

Geotechnical
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Environmental
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Hydrogeology

Geological
Engineering

Materials Testing

Building Science

Phase I-II Environmental Site Assessment

10 King Street
Richmond (Ottawa), Ontario

Prepared For

Talos Custom Homes Limited

July 15, 2009

Report: PE1623-1

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EXECUTIVE SUMMARY

Assessment

A Phase I-II - Environmental Site Assessment was carried out at 10 King Street, in the City of Richmond (Ottawa), Ontario. The purpose of this investigation was to research the past and current uses of the site and adjacent lands to identify any potential environmental concerns associated with the subject or adjacent properties.

Based on the findings of the historical research and site inspection, concerns were identified regarding the past use of the neighbouring property to the north as a retail fuel outlet. Five (5) boreholes were placed on site to assess this potential concern.

Soil

Two (2) soil samples were analysed for the following parameters: petroleum hydrocarbons (PHCs F_1 to F_4) and benzene, ethylbenzene, toluene and xylenes (BTEX). The soil samples analysed were from boreholes placed adjacent to the former retail fuel outlet on the neighbouring property to the north. The analytical test results did not identify any of the parameters analysed in excess of the MOE Table 2 standards.

Groundwater

A groundwater sample was recovered from the groundwater monitoring well installed in BH5. The sample was submitted for analytical testing of volatile organic compounds (VOCs) and PHCs (F_1 to F_4). The groundwater analytical test results did not identify any detectable concentrations of the parameters analysed.

Based on our findings, it is our opinion that the subject site has not been significantly impacted by former retail fuel outlet on the neighbouring property to the north. **No further investigation is recommended at this time.**

Recommendations

Potable and Monitoring Water Wells

It is our understanding that the subject property will undergo future re-development. It is recommended that the one (1) drilled water well on the subject property be properly decommissioned by licenced well drillers if it is not going to be used as part of the future development. Similarly, the groundwater monitoring well installed in BH5 should be properly abandoned by a licensed well driller, if it is not going to be used in the future, or it should be registered with the MOE.

1.0 INTRODUCTION

At the request of Talos Custom Homes, Paterson conducted a Phase I-II - Environmental Site Assessment (ESA) for the vacant property located at 10 King Street in the Village of Richmond (Ottawa), Ontario.

This report has been prepared specifically and solely for the above noted project which is described herein. It contains all of our findings and results of the environmental conditions at this site.

2.0 SITE INFORMATION

Address: 10 King Street, Richmond (Ottawa), Ontario.

Legal Description: Registered Plan D-13 Unit 59 REF Plans; 4R5234, Parts 1 and 2 Less 4R11108; PTS 2, 4, Ottawa, Ontario.

Location: The subject property is located on the west side of King Street approximately 60 m south of Perth Street, in the Village of Richmond (Ottawa), Ontario. Refer to Figure 1 - Key Plan in Appendix 2 for the site location.

Site Description:

Configuration:	Irregular
Total Site Area:	15, 927 m ² (approximate)
Current Use:	The subject site is currently vacant.
Services:	The properties in the area of the site are serviced with private wells and municipal sewers at this time.

3.0 SCOPE OF WORK

The scope of work for this Phase I-II - Environmental Site Assessment was as follows:

- ☐ Investigate the existing conditions present at the subject property by carrying out a field study and historical review in accordance with CSA Z768-01.
- ☐ Conduct a Phase II - ESA, according to CSA Z769-00, to assess potential impacts from the presence of a former fuel dispensing facility on the neighbouring property to the north.
- ☐ Present the results of our findings in a comprehensive report.
- ☐ Provide a preliminary environmental site evaluation based on our findings.
- ☐ Provide preliminary remediation recommendations and further investigative work if contamination is encountered or suspected.

4.0 PHASE I - ENVIRONMENTAL SITE ASSESSMENT

4.1 Historical Research

The methodology for the Phase I - Environmental Site Assessment program was carried out in two segments. The first consisted of a historical review which included a brief research of the past use of the site. This portion of the program was carried out by personnel from our environmental division. The following is a list of the key information sources reviewed by this firm.

Federal Records

- ☐ Maps and photographs (Geological Survey of Canada surficial and subsurface mapping).
- ☐ Air photos at the Energy Mines and Resources Air Photo Library.
- ☐ National Archives.

Provincial Records

- ☐ MOE document titled "Waste Disposal Site Inventory in Ontario".
- ☐ Office of Technical Standards and Safety Authority, Fuels Safety Branch.

Municipal Records

- ☐ The Corporation of the City of Ottawa.
- ☐ Intera Technologies Limited Report "Mapping and Assessment of Former Industrial Sites, City of Ottawa".
- ☐ City of Ottawa document entitled "Old Landfill Management Strategy; Phase 1 - Identification of Sites, City of Ottawa, Ontario"; finalised October, 2004.

Local Information Sources

- ☐ Previous engineering report.

4.2 Field Assessment

The second segment of the assessment consisted of a field investigation which included a walk-through inspection and detailed visual assessment of the environmental conditions of the subject property. The field investigation was carried out on July 7, 2009 by personnel from our Environmental Division.

As part of the field assessment, the site was inspected for signs of the following:

- ☐ Evidence of previous or existing fuel storage tanks.
- ☐ On-site use or storage of hazardous materials.
- ☐ On-site handling or disposal of liquid or solid waste materials.
- ☐ Aboveground piping systems, including pumps, valves, and joints.
- ☐ Truck or rail loading or unloading areas.
- ☐ Electrical conduits, abandoned pipelines or pumping stations.
- ☐ Remnants of old buildings.
- ☐ Signs of surficial contamination (ie: staining, distressed vegetation).
- ☐ Unnaturally discoloured, ponded, or flowing waters.
- ☐ Surficial drainage, wetlands, natural waterways, or watercourses through the property (ie: ditches, creeks, ponds, poor drainage).
- ☐ Any evidence of potable water supply wells or groundwater monitoring wells (such as leak detection monitoring wells for underground storage tank systems or abandoned systems).
- ☐ Any abnormal odours associated with the site, whether from on-site or off-site sources.
- ☐ The presence of any recent soil disturbances such as soil removal, filling, tilling, grading, etc.
- ☐ Asbestos containing materials (ACMs).
- ☐ Urea formaldehyde foam insulation (UFFI).
- ☐ Products containing Polychlorinated Biphenyls (PCBs).
- ☐ Ozone depleting substances (ODS).
- ☐ Lead-containing materials.
- ☐ Current use of neighbouring properties.

4.3 Historical Review

Air Photo Research

Historical air photos of the subject property were reviewed at the National Air Photo Library. Based on the review, the following observations have been made:

- | | |
|------|--|
| 1950 | The subject site and adjacent properties are agricultural fields. King Street to the east and Perth Street to the north have been developed. The Village of Richmond is present west of the subject site. |
| 1963 | The site remains vacant/agricultural land. A drainage ditch has been constructed on the property south of the site, leading to the Jock River further to the south. Two (2) properties have been or are being developed north of the subject site, on the south side of Perth Street. Residential development has continued in the area, specifically east of King Street. |
| 1980 | The property north of the subject site, in the southwest corner of the Perth Street and King Street intersection, is occupied by a retail fuel outlet. Another structure has been developed north of the site, west of the gas station. The subject property and the remainder of the adjacent lands remain primarily unchanged. |
| 2001 | The subject site and neighbouring properties are relatively unchanged from the previous photo. |

Laser copies of the aerial photographs taken in the above years are included in Appendix 2 of this report.

National Archives

No city directories or fire insurance plans were available for the area of the subject or neighbouring properties.

Ontario Ministry of Environment (MOE)

The Ontario Ministry of Environment document entitled "Waste Disposal Site Inventory in Ontario, 1991" was reviewed as part of the historical research. This document includes all recorded active and closed waste disposal sites, industrial manufactured gas plants, and coal tar distillation plants in the Province of Ontario. Based on this document, there are no former or current waste disposal sites or above mentioned industrial sites in the vicinity of the subject property.

A search of the MOE brownfields environmental site registry was conducted electronically on July 14, 2009. No Record of Site Conditions (RSC) have been filed for any properties within 1 km of the subject site.

Technical Standards and Safety Authority (TSSA)

The TSSA, Fuels Safety Branch in Toronto, was contacted on November 20, 2008. There are no underground storage tanks recorded in the TSSA registry for the subject property and the subject property is not registered with the TSSA as a private fuel outlet. Properties immediately adjacent to the site are also not registered with the TSSA with one exception. The property to the north is registered with the TSSA as a private fuel outlet. According to their records, this property (6044 Perth Street) is a full serve gasoline station and currently has a total of four (4) single wall fibreglass underground gasoline storage tanks. The tanks were installed in 1979 and are 22,700 L capacity. The TSSA registry is not up to date regarding this property as the above noted tanks were removed from this property when the retail fuel outlet was decommissioned in 2000. There were no infractions or spills recorded in the TSSA registry with regards to this property.

City of Ottawa

The document prepared by Golder Associates entitled "Old Landfill Management Strategy, Phase 1- Identification of Sites, City of Ottawa, Ontario", was reviewed. The document identified no former landfill sites within the immediate vicinity of the subject site.

PCB Inventory

A search of national PCB waste storage sites was conducted. No PCB waste storage sites are located in the immediate vicinity of the subject property.

Previous Environmental Report

In 2002 Aqua Terre conducted soil and groundwater investigations on the former gas station located north of the subject site. The document entitled "*Summary of Soil and Groundwater Investigations, 6044 Perth Street and Vicinity Richmond, Ontario (Former Petro-Canada Outlet No. 00654)*", dated May 14, 2002 was provided to Paterson for review.

According to the document, the property located at 6044 Perth Street operated as a retail fuel outlet between 1955 and 2000. Between 2000 and 2002 a total of six (6) boreholes, four (4) of which were instrumented with monitoring wells were drilled. Two (2) of the holes were placed on the former retail fuel outlet site immediately north of the subject property line, two (2) boreholes, with wells, were placed on the subject site (MW-29 and MW-30). One (1) borehole was placed east of the site on the east side of King Street and one (1) was placed in the western portion of the gas station property, southwest of the fuelling equipment. See attached Test Hole Location Plan for approximate borehole locations.

Following a vapour screening program, one (1) soil sample from each borehole was submitted for analytical testing of BTEX and total petroleum hydrocarbons (TPH). The samples from the two (2) boreholes placed on the subject site were obtained from depths of 3.0 m below the measured groundwater table. None of the analysed parameters were detected above the laboratory method detection limit in the six (6) soil samples submitted.

Groundwater samples from the four (4) monitoring wells were obtained on two or three separate occasions. BTEX parameters were detected on two (2) of three (3) occasions in MW13 (located on the former gas station site, southwest of the former fuelling equipment) in concentrations below the MOE Table 2 potable water standards. TPH parameters were detected in MW 29, located on the subject site on one (1) of two (2) occasions. The detected concentration of 155 µg/L was below the MOE standard of 1000 µg/L. The report indicated that additional boreholes were being proposed, two of which were to be located along the property line between the former gas station and the subject site. However, we do not believe that these were ever drilled.

4.4 Exterior Assessment

The property is predominantly grass covered and is flat. Drainage on site consists of infiltration and ditches along the adjacent roadways. The topography of the area is relatively flat with a slight slope downward towards the Jock River located approximately 500 m southeast of the subject property. The subject site is approximately at grade with the neighbouring roadways and properties. No ponded water or signs of surficial staining were observed at the time of our site visit.

Potential Environmental Concerns

☐ ***Fuels and Chemical Storage***

There were no above ground storage tanks or signs of underground storage tanks observed on the exterior of the subject property at the time of the investigation. There were no hazardous chemicals, spills, or stains observed at the time of the site inspection.

☐ ***Waste Management***

There is no waste currently generated on the subject property.

☐ ***Polychlorinated Biphenyls (PCBs)***

No concerns with respect to PCBs were noted on the exterior of the subject property at the time of the site inspection.

☐ ***Wastewater Discharges***

There is no wastewater currently generated on site.

☐ ***Fill Material***

A pile of fill was observed on the southern side of the subject property at the time our inspection. This fill was likely placed on the property during the construction of the neighbouring residential lands to the south. No apparent concerns were noted with the fill material at the time of our field work. No fill was observed in any of the boreholes drilled as part of our field program.

☐ **Potable Groundwater Well**

A drilled potable groundwater well was observed in the western portion of the subject site.

4.5 Adjacent Properties

Land use adjacent to the subject property was as follows:

- ☐ North - Commercial and residential (former retail fuel outlet located at 6044 Perth Street);
- ☐ South - Vacant and residential;
- ☐ East - King Street followed by residential land;
- ☐ West - Cockburn Street followed by residential land.

The environmental impact of the current use of the adjacent properties to the south, east and west upon the subject site was considered to be low. The potential environmental impact from the adjacent property to the north (former retail fuel outlet) was considered to be moderate to high. Land use adjacent to the subject property is illustrated on Drawing PE1623-1 - Test Hole Location Plan in Appendix 2.

4.6 Phase I - Environmental Assessment

The purpose of this Phase I-ESA was to research the past use of the subject property and identify any potential environmental concerns associated with the subject site or adjacent properties.

Based on the former use of neighbouring property to the north (former retail fuel outlet), a Phase II - ESA was recommended for the subject property.

5.0 PHASE II - ENVIRONMENTAL SITE ASSESSMENT

5.1 Subsurface Investigation

Field Program

The subsurface investigation was conducted in July 3, 2009 and consisted of the placement of five (5) boreholes in the subject property. The test holes were placed along the northern portion of the property adjacent to the former retail fuel outlet. The test hole locations are illustrated on Drawing No. PE1623-1 - Test Hole Location Plan in Appendix 2. All boreholes were completed using a track mounted power auger drill rig.

The test holes were completed to depths ranging from 5.2 to 6.1 m below grade. A total of twenty-eight (28) soil samples were recovered by means of split spoon sampling, from the auger flight or grab sampling. Upon recovery, all samples were immediately sealed in appropriate containers to facilitate the preliminary screening procedure. The depths at which the auger and split-spoon samples were recovered from the test holes are shown as "AU" and "SS", respectively on the Soil Profile and Test Data sheets in Appendix 1.

All samples recovered as part of this investigation will be stored in the laboratory for a period of one (1) month after issuance of this report. All samples will then be discarded unless this firm is otherwise directed.

Monitoring Well Installation

A groundwater monitoring well was installed in BH5. Typical monitoring well construction details are described below:

- ☐ Slotted 50 mm diameter PVC screen at base of borehole.
- ☐ 50 mm diameter PVC riser pipe from the top of the screen to the ground surface.
- ☐ No.3 silica sand backfill within annular space around screen.
- ☐ 300 mm thick bentonite hole plug directly above PVC slotted screen.
- ☐ Clean backfill from top of bentonite plug to the ground surface.

Refer to the Soil Profile and Test Data sheets in Appendix 1 for the actual well construction in BH5.

Soil Sampling Protocol

Soil sampling protocols were followed using the MOE document titled "Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario", dated May 1996.

The soil samples from the split spoon or augers were recovered using a stainless steel spoon, using a shovel or by hand, using protective gloves (changed after each sample). The samples were placed into plastic bags. If significant contamination was encountered, the samples were placed into glass jars. Sampling equipment was washed in soapy water after each split spoon to prevent cross contamination of the samples. Samples were stored in coolers to reduce analyte volatilization during transportation.

Groundwater Sampling Protocol

The groundwater sample was taken using a dedicated footvalve and polytubing. Prior to sampling, the well was purged of three (3) times the well volume, if adequate water was available. Samples were stored in bottles prepared by Paracel Laboratories.

Analytical Testing

Paracel Laboratories (Paracel), of Ottawa, performed the laboratory analysis of the soil and groundwater samples submitted for analytical testing. Paracel is a member of the Standards Council of Canada/Canadian Association for Environmental Analytical Laboratories (SCC/CAEAL). Paracel is accredited and certified by SCC/CAEAL for specific tests registered with the association.

5.2 Subsurface Profile

In general, the soil profile consisted of a layer of topsoil underlain by native silty clay. Specific details of the soil profile at each test hole location can be seen on the Soil Profile and Test Data sheets in Appendix 1.

5.3 Groundwater

The groundwater level was measured in BH5 on July 7, 2009. The water level was approximately 1.9 m below ground surface. It should be noted that groundwater levels fluctuate seasonally.

5.4 Soil Sample Headspace Analysis

A Gastechtor with methane elimination and calibrated to hexane was used to measure the combustible vapour concentrations in the headspace of the soil samples recovered from the test holes.

The technical protocol was obtained from Appendix C of the MOE document entitled "Interim Guidelines for the Remediation of Petroleum Contamination at Operating Retail and Private Fuel Outlets in Ontario", dated March 1992.

Soil samples recovered at the time of sampling were placed immediately into airtight plastic bags with nominal headspace. All lumps of soil inside the bags were broken by hand, and the soil was allowed to come to room temperature prior to conducting the vapour survey. Allowing the samples to stabilize to room temperature ensures consistency of readings between samples.

To measure soil vapours, the analyser probe is inserted into the nominal headspace above the soil sample. A Gastech Tanktechtor with methane elimination and calibrated to hexane were used for this purpose. The sample is agitated/manipulated gently as the measurement is taken. The peak reading registered within the first 15 seconds is recorded as the vapour measurement.

The combustible vapour readings (gastech readings) for all soil samples were found to be less than 10 ppm. These readings were not considered to be indicative of the presence significant levels of volatile substances (such as gasoline or diesel, to a lesser extent). It should be noted that the combustible vapour results can not be used to identify the presence of heavier petroleum hydrocarbons such as heavy oil. The results of the vapour survey are presented on the Soil Profile and Test Data sheets in Appendix 1.

5.5 Analytical Test Results

Remediation Criteria

The remediation criteria for the subject property were obtained from Table 2 of the document entitled "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", prepared by the Ontario Ministry of Environment (MOE), March, 2004. The MOE Cleanup Standards are based on the following considerations:

- ☐ Coarse grained soil conditions.
- ☐ Surface soil and groundwater conditions.
- ☐ Potable groundwater situation.
- ☐ Residential land use.

Soil and Groundwater Analysis

Two (2) soil samples were submitted for petroleum hydrocarbons PHC (fractions 1 to 4), and benzene, ethylbenzene, toluene and xylene (BTEX) analysis. One (1) water sample was submitted for analytical testing of PHCs and volatile organic compounds (VOCs). The results of the analytical testing are presented in Tables 1, 2 and 3 along with the applicable remediation criteria. The laboratory reports are included in Appendix 1 of this report.

Table 1 Analytical Test Results - Soil BTEX and Petroleum Hydrocarbons (F1 to F4)				
Parameters	MDL (µg/g)	Soil Sample (ug/g)		MOE Table 2 (Residential) (ug/g)
		BH1 SS6	BH2 SS5	
Benzene	0.03	nd	nd	0.24
Ethylbenzene	0.05	nd	nd	0.28
Toluene	0.05	nd	nd	2.1
Xylenes (total)	0.1	nd	nd	25
PHCs - F1 (C ₆ - C ₁₀)	10	nd	nd	180
PHCs - F2 (>C ₁₀ - C ₁₆)	10	nd	nd	250
PHCs - F3 (>C ₁₆ - C ₃₄)	10	127	nd	800
PHCs - F4 (>C ₃₄)	10	136	nd	5,600
Notes: MDL - Method Detection Limit nd - Not Detected (i.e <MDL) nt - Not tested				

The analytical test results did not identify any BTEX or petroleum hydrocarbon concentrations in the soil samples analysed with the following exceptions. Sample BH1-SS6 identified detectable concentrations of petroleum hydrocarbons (F3 and F4), which were below the MOE Table 2 standards.

Groundwater Analysis

A groundwater sample recovered from the monitoring well installed in BH5 and was submitted for volatile organic compounds (VOCs) and PHCs (F₁ to F₄) analysis. The results are presented in Tables 2 and 3. The laboratory report is included in Appendix 1 of this report.

Table 2 Analytical Test Results - Groundwater PHCs (Fractions 1 to 4)			
Parameter	MDL (ug/L)	Groundwater Samples (ug/L)	Residential Land Use MOE Table 2 (ug/L)
		BH5 - MW1	
F1 PHCs (C ₆ -C ₁₀)	200	nd	1,000
F2 PHCs (C ₁₀ -C ₁₆)	100	nd	
F3 PHCs (C ₁₆ -C ₃₄)	100	nd	1,000
F4 PHCs (C ₃₄ -C ₅₀)	100	nd	
Notes: <input type="checkbox"/> MDL - Method Detection Limit <input type="checkbox"/> nd - Not Detected (< MDL)			

No detectable PHC concentrations were identified in the groundwater sample analysed.

Table 3 Analytical Test Results - Groundwater Volatile Organic Compounds (VOCs)			
Parameters	MDL (µg/L)	Groundwater Samples (ug/L)	MOE Table 2 (Residential) (ug/L)
		BH5 - MW1	
Benzene	0.5	nd	5.0
Toluene	0.5	nd	24
Ethylbenzene	0.5	nd	2.4
Total Xylenes	0.5	nd	300
Bromodichloromethane	0.4	nd	5.0
Bromoform	0.5	nd	5.0
Bromomethane	0.7	nd	3.7
Carbon Tetrachloride	0.5	nd	5.0
Chlorobenzene	0.4	nd	30
Chloroethane	1.0	nd	nv
Chloroform	0.5	nd	5.0
Chloromethane	3.0	nd	nv
Dibromochloromethane	0.5	nd	5.0
1,2 - Dibromoethane	1.0	nd	nv
1,2 - Dichlorobenzene	0.4	nd	3.0
1,3 - Dichlorobenzene	0.4	nd	630
1,4 - Dichlorobenzene	0.4	nd	1.0
1,1-Dichloroethane	0.5	nd	70
1,2-Dichloroethane	0.5	nd	5.0
1,1-Dichloroethylene	0.5	nd	0.66
c-1,2-Dichloroethylene	0.4	nd	70
t-1,2-Dichloroethylene	1.0	nd	100
1,2-Dichloropropane	0.5	nd	5.0
c-1,3-Dichloropropylene	0.4	nd	nv
t-1,3-Dichloropropylene	0.5	nd	nv
Methylene Chloride	4.0	nd	50
Styrene	0.4	nd	100
1,1,1,2-tetrachloroethane	0.5	nd	5.0
1,1,2,2-tetrachloroethane	0.6	nd	1.0
Tetrachloroethylene	0.5	nd	5.0
1,1,1-Trichloroethane	0.4	nd	200
1,1,2-Trichloroethane	0.6	nd	5.0
Trichloroethylene	0.4	nd	50
Trichlorofluoromethane	1.0	nd	nv
1,3,5-Trimethylbenzene	0.5	nd	nv
Vinyl Chloride	0.4	nd	0.5
Notes: <input type="checkbox"/> MDL - Method Detection Limit; <input type="checkbox"/> nd - Not Detected (< MDL) <input type="checkbox"/> nv - No current MOE standard			

No detectable VOC concentrations were identified in the groundwater sample analysed.

5.6 Phase II - Environmental Assessment

A Phase II - ESA was recommended and conducted for the subject property in order to address potential concerns from the former use of the adjacent property to the north as a retail fuel outlet.

Soil

A total of twenty-eight (28) soil samples were recovered from the five (5) boreholes placed on the subject site. No visual or olfactory signs indicating the possible presence of petroleum hydrocarbons were noted in the recovered samples. Furthermore, the results of the combustible vapour survey did not indicate the potential for significant concern. Two (2) soil samples were submitted for analytical testing for PHCs (Fractions 1 to 4) and BTEX parameters.

The analytical test results did not identify any BTEX or petroleum hydrocarbon concentrations in the soil samples analysed with the following exceptions. Sample BH1-SS6 identified detectable concentrations of petroleum hydrocarbons (F3 and F4), which were below the MOE Table 2 standards. It should be noted that the petroleum hydrocarbon fractions identified in this sample (F3 and F4) are representative of a heavy oil (such as lubricating oil or grease), as opposed to gasoline.

Water

No detectable VOCs or PHC concentrations were identified in the groundwater sample analysed from BH5.

6.0 ASSESSMENT AND RECOMMENDATIONS

6.1 Assessment

The purpose of the Phase I - ESA was to research the past use of the subject property and identify any potential environmental concerns associated with the subject or neighbouring sites with the potential to impact the subject lands.

No significant environmental concerns were identified with the current or former use of the subject property or the adjacent properties to the south, east and west. Based on our findings, a Phase II - ESA was recommended for the subject property to address potential concerns from the former retail fuel outlet located on the neighbouring property to the north.

Soil

Two (2) soil samples were analysed for the following parameters: petroleum hydrocarbons (PHCs F_1 to F_4) and benzene, ethylbenzene, toluene and xylenes (BTEX). The soil samples analysed were from two (2) of the boreholes placed adjacent to the former retail fuel outlet on the neighbouring property to the north. The analytical test results did not identify any of the parameters analysed in excess of the MOE Table 2 standards.

Groundwater

A groundwater sample was recovered from the groundwater monitoring well installed in BH5. The sample was submitted for analytical testing of volatile organic compounds (VOCs) and PHCs (F_1 to F_4). The groundwater analytical test results did not identify any detectable concentrations of the parameters analysed.

Based on our findings, it is our opinion that the subject site has not been significantly impacted by former retail fuel outlet on the neighbouring property to the north. **No further investigation is recommended at this time.**

6.2 Recommendations

It is our understanding that the subject property will undergo future re-development. It is recommended that the one (1) drilled water well on the subject property be properly decommissioned by licenced well drillers, if it is not going to be used as part of the future development. Similarly, the groundwater monitoring well installed in BH5 should be properly abandoned by a licensed well driller, if it is not going to be used in the future, or it should be registered with the MOE.

7.0 STATEMENT OF LIMITATIONS

This Phase I-II - Environmental Site Assessment (ESA) report has been prepared in general accordance with the agreed scope-of-work and the requirements of CSA Z768-01 and CSA Z769-00. The conclusions presented herein are based on information gathered from a limited historical review, field inspection, and testing program. The findings of the Phase I-II - ESA are based on a review of readily available geological, historical, and regulatory information and a cursory review made at the time of the field assessment. The historical research relies on information supplied by others, such as local, provincial, and federal agencies and was limited within the scope-of-work, time, and budget of the project herein.

The client should be aware that any information pertaining to soils and all test hole logs are furnished as a matter of general information only and test hole descriptions or logs are not to be interpreted as descriptive of conditions at locations other than those described by the test holes themselves.

This report was prepared for the sole use of Talos Custom Homes Ltd. Permission from Talos Custom Homes Ltd. and our firm will be required to release this report to any other party.

Paterson Group Inc.


Eric Leveque, B.A.



Mark S. D'Arcy, P. Eng.



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APPENDIX 1

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

ANALYTICAL TEST RESULTS

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

SOIL PROFILE AND TEST DATA

Phase I-II Environmental Site Assessment
10 King Street
Ottawa (Richmond), Ontario

DATUM TBM - Top of grate located on south side of subject site. Geodetic elevation = 93.71m.

REMARKS

BORINGS BY CME 45 Power Auger

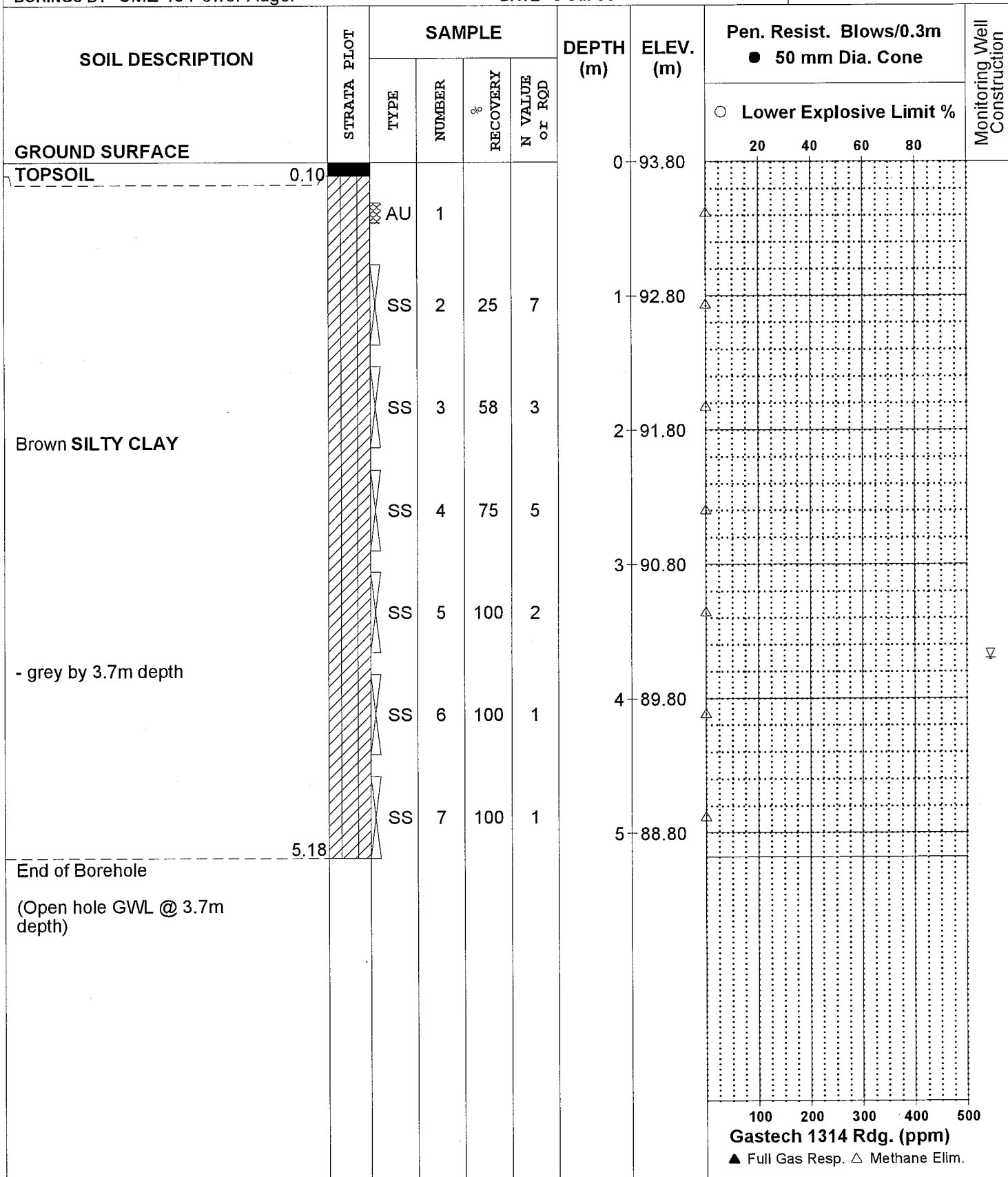
DATE 3 Jul 09

FILE NO.

PE1623

HOLE NO.

BH 1



DATUM TBM - Top of grate located on south side of subject site. Geodetic elevation = 93.71m.

REMARKS

FILE NO.

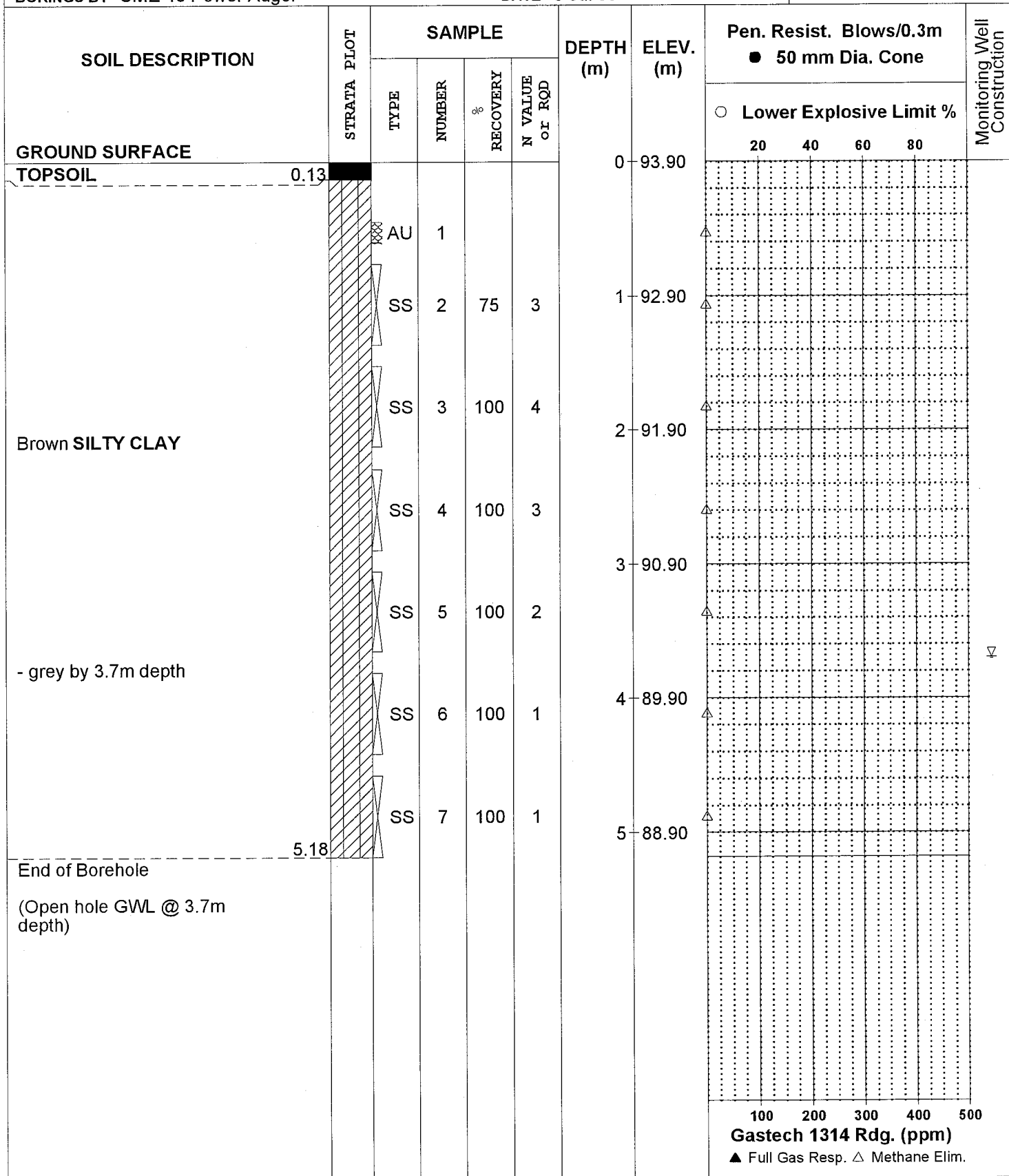
PE1623

HOLE NO.

BH 2

BORINGS BY CME 45 Power Auger

DATE 3 Jul 09



28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

SOIL PROFILE AND TEST DATA

Phase I-II Environmental Site Assessment
10 King Street
Ottawa (Richmond), Ontario

DATUM TBM - Top of grate located on south side of subject site. Geodetic elevation = 93.71m.

FILE NO.

PE1623

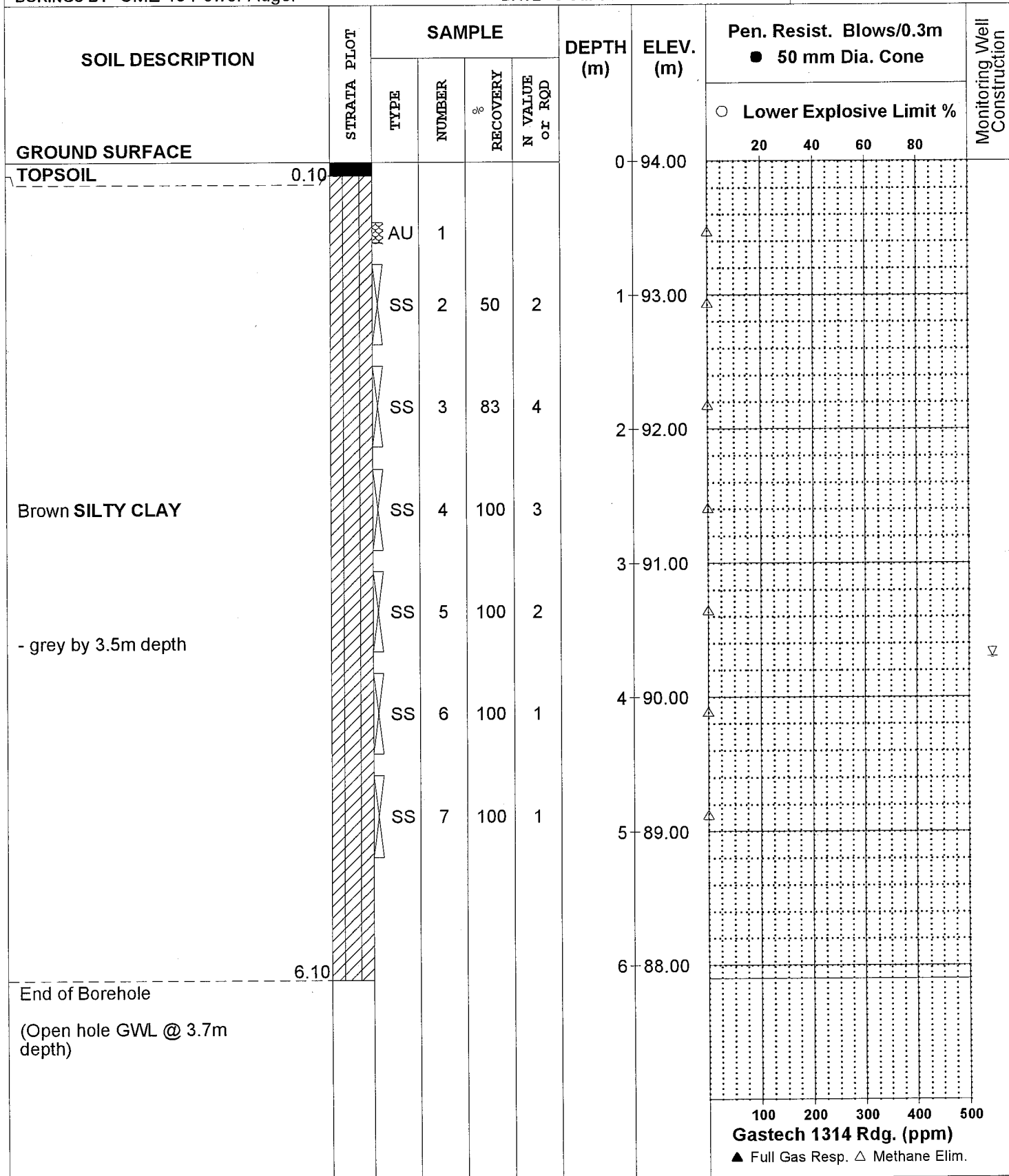
REMARKS

HOLE NO.

BH 3

BORINGS BY CME 45 Power Auger

DATE 3 Jul 09



28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

SOIL PROFILE AND TEST DATA

Phase I-II Environmental Site Assessment
10 King Street
Ottawa (Richmond), Ontario

DATUM TBM - Top of grate located on south side of subject site. Geodetic elevation = 93.71m.

FILE NO.

PE1623

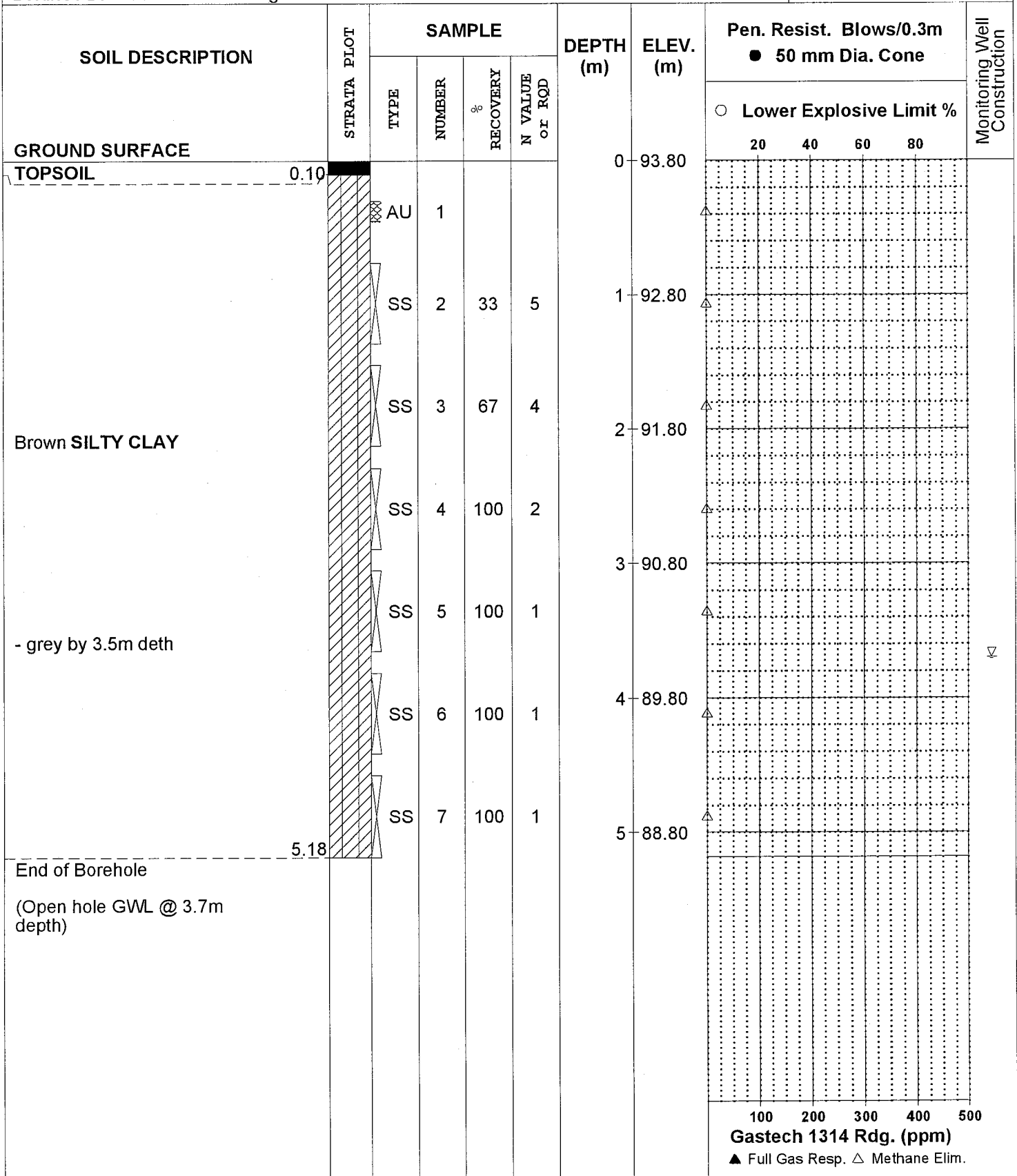
REMARKS

HOLE NO.

BH 4

BORINGS BY CME 45 Power Auger

DATE 3 Jul 09



DATUM TBM - Top of grate located on south side of subject site. Geodetic elevation = 93.71m.

REMARKS

BORINGS BY CME 45 Power Auger

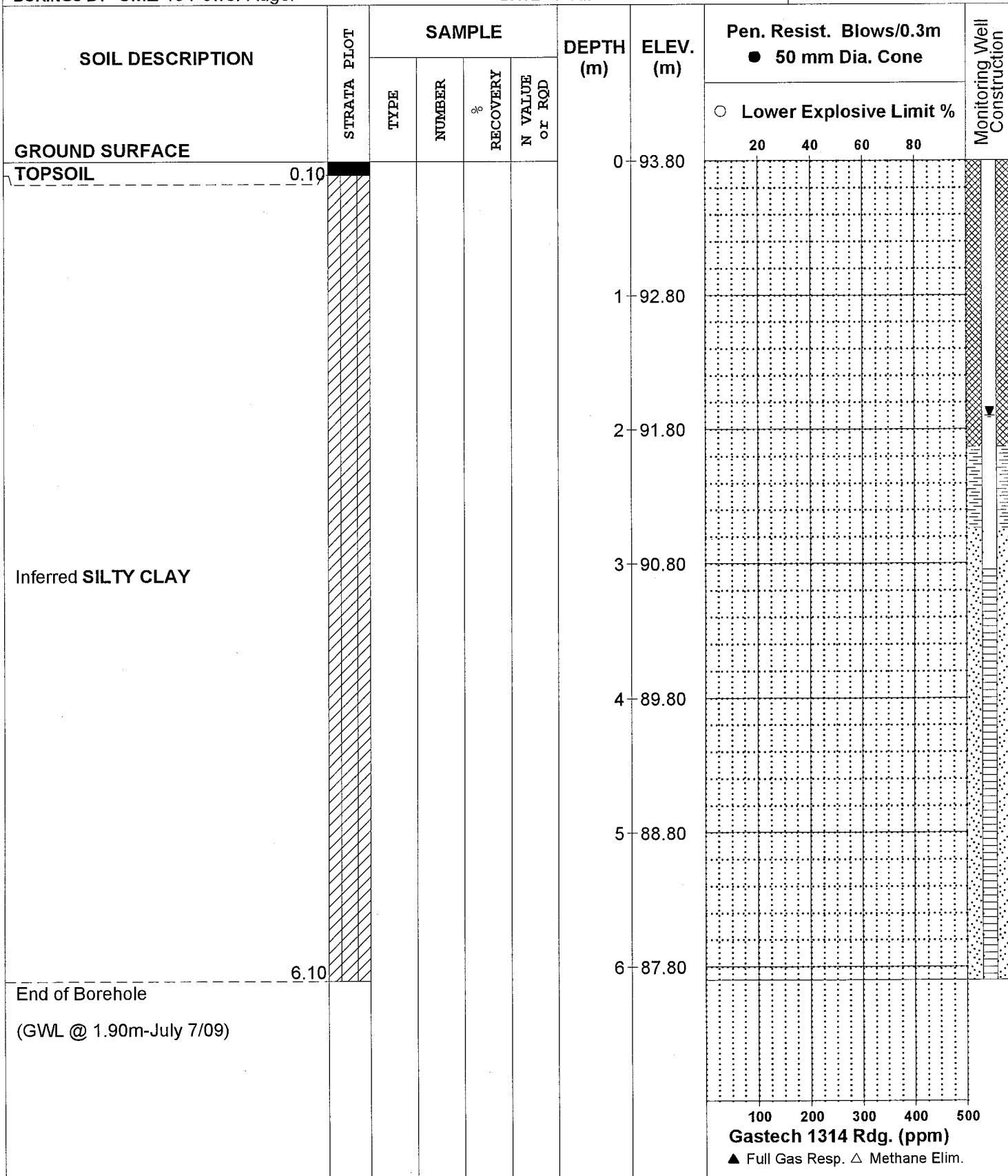
DATE 3 Jul 09

FILE NO.

PE1623

HOLE NO.

BH 5



SYMBOLS AND TERMS

SOIL DESCRIPTION

Behavioural properties, such as structure and strength, take precedence over particle gradation in describing soils. Terminology describing soil structure are as follows:

Desiccated	-	having visible signs of weathering by oxidation of clay minerals, shrinkage cracks, etc.
Fissured	-	having cracks, and hence a blocky structure.
Varved	-	composed of regular alternating layers of silt and clay.
Stratified	-	composed of alternating layers of different soil types, e.g. silt and sand or silt and clay.
Well-Graded	-	having wide range in grain sizes and substantial amounts of all intermediate particle sizes (see Grain Size Distribution).
Uniformly-Graded	-	predominantly of one grain size (see Grain Size Distribution).

The standard terminology to describe the strength of cohesionless soils is the relative density, usually inferred from the results of the Standard Penetration Test (SPT) 'N' value. The SPT N value is the number of blows of a 63.5 kg hammer, falling 760 mm, required to drive a 51 mm O.D. split spoon sampler 300 mm into the soil after an initial penetration of 150 mm.

Relative Density	'N' Value	Relative Density %
Very Loose	< 4	< 15
Loose	4-10	15-35
Compact	10-30	35-65
Dense	30-50	65-85
Very Dense	> 50	> 85

The standard terminology to describe the strength of cohesive soils is the consistency, which is based on the undisturbed undrained shear strength as measured by in situ or laboratory vane tests, penetrometer tests, unconfined compression tests, or occasionally by Standard Penetration Tests.

Consistency	Undrained Shear Strength (kPa)	'N' Value
Very Soft	< 12	< 2
Soft	12-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very Stiff	100-200	15-30
Hard	> 200	> 30

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

Cohesive soils can also be classified according to their "sensitivity". The sensitivity is the ratio between the undisturbed undrained shear strength and the remoulded undrained shear strength of the soil.

Terminology used for describing soil strata based upon texture, or the proportion of individual particle sizes present is provided on the Textural Soil Classification Chart at the end of this information package.

ROCK DESCRIPTION

The structural description of the bedrock mass is based on the Rock Quality Designation (RQD).

The RQD classification is based on a modified core recovery percentage in which all pieces of sound core over 100 mm long are counted as recovery. The smaller pieces are considered to be a result of closely-spaced discontinuities (resulting from shearing, jointing, faulting, or weathering) in the rock mass and are not counted. RQD is ideally determined from NXL size core. However, it can be used on smaller core sizes, such as BX, if the bulk of the fractures caused by drilling stresses (called "mechanical breaks") are easily distinguishable from the normal in-situ fractures.

RQD %	ROCK QUALITY
90-100	Excellent, intact, very sound
75-90	Good, massive, moderately jointed or sound
50-75	Fair, blocky and seamy, fractured
25-50	Poor, shattered and very seamy or blocky, severely fractured
0-25	Very poor, crushed, very severely fractured

SAMPLE TYPES

SS	-	Split spoon sample (obtained in conjunction with the performing of the Standard Penetration Test (SPT))
TW	-	Thin wall tube or Shelby tube
PS	-	Piston sample
AU	-	Auger sample or bulk sample
WS	-	Wash sample
RC	-	Rock core sample (Core bit size AXT, BXL, etc.) Rock core samples are obtained with the use of standard diamond drilling bits

SYMBOLS AND TERMS (continued)

GRAIN SIZE DISTRIBUTION

MC%	-	Natural moisture content or water content of sample, %
LL	-	Liquid limit, % (water content above which soil behaves as a liquid)
PL	-	Plastic limit, % (water content above which soil behaves plastically)
PI	-	Plasticity index, % (difference between LL and PL)
Dxx	-	Grain size at which xx% of the soil, by weight, is of finer grain sizes These grain size descriptions are not used below 0.075 mm grain size
D10	-	Grain size at which 10% of the soil is finer (effective grain size)
D60	-	Grain size at which 60% of the soil is finer
Cc	-	Concavity coefficient = $(D_{30})^2 / (D_{10} \times D_{60})$
Cu	-	Uniformity coefficient = D_{60} / D_{10}

Cc and Cu are used to assess the grading of sands and gravels:

Well-graded gravels have: $1 < Cc < 3$ and $Cu > 4$

Well-graded sands have: $1 < Cc < 3$ and $Cu > 6$

Sand and gravels not meeting the above requirements are poorly-graded or uniformly-graded.

Cc and Cu are not applicable for the description of soils with more than 10% silt and clay (more than 10% finer than 0.075 mm or the #200 sieve)

CONSOLIDATION TEST

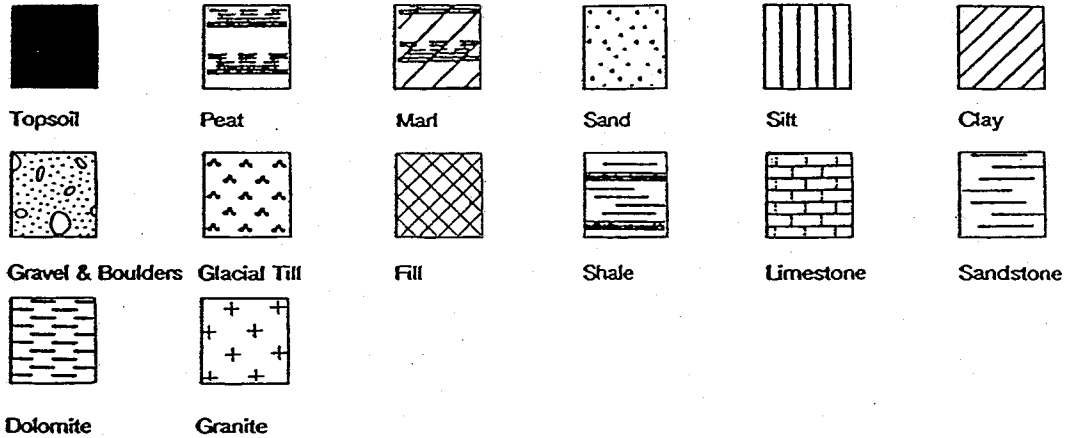
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
C_{cr}	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidation ratio = p'_c / p'_o
Void Ratio		Initial sample void ratio = volume of voids / volume of solids
Wo	-	Initial water content (at start of consolidation test)

PERMEABILITY TEST

k	-	Coefficient of permeability or hydraulic conductivity is a measure of the ability of water to flow through the sample. The value of k is measured at a specified unit weight for (remoulded) cohesionless soil samples, because its value will vary with the unit weight or density of the sample during the test.
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SYMBOLS AND TERMS (continued)

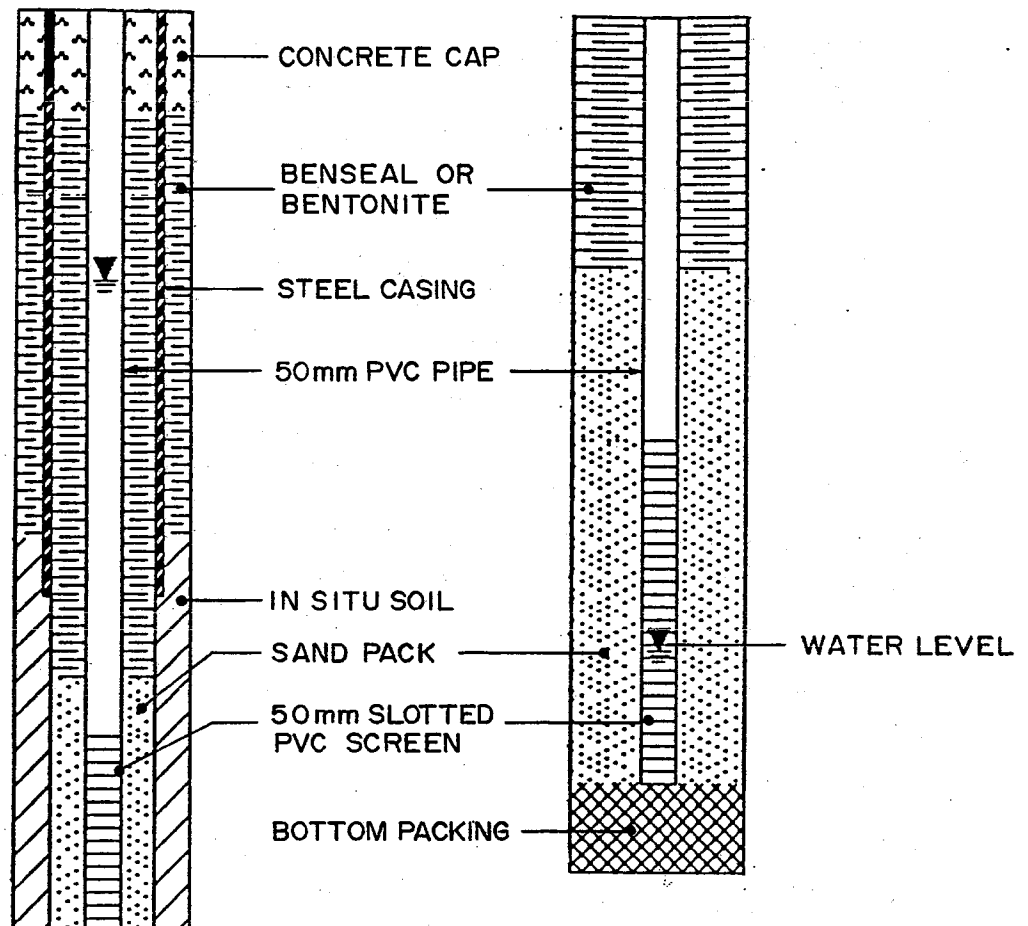
STRATA PLOT



MONITORING WELL AND PIEZOMETER CONSTRUCTION

Monitoring Well Construction

Piezometer Construction



Certificate of Analysis

Paterson Group Consulting Engineers

28 Concourse Gate, Unit 1
Nepean, ON K2E 7T7

Attn: Eric Leveque

Client PO: 8093

Project: PE1623

Custody: 62523

Phone: (613) 226-7381

Fax: (613) 226-6344

Report Date: 9-Jul-2009

Order Date: 3-Jul-2009

Order #: 0928003

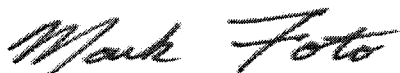
This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
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0928003-01	BH1-SS6
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0928003-02	BH2-SS5
------------	---------

Approved By:



Mark Foto, M.Sc. For Dale Robertson, BSc
Laboratory Director

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

Certificate of Analysis

Report Date: 09-Jul-2009

Order Date: 3-Jul-2009

Client: **Paterson Group Consulting Engineers**

Client PO: 8093

Project Description: PE1623

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX	EPA 8260 - P&T GC-MS	6-Jul-09	8-Jul-09
CCME PHC F1	CWS Tier 1 - P&T GC-FID	6-Jul-09	8-Jul-09
CCME PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	7-Jul-09	7-Jul-09
Solids, %	Gravimetric, calculation	6-Jul-09	6-Jul-09

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Certificate of Analysis

Report Date: 09-Jul-2009

Order Date: 3-Jul-2009

Client: **Paterson Group Consulting Engineers**

Client PO: 8093

Project Description: PE1623

Client ID:	BH1-SS6	BH2-SS5	-	-
Sample Date:	03-Jul-09	03-Jul-09	-	-
Sample ID:	0928003-01	0928003-02	-	-
MDL/Units	Soil	Soil	-	-

Physical Characteristics

% Solids	0.1 % by Wt.	70.6	70.0	-	-
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Volatiles

Benzene	0.03 ug/g dry	<0.03	<0.03	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	-	-
Toluene	0.05 ug/g dry	<0.05	<0.05	-	-
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g dry	<0.05	<0.05	-	-
Toluene-d8	Surrogate	102%	103%	-	-

Hydrocarbons

F1 PHCs (C6-C10)	10 ug/g dry	<10	<10	-	-
F2 PHCs (C10-C16)	10 ug/g dry	<10	<10	-	-
F3 PHCs (C16-C34)	10 ug/g dry	127	<10	-	-
F4 PHCs (C34-C50)	10 ug/g dry	136	<10	-	-

Certificate of Analysis

Report Date: 09-Jul-2009

Order Date: 3-Jul-2009

Client: **Paterson Group Consulting Engineers**

Client PO: 8093

Project Description: PE1623

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	10	ug/g						
F2 PHCs (C10-C16)	ND	10	ug/g						
F3 PHCs (C16-C34)	ND	10	ug/g						
F4 PHCs (C34-C50)	ND	10	ug/g						
Volatiles									
Benzene	ND	0.03	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						
Surrogate: Toluene-d8	8.09		ug/g		101	76-118			

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Sarnia, ON N7T 5T7

Certificate of Analysis

Report Date: 09-Jul-2009

Order Date: 3-Jul-2009

Client: **Paterson Group Consulting Engineers**

Client PO: 8093

Project Description: PE1623

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	10	ug/g dry	ND				32	
F2 PHCs (C10-C16)	ND	10	ug/g dry	ND				50	
F3 PHCs (C16-C34)	28	10	ug/g dry	25			11.3	50	
F4 PHCs (C34-C50)	116	10	ug/g dry	97			18.2	50	
Physical Characteristics									
% Solids	95.4	0.1	% by Wt.	96.0			0.6	25	
Volatiles									
Benzene	ND	0.03	ug/g dry	ND				50	
Ethylbenzene	ND	0.05	ug/g dry	ND				34	
Toluene	ND	0.05	ug/g dry	ND				32	
m,p-Xylenes	ND	0.05	ug/g dry	ND				35	
o-Xylene	ND	0.05	ug/g dry	ND				50	
Surrogate: Toluene-d8	10.5		ug/g dry	ND	106	76-118			

Certificate of Analysis

Report Date: 09-Jul-2009

Order Date: 3-Jul-2009

Client: **Paterson Group Consulting Engineers**

Client PO: 8093

Project Description: PE1623

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	94	10	ug/g	ND	94.2	80-120			
F2 PHCs (C10-C16)	80	10	ug/g	ND	100	61-129			
F3 PHCs (C16-C34)	180	10	ug/g	ND	90.0	61-129			
F4 PHCs (C34-C50)	132	10	ug/g	ND	110	61-129			
Volatiles									
Benzene	0.799	0.03	ug/g	ND	85.6	55-141			
Ethylbenzene	1.80	0.05	ug/g	ND	80.9	61-139			
Toluene	14.3	0.05	ug/g	ND	132	54-136			
m,p-Xylenes	6.14	0.05	ug/g	ND	91.2	61-139			
o-Xylene	2.42	0.05	ug/g	ND	89.6	60-142			
Surrogate: Toluene-d8	8.42		ug/g		105	76-118			

Certificate of Analysis

Report Date: 09-Jul-2009

Order Date: 3-Jul-2009

Client: **Paterson Group Consulting Engineers**

Client PO: 8093

Project Description: PE1623

Sample Data Revisions

None

Work Order Revisions/Comments:

None

Other Report Notes:

n/a: not applicable

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

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.

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Niagara Falls, ON L2J 8A3

SARNIA
123 Christina St. N.
Sarnia, ON N7T 5T7

Company Name: <u>Paragon Corp.</u>	Project Ref: <u>PE 1623</u>	Date Required: _____
Contact Name: <u>Eric Levesque</u>	PO# <u>8093</u>	Turn Around Time: <input type="checkbox"/> 1-day <input type="checkbox"/> 2-day <input checked="" type="checkbox"/> Regular
Address: <u>28 Carrouble Gok, Ont</u>	Quote # _____ <input type="checkbox"/> Not Quoted	Regulatory/Guideline Requirements
Tel: <u>226 7301</u> Cell: <u>2</u>	Preservative to be added by Paracel? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Email: <u>blavieque@paragoncorp.ca</u>		

Matrix Types: S-Soil/Sed GW-Ground Water SW-Surface Water SS-Storm/Sanitary Sewer A-Air O-Other RDW-Regulated Drinking Water

Sample Information					Analysis Required														
Paracel Order #	Sample Identification	Matrix	Air Volume	# Containers	Date Sampled dd/mm/yy														Hazardous? (Y/N)
0988003																			
1	BH 1-SS6	S	✓	1	July 3	✓													
2	BH 2-SS5	S	✓	1	4	✓													
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Comments: _____

Relinquished By: <u>Eric Levesque</u>	Received at Depot:	Received at Lab:	Verified By: <u>MT</u>
Date: <u>July 3</u> Time: <u>1:50 PM</u>	Date: _____ Time: _____	Date: <u>July 6</u> Time: <u>9:47</u>	Date: _____ Time: _____

Please refer to the back page for Locations and Sample Preservation, Container and Hold Time Requirements.

WHITE - Lab Copy, PINK - Client Copy



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Certificate of Analysis

Paterson Group Consulting Engineers

28 Concourse Gate, Unit 1
Nepean, ON K2E 7T7
Attn: Eric Leveque

Phone: (613) 226-7381
Fax: (613) 226-6344

Client PO: 8088
Project: PE1623
Custody: 62549

Report Date: 8-Jul-2009
Order Date: 7-Jul-2009

Order #: 0928057

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

Paracel ID Client ID
0928057-01 BH5-MW1

Approved By:

A handwritten signature in black ink that reads "Mark Foto".

Mark Foto, M.Sc. For Dale Robertson, BSc
Laboratory Director

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

Certificate of Analysis

Report Date: 08-Jul-2009

Order Date: 7-Jul-2009

Client: **Paterson Group Consulting Engineers**

Client PO: 8088

Project Description: PE1623

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
CCME PHC F1	CWS Tier 1 - P&T GC-FID	7-Jul-09	8-Jul-09
CCME PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	7-Jul-09	8-Jul-09
VOCs	EPA 624 - P&T GC-MS	7-Jul-09	8-Jul-09

Certificate of Analysis

Report Date: 08-Jul-2009

Order Date: 7-Jul-2009

Client: **Paterson Group Consulting Engineers**

Client PO: 8088

Project Description: PE1623

	Client ID:	BH5-MW1	-	-	-
	Sample Date:	07/07/2009 09:00	-	-	-
	Sample ID:	0928057-01	-	-	-
	MDL/Units	Water	-	-	-

Volatiles

Benzene	0.5 ug/L	<0.5	-	-	-
Bromodichloromethane	0.4 ug/L	<0.4	-	-	-
Bromoform	0.5 ug/L	<0.5	-	-	-
Bromomethane	0.7 ug/L	<0.7	-	-	-
Carbon Tetrachloride	0.5 ug/L	<0.5	-	-	-
Chlorobenzene	0.4 ug/L	<0.4	-	-	-
Chloroethane	1.0 ug/L	<1.0	-	-	-
Chloroform	0.5 ug/L	<0.5	-	-	-
Chloromethane	3.0 ug/L	<3.0	-	-	-
Dibromochloromethane	0.5 ug/L	<0.5	-	-	-
1,2-Dibromoethane	1.0 ug/L	<1.0	-	-	-
1,2-Dichlorobenzene	0.4 ug/L	<0.4	-	-	-
1,3-Dichlorobenzene	0.4 ug/L	<0.4	-	-	-
1,4-Dichlorobenzene	0.4 ug/L	<0.4	-	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	-	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	-	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
cis-1,2-Dichloroethylene	0.4 ug/L	<0.4	-	-	-
trans-1,2-Dichloroethylene	1.0 ug/L	<1.0	-	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	-	-	-
cis-1,3-Dichloropropylene	0.4 ug/L	<0.4	-	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	-
Ethylbenzene	0.5 ug/L	<0.5	-	-	-
Methylene Chloride	4.0 ug/L	<4.0	-	-	-
Styrene	0.4 ug/L	<0.4	-	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-
1,1,1,2,2-Tetrachloroethane	0.6 ug/L	<0.6	-	-	-
Tetrachloroethylene	0.5 ug/L	<0.5	-	-	-
Toluene	0.5 ug/L	<0.5	-	-	-
1,1,1-Trichloroethane	0.4 ug/L	<0.4	-	-	-
1,1,2-Trichloroethane	0.6 ug/L	<0.6	-	-	-

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Certificate of Analysis

Report Date: 08-Jul-2009

Order Date: 7-Jul-2009

Client: **Paterson Group Consulting Engineers**

Client PO: 8088

Project Description: PE1623

	Client ID:	BH5-MW1	-	-	-
	Sample Date:	07/07/2009 09:00	-	-	-
	Sample ID:	0928057-01	-	-	-
	MDL/Units	Water	-	-	-
Trichloroethylene	0.4 ug/L	<0.4	-	-	-
Trichlorofluoromethane	1.0 ug/L	<1.0	-	-	-
1,3,5-Trimethylbenzene	0.5 ug/L	<0.5	-	-	-
Vinyl chloride	0.4 ug/L	<0.4	-	-	-
m,p-Xylenes	0.5 ug/L	<0.5	-	-	-
o-Xylene	0.5 ug/L	<0.5	-	-	-
4-Bromofluorobenzene	Surrogate	101%	-	-	-
Dibromofluoromethane	Surrogate	95.1%	-	-	-
Toluene-d8	Surrogate	97.1%	-	-	-

Hydrocarbons

F1 PHCs (C6-C10)	200 ug/L	<200	-	-	-
F2 PHCs (C10-C16)	100 ug/L	<100	-	-	-
F3 PHCs (C16-C34)	100 ug/L	<100	-	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	-	-	-

Certificate of Analysis

Report Date: 08-Jul-2009

Order Date: 7-Jul-2009

Client: **Paterson Group Consulting Engineers**

Client PO: 8088

Project Description: PE1623

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	200	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						
Volatiles									
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.4	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.7	ug/L						
Carbon Tetrachloride	ND	0.5	ug/L						
Chlorobenzene	ND	0.4	ug/L						
Chloroethane	ND	1.0	ug/L						
Chloroform	ND	0.5	ug/L						
Chloromethane	ND	3.0	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
1,2-Dibromoethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.4	ug/L						
1,3-Dichlorobenzene	ND	0.4	ug/L						
1,4-Dichlorobenzene	ND	0.4	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.4	ug/L						
trans-1,2-Dichloroethylene	ND	1.0	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.4	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Methylene Chloride	ND	4.0	ug/L						
Styrene	ND	0.4	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.6	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.4	ug/L						
1,1,2-Trichloroethane	ND	0.6	ug/L						
Trichloroethylene	ND	0.4	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
1,3,5-Trimethylbenzene	ND	0.5	ug/L						
Vinyl chloride	ND	0.4	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	81.7		ug/L		102	83-134			
Surrogate: Dibromofluoromethane	72.0		ug/L		90.1	78-124			
Surrogate: Toluene-d8	78.6		ug/L		98.2	76-118			

Certificate of Analysis

Report Date: 08-Jul-2009

Order Date: 7-Jul-2009

Client: **Paterson Group Consulting Engineers**

Client PO: 8088

Project Description: PE1623

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	200	ug/L	ND				32	
Volatiles									
Benzene	ND	0.5	ug/L	ND				20	
Bromodichloromethane	ND	0.4	ug/L	ND				25	
Bromoform	ND	0.5	ug/L	ND				25	
Bromomethane	ND	0.7	ug/L	ND				25	
Carbon Tetrachloride	ND	0.5	ug/L	ND				25	
Chlorobenzene	ND	0.4	ug/L	ND				25	
Chloroethane	ND	1.0	ug/L	ND				25	
Chloroform	ND	0.5	ug/L	ND				19	
Chloromethane	ND	3.0	ug/L	ND				25	
Dibromochloromethane	ND	0.5	ug/L	ND				25	
1,2-Dibromoethane	ND	1.0	ug/L	ND				25	
1,2-Dichlorobenzene	ND	0.4	ug/L	ND				25	
1,3-Dichlorobenzene	ND	0.4	ug/L	ND				25	
1,4-Dichlorobenzene	ND	0.4	ug/L	ND				25	
1,1-Dichloroethane	ND	0.5	ug/L	ND				21	
1,2-Dichloroethane	ND	0.5	ug/L	ND				25	
1,1-Dichloroethylene	ND	0.5	ug/L	ND				21	
cis-1,2-Dichloroethylene	ND	0.4	ug/L	ND				20	
trans-1,2-Dichloroethylene	ND	1.0	ug/L	ND				25	
1,2-Dichloropropane	ND	0.5	ug/L	ND				25	
cis-1,3-Dichloropropylene	ND	0.4	ug/L	ND				25	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND				25	
Ethylbenzene	ND	0.5	ug/L	ND				35	
Methylene Chloride	ND	4.0	ug/L	ND				25	
Styrene	ND	0.4	ug/L	ND				25	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND				25	
1,1,2,2-Tetrachloroethane	ND	0.6	ug/L	ND				25	
Tetrachloroethylene	ND	0.5	ug/L	ND				31	
Toluene	ND	0.5	ug/L	ND				30	
1,1,1-Trichloroethane	ND	0.4	ug/L	ND				25	
1,1,2-Trichloroethane	ND	0.6	ug/L	ND				25	
Trichloroethylene	ND	0.4	ug/L	ND				30	
Trichlorofluoromethane	ND	1.0	ug/L	ND				25	
1,3,5-Trimethylbenzene	ND	0.5	ug/L	ND				20	
Vinyl chloride	ND	0.4	ug/L	ND				25	
m,p-Xylenes	ND	0.5	ug/L	ND				34	
o-Xylene	ND	0.5	ug/L	ND				32	
Surrogate: 4-Bromofluorobenzene	82.1		ug/L	ND	103	83-134			
Surrogate: Dibromofluoromethane	77.2		ug/L	ND	96.5	78-124			
Surrogate: Toluene-d8	78.4		ug/L	ND	98.0	76-118			

Certificate of Analysis

Report Date: 08-Jul-2009

Order Date: 7-Jul-2009

Client: **Paterson Group Consulting Engineers**

Client PO: 8088

Project Description: PE1623

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1540	200	ug/L	ND	77.1	68-117			
F2 PHCs (C10-C16)	1200	100	ug/L	ND	75.0	61-129			
F3 PHCs (C16-C34)	2860	100	ug/L	ND	71.4	61-129			
F4 PHCs (C34-C50)	2020	100	ug/L	ND	84.4	61-129			
Volatiles									
Benzene	30.3	0.5	ug/L	ND	75.7	55-141			
Bromodichloromethane	30.3	0.4	ug/L	ND	75.7	52-139			
Bromoform	38.9	0.5	ug/L	ND	97.2	52-170			
Bromomethane	70.6	0.7	ug/L	ND	177	32-138			QS-02
Carbon Tetrachloride	21.9	0.5	ug/L	ND	54.8	49-149			
Chlorobenzene	37.1	0.4	ug/L	ND	92.7	64-137			
Chloroethane	25.5	1.0	ug/L	ND	63.7	39-152			
Chloroform	30.2	0.5	ug/L	ND	75.6	58-138			
Chloromethane	27.8	3.0	ug/L	ND	69.6	24-163			
Dibromochloromethane	38.4	0.5	ug/L	ND	96.0	61-153			
1,2-Dibromoethane	38.5	1.0	ug/L	ND	96.2	61-145			
1,2-Dichlorobenzene	38.4	0.4	ug/L	ND	96.0	60-150			
1,3-Dichlorobenzene	38.0	0.4	ug/L	ND	95.0	62-149			
1,4-Dichlorobenzene	38.5	0.4	ug/L	ND	96.4	63-132			
1,1-Dichloroethane	27.8	0.5	ug/L	ND	69.6	51-156			
1,2-Dichloroethane	34.1	0.5	ug/L	ND	85.4	50-140			
1,1-Dichloroethylene	31.6	0.5	ug/L	ND	78.9	43-153			
cis-1,2-Dichloroethylene	30.4	0.4	ug/L	ND	76.0	58-145			
trans-1,2-Dichloroethylene	29.4	1.0	ug/L	ND	73.5	51-145			
1,2-Dichloropropane	30.2	0.5	ug/L	ND	75.6	56-136			
cis-1,3-Dichloropropylene	37.5	0.4	ug/L	ND	93.7	54-141			
trans-1,3-Dichloropropylene	43.2	0.5	ug/L	ND	108	61-140			
Ethylbenzene	36.8	0.5	ug/L	ND	92.1	61-139			
Methylene Chloride	36.1	4.0	ug/L	ND	90.2	58-149			
Styrene	39.2	0.4	ug/L	ND	98.0	63-143			
1,1,1,2-Tetrachloroethane	36.0	0.5	ug/L	ND	90.0	61-148			
1,1,2,2-Tetrachloroethane	47.7	0.6	ug/L	ND	119	50-157			
Tetrachloroethylene	40.4	0.5	ug/L	ND	101	51-145			
Toluene	36.6	0.5	ug/L	ND	91.6	54-136			
1,1,1-Trichloroethane	30.0	0.4	ug/L	ND	75.1	55-140			
1,1,2-Trichloroethane	31.5	0.6	ug/L	ND	78.7	63-144			
Trichloroethylene	27.0	0.4	ug/L	ND	67.6	52-135			
Trichlorofluoromethane	33.4	1.0	ug/L	ND	83.6	37-155			
1,3,5-Trimethylbenzene	32.5	0.5	ug/L	ND	81.2	61-151			
Vinyl chloride	30.0	0.4	ug/L	ND	75.0	31-159			
m,p-Xylenes	74.4	0.5	ug/L	ND	93.0	61-139			
o-Xylene	37.1	0.5	ug/L	ND	92.7	60-142			
Surrogate: 4-Bromofluorobenzene	79.4		ug/L		99.3	83-134			
Surrogate: Dibromofluoromethane	74.9		ug/L		93.6	78-124			
Surrogate: Toluene-d8	79.8		ug/L		99.7	76-118			

Certificate of Analysis

Report Date: 08-Jul-2009

Order Date: 7-Jul-2009

Client: **Paterson Group Consulting Engineers**

Client PO: 8088

Project Description: PE1623

Sample and QC Qualifiers Notes

1- QS-02 : Spike level outside of control limits. Analysis batch accepted based on other QC included in the batch.

Sample Data Revisions

None

Work Order Revisions/Comments:

None

Other Report Notes:

n/a: not applicable

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

CCME PHC additional information:

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

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Chain of Custody Record

Nº 62549

Pg. ___ of ___

Company Name: <u>PATERSON GROUP</u>	Project Ref: <u>PE 1623</u>	Date Required: _____
Contact Name: <u>ERIC LEVEQUE</u>	PO# <u>8088</u>	Turn Around Time: <input type="checkbox"/> 1-day <input type="checkbox"/> 2-day <input checked="" type="checkbox"/> Regular
Address: <u>28 CONCORDE GATE, OTTAWA</u>	Quote # _____ <input type="checkbox"/> Not Quoted	Regulatory Guideline Requirements
Tel: <u>226-7381</u> Cell: _____	Preservative to be added by Paracel? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Email: <u>ERIC.LEVEQUE@PATERSONGROUP.CA</u>		

Matrix Types: S-Soil/Sed GW-Ground Water SW-Surface Water SS-Storm/Sanitary Sewer A-Air O-Other RDW-Regulated Drinking Water

Sample Information					Analysis Required														
Paracel Order #	Matrix	Air Volume	# Containers	Date Sampled dd/mm/yy															
0928057																			
Sample Identification																			
1	BHS-mw1	GW	3	July 7/09	✓														
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Comments:

SWIFT 1063

Relinquished By: <u>MACLEOD</u>	Received at Depot:	Received at Lab:	Verified By:
Date: <u>July 7, 09</u> Time: _____	Date: _____ Time: _____	Date: <u>July 7, 09</u> Time: <u>1:20</u>	Date: <u>July 7, 09</u> Time: <u>1:30</u>

Please refer to the back page for Locations and Sample Preservation, Container and Hold Time Requirements.

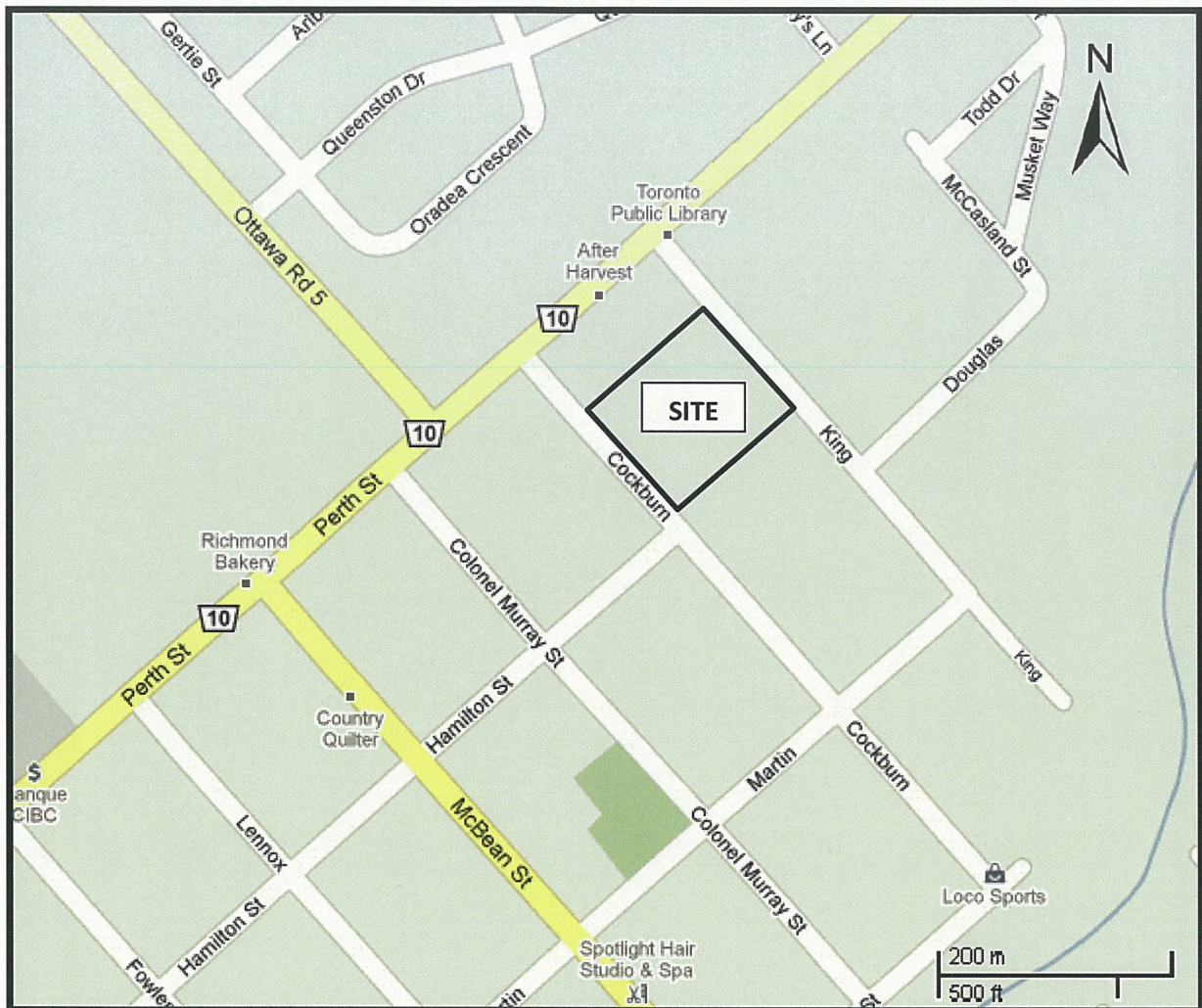
WHITE - Lab Copy, PINK - Client Copy

APPENDIX 2

AERIAL PHOTOGRAPHS

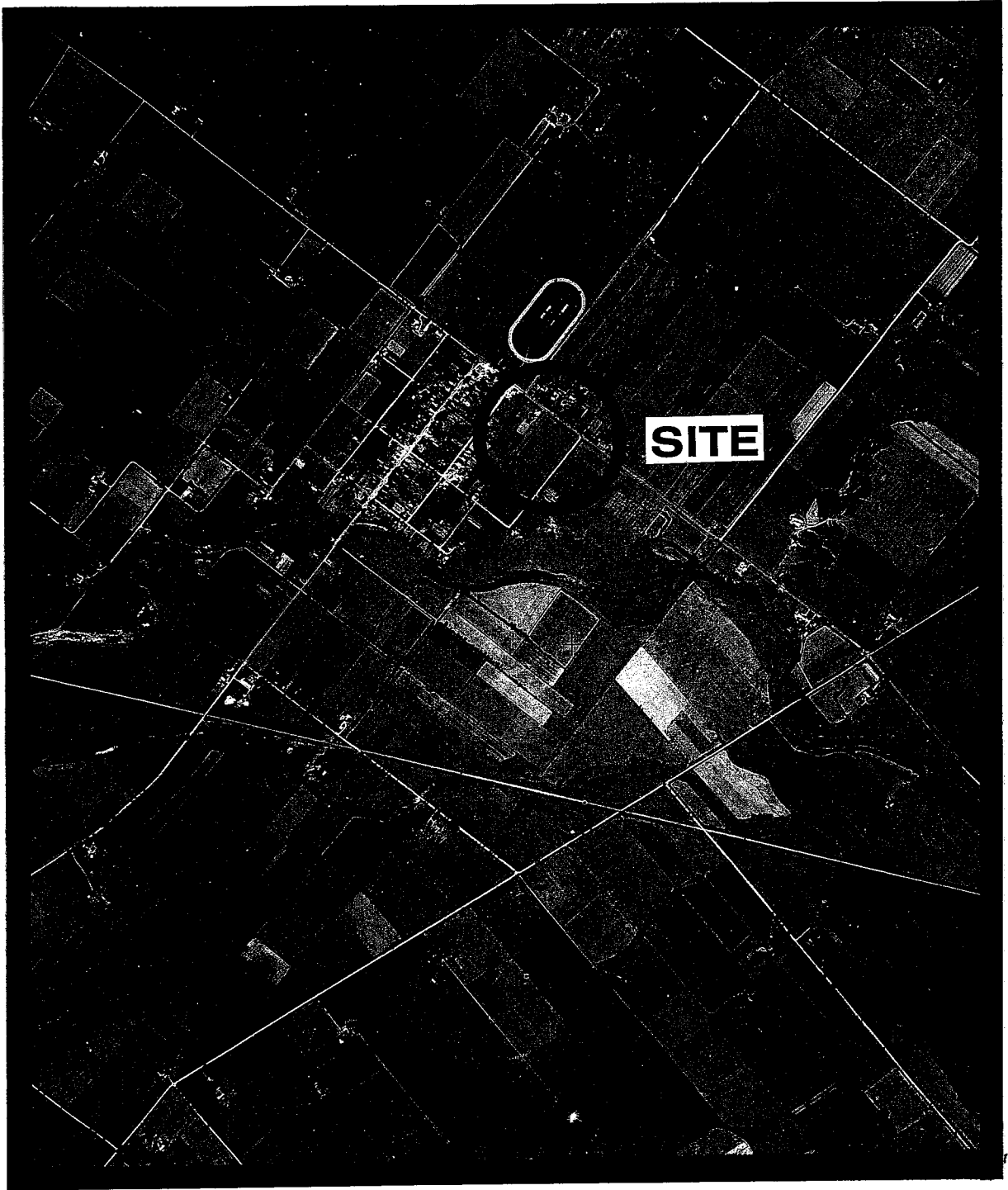
FIGURE 1 - KEY PLAN

DRAWING NO. PE1623-1 - TEST HOLE LOCATION PLAN

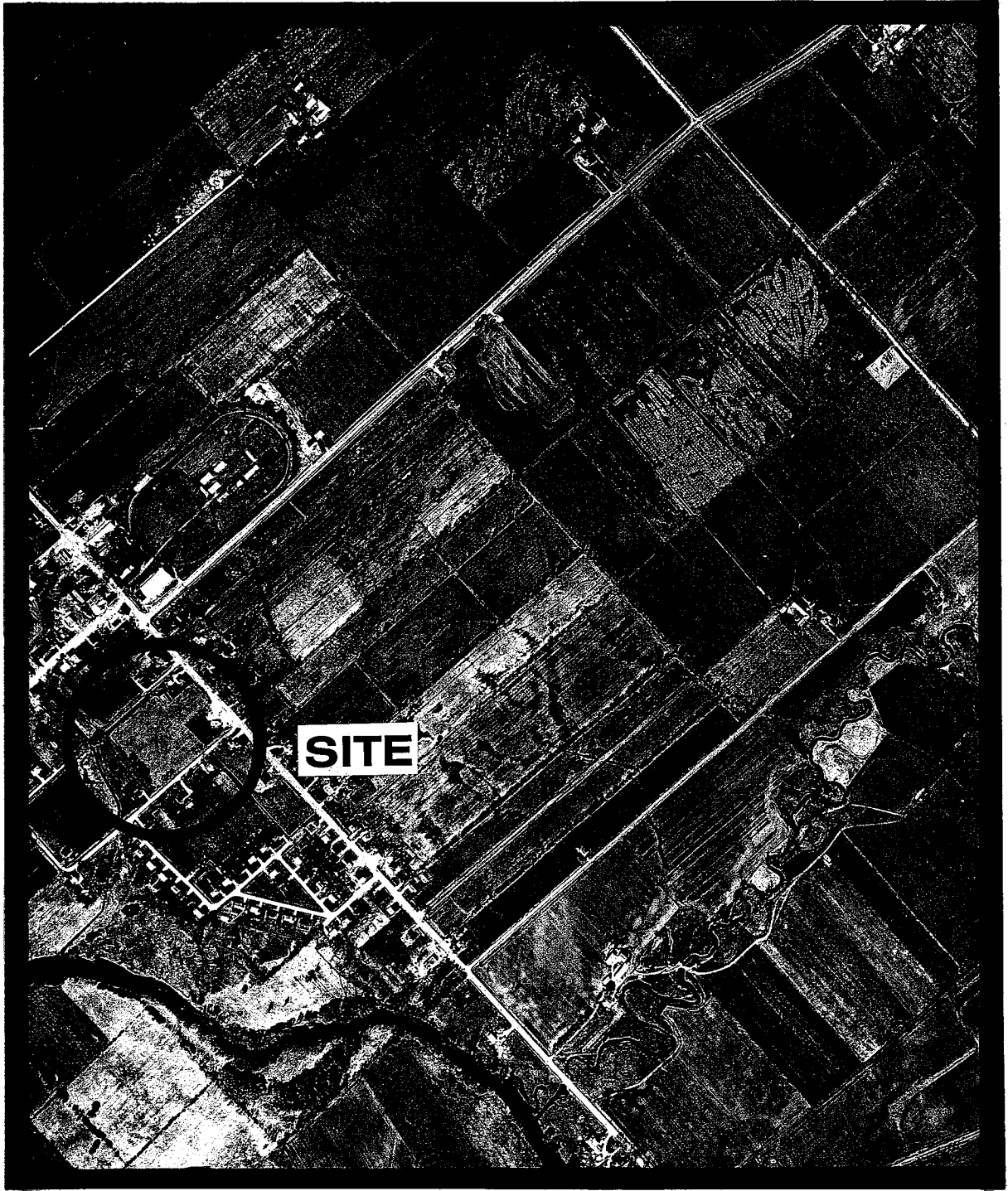


Source: Google Maps

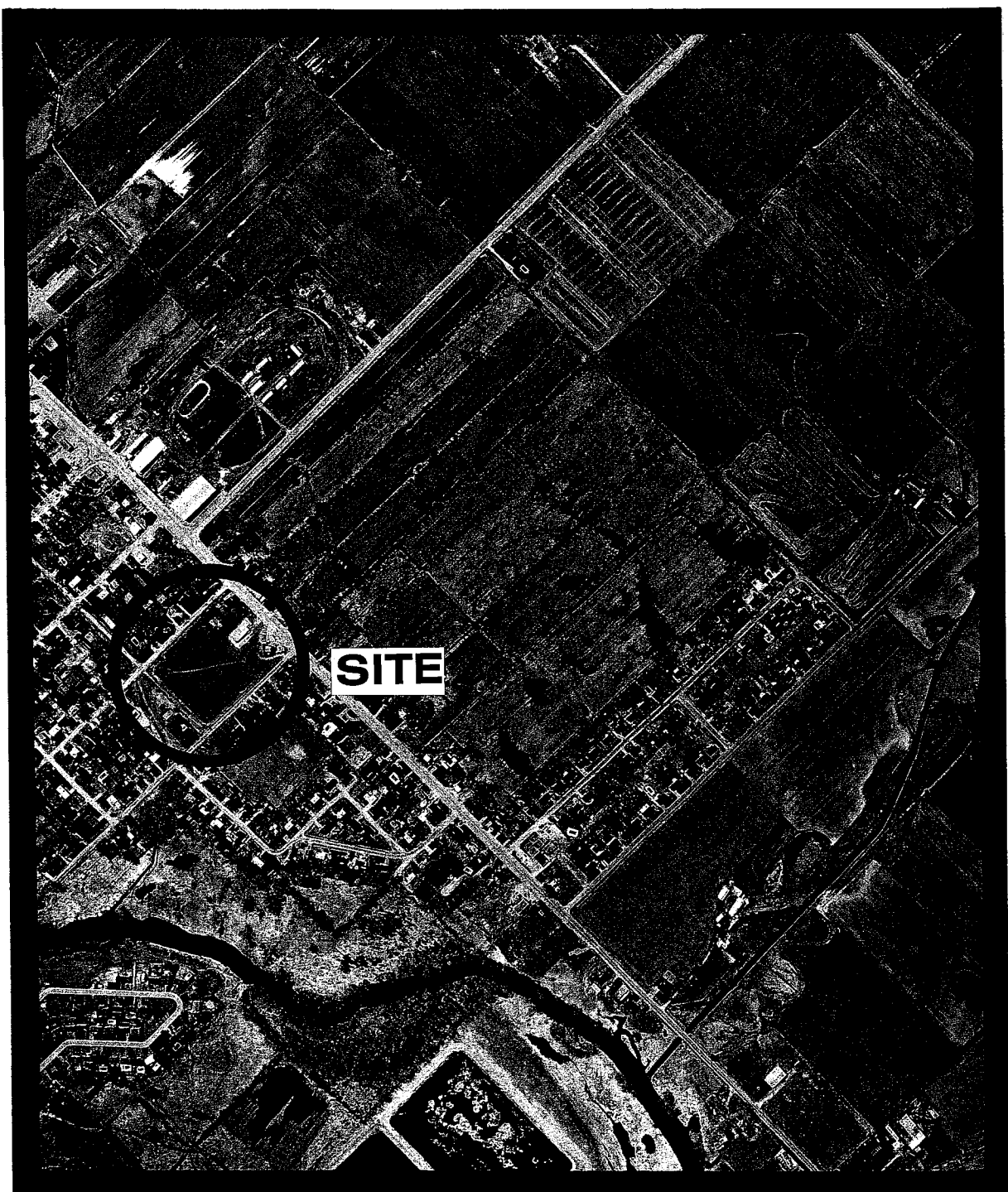
FIGURE 1
KEY PLAN



AERIAL PHOTOGRAPH
1950



AERIAL PHOTOGRAPH
1963



AERIAL PHOTOGRAPH
1980



AERIAL PHOTOGRAPH
2001