)	ND (25)	ND (25)	ND (25)
F2 (C10-C16)	150	150	100	µg/L	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)
F3 (C16-C34)	500	500	250	µg/L	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)
F4 (C34-C50)	500	500	250	µg/L	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)
Volatile Organic Compounds (VOCs)										
Benzene	0.5	0.5	0.5	µg/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Ethylbenzene	2.4	0.5	0.5	µg/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Toluene	24	0.8	0.5	µg/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
m-Xylene & p-Xylene	NV	NV	0.4	µg/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
o-Xylene	NV	NV	0.3	µg/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Total Xylenes	72	72	0.5	µg/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)

Notes:

'NV ' : No Standard established

'NA': Parameter not analyzed

MECP Table 1: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Full Depth Background Site Condition Standards for Soil for Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use.

MECP Table 6: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Generic Site Condition Standards for Shallow Soils in a Potable Ground Water Condition for All Types of Property Use.

100	Exceeds MECP Table 1 Standards
100	Exceeds MECP Table 6 Standards

GEMTEC
CONSULTING ENGINEERS AND SCIENTISTS

Table 6: Summary of Analytical Results in Groundwater
PHCs and BTEX
Proposed Residential Development
Perth, Ontario

Sample ID Sampling Date	MECP TABLE 6 STANDARD	MECP TABLE 1 STANDARD	REPORTING LIMIT	UNITS	BH22-225A 9-Feb-2022	BH22-228A 8-Feb-2022	Trip Blank 8-Feb-2022	Trip Blank 8-Feb-2022
Petroleum Hydrocarbon Compounds (PHCs)								
F1 (C6-C10)	420	420	25	µg/L	ND (25)	ND (25)	ND (25)	ND (25)
F2 (C10-C16)	150	150	100	µg/L	ND (100)	ND (100)	N/A	N/A
F3 (C16-C34)	500	500	250	µg/L	ND (100)	ND (100)	N/A	N/A
F4 (C34-C50)	500	500	250	µg/L	ND (100)	ND (100)	N/A	N/A
Volatile Organic Compounds (VOCs)								
Benzene	0.5	0.5	0.5	µg/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Ethylbenzene	2.4	0.5	0.5	µg/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Toluene	24	0.8	0.5	µg/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
m-Xylene & p-Xylene	NV	NV	0.4	µg/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
o-Xylene	NV	NV	0.3	µg/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Total Xylenes	72	72	0.5	µg/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)

Notes:

'NV ' : No Standard established

'NA': Parameter not analyzed

MECP Table 1: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Full Depth Background Site Condition Standards for Soil for Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use.

MECP Table 6: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Generic Site Condition Standards for Shallow Soils in a Potable Ground Water Condition for All Types of Property Use.

100	Exceeds MECP Table 1 Standards
100	Exceeds MECP Table 6 Standards

Table **7**: Summary of Analytical Results in
Groundwater OC Pesticides
Proposed Residential Development
Perth, Ontario

Sample ID Sampling Date	MECP TABLE 6 STANDARD	MECP TABLE 1 STANDARD	REPORTING LIMIT	UNITS	BH22-214 8-Feb-2022	BH22-223 8-Feb-2022	BH22-224 8-Feb-2022	DUP 2 Duplicate of BH22-224 8-Feb-2022	BH22-228A 8-Feb-2022
Organochlorine Pesticides									
Aldrin	0.35	0.01	0.008	µg/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
gamma-hexachlorocyclohexane	0.95	0.01	0.008	µg/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
a-chlordane	NV	NV	0.008	µg/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Chlordane (Total)	0.06	0.06	0.011	µg/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
g-chlordane	NV	NV	0.008	µg/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
op-DDD	NV	NV	0.004	µg/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
pp-DDD	NV	NV	0.004	µg/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Total DDD	1.8	1.8	0.0057	µg/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
o,p-DDE	NV	NV	0.004	µg/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
pp-DDE	NV	NV	0.004	µg/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Total DDE	10	10	0.0057	µg/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
op-DDT	NV	NV	0.004	µg/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
pp-DDT	NV	NV	0.004	µg/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Total DDT	0.05	0.05	0.0057	µg/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Dieldrin	0.35	0.05	0.008	µg/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Endosulfan I	NV	NV	0.007	µg/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Endosulfan II	NV	NV	0.007	µg/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Endosulfan (Total)	0.56	0.05	0.0099	µg/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Endrin	0.36	0.05	0.01	µg/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Heptachlor	0.038	0.01	0.008	µg/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Heptachlor Epoxide	0.038	0.01	0.008	µg/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Hexachlorobenzene	1	0.01	0.008	µg/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Hexachlorobutadiene	0.012	0.01	0.008	µg/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Hexachloroethane	0.17	0.01	0.008	µg/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Methoxychlor	0.3	0.05	0.019	µg/L	ND (0.01)	ND (0.01)	0.03	ND (0.01)	ND (0.01)

Notes:

'NV ' : No Standard established

'NA': Parameter not analyzed

MECP Table 1: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Full Depth Background Site Condition Standards for Soil for Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use.

MECP Table 6: Ontario Ministry of the Environment, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, " March 2004, amended July 1, 2011. Generic Site Condition Standards for Shallow Soils in a Potable Ground Water Condition for All Types of Property Use.

100	Exceeds MECP Table 1 Standards
100	Exceeds MECP Table 6 Standards

APPENDIX D

Laboratory Certificates of Analysis

PARACEL LABORATORIES LTD.
TRUSTED. RESPONSIVE. RELIABLE.

300 - 2319 St. Laurent Blvd
Ottawa, ON, K1G 4J8
1-800-749-1947
www.paracellabs.com

Certificate of Analysis

GEMTEC Consulting Engineers and Scientists Limited

32 Steacie Drive
Kanata, ON K2K 2A9
Attn: Brenda Thom

Client PO:
Project: 100737.002 Perth Golf Course
Custody: 134585

Report Date: 19-Jan-2022
Order Date: 13-Jan-2022

Order #: 2203418

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

Paracel ID	Client ID
2203418-01	BH22-214 SS2
2203418-02	BH22-215 SS3
2203418-03	BH22-216 SS1

Approved By:

Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	17-Jan-22	17-Jan-22
PHC F1	CWS Tier 1 - P&T GC-FID	17-Jan-22	17-Jan-22
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	14-Jan-22	18-Jan-22
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	17-Jan-22	17-Jan-22
REG 153: Pesticides, OC	EPA 8081B - GC-ECD	14-Jan-22	17-Jan-22
Solids, %	Gravimetric, calculation	14-Jan-22	15-Jan-22

Certificate of Analysis

Report Date: 19-Jan-2022

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 13-Jan-2022

Client PO:

Project Description: 100737.002 Perth Golf Course

	Client ID:	BH22-214 SS2	BH22-214 SS2	BH22-215 SS3	BH22-216 SS1
	Sample Date:	06-Jan-22 09:00	06-Jan-22 09:00	06-Jan-22 12:00	06-Jan-22 12:00
	Sample ID:	2203418-01	2203418-01RE1	2203418-02	2203418-03
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	90.7	-	93.8	81.9
Metals					
Antimony	1.0 ug/g dry	<1.0	-	<1.0	<1.0
Arsenic	1.0 ug/g dry	1.3	-	1.2	2.3
Barium	1.0 ug/g dry	78.0	-	89.2	167
Beryllium	0.5 ug/g dry	<0.5	-	<0.5	0.6
Boron	5.0 ug/g dry	<5.0	-	<5.0	5.3
Cadmium	0.5 ug/g dry	<0.5	-	<0.5	<0.5
Chromium	5.0 ug/g dry	14.4	-	12.6	28.3
Cobalt	1.0 ug/g dry	4.7	-	4.0	6.2
Copper	5.0 ug/g dry	9.2	-	7.3	11.3
Lead	1.0 ug/g dry	2.2	-	2.1	3.7
Molybdenum	1.0 ug/g dry	<1.0	-	<1.0	<1.0
Nickel	5.0 ug/g dry	7.7	-	6.4	13.1
Selenium	1.0 ug/g dry	<1.0	-	<1.0	<1.0
Silver	0.3 ug/g dry	<0.3	-	<0.3	<0.3
Thallium	1.0 ug/g dry	<1.0	-	<1.0	<1.0
Uranium	1.0 ug/g dry	<1.0	-	<1.0	<1.0
Vanadium	10.0 ug/g dry	24.7	-	19.9	40.2
Zinc	20.0 ug/g dry	<20.0	-	<20.0	28.9
Volatiles					
Benzene	0.02 ug/g dry	<0.02	-	<0.02	<0.02
Ethylbenzene	0.05 ug/g dry	<0.05	-	<0.05	<0.05
Toluene	0.05 ug/g dry	<0.05	-	<0.05	<0.05
m,p-Xylenes	0.05 ug/g dry	<0.05	-	<0.05	<0.05
o-Xylene	0.05 ug/g dry	<0.05	-	<0.05	<0.05
Xylenes, total	0.05 ug/g dry	<0.05	-	<0.05	<0.05
Toluene-d8	Surrogate	91.8%	-	94.7%	100%
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	-	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	-	<4	<4	<4
F3 PHCs (C16-C34)	8 ug/g dry	-	<8	<8	<8
F4 PHCs (C34-C50)	6 ug/g dry	-	<6	<6	<6
Pesticides, OC					
Aldrin	0.01 ug/g dry	<0.01	-	-	-

Certificate of Analysis

Report Date: 19-Jan-2022

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 13-Jan-2022

Client PO:

Project Description: 100737.002 Perth Golf Course

	Client ID:	BH22-214 SS2	BH22-214 SS2	BH22-215 SS3	BH22-216 SS1
	Sample Date:	06-Jan-22 09:00	06-Jan-22 09:00	06-Jan-22 12:00	06-Jan-22 12:00
	Sample ID:	2203418-01	2203418-01RE1	2203418-02	2203418-03
	MDL/Units	Soil	Soil	Soil	Soil
gamma-BHC (Lindane)	0.01 ug/g dry	<0.01	-	-	-
alpha-Chlordane	0.01 ug/g dry	<0.01	-	-	-
gamma-Chlordane	0.01 ug/g dry	<0.01	-	-	-
Chlordane	0.01 ug/g dry	<0.01	-	-	-
o,p'-DDD	0.01 ug/g dry	<0.01	-	-	-
p,p'-DDD	0.02 ug/g dry	<0.02	-	-	-
DDD	0.02 ug/g dry	<0.02	-	-	-
o,p'-DDE	0.01 ug/g dry	<0.01	-	-	-
p,p'-DDE	0.01 ug/g dry	<0.01	-	-	-
DDE	0.01 ug/g dry	<0.01	-	-	-
o,p'-DDT	0.01 ug/g dry	<0.01	-	-	-
p,p'-DDT	0.01 ug/g dry	<0.01	-	-	-
DDT	0.01 ug/g dry	<0.01	-	-	-
Dieldrin	0.02 ug/g dry	<0.02	-	-	-
Endrin	0.02 ug/g dry	<0.02	-	-	-
Endosulfan I	0.01 ug/g dry	<0.01	-	-	-
Endosulfan II	0.02 ug/g dry	<0.02	-	-	-
Endosulfan I/II	0.02 ug/g dry	<0.02	-	-	-
Heptachlor	0.01 ug/g dry	<0.01	-	-	-
Heptachlor epoxide	0.01 ug/g dry	<0.01	-	-	-
Hexachlorobenzene	0.01 ug/g dry	<0.01	-	-	-
Hexachlorobutadiene	0.01 ug/g dry	<0.01	-	-	-
Hexachloroethane	0.01 ug/g dry	<0.01	-	-	-
Methoxychlor	0.01 ug/g dry	<0.01	-	-	-
Decachlorobiphenyl	Surrogate	80.3%	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	ND	5.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	5.0	ug/g						
Lead	ND	1.0	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						
Pesticides, OC									
Aldrin	ND	0.01	ug/g						
gamma-BHC (Lindane)	ND	0.01	ug/g						
alpha-Chlordane	ND	0.01	ug/g						
gamma-Chlordane	ND	0.01	ug/g						
Chlordane	ND	0.01	ug/g						
o,p'-DDD	ND	0.01	ug/g						
p,p'-DDD	ND	0.02	ug/g						
DDD	ND	0.02	ug/g						
o,p'-DDE	ND	0.01	ug/g						
p,p'-DDE	ND	0.01	ug/g						
DDE	ND	0.01	ug/g						
o,p'-DDT	ND	0.01	ug/g						
p,p'-DDT	ND	0.01	ug/g						
DDT	ND	0.01	ug/g						
Dieldrin	ND	0.02	ug/g						
Endrin	ND	0.02	ug/g						
Endosulfan I	ND	0.01	ug/g						
Endosulfan II	ND	0.02	ug/g						
Endosulfan I/II	ND	0.02	ug/g						
Heptachlor	ND	0.01	ug/g						
Heptachlor epoxide	ND	0.01	ug/g						
Hexachlorobenzene	ND	0.01	ug/g						
Hexachlorobutadiene	ND	0.01	ug/g						
Hexachloroethane	ND	0.01	ug/g						
Methoxychlor	ND	0.01	ug/g						
Surrogate: Decachlorobiphenyl	*0.0810*		*ug/g*		*81.0*	*50-140*			
Volatiles									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	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: Toluene-d8	*2.89*		*ug/g*		*90.2*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	1.2	1.0	ug/g dry	1.2			1.1	30	
Barium	25.5	1.0	ug/g dry	25.7			0.6	30	
Beryllium	ND	0.5	ug/g dry	ND			NC	30	
Boron	ND	5.0	ug/g dry	ND			NC	30	
Cadmium	ND	0.5	ug/g dry	ND			NC	30	
Chromium	9.1	5.0	ug/g dry	9.3			1.9	30	
Cobalt	2.4	1.0	ug/g dry	2.4			1.3	30	
Copper	ND	5.0	ug/g dry	ND			NC	30	
Lead	4.9	1.0	ug/g dry	4.8			0.3	30	
Molybdenum	ND	1.0	ug/g dry	ND			NC	30	
Nickel	ND	5.0	ug/g dry	ND			NC	30	
Selenium	ND	1.0	ug/g dry	ND			NC	30	
Silver	ND	0.3	ug/g dry	ND			NC	30	
Thallium	ND	1.0	ug/g dry	ND			NC	30	
Uranium	ND	1.0	ug/g dry	ND			NC	30	
Vanadium	19.1	10.0	ug/g dry	19.3			1.0	30	
Zinc	26.3	20.0	ug/g dry	25.7			2.4	30	
Pesticides, OC									
Aldrin	ND	0.01	ug/g dry	ND			NC	40	
gamma-BHC (Lindane)	ND	0.01	ug/g dry	ND			NC	40	
alpha-Chlordane	ND	0.01	ug/g dry	ND			NC	40	
gamma-Chlordane	ND	0.01	ug/g dry	ND			NC	40	
o,p'-DDD	ND	0.01	ug/g dry	ND			NC	40	
p,p'-DDD	ND	0.02	ug/g dry	ND			NC	40	
o,p'-DDE	ND	0.01	ug/g dry	ND			NC	40	
p,p'-DDE	ND	0.01	ug/g dry	ND			NC	40	
o,p'-DDT	ND	0.01	ug/g dry	ND			NC	40	
p,p'-DDT	ND	0.01	ug/g dry	ND			NC	40	
Dieldrin	ND	0.02	ug/g dry	ND			NC	40	
Endrin	ND	0.02	ug/g dry	ND			NC	40	
Endosulfan I	ND	0.01	ug/g dry	ND			NC	40	
Endosulfan II	ND	0.02	ug/g dry	ND			NC	40	
Heptachlor	ND	0.01	ug/g dry	ND			NC	40	
Heptachlor epoxide	ND	0.01	ug/g dry	ND			NC	40	
Hexachlorobenzene	ND	0.01	ug/g dry	ND			NC	40	
Hexachlorobutadiene	ND	0.01	ug/g dry	ND			NC	40	
Hexachloroethane	ND	0.01	ug/g dry	ND			NC	40	
Methoxychlor	ND	0.01	ug/g dry	ND			NC	40	
Surrogate: Decachlorobiphenyl	*0.0853*		*ug/g dry*		*77.3*	*50-140*			
Physical Characteristics									
% Solids	85.1	0.1	% by Wt.	80.9			5.1	25	
Volatiles									
Benzene	ND	0.02	ug/g dry	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g dry	ND			NC	50	
Toluene	ND	0.05	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: Toluene-d8	*4.41*		*ug/g dry*		*104*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	176	7	ug/g	ND	88.2	80-120			
F2 PHCs (C10-C16)	66	4	ug/g	ND	75.0	60-140			
F3 PHCs (C16-C34)	195	8	ug/g	ND	90.0	60-140			
F4 PHCs (C34-C50)	125	6	ug/g	ND	91.2	60-140			
Metals									
Antimony	39.4	1.0	ug/g	ND	78.8	70-130			
Arsenic	45.6	1.0	ug/g	ND	90.2	70-130			
Barium	53.0	1.0	ug/g	10.3	85.4	70-130			
Beryllium	48.1	0.5	ug/g	ND	95.9	70-130			
Boron	45.4	5.0	ug/g	ND	89.4	70-130			
Cadmium	42.9	0.5	ug/g	ND	85.7	70-130			
Chromium	50.7	5.0	ug/g	ND	94.0	70-130			
Cobalt	47.0	1.0	ug/g	1.0	92.1	70-130			
Copper	46.4	5.0	ug/g	ND	90.3	70-130			
Lead	45.6	1.0	ug/g	1.9	87.2	70-130			
Molybdenum	43.8	1.0	ug/g	ND	87.5	70-130			
Nickel	47.0	5.0	ug/g	ND	90.8	70-130			
Selenium	44.6	1.0	ug/g	ND	89.1	70-130			
Silver	43.3	0.3	ug/g	ND	86.6	70-130			
Thallium	45.7	1.0	ug/g	ND	91.3	70-130			
Uranium	47.6	1.0	ug/g	ND	94.8	70-130			
Vanadium	55.3	10.0	ug/g	ND	95.2	70-130			
Zinc	53.6	20.0	ug/g	ND	86.6	70-130			
Pesticides, OC									
Aldrin	0.21	0.01	ug/g	ND	93.9	50-140			
gamma-BHC (Lindane)	0.18	0.01	ug/g	ND	83.9	50-140			
alpha-Chlordane	0.19	0.01	ug/g	ND	88.4	50-140			
gamma-Chlordane	0.20	0.01	ug/g	ND	89.3	50-140			
o,p'-DDD	0.20	0.01	ug/g	ND	89.0	50-140			
p,p'-DDD	0.17	0.02	ug/g	ND	76.2	50-140			
o,p'-DDE	0.21	0.01	ug/g	ND	93.1	50-140			
p,p'-DDE	0.18	0.01	ug/g	ND	80.5	50-140			
o,p'-DDT	0.26	0.01	ug/g	ND	119	50-140			
p,p'-DDT	0.19	0.01	ug/g	ND	88.1	50-140			
Dieldrin	0.11	0.02	ug/g	ND	51.4	50-140			
Endosulfan I	0.26	0.01	ug/g	ND	117	50-140			
Endosulfan II	0.16	0.02	ug/g	ND	71.5	50-140			
Heptachlor	0.21	0.01	ug/g	ND	97.2	50-140			
Heptachlor epoxide	0.21	0.01	ug/g	ND	96.9	50-140			
Hexachlorobenzene	0.23	0.01	ug/g	ND	104	50-140			
Hexachlorobutadiene	0.21	0.01	ug/g	ND	97.2	50-140			
Hexachloroethane	0.23	0.01	ug/g	ND	103	50-140			
Methoxychlor	0.16	0.01	ug/g	ND	74.3	50-140			
Surrogate: Decachlorobiphenyl	*0.0986*		*ug/g*		*89.4*	*50-140*			
Volatiles									
Benzene	4.43	0.02	ug/g	ND	111	60-130			
Ethylbenzene	4.45	0.05	ug/g	ND	111	60-130			
Toluene	4.38	0.05	ug/g	ND	110	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
m,p-Xylenes	8.95	0.05	ug/g	ND	112	60-130			
o-Xylene	4.61	0.05	ug/g	ND	115	60-130			
Surrogate: Toluene-d8	*2.95*		*ug/g*		*92.2*	*50-140*			

Qualifier Notes:

None

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.

PARACEL LABORATORIES LTD.

Paracel ID: 2203418

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2203418	№ 134585

Client Name: Gemtech	Project Ref: 100737.002 Perth Golf Course	Page 1 of _
Contact Name: Brenda Thom	Quote #:	Turnaround Time
Address: 32 Steacie Dr. Kanata ON	PO #:	☐ 1 day ☐ 3 day ☐ 2 day ☒ Regular
Telephone: 613-327-2345	E-mail: brenda.thom@gemtec.ca	Date Required:

☒ REG 153/04 ☐ REG 406/19

☒ Table 1 ☐ Res/Park ☐ Med/Fine
☒ Table 2 ☐ Ind/Comm ☐ Coarse
☐ Table 3 ☐ Agri/Other
☐ Table —
For RSC: ☐ Yes ☐ No

Other Regulation: ☐ REG 558 ☐ PWQO ☐ CCME ☐ MISA ☐ SU - Sani ☐ SU - Storm
Mun: ☐ Other:

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

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	Required Analysis: PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	OC Pesticides
1	BH 22-214 SS2	S	n/a	2	Jan 6, 2021	AM	X			X				X
2	BH 22-215 SS3	|	|	|	Jan 6, 2021	PM	X			X				
3	BH 22-216 SS1	|	|	|	Jan 6, 2021	PM	X			X				
4														
5														
6														
7														
8														
9														
10														

Comments:

Method of Delivery: Walk-in

Relinquished By (Sign): Brenda Thom	Received By Driver/Depot:	Received at Lab: Vineeporn Dhirmal	Verified By:
Relinquished By (Print): Brenda Thom	Date/Time: Jan 13/22 4:53pm	Date/Time: Jan 14, 2022 12:40	Date/Time: Jan 14 2022 Nicole
Date/Time: Jan 13, 2022 4:50pm	Temperature: 11.3 °C	Temperature: 8.5 °C	pH Verified: ☐ By:

PARACEL LABORATORIES LTD.
TRUSTED. RESPONSIVE. RELIABLE.

300 - 2319 St. Laurent Blvd
Ottawa, ON, K1G 4J8
1-800-749-1947
www.paracellabs.com

Certificate of Analysis

GEMTEC Consulting Engineers and Scientists Limited

32 Steacie Drive
Kanata, ON K2K 2A9
Attn: Brenda Thom

Client PO: 100737.002
Project: 100737.002 Perth Golf Course
Custody: 129651

Report Date: 1-Feb-2022
Order Date: 26-Jan-2022

Order #: 2205344

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

Paracel ID	Client ID
2205344-01	BH22-221 SS1
2205344-02	BH22-201 SS1
2205344-03	BH22-203 SS1
2205344-04	BH22-207 SS2
2205344-05	BH22-207 SS102
2205344-06	BH22-208 SS1
2205344-07	BH22-209 SS1
2205344-08	BH22-210 SS2
2205344-09	BH22-222 SS102
2205344-10	BH22-222 SS2
2205344-11	BH22-202 SS3

Approved By: Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	26-Jan-22	26-Jan-22
PHC F1	CWS Tier 1 - P&T GC-FID	26-Jan-22	26-Jan-22
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	26-Jan-22	27-Jan-22
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	28-Jan-22	28-Jan-22
Solids, %	Gravimetric, calculation	26-Jan-22	27-Jan-22

Certificate of Analysis

Report Date: 01-Feb-2022

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 26-Jan-2022

Client PO: 100737.002

Project Description: 100737.002 Perth Golf Course

	Client ID:	BH22-221 SS1	BH22-201 SS1	BH22-203 SS1	BH22-207 SS2
	Sample Date:	12-Jan-22 09:00	18-Jan-22 09:00	18-Jan-22 09:00	12-Jan-22 09:00
	Sample ID:	2205344-01	2205344-02	2205344-03	2205344-04
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	73.0	67.6	74.5	85.5
Metals					
Antimony	1.0 ug/g dry	2.1	1.0	<1.0	<1.0
Arsenic	1.0 ug/g dry	2.5	1.8	2.7	1.5
Barium	1.0 ug/g dry	208	60.2	213	114
Beryllium	0.5 ug/g dry	0.8	<0.5	0.7	<0.5
Boron	5.0 ug/g dry	6.0	<5.0	6.8	<5.0
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Chromium	5.0 ug/g dry	31.0	11.8	47.0	20.0
Cobalt	1.0 ug/g dry	6.3	2.9	10.7	4.2
Copper	5.0 ug/g dry	13.2	5.8	15.2	9.2
Lead	1.0 ug/g dry	6.1	8.6	8.7	3.0
Molybdenum	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Nickel	5.0 ug/g dry	14.6	5.4	22.3	8.2
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	1.3	<1.0	<1.0	<1.0
Vanadium	10.0 ug/g dry	39.4	18.7	57.0	24.4
Zinc	20.0 ug/g dry	54.3	24.3	52.6	21.5
Volatiles					
Benzene	0.02 ug/g dry	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Toluene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
o-Xylene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Toluene-d8	Surrogate	122%	111%	101%	113%
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	<4	<4
F3 PHCs (C16-C34)	8 ug/g dry	31 [1]	89 [1]	17	<8
F4 PHCs (C34-C50)	6 ug/g dry	41 [1]	43 [1]	21	<6

Certificate of Analysis

Report Date: 01-Feb-2022

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 26-Jan-2022

Client PO: 100737.002

Project Description: 100737.002 Perth Golf Course

	Client ID:	BH22-207 SS102	BH22-208 SS1	BH22-209 SS1	BH22-210 SS2
	Sample Date:	12-Jan-22 09:00	12-Jan-22 09:00	14-Jan-22 09:00	14-Jan-22 09:00
	Sample ID:	2205344-05	2205344-06	2205344-07	2205344-08
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	83.7	75.8	79.9	83.2
Metals					
Antimony	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Arsenic	1.0 ug/g dry	1.6	4.4	1.8	2.6
Barium	1.0 ug/g dry	145	86.0	73.3	127
Beryllium	0.5 ug/g dry	<0.5	0.7	<0.5	<0.5
Boron	5.0 ug/g dry	<5.0	<5.0	<5.0	<5.0
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Chromium	5.0 ug/g dry	21.0	70.9	16.4	41.7
Cobalt	1.0 ug/g dry	5.2	16.8	5.1	7.3
Copper	5.0 ug/g dry	9.6	44.1	7.1	15.9
Lead	1.0 ug/g dry	3.6	12.1	7.2	3.3
Molybdenum	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Nickel	5.0 ug/g dry	9.7	28.7	7.9	16.9
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	29.8	54.4	26.8	46.7
Zinc	20.0 ug/g dry	25.6	38.3	28.4	31.2
Volatiles					
Benzene	0.02 ug/g dry	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Toluene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
o-Xylene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Toluene-d8	Surrogate	115%	116%	97.6%	100%
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	<4	<4
F3 PHCs (C16-C34)	8 ug/g dry	<8	41 [1]	55 [1]	<8
F4 PHCs (C34-C50)	6 ug/g dry	<6	11 [1]	32 [1]	<6

Certificate of Analysis

Report Date: 01-Feb-2022

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 26-Jan-2022

Client PO: 100737.002

Project Description: 100737.002 Perth Golf Course

	Client ID:	BH22-222 SS102	BH22-222 SS2	BH22-202 SS3	-
	Sample Date:	13-Jan-22 09:00	13-Jan-22 09:00	14-Jan-22 09:00	-
	Sample ID:	2205344-09	2205344-10	2205344-11	-
	MDL/Units	Soil	Soil	Soil	-
Physical Characteristics					
% Solids	0.1 % by Wt.	85.4	80.2	90.5	-
Metals					
Antimony	1.0 ug/g dry	<1.0	<1.0	<1.0	-
Arsenic	1.0 ug/g dry	3.2	1.6	1.3	-
Barium	1.0 ug/g dry	146	85.7	134	-
Beryllium	0.5 ug/g dry	0.6	<0.5	<0.5	-
Boron	5.0 ug/g dry	8.1	<5.0	<5.0	-
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	-
Chromium	5.0 ug/g dry	25.6	15.8	13.5	-
Cobalt	1.0 ug/g dry	7.3	4.2	4.0	-
Copper	5.0 ug/g dry	17.8	10.8	7.7	-
Lead	1.0 ug/g dry	5.3	2.4	2.0	-
Molybdenum	1.0 ug/g dry	<1.0	<1.0	<1.0	-
Nickel	5.0 ug/g dry	15.1	8.5	7.1	-
Selenium	1.0 ug/g dry	<1.0	<1.0	<1.0	-
Silver	0.3 ug/g dry	<0.3	<0.3	<0.3	-
Thallium	1.0 ug/g dry	<1.0	<1.0	<1.0	-
Uranium	1.0 ug/g dry	<1.0	<1.0	<1.0	-
Vanadium	10.0 ug/g dry	41.3	24.2	20.1	-
Zinc	20.0 ug/g dry	25.3	<20.0	<20.0	-
Volatiles					
Benzene	0.02 ug/g dry	<0.02	<0.02	<0.02	-
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Toluene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	<0.05	-
o-Xylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Toluene-d8	Surrogate	115%	118%	94.2%	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	<7	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	<4	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	<8	<8	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	<6	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	ND	5.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	5.0	ug/g						
Lead	ND	1.0	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						
Volatiles									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	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: Toluene-d8	*8.37*		*ug/g*		*105*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	1.9	1.0	ug/g dry	2.1			7.1	30	
Arsenic	1.1	1.0	ug/g dry	2.5			NC	30	
Barium	52.9	1.0	ug/g dry	208			119.0	30	QR-05
Beryllium	ND	0.5	ug/g dry	0.8			NC	30	
Boron	ND	5.0	ug/g dry	6.0			NC	30	
Cadmium	ND	0.5	ug/g dry	ND			NC	30	
Chromium	ND	5.0	ug/g dry	31.0			NC	30	
Cobalt	1.0	1.0	ug/g dry	6.3			NC	30	
Copper	ND	5.0	ug/g dry	13.2			NC	30	
Lead	3.4	1.0	ug/g dry	6.1			NC	30	
Molybdenum	ND	1.0	ug/g dry	ND			NC	30	
Nickel	ND	5.0	ug/g dry	14.6			NC	30	
Selenium	ND	1.0	ug/g dry	ND			NC	30	
Silver	ND	0.3	ug/g dry	ND			NC	30	
Thallium	ND	1.0	ug/g dry	ND			NC	30	
Uranium	ND	1.0	ug/g dry	1.3			NC	30	
Vanadium	ND	10.0	ug/g dry	39.4			NC	30	
Zinc	ND	20.0	ug/g dry	54.3			NC	30	
Physical Characteristics									
% Solids	79.6	0.1	% by Wt.	73.0			8.7	25	
Volatiles									
Benzene	ND	0.02	ug/g dry	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g dry	ND			NC	50	
Toluene	ND	0.05	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: Toluene-d8	*9.45*		*ug/g dry*		*109*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	161	7	ug/g	ND	80.7	80-120			
F2 PHCs (C10-C16)	84	4	ug/g	ND	95.0	60-140			
F3 PHCs (C16-C34)	206	8	ug/g	ND	95.2	60-140			
F4 PHCs (C34-C50)	158	6	ug/g	ND	116	60-140			
Metals									
Antimony	39.9	1.0	ug/g	ND	78.7	70-130			
Arsenic	49.7	1.0	ug/g	1.5	96.4	70-130			
Barium	45.0	1.0	ug/g	ND	90.0	70-130			
Beryllium	47.1	0.5	ug/g	ND	93.5	70-130			
Boron	45.2	5.0	ug/g	ND	82.7	70-130			
Cadmium	41.0	0.5	ug/g	ND	81.8	70-130			
Chromium	58.1	5.0	ug/g	24.3	67.8	70-130			QM-07
Cobalt	47.5	1.0	ug/g	6.6	81.7	70-130			
Copper	50.1	5.0	ug/g	14.6	71.0	70-130			
Lead	46.0	1.0	ug/g	2.6	86.8	70-130			
Molybdenum	42.8	1.0	ug/g	ND	85.1	70-130			
Nickel	50.4	5.0	ug/g	14.4	72.0	70-130			
Selenium	45.7	1.0	ug/g	ND	91.0	70-130			
Silver	40.6	0.3	ug/g	ND	81.1	70-130			
Thallium	44.0	1.0	ug/g	ND	87.7	70-130			
Uranium	46.0	1.0	ug/g	ND	91.7	70-130			
Vanadium	51.3	10.0	ug/g	15.7	71.2	70-130			
Zinc	46.2	20.0	ug/g	ND	92.4	70-130			
Volatiles									
Benzene	2.47	0.02	ug/g	ND	61.9	60-130			
Ethylbenzene	3.97	0.05	ug/g	ND	99.3	60-130			
Toluene	3.93	0.05	ug/g	ND	98.3	60-130			
m,p-Xylenes	8.04	0.05	ug/g	ND	100	60-130			
o-Xylene	4.17	0.05	ug/g	ND	104	60-130			
Surrogate: Toluene-d8	*7.96*		*ug/g*		*99.6*	*50-140*			

Qualifier Notes:

Sample Qualifiers :

1 : Some peak(s) in the GC-FID Chromatogram are not typical of petroleum hydrocarbon distillates. May be the result of high concentrations of non-mineral based compounds not completely removed by the method cleanup. Results may be biased high.

QC Qualifiers :

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

QR-05 : Duplicate RPDs higher than normally accepted. Remaining batch QA\QC was acceptable. May be sample effect.

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.

PARACEL LABORATORIES LTD.

Paracel ID: 2205344

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2205344	№ 129651

Client Name: Gentec	Project Ref: 100737.002 Perth Golf Course	Page 1 of 2
Contact Name: Mohit Bhargav; Brenda Thom	Quote #:	Turnaround Time
Address: 32 Steacie Drive, Kanata, ON K2K2A9	PO #: 100737.002	☐ 1 day ☐ 3 day ☐ 2 day ☒ Regular
Telephone: 5068970427	E-mail: mohit.bhargav@gentec.ca brenda.thom@gentec.ca	Date Required:

Regulation 153/04: ☒ Table 1 ☐ Res/Park ☐ Med/Fine ☒ Table 2 ☐ Ind/Comm ☐ Coarse ☐ Table 3 ☐ Agri/Other ☐ Table ___ For RSC: ☒ Yes ☐ No

Other Regulation: ☐ REG 558 ☐ PWQO ☐ CCME ☐ MISA ☐ SU - Sani ☐ SU - Storm Mun: ☐ Other:

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

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	Required Analysis: PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)
1	BH22-221 SS1	S	NA	2	12 Jan 2022		✓			✓			
2	BH 22-201 SS1	S	N/A	2	18 Jan 2022		✓			✓			
3	BH 22-203 SS1				18 Jan 2022		✓			✓			
4	BH 22-207 SS2				12 Jan 2022		✓			✓			
5	BH 22-207 SS102				12 Jan 2022		✓			✓			
6	BH 22-208 SS1				14 Jan 2022		✓			✓			
7	BH 22-209 SS1				14 Jan 2022		✓			✓			
8	BH 22-210 SS2				14 Jan 2022		✓			✓			
9													
10		↓	↓	↓									

Comments:

Method of Delivery: Drop Box

Relinquished By (Sign): Mohit.	Received By Driver/Depot:	Received at Lab: Shreyaan Dhumal	Verified By:
Relinquished By (Print): MOHIT BHARGAV	Date/Time:	Date/Time: Jan 26, 2022 09.50	Date/Time: Jan 26 2022 3:57
Date/Time: 26 Jan 2022	Temperature: °C	Temperature: 15.3 °C	pH Verified: ☐ By:

PARACE LABORATORIES LT

Paracel ID: 2205344

lvd.
J8
.com

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2205344	№ 134586

Client Name: Gemtec	Project Ref: 100737.002 Perth Golf Course	Page 2 of 2
Contact Name: Brenda Thom	Quote #:	Turnaround Time
Address: 32 Steacie Drive Kanata ON K2K 2A9	PO #: 100737.002	☐ 1 day ☐ 3 day
	E-mail: brenda.thom@gemtec.ca	☐ 2 day ☒ Regular
Telephone: 613-327-2345		Date Required:

☒ REG 153/04 ☐ REG 406/19

☒ Table 1 ☐ Res/Park ☐ Med/Fine
☒ Table 2 ☐ Ind/Comm ☐ Coarse
☐ Table 3 ☐ Agri/Other
☐ Table
For RSC: ☒ Yes ☐ No

Other Regulation: ☐ REG 558 ☐ PWQO ☐ CCME ☐ MISA ☐ SU - Sani ☐ SU - Storm
Mun:
☐ Other:

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

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)					
1	BH22-222 SS102	S	n/a	2	13-Jan 2022		✓			✓								
2	BH22-222 SS2	S	n/a	2	13-Jan 2022		✓			✓								
3	BH22-202 SS3	S	n/a	2	14-Jan 2022		✓			✓								
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Comments:

Method of Delivery: Drop box

Relinquished By (Sign): Mohit.	Received By Driver/Depot:	Received at Lab: Jumeepreet Dhamai	Verified By:
Relinquished By (Print): MOHIT BHARGAV	Date/Time:	Date/Time: Jan 26, 2022 02.50	Date/Time: Jan 26 2022 3:57
Date/Time: 26 Jan 2022	Temperature: °C	Temperature: 15.3 °C	pH Verified: ☐ By:

PARACEL LABORATORIES LTD.
TRUSTED. RESPONSIVE. RELIABLE.

300 - 2319 St. Laurent Blvd
Ottawa, ON, K1G 4J8
1-800-749-1947
www.paracellabs.com

Certificate of Analysis

GEMTEC Consulting Engineers and Scientists Limited

32 Steacie Drive
Kanata, ON K2K 2A9
Attn: Brenda Thom

Client PO: Perth Golf Course
Project: 100737.002
Custody: 135029,135028

Report Date: 8-Feb-2022
Order Date: 3-Feb-2022

Order #: 2206357

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

Paracel ID	Client ID
2206357-01	22-213 SS1
2206357-02	22-226 SS1
2206357-03	22-224 SS1
2206357-04	22-225 SS1
2206357-05	22-227 SS1
2206357-06	22-223 SS1
2206357-07	22-205 SS1
2206357-08	22-219 SS1
2206357-09	22-219 SS101
2206357-10	22-223 SS101
2206357-11	22-220 SS1
2206357-12	22-212 SS1

Approved By: Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	4-Feb-22	5-Feb-22
PHC F1	CWS Tier 1 - P&T GC-FID	4-Feb-22	5-Feb-22
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	3-Feb-22	5-Feb-22
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	4-Feb-22	7-Feb-22
REG 153: Pesticides, OC	EPA 8081B - GC-ECD	3-Feb-22	4-Feb-22
Solids, %	Gravimetric, calculation	4-Feb-22	5-Feb-22

Certificate of Analysis

Report Date: 08-Feb-2022

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 3-Feb-2022

Client PO: Perth Golf Course

Project Description: 100737.002

	Client ID:	22-213 SS1	22-226 SS1	22-224 SS1	22-225 SS1
	Sample Date:	27-Jan-22 09:00	26-Jan-22 09:00	26-Jan-22 12:00	26-Jan-22 12:00
	Sample ID:	2206357-01	2206357-02	2206357-03	2206357-04
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	86.9	83.7	74.1	88.2
Metals					
Antimony	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Arsenic	1.0 ug/g dry	2.2	2.2	2.4	1.4
Barium	1.0 ug/g dry	152	188	233	115
Beryllium	0.5 ug/g dry	<0.5	0.6	0.7	<0.5
Boron	5.0 ug/g dry	6.4	<5.0	6.5	<5.0
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Chromium	5.0 ug/g dry	25.0	32.5	39.6	12.1
Cobalt	1.0 ug/g dry	7.7	11.1	11.3	3.3
Copper	5.0 ug/g dry	15.6	12.0	21.3	7.2
Lead	1.0 ug/g dry	4.9	5.6	7.5	2.0
Molybdenum	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Nickel	5.0 ug/g dry	14.7	16.8	22.7	6.5
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	1.1	<1.0	<1.0
Vanadium	10.0 ug/g dry	39.1	50.8	58.5	20.8
Zinc	20.0 ug/g dry	32.6	62.6	75.6	<20.0
Volatiles					
Benzene	0.02 ug/g dry	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Toluene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
o-Xylene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Toluene-d8	Surrogate	112%	117%	118%	112%
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	<4	<4
F3 PHCs (C16-C34)	8 ug/g dry	<8	<8	<8	<8
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	<6	<6
Pesticides, OC					
Aldrin	0.01 ug/g dry	-	<0.01	<0.01	-

Certificate of Analysis

Report Date: 08-Feb-2022

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 3-Feb-2022

Client PO: Perth Golf Course

Project Description: 100737.002

	Client ID:	22-213 SS1	22-226 SS1	22-224 SS1	22-225 SS1
	Sample Date:	27-Jan-22 09:00	26-Jan-22 09:00	26-Jan-22 12:00	26-Jan-22 12:00
	Sample ID:	2206357-01	2206357-02	2206357-03	2206357-04
	MDL/Units	Soil	Soil	Soil	Soil
gamma-BHC (Lindane)	0.01 ug/g dry	-	<0.01	<0.01	-
alpha-Chlordane	0.01 ug/g dry	-	<0.01	<0.01	-
gamma-Chlordane	0.01 ug/g dry	-	<0.01	<0.01	-
Chlordane	0.01 ug/g dry	-	<0.01	<0.01	-
o,p'-DDD	0.01 ug/g dry	-	<0.01	<0.01	-
p,p'-DDD	0.02 ug/g dry	-	<0.02	<0.02	-
DDD	0.02 ug/g dry	-	<0.02	<0.02	-
o,p'-DDE	0.01 ug/g dry	-	<0.01	<0.01	-
p,p'-DDE	0.01 ug/g dry	-	<0.01	<0.01	-
DDE	0.01 ug/g dry	-	<0.01	<0.01	-
o,p'-DDT	0.01 ug/g dry	-	<0.01	<0.01	-
p,p'-DDT	0.01 ug/g dry	-	<0.01	<0.01	-
DDT	0.01 ug/g dry	-	<0.01	<0.01	-
Dieldrin	0.02 ug/g dry	-	<0.02	<0.02	-
Endrin	0.02 ug/g dry	-	<0.02	<0.02	-
Endosulfan I	0.01 ug/g dry	-	<0.01	<0.01	-
Endosulfan II	0.02 ug/g dry	-	<0.02	<0.02	-
Endosulfan I/II	0.02 ug/g dry	-	<0.02	<0.02	-
Heptachlor	0.01 ug/g dry	-	<0.01	<0.01	-
Heptachlor epoxide	0.01 ug/g dry	-	<0.01	<0.01	-
Hexachlorobenzene	0.01 ug/g dry	-	<0.01	<0.01	-
Hexachlorobutadiene	0.01 ug/g dry	-	<0.01	<0.01	-
Hexachloroethane	0.01 ug/g dry	-	<0.01	<0.01	-
Methoxychlor	0.01 ug/g dry	-	<0.01	<0.01	-
Decachlorobiphenyl	Surrogate	-	52.8%	72.0%	-

Certificate of Analysis

Report Date: 08-Feb-2022

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 3-Feb-2022

Client PO: Perth Golf Course

Project Description: 100737.002

	Client ID:	22-227 SS1	22-223 SS1	22-205 SS1	22-219 SS1
	Sample Date:	25-Jan-22 12:00	25-Jan-22 12:00	27-Jan-22 09:00	27-Jan-22 09:00
	Sample ID:	2206357-05	2206357-06	2206357-07	2206357-08
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	67.5	66.5	75.9	87.9
Metals					
Antimony	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Arsenic	1.0 ug/g dry	1.5	3.6	2.2	1.2
Barium	1.0 ug/g dry	96.3	382	271	43.2
Beryllium	0.5 ug/g dry	<0.5	1.0	0.6	<0.5
Boron	5.0 ug/g dry	<5.0	8.4	<5.0	<5.0
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Chromium	5.0 ug/g dry	21.0	58.4	28.7	13.6
Cobalt	1.0 ug/g dry	6.9	17.1	7.6	4.5
Copper	5.0 ug/g dry	8.1	31.8	13.5	<5.0
Lead	1.0 ug/g dry	6.5	8.3	8.0	2.8
Molybdenum	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Nickel	5.0 ug/g dry	10.3	33.7	14.0	6.5
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	1.8	<1.0	<1.0
Vanadium	10.0 ug/g dry	33.1	84.5	44.3	22.1
Zinc	20.0 ug/g dry	43.2	103	42.9	<20.0
Volatiles					
Benzene	0.02 ug/g dry	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Toluene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
o-Xylene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Toluene-d8	Surrogate	127%	124%	121%	112%
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	<4	<4
F3 PHCs (C16-C34)	8 ug/g dry	<8	<8	<8	<8
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	<6	<6
Pesticides, OC					
Aldrin	0.01 ug/g dry	<0.01	<0.01	-	<0.01

Certificate of Analysis

Report Date: 08-Feb-2022

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 3-Feb-2022

Client PO: Perth Golf Course

Project Description: 100737.002

	Client ID:	22-227 SS1	22-223 SS1	22-205 SS1	22-219 SS1
	Sample Date:	25-Jan-22 12:00	25-Jan-22 12:00	27-Jan-22 09:00	27-Jan-22 09:00
	Sample ID:	2206357-05	2206357-06	2206357-07	2206357-08
	MDL/Units	Soil	Soil	Soil	Soil
gamma-BHC (Lindane)	0.01 ug/g dry	<0.01	<0.01	-	<0.01
alpha-Chlordane	0.01 ug/g dry	<0.01	<0.01	-	<0.01
gamma-Chlordane	0.01 ug/g dry	<0.01	<0.01	-	<0.01
Chlordane	0.01 ug/g dry	<0.01	<0.01	-	<0.01
o,p'-DDD	0.01 ug/g dry	<0.01	<0.01	-	<0.01
p,p'-DDD	0.02 ug/g dry	<0.02	<0.02	-	<0.02
DDD	0.02 ug/g dry	<0.02	<0.02	-	<0.02
o,p'-DDE	0.01 ug/g dry	<0.01	<0.01	-	<0.01
p,p'-DDE	0.01 ug/g dry	<0.01	<0.01	-	<0.01
DDE	0.01 ug/g dry	<0.01	<0.01	-	<0.01
o,p'-DDT	0.01 ug/g dry	<0.01	<0.01	-	<0.01
p,p'-DDT	0.01 ug/g dry	<0.01	<0.01	-	<0.01
DDT	0.01 ug/g dry	<0.01	<0.01	-	<0.01
Dieldrin	0.02 ug/g dry	<0.02	<0.02	-	<0.02
Endrin	0.02 ug/g dry	<0.02	<0.02	-	<0.02
Endosulfan I	0.01 ug/g dry	<0.01	<0.01	-	<0.01
Endosulfan II	0.02 ug/g dry	<0.02	<0.02	-	<0.02
Endosulfan I/II	0.02 ug/g dry	<0.02	<0.02	-	<0.02
Heptachlor	0.01 ug/g dry	<0.01	<0.01	-	<0.01
Heptachlor epoxide	0.01 ug/g dry	<0.01	<0.01	-	<0.01
Hexachlorobenzene	0.01 ug/g dry	<0.01	<0.01	-	<0.01
Hexachlorobutadiene	0.01 ug/g dry	<0.01	<0.01	-	<0.01
Hexachloroethane	0.01 ug/g dry	<0.01	<0.01	-	<0.01
Methoxychlor	0.01 ug/g dry	<0.01	<0.01	-	<0.01
Decachlorobiphenyl	Surrogate	90.8%	72.5%	-	72.0%

Certificate of Analysis

Report Date: 08-Feb-2022

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 3-Feb-2022

Client PO: Perth Golf Course

Project Description: 100737.002

	Client ID:	22-219 SS101	22-223 SS101	22-220 SS1	22-212 SS1
	Sample Date:	27-Jan-22 09:00	25-Jan-22 00:00	27-Jan-22 00:00	27-Jan-22 00:00
	Sample ID:	2206357-09	2206357-10	2206357-11	2206357-12
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	88.9	39.0	83.7	77.0
Metals					
Antimony	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Arsenic	1.0 ug/g dry	1.3	2.6	2.0	3.4
Barium	1.0 ug/g dry	46.7	273	127	381
Beryllium	0.5 ug/g dry	<0.5	0.8	<0.5	1.0
Boron	5.0 ug/g dry	<5.0	7.0	<5.0	8.0
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Chromium	5.0 ug/g dry	17.2	43.3	24.2	50.1
Cobalt	1.0 ug/g dry	5.5	13.3	6.8	14.2
Copper	5.0 ug/g dry	<5.0	24.4	11.6	27.3
Lead	1.0 ug/g dry	3.4	8.1	3.8	7.3
Molybdenum	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Nickel	5.0 ug/g dry	7.6	24.4	12.8	28.1
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	3.6	<1.0	<1.0
Vanadium	10.0 ug/g dry	27.9	62.2	36.5	64.2
Zinc	20.0 ug/g dry	<20.0	90.9	26.1	66.5
Volatiles					
Benzene	0.02 ug/g dry	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Toluene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
o-Xylene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Toluene-d8	Surrogate	114%	139%	119%	125%
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	<4	<4
F3 PHCs (C16-C34)	8 ug/g dry	<8	<8	<8	<8
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	<6	<6
Pesticides, OC					
Aldrin	0.01 ug/g dry	-	<0.01	-	<0.01

	Client ID:	22-219 SS101	22-223 SS101	22-220 SS1	22-212 SS1
	Sample Date:	27-Jan-22 09:00	25-Jan-22 00:00	27-Jan-22 00:00	27-Jan-22 00:00
	Sample ID:	2206357-09	2206357-10	2206357-11	2206357-12
	MDL/Units	Soil	Soil	Soil	Soil
gamma-BHC (Lindane)	0.01 ug/g dry	-	<0.01	-	<0.01
alpha-Chlordane	0.01 ug/g dry	-	<0.01	-	<0.01
gamma-Chlordane	0.01 ug/g dry	-	<0.01	-	<0.01
Chlordane	0.01 ug/g dry	-	<0.01	-	<0.01
o,p'-DDD	0.01 ug/g dry	-	<0.01	-	<0.01
p,p'-DDD	0.02 ug/g dry	-	<0.02	-	<0.02
DDD	0.02 ug/g dry	-	<0.02	-	<0.02
o,p'-DDE	0.01 ug/g dry	-	<0.01	-	<0.01
p,p'-DDE	0.01 ug/g dry	-	<0.01	-	<0.01
DDE	0.01 ug/g dry	-	<0.01	-	<0.01
o,p'-DDT	0.01 ug/g dry	-	<0.01	-	<0.01
p,p'-DDT	0.01 ug/g dry	-	<0.01	-	<0.01
DDT	0.01 ug/g dry	-	<0.01	-	<0.01
Dieldrin	0.02 ug/g dry	-	<0.02	-	<0.02
Endrin	0.02 ug/g dry	-	<0.02	-	<0.02
Endosulfan I	0.01 ug/g dry	-	<0.01	-	<0.01
Endosulfan II	0.02 ug/g dry	-	<0.02	-	<0.02
Endosulfan I/II	0.02 ug/g dry	-	<0.02	-	<0.02
Heptachlor	0.01 ug/g dry	-	<0.01	-	<0.01
Heptachlor epoxide	0.01 ug/g dry	-	<0.01	-	<0.01
Hexachlorobenzene	0.01 ug/g dry	-	<0.01	-	<0.01
Hexachlorobutadiene	0.01 ug/g dry	-	<0.01	-	<0.01
Hexachloroethane	0.01 ug/g dry	-	<0.01	-	<0.01
Methoxychlor	0.01 ug/g dry	-	<0.01	-	<0.01
Decachlorobiphenyl	Surrogate	-	60.6%	-	53.0%

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	ND	5.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	5.0	ug/g						
Lead	ND	1.0	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						
Pesticides, OC									
Aldrin	ND	0.01	ug/g						
gamma-BHC (Lindane)	ND	0.01	ug/g						
alpha-Chlordane	ND	0.01	ug/g						
gamma-Chlordane	ND	0.01	ug/g						
Chlordane	ND	0.01	ug/g						
o,p'-DDD	ND	0.01	ug/g						
p,p'-DDD	ND	0.02	ug/g						
DDD	ND	0.02	ug/g						
o,p'-DDE	ND	0.01	ug/g						
p,p'-DDE	ND	0.01	ug/g						
DDE	ND	0.01	ug/g						
o,p'-DDT	ND	0.01	ug/g						
p,p'-DDT	ND	0.01	ug/g						
DDT	ND	0.01	ug/g						
Dieldrin	ND	0.02	ug/g						
Endrin	ND	0.02	ug/g						
Endosulfan I	ND	0.01	ug/g						
Endosulfan II	ND	0.02	ug/g						
Endosulfan I/II	ND	0.02	ug/g						
Heptachlor	ND	0.01	ug/g						
Heptachlor epoxide	ND	0.01	ug/g						
Hexachlorobenzene	ND	0.01	ug/g						
Hexachlorobutadiene	ND	0.01	ug/g						
Hexachloroethane	ND	0.01	ug/g						
Methoxychlor	ND	0.01	ug/g						
Surrogate: Decachlorobiphenyl	*0.0716*		*ug/g*		*71.6*	*50-140*			
Volatiles									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	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: Toluene-d8	*3.31*		*ug/g*		*104*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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)	44	8	ug/g dry	40			8.9	30	
F4 PHCs (C34-C50)	144	6	ug/g dry	154			6.5	30	
Metals									
Antimony	2.0	1.0	ug/g dry	ND			NC	30	
Arsenic	6.8	1.0	ug/g dry	6.7			0.8	30	
Barium	72.2	1.0	ug/g dry	77.9			7.6	30	
Beryllium	0.9	0.5	ug/g dry	0.9			1.8	30	
Boron	26.4	5.0	ug/g dry	27.0			2.3	30	
Cadmium	ND	0.5	ug/g dry	ND			NC	30	
Chromium	23.1	5.0	ug/g dry	25.1			8.2	30	
Cobalt	14.5	1.0	ug/g dry	15.3			5.6	30	
Copper	7.5	5.0	ug/g dry	8.2			9.2	30	
Lead	7.0	1.0	ug/g dry	7.1			2.3	30	
Molybdenum	1.2	1.0	ug/g dry	ND			NC	30	
Nickel	29.0	5.0	ug/g dry	31.8			9.2	30	
Selenium	ND	1.0	ug/g dry	ND			NC	30	
Silver	ND	0.3	ug/g dry	ND			NC	30	
Thallium	ND	1.0	ug/g dry	ND			NC	30	
Uranium	ND	1.0	ug/g dry	ND			NC	30	
Vanadium	26.6	10.0	ug/g dry	28.4			6.6	30	
Zinc	60.5	20.0	ug/g dry	64.3			6.1	30	
Pesticides, OC									
Aldrin	ND	0.01	ug/g dry	ND			NC	40	
gamma-BHC (Lindane)	ND	0.01	ug/g dry	ND			NC	40	
alpha-Chlordane	ND	0.01	ug/g dry	ND			NC	40	
gamma-Chlordane	ND	0.01	ug/g dry	ND			NC	40	
o,p'-DDD	ND	0.01	ug/g dry	ND			NC	40	
p,p'-DDD	ND	0.02	ug/g dry	ND			NC	40	
o,p'-DDE	ND	0.01	ug/g dry	ND			NC	40	
p,p'-DDE	ND	0.01	ug/g dry	ND			NC	40	
o,p'-DDT	ND	0.01	ug/g dry	ND			NC	40	
p,p'-DDT	ND	0.01	ug/g dry	ND			NC	40	
Dieldrin	ND	0.02	ug/g dry	ND			NC	40	
Endrin	ND	0.02	ug/g dry	ND			NC	40	
Endosulfan I	ND	0.01	ug/g dry	ND			NC	40	
Endosulfan II	ND	0.02	ug/g dry	ND			NC	40	
Heptachlor	ND	0.01	ug/g dry	ND			NC	40	
Heptachlor epoxide	ND	0.01	ug/g dry	ND			NC	40	
Hexachlorobenzene	ND	0.01	ug/g dry	ND			NC	40	
Hexachlorobutadiene	ND	0.01	ug/g dry	ND			NC	40	
Hexachloroethane	ND	0.01	ug/g dry	ND			NC	40	
Methoxychlor	0.21	0.01	ug/g dry	ND			NC	40	
Surrogate: Decachlorobiphenyl	*0.152*		*ug/g dry*		*127*	*50-140*			
Physical Characteristics									
% Solids	85.3	0.1	% by Wt.	87.2			2.2	25	
Volatiles									
Benzene	ND	0.02	ug/g dry	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g dry	ND			NC	50	
Toluene	ND	0.05	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: Toluene-d8	*4.96*		*ug/g dry*		*120*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	227	7	ug/g	ND	114	80-120			
F2 PHCs (C10-C16)	74	4	ug/g	ND	87.5	60-140			
F3 PHCs (C16-C34)	243	8	ug/g	40	98.5	60-140			
F4 PHCs (C34-C50)	317	6	ug/g	154	125	60-140			
Metals									
Antimony	43.8	1.0	ug/g	ND	87.6	70-130			
Arsenic	50.8	1.0	ug/g	2.7	96.3	70-130			
Barium	74.1	1.0	ug/g	31.2	85.9	70-130			
Beryllium	45.5	0.5	ug/g	ND	90.2	70-130			
Boron	53.7	5.0	ug/g	10.8	85.7	70-130			
Cadmium	43.4	0.5	ug/g	ND	86.7	70-130			
Chromium	56.9	5.0	ug/g	10.0	93.8	70-130			
Cobalt	53.0	1.0	ug/g	6.1	93.7	70-130			
Copper	48.3	5.0	ug/g	ND	90.1	70-130			
Lead	45.4	1.0	ug/g	2.9	85.1	70-130			
Molybdenum	47.2	1.0	ug/g	ND	93.7	70-130			
Nickel	56.7	5.0	ug/g	12.7	87.9	70-130			
Selenium	45.9	1.0	ug/g	ND	91.7	70-130			
Silver	34.2	0.3	ug/g	ND	68.4	70-130			
Thallium	43.7	1.0	ug/g	ND	87.2	70-130			
Uranium	45.2	1.0	ug/g	ND	90.0	70-130			
Vanadium	58.6	10.0	ug/g	11.4	94.4	70-130			
Zinc	68.2	20.0	ug/g	25.7	84.9	70-130			
Pesticides, OC									
Aldrin	0.25	0.01	ug/g	ND	105	50-140			
gamma-BHC (Lindane)	0.22	0.01	ug/g	ND	90.8	50-140			
alpha-Chlordane	0.24	0.01	ug/g	ND	98.3	50-140			
gamma-Chlordane	0.24	0.01	ug/g	ND	100	50-140			
o,p'-DDD	0.23	0.01	ug/g	ND	95.4	50-140			
p,p'-DDD	0.20	0.02	ug/g	ND	83.3	50-140			
o,p'-DDE	0.24	0.01	ug/g	ND	99.3	50-140			
p,p'-DDE	0.21	0.01	ug/g	ND	89.7	50-140			
o,p'-DDT	0.31	0.01	ug/g	ND	128	50-140			
p,p'-DDT	0.21	0.01	ug/g	ND	88.6	50-140			
Dieldrin	0.16	0.02	ug/g	ND	67.3	50-140			
Endosulfan I	0.28	0.01	ug/g	ND	119	50-140			
Endosulfan II	0.19	0.02	ug/g	ND	78.2	50-140			
Heptachlor	0.26	0.01	ug/g	ND	107	50-140			
Heptachlor epoxide	0.27	0.01	ug/g	ND	111	50-140			
Hexachlorobenzene	0.27	0.01	ug/g	ND	113	50-140			
Hexachlorobutadiene	0.25	0.01	ug/g	ND	103	50-140			
Hexachloroethane	0.25	0.01	ug/g	ND	104	50-140			
Methoxychlor	0.18	0.01	ug/g	ND	77.2	50-140			
Surrogate: Decachlorobiphenyl	*0.0939*		*ug/g*		*78.5*	*50-140*			
Volatiles									
Benzene	2.64	0.02	ug/g	ND	66.0	60-130			
Ethylbenzene	3.46	0.05	ug/g	ND	86.5	60-130			
Toluene	3.02	0.05	ug/g	ND	75.4	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
m,p-Xylenes	6.76	0.05	ug/g	ND	84.5	60-130			
o-Xylene	2.67	0.05	ug/g	ND	66.6	60-130			
Surrogate: Toluene-d8	*2.91*		*ug/g*		*91.0*	*50-140*			

Qualifier Notes:

Login Qualifiers :

Container and COC sample IDs don't match - 250mL jar is labelled 22-226 SA101, the lid 22-226 SS1, chain of custody reads 22-226 SS1

Applies to samples: 22-226 SS1

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.

PARACE LABORATORIES L

Paracel ID: 2206357

Blvd.
4J8
bs.com
m

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only) № 135029

Client Name: Gemtec	Project Ref: Perth Golf Course	Page 1 of 2
Contact Name: Brenda Thom	Quote #:	Turnaround Time
Address: 32 Steacie Dr. Ottawa On K2K 2A9	PO #: 100737.002	☐ 1 day ☐ 3 day
	E-mail: brenda.thom@gemtec.ca	☐ 2 day ☒ Regular
Telephone: 613-327-2345		Date Required:

☒ REG 153/04 ☐ REG 406/19

☐ Table 1 ☐ Res/Park ☐ Med/Fine
☒ Table 2 ☐ Ind/Comm ☐ Coarse
☐ Table 3 ☐ Agri/Other
☐ Table ___
For RSC: ☒ Yes ☐ No

Other Regulation: ☐ REG 558 ☐ PWQO ☐ CCME ☐ MISA ☐ SU - Sani ☐ SU - Storm
Mun: ___
☐ Other:

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

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	OC Pest.
1	BH22-213 SS1	S	n/a	2	27-Jan-22	AM	X			X				
2	22-226 SS1	S	n/a	2	25-Jan-22	AM	X			X				X
3	22-224 SS1	S	n/a	2	26-Jan-22	PM	X			X				X
4	~~BH 22-226 SS101~~	~~S~~	~~n/a~~	~~2~~	~~26-Jan-22~~	~~AM~~	~~X~~			~~X~~				~~X~~
5	22-225 SS1	S	n/a	2	26-Jan-22	PM	X			X				
6	22-227 SS1	S	n/a	2	25-Jan-22	PM	X			X				X
7	22-223 SS1	S	n/a	2	25-Jan-22	PM	X			X				X
8	22-205 SS1	S	n/a	2	27-01-22	AM	X			X				
9	22-219 SS1	S	n/a	2	27-01-22	AM	X			X				X
10	22-219 SS101	S	n/a	2	27-01-22	AM	X			X				[illegible]

Comments:

Method of Delivery: Walk-

Relinquished By (Sign): Brenda Thom	Received By Driver/Depot:	Received at Lab: Jinnaporn Dakmai	Verified By:
Relinquished By (Print): B. Thom	Date/Time: Feb 3/22	Date/Time: Feb 03, 2022 12.15	Date/Time: Feb 3 2022 1244
Date/Time: ~~Feb 3, 2022 9:03~~ 9:04	Temperature: 7.1 °C	Temperature: 8.3 °C	pH Verified: ☐ By:

Paracel ID: 2206357

PARACEL LABORATORIES

...urent Blvd.
... K1G 4J8
...47
...cellabs.com
...s.com

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
	№ 135028

Client Name: GEMTEC	Project Ref: Perth Golf Course		Page 2 of 2
Contact Name: Brenda Thom	Quote #:		**Turnaround Time**
Address: 32 Steacie Dr Ottawa K2R 2A9	PO #: 100737.002		☐ 1 day ☐ 3 day
	E-mail: brenda.thom@gemtec.ca		☐ 2 day ☒ Regular
Telephone: 613-327-2345			Date Required:

☐ REG 153/04 ☐ REG 406/19 | Other Regulation

☐ Table 1 ☐ Res/Park ☐ Med/Fine | ☐ REG 558 ☐ PWQO
☐ Table 2 ☐ Ind/Comm ☐ Coarse | ☐ CCME ☐ MISA
☐ Table 3 ☐ Agri/Other | ☐ SU - Sani ☐ SU - Storm
☐ Table ___ | Mun: ___
For RSC: ☐ Yes ☐ No | ☐ Other:

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

Required Analysis

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	OC Pest				
1	22-223 SS107				25·01·22		X			X				X				
2	22-220 SS1				27·01·22		X			X								
3	22-212 SS1				27·01·22		X			X				X				
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Comments:

Method of Delivery: walk-in

Relinquished By (Sign): BThom	Received By Driver/Depot:	Received at Lab: Juneepnn Dhmi	Verified By:
Relinquished By (Print): Brenda Thom	Date/Time: Feb 3/22	Date/Time: Feb 03, 2022 12.15	Date/Time: Feb 3 2022 1244
Date/Time: Feb 3 2022 9:03	Temperature: 7.1 °C	Temperature: 2.3 °C	pH Verified: ☐ By:

9:04

PARACEL LABORATORIES LTD.
TRUSTED. RESPONSIVE. RELIABLE.

300 - 2319 St. Laurent Blvd
Ottawa, ON, K1G 4J8
1-800-749-1947
www.paracellabs.com

Certificate of Analysis

GEMTEC Consulting Engineers and Scientists Limited

32 Steacie Drive
Kanata, ON K2K 2A9
Attn: Brenda Thom

Client PO: Perth Golf Course
Project: 100737.002
Custody: 62943

Report Date: 10-Feb-2022
Order Date: 4-Feb-2022

Order #: 2206479

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

Paracel ID	Client ID
2206479-01	BH22-206 SA2
2206479-02	22-206 SA1
2206479-03	22-226 SS2
2206479-04	22-228 SS1

Approved By: Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 10-Feb-2022

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 4-Feb-2022

Client PO: Perth Golf Course

Project Description: 100737.002

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	7-Feb-22	7-Feb-22
PHC F1	CWS Tier 1 - P&T GC-FID	7-Feb-22	7-Feb-22
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	4-Feb-22	7-Feb-22
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	7-Feb-22	7-Feb-22
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	5-Feb-22	9-Feb-22
REG 153: Pesticides, OC	EPA 8081B - GC-ECD	4-Feb-22	7-Feb-22
Solids, %	Gravimetric, calculation	5-Feb-22	7-Feb-22

Certificate of Analysis

Report Date: 10-Feb-2022

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 4-Feb-2022

Client PO: Perth Golf Course

Project Description: 100737.002

	Client ID:	BH22-206 SA2	22-206 SA1	22-226 SS2	22-228 SS1
	Sample Date:	26-Jan-22 12:00	26-Jan-22 12:00	26-Jan-22 09:00	28-Jan-22 09:00
	Sample ID:	2206479-01	2206479-02	2206479-03	2206479-04
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	87.5	76.9	69.7	82.6
Metals					
Antimony	1.0 ug/g dry	<1.0	-	<1.0	<1.0
Arsenic	1.0 ug/g dry	1.3	-	3.6	1.7
Barium	1.0 ug/g dry	93.3	-	475	175
Beryllium	0.5 ug/g dry	<0.5	-	1.3	0.5
Boron	5.0 ug/g dry	<5.0	-	7.8	<5.0
Cadmium	0.5 ug/g dry	0.7	-	<0.5	<0.5
Chromium	5.0 ug/g dry	14.3	-	66.2	29.9
Cobalt	1.0 ug/g dry	4.5	-	17.2	9.5
Copper	5.0 ug/g dry	9.6	-	32.3	31.5
Lead	1.0 ug/g dry	2.7	-	9.1	6.7
Molybdenum	1.0 ug/g dry	<1.0	-	<1.0	<1.0
Nickel	5.0 ug/g dry	9.2	-	37.0	13.6
Selenium	1.0 ug/g dry	<1.0	-	<1.0	<1.0
Silver	0.3 ug/g dry	<0.3	-	<0.3	<0.3
Thallium	1.0 ug/g dry	<1.0	-	<1.0	<1.0
Uranium	1.0 ug/g dry	<1.0	-	1.3	1.1
Vanadium	10.0 ug/g dry	22.9	-	86.2	36.8
Zinc	20.0 ug/g dry	265	-	112	66.4
Volatiles					
Benzene	0.02 ug/g dry	<0.02	-	<0.02	<0.02
Ethylbenzene	0.05 ug/g dry	<0.05	-	<0.05	<0.05
Toluene	0.05 ug/g dry	<0.05	-	<0.05	<0.05
m,p-Xylenes	0.05 ug/g dry	<0.05	-	<0.05	<0.05
o-Xylene	0.05 ug/g dry	<0.05	-	<0.05	<0.05
Xylenes, total	0.05 ug/g dry	<0.05	-	<0.05	<0.05
Toluene-d8	Surrogate	118%	-	125%	114%
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	-	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	<4	-	<4	<4
F3 PHCs (C16-C34)	8 ug/g dry	<8	-	<8	<8
F4 PHCs (C34-C50)	6 ug/g dry	<6	-	<6	<6
Semi-Volatiles					
Acenaphthene	0.02 ug/g dry	-	<0.02	-	-

Certificate of Analysis

Report Date: 10-Feb-2022

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 4-Feb-2022

Client PO: Perth Golf Course

Project Description: 100737.002

	Client ID:	BH22-206 SA2	22-206 SA1	22-226 SS2	22-228 SS1
	Sample Date:	26-Jan-22 12:00	26-Jan-22 12:00	26-Jan-22 09:00	28-Jan-22 09:00
	Sample ID:	2206479-01	2206479-02	2206479-03	2206479-04
	MDL/Units	Soil	Soil	Soil	Soil
Acenaphthylene	0.02 ug/g dry	-	<0.02	-	-
Anthracene	0.02 ug/g dry	-	<0.02	-	-
Benzo [a] anthracene	0.02 ug/g dry	-	<0.02	-	-
Benzo [a] pyrene	0.02 ug/g dry	-	<0.02	-	-
Benzo [b] fluoranthene	0.02 ug/g dry	-	<0.02	-	-
Benzo [g,h,i] perylene	0.02 ug/g dry	-	<0.02	-	-
Benzo [k] fluoranthene	0.02 ug/g dry	-	<0.02	-	-
Chrysene	0.02 ug/g dry	-	<0.02	-	-
Dibenzo [a,h] anthracene	0.02 ug/g dry	-	<0.02	-	-
Fluoranthene	0.02 ug/g dry	-	<0.02	-	-
Fluorene	0.02 ug/g dry	-	<0.02	-	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	-	<0.02	-	-
1-Methylnaphthalene	0.02 ug/g dry	-	<0.02	-	-
2-Methylnaphthalene	0.02 ug/g dry	-	<0.02	-	-
Methylnaphthalene (1&2)	0.04 ug/g dry	-	<0.04	-	-
Naphthalene	0.01 ug/g dry	-	<0.01	-	-
Phenanthrene	0.02 ug/g dry	-	<0.02	-	-
Pyrene	0.02 ug/g dry	-	<0.02	-	-
2-Fluorobiphenyl	Surrogate	-	76.0%	-	-
Terphenyl-d14	Surrogate	-	92.4%	-	-
Pesticides, OC					
Aldrin	0.01 ug/g dry	<0.01	-	<0.01	<0.01
gamma-BHC (Lindane)	0.01 ug/g dry	<0.01	-	<0.01	<0.01
alpha-Chlordane	0.01 ug/g dry	<0.01	-	<0.01	<0.01
gamma-Chlordane	0.01 ug/g dry	<0.01	-	<0.01	<0.01
Chlordane	0.01 ug/g dry	<0.01	-	<0.01	<0.01
o,p'-DDD	0.01 ug/g dry	<0.01	-	<0.01	<0.01
p,p'-DDD	0.02 ug/g dry	<0.02	-	<0.02	<0.02
DDD	0.02 ug/g dry	<0.02	-	<0.02	<0.02
o,p'-DDE	0.01 ug/g dry	<0.01	-	<0.01	<0.01
p,p'-DDE	0.01 ug/g dry	<0.01	-	<0.01	<0.01
DDE	0.01 ug/g dry	<0.01	-	<0.01	<0.01
o,p'-DDT	0.01 ug/g dry	<0.01	-	<0.01	<0.01
p,p'-DDT	0.01 ug/g dry	<0.01	-	<0.01	<0.01
DDT	0.01 ug/g dry	<0.01	-	<0.01	<0.01
Dieldrin	0.02 ug/g dry	<0.02	-	<0.02	<0.02

Certificate of Analysis

Report Date: 10-Feb-2022

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 4-Feb-2022

Client PO: Perth Golf Course

Project Description: 100737.002

	Client ID:	BH22-206 SA2	22-206 SA1	22-226 SS2	22-228 SS1
	Sample Date:	26-Jan-22 12:00	26-Jan-22 12:00	26-Jan-22 09:00	28-Jan-22 09:00
	Sample ID:	2206479-01	2206479-02	2206479-03	2206479-04
	MDL/Units	Soil	Soil	Soil	Soil
Endrin	0.02 ug/g dry	<0.02	-	<0.02	<0.02
Endosulfan I	0.01 ug/g dry	<0.01	-	<0.01	<0.01
Endosulfan II	0.02 ug/g dry	<0.02	-	<0.02	<0.02
Endosulfan I/II	0.02 ug/g dry	<0.02	-	<0.02	<0.02
Heptachlor	0.01 ug/g dry	<0.01	-	<0.01	<0.01
Heptachlor epoxide	0.01 ug/g dry	<0.01	-	<0.01	<0.01
Hexachlorobenzene	0.01 ug/g dry	<0.01	-	<0.01	<0.01
Hexachlorobutadiene	0.01 ug/g dry	<0.01	-	<0.01	<0.01
Hexachloroethane	0.01 ug/g dry	<0.01	-	<0.01	<0.01
Methoxychlor	0.01 ug/g dry	<0.01	-	<0.01	<0.01
Decachlorobiphenyl	Surrogate	57.0%	-	63.8%	72.9%

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	ND	5.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	5.0	ug/g						
Lead	ND	1.0	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						
Pesticides, OC									
Aldrin	ND	0.01	ug/g						
gamma-BHC (Lindane)	ND	0.01	ug/g						
alpha-Chlordane	ND	0.01	ug/g						
gamma-Chlordane	ND	0.01	ug/g						
Chlordane	ND	0.01	ug/g						
o,p'-DDD	ND	0.01	ug/g						
p,p'-DDD	ND	0.02	ug/g						
DDD	ND	0.02	ug/g						
o,p'-DDE	ND	0.01	ug/g						
p,p'-DDE	ND	0.01	ug/g						
DDE	ND	0.01	ug/g						
o,p'-DDT	ND	0.01	ug/g						
p,p'-DDT	ND	0.01	ug/g						
DDT	ND	0.01	ug/g						
Dieldrin	ND	0.02	ug/g						
Endrin	ND	0.02	ug/g						
Endosulfan I	ND	0.01	ug/g						
Endosulfan II	ND	0.02	ug/g						
Endosulfan I/II	ND	0.02	ug/g						
Heptachlor	ND	0.01	ug/g						
Heptachlor epoxide	ND	0.01	ug/g						
Hexachlorobenzene	ND	0.01	ug/g						
Hexachlorobutadiene	ND	0.01	ug/g						
Hexachloroethane	ND	0.01	ug/g						
Methoxychlor	ND	0.01	ug/g						
Surrogate: Decachlorobiphenyl	*0.0546*		*ug/g*		*54.6*	*50-140*			
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						

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	*1.43*		*ug/g*		*107*	*50-140*			
Surrogate: Terphenyl-d14	*1.70*		*ug/g*		*127*	*50-140*			
Volatiles									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	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: Toluene-d8	*3.26*		*ug/g*		*102*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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)	184	8	ug/g dry	224			20.0	30	
F4 PHCs (C34-C50)	230	6	ug/g dry	316			31.7	30	QR-04
Metals									
Antimony	ND	1.0	ug/g dry	ND			NC	30	
Arsenic	4.0	1.0	ug/g dry	4.2			5.0	30	
Barium	137	1.0	ug/g dry	146			6.3	30	
Beryllium	0.8	0.5	ug/g dry	0.8			6.7	30	
Boron	9.3	5.0	ug/g dry	9.3			0.1	30	
Cadmium	ND	0.5	ug/g dry	ND			NC	30	
Chromium	30.0	5.0	ug/g dry	30.4			1.4	30	
Cobalt	8.5	1.0	ug/g dry	9.1			6.7	30	
Copper	19.7	5.0	ug/g dry	20.0			1.7	30	
Lead	16.8	1.0	ug/g dry	18.4			9.0	30	
Molybdenum	ND	1.0	ug/g dry	ND			NC	30	
Nickel	17.2	5.0	ug/g dry	18.0			4.3	30	
Selenium	ND	1.0	ug/g dry	ND			NC	30	
Silver	ND	0.3	ug/g dry	ND			NC	30	
Thallium	ND	1.0	ug/g dry	ND			NC	30	
Uranium	ND	1.0	ug/g dry	ND			NC	30	
Vanadium	35.3	10.0	ug/g dry	38.0			7.3	30	
Zinc	53.2	20.0	ug/g dry	55.0			3.4	30	
Pesticides, OC									
Aldrin	ND	0.01	ug/g dry	ND			NC	40	
gamma-BHC (Lindane)	ND	0.01	ug/g dry	ND			NC	40	
alpha-Chlordane	ND	0.01	ug/g dry	ND			NC	40	
gamma-Chlordane	ND	0.01	ug/g dry	ND			NC	40	
o,p'-DDD	ND	0.01	ug/g dry	ND			NC	40	
p,p'-DDD	ND	0.02	ug/g dry	ND			NC	40	
o,p'-DDE	ND	0.01	ug/g dry	ND			NC	40	
p,p'-DDE	ND	0.01	ug/g dry	ND			NC	40	
o,p'-DDT	ND	0.01	ug/g dry	ND			NC	40	
p,p'-DDT	ND	0.01	ug/g dry	ND			NC	40	
Dieldrin	ND	0.02	ug/g dry	ND			NC	40	
Endrin	ND	0.02	ug/g dry	ND			NC	40	
Endosulfan I	ND	0.01	ug/g dry	ND			NC	40	
Endosulfan II	ND	0.02	ug/g dry	ND			NC	40	
Heptachlor	ND	0.01	ug/g dry	ND			NC	40	
Heptachlor epoxide	ND	0.01	ug/g dry	ND			NC	40	
Hexachlorobenzene	ND	0.01	ug/g dry	ND			NC	40	
Hexachlorobutadiene	ND	0.01	ug/g dry	ND			NC	40	
Hexachloroethane	ND	0.01	ug/g dry	ND			NC	40	
Methoxychlor	ND	0.01	ug/g dry	ND			NC	40	
Surrogate: Decachlorobiphenyl	*0.0817*		*ug/g dry*		*71.5*	*50-140*			
Physical Characteristics									
% Solids	84.8	0.1	% by Wt.	82.1			3.2	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	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	*1.24*		*ug/g dry*		*80.8*	*50-140*			
Surrogate: Terphenyl-d14	*1.51*		*ug/g dry*		*98.5*	*50-140*			
Volatiles									
Benzene	ND	0.02	ug/g dry	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g dry	ND			NC	50	
Toluene	ND	0.05	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: Toluene-d8	*4.21*		*ug/g dry*		*115*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	184	7	ug/g	ND	92.2	80-120			
F2 PHCs (C10-C16)	75	4	ug/g	ND	91.9	60-140			
F3 PHCs (C16-C34)	431	8	ug/g	224	103	60-140			
F4 PHCs (C34-C50)	471	6	ug/g	316	122	60-140			
Metals									
Antimony	46.8	1.0	ug/g	ND	93.0	70-130			
Arsenic	52.0	1.0	ug/g	1.7	101	70-130			
Barium	113	1.0	ug/g	58.6	108	70-130			
Beryllium	49.2	0.5	ug/g	ND	97.7	70-130			
Boron	49.0	5.0	ug/g	ND	90.6	70-130			
Cadmium	48.3	0.5	ug/g	ND	96.4	70-130			
Chromium	61.3	5.0	ug/g	12.2	98.4	70-130			
Cobalt	51.0	1.0	ug/g	3.6	94.8	70-130			
Copper	54.8	5.0	ug/g	8.0	93.5	70-130			
Lead	54.3	1.0	ug/g	7.4	93.9	70-130			
Molybdenum	48.9	1.0	ug/g	ND	97.1	70-130			
Nickel	54.5	5.0	ug/g	7.2	94.7	70-130			
Selenium	48.9	1.0	ug/g	ND	97.4	70-130			
Silver	41.9	0.3	ug/g	ND	83.6	70-130			
Thallium	50.1	1.0	ug/g	ND	100	70-130			
Uranium	51.7	1.0	ug/g	ND	103	70-130			
Vanadium	64.3	10.0	ug/g	15.2	98.1	70-130			
Zinc	69.3	20.0	ug/g	22.0	94.6	70-130			
Pesticides, OC									
Aldrin	0.24	0.01	ug/g	ND	106	50-140			
gamma-BHC (Lindane)	0.22	0.01	ug/g	ND	94.9	50-140			
alpha-Chlordane	0.22	0.01	ug/g	ND	95.6	50-140			
gamma-Chlordane	0.22	0.01	ug/g	ND	96.3	50-140			
o,p'-DDD	0.21	0.01	ug/g	ND	91.0	50-140			
p,p'-DDD	0.18	0.02	ug/g	ND	80.2	50-140			
o,p'-DDE	0.21	0.01	ug/g	ND	93.0	50-140			
p,p'-DDE	0.20	0.01	ug/g	ND	89.0	50-140			
o,p'-DDT	0.23	0.01	ug/g	ND	98.8	50-140			
p,p'-DDT	0.16	0.01	ug/g	ND	68.5	50-140			
Dieldrin	0.24	0.02	ug/g	ND	104	50-140			
Endrin	0.12	0.02	ug/g	ND	50.5	50-140			
Endosulfan I	0.25	0.01	ug/g	ND	110	50-140			
Endosulfan II	0.20	0.02	ug/g	ND	87.6	50-140			
Heptachlor	0.25	0.01	ug/g	ND	108	50-140			
Heptachlor epoxide	0.24	0.01	ug/g	ND	104	50-140			
Hexachlorobenzene	0.27	0.01	ug/g	ND	116	50-140			
Hexachlorobutadiene	0.19	0.01	ug/g	ND	81.5	50-140			
Hexachloroethane	0.26	0.01	ug/g	ND	114	50-140			
Methoxychlor	0.17	0.01	ug/g	ND	74.0	50-140			
Surrogate: Decachlorobiphenyl	*0.0668*		*ug/g*		*58.5*	*50-140*			
Semi-Volatiles									
Acenaphthene	0.186	0.02	ug/g	ND	97.0	50-140			
Acenaphthylene	0.172	0.02	ug/g	ND	89.8	50-140			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anthracene	0.157	0.02	ug/g	ND	82.0	50-140			
Benzo [a] anthracene	0.142	0.02	ug/g	ND	74.1	50-140			
Benzo [a] pyrene	0.154	0.02	ug/g	ND	80.2	50-140			
Benzo [b] fluoranthene	0.194	0.02	ug/g	ND	101	50-140			
Benzo [g,h,i] perylene	0.168	0.02	ug/g	ND	87.6	50-140			
Benzo [k] fluoranthene	0.158	0.02	ug/g	ND	82.2	50-140			
Chrysene	0.210	0.02	ug/g	ND	110	50-140			
Dibenzo [a,h] anthracene	0.136	0.02	ug/g	ND	70.8	50-140			
Fluoranthene	0.159	0.02	ug/g	ND	83.1	50-140			
Fluorene	0.177	0.02	ug/g	ND	92.6	50-140			
Indeno [1,2,3-cd] pyrene	0.143	0.02	ug/g	ND	74.8	50-140			
1-Methylnaphthalene	0.233	0.02	ug/g	ND	121	50-140			
2-Methylnaphthalene	0.247	0.02	ug/g	ND	129	50-140			
Naphthalene	0.213	0.01	ug/g	ND	111	50-140			
Phenanthrene	0.186	0.02	ug/g	ND	97.1	50-140			
Pyrene	0.174	0.02	ug/g	ND	90.6	50-140			
Surrogate: 2-Fluorobiphenyl	*1.44*		*ug/g*		*93.7*	*50-140*			
Surrogate: Terphenyl-d14	*1.78*		*ug/g*		*116*	*50-140*			
Volatiles									
Benzene	2.80	0.02	ug/g	ND	69.9	60-130			
Ethylbenzene	3.48	0.05	ug/g	ND	87.1	60-130			
Toluene	3.15	0.05	ug/g	ND	78.8	60-130			
m,p-Xylenes	6.45	0.05	ug/g	ND	80.6	60-130			
o-Xylene	2.72	0.05	ug/g	ND	68.1	60-130			
Surrogate: Toluene-d8	*3.25*		*ug/g*		*101*	*50-140*			

Qualifier Notes:

QC Qualifiers :

QR-04 : Duplicate results exceeds RPD limits due to non-homogeneous matrix.

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.

Paracel ID: 2206479

PARACEL LABORATORIES LTD

www.paracellabs.com

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2206479	№ 62943

Client Name: Gemtec	Project Ref: Perth Golf Course	Page 1 of 1
Contact Name: Brenda Thom	Quote #:	Turnaround Time
Address: 32 Steacie Dr. Kanata, ON K2R 2A9	PO #: 100737.002	☐ 1 day ☐ 3 day ☐ 2 day ☒ Regular
Telephone: 613-327-2345	E-mail: brenda.thom@gemtec.ca.	Date Required:

Regulation	Other Regulation	Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)
☐ REG 153/04 ☐ REG 406/19	☐ REG 558 ☐ PWQO	
☐ Table 1 ☒ Res/Park ☐ Med/Fine	☐ CCME ☐ MISA	
☒ Table 2 ☐ Ind/Comm ☐ Coarse	☐ SU - Sani ☐ SU - Storm	
☐ Table 3 ☐ Agri/Other	Mun:	
☐ Table	☐ Other:	
For RSC: ☒ Yes ☐ No		

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	Required Analysis: metals icp	PHC + BTEX	OC Pest	PAHs
1	BH 22-206 SA2	S	n/a	2	26.01.22	PM	X	X	X	
2	22-206 SA1	S	n/a	2	26.01.22	PM				X
3	22-226 SS2	S	n/a	2	26.01.22	AM	X	X	X	
4	22-228 SS1	S	n/a	2	28.01.22	AM	X	X	X	
5										
6										
7										
8										
9										
10										

Comments:

Method of Delivery: Drop Box

Relinquished By (Sign): Brenda Thom	Received By Driver/Depot:	Received at Lab: C	Verified By: C
Relinquished By (Print): Brenda Thom	Date/Time: Feb 4/22	Date/Time: 16:40 Feb 4/22	Date/Time: Feb 4 2022 11:44
Date/Time: 03-Feb-2022 5:30pm	Temperature: 12.6 °C	Temperature: 1.8 °C	pH Verified: ☐ By:

Chain of Custody (Blank) xlsx

Revision 4.0

8:30

PARACEL LABORATORIES LTD.
TRUSTED. RESPONSIVE. RELIABLE.

300 - 2319 St. Laurent Blvd
Ottawa, ON, K1G 4J8
1-800-749-1947
www.paracellabs.com

Certificate of Analysis

GEMTEC Consulting Engineers and Scientists Limited

32 Steacie Drive
Kanata, ON K2K 2A9
Attn: Brenda Thom

Client PO: 100737.002
Project: Perth Golf Course 100737.002
Custody:

Report Date: 15-Feb-2022
Order Date: 9-Feb-2022

Order #: 2207264

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

Paracel ID	Client ID
2207264-01	BH22-201
2207264-02	BH22-203
2207264-03	BH22-205
2207264-04	BH22-208
2207264-05	BH22-214
2207264-06	BH22-216
2207264-07	BH22-221
2207264-08	BH22-222
2207264-09	BH22-223
2207264-10	BH22-224
2207264-11	BH22-228
2207264-12	DUP 1
2207264-13	DUP 2
2207264-14	Trip Blank

Approved By:

Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 624 - P&T GC-MS	10-Feb-22	10-Feb-22
Metals, ICP-MS	EPA 200.8 - ICP-MS	11-Feb-22	11-Feb-22
pH	EPA 150.1 - pH probe @25 °C	10-Feb-22	10-Feb-22
PHC F1	CWS Tier 1 - P&T GC-FID	10-Feb-22	10-Feb-22
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	11-Feb-22	11-Feb-22
REG 153: Pesticides, OC	EPA 8081B - GC-ECD	11-Feb-22	11-Feb-22

Certificate of Analysis

Report Date: 15-Feb-2022

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 9-Feb-2022

Client PO: 100737.002

Project Description: Perth Golf Course 100737.002

	Client ID:	BH22-201	BH22-203	BH22-205	BH22-208
	Sample Date:	08-Feb-22 09:00	08-Feb-22 09:00	08-Feb-22 09:00	08-Feb-22 09:00
	Sample ID:	2207264-01	2207264-02	2207264-03	2207264-04
	MDL/Units	Water	Water	Water	Water
General Inorganics					
pH	0.1 pH Units	7.7	-	-	-
Metals					
Antimony	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Arsenic	1 ug/L	<1	<1	<1	<1
Barium	1 ug/L	106	113	125	67
Beryllium	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Boron	10 ug/L	104	59	48	23
Cadmium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Chromium	1 ug/L	<1	<1	<1	1
Cobalt	0.5 ug/L	2.3	<0.5	<0.5	<0.5
Copper	0.5 ug/L	4.2	1.7	<0.5	7.8
Lead	0.1 ug/L	<0.1	<0.1	<0.1	0.2
Molybdenum	0.5 ug/L	5.6	3.5	9.9	0.6
Nickel	1 ug/L	29	2	<1	2
Selenium	1 ug/L	<1	<1	<1	<1
Silver	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Sodium	200 ug/L	36400	12900	13700	5600
Thallium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Uranium	0.1 ug/L	0.8	8.0	0.4	1.0
Vanadium	0.5 ug/L	<0.5	1.5	0.6	1.5
Zinc	5 ug/L	8	5	<5	9
Volatiles					
Benzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Xylenes, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Toluene-d8	Surrogate	84.2%	86.6%	83.6%	85.1%
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	<25	<25	<25
F2 PHCs (C10-C16)	100 ug/L	<100	<100	<100	<100
F3 PHCs (C16-C34)	100 ug/L	<100	<100	<100	<100
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	<100

Certificate of Analysis

Report Date: 15-Feb-2022

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 9-Feb-2022

Client PO: 100737.002

Project Description: Perth Golf Course 100737.002

	Client ID:	BH22-214	BH22-216	BH22-221	BH22-222
	Sample Date:	08-Feb-22 09:00	08-Feb-22 09:00	08-Feb-22 09:00	08-Feb-22 09:00
	Sample ID:	2207264-05	2207264-06	2207264-07	2207264-08
	MDL/Units	Water	Water	Water	Water
Metals					
Antimony	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Arsenic	1 ug/L	<1	<1	<1	<1
Barium	1 ug/L	130	76	32	55
Beryllium	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Boron	10 ug/L	<10	24	<10	21
Cadmium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Chromium	1 ug/L	<1	<1	<1	<1
Cobalt	0.5 ug/L	<0.5	<0.5	1.2	0.9
Copper	0.5 ug/L	1.2	1.5	12.5	5.9
Lead	0.1 ug/L	<0.1	<0.1	<0.1	0.2
Molybdenum	0.5 ug/L	2.0	1.4	2.3	5.5
Nickel	1 ug/L	<1	<1	2	1
Selenium	1 ug/L	<1	<1	<1	<1
Silver	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Sodium	200 ug/L	6630	6320	13100	15500
Thallium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Uranium	0.1 ug/L	0.7	14.0	1.4	12.8
Vanadium	0.5 ug/L	<0.5	1.1	<0.5	<0.5
Zinc	5 ug/L	<5	<5	<5	6
Volatiles					
Benzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Xylenes, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Toluene-d8	Surrogate	83.8%	84.1%	84.1%	83.7%
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	<25	<25	<25
F2 PHCs (C10-C16)	100 ug/L	<100	<100	<100	<100
F3 PHCs (C16-C34)	100 ug/L	<100	<100	<100	<100
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	<100
Pesticides, OC					
Aldrin	0.01 ug/L	<0.01	-	-	-
gamma-BHC (Lindane)	0.01 ug/L	<0.01	-	-	-

Certificate of Analysis

Report Date: 15-Feb-2022

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 9-Feb-2022

Client PO: 100737.002

Project Description: Perth Golf Course 100737.002

	Client ID:	BH22-214	BH22-216	BH22-221	BH22-222
	Sample Date:	08-Feb-22 09:00	08-Feb-22 09:00	08-Feb-22 09:00	08-Feb-22 09:00
	Sample ID:	2207264-05	2207264-06	2207264-07	2207264-08
	MDL/Units	Water	Water	Water	Water
alpha-Chlordane	0.01 ug/L	<0.01	-	-	-
gamma-Chlordane	0.01 ug/L	<0.01	-	-	-
Chlordane	0.01 ug/L	<0.01	-	-	-
o,p'-DDD	0.01 ug/L	<0.01	-	-	-
p,p'-DDD	0.01 ug/L	<0.01	-	-	-
DDD	0.01 ug/L	<0.01	-	-	-
o,p'-DDE	0.01 ug/L	<0.01	-	-	-
p,p'-DDE	0.01 ug/L	<0.01	-	-	-
DDE	0.01 ug/L	<0.01	-	-	-
o,p'-DDT	0.01 ug/L	<0.01	-	-	-
p,p'-DDT	0.01 ug/L	<0.01	-	-	-
DDT	0.01 ug/L	<0.01	-	-	-
Dieldrin	0.01 ug/L	<0.01	-	-	-
Endrin	0.01 ug/L	<0.01	-	-	-
Endosulfan I	0.01 ug/L	<0.01	-	-	-
Endosulfan II	0.01 ug/L	<0.01	-	-	-
Endosulfan I/II	0.01 ug/L	<0.01	-	-	-
Heptachlor	0.01 ug/L	<0.01	-	-	-
Heptachlor epoxide	0.01 ug/L	<0.01	-	-	-
Hexachlorobenzene	0.01 ug/L	<0.01	-	-	-
Hexachlorobutadiene	0.01 ug/L	<0.01	-	-	-
Hexachloroethane	0.01 ug/L	<0.01	-	-	-
Methoxychlor	0.01 ug/L	<0.01	-	-	-
Decachlorobiphenyl	Surrogate	115%	-	-	-

Certificate of Analysis

Report Date: 15-Feb-2022

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 9-Feb-2022

Client PO: 100737.002

Project Description: Perth Golf Course 100737.002

	Client ID:	BH22-223	BH22-224	BH22-228	DUP 1
	Sample Date:	08-Feb-22 09:00	08-Feb-22 09:00	08-Feb-22 09:00	08-Feb-22 09:00
	Sample ID:	2207264-09	2207264-10	2207264-11	2207264-12
	MDL/Units	Water	Water	Water	Water
Metals					
Antimony	0.5 ug/L	1.2	<0.5	1.0	<0.5
Arsenic	1 ug/L	1	2	3	<1
Barium	1 ug/L	80	320	454	114
Beryllium	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Boron	10 ug/L	183	13	69	59
Cadmium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Chromium	1 ug/L	<1	<1	<1	<1
Cobalt	0.5 ug/L	0.6	6.1	0.7	<0.5
Copper	0.5 ug/L	2.0	2.5	5.6	3.2
Lead	0.1 ug/L	<0.1	<0.1	0.2	<0.1
Molybdenum	0.5 ug/L	8.6	2.8	7.0	3.5
Nickel	1 ug/L	4	10	3	2
Selenium	1 ug/L	<1	<1	<1	<1
Silver	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Sodium	200 ug/L	40900	18700	23300	12400
Thallium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Uranium	0.1 ug/L	9.7	2.1	295	8.1
Vanadium	0.5 ug/L	2.0	<0.5	0.5	1.5
Zinc	5 ug/L	12	<5	11	6
Volatiles					
Benzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Xylenes, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Toluene-d8	Surrogate	82.8%	84.9%	84.7%	83.0%
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	<25	<25	<25
F2 PHCs (C10-C16)	100 ug/L	<100	<100	<100	<100
F3 PHCs (C16-C34)	100 ug/L	<100	<100	<100	<100
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	<100
Pesticides, OC					
Aldrin	0.01 ug/L	<0.01	<0.01	<0.01	-
gamma-BHC (Lindane)	0.01 ug/L	<0.01	<0.01	<0.01	-

Certificate of Analysis

Report Date: 15-Feb-2022

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 9-Feb-2022

Client PO: 100737.002

Project Description: Perth Golf Course 100737.002

	Client ID:	BH22-223	BH22-224	BH22-228	DUP 1
	Sample Date:	08-Feb-22 09:00	08-Feb-22 09:00	08-Feb-22 09:00	08-Feb-22 09:00
	Sample ID:	2207264-09	2207264-10	2207264-11	2207264-12
	MDL/Units	Water	Water	Water	Water
alpha-Chlordane	0.01 ug/L	<0.01	<0.01	<0.01	-
gamma-Chlordane	0.01 ug/L	<0.01	<0.01	<0.01	-
Chlordane	0.01 ug/L	<0.01	<0.01	<0.01	-
o,p'-DDD	0.01 ug/L	<0.01	<0.01	<0.01	-
p,p'-DDD	0.01 ug/L	<0.01	<0.01	<0.01	-
DDD	0.01 ug/L	<0.01	<0.01	<0.01	-
o,p'-DDE	0.01 ug/L	<0.01	<0.01	<0.01	-
p,p'-DDE	0.01 ug/L	<0.01	<0.01	<0.01	-
DDE	0.01 ug/L	<0.01	<0.01	<0.01	-
o,p'-DDT	0.01 ug/L	<0.01	<0.01	<0.01	-
p,p'-DDT	0.01 ug/L	<0.01	<0.01	<0.01	-
DDT	0.01 ug/L	<0.01	<0.01	<0.01	-
Dieldrin	0.01 ug/L	<0.01	<0.01	<0.01	-
Endrin	0.01 ug/L	<0.01	<0.01	<0.01	-
Endosulfan I	0.01 ug/L	<0.01	<0.01	<0.01	-
Endosulfan II	0.01 ug/L	<0.01	<0.01	<0.01	-
Endosulfan I/II	0.01 ug/L	<0.01	<0.01	<0.01	-
Heptachlor	0.01 ug/L	<0.01	<0.01	<0.01	-
Heptachlor epoxide	0.01 ug/L	<0.01	<0.01	<0.01	-
Hexachlorobenzene	0.01 ug/L	<0.01	<0.01	<0.01	-
Hexachlorobutadiene	0.01 ug/L	<0.01	<0.01	<0.01	-
Hexachloroethane	0.01 ug/L	<0.01	<0.01	<0.01	-
Methoxychlor	0.01 ug/L	<0.01	0.03	<0.01	-
Decachlorobiphenyl	Surrogate	121%	116%	106%	-

Certificate of Analysis

Report Date: 15-Feb-2022

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 9-Feb-2022

Client PO: 100737.002

Project Description: Perth Golf Course 100737.002

	Client ID:	DUP 2	Trip Blank	-	-
	Sample Date:	08-Feb-22 09:00	08-Feb-22 09:00	-	-
	Sample ID:	2207264-13	2207264-14	-	-
	MDL/Units	Water	Water	-	-
Metals					
Antimony	0.5 ug/L	<0.5	-	-	-
Arsenic	1 ug/L	1	-	-	-
Barium	1 ug/L	316	-	-	-
Beryllium	0.5 ug/L	<0.5	-	-	-
Boron	10 ug/L	12	-	-	-
Cadmium	0.1 ug/L	<0.1	-	-	-
Chromium	1 ug/L	<1	-	-	-
Cobalt	0.5 ug/L	6.3	-	-	-
Copper	0.5 ug/L	<0.5	-	-	-
Lead	0.1 ug/L	<0.1	-	-	-
Molybdenum	0.5 ug/L	2.8	-	-	-
Nickel	1 ug/L	10	-	-	-
Selenium	1 ug/L	<1	-	-	-
Silver	0.1 ug/L	<0.1	-	-	-
Sodium	200 ug/L	18000	-	-	-
Thallium	0.1 ug/L	<0.1	-	-	-
Uranium	0.1 ug/L	2.2	-	-	-
Vanadium	0.5 ug/L	<0.5	-	-	-
Zinc	5 ug/L	<5	-	-	-
Volatiles					
Benzene	0.5 ug/L	<0.5	<0.5	-	-
Ethylbenzene	0.5 ug/L	<0.5	<0.5	-	-
Toluene	0.5 ug/L	<0.5	<0.5	-	-
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	-	-
o-Xylene	0.5 ug/L	<0.5	<0.5	-	-
Xylenes, total	0.5 ug/L	<0.5	<0.5	-	-
Toluene-d8	Surrogate	85.9%	87.1%	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	<25	-	-
F2 PHCs (C10-C16)	100 ug/L	<100	-	-	-
F3 PHCs (C16-C34)	100 ug/L	<100	-	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	-	-	-
Pesticides, OC					
Aldrin	0.01 ug/L	<0.01	-	-	-
gamma-BHC (Lindane)	0.01 ug/L	<0.01	-	-	-

	Client ID:	DUP 2	Trip Blank	-	-
	Sample Date:	08-Feb-22 09:00	08-Feb-22 09:00	-	-
	Sample ID:	2207264-13	2207264-14	-	-
	MDL/Units	Water	Water	-	-
alpha-Chlordane	0.01 ug/L	<0.01	-	-	-
gamma-Chlordane	0.01 ug/L	<0.01	-	-	-
Chlordane	0.01 ug/L	<0.01	-	-	-
o,p'-DDD	0.01 ug/L	<0.01	-	-	-
p,p'-DDD	0.01 ug/L	<0.01	-	-	-
DDD	0.01 ug/L	<0.01	-	-	-
o,p'-DDE	0.01 ug/L	<0.01	-	-	-
p,p'-DDE	0.01 ug/L	<0.01	-	-	-
DDE	0.01 ug/L	<0.01	-	-	-
o,p'-DDT	0.01 ug/L	<0.01	-	-	-
p,p'-DDT	0.01 ug/L	<0.01	-	-	-
DDT	0.01 ug/L	<0.01	-	-	-
Dieldrin	0.01 ug/L	<0.01	-	-	-
Endrin	0.01 ug/L	<0.01	-	-	-
Endosulfan I	0.01 ug/L	<0.01	-	-	-
Endosulfan II	0.01 ug/L	<0.01	-	-	-
Endosulfan I/II	0.01 ug/L	<0.01	-	-	-
Heptachlor	0.01 ug/L	<0.01	-	-	-
Heptachlor epoxide	0.01 ug/L	<0.01	-	-	-
Hexachlorobenzene	0.01 ug/L	<0.01	-	-	-
Hexachlorobutadiene	0.01 ug/L	<0.01	-	-	-
Hexachloroethane	0.01 ug/L	<0.01	-	-	-
Methoxychlor	0.01 ug/L	<0.01	-	-	-
Decachlorobiphenyl	Surrogate	122%	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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									
Antimony	ND	0.5	ug/L						
Arsenic	ND	1	ug/L						
Barium	ND	1	ug/L						
Beryllium	ND	0.5	ug/L						
Boron	ND	10	ug/L						
Cadmium	ND	0.1	ug/L						
Chromium	ND	1	ug/L						
Cobalt	ND	0.5	ug/L						
Copper	ND	0.5	ug/L						
Lead	ND	0.1	ug/L						
Molybdenum	ND	0.5	ug/L						
Nickel	ND	1	ug/L						
Selenium	ND	1	ug/L						
Silver	ND	0.1	ug/L						
Sodium	ND	200	ug/L						
Thallium	ND	0.1	ug/L						
Uranium	ND	0.1	ug/L						
Vanadium	ND	0.5	ug/L						
Zinc	ND	5	ug/L						
Pesticides, OC									
Aldrin	ND	0.01	ug/L						
gamma-BHC (Lindane)	ND	0.01	ug/L						
alpha-Chlordane	ND	0.01	ug/L						
gamma-Chlordane	ND	0.01	ug/L						
Chlordane	ND	0.01	ug/L						
o,p'-DDD	ND	0.01	ug/L						
p,p'-DDD	ND	0.01	ug/L						
DDD	ND	0.01	ug/L						
o,p'-DDE	ND	0.01	ug/L						
p,p'-DDE	ND	0.01	ug/L						
DDE	ND	0.01	ug/L						
o,p'-DDT	ND	0.01	ug/L						
p,p'-DDT	ND	0.01	ug/L						
DDT	ND	0.01	ug/L						
Dieldrin	ND	0.01	ug/L						
Endrin	ND	0.01	ug/L						
Endosulfan I	ND	0.01	ug/L						
Endosulfan II	ND	0.01	ug/L						
Endosulfan I/II	ND	0.01	ug/L						
Heptachlor	ND	0.01	ug/L						
Heptachlor epoxide	ND	0.01	ug/L						
Hexachlorobenzene	ND	0.01	ug/L						
Hexachlorobutadiene	ND	0.01	ug/L						
Hexachloroethane	ND	0.01	ug/L						
Methoxychlor	ND	0.01	ug/L						
Surrogate: Decachlorobiphenyl	*0.495*		*ug/L*		*99.0*	*50-140*			
Volatiles									
Benzene	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Toluene	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						

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Surrogate: Toluene-d8	*70.7*		*ug/L*		*88.4*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
pH	7.6	0.1	pH Units	7.6			0.3	3.3	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND			NC	30	
Metals									
Antimony	0.81	0.5	ug/L	ND			NC	20	
Arsenic	ND	1	ug/L	ND			NC	20	
Barium	22.5	1	ug/L	22.7			1.0	20	
Beryllium	ND	0.5	ug/L	ND			NC	20	
Boron	18	10	ug/L	18			2.5	20	
Cadmium	ND	0.1	ug/L	ND			NC	20	
Chromium	ND	1	ug/L	ND			NC	20	
Cobalt	ND	0.5	ug/L	ND			NC	20	
Copper	1.09	0.5	ug/L	1.11			2.0	20	
Lead	ND	0.1	ug/L	ND			NC	20	
Molybdenum	1.19	0.5	ug/L	1.11			6.9	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	14400	200	ug/L	14500			0.8	20	
Thallium	ND	0.1	ug/L	ND			NC	20	
Uranium	ND	0.1	ug/L	ND			NC	20	
Vanadium	ND	0.5	ug/L	ND			NC	20	
Zinc	7	5	ug/L	7			5.9	20	
Volatiles									
Benzene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Toluene	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: Toluene-d8	*67.8*		*ug/L*		*84.7*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1810	25	ug/L	ND	90.7	68-117			
F2 PHCs (C10-C16)	1370	100	ug/L	ND	85.6	60-140			
F3 PHCs (C16-C34)	3680	100	ug/L	ND	93.9	60-140			
F4 PHCs (C34-C50)	2400	100	ug/L	ND	96.8	60-140			
Metals									
Antimony	46.4	0.5	ug/L	ND	92.6	80-120			
Arsenic	52.4	1	ug/L	ND	104	80-120			
Barium	70.6	1	ug/L	22.7	95.7	80-120			
Beryllium	47.3	0.5	ug/L	ND	94.6	80-120			
Boron	60	10	ug/L	18	84.3	80-120			
Cadmium	50.1	0.1	ug/L	ND	100	80-120			
Chromium	50.9	1	ug/L	ND	101	80-120			
Cobalt	49.6	0.5	ug/L	ND	99.2	80-120			
Copper	49.2	0.5	ug/L	1.11	96.1	80-120			
Lead	42.7	0.1	ug/L	ND	85.3	80-120			
Molybdenum	46.6	0.5	ug/L	1.11	91.1	80-120			
Nickel	49.0	1	ug/L	ND	97.1	80-120			
Selenium	49.8	1	ug/L	ND	99.3	80-120			
Silver	47.8	0.1	ug/L	ND	95.7	80-120			
Sodium	22600	200	ug/L	14500	81.1	80-120			
Thallium	45.5	0.1	ug/L	ND	90.9	80-120			
Uranium	44.5	0.1	ug/L	ND	89.1	80-120			
Vanadium	50.7	0.5	ug/L	ND	101	80-120			
Zinc	54	5	ug/L	7	93.5	80-120			
Pesticides, OC									
Aldrin	0.51	0.01	ug/L	ND	102	50-140			
gamma-BHC (Lindane)	0.46	0.01	ug/L	ND	91.1	50-140			
alpha-Chlordane	0.48	0.01	ug/L	ND	96.9	50-140			
gamma-Chlordane	0.48	0.01	ug/L	ND	96.5	50-140			
o,p'-DDD	0.38	0.01	ug/L	ND	76.8	50-140			
p,p'-DDD	0.44	0.01	ug/L	ND	87.7	50-140			
o,p'-DDE	0.44	0.01	ug/L	ND	87.3	50-140			
p,p'-DDE	0.46	0.01	ug/L	ND	91.1	50-140			
o,p'-DDT	0.47	0.01	ug/L	ND	94.8	50-140			
p,p'-DDT	0.52	0.01	ug/L	ND	104	50-140			
Dieldrin	0.54	0.01	ug/L	ND	107	50-140			
Endrin	0.45	0.01	ug/L	ND	90.6	50-140			
Endosulfan I	0.54	0.01	ug/L	ND	107	50-140			
Endosulfan II	0.51	0.01	ug/L	ND	102	50-140			
Heptachlor	0.49	0.01	ug/L	ND	98.6	50-140			
Heptachlor epoxide	0.52	0.01	ug/L	ND	104	50-140			
Hexachlorobenzene	0.53	0.01	ug/L	ND	107	50-140			
Hexachlorobutadiene	0.44	0.01	ug/L	ND	87.8	50-140			
Hexachloroethane	0.52	0.01	ug/L	ND	104	50-140			
Methoxychlor	0.50	0.01	ug/L	ND	101	50-140			
Surrogate: Decachlorobiphenyl	*0.566*		*ug/L*		*113*	*50-140*			
Volatiles									
Benzene	43.4	0.5	ug/L	ND	109	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Ethylbenzene	37.0	0.5	ug/L	ND	92.6	60-130			
Toluene	45.0	0.5	ug/L	ND	112	60-130			
m,p-Xylenes	68.0	0.5	ug/L	ND	85.0	60-130			
o-Xylene	42.2	0.5	ug/L	ND	106	60-130			
Surrogate: Toluene-d8	*56.5*		*ug/L*		*70.6*	*50-140*			

Qualifier Notes:

None

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.

PARACEL LABORATORIES LTD. | TRU RES REL

Paracel ID: 2207264

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2207264	

Client Name: GEMTEC	Project Ref: Perth Golf Course 100737.002	Page 1 of 2
Contact Name: Brenda Thom	Quote #:	Turnaround Time
Address: 32 Steacie Drive	PO #: 100737.002	☐ 1 day ☐ 3 day
	E-mail: brenda.thom@gemtec.ca	☐ 2 day ☒ Regular
Telephone: 613-327-2345		Date Required:

Regulation 153/04	Other Regulation
☐ Table 1 ☐ Res/Park ☐ Med/Fine	☐ REG 558 ☐ PWQO
☒ Table 2 ☐ Ind/Comm ☐ Coarse	☐ CCME ☐ MISA
☐ Table 3 ☐ Agri/Other	☐ SU - Sani ☐ SU - Storm
☐ Table NA	Mun:
For RSC: ☒ Yes ☐ No	☒ Other:

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

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	Metals	BTEX & PHC F1F4	OCP	pH
1	~~BHMW 22-201~~ BH 22-201	GW		5	8-Feb-22		✓	✓		✓
2	BH 22-203	GW		4	"		✓	✓		
3	BH 22-205			↓	"		✓	✓		
4	BH 22-208			↓	"		✓	✓		
5	BH 22-214			5	"		✓	✓	✓	
6	BH 22-216			4	"		✓	✓		
7	BH 22-221			↓	"		✓	✓		
8	BH 22-222			↓	"		✓			
9	BH 22-223			5	"		✓	✓	✓	
10	BH 22-224			↓	"		✓	✓	✓	

Comments:

Method of Delivery: Walker

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab: Jyneeporn Dhanoa	Verified By:
Relinquished By (Print):	Date/Time: 02/09/22 11:47am	Date/Time: Feb 09, 2022 04:15	Date/Time: feb 9 2022 9:55
Date/Time:	Temperature: 8.3 °C	Temperature: 6.6 C	pH Verified: ☑ By:

PARACEL LABORATORIES LTD. | TRU RES REL

Paracel ID: 2207264

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2207264	

Client Name: GEMTEC		Project Ref: Perth Golf Course 100737.002	Page 2 of 2
Contact Name: Brenda Thom		Quote #:	**Turnaround Time**
Address: 32 Steacie Drive		PO #: 100737.002	☐ 1 day ☐ 3 day
		E-mail: brenda.thom@gemtec.ca	☐ 2 day ☒ Regular
Telephone: 613-327-2345			Date Required:

Regulation 153/04			Other Regulation	
☐ Table 1	☐ Res/Park	☐ Med/Fine	☐ REG 558	☐ PWQO
☒ Table 2	☐ Ind/Comm	☐ Coarse	☐ CCME	☐ MISA
☐ Table 3	☐ Agri/Other		☐ SU - Sani	☐ SU - Storm
☐ Table NA			Mun:	
For RSC: ☒ Yes ☐ No			☒ Other:	

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

Required Analysis

#	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Time	Metals	BTEX & PHC F1F4	OCP	~~BTEX~~	BTEX, PHC F1
1	~~BHMW 22-201~~	GW		2	~~B-Feb-22~~						
2	BH 22-228	GW		~~2~~ 5	8-Feb-22		✓	✓	✓		
3	Dup 1			4	"		✓	✓	✓		
4	Dup 2			5	"		✓	✓			
5	Trip Blank			1	Feb 08, 2022			~~✓~~			✓
6											
7											
8											
9											
10											

Comments:

Method of Delivery: Walk in

Relinquished By (Sign):	Received By Driver/Depot: [signature]	Received at Lab: Suneeporn Dolmal	Verified By: [signature]
Relinquished By (Print):	Date/Time: 02/09/22 11:47am	Date/Time: Feb 09, 2022 04.15	Date/Time: 02/09/2022 4:55
Date/Time:	Temperature: 8.3 °C	Temperature: 6.6 C	pH Verified: ☑ By: [signature]

PARACEL LABORATORIES LTD.
TRUSTED. RESPONSIVE. RELIABLE.

300 - 2319 St. Laurent Blvd
Ottawa, ON, K1G 4J8
1-800-749-1947
www.paracellabs.com

Certificate of Analysis

GEMTEC Consulting Engineers and Scientists Limited

32 Steacie Drive
Kanata, ON K2K 2A9
Attn: Brenda Thom

Client PO: 100737.002
Project: Perth Golf Course 100737.002
Custody:

Report Date: 15-Feb-2022
Order Date: 9-Feb-2022

Order #: 2207351

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

Paracel ID	Client ID
2207351-01	BH22-225
2207351-02	Trip Blank

Approved By: Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 624 - P&T GC-MS	10-Feb-22	10-Feb-22
Metals, ICP-MS	EPA 200.8 - ICP-MS	11-Feb-22	11-Feb-22
PHC F1	CWS Tier 1 - P&T GC-FID	10-Feb-22	10-Feb-22
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	14-Feb-22	15-Feb-22

Certificate of Analysis

Report Date: 15-Feb-2022

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 9-Feb-2022

Client PO: 100737.002

Project Description: Perth Golf Course 100737.002

	Client ID:	BH22-225	Trip Blank	-	-
	Sample Date:	09-Feb-22 08:30	08-Feb-22 08:30	-	-
	Sample ID:	2207351-01	2207351-02	-	-
	MDL/Units	Water	Water	-	-
Metals					
Antimony	0.5 ug/L	<0.5	-	-	-
Arsenic	1 ug/L	<1	-	-	-
Barium	1 ug/L	365	-	-	-
Beryllium	0.5 ug/L	<0.5	-	-	-
Boron	10 ug/L	<10	-	-	-
Cadmium	0.1 ug/L	<0.1	-	-	-
Chromium	1 ug/L	<1	-	-	-
Cobalt	0.5 ug/L	6.8	-	-	-
Copper	0.5 ug/L	4.4	-	-	-
Lead	0.1 ug/L	0.1	-	-	-
Molybdenum	0.5 ug/L	1.7	-	-	-
Nickel	1 ug/L	6	-	-	-
Selenium	1 ug/L	<1	-	-	-
Silver	0.1 ug/L	<0.1	-	-	-
Sodium	200 ug/L	4700	-	-	-
Thallium	0.1 ug/L	<0.1	-	-	-
Uranium	0.1 ug/L	1.6	-	-	-
Vanadium	0.5 ug/L	<0.5	-	-	-
Zinc	5 ug/L	<5	-	-	-
Volatiles					
Benzene	0.5 ug/L	<0.5	<0.5	-	-
Ethylbenzene	0.5 ug/L	<0.5	<0.5	-	-
Toluene	0.5 ug/L	<0.5	<0.5	-	-
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	-	-
o-Xylene	0.5 ug/L	<0.5	<0.5	-	-
Xylenes, total	0.5 ug/L	<0.5	<0.5	-	-
Toluene-d8	Surrogate	103%	103%	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	<25	-	-
F2 PHCs (C10-C16)	100 ug/L	<100	-	-	-
F3 PHCs (C16-C34)	100 ug/L	<100	-	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L						
Metals									
Antimony	ND	0.5	ug/L						
Arsenic	ND	1	ug/L						
Barium	ND	1	ug/L						
Beryllium	ND	0.5	ug/L						
Boron	ND	10	ug/L						
Cadmium	ND	0.1	ug/L						
Chromium	ND	1	ug/L						
Cobalt	ND	0.5	ug/L						
Copper	ND	0.5	ug/L						
Lead	ND	0.1	ug/L						
Molybdenum	ND	0.5	ug/L						
Nickel	ND	1	ug/L						
Selenium	ND	1	ug/L						
Silver	ND	0.1	ug/L						
Sodium	ND	200	ug/L						
Thallium	ND	0.1	ug/L						
Uranium	ND	0.1	ug/L						
Vanadium	ND	0.5	ug/L						
Zinc	ND	5	ug/L						
Volatiles									
Benzene	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Toluene	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: Toluene-d8	*85.5*		*ug/L*		*107*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND			NC	30	
Metals									
Antimony	0.81	0.5	ug/L	ND			NC	20	
Arsenic	ND	1	ug/L	ND			NC	20	
Barium	22.5	1	ug/L	22.7			1.0	20	
Beryllium	ND	0.5	ug/L	ND			NC	20	
Boron	18	10	ug/L	18			2.5	20	
Cadmium	ND	0.1	ug/L	ND			NC	20	
Chromium	ND	1	ug/L	ND			NC	20	
Cobalt	ND	0.5	ug/L	ND			NC	20	
Copper	1.09	0.5	ug/L	1.11			2.0	20	
Lead	ND	0.1	ug/L	ND			NC	20	
Molybdenum	1.19	0.5	ug/L	1.11			6.9	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	14400	200	ug/L	14500			0.8	20	
Thallium	ND	0.1	ug/L	ND			NC	20	
Uranium	ND	0.1	ug/L	ND			NC	20	
Vanadium	ND	0.5	ug/L	ND			NC	20	
Zinc	7	5	ug/L	7			5.9	20	
Volatiles									
Benzene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Toluene	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: Toluene-d8	*82.4*		*ug/L*		*103*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	2180	25	ug/L	ND	109	68-117			
Metals									
Antimony	46.4	0.5	ug/L	ND	92.6	80-120			
Arsenic	52.4	1	ug/L	ND	104	80-120			
Barium	70.6	1	ug/L	22.7	95.7	80-120			
Beryllium	47.3	0.5	ug/L	ND	94.6	80-120			
Boron	60	10	ug/L	18	84.3	80-120			
Cadmium	50.1	0.1	ug/L	ND	100	80-120			
Chromium	50.9	1	ug/L	ND	101	80-120			
Cobalt	49.6	0.5	ug/L	ND	99.2	80-120			
Copper	49.2	0.5	ug/L	1.11	96.1	80-120			
Lead	42.7	0.1	ug/L	ND	85.3	80-120			
Molybdenum	46.6	0.5	ug/L	1.11	91.1	80-120			
Nickel	49.0	1	ug/L	ND	97.1	80-120			
Selenium	49.8	1	ug/L	ND	99.3	80-120			
Silver	47.8	0.1	ug/L	ND	95.7	80-120			
Sodium	22600	200	ug/L	14500	81.1	80-120			
Thallium	45.5	0.1	ug/L	ND	90.9	80-120			
Uranium	44.5	0.1	ug/L	ND	89.1	80-120			
Vanadium	50.7	0.5	ug/L	ND	101	80-120			
Zinc	54	5	ug/L	7	93.5	80-120			
Volatiles									
Benzene	34.4	0.5	ug/L	ND	86.0	60-130			
Ethylbenzene	37.2	0.5	ug/L	ND	93.0	60-130			
Toluene	38.2	0.5	ug/L	ND	95.6	60-130			
m,p-Xylenes	74.0	0.5	ug/L	ND	92.5	60-130			
o-Xylene	36.9	0.5	ug/L	ND	92.2	60-130			
Surrogate: Toluene-d8	*80.6*		*ug/L*		*101*	*50-140*			

Qualifier Notes:

None

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.

PARACEL LABORATORIES LTD.

Paracel ID: 2207351

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2207351	

Client Name: GEMTEC	Project Ref: Perth Golf Course 100737.002	Page 1 of 1
Contact Name: Brenda Thom	Quote #:	
Address: 32 Steacie Drive	PO #: 100737.002	Turnaround Time: ☐ 1 day ☐ 3 day ☐ 2 day ☒ Regular
Telephone: 613-327-2345	E-mail: brenda.thom@gemtec.ca	Date Required:

Regulation 153/04: ☐ Table 1 ☐ Res/Park ☐ Med/Fine ☒ Table 2 ☐ Ind/Comm ☐ Coarse ☐ Table 3 ☐ Agri/Other ☐ Table NA — For RSC: ☒ Yes ☐ No

Other Regulation: ☐ REG 558 ☐ PWQO ☐ CCME ☐ MISA ☐ SU - Sani ☐ SU - Storm — Mun: — ☒ Other:

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

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	Required Analysis: Metals	BTEX & PHC F1F4	OCP	BTEX PHC 1
1	~~BHMW 22-201~~	GW		2						
2	BH 22-205	GW		4	9-Feb-22	8:30AM	/	/		
3	Trip Blank				Feb 08, 22					/
4										
5										
6										
7										
8										
9										
10										

Comments:

Method of Delivery: Walk-in

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab: BS am	Verified By: BS am
Relinquished By (Print): Connor Shaw	Date/Time: 02/09/22 3:56 pm	Date/Time: Feb 10,22 11:40	Date/Time: Feb 10, 2022 13:18
Date/Time: 9-Feb-22	Temperature: 6.7 °C	Temperature: 5.1°C	pH Verified: ☑ By: BS

experience • knowledge • integrity

civil	civil
geotechnical	géotechnique
environmental	environnementale
field services	surveillance de chantier
materials testing	service de laboratoire des matériaux

expérience • connaissance • intégrité