

August 19, 2016

Project No.: 151-62362-00

**National Capital Commission
40 Elgin Street
Ottawa, Ontario
K1P 1C7**

Attention: Mr. Mike Moroz

**Re: Soil and Groundwater Management Plan
Areas around the Southern Parts of Victoria Island, Richmond Landing,
and the South Shore of the Ottawa River, Ottawa, Ontario**

1. INTRODUCTION

WSP Canada Inc. (WSP) was retained by the National Capital Commission (NCC) to provide a soil and groundwater management plan for the above-noted properties (herein referred to as the Subject Study Area). The environmental characterization and recommended contaminant management provided in this letter will be provided as background information for construction projects in the Subject Study Area, which are planned to include the following:

- Development of a new Ceremonial Landing and Dock located at the northeastern end of the Richmond Landing;
- Construction of two new pedestrian bridges: connecting Victoria Island to Richmond Landing, and connecting the Richmond Landing to the South Shore of the Ottawa River;
- Construction of four monuments at locations on the Richmond Landing and the South Shore of the Ottawa River; and
- Completion of new landscaping works throughout the Subject Study Area.

This letter presents environmental characterization data extracted from multiple investigations conducted at the Subject Study Area from 2005 to 2016 and provides recommendations for the management of contaminated soil and groundwater that may be encountered during construction.

2. APPLICABLE SITE CONDITION STANDARDS

Generic site condition standards established by the Ministry of the Environment and Climate Change (MOE) in their document: *Soil, Groundwater and Sediment Standards for Use Under Part XV.I of the Environmental Protection Act* (April 2011) (the "Standard") were used to assess soil quality within the Subject Study Area. Because excess soil will require management as part of this project, the generic standards were considered not only for soil that will remain in place but also for soil that may require off-site management.

The MOE has established nine categories of accepted generic Site Condition Standards (SCSs) to evaluate soil and groundwater quality at a site documented in Tables 1 to 9 in the Standard. The applicability of the category is dependent on site specific features. Table 1 SCSs are the most stringent values and are considered representative of typical province wide background concentrations in soil and groundwater. These SCS apply to soil and groundwater in an environmentally significant area (e.g., wetland or forest). For lands that are within 30 m of a watercourse, but are not otherwise environmentally sensitive, Table 8 SCSs would apply in a potable groundwater conditions and Table 9 SCSs would apply in non-potable groundwater conditions. Table 9 SCS (applicable in Ottawa) differentiate between residential/ parkland/ institutional (RPI) and industrial/ commercial and community (ICC) land uses.

The Subject Study Area is adjacent to the Ottawa River; and for the purposes of the soil and groundwater management plan, the Table 9 SCSs would apply to any excess fill material that would be considered for reuse. Because of the historical contamination identified in the Subject Study Area, a risk assessment has established acceptable concentrations for materials to remain onsite. Soil may only be reused if it will be placed in dry conditions, be covered by a minimum of 10 cm of clean soil and be placed in the excavation from which it was removed (i.e., no transport of soil between construction areas).

Given these constraints to soil reuse, much of the soil excavated for the planned construction projects will require offsite management. To evaluate these options, the less stringent Table 3 SCSs were considered to apply; however, the presence of contaminants in most samples has dictated that soil be managed as solid non-hazardous waste. The management of soil is discussed in more detail in the following sections.

3. HISTORICAL ENVIRONMENTAL CONDITIONS

The following reports have been completed for lands within the Subject Study Area were provided to WSP to compile existing soil and groundwater data to describe the environmental quality within the proposed construction areas.

Victoria Island Human Health and Ecological Risk Assessment (Final Report). Prepared for the National Capital Commission, by Dillon Consulting Limited (Dillon), May 2005. Dillon Project No. 04-4107.

Phase I Environmental Site Assessment, Property along the Ottawa River East of the Portage Bridge, Ottawa, Ontario (NCC Property Asset # 96195). Prepared for the National Capital Commission, by T. Harris Environmental Management Inc. (THEM), March 2006.

Soil Sampling Program, Richmond Landing Pathways, Ottawa, Ontario (Property Asset #96189). Prepared for the National Capital Commission, by Trow Associates Inc. (Trow), December 2009. Trow Project No. OTEN00020038R.

Screening Level Risk Assessment, Richmond Landing P. A. No. 96189, Ottawa, Ontario. Prepared for the National Capital Commission, by Geofirma Engineering Ltd. (Geofirma), September 2013. Geofirma Project No. 13-215.

2014 Groundwater Monitoring, Victoria Island, NCC Property Asset 841 and 839. Prepared for the

National Capital Commission, by WESA, a division of BluMetric Environmental Inc (BluMetric)., May 2014. Blumetric Project No. CB11339-00-04.

Geotechnical Report, Richmond Landing Shoreline Access Feasibility Study, Ottawa, Ontario. Prepared for the National Capital Commission, by SPL Consultants Limited (SPL), February 2016. SPL Project No. 10001599.

The following bullets present a summary of the significant findings of these reports, as they relate to the planned construction activities. A Subject Study Area location plan is provided and enclosed as **Figure 1**.

- The soil stratigraphy within the Subject Study Area generally consists of a layer of surficial grading material (i.e., topsoil and asphalt) followed by a heterogeneous mix of fill material (i.e., mix of silt, sand and gravel with cobbles and boulders, and debris) that extended to depths ranging from 1.5 to 7.8 m below ground surface (mbgs). The fill material on the Subject Study Area is underlain by limestone bedrock, which was investigated to a maximum rock coring depth of 9.7 mbgs.
- The eastern sector of Victoria Island within the Subject Study Area was used for industrial operations since the late 1800s, which included a pulp mill, a mechanical construction shop, and a calcium carbide mill. Industrial activities ceased operations in the early 1960s; however, remnants of former site operations remain, including the abandoned calcium carbide mill. Contaminants of concern (COCs) including metals and inorganics (M&I), volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs) were measured in soil and groundwater at concentrations exceeding the 2011 MOE Table 3 Full Depth Generic Site Condition Standards (SCSs) in a Non-Potable Groundwater Condition, with Residential, Parkland, and Institutional Property Uses (referred to as the 2011 MOE Table 3 SCSs). However, the most recent 2014 groundwater monitoring program for the south-central part of Victoria Island reported by BluMetric documented concentrations of COCs meeting the 2011 MOE Table 3 SCSs.
- The Richmond Landing area uses included historical operations considered as contaminating activities, such as a bulk fuel oil storage facility operated by Imperial Oil, rail sidings and the placement fill that would have originated from industrial operations. These historical uses have contributed to contamination of the soil and groundwater by M&I, petroleum hydrocarbon compounds (PHCs), VOCs, and PAHs, all of which have been measured in soil and groundwater at concentrations exceeding the 2011 MOE Table 3 SCSs. Remediation was conducted in 2013 using chemical oxidation to reduce PHCs and PAHs in groundwater. More recent investigations have indicated that these COCs persist on these lands.
- The South Shore of the Ottawa River was historically part of a lumber yard from the 1800s to the 1940s. In addition, adjacent properties to east have been classified as contaminated sites under The Treasury Board of Canada Federal Contaminated Sites and Solid Waste Landfills Inventory (the Federal Inventory). Environmental soil sampling conducted on the western part of these lands (i.e., immediately east of the Portage Bridge) identified M&I exceedances to the 2011 MOE Table 3 SCSs.

Based on a review of the reports listed previously, WSP has compiled a summary of maximum measured concentrations of COCs in the soil and groundwater within the three properties of the Subject Study Area. For soil data, the maximum concentrations were compared to the 2011 MOE Table 1 SCSs (background site condition standards) and to the 2011 MOE Table 3 SCSs, as presented in Table 2-1. Yellow highlighted values in the table indicate concentrations that exceed the 2011 MOE Table 3 SCSs.

Table 2-1 Summary of Maximum Historical Soil Concentration in the Subject Study Area

Parameter	2011 MOE Table 1 SCSs (µg/g)	2011 MOE Table 3 SCSs (µg/g)	Victoria Island (µg/g)	Richmond Landing (µg/g)	West Area of South Shore (µg/g)
Antimony	1.3	7.5	25	7	2
Arsenic	18	18	24	N/A	6
Barium	220	390	540	233	128
Cadmium	1.2	1.2	4	N/A	Less than detection limits
Chromium (Total)	70	160	3300	N/A	16
Copper	92	140	160	166	216
Lead	120	120	510	225	55
Mercury	0.27	0.27	N/A	0.4	Less than detection limits
Molybdenum	2	6.9	14	4	5
Nickel	82	100	85	N/A	8
Silver	0.5	20	2.5	1.5	Less than detection limits
Vanadium	86	86	370	N/A	28
Zinc	290	340	520	206	468
Acenaphthene	0.072	7.9	13	2.69	0.12
Acenaphthylene	0.093	0.15	1.6	2.84	0.09
Anthracene	0.16	0.67	40	9.58	0.37
Benzo(a)anthracene	0.36	0.5	48	12.2	0.53
Benzo(a)pyrene	0.3	0.3	39	7.72	0.43
Benzo(b)fluoranthene	0.47	0.78	32	10.5	0.58
Benzo(g,h,i)perylene	0.68	6.6	13	2.99	0.2
Benzo(k)fluoranthene	0.48	0.78	27	3.95	0.32
Chrysene	2.8	7	39	13.5	0.58
Dibenz(a,h)anthracene	0.1	0.1	4.4	0.56	0.06
Fluoranthene	0.56	0.69	100	24.3	1.14
Fluorene	0.12	62	16	4	0.2
Indeno(1,2,3-cd)pyrene	0.23	0.38	17	2.31	0.18
Naphthalene	0.09	0.6	5.6	4.47	0.21
Phenanthrene	0.69	6.2	110	25.5	1.2
Pyrene	1	78	80	22.3	0.93
Benzene	0.02	0.21	N/A	0.3	Less than detection limits
Toluene	0.2	2.3	N/A	N/A	Less than detection limits
Ethylbenzene	0.05	2	N/A	0.2	Less than detection limits
Xylene	0.05	3.1	2.8	3.2	Less than detection limits
PHCs F1	25	55	N/A	289	Less than detection limits
PHCs F2	10	98	N/A	1,350	Less than detection limits
PHCs F3	240	300	N/A	1,080	65
PHCs F4	120	2,800	N/A	739	Less than detection limits

For groundwater data, the maximum concentrations (Table 2-2) were compared to the 2011 MOE Table 1 SCSs, the 2011 MOE Table 3 SCSs, and the City of Ottawa Discharge Limits for Sanitary and Storm Sewers. It should be noted that there are no available reviewed values above the City of Ottawa Discharge limits for Sanitary Sewers. Yellow highlighted values represent exceedances above the 2011 MOE Table 3 SCSs. It is noted that although COCs exceed the MOE standards for non-potable groundwater conditions, no concentrations exceed the acceptable limits for discharge to sanitary sewers, where values have been established for the parameters analysed.

Table 2-2 Summary of Maximum Historical Groundwater Concentration in the Subject Study Area

Parameter	2011 MOE Table 1 SCSs (µg/L)	Discharge Limits for Storm Sewers (µg/L)	Discharge Limits for Sanitary Sewers (µg/L)	2011 MOE Table 3 SCSs (µg/L)	Victoria Island (µg/L)	Richmond Landing (µg/L)	West Area of South Shore (µg/L)
Antimony	1.5	NV	5,000	20,000	50	Less than detection limits	No groundwater analytical data available
Cadmium	0.5	8	20	2.7	N/A		
Copper	5	40	3,000	87	66		
Lead	1.9	120	5,000	25	41		
Molybdenum	23	NV	5,000	9,200	55		
Nickel	14	80	3,000	490	55		
Selenium	5	20	5,000	63	N/A		
Silver	0.3	120	5,000	1.5	0.5		
Vanadium	3.9	NV	3,000	250	N/A		
Zinc	160	40	3,000	1,100	260	20	
Acenaphthene	4.1	NV	NV	1700	N/A	0.3	
Acenaphthylene	1	NV	NV	1.8	N/A	Less than detection limits	
Anthracene	0.1	NV	NV	2.4	1.8	1	
Benzo(a)anthracene	0.2	NV	NV	4.7	1.3	3.8	
Benzo(a)pyrene	0.01	NV	NV	0.81	0.79	3.83	
Benzo(b)fluoranthene	0.1	NV	NV	0.75	1.3	2.92	
Benzo(g,h,i)perylene	0.2	NV	NV	0.2	0.25	2.3	
Benzo(k)fluoranthene	0.1	NV	NV	0.4	0.19	3.12	
Chrysene	0.1	NV	NV	1	1.4	3.55	
Dibenz(a,h)anthracene	0.2	NV	NV	0.52	0.12	1	
Fluoranthene	0.4	NV	NV	130	5.3	5.8	
Fluorene	120	NV	59	400	1.2	0.5	
Indeno(1,2,3-cd)pyrene	0.2	NV	NV	0.2	0.31	2.1	
Naphthalene	7	6.4	59	6400	2.8	0.6	
Phenanthrene	0.1	NV	NV	580	5.7	3.1	
Pyrene	0.2	NV	NV	68	3.8	5.6	
Methylnaphthalene, 2-(1-)	2	NV	54	1,800	N/A	N/A	
Total PAHs	NV	6	15	NV	N/A	N/A	
Benzene	0.5	2	10	44	N/A	N/A	
Toluene	0.8	2	80	18,000	N/A	4.2	
Ethylbenzene	0.5	2	57	2,300	N/A	N/A	
Xylene	72	4.4	320	4,200	N/A	N/A	
PHCs F1	420	NV	NV	750	N/A	Less than detection limits	
PHCs F2	150	NV	NV	150	N/A	2,600	
PHCs F3	500	NV	NV	500	N/A	1,600	
PHCs F4	500	NV	NV	500	N/A	Less than detection limits	

4. DISCUSSION OF ENVIRONMENTAL CONDITIONS

4.1. SUMMARY OF WSP'S 2016 INVESTIGATION

Further to the historical environmental data reviewed, environmental sampling was incorporated into a 2016 geotechnical work program focused on the pedestrian bridges and the floating dock areas of the Subject Study Area. Five boreholes, each completed as a monitoring well, were drilled on the Subject Study Area to a maximum depth of 7.7 mbgs, as follows:

- One on the southern part of Victoria Island (BH16-21 – 7.7 mbgs),
- Two on the South Shore of the Ottawa River (BH16-22 – 4.4 mbgs and BH16-23 – 4.7 mbgs), and
- Two on the Richmond Landing (BH16-24 – 1.2 mbgs and BH16-25 – 4.5 mbgs).

Detailed figures showing borehole locations are provided in the original reports and are not reproduced for this summary. Borehole logs prepared for the 2016 geotechnical investigation are included in Appendix A.

Soil and groundwater samples were recovered from the 2016 to provide for characterization of the soil at Victoria Island and Richmond Landing for waste management purposes and to assess the quality of soil along the South Shore, in an area with limited existing data. The samples for waste characterization were submitted for analysis of the Toxicity Characteristic Leaching Procedure (TCLP) for M&I, PCBs and VOCs and the sample from the South Shore (BH16-23) was analyzed for M&I, PAHs, VOCs, and PHCs. Results of chemical analysis are reported on Certificates of Analysis included in Appendix B.

Soil samples were recovered from the boreholes using sampling and handling procedures established by WSP and in compliance with the environmental consulting industry standards as mandated by Ontario Regulation (O.Reg.) 153/04. Sample containers, preservative, and labels were supplied by the laboratory and methods to preserve sample integrity were implemented. During drilling, the respective split-spoon samplers were brushed clean of soil, washed in municipal water containing phosphate free detergent, rinsed in municipal water, and then rinsed with distilled water between each sampling event. New disposable gloves were used during each sampling event to remove the soil from the sampler and to transfer the samples into plastic bags, glass jars and/or vials filled with methanol.

Monitoring wells installed during the 2016 geotechnical investigation were set in flush-mounted casings and were constructed using 51 mm diameter Schedule 40 polyvinyl chloride (PVC) piping, including a pre-packed screen section with a factory machined slot width of 0.25 mm and completed with a PVC riser pipe. Pipe and screen sections were wrapped in plastic that was removed just prior to installation to minimize the potential for contamination. The base of the monitoring well was covered with a PVC cap to prevent the influx of sediment.

The pre-packed well screens contain clean silica sand, and additional silica sand supplied in bags from a supplier was placed in the annular space between the pre-packed screen and the sides of the boreholes to obtain relatively sediment-free water. A bentonite seal was added to the annular space above the sand pack to reduce the infiltration of surface water into the borehole annulus.

As part of WSP's standard operating procedures, monitoring wells were developed and purged prior to

sampling. At the time of sampling, monitoring wells were purged dry or three (3) well volumes were removed and the groundwater was allowed to recover prior to sampling.

The soil and groundwater chemical analyses for the geotechnical investigation were conducted by AGAT Laboratories (AGAT) in Mississauga, Ontario. AGAT is a member of the Canadian Association for Laboratory Accreditation (CALA) and meets the requirements of Section 47 of O. Reg. 153/04 and of O. Reg. 558, certifying that the analytical laboratory be accredited in accordance with the International Standard ISO/IEC 17025 and with standards developed by the Standards Council of Canada.

4.2. SOIL QUALITY

Based on a review of analytical results from WSP's 2016 investigation and historical data for the Subject Study Area within the areas of the pedestrian bridges and the floating dock, the soil contaminants are consistent with impacts from historical potentially contaminating activities. The level of contamination for the lands are summarized as follows:

Victoria Island

- Historical environmental investigations at Victoria Island, although not in the immediate area of the pedestrian bridge footings, identified a range of contaminants (Table 2-1). For the purpose of soil management planning for construction, it is assumed these historical data are representative of the construction area.
- TCLP data obtained in 2016, in accordance with O. Reg. 347 confirmed that excess soil should be managed as solid, non-hazardous waste.

Richmond Landing – Pedestrian Bridge Areas

- Historical soil characterization identified PAHs and PHCs at concentrations exceeding the 2011 MOE Table 3 SCSs. The contaminants were noted to extend into the native soils to depths greater than 4.5 mbgs.
- TCLP data obtained in 2016, in accordance with O. Reg. 347 confirmed that excess soil should be managed as solid, non-hazardous waste.

Richmond Landing – Dock Area

- Historical soil characterization data did not identify concentrations exceeding the 2011 MOE Table 3 SCSs. Because of the wet conditions likely to be encountered soil will require office management and TCLP data from the 2016 will apply.

South Shore of the Ottawa River

- Analytical results from the 2016 WSP investigation indicated soil met the 2011 Table 9 SCSs for M&I, PAHs, PHCs, and VOCs.
- TCLP data obtained in 2016, in accordance with O. Reg. 347 confirmed that excess soil should be managed as solid, non-hazardous waste.

4.3. GROUNDWATER QUALITY

Based on a review of analytical results from WSP's 2016 investigation and historical data for the Subject Study Area within the areas of the pedestrian bridges and the floating dock, the groundwater contaminants are consistent with impacts from historical potentially contaminating activities. The level of contamination for the lands are summarized as follows:

Victoria Island

- Recent groundwater sampling data collected in 2014 by BluMetric did not identify contaminant concentrations exceeding the 2011 MOE Table 8 SCSs for M&I and PAHs.
- A groundwater sample collected within this area in 2016 and analyzed for the City of Ottawa's sewer use criteria identified total manganese and total suspended solids at values exceeding the storm sewer limits; however, no measured concentrations exceeded the City of Ottawa's sanitary sewer criteria.

Richmond Landing – Pedestrian Bridge Areas

- Historical groundwater characterization data identified concentrations PAHs and PHCs exceeding the 2011 MOE Table 3 SCSs.
- A groundwater sample collected within this area in 2016 and analyzed for the City of Ottawa's sewer use criteria identified total manganese and total suspended solids at values exceeding the storm sewer limits; however, no measured concentrations exceeded the City of Ottawa's sanitary sewer criteria.

Richmond Landing – Dock Area

- Historical groundwater characterization data identified concentrations PAHs and PHCs exceeding the 2011 MOE Table 3 SCSs.
- 2016 sampling conducted in nearby wells would be considered representative of this area as well.

South Shore of the Ottawa River

- No historical groundwater analytical data was available for review.
- A groundwater sample collected within this area in 2016 and analyzed for M&I, PAHs, PHCs, and VOCs did not identify any contaminants exceeding the MOE Standards for Table 9 SCS.
- A groundwater sample collected within this area in 2016 and analyzed for the City of Ottawa's sewer use criteria identified a variety of M&I that are not included in the O.Reg. 153/04 suite of analytical parameters. These are contaminants include: total chromium, total copper, total lead, total manganese, total mercury, total nickel, total zinc, total phosphorus, and total suspended solids. Comparison to the City of Ottawa's sanitary sewer criteria identified total aluminum, total titanium, and total suspended solids at values that exceed the criteria. Depending on municipal requirements, treatment may be required prior to discharge.

5. CONCLUSIONS AND RECOMMENDATIONS

Based on a review of available information it is anticipated that soil encountered during the construction will show evidence of contamination from one or more contaminants. Because of the risk to aquatic habitat in the event of a release, it is recommended that soil excavated for construction be removed for offsite disposal without stockpiling to allow further characterization. Results of analysis conducted in 2016 indicate that this soil can be managed as solid non-hazardous waste.

The quality of groundwater sampled in the Subject Study Area was variable, with most of the sampling indicating that groundwater is suitable for disposal to municipal sanitary sewers. Permitting would be required prior to any discharge. We understand that the intent is to limit the quantity of groundwater that may be collected and require management during construction. If conditions do result in the accumulation of groundwater, it should be contained and tested prior to identify disposal options.

The following presents recommended management practices for excess soil and accumulated groundwater during construction activities in the Subject Study Area:

Soil:

- Excavated soil should be loaded to transport vehicles without interim stockpiling. If conditions require staged handling of soil (e.g., vehicles cannot reach the excavation area), no soil shall be stockpiled within 10 m of the river and erosion controls (e.g., tarps and silt fencing) must be implemented for any overnight storage.
- Contractors should prepare an operation plan showing construction access routes, excavation and loading areas and trucking routes.
- Dust control methods shall be implemented to prevent the release of potentially contaminated dust beyond the construction area. Ground disturbance shall be limited to the immediate area of construction.
- Excavated material shall be managed as solid non-hazardous waste and shall be transported and disposed of at a waste receiving site or soil treatment facility approved by MOE, the selection of which shall be the responsibility of the Contractor. Each facility selected for waste disposal must be approved to accept materials contaminated with the identified COCs.
- Any soil that is required to be imported to re-establish grades, not including aggregate materials used as sub-grade material for construction purposes, must be accompanied by chemical analysis to confirm that it meets the 2011 MOE Table 1 SCS. Soil transported to the Subject Study Area for backfill must be managed in accordance with MOE Best Management Practices for Soil Management (MOE 2014 or as amended).

Groundwater:

- Contaminants have been identified in groundwater at varying concentrations. Methods shall be implemented to minimize the generation of groundwater during construction activities.
- Groundwater accumulated during construction must not be discharged directly to surface or to the Ottawa River. It shall be contained to allow sampling prior to the identification of appropriate disposal options.
- Any groundwater directed to municipal sanitary sewers shall be subject to permitting that must be secured by the Contractor. Data in this and other environmental reports can be used to secure permits, it acceptable to the municipality.

At the conclusion of the work, monitoring wells that are no longer required should be decommissioned according to applicable regulations (i.e., O. Reg. 903).

6. LIMITATIONS

It should be noted that this review has been based on some information prepared by others and provided to WSP by the NCC. This summary does not constitute as a Phase Two Environmental Site Assessment as defined in O. Reg. 153/04, and does not comment on the geotechnical suitability of the material.

The material in this report reflects WSP's judgment in light of the information available to it at the time of preparation. Any use, which a Third Party not noted above makes of this report, or any reliance on decisions to be made based on it, are the responsibility of such Third Parties. WSP Canada Inc. accepts no responsibility for damages, if any, suffered by any Third Party as a result of decisions made or actions based on this report.

We trust this information is sufficient to form the basis of soil and groundwater management during construction. If clarification is required, please contact either of the undersigned.

Regards,

WSP Canada Inc.

A blue ink signature of Eugene Ma, consisting of a stylized, cursive 'E' followed by 'Ma'.

Eugene Ma, M.A.Sc., P.Eng.

Environmental Engineer

A blue ink signature of Carolyn Adams, written in a cursive script.

Carolyn Adams, M.A.Sc., P.Eng.

Manager, Environmental Management

Enclosures:

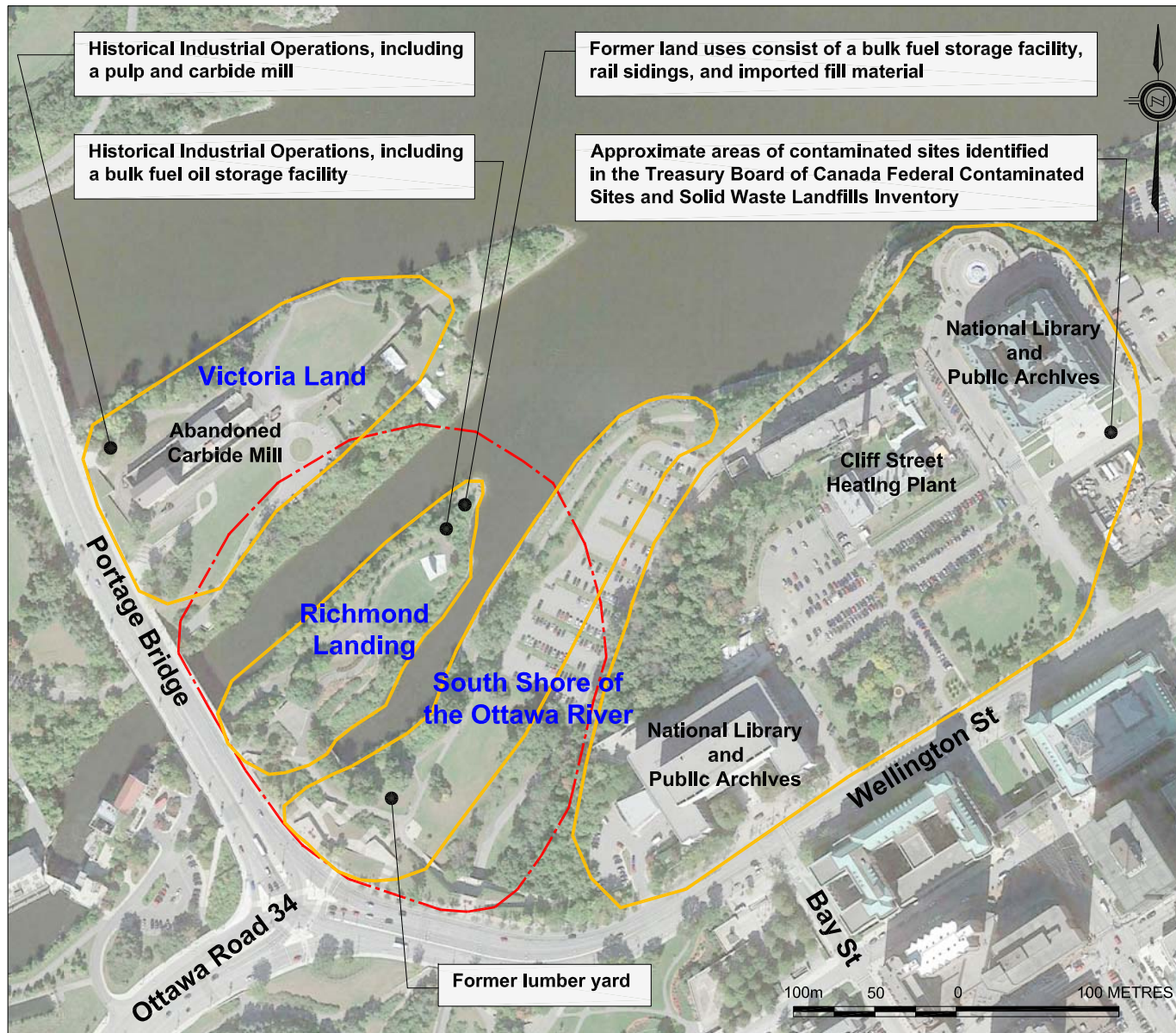
Figure 1 – Site Location Plan

Appendix A – Borehole Logs

Appendix B – Certificates of Analysis

Figure 1

SITE LOCATION PLAN



Legend:

 Subject Study Area



351 STEELCASE ROAD, UNITS 9-12
MARKHAM, ONTARIO CANADA L3R 4H9
TEL.: 905-7475-0065 | FAX: 905-475-0045 | WWW.WSPGROUP.COM

Client: National Capital Commission		Project No.: 151- 62362- 00	Figure: 1
Drawn: LWS	Approved: PMR	Discipline: ENVIRONMENT	
Date: March 2016	Scale: As Shown	Title: Subject Study Area Location Plan	
Original Size: Letter	Rev: N/A	Project: Environmental Soil and Groundwater Review of Areas around the Southern parts of Victoria Island, Richmond Landing, and the South Shore of the Ottawa River	

Appendix A

BOREHOLE LOGS



LOG OF BOREHOLE BH15-21

Project: NCC Richmond Landing

Client: National Capital Commission, Capital Planning Branch

Project Location: Richmond Landing, Ottawa, ON

Datum: Geodetic

BH Location: See Borehole Location Plan

DRILLING DATA

Rig Type: Hand Portable

Method: Hand portable and coring

Borehole Diameter: 50 mm

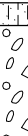
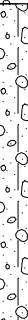

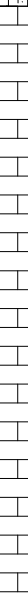
Core Diameter: NQ

Project No.: 10001599

Date Started: 7/4/2016

Supervisor: DR

Reviewer: CH

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT					POCKET PEN (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)		
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)									
43.6	SILTY SAND some organics, trace gravel, brown, moist COBBLES AND BOULDERS (Rock Fill)		1	SS	>50/0 mm	20 40 60 80 100					PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	GR	SA	SI	CL
43.6 0.2			○ UNCONFINED + FIELD VANE & Sensitivity ● QUICK TRIAXIAL × LAB VANE					WATER CONTENT (%) 25 50 75									
42.7	SILTY SAND AND GRAVEL trace to some clay, brown, moist, compact (FILL) - wet below 2.5 m		2	CORE		43											
42.7 0.9			3	SS	11	42											
			4	SS	16	41											
			5	SS	21	40											
40.6	SILTY SAND trace to some clay, some gravel, some organics, brown, wet, loose to compact (Poss. Fill)		6	SS	9	39											
40.6 3.0			7	SS	14	38											
39.9	LIMESTONE fresh, strong to very strong, very closely bedded with close to very closely spaced shale partings, grey, with close to moderately closely spaced horizontal joints Run 8: 3.7m - 4.0m TCR: 100% SCR: 83% RQD: 0% Run 9: 4.0m - 5.3m TCR:100% SCR: 92%RQD: 55% Run 10: 5.3m - 6.5m TCR: 100% SCR: 96% RQD: 72% Run 11: 6.5m - 7.7m TCR: 100% SCR: 100% RQD: 80%		8	CORE		37											
39.9 3.7			9	CORE		36											
			10	CORE													
			11	CORE													
35.9	End of Borehole																
35.9 7.7	Notes: 1) SPT sampler refusal encountered at 3.7 m below the existing ground surface. Switch to NQ coring.																

GROUNDWATER ELEVATIONS

GRAPH NOTES

+ 3, × 3: Numbers refer to Sensitivity

○ ε=3% Strain at Failure

Sheet No. 1 of 1

Shallow/ Single Installation Deep/Dual Installation



LOG OF BOREHOLE BH15-22

Project: NCC Richmond Landing

Client: National Capital Commission, Capital Planning Branch

Project Location: Richmond Landing, Ottawa, ON

Datum: Geodetic

BH Location: See Borehole Location Plan

DRILLING DATA

Rig Type: Hand Portable

Method: Hand Portable

Borehole Diameter: 50 mm








Core Diameter: NQ

Project No.: 10001599

Date Started: 6/30/2016

Supervisor: KM

Reviewer: CH

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT					POCKET PEN (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)			
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)								PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L
0.0	SAND AND GRAVEL brown, wet																	
0.2	ORGANIC SOIL		1A	SS	3													
0.3	SAND come gravel, trace to some clay, brown, wet		1B	SS	21													
0.6	LIMESTONE fresh, strong to very strong, very closely bedded with close to very closely spaced shale partings, grey, with close to moderately closely spaced horizontal joints																	
	Run 2: 0.7m - 2.0m TCR: 99% SCR: 84% RQD: 41%																	
	Run 3: 2.0m - 3.1m TCR: 100% SCR: 93% RQD: 55%		3	CORE														
	Run 4: 3.1m - 4.4m TCR:96% SCR:89% RQD: 67%		4	CORE														
4.4	End of Borehole																	
	Notes: 1) SPT refusal at 0.6 m below the existing ground surface. Switch to NQ coring.																	

GROUNDWATER ELEVATIONS

Shallow/ Single Installation Deep/Dual Installation

GRAPH NOTES

+ 3, × 3: Numbers refer to Sensitivity

○ ε=3% Strain at Failure



LOG OF BOREHOLE BH15-23

Project: NCC Richmond Landing

Client: National Capital Commission, Capital Planning Branch

Project Location: Richmond Landing, Ottawa, ON

Datum: Geodetic

BH Location: See Borehole Location Plan

DRILLING DATA

Rig Type: Hand Portable

Method: Hollow Stem Auger Drilling

Borehole Diameter: 50 mm

Core Diameter: NQ

Project No.: 10001599

Date Started: 7/7/2016

Supervisor: DR

Reviewer: CH

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC NATURAL LIQUID LIMIT MOISTURE CONTENT			POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m)	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)				W _p	W	W _L			
45.6								20	40	60	80	25	50	75			GR SA SI CL
45.6	TOPSOIL - 100 mm		1	SS	31			100	125								
44.1	SILTY SAND some gravel, trace to some clay, brown, compact to dense, moist (FILL)		2	SS	13												
44.1																	
44.1	SILTY SAND AND GRAVEL trace to some clay, brown, dense, moist (Poss. Boulder Fill)		3	SS	35												
			4	SS	35												
			5	SS	39												
			6	SS	61												
40.9			7	SS	>50/6 mm												
40.9	End of Borehole																
4.7	Notes: 1) Auger refusal encountered at 4.9 m below the existing ground surface. 2) 31 mm dia. piezometer was installed in the borehole upon completion. 3) Date Depth-groundwater 7/20/2016 4.7 m																

GROUNDWATER ELEVATIONS

GRAPH NOTES

+ 3, × 3: Numbers refer to Sensitivity

○ ε=3% Strain at Failure

Sheet No. 1 of 1

Shallow/ Single Installation Deep/Dual Installation

WSP SOIL LOG - OTTAWA GINT 10001599 NCC RICHMOND LANDING.GPJ SPL.GDT 7/27/16



LOG OF BOREHOLE BH15-24

Project: NCC Richmond Landing
 Client: National Capital Commission, Capital Planning Branch
 Project Location: Richmond Landing, Ottawa, ON
 Datum: Geodetic
 BH Location: See Borehole Location Plan

DRILLING DATA
 Rig Type: CME 55
 Method: Hand Portable
 Borehole Diameter: 50 mm
 Core Diameter: NQ

Project No.: 10001599
 Date Started: 7/6/2016
 Supervisor: DR
 Reviewer: CH

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT					POCKET PEN (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)											WATER CONTENT (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
								20	40	60	80	100	PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								

WSP SOIL LOG - OTTAWA GINT 10001599 NCC RICHMOND LANDING.GPJ SPL_GDT 7/27/16

GROUNDWATER ELEVATIONS

Shallow/ Single Installation Deep/Dual Installation

GRAPH NOTES

+ 3, × 3: Numbers refer to Sensitivity

○ ε=3% Strain at Failure

Sheet No. 1 of 1

Appendix B

CERIFICATES OF ANALYSIS

**CLIENT NAME: WSP CANADA INC
2611 QUEENSVIEW DRIVE, SUITE 300
OTTAWA, ON K2B8K2
(613) 829-2800**

ATTENTION TO: Kathryn Maton

PROJECT: Richmond Landing

AGAT WORK ORDER: 16Z113261

SOIL ANALYSIS REVIEWED BY: Amanjot Bhela, Inorganic Coordinator

TRACE ORGANICS REVIEWED BY: Neli Popnikolova, Senior Chemist

DATE REPORTED: Jul 18, 2016

PAGES (INCLUDING COVER): 13

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

***NOTES**

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 16Z113261

PROJECT: Richmond Landing

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC

ATTENTION TO: Kathryn Maton

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2016-07-07

DATE REPORTED: 2016-07-18

SAMPLE DESCRIPTION: BH16-23 SS 1

SAMPLE TYPE: Soil

DATE SAMPLED: 7/7/2016

G / S RDL 7687416

Parameter	Unit	G / S	RDL	7687416
Antimony	µg/g	1.3	0.8	<0.8
Arsenic	µg/g	18	1	2
Barium	µg/g	220	2	86
Beryllium	µg/g	2.5	0.5	<0.5
Boron	µg/g	36	5	5
Boron (Hot Water Soluble)	µg/g	1.5	0.10	0.31
Cadmium	µg/g	1.2	0.5	<0.5
Chromium	µg/g	70	2	17
Cobalt	µg/g	22	0.5	4.2
Copper	µg/g	92	1	11
Lead	µg/g	120	1	16
Molybdenum	µg/g	2	0.5	0.7
Nickel	µg/g	82	1	11
Selenium	µg/g	1.5	0.4	<0.4
Silver	µg/g	0.5	0.2	<0.2
Thallium	µg/g	1	0.4	<0.4
Uranium	µg/g	2.5	0.5	0.7
Vanadium	µg/g	86	1	22
Zinc	µg/g	290	5	57
Chromium VI	µg/g	0.66	0.2	<0.2
Cyanide	µg/g	0.051	0.040	<0.040
Mercury	µg/g	0.27	0.10	<0.10
Electrical Conductivity	mS/cm	0.7	0.005	0.158
Sodium Adsorption Ratio	NA	5	NA	0.059
pH, 2:1 CaCl2 Extraction	pH Units		NA	7.45

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 8: Generic Site Condition Standards for Use within 30 m of a Water Body in a Potable Ground Water Condition - Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

7687416 EC & SAR were determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio.

Certified By:

Amanjot Bhela



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 16Z113261

PROJECT: Richmond Landing

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC

SAMPLING SITE:

ATTENTION TO: Kathryn Maton

SAMPLED BY:

O. Reg. 153(511) - PAHs (Soil)

DATE RECEIVED: 2016-07-07

DATE REPORTED: 2016-07-18

SAMPLE DESCRIPTION: BH16-23 SS 2

SAMPLE TYPE: Soil

DATE SAMPLED: 7/7/2016

G / S RDL 7687438

Parameter	Unit	G / S	RDL	7687438
Naphthalene	µg/g	0.09	0.05	<0.05
Acenaphthylene	µg/g	0.093	0.05	<0.05
Acenaphthene	µg/g	0.072	0.05	<0.05
Fluorene	µg/g	0.19	0.05	<0.05
Phenanthrene	µg/g	0.69	0.05	<0.05
Anthracene	µg/g	0.22	0.05	<0.05
Fluoranthene	µg/g	0.69	0.05	<0.05
Pyrene	µg/g	1	0.05	<0.05
Benz(a)anthracene	µg/g	0.36	0.05	<0.05
Chrysene	µg/g	2.8	0.05	<0.05
Benzo(b)fluoranthene	µg/g	0.47	0.05	<0.05
Benzo(k)fluoranthene	µg/g	0.48	0.05	<0.05
Benzo(a)pyrene	µg/g	0.3	0.05	<0.05
Indeno(1,2,3-cd)pyrene	µg/g	0.23	0.05	<0.05
Dibenz(a,h)anthracene	µg/g	0.1	0.05	<0.05
Benzo(g,h,i)perylene	µg/g	0.68	0.05	<0.05
2-and 1-methyl Naphthalene	µg/g	0.59	0.05	<0.05
Moisture Content	%		0.1	19.7
Surrogate	Unit	Acceptable Limits		
Chrysene-d12	%	50-140		130

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 8: Generic Site Condition Standards for Use within 30 m of a Water Body in a Potable Ground Water Condition - Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

7687438 Results are based on the dry weight of the soil.

Note: The result for Benzo(b)Fluoranthene is the total of the Benzo(b)&(j)Fluoranthene isomers because the isomers co-elute on the GC column.

Certified By:

N Popmukolof



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 16Z113261

PROJECT: Richmond Landing

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC

ATTENTION TO: Kathryn Maton

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - PHCs F1 - F4 (Soil)

DATE RECEIVED: 2016-07-07

DATE REPORTED: 2016-07-18

SAMPLE DESCRIPTION: BH16-23 SS 6

SAMPLE TYPE: Soil

DATE SAMPLED: 7/7/2016

G / S RDL 7687388

Parameter	Unit	G / S	RDL	7687388
Benzene	µg/g	0.02	0.02	<0.02
Toluene	µg/g	0.2	0.08	<0.08
Ethylbenzene	µg/g	0.05	0.05	<0.05
Xylene Mixture	µg/g	0.05	0.05	0.05
F1 (C6 to C10)	µg/g		5	17
F1 (C6 to C10) minus BTEX	µg/g	25	5	17
F2 (C10 to C16)	µg/g	10	10	<10
F3 (C16 to C34)	µg/g	240	50	<50
F4 (C34 to C50)	µg/g	120	50	<50
Gravimetric Heavy Hydrocarbons	µg/g	120	50	NA
Moisture Content	%		0.1	15.4
Surrogate	Unit	Acceptable Limits		
Terphenyl	%	60-140		85

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 8: Generic Site Condition Standards for Use within 30 m of a Water Body in a Potable Ground Water Condition - Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

7687388

Results are based on sample dry weight.

The C6-C10 fraction is calculated using Toluene response factor.

The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.

Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.

The chromatogram has returned to baseline by the retention time of nC50.

Total C6 - C50 results are corrected for BTEX contributions.

This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.

nC6 and nC10 response factors are within 30% of Toluene response factor.

nC10, nC16 and nC34 response factors are within 10% of their average.

C50 response factor is within 70% of nC10 + nC16 + nC34 average.

Linearity is within 15%.

Extraction and holding times were met for this sample.

Fractions 1-4 are quantified with the contribution of PAHs. Under Ontario Regulation 153, results are considered valid without determining the PAH contribution if not requested by the client.

Quality Control Data is available upon request.

Certified By:

N Popiwko



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 16Z113261

PROJECT: Richmond Landing

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC

SAMPLING SITE:

ATTENTION TO: Kathryn Maton

SAMPLED BY:

O. Reg. 153(511) - VOCs (Soil)

DATE RECEIVED: 2016-07-07

DATE REPORTED: 2016-07-18

SAMPLE DESCRIPTION: BH16-23 SS 7

SAMPLE TYPE: Soil

DATE SAMPLED: 7/7/2016

7687395

Parameter	Unit	G / S	RDL	7687395
Dichlorodifluoromethane	ug/g	0.05	0.05	<0.05
Vinyl Chloride	ug/g	0.02	0.02	<0.02
Bromomethane	ug/g	0.05	0.05	<0.05
Trichlorofluoromethane	ug/g	0.25	0.05	<0.05
Acetone	ug/g	0.5	0.50	<0.50
1,1-Dichloroethylene	ug/g	0.05	0.05	<0.05
Methylene Chloride	ug/g	0.05	0.05	<0.05
Trans- 1,2-Dichloroethylene	ug/g	0.05	0.05	<0.05
Methyl tert-butyl Ether	ug/g	0.05	0.05	<0.05
1,1-Dichloroethane	ug/g	0.05	0.02	<0.02
Methyl Ethyl Ketone	ug/g	0.5	0.50	<0.50
Cis- 1,2-Dichloroethylene	ug/g	0.05	0.02	<0.02
Chloroform	ug/g	0.05	0.04	<0.04
1,2-Dichloroethane	ug/g	0.05	0.03	<0.03
1,1,1-Trichloroethane	ug/g	0.05	0.05	<0.05
Carbon Tetrachloride	ug/g	0.05	0.05	<0.05
Benzene	ug/g	0.02	0.02	<0.02
1,2-Dichloropropane	ug/g	0.05	0.03	<0.03
Trichloroethylene	ug/g	0.05	0.03	<0.03
Bromodichloromethane	ug/g	0.05	0.05	<0.05
Methyl Isobutyl Ketone	ug/g	0.5	0.50	<0.50
1,1,2-Trichloroethane	ug/g	0.05	0.04	<0.04
Toluene	ug/g	0.2	0.05	<0.05
Dibromochloromethane	ug/g	0.05	0.05	<0.05
Ethylene Dibromide	ug/g	0.05	0.04	<0.04
Tetrachloroethylene	ug/g	0.05	0.05	<0.05
1,1,1,2-Tetrachloroethane	ug/g	0.05	0.04	<0.04
Chlorobenzene	ug/g	0.05	0.05	<0.05
Ethylbenzene	ug/g	0.05	0.05	<0.05
m & p-Xylene	ug/g		0.05	<0.05

Certified By:

N Popmukolof



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 16Z113261

PROJECT: Richmond Landing

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC

SAMPLING SITE:

ATTENTION TO: Kathryn Maton

SAMPLED BY:

O. Reg. 153(511) - VOCs (Soil)

DATE RECEIVED: 2016-07-07

DATE REPORTED: 2016-07-18

SAMPLE DESCRIPTION: BH16-23 SS 7

SAMPLE TYPE: Soil

DATE SAMPLED: 7/7/2016

G / S RDL 7687395

Parameter	Unit	G / S	RDL	7687395
Bromoform	ug/g	0.05	0.05	<0.05
Styrene	ug/g	0.05	0.05	<0.05
1,1,2,2-Tetrachloroethane	ug/g	0.05	0.05	<0.05
o-Xylene	ug/g		0.05	<0.05
1,3-Dichlorobenzene	ug/g	0.05	0.05	<0.05
1,4-Dichlorobenzene	ug/g	0.05	0.05	<0.05
1,2-Dichlorobenzene	ug/g	0.05	0.05	<0.05
Xylene Mixture	ug/g	0.05	0.05	<0.05
1,3-Dichloropropene	µg/g	0.05	0.04	<0.04
n-Hexane	µg/g	0.05	0.05	<0.05
Moisture Content	%		0.1	11.8

Surrogate	Unit	Acceptable Limits	
Toluene-d8	% Recovery	50-140	105
4-Bromofluorobenzene	% Recovery	50-140	89

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 8: Generic Site Condition Standards for Use within 30 m of a Water Body in a Potable Ground Water Condition - Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

7687395 The sample was analysed using the high level technique. The sample was extracted using methanol, a small amount of the methanol extract was diluted in water and the purge & trap GC/MS analysis was performed. Results are based on the dry weight of the soil.

Certified By:

N Popmukolof



Quality Assurance

CLIENT NAME: WSP CANADA INC

PROJECT: Richmond Landing

SAMPLING SITE:

AGAT WORK ORDER: 16Z113261

ATTENTION TO: Kathryn Maton

SAMPLED BY:

Soil Analysis

RPT Date: Jul 18, 2016			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - Metals & Inorganics (Soil)															
Antimony	7691055		<0.8	<0.8	NA	< 0.8	125%	70%	130%	97%	80%	120%	104%	70%	130%
Arsenic	7691055		11	11	0.0%	< 1	111%	70%	130%	102%	80%	120%	98%	70%	130%
Barium	7691055		135	129	4.5%	< 2	108%	70%	130%	100%	80%	120%	109%	70%	130%
Beryllium	7691055		0.6	0.6	NA	< 0.5	80%	70%	130%	87%	80%	120%	81%	70%	130%
Boron	7691055		6	7	NA	< 5	71%	70%	130%	93%	80%	120%	82%	70%	130%
Boron (Hot Water Soluble)	7698102		0.24	0.24	NA	< 0.10	96%	60%	140%	94%	70%	130%	95%	60%	140%
Cadmium	7691055		<0.5	<0.5	NA	< 0.5	119%	70%	130%	106%	80%	120%	104%	70%	130%
Chromium	7691055		19	18	5.4%	< 2	96%	70%	130%	85%	80%	120%	85%	70%	130%
Cobalt	7691055		10.5	11.0	4.7%	< 0.5	81%	70%	130%	88%	80%	120%	78%	70%	130%
Copper	7691055		75	73	2.7%	< 1	93%	70%	130%	100%	80%	120%	80%	70%	130%
Lead	7691055		31	29	6.7%	< 1	122%	70%	130%	97%	80%	120%	99%	70%	130%
Molybdenum	7691055		1.0	1.0	NA	< 0.5	117%	70%	130%	100%	80%	120%	109%	70%	130%
Nickel	7691055		30	30	0.0%	< 1	103%	70%	130%	105%	80%	120%	100%	70%	130%
Selenium	7691055		0.6	0.5	NA	< 0.4	82%	70%	130%	99%	80%	120%	105%	70%	130%
Silver	7691055		<0.2	<0.2	NA	< 0.2	118%	70%	130%	104%	80%	120%	108%	70%	130%
Thallium	7691055		<0.4	<0.4	NA	< 0.4	109%	70%	130%	108%	80%	120%	110%	70%	130%
Uranium	7691055		0.5	<0.5	NA	< 0.5	84%	70%	130%	89%	80%	120%	85%	70%	130%
Vanadium	7691055		27	29	7.1%	< 1	81%	70%	130%	88%	80%	120%	108%	70%	130%
Zinc	7691055		100	94	6.2%	< 5	125%	70%	130%	109%	80%	120%	101%	70%	130%
Chromium VI	7682271		<0.2	<0.2	NA	< 0.2	91%	70%	130%	89%	80%	120%	89%	70%	130%
Cyanide	7685613		<0.040	<0.040	NA	< 0.040	91%	70%	130%	99%	80%	120%	104%	70%	130%
Mercury	7691055		<0.10	<0.10	NA	< 0.10	121%	70%	130%	103%	80%	120%	104%	70%	130%
Electrical Conductivity	7698102		0.201	0.201	0.0%	< 0.005	99%	90%	110%	NA			NA		
Sodium Adsorption Ratio	7698102		0.537	0.540	0.6%	NA	NA			NA			NA		
pH, 2:1 CaCl2 Extraction	7688998		10.9	10.9	0.0%	NA	100%	80%	120%	NA			NA		

Comments: NA signifies Not Applicable.

Duplicate Qualifier: As the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Certified By:

Amanjot Bhela

Quality Assurance

CLIENT NAME: WSP CANADA INC

PROJECT: Richmond Landing

SAMPLING SITE:

AGAT WORK ORDER: 16Z113261

ATTENTION TO: Kathryn Maton

SAMPLED BY:

Trace Organics Analysis

RPT Date: Jul 18, 2016			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

O. Reg. 153(511) - PHCs F1 - F4 (Soil)

Benzene	7687388	7687388	< 0.02	< 0.02	NA	< 0.02	97%	60%	130%	89%	60%	130%	91%	60%	130%
Toluene	7687388	7687388	< 0.08	< 0.08	NA	< 0.08	97%	60%	130%	89%	60%	130%	98%	60%	130%
Ethylbenzene	7687388	7687388	< 0.05	< 0.05	NA	< 0.05	93%	60%	130%	87%	60%	130%	94%	60%	130%
Xylene Mixture	7687388	7687388	0.05	0.07	NA	< 0.05	91%	60%	130%	89%	60%	130%	93%	60%	130%
F1 (C6 to C10)	7687388	7687388	17	16	NA	< 5	88%	60%	130%	100%	85%	115%	86%	70%	130%
F2 (C10 to C16)	7688547		< 10	< 10	NA	< 10	102%	60%	130%	99%	80%	120%	91%	70%	130%
F3 (C16 to C34)	7688547		< 50	< 50	NA	< 50	98%	60%	130%	86%	80%	120%	108%	70%	130%
F4 (C34 to C50)	7688547		< 50	< 50	NA	< 50	102%	60%	130%	99%	80%	120%	104%	70%	130%

O. Reg. 153(511) - VOCs (Soil)

Dichlorodifluoromethane	7687395	7687395	< 0.05	< 0.05	NA	< 0.05	120%	50%	140%	74%	50%	140%	87%	50%	140%
Vinyl Chloride	7687395	7687395	< 0.02	< 0.02	NA	< 0.02	120%	50%	140%	97%	50%	140%	63%	50%	140%
Bromomethane	7687395	7687395	< 0.05	< 0.05	NA	< 0.05	119%	50%	140%	109%	50%	140%	85%	50%	140%
Trichlorofluoromethane	7687395	7687395	< 0.05	< 0.05	NA	< 0.05	113%	50%	140%	108%	50%	140%	83%	50%	140%
Acetone	7687395	7687395	< 0.50	< 0.50	NA	< 0.50	119%	50%	140%	116%	50%	140%	95%	50%	140%
1,1-Dichloroethylene	7687395	7687395	< 0.05	< 0.05	NA	< 0.05	102%	50%	140%	91%	60%	130%	70%	50%	140%
Methylene Chloride	7687395	7687395	< 0.05	< 0.05	NA	< 0.05	92%	50%	140%	104%	60%	130%	88%	50%	140%
Trans- 1,2-Dichloroethylene	7687395	7687395	< 0.05	< 0.05	NA	< 0.05	102%	50%	140%	93%	60%	130%	73%	50%	140%
Methyl tert-butyl Ether	7687395	7687395	< 0.05	< 0.05	NA	< 0.05	118%	50%	140%	106%	60%	130%	77%	50%	140%
1,1-Dichloroethane	7687395	7687395	< 0.02	< 0.02	NA	< 0.02	126%	50%	140%	104%	60%	130%	70%	50%	140%
Methyl Ethyl Ketone	7687395	7687395	< 0.50	< 0.50	NA	< 0.50	115%	50%	140%	80%	50%	140%	81%	50%	140%
Cis- 1,2-Dichloroethylene	7687395	7687395	< 0.02	< 0.02	NA	< 0.02	108%	50%	140%	91%	60%	130%	79%	50%	140%
Chloroform	7687395	7687395	< 0.04	< 0.04	NA	< 0.04	111%	50%	140%	90%	60%	130%	82%	50%	140%
1,2-Dichloroethane	7687395	7687395	< 0.03	< 0.03	NA	< 0.03	92%	50%	140%	89%	60%	130%	80%	50%	140%
1,1,1-Trichloroethane	7687395	7687395	< 0.05	< 0.05	NA	< 0.05	115%	50%	140%	96%	60%	130%	77%	50%	140%
Carbon Tetrachloride	7687395	7687395	< 0.05	< 0.05	NA	< 0.05	96%	50%	140%	82%	60%	130%	69%	50%	140%
Benzene	7687395	7687395	< 0.02	< 0.02	NA	< 0.02	97%	50%	140%	83%	60%	130%	82%	50%	140%
1,2-Dichloropropane	7687395	7687395	< 0.03	< 0.03	NA	< 0.03	100%	50%	140%	83%	60%	130%	78%	50%	140%
Trichloroethylene	7687395	7687395	< 0.03	< 0.03	NA	< 0.03	101%	50%	140%	89%	60%	130%	100%	50%	140%
Bromodichloromethane	7687395	7687395	< 0.05	< 0.05	NA	< 0.05	100%	50%	140%	83%	60%	130%	76%	50%	140%
Methyl Isobutyl Ketone	7687395	7687395	< 0.50	< 0.50	NA	< 0.50	94%	50%	140%	83%	50%	140%	96%	50%	140%
1,1,2-Trichloroethane	7687395	7687395	< 0.04	< 0.04	NA	< 0.04	106%	50%	140%	86%	60%	130%	86%	50%	140%
Toluene	7687395	7687395	< 0.05	< 0.05	NA	< 0.05	101%	50%	140%	85%	60%	130%	87%	50%	140%
Dibromochloromethane	7687395	7687395	< 0.05	< 0.05	NA	< 0.05	95%	50%	140%	81%	60%	130%	81%	50%	140%
Ethylene Dibromide	7687395	7687395	< 0.04	< 0.04	NA	< 0.04	99%	50%	140%	82%	60%	130%	77%	50%	140%
Tetrachloroethylene	7687395	7687395	< 0.05	< 0.05	NA	< 0.05	103%	50%	140%	84%	60%	130%	80%	50%	140%
1,1,1,2-Tetrachloroethane	7687395	7687395	< 0.04	< 0.04	NA	< 0.04	115%	50%	140%	84%	60%	130%	75%	50%	140%
Chlorobenzene	7687395	7687395	< 0.05	< 0.05	NA	< 0.05	101%	50%	140%	84%	60%	130%	80%	50%	140%
Ethylbenzene	7687395	7687395	< 0.05	< 0.05	NA	< 0.05	98%	50%	140%	80%	60%	130%	78%	50%	140%

Quality Assurance

CLIENT NAME: WSP CANADA INC

PROJECT: Richmond Landing

SAMPLING SITE:

AGAT WORK ORDER: 16Z113261

ATTENTION TO: Kathryn Maton

SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Jul 18, 2016			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
m & p-Xylene	7687395	7687395	< 0.05	< 0.05	NA	< 0.05	102%	50%	140%	84%	60%	130%	79%	50%	140%
Bromoform	7687395	7687395	< 0.05	< 0.05	NA	< 0.05	110%	50%	140%	82%	60%	130%	64%	50%	140%
Styrene	7687395	7687395	< 0.05	< 0.05	NA	< 0.05	96%	50%	140%	81%	60%	130%	74%	50%	140%
1,1,2,2-Tetrachloroethane	7687395	7687395	< 0.05	< 0.05	NA	< 0.05	112%	50%	140%	90%	60%	130%	74%	50%	140%
o-Xylene	7687395	7687395	< 0.05	< 0.05	NA	< 0.05	104%	50%	140%	85%	60%	130%	78%	50%	140%
1,3-Dichlorobenzene	7687395	7687395	< 0.05	< 0.05	NA	< 0.05	98%	50%	140%	83%	60%	130%	71%	50%	140%
1,4-Dichlorobenzene	7687395	7687395	< 0.05	< 0.05	NA	< 0.05	103%	50%	140%	84%	60%	130%	71%	50%	140%
1,2-Dichlorobenzene	7687395	7687395	< 0.05	< 0.05	NA	< 0.05	103%	50%	140%	83%	60%	130%	72%	50%	140%
1,3-Dichloropropene	7687395	7687395	< 0.04	< 0.04	NA	< 0.04	93%	50%	140%	78%	60%	130%	85%	50%	140%
n-Hexane	7687395	7687395	< 0.05	< 0.05	NA	< 0.05	114%	50%	140%	86%	60%	130%	93%	50%	140%
O. Reg. 153(511) - PAHs (Soil)															
Naphthalene	7688742		< 0.05	< 0.05	NA	< 0.05	110%	50%	140%	99%	50%	140%	75%	50%	140%
Acenaphthylene	7688742		< 0.05	< 0.05	NA	< 0.05	102%	50%	140%	108%	50%	140%	84%	50%	140%
Acenaphthene	7688742		< 0.05	< 0.05	NA	< 0.05	110%	50%	140%	109%	50%	140%	87%	50%	140%
Fluorene	7688742		< 0.05	< 0.05	NA	< 0.05	98%	50%	140%	107%	50%	140%	85%	50%	140%
Phenanthrene	7688742		< 0.05	< 0.05	NA	< 0.05	96%	50%	140%	104%	50%	140%	89%	50%	140%
Anthracene	7688742		< 0.05	< 0.05	NA	< 0.05	99%	50%	140%	109%	50%	140%	92%	50%	140%
Fluoranthene	7688742		< 0.05	< 0.05	NA	< 0.05	103%	50%	140%	126%	50%	140%	130%	50%	140%
Pyrene	7688742		< 0.05	< 0.05	NA	< 0.05	106%	50%	140%	131%	50%	140%	135%	50%	140%
Benz(a)anthracene	7688742		< 0.05	< 0.05	NA	< 0.05	98%	50%	140%	133%	50%	140%	134%	50%	140%
Chrysene	7688742		< 0.05	< 0.05	NA	< 0.05	126%	50%	140%	125%	50%	140%	125%	50%	140%
Benzo(b)fluoranthene	7688742		< 0.05	< 0.05	NA	< 0.05	103%	50%	140%	133%	50%	140%	135%	50%	140%
Benzo(k)fluoranthene	7688742		< 0.05	< 0.05	NA	< 0.05	117%	50%	140%	116%	50%	140%	109%	50%	140%
Benzo(a)pyrene	7688742		< 0.05	< 0.05	NA	< 0.05	109%	50%	140%	128%	50%	140%	129%	50%	140%
Indeno(1,2,3-cd)pyrene	7688742		< 0.05	< 0.05	NA	< 0.05	114%	50%	140%	119%	50%	140%	121%	50%	140%
Dibenz(a,h)anthracene	7688742		< 0.05	< 0.05	NA	< 0.05	104%	50%	140%	116%	50%	140%	117%	50%	140%
Benzo(g,h,i)perylene	7688742		< 0.05	< 0.05	NA	< 0.05	111%	50%	140%	107%	50%	140%	109%	50%	140%
2-and 1-methyl Naphthalene	7688742		< 0.05	< 0.05	NA	< 0.05	124%	50%	140%	95%	50%	140%	73%	50%	140%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Certified By:



Method Summary

CLIENT NAME: WSP CANADA INC

PROJECT: Richmond Landing

SAMPLING SITE:

AGAT WORK ORDER: 16Z113261

ATTENTION TO: Kathryn Maton

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Antimony	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Arsenic	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Barium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Beryllium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Boron	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Boron (Hot Water Soluble)	MET-93-6104	EPA SW 846 6010C; MSA, Part 3, Ch.21	ICP/OES
Cadmium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Chromium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Copper	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Lead	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Molybdenum	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Nickel	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Selenium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Silver	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Thallium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Uranium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Vanadium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Zinc	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Chromium VI	INOR-93-6029	SM 3500 B; MSA Part 3, Ch. 25	SPECTROPHOTOMETER
Cyanide	INOR-93-6052	MOE CN-3015 & E 3009 A; SM 4500 CN	TECHNICON AUTO ANALYZER
Mercury	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Electrical Conductivity	INOR-93-6036	McKeague 4.12, SM 2510 B	EC METER
Sodium Adsorption Ratio	INOR-93-6007	McKeague 4.12 & 3.26 & EPA SW-846 6010B	ICP/OES
pH, 2:1 CaCl ₂ Extraction	INOR-93-6031	MSA part 3 & SM 4500-H+ B	PH METER

Method Summary

CLIENT NAME: WSP CANADA INC

PROJECT: Richmond Landing

SAMPLING SITE:
AGAT WORK ORDER: 16Z113261

ATTENTION TO: Kathryn Maton

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Acenaphthylene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Acenaphthene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Fluorene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Phenanthrene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Anthracene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Fluoranthene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Pyrene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Benz(a)anthracene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Chrysene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Benzo(b)fluoranthene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Benzo(k)fluoranthene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Benzo(a)pyrene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Indeno(1,2,3-cd)pyrene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Dibenz(a,h)anthracene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Benzo(g,h,i)perylene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
2-and 1-methyl Naphthalene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Moisture Content	ORG-91-5106	EPA SW-846 3541 & 8270	BALANCE
Chrysene-d12	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Benzene	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
Toluene	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
Ethylbenzene	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
Xylene Mixture	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
F1 (C6 to C10)	VOL-91-5009	CCME Tier 1 Method	P & T GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5009	CCME Tier 1 Method	P & T GC/FID
F2 (C10 to C16)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID
F3 (C16 to C34)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID
F4 (C34 to C50)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID
Gravimetric Heavy Hydrocarbons	VOL-91-5009	CCME Tier 1 Method	BALANCE
Moisture Content	VOL-91-5009	CCME Tier 1 Method	BALANCE
Terphenyl	VOL-91-5009		GC/FID
Dichlorodifluoromethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Vinyl Chloride	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Bromomethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Trichlorofluoromethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Acetone	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,1-Dichloroethylene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Methylene Chloride	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Trans- 1,2-Dichloroethylene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Methyl tert-butyl Ether	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,1-Dichloroethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Methyl Ethyl Ketone	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Cis- 1,2-Dichloroethylene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Chloroform	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,2-Dichloroethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,1,1-Trichloroethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS

Method Summary

CLIENT NAME: WSP CANADA INC

PROJECT: Richmond Landing

SAMPLING SITE:

AGAT WORK ORDER: 16Z113261

ATTENTION TO: Kathryn Maton

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Benzene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,2-Dichloropropane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Trichloroethylene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Bromodichloromethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Methyl Isobutyl Ketone	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,1,2-Trichloroethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Toluene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Dibromochloromethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Ethylene Dibromide	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,1,1,2-Tetrachloroethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Chlorobenzene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Ethylbenzene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
m & p-Xylene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Bromoform	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Styrene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,1,2,2-Tetrachloroethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
o-Xylene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,3-Dichlorobenzene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Xylene Mixture	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,3-Dichloropropene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
n-Hexane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Toluene-d8	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Moisture Content	VOL-91-5002	MOE E3139	BALANCE

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water intended for human consumption)

Report Information:

Company: WSP.
Contact: KATHRYN MATON / CHRIS HENDRY.
Address: 300-2611 QUEENSVIEW DR.
OTTAWA, ON.
Phone: 613-617-69237 Fax: 613-
Reports to be sent to:
1. Email: KATHRYN.MATON@WSPGROUP.COM.
2. Email: CHRIS.HENDRY@WSPGROUP.COM.

Project Information:

Project: Richmond Landing.
Site Location: Derek Robertson.
Sampled By:
AGAT Quote #: PO: 10001599.

Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:

Bill To Same: Yes ☒ No ☐
Company:
Contact:
Address:
Email:

Regulatory Requirements:

(Please check all applicable boxes)

☒ Regulation 153/04

Table 8

☐ Ind/Corn

☒ Parks/Park

☐ Agriculture

Soil Texture (Check One)

☒ Coarse

☐ Fine

☐ Sewer Use

☐ Sanitary

☐ Storm

☐ Regulation 558

☐ CCME

☐ Prov. Water Quality Objectives (PWQO)

☐ Other

Indicate One

Is this submission for a
Record of Site Condition?

☒ Yes ☐ No

Report Guideline on
Certificate of Analysis

☒ Yes ☐ No

Sample Matrix Legend

B Biota
GW Ground Water
O Oil
P Paint
S Soil
SD Sediment
SW Surface Water

Field Filtered - Metals, Hg, Cu, Ni
(Please Circle)

Metals and Inorganics

Metal Scan

Hydride Forming Metals

Client Custom Metals

ORPs: ☐ B-HWS ☐ Cl ☐ Cu ☐ EC ☐ FOC ☐ NO₃/NO₂ ☐ Total N ☐ Hg ☐ pH ☐ SAR

Nutrients: ☐ TP ☐ NH₃ ☐ TKN ☐ NO₃ ☐ NO₂ ☐ NO₂/NO₃

Volatiles: ☒ VOC ☐ BTEX ☐ THM

CCME Fractions 1 to 4

ABNs

PAHs

Chlorophenols

PCBs

Organochlorine Pesticides

TCLP Metals/Inorganics

Sewer Use

0.00153 metal bag

0.00153 PAHs

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Y/N	Field Filtered - Metals, Hg, Cu, Ni (Please Circle)	Metals and Inorganics	Metal Scan	Hydride Forming Metals	Client Custom Metals	ORPs: <input type="checkbox"/> B-HWS <input type="checkbox"/> Cl <input type="checkbox"/> Cu <input type="checkbox"/> EC <input type="checkbox"/> FOC <input type="checkbox"/> NO ₃ /NO ₂ <input type="checkbox"/> Total N <input type="checkbox"/> Hg <input type="checkbox"/> pH <input type="checkbox"/> SAR	Nutrients: <input type="checkbox"/> TP <input type="checkbox"/> NH ₃ <input type="checkbox"/> TKN <input type="checkbox"/> NO ₃ <input type="checkbox"/> NO ₂ <input type="checkbox"/> NO ₂ /NO ₃	Volatiles: <input checked="" type="checkbox"/> VOC <input type="checkbox"/> BTEX <input type="checkbox"/> THM	CCME Fractions 1 to 4	ABNs	PAHs	Chlorophenols	PCBs	Organochlorine Pesticides	TCLP Metals/Inorganics	Sewer Use
BH16-23 SS 6	07/07/16	10am.	3	Soil																		
BH16-23 SS 7			4																			
BH16-23 SS 1			1																			
BH16-23 SS 2			1																			

Samples Retinquished By (Print Name and Sign):

KATHRYN MATON.
Kathryn Maton

Date:

07/07/16.

Time:

13:30

Samples Received By (Print Name and Sign):

Deaneletta Smith

Date:

7 July 16

Time:

1400

Page 1 of 1

N^o **T 028831**

Laboratory Use Only

Work Order #: 16Z113261

Cooler Quantity: 1

Arrival Temperatures: 7.5 7.0 7.4

Custody Seal Intact: ☐ Yes ☐ No ☐ N/A

Notes:

Turnaround Time (TAT) Required:

Regular TAT ☒ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ 1 Business Day

OR Date Required (Rush Surcharges May Apply):

Please provide prior notification for rush TAT
*TAT is exclusive of weekends and statutory holidays

CLIENT NAME: WSP CANADA INC
2611 QUEENSVIEW DRIVE, SUITE 300
OTTAWA, ON K2B8K2
(613) 829-2800

ATTENTION TO: Kathryn Maton

PROJECT: Richmond/Arding

AGAT WORK ORDER: 16Z111782

SOIL ANALYSIS REVIEWED BY: Parvathi Malemath, Data Reviewer

TRACE ORGANICS REVIEWED BY: Neli Popnikolova, Senior Chemist

DATE REPORTED: Jul 13, 2016

PAGES (INCLUDING COVER): 8

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

***NOTES**

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories (V1)

Member of: Association of Professional Engineers, Geologists and Geophysicists of Alberta (APEGGA)
Western Enviro-Agricultural Laboratory Association (WEALA)
Environmental Services Association of Alberta (ESAA)

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.

Results relate only to the items tested and to all the items tested
All reportable information as specified by ISO 17025:2005 is available from AGAT Laboratories upon request

Page 1 of 8



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 16Z111782

PROJECT: Richmond/Arding

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC

SAMPLING SITE:

ATTENTION TO: Kathryn Maton

SAMPLED BY:

O. Reg. 558 Metals

DATE RECEIVED: 2016-07-04

DATE REPORTED: 2016-07-13

		TCLP-Victoria		
SAMPLE DESCRIPTION:		Island		
SAMPLE TYPE:		Soil		
DATE SAMPLED:		6/29/2016		
Parameter	Unit	G / S	RDL	7679038
Arsenic Leachate	mg/L	2.5	0.010	<0.010
Barium Leachate	mg/L	100	0.100	1.41
Boron Leachate	mg/L	500	0.050	0.063
Cadmium Leachate	mg/L	0.5	0.010	0.045
Chromium Leachate	mg/L	5	0.010	0.012
Lead Leachate	mg/L	5	0.010	0.154
Selenium Leachate	mg/L	1	0.010	<0.010
Silver Leachate	mg/L	5	0.010	<0.010
Uranium Leachate	mg/L	10	0.050	<0.050

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 558 - Schedule IV Leachate Quality Criteria

Certified By:





AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 16Z111782

PROJECT: Richmond/Arding

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC

SAMPLING SITE:

ATTENTION TO: Kathryn Maton

SAMPLED BY:

O. Reg. 558 - PCBs

DATE RECEIVED: 2016-07-04

DATE REPORTED: 2016-07-13

		TCLP-Victoria		
SAMPLE DESCRIPTION:		Island		
SAMPLE TYPE:		Soil		
DATE SAMPLED:		6/29/2016		
Parameter	Unit	G / S	RDL	7679038
Polychlorinated Biphenyls	mg/L	0.3	0.005	<0.005
Surrogate	Unit	Acceptable Limits		
Decachlorobiphenyl	%	60-130	123	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Regulation 558
7679038 The soil sample was leached using the Regulation 558 procedure. Analysis was performed on the leachate.

Certified By:



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 16Z111782

PROJECT: Richmond/Arding

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC

SAMPLING SITE:

ATTENTION TO: Kathryn Maton

SAMPLED BY:

O. Reg. 558 - VOCs

DATE RECEIVED: 2016-07-04

DATE REPORTED: 2016-07-13

		TCLP-Victoria		
SAMPLE DESCRIPTION:		Island		
SAMPLE TYPE:		Soil		
DATE SAMPLED:		6/29/2016		
Parameter	Unit	G / S	RDL	7679038
Vinyl Chloride	mg/L	0.2	0.030	<0.030
1,1 Dichloroethene	mg/L	1.4	0.020	<0.020
Dichloromethane	mg/L	5.0	0.030	<0.030
Methyl Ethyl Ketone	mg/L	200	0.090	<0.090
Chloroform	mg/L	10.0	0.020	<0.020
1,2-Dichloroethane	mg/L	0.5	0.020	<0.020
Carbon Tetrachloride	mg/L	0.5	0.020	<0.020
Benzene	mg/L	0.5	0.020	<0.020
Trichloroethene	mg/L	5.0	0.020	<0.020
Tetrachloroethene	mg/L	3.0	0.050	<0.050
Chlorobenzene	mg/L	8.0	0.010	<0.010
1,2-Dichlorobenzene	mg/L	20.0	0.010	<0.010
1,4-Dichlorobenzene	mg/L	0.5	0.010	<0.010
Surrogate	Unit	Acceptable Limits		
Toluene-d8	% Recovery	60-130	101	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 558 - Schedule IV Leachate Quality Criteria
7679038 Sample was prepared using Regulation 558 protocol and a zero headspace extractor.

Certified By:

Quality Assurance

CLIENT NAME: WSP CANADA INC

PROJECT: Richmond/Arding

SAMPLING SITE:

AGAT WORK ORDER: 16Z111782

ATTENTION TO: Kathryn Maton

SAMPLED BY:

Soil Analysis

RPT Date: Jul 13, 2016			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 558 Metals															
Arsenic Leachate	7680366		<0.010	<0.010	NA	< 0.010	107%	90%	110%	105%	80%	120%	108%	70%	130%
Barium Leachate	7680366		1.18	1.13	4.3%	< 0.100	98%	90%	110%	105%	80%	120%	97%	70%	130%
Boron Leachate	7680366		<0.050	<0.050	NA	< 0.050	104%	90%	110%	105%	80%	120%	97%	70%	130%
Cadmium Leachate	7680366		<0.010	<0.010	NA	< 0.010	100%	90%	110%	103%	80%	120%	102%	70%	130%
Chromium Leachate	7680366		0.019	0.019	NA	< 0.010	105%	90%	110%	103%	80%	120%	100%	70%	130%
Lead Leachate	7680366		<0.010	<0.010	NA	< 0.010	101%	90%	110%	105%	80%	120%	97%	70%	130%
Selenium Leachate	7680366		<0.010	<0.010	NA	< 0.010	99%	90%	110%	101%	80%	120%	103%	70%	130%
Silver Leachate	7680366		<0.010	<0.010	NA	< 0.010	97%	90%	110%	113%	80%	120%	109%	70%	130%
Uranium Leachate	7680366		<0.050	<0.050	NA	< 0.050	101%	90%	110%	88%	80%	120%	82%	70%	130%

Comments: NA signifies Not Applicable.

Duplicate Qualifier: As the measured result approaches the RL (Reporting Limit), the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Certified By:



Quality Assurance

CLIENT NAME: WSP CANADA INC

AGAT WORK ORDER: 16Z111782

PROJECT: Richmond/Arding

ATTENTION TO: Kathryn Maton

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Jul 13, 2016

DUPLICATE

REFERENCE MATERIAL

METHOD BLANK SPIKE

MATRIX SPIKE

PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value			Recovery	Acceptable Limits		Recovery	Acceptable Limits	
							Measured Value	Acceptable Limits			Recovery	Acceptable Limits			
								Lower	Upper			Lower		Upper	
O. Reg. 558 - VOCs															
Vinyl Chloride	7675910		< 0.030	< 0.030	NA	< 0.030	103%	60%	140%	82%	60%	140%	NA	60%	140%
1,1 Dichloroethene	7675910		< 0.020	< 0.020	NA	< 0.020	113%	70%	130%	85%	70%	130%	NA	60%	140%
Dichloromethane	7675910		< 0.030	< 0.030	NA	< 0.030	93%	70%	130%	97%	70%	130%	NA	60%	140%
Methyl Ethyl Ketone	7675910		< 0.090	< 0.090	NA	< 0.090	112%	70%	130%	92%	70%	130%	NA	60%	140%
Chloroform	7675910		< 0.020	< 0.020	NA	< 0.020	107%	70%	130%	85%	70%	130%	NA	60%	140%
1,2-Dichloroethane	7675910		< 0.020	< 0.020	NA	< 0.020	106%	70%	130%	84%	70%	130%	NA	60%	140%
Carbon Tetrachloride	7675910		< 0.020	< 0.020	NA	< 0.020	118%	70%	130%	82%	70%	130%	NA	60%	140%
Benzene	7675910		< 0.020	< 0.020	NA	< 0.020	102%	70%	130%	84%	70%	130%	NA	60%	140%
Trichloroethene	7675910		< 0.020	< 0.020	NA	< 0.020	101%	70%	130%	82%	70%	130%	NA	60%	140%
Tetrachloroethene	7675910		< 0.050	< 0.050	NA	< 0.050	108%	70%	130%	91%	70%	130%	NA	60%	140%
Chlorobenzene	7675910		< 0.010	< 0.010	NA	< 0.010	103%	70%	130%	88%	70%	130%	NA	60%	140%
1,2-Dichlorobenzene	7675910		< 0.010	< 0.010	NA	< 0.010	104%	70%	130%	81%	70%	130%	NA	60%	140%
1,4-Dichlorobenzene	7675910		< 0.010	< 0.010	NA	< 0.010	106%	70%	130%	85%	70%	130%	NA	60%	140%

O. Reg. 558 - PCBs

Polychlorinated Biphenyls	7679804		< 0.005	< 0.005	NA	< 0.005	109%	60%	130%	116%	60%	130%	NA	60%	130%
---------------------------	---------	--	---------	---------	----	---------	------	-----	------	------	-----	------	----	-----	------

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Certified By:



Method Summary

CLIENT NAME: WSP CANADA INC

PROJECT: Richmond/Arding

SAMPLING SITE:

AGAT WORK ORDER: 16Z111782

ATTENTION TO: Kathryn Maton

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Arsenic Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Barium Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Boron Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Cadmium Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Chromium Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Lead Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Selenium Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Silver Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Uranium Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Trace Organics Analysis			
Polychlorinated Biphenyls	ORG-91-5112	Regulation 558, EPA SW846 3510C/8082	GC/ECD
Decachlorobiphenyl	ORG-91-5112	EPA SW846 3510C/8082	GC/ECD
Vinyl Chloride	VOL-91-5001	EPA SW-846 5230B & 8260	(P&T)GC/MS
1,1 Dichloroethene	VOL-91-5001	EPA SW-846 5230B & 8260	(P&T)GC/MS
Dichloromethane	VOL-91-5001	EPA SW-846 5230B & 8260	(P&T)GC/MS
Methyl Ethyl Ketone	VOL-91-5001	EPA SW-846 5230B & 8260	(P&T)GC/MS
Chloroform	VOL-91-5001	EPA SW-846 5230B & 8260	(P&T)GC/MS
1,2-Dichloroethane	VOL-91-5001	EPA SW-846 5230B & 8260	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5001	EPA SW-846 5230B & 8260	(P&T)GC/MS
Benzene	VOL-91-5001	EPA SW-846 5230B & 8260	(P&T)GC/MS
Trichloroethene	VOL-91-5001	EPA SW-846 5230B & 8260	(P&T)GC/MS
Tetrachloroethene	VOL-91-5001	EPA SW-846 5230B & 8260	(P&T)GC/MS
Chlorobenzene	VOL-91-5001	EPA SW-846 5230B & 8260	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5001	EPA SW-846 5230B & 8260	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5001	EPA SW-846 5230B & 8260	(P&T)GC/MS
Toluene-d8	VOL-91-5001	EPA SW-846 5230B & 8260	(P&T)GC/MS

CLIENT NAME: WSP CANADA INC
2611 QUEENSVIEW DRIVE, SUITE 300
OTTAWA, ON K2B8K2
(613) 829-2800

ATTENTION TO: Kathryn Maton

PROJECT: Richmond Landing

AGAT WORK ORDER: 16Z113282

SOIL ANALYSIS REVIEWED BY: Sofka Pehlyova, Senior Analyst

TRACE ORGANICS REVIEWED BY: Oksana Gushyla, Trace Organics Lab Supervisor

DATE REPORTED: Jul 18, 2016

PAGES (INCLUDING COVER): 8

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

***NOTES**

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 16Z113282

PROJECT: Richmond Landing

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC

ATTENTION TO: Kathryn Maton

SAMPLING SITE:

SAMPLED BY:

O. Reg. 558 Metals and Inorganics

DATE RECEIVED: 2016-07-07

DATE REPORTED: 2016-07-18

Parameter	Unit	SAMPLE DESCRIPTION:		TCLP - South	TCLP -
		SAMPLE TYPE:		Shore	Richmond
		DATE SAMPLED:		Soil	Landing
		G / S	RDL	7/7/2016	7/6/2016
				7687460	7687471
Arsenic Leachate	mg/L	2.5	0.010	<0.010	<0.010
Barium Leachate	mg/L	100	0.100	0.587	0.636
Boron Leachate	mg/L	500	0.050	0.119	0.116
Cadmium Leachate	mg/L	0.5	0.010	<0.010	<0.010
Chromium Leachate	mg/L	5	0.010	<0.010	<0.010
Lead Leachate	mg/L	5	0.010	<0.010	0.055
Mercury Leachate	mg/L	0.1	0.01	<0.01	<0.01
Selenium Leachate	mg/L	1	0.010	<0.010	<0.010
Silver Leachate	mg/L	5	0.010	<0.010	<0.010
Uranium Leachate	mg/L	10	0.050	<0.050	<0.050
Fluoride Leachate	mg/L	150	0.05	0.14	0.17
Cyanide Leachate	mg/L	20	0.05	<0.05	<0.05
(Nitrate + Nitrite) as N Leachate	mg/L	1000	0.70	<0.70	<0.70

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 558 - Schedule IV Leachate Quality Criteria

Certified By:

Sofra Pehlyova



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 16Z113282

PROJECT: Richmond Landing

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC

SAMPLING SITE:

ATTENTION TO: Kathryn Maton

SAMPLED BY:

O. Reg. 558 - PCBs

DATE RECEIVED: 2016-07-07

DATE REPORTED: 2016-07-18

				TCLP - South Shore	TCLP - Richmond Landing
SAMPLE DESCRIPTION:				Soil	Soil
SAMPLE TYPE:				Soil	Soil
DATE SAMPLED:				7/7/2016	7/6/2016
Parameter	Unit	G / S	RDL	7687460	7687471
Polychlorinated Biphenyls	mg/L	0.3	0.005	<0.005	<0.005
Surrogate	Unit	Acceptable Limits			
Decachlorobiphenyl	%	60-130	121	124	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Regulation 558

7687460-7687471 The soil sample was leached using the Regulation 558 procedure. Analysis was performed on the leachate.

Certified By:



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 16Z113282

PROJECT: Richmond Landing

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC

SAMPLING SITE:

ATTENTION TO: Kathryn Maton

SAMPLED BY:

O. Reg. 558 - VOCs

DATE RECEIVED: 2016-07-07

DATE REPORTED: 2016-07-18

Parameter	Unit	SAMPLE DESCRIPTION:		TCLP - South		TCLP - Richmond	
		SAMPLE TYPE:		Shore		Landing	
		DATE SAMPLED:		Soil		Soil	
		G / S	RDL	7/7/2016	7687460	7/6/2016	7687471
Vinyl Chloride	mg/L	0.2	0.030	<0.030	<0.030	<0.030	<0.030
1,1 Dichloroethene	mg/L	1.4	0.020	<0.020	<0.020	<0.020	<0.020
Dichloromethane	mg/L	5.0	0.030	<0.030	<0.030	<0.030	<0.030
Methyl Ethyl Ketone	mg/L	200	0.090	<0.090	<0.090	<0.090	<0.090
Chloroform	mg/L	10.0	0.020	<0.020	<0.020	<0.020	<0.020
1,2-Dichloroethane	mg/L	0.5	0.020	<0.020	<0.020	<0.020	<0.020
Carbon Tetrachloride	mg/L	0.5	0.020	<0.020	<0.020	<0.020	<0.020
Benzene	mg/L	0.5	0.020	<0.020	<0.020	<0.020	<0.020
Trichloroethene	mg/L	5.0	0.020	<0.020	<0.020	<0.020	<0.020
Tetrachloroethene	mg/L	3.0	0.050	<0.050	<0.050	<0.050	<0.050
Chlorobenzene	mg/L	8.0	0.010	<0.010	<0.010	<0.010	<0.010
1,2-Dichlorobenzene	mg/L	20.0	0.010	<0.010	<0.010	<0.010	<0.010
1,4-Dichlorobenzene	mg/L	0.5	0.010	<0.010	<0.010	<0.010	<0.010
Surrogate	Unit	Acceptable Limits					
Toluene-d8	% Recovery	60-130		116		105	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 558 - Schedule IV Leachate Quality Criteria

7687460-7687471 Sample was prepared using Regulation 558 protocol and a zero headspace extractor.

Certified By:

Quality Assurance

CLIENT NAME: WSP CANADA INC

PROJECT: Richmond Landing

SAMPLING SITE:

AGAT WORK ORDER: 16Z113282

ATTENTION TO: Kathryn Maton

SAMPLED BY:

Soil Analysis

RPT Date: Jul 18, 2016			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 558 Metals and Inorganics															
Arsenic Leachate	7690137		<0.010	<0.010	NA	< 0.010	95%	90%	110%	102%	80%	120%	107%	70%	130%
Barium Leachate	7690137		0.328	0.304	NA	< 0.100	97%	90%	110%	97%	80%	120%	100%	70%	130%
Boron Leachate	7690137		0.121	0.112	NA	< 0.050	102%	90%	110%	98%	80%	120%	114%	70%	130%
Cadmium Leachate	7690137		<0.010	<0.010	NA	< 0.010	98%	90%	110%	101%	80%	120%	102%	70%	130%
Chromium Leachate	7690137		0.015	0.014	NA	< 0.010	96%	90%	110%	105%	80%	120%	96%	70%	130%
Lead Leachate	7690137		0.013	0.013	NA	< 0.010	97%	90%	110%	93%	80%	120%	96%	70%	130%
Mercury Leachate	7690137		<0.01	<0.01	NA	< 0.01	106%	90%	110%	110%	80%	120%	96%	70%	130%
Selenium Leachate	7690137		<0.010	<0.010	NA	< 0.010	97%	90%	110%	104%	80%	120%	107%	70%	130%
Silver Leachate	7690137		<0.010	<0.010	NA	< 0.010	101%	90%	110%	108%	80%	120%	107%	70%	130%
Uranium Leachate	7690137		<0.050	<0.050	NA	< 0.050	91%	90%	110%	92%	80%	120%	92%	70%	130%
Fluoride Leachate	7690137		0.26	0.26	0.0%	< 0.05	100%	90%	110%	100%	90%	110%	84%	70%	130%
Cyanide Leachate	7690137		<0.05	<0.05	NA	< 0.05	91%	90%	110%	99%	90%	110%	99%	70%	130%
(Nitrate + Nitrite) as N Leachate	7690137		<0.70	<0.70	NA	< 0.70	98%	80%	120%	101%	80%	120%	93%	70%	130%

Comments: NA signifies Not Applicable.

Duplicate Qualifier: As the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Certified By:




Quality Assurance

CLIENT NAME: WSP CANADA INC

PROJECT: Richmond Landing

SAMPLING SITE:

AGAT WORK ORDER: 16Z113282

ATTENTION TO: Kathryn Maton

SAMPLED BY:

Trace Organics Analysis

RPT Date: Jul 18, 2016

RPT Date: Jul 18, 2016			DUPLICATE			Method Blank	REFERENCE MATERIAL		METHOD BLANK SPIKE			MATRIX SPIKE			
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

O. Reg. 558 - PCBs

Polychlorinated Biphenyls	7687460	7687460	< 0.005	< 0.005	NA	< 0.005	90%	60%	130%	118%	60%	130%	NA	60%	130%
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O. Reg. 558 - VOCs

Vinyl Chloride	7692758		< 0.030	< 0.030	NA	< 0.030	78%	60%	140%	78%	60%	140%	NA	60%	140%
1,1 Dichloroethene	7692758		< 0.020	< 0.020	NA	< 0.020	73%	70%	130%	88%	70%	130%	NA	60%	140%
Dichloromethane	7692758		< 0.030	< 0.030	NA	< 0.030	117%	70%	130%	111%	70%	130%	NA	60%	140%
Methyl Ethyl Ketone	7692758		< 0.090	< 0.090	NA	< 0.090	107%	70%	130%	99%	70%	130%	NA	60%	140%
Chloroform	7692758		< 0.020	< 0.020	NA	< 0.020	78%	70%	130%	105%	70%	130%	NA	60%	140%
1,2-Dichloroethane	7692758		< 0.020	< 0.020	NA	< 0.020	92%	70%	130%	94%	70%	130%	NA	60%	140%
Carbon Tetrachloride	7692758		< 0.020	< 0.020	NA	< 0.020	92%	70%	130%	103%	70%	130%	NA	60%	140%
Benzene	7692758		< 0.020	< 0.020	NA	< 0.020	95%	70%	130%	91%	70%	130%	NA	60%	140%
Trichloroethene	7692758		< 0.020	< 0.020	NA	< 0.020	95%	70%	130%	101%	70%	130%	NA	60%	140%
Tetrachloroethene	7692758		< 0.050	< 0.050	NA	< 0.050	110%	70%	130%	116%	70%	130%	NA	60%	140%
Chlorobenzene	7692758		< 0.010	< 0.010	NA	< 0.010	93%	70%	130%	100%	70%	130%	NA	60%	140%
1,2-Dichlorobenzene	7692758		< 0.010	< 0.010	NA	< 0.010	91%	70%	130%	95%	70%	130%	NA	60%	140%
1,4-Dichlorobenzene	7692758		< 0.010	< 0.010	NA	< 0.010	90%	70%	130%	97%	70%	130%	NA	60%	140%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Certified By:

Method Summary

CLIENT NAME: WSP CANADA INC

PROJECT: Richmond Landing

SAMPLING SITE:
AGAT WORK ORDER: 16Z113282

ATTENTION TO: Kathryn Maton

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Arsenic Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Barium Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Boron Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Cadmium Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Chromium Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Lead Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Mercury Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Selenium Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Silver Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Uranium Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Fluoride Leachate	INOR-93-6018	EPA SW-846-1311 & SM4500-F- C	ION SELECTIVE ELECTRODE
Cyanide Leachate	INOR-93-6052	EPA SW-846-1311 & MOE 3015 & SM 4500 CN- I	TECHNICON AUTO ANALYZER
(Nitrate + Nitrite) as N Leachate	INOR-93-6053	EPA SW 846-1311 & SM 4500 - NO3- I	LACHAT FIA
Trace Organics Analysis			
Polychlorinated Biphenyls	ORG-91-5112	Regulation 558, EPA SW846 3510C/8082	GC/ECD
Decachlorobiphenyl	ORG-91-5112	EPA SW846 3510C/8082	GC/ECD
Vinyl Chloride	VOL-91-5001	EPA SW-846 5230B & 8260	(P&T)GC/MS
1,1 Dichloroethene	VOL-91-5001	EPA SW-846 5230B & 8260	(P&T)GC/MS
Dichloromethane	VOL-91-5001	EPA SW-846 5230B & 8260	(P&T)GC/MS
Methyl Ethyl Ketone	VOL-91-5001	EPA SW-846 5230B & 8260	(P&T)GC/MS
Chloroform	VOL-91-5001	EPA SW-846 5230B & 8260	(P&T)GC/MS
1,2-Dichloroethane	VOL-91-5001	EPA SW-846 5230B & 8260	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5001	EPA SW-846 5230B & 8260	(P&T)GC/MS
Benzene	VOL-91-5001	EPA SW-846 5230B & 8260	(P&T)GC/MS
Trichloroethene	VOL-91-5001	EPA SW-846 5230B & 8260	(P&T)GC/MS
Tetrachloroethene	VOL-91-5001	EPA SW-846 5230B & 8260	(P&T)GC/MS
Chlorobenzene	VOL-91-5001	EPA SW-846 5230B & 8260	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5001	EPA SW-846 5230B & 8260	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5001	EPA SW-846 5230B & 8260	(P&T)GC/MS
Toluene-d8	VOL-91-5001	EPA SW-846 5230B & 8260	(P&T)GC/MS

Laboratory Use Only

Work Order #:

16Z113282

Cooler Quantity:

1

Arrival Temperatures:

7.5 | 7.0 | 7.4

Custody Seal Intact:

☐ Yes ☐ No ☐ N/A

Notes:

Turnaround Time (TAT) Required:

Regular TAT

5 to 7 Business Days

Rush TAT

(Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ 1 Business Day

OR Date Required (Rush Surcharges May Apply):

Please provide prior notification for rush TAT
*TAT is exclusive of weekends and statutory holidays

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water intended for human consumption)

Report Information:

Company: WSP
Contact: KATHRYN MATON/CHRIS HENDRY
Address: 300-2611 Queensnew Dr.
Ottawa, ON
Phone: 613-617-9237 Fax: _____
Reports to be sent to:
1. Email: Kathryn.maton@wspgroup.com
2. Email: Chris.hendry@wspgroup.com

Regulatory Requirements:

☐ No Regulatory Requirement

(Please check all applicable boxes)

☒ Regulation 153/04

☐ Sewer Use

☐ Regulation 558

Table 8

Indicate One

☐ Ind/Com

☐ Sanitary

☐ CCME

☒ Res/Park

☐ Storm

☐ Prov. Water Quality Objectives (PWQO)

☐ Agriculture

☐ Other

Soil Texture (Check One)

Region

Indicate One

☒ Coarse

☐ Fine

Indicate One

Is this submission for a
Record of Site Condition?

☒ Yes ☐ No

Report Guideline on
Certificate of Analysis

☒ Yes ☐ No

Sample Matrix Legend

B Biota
GW Ground Water
O Oil
P Paint
S Soil
SD Sediment
SW Surface Water

Field Filtered - Metals, Hg, CrVI
(Please Circle)

(Check Applicable)

Metals and Inorganics
Metal Scan
Hydride Forming Metals
Client Custom Metals
ORPs: ☐ B-HWS ☐ C ☐ CN
☐ C⁺ ☐ EC ☐ FOC ☐ NO₃/NO₂
☐ Total N ☐ Hg ☐ pH ☐ SAR
Nutrients: ☐ TP ☐ NH₃ ☐ TNX
☐ NO₃ ☐ NO₂ ☐ NO₃/NO₂
Volatiles: ☐ VOC ☐ BTEX ☐ THM
CCME Fractions 1 to 4

Invoice Information:

Bill To Same: Yes ☒ No ☐

Company: _____
Contact: _____
Address: _____
Email: _____

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Y / N	Field Filtered - Metals, Hg, CrVI (Please Circle)	Metals and Inorganics	Metal Scan	Hydride Forming Metals	Client Custom Metals	ORPs: <input type="checkbox"/> B-HWS <input type="checkbox"/> C <input type="checkbox"/> CN <input type="checkbox"/> C ⁺ <input type="checkbox"/> EC <input type="checkbox"/> FOC <input type="checkbox"/> NO ₃ /NO ₂ <input type="checkbox"/> Total N <input type="checkbox"/> Hg <input type="checkbox"/> pH <input type="checkbox"/> SAR	Nutrients: <input type="checkbox"/> TP <input type="checkbox"/> NH ₃ <input type="checkbox"/> TNX <input type="checkbox"/> NO ₃ <input type="checkbox"/> NO ₂ <input type="checkbox"/> NO ₃ /NO ₂	Volatiles: <input type="checkbox"/> VOC <input type="checkbox"/> BTEX <input type="checkbox"/> THM	CCME Fractions 1 to 4	ABNs	PAHs	Chlorophenols	PCBs	Organochlorine Pesticides	TCLP Metals/Inorganics	Sewer Use	Notes
TCLP - South shore	07/07/16	12pm	3	soil																			
TCLP - Richmond Landing	06/07/16	9:30am	3	soil																			

Samples Relinquished By (Print Name and Sign): <u>KATHRYN MATON</u>	Date: 07/07/16	Time: 13:30	Samples Received By (Print Name and Sign): <u>Use the left column</u>	Date: 7 July 16	Time: 14h00
Samples Relinquished By (Print Name and Sign): <u>Kathryn</u>	Date: 07/07/16	Time: 13:30	Samples Received By (Print Name and Sign):	Date:	Time:
Samples Relinquished By (Print Name and Sign):	Date:	Time:	Samples Received By (Print Name and Sign):	Date:	Time:

Page 1 of 1

Nº: **T 028830**

**CLIENT NAME: WSP CANADA INC
2611 QUEENSVIEW DRIVE, SUITE 300
OTTAWA, ON K2B8K2
(613) 829-2800**

ATTENTION TO: Chris Hendry

PROJECT: 10001599 Richmond Landing

AGAT WORK ORDER: 16Z119601

TRACE ORGANICS REVIEWED BY: Neli Popnikolova, Senior Chemist

WATER ANALYSIS REVIEWED BY: Sofka Pehlyova, Senior Analyst

DATE REPORTED: Aug 02, 2016

PAGES (INCLUDING COVER): 12

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

***NOTES**

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories (V1)

Page 1 of 12

Member of: Association of Professional Engineers, Geologists and Geophysicists of Alberta (APEGGA)
Western Enviro-Agricultural Laboratory Association (WEALA)
Environmental Services Association of Alberta (ESAA)

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.

*Results relate only to the items tested and to all the items tested
All reportable information as specified by ISO 17025:2005 is available from AGAT Laboratories upon request*



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 16Z119601

PROJECT: 10001599 Richmond Landing

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC

SAMPLING SITE:

ATTENTION TO: Chris Hendry

SAMPLED BY: Kathryn Maton

O. Reg. 153(511) - PAHs (Water)

DATE RECEIVED: 2016-07-25

DATE REPORTED: 2016-08-02

		SAMPLE DESCRIPTION:		MW16 - 23	MW16 - 1023
		SAMPLE TYPE:		Water	Water
		DATE SAMPLED:		7/21/2016	7/21/2016
Parameter	Unit	G / S	RDL	7732286	7732302
Naphthalene	µg/L	11	0.20	<0.20	<0.20
Acenaphthylene	µg/L	1	0.20	<0.20	<0.20
Acenaphthene	µg/L	4.1	0.20	<0.20	<0.20
Fluorene	µg/L	120	0.20	<0.20	<0.20
Phenanthrene	µg/L	1	0.10	<0.10	<0.10
Anthracene	µg/L	1	0.10	<0.10	<0.10
Fluoranthene	µg/L	0.41	0.20	<0.20	<0.20
Pyrene	µg/L	4.1	0.20	<0.20	<0.20
Benz(a)anthracene	µg/L	1	0.20	<0.20	<0.20
Chrysene	µg/L	0.1	0.10	<0.10	<0.10
Benzo(b)fluoranthene	µg/L	0.1	0.10	<0.10	<0.10
Benzo(k)fluoranthene	µg/L	0.1	0.10	<0.10	<0.10
Benzo(a)pyrene	µg/L	0.01	0.01	<0.01	<0.01
Indeno(1,2,3-cd)pyrene	µg/L	0.2	0.20	<0.20	<0.20
Dibenz(a,h)anthracene	µg/L	0.2	0.20	<0.20	<0.20
Benzo(g,h,i)perylene	µg/L	0.2	0.20	<0.20	<0.20
2-and 1-methyl Naphthalene	µg/L	3.2	0.20	<0.20	<0.20
Surrogate	Unit	Acceptable Limits			
Chrysene-d12	%	50-140	110	112	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 8: Generic Site Condition Standards for Use within 30 m of a Water Body in a Potable Ground Water Condition - Ground Water - All Types of Property Uses

7732286-7732302 Note: The result for Benzo(b)Flouranthene is the total of the Benzo(b)&(j)Flouranthene isomers because the isomers co-elute on the GC column.

Certified By:



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 16Z119601

PROJECT: 10001599 Richmond Landing

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC

SAMPLING SITE:

ATTENTION TO: Chris Hendry

SAMPLED BY: Kathyn Maton

O. Reg. 153(511) - PHCs F1 - F4 (with PAHs) (Water)

DATE RECEIVED: 2016-07-25

DATE REPORTED: 2016-08-02

		SAMPLE DESCRIPTION:		MW16 - 23	MW16 - 1023
		SAMPLE TYPE:		Water	Water
		DATE SAMPLED:		7/21/2016	7/21/2016
Parameter	Unit	G / S	RDL	7732286	7732302
F1 (C6 to C10)	µg/L		25	<25	<25
F1 (C6 to C10) minus BTEX	µg/L	420	25	<25	<25
F2 (C10 to C16)	µg/L	150	100	<100	<100
F2 (C10 to C16) minus Naphthalene	µg/L		100	<100	<100
F3 (C16 to C34)	µg/L	500	100	<100	<100
F3 (C16 to C34) minus PAHs	µg/L		100	<100	<100
F4 (C34 to C50)	µg/L	500	100	<100	<100
Gravimetric Heavy Hydrocarbons	µg/L	500	500	NA	NA
Surrogate	Unit	Acceptable Limits			
Terphenyl	%	60-140	79	85	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 8: Generic Site Condition Standards for Use within 30 m of a Water Body in a Potable Ground Water Condition - Ground Water - All Types of Property Uses

7732286-7732302 The C6-C10 fraction is calculated using Toluene response factor.
The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons are not included in the Total C16 - C50 and are only determined if the chromatogram of the C34 - C50 Hydrocarbons indicated that hydrocarbons >C50 are present.
The chromatogram has returned to baseline by the retention time of nC50.
Total C6-C50 results are corrected for BTEX and PAH contributions.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 nC34 average.
Linearity is within 15%.
Extraction and holding times were met for this sample.

Certified By:

N Popiwko



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 16Z119601

PROJECT: 10001599 Richmond Landing

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC

ATTENTION TO: Chris Hendry

SAMPLING SITE:

SAMPLED BY: Kathyn Maton

O. Reg. 153(511) - VOCs (Water)

DATE RECEIVED: 2016-07-25

DATE REPORTED: 2016-08-02

Parameter	Unit	SAMPLE DESCRIPTION:		MW16 - 23	MW16 - 1023
		SAMPLE TYPE:		Water	Water
		DATE SAMPLED:		7/21/2016	7/21/2016
		G / S	RDL	7732286	7732302
Dichlorodifluoromethane	µg/L	590	0.20	<0.20	<0.20
Vinyl Chloride	µg/L	0.5	0.17	<0.17	<0.17
Bromomethane	µg/L	0.89	0.20	<0.20	<0.20
Trichlorofluoromethane	µg/L	150	0.40	<0.40	<0.40
Acetone	µg/L	2700	1.0	<1.0	<1.0
1,1-Dichloroethylene	µg/L	1.6	0.30	<0.30	<0.30
Methylene Chloride	µg/L	50	0.30	<0.30	<0.30
trans- 1,2-Dichloroethylene	µg/L	1.6	0.20	<0.20	<0.20
Methyl tert-butyl ether	µg/L	15	0.20	<0.20	<0.20
1,1-Dichloroethane	µg/L	5	0.30	<0.30	<0.30
Methyl Ethyl Ketone	µg/L	1800	1.0	<1.0	<1.0
cis- 1,2-Dichloroethylene	µg/L	1.6	0.20	<0.20	<0.20
Chloroform	µg/L	2.4	0.20	<0.20	<0.20
1,2-Dichloroethane	µg/L	1.6	0.20	<0.20	<0.20
1,1,1-Trichloroethane	µg/L	200	0.30	<0.30	<0.30
Carbon Tetrachloride	µg/L	0.79	0.20	<0.20	<0.20
Benzene	µg/L	5	0.20	<0.20	<0.20
1,2-Dichloropropane	µg/L	5	0.20	<0.20	<0.20
Trichloroethylene	µg/L	1.6	0.20	<0.20	<0.20
Bromodichloromethane	µg/L	16	0.20	<0.20	<0.20
Methyl Isobutyl Ketone	µg/L	640	1.0	<1.0	<1.0
1,1,2-Trichloroethane	µg/L	4.7	0.20	<0.20	<0.20
Toluene	µg/L	22	0.20	0.22	0.20
Dibromochloromethane	µg/L	25	0.10	<0.10	<0.10
Ethylene Dibromide	µg/L	0.2	0.10	<0.10	<0.10
Tetrachloroethylene	µg/L	1.6	0.20	<0.20	<0.20
1,1,1,2-Tetrachloroethane	µg/L	1.1	0.10	<0.10	<0.10
Chlorobenzene	µg/L	30	0.10	<0.10	<0.10
Ethylbenzene	µg/L	2.4	0.10	<0.10	<0.10
m & p-Xylene	µg/L		0.20	<0.20	<0.20

Certified By:

N Popiwko



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 16Z119601

PROJECT: 10001599 Richmond Landing

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC

SAMPLING SITE:

ATTENTION TO: Chris Hendry

SAMPLED BY: Kathyn Maton

O. Reg. 153(511) - VOCs (Water)

DATE RECEIVED: 2016-07-25

DATE REPORTED: 2016-08-02

		SAMPLE DESCRIPTION:		MW16 - 23	MW16 - 1023
		SAMPLE TYPE:		Water	Water
		DATE SAMPLED:		7/21/2016	7/21/2016
Parameter	Unit	G / S	RDL	7732286	7732302
Bromoform	µg/L	25	0.10	<0.10	<0.10
Styrene	µg/L	5.4	0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	µg/L	1	0.10	<0.10	<0.10
o-Xylene	µg/L		0.10	<0.10	<0.10
1,3-Dichlorobenzene	µg/L	59	0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	1	0.10	<0.10	<0.10
1,2-Dichlorobenzene	µg/L	3	0.10	<0.10	<0.10
1,3-Dichloropropene	µg/L	0.5	0.30	<0.30	<0.30
Xylene Mixture	µg/L	300	0.20	<0.20	<0.20
n-Hexane	µg/L	51	0.20	0.48	0.64
Surrogate	Unit	Acceptable Limits			
Toluene-d8	% Recovery	50-140		111	113
4-Bromofluorobenzene	% Recovery	50-140		95	97

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 8: Generic Site Condition Standards for Use within 30 m of a Water Body in a Potable Ground Water Condition - Ground Water - All Types of Property Uses

7732286-7732302 Dilution factor=

The sample was diluted to keep the target compounds in the calibration range of the instrument and avoid contaminating the Purge and Trap system. The reporting detection limit has been corrected for the dilution factor used.

Certified By:



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 16Z119601

PROJECT: 10001599 Richmond Landing

5835 COOPERS AVENUE
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FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC

ATTENTION TO: Chris Hendry

SAMPLING SITE:

SAMPLED BY:Kathyn Maton

O. Reg. 153(511) - Metals & Inorganics (Water)

DATE RECEIVED: 2016-07-25

DATE REPORTED: 2016-08-02

Parameter	Unit	SAMPLE DESCRIPTION:		MW16 - 23	MW16 - 1023
		SAMPLE TYPE:		Water	Water
		DATE SAMPLED:		7/21/2016	7/21/2016
		G / S	RDL	7732286	7732302
Antimony	µg/L	6	1.0	<1.0	<1.0
Arsenic	µg/L	25	1.0	<1.0	<1.0
Barium	µg/L	1000	2.0	29.9	27.9
Beryllium	µg/L	4	0.5	<0.5	<0.5
Boron	µg/L	5000	10.0	18.4	14.4
Cadmium	µg/L	2.1	0.2	<0.2	<0.2
Chromium	µg/L	50	2.0	<2.0	<2.0
Cobalt	µg/L	3.8	0.5	<0.5	<0.5
Copper	µg/L	69	1.0	2.2	1.9
Lead	µg/L	10	0.5	<0.5	<0.5
Molybdenum	µg/L	70	0.5	1.5	1.1
Nickel	µg/L	100	1.0	2.5	1.7
Selenium	µg/L	10	1.0	<1.0	1.3
Silver	µg/L	1.2	0.2	<0.2	<0.2
Thallium	µg/L	2	0.3	<0.3	<0.3
Uranium	µg/L	20	0.5	<0.5	<0.5
Vanadium	µg/L	6.2	0.4	6.2	5.3
Zinc	µg/L	890	5.0	<5.0	<5.0
Mercury	µg/L	0.29	0.02	<0.02	<0.02
Chromium VI	µg/L	25	5	<5	<5
Cyanide	µg/L	52	2	<2	<2
Sodium	µg/L	490000	500	6110	5270
Chloride	µg/L	790000	100	12200	19400
Electrical Conductivity	uS/cm		2	257	308
pH	pH Units		NA	9.94	10.3

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 8: Generic Site Condition Standards for Use within 30 m of a Water Body in a Potable Ground Water Condition - Ground Water - All Types of Property Uses

Certified By:

Sofra Pehlyova

Quality Assurance

CLIENT NAME: WSP CANADA INC

PROJECT: 10001599 Richmond Landing

SAMPLING SITE:

AGAT WORK ORDER: 16Z119601

ATTENTION TO: Chris Hendry

SAMPLED BY: Kathryn Maton

Trace Organics Analysis

RPT Date: Aug 02, 2016			DUPLICATE			Method Blank	REFERENCE MATERIAL		METHOD BLANK SPIKE		MATRIX SPIKE				
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

O. Reg. 153(511) - VOCs (Water)

Dichlorodifluoromethane	7728224		< 0.20	< 0.20	NA	< 0.20	85%	50%	140%	80%	50%	140%	83%	50%	140%
Vinyl Chloride	7728224		64	64	0.0%	< 0.17	99%	50%	140%	85%	50%	140%	87%	50%	140%
Bromomethane	7728224		< 0.20	< 0.20	NA	< 0.20	112%	50%	140%	95%	50%	140%	72%	50%	140%
Trichlorofluoromethane	7728224		< 0.40	< 0.40	NA	< 0.40	112%	50%	140%	109%	50%	140%	121%	50%	140%
Acetone	7728224		< 1.0	< 1.0	NA	< 1.0	107%	50%	140%	120%	50%	140%	130%	50%	140%
1,1-Dichloroethylene	7728224		< 0.30	< 0.30	NA	< 0.30	125%	50%	140%	116%	60%	130%	118%	50%	140%
Methylene Chloride	7728224		< 0.30	< 0.30	NA	< 0.30	94%	50%	140%	110%	60%	130%	90%	50%	140%
trans- 1,2-Dichloroethylene	7728224		0.35	0.35	NA	< 0.20	120%	50%	140%	120%	60%	130%	127%	50%	140%
Methyl tert-butyl ether	7728224		< 0.20	< 0.20	NA	< 0.20	112%	50%	140%	115%	60%	130%	125%	50%	140%
1,1-Dichloroethane	7728224		< 0.30	< 0.30	NA	< 0.30	127%	50%	140%	121%	60%	130%	129%	50%	140%
Methyl Ethyl Ketone	7728224		< 1.0	< 1.0	NA	< 1.0	97%	50%	140%	105%	50%	140%	95%	50%	140%
cis- 1,2-Dichloroethylene	7728224		11	11	0.0%	< 0.20	128%	50%	140%	121%	60%	130%	124%	50%	140%
Chloroform	7728224		< 0.20	< 0.20	NA	< 0.20	120%	50%	140%	114%	60%	130%	121%	50%	140%
1,2-Dichloroethane	7728224		< 0.20	< 0.20	NA	< 0.20	93%	50%	140%	91%	60%	130%	96%	50%	140%
1,1,1-Trichloroethane	7728224		< 0.30	< 0.30	NA	< 0.30	111%	50%	140%	101%	60%	130%	99%	50%	140%
Carbon Tetrachloride	7728224		< 0.20	< 0.20	NA	< 0.20	103%	50%	140%	100%	60%	130%	85%	50%	140%
Benzene	7728224		0.55	0.67	NA	< 0.20	98%	50%	140%	92%	60%	130%	94%	50%	140%
1,2-Dichloropropane	7728224		< 0.20	< 0.20	NA	< 0.20	94%	50%	140%	88%	60%	130%	91%	50%	140%
Trichloroethylene	7728224		< 0.20	< 0.20	NA	< 0.20	102%	50%	140%	95%	60%	130%	95%	50%	140%
Bromodichloromethane	7728224		< 0.20	< 0.20	NA	< 0.20	105%	50%	140%	92%	60%	130%	99%	50%	140%
Methyl Isobutyl Ketone	7728224		< 1.0	< 1.0	NA	< 1.0	83%	50%	140%	74%	50%	140%	87%	50%	140%
1,1,2-Trichloroethane	7728224		< 0.20	< 0.20	NA	< 0.20	99%	50%	140%	96%	60%	130%	107%	50%	140%
Toluene	7728224		0.71	0.70	NA	< 0.20	107%	50%	140%	104%	60%	130%	105%	50%	140%
Dibromochloromethane	7728224		< 0.10	< 0.10	NA	< 0.10	92%	50%	140%	96%	60%	130%	103%	50%	140%
Ethylene Dibromide	7728224		< 0.10	< 0.10	NA	< 0.10	93%	50%	140%	91%	60%	130%	99%	50%	140%
Tetrachloroethylene	7728224		< 0.20	< 0.20	NA	< 0.20	107%	50%	140%	103%	60%	130%	101%	50%	140%
1,1,1,2-Tetrachloroethane	7728224		< 0.10	< 0.10	NA	< 0.10	104%	50%	140%	98%	60%	130%	102%	50%	140%
Chlorobenzene	7728224		< 0.10	< 0.10	NA	< 0.10	102%	50%	140%	101%	60%	130%	102%	50%	140%
Ethylbenzene	7728224		< 0.10	< 0.10	NA	< 0.10	105%	50%	140%	85%	60%	130%	102%	50%	140%
m & p-Xylene	7728224		< 0.20	< 0.20	NA	< 0.20	110%	50%	140%	105%	60%	130%	105%	50%	140%
Bromoform	7728224		< 0.10	< 0.10	NA	< 0.10	100%	50%	140%	93%	60%	130%	103%	50%	140%
Styrene	7728224		< 0.10	< 0.10	NA	< 0.10	88%	50%	140%	90%	60%	130%	89%	50%	140%
1,1,2,2-Tetrachloroethane	7728224		< 0.10	< 0.10	NA	< 0.10	101%	50%	140%	99%	60%	130%	117%	50%	140%
o-Xylene	7728224		< 0.10	< 0.10	NA	< 0.10	108%	50%	140%	104%	60%	130%	107%	50%	140%
1,3-Dichlorobenzene	7728224		< 0.10	< 0.10	NA	< 0.10	95%	50%	140%	91%	60%	130%	98%	50%	140%
1,4-Dichlorobenzene	7728224		< 0.10	< 0.10	NA	< 0.10	97%	50%	140%	101%	60%	130%	105%	50%	140%
1,2-Dichlorobenzene	7728224		< 0.10	< 0.10	NA	< 0.10	93%	50%	140%	92%	60%	130%	100%	50%	140%
1,3-Dichloropropene	7728224		< 0.30	< 0.30	NA	< 0.30	92%	50%	140%	83%	60%	130%	90%	50%	140%
n-Hexane	7728224		< 0.20	< 0.20	NA	< 0.20	79%	50%	140%	78%	60%	130%	112%	50%	140%

AGAT QUALITY ASSURANCE REPORT (V1)

Page 7 of 12

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.

Results relate only to the items tested and to all the items tested



Quality Assurance

CLIENT NAME: WSP CANADA INC

PROJECT: 10001599 Richmond Landing

SAMPLING SITE:

AGAT WORK ORDER: 16Z119601

ATTENTION TO: Chris Hendry

SAMPLED BY:Kathyn Maton

Trace Organics Analysis (Continued)

RPT Date: Aug 02, 2016			DUPLICATE			Method Blank	REFERENCE MATERIAL		METHOD BLANK SPIKE			MATRIX SPIKE			
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

O. Reg. 153(511) - PHCs F1 - F4 (with PAHs) (Water)

F1 (C6 to C10)	7732177		< 25	< 25	0.0%	< 25	98%	60%	140%	85%	60%	140%	109%	60%	140%
F2 (C10 to C16)		TW	< 100	< 100	NA	< 100	96%	60%	140%	64%	60%	140%	64%	60%	140%
F3 (C16 to C34)		TW	< 100	< 100	NA	< 100	102%	60%	140%	101%	60%	140%	96%	60%	140%
F4 (C34 to C50)		TW	< 100	< 100	NA	< 100	89%	60%	140%	89%	60%	140%	88%	60%	140%

O. Reg. 153(511) - PAHs (Water)

Naphthalene		TW	< 0.20	< 0.20	NA	< 0.20	83%	50%	140%	91%	50%	140%	63%	50%	140%
Acenaphthylene		TW	< 0.20	< 0.20	NA	< 0.20	92%	50%	140%	87%	50%	140%	63%	50%	140%
Acenaphthene		TW	< 0.20	< 0.20	NA	< 0.20	90%	50%	140%	81%	50%	140%	64%	50%	140%
Fluorene		TW	< 0.20	< 0.20	NA	< 0.20	97%	50%	140%	91%	50%	140%	76%	50%	140%
Phenanthrene		TW	< 0.10	< 0.10	NA	< 0.10	92%	50%	140%	84%	50%	140%	81%	50%	140%
Anthracene		TW	< 0.10	< 0.10	NA	< 0.10	101%	50%	140%	95%	50%	140%	85%	50%	140%
Fluoranthene		TW	< 0.20	< 0.20	NA	< 0.20	97%	50%	140%	85%	50%	140%	98%	50%	140%
Pyrene		TW	< 0.20	< 0.20	NA	< 0.20	97%	50%	140%	86%	50%	140%	95%	50%	140%
Benz(a)anthracene		TW	< 0.20	< 0.20	NA	< 0.20	86%	50%	140%	76%	50%	140%	83%	50%	140%
Chrysene		TW	< 0.10	< 0.10	NA	< 0.10	97%	50%	140%	82%	50%	140%	87%	50%	140%
Benzo(b)fluoranthene		TW	< 0.10	< 0.10	NA	< 0.10	117%	50%	140%	98%	50%	140%	105%	50%	140%
Benzo(k)fluoranthene		TW	< 0.10	< 0.10	NA	< 0.10	117%	50%	140%	115%	50%	140%	111%	50%	140%
Benzo(a)pyrene		TW	< 0.01	< 0.01	NA	< 0.01	123%	50%	140%	104%	50%	140%	94%	50%	140%
Indeno(1,2,3-cd)pyrene		TW	< 0.20	< 0.20	NA	< 0.20	114%	50%	140%	119%	50%	140%	83%	50%	140%
Dibenz(a,h)anthracene		TW	< 0.20	< 0.20	NA	< 0.20	119%	50%	140%	122%	50%	140%	88%	50%	140%
Benzo(g,h,i)perylene		TW	< 0.20	< 0.20	NA	< 0.20	117%	50%	140%	118%	50%	140%	82%	50%	140%
2-and 1-methyl Naphthalene		TW	< 0.20	< 0.20	NA	< 0.20	86%	50%	140%	99%	50%	140%	85%	50%	140%

Comments: Tap water analysis has been performed as QC sample testing for duplicate and matrix spike due to insufficient sample volume.

When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Certified By:

N Popmukohof

Quality Assurance

CLIENT NAME: WSP CANADA INC

PROJECT: 10001599 Richmond Landing

SAMPLING SITE:

AGAT WORK ORDER: 16Z119601

ATTENTION TO: Chris Hendry

SAMPLED BY: Kathryn Maton

Water Analysis															
RPT Date: Aug 02, 2016			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - Metals & Inorganics (Water)															
Antimony	7731770		<1.0	<1.0	NA	< 1.0	98%	70%	130%	92%	80%	120%	92%	70%	130%
Arsenic	7731770		<1.0	<1.0	NA	< 1.0	100%	70%	130%	101%	80%	120%	98%	70%	130%
Barium	7731770		282	280	0.7%	< 2.0	101%	70%	130%	99%	80%	120%	94%	70%	130%
Beryllium	7731770		<0.5	<0.5	NA	< 0.5	103%	70%	130%	99%	80%	120%	103%	70%	130%
Boron	7731770		45.9	48.8	NA	< 10.0	108%	70%	130%	102%	80%	120%	99%	70%	130%
Cadmium	7731770		<0.2	<0.2	NA	< 0.2	94%	70%	130%	98%	80%	120%	93%	70%	130%
Chromium	7731770		4.8	5.1	NA	< 2.0	101%	70%	130%	104%	80%	120%	94%	70%	130%
Cobalt	7731770		<0.5	<0.5	NA	< 0.5	103%	70%	130%	101%	80%	120%	91%	70%	130%
Copper	7731770		76.2	77.8	2.1%	< 1.0	98%	70%	130%	100%	80%	120%	87%	70%	130%
Lead	7731770		8.2	8.0	2.5%	< 0.5	99%	70%	130%	97%	80%	120%	88%	70%	130%
Molybdenum	7731770		<0.5	<0.5	NA	< 0.5	94%	70%	130%	93%	80%	120%	89%	70%	130%
Nickel	7731770		<1.0	<1.0	NA	< 1.0	106%	70%	130%	108%	80%	120%	96%	70%	130%
Selenium	7731770		1.6	1.4	NA	< 1.0	102%	70%	130%	104%	80%	120%	104%	70%	130%
Silver	7731770		<0.2	<0.2	NA	< 0.2	97%	70%	130%	108%	80%	120%	100%	70%	130%
Thallium	7731770		<0.3	<0.3	NA	< 0.3	97%	70%	130%	98%	80%	120%	91%	70%	130%
Uranium	7731770		<0.5	<0.5	NA	< 0.5	98%	70%	130%	101%	80%	120%	106%	70%	130%
Vanadium	7731770		1.3	1.4	NA	< 0.4	102%	70%	130%	101%	80%	120%	92%	70%	130%
Zinc	7731770		38.5	39.1	1.5%	< 5.0	103%	70%	130%	109%	80%	120%	96%	70%	130%
Mercury	7729438		<0.02	<0.02	NA	< 0.02	102%	70%	130%	108%	80%	120%	107%	70%	130%
Chromium VI	7732177		<5	<5	NA	< 5	101%	70%	130%	109%	80%	120%	107%	70%	130%
Cyanide	7729438		<2	<2	NA	< 2	104%	70%	130%	101%	80%	120%	99%	70%	130%
Sodium	7732286	7732286	6110	6090	0.3%	< 500	102%	70%	130%	102%	80%	120%	98%	70%	130%
Chloride	7732288		66500	66800	0.5%	< 100	94%	70%	130%	109%	70%	130%	101%	70%	130%
Electrical Conductivity	7732346		1820	1820	0.0%	< 2	100%	90%	110%	NA			NA		
pH	7732346		7.91	7.84	0.9%	NA	101%	90%	110%	NA			NA		

Comments: NA signifies Not Applicable.

Duplicate Qualifier: As the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Certified By:


Method Summary

CLIENT NAME: WSP CANADA INC

PROJECT: 10001599 Richmond Landing

SAMPLING SITE:
AGAT WORK ORDER: 16Z119601

ATTENTION TO: Chris Hendry

SAMPLED BY: Kathryn Maton

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Acenaphthylene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Acenaphthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Fluorene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Phenanthrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Anthracene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Fluoranthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Pyrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benz(a)anthracene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Chrysene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(b)fluoranthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(k)fluoranthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(a)pyrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Indeno(1,2,3-cd)pyrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Dibenz(a,h)anthracene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(g,h,i)perylene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
2-and 1-methyl Naphthalene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Chrysene-d12	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
F1 (C6 to C10)	VOL-91-5010	MOE PHC E3421	(P&T)GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5010	MOE PHC E3421	(P&T)GC/FID
F2 (C10 to C16)	VOL-91-5010	MOE PHC E3421	GC/FID
F2 (C10 to C16) minus Naphthalene	VOL-91-5010	MOE PHC E3421	GC/FID
F3 (C16 to C34)	VOL-91-5010	MOE PHC E3421	GC/FID
F3 (C16 to C34) minus PAHs	VOL-91-5010	MOE PHC E3421	GC/FID
F4 (C34 to C50)	VOL -91- 5010	MOE PHC- E3421	GC/FID
Gravimetric Heavy Hydrocarbons	VOL-91-5010	MOE PHC E3421	BALANCE
Terphenyl	VOL-91-5010		GC/FID
Dichlorodifluoromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Vinyl Chloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromomethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Trichlorofluoromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Acetone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1-Dichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methylene Chloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
trans- 1,2-Dichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl tert-butyl ether	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1-Dichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl Ethyl Ketone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
cis- 1,2-Dichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chloroform	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2-Dichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,1-Trichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Benzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2-Dichloropropane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Trichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromodichloromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl Isobutyl Ketone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,2-Trichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS

Method Summary

CLIENT NAME: WSP CANADA INC

PROJECT: 10001599 Richmond Landing

SAMPLING SITE:
AGAT WORK ORDER: 16Z119601

ATTENTION TO: Chris Hendry

SAMPLED BY: Kathryn Maton

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Toluene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Dibromochloromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Ethylene Dibromide	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,1,2-Tetrachloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Ethylbenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
m & p-Xylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromoform	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Styrene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,2,2-Tetrachloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
o-Xylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,3-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,3-Dichloropropene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Xylene Mixture	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
n-Hexane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Toluene-d8	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Water Analysis			
Antimony	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Arsenic	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Beryllium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Chromium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Copper	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Molybdenum	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Nickel	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Selenium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Silver	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Thallium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Uranium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Vanadium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Zinc	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Mercury	MET-93-6100	EPA SW-846 7470 & 245.1	CVAAS
Chromium VI	INOR-93-6034	SM 3500-Cr B	SPECTROPHOTOMETER
Cyanide	INOR-93-6052	MOE METHOD CN- 3015 & SM 4500 CN- I	TECHNICON AUTO ANALYZER
Sodium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
pH	INOR-93-6000	SM 4500-H+ B	PC TITRATE

CLIENT NAME: WSP CANADA INC
2611 QUEENSVIEW DRIVE, SUITE 300
OTTAWA, ON K2B8K2
(613) 829-2800

ATTENTION TO: Chris Hendry

PROJECT: 10001599 Richmond Landing

AGAT WORK ORDER: 16Z119614

MICROBIOLOGY ANALYSIS REVIEWED BY: Inesa Alizarchyk, Inorganic Lab Supervisor

TRACE ORGANICS REVIEWED BY: Oksana Gushyla, Trace Organics Lab Supervisor

WATER ANALYSIS REVIEWED BY: Mike Muneswar, BSc (Chem), Senior Inorganic Analyst

DATE REPORTED: Aug 03, 2016

PAGES (INCLUDING COVER): 16

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

***NOTES**

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 16Z119614

PROJECT: 10001599 Richmond Landing

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC

SAMPLING SITE:

ATTENTION TO: Chris Hendry

SAMPLED BY:

Microbiological Analysis (water)

DATE RECEIVED: 2016-07-25

DATE REPORTED: 2016-08-03

		SAMPLE DESCRIPTION: MW16-23		MW16-14		MW15-3	
		SAMPLE TYPE: Water		Water		Water	
		DATE SAMPLED: 7/25/2016		7/26/2016		7/26/2016	
Parameter	Unit	G / S	RDL	7732363	RDL	7749318	7749319
Escherichia coli	CFU/100mL	200	10	ND	2	8	ND

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Limits for Storm Sewer Discharge - City of Ottawa - By-Law No. 2003-514

7732363 RDL >1 indicates dilutions of the sample.
ND - Not Detected.

7749318-7749319 RDL >1 indicates dilutions of the sample.

Certified By:



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 16Z119614

PROJECT: 10001599 Richmond Landing

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MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC

ATTENTION TO: Chris Hendry

SAMPLING SITE:

SAMPLED BY:

Ottawa Sanitary and Combined Sewer Use By-law - Organics

DATE RECEIVED: 2016-07-25

DATE REPORTED: 2016-08-03

Parameter	Unit	SAMPLE DESCRIPTION:			MW16-14	MW15-3	MW16-23
		SAMPLE TYPE:			Water	Water	Water
		DATE SAMPLED:			7/21/2016	7/21/2016	7/25/2016
		G / S: A	G / S: B	RDL	7732301	7732346	7732363
Oil and Grease (animal/vegetable) in water	mg/L		150	0.5	<0.5[<B]	<0.5[<B]	<0.5[<B]
Oil and Grease (mineral) in water	mg/L		15	0.5	<0.5[<B]	<0.5[<B]	<0.5[<B]
Chloromethane	mg/L		0.19	0.0001	<0.0001[<B]	<0.0001[<B]	<0.0001[<B]
Vinyl Chloride	mg/L		0.4	0.0002	<0.0002[<B]	<0.0002[<B]	<0.0002[<B]
Bromomethane	mg/L		0.11	0.0001	<0.0001[<B]	<0.0001[<B]	<0.0001[<B]
Chloroethane	mg/L		0.27	0.0002	<0.0002[<B]	<0.0002[<B]	<0.0002[<B]
Trichlorofluoromethane	mg/L		0.02	0.0001	<0.0001[<B]	<0.0001[<B]	<0.0001[<B]
1,1-Dichloroethylene	mg/L		0.04	0.0002	<0.0002[<B]	<0.0002[<B]	<0.0002[<B]
Methylene Chloride	mg/L	0.0052	0.211	0.0003	<0.0003[<A]	<0.0003[<A]	<0.0003[<A]
trans-1,2-Dichloroethylene	mg/L		0.2	0.0002	<0.0002[<B]	<0.0002[<B]	<0.0002[<B]
1,1-Dichloroethane	mg/L		0.2	0.0003	<0.0003[<B]	<0.0003[<B]	<0.0003[<B]
cis-1,2-Dichloroethylene	mg/L	0.0056	0.2	0.0002	0.00044[<A]	<0.0002[<A]	<0.0002[<A]
Chloroform	mg/L	0.002	0.08	0.0002	<0.0002[<A]	<0.0002[<A]	<0.0002[<A]
1,2-Dichloroethane	mg/L		0.21	0.0002	<0.0002[<B]	<0.0002[<B]	<0.0002[<B]
1,1,1-Trichloroethane	mg/L		0.054	0.0003	<0.0003[<B]	<0.0003[<B]	<0.0003[<B]
Carbon Tetrachloride	mg/L		0.057	0.0002	<0.0002[<B]	<0.0002[<B]	<0.0002[<B]
Benzene	mg/L	0.002	0.01	0.0002	<0.0002[<A]	<0.0002[<A]	<0.0002[<A]
1,2-Dichloropropane	mg/L		0.85	0.0002	<0.0002[<B]	<0.0002[<B]	<0.0002[<B]
Trichloroethylene	mg/L	0.0076	0.054	0.0002	<0.0002[<A]	<0.0002[<A]	<0.0002[<A]
Bromodichloromethane	mg/L		0.35	0.0002	<0.0002[<B]	<0.0002[<B]	<0.0002[<B]
cis-1,3-Dichloropropylene	mg/L		0.07	0.0002	<0.0002[<B]	<0.0002[<B]	<0.0002[<B]
trans-1,3-Dichloropropylene	mg/L	0.0056	0.07	0.0003	<0.0003[<A]	<0.0003[<A]	<0.0003[<A]
1,1,2-Trichloroethane	mg/L		0.8	0.0002	<0.0002[<B]	<0.0002[<B]	<0.0002[<B]
Toluene	mg/L	0.002	0.08	0.0002	<0.0002[<A]	<0.0002[<A]	<0.0002[<A]
Dibromochloromethane	mg/L		0.057	0.0001	<0.0001[<B]	<0.0001[<B]	<0.0001[<B]
1,2-Dibromoethane	mg/L		0.028	0.0002	<0.0002[<B]	<0.0002[<B]	<0.0002[<B]
Tetrachloroethylene	mg/L	0.0044	0.05	0.0001	<0.0001[<A]	<0.0001[<A]	<0.0001[<A]
Chlorobenzene	mg/L		0.057	0.0001	<0.0001[<B]	<0.0001[<B]	<0.0001[<B]
Ethylbenzene	mg/L	0.002	0.057	0.0001	<0.0001[<A]	<0.0001[<A]	<0.0001[<A]

Certified By:



Certificate of Analysis

AGAT WORK ORDER: 16Z119614

PROJECT: 10001599 Richmond Landing

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC

ATTENTION TO: Chris Hendry

SAMPLING SITE:

SAMPLED BY:

Ottawa Sanitary and Combined Sewer Use By-law - Organics

DATE RECEIVED: 2016-07-25

DATE REPORTED: 2016-08-03

		SAMPLE DESCRIPTION:			MW16-14	MW15-3	MW16-23
		SAMPLE TYPE:			Water	Water	Water
		DATE SAMPLED:			7/21/2016	7/21/2016	7/25/2016
Parameter	Unit	G / S: A	G / S: B	RDL	7732301	7732346	7732363
Bromoform	mg/L		0.63	0.0001	<0.0001[<B]	<0.0001[<B]	<0.0001[<B]
Styrene	mg/L		0.04	0.0001	<0.0001[<B]	<0.0001[<B]	<0.0001[<B]
1,1,2,2-Tetrachloroethane	mg/L	0.017	0.04	0.0001	<0.0001[<A]	<0.0001[<A]	<0.0001[<A]
1,3-Dichlorobenzene	mg/L		0.036	0.0001	<0.0001[<B]	<0.0001[<B]	<0.0001[<B]
1,4-Dichlorobenzene	mg/L	0.0068	0.017	0.0001	<0.0001[<A]	<0.0001[<A]	<0.0001[<A]
1,2-Dichlorobenzene	mg/L	0.0056	0.088	0.0001	<0.0001[<A]	<0.0001[<A]	<0.0001[<A]
1,3,5-Trimethylbenzene	mg/L		0.003	0.0001	<0.0001[<B]	<0.0001[<B]	<0.0001[<B]
Total Xylenes	mg/L	0.0044	0.32	0.0001	<0.0001[<A]	<0.0001[<A]	<0.0001[<A]
Bis(2-Chloroethoxy)methane	mg/L		0.036	0.0005	<0.0005[<B]	<0.0005[<B]	<0.0005[<B]
2,4-Dichlorophenol	mg/L		0.044	0.0005	<0.0005[<B]	<0.0005[<B]	<0.0005[<B]
Naphthalene	mg/L	0.0064	0.059	0.0003	<0.0003[<A]	<0.0003[<A]	<0.0003[<A]
2-Methylnaphthalene	mg/L		0.022	0.0002	<0.0002[<B]	<0.0002[<B]	<0.0002[<B]
1-Methylnaphthalene	mg/L		0.032	0.0002	<0.0002[<B]	<0.0002[<B]	<0.0002[<B]
Fluorene	mg/L		0.059	0.0002	<0.0002[<B]	<0.0002[<B]	<0.0002[<B]
Diethyl phthalate	mg/L		0.2	0.0005	<0.0005[<B]	<0.0005[<B]	<0.0005[<B]
Bis(2-Ethylhexyl)phthalate	mg/L		0.28	0.0005	0.0005[<B]	0.0024[<B]	<0.0005[<B]
Hexachlorobenzene	mg/L	0.00004	0.0001	0.00001	<0.00001[<A]	<0.00001[<A]	<0.00001[<A]
Di-n-butyl phthalate	mg/L		0.057	0.0005	<0.0005[<B]	<0.0005[<B]	<0.0005[<B]
Total PAHs	mg/L	0.006	0.015	0.0003	<0.0003[<A]	<0.0003[<A]	0.0006[<A]
Butyl benzyl phthalate	mg/L		0.017	0.0005	<0.0005[<B]	<0.0005[<B]	<0.0005[<B]
Di-n-octyl phthalate	mg/L		0.03	0.0005	<0.0005[<B]	<0.0005[<B]	<0.0005[<B]
Indole	mg/L		0.05	0.0005	<0.0005[<B]	<0.0005[<B]	<0.0005[<B]
Surrogate	Unit	Acceptable Limits					
Toluene-d8	% Recovery		50-140		108	111	110
4-Bromofluorobenzene	% Recovery		50-140		95	97	99

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: A Refers to Limits for Storm Sewer Discharge - City of Ottawa - By-Law No. 2003-514, B Refers to Limits for Sanitary and Combined Sewer Discharge - City of Ottawa - By-Law No. 2003-514

Certified By:



Certificate of Analysis

AGAT WORK ORDER: 16Z119614

PROJECT: 10001599 Richmond Landing

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC

ATTENTION TO: Chris Hendry

SAMPLING SITE:

SAMPLED BY:

Ottawa Sanitary and Combined Sewer Use By-law - Inorganics

DATE RECEIVED: 2016-07-25

DATE REPORTED: 2016-08-03

Parameter	Unit	SAMPLE DESCRIPTION:			MW16-14		MW15-3		MW16-23	
		SAMPLE TYPE:			Water		Water		Water	
		DATE SAMPLED:			7/21/2016		7/21/2016		7/25/2016	
		G / S: A	G / S: B	RDL	7732301	RDL	7732346	RDL	7732363	
BOD (5)	mg/L	25	300	5	<5[<A]	5	<5[<A]	5	<5[<A]	
pH	pH Units	6-9	5.5-11	NA	7.90	NA	7.91	NA	8.62	
Total Suspended Solids	mg/L	15	350	10	305[A-B]	10	144[A-B]	10	8870[>B]	
Total Phosphorus	mg/L	0.4	10	0.10	0.40[A]	0.05	0.12[<A]	1.2	7.18[A-B]	
Total Kjeldahl Nitrogen	mg/L		100	0.10	0.53[<B]	0.10	0.62[<B]	0.50	4.13[<B]	
Fluoride	mg/L		10	0.25	<0.25[<B]	0.25	<0.25[<B]	0.05	<0.05[<B]	
Sulphate	mg/L		1500	0.50	267[<B]	0.50	39.5[<B]	0.10	15.1[<B]	
Sulphide	mg/L		2	0.1	<0.1[<B]	0.1	<0.1[<B]	0.1	<0.1[<B]	
Phenols	mg/L	0.008	1	0.001	<0.001[<A]	0.001	<0.001[<A]	0.001	<0.001[<A]	
Total Cyanide	mg/L	0.02	2	0.002	<0.002[<A]	0.002	<0.002[<A]	0.002	<0.002[<A]	
Total Aluminum	mg/L		50	0.020	11.8[<B]	0.020	1.09[<B]	0.20	125[>B]	
Total Antimony	mg/L		5	0.020	<0.020[<B]	0.020	<0.020[<B]	0.040	<0.040[<B]	
Total Arsenic	mg/L	0.02	1	0.015	<0.015[<A]	0.015	<0.015[<A]	0.030	<0.030[<B]	
Total Bismuth	mg/L		5	0.010	<0.010[<B]	0.010	<0.010[<B]	0.020	<0.020[<B]	
Total Boron	mg/L		25	0.050	0.165[<B]	0.050	0.173[<B]	0.100	<0.100[<B]	
Total Cadmium	mg/L	0.008	0.02	0.010	<0.010[<B]	0.010	<0.010[<B]	0.020	<0.020[<B]	
Total Chromium	mg/L	0.08	5	0.020	<0.020[<A]	0.020	<0.020[<A]	0.040	0.297[A-B]	
Total Cobalt	mg/L		5	0.020	<0.020[<B]	0.020	<0.020[<B]	0.040	0.097[<B]	
Total Copper	mg/L	0.04	3	0.020	0.029[<A]	0.020	<0.020[<A]	0.040	0.245[A-B]	
Total Lead	mg/L	0.12	5	0.020	<0.020[<A]	0.020	<0.020[<A]	0.040	0.238[A-B]	
Total Manganese	mg/L	0.05	5	0.020	0.326[A-B]	0.020	0.182[A-B]	0.040	4.28[A-B]	
Total Mercury	mg/L	0.0004	0.001	0.0002	<0.0002[<A]	0.0002	<0.0002[<A]	0.0002	0.0006[A-B]	
Total Molybdenum	mg/L		5	0.020	<0.020[<B]	0.020	<0.020[<B]	0.040	<0.040[<B]	
Total Nickel	mg/L	0.08	3	0.030	<0.030[<A]	0.030	<0.030[<A]	0.060	0.225[A-B]	
Total Selenium	mg/L	0.02	5	0.020	<0.020[<A]	0.020	<0.020[<A]	0.040	<0.040[<B]	
Total Silver	mg/L	0.12	5	0.020	<0.020[<A]	0.020	<0.020[<A]	0.040	<0.040[<A]	
Total Tin	mg/L		5	0.020	<0.020[<B]	0.020	<0.020[<B]	0.040	<0.040[<B]	
Total Titanium	mg/L		5	0.020	0.607[<B]	0.020	0.053[<B]	0.20	11.3[>B]	
Total Vanadium	mg/L		5	0.020	<0.020[<B]	0.020	<0.020[<B]	0.040	0.318[<B]	
Total Zinc	mg/L	0.04	3	0.020	0.029[<A]	0.020	<0.020[<A]	0.040	0.580[A-B]	

Certified By:



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 16Z119614

PROJECT: 10001599 Richmond Landing

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC

ATTENTION TO: Chris Hendry

SAMPLING SITE:

SAMPLED BY:

Ottawa Sanitary and Combined Sewer Use By-law - Inorganics

DATE RECEIVED: 2016-07-25

DATE REPORTED: 2016-08-03

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: A Refers to Limits for Storm Sewer Discharge - City of Ottawa - By-Law No. 2003-514, B Refers to Limits for Sanitary and Combined Sewer Discharge - City of Ottawa - By-Law No. 2003-514

7732301-7732363 Elevated RDLs indicate the degree of sample dilutions prior to analysis in order to keep analytes within the calibration range of the instruments and to reduce matrix interferences.

Certified By:



Guideline Violation

AGAT WORK ORDER: 16Z119614

PROJECT: 10001599 Richmond Landing

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CLIENT NAME: WSP CANADA INC

ATTENTION TO: Chris Hendry

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
7732301	MW16-14	Ottawa Storm	Ottawa Sanitary and Combined Sewer Use By-law - Inorganics	Total Manganese	0.05	0.326
7732301	MW16-14	Ottawa Storm	Ottawa Sanitary and Combined Sewer Use By-law - Inorganics	Total Suspended Solids	15	305
7732346	MW15-3	Ottawa Storm	Ottawa Sanitary and Combined Sewer Use By-law - Inorganics	Total Manganese	0.05	0.182
7732346	MW15-3	Ottawa Storm	Ottawa Sanitary and Combined Sewer Use By-law - Inorganics	Total Suspended Solids	15	144
7732363	MW16-23	Ottawa Sanitary	Ottawa Sanitary and Combined Sewer Use By-law - Inorganics	Total Aluminum	50	125
7732363	MW16-23	Ottawa Sanitary	Ottawa Sanitary and Combined Sewer Use By-law - Inorganics	Total Suspended Solids	350	8870
7732363	MW16-23	Ottawa Sanitary	Ottawa Sanitary and Combined Sewer Use By-law - Inorganics	Total Titanium	5	11.3
7732363	MW16-23	Ottawa Storm	Ottawa Sanitary and Combined Sewer Use By-law - Inorganics	Total Chromium	0.08	0.297
7732363	MW16-23	Ottawa Storm	Ottawa Sanitary and Combined Sewer Use By-law - Inorganics	Total Copper	0.04	0.245
7732363	MW16-23	Ottawa Storm	Ottawa Sanitary and Combined Sewer Use By-law - Inorganics	Total Lead	0.12	0.238
7732363	MW16-23	Ottawa Storm	Ottawa Sanitary and Combined Sewer Use By-law - Inorganics	Total Manganese	0.05	4.28
7732363	MW16-23	Ottawa Storm	Ottawa Sanitary and Combined Sewer Use By-law - Inorganics	Total Mercury	0.0004	0.0006
7732363	MW16-23	Ottawa Storm	Ottawa Sanitary and Combined Sewer Use By-law - Inorganics	Total Nickel	0.08	0.225
7732363	MW16-23	Ottawa Storm	Ottawa Sanitary and Combined Sewer Use By-law - Inorganics	Total Phosphorus	0.4	7.18
7732363	MW16-23	Ottawa Storm	Ottawa Sanitary and Combined Sewer Use By-law - Inorganics	Total Suspended Solids	15	8870
7732363	MW16-23	Ottawa Storm	Ottawa Sanitary and Combined Sewer Use By-law - Inorganics	Total Zinc	0.04	0.580

Quality Assurance

CLIENT NAME: WSP CANADA INC

PROJECT: 10001599 Richmond Landing

SAMPLING SITE:

AGAT WORK ORDER: 16Z119614

ATTENTION TO: Chris Hendry

SAMPLED BY:

Microbiology Analysis

RPT Date: Aug 03, 2016

RPT Date: Aug 03, 2016			DUPLICATE			Method Blank	REFERENCE MATERIAL		METHOD BLANK SPIKE			MATRIX SPIKE			
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Microbiological Analysis (water)

Escherichia coli	7732524	ND	ND	NA	< 1
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Certified By:




Quality Assurance

CLIENT NAME: WSP CANADA INC

PROJECT: 10001599 Richmond Landing

SAMPLING SITE:

AGAT WORK ORDER: 16Z119614

ATTENTION TO: Chris Hendry

SAMPLED BY:

Trace Organics Analysis

RPT Date: Aug 03, 2016			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Ottawa Sanitary and Combined Sewer Use By-law - Organics															
Oil and Grease (animal/vegetable) in water		TW	< 0.5	< 0.5	NA	< 0.5	NA	70%	130%	106%	70%	130%	109%	70%	130%
Oil and Grease (mineral) in water		TW	< 0.5	< 0.5	NA	< 0.5	NA	70%	130%	78%	70%	130%	81%	70%	130%
Chloromethane	7732301	7732301	0.0001	0.0001	NA	0.0001	89%	60%	130%	104%	60%	130%	91%	60%	130%
Vinyl Chloride	7732301	7732301	0.0002	0.0002	NA	0.0002	99%	60%	130%	85%	60%	130%	87%	60%	130%
Bromomethane	7732301	7732301	< 0.20	< 0.20	NA	0.0001	112%	60%	130%	95%	60%	130%	72%	60%	130%
Chloroethane	7732301	7732301	0.0002	0.0002	NA	0.0002	124%	60%	130%	97%	60%	130%	105%	60%	130%
Trichlorofluoromethane	7732301	7732301	< 0.40	< 0.40	NA	0.0001	112%	60%	130%	109%	60%	130%	121%	60%	130%
1,1-Dichloroethylene	7732301	7732301	0.0002	0.0002	NA	0.0002	125%	60%	130%	116%	60%	130%	118%	60%	130%
Methylene Chloride	7732301	7732301	0.0003	0.0003	NA	0.0003	94%	60%	130%	110%	60%	130%	90%	60%	130%
trans-1,2-Dichloroethylene	7732301	7732301	0.0002	0.0002	NA	0.0002	120%	60%	130%	120%	60%	130%	127%	60%	130%
1,1-Dichloroethane	7732301	7732301	< 0.30	< 0.30	NA	0.0003	127%	60%	130%	121%	60%	130%	129%	60%	130%
cis-1,2-Dichloroethylene	7732301	7732301	0.0002	0.0002	NA	0.0002	128%	60%	130%	121%	60%	130%	124%	60%	130%
Chloroform	7732301	7732301	0.0002	0.0002	NA	0.0002	120%	60%	130%	114%	60%	130%	121%	60%	130%
1,2-Dichloroethane	7732301	7732301	0.0002	0.0002	NA	0.0002	93%	60%	130%	91%	60%	130%	96%	60%	130%
1,1,1-Trichloroethane	7732301	7732301	< 0.30	< 0.30	NA	0.0003	111%	60%	130%	101%	60%	130%	99%	60%	130%
Carbon Tetrachloride	7732301	7732301	< 0.20	< 0.20	NA	0.0002	103%	60%	130%	100%	60%	130%	85%	60%	130%
Benzene	7732301	7732301	0.55	0.67	19.7%	0.0002	98%	60%	130%	92%	60%	130%	94%	60%	130%
1,2-Dichloropropane	7732301	7732301	< 0.20	< 0.20	NA	0.0002	94%	60%	130%	88%	60%	130%	91%	60%	130%
Trichloroethylene	7732301	7732301	0.0002	0.0002	NA	0.0002	102%	60%	130%	95%	60%	130%	95%	60%	130%
Bromodichloromethane	7732301	7732301	< 0.20	< 0.20	NA	0.0002	105%	60%	130%	92%	60%	130%	99%	60%	130%
cis-1,3-Dichloropropylene	7732301	7732301	0.0002	0.0002	NA	0.0002	93%	60%	130%	80%	60%	130%	88%	60%	130%
trans-1,3-Dichloropropylene	7732301	7732301	0.0003	0.0003	NA	0.0003	91%	60%	130%	85%	60%	130%	91%	60%	130%
1,1,2-Trichloroethane	7732301	7732301	< 0.20	< 0.20	NA	0.0002	99%	60%	130%	96%	60%	130%	107%	60%	130%
Toluene	7732301	7732301	0.71	0.70	1.4%	0.0002	107%	60%	130%	104%	60%	130%	105%	60%	130%
Dibromochloromethane	7732301	7732301	< 0.10	< 0.10	NA	0.0001	92%	60%	130%	96%	60%	130%	103%	60%	130%
1,2-Dibromoethane	7732301	7732301	0.0002	0.0002	NA	0.0002	93%	60%	130%	91%	60%	130%	99%	60%	130%
Tetrachloroethylene	7732301	7732301	< 0.20	< 0.20	NA	0.0001	107%	60%	130%	103%	60%	130%	101%	60%	130%
Chlorobenzene	7732301	7732301	< 0.10	< 0.10	NA	0.0001	102%	60%	130%	101%	60%	130%	102%	60%	130%
Ethylbenzene	7732301	7732301	< 0.10	< 0.10	NA	0.0001	105%	60%	130%	85%	60%	130%	102%	60%	130%
Bromoform	7732301	7732301	< 0.10	< 0.10	NA	0.0001	100%	60%	130%	93%	60%	130%	103%	60%	130%
Styrene	7732301	7732301	0.0001	0.0001	NA	0.0001	88%	60%	130%	90%	60%	130%	89%	60%	130%
1,1,2,2-Tetrachloroethane	7732301	7732301	< 0.10	< 0.10	NA	0.0001	101%	60%	130%	99%	60%	130%	117%	60%	130%
1,3-Dichlorobenzene	7732301	7732301	< 0.10	< 0.10	NA	0.0001	95%	60%	130%	91%	60%	130%	98%	60%	130%
1,4-Dichlorobenzene	7732301	7732301	< 0.10	< 0.10	NA	0.0001	97%	60%	130%	101%	60%	130%	105%	60%	130%
1,2-Dichlorobenzene	7732301	7732301	< 0.10	< 0.10	NA	0.0001	93%	60%	130%	92%	60%	130%	100%	60%	130%
1,3,5-Trimethylbenzene	7732301	7732301	0.0001	0.0001	NA	0.0001	89%	60%	130%	96%	60%	130%	93%	60%	130%
Bis(2-Chloroethoxy)methane		TW	< 0.0005	< 0.0005	NA	< 0.0005	98%	60%	140%	94%	60%	140%	82%	60%	140%
2,4-Dichlorophenol		TW	< 0.0005	< 0.0005	NA	< 0.0005	86%	60%	140%	81%	60%	140%	67%	60%	140%

Quality Assurance

CLIENT NAME: WSP CANADA INC

PROJECT: 10001599 Richmond Landing

SAMPLING SITE:

AGAT WORK ORDER: 16Z119614

ATTENTION TO: Chris Hendry

SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Aug 03, 2016			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Naphthalene		TW	< 0.0003	< 0.0003	NA	< 0.0003	84%	60%	140%	89%	60%	140%	99%	60%	140%
2-Methylnaphthalene		TW	< 0.0002	< 0.0002	NA	< 0.0002	82%	60%	130%	102%	60%	130%	73%	60%	130%
1-Methylnaphthalene		TW	< 0.0002	< 0.0002	NA	< 0.0002	64%	60%	130%	90%	60%	130%	80%	60%	130%
Fluorene		TW	< 0.0002	< 0.0002	NA	< 0.0002	94%	60%	140%	86%	60%	140%	94%	60%	140%
Diethyl phthalate		TW	< 0.0005	< 0.0005	NA	< 0.0005	99%	60%	130%	94%	60%	130%	76%	60%	130%
Bis(2-Ethylhexyl)phthalate		TW	< 0.0005	< 0.0005	NA	< 0.0005	90%	60%	130%	82%	60%	130%	93%	60%	130%
Hexachlorobenzene		TW	< 0.00001	< 0.00001	NA	< 0.00001	98%	60%	130%	101%	60%	130%	100%	60%	130%
Di-n-butyl phthalate		TW	< 0.0005	< 0.0005	NA	< 0.0005	98%	60%	130%	108%	60%	130%	86%	60%	130%
Total PAHs		TW	< 0.0003	< 0.0003	NA	< 0.0003	102%	60%	130%	64%	60%	130%	105%	60%	130%
Butyl benzyl phthalate		TW	< 0.0005	< 0.0005	NA	< 0.0005	89%	60%	130%	94%	60%	130%	98%	60%	130%
Di-n-octyl phthalate		TW	< 0.0005	< 0.0005	NA	< 0.0005	81%	60%	130%	82%	60%	130%	69%	60%	130%
Indole		TW	< 0.0005	< 0.0005	NA	< 0.0005	94%	60%	130%	67%	60%	130%	78%	60%	130%

Comments: Tap water analysis has been performed as QC sample testing for duplicate and matrix spike due to insufficient sample volume.

When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Certified By:


Quality Assurance

CLIENT NAME: WSP CANADA INC

PROJECT: 10001599 Richmond Landing

SAMPLING SITE:

AGAT WORK ORDER: 16Z119614

ATTENTION TO: Chris Hendry

SAMPLED BY:

Water Analysis															
RPT Date: Aug 03, 2016			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Ottawa Sanitary and Combined Sewer Use By-law - Inorganics															
BOD (5)	7732403		243	248	2.0%	< 5	101%	75%	125%	NA			NA		
pH	7732346	7732346	7.91	7.84	0.9%	NA	99%	90%	110%	NA			NA		
Total Suspended Solids	7732435		48	50	NA	< 10	100%	80%	120%	NA			NA		
Total Phosphorus	7726836		<0.05	<0.05	NA	< 0.05	99%	90%	110%	106%	90%	110%	100%	80%	120%
Total Kjeldahl Nitrogen	7732785		18.8	19.1	1.6%	< 0.10	107%	80%	120%	107%	80%	120%	105%	70%	130%
Fluoride	7731783		<0.25	<0.25	NA	< 0.05	101%	90%	110%	106%	90%	110%	100%	80%	120%
Sulphate	7731783		6.03	5.86	2.9%	< 0.10	96%	90%	110%	100%	90%	110%	105%	80%	120%
Sulphide	7732301	7732301	< 0.1	<0.1	NA	< 0.1	100%	90%	110%	99%	90%	110%	102%	80%	120%
Phenols	7732301	7732301	< 0.001	<0.001	NA	< 0.001	102%	90%	110%	105%	90%	110%	100%	80%	120%
Total Cyanide	7729363		0.002	0.002	NA	< 0.002	103%	80%	120%	100%	90%	110%	100%	70%	130%
Total Aluminum	7731779		0.035	0.028	NA	< 0.020	102%	90%	110%	100%	80%	120%	98%	70%	130%
Total Antimony	7731779		<0.020	<0.020	NA	< 0.020	99%	90%	110%	94%	80%	120%	95%	70%	130%
Total Arsenic	7731779		<0.015	<0.015	NA	< 0.015	96%	90%	110%	94%	80%	120%	94%	70%	130%
Total Bismuth	7731779		<0.010	<0.010	NA	< 0.010	98%	90%	110%	109%	80%	120%	107%	70%	130%
Total Boron	7731779		0.054	0.054	NA	< 0.050	100%	90%	110%	94%	80%	120%	96%	70%	130%
Total Cadmium	7731779		<0.010	<0.010	NA	< 0.010	100%	90%	110%	99%	80%	120%	106%	70%	130%
Total Chromium	7731779		<0.020	<0.020	NA	< 0.020	100%	90%	110%	100%	80%	120%	98%	70%	130%
Total Cobalt	7731779		<0.020	<0.020	NA	< 0.020	100%	90%	110%	101%	80%	120%	96%	70%	130%
Total Copper	7731779		0.026	<0.020	NA	< 0.020	100%	90%	110%	97%	80%	120%	90%	70%	130%
Total Lead	7731779		<0.020	<0.020	NA	< 0.020	99%	90%	110%	97%	80%	120%	94%	70%	130%
Total Manganese	7731779		<0.020	<0.020	NA	< 0.020	95%	90%	110%	106%	80%	120%	98%	70%	130%
Total Mercury	7726615		<0.0002	<0.0002	NA	< 0.0002	100%	90%	110%	101%	90%	110%	107%	80%	120%
Total Molybdenum	7731779		0.093	0.096	NA	< 0.020	102%	90%	110%	98%	80%	120%	97%	70%	130%
Total Nickel	7731779		<0.030	<0.030	NA	< 0.030	102%	90%	110%	102%	80%	120%	100%	70%	130%
Total Selenium	7731779		<0.020	<0.020	NA	< 0.020	101%	90%	110%	99%	80%	120%	99%	70%	130%
Total Silver	7731779		<0.020	<0.020	NA	< 0.020	100%	90%	110%	105%	80%	120%	105%	70%	130%
Total Tin	7731779		<0.020	<0.020	NA	< 0.020	93%	90%	110%	95%	80%	120%	93%	70%	130%
Total Titanium	7731779		<0.020	<0.020	NA	< 0.020	106%	90%	110%	97%	80%	120%	102%	70%	130%
Total Vanadium	7731779		<0.020	<0.020	NA	< 0.020	98%	90%	110%	99%	80%	120%	95%	70%	130%
Total Zinc	7731779		<0.020	<0.020	NA	< 0.020	100%	90%	110%	100%	80%	120%	97%	70%	130%

Comments: NA signifies Not Applicable.

Duplicate Qualifier: As the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Chris Hendry
Certified By:

Method Summary

CLIENT NAME: WSP CANADA INC

AGAT WORK ORDER: 16Z119614

PROJECT: 10001599 Richmond Landing

ATTENTION TO: Chris Hendry

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Microbiology Analysis			
Escherichia coli	MIC-93-7010	EPA 1604	Membrane Filtration

Method Summary

CLIENT NAME: WSP CANADA INC

PROJECT: 10001599 Richmond Landing

SAMPLING SITE:
AGAT WORK ORDER: 16Z119614

ATTENTION TO: Chris Hendry

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Oil and Grease (animal/vegetable) in water	VOL-91-5011	EPA SW-846 3510C & SM 5520	GRAVIMETRIC
Oil and Grease (mineral) in water	VOL-91-5011	EPA SW-846 3510C & SM 5520	GRAVIMETRIC
Chloromethane	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
Vinyl Chloride	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
Bromomethane	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
Chloroethane	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
Trichlorofluoromethane	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
1,1-Dichloroethylene	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
Methylene Chloride	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
trans-1,2-Dichloroethylene	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
1,1-Dichloroethane	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
cis-1,2-Dichloroethylene	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
Chloroform	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
1,2-Dichloroethane	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
1,1,1-Trichloroethane	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
Benzene	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
1,2-Dichloropropane	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
Trichloroethylene	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
Bromodichloromethane	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
cis-1,3-Dichloropropylene	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
trans-1,3-Dichloropropylene	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
1,1,2-Trichloroethane	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
Toluene	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
Dibromochloromethane	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
1,2-Dibromoethane	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
Chlorobenzene	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
Ethylbenzene	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
Bromoform	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
Styrene	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
1,1,2,2-Tetrachloroethane	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
1,3-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
1,3,5-Trimethylbenzene	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
Total Xylenes	VOL-91-5001	EPA SW-846 5030B & 8260B	(P&T)GC/MS
Toluene-d8	VOL-91-5001		(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5001		(P&T)GC/MS
Bis(2-Chloroethoxy)methane	ORG-91-5114	EPA SW-846 3510C & 8270D	GC/MS
2,4-Dichlorophenol	ORG-91-5114	EPA SW-846 3510C & 8270D	GC/MS
Naphthalene	ORG-91-5114	EPA SW-846 3510C & 8270D	GC/MS
2-Methylnaphthalene	ORG-91-5114	EPA SW-846 3510C & 8270D	GC/MS
1-Methylnaphthalene	ORG-91-5114	EPA SW-846 3510C & 8270D	GC/MS
Fluorene	ORG-91-5114	EPA SW-846 3510C & 8270D	GC/MS
Diethyl phthalate	ORG-91-5114	EPA SW-846 3510C & 8270D	GC/MS
Bis(2-Ethylhexyl)phthalate	ORG-91-5114	EPA SW-846 3510C & 8270D	GC/MS
Hexachlorobenzene	ORG-91-5112	EPA SW-846 3510C & 8081B	GC/ECD
Di-n-butyl phthalate	ORG-91-5114	EPA SW-846 3510C & 8270D	GC/MS



Method Summary

CLIENT NAME: WSP CANADA INC

PROJECT: 10001599 Richmond Landing

SAMPLING SITE:

AGAT WORK ORDER: 16Z119614

ATTENTION TO: Chris Hendry

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Total PAHs	ORG-91-5114	EPA SW-846 3510C & 8270D	GC/MS
Butyl benzyl phthalate	ORG-91-5114	EPA SW-846 3510C & 8270D	GC/MS
Di-n-octyl phthalate	ORG-91-5114	EPA SW-846 3510C & 8270D	GC/MS
Indole	ORG-91-5114	EPA SW-846 3510C & 8270D	GC/MS
Water Analysis			
BOD (5)	INOR-93-6006	SM 5210 B	DO METER
pH	INOR-93-6000	SM 4500-H+ B	PC TITRATE
Total Suspended Solids	INOR-93-6028	SM 2540 D	BALANCE
Total Phosphorus	INOR-93-6022	SM 4500-P B&E	SPECTROPHOTOMETER
Total Kjeldahl Nitrogen	INOR-93-6048	QuikChem 10-107-06-2-I & SM 4500-Norg D	LACHAT FIA
Fluoride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Sulphide	INOR-93-6054	SM 4500 S2- D	SPECTROPHOTOMETER
Phenols	INOR-93-6050	MOE ROPHEN-E 3179 & SM 5530 D	TECHNICON AUTO ANALYZER
Total Cyanide	INOR-93-6051	MOE 3015 & SM 4500 CN- A,B,C	TECHNICON AUTO ANALYZER
Total Aluminum	MET-93-6003	EPA SW-846 3010A & 6020A	ICP-MS
Total Antimony	MET-93-6003	EPA SW-846 3010A & 6020A	ICP-MS
Total Arsenic	MET-93-6103	EPA SW-846 3010A & 6020A	ICP-MS
Total Bismuth	MET-93-6003	EPA SW-846 3010A & 6020A	ICP-MS
Total Boron	MET-93-6103	EPA SW-846 3010A & 6020A	ICP-MS
Total Cadmium	MET-93-6003	EPA SW-846 3010A & 6020A	ICP-MS
Total Chromium	MET-93-6003	EPA SW-846 3010A & 6020A	ICP-MS
Total Cobalt	MET-93-6003	EPA SW-846 3010A & 6020A	ICP-MS
Total Copper	MET-93-6003	EPA SW-846 3010A & 6020A	ICP-MS
Total Lead	MET-93-6003	EPA SW-846 3010A & 6020A	ICP-MS
Total Manganese	MET-93-6003	EPA SW-846 3010A & 6020A	ICP-MS
Total Mercury	MET-93-6100	EPA SW-846 7470 & 245.1	CVAAS
Total Molybdenum	MET-93-6103	EPA SW-846 3010A & 6020A	ICP-MS
Total Nickel	MET-93-6003	EPA SW-846 3010A & 6020A	ICP-MS
Total Selenium	MET-93-6103	EPA SW-846 3010A & 6020A	ICP-MS
Total Silver	MET-93-6003	EPA SW-846 3010A & 6020A	ICP-MS
Total Tin	MET-93-6003	EPA SW-846 3010A & 6020A	ICP-MS
Total Titanium	MET-93-6103	EPA SW-846 3010A & 6020A	ICP-MS
Total Vanadium	MET-93-6103	EPA SW-846 3010A & 6020A	ICP-MS
Total Zinc	MET-93-6003	EPA SW-846 3010A & 6020A	ICP-MS

