12/14/2018

Initial Phase II Environmental Site Assessment

471 Richmond Street West, Toronto

PROJECT 18*4495 BRUCE A. BROWN ASSOCIATES LIMITED
CONSULTANTS IN THE ENVIRONMENTAL AND APPLIED EARTH SCIENCES

Contents

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Project 18*4495
December 14, 2018

Attn: Mr. Vahé Kouyoumdjian, P.Eng.

Manga Hotels (Richmond) Inc.
3279 Caroga Drive
Mississauga, ON
L4V 1A3

E-mail: vahe@kingslakeprojects.com

Dear Mr. Kouyoumdjian,

Re: Initial Phase II Environmental Site Assessment
471 Richmond Street West, Toronto

1.0 Summary

The phase II Investigation was authorized by Mr. Vahé Kouyoumdjian, P. Eng., of Kingslake Projects Inc. The investigation consisted of the advancement of three boreholes all instrumented as monitoring wells and extended to refusal on shale bedrock, to be used for a preliminary geotechnical report, a preliminary Phase 2 environmental report and a hydrogeological assessment. Wells were fitted with flushmount covers to preserve them for future use. Soil samples were taken during the drilling program and groundwater samples were obtained for laboratory characterization after a standalone hydrogeological assessment was conducted for the subject property by this office.

Representative samples submitted for laboratory characterization yielded exceedances in soil for several organic parameters in all three borehole locations and for Polycyclic Aromatic Hydrocarbons in two of them.

Groundwater yielded exceedances for inorganic parameters zinc and chloride in one well, as compared to Table 3 residential standards, while a third well remained dry.

This phase II report is considered preliminary for the following reasons: (1) only the eastern half of the site was investigated because the western half remains occupied by a commercial building, (2) additional sampling from the west part of the site will be required following demolition, (3) groundwater must be characterized, including gradient and direction of flow applying data from at least three locations to satisfy MECP requirements, and (4) exceedances in soil and water need to be addressed with a remediation program before a Record of Site Condition submission can be made to Ontario Ministry of the Environment, Conservation and Parks (MECP) to support a more sensitive residential use of any part of the lands, if subject to redevelopment.

It is likely that demolition, followed by shoring and bulk excavation at least to around 2 meters below present grades will be required before this site will yield soil chemistry which meets residential standards. Excavation to bedrock may be required to remove pore water, perched on top of shale bedrock, which exceeds sewer bylaw and O.Reg. 153-04 Table 3 standards. Addition of any residential component with redevelopment would change remediation requirements to the more restrictive residential standards set out in O.Reg. 153/04 Table 3, and an RSC submission to MECP would be required for the entire site.

This preliminary report is subject to the terms of the Statement of Limitations for Phase II property evaluations, which is attached as **Appendix A** and forms a part of this report.

2.0 Introduction

2.1 Site Description

The Phase II site has the municipal address of 465 and 471 Richmond Street West in the City of Toronto.

The site is almost square, with 104.3 meters frontage on the south side of Richmond Street West midway between Spadina Avenue and Brant Street to the west, and has an area of 956 square meters. It is partially developed with a 2 storey *circa* 1943 commercial building on the west half,

and a newly constructed 9 storey building to the west of that, and is bounded by a 3 storey *circa* 1940s commercial building to the east, and a 2 storey *circa* 1940s commercial building to the south, which has recently constructed 9 storey residential buildings, one with two additional penthouses, to its east and west. The eastern half of the Phase II property is used for tenant parking. A Site Location Map is attached, **Figure 1**.

2.2 Property Ownership

The subject site is owned by the client, with the contact information as:

Mr. Vahé Kouyoumdjian, P.Eng.
Manga Hotels (Richmond) Inc.
3279 Caroga Drive
Mississauga, ON L4V 1A3

E-mail: vahe@kingslakeprojects.com

The phase II environmental investigation was authorized by Mr. Vahé Kouyoumdjian, P. Eng., who also instructed this office to preform concurrent geotechnical investigations, and a hydrogeological assessment.

A proposed redevelopment submission will be a mixed use multi-storey structure including a residential component which will increase site sensitivity and require filing of a Record of Site Condition with MECP to obtain a final building permit from City of Toronto.

2.3 Applicable Site Condition Standards

There is no demand for potable water from on site, nor does the City of Toronto employ wells for the purposes of obtaining municipal drinking water anywhere. Bedrock is more than 2m in depth and groundwater is more than 1.5m in depth below grade. Underlying soils are predominantly medium to fine-grained soils in excess of 9m in thickness, which are underlain by Georgian Bay Formation shale bedrock. There are no surface water bodies or other sensitive areas within 30m. Therefore, the appropriate soil and groundwater remediation standards for

the property are for residential and parkland uses, based on medium and fine textured soils, as set out in Table 3 of O.Reg. 153/04 as amended.

3.0 Physical Setting and Previous Investigations

3.1 Physical Setting

The subject site is square and lies within a densely developed mixed commercial and residential neighbourhood west of the main intersection of King Street West and Spadina Avenue. The nearest water body is Lake Ontario, approximately 1200m due south, with no other sensitive area or wetland found within a 500m radius.

Grades are essentially flat with surface runoff on the asphaltic concrete pavement divided between sloping towards King Street in the northern half and balance southward to a low point on the southern common lotline

3.2 Previous Investigations

There is a history of previous investigations which are listed in a recent Phase 1 Environmental Report by Watters Environment Group Inc., dated August, 2017, prepared for Manga Hotels (Richmond) Inc. None of these other reports were available for review. The Watters report was completed to Canadian Standards Association standards, and will require a fresh update to "*enhanced*" levels required by MECP to support a future RSC submission. This should be completed after demolition, when additional potentially contaminating activities (PCAs) may be identified, leading to designating various areas of potential concern (APECs) on the Phase II property. Fresh Phase I and II reports and chemical data should not be older than 18 months at time of submissions. An updated Phase 2 report, with additional site characterisation after demolition, would address all of the APECs identified in an extended Phase 1 report. The Watters report listed the following earlier studies of the Phase II lands:

> *Environmental Studies and Report, 460 and 471 Richmond Street West, Toronto, Ontario* prepared by Erikson Environmental Consultants Inc., for Canadian Building Inspection Services Limited, dated 1993

Environmental Studies and Report, Part 2, 460 and 471 Richmond Street West, Toronto, Ontario prepared by Erikson Environmental Consultants Inc., for Canadian Building Inspection Services Limited, dated 1993

Phase 1 Environmental Site Assessment, 471 Richmond Street West, Toronto, Ontario, prepared by Winchurch Environmental Inc., for 1027285 Ontario Ltd., dated August 1998

Phase II Subsurface Investigation, 460 and 471 Richmond Street West, Toronto, Ontario, prepared by Jacques Whitford Environment Limited for The Strashin Group, February 19, 1999

Phase 1 Environmental Site Assessment, 465-471 Richmond Street West, Toronto, Ontario, prepared by S2S Environmental Inc., for the First National Financial Corporation, January 10, 2006.

The only intrusive testing program, by Jacques Whitford, comprised two boreholes advanced to about 2m below grade, which found demolition spoils and exceedances in PAHs and transition metal in both. References above to 460 Richmond may be a typographical error since both parts of the site, including 465 Richmond, were in common ownership at all times.

4.0 Scope of Work

4.1 Overview of Site Investigation

The scope of work for the subject property was to conduct two additional investigations concurrently with the Phase II investigation. The geotechnical and hydrogeological information from these boreholes and wells is shared for production of separate freestanding geotechnical and hydrogeological reports by Brown Associates.

4.2 Media Investigated

Earlier Phase I studies of the subject site listed above identified a number of potential environmental impacts, including possible presence of demolition debris from original 19th century residences, and potential inorganics and polycyclic aromatic compounds (PAHs) impacts

from contamination by cinders and ash related to use of coal for comfort heating of former structures. Field staff also conducted examination of recovered soil samples and submitted samples for laboratory characterization based on aesthetics resulting in testing for polyaromatic hydrocarbons (PAHs) from particulate coal and cinders and ash, and metals and inorganics (M&Is) in shallow soils. M&I as well as PAHs were also characterized in groundwater. See **Appendix B** for additional details.

4.3 Phase One Conceptual Site Model

Earlier reports did not list potential offsite PCAs or whether they may generate onsite APECs, since reports were done to CSA standards. Shallow soil may be impacted by former building demolition spoils, including cinders and ash and elemental coal from 19th century comfort heating. These are typically limited to depths of former basements or fill since underlying tills will prevent migration of most potential contaminants such as elemental coal, cinders and ash, lead, zinc and other transition metals as well as some PAHs generated from these materials. Groundwater is typically found perched on the bedrock interface or sometimes at the base of fill, at least seasonally. Perched water at base of fill often contains impacts from salt application. Groundwater below undisturbed tills are typically uncontaminated but may have naturally-occurring concentrations of manganese and suspended solids exceeding Toronto Water standards for discharge to storm sewers.

4.4 Deviations from Sampling and Analysis Plan

There was a significant deviation from the sampling plan which occurred when the well screen for MW-02-18 could not be set at the invert of the advanced borehole, even using hollow stem augurs, resulting in the well screen interval being set possibly higher than a potential aquifer. This resulted in the second deviation, where no groundwater elevation or sample could be obtained. Accordingly, the local groundwater gradient could not be established.

4.5 Impediments

There were no physical impediments to the onsite work from above grade; however, because of significant caving in borehole MW-02-18, the well piezometer could not be set sufficiently deeply.

5.0 Field Investigation

5.1 General

The field investigation commenced with the advancement of three boreholes to a maximum depth of 9.8mbgs. All boreholes were instrumented as monitoring wells and are numbered as MW-01-18, MW-02-18 and MW-03-18. The groundwater sampling program was conducted after the hydrogeological survey which, by taking water for drawdown-recovery testing, fulfilled the purging requirements prior to groundwater quality sampling. Of the three onsite wells, MW-02-18 failed to yield groundwater in this investigation. Wells were fitted with flushmount covers and should be retained for further studies, since additional site characterization will be required following demolition of the building at 471 Richmond.

5.2 Drilling and Excavating

The drilling contractor for this project was Determination Drilling, using a truck-mounted CME 75, hollow stem flight augurs, advanced using a 50mm x 0.6m split spoon sampler with a standard force automatic hammer.

Please refer to Standard Operating Procedures (SOP) Sections, 2.1, 2.1.1, 2.1.2, 2.1.3, 3.1, 3.9 and all of Section 5.0 for additional details concerning borehole and monitoring well methodologies.

5.3 Soil: Sampling

Soil samples were obtained directly from the split spoon sampler. Please refer to SOP Sections 2.1, 2.1.1, 2.1.2, 2.1.3, 3.1, 3.9, all of Section 5.0 for additional details. Please refer to **Appendix C** for description for each borehole location.

5.4 Field Screening Measurements

Reader is referred to the SOPs and all of Section 2.0.

5.5 Groundwater: Monitoring Well, Installation

The drilling contractor provided a licensed well technician to install the monitoring wells. The well screens are 50mm diameter x 3.05m #10 slot PVC with cap on bottom and with 50mm solid standpipes fitted with a J-plug beneath flush mounted protective covers. Please refer to **Appendix C** and **Table 1** for additional well installation details.

5.6 Groundwater: Field Measurement of Water Quality Parameters

See Section 2.2 of SOPs for details.

5.7 Groundwater: Sampling

Purging and sampling was carried out using a low-flow peristaltic pump. Purging of wells occurred from May 9 to 11, 2018 with the target volumes of five times the well volume achieved during the course of drawdown-recovery testing. All purge water containment and onsite storage conformed to SOPs. Please refer to SOPs Sections 2.2, 4.1, 4.3.4, 4.4, 6.3 and 6.4 for additional details.

5.8 Sediment: Sampling

No sediment was encountered in this investigation.

5.9 Analytical Testing

All soil and groundwater samples obtained in this program were direct-driven to Maxxam Laboratories for analytical assessment. Maxxam quality assurance and quality control data are found in **Appendix D**.

5.10 Residue Management Procedures

See SOP Section 6.0 for details.

5.11 Elevation Surveying

There was no site benchmark established. For the preliminary purposes of this report, the grade elevation was considered as a uniform nominal elevation of 100m.

5.12 Quality Assurance and Quality Control Measures

See Section 5.0 of the SOPs for details.

6.0 Review and Evaluation

6.1 Geology

The area of investigation of the subject site is an asphaltic concrete paved surface underlain by 0.6m to 1.4m of fill materials consisting of a heterogeneous mix of SILTY SAND, CLAY, CONCRETE RUBBLE, ASPHALTIC CONCRETE RUBBLE, RED BRICK FRAGMENTS and TOPSOIL. The fill zone is underlain by a CLAY-SIZED to SILTY CLAY layer ranging in depth from grade of 2.1mbgs to 3.7mgs, this is further underlain by SILTS and further underlain by SAND on top of shale bedrock.

A water-bearing zone on the east portion of the property ranged between 6.8mbgs to 9.8mbgs, while on the west side, a more restrictive zone of saturation between 8.8mbgs to 9.3mbgs was noted. Both zones were perched at the shale interface.

6.2 Groundwater: Elevations and Flow Direction

Since only two wells encountered groundwater, gradient could not be established, since a minimum of three water levels is required for that purpose. The groundwater zone encountered by two wells was perched directly on top of bedrock. The screens were set so the invert of the piezometer would be at least 1.5m into the grey coloured soils, indicative of the groundwater table. No film, odour, discolouration, or separate liquid phase was found in groundwater. Please see Sections 2.2 and 4.0 of the SOPs for additional information.

6.3 Groundwater: Hydraulic Gradients

The hydraulic gradient could not be determined as only two of the three wells yielded water.

6.4 Fine-Medium Soil Texture

The majority of original undisturbed soils on site are medium to fine-grained silts and clay-size at intermediate depth and below with fewer than 5% retained on a 75 micron screen.

6.5 Soil: Field Screening

Field screening using a photoionization detector found no significant values above a background of up to +10ppm. There were no distinctive odors or discolouration of native soils; however all recovered samples from the fill zone contained macro and micro waste, texture, staining and colour indicative of PAHs and M&I in soils.

6.6 Soil Quality

The following exceedances are for soil relative to Table 3 medium and fine textured soil for residential property use, as indicated in red in the table below:

Parameters	**Standard Table 3 Fine Grained Residential**	**MW-01-18**
Organics in Soil		
Lead	120	**250**
Conductivity (ms/cm)	0.7	**3.7**
Sodium Adsorption Ratio	5	**36**

Parameters	Standard Table 3 Fine Grained Residential	MW-02-18
PAHs in Soil		
Benzo(a)anthracene	0.63	**1.1**
Benzo(b/j)fluoranthene	0.78	**1.2**
Dibenzo(a,h)anthracene	0.1	**0.14**
Fluoranthene	0.69	**2.9**
Indeno(1,2,3-cd)pyrene	0.48	**0.55**
Organics in Soil		
Lead	120	**220**
Zinc	340	**710**
Conductivity (ms/cm)	0.7	**1.4**
Sodium Adsorption Ratio	5	**26**

Parameters	Standard Table 3 Fine Grained Residential	MW-03-18
PAHs in Soil		
Benzo(a)anthracene	0.63	**1.8**
Benzo(a)pyrene	0.3	**1.7**
Benzo(b/j)fluoranthene	0.78	**2.1**
Chrysene	7.8	**1.6**
Dibenzo(a,h)anthracene	0.1	**0.25**
Fluoranthene	0.69	**3.2**
Indeno(1,2,3-cd)pyrene	0.48	**1.1**
Organics in Soil		
Lead	120	**270**
Zinc	340	**430**
Conductivity (ms/cm)	0.7	**2.7**
Sodium Adsorption Ratio	5	**41**

Please refer to attached **Table 4** for additional details.

6.7 Groundwater Quality

Of the two wells that were sampled there were only exceedances relative to Table 3 standards in MW-03 as follows, based on filtered samples recovered with a low-flow peristaltic pump:

Parameters	**Standard Table 3, Fine Grain Soils, All Uses**	MW-03-18
Inorganics in Groundwater		
Zinc	1100	**2900**
Chloride (mg/L)	2300	**5200**

6.8 Sediment Quality

Sediment was not found or assessed in this program.

6.9 Quality Assurance and Quality Control Results

Maxxam Laboratories was employed for soil as well for groundwater analyses. Maxxam is a NELAC accredited independent laboratory. Following the Sampling and Analysis Plan – Data Quality Objectives in **Appendix B**, laboratory QA/QC data were found to satisfy the goal of providing confidence in the scientific validity of the sampling program, since results are verifiable and reproducible. This review was conducted based on the laboratory QA/QC reporting, which are attached together with analytical data, as **Appendix D**.

6.10 Phase Two Conceptual Site Model

Since this is a preliminary report, supplementary testing will be required after demolition of the adjacent building which has a partial basement. Temporary backfilling of the basement will be required to make a working pad capable of supporting perimeter shoring equipment. It is likely imported fill will be required for this purpose. Phase I and II conceptual site models will be required as part of enhanced Phase I and II reports and following acquisition of additional site information, especially for the western half of the property, presently located beneath the 471 building.

The proposed redevelopment has bulk excavation to all four lotlines and extended through the transition zone and into sound shale bedrock at the base of the 3rd parking level. On completion of shoring and bulk excavation, there will be no residual soil remaining on the Phase II lands. Selective excavation of shallow soils will be required since they are likely to exceed requirements of available clean fill sites or lakefill. Bulk excavation into underlying tills and lacustrine sediments will generally meet Table 1 standards; however a routine monitoring program may be required to commend excavate to other urban receiving sites.

7.0 Conclusions

The 465-471 Richmond West property was originally developed with Victorian residences which were demolished in the late 1930s. Demolition spoils, including brick and other debris, and cinders and ash were found in the top 2 meters of the eastern half of the property accessible for investigation. The western half has a building with a partial basement. Impacted soils are anticipated beneath the slab-on-grade portion of the west building. Additional soil characterization and an enhanced Phase II is required following demolition. The basement excavation may be sufficiently deep to extend beneath any disturbed soil and is likely to be founded on underlying till.

Additional bulk excavation, following perimeter shoring will continue through the base of the soil transition to bedrock at about 9 to 10m below grade, so that the proposed structure will have footings founded directly on rock. The resulting excavate will generally meet Table 3 standards which may permit acceptance of excavate in available clean fill sites. Shallow soils exceeding Table 3 standards are likely to be destined to a transfer station or licensed landfill. Some receivers may require a program of continued soil characterization in order to accept excavate.

Groundwater quality, including discharges from open excavation during construction when there is a contribution from precipitation, and long term discharges are discussed in a separate hydrogeological report.

8.0 Qualification

Brown Associates Limited is a full-services environmental consultant which has carried out more than 4,200 environmental evaluations or remediations in Ontario over the past 46 years. The writer is also qualified to manage asbestos and PCB and other abatement programs and to design and supervise site demolition, subsurface soil and groundwater remediation programs. The writer is a Qualified Person for purposes of submitting Records of Site Condition to the Ontario Ministry of the Environment. Dr. Brown is a Professional Engineer with a B.Sc. from Queens University in geology and chemistry (1968) and a doctorate from Oxford University in geochemistry (1970). Brown Associates carries $2MM environmental liability insurance and $2MM errors & omissions insurance and enjoys a claims-free status.

9.0 Closure

Thank you for this opportunity to once again be of service. Should any questions arise, please do not hesitate to call.

Yours very truly,

BRUCE A. BROWN ASSOCIATES LIMITED

Bruce A. Brown, Ph.D., RPP, MCIP, P.Eng., QPESA

TABLE 1

Monitoring Well Installation												
Well No.:	**Total Depth of Borehole (m) from Grade**	**Piezometer set at (m) from Grade**	**Backfill under Piezometer (yes/no)**	**Type of Backfill**	**Length of Piezometer (m)**	**Stand Pipe (m) Below Grade**	**Standpipe (m) Above Grade**	**Type of Well Cap**	**Type of Protective Well Cover**	**Well Sand Backfilled to (m) Above Piezometer**	**Bentonite to (m) Below Grade**	**Concrete Cap Below Grade**
MW-01-18	9.3	9.23	no	n/a	3.05	0.15	n/a	J-Plug	Flush Mount	0.6	0.3	0.3
MW-02-18	9.8	7.78	yes	Cave material	3.05	0.15	n/a	J-Plug	Flush Mount	0.6	0.3	0.3
MW-03-18	9.7	9.42	yes	Cave material	3.05	0.15	n/a	J-Plug	Flush Mount	0.6	0.3	0.3

TABLE 2

Groundwater Levels

Well No.:	Grade Elevation (m)	TOR Elevation (m)	Date	Measured Depth to WL	WL Elevation
MW-01-18	100	99.85	09-May-18	8.83	91.17
MW-02-18	100	99.85	09-May-18	7.78	>92.22, Dry Well
MW-03-18	100	99.85	09-May-18	6.78	93.22

TABLE 3

LNAPLS and DNAPLS

	Monitoring Well No.:		
	MW-01-18	**MW-02-18**	**MW-03-18**
Top of LNAPL	Non-Detect	Non-Detect	Non-Detect
Invert of LNAPL	Non-Detect	Non-Detect	Non-Detect
Top of DNAPL	Non-Detect	Non-Detect	Non-Detect
Invert of DNAPL	Non-Detect	Non-Detect	Non-Detect

Parameters	Standard Table 3 Fine Grained Residential	Borehole Location:	MW-01-18	MW-02-18	MW-03-18
		Sample Depth Interval, mbgs:	0 to 0.6	0 to 0.6	0 to 0.6
		Sample Date:	03-May-2018	03-May-2018	03-May-2018
		Field ID No.:	SOIL-4495-18050301-001	SOIL-4495-18050302-002	SOIL-4495-18050303-003
PAHs in Soil					
Acenaphthene	58		<0.0050	0.19	0.05
Acenaphthylene	0.17		0.015	0.072	0.14
Anthracene	0.74		0.024	0.56	0.28
Benzo(a)anthracene	0.63		0.17	**1.1**	**1.8**
Benzo(a)pyrene	0.3		0.19	0.88	**1.7**
Benzo(b/j)fluoranthene	0.78		0.21	**1.2**	**2.1**
Benzo(ghi)perylene	7.8		0.12	0.48	0.96
Benzo(k)fluoranthene	0.78		0.08	0.46	0.77
Chrysene	7.8		0.12	0.93	**1.6**
Dibenzo(a,h)anthracene	0.1		0.025	**0.14**	**0.25**
Fluoranthene	0.69		0.27	**2.9**	**3.2**
Fluorene	69		<0.0050	0.3	0.063
Indeno(1,2,3-cd)pyrene	0.48		0.12	**0.55**	**1.1**
1-Methylnaphthalene	3.4		0.007	0.15	0.031
2-Methylnaphthalene	3.4		0.0066	0.17	0.027
Naphthalene	0.75		<0.0050	0.33	0.028
Phenanthrene	7.8		0.069	3	1.1
Pyrene	78		0.26	2.1	2.7
Methylnaphthalene, 2-(1-)	3.4		-	-	-

Parameters	Standard Table 3 Fine Grained Residential	Borehole Location:	MW-01-18	MW-02-18	MW-03-18
		Sample Depth Interval, mbgs:	0 to 0.6	0 to 0.6	0 to 0.6
		Sample Date:	03-May-2018	03-May-2018	03-May-2018
		Field ID No.:	SOIL-4495-18050301-001	SOIL-4495-18050302-002	SOIL-4495-18050303-003
Organics in Soil					
Antimony	7.5		2	2.3	2.4
Arsenic	18		6.1	18	12
Barium	390		190	250	290
Beryllium	5		0.61	0.62	0.82
Boron (Hot Water Soluble)	1.5		0.7	0.49	1.2
Cadmium	1.2		0.27	0.67	1
Chromium	160		26	22	40
Chromium VI	10		<0.2	<0.2	<0.2
Cobalt	22		9.3	6	8.8
Copper	180		48	40	57
Lead	120		**250**	**220**	**270**
Mercury	1.8		1.1	1.7	0.62
Molybdenum	6.9		1	1.5	1.8
Nickel	130		20	18	28
Selenium	2.4		0.83	0.84	1.1
Silver	25		0.41	0.31	0.56
Thallium	1		0.14	0.28	0.28
Vanadium	86		32	22	31
Zinc	340		130	**710**	**430**
pH (pH Units)	NV		7.79	7.86	7.6
Conductivity (ms/cm)	0.7		**3.7**	**1.4**	**2.7**
Sodium Adsorption Ratio	5		**36**	**26**	**41**
Cyanide, Free	0.051		0.01	<0.01	0.06
Chloride	NV		-	-	-
Boron (Total)	120		8.8	9.4	8.3
Uranium	23		0.42	0.71	0.6

All units in ug/g unless otherwise stated

XX.XX Denotes an exceedance of the set Standard

Parameters	Standard Table 3, Fine Grain Soils, All Uses	Reportable Detection Limit	Monitoring Well Location	MW-01-18	MW-03-18
			Date of Sample	11-May-2018	11-May-2018
			Field Sample Number	GW-4495-180511-01-002	GW-4495-180511-03-001
Inorganics in Groundwater					
Antimony	20000	0.5		0.92	<2.5
Arsenic	1900	1		2.8	<5.0
Barium	29000	2		380	610
Beryllium	67	0.5		<0.50	<2.5
Boron	45000	10		260	310
Cadmium	2.7	0.1		<0.10	<0.50
Chromium	810	5		<5.0	<25
Chromium VI	140	0.5		<0.50	<2.5
Cobalt	66	0.5		2.5	<2.5
Copper	87	1		2.9	<5.0
Lead	25	0.5		<0.50	<2.5
Mercury	2.8	0.1		<0.1	<0.1
Molybdenum	9200	0.5		19	8.6
Nickel	490	1		6.2	5.9
Sodium	2300000	100		540000	2200000
Selenium	63	2		<2.0	<10
Silver	1.5	0.1		<0.10	<0.50
Thallium	510	0.05		0.082	<0.25
Vanadium	250	0.5		0.89	<2.5
Zinc	1100	5		5.6	**2900**
Cyanide, Free	66	1		<1	<1
Nitrate (mg/L)	NV	-		-	-
Nitrite (mg/L)	NV	-		-	-
Chloride (mg/L)	2300	25		1700	**5200**
Uranium	420	0.1		4.8	1.2

Parameters	Standard Table 3, Fine Grain Soils, All Uses	Reportable Detection Limit	Monitoring Well Location	MW-01-18	MW-03-18
			Date of Sample	11-May-2018	11-May-2018
			Field Sample Number	GW-4495-180511-01-002	GW-4495-180511-03-001
PAHs in Groundwater					
Acenaphthene	1700	0.05		<0.050	<0.050
Acenaphthylene	1.8	0.05		<0.050	<0.050
Anthracene	2.4	0.05		<0.050	<0.050
Benzo(a)anthracene	4.7	0.05		<0.050	<0.050
Benzo(a)pyrene	0.81	0.01		<0.010	<0.010
Benzo(b/j)fluoranthene	0.75	0.05		<0.050	<0.050
Benzo(ghi)perylene	0.2	0.05		<0.050	<0.050
Benzo(k)fluoranthene	0.4	0.05		<0.050	<0.050
Chrysene	1	0.05		<0.050	<0.050
Dibenzo(a,h)anthracene	0.52	0.05		<0.050	<0.050
Fluoranthene	130	0.05		<0.050	<0.050
Fluorene	400	0.05		<0.050	<0.050
Indeno(1,2,3-cd)pyrene	0.2	0.05		<0.050	<0.050
1-Methylnaphthalene	1800	0.05		<0.050	<0.050
2-Methylnaphthalene	1800	0.05		<0.050	<0.050
Naphthalene	6400	0.05		<0.050	<0.050
Phenanthrene	580	0.03		<0.030	<0.030
Pyrene	68	0.05		<0.050	<0.050
Methylnaphthalene, 2-(1-)	1800	-		-	-

All units expressed in ug/L unless otherwised noted.

XX.XX Denotes exceedance of the set Standard.

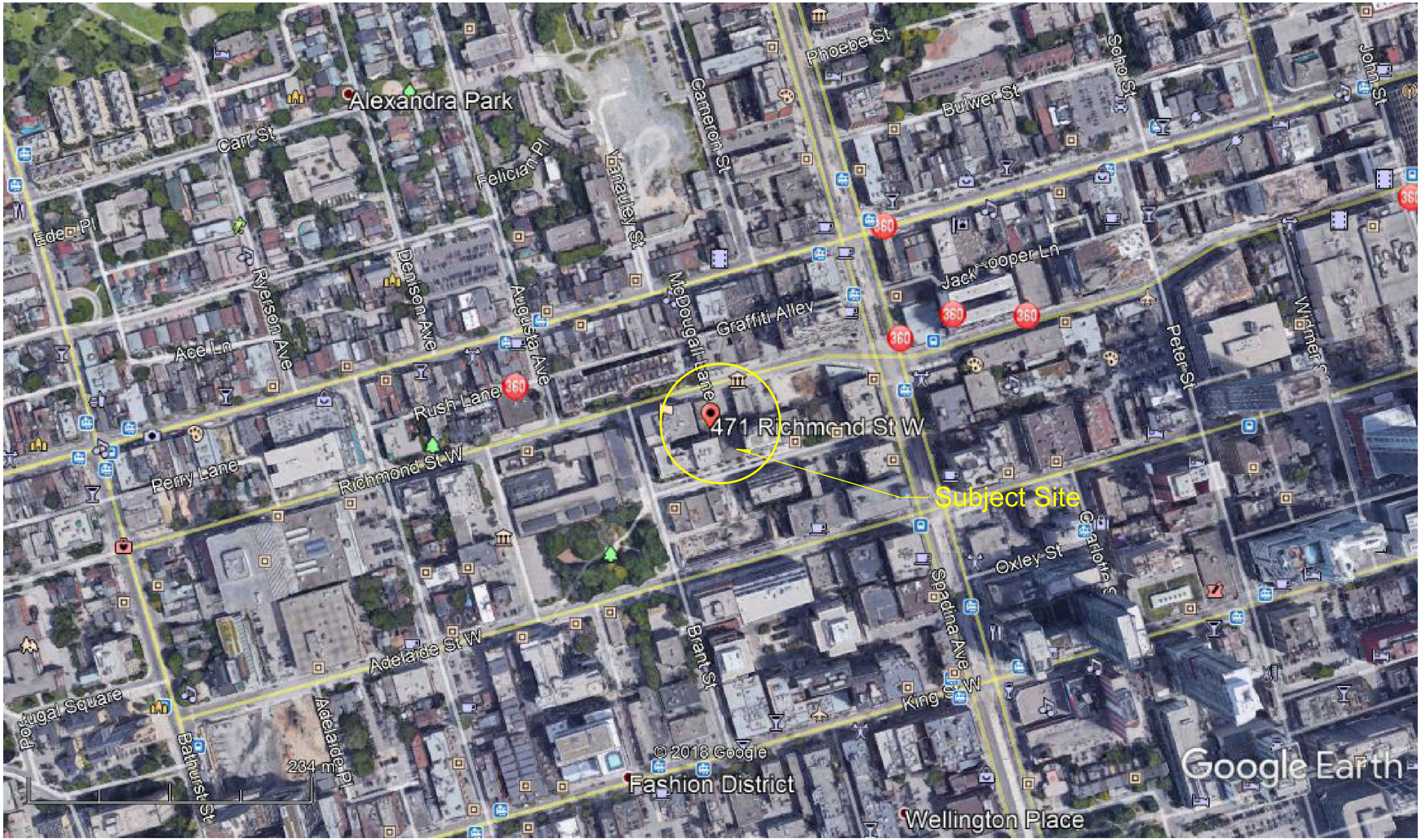
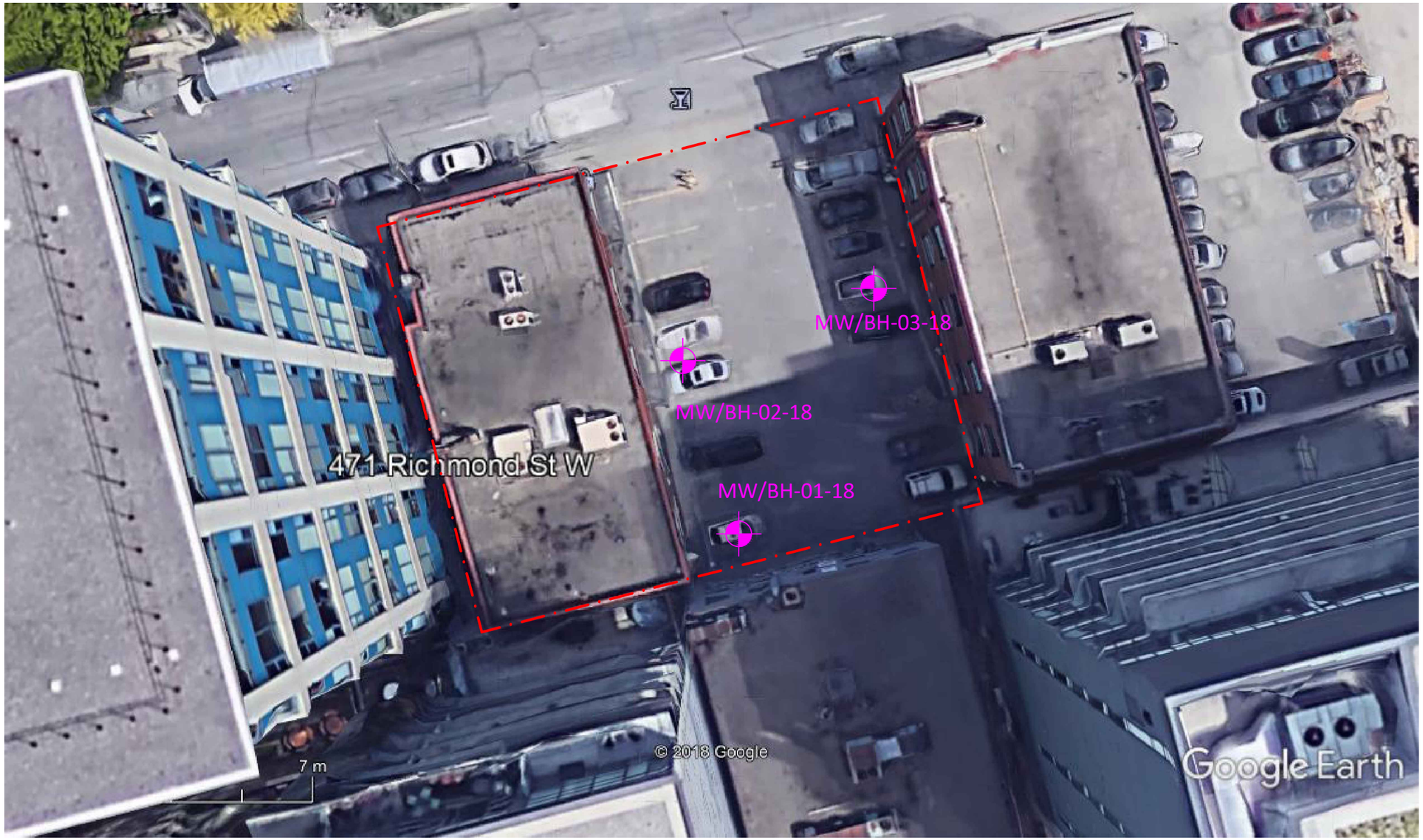


Figure:	Title:	Client:	Drawn By:	Date:	
1-0	**Site Location** 471 Richmond Street West, City of Toronto	Manga Hotels (Richmond) Inc.	C. Colbourne, A.Sc.T.	July 30, 2018	BRUCE A. BROWN ASSOCIATES LIMITED Consultants in the Environmental and Applied Earth Sciences 101–102 Aerodrome Crescent Toronto, Ontario M4G 4J4 Tel [416] 424-3355
			Project No.: 18*4495	Drawing No.: 4495180730-001	



General site layout of 471 Richmond Street West, City of Toronto.

Notes:

(1) Site Drawing based on field notes of attending Technologist..

(2) Results compiled from boreholes advanced by Bruce A. Brown Associates Limited, as indicated.

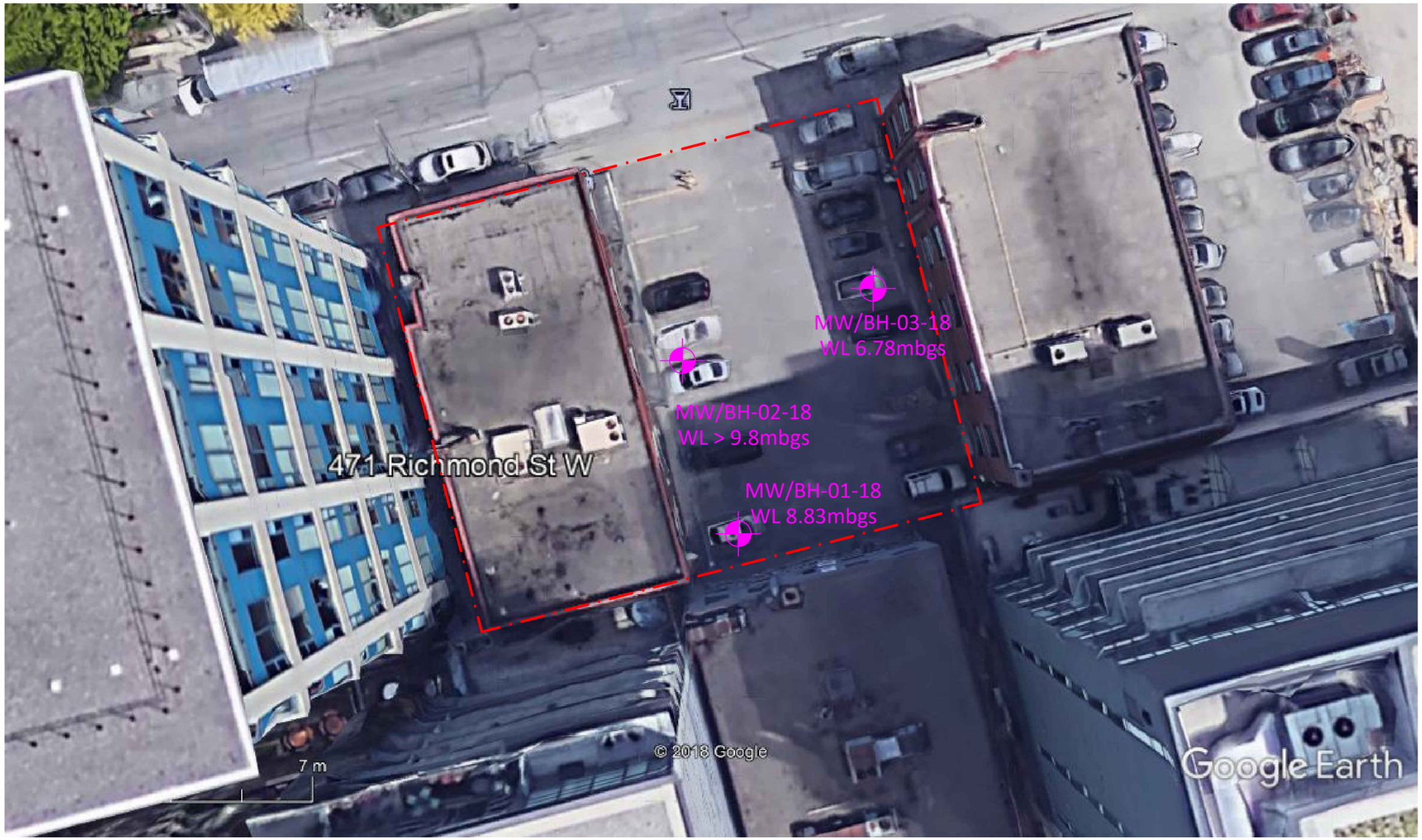
(3) Scale as indicated on drawing.

DRAWING KEY

Boreholes / Monitoring Wells - Advanced by Bruce A. Brown Associates Limited, May 3, 2018.

Approximate existing property boundary.

Figure:	Title:	Client:	Drawn By:	Date:	
2-0	**Site Layout and Borehole Location Plan** 471 Richmond Street West, City of Toronto	Manga Hotels (Richmond) Inc.	C. Colbourne, A.Sc.T.	July 30, 2018	BRUCE A. BROWN ASSOCIATES LIMITED Consultants in the Environmental and Applied Earth Sciences 101–102 Aerodrome Crescent Toronto, Ontario M4G 4J4 Tel [416] 424-3355
			Project No.: 18*4495	Drawing No.: 4495180730-002	



General site layout of 471 Richmond Street West, City of Toronto.

Notes:

(1) Site Drawing based on field notes of attending Technologist..

(2) Results compiled from boreholes advanced by Bruce A. Brown Associates Limited, as indicated.

(3) Scale as indicated on drawing.

DRAWING KEY

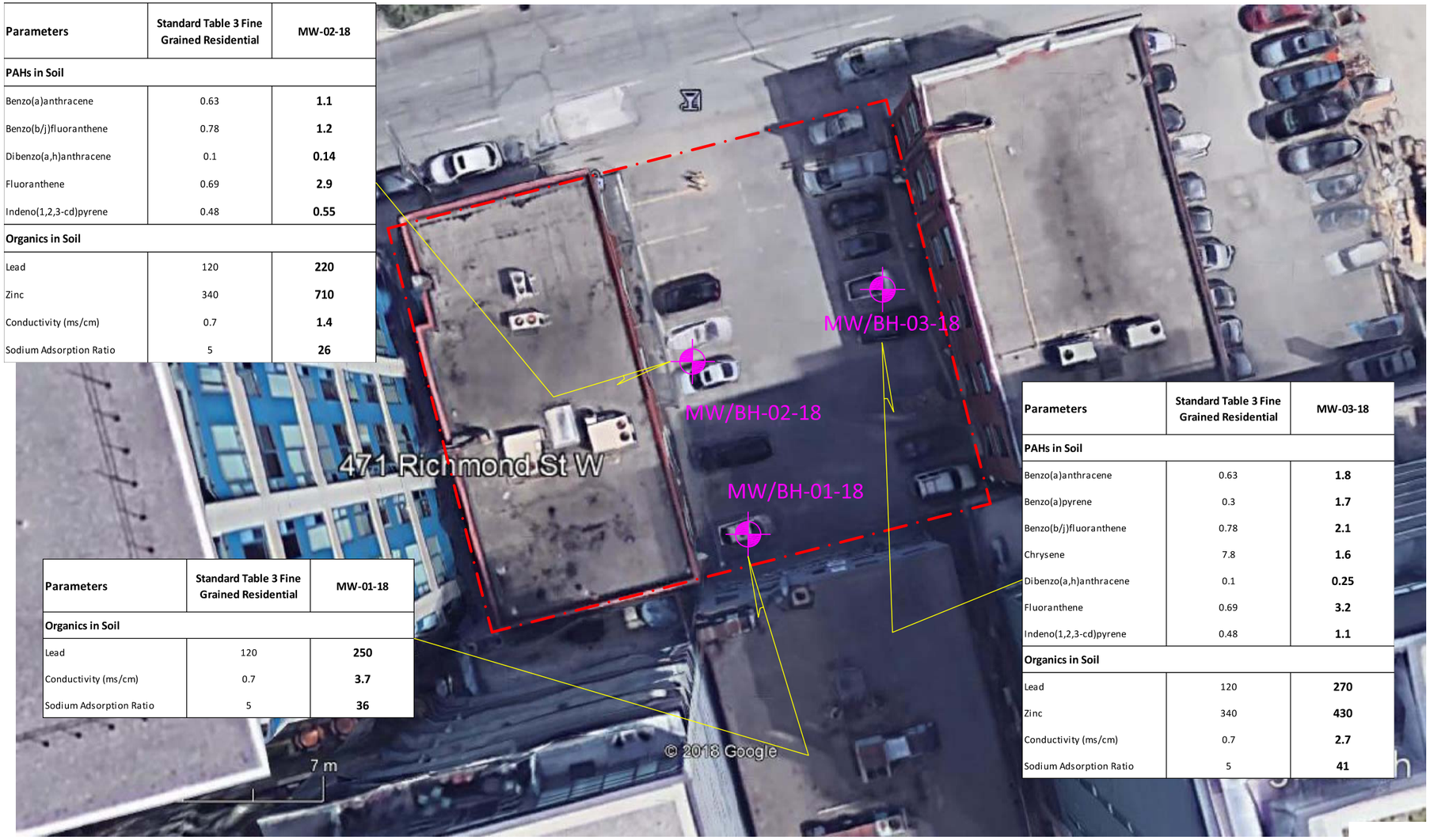
Boreholes / Monitoring Wells - Advanced by Bruce A. Brown Associates Limited, May 3, 2018.

Approximate existing property boundary.

Standard practice requires at least a minimum of three water levels from three different on-site wells to determine the actual groundwater gradient. However due to the significant difference in the two reading that was recorded, and that the third is dry we cannot conclude the direction of the local groundwater gradient.

Figure:	Title:	Client:	Drawn By:	Date:	
3-0	**Groundwater Levels** 471 Richmond Street West, City of Toronto	Manga Hotels (Richmond) Inc.	C. Colbourne, A.Sc.T.	July 30, 2018	BRUCE A. BROWN ASSOCIATES LIMITED Consultants in the Environmental and Applied Earth Sciences 101–102 Aerodrome Crescent Toronto, Ontario M4G 4J4 Tel [416] 424–3355
			Project No.: 18*4495	Drawing No.: 4495180730-003	

Parameters	Standard Table 3 Fine Grained Residential	MW-02-18
PAHs in Soil		
Benzo(a)anthracene	0.63	**1.1**
Benzo(b/j)fluoranthene	0.78	**1.2**
Dibenzo(a,h)anthracene	0.1	**0.14**
Fluoranthene	0.69	**2.9**
Indeno(1,2,3-cd)pyrene	0.48	**0.55**
Organics in Soil		
Lead	120	**220**
Zinc	340	**710**
Conductivity (ms/cm)	0.7	**1.4**
Sodium Adsorption Ratio	5	**26**



Parameters	Standard Table 3 Fine Grained Residential	MW-03-18
PAHs in Soil		
Benzo(a)anthracene	0.63	**1.8**
Benzo(a)pyrene	0.3	**1.7**
Benzo(b/j)fluoranthene	0.78	**2.1**
Chrysene	7.8	**1.6**
Dibenzo(a,h)anthracene	0.1	**0.25**
Fluoranthene	0.69	**3.2**
Indeno(1,2,3-cd)pyrene	0.48	**1.1**
Organics in Soil		
Lead	120	**270**
Zinc	340	**430**
Conductivity (ms/cm)	0.7	**2.7**
Sodium Adsorption Ratio	5	**41**

Parameters	Standard Table 3 Fine Grained Residential	MW-01-18
Organics in Soil		
Lead	120	**250**
Conductivity (ms/cm)	0.7	**3.7**
Sodium Adsorption Ratio	5	**36**

General site layout of 471 Richmond Street West, City of Toronto.

Notes:

(1) Site Drawing based on field notes of attending Technologist..

(2) Results compiled from boreholes advanced by Bruce A. Brown Associates Limited, as indicated.

(3) Scale as indicated on drawing.

DRAWING KEY

Boreholes / Monitoring Wells - Advanced by Bruce A. Brown Associates Limited, May 3, 2018.

Approximate existing property boundary.

All units in ug/g.

XX.XX Denotes an exceedance of the set Standard of Table 3 Fine Grain Soils, Residential Uses

Figure: 4-0

Title: **Soil Exceedances** 471 Richmond Street West, City of Toronto

Client: Manga Hotels (Richmond) Inc.

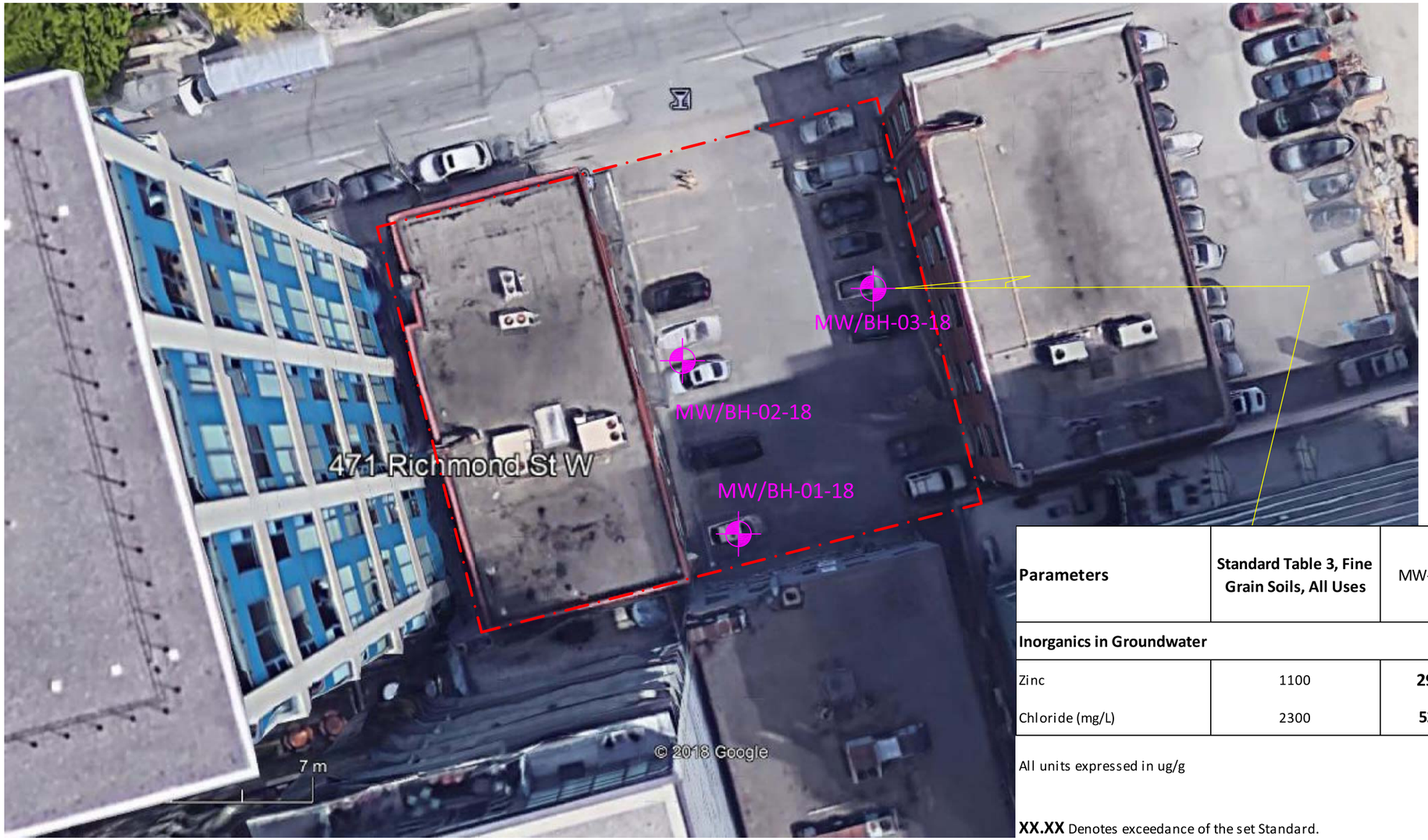
Drawn By: C. Colbourne, A.Sc.T.

Date: July 30, 2018

Project No.: 18*4495

Drawing No.: 4495180730-004

BRUCE A. BROWN ASSOCIATES LIMITED
Consultants in the Environmental and Applied Earth Sciences
101–102 Aerodrome Crescent Toronto, Ontario
M4G 4J4 Tel [416] 424–3355



General site layout of 471 Richmond Street West, City of Toronto.

Notes:

(1) Site Drawing based on field notes of attending Technologist..

(2) Results compiled from boreholes advanced by Bruce A. Brown Associates Limited, as indicated.

(3) Scale as indicated on drawing.

DRAWING KEY

Boreholes / Monitoring Wells - Advanced by Bruce A. Brown Associates Limited, May 3, 2018.

Approximate existing property boundary.

Parameters	Standard Table 3, Fine Grain Soils, All Uses	MW-03-18
Inorganics in Groundwater		
Zinc	1100	**2900**
Chloride (mg/L)	2300	**5200**

All units expressed in ug/g

XX.XX Denotes exceedance of the set Standard.

Figure:	Title:	Client:	Drawn By:	Date:	
5-0	**Groundwater Exceedances** 471 Richmond Street West, City of Toronto	Manga Hotels (Richmond) Inc.	C. Colbourne, A.Sc.T.	July 30, 2018	BRUCE A. BROWN ASSOCIATES LIMITED Consultants in the Environmental and Applied Earth Sciences 101–102 Aerodrome Crescent Toronto, Ontario M4G 4J4 Tel [416] 424-3355
			Project No.: 18*4495	Drawing No.: 4495180730-005	

Appendices

Appendix A
Statement of Limitations for Phase II Evaluations

Bruce A. Brown Associates Limited

Statement of Limitations for Phase II Environmental Evaluations

The conclusions and recommendations of this report are applicable only for the area of investigation set out in the report, and to the time of investigation. Subsurface conditions including soil type, presence or extent of a contaminant, groundwater elevations and quality, or conditions within buildings and structures which may affect realty value or site redevelopment may differ between test locations and may not be applicable to areas beyond those investigated.

This report is applicable only to the client to which it is addressed and for the purpose set out in the introduction. Bruce A. Brown Associates Limited does not permit use of this report by any third party or for any other purpose unless prior written authorization is provided by this firm.

A Phase II Environmental Evaluation generally includes intrusive investigations or materials sampling, monitoring and laboratory analyses of select sample materials. As a consequence, it is recognized that some site specific conditions which are not historically referenced or otherwise communicated or may not be visually or olfactory apparent to a qualified field investigator may not be detected at this level of evaluation. In addition, the number of actual test locations, or numbers of chemical characterizations, although intended to establish representative conditions, may not be sufficient to completely delineate any condition or to determine presence of a deleterious condition.

While recommendations are valid for the actual test locations, it is further recommended that verification of uniformity, or of any anticipated variances in construction materials, subsoils or groundwater, or building conditions be made at the time of any future demolition, excavation, remediation program or construction involving site work which may be affected by presence of certain building materials, soil or groundwater conditions.

With the exception of instances where this firm is specifically retained to confirm field conditions, the responsibility of Bruce A. Brown Associates Limited shall be restricted to accurate interpretation of actual test location(s). No responsibility can be taken for the

procedures or the sequence of efforts carried out by any contractor, even when his final result would be to implement the recommended design, unless field supervision is requested from this firm.

Where site soil conditions or history of use of a site and/or neighbouring lands, or visible hazardous materials located on a facility suggest potential for hazardous conditions, a more detailed program of investigation may be required to determine the presence or extent of any impaired condition or to define potential costs associated with future remediation to achieve acceptable environmental conditions to permit continued or proposed future uses of a property.

All costing and figures are rough estimates based on the current guidelines and market costs and several quotes from contractors should be obtained prior to site work. Costs will depend on extent of work and approach taken and in some cases the best approach cannot be determined until after site work has commenced.

Communication of all matters concerning on-site materials, identified hazardous wastes, soils or groundwater quality and other matters shall be to the firm or individual authorizing site investigations. Where recommendations are made by Bruce A. Brown Associates Limited to an authorizing agent, it shall be the responsibility of that agent to communicate, as required, to any contractor, owner, agency, or other consultant who may be affected by such recommendations, or shall require such data to carry out his duties in a safe and responsible manner as they relate to the subject property and ensure compliance with all regulatory requirements and guidelines affecting the environment or matters of occupational health and safety.

Appendix B

Sampling and Analysis Plan

The final sampling is understanding that this is the preliminary soil assessment. Based on initial Phase I study of the subject site it was concluded that the site was subject to potential impacts for use of coal for comfort heating, some potential for heating oil and presence of demolition wastes.

The sampling plan includes examination of each recovered soil sample to as usual issues, such as: volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), petroleum hydrocarbons (PHCs) and metals & inorganics (M&Is).

Should a sample exhibit any physical or olfactory issues, submit the sample for contaminants of concern.

For the groundwater examination, the plan, as per our proposal to client, was to sample for the same parameters of concern as for soil.

All testing to employ clean tool and hand methodology, as well as soil sample duplicates.

Appendix C
Finalized Field Borehole Logs

BRUCE A. BROWN ASSOCIATES LIMITED
Consultants in the Environmental and Applied Earth Sciences

101-102 Aerodrome Crescent
Toronto, Ontario, Canada M4G 4J4
Tel: (416) 424-3355, Email bruce@brownassociates.ca

Project Location: 147 Richmond Street West, City of Toronto

Project Number: 17*4495

Technologist: C.W. Colbourne, A.Sc.T.

Client: Manga Hotels (Richmond) Inc.

Date of Borehole: 03-May-18

Drilling Contrator: Determination Drilling, Truck Mounted CME 75 with hollow stem augurs and 50mm x 0.06m Split Spoon driven by Standard force Hammer

BH/MW Location: See site drawing

Bench Mark: Temp Bench Mark

TOR Elevation:

BOREHOLE LOG No. **MW/BH-01-18**

Stratigraphy						Tests	Samples				
Depth in Metres	Monitoring Well Diagram	Symbol	Sample Interval	Description	Elevation	x Moisture Content / 0 Dynamic Penetration Test (20 40 60 80)	Lab Sample No.	PID READING	% Recovery	Standard Penetration N-Blows per 0.30m	Moisture Content %
SS-1				Grade to 0.6mbgs FILL – 50mm of ASPHALT PAVEMENT underlain by SILTY CLAY with CINDERS and ASH, brown, slightly moist, non-plastic, non-cohesive, very loose, trace brick, coal, organics.		0	SOIL-4495-180502-01-001 (M&I & PAHs)	1.7	80	4	
SS-2						0		0.2	60	8	
SS-3				0.8mbgs to 3.7mbgs NATIVE – CLAYEY SILT / CLAYEY SILT TILL, brown changing to grey by 3.4mbgs, slightly moist, low to no plasticity, slightly to no cohesiveness, medium stiff to very stiff, mottled.		0		0.2	100	25	
SS-4						0		0.2	100	19	
SS-5				4.6mbgs to 5.2mbgs CLAY TILL – grey, slightly moist, medium plasticity, cohesive, medium stiff.		0		0.2	100	8	
SS-6						0		0.2	100	79	
SS-7				6.1mbgs to 8.2mbgs SAND / FINE SILTY SAND, grey, moist, non-plastic, non-cohesive, very dense.		0		0.2	100	74	
SS-8				9.1mbgs to 9.3mbgs SILT, grey, slightly moist, non-plastic, non-cohesive, very dense, trace gravel. Split spoon refusal at 9.3mbgs		0		0.2	100	100 (50 BLOWS FOR 125mm)	

Borehole terminated at 9.3mbgs, 50mm x 3.05m No.:10 slotted piezometer installed at 9.23mbgs followed by 50mm solid stand pipe to 0.15mbgs. The piezometer was backfilled with well sand to 0.6m above the slotted interval followed by bentonite seal up to 0.3mbgs. Standpipe was fitted with a 50mm J-Plug and well fitted with a flush mounted protective cover cemented into place. Groundwater levels were established on May 9, 2018 to be 8.83mbgs.

BRUCE A. BROWN ASSOCIATES LIMITED
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Tel: (416) 424-3355, Email bruce@brownassociates.ca

Project Location: 147 Richmond Street West, City of Toronto

Project Number: 17*4495

Technologist: C.W. Colbourne, A.Sc.T.

Client: Manga Hotels (Richmond) Inc.

Date of Borehole: 03-May-18

Drilling Contrator: Determination Drilling, Truck Mounted CME 75 with hollow stem augurs and 50mm x 0.06m Split Spoon driven by Standard force Hammer

BH/MW Location: See site drawing

Bench Mark: Temp Bench Mark

TOR Elevation: 0.9m above grade

BOREHOLE LOG No. **MW/BH-02-18**

Stratigraphy						Tests	Samples				
Depth in Metres	Monitoring Well Diagram	Symbol	Sample Interval	Description	Elevation	x Moisture Content / 0 Dynamic Penetration Test (20 40 60 80)	Lab Sample No.	PID READING	% Recovery	Standard Penetration N-Blows per 0.30m	Moisture Content %
0											
0.1–0.8			SS-1	Grade to 0.6mbgs FILL – 50mm TO 60mm OF ASPHALT PAVEMENT underlain by SILTY CLAY some CINDERS some ASH some COARSE GRAVEL some SAND, brown to black to ochre, moist, non-plastic, non-cohesive, very loose, trace glass and trace red brick fragments.		0	SOIL-4495-180502-02-002 (M&I & PAHs)	0.2	100	<2	
0.9–1.4			SS-2	0.8mbgs to 1.4mbgs FILL- SILTY CLAY some SAND, brown / very loose, moist, low plasticity, slightly cohesive, ochre staining present.		0		0.1	100	4	
1.5–2.1			SS-3	1.5mbgs to 2.1mbgs NATIVE – CLAYEY SILT TILL, brown, slightly moist, non-plastic, non-cohesive, medium dense, mottled.		0		0	100	14	
2.2–3.7			SS-4	3mbgs to 3.7mbgs NATIVE - SILT TILL, brown to grey, slightly moist, non-plastic, non-cohesive, medium dense, mottled.		0		0	100	19	
3.8–5.2			SS-5	4.6mbgs to 5.2mbgs CLAY, grey, moist, medium plasticity cohesive, stiff, trace gravel.		0		0	100	13	
5.3–6.4			SS-6			0		0	100	52	
6.5–7.8			SS-7	6.1mbgs to 9.8mbgs SILT TILL, grey, dry, non-plastic, non-cohesive, very dense, trace cobble at 6.4mbgs, trace sand inclusions from 7.6mbgs to 9.2mbgs.		0		0	100	58	
7.9–9.5			SS-8			0		0	100	54	
9.6–10.0				Borehole terminated at 9.8mbgs, 50mm x 3.05m No.:10 slotted piezometer installed at 7.78mbgs followed by 50mm solid stand pipe to 0.15mbgs. The piezometer was backfilled with well sand to 0.6m above the slotted interval followed by bentonite seal up to 0.3mbgs. Standpipe was fitted with a 50mm J-Plug and well fitted with a flush mounted protective cover cemented into place. Groundwater levels were established on May 9, 2018 to be dry.							

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Project Location: 147 Richmond Street West, City of Toronto

Project Number: 17*4495

Technologist: C.W. Colbourne, A.Sc.T.

Client: Manga Hotels (Richmond) Inc.

Date of Borehole: 03-May-18

Drilling Contrator: Determination Drilling, Truck Mounted CME 75 with hollow stem augurs and 50mm x 0.06m Split Spoon driven by Standard force Hammer

BH/MW Location: See site drawing

Bench Mark: Temp Bench Mark

TOR Elevation:

BOREHOLE LOG No. **MW/BH-03-18**

Stratigraphy						Tests	Samples				
Depth in Metres	Monitoring Well Diagram	Symbol	Sample Interval	Description	Elevation	x Moisture Content / 0 Dynamic Penetration Test (20 40 60 80)	Lab Sample No.	PID READING	% Recovery	Standard Penetration N-Blows per 0.30m	Moisture Content %
0											
0.1–0.6			SS-1	Grade to 0.6mbgs FILL – 75mm of ASPHALT PAVEMENT underlain by a homogeneous blend of SILTY SAND, CLAY, CONCRETE RUBBLE, ASPHALT RUBBLE, RED BRICK FRAGMENTS, TOPSOIL, brown, moist, non-plastic, non-cohesive, very loose.		0	SOIL-4495-180502-02-002 (M&I & PAHs)	9.4	100	<3	
0.7–0.8											
0.9–1.4			SS-2	0.8mbgs to 1.4mbgs NATIVE – SILTY CLAY, brown, moist, low plasticity, slightly cohesive, soft, ochre staining, mottled.		0			100	4	
1.5											
1.6–2.1			SS-3	1.5mbgs to 2.1mbgs CLAYEY SILT TILL, brown, slightly moist, non-plastic, non-cohesive, loose, ochre staining.		0			100	20	
2.2–2.9											
3.0–3.7			SS-4	3mbgs to 3.7mbgs SILT TILL, brown to grey, slightly moist, non-plastic, non-cohesive, medium dense, mottled.		0			50	21	
3.8–4.5											
4.6–5.2			SS-5	4.6mbgs to 5.2mbgs CLAY, grey, moist, medium plasticity, cohesive, very stiff.		0			100	<4	
5.3–6.2											
6.1–6.7			SS-6	6.1mbgs to 6.7mbgs SILT TILL, grey, dry, non-plastic, non-cohesive, dense, sand in tip of split spoon sampler.		0			100	47	
6.8–7.6											
7.7–7.9			SS-7	7.6mbgs to 7.9mbgs SILTY SAND, grey, moist, non-plastic, non-cohesive, very dense, split spoon refusal at 7.9mbgs.		0			100	100 (50 BLOWS FOR 75mm)	
8.0–9.0											
9.1–9.7			SS-8	9.1mbgs to 9.7mbgs Alternating seams of SILT and FINE SAND, grey, moist sand dry silt, non-plastic, non-cohesive, very dense.		0			100	64	
9.8–10.0				Borehole terminated at 9.7mbgs, 50mm x 3.05m No.:10 slotted piezometer installed at 9.42mbgs followed by 50mm solid stand pipe to 0.15mbgs. The piezometer was backfilled with well sand to 0.6m above the slotted interval followed by bentonite seal up to 0.3mbgs. Standpipe was fitted with a 50mm J-Plug and well fitted with a flush mounted protective cover cemented into place. Groundwater levels were established on May 9, 2018 to be 6.78mbgs.							

Borehole Log Key and Soil Classification Key

Major Divisions			Colour / Symbol	Letter Symbol	Typical Description
Coarse Grained Soils, More than 50% of material is larger than No. 200 sieve size.	Gravel and Gravelly Soils, More than 50% of coarse fractions retained on No. 4 sieve	Clean Gravels (little or no fines)		GW	Well- graded gravels, gravel sand mixtures, little or no fines
				GP	Poorly grade gravels, gravel-sand mixtures, little or no fines
		Gravels With Fines (Appreciable amount of fines)		GM	Silty gravels, gravel-sand-silt mixtures
				GC	Clayey gravels, gravel-sand clay mixtures
	Sand and Sandy Soils, more than 50% of coarse fraction passing No. 4 sieve	Clean Sand (Little or no fines)		SW	Well-graded sands, gravelly sands, little or no fines
				SP	Poorly-graded sands, gravelly sands, little or no fines
		Sands with Fines (Appreciable amount of fines)		SM	Silty-sands, sand-silt mixtures.
				SC	Clayey sands, sand-clay mixtures
Fine Grained Soils, more than 50% of material is smaller than No. 200 sieve size	Silts and Clays,	Liquid limit less than 50		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
				CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
				OL	Organic silts and organic silty clays of low plasticity
	Silts and Clays,	Liquid limit greater than 50		MH	Inorganic silts, micaceous or diatomaceous fine sand or silty soils
				CH	Inorganic clays of high plasticity, fat clays
				OH	Organic clays of medium to high plasticity, organic silts
Highly Organic Soils				PT	Peat, humus, swamp soils with high organic contents

Bruce A. Brown Associates Limited.

Appendix D - Soil
Certificate of Analysis, Chain of Custody

Maxxam
A Bureau Veritas Group Company

Your Project #: *4495
Site Location: RICHMOND
Your C.O.C. #: 662517-01-01

Attention: Craig Colbourne

Bruce A. Brown Associates Limited
101-102 Aerodrome Cr
Toronto, ON
CANADA M4G 4J4

Report Date: 2018/06/12
Report #: R5232444
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8A3645
Received: 2018/05/03, 16:33

Sample Matrix: Soil
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Methylnaphthalene Sum	3	N/A	2018/05/11	CAM SOP-00301	EPA 8270D m
Hot Water Extractable Boron	3	2018/05/08	2018/05/09	CAM SOP-00408	R153 Ana. Prot. 2011
Free (WAD) Cyanide	3	2018/05/07	2018/05/09	CAM SOP-00457	OMOE E3015 m
Conductivity	3	2018/05/10	2018/05/10	CAM SOP-00414	OMOE E3530 v1 m
Hexavalent Chromium in Soil by IC (1)	3	2018/05/08	2018/05/10	CAM SOP-00436	EPA 3060/7199 m
Strong Acid Leachable Metals by ICPMS	3	2018/05/08	2018/05/10	CAM SOP-00447	EPA 6020B m
Moisture	3	N/A	2018/05/08	CAM SOP-00445	Carter 2nd ed 51.2 m
PAH Compounds in Soil by GC/MS (SIM)	3	2018/05/10	2018/05/10	CAM SOP-00318	EPA 8270D m
pH CaCl2 EXTRACT	3	2018/05/08	2018/05/08	CAM SOP-00413	EPA 9045 D m
Sodium Adsorption Ratio (SAR)	3	N/A	2018/05/10	CAM SOP-00102	EPA 6010C

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Soils are reported on a dry weight basis unless otherwise specified.

Your Project #: *4495
Site Location: RICHMOND
Your C.O.C. #: 662517-01-01

Attention: Craig Colbourne

Bruce A. Brown Associates Limited
101-102 Aerodrome Cr
Toronto, ON
CANADA M4G 4J4

Report Date: 2018/06/12
Report #: R5232444
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8A3645
Received: 2018/05/03, 16:33

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Ronklin Gracian, Project Manager
Email: RGracian@maxxam.ca
Phone# (905) 817-5700
==========
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Maxxam Job #: B8A3645
Report Date: 2018/06/12

Bruce A. Brown Associates Limited
Client Project #: *4495
Site Location: RICHMOND
Sampler Initials: CC

RESULTS OF ANALYSES OF SOIL

Maxxam ID			GPQ887	GPQ888	GPQ889		
Sampling Date			2018/05/03	2018/05/03	2018/05/03		
COC Number			662517-01-01	662517-01-01	662517-01-01		
	UNITS	Criteria	SOIL-4495-18050301-001	SOIL-4495-18050302-002	SOIL-4495-18050303-003	RDL	QC Batch
Calculated Parameters							
Sodium Adsorption Ratio	N/A	5.0	**36**	**26**	**41**		5515549
Inorganics							
Conductivity	mS/cm	0.7	**3.7**	**1.4**	**2.7**	0.002	5522847
Moisture	%	-	20	17	18	1.0	5520489
Available (CaCl2) pH	pH	-	7.79	7.86	7.60		5518828
WAD Cyanide (Free)	ug/g	0.051	0.01	ND	**0.06**	0.01	5519034

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
Soil - Residential/Parkland/Institutional Property Use - Medium and Fine Textured Soil
ND = Not detected

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B8A3645
Report Date: 2018/06/12

Bruce A. Brown Associates Limited
Client Project #: *4495
Site Location: RICHMOND
Sampler Initials: CC

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID			GPQ887	GPQ888	GPQ889		
Sampling Date			2018/05/03	2018/05/03	2018/05/03		
COC Number			662517-01-01	662517-01-01	662517-01-01		
	UNITS	Criteria	SOIL-4495-18050301-001	SOIL-4495-18050302-002	SOIL-4495-18050303-003	RDL	QC Batch
Inorganics							
Chromium (VI)	ug/g	10	ND	ND	ND	0.2	5520089
Metals							
Hot Water Ext. Boron (B)	ug/g	1.5	0.70	0.49	1.2	0.050	5520179
Acid Extractable Antimony (Sb)	ug/g	7.5	2.0	2.3	2.4	0.20	5520276
Acid Extractable Arsenic (As)	ug/g	18	6.1	18	12	1.0	5520276
Acid Extractable Barium (Ba)	ug/g	390	190	250	290	0.50	5520276
Acid Extractable Beryllium (Be)	ug/g	5	0.61	0.62	0.82	0.20	5520276
Acid Extractable Boron (B)	ug/g	120	8.8	9.4	8.3	5.0	5520276
Acid Extractable Cadmium (Cd)	ug/g	1.2	0.27	0.67	1.0	0.10	5520276
Acid Extractable Chromium (Cr)	ug/g	160	26	22	40	1.0	5520276
Acid Extractable Cobalt (Co)	ug/g	22	9.3	6.0	8.8	0.10	5520276
Acid Extractable Copper (Cu)	ug/g	180	48	40	57	0.50	5520276
Acid Extractable Lead (Pb)	ug/g	120	**250**	**220**	**270**	1.0	5520276
Acid Extractable Molybdenum (Mo)	ug/g	6.9	1.0	1.5	1.8	0.50	5520276
Acid Extractable Nickel (Ni)	ug/g	130	20	18	28	0.50	5520276
Acid Extractable Selenium (Se)	ug/g	2.4	0.83	0.84	1.1	0.50	5520276
Acid Extractable Silver (Ag)	ug/g	25	0.41	0.31	0.56	0.20	5520276
Acid Extractable Thallium (Tl)	ug/g	1	0.14	0.28	0.28	0.050	5520276
Acid Extractable Uranium (U)	ug/g	23	0.42	0.71	0.60	0.050	5520276
Acid Extractable Vanadium (V)	ug/g	86	32	22	31	5.0	5520276
Acid Extractable Zinc (Zn)	ug/g	340	130	**710**	**430**	5.0	5520276
Acid Extractable Mercury (Hg)	ug/g	1.8	1.1	1.7	0.62	0.050	5520276

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
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RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
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Site Location: RICHMOND
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SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID			GPQ887		GPQ888		
Sampling Date			2018/05/03		2018/05/03		
COC Number			662517-01-01		662517-01-01		
	UNITS	Criteria	SOIL-4495-18050301-001	RDL	SOIL-4495-18050302-002	RDL	QC Batch
Calculated Parameters							
Methylnaphthalene, 2-(1-)	ug/g	3.4	0.014	0.0071	0.31	0.071	5515829
Polyaromatic Hydrocarbons							
Acenaphthene	ug/g	58	ND	0.0050	0.19	0.050	5524532
Acenaphthylene	ug/g	0.17	0.015	0.0050	0.072	0.050	5524532
Anthracene	ug/g	0.74	0.024	0.0050	0.56	0.050	5524532
Benzo(a)anthracene	ug/g	0.63	0.17	0.0050	**1.1**	0.050	5524532
Benzo(a)pyrene	ug/g	0.3	0.19	0.0050	**0.88**	0.050	5524532
Benzo(b/j)fluoranthene	ug/g	0.78	0.21	0.0050	**1.2**	0.050	5524532
Benzo(g,h,i)perylene	ug/g	7.8	0.12	0.0050	0.48	0.050	5524532
Benzo(k)fluoranthene	ug/g	0.78	0.080	0.0050	0.46	0.050	5524532
Chrysene	ug/g	7.8	0.12	0.0050	0.93	0.050	5524532
Dibenz(a,h)anthracene	ug/g	0.1	0.025	0.0050	**0.14**	0.050	5524532
Fluoranthene	ug/g	0.69	0.27	0.0050	**2.9**	0.050	5524532
Fluorene	ug/g	69	ND	0.0050	0.30	0.050	5524532
Indeno(1,2,3-cd)pyrene	ug/g	0.48	0.12	0.0050	**0.55**	0.050	5524532
1-Methylnaphthalene	ug/g	3.4	0.0070	0.0050	0.15	0.050	5524532
2-Methylnaphthalene	ug/g	3.4	0.0066	0.0050	0.17	0.050	5524532
Naphthalene	ug/g	0.75	ND	0.0050	0.33	0.050	5524532
Phenanthrene	ug/g	7.8	0.069	0.0050	3.0	0.050	5524532
Pyrene	ug/g	78	0.26	0.0050	2.1	0.050	5524532
Surrogate Recovery (%)							
D10-Anthracene	%	-	91		101		5524532
D14-Terphenyl (FS)	%	-	93		96		5524532
D8-Acenaphthylene	%	-	88		96		5524532

No Fill	No Exceedance
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Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
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SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID			GPQ889		
Sampling Date			2018/05/03		
COC Number			662517-01-01		
	UNITS	Criteria	SOIL-4495-18050303-003	RDL	QC Batch
Calculated Parameters					
Methylnaphthalene, 2-(1-)	ug/g	3.4	0.059	0.0071	5515829
Polyaromatic Hydrocarbons					
Acenaphthene	ug/g	58	0.050	0.0050	5524532
Acenaphthylene	ug/g	0.17	0.14	0.0050	5524532
Anthracene	ug/g	0.74	0.28	0.0050	5524532
Benzo(a)anthracene	ug/g	0.63	**1.8**	0.0050	5524532
Benzo(a)pyrene	ug/g	0.3	**1.7**	0.0050	5524532
Benzo(b/j)fluoranthene	ug/g	0.78	**2.1**	0.0050	5524532
Benzo(g,h,i)perylene	ug/g	7.8	0.96	0.0050	5524532
Benzo(k)fluoranthene	ug/g	0.78	0.77	0.0050	5524532
Chrysene	ug/g	7.8	1.6	0.0050	5524532
Dibenz(a,h)anthracene	ug/g	0.1	**0.25**	0.0050	5524532
Fluoranthene	ug/g	0.69	**3.2**	0.0050	5524532
Fluorene	ug/g	69	0.063	0.0050	5524532
Indeno(1,2,3-cd)pyrene	ug/g	0.48	**1.1**	0.0050	5524532
1-Methylnaphthalene	ug/g	3.4	0.031	0.0050	5524532
2-Methylnaphthalene	ug/g	3.4	0.027	0.0050	5524532
Naphthalene	ug/g	0.75	0.028	0.0050	5524532
Phenanthrene	ug/g	7.8	1.1	0.0050	5524532
Pyrene	ug/g	78	2.7	0.0050	5524532
Surrogate Recovery (%)					
D10-Anthracene	%	-	92		5524532
D14-Terphenyl (FS)	%	-	95		5524532
D8-Acenaphthylene	%	-	92		5524532

No Fill	No Exceedance
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Maxxam Job #: B8A3645
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Bruce A. Brown Associates Limited
Client Project #: *4495
Site Location: RICHMOND
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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	8.3°C

Sample GPQ888 [SOIL-4495-18050302-002] : PAH Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5518828	GTO	Spiked Blank	Available (CaCl2) pH	2018/05/08		100	%	97 - 103
5518828	GTO	RPD	Available (CaCl2) pH	2018/05/08	0.98		%	N/A
5519034	LHA	Matrix Spike	WAD Cyanide (Free)	2018/05/09		94	%	75 - 125
5519034	LHA	Spiked Blank	WAD Cyanide (Free)	2018/05/09		97	%	80 - 120
5519034	LHA	Method Blank	WAD Cyanide (Free)	2018/05/09	ND, RDL=0.01		ug/g	
5519034	LHA	RPD	WAD Cyanide (Free)	2018/05/09	NC		%	35
5520089	SAC	Matrix Spike	Chromium (VI)	2018/05/10		22 (1)	%	70 - 130
5520089	SAC	Spiked Blank	Chromium (VI)	2018/05/10		94	%	80 - 120
5520089	SAC	Method Blank	Chromium (VI)	2018/05/10	ND, RDL=0.2		ug/g	
5520089	SAC	RPD	Chromium (VI)	2018/05/10	NC		%	35
5520179	APT	Matrix Spike	Hot Water Ext. Boron (B)	2018/05/09		109	%	75 - 125
5520179	APT	Spiked Blank	Hot Water Ext. Boron (B)	2018/05/09		108	%	75 - 125
5520179	APT	Method Blank	Hot Water Ext. Boron (B)	2018/05/09	ND, RDL=0.050		ug/g	
5520179	APT	RPD	Hot Water Ext. Boron (B)	2018/05/09	7.0		%	40
5520276	DT1	Matrix Spike	Acid Extractable Antimony (Sb)	2018/05/10		95	%	75 - 125
			Acid Extractable Arsenic (As)	2018/05/10		105	%	75 - 125
			Acid Extractable Barium (Ba)	2018/05/10		NC	%	75 - 125
			Acid Extractable Beryllium (Be)	2018/05/10		102	%	75 - 125
			Acid Extractable Boron (B)	2018/05/10		92	%	75 - 125
			Acid Extractable Cadmium (Cd)	2018/05/10		102	%	75 - 125
			Acid Extractable Chromium (Cr)	2018/05/10		105	%	75 - 125
			Acid Extractable Cobalt (Co)	2018/05/10		101	%	75 - 125
			Acid Extractable Copper (Cu)	2018/05/10		NC	%	75 - 125
			Acid Extractable Lead (Pb)	2018/05/10		101	%	75 - 125
			Acid Extractable Molybdenum (Mo)	2018/05/10		102	%	75 - 125
			Acid Extractable Nickel (Ni)	2018/05/10		NC	%	75 - 125
			Acid Extractable Selenium (Se)	2018/05/10		103	%	75 - 125
			Acid Extractable Silver (Ag)	2018/05/10		98	%	75 - 125
			Acid Extractable Thallium (Tl)	2018/05/10		100	%	75 - 125
			Acid Extractable Uranium (U)	2018/05/10		101	%	75 - 125
			Acid Extractable Vanadium (V)	2018/05/10		NC	%	75 - 125
			Acid Extractable Zinc (Zn)	2018/05/10		NC	%	75 - 125
			Acid Extractable Mercury (Hg)	2018/05/10		103	%	75 - 125
5520276	DT1	Spiked Blank	Acid Extractable Antimony (Sb)	2018/05/10		100	%	80 - 120
			Acid Extractable Arsenic (As)	2018/05/10		97	%	80 - 120
			Acid Extractable Barium (Ba)	2018/05/10		93	%	80 - 120
			Acid Extractable Beryllium (Be)	2018/05/10		96	%	80 - 120
			Acid Extractable Boron (B)	2018/05/10		94	%	80 - 120
			Acid Extractable Cadmium (Cd)	2018/05/10		97	%	80 - 120
			Acid Extractable Chromium (Cr)	2018/05/10		97	%	80 - 120
			Acid Extractable Cobalt (Co)	2018/05/10		98	%	80 - 120
			Acid Extractable Copper (Cu)	2018/05/10		97	%	80 - 120
			Acid Extractable Lead (Pb)	2018/05/10		97	%	80 - 120
			Acid Extractable Molybdenum (Mo)	2018/05/10		100	%	80 - 120
			Acid Extractable Nickel (Ni)	2018/05/10		99	%	80 - 120
			Acid Extractable Selenium (Se)	2018/05/10		100	%	80 - 120
			Acid Extractable Silver (Ag)	2018/05/10		97	%	80 - 120
			Acid Extractable Thallium (Tl)	2018/05/10		97	%	80 - 120
			Acid Extractable Uranium (U)	2018/05/10		97	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Acid Extractable Vanadium (V)	2018/05/10		100	%	80 - 120
			Acid Extractable Zinc (Zn)	2018/05/10		96	%	80 - 120
			Acid Extractable Mercury (Hg)	2018/05/10		95	%	80 - 120
5520276	DT1	Method Blank	Acid Extractable Antimony (Sb)	2018/05/10	ND, RDL=0.20		ug/g	
			Acid Extractable Arsenic (As)	2018/05/10	ND, RDL=1.0		ug/g	
			Acid Extractable Barium (Ba)	2018/05/10	ND, RDL=0.50		ug/g	
			Acid Extractable Beryllium (Be)	2018/05/10	ND, RDL=0.20		ug/g	
			Acid Extractable Boron (B)	2018/05/10	ND, RDL=5.0		ug/g	
			Acid Extractable Cadmium (Cd)	2018/05/10	ND, RDL=0.10		ug/g	
			Acid Extractable Chromium (Cr)	2018/05/10	ND, RDL=1.0		ug/g	
			Acid Extractable Cobalt (Co)	2018/05/10	ND, RDL=0.10		ug/g	
			Acid Extractable Copper (Cu)	2018/05/10	ND, RDL=0.50		ug/g	
			Acid Extractable Lead (Pb)	2018/05/10	ND, RDL=1.0		ug/g	
			Acid Extractable Molybdenum (Mo)	2018/05/10	ND, RDL=0.50		ug/g	
			Acid Extractable Nickel (Ni)	2018/05/10	ND, RDL=0.50		ug/g	
			Acid Extractable Selenium (Se)	2018/05/10	ND, RDL=0.50		ug/g	
			Acid Extractable Silver (Ag)	2018/05/10	ND, RDL=0.20		ug/g	
			Acid Extractable Thallium (Tl)	2018/05/10	ND, RDL=0.050		ug/g	
			Acid Extractable Uranium (U)	2018/05/10	ND, RDL=0.050		ug/g	
			Acid Extractable Vanadium (V)	2018/05/10	ND, RDL=5.0		ug/g	
			Acid Extractable Zinc (Zn)	2018/05/10	ND, RDL=5.0		ug/g	
			Acid Extractable Mercury (Hg)	2018/05/10	ND, RDL=0.050		ug/g	
5520276	DT1	RPD	Acid Extractable Antimony (Sb)	2018/05/10	NC		%	30
			Acid Extractable Arsenic (As)	2018/05/10	5.5		%	30
			Acid Extractable Barium (Ba)	2018/05/10	3.2		%	30
			Acid Extractable Beryllium (Be)	2018/05/10	6.3		%	30
			Acid Extractable Boron (B)	2018/05/10	0.0045		%	30
			Acid Extractable Cadmium (Cd)	2018/05/10	15		%	30
			Acid Extractable Chromium (Cr)	2018/05/10	3.2		%	30
			Acid Extractable Cobalt (Co)	2018/05/10	4.1		%	30
			Acid Extractable Copper (Cu)	2018/05/10	0.72		%	30
			Acid Extractable Lead (Pb)	2018/05/10	2.8		%	30
			Acid Extractable Molybdenum (Mo)	2018/05/10	NC		%	30

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Acid Extractable Nickel (Ni)	2018/05/10	5.4		%	30
			Acid Extractable Selenium (Se)	2018/05/10	NC		%	30
			Acid Extractable Silver (Ag)	2018/05/10	NC		%	30
			Acid Extractable Thallium (Tl)	2018/05/10	3.2		%	30
			Acid Extractable Uranium (U)	2018/05/10	0.69		%	30
			Acid Extractable Vanadium (V)	2018/05/10	1.3		%	30
			Acid Extractable Zinc (Zn)	2018/05/10	0.50		%	30
5520489	NB3	RPD	Moisture	2018/05/08	0		%	20
5522847	TA1	Spiked Blank	Conductivity	2018/05/10		100	%	90 - 110
5522847	TA1	Method Blank	Conductivity	2018/05/10	ND, RDL=0.002		mS/cm	
5522847	TA1	RPD	Conductivity	2018/05/10	1.1		%	10
5524532	RAJ	Matrix Spike	D10-Anthracene	2018/05/10		95	%	50 - 130
			D14-Terphenyl (FS)	2018/05/10		97	%	50 - 130
			D8-Acenaphthylene	2018/05/10		89	%	50 - 130
			Acenaphthene	2018/05/10		97	%	50 - 130
			Acenaphthylene	2018/05/10		94	%	50 - 130
			Anthracene	2018/05/10		95	%	50 - 130
			Benzo(a)anthracene	2018/05/10		102	%	50 - 130
			Benzo(a)pyrene	2018/05/10		97	%	50 - 130
			Benzo(b/j)fluoranthene	2018/05/10		95	%	50 - 130
			Benzo(g,h,i)perylene	2018/05/10		90	%	50 - 130
			Benzo(k)fluoranthene	2018/05/10		96	%	50 - 130
			Chrysene	2018/05/10		98	%	50 - 130
			Dibenz(a,h)anthracene	2018/05/10		92	%	50 - 130
			Fluoranthene	2018/05/10		102	%	50 - 130
			Fluorene	2018/05/10		97	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2018/05/10		93	%	50 - 130
			1-Methylnaphthalene	2018/05/10		112	%	50 - 130
			2-Methylnaphthalene	2018/05/10		96	%	50 - 130
			Naphthalene	2018/05/10		92	%	50 - 130
			Phenanthrene	2018/05/10		98	%	50 - 130
			Pyrene	2018/05/10		102	%	50 - 130
5524532	RAJ	Spiked Blank	D10-Anthracene	2018/05/10		88	%	50 - 130
			D14-Terphenyl (FS)	2018/05/10		90	%	50 - 130
			D8-Acenaphthylene	2018/05/10		82	%	50 - 130
			Acenaphthene	2018/05/10		92	%	50 - 130
			Acenaphthylene	2018/05/10		88	%	50 - 130
			Anthracene	2018/05/10		89	%	50 - 130
			Benzo(a)anthracene	2018/05/10		94	%	50 - 130
			Benzo(a)pyrene	2018/05/10		92	%	50 - 130
			Benzo(b/j)fluoranthene	2018/05/10		91	%	50 - 130
			Benzo(g,h,i)perylene	2018/05/10		87	%	50 - 130
			Benzo(k)fluoranthene	2018/05/10		92	%	50 - 130
			Chrysene	2018/05/10		92	%	50 - 130
			Dibenz(a,h)anthracene	2018/05/10		86	%	50 - 130
			Fluoranthene	2018/05/10		96	%	50 - 130
			Fluorene	2018/05/10		91	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2018/05/10		89	%	50 - 130
			1-Methylnaphthalene	2018/05/10		109	%	50 - 130
			2-Methylnaphthalene	2018/05/10		94	%	50 - 130
			Naphthalene	2018/05/10		93	%	50 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Phenanthrene	2018/05/10		93	%	50 - 130
			Pyrene	2018/05/10		97	%	50 - 130
5524532	RAJ	Method Blank	D10-Anthracene	2018/05/10		89	%	50 - 130
			D14-Terphenyl (FS)	2018/05/10		91	%	50 - 130
			D8-Acenaphthylene	2018/05/10		84	%	50 - 130
			Acenaphthene	2018/05/10	ND, RDL=0.0050		ug/g	
			Acenaphthylene	2018/05/10	ND, RDL=0.0050		ug/g	
			Anthracene	2018/05/10	ND, RDL=0.0050		ug/g	
			Benzo(a)anthracene	2018/05/10	ND, RDL=0.0050		ug/g	
			Benzo(a)pyrene	2018/05/10	ND, RDL=0.0050		ug/g	
			Benzo(b/j)fluoranthene	2018/05/10	ND, RDL=0.0050		ug/g	
			Benzo(g,h,i)perylene	2018/05/10	ND, RDL=0.0050		ug/g	
			Benzo(k)fluoranthene	2018/05/10	ND, RDL=0.0050		ug/g	
			Chrysene	2018/05/10	ND, RDL=0.0050		ug/g	
			Dibenz(a,h)anthracene	2018/05/10	ND, RDL=0.0050		ug/g	
			Fluoranthene	2018/05/10	ND, RDL=0.0050		ug/g	
			Fluorene	2018/05/10	ND, RDL=0.0050		ug/g	
			Indeno(1,2,3-cd)pyrene	2018/05/10	ND, RDL=0.0050		ug/g	
			1-Methylnaphthalene	2018/05/10	ND, RDL=0.0050		ug/g	
			2-Methylnaphthalene	2018/05/10	ND, RDL=0.0050		ug/g	
			Naphthalene	2018/05/10	ND, RDL=0.0050		ug/g	
			Phenanthrene	2018/05/10	ND, RDL=0.0050		ug/g	
			Pyrene	2018/05/10	ND, RDL=0.0050		ug/g	
5524532	RAJ	RPD	Acenaphthene	2018/05/10	NC		%	40
			Acenaphthylene	2018/05/10	NC		%	40
			Anthracene	2018/05/10	NC		%	40
			Benzo(a)anthracene	2018/05/10	NC		%	40
			Benzo(a)pyrene	2018/05/10	NC		%	40
			Benzo(b/j)fluoranthene	2018/05/10	NC		%	40
			Benzo(g,h,i)perylene	2018/05/10	NC		%	40
			Benzo(k)fluoranthene	2018/05/10	NC		%	40
			Chrysene	2018/05/10	NC		%	40
			Dibenz(a,h)anthracene	2018/05/10	NC		%	40
			Fluoranthene	2018/05/10	NC		%	40

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Maxxam Job #: B8A3645
Report Date: 2018/06/12

Bruce A. Brown Associates Limited
Client Project #: *4495
Site Location: RICHMOND
Sampler Initials: CC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Fluorene	2018/05/10	NC		%	40
			Indeno(1,2,3-cd)pyrene	2018/05/10	NC		%	40
			1-Methylnaphthalene	2018/05/10	NC		%	40
			2-Methylnaphthalene	2018/05/10	NC		%	40
			Naphthalene	2018/05/10	NC		%	40
			Phenanthrene	2018/05/10	NC		%	40
			Pyrene	2018/05/10	NC		%	40

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) The matrix spike recovery was below the lower control limit. This may be due in part to the reducing environment of the sample. The matrix spike was reanalyzed to confirm result.

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Cristina Carriere

Cristina Carriere, Scientific Service Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Exceedence Summary Table – Reg153/04 T3-Soil/Res-F/M

Result Exceedences

Sample ID	Maxxam ID	Parameter	Criteria	Result	DL	Units
SOIL-4495-18050301-001	GPQ887-01	Conductivity	0.7	3.7	0.002	mS/cm
SOIL-4495-18050301-001	GPQ887-01	Acid Extractable Lead (Pb)	120	250	1.0	ug/g
SOIL-4495-18050301-001	GPQ887-01	Sodium Adsorption Ratio	5.0	36		N/A
SOIL-4495-18050302-002	GPQ888-01	Benzo(a)anthracene	0.63	1.1	0.050	ug/g
SOIL-4495-18050302-002	GPQ888-01	Benzo(a)pyrene	0.3	0.88	0.050	ug/g
SOIL-4495-18050302-002	GPQ888-01	Benzo(b/j)fluoranthene	0.78	1.2	0.050	ug/g
SOIL-4495-18050302-002	GPQ888-01	Conductivity	0.7	1.4	0.002	mS/cm
SOIL-4495-18050302-002	GPQ888-01	Dibenz(a,h)anthracene	0.1	0.14	0.050	ug/g
SOIL-4495-18050302-002	GPQ888-01	Fluoranthene	0.69	2.9	0.050	ug/g
SOIL-4495-18050302-002	GPQ888-01	Indeno(1,2,3-cd)pyrene	0.48	0.55	0.050	ug/g
SOIL-4495-18050302-002	GPQ888-01	Acid Extractable Lead (Pb)	120	220	1.0	ug/g
SOIL-4495-18050302-002	GPQ888-01	Sodium Adsorption Ratio	5.0	26		N/A
SOIL-4495-18050302-002	GPQ888-01	Acid Extractable Zinc (Zn)	340	710	5.0	ug/g
SOIL-4495-18050303-003	GPQ889-01	Benzo(a)anthracene	0.63	1.8	0.0050	ug/g
SOIL-4495-18050303-003	GPQ889-01	Benzo(a)pyrene	0.3	1.7	0.0050	ug/g
SOIL-4495-18050303-003	GPQ889-01	Benzo(b/j)fluoranthene	0.78	2.1	0.0050	ug/g
SOIL-4495-18050303-003	GPQ889-01	Conductivity	0.7	2.7	0.002	mS/cm
SOIL-4495-18050303-003	GPQ889-01	Dibenz(a,h)anthracene	0.1	0.25	0.0050	ug/g
SOIL-4495-18050303-003	GPQ889-01	Fluoranthene	0.69	3.2	0.0050	ug/g
SOIL-4495-18050303-003	GPQ889-01	Indeno(1,2,3-cd)pyrene	0.48	1.1	0.0050	ug/g
SOIL-4495-18050303-003	GPQ889-01	Acid Extractable Lead (Pb)	120	270	1.0	ug/g
SOIL-4495-18050303-003	GPQ889-01	Sodium Adsorption Ratio	5.0	41		N/A
SOIL-4495-18050303-003	GPQ889-01	WAD Cyanide (Free)	0.051	0.06	0.01	ug/g
SOIL-4495-18050303-003	GPQ889-01	Acid Extractable Zinc (Zn)	340	430	5.0	ug/g

The exceedence summary table is for information purposes only and should not be considered a comprehensive listing or statement of conformance to applicable regulatory guidelines.

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03-May-18 16:33
Ronklin Gracian

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Page of
Only:

Bottle Order #: 662517

Project Manager: Ronklin Gracian

COC #: C#662517-01-01

INVOICE TO:	REPORT TO:	PROJECT INFORMATION:
Company Name: #29111 Bruce A. Brown Associates Limited	Company Name: Bruce A. Brown Assoc Ltd.	Quotation #: B44941
Attention: Cheryl Curtis	Attention: Craig Colbourne	P.O. #:
Address: 101-102 Aerodrome Cr, Toronto ON M4G 4J4	Address: 101-102 Aerodrome Cres, Toronto	Project: *
Tel: (416) 424-3355 x Fax:	Tel: (416) 424-3355 x Fax:	Project Name:
Email: cheryl@brownassociates.ca	Email: craig@brownassociates.ca; bruce@brownassociates.ca	Site #:
		Sampled By:

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)	Other Regulations	Special Instructions
☐ Table 1 ☒ Res/Park ☒ Medium/Fine	☐ CCME ☐ Sanitary Sewer Bylaw	
☐ Table 2 ☐ Ind/Comm ☐ Coarse	☐ Reg 558 ☐ Storm Sewer Bylaw	
☒ Table 3 ☐ Agri/Other ☐ For RSC	☐ MISA Municipality	
☐ Table ___	☐ PWQO	
	☐ Other	

Include Criteria on Certificate of Analysis (Y/N)? ___

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required
Please provide advance notice for rush projects

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified).
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___ ☐
Rush Confirmation Number: ___ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	MET 1-11 SOIL	PHCs in SOIL							# of Bottles	Comments
1		6														
2		Soil-4495-180503 01-001	MAY 3/18	AM	Soil		X	X							1	
3		Soil-4495-180503 02-001	↓	AM	↓		X	X							1	
4		Soil-4495-180503 03-003	↓	AM	↓		X	2							1	
5																
6																
7																
8																
9																
10																

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
C. Colbourne	18/05/03	1621	HARJIT GILL	2018/05/03	16:33	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Recei	Custody Seal Present	Yes	No
	9/8/8	Intact	✓	

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO MAXXAM'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.MAXXAM.CA/TERMS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT HTTP://MAXXAM.CA/WP-CONTENT/UPLOADS/ONTARIO-COC.PDF.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

White: Maxxa Yellow: Client

Maxxam Analytics International Corporation o/a Maxxam Analytics

Appendix E

Residue Management

All residue soils generated by the borehole investigation were contained on site in two sealed 220L steel drums. Based on returned laboratory results these soils cannot be removed from the site. If they are to be removed it is required that a licenced contractor transport material to a licensed transfer facility.

All purged groundwater and drilling fluids were contained in a 220L plastic sealed drum on the subject site. Based on returned groundwater data, groundwater cannot be released to site or taken off site unless by a licensed contractor. Removals can be coordinated through this office.