MEMO

TO: Ken Szekely

COMPANY: Quantum Realty Management

FROM: WSP E&I Canada Limited

DATE: May 2, 2023

PROJECT NO.: WW21012079

SUBJECT: 1450 King Road SWM Facility Works – Hydrogeological Addendum

WSP E&I Canada Limited (formerly Wood Environment & Infrastructure Solutions) was retained by Quantum Realty Management to complete an addendum to the Geotechnical Investigation for the re-design of the existing stormwater management facility (SWMF) and associated future re-development at 1450 King Road, located in the City of Burlington ("Site").

This report has been prepared as an addendum to the Geotechnical Investigation Report (Geotechnical Report) entitled *"Geotechnical Investigation Report, 1450 King Road, Burlington*" dated January 24, 2022 (Wood 2022, Project No. WW21012079) to supplement the information in the Geotechnical Report and should be read in conjunction with the Geotechnical Report. This report has been prepared to document the activities arising from the recommendations following the submission of the Geotechnical Report.

The Site is at the north-west corner of North Service Road and King Road, in Burlington, Ontario. The northern and western portions are vacant, vegetated with grasses with a few trees and shrubs. The southeast section serves as an existing storm water pond. A tributary of Indian Creek flows along the west boundary with heavily treed valley slopes. The topography within the Site slopes from the north-west to the south-east.

1 FIELD ACTIVITIES

1.1 GROUNDWATER MONITORING

WSP conducted groundwater level monitoring at the Site from March 1 to April 4, 2023 utilizing pressure transducers and manual water level measurements in groundwater monitoring wells. The monitoring occurred at MW4 and MW5 as shown in Figure 1. Pressure transducers were set to record readings at 15-minute intervals during the monitoring period. An additional pressure transducer was installed in MW4 above the groundwater level which was utilized to compensate for barometric pressure changes during the monitoring period. The manual levels were used to corroborate the pressure transducer data.

Groundwater elevations recorded during the monitoring period are shown in Figure 2. The groundwater levels from March to April 2023 in MW4 ranged from 121.33 to 121.81 metres above sea level (mASL). It is noted that this does not consider two decreases in water level that occurred on March 10 and March 14, 2023. The groundwater level decreases in MW4 on March 10, 2023, and March 14, 2023 represent purging of the monitoring well in preparation for groundwater sampling and subsequent groundwater quality sampling. The groundwater levels from March to April 2023 in MW5 ranged from 119.31 to 119.64 mASL. The groundwater level data indicates very little variation in the groundwater level during the monitoring period. The pressure transducers currently remain installed.

1.2 GROUNDWATER QUALITY SAMPLING

MW4 was purged on March 10, 2023 using a Waterra® inertial lift pump (i.e. foot valve) fitted with dedicated polyethylene tubing installed in the monitoring well. MW4 was purged dry to remove in preparation for groundwater sampling to remove fine particles from the sand filter pack and the soils immediately surrounding the well screen.

Groundwater samples were collected from MW4 on March 14, 2023 using low flow sampling techniques (peristaltic pump or bladder pump system) following stabilization of water quality parameters which include water temperature, electrical conductivity, dissolved oxygen, and pH. Groundwater samples were collected in lab supplied bottles for parameters listed in In Halton Region Sanitary Sewer Bylaw (2-03) and City of Burlington Storm Sewer Bylaw (059-2022), and for metals & inorganics, volatile organic compounds, polycyclic aromatic hydrocarbons, and polychlorinated biphenyls compared to the MECP Table 3 – Full Depth Generic Site Condition Standards in a Non-Potable ground Water Condition.

Laboratory chemical analyses were conducted by ALS Environmental, accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) in accordance with ISO/IEC 17025:1999 – General Requirements for the Competence of testing and Calibration laboratories for the tested parameters set out in the Soil, Ground and Sediment Standards document (MOE, 15 April 2011).

The certificates of analysis for the groundwater sample by ALS Environmental are provided in Appendix A on lab work order #WT2306151 and #WT2306162.

No exceedances were identified for any of the above listed guidelines or bylaws.

2 DEWATERING RATE ESTIMATION

2.1 EXCAVATION AND DEWATERING ASSUMPTIONS

For the construction of the proposed SWMF, it is expected that excavations will be below the groundwater level, and dewatering is expected to be needed to support the construction. Analytical equations have been used to estimate dewatering rates that may be required to support the construction of the stormwater management pond.

To provide a dewatering rate estimate, the following assumptions have been made, which are based on information provided and Site conditions encountered during the investigation.

The dewatering rates have been estimated using the estimated hydraulic conductivities from the two on-site monitoring wells tested on November 2, 2021. The details of the hydraulic conductivity testing are included in the Geotechnical Report. The dewatering rate has been selected based on the highest hydraulic conductivity as an input parameter. It has been assumed that this hydraulic conductivity value is representative of the entire excavation area, and that there will be negligible inflow along areas not considered in this analysis (e.g. utility trenches).

It is expected that open cut trench excavation will be used to construct the SWMF. Based on the Site layout plan (dated February 17, 2022), the dimensions of the SWMF are expected to be approximately 133 m by 35.5 m with a maximum expected excavation depth of 4.1 m. The base elevation of the SWMF is expected to be approximately 118.5 mASL. As the excavation for the SWMF is sloped towards the centre of the pond, two scenarios were considered for the dewatering estimations: 1) the maximum excavation depth of 4.1 m is applied through the excavation area and 2) the maximum excavation depth of 4.1 m is only applied to the area of maximum excavation

depth. Based on the Site layout plan, the area of maximum excavation depth is assumed to be approximately 101 m by 17.1 m.

For purposes of estimating the dewatering requirements and to conservatively account for seasonal water level changes, up to 1.0 m has been added to account for potential higher water table levels than encountered during the investigation. Where the water table is less than 1.0 m from the surface, water table has been increased to ground surface.

Estimated dewatering rates have been conservatively determined using unconfined homogenous hydrogeological conditions. This is a conservative simplification of the soils and heterogeneous and/or confined hydrogeological conditions may be encountered.

Additional higher inflow rates can be expected because of any or all of the following circumstances:

- Initial depletion of storage in the aquifer – this is a temporary response to dewatering and dewatering rates should fall to the expected volumes once equilibrium conditions are approached.
- Direct precipitation or runoff into an open excavation from precipitation events.

2.2 METHODOLOGY

To estimate the dewatering rates that would be required to support construction, analytical equations have been used.

For the SWMF, the amount of groundwater flow into an excavation that is trench shaped (where the length is a minimum of 1.5 times the width) under unconfined hydrogeological conditions were estimated using the following analytical expression (corrected from Powers et al., 2007):

$$Q = \pi K \frac{(H_0^2 - h_e^2)}{ln\left(\frac{2R_i + w}{w}\right)} + 2lK \frac{(H_0^2 - h_e^2)}{2R_i}$$

Where:

Q = groundwater flow rate (m^3/s).

K = hydraulic conductivity (m/s)

H_0 = static water table level (m above reference elevation) - [measured in the monitoring wells during the field investigation].

h_e = dewatered groundwater level at excavation (m above reference elevation) – [the reference elevation has been taken as 1.0 m below the proposed excavation depth. This assumes that there is no significant groundwater upflow from greater than 1.0 m below the excavation.

w = dewatering area width (m).

ℓ = dewatering area length (m).

R_i = radius of influence (m) – [estimated using Sichardt's Equation:

$$R_i = 3000(H_0 - h_e)\sqrt{K}$$

Dewatering rates with the assumptions listed above have been estimated and are provided in the Dewatering Rate Estimations found in Appendix B. The groundwater inflow (in m^3/day) estimated using the hydraulic conductivity value for each borehole location can be found in the far-right column. The maximum estimated groundwater inflow rate was multiplied by three (3) to determine a conservative dewatering rate to account for higher, short-term inflows and / or parameter uncertainty.

2.3 DEWATERING ESTIMATES

For the first scenario where the maximum excavation depth is applied across the entire excavation area, the estimated dewatering rates indicates that groundwater inflow rates of between approximately 5,400 L/day (5.4 m^3/day) and 5,500 L/day (5.5 m^3/day) may be expected. A three times factor of safety applied to the highest rate calculated has been determined to be approximately 16,600L/day (16.6 m^3/day).

For the second scenario where the minimum excavation area for the maximum excavation depth is used as the input for the excavation depth, the estimated dewatering rates indicates that groundwater inflow rates of between approximately 3,700 L/day (3.7 m^3/day) and 3,800 L/day (3,800 m^3/day) may be expected. A three times factor of safety applied to the highest rate calculated has been determined to be approximately 11,300 L/day (11.3 m^3/day).

The zone of influence (ZOI) has been estimated based on the Sichardt's equation (shown above) using information from the dewatering rate estimations found in Appendix B. The estimated ZOI is approximately 2.0 m. A safety factor has been applied by multiplying the hydraulic conductivity value by 3, and based on this the ZOI is approximately 3.5 m.

3 WATER TAKING PERMITTING RECOMMENDATION

Based on the dewatering rates provided above, water taking is expected to be below the threshold of 50,000 L/day, and as such an EASR is likely not required for the proposed construction activities.

4 GROUNDWATER MANAGEMENT

As excavations extend below the groundwater level temporary groundwater control may be required during construction. The method of groundwater control should be solely determined by the Project Contractor based on their own assessment of the Site-specific conditions, or by a specialist dewatering subcontractor retained by the Contractor, if required.

The groundwater sampling results are representative of the groundwater within the monitoring well sampled. However, groundwater quality may vary depending on location, time, meteorological conditions, and construction and dewatering methods utilized. The concentration of suspended solids in groundwater or water that must be removed from the construction area will impact the concentrations of many of the parameters tested for above, particularly metals.

Dewatering discharge and surface water runoff must be directed away from any open excavation. At a minimum, all dewatering operations should be in accordance with OPSS.MUNI 517 (Dewatering), OPSS.MUNI 518 (Control of Water), and OHSA. It is recommended that the discharge location is inspected daily to ensure the discharge is as intended. The discharge water should visually inspected daily to ensure that there is minimal turbidity, and that there is no visible hydrocarbon film or sheen present. If an increase in turbidity, any film or sheen is observed dewatering should cease until the source is identified.

The discharge of water, either groundwater or storm water encountered on the Site during construction will need to be considered and an approved discharge location determined and permitted as necessary prior to construction or discharge of any water.

5 CLOSURE

We trust the above is of assistance to you. The limitations of this report have been provided in Appendix C. If you would like to discuss any portion of the above, please do not hesitate to contact this office.

Yours very truly,

WSP E&I Canada Limited

Prepared by:



Jessica Pittman, B.Sc., P.Geo.
Hydrogeologist



Sarah Irvine, M.Sc., P.Geo.
Hydrogeologist

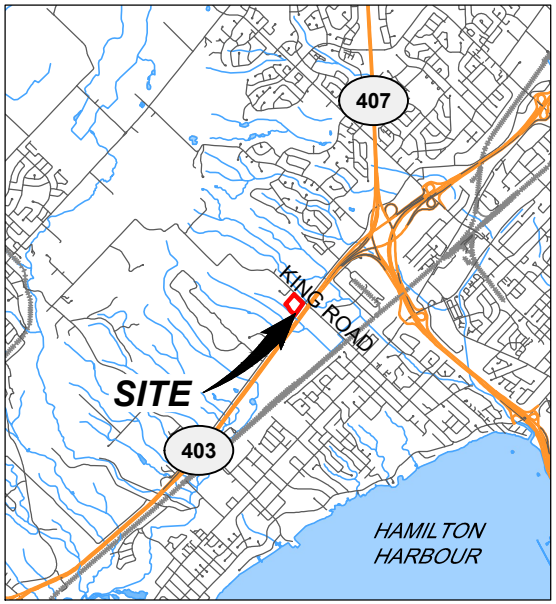


Reviewed by:



Simon Gautrey, M.Sc., MBA., P.Geo., F.G.C.,
Principal Hydrogeologist

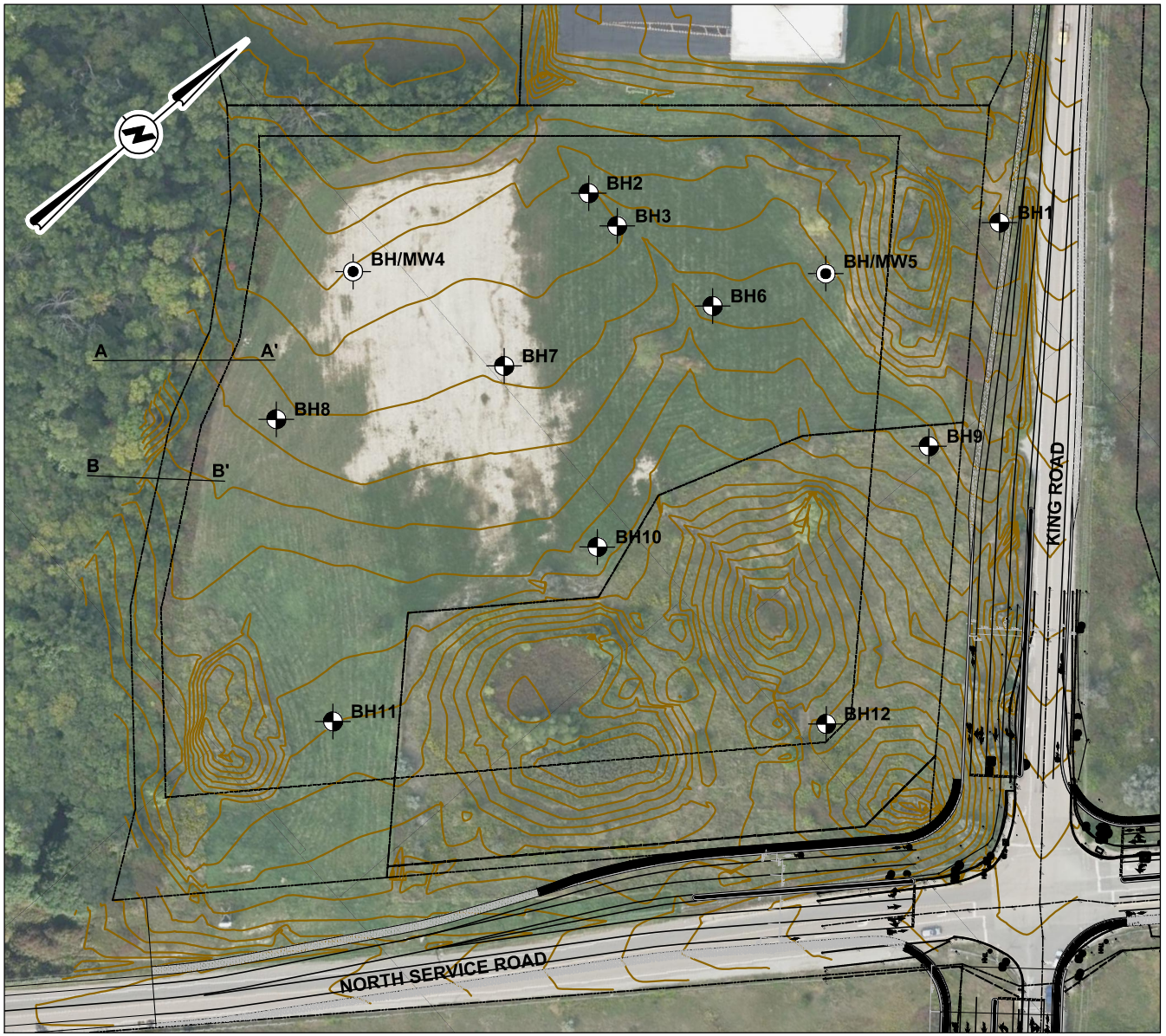
Figures



KEY PLAN

0 10 30 50m

SCALE 1:1,500



LEGEND:

- BOREHOLE LOCATION
- BOREHOLE/MONITORING WELL LOCATION

NOTES:
THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS REPORT No. WW21012079.

ALL LOCATIONS ARE APPROXIMATE ONLY.

REFERENCES:
BING IMAGERY AS OF NOVEMBER 22, 2021 (IMAGE DATE UNKNOWN), BING IMAGERY USED FOR ILLUSTRATION PURPOSES ONLY AND NOT TO BE USED FOR MEASUREMENTS.

DATE PLOTTED: 11/23/2021 2:04:43 PM
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CLIENT:
QUANTUM REALTY MANAGEMENT
2213 N SHERIDAN WAY
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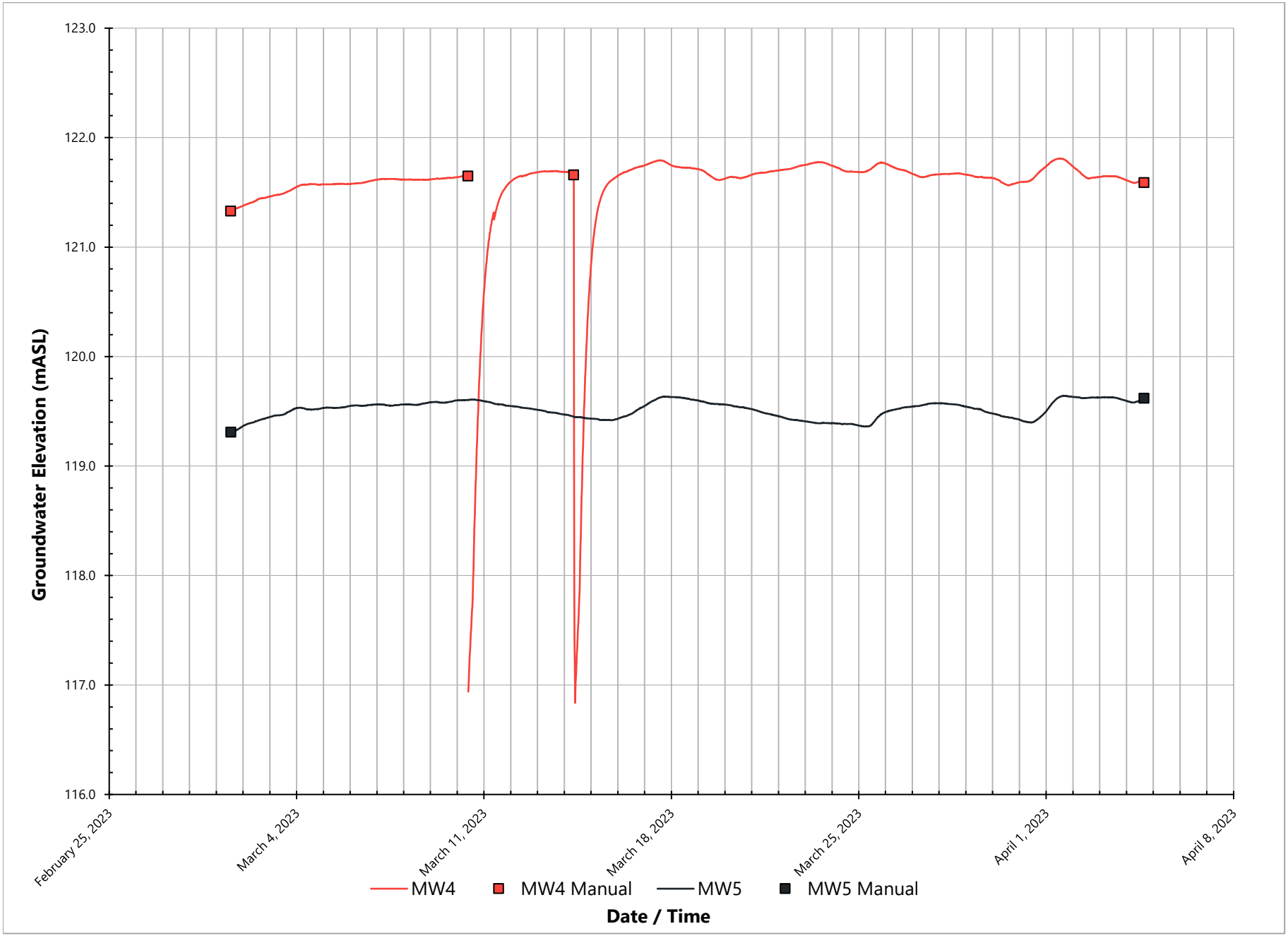
DWN BY:	LMK
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DATUM:	NAD83
PROJECTION:	UTM Zone 17
SCALE:	1:1,500

PROJECT:
SLOPE STABILITY
1450 KING ROAD
BURLINGTON, ONTARIO

TITLE:
BOREHOLE LOCATION PLAN

DATE:	NOV. 23, 2021
PROJECT No:	WW21012079
REV. No:	0
FIGURE No:	1

Figure 2 - Groundwater Monitoring



Appendix A

ALS Canada Ltd.

right solutions.
right partner.

CERTIFICATE OF ANALYSIS (GUIDELINE EVALUATION)

Work Order	: **WT2306151**	Page	: 1 of 12
Client	: **WSP E&I Canada Limited**	Laboratory	: Waterloo - Environmental
Contact	: Sarah Irvine	Account Manager	: Gayle Braun
Address	: 50 Vogel Road Unit 3 & 4 Richmond Hill ON Canada L4B 3K6	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: ----	Telephone	: +1 519 886 6910
Project	: WW21012079.CO1P.****. 5120.573000	Date Samples Received	: 14-Mar-2023 15:40
PO	: ----	Date Analysis Commenced	: 14-Mar-2023
C-O-C number	: 20-1003332	Issue Date	: 21-Mar-2023 13:36
Sampler	: ----		
Site	:		
Quote number	: WOOD SOA 2022/23		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Guideline Comparison

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Amanda Ganouri-Lumsden	Department Manager - Microbiology and Prep	Microbiology, Waterloo, Ontario
Danielle Gravel	Supervisor - Semi-Volatile Instrumentation	Organics, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Inorganics, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Metals, Waterloo, Ontario
Joshua Stessun	Laboratory Analyst	Organics, Calgary, Alberta
Marsha Calero	Laboratory Assistant	Organics, Calgary, Alberta
Nguyen Tran	Laboratory Analyst	Organics, Calgary, Alberta
Sanja Risticevic	Department Manager - LCMS	LCMS, Waterloo, Ontario
Sarah Birch	VOC Section Supervisor	Organics, Waterloo, Ontario

No Breaches Found

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.
Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guidelines are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Key : LOR: Limit of Reporting (detection limit).

Unit	*Description*
µg/L	micrograms per litre
CFU/100mL	colony forming units per hundred millilitres
mg/L	milligrams per litre
pH units	pH units

>: greater than.
<: less than.
Red shading is applied where the result is greater than the Guideline Upper Limit or the result is lower than the Guideline Lower Limit.
For drinking water samples, Red shading is applied where the result for E.coli, fecal or total coliforms is greater than or equal to the Guideline Upper Limit.

Qualifiers

Qualifier	Description
BODL	Limit of Reporting for BOD was increased to account for the largest volume of sample tested.
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
SUR-ND	Surrogate recovery marginally exceeded ALS DQO. Reported non-detect results for associated samples were deemed to be unaffected.

Analytical Results Evaluation

Matrix: **Groundwater**

Analyte	CAS Number	Unit	Client sample ID	BH4 Burlington	BH4 Halton	BH4-F	----	----	----	----
			Sampling date/time	14-Mar-2023 10:00	14-Mar-2023 10:00	14-Mar-2023 10:00	----	----	----	----
			Sub-Matrix	Groundwater	Groundwater	Groundwater	----	----	----	----
			WT2306151-001	WT2306151-002	WT2306151-003	--------	--------	--------	--------
Physical Tests										
pH	----	pH units	8.04	7.98	----	----	----	----	----
Solids, total suspended [TSS]	----	mg/L	8.5	7.9	----	----	----	----	----
Anions and Nutrients										
Fluoride	16984-48-8	mg/L	----	<0.200 DLDS	----	----	----	----	----
Kjeldahl nitrogen, total [TKN]	----	mg/L	----	<0.050	----	----	----	----	----
Phosphorus, total	7723-14-0	mg/L	0.0064	0.0059	----	----	----	----	----
Sulfate (as SO4)	14808-79-8	mg/L	----	57.5 DLDS	----	----	----	----	----
Cyanides										
Cyanide, strong acid dissociable (Total)	----	mg/L	<0.0020	<0.0020	----	----	----	----	----
Microbiological Tests										
Coliforms, Escherichia coli [E. coli]	----	CFU/100mL	Not Detected	----	----	----	----	----	----
Total Metals										
Aluminum, total	7429-90-5	mg/L	----	0.194 DLHC	<0.0300 DLHC	----	----	----	----
Antimony, total	7440-36-0	mg/L	----	<0.00100 DLHC	<0.00100 DLHC	----	----	----	----
Arsenic, total	7440-38-2	mg/L	<0.00100 DLHC	<0.00100 DLHC	<0.00100 DLHC	----	----	----	----
Beryllium, total	7440-41-7	mg/L	----	<0.000200 DLHC	----	----	----	----	----
Cadmium, total	7440-43-9	mg/L	<0.0000500 DLHC	<0.0000500 DLHC	<0.0000500 DLHC	----	----	----	----
Chromium, total	7440-47-3	mg/L	<0.00500 DLHC	<0.00500 DLHC	<0.00500 DLHC	----	----	----	----
Cobalt, total	7440-48-4	mg/L	----	<0.00100 DLHC	<0.00100 DLHC	----	----	----	----
Copper, total	7440-50-8	mg/L	<0.00500 DLHC	<0.00500 DLHC	<0.00500 DLHC	----	----	----	----
Iron, total	7439-89-6	mg/L	----	0.133 DLHC	----	----	----	----	----
Lead, total	7439-92-1	mg/L	<0.000500 DLHC	<0.000500 DLHC	<0.000500 DLHC	----	----	----	----
Manganese, total	7439-96-5	mg/L	0.00758 DLHC	0.0139 DLHC	0.00975 DLHC	----	----	----	----
Mercury, total	7439-97-6	mg/L	<0.0000050	<0.0000050	<0.0000050	----	----	----	----
Molybdenum, total	7439-98-7	mg/L	----	0.00135 DLHC	0.00137 DLHC	----	----	----	----
Nickel, total	7440-02-0	mg/L	<0.00500 DLHC	<0.00500 DLHC	<0.00500 DLHC	----	----	----	----
Selenium, total	7782-49-2	mg/L	0.000515 DLHC	<0.000500 DLHC	<0.000500 DLHC	----	----	----	----

Analytical Results Evaluation

Matrix: **Groundwater**

Analyte	CAS Number	Unit	Client sample ID	BH4 Burlington	BH4 Halton	BH4-F	----	----	----	----
			Sampling date/time	14-Mar-2023 10:00	14-Mar-2023 10:00	14-Mar-2023 10:00	----	----	----	----
			Sub-Matrix	Groundwater	Groundwater	Groundwater	----	----	----	----
				WT2306151-001	WT2306151-002	WT2306151-003	--------	--------	--------	--------
Total Metals										
Silver, total	7440-22-4	mg/L		<0.000100 DLHC	<0.000100 DLHC	<0.000100 DLHC	----	----	----	----
Tin, total	7440-31-5	mg/L		----	<0.00100 DLHC	<0.00100 DLHC	----	----	----	----
Titanium, total	7440-32-6	mg/L		----	0.00413 DLHC	<0.00300 DLHC	----	----	----	----
Zinc, total	7440-66-6	mg/L		<0.0300 DLHC	<0.0300 DLHC	<0.0300 DLHC	----	----	----	----
Speciated Metals										
Chromium, hexavalent [Cr VI], total	18540-29-9	mg/L		<0.00050	----	<0.00050	----	----	----	----
Aggregate Organics										
Biochemical oxygen demand [BOD]	----	mg/L		<3.0 BODL	<3.0 BODL	----	----	----	----	----
Oil & grease (gravimetric)	----	mg/L		----	<5.0	----	----	----	----	----
Oil & grease, animal/vegetable (gravimetric)	----	mg/L		----	<5.0	----	----	----	----	----
Oil & grease, mineral (gravimetric)	----	mg/L		----	<5.0	----	----	----	----	----
Phenols, total (4AAP)	----	mg/L		<0.0010	<0.0010	----	----	----	----	----
Volatile Organic Compounds										
Benzene	71-43-2	µg/L		<0.50	----	----	----	----	----	----
Chloroform	67-66-3	µg/L		<0.50	----	----	----	----	----	----
Dichlorobenzene, 1,2-	95-50-1	µg/L		<0.50	----	----	----	----	----	----
Dichlorobenzene, 1,4-	106-46-7	µg/L		<0.50	----	----	----	----	----	----
Dichlorobenzene, 1,4-	106-46-7	µg/L		----	<0.50	----	----	----	----	----
Dichloroethylene, cis-1,2-	156-59-2	µg/L		<0.50	----	----	----	----	----	----
Dichloromethane	75-09-2	µg/L		<1.0	----	----	----	----	----	----
Dichloropropylene, trans-1,3-	10061-02-6	µg/L		<0.30	----	----	----	----	----	----
Ethylbenzene	100-41-4	µg/L		<0.50	----	----	----	----	----	----
Tetrachloroethane, 1,1,2,2-	79-34-5	µg/L		<0.50	----	----	----	----	----	----
Tetrachloroethylene	127-18-4	µg/L		<0.50	----	----	----	----	----	----
Toluene	108-88-3	µg/L		<0.50	----	----	----	----	----	----
Trichloroethylene	79-01-6	µg/L		<0.50	----	----	----	----	----	----
Xylene, m+p-	179601-23-1	µg/L		<0.40	----	----	----	----	----	----
Xylene, o-	95-47-6	µg/L		<0.30	----	----	----	----	----	----
Xylenes, total	1330-20-7	µg/L		<0.50	----	----	----	----	----	----

Analytical Results Evaluation

Matrix: **Groundwater**

Analyte	CAS Number	Unit	Client sample ID: BH4 Burlington	BH4 Halton	BH4-F	----	----	----	----
			Sampling date/time: 14-Mar-2023 10:00	14-Mar-2023 10:00	14-Mar-2023 10:00	----	----	----	----
			Sub-Matrix: Groundwater	Groundwater	Groundwater	----	----	----	----
			WT2306151-001	WT2306151-002	WT2306151-003	--------	--------	--------	--------
Volatile Organic Compounds [Drycleaning]									
Dichloromethane	75-09-2	µg/L	----	<1.0	----	----	----	----	----
Tetrachloroethylene	127-18-4	µg/L	----	<0.50	----	----	----	----	----
Trichloroethylene	79-01-6	µg/L	----	<0.50	----	----	----	----	----
Volatile Organic Compounds [Fuels]									
Benzene	71-43-2	µg/L	----	<0.50	----	----	----	----	----
Ethylbenzene	100-41-4	µg/L	----	<0.50	----	----	----	----	----
Toluene	108-88-3	µg/L	----	<0.50	----	----	----	----	----
Volatile Organic Compounds [THMs]									
Chloroform	67-66-3	µg/L	----	<0.50	----	----	----	----	----
Volatile Organic Compounds Surrogates									
Bromofluorobenzene, 4-	460-00-4	%	84.3	----	----	----	----	----	----
Bromofluorobenzene, 4-	460-00-4	%	----	85.2	----	----	----	----	----
Difluorobenzene, 1,4-	540-36-3	%	91.4	----	----	----	----	----	----
Difluorobenzene, 1,4-	540-36-3	%	----	94.7	----	----	----	----	----
Polycyclic Aromatic Hydrocarbons									
Anthracene	120-12-7	mg/L	<0.000010	----	----	----	----	----	----
Benz(a)anthracene	56-55-3	mg/L	<0.000010	----	----	----	----	----	----
Benzo(a)pyrene	50-32-8	mg/L	<0.0000050	----	----	----	----	----	----
Benzo(b+j)fluoranthene	n/a	mg/L	<0.000010	----	----	----	----	----	----
Benzo(e)pyrene	192-97-2	mg/L	<0.000010	----	----	----	----	----	----
Benzo(g,h,i)perylene	191-24-2	mg/L	<0.000010	----	----	----	----	----	----
Benzo(k)fluoranthene	207-08-9	mg/L	<0.000010	----	----	----	----	----	----
Chrysene	218-01-9	mg/L	<0.000010	----	----	----	----	----	----
Dibenz(a,h)acridine	226-36-8	mg/L	<0.000050	----	----	----	----	----	----
Dibenz(a,h)anthracene	53-70-3	mg/L	<0.0000050	----	----	----	----	----	----
Dibenz(a,j)acridine	224-42-0	mg/L	<0.000050	----	----	----	----	----	----
Dibenzo(a,i)pyrene	189-55-9	mg/L	<0.000050	----	----	----	----	----	----
Dibenzo(c,g)carbazole, 7H-	194-59-2	mg/L	<0.000050	----	----	----	----	----	----

Analytical Results Evaluation

Matrix: **Groundwater**

Analyte	CAS Number	Unit	Client sample ID	BH4 Burlington	BH4 Halton	BH4-F	----	----	----	----
			Sampling date/time	14-Mar-2023 10:00	14-Mar-2023 10:00	14-Mar-2023 10:00	----	----	----	----
			Sub-Matrix	Groundwater	Groundwater	Groundwater	----	----	----	----
				WT2306151-001	WT2306151-002	WT2306151-003	--------	--------	--------	--------
Polycyclic Aromatic Hydrocarbons										
Dinitropyrene, 1,3-	75321-20-9	mg/L		<0.0010	----	----	----	----	----	----
Dinitropyrene, 1,6-	42397-64-8	mg/L		<0.0010	----	----	----	----	----	----
Dinitropyrene, 1,8-	42397-65-9	mg/L		<0.0010	----	----	----	----	----	----
Fluoranthene	206-44-0	mg/L		<0.000010	----	----	----	----	----	----
Indeno(1,2,3-c,d)pyrene	193-39-5	mg/L		<0.000010	----	----	----	----	----	----
Methylcholanthrene, 3-	56-49-5	mg/L		<0.000050	----	----	----	----	----	----
Perylene	198-55-0	mg/L		<0.000010	----	----	----	----	----	----
Phenanthrene	85-01-8	mg/L		<0.000010	----	----	----	----	----	----
Pyrene	129-00-0	mg/L		<0.000010	----	----	----	----	----	----
PAHs, total (ON Sewer Use)	n/a	mg/L		<0.00175	----	----	----	----	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	%		88.2	----	----	----	----	----	----
Naphthalene-d8	1146-65-2	%		106	----	----	----	----	----	----
Phenanthrene-d10	1517-22-2	%		98.5	----	----	----	----	----	----
Terphenyl-d14, p-	1718-51-0	%		91.0	----	----	----	----	----	----
Phthalate Esters										
bis(2-Ethylhexyl) phthalate [DEHP]	117-81-7	µg/L		<2.0	----	----	----	----	----	----
Di-n-butyl phthalate	84-74-2	µg/L		<1.0	----	----	----	----	----	----
Semi-Volatile Organics										
Dichlorobenzidine, 3,3'-	91-94-1	µg/L		<0.40	----	----	----	----	----	----
Semi-Volatile Organics Surrogates										
Fluorobiphenyl, 2-	321-60-8	%		79.7	----	----	----	----	----	----
Terphenyl-d14, p-	1718-51-0	%		98.6	----	----	----	----	----	----
Chlorinated Phenolics										
Pentachlorophenol [PCP]	87-86-5	µg/L		<0.50	----	----	----	----	----	----
Phenolics Surrogates										
Tribromophenol, 2,4,6-	118-79-6	%		117	----	----	----	----	----	----
Nonylphenols										

Analytical Results Evaluation

Matrix: **Groundwater**

Analyte	CAS Number	Unit	Client sample ID: BH4 Burlington	BH4 Halton	BH4-F	----	----	----	----
			Sampling date/time: 14-Mar-2023 10:00	14-Mar-2023 10:00	14-Mar-2023 10:00	----	----	----	----
			Sub-Matrix: Groundwater	Groundwater	Groundwater	----	----	----	----
			WT2306151-001	WT2306151-002	WT2306151-003	--------	--------	--------	--------
Nonylphenols									
Nonylphenol diethoxylates [NP2EO]	n/a	µg/L	<0.10	----	----	----	----	----	----
Nonylphenol ethoxylates, total	n/a	µg/L	<2.0	----	----	----	----	----	----
Nonylphenol monoethoxylates [NP1EO]	n/a	µg/L	<2.0	----	----	----	----	----	----
Nonylphenols [NP]	84852-15-3	µg/L	<1.0	----	----	----	----	----	----
Polychlorinated Biphenyls									
Aroclor 1016	12674-11-2	µg/L	<0.020	----	----	----	----	----	----
Aroclor 1221	11104-28-2	µg/L	<0.020	----	----	----	----	----	----
Aroclor 1232	11141-16-5	µg/L	<0.020	----	----	----	----	----	----
Aroclor 1242	53469-21-9	µg/L	<0.020	----	----	----	----	----	----
Aroclor 1248	12672-29-6	µg/L	<0.020	----	----	----	----	----	----
Aroclor 1254	11097-69-1	µg/L	<0.020	----	----	----	----	----	----
Aroclor 1260	11096-82-5	µg/L	<0.020	----	----	----	----	----	----
Aroclor 1262	37324-23-5	µg/L	<0.020	----	----	----	----	----	----
Aroclor 1268	11100-14-4	µg/L	<0.020	----	----	----	----	----	----
Polychlorinated biphenyls [PCBs], total	----	µg/L	<0.060	----	----	----	----	----	----
Polychlorinated Biphenyls Surrogates									
Decachlorobiphenyl	2051-24-3	%	142 SUR-ND	----	----	----	----	----	----
Tetrachloro-m-xylene	877-09-8	%	116	----	----	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Summary of Guideline Limits

Analyte	CAS Number	Unit	BURSTM STM	HALSUB SAN					
Physical Tests									
pH	----	pH units	**6.5 - 8.5 pH units**	**6 - 10 pH units**					
Solids, total suspended [TSS]	----	mg/L	**15 mg/L**	**350 mg/L**					
Anions and Nutrients									
Fluoride	16984-48-8	mg/L		**10 mg/L**					
Kjeldahl nitrogen, total [TKN]	----	mg/L		**100 mg/L**					
Phosphorus, total	7723-14-0	mg/L	**0.4 mg/L**	**10 mg/L**					
Sulfate (as SO4)	14808-79-8	mg/L		**1500 mg/L**					
Cyanides									
Cyanide, strong acid dissociable (Total)	----	mg/L		**2 mg/L**					
Microbiological Tests									
Coliforms, Escherichia coli [E. coli]	----	CFU/100mL	**200 CFU/100mL**						
Total Metals									
Aluminum, total	7429-90-5	mg/L		**50 mg/L**					
Antimony, total	7440-36-0	mg/L		**5 mg/L**					
Arsenic, total	7440-38-2	mg/L	**0.02 mg/L**	**1 mg/L**					
Beryllium, total	7440-41-7	mg/L		**5 mg/L**					
Cadmium, total	7440-43-9	mg/L	**0.008 mg/L**	**1 mg/L**					
Chromium, total	7440-47-3	mg/L	**0.08 mg/L**	**3 mg/L**					
Cobalt, total	7440-48-4	mg/L		**5 mg/L**					
Copper, total	7440-50-8	mg/L	**0.04 mg/L**	**3 mg/L**					
Iron, total	7439-89-6	mg/L		**50 mg/L**					
Lead, total	7439-92-1	mg/L	**0.12 mg/L**	**3 mg/L**					
Manganese, total	7439-96-5	mg/L	**0.05 mg/L**	**5 mg/L**					
Mercury, total	7439-97-6	mg/L	**0.0004 mg/L**	**0.05 mg/L**					
Molybdenum, total	7439-98-7	mg/L		**5 mg/L**					
Nickel, total	7440-02-0	mg/L	**0.08 mg/L**	**3 mg/L**					
Selenium, total	7782-49-2	mg/L	**0.02 mg/L**	**5 mg/L**					
Silver, total	7440-22-4	mg/L	**0.12 mg/L**	**5 mg/L**					
Tin, total	7440-31-5	mg/L		**5 mg/L**					
Titanium, total	7440-32-6	mg/L		**5 mg/L**					
Zinc, total	7440-66-6	mg/L	**0.04 mg/L**	**3 mg/L**					
Speciated Metals									
Chromium, hexavalent [Cr VI], total	18540-29-9	mg/L	**0.04 mg/L**						
Aggregate Organics									
Biochemical oxygen demand [BOD]	----	mg/L	**15 mg/L**	**300 mg/L**					

Analyte	CAS Number	Unit	BURSTM STM	HALSUB SAN					
Aggregate Organics - Continued									
Oil & grease (gravimetric)	----	mg/L							
Oil & grease, animal/vegetable (gravimetric)	----	mg/L		**150 mg/L**					
Oil & grease, mineral (gravimetric)	----	mg/L		**15 mg/L**					
Phenols, total (4AAP)	----	mg/L	**0.008 mg/L**	**1 mg/L**					
Volatile Organic Compounds									
Benzene	71-43-2	µg/L	**2 µg/L**						
Chloroform	67-66-3	µg/L	**2 µg/L**						
Dichlorobenzene, 1,2-	95-50-1	µg/L	**5.6 µg/L**						
Dichlorobenzene, 1,4-	106-46-7	µg/L	**6.8 µg/L**	**80 µg/L**					
Dichloroethylene, cis-1,2-	156-59-2	µg/L	**5.6 µg/L**						
Dichloromethane	75-09-2	µg/L	**5.2 µg/L**						
Dichloropropylene, trans-1,3-	10061-02-6	µg/L	**5.6 µg/L**						
Ethylbenzene	100-41-4	µg/L	**2 µg/L**						
Tetrachloroethane, 1,1,2,2-	79-34-5	µg/L	**17 µg/L**						
Tetrachloroethylene	127-18-4	µg/L	**4.4 µg/L**						
Toluene	108-88-3	µg/L	**2 µg/L**						
Trichloroethylene	79-01-6	µg/L	**7.6 µg/L**						
Xylene, m+p-	179601-23-1	µg/L							
Xylene, o-	95-47-6	µg/L							
Xylenes, total	1330-20-7	µg/L	**4.4 µg/L**						
Dichloromethane	75-09-2	µg/L		**2000 µg/L**					
Tetrachloroethylene	127-18-4	µg/L		**1000 µg/L**					
Trichloroethylene	79-01-6	µg/L		**400 µg/L**					
Benzene	71-43-2	µg/L		**10 µg/L**					
Ethylbenzene	100-41-4	µg/L		**160 µg/L**					
Toluene	108-88-3	µg/L		**16 µg/L**					
Chloroform	67-66-3	µg/L		**40 µg/L**					
Polycyclic Aromatic Hydrocarbons									
Anthracene	120-12-7	mg/L							
Benz(a)anthracene	56-55-3	mg/L							
Benzo(a)pyrene	50-32-8	mg/L							
Benzo(b+j)fluoranthene	n/a	mg/L							
Benzo(e)pyrene	192-97-2	mg/L							
Benzo(g,h,i)perylene	191-24-2	mg/L							
Benzo(k)fluoranthene	207-08-9	mg/L							
Chrysene	218-01-9	mg/L							
Dibenz(a,h)acridine	226-36-8	mg/L							
Dibenz(a,h)anthracene	53-70-3	mg/L							
Dibenz(a,j)acridine	224-42-0	mg/L							

Analyte	CAS Number	Unit	BURSTM STM	HALSUB SAN					
Polycyclic Aromatic Hydrocarbons - Continued									
Dibenzo(a,i)pyrene	189-55-9	mg/L							
Dibenzo(c,g)carbazole, 7H-	194-59-2	mg/L							
Dinitropyrene, 1,3-	75321-20-9	mg/L							
Dinitropyrene, 1,6-	42397-64-8	mg/L							
Dinitropyrene, 1,8-	42397-65-9	mg/L							
Fluoranthene	206-44-0	mg/L							
Indeno(1,2,3-c,d)pyrene	193-39-5	mg/L							
Methylcholanthrene, 3-	56-49-5	mg/L							
PAHs, total (ON Sewer Use)	n/a	mg/L	**0.002 mg/L**						
Perylene	198-55-0	mg/L							
Phenanthrene	85-01-8	mg/L							
Pyrene	129-00-0	mg/L							
Phthalate Esters									
bis(2-Ethylhexyl) phthalate [DEHP]	117-81-7	µg/L	**8.8 µg/L**						
Di-n-butyl phthalate	84-74-2	µg/L	**15 µg/L**						
Semi-Volatile Organics									
Dichlorobenzidine, 3,3'-	91-94-1	µg/L	**0.8 µg/L**						
Chlorinated Phenolics									
Pentachlorophenol [PCP]	87-86-5	µg/L	**2 µg/L**						
Nonylphenols									
Nonylphenol diethoxylates [NP2EO]	n/a	µg/L							
Nonylphenol ethoxylates, total	n/a	µg/L	**10 µg/L**						
Nonylphenol monoethoxylates [NP1EO]	n/a	µg/L							
Nonylphenols [NP]	84852-15-3	µg/L	**1 µg/L**						
Polychlorinated Biphenyls									
Aroclor 1016	12674-11-2	µg/L							
Aroclor 1221	11104-28-2	µg/L							
Aroclor 1232	11141-16-5	µg/L							
Aroclor 1242	53469-21-9	µg/L							
Aroclor 1248	12672-29-6	µg/L							
Aroclor 1254	11097-69-1	µg/L							
Aroclor 1260	11096-82-5	µg/L							
Aroclor 1262	37324-23-5	µg/L							
Aroclor 1268	11100-14-4	µg/L							
Polychlorinated biphenyls [PCBs], total	----	µg/L	**0.4 µg/L**						

Please refer to the General Comments section for an explanation of any qualifiers detected.

Key:

BURSTM		Ontario Burlington Storm Sewer By-Law (59-2022)
	STM	Burlington Storm Sewer (59-2022)
HALSUB		Ontario Halton Sanitary Sewer By-law No. 02-03 (MAR, 2003)
	SAN	Halton Sanitary Sewer By-Law No. 02-03

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **WT2306151**	Page	: 1 of 15
Client	: **WSP E&I Canada Limited**	Laboratory	: Waterloo - Environmental
Contact	: Sarah Irvine	Account Manager	: Gayle Braun
Address	: 50 Vogel Road Unit 3 & 4 Richmond Hill ON Canada L4B 3K6	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: ----	Telephone	: +1 519 886 6910
Project	: WW21012079.CO1P.****. 5120.573000	Date Samples Received	: 14-Mar-2023 15:40
PO	: ----	Issue Date	: 21-Mar-2023 13:37
C-O-C number	: 20-1003332		
Sampler	: ----		
Site	:		
Quote number	: WOOD SOA 2022/23		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Matrix Spike outliers occur.
- Laboratory Control Sample (LCS) outliers occur - please see following pages for full details.
- Test sample Surrogate recovery outliers exist for all regular sample matrices - please see following pages for full details.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Laboratory Control Sample (LCS) Recoveries								
Polycyclic Aromatic Hydrocarbons	QC-865023-002	----	Methylcholanthrene, 3-	56-49-5	E642D	192 % LCS-H	60.0-130%	Recovery greater than upper control limit
Semi-Volatile Organics	QC-MRG4-8650170 02	----	Dichlorobenzidine, 3,3'-	91-94-1	E655F	37.1 % LCS-ND	50.0-140%	Recovery less than lower control limit

Result Qualifiers

Qualifier	Description
LCS-H	*Lab Control Sample recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.*
LCS-ND	*Lab Control Sample recovery was slightly outside ALS DQO. Reported non-detect results for associated samples were unaffected.*

Regular Sample Surrogates

Sub-Matrix: **Groundwater**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Result	Limits	Comment
Samples Submitted							
Polychlorinated Biphenyls Surrogates	WT2306151-001	BH4 Burlington	Decachlorobiphenyl	2051-24-3	142 %	50.0-140 %	Recovery greater than upper data quality objective

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT-4d]										
BH4 - Burlington	E550	14-Mar-2023	----	----	----		15-Mar-2023	4 days	1 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT-4d]										
BH4 - Halton	E550	14-Mar-2023	----	----	----		15-Mar-2023	4 days	1 days	✓
Aggregate Organics : Mineral Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid)										
BH4 - Halton	E567SG	14-Mar-2023	16-Mar-2023	28 days	2 days	✓	17-Mar-2023	40 days	1 days	✓
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid)										
BH4 - Halton	E567	14-Mar-2023	16-Mar-2023	28 days	2 days	✓	16-Mar-2023	40 days	0 days	✓
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid) [ON MECP]										
BH4 - Burlington	E562	14-Mar-2023	15-Mar-2023	----	----		15-Mar-2023	28 days	1 days	✓
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid) [ON MECP]										
BH4 - Halton	E562	14-Mar-2023	15-Mar-2023	----	----		15-Mar-2023	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE [ON MECP]										
BH4 - Halton	E235.F	14-Mar-2023	16-Mar-2023	----	----		16-Mar-2023	28 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE [ON MECP]										
BH4 - Halton	E235.SO4	14-Mar-2023	16-Mar-2023	----	----		16-Mar-2023	28 days	2 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) [ON MECP]										
BH4 - Halton	E318	14-Mar-2023	16-Mar-2023	----	----		16-Mar-2023	28 days	2 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) [ON MECP]										
BH4 - Burlington	E372-U	14-Mar-2023	15-Mar-2023	----	----		16-Mar-2023	28 days	2 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) [ON MECP]										
BH4 - Halton	E372-U	14-Mar-2023	15-Mar-2023	----	----		16-Mar-2023	28 days	2 days	✓
Chlorinated Phenolics : BNA (Ontario Sanitary Sewer SVOC Target List) by GC-MS										
Amber glass/Teflon lined cap [ON MECP]										
BH4 - Burlington	E655F	14-Mar-2023	16-Mar-2023	14 days	2 days	✓	20-Mar-2023	40 days	4 days	✓
Cyanides : Total Cyanide										
UV-inhibited HDPE - total (sodium hydroxide)										
BH4 - Burlington	E333	14-Mar-2023	16-Mar-2023	----	----		16-Mar-2023	14 days	2 days	✓
Cyanides : Total Cyanide										
UV-inhibited HDPE - total (sodium hydroxide)										
BH4 - Halton	E333	14-Mar-2023	16-Mar-2023	----	----		16-Mar-2023	14 days	2 days	✓
Microbiological Tests : E. coli (MF-mFC-BCIG)										
Sterile HDPE (Sodium thiosulphate) [ON MECP]										
BH4 - Burlington	E012A.EC	14-Mar-2023	----	----	----		15-Mar-2023	48 hrs	27 hrs	✓
Nonylphenols : Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode										
Amber glass/Teflon lined cap - LCMS										
BH4 - Burlington	E749B	14-Mar-2023	14-Mar-2023	7 days	0 days	✓	14-Mar-2023	7 days	0 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Nonylphenols : Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode										
Amber glass/Teflon lined cap - LCMS										
BH4 - Burlington	E749A	14-Mar-2023	14-Mar-2023	7 days	0 days	✓	14-Mar-2023	7 days	0 days	✓
Phthalate Esters : BNA (Ontario Sanitary Sewer SVOC Target List) by GC-MS										
Amber glass/Teflon lined cap [ON MECP]										
BH4 - Burlington	E655F	14-Mar-2023	16-Mar-2023	14 days	2 days	✓	20-Mar-2023	40 days	4 days	✓
Physical Tests : pH by Meter										
HDPE [ON MECP]										
BH4 - Burlington	E108	14-Mar-2023	15-Mar-2023	----	----		16-Mar-2023	14 days	2 days	✓
Physical Tests : pH by Meter										
HDPE [ON MECP]										
BH4 - Halton	E108	14-Mar-2023	16-Mar-2023	----	----		16-Mar-2023	14 days	2 days	✓
Physical Tests : TSS by Gravimetry										
HDPE [ON MECP]										
BH4 - Burlington	E160	14-Mar-2023	----	----	----		15-Mar-2023	7 days	1 days	✓
Physical Tests : TSS by Gravimetry										
HDPE [ON MECP]										
BH4 - Halton	E160	14-Mar-2023	----	----	----		15-Mar-2023	7 days	1 days	✓
Polychlorinated Biphenyls : PCB Aroclors by GC-MS										
Amber glass/Teflon lined cap [ON MECP]										
BH4 - Burlington	E687	14-Mar-2023	15-Mar-2023	14 days	1 days	✓	16-Mar-2023	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs (ON Special List) by GC-MS										
Amber glass/Teflon lined cap [ON MECP]										
BH4 - Burlington	E642D	14-Mar-2023	16-Mar-2023	14 days	2 days	✓	16-Mar-2023	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS (Low Level)										
Amber glass/Teflon lined cap (sodium bisulfate)										
BH4 - Burlington	E641A-L	14-Mar-2023	15-Mar-2023	14 days	1 days	✓	16-Mar-2023	40 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Semi-Volatile Organics : BNA (Ontario Sanitary Sewer SVOC Target List) by GC-MS										
Amber glass/Teflon lined cap [ON MECP]										
BH4 - Burlington	E655F	14-Mar-2023	16-Mar-2023	14 days	2 days	✓	20-Mar-2023	40 days	4 days	✓
Speciated Metals : Total Hexavalent Chromium (Cr VI) by IC										
HDPE - total (NaOH+Buf) [ON MECP]										
BH4 - Burlington	E532	14-Mar-2023	----	----	----		15-Mar-2023	28 days	1 days	✓
Speciated Metals : Total Hexavalent Chromium (Cr VI) by IC										
HDPE - total (NaOH+Buf) [ON MECP]										
BH4-F	E532	14-Mar-2023	----	----	----		15-Mar-2023	28 days	1 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) [ON MECP]										
BH4 - Burlington	E508	14-Mar-2023	15-Mar-2023	----	----		15-Mar-2023	28 days	1 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) [ON MECP]										
BH4-F	E508	14-Mar-2023	15-Mar-2023	----	----		15-Mar-2023	28 days	1 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) [ON MECP]										
BH4 - Halton	E508	14-Mar-2023	15-Mar-2023	----	----		15-Mar-2023	28 days	1 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
BH4 - Burlington	E420	14-Mar-2023	14-Mar-2023	----	----		15-Mar-2023	180 days	2 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
BH4-F	E420	14-Mar-2023	14-Mar-2023	----	----		15-Mar-2023	180 days	2 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
BH4 - Halton	E420	14-Mar-2023	14-Mar-2023	----	----		15-Mar-2023	180 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Volatile Organic Compounds : VOCs (Eastern Canada List) by Headspace GC-MS										
Glass vial (sodium bisulfate)										
BH4 - Burlington	E611D	14-Mar-2023	16-Mar-2023	----	----		16-Mar-2023	14 days	2 days	✓
Volatile Organic Compounds : VOCs (Full List) by Headspace GC-MS										
Glass vial (sodium bisulfate)										
BH4 - Halton	E611F	14-Mar-2023	17-Mar-2023	----	----		17-Mar-2023	14 days	3 days	✓
Volatile Organic Compounds [Drycleaning] : VOCs (Full List) by Headspace GC-MS										
Glass vial (sodium bisulfate)										
BH4 - Halton	E611F	14-Mar-2023	17-Mar-2023	----	----		17-Mar-2023	14 days	3 days	✓
Volatile Organic Compounds [Fuels] : VOCs (Full List) by Headspace GC-MS										
Glass vial (sodium bisulfate)										
BH4 - Halton	E611F	14-Mar-2023	17-Mar-2023	----	----		17-Mar-2023	14 days	3 days	✓
Volatile Organic Compounds [THMs] : VOCs (Full List) by Headspace GC-MS										
Glass vial (sodium bisulfate)										
BH4 - Halton	E611F	14-Mar-2023	17-Mar-2023	----	----		17-Mar-2023	14 days	3 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: ✗ = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Biochemical Oxygen Demand - 5 day	E550	863816	1	19	5.2	5.0	✓
E. coli (MF-mFC-BCIG)	E012A.EC	864123	0	9	0.0	5.0	✗
Fluoride in Water by IC	E235.F	865014	1	3	33.3	5.0	✓
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B	863310	1	18	5.5	5.0	✓
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A	863309	1	18	5.5	5.0	✓
pH by Meter	E108	864651	2	19	10.5	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	863563	1	14	7.1	5.0	✓
Sulfate in Water by IC	E235.SO4	865013	1	16	6.2	5.0	✓
Total Cyanide	E333	865831	1	20	5.0	5.0	✓
Total Hexavalent Chromium (Cr VI) by IC	E532	863582	1	13	7.6	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	863564	1	13	7.6	5.0	✓
Total Mercury in Water by CVAAS	E508	863570	1	10	10.0	5.0	✓
Total metals in Water by CRC ICPMS	E420	863382	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	863561	1	19	5.2	5.0	✓
TSS by Gravimetry	E160	863863	1	19	5.2	4.7	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	866098	1	19	5.2	5.0	✓
VOCs (Full List) by Headspace GC-MS	E611F	867468	1	1	100.0	5.0	✓
Laboratory Control Samples (LCS)							
Biochemical Oxygen Demand - 5 day	E550	863816	1	19	5.2	5.0	✓
BNA (Ontario Sanitary Sewer SVOC Target List) by GC-MS	E655F	865018	1	4	25.0	5.0	✓
Fluoride in Water by IC	E235.F	865014	1	3	33.3	5.0	✓
Mineral Oil & Grease by Gravimetry	E567SG	865916	1	12	8.3	5.0	✓
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B	863310	1	18	5.5	5.0	✓
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A	863309	1	18	5.5	5.0	✓
Oil & Grease by Gravimetry	E567	865915	1	12	8.3	5.0	✓
PAHs (ON Special List) by GC-MS	E642D	865023	1	3	33.3	5.0	✓
PAHs by Hexane LVI GC-MS (Low Level)	E641A-L	863531	1	1	100.0	5.0	✓
PCB Aroclors by GC-MS	E687	863525	1	16	6.2	4.7	✓
pH by Meter	E108	864651	2	19	10.5	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	863563	1	14	7.1	5.0	✓
Sulfate in Water by IC	E235.SO4	865013	1	16	6.2	5.0	✓
Total Cyanide	E333	865831	1	20	5.0	5.0	✓
Total Hexavalent Chromium (Cr VI) by IC	E532	863582	1	13	7.6	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	863564	1	13	7.6	5.0	✓
Total Mercury in Water by CVAAS	E508	863570	1	10	10.0	5.0	✓
Total metals in Water by CRC ICPMS	E420	863382	1	20	5.0	5.0	✓

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	863561	1	19	5.2	5.0	✓
TSS by Gravimetry	E160	863863	1	19	5.2	4.7	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	866098	1	19	5.2	5.0	✓
VOCs (Full List) by Headspace GC-MS	E611F	867468	1	1	100.0	5.0	✓
Method Blanks (MB)							
Biochemical Oxygen Demand - 5 day	E550	863816	1	19	5.2	5.0	✓
BNA (Ontario Sanitary Sewer SVOC Target List) by GC-MS	E655F	865018	1	4	25.0	5.0	✓
E. coli (MF-mFC-BCIG)	E012A.EC	864123	1	9	11.1	5.0	✓
Fluoride in Water by IC	E235.F	865014	1	3	33.3	5.0	✓
Mineral Oil & Grease by Gravimetry	E567SG	865916	1	12	8.3	5.0	✓
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B	863310	1	18	5.5	5.0	✓
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A	863309	1	18	5.5	5.0	✓
Oil & Grease by Gravimetry	E567	865915	1	12	8.3	5.0	✓
PAHs (ON Special List) by GC-MS	E642D	865023	1	3	33.3	5.0	✓
PAHs by Hexane LVI GC-MS (Low Level)	E641A-L	863531	1	1	100.0	5.0	✓
PCB Aroclors by GC-MS	E687	863525	1	16	6.2	4.7	✓
Phenols (4AAP) in Water by Colorimetry	E562	863563	1	14	7.1	5.0	✓
Sulfate in Water by IC	E235.SO4	865013	1	16	6.2	5.0	✓
Total Cyanide	E333	865831	1	20	5.0	5.0	✓
Total Hexavalent Chromium (Cr VI) by IC	E532	863582	1	13	7.6	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	863564	1	13	7.6	5.0	✓
Total Mercury in Water by CVAAS	E508	863570	1	10	10.0	5.0	✓
Total metals in Water by CRC ICPMS	E420	863382	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	863561	1	19	5.2	5.0	✓
TSS by Gravimetry	E160	863863	1	19	5.2	4.7	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	866098	1	19	5.2	5.0	✓
VOCs (Full List) by Headspace GC-MS	E611F	867468	1	1	100.0	5.0	✓
Matrix Spikes (MS)							
Fluoride in Water by IC	E235.F	865014	1	3	33.3	5.0	✓
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B	863310	1	18	5.5	5.0	✓
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A	863309	1	18	5.5	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	863563	1	14	7.1	5.0	✓
Sulfate in Water by IC	E235.SO4	865013	1	16	6.2	5.0	✓
Total Cyanide	E333	865831	1	20	5.0	5.0	✓
Total Hexavalent Chromium (Cr VI) by IC	E532	863582	1	13	7.6	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	863564	1	13	7.6	5.0	✓
Total Mercury in Water by CVAAS	E508	863570	1	10	10.0	5.0	✓
Total metals in Water by CRC ICPMS	E420	863382	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	863561	1	19	5.2	5.0	✓

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS) - Continued							
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	866098	1	19	5.2	5.0	✓
VOCs (Full List) by Headspace GC-MS	E611F	867468	1	1	100.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
E. coli (MF-mFC-BCIG)	E012A.EC Waterloo - Environmental	Water	ON E3433 (mod)	Following filtration (0.45 µm), and incubation at 44.5±0.2°C for 24 hours, colonies exhibiting characteristic morphology of the target organism are enumerated.
pH by Meter	E108 Waterloo - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry	E160 Waterloo - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Fluoride in Water by IC	E235.F Waterloo - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Waterloo - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Waterloo - Environmental	Water	Method Fialab 100, 2018	TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).
Total Cyanide	E333 Waterloo - Environmental	Water	ISO 14403 (mod)	Total or Strong Acid Dissociable (SAD) Cyanide is determined by Continuous Flow Analyzer (CFA) with in-line UV digestion followed by colourmetric analysis. Method Limitation: High levels of thiocyanate (SCN) may cause positive interference (up to 0.5% of SCN concentration).
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Waterloo - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total metals in Water by CRC ICPMS	E420 Waterloo - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Mercury in Water by CVAAS	E508 Waterloo - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Total Hexavalent Chromium (Cr VI) by IC	E532 Waterloo - Environmental	Water	APHA 3500-Cr C (Ion Chromatography)	Hexavalent Chromium is measured by Ion chromatography-Post column reaction and UV detection. Results are based on an un-filtered, field-preserved sample.
Biochemical Oxygen Demand - 5 day	E550 Waterloo - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Phenols (4AAP) in Water by Colorimetry	E562 Waterloo - Environmental	Water	EPA 9066	This automated method is based on the distillation of phenol and subsequent reaction of the distillate with alkaline ferricyanide ($K_3Fe(CN)_6$) and 4-amino-antipyrine (4-AAP) to form a red complex which is measured colorimetrically.
Oil & Grease by Gravimetry	E567 Calgary - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane and the extract is evaporated to dryness. The residue is then weighed to determine Oil and Grease.
Mineral Oil & Grease by Gravimetry	E567SG Calgary - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane, followed by silica gel treatment after which the extract is evaporated to dryness. The residue is then weighed to determine Mineral Oil and Grease.
VOCs (Eastern Canada List) by Headspace GC-MS	E611D Waterloo - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
VOCs (Full List) by Headspace GC-MS	E611F Waterloo - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS (Low Level)	E641A-L Waterloo - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
PAHs (ON Special List) by GC-MS	E642D Waterloo - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by GC-MS.
BNA (Ontario Sanitary Sewer SVOC Target List) by GC-MS	E655F Waterloo - Environmental	Water	EPA 8270E (mod)	BNA are analyzed by GC-MS.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
PCB Aroclors by GC-MS	E687 Waterloo - Environmental	Water	EPA 8270E (mod)	PCB Aroclors are analyzed by GC-MS
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A Waterloo - Environmental	Water	J. Chrom A849 (1999) p.467-482	An aliquot of 5.0 ± 0.10 mL of filtered sample is spiked with Nonylphenol-D4, Nonylphenol Diethoxylate 13C6, and Bisphenol A 13C12 internal standards and analyzed by LC-MS/MS.
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B Waterloo - Environmental	Water	J. Chrom A849 (1999) p.467-482	Water samples are filtered and analyzed on LCMS/MS by direct injection.
Animal & Vegetable Oil & Grease by Gravimetry	EC567A.SG Calgary - Environmental	Water	APHA 5520 (mod)	Animal & vegetable oil and grease is calculated as follows: Oil & Grease (gravimetric) minus Mineral Oil & Grease (gravimetric)
Total PAH (Ontario Sewer Use Extended List)	EC640A Waterloo - Environmental	Water	Calculation (Sum of the Squares)	Total PAH (Ontario Sewer Use) is the sum of the following PAHs: anthracene, benz(a)anthracene, benzo(a)pyrene, benzo(b+j)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, indeno(1,2,3-c,d)pyrene, phenanthrene, pyrene, benzo(e)pyrene, perylene, 3-methylcholanthrene, 1,3-dinitropyrene, 1,6-dinitropyrene, 1,8-dinitropyrene, 7H-dibenzo(c,g)carbazole, dibenzo(a,i)pyrene, dibenz(a,j)acridine, and dibenz(a,h)acridine. When the PAH is less than LOR, zero is used for calculation.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for TKN in water	EP318 Waterloo - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Digestion for Total Phosphorus in water	EP372 Waterloo - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Oil & Grease Extraction for Gravimetry	EP567 Calgary - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane by liquid-liquid extraction.
VOCs Preparation for Headspace Analysis	EP581 Waterloo - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Waterloo - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
PAHs DCM Extraction	EP642 Waterloo - Environmental	Water	EPA 3510C (mod)	PAH are extracted from aqueous sample using DCM liquid-liquid extraction.
BNA Extraction	EP655 Waterloo - Environmental	Water	EPA 3510C (mod)	SVOCs are extracted from aqueous sample using DCM liquid-liquid extraction.
Pesticides, PCB, and Neutral Extractable Chlorinated Hydrocarbons Extraction	EP660 Waterloo - Environmental	Water	EPA 3511 (mod)	Samples are extracted from aqueous sample using an organic solvent liquid-liquid extraction.
Preparation of Nonylphenol and Nonylphenol Ethoxylates	EP749 Waterloo - Environmental	Water	J. Chrom A849 (1999) p.467-482	An aliquot of 5.0 ± 0.10 mL of filtered sample is spiked with Nonylphenol-D4, Nonylphenol Diethoxylate 13C6, and Bisphenol A 13C12 internal standards and analyzed by LC-MS/MS.

QUALITY CONTROL REPORT

Work Order	: **WT2306151**	Page	: 1 of 16
Client	: WSP E&I Canada Limited	Laboratory	: Waterloo - Environmental
Contact	: Sarah Irvine	Account Manager	: Gayle Braun
Address	: 50 Vogel Road Unit 3 & 4 Richmond Hill ON Canada L4B 3K6	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	:	Telephone	: +1 519 886 6910
Project	: WW21012079.CO1P.****. 5120.573000	Date Samples Received	: 14-Mar-2023 15:40
PO	: ----	Date Analysis Commenced	: 14-Mar-2023
C-O-C number	: 20-1003332	Issue Date	: 21-Mar-2023 13:36
Sampler	: ---- ----		
Site	:		
Quote number	: WOOD SOA 2022/23		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Amanda Ganouri-Lumsden	Department Manager - Microbiology and Prep	Waterloo Microbiology, Waterloo, Ontario
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General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 863863)											
WT2306163-001	Anonymous	Solids, total suspended [TSS]	----	E160	150	mg/L	24200	25400	4.87%	20%	----
Physical Tests (QC Lot: 864651)											
WT2306084-009	Anonymous	pH	----	E108	0.10	pH units	7.86	7.89	0.381%	4%	----
Physical Tests (QC Lot: 865008)											
WT2306082-003	Anonymous	pH	----	E108	0.10	pH units	7.99	8.05	0.748%	4%	----
Anions and Nutrients (QC Lot: 863561)											
WT2306038-005	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0437	0.0438	0.388%	20%	----
Anions and Nutrients (QC Lot: 863564)											
WT2306041-002	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.100	0.090	0.010	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 865013)											
WT2306082-003	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	25.1	25.1	0.228%	20%	----
Anions and Nutrients (QC Lot: 865014)											
WT2306082-003	Anonymous	Fluoride	16984-48-8	E235.F	0.020	mg/L	0.581	0.587	1.16%	20%	----
Cyanides (QC Lot: 865831)											
CG2303021-001	Anonymous	Cyanide, strong acid dissociable (Total)	----	E333	0.200	mg/L	<0.200	<0.200	0	Diff <2x LOR	----
Total Metals (QC Lot: 863382)											
TY2301970-001	Anonymous	Aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0048	0.0045	0.0003	Diff <2x LOR	----
		Antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00113	0.00113	0.0354%	20%	----
		Beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		Chromium, total	7440-47-3	E420	0.00050	mg/L	0.00066	0.00057	0.00008	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00054	0.00055	0.000004	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Iron, total	7439-89-6	E420	0.010	mg/L	10.2	10.1	1.18%	20%	----
		Lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Manganese, total	7439-96-5	E420	0.00010	mg/L	0.363	0.367	0.942%	20%	----
		Molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00417	0.00388	7.38%	20%	----
		Nickel, total	7440-02-0	E420	0.00050	mg/L	0.00825	0.00837	1.48%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 863382) - continued											
TY2301970-001	Anonymous	Selenium, total	7782-49-2	E420	0.000050	mg/L	0.000052	<0.000050	0.000002	Diff <2x LOR	----
		Silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
Total Metals (QC Lot: 863570)											
TY2301993-002	Anonymous	Mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Speciated Metals (QC Lot: 863582)											
WT2305870-001	Anonymous	Chromium, hexavalent [Cr VI], total	18540-29-9	E532	0.00050	mg/L	0.0104	0.0105	0.950%	20%	----
Aggregate Organics (QC Lot: 863563)											
WT2305982-001	Anonymous	Phenols, total (4AAP)	----	E562	0.0010	mg/L	0.0051	0.0050	0.00008	Diff <2x LOR	----
Aggregate Organics (QC Lot: 863816)											
WT2306171-001	Anonymous	Biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	5.5	5.3	3.9%	30%	----
Volatile Organic Compounds (QC Lot: 866098)											
WT2306113-001	Anonymous	Benzene	71-43-2	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Chloroform	67-66-3	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichlorobenzene, 1,2-	95-50-1	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichlorobenzene, 1,4-	106-46-7	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichloroethylene, cis-1,2-	156-59-2	E611D	0.50	µg/L	399	389	2.53%	30%	----
		Dichloromethane	75-09-2	E611D	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloropropylene, trans-1,3-	10061-02-6	E611D	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611D	0.50	µg/L	24.7	23.7	4.38%	30%	----
		Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Tetrachloroethylene	127-18-4	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611D	0.50	µg/L	0.72	0.69	0.03	Diff <2x LOR	----
		Trichloroethylene	79-01-6	E611D	0.50	µg/L	382	367	3.89%	30%	----
		Xylene, m+p-	179601-23-1	E611D	0.40	µg/L	19.0	18.2	4.62%	30%	----
		Xylene, o-	95-47-6	E611D	0.30	µg/L	9.61	9.25	3.82%	30%	----
Volatile Organic Compounds (QC Lot: 867468)											
WT2306151-002	BH4 Halton	Benzene	71-43-2	E611F	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Chloroform	67-66-3	E611F	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichlorobenzene, 1,4-	106-46-7	E611F	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichloromethane	75-09-2	E611F	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611F	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Volatile Organic Compounds (QC Lot: 867468) - continued											
WT2306151-002	BH4 Halton	Tetrachloroethylene	127-18-4	E611F	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611F	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Trichloroethylene	79-01-6	E611F	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
Nonylphenols (QC Lot: 863309)											
WT2305739-001	Anonymous	Nonylphenols [NP]	84852-15-3	E749A	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
Nonylphenols (QC Lot: 863310)											
WT2305739-001	Anonymous	Nonylphenol diethoxylates [NP2EO]	n/a	E749B	0.10	µg/L	<0.10	<0.10	0	Diff <2x LOR	----
		Nonylphenol monoethoxylates [NP1EO]	n/a	E749B	2.0	µg/L	<2.0	<2.0	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 863863)						
Solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Anions and Nutrients (QCLot: 863561)						
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 863564)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 865013)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 865014)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Cyanides (QCLot: 865831)						
Cyanide, strong acid dissociable (Total)	----	E333	0.002	mg/L	<0.0020	----
Microbiological Tests (QCLot: 864123)						
Coliforms, Escherichia coli [E. coli]	----	E012A.EC	1	CFU/100mL	<1	----
Total Metals (QCLot: 863382)						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 863570)						
Mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Speciated Metals (QCLot: 863582)						
Chromium, hexavalent [Cr VI], total	18540-29-9	E532	0.0005	mg/L	<0.00050	----
Aggregate Organics (QCLot: 863563)						
Phenols, total (4AAP)	----	E562	0.001	mg/L	<0.0010	----
Aggregate Organics (QCLot: 863816)						
Biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 865915)						
Oil & grease (gravimetric)	----	E567	5	mg/L	<5.0	----
Aggregate Organics (QCLot: 865916)						
Oil & grease, mineral (gravimetric)	----	E567SG	5	mg/L	<5.0	----
Volatile Organic Compounds (QCLot: 866098)						
Benzene	71-43-2	E611D	0.5	µg/L	<0.50	----
Chloroform	67-66-3	E611D	0.5	µg/L	<0.50	----
Dichlorobenzene, 1,2-	95-50-1	E611D	0.5	µg/L	<0.50	----
Dichlorobenzene, 1,4-	106-46-7	E611D	0.5	µg/L	<0.50	----
Dichloroethylene, cis-1,2-	156-59-2	E611D	0.5	µg/L	<0.50	----
Dichloromethane	75-09-2	E611D	1	µg/L	<1.0	----
Dichloropropylene, trans-1,3-	10061-02-6	E611D	0.3	µg/L	<0.30	----
Ethylbenzene	100-41-4	E611D	0.5	µg/L	<0.50	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.5	µg/L	<0.50	----
Tetrachloroethylene	127-18-4	E611D	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611D	0.5	µg/L	<0.50	----
Trichloroethylene	79-01-6	E611D	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611D	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611D	0.3	µg/L	<0.30	----
Volatile Organic Compounds (QCLot: 867468)						
Benzene	71-43-2	E611F	0.5	µg/L	<0.50	----
Chloroform	67-66-3	E611F	0.5	µg/L	<0.50	----
Dichlorobenzene, 1,4-	106-46-7	E611F	0.5	µg/L	<0.50	----
Dichloromethane	75-09-2	E611F	1	µg/L	<1.0	----
Ethylbenzene	100-41-4	E611F	0.5	µg/L	<0.50	----
Tetrachloroethylene	127-18-4	E611F	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611F	0.5	µg/L	<0.50	----
Trichloroethylene	79-01-6	E611F	0.5	µg/L	<0.50	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 863531)						
Anthracene	120-12-7	E641A-L	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A-L	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A-L	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A-L	0.01	µg/L	<0.010	----
Benzo(e)pyrene	192-97-2	E641A-L	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A-L	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A-L	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A-L	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A-L	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A-L	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A-L	0.01	µg/L	<0.010	----
Perylene	198-55-0	E641A-L	0.01	µg/L	<0.010	----
Phenanthrene	85-01-8	E641A-L	0.01	µg/L	<0.010	----
Pyrene	129-00-0	E641A-L	0.01	µg/L	<0.010	----
Polycyclic Aromatic Hydrocarbons (QCLot: 865023)						
Dibenz(a,h)acridine	226-36-8	E642D	0.05	µg/L	<0.050	----
Dibenz(a,j)acridine	224-42-0	E642D	0.05	µg/L	<0.050	----
Dibenzo(a,i)pyrene	189-55-9	E642D	0.05	µg/L	<0.050	----
Dibenzo(c,g)carbazole, 7H-	194-59-2	E642D	0.05	µg/L	<0.050	----
Dinitropyrene, 1,3-	75321-20-9	E642D	1	µg/L	<1.0	----
Dinitropyrene, 1,6-	42397-64-8	E642D	1	µg/L	<1.0	----
Dinitropyrene, 1,8-	42397-65-9	E642D	1	µg/L	<1.0	----
Methylcholanthrene, 3-	56-49-5	E642D	0.05	µg/L	<0.050	----
Phthalate Esters (QCLot: 865018)						
bis(2-Ethylhexyl) phthalate [DEHP]	117-81-7	E655F	2	µg/L	<2.0	----
Di-n-butyl phthalate	84-74-2	E655F	1	µg/L	<1.0	----
Semi-Volatile Organics (QCLot: 865018)						
Dichlorobenzidine, 3,3'-	91-94-1	E655F	0.4	µg/L	<0.40	----
Chlorinated Phenolics (QCLot: 865018)						
Pentachlorophenol [PCP]	87-86-5	E655F	0.5	µg/L	<0.50	----
Nonylphenols (QCLot: 863309)						
Nonylphenols [NP]	84852-15-3	E749A	1	µg/L	<1.0	----
Nonylphenols (QCLot: 863310)						
Nonylphenol diethoxylates [NP2EO]	n/a	E749B	0.1	µg/L	<0.10	----
Nonylphenol monoethoxylates [NP1EO]	n/a	E749B	2	µg/L	<2.0	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polychlorinated Biphenyls (QCLot: 863525)						
Aroclor 1016	12674-11-2	E687	0.02	µg/L	<0.020	----
Aroclor 1221	11104-28-2	E687	0.02	µg/L	<0.020	----
Aroclor 1232	11141-16-5	E687	0.02	µg/L	<0.020	----
Aroclor 1242	53469-21-9	E687	0.02	µg/L	<0.020	----
Aroclor 1248	12672-29-6	E687	0.02	µg/L	<0.020	----
Aroclor 1254	11097-69-1	E687	0.02	µg/L	<0.020	----
Aroclor 1260	11096-82-5	E687	0.02	µg/L	<0.020	----
Aroclor 1262	37324-23-5	E687	0.02	µg/L	<0.020	----
Aroclor 1268	11100-14-4	E687	0.02	µg/L	<0.020	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 863863)									
Solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	87.8	85.0	115	----
Physical Tests (QCLot: 864651)									
pH	----	E108	----	pH units	7 pH units	101	98.0	102	----
Physical Tests (QCLot: 865008)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Anions and Nutrients (QCLot: 863561)									
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.845 mg/L	99.7	80.0	120	----
Anions and Nutrients (QCLot: 863564)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	106	75.0	125	----
Anions and Nutrients (QCLot: 865013)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	98.0	90.0	110	----
Anions and Nutrients (QCLot: 865014)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	101	90.0	110	----
Cyanides (QCLot: 865831)									
Cyanide, strong acid dissociable (Total)	----	E333	0.002	mg/L	0.25 mg/L	88.6	80.0	120	----
Total Metals (QCLot: 863382)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	0.1 mg/L	98.2	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	0.05 mg/L	104	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	0.05 mg/L	103	80.0	120	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	0.005 mg/L	102	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.005 mg/L	102	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.0125 mg/L	97.7	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.0125 mg/L	99.3	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.0125 mg/L	96.0	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	0.05 mg/L	102	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.025 mg/L	103	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.0125 mg/L	99.4	80.0	120	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.0125 mg/L	102	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.025 mg/L	95.4	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	0.05 mg/L	100	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Total Metals (QCLot: 863382) - continued									
Silver, total	7440-22-4	E420	0.00001	mg/L	0.005 mg/L	100	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.025 mg/L	102	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.0125 mg/L	97.5	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.025 mg/L	99.2	80.0	120	----
Total Metals (QCLot: 863570)									
Mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	91.3	80.0	120	----
Speciated Metals (QCLot: 863582)									
Chromium, hexavalent [Cr VI], total	18540-29-9	E532	0.0005	mg/L	0.025 mg/L	96.7	80.0	120	----
Aggregate Organics (QCLot: 863563)									
Phenols, total (4AAP)	----	E562	0.001	mg/L	0.02 mg/L	96.6	85.0	115	----
Aggregate Organics (QCLot: 863816)									
Biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	98.6	85.0	115	----
Aggregate Organics (QCLot: 865915)									
Oil & grease (gravimetric)	----	E567	5	mg/L	100 mg/L	70.4	70.0	130	----
Aggregate Organics (QCLot: 865916)									
Oil & grease, mineral (gravimetric)	----	E567SG	5	mg/L	50 mg/L	75.6	70.0	130	----
Volatile Organic Compounds (QCLot: 866098)									
Benzene	71-43-2	E611D	0.5	µg/L	100 µg/L	119	70.0	130	----
Chloroform	67-66-3	E611D	0.5	µg/L	100 µg/L	115	70.0	130	----
Dichlorobenzene, 1,2-	95-50-1	E611D	0.5	µg/L	100 µg/L	111	70.0	130	----
Dichlorobenzene, 1,4-	106-46-7	E611D	0.5	µg/L	100 µg/L	113	70.0	130	----
Dichloroethylene, cis-1,2-	156-59-2	E611D	0.5	µg/L	100 µg/L	112	70.0	130	----
Dichloromethane	75-09-2	E611D	1	µg/L	100 µg/L	124	70.0	130	----
Dichloropropylene, trans-1,3-	10061-02-6	E611D	0.3	µg/L	100 µg/L	75.9	70.0	130	----
Ethylbenzene	100-41-4	E611D	0.5	µg/L	100 µg/L	103	70.0	130	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.5	µg/L	100 µg/L	98.6	70.0	130	----
Tetrachloroethylene	127-18-4	E611D	0.5	µg/L	100 µg/L	117	70.0	130	----
Toluene	108-88-3	E611D	0.5	µg/L	100 µg/L	107	70.0	130	----
Trichloroethylene	79-01-6	E611D	0.5	µg/L	100 µg/L	125	70.0	130	----
Xylene, m+p-	179601-23-1	E611D	0.4	µg/L	200 µg/L	108	70.0	130	----
Xylene, o-	95-47-6	E611D	0.3	µg/L	100 µg/L	103	70.0	130	----
Volatile Organic Compounds (QCLot: 867468)									
Benzene	71-43-2	E611F	0.5	µg/L	100 µg/L	101	70.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 867468) - continued									
Chloroform	67-66-3	E611F	0.5	µg/L	100 µg/L	96.8	70.0	130	----
Dichlorobenzene, 1,4-	106-46-7	E611F	0.5	µg/L	100 µg/L	102	70.0	130	----
Dichloromethane	75-09-2	E611F	1	µg/L	100 µg/L	106	70.0	130	----
Ethylbenzene	100-41-4	E611F	0.5	µg/L	100 µg/L	88.1	70.0	130	----
Tetrachloroethylene	127-18-4	E611F	0.5	µg/L	100 µg/L	103	70.0	130	----
Toluene	108-88-3	E611F	0.5	µg/L	100 µg/L	91.5	70.0	130	----
Trichloroethylene	79-01-6	E611F	0.5	µg/L	100 µg/L	108	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 863531)									
Anthracene	120-12-7	E641A-L	0.01	µg/L	0.5263 µg/L	81.4	50.0	140	----
Benz(a)anthracene	56-55-3	E641A-L	0.01	µg/L	0.5263 µg/L	90.5	50.0	140	----
Benzo(a)pyrene	50-32-8	E641A-L	0.005	µg/L	0.5263 µg/L	77.0	50.0	140	----
Benzo(b+j)fluoranthene	n/a	E641A-L	0.01	µg/L	0.5263 µg/L	79.9	50.0	140	----
Benzo(e)pyrene	192-97-2	E641A-L	0.01	µg/L	0.5263 µg/L	93.6	50.0	140	----
Benzo(g,h,i)perylene	191-24-2	E641A-L	0.01	µg/L	0.5263 µg/L	92.9	50.0	140	----
Benzo(k)fluoranthene	207-08-9	E641A-L	0.01	µg/L	0.5263 µg/L	90.7	50.0	140	----
Chrysene	218-01-9	E641A-L	0.01	µg/L	0.5263 µg/L	102	50.0	140	----
Dibenz(a,h)anthracene	53-70-3	E641A-L	0.005	µg/L	0.5263 µg/L	81.6	50.0	140	----
Fluoranthene	206-44-0	E641A-L	0.01	µg/L	0.5263 µg/L	100	50.0	140	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A-L	0.01	µg/L	0.5263 µg/L	98.6	50.0	140	----
Perylene	198-55-0	E641A-L	0.01	µg/L	0.5263 µg/L	96.2	50.0	140	----
Phenanthrene	85-01-8	E641A-L	0.01	µg/L	0.5263 µg/L	97.1	50.0	140	----
Pyrene	129-00-0	E641A-L	0.01	µg/L	0.5263 µg/L	100	50.0	140	----
Polycyclic Aromatic Hydrocarbons (QCLot: 865023)									
Dibenz(a,h)acridine	226-36-8	E642D	0.05	µg/L	1.6 µg/L	108	60.0	130	----
Dibenz(a,j)acridine	224-42-0	E642D	0.05	µg/L	1.6 µg/L	103	60.0	130	----
Dibenzo(a,i)pyrene	189-55-9	E642D	0.05	µg/L	1.6 µg/L	63.0	60.0	130	----
Dibenzo(c,g)carbazole, 7H-	194-59-2	E642D	0.05	µg/L	1.6 µg/L	112	60.0	130	----
Dinitropyrene, 1,3-	75321-20-9	E642D	1	µg/L	1.6 µg/L	120	60.0	130	----
Dinitropyrene, 1,6-	42397-64-8	E642D	1	µg/L	1.6 µg/L	66.3	60.0	130	----
Dinitropyrene, 1,8-	42397-65-9	E642D	1	µg/L	1.6 µg/L	94.9	60.0	130	----
Methylcholanthrene, 3-	56-49-5	E642D	0.05	µg/L	1.6 µg/L	# 192	60.0	130	LCS-H
Phthalate Esters (QCLot: 865018)									
bis(2-Ethylhexyl) phthalate [DEHP]	117-81-7	E655F	2	µg/L	6.4 µg/L	107	50.0	140	----
Di-n-butyl phthalate	84-74-2	E655F	1	µg/L	6.4 µg/L	108	50.0	140	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Semi-Volatile Organics (QCLot: 865018)									
Dichlorobenzidine, 3,3'-	91-94-1	E655F	0.4	µg/L	1.6 µg/L	# 37.1	50.0	140	LCS-ND
Chlorinated Phenolics (QCLot: 865018)									
Pentachlorophenol [PCP]	87-86-5	E655F	0.5	µg/L	4.8 µg/L	135	50.0	140	----
Nonylphenols (QCLot: 863309)									
Nonylphenols [NP]	84852-15-3	E749A	1	µg/L	10 µg/L	98.8	75.0	125	----
Nonylphenols (QCLot: 863310)									
Nonylphenol diethoxylates [NP2EO]	n/a	E749B	0.1	µg/L	1 µg/L	102	75.0	125	----
Nonylphenol monoethoxylates [NP1EO]	n/a	E749B	2	µg/L	20 µg/L	118	75.0	125	----
Polychlorinated Biphenyls (QCLot: 863525)									
Aroclor 1016	12674-11-2	E687	0.02	µg/L	0.2 µg/L	116	60.0	140	----
Aroclor 1221	11104-28-2	E687	0.02	µg/L	0.2 µg/L	116	60.0	140	----
Aroclor 1232	11141-16-5	E687	0.02	µg/L	0.2 µg/L	116	60.0	140	----
Aroclor 1242	53469-21-9	E687	0.02	µg/L	0.2 µg/L	116	60.0	140	----
Aroclor 1248	12672-29-6	E687	0.02	µg/L	0.2 µg/L	109	60.0	140	----
Aroclor 1254	11097-69-1	E687	0.02	µg/L	0.2 µg/L	83.5	60.0	140	----
Aroclor 1260	11096-82-5	E687	0.02	µg/L	0.2 µg/L	92.1	60.0	140	----
Aroclor 1262	37324-23-5	E687	0.02	µg/L	0.2 µg/L	92.1	60.0	140	----
Aroclor 1268	11100-14-4	E687	0.02	µg/L	0.2 µg/L	92.1	60.0	140	----

Qualifiers

Qualifier	Description
LCS-H	*Lab Control Sample recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.*
LCS-ND	*Lab Control Sample recovery was slightly outside ALS DQO. Reported non-detect results for associated samples were unaffected.*

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 863561)										
WT2306038-005	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0975 mg/L	0.1 mg/L	97.5	70.0	130	----
Anions and Nutrients (QCLot: 863564)										
WT2306041-002	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.80 mg/L	2.5 mg/L	112	70.0	130	----
Anions and Nutrients (QCLot: 865013)										
WT2306082-003	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	97.9 mg/L	100 mg/L	97.9	75.0	125	----
Anions and Nutrients (QCLot: 865014)										
WT2306082-003	Anonymous	Fluoride	16984-48-8	E235.F	1.01 mg/L	1 mg/L	101	75.0	125	----
Cyanides (QCLot: 865831)										
CG2303021-001	Anonymous	Cyanide, strong acid dissociable (Total)	----	E333	0.233 mg/L	0.25 mg/L	93.3	75.0	125	----
Total Metals (QCLot: 863382)										
TY2301973-001	Anonymous	Aluminum, total	7429-90-5	E420	0.0964 mg/L	0.1 mg/L	96.4	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0520 mg/L	0.05 mg/L	104	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0520 mg/L	0.05 mg/L	104	70.0	130	----
		Beryllium, total	7440-41-7	E420	0.00522 mg/L	0.005 mg/L	104	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00505 mg/L	0.005 mg/L	101	70.0	130	----
		Chromium, total	7440-47-3	E420	0.0124 mg/L	0.0125 mg/L	99.7	70.0	130	----
		Cobalt, total	7440-48-4	E420	0.0124 mg/L	0.0125 mg/L	99.3	70.0	130	----
		Copper, total	7440-50-8	E420	0.0122 mg/L	0.0125 mg/L	97.4	70.0	130	----
		Iron, total	7439-89-6	E420	ND mg/L	0.05 mg/L	ND	70.0	130	----
		Lead, total	7439-92-1	E420	0.0255 mg/L	0.025 mg/L	102	70.0	130	----
		Manganese, total	7439-96-5	E420	0.0122 mg/L	0.0125 mg/L	97.8	70.0	130	----
		Molybdenum, total	7439-98-7	E420	0.0127 mg/L	0.0125 mg/L	102	70.0	130	----
		Nickel, total	7440-02-0	E420	0.0240 mg/L	0.025 mg/L	96.2	70.0	130	----
		Selenium, total	7782-49-2	E420	0.0509 mg/L	0.05 mg/L	102	70.0	130	----
		Silver, total	7440-22-4	E420	0.00496 mg/L	0.005 mg/L	99.2	70.0	130	----
		Tin, total	7440-31-5	E420	0.0254 mg/L	0.025 mg/L	102	70.0	130	----
		Titanium, total	7440-32-6	E420	0.0122 mg/L	0.0125 mg/L	98.0	70.0	130	----
		Zinc, total	7440-66-6	E420	0.0244 mg/L	0.025 mg/L	97.4	70.0	130	----
Total Metals (QCLot: 863570)										
TY2301993-003	Anonymous	Mercury, total	7439-97-6	E508	0.000102 mg/L	0.0001 mg/L	102	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Speciated Metals (QCLot: 863582)										
WT2305870-001	Anonymous	Chromium, hexavalent [Cr VI], total	18540-29-9	E532	0.0389 mg/L	0.04 mg/L	97.4	70.0	130	----
Aggregate Organics (QCLot: 863563)										
WT2305982-001	Anonymous	Phenols, total (4AAP)	----	E562	0.0196 mg/L	0.02 mg/L	98.3	75.0	125	----
Volatile Organic Compounds (QCLot: 866098)										
WT2306113-001	Anonymous	Benzene	71-43-2	E611D	104 µg/L	100 µg/L	104	60.0	140	----
		Chloroform	67-66-3	E611D	102 µg/L	100 µg/L	102	60.0	140	----
		Dichlorobenzene, 1,2-	95-50-1	E611D	97.4 µg/L	100 µg/L	97.4	60.0	140	----
		Dichlorobenzene, 1,4-	106-46-7	E611D	99.7 µg/L	100 µg/L	99.7	60.0	140	----
		Dichloroethylene, cis-1,2-	156-59-2	E611D	ND µg/L	100 µg/L	ND	60.0	140	----
		Dichloromethane	75-09-2	E611D	108 µg/L	100 µg/L	108	60.0	140	----
		Dichloropropylene, trans-1,3-	10061-02-6	E611D	69.1 µg/L	100 µg/L	69.1	60.0	140	----
		Ethylbenzene	100-41-4	E611D	88.2 µg/L	100 µg/L	88.2	60.0	140	----
		Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	89.8 µg/L	100 µg/L	89.8	60.0	140	----
		Tetrachloroethylene	127-18-4	E611D	99.1 µg/L	100 µg/L	99.1	60.0	140	----
		Toluene	108-88-3	E611D	91.6 µg/L	100 µg/L	91.6	60.0	140	----
		Trichloroethylene	79-01-6	E611D	ND µg/L	100 µg/L	ND	60.0	140	----
		Xylene, m+p-	179601-23-1	E611D	187 µg/L	200 µg/L	93.6	60.0	140	----
		Xylene, o-	95-47-6	E611D	89.8 µg/L	100 µg/L	89.8	60.0	140	----
Volatile Organic Compounds (QCLot: 867468)										
WT2306151-002	BH4 Halton	Benzene	71-43-2	E611F	104 µg/L	100 µg/L	104	60.0	140	----
		Chloroform	67-66-3	E611F	101 µg/L	100 µg/L	101	60.0	140	----
		Dichlorobenzene, 1,4-	106-46-7	E611F	104 µg/L	100 µg/L	104	60.0	140	----
		Dichloromethane	75-09-2	E611F	109 µg/L	100 µg/L	109	60.0	140	----
		Ethylbenzene	100-41-4	E611F	91.2 µg/L	100 µg/L	91.2	60.0	140	----
		Tetrachloroethylene	127-18-4	E611F	105 µg/L	100 µg/L	105	60.0	140	----
		Toluene	108-88-3	E611F	94.4 µg/L	100 µg/L	94.4	60.0	140	----
		Trichloroethylene	79-01-6	E611F	112 µg/L	100 µg/L	112	60.0	140	----
Nonylphenols (QCLot: 863309)										
WT2305739-001	Anonymous	Nonylphenols [NP]	84852-15-3	E749A	13.4 µg/L	10 µg/L	134	60.0	140	----
Nonylphenols (QCLot: 863310)										
WT2305739-001	Anonymous	Nonylphenol diethoxylates [NP2EO]	n/a	E749B	0.85 µg/L	1 µg/L	85.1	60.0	140	----
		Nonylphenol monoethoxylates [NP1EO]	n/a	E749B	19.4 µg/L	20 µg/L	96.9	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

ALS www.alsglobal.com

Canada Toll Free: 1 800 668 9878

COC Number: 20 - 1003332

Page of

JD

Report To (Contact and company name below will appear on the final report)
Company: WSP
Contact: Sarah Irvine
Phone:

(Company address below will appear on the final report)
Street: 3450 Harvester Rd
City/Province: Burlington ON
Postal Code: L7N 3W5

Invoice To
Same as Report To ☐ YES ☒ NO
Copy of Invoice with Report ☒ YES ☐ NO
Company: WSP
Contact: AP Invoice

Project Information
ALS Account # / Quote #:
Job #:
PO / AFE:
LSD:

Reports / Recipients
Select Report Format: ☐ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Merge QC/QCI Reports with COA ☒ YES ☐ NO ☐ N/A
☒ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☒ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: Sarah.irvine@wsp.com
Email 2: Jessica.Pitman@wsp.com
Email 3: ryan.phillips@wsp.com

Invoice Recipients
Select Invoice Distribution: ☐ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: APinvoice.Canada@wsp.com
Email 2:

Oil and Gas Required Fields (client use)
AFE/Cost Center: PO#
Major/Minor Code: Routing Code:
Requisitioner:
Location:

Turnaround Time (TAT) Requested
☒ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimu
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minim
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minim
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minim
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Ad
may apply to rush requests on weekends, statutory holidays and non-
Date and Time Required for all E&P TATs:
For all tests with rush TATs requested, pleas

Environmental Division
Waterloo
Work Order Reference
WT2306151

Telephone : +1 519 886 6910

ALS Lab Work Order # (ALS use only): WT2306151

ALS Contact: Sampler:

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Analysis Request: Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P)						SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see Special Instructions)
						Burlington Storm	Halton Sanitary	Total metals	Total mercury	Total chromium				
	BH 4	March 14,23	1000	GW	2	X	X							
	BH 4-F	March 14,23	1000	GW	3			X	X	X				

Drinking Water (DW) Samples[1] (client use)
Are samples taken from a Regulated DW System? ☐ YES ☒ NO
Are samples for human consumption/ use? ☐ YES ☒ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Compare BH-4-F directly to Sewer Bylaw metals
*Broke/missing BTEX Vial.

SAMPLE RECEIPT DETAILS (ALS use only)
Cooling Method: ☐ NONE ☐ ICE ☒ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED
Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO
Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
1.2°C			7.1		

SHIPMENT RELEASE (client use)
Released by: Ryan Phillips Date: March 14,23 Time: 3:00pm

INITIAL SHIPMENT RECEPTION (ALS use only)
Received by: JG Date: 3/14/2023 Time: 3:40pm

FINAL SHIPMENT RECEPTION (ALS use only)
Received by: FH Date: 2023-03-14 Time: 5:30PM

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Se-200 CN-EQL B-S25 L-416

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CERTIFICATE OF ANALYSIS (GUIDELINE EVALUATION)

Work Order	: **WT2306162**	Page	: 1 of 7
Client	: **WSP E&I Canada Limited**	Laboratory	: Waterloo - Environmental
Contact	: Sarah Irvine	Account Manager	: Gayle Braun
Address	: 100 - 3450 Harvester Road Burlington ON Canada L7N 3W5	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: ----	Telephone	: +1 519 886 6910
Project	: WW21012079.CO1P.****. 5120.573000	Date Samples Received	: 14-Mar-2023 15:00
PO	: ----	Date Analysis Commenced	: 15-Mar-2023
C-O-C number	: 20-1003324	Issue Date	: 20-Mar-2023 15:03
Sampler	: ----		
Site	:		
Quote number	: WOOD SOA 2022/23		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Guideline Comparison

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Danielle Gravel	Supervisor - Semi-Volatile Instrumentation	Organics, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Inorganics, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Metals, Waterloo, Ontario
Sarah Birch	VOC Section Supervisor	Organics, Waterloo, Ontario

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.
Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guidelines are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Key : LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
µg/L	micrograms per litre
mg/L	milligrams per litre
mS/cm	millisiemens per centimetre
pH units	pH units

>: greater than.
<: less than.
Red shading is applied where the result is greater than the Guideline Upper Limit or the result is lower than the Guideline Lower Limit.
For drinking water samples, Red shading is applied where the result for E.coli, fecal or total coliforms is greater than or equal to the Guideline Upper Limit .

Analytical Results

Sub-Matrix: **Water** (Matrix: **Water**)			Client sample ID	BH-4						
			Sampling date/time	14-Mar-2023 15:00						
Analyte	*Method*	*LOR*	*Unit*	WT2306162-001	**ON153/04 T3-NPGW-C-All**	**ON153/04 T3-NPGW-F-All**				
Physical Tests										
Conductivity	E100	0.0010	mS/cm	1.00	--	--	--	--	--	--
pH	E108	0.10	pH units	7.95	--	--	--	--	--	--
Anions and Nutrients										
Chloride	E235.Cl	0.50	mg/L	2.71	2300 mg/L	2300 mg/L	--	--	--	--
Cyanides										
Cyanide, weak acid dissociable	E336	2.0	µg/L	<2.0	66 µg/L	66 µg/L	--	--	--	--
Dissolved Metals										
Antimony, dissolved	E421	0.10	µg/L	<0.10	20000 µg/L	20000 µg/L	--	--	--	--
Arsenic, dissolved	E421	0.10	µg/L	0.22	1900 µg/L	1900 µg/L	--	--	--	--
Barium, dissolved	E421	0.10	µg/L	64.1	29000 µg/L	29000 µg/L	--	--	--	--
Beryllium, dissolved	E421	0.020	µg/L	<0.020	67 µg/L	67 µg/L	--	--	--	--
Boron, dissolved	E421	10	µg/L	124	45000 µg/L	45000 µg/L	--	--	--	--
Cadmium, dissolved	E421	0.0050	µg/L	<0.0050	2.7 µg/L	2.7 µg/L	--	--	--	--
Chromium, dissolved	E421	0.50	µg/L	<0.50	810 µg/L	810 µg/L	--	--	--	--
Cobalt, dissolved	E421	0.10	µg/L	<0.10	66 µg/L	66 µg/L	--	--	--	--
Copper, dissolved	E421	0.20	µg/L	0.33	87 µg/L	87 µg/L	--	--	--	--
Lead, dissolved	E421	0.050	µg/L	<0.050	25 µg/L	25 µg/L	--	--	--	--
Mercury, dissolved	E509	0.0050	µg/L	<0.0050	0.29 µg/L	2.8 µg/L	--	--	--	--
Molybdenum, dissolved	E421	0.050	µg/L	1.29	9200 µg/L	9200 µg/L	--	--	--	--
Nickel, dissolved	E421	0.50	µg/L	0.57	490 µg/L	490 µg/L	--	--	--	--
Selenium, dissolved	E421	0.050	µg/L	0.292	63 µg/L	63 µg/L	--	--	--	--
Silver, dissolved	E421	0.010	µg/L	<0.010	1.5 µg/L	1.5 µg/L	--	--	--	--
Sodium, dissolved	E421	50	µg/L	18500	2300000 µg/L	2300000 µg/L	--	--	--	--
Thallium, dissolved	E421	0.010	µg/L	0.028	510 µg/L	510 µg/L	--	--	--	--
Uranium, dissolved	E421	0.010	µg/L	6.68	420 µg/L	420 µg/L	--	--	--	--
Vanadium, dissolved	E421	0.50	µg/L	0.85	250 µg/L	250 µg/L	--	--	--	--
Zinc, dissolved	E421	1.0	µg/L	<1.0	1100 µg/L	1100 µg/L	--	--	--	--
Dissolved mercury filtration location	EP509		-	Field	--	--	--	--	--	--
Dissolved metals filtration location	EP421		-	Field	--	--	--	--	--	--

Analyte	Method	LOR	Unit	WT2306162-001 (Continued)	ON153/04 T3-NPGW-C-All	ON153/04 T3-NPGW-F-All				
Speciated Metals										
Chromium, hexavalent [Cr VI], dissolved	E532A	0.50	µg/L	<0.50	140 µg/L	140 µg/L	--	--	--	--
Volatile Organic Compounds										
Acetone	E611D	20	µg/L	<20	130000 µg/L	130000 µg/L	--	--	--	--
Benzene	E611D	0.50	µg/L	<0.50	44 µg/L	430 µg/L	--	--	--	--
Bromodichloromethane	E611D	0.50	µg/L	<0.50	85000 µg/L	85000 µg/L	--	--	--	--
Bromoform	E611D	0.50	µg/L	<0.50	380 µg/L	770 µg/L	--	--	--	--
Bromomethane	E611D	0.50	µg/L	<0.50	5.6 µg/L	56 µg/L	--	--	--	--
Carbon tetrachloride	E611D	0.20	µg/L	<0.20	0.79 µg/L	8.4 µg/L	--	--	--	--
Chlorobenzene	E611D	0.50	µg/L	<0.50	630 µg/L	630 µg/L	--	--	--	--
Chloroform	E611D	0.50	µg/L	<0.50	2.4 µg/L	22 µg/L	--	--	--	--
Dibromochloromethane	E611D	0.50	µg/L	<0.50	82000 µg/L	82000 µg/L	--	--	--	--
Dibromoethane, 1,2-	E611D	0.20	µg/L	<0.20	0.25 µg/L	0.83 µg/L	--	--	--	--
Dichlorobenzene, 1,2-	E611D	0.50	µg/L	<0.50	4600 µg/L	9600 µg/L	--	--	--	--
Dichlorobenzene, 1,3-	E611D	0.50	µg/L	<0.50	9600 µg/L	9600 µg/L	--	--	--	--
Dichlorobenzene, 1,4-	E611D	0.50	µg/L	<0.50	8 µg/L	67 µg/L	--	--	--	--
Dichlorodifluoromethane	E611D	0.50	µg/L	<0.50	4400 µg/L	4400 µg/L	--	--	--	--
Dichloroethane, 1,1-	E611D	0.50	µg/L	<0.50	320 µg/L	3100 µg/L	--	--	--	--
Dichloroethane, 1,2-	E611D	0.50	µg/L	<0.50	1.6 µg/L	12 µg/L	--	--	--	--
Dichloroethylene, 1,1-	E611D	0.50	µg/L	<0.50	1.6 µg/L	17 µg/L	--	--	--	--
Dichloroethylene, cis-1,2-	E611D	0.50	µg/L	<0.50	1.6 µg/L	17 µg/L	--	--	--	--
Dichloroethylene, trans-1,2-	E611D	0.50	µg/L	<0.50	1.6 µg/L	17 µg/L	--	--	--	--
Dichloromethane	E611D	1.0	µg/L	<1.0	610 µg/L	5500 µg/L	--	--	--	--
Dichloropropane, 1,2-	E611D	0.50	µg/L	<0.50	16 µg/L	140 µg/L	--	--	--	--
Dichloropropylene, cis+trans-1,3-	E611D	0.50	µg/L	<0.50	5.2 µg/L	45 µg/L	--	--	--	--
Dichloropropylene, cis-1,3-	E611D	0.30	µg/L	<0.30	--	--	--	--	--	--
Dichloropropylene, trans-1,3-	E611D	0.30	µg/L	<0.30	--	--	--	--	--	--
Ethylbenzene	E611D	0.50	µg/L	<0.50	2300 µg/L	2300 µg/L	--	--	--	--
Hexane, n-	E611D	0.50	µg/L	<0.50	51 µg/L	520 µg/L	--	--	--	--
Methyl ethyl ketone [MEK]	E611D	20	µg/L	<20	470000 µg/L	1500000 µg/L	--	--	--	--
Methyl isobutyl ketone [MIBK]	E611D	20	µg/L	<20	140000 µg/L	580000 µg/L	--	--	--	--
Methyl-tert-butyl ether [MTBE]	E611D	0.50	µg/L	<0.50	190 µg/L	1400 µg/L	--	--	--	--
Styrene	E611D	0.50	µg/L	<0.50	1300 µg/L	9100 µg/L	--	--	--	--
Tetrachloroethane, 1,1,1,2-	E611D	0.50	µg/L	<0.50	3.3 µg/L	28 µg/L	--	--	--	--

Analyte	Method	LOR	Unit	WT2306162-001 (Continued)	ON153/04 T3-NPGW-C-All	ON153/04 T3-NPGW-F-All				
Volatile Organic Compounds - Continued										
Tetrachloroethane, 1,1,2,2-	E611D	0.50	µg/L	<0.50	3.2 µg/L	15 µg/L	--	--	--	--
Tetrachloroethylene	E611D	0.50	µg/L	<0.50	1.6 µg/L	17 µg/L	--	--	--	--
Toluene	E611D	0.50	µg/L	<0.50	18000 µg/L	18000 µg/L	--	--	--	--
Trichloroethane, 1,1,1-	E611D	0.50	µg/L	<0.50	640 µg/L	6700 µg/L	--	--	--	--
Trichloroethane, 1,1,2-	E611D	0.50	µg/L	<0.50	4.7 µg/L	30 µg/L	--	--	--	--
Trichloroethylene	E611D	0.50	µg/L	<0.50	1.6 µg/L	17 µg/L	--	--	--	--
Trichlorofluoromethane	E611D	0.50	µg/L	<0.50	2500 µg/L	2500 µg/L	--	--	--	--
Vinyl chloride	E611D	0.50	µg/L	<0.50	0.5 µg/L	1.7 µg/L	--	--	--	--
Xylene, m+p-	E611D	0.40	µg/L	<0.40	--	--	--	--	--	--
Xylene, o-	E611D	0.30	µg/L	<0.30	--	--	--	--	--	--
Xylenes, total	E611D	0.50	µg/L	<0.50	4200 µg/L	4200 µg/L	--	--	--	--
BTEX, total	E611D	1.0	µg/L	<1.0	--	--	--	--	--	--
Hydrocarbons										
F1 (C6-C10)	E581.F1-L	25	µg/L	<25	750 µg/L	750 µg/L	--	--	--	--
F2 (C10-C16)	E601.SG	100	µg/L	<100	150 µg/L	150 µg/L	--	--	--	--
F2-Naphthalene	EC600SG	100	µg/L	<100	--	--	--	--	--	--
F3 (C16-C34)	E601.SG	250	µg/L	<250	500 µg/L	500 µg/L	--	--	--	--
F3-PAH	EC600SG	250	µg/L	<250	--	--	--	--	--	--
F4 (C34-C50)	E601.SG	250	µg/L	<250	500 µg/L	500 µg/L	--	--	--	--
F1-BTEX	EC580	25	µg/L	<25	750 µg/L	750 µg/L	--	--	--	--
Hydrocarbons, total (C6-C50)	EC581SG	240	µg/L	<370	--	--	--	--	--	--
Chromatogram to baseline at nC50	E601.SG		-	YES	--	--	--	--	--	--
Bromobenzotrifluoride, 2- (F2-F4 surrogate)	E601.SG	1.0	%	84.3	--	--	--	--	--	--
Dichlorotoluene, 3,4-	E581.F1-L	1.0	%	75.8	--	--	--	--	--	--
Bromofluorobenzene, 4-	E611D	1.0	%	79.5	--	--	--	--	--	--
Difluorobenzene, 1,4-	E611D	1.0	%	96.4	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	E641A	0.010	µg/L	<0.010	600 µg/L	1700 µg/L	--	--	--	--
Acenaphthylene	E641A	0.010	µg/L	<0.010	1.8 µg/L	1.8 µg/L	--	--	--	--
Anthracene	E641A	0.010	µg/L	<0.010	2.4 µg/L	2.4 µg/L	--	--	--	--
Benz(a)anthracene	E641A	0.010	µg/L	<0.010	4.7 µg/L	4.7 µg/L	--	--	--	--
Benzo(a)pyrene	E641A	0.0050	µg/L	<0.0050	0.81 µg/L	0.81 µg/L	--	--	--	--
Benzo(b+j)fluoranthene	E641A	0.010	µg/L	<0.010	0.75 µg/L	0.75 µg/L	--	--	--	--

Analyte	Method	LOR	Unit	WT2306162-001 (Continued)	ON153/04 T3-NPGW-C-AII	ON153/04 T3-NPGW-F-AII				
Polycyclic Aromatic Hydrocarbons - Continued										
Benzo(g,h,i)perylene	E641A	0.010	µg/L	<0.010	0.2 µg/L	0.2 µg/L	--	--	--	--
Benzo(k)fluoranthene	E641A	0.010	µg/L	<0.010	0.4 µg/L	0.4 µg/L	--	--	--	--
Chrysene	E641A	0.010	µg/L	<0.010	1 µg/L	1 µg/L	--	--	--	--
Dibenz(a,h)anthracene	E641A	0.0050	µg/L	<0.0050	0.52 µg/L	0.52 µg/L	--	--	--	--
Fluoranthene	E641A	0.010	µg/L	<0.010	130 µg/L	130 µg/L	--	--	--	--
Fluorene	E641A	0.010	µg/L	<0.010	400 µg/L	400 µg/L	--	--	--	--
Indeno(1,2,3-c,d)pyrene	E641A	0.010	µg/L	<0.010	0.2 µg/L	0.2 µg/L	--	--	--	--
Methylnaphthalene, 1+2-	E641A	0.015	µg/L	<0.015	1800 µg/L	1800 µg/L	--	--	--	--
Methylnaphthalene, 1-	E641A	0.010	µg/L	<0.010	1800 µg/L	1800 µg/L	--	--	--	--
Methylnaphthalene, 2-	E641A	0.010	µg/L	<0.010	1800 µg/L	1800 µg/L	--	--	--	--
Naphthalene	E641A	0.050	µg/L	<0.050	1400 µg/L	6400 µg/L	--	--	--	--
Phenanthrene	E641A	0.020	µg/L	<0.020	580 µg/L	580 µg/L	--	--	--	--
Pyrene	E641A	0.010	µg/L	<0.010	68 µg/L	68 µg/L	--	--	--	--
Chrysene-d12	E641A	0.1	%	82.5	--	--	--	--	--	--
Naphthalene-d8	E641A	0.1	%	105	--	--	--	--	--	--
Phenanthrene-d10	E641A	0.1	%	97.4	--	--	--	--	--	--
Polychlorinated Biphenyls										
Aroclor 1016	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Aroclor 1221	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Aroclor 1232	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Aroclor 1242	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Aroclor 1248	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Aroclor 1254	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Aroclor 1260	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Aroclor 1262	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Aroclor 1268	E687	0.020	µg/L	<0.020	--	--	--	--	--	--
Polychlorinated biphenyls [PCBs], total	E687	0.060	µg/L	<0.060	7.8 µg/L	15 µg/L	--	--	--	--
Decachlorobiphenyl	E687	0.1	%	135	--	--	--	--	--	--
Tetrachloro-m-xylene	E687	0.1	%	97.1	--	--	--	--	--	--

Please refer to the General Comments section for an explanation of any qualifiers detected.

No Breaches Found

Key:

ON153/04	Ontario Regulation 153/04 - April 15, 2011 Standards (JUL, 2011)
T3-NPGW-C-All	153 T3-Non-Potable Ground Water-All Types of Property Uses (Coarse)
T3-NPGW-F-All	153 T3-Non-Potable Ground Water-All Types of Property Uses (Fine)

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **WT2306162**	Page	: 1 of 9
Client	: **WSP E&I Canada Limited**	Laboratory	: Waterloo - Environmental
Contact	: Sarah Irvine	Account Manager	: Gayle Braun
Address	: 100 - 3450 Harvester Road Burlington ON Canada L7N 3W5	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: ----	Telephone	: +1 519 886 6910
Project	: WW21012079.CO1P.****. 5120.573000	Date Samples Received	: 14-Mar-2023 15:00
PO	: ----	Issue Date	: 20-Mar-2023 15:03
C-O-C number	: 20-1003324		
Sampler	: ----		
Site	:		
Quote number	: WOOD SOA 2022/23		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Chloride in Water by IC										
HDPE [ON MECP]										
BH-4	E235.Cl	14-Mar-2023	16-Mar-2023	----	----		16-Mar-2023	28 days	2 days	✓
Cyanides : WAD Cyanide										
UV-inhibited HDPE - total (sodium hydroxide)										
BH-4	E336	14-Mar-2023	16-Mar-2023	----	----		16-Mar-2023	14 days	2 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
BH-4	E509	14-Mar-2023	16-Mar-2023	----	----		16-Mar-2023	28 days	2 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
BH-4	E421	14-Mar-2023	16-Mar-2023	----	----		16-Mar-2023	180 days	2 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID (Low Level)										
Glass vial (sodium bisulfate)										
BH-4	E581.F1-L	14-Mar-2023	17-Mar-2023	----	----		17-Mar-2023	14 days	3 days	✓
Hydrocarbons : Silica Gel Treated CCME PHCs - F2-F4sg by GC-FID										
Amber glass/Teflon lined cap [ON MECP]										
BH-4	E601.SG	14-Mar-2023	15-Mar-2023	7 days	1 days	✓	16-Mar-2023	40 days	1 days	✓
Physical Tests : Conductivity in Water										
HDPE [ON MECP]										
BH-4	E100	14-Mar-2023	16-Mar-2023	----	----		16-Mar-2023	28 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter										
HDPE [ON MECP]										
BH-4	E108	14-Mar-2023	16-Mar-2023	----	----		16-Mar-2023	14 days	2 days	✓
Polychlorinated Biphenyls : PCB Aroclors by GC-MS										
Amber glass/Teflon lined cap [ON MECP]										
BH-4	E687	14-Mar-2023	15-Mar-2023	14 days	1 days	✓	16-Mar-2023	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap [ON MECP]										
BH-4	E641A	14-Mar-2023	15-Mar-2023	14 days	1 days	✓	16-Mar-2023	40 days	1 days	✓
Speciated Metals : Dissolved Hexavalent Chromium (Cr VI) by IC										
HDPE - dissolved (NaOH+Buf) [ON MECP]										
BH-4	E532A	14-Mar-2023	----	----	----		17-Mar-2023	28 days	3 days	✓
Volatile Organic Compounds : VOCs (Eastern Canada List) by Headspace GC-MS										
Glass vial (sodium bisulfate)										
BH-4	E611D	14-Mar-2023	17-Mar-2023	----	----		17-Mar-2023	14 days	3 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
CCME PHC - F1 by Headspace GC-FID (Low Level)	E581.F1-L	866679	1	18	5.5	5.0	✓
Chloride in Water by IC	E235.Cl	865015	1	17	5.8	5.0	✓
Conductivity in Water	E100	865010	1	9	11.1	5.0	✓
Dissolved Hexavalent Chromium (Cr VI) by IC	E532A	866920	1	10	10.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	865044	1	2	50.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	864845	1	12	8.3	5.0	✓
pH by Meter	E108	865008	1	15	6.6	5.0	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	866680	1	20	5.0	5.0	✓
WAD Cyanide	E336	865189	1	1	100.0	5.0	✓
Laboratory Control Samples (LCS)							
CCME PHC - F1 by Headspace GC-FID (Low Level)	E581.F1-L	866679	1	18	5.5	5.0	✓
Chloride in Water by IC	E235.Cl	865015	1	17	5.8	5.0	✓
Conductivity in Water	E100	865010	1	9	11.1	5.0	✓
Dissolved Hexavalent Chromium (Cr VI) by IC	E532A	866920	1	10	10.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	865044	1	2	50.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	864845	1	12	8.3	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	864051	1	1	100.0	5.0	✓
PCB Aroclors by GC-MS	E687	864122	1	7	14.2	4.7	✓
pH by Meter	E108	865008	1	15	6.6	5.0	✓
Silica Gel Treated CCME PHCs - F2-F4sg by GC-FID	E601.SG	864052	1	10	10.0	5.0	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	866680	1	20	5.0	5.0	✓
WAD Cyanide	E336	865189	1	1	100.0	5.0	✓
Method Blanks (MB)							
CCME PHC - F1 by Headspace GC-FID (Low Level)	E581.F1-L	866679	1	18	5.5	5.0	✓
Chloride in Water by IC	E235.Cl	865015	1	17	5.8	5.0	✓
Conductivity in Water	E100	865010	1	9	11.1	5.0	✓
Dissolved Hexavalent Chromium (Cr VI) by IC	E532A	866920	1	10	10.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	865044	1	2	50.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	864845	1	12	8.3	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	864051	1	1	100.0	5.0	✓
PCB Aroclors by GC-MS	E687	864122	1	7	14.2	4.7	✓
Silica Gel Treated CCME PHCs - F2-F4sg by GC-FID	E601.SG	864052	1	10	10.0	5.0	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	866680	1	20	5.0	5.0	✓
WAD Cyanide	E336	865189	1	1	100.0	5.0	✓
Matrix Spikes (MS)							

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS) - Continued							
CCME PHC - F1 by Headspace GC-FID (Low Level)	E581.F1-L	866679	1	18	5.5	5.0	✓
Chloride in Water by IC	E235.Cl	865015	1	17	5.8	5.0	✓
Dissolved Hexavalent Chromium (Cr VI) by IC	E532A	866920	1	10	10.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	865044	1	2	50.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	864845	1	12	8.3	5.0	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	866680	1	20	5.0	5.0	✓
WAD Cyanide	E336	865189	1	1	100.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Waterloo - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Waterloo - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Chloride in Water by IC	E235.Cl Waterloo - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
WAD Cyanide	E336 Waterloo - Environmental	Water	APHA 4500-CN I (mod)	Weak Acid Dissociable (WAD) cyanide is determined by Continuous Flow Analyzer (CFA) with in-line distillation followed by colourmetric analysis.
Dissolved Metals in Water by CRC ICPMS	E421 Waterloo - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Mercury in Water by CVAAS	E509 Waterloo - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Dissolved Hexavalent Chromium (Cr VI) by IC	E532A Waterloo - Environmental	Water	APHA 3500-Cr C (Ion Chromatography)	Hexavalent Chromium is measured by Ion chromatography-Post column reaction and UV detection. sample pretreatment involved field or lab filtration following by sample preservation.
CCME PHC - F1 by Headspace GC-FID (Low Level)	E581.F1-L Waterloo - Environmental	Water	CCME PHC in Soil - Tier 1	CCME Fraction 1 (F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
Silica Gel Treated CCME PHCs - F2-F4sg by GC-FID	E601.SG Waterloo - Environmental	Water	CCME PHC in Soil - Tier 1	Sample extracts are subjected to in-situ silica gel treatment prior to analysis by GC-FID for CCME hydrocarbon fractions (F2-F4).

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VOCs (Eastern Canada List) by Headspace GC-MS	E611D Waterloo - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A Waterloo - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
PCB Aroclors by GC-MS	E687 Waterloo - Environmental	Water	EPA 8270E (mod)	PCB Aroclors are analyzed by GC-MS
F1-BTEX	EC580 Waterloo - Environmental	Water	CCME PHC in Soil - Tier 1	F1-BTEX is calculated as follows: F1-BTEX = F1 (C6-C10) minus benzene, toluene, ethylbenzene and xylenes (BTEX).
SUM F1 to F4 where F2-F4 is SG treated	EC581SG Waterloo - Environmental	Water	CCME PHC in Soil - Tier 1	Hydrocarbons, total (C6-C50) is the sum of CCME Fraction F1(C6-C10), F2(C10-C16), F3(C16-C34), and F4(C34-C50), where F2-F4 have been treated with silica gel. F4G-sg is not used within this calculation due to overlap with other fractions.
F2-F4 (sg) minus PAH	EC600SG Waterloo - Environmental	Water	CCME PHC in Soil - Tier 1	F2-F4 (sg) minus PAH is calculated as follows: F2-F4 minus PAH = Sum of CCME Fraction 2 (C10-C16), CCME Fraction 3 (C16-C34), and CCME Fraction 4 (C34-C50), minus select Polycyclic Aromatic Hydrocarbons (PAH).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421 Waterloo - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 Waterloo - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.
VOCs Preparation for Headspace Analysis	EP581 Waterloo - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Waterloo - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Pesticides, PCB, and Neutral Extractable Chlorinated Hydrocarbons Extraction	EP660 Waterloo - Environmental	Water	EPA 3511 (mod)	Samples are extracted from aqueous sample using an organic solvent liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **WT2306162**	Page	: 1 of 16
Client	: WSP E&I Canada Limited	Laboratory	: Waterloo - Environmental
Contact	: Sarah Irvine	Account Manager	: Gayle Braun
Address	: 100 - 3450 Harvester Road Burlington ON Canada L7N 3W5	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	:	Telephone	: +1 519 886 6910
Project	: WW21012079.CO1P.****. 5120.573000	Date Samples Received	: 14-Mar-2023 15:00
PO	: ----	Date Analysis Commenced	: 15-Mar-2023
C-O-C number	: 20-1003324	Issue Date	: 20-Mar-2023 15:03
Sampler	: ---- ----		
Site	:		
Quote number	: WOOD SOA 2022/23		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Danielle Gravel	Supervisor - Semi-Volatile Instrumentation	Waterloo Organics, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Waterloo Inorganics, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Waterloo Metals, Waterloo, Ontario
Sarah Birch	VOC Section Supervisor	Waterloo Organics, Waterloo, Ontario

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 865008)											
WT2306082-003	Anonymous	pH	----	E108	0.10	pH units	7.99	8.05	0.748%	4%	----
Physical Tests (QC Lot: 865010)											
WT2306082-003	Anonymous	Conductivity	----	E100	1.0	µS/cm	316	318	0.631%	10%	----
Anions and Nutrients (QC Lot: 865015)											
WT2306082-003	Anonymous	Chloride	16887-00-6	E235.Cl	0.50	mg/L	30.6	30.5	0.208%	20%	----
Cyanides (QC Lot: 865189)											
WT2306162-001	BH-4	Cyanide, weak acid dissociable	----	E336	0.0020	mg/L	<2.0 µg/L	<0.0020	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 864845)											
WT2306162-001	BH-4	Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.22 µg/L	0.00022	0.000002	Diff <2x LOR	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	64.1 µg/L	0.0647	0.933%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E421	0.010	mg/L	124 µg/L	0.122	1.98%	20%	----
		Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0050 µg/L	<0.0000050	0	Diff <2x LOR	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.50 µg/L	<0.00050	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.33 µg/L	0.00034	0.00001	Diff <2x LOR	----
		Lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.050 µg/L	<0.000050	0	Diff <2x LOR	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	1.29 µg/L	0.00132	1.97%	20%	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.57 µg/L	0.00057	0.000007	Diff <2x LOR	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.292 µg/L	0.000281	0.000010	Diff <2x LOR	----
		Silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.010 µg/L	<0.000010	0	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E421	0.050	mg/L	18500 µg/L	18.4	0.938%	20%	----
		Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	0.028 µg/L	0.000027	0.0000009	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	6.68 µg/L	0.00670	0.287%	20%	----
		Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.85 µg/L	0.00085	0.000003	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<1.0 µg/L	0.0010	0.00003	Diff <2x LOR	----
Dissolved Metals (QC Lot: 865044)											
TY2302011-001	Anonymous	Mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Speciated Metals (QC Lot: 866920)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Speciated Metals (QC Lot: 866920) - continued											
WT2306162-001	BH-4	Chromium, hexavalent [Cr VI], dissolved	18540-29-9	E532A	0.00050	mg/L	<0.50 µg/L	<0.00050	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 866680)											
WT2305685-001	Anonymous	Acetone	67-64-1	E611D	20	µg/L	<20	<20	0	Diff <2x LOR	----
		Benzene	71-43-2	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Bromodichloromethane	75-27-4	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Bromoform	75-25-2	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Bromomethane	74-83-9	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Carbon tetrachloride	56-23-5	E611D	0.20	µg/L	<0.20	<0.20	0	Diff <2x LOR	----
		Chlorobenzene	108-90-7	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Chloroform	67-66-3	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dibromochloromethane	124-48-1	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dibromoethane, 1,2-	106-93-4	E611D	0.20	µg/L	<0.20	<0.20	0	Diff <2x LOR	----
		Dichlorobenzene, 1,2-	95-50-1	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichlorobenzene, 1,3-	541-73-1	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichlorobenzene, 1,4-	106-46-7	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichlorodifluoromethane	75-71-8	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichloroethane, 1,1-	75-34-3	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichloroethane, 1,2-	107-06-2	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichloroethylene, 1,1-	75-35-4	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichloroethylene, cis-1,2-	156-59-2	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichloroethylene, trans-1,2-	156-60-5	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichloromethane	75-09-2	E611D	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloropropane, 1,2-	78-87-5	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichloropropylene, cis-1,3-	10061-01-5	E611D	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
		Dichloropropylene, trans-1,3-	10061-02-6	E611D	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Hexane, n-	110-54-3	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl ethyl ketone [MEK]	78-93-3	E611D	20	µg/L	<20	<20	0	Diff <2x LOR	----
		Methyl isobutyl ketone [MIBK]	108-10-1	E611D	20	µg/L	<20	<20	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Tetrachloroethane, 1,1,1,2-	630-20-6	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Tetrachloroethylene	127-18-4	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Volatile Organic Compounds (QC Lot: 866680) - continued											
WT2305685-001	Anonymous	Toluene	108-88-3	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Trichloroethane, 1,1,1-	71-55-6	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Trichloroethane, 1,1,2-	79-00-5	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Trichloroethylene	79-01-6	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Trichlorofluoromethane	75-69-4	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Vinyl chloride	75-01-4	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611D	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611D	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 866679)											
WT2305685-001	Anonymous	F1 (C6-C10)	----	E581.F1-L	25	µg/L	<25	<25	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 865010)						
Conductivity	----	E100	1	µS/cm	<1.0	----
Anions and Nutrients (QCLot: 865015)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Cyanides (QCLot: 865189)						
Cyanide, weak acid dissociable	----	E336	0.002	mg/L	<0.0020	----
Dissolved Metals (QCLot: 864845)						
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Dissolved Metals (QCLot: 865044)						
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Speciated Metals (QCLot: 866920)						
Chromium, hexavalent [Cr VI], dissolved	18540-29-9	E532A	0.0005	mg/L	<0.00050	----
Volatile Organic Compounds (QCLot: 866680)						
Acetone	67-64-1	E611D	20	µg/L	<20	----
Benzene	71-43-2	E611D	0.5	µg/L	<0.50	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 866680) - continued						
Bromodichloromethane	75-27-4	E611D	0.5	µg/L	<0.50	----
Bromoform	75-25-2	E611D	0.5	µg/L	<0.50	----
Bromomethane	74-83-9	E611D	0.5	µg/L	<0.50	----
Carbon tetrachloride	56-23-5	E611D	0.2	µg/L	<0.20	----
Chlorobenzene	108-90-7	E611D	0.5	µg/L	<0.50	----
Chloroform	67-66-3	E611D	0.5	µg/L	<0.50	----
Dibromochloromethane	124-48-1	E611D	0.5	µg/L	<0.50	----
Dibromoethane, 1,2-	106-93-4	E611D	0.2	µg/L	<0.20	----
Dichlorobenzene, 1,2-	95-50-1	E611D	0.5	µg/L	<0.50	----
Dichlorobenzene, 1,3-	541-73-1	E611D	0.5	µg/L	<0.50	----
Dichlorobenzene, 1,4-	106-46-7	E611D	0.5	µg/L	<0.50	----
Dichlorodifluoromethane	75-71-8	E611D	0.5	µg/L	<0.50	----
Dichloroethane, 1,1-	75-34-3	E611D	0.5	µg/L	<0.50	----
Dichloroethane, 1,2-	107-06-2	E611D	0.5	µg/L	<0.50	----
Dichloroethylene, 1,1-	75-35-4	E611D	0.5	µg/L	<0.50	----
Dichloroethylene, cis-1,2-	156-59-2	E611D	0.5	µg/L	<0.50	----
Dichloroethylene, trans-1,2-	156-60-5	E611D	0.5	µg/L	<0.50	----
Dichloromethane	75-09-2	E611D	1	µg/L	<1.0	----
Dichloropropane, 1,2-	78-87-5	E611D	0.5	µg/L	<0.50	----
Dichloropropylene, cis-1,3-	10061-01-5	E611D	0.3	µg/L	<0.30	----
Dichloropropylene, trans-1,3-	10061-02-6	E611D	0.3	µg/L	<0.30	----
Ethylbenzene	100-41-4	E611D	0.5	µg/L	<0.50	----
Hexane, n-	110-54-3	E611D	0.5	µg/L	<0.50	----
Methyl ethyl ketone [MEK]	78-93-3	E611D	20	µg/L	<20	----
Methyl isobutyl ketone [MIBK]	108-10-1	E611D	20	µg/L	<20	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611D	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611D	0.5	µg/L	<0.50	----
Tetrachloroethane, 1,1,1,2-	630-20-6	E611D	0.5	µg/L	<0.50	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.5	µg/L	<0.50	----
Tetrachloroethylene	127-18-4	E611D	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611D	0.5	µg/L	<0.50	----
Trichloroethane, 1,1,1-	71-55-6	E611D	0.5	µg/L	<0.50	----
Trichloroethane, 1,1,2-	79-00-5	E611D	0.5	µg/L	<0.50	----
Trichloroethylene	79-01-6	E611D	0.5	µg/L	<0.50	----
Trichlorofluoromethane	75-69-4	E611D	0.5	µg/L	<0.50	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 866680) - continued						
Vinyl chloride	75-01-4	E611D	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611D	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611D	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 864052)						
F2 (C10-C16)	----	E601.SG	100	µg/L	<100	----
F3 (C16-C34)	----	E601.SG	250	µg/L	<250	----
F4 (C34-C50)	----	E601.SG	250	µg/L	<250	----
Hydrocarbons (QCLot: 866679)						
F1 (C6-C10)	----	E581.F1-L	25	µg/L	<25	----
Polycyclic Aromatic Hydrocarbons (QCLot: 864051)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Polychlorinated Biphenyls (QCLot: 864122)						
Aroclor 1016	12674-11-2	E687	0.02	µg/L	<0.020	----
Aroclor 1221	11104-28-2	E687	0.02	µg/L	<0.020	----
Aroclor 1232	11141-16-5	E687	0.02	µg/L	<0.020	----
Aroclor 1242	53469-21-9	E687	0.02	µg/L	<0.020	----
Aroclor 1248	12672-29-6	E687	0.02	µg/L	<0.020	----
Aroclor 1254	11097-69-1	E687	0.02	µg/L	<0.020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polychlorinated Biphenyls (QCLot: 864122) - continued						
Aroclor 1260	11096-82-5	E687	0.02	µg/L	<0.020	----
Aroclor 1262	37324-23-5	E687	0.02	µg/L	<0.020	----
Aroclor 1268	11100-14-4	E687	0.02	µg/L	<0.020	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 865008)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 865010)									
Conductivity	----	E100	1	µS/cm	1409 µS/cm	94.8	90.0	110	----
Anions and Nutrients (QCLot: 865015)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	99.9	90.0	110	----
Cyanides (QCLot: 865189)									
Cyanide, weak acid dissociable	----	E336	0.002	mg/L	0.125 mg/L	101	80.0	120	----
Dissolved Metals (QCLot: 864845)									
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	0.05 mg/L	105	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	0.05 mg/L	106	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.0125 mg/L	105	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.005 mg/L	104	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	0.05 mg/L	98.8	80.0	120	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.005 mg/L	101	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.0125 mg/L	103	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.0125 mg/L	102	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.0125 mg/L	100	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.025 mg/L	105	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.0125 mg/L	102	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.025 mg/L	101	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	0.05 mg/L	99.1	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.005 mg/L	102	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	2.5 mg/L	106	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	0.05 mg/L	105	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.00025 mg/L	107	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.025 mg/L	104	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.025 mg/L	102	80.0	120	----
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	98.9	80.0	120	----
Speciated Metals (QCLot: 866920)									

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Speciated Metals (QCLot: 866920) - continued									
Chromium, hexavalent [Cr VI], dissolved	18540-29-9	E532A	0.0005	mg/L	0.025 mg/L	101	80.0	120	----
Volatile Organic Compounds (QCLot: 866680)									
Acetone	67-64-1	E611D	20	µg/L	100 µg/L	127	70.0	130	----
Benzene	71-43-2	E611D	0.5	µg/L	100 µg/L	107	70.0	130	----
Bromodichloromethane	75-27-4	E611D	0.5	µg/L	100 µg/L	106	70.0	130	----
Bromoform	75-25-2	E611D	0.5	µg/L	100 µg/L	99.5	70.0	130	----
Bromomethane	74-83-9	E611D	0.5	µg/L	100 µg/L	107	60.0	140	----
Carbon tetrachloride	56-23-5	E611D	0.2	µg/L	100 µg/L	107	70.0	130	----
Chlorobenzene	108-90-7	E611D	0.5	µg/L	100 µg/L	104	70.0	130	----
Chloroform	67-66-3	E611D	0.5	µg/L	100 µg/L	110	70.0	130	----
Dibromochloromethane	124-48-1	E611D	0.5	µg/L	100 µg/L	100	70.0	130	----
Dibromoethane, 1,2-	106-93-4	E611D	0.2	µg/L	100 µg/L	103	70.0	130	----
Dichlorobenzene, 1,2-	95-50-1	E611D	0.5	µg/L	100 µg/L	102	70.0	130	----
Dichlorobenzene, 1,3-	541-73-1	E611D	0.5	µg/L	100 µg/L	102	70.0	130	----
Dichlorobenzene, 1,4-	106-46-7	E611D	0.5	µg/L	100 µg/L	104	70.0	130	----
Dichlorodifluoromethane	75-71-8	E611D	0.5	µg/L	100 µg/L	92.0	60.0	140	----
Dichloroethane, 1,1-	75-34-3	E611D	0.5	µg/L	100 µg/L	117	70.0	130	----
Dichloroethane, 1,2-	107-06-2	E611D	0.5	µg/L	100 µg/L	112	70.0	130	----
Dichloroethylene, 1,1-	75-35-4	E611D	0.5	µg/L	100 µg/L	104	70.0	130	----
Dichloroethylene, cis-1,2-	156-59-2	E611D	0.5	µg/L	100 µg/L	105	70.0	130	----
Dichloroethylene, trans-1,2-	156-60-5	E611D	0.5	µg/L	100 µg/L	112	70.0	130	----
Dichloromethane	75-09-2	E611D	1	µg/L	100 µg/L	113	70.0	130	----
Dichloropropane, 1,2-	78-87-5	E611D	0.5	µg/L	100 µg/L	107	70.0	130	----
Dichloropropylene, cis-1,3-	10061-01-5	E611D	0.3	µg/L	100 µg/L	104	70.0	130	----
Dichloropropylene, trans-1,3-	10061-02-6	E611D	0.3	µg/L	100 µg/L	108	70.0	130	----
Ethylbenzene	100-41-4	E611D	0.5	µg/L	100 µg/L	96.2	70.0	130	----
Hexane, n-	110-54-3	E611D	0.5	µg/L	100 µg/L	110	70.0	130	----
Methyl ethyl ketone [MEK]	78-93-3	E611D	20	µg/L	100 µg/L	114	70.0	130	----
Methyl isobutyl ketone [MIBK]	108-10-1	E611D	20	µg/L	100 µg/L	98.0	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611D	0.5	µg/L	100 µg/L	108	70.0	130	----
Styrene	100-42-5	E611D	0.5	µg/L	100 µg/L	98.3	70.0	130	----
Tetrachloroethane, 1,1,1,2-	630-20-6	E611D	0.5	µg/L	100 µg/L	101	70.0	130	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.5	µg/L	100 µg/L	111	70.0	130	----
Tetrachloroethylene	127-18-4	E611D	0.5	µg/L	100 µg/L	90.5	70.0	130	----
Toluene	108-88-3	E611D	0.5	µg/L	100 µg/L	97.6	70.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 866680) - continued									
Trichloroethane, 1,1,1-	71-55-6	E611D	0.5	µg/L	100 µg/L	109	70.0	130	----
Trichloroethane, 1,1,2-	79-00-5	E611D	0.5	µg/L	100 µg/L	107	70.0	130	----
Trichloroethylene	79-01-6	E611D	0.5	µg/L	100 µg/L	99.4	70.0	130	----
Trichlorofluoromethane	75-69-4	E611D	0.5	µg/L	100 µg/L	103	60.0	140	----
Vinyl chloride	75-01-4	E611D	0.5	µg/L	100 µg/L	93.5	60.0	140	----
Xylene, m+p-	179601-23-1	E611D	0.4	µg/L	200 µg/L	100	70.0	130	----
Xylene, o-	95-47-6	E611D	0.3	µg/L	100 µg/L	97.3	70.0	130	----
Hydrocarbons (QCLot: 864052)									
F2 (C10-C16)	----	E601.SG	100	µg/L	4613.474 µg/L	99.4	70.0	130	----
F3 (C16-C34)	----	E601.SG	250	µg/L	6464.481 µg/L	101	70.0	130	----
F4 (C34-C50)	----	E601.SG	250	µg/L	4040.361 µg/L	104	70.0	130	----
Hydrocarbons (QCLot: 866679)									
F1 (C6-C10)	----	E581.F1-L	25	µg/L	2000 µg/L	99.7	80.0	120	----
Polycyclic Aromatic Hydrocarbons (QCLot: 864051)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5263 µg/L	96.2	50.0	140	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5263 µg/L	93.3	50.0	140	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5263 µg/L	83.0	50.0	140	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5263 µg/L	87.5	50.0	140	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5263 µg/L	78.7	50.0	140	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5263 µg/L	76.2	50.0	140	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5263 µg/L	93.6	50.0	140	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5263 µg/L	82.4	50.0	140	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5263 µg/L	96.8	50.0	140	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5263 µg/L	82.4	50.0	140	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5263 µg/L	100	50.0	140	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5263 µg/L	99.0	50.0	140	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5263 µg/L	96.5	50.0	140	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5263 µg/L	95.6	50.0	140	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5263 µg/L	95.8	50.0	140	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5263 µg/L	95.2	50.0	140	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5263 µg/L	98.0	50.0	140	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.5263 µg/L	100	50.0	140	----
Polychlorinated Biphenyls (QCLot: 864122)									

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Polychlorinated Biphenyls (QCLot: 864122) - continued									
Aroclor 1016	12674-11-2	E687	0.02	µg/L	0.2 µg/L	107	60.0	140	----
Aroclor 1221	11104-28-2	E687	0.02	µg/L	0.2 µg/L	107	60.0	140	----
Aroclor 1232	11141-16-5	E687	0.02	µg/L	0.2 µg/L	107	60.0	140	----
Aroclor 1242	53469-21-9	E687	0.02	µg/L	0.2 µg/L	107	60.0	140	----
Aroclor 1248	12672-29-6	E687	0.02	µg/L	0.2 µg/L	94.7	60.0	140	----
Aroclor 1254	11097-69-1	E687	0.02	µg/L	0.2 µg/L	82.0	60.0	140	----
Aroclor 1260	11096-82-5	E687	0.02	µg/L	0.2 µg/L	92.3	60.0	140	----
Aroclor 1262	37324-23-5	E687	0.02	µg/L	0.2 µg/L	92.3	60.0	140	----
Aroclor 1268	11100-14-4	E687	0.02	µg/L	0.2 µg/L	92.3	60.0	140	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 865015)										
WT2306082-003	Anonymous	Chloride	16887-00-6	E235.Cl	99.4 mg/L	100 mg/L	99.4	75.0	125	----
Cyanides (QCLot: 865189)										
WT2306162-001	BH-4	Cyanide, weak acid dissociable	----	E336	0.123 mg/L	0.125 mg/L	98.3	75.0	125	----
Dissolved Metals (QCLot: 864845)										
WT2306248-001	Anonymous	Antimony, dissolved	7440-36-0	E421	0.0551 mg/L	0.05 mg/L	110	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0565 mg/L	0.05 mg/L	113	70.0	130	----
		Barium, dissolved	7440-39-3	E421	ND mg/L	0.0125 mg/L	ND	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.00528 mg/L	0.005 mg/L	106	70.0	130	----
		Boron, dissolved	7440-42-8	E421	0.048 mg/L	0.05 mg/L	97.0	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00485 mg/L	0.005 mg/L	97.1	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.0123 mg/L	0.0125 mg/L	98.2	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0118 mg/L	0.0125 mg/L	94.4	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0111 mg/L	0.0125 mg/L	88.9	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0250 mg/L	0.025 mg/L	100	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	0.0137 mg/L	0.0125 mg/L	110	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0224 mg/L	0.025 mg/L	89.6	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0573 mg/L	0.05 mg/L	115	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00494 mg/L	0.005 mg/L	98.8	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	ND mg/L	2.5 mg/L	ND	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.0502 mg/L	0.05 mg/L	100	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	ND mg/L	0.00025 mg/L	ND	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.0255 mg/L	0.025 mg/L	102	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.0232 mg/L	0.025 mg/L	92.8	70.0	130	----
Dissolved Metals (QCLot: 865044)										
WT2306162-001	BH-4	Mercury, dissolved	7439-97-6	E509	0.0000899 mg/L	0.0001 mg/L	89.9	70.0	130	----
Speciated Metals (QCLot: 866920)										
WT2306162-001	BH-4	Chromium, hexavalent [Cr VI], dissolved	18540-29-9	E532A	0.0409 mg/L	0.04 mg/L	102	70.0	130	----
Volatile Organic Compounds (QCLot: 866680)										
WT2305685-001	Anonymous	Acetone	67-64-1	E611D	109 µg/L	100 µg/L	109	60.0	140	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 866680) - continued										
WT2305685-001	Anonymous	Benzene	71-43-2	E611D	100 µg/L	100 µg/L	100	60.0	140	----
		Bromodichloromethane	75-27-4	E611D	100 µg/L	100 µg/L	100	60.0	140	----
		Bromoform	75-25-2	E611D	92.1 µg/L	100 µg/L	92.1	60.0	140	----
		Bromomethane	74-83-9	E611D	97.3 µg/L	100 µg/L	97.3	60.0	140	----
		Carbon tetrachloride	56-23-5	E611D	99.5 µg/L	100 µg/L	99.5	60.0	140	----
		Chlorobenzene	108-90-7	E611D	97.4 µg/L	100 µg/L	97.4	60.0	140	----
		Chloroform	67-66-3	E611D	103 µg/L	100 µg/L	103	60.0	140	----
		Dibromochloromethane	124-48-1	E611D	93.1 µg/L	100 µg/L	93.1	60.0	140	----
		Dibromoethane, 1,2-	106-93-4	E611D	96.6 µg/L	100 µg/L	96.6	60.0	140	----
		Dichlorobenzene, 1,2-	95-50-1	E611D	95.2 µg/L	100 µg/L	95.2	60.0	140	----
		Dichlorobenzene, 1,3-	541-73-1	E611D	95.1 µg/L	100 µg/L	95.1	60.0	140	----
		Dichlorobenzene, 1,4-	106-46-7	E611D	96.6 µg/L	100 µg/L	96.6	60.0	140	----
		Dichlorodifluoromethane	75-71-8	E611D	77.9 µg/L	100 µg/L	77.9	60.0	140	----
		Dichloroethane, 1,1-	75-34-3	E611D	98.3 µg/L	100 µg/L	98.3	60.0	140	----
		Dichloroethane, 1,2-	107-06-2	E611D	106 µg/L	100 µg/L	106	60.0	140	----
		Dichloroethylene, 1,1-	75-35-4	E611D	94.7 µg/L	100 µg/L	94.7	60.0	140	----
		Dichloroethylene, cis-1,2-	156-59-2	E611D	97.9 µg/L	100 µg/L	97.9	60.0	140	----
		Dichloroethylene, trans-1,2-	156-60-5	E611D	102 µg/L	100 µg/L	102	60.0	140	----
		Dichloromethane	75-09-2	E611D	105 µg/L	100 µg/L	105	60.0	140	----
		Dichloropropane, 1,2-	78-87-5	E611D	100 µg/L	100 µg/L	100	60.0	140	----
		Dichloropropylene, cis-1,3-	10061-01-5	E611D	98.4 µg/L	100 µg/L	98.4	60.0	140	----
		Dichloropropylene, trans-1,3-	10061-02-6	E611D	100 µg/L	100 µg/L	100	60.0	140	----
		Ethylbenzene	100-41-4	E611D	88.3 µg/L	100 µg/L	88.3	60.0	140	----
		Hexane, n-	110-54-3	E611D	98.7 µg/L	100 µg/L	98.7	60.0	140	----
		Methyl ethyl ketone [MEK]	78-93-3	E611D	100 µg/L	100 µg/L	99.5	60.0	140	----
		Methyl isobutyl ketone [MIBK]	108-10-1	E611D	85 µg/L	100 µg/L	85.5	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611D	101 µg/L	100 µg/L	101	60.0	140	----
		Styrene	100-42-5	E611D	91.7 µg/L	100 µg/L	91.7	60.0	140	----
		Tetrachloroethane, 1,1,1,2-	630-20-6	E611D	94.1 µg/L	100 µg/L	94.1	60.0	140	----
		Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	102 µg/L	100 µg/L	102	60.0	140	----
		Tetrachloroethylene	127-18-4	E611D	82.2 µg/L	100 µg/L	82.2	60.0	140	----
		Toluene	108-88-3	E611D	90.0 µg/L	100 µg/L	90.0	60.0	140	----
		Trichloroethane, 1,1,1-	71-55-6	E611D	102 µg/L	100 µg/L	102	60.0	140	----
		Trichloroethane, 1,1,2-	79-00-5	E611D	101 µg/L	100 µg/L	101	60.0	140	----
		Trichloroethylene	79-01-6	E611D	92.3 µg/L	100 µg/L	92.3	60.0	140	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 866680) - continued										
WT2305685-001	Anonymous	Trichlorofluoromethane	75-69-4	E611D	93.1 µg/L	100 µg/L	93.1	60.0	140	----
		Vinyl chloride	75-01-4	E611D	81.7 µg/L	100 µg/L	81.7	60.0	140	----
		Xylene, m+p-	179601-23-1	E611D	185 µg/L	200 µg/L	92.6	60.0	140	----
		Xylene, o-	95-47-6	E611D	89.9 µg/L	100 µg/L	89.9	60.0	140	----
Hydrocarbons (QCLot: 866679)										
WT2305685-001	Anonymous	F1 (C6-C10)	----	E581.F1-L	1780 µg/L	2000 µg/L	89.2	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 - 1003324 RP

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Page of

Environmental Division Waterloo

Work Order Reference WT2306162

Telephone : +1 519 886 6910

Report To	Contact and company name below will appear on the final report
Company:	WSP
Contact:	Sarah Irvine
Phone:	
	Company address below will appear on the final report
Street:	3450 Harvester Rd
City/Province:	Burlington ON
Postal Code:	L7N 3W5
Invoice To	Same as Report To ☐ YES ☒ NO
	Copy of Invoice with Report ☒ YES ☐ NO
Company:	
Contact:	

Reports / Recipients

Select Report Format: ☒ PDF ☒ EXCEL ☐ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☒ YES ☐ NO ☐ N/A

☒ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☒ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: Sarah.irvine@wsp.com

Email 2: jessica.pitman@wsp.com

Email 3: ryan.phillips@wsp.com

Invoice Recipients

Select Invoice Distribution: ☒ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: APInvoice.canada@wsp.com

Email 2:

Turnaround Time (TAT) Requested

☒ Routine [R] if received by 3pm M-F - no surcharges apply

☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum

☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum

☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum

☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum

☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional may apply to rush requests on weekends, statutory holidays and non-routine

Date and Time Required for all E&P TATs:

For all tests with rush TATs requested, please contac

Project Information

ALS Account # / Quote #:

Job #:

PO / AFE:

LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#:

Major/Minor Code: Routing Code:

Requisitioner:

Location:

ALS Lab Work Order # (ALS use only): WT2306162 RP

ALS Contact: Sampler:

Analysis Reque

Indicate Filtered (F), Preserved (P) or Filtered and Pr

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Metals + Inorganics	VOCs	PAHs	PCBs	SAMPLES ON HOLD	EXTENDED STORAGE REQUI	SUSPECTED HAZARD (see no
	BH-4	March 14, 23	1000	GW	11	X	X	X	X			

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☒ NO

Are samples for human consumption/ use? ☐ YES ☒ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

Standard filtration of metals

Compare to 153/04 Table 3

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
9.6				-1.9			

SHIPMENT RELEASE (client use)

Released by: Ryan Phillips Date: March 14, 23 Time: 3:00pm

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by: Date: Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by: Date: Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form.**

GCS21, KI VW169, OR374, SC249, CN575, MM703

Appendix B

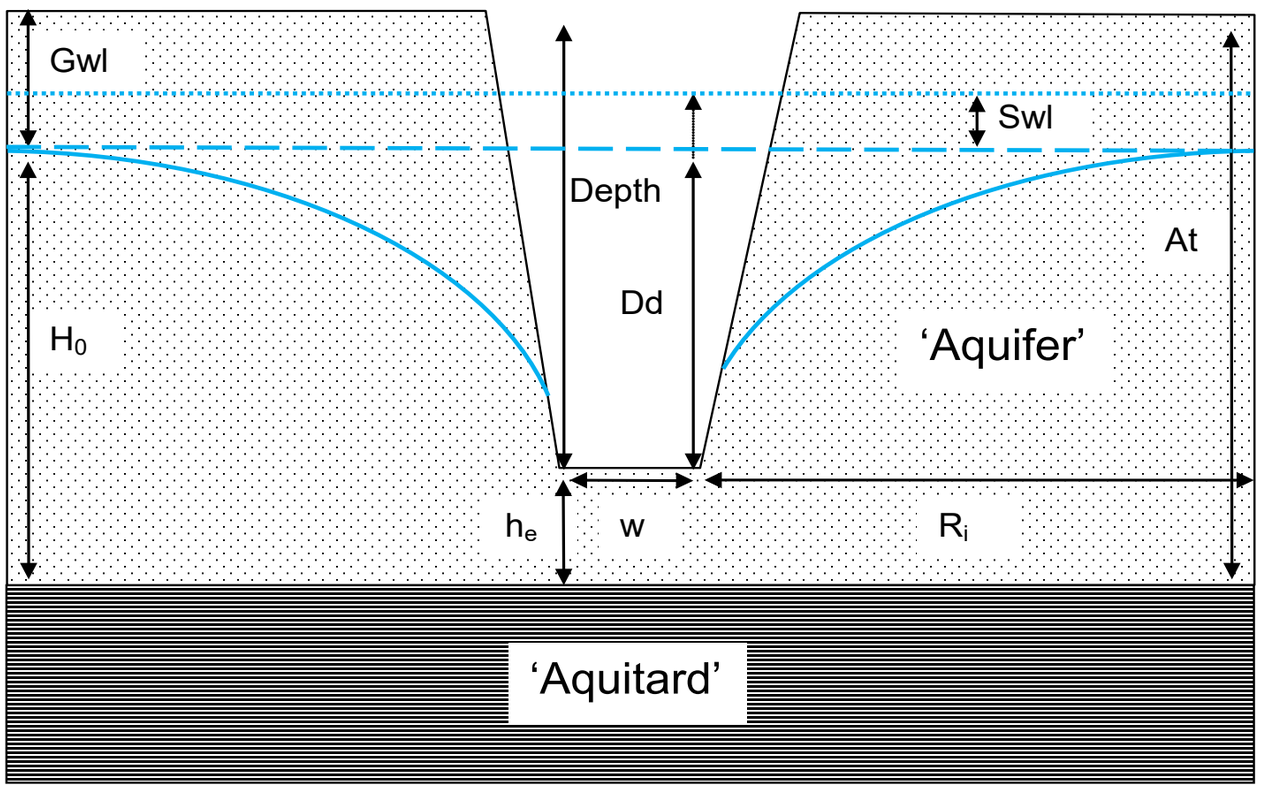
Dewatering Rate Estimation - Unconfined Trench

Project No.:	**WW21012079**
Project Name:	**1450 King Road SWM Facility Works**
Client:	**Quantum Realty Management**
Location:	**1450 King Road, Burlington, ON**
Description:	**Assume greatest excavation depth throughout entire excavation area**
Date:	**April 17, 2023**

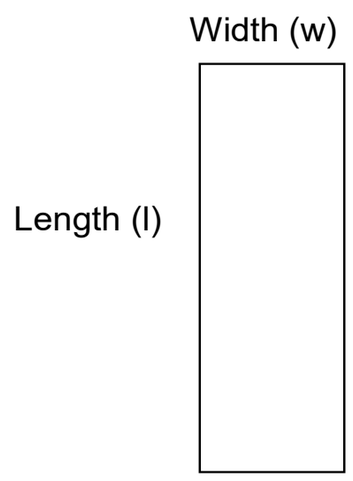
Performed by:	**JP**
Checked by:	**SI**

EXCAVATION INFO	
Length, l (m)	133.0
Width, w (m)	35.5
Depth (mbgs)	4.1

Cross Section



Plan View



Radius of Influence (R_i) calculated with the Sichardt equation $R_i = 3000(H_0 - h_e)\sqrt{K}$

Groundwater Inflow (Q) to the excavation calculated with the Dupuit solution combining:
1) radial steady-state for inflow to trench ends; and
2) linear steady-state for inflow to trench sides.

$$Q = \pi K \frac{(H_0^2 - h_e^2)}{\ln\left(\frac{2R_i + w}{w}\right)} + 2lK\frac{(H_0^2 - h_e^2)}{2R_i}$$

Bh	Gwl Measured Groundwater Level (mbgs)	Swl Estimated Seasonal Fluctuation above Gwl (m)	K Hydraulic Conductivity (m/s)	At 'Aquifer' Thickness (mbgs)	H_0 Ambient Head above 'Aquitard' (m)	h_e Head above 'Aquitard' at Excavation (m)	Dd Drawdown (m)	R_i Sichardt Calculation (m)	R_i User Defined (m)	Q Groundwater Inflow (m^3/d)
BH4	**0.47**	**0.47**	**2.7E-08**	**5.1**	5.1	1.0	4.1	2.0		5.5
BH5	**0.86**	**0.86**	**2.6E-08**	**5.1**	5.1	1.0	4.1	2.0		5.4
Maximum										5.5
K Geometric Mean			2.6E-08	5.10	5.10	1.00	4.10	2.0		5.5
K Arithmetic Mean			2.6E-08	5.10	5.10	1.00	4.10	2.0		5.5

Uncertainty Factor	*3*	**Maximum × SF**	**(K Geometric Mean) × SF**	**(K Arithmetic Mean) × SF**
Q Groundwater Inflow (m^3/d)		**16.6**	**16.4**	**16.4**
Uncertainty Factor	*3*	**S(Maximum K × SF)**	**S(K Geometric Mean × SF)**	**S(K Arithmetic Mean × SF)**
R_i Radius of Influence, Sichert (m)		**3.5**	**3.5**	**3.5**

Notes

1 mbgs = meters below ground surface
2 The user defined R_i is used for the calculation of groundwater inflow (Q) if specified
3 Geometric mean calculation is applied only to the hydraulic conductivity (K) - other input parameters for the Dupuit and Sichardt equation use the arithmetic average
4 The calculated groundwater inflows for the arithmetic and geometric mean both use the Sichardt R_i calculated from the respective mean K
5 If the depth of the excavation is below the base of the 'Aquifer' then the head at the excavation is set at the top of the 'Aquitard' (i.e. $h_e = 0$)

Comments

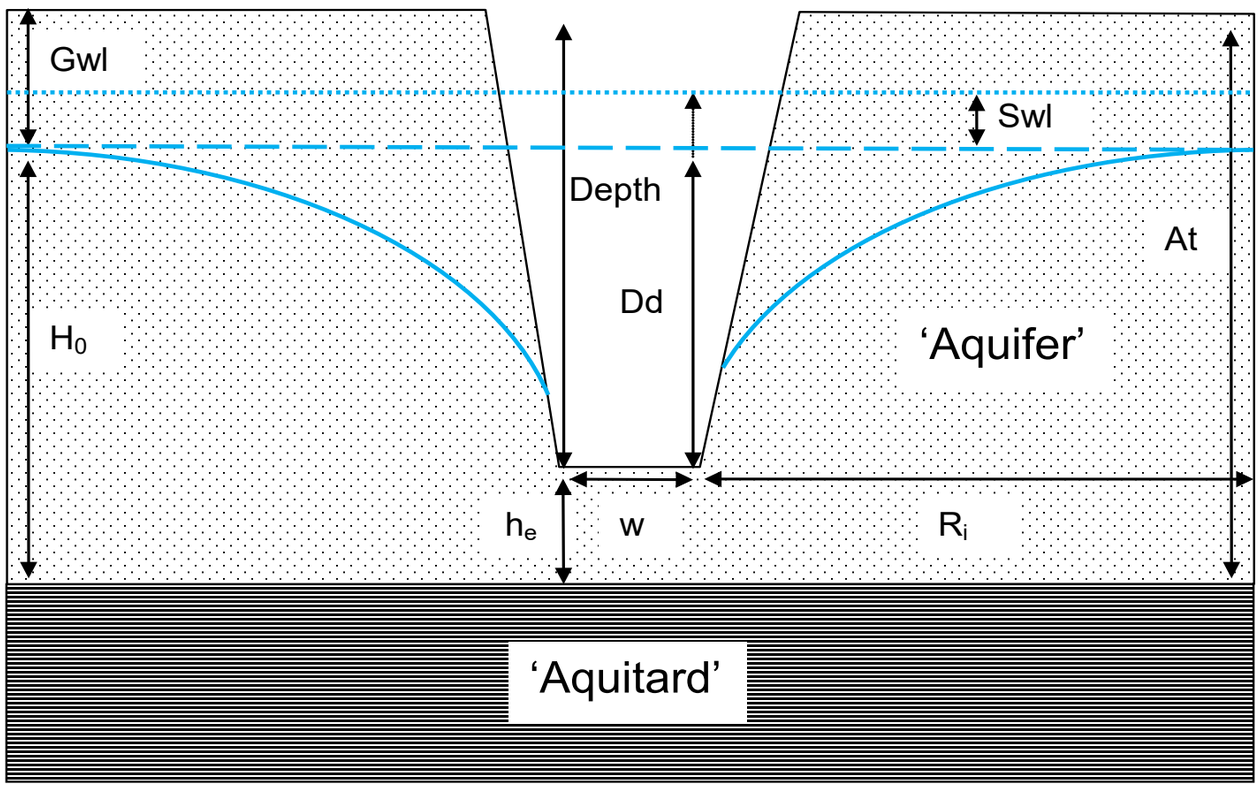
Dewatering Rate Estimation - Unconfined Trench

Project No.:	**WW21012079**
Project Name:	**1450 King Road SWM Facility Works**
Client:	**Quantum Realty Management**
Location:	**1450 King Road, Burlington, ON**
Description:	**Area of greatest excavation depth**
Date:	**April 17, 2023**

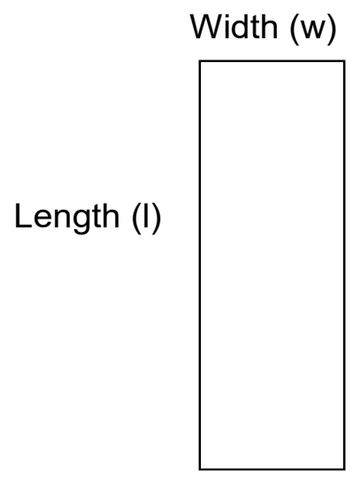
Performed by:	**JP**
Checked by:	**SI**

EXCAVATION INFO	
Length, l (m)	**101.0**
Width, w (m)	**17.1**
Depth (mbgs)	**4.1**

Cross Section



Plan View



Radius of Influence (R_i) calculated with the Sichardt equation $R_i = 3000(H_0 - h_e)\sqrt{K}$

Groundwater Inflow (Q) to the excavation calculated with the Dupuit solution combining:
1) radial steady-state for inflow to trench ends; and
2) linear steady-state for inflow to trench sides.

$$Q = \pi K \frac{(H_0^2 - h_e^2)}{\ln\left(\frac{2R_i + w}{w}\right)} + 2lK\frac{(H_0^2 - h_e^2)}{2R_i}$$

Bh	Gwl Measured Groundwater Level (mbgs)	Swl Estimated Seasonal Fluctuation above Gwl (m)	K Hydraulic Conductivity (m/s)	At 'Aquifer' Thickness (mbgs)	H_0 Ambient Head above 'Aquitard' (m)	h_e Head above 'Aquitard' at Excavation (m)	Dd Drawdown (m)	R_i Sichardt Calculation (m)	R_i User Defined (m)	Q Groundwater Inflow (m^3/d)
BH4	**0.47**	**0.47**	**2.7E-08**	**5.1**	5.1	1.0	4.1	2.0		3.8
BH5	**0.86**	**0.86**	**2.6E-08**	**5.1**	5.1	1.0	4.1	2.0		3.7
Maximum										3.8
K Geometric Mean			2.6E-08	5.10	5.10	1.00	4.10	2.0		3.7
K Arithmetic Mean			2.6E-08	5.10	5.10	1.00	4.10	2.0		3.7

Uncertainty Factor	*3*	**Maximum × SF**	**(K Geometric Mean) × SF**	**(K Arithmetic Mean) × SF**
Q Groundwater Inflow (m^3/d)		**11.3**	**11.2**	**11.2**
Uncertainty Factor	*3*	**S(Maximum K × SF)**	**S(K Geometric Mean × SF)**	**S(K Arithmetic Mean × SF)**
R_i Radius of Influence, Sichert (m)		**3.5**	**3.5**	**3.5**

Notes

1 mbgs = meters below ground surface
2 The user defined R_i is used for the calculation of groundwater inflow (Q) if specified
3 Geometric mean calculation is applied only to the hydraulic conductivity (K) - other input parameters for the Dupuit and Sichardt equation use the arithmetic average
4 The calculated groundwater inflows for the arithmetic and geometric mean both use the Sichardt R_i calculated from the respective mean K
5 If the depth of the excavation is below the base of the 'Aquifer' then the head at the excavation is set at the top of the 'Aquitard' (i.e. $h_e = 0$)

Comments

Appendix C

Limitations

1. The work performed in the preparation of this document and the data, interpretations and recommendations presented are subject to the following:

   (a) WSP's Standard Terms and Conditions;

   (b) The Scope of Services;

   (c) Time and Budgetary limitations as described in our Contract; and,

   (d) The Limitations stated herein.

2. No other warranties or representations, either expressed or implied, are made as to the professional services provided under the terms of our Contract.

3. This document was prepared with the assumption that the design and construction will be in accordance with all applicable standards, codes and regulations of authorities having jurisdiction, as well as good engineering practice. Further, the recommendations and opinions in this document are applicable only to the subject project described above. Contractors should be aware that the data and their interpretations presented in this report might not be sufficient to assess all factors that may have an impact on the construction process.

4. The conditions presented in this document were based, in part, on visual observations of the site and on subsurface investigation. The number of boreholes may not be sufficient to determine all of the factors that may affect construction methods and costs. Subsurface and groundwater conditions between and beyond the boreholes may differ from those encountered at the borehole locations. Conditions may become apparent during construction, which could not be detected or anticipated at the time of the site investigation.

5. Where testing was performed, it was carried out in accordance with the terms of our contract providing for testing. Other conditions may be present on site and may be revealed by different of other testing not provided for in our contract.

6. Because of the limitations referred to above, different conditions from those stated in our report may exist. There should be an ongoing liaison with WSP to ensure that the recommendations in this report have been interpreted and implemented as intended. In addition, if any further clarification and/or elaboration are needed, WSP should be contacted immediately.

7. This report is for the sole use of the party to whom it is addressed unless expressly stated otherwise in the report or contract. Any use which any third party makes of the report, in whole or in part, or any reliance thereon, or decisions made based on any information in the report, is the sole responsibility of such third party. WSP accepts no responsibility whatsoever for damages or loss of any nature or kind suffered by any such third party as a result of actions taken or not taken or decisions made in reliance on the report or anything set out therein.

WSP E&I Canada Limited