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2023 ANNUAL GROUNDWATER MONITORING REPORT PROVIDENCE BAY WASTE DISPOSAL SITE PROVIDENCE BAY, ONTARIO

THE MUNICIPALITY OF CENTRAL MANITOULIN

PROJECT NO.: TY1410143 DATE: FEBRUARY 2, 2024

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February 2, 2024

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Attention: Ms. Patricia Mader Municipal Coordinator - Special Projects

Dear Madam:

Subject: 2023 ANNUAL GROUNDWATER MONITORING REPORT PROVIDENCE BAY WASTE DISPOSAL SITE PROVIDENCE BAY, ONTARIO

Please fined enclosed one (1) electronic copy, in PDF format, of our Final report entitled 2023 ANNUAL GROUNDWATER MONITORING REPORT, PROVIDENCE BAY WASTE DISPOSAL SITE, PROVIDENCE BAY, ONTARIO.

Yours sincerely,

WSP E&I Canada Limited

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Report number				
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### 1.0 INTRODUCTION

WSP E&I Canada Limited (WSP), was retained by The Municipality of Central Manitoulin (the Municipality) to prepare the 2023 annual groundwater monitoring report for the Providence Bay Waste Disposal Site (the Site). The following report provides a detailed evaluation and summary of the 2023 monitoring data and was completed to constitute the 2023 Annual Monitoring Report. This document also includes a review of the available groundwater flow and geochemical data, as well as an evaluation of the groundwater quality with respect to Ministry of the Environment, Conservation and Parks (MECP) Guideline B-7.

#### 1.1 SITE LOCATION

The Site is located at 4077 Government Road, approximately one kilometre (km) southeast of the village of Providence Bay, Ontario, and approximately 500 metres (m) east of Lake Huron, as presented on Figure 1. The legal description of the Site is part Lot 3, Concession 13, former Township of Carnarvon, District of Manitoulin. The Universal Transverse Mercator (UTM) coordinates of the Site are 401859 Easting and 5056873 Northing, Zone 17, relative to the North American Datum (NAD) 83 (collected via handheld Global Positioning System (GPS), accuracy +/- 5 m).

#### 1.2 OWNERSHIP AND KEY PERSONNEL

Contact information for the Site contact representative and the Competent Environmental Practitioner (CEP) for groundwater is outlined below.

Site Contact Representative:

Patricia Mader The Municipality of Central Manitoulin 6020 Highway 542 P.O. Box 187 Mindemoya, Ontario POP 1S0 Phone: (705) 377-5726 Fax: (705) 377-5585 Email: centralmc@eastlink.ca

Groundwater and Surface Water CEP:

Larry Rodricks, P.Eng. WSP E&I Canada Limited 900 Maple Grove Road, Unit 10 Cambridge, Ontario N3H 4R7 Phone: (519) 650-7108 Email: larry.rodricks@wsp.com

#### 1.3 DESCRIPTION AND DEVELOPMENT OF THE SITE

Under Environmental Compliance Approval (ECA) No. A550702, issued 18 March 1980, amended 21 September 2016, 2 August 2022, and most recently on 5 September 2023. The Site ceased accepting waste as of 1 June 2023,

at

which time the Site is continuing to operate as a waste transfer station. The most recently issued 5 September 2023 ECA, revokes and replaces the previously issued and amended ECA, attached as Appendix A. The Site accepted commercial and domestic wastes, specifically solid non-hazardous municipal waste, and serviced the Municipality of Central Manitoulin, with an estimated 1,900 residents (Gamsby and Mannerow Limited (GM), 2014). The Site was approved for a 4.1 hectare (ha) fill area, and the 2022 amendment had set a maximum deposition limit of 2,500 cubic metres (m<sup>3</sup>) per year including waste and daily cover. It is noted that before the August 2022 ECA amendment there was no deposition limit specified for the Site. The most recent amendment, issued following the closure of the landfill on 1 June 2023, states that no waste is to be placed in the landfill given the change in status. The adjacent property immediately northwest of the Site is also owned by the Municipality, legally described as Part 1, Concession 13, on Registered Plan 31R 2056 (GM, 2014). A site plan is provided as Figure 2.

A closure plan was issued and accepted by the MECP, which was recognized as of the August 2022 ECA amendment. As part of the Site closure, the Municipality was required to obtain the necessary contaminant attenuation zone (CAZ) property, through a groundwater easement prior to 28 June 2022, as outlined in Wood Environment & Infrastructure Solutions ('Wood', WSP's predecessor) Contaminant Attenuation Zone Reassessment dated 28 February 2020 (Wood, 2020). The Municipality acquired the groundwater easement required to comply with the ECA on 16 September of 2022, copies of transfer easements and legal surveys are found on Appendix J. In December 2022, the extended CAZ was instrumented with nested monitoring wells and one leachate well to monitor quality of groundwater near the downgradient Site boundaries. Groundwater sampling and analysis of the new wells were completed as part of the monitoring program in 2023. Copies of the borehole logs of the newly installed wells are attached in Appendix B.

No operational issues were encountered at the Site in 2023, and no official public complaints were received. Significant changes in operations occurred as of June 1, 2023 at which point the Site ceased accepting waste for burial and limited the accepted size of construction/demolition loads. There were no areas of excavation at the Site during 2023. Site works undertaken in 2023 include grinding of wood material as well as the installation of a retaining wall at the transfer station area to facilitate public use. Site works currently planned for 2024 include the commencement of closure activities, such as moving and reshaping the landfill mound.

#### 1.3.1 SITE CAPACITY

Landfilling activity in 2023 was located on the southwest edge of the fill area, as presented on Figure 2. As weigh scales are not in place at the Site, mass and therefore volume estimates of incoming waste are not tracked. Capacity assessments are completed annually; however, annual topographical surveys offer a more accurate volume estimate than incoming volumes of uncompacted waste.

A topographical survey of the annual change in waste volume was not completed in 2023, at the request of the Municipality, as a survey of the entire waste pile will be completed for the closure activities. Therefore, the most recent topographical survey conducted at the Site was undertaken in 2022 and is presented on Figure 3. A total volume of existing waste of approximately 48,030 m<sup>3</sup> was measured during completion of the 2022 survey, including both waste and cover material. An annual deposition rate of approximately 2,530 m<sup>3</sup> was calculated for 2022. In 2023, as the Site only operated for a period of 5 months, the annul deposition rate is assumed to be less than that of 2022. For the purpose of this report, an annual deposition rate for 2023 was estimated at 1,054 m<sup>3</sup>, based on the 2022 deposition rate and the duration of the 2023 operations. It is noted that the volume of waste measured during the 2022 survey excludes a brush pile situated to the northwest of the fill area. The volume of this pile is unknown and could not be determined during the survey.

Although no maximum allowable capacity was stated in the Site's ECA, a theoretical maximum capacity of 107,895 m<sup>3</sup> was calculated by Cambium Inc., based on MECP approved design requirements, as part of historical Design and Operations Plan development. Based on this theoretical capacity, the Site has an estimated remaining capacity of approximately 59,865 m<sup>3</sup>, as of the 2022 survey. As per the estimated 2023 annual deposition rate, the Site would have an estimated site capacity of 58,811 m<sup>3</sup> as of 1 June 2023. The estimated remaining life expectancy was not calculated for 2023, given that the Site has ceased accepting waste. The remaining capacity of

Site can only be accurately estimated when a topographical survey is undertaken, however, given that the site had a calculated maximum expectancy of 24 years as of 2022, it is estimated that the capacity was not reached in 2023. The required closure of the Site, as discussed above, is unrelated to Site capacity; the Site will be closed despite the remaining capacity and potential life span.

### 1.4 MONITORING AND REPORTING PROGRAM OBJECTIVES AND REQUIREMENTS

Historical Site investigations resulted in the instrumentation of the Site with a number of groundwater monitoring wells and identification of adjacent residential water well monitoring locations. The current groundwater monitoring program comprises 25 groundwater monitoring wells (OW-1, OW-2, OW-3A, OW-3B, OW-4 through OW-11, OW-12A/B, OW-13A/B, OW-14A/B, OW-15A/B, OW-16A/B, OW-17A/B and OW-18) and two off-Site residential water wells (Irving and Paquet). Monitoring wells OW-1 through OW-8 were installed by Waters Environmental Geosciences Ltd. OW-1 through OW-5 were installed in April 2002 and OW-6 through OW-8 in December 2003. OW-9 through OW-11 were installed by Amec Foster Wheeler (Wood's predecessor) in August 2014. Well nests OW-12A/B, OW-13A/B and OW-14A/B were installed by Amec Foster Wheeler in July 2017. Wells OW-15A/B through OW-18 were installed by WSP E&I in December 2022. The locations of all groundwater monitoring wells are presented on Figure 2.

### 1.5 ASSUMPTIONS AND LIMITATIONS

WSP's limitation of liability and scope of work is as follows:

- 1. The work performed in this report was carried out in accordance with the Terms and Conditions made part of our contract. The conclusions presented herein are based solely upon the scope of services and time and budgetary limitations described in our contract.
- 2. The report has been prepared in accordance with generally accepted environmental study and/or engineering practices. No other warranties, either expressed or implied, are made as to the professional services provided under the terms of our contract and included in this report.
- 3. The services performed and outlined in this report were based, in part, upon a previously installed monitoring network, established by others and approved by the applicable regulatory agencies. Our opinion cannot be extended to portions of the Site which were unavailable for direct observations, reasonably beyond the control of WSP.
- 4. The objective of this report was to present a hydrological assessment for the Providence Bay Waste Disposal Site (the Site) for submission to the Ministry of the Environment, Conservation and Parks (MECP) in support of ongoing operations at the Site, and Site closure.
- 5. The Site history interpreted herein relies on information supplied by others, such as local, provincial and federal agencies, as well as Site personnel. No attempt has been made to independently verify the accuracy of such information, unless specifically noted in our report.
- 6. Our interpretations relating to the landfill-derived leachate plume at the Site are described in this report. Where testing was performed, it was executed in accordance with our contract for these services. It should be noted that other compounds or materials not tested for may be present in the Site environment.
- 7. The conclusions of this report are based, in part, on the information provided by others. The possibility remains that unexpected environmental conditions may be encountered at the Site in locations not specifically investigated. Should such an event occur, WSP must be notified in order that we may determine if modifications to our conclusions are necessary.
- 8. The utilization of WSP's services during future monitoring at the Site will allow WSP to observe compliance with the conclusions and recommendations contained herein. It will also provide for changes as necessary to

suit



field conditions as they are encountered.

9. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. WSP accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

### 2 PHYSICAL SETTING

### 2.1 GEOLOGY AND HYDROGEOLOGY

The subsurface soil conditions in the vicinity of the Site comprise shallow overburden overlying limestone/dolostone and shale (GM, 2014). The bedrock encountered beneath the Site is described as grey/brown dolomitic limestone (GM, 2014). Groundwater flow is thought to be predominantly in the upper, more highly fractured bedrock unit, which is reported to be underlain by more competent, less fractured, dolostone bedrock (GM, 2014). The hydraulic conductivity and linear groundwater flow velocity likely decreases with depth as a result. Borehole logs depicting the soil and monitoring well construction details for monitoring wells are provided in Appendix B.

Static water levels were recorded by WSP at each of the wells during the fall 2023 groundwater monitoring event. Appendix C presents the groundwater elevations measured during the 2023 groundwater monitoring event. Figure 4A though 4C presents the inferred groundwater elevation contours and groundwater flow directions for the shallow, intermediate and deep flow systems during the fall 2023 monitoring event.

The inclusion of the supplemental monitoring well nests installed in 2022 resulted in the reassessment of the current groundwater flow systems. Based on the groundwater elevations and the well screen depth elevations, the monitoring network was divided into three (3) hydrostratigraphic units; shallow, intermediate, and deep. In general, the recorded static groundwater levels indicate localized groundwater flow across the Site to the north, west and northwest in the shallow and intermediate flow systems, and southwest in the deep flow system. The overall groundwater flow direction is inferred to be away from the Site, ultimately discharging to Lake Huron, which is situated approximately 500 m west of the Site.

### 3 DESCRIPTION OF MONITORING PROGRAM

### 3.1 MONITORING LOCATIONS

All groundwater monitoring locations are illustrated on Figure 2. Detailed locations are provided in Table 1. Monitoring well elevations for top of casing are provided in Appendix C.

Monitoring Location	Easting Zone 17 NAD 83	Northing Zone 17 NAD 83	Collection Method	Accuracy	Collection Personnel	Date Collected
OW-1	401860	5056683				
OW-2	401790	5056836				
OW-3A/B	401767	5056727				
OW-4	401763	5056674			Trained WSP field crew	
OW-5	401735	5056770				24 September
OW-6	401649	5056865	Handheld GPS			
OW-7	401676	5056698		+/- 5 m		2015
OW-8	401954	5056866				
OW-9	401633	5056783				
OW-10	401839	5056881				
OW-11	401731	5056882				
OW-12A/B	401619	5056825				
OW-13A/B	401738	5056741	-			25 July 2017
OW-14A/B	401722	5056634				
OW-15A/B	401623	5056626				
OW-16A/B	401639	5056705				12 December
OW17-A/B	401652	5056948				2023
OW-18	401751	5056653				

#### Table 1: Monitoring Locations On-Site

Table 2 presents a summary of the construction details and respective on-Site positions of the groundwater monitoring wells. All construction details for wells installed in 2002 and 2003 are based on borehole logs prepared

by

Waters Environmental Geosciences Ltd (Appendix B). According to the groundwater elevation data collected to date, OW-8 is located upgradient of the Site, and is interpreted to be representative of background (i.e., non-impacted) water quality conditions, allowing a detailed evaluation of the Site to be undertaken with respect to MECP Guideline B-7. Following the 2023 monitoring period there appears to be a potential groundwater divide along the eastern property boundary, between monitoring well OW-10 and background monitoring well OW-8.

As previously discussed, the monitoring well network was divided into three (3) flow systems, therefore, by the present assessment, some of monitoring well nest's on-site position have been re-assessed. Monitoring well OW-1, previously interpreted as crossgradient, is now interpreted to be located upgradient, but in the immediate vicinity of the fill area. Well nest OW-14A/B and OW-15A/B are located crossgradient from the fill area. Monitoring well OW-16A, as part of the shallow flow system; as well as OW-17B, as part of the deep flow system, are situated crossgradient to the Site. All remaining wells are situated at various distances and directions downgradient of the waste deposits and are considered representative of water quality downgradient from the fill area. The downgradient property boundaries are represented by OW-6, OW-7, OW-10, OW-11, and OW-13A/B, as presented on Figure 2. As discussed in Section 1.3, well nests OW-15, OW-16, and OW-17 were installed on 12 December 2022 in order to monitor the recently extended downgradient CAZ boundaries. Monitoring wells OW-9 and OW-12A/B monitor the western CAZ boundary of the Site. Monitoring well OW-18 was installed to monitor the leachate characteristics of the Site.

Well ID	Condition	Total Depth (mbgs) <sup>1</sup>	Screened Interval (mbgs)	Unit Screened	On-Site Position
OW-1	Good	13.34	8.4 – 13.34	Bedrock	Upgradient
OW-2	Good	13.28	8.3 – 13.28	Bedrock	Downgradient
OW-3A	Good	11.98	8.1 – 11.98	Bedrock	Downgradient
OW-3B	Good	19.40	Not available	Bedrock	Downgradient
OW-4	Good	12.13	7.6 – 12.13	Bedrock	Downgradient
OW-5	Good	13.31	8.2 – 13.31	Bedrock	Downgradient
OW-6	Good	13.36	8.3 – 13.36	Bedrock	Downgradient
OW-7	Good	13.33	8.3 – 13.33	Bedrock	Downgradient
OW-8	Good	13.20	8.3 – 13.20	Bedrock	Upgradient (background)
OW-9	Good	15.65	12.65 – 15.65	Bedrock	Downgradient
OW-10	Good	14.47	11.47 – 14.47	Bedrock	Downgradient
OW-11	Good	14.62	13.12 – 14.62	Bedrock	Downgradient

Table 2: Groundwater Monitoring Well Construction Details

Well ID	Condition	Total Depth (mbgs) <sup>1</sup>	Screened Interval (mbgs)	Unit Screened	On-Site Position
OW-12A	Good	13.4	11.9 – 13.4	Bedrock	Downgradient CAZ Boundary
OW-12B	Good	17.1	14.1 – 17.1	Bedrock	Downgradient CAZ Boundary
OW-13A	Good	5.5	4.0 – 5.5	Bedrock	Downgradient
OW-13B	Good	11.0	8.0 – 11.0	Bedrock	Downgradient
OW-14A	Good	6.9	5.4 – 6.9	Bedrock	Crossgradient
OW-14B	Good	11.6	8.6 – 11.6	Bedrock	Crossgradient
OW-15A	Good	7.0	4.0 7.0	Bedrock	Crossgradient CAZ Boundary
OW-15B	Good	12.0	9.0 – 12.0	Bedrock	Crossgradient CAZ Boundary
OW-16A	Good	6.1	3.1 – 6.1	Bedrock	Crossgradient CAZ Boundary
OW-16B	Good	11.5	8.5 – 11.5	Bedrock	Downgradient CAZ Boundary
OW-17A	Good	8.0	5.0 - 8.0	Bedrock	Downgradient CAZ Boundary
OW-17B	Good	17.1	14.1 – 17.1	Bedrock	Crossgradient CAZ Boundary
OW-18	Good	7.0	3.7 – 6.7	Bedrock	Downgradient (Source)

Notes:

(1) mbgs indicates m below ground surface.

#### 3.2 MONITORING FREQUENCY

Groundwater is sampled by WSP annually, during the fall. The annual monitoring event occurred on 30 October 2023 to 2 November 2023. Beginning in 2020, the annual sampling events have been undertaken later in the year, as compared to historical events, in an attempt to capture higher groundwater table elevations, as limited well volumes and recoveries, which impacted groundwater sampling activities, were historically noted at the Site.

### 3.3 FIELD AND LABORATORY PARAMETERS AND ANALYSIS

Geochemical analyses for general chemistry, metals, select volatiles and nitrogen cycle parameters were completed on all samples collected. A detailed list of laboratory parameters is included in Appendix D. Field parameters comprised static water level measurements, temperature, pH, conductivity, dissolved solids, dissolved oxygen and oxygen reduction potential (ORP). All field equipment were maintained, calibrated, and decontaminated appropriately prior to each use.

### 3.4 MONITORING PROCEDURES AND METHODS

Monitoring and sample collection followed typical industry standard practices. Each groundwater monitoring well was purged prior to sampling to obtain samples representative of the formation water. Dedicated well instrumentation (Waterra Tube and foot valve system) was used to obtain water samples from the groundwater monitoring wells, and samples were immediately transferred to laboratory-prepared sample vials and bottles. Samples identified for heavy metals and dissolved organic carbon analysis were field-filtered using a single use 0.45 µm filter unit, and the remaining samples were preserved following standard laboratory protocols as established in the MECP "Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act, Version 3.0" ("Analytical Protocol"; MECP, 2020)".

Samples were submitted under chain of custody, in a temperature controlled setting (i.e., in a cooler, on ice) to Canadian Association for Laboratory Accreditation (CALA) accredited laboratory sub-contractor, AGAT Laboratories (AGAT), in Mississauga for analysis. The analytical results were subsequently forwarded to WSP. Laboratory analytical reports for 2023 are provided in Appendix D. The 2023 groundwater monitoring data were reviewed by comparison to the current MECP Ontario Drinking Water Standards (ODWS).

## 3.5 QUALITY ASSURANCE FOR SAMPLING AND ANALYSIS

WSP uses recognized industry standards, including the Canadian Council of Ministers of the Environment (CCME) Subsurface Assessment Handbook for Contaminated Sites and MECP's manual Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario for conducting environmental assessments. For guality assurance, all work is supervised and internally reviewed by senior staff members.

Field sampling equipment decontamination is completed in accordance with industry accepted protocols. As a minimum, sampling equipment is washed with detergent solution and rinsed with distilled water between sampling locations. Decontamination procedures are undertaken to prevent any cross-contamination between monitoring locations and sampling sites. Screening instruments are calibrated prior to each use.

As a minimum, for every ten groundwater samples collected, one field duplicate sample is collected and included in the laboratory submission for analysis. Three field duplicate samples were collected during the 2023 annual monitoring event. Relative Percent Differences (RPDs) were calculated and discussed where applicable. Samples were placed in appropriate sample containers provided by the laboratory and preserved (as required based on type of analysis) until delivered (shipped by courier or hand delivered) to the laboratory for analysis. A chain of custody form accompanied samples at all points of handling.

### 4 MONITORING RESULTS

### 4.1 HISTORICAL DATA

Historical data for groundwater dating back to 2004 are provided in Appendix E.

### 4.2 DATA QUALITY EVALUATION

The analytical laboratory employed to perform the laboratory analyses (AGAT) is accredited by the Standards Council of Canada/Canadian Association for Laboratory Accreditation in accordance with ISO/IEC 17025:1999 – "General Requirements for the Competence of Testing and Calibration Laboratories" for the tested parameters and has met the standards for proficiency testing developed by the Standards Council of Canada for parameters set out in the Soil, Ground Water and Sediment Standards.

Sample analysis dates provided on the laboratory analytical reports issued by AGAT indicate that all sample analyses were performed within the required sample/extract hold times, as indicated by the dates presented in columns for each sample parameter on the analytical report. The laboratory minimum detection limits were reported to be at or lower than the required MECP reporting detection limits for the parameters analyzed. A comparison of the internal laboratory duplicate samples indicates that all samples and the respective duplicates are within laboratory acceptable range limits.

The measured cooler temperatures when received by the laboratory were within acceptable limits (< 10 degrees Celsius), with the exception of the residential samples (23T074344). These samples were delivered to the lab with an average temperature of 16.4°C. Temperatures above 10°C are more conducive to chemical and biological activity in the sample, which can lead degradation or transformation of target contaminants. Therefore, results for samples delivered to the laboratory above 10°C should be qualified and considered estimated, particularly biological and organic samples. In addition, complication with sample submission required the lab to subsample for mercury from a plastic bottle, as opposed to the lab issued amber vial. The mercury results for the residential samples may have a low biased outcome.

As a quality control measure, groundwater field duplicate samples were collected during the annual sampling event. All field duplicate data are provided in Appendix D and summarized in Appendix E. The groundwater duplicate samples were collected from OW-13B, OW-14B and OW-10 and identified as PB DUP1, PB DUP2 and PB DUP3, respectively. When compared to concentrations reported in the original samples, duplicate water quality data reported that all parameters were within an acceptable range with respect to relative percent difference (i.e., the industry standard of less than 50%) and, therefore, indicative of no sampling or laboratory biases during 2023.

### 4.3 GROUNDWATER FLOW MONITORING

As discussed in Section 2.1, the recorded static groundwater levels indicate groundwater flow across the Site towards the north, west and northwest in the shallow, and intermediate hyrdrostratigraphic units, and assumed to be to the southwest in the deep hydrostratigraphic unit. Static groundwater levels are presented in Appendix C; groundwater elevations, inferred groundwater elevation contours, and inferred groundwater flow directions for the fall 2023 groundwater monitoring event are illustrated on Figure 4A through 4C.

In addition to the current groundwater elevation data, groundwater elevations in previous sampling events were reviewed to identify any trends or inconsistencies in the data. The available groundwater elevation data indicate relatively stable elevations over time, particularly since 2006. The reported static groundwater elevations for the majority of the monitoring wells in 2023 are elevated compared to previous sampling events, however, remain

relatively within the historical range. It is noted that the groundwater elevations recorded in monitoring wells OW-9 and OW-11 during the 2014 monitoring event do not appear to be representative of actual groundwater conditions at these locations, as wells were developed following measurement of static water levels during that sampling event. A time-elevation graph is presented in Appendix F for all monitoring wells from 2002 to 2023.

### 4.4 GROUNDWATER QUALITY MONITORING

Samples were collected from all 25 groundwater monitoring wells during the fall 2023 annual monitoring event. Data summary tables are provided in Appendix E. A photographic inventory of monitoring wells is provided in Appendix G.

#### 4.4.1 UPGRADIENT WATER QUALITY

Background water quality in upgradient monitoring well OW-8 is generally characterized across the historical records by elevated concentrations of dissolved organic carbon (DOC), moderate concentrations of alkalinity and total dissolved solids (TDS), and low concentrations of chloride, sulphate and most metals parameters, when compared to the ODWS (Ontario Drinking Water Quality Standards). An ODWS exceedance was quantified for DOC, indicated by a bold entry in the associated data table provided in Appendix E. In accordance with Guideline B-7 calculations, these concentrations are considered to be representative of Site-specific background water quality in the aquifer intersected by the well screen. OW-8 is interpreted to be screened within the intermediate hydrostratigraphic unit.

It is also noted that groundwater quality in the area is reported to be highly mineralized, with a noticeable sulphur odour. It has been concluded during previous investigations completed by others that this is the result of naturally occurring elevated concentrations of sulphate, iron, TDS and DOC, which are typical of limestone/dolostone bedrock groundwater aquifers (GM BluePlan Engineering, 2014). These parameters are therefore interpreted to be poor landfill indicator parameters for this site, as elevated concentrations are not necessarily indicative of a landfill-derived impact to groundwater quality.

Groundwater quality in OW-1, situated east and upgradient of the fill area, is characterized by elevated concentrations of most parameters, as compared to background monitor OW-8 throughout the monitoring record. The increase in leachate indicator parameter concentrations in OW-1 over recent years, suggests that the aquifer is potentially beginning to present effects related to localized leachate mounding within the fill area. The water quality characterized at this location is similar to those characterized at the downgradient wells screened at a similar depth. Therefore, Site-derived impacts to water quality are interpreted at this location.

#### 4.4.2 CROSSGRADIENT WATER QUALITY

Wel nest OW-14, situated southwest of the active fill area, exhibits differing water quality in the shallow and intermediate units. Groundwater quality in OW-14A, the shallow installation, is characterized by elevated concentrations of most landfill indicator parameters, and exhibits water quality similar to OW-1, with the exception of manganese, which is consistently elevated in OW-14A. A detectable concentration of toluene was quantified in previous sampling events in OW-14A at levels below the ODWQS. Water quality in intermediate monitoring well OW-14B is generally characterized by slightly elevated concentrations of sulphate, barium, boron, potassium and sodium, in comparison to background well OW-8; however, concentrations of most parameters are similar to, or lower than, background across the monitoring record.

Based on the groundwater flow direction, well nest OW-15 is located hydrologically crossgradient of the landfill area, this well nest is located in the southwest corner of the recently extended downgradient CAZ boundary, west of the OW-14 well nest. This well nest indicates an impact to groundwater quality in both installations, with a more defined impact apparent in the intermediate installation, OW-15B. Concentrations of most landfill indicator parameters are elevated in OW-15A, in comparison to background water quality, with the exception of alkalinity

and

DOC which are lower than background. Elevated concentrations of landfill indicator parameters also characterize water quality in OW-15B, but at levels higher than those quantified in the shallow installation. Sulphate concentrations at this well nest are also significantly elevated, particularly within the deeper installation, compared to the leachate water quality at OW-18. Given the hydraulic position of the well nest in relation to the fill area, in addition to the elevated sulphate concentrations exhibited in the deep installation, impacts are potentially a result of background water quality conditions.

#### 4.4.3 ON-SITE DOWNGRADIENT WATER QUALITY

Monitoring wells OW-18, OW-4, OW-3A/B, OW-5 and OW-2 monitor groundwater quality immediately downgradient of the fill area and the various waste segregation areas on-Site.

OW-18, situated immediately downgradient of the active fill area, is characterized by significantly elevated concentrations of all landfill indicator parameters in comparison to background water quality, indicating Site-derived impacts to the groundwater quality at this location.

OW-4 is situated immediately west of the active fill area. Groundwater quality at this location is characterized by slightly elevated concentrations of sulphate and boron, when compared to background water quality, and concentrations of DOC lower than those reported at background monitoring well OW-8. Concentrations of parameters including alkalinity, chloride and TDS are usually quantified at levels similar to background conditions at OW-4, however, chloride is slightly elevated compared to background water quality in 2023.

Well nest OW-3A/B is located northwest of the active fill area and is situated mid-Site. The intermediate and deep hydrostratigraphic units are monitored at this location by OW-3A and OW-3B, respectively, and report differing water quality. Water quality in intermediate downgradient well OW-3A is characterized by elevated concentrations of most parameters analyzed, as compared to background. Groundwater quality in the deep unit at this location, in OW-3B, is generally characterized by low concentrations of DOC, and elevated concentrations of chloride, sulphate, TDS, boron and sodium, as compared to water quality in OW-8 (i.e., background well).

Groundwater quality in intermediate depth well OW-5, situated northwest of well nest OW-3 and downgradient of Site activities, is generally characterized by slightly elevated concentrations of most landfill indicator parameters, with the exception of DOC and alkalinity, which were quantified at a concentration lower than background. It is noted that concentrations of indicator parameters have been lower at this location since 2019, as compared to recent historical events, potentially indicating an apparent decreasing landfill-derived impact at OW-5.

OW-2 is situated downgradient of Site activities to the north and is screened within the intermediate unit. Groundwater quality at this location is generally characterized by elevated concentrations of chloride, sulphate and boron, and low concentrations of alkalinity and DOC, as compared to water quality in background monitoring well OW-8.

#### 4.4.4 DOWNGRADIENT PROPERTY BOUNDARY WATER QUALITY

As discussed above, downgradient property boundaries are represented by monitoring wells OW-7, OW-13A/B, and OW-14A/B to the west of the fill area, OW-6 to the northwest of the fill area, and OW-10 and OW-11 to the north of the fill area, as illustrated on Figure 2.

Groundwater quality in OW-7, situated west of the fill area, is characterized by elevated sulphate, TDS, boron and sodium, as compared to background, and low concentrations of alkalinity and DOC.

Well nest OW-13 is situated northwest of the fill area, east of the west property boundary, and indicates a potential Site-derived impact to groundwater quality in both wells, with a more defined impact apparent in the shallow installation, OW-13A. Concentrations of all landfill indicator parameters are elevated in OW-13A, in comparison to background water quality. Elevated concentrations of landfill indicator parameters also characterize water quality in the intermediate installation OW-13B, but at levels lower than those quantified in the shallow installation. Detectable concentrations of toluene were quantified in previous sampling events in both

OW-13A and OW-13B, at levels below the ODWS.

OW-6 is located in the northwest corner of the Municipality-owned property, and immediately west of the Municipal Works building. Groundwater quality at this intermediate downgradient location is generally characterized by concentrations of most parameters at levels similar to or lower than background, with the exceptions of sulphate, TDS, boron and sodium, which are elevated in comparison to water quality in OW-8.

The north property boundary of the Site is monitored by wells OW-10 and OW-11, both screened within the intermediate hydrostratigraphic unit. Water quality in OW-10 is characterized by slightly elevated concentrations of most analytical parameters in comparison to background water quality in OW-8, with the exception of alkalinity, DOC, and iron which are lower than background. Water quality in OW-11, situated at the north property boundary to the west of OW-10, is characterized by low alkalinity and DOC, and elevated concentrations of sulphate, barium, boron and sodium, in comparison to background water quality in OW-8.

#### 4.4.5 DOWNGRADIENT CAZ BOUNDARY WATER QUALITY

The downgradient CAZ boundaries are represented by monitoring wells OW-9, OW-12A/B, and recently installed monitoring wells OW-16A/B, and OW-17A/B.

OW-9, located west of the Site and at the west property boundary line in the intermediate unit, generally demonstrates water quality characterized by low concentrations of alkalinity and DOC, and slightly elevated concentrations of chloride, sulphate, barium, boron and sodium, as compared to background monitoring well OW-8.

Well nest OW-12 is situated along the western property/CAZ boundary of the Site, north of OW-9, and reports generally slightly higher concentrations of indicator parameters in OW-12B, the deeper of the two installations, as compared to OW-12A. Groundwater quality in intermediate installation OW-12A is characterized by elevated concentrations of barium, boron and sodium, and low concentrations of alkalinity, DOC and TDS, as compared to background throughout the monitoring record. Water quality in the deeper installation, OW-12B, is characterized by elevated concentrations of sulphate, TDS, barium and boron, in comparison to water quality at background monitor OW-8. It is important to note, that OW-12B is screened within a deeper unit as compared to the background well, therefore elevated concentrations in OW-12B may not be indicative of landfill derived impacts, but a difference in water quality at depth, as compared to the background well.

During a historical monitoring event conducted in October 2017, additional parameters, namely volatile organic compounds (VOCs) and petroleum hydrocarbons (PHCs) were analyzed at OW-12B in order to confirm a potential presence these parameters associated with petroleum hydrocarbons. PHCs in groundwater were initially observed during a supplemental sampling event in May 2017, which was conducted as part of a separate hydrogeological investigation. Detectable levels of PHCs and toluene were guantified in October 2017, as shown in the associated data summary table presented in Appendix E, resulting in the recommendation to continue the analysis of PHCs and VOCs at this monitoring well during future monitoring events. An insufficient volume of water and slow recovery prevented the collection of samples for VOCs in 2018 and for PHCs in 2018 through 2022. PHCs and VOCs were analyzed at OW-12B during the 2021, 2022 and 2023 monitoring events. Obtaining a sufficient sample volume at OW-12B is an ongoing challenge and consistent collection of extra sample volume is not realistic at this well on an ongoing basis. All VOC results were below the detection limit during 2021, 2022 and 2023 and detectable concentrations of PHCs fractions F3 and F4 were quantified during those events. Based on the available data, the source of the PHCs guantified in 2017 is unknown at this time; however, they are not interpreted to be derived from the waste deposition area and could potentially be the result of sources unrelated to landfill activity. It is noted that PHCs are sometimes present naturally on Manitoulin Island and are not always indicative of contamination to groundwater from anthropogenic sources.

Well nest OW-16 is located west of the Site in the recently extended downgradient CAZ boundary, south of OW-9 and indicates a potential Site-derived impact to groundwater quality in both wells. Water quality in OW-16A is characterized by elevated concentrations of alkalinity, chloride, DOC, sulphate, TDS, barium, boron and sodium in comparison to the background water quality. Water quality in the intermediate installation OW-16B is

characterized by elevated concentrations of chloride, sulphate, TDS, barium, boron and sodium and lower concentrations of alkalinity and DOC in comparison to background water quality.

Well nest OW-17 is located across Government Road to the northwest of Site. Water quality in the intermediate installation OW-17A is characterized by slightly elevated concentrations of chloride, sulphate and boron, DOC, TDS and barium and lower concentrations of alkalinity in comparison to background water quality. Water quality in the deeper installation OW-17B is characterized by slightly elevated concentrations of chloride, sulphate, barium, boron and sodium with lower concentrations of alkalinity and DOC in comparison to background water quality. Given that OW-17B is screened within a deeper unit as compared to the background well, it is noted that the elevated concentrations in OW-17B may not be indicative of landfill derived impacts, but a difference in water quality at depth, as compared to the background well.

#### 4.4.6 GROUNDWATER FIELD PARAMETER MEASUREMENTS

Field parameters were measured at all monitoring wells at the time of sampling and are presented in Table 3.

Well ID	Temperature (°C)	рН	Conductivity (mS/cm)	Dissolved Solids (mg/L)	Dissolved Oxygen (mg/L)	ORP (mV)
OW-1	7.8	7.80	1074	537	2.15	-58.4
OW-2	8.3	8.30	408	204	3.53	30.2
OW-3A	8.4	7.75	1221	611	4.83	-13.3
OW-3B	7.2	8.17	637	319	9.15	51.2
OW-4	8.4	8.14	521	261	4.57	16.7
OW-5	7.5	8.11	615	308	10.56	63.2
OW-6	8.4	8.87	524	262	7.90	87.5
OW-7	8.6	9.28	551	276	8.55	23.8
OW-8	9.0	8.80	410	205	6.62	65.4
OW-9	9.5	8.79	433	217	6.89	23.1
OW-10	6.5	8.00	502	251	3.70	28.4
OW-11	7.2	10.52	487	244	10.60	41.1
OW-12A	8.5	9.30	381	191	5.60	49.7
OW-12B	9.1	8.85	570	285	7.90	64.0
OW-13A	10.7	7.26	1934	967	6.42	82.4
OW-13B	8.8	7.77	735	368	5.09	52.4
OW-14A	3.8	7.83	932	466	9.85	117.9
OW-14B	4.86	7.96	472	236	4.04	113.8
OW-15A	8.58	9.59	587	294	8.22	46.1
OW-15B	7.71	9.63	1663	832	10.25	31.6
OW-16A	8.34	8.61	847	424	8.28	32.9
OW-16B	7.37	9.43	761	381	9.53	32.4
OW-17A	7.89	9.84	454	227	3.53	15.9
OW-17B	6.07	9.98	472	236	9.42	29.9
OW-18	9.77	7.77	4488	2244	5.39	-41.3

Table 3: October 2023 Groundwater Field Parameter Measurements

#### 4.4.7 RESIDENTIAL WELL MONITORING

Two residential wells are integrated into the Site annual monitoring program. Samples were obtained at both locations (Irving and Paquet) during 2023 in advance of the fall monitoring event. Residential samples were collected in September 2023 by Municipality staff under direction from WSP. Advanced sampling of residential locations was deemed necessary by the Municipality in order to ensure both samples were obtained, as residents are often not available later in the fall during the planned landfill sampling event. As shown on Figure 2, both residential monitoring locations are situated west, and therefore hydraulically downgradient, of the Site.

Groundwater quality in the Paquet residential water well is generally characterized by concentrations of all parameters analyzed at levels similar to background, with the exceptions of boron and sulphate, which are slightly elevated. A high TDS concentration, exceeding the ODWS, was quantified at this location during 2019; however, subsequent results have confirmed that the 2019 concentration was anomalous and not representative of actual TDS concentrations at this location. DOC ODWS exceedances were quantified during the 2021 and 2022 monitoring events, at a level lower than background concentrations. Microbial parameters are occasionally elevated with respect to the ODWS which are interpreted to be unrelated to the landfill (Appendix E).

Water quality in the Irving residential water well is generally characterized by concentrations of all parameters at levels similar to, or lower than, background, with the exceptions of sulphate and boron, which were slightly elevated in comparison to OW-8 and are generally quantified at levels similar to those reported at the Paquet location. Occasional ODWS exceedances of DOC are detected at concentrations lower than at the background monitoring location. These elevated DOC and microbial concentrations at the Irving residential water well are not interpreted to be landfill-related and are likely representative of the natural range of fluctuation of these parameters in the vicinity of the Site.

In summary, a review of the 2023 geochemical data from the neighbouring residential water supply wells indicates that these locations are not experiencing evidence of a landfill-derived impact.

### 5 ASSESSMENT, INTERPRETATION AND DISCUSSION

### 5.1 GROUNDWATER PLUME DELINEATION

The horizontal delineation of the groundwater plume emanating from the landfill fill area was inferred based on the geographical distribution of chloride, which is interpreted to be an effective landfill indicator parameter. The distribution of chloride concentrations across the Site was illustrated by contours inferred from the October/November 2023 monitoring data, which are presented on Figure 4. These contours were derived from maximum reported concentrations at each multi-level well nest and are considered representative of "worst-case" conditions. The contours observed for chloride are interpreted to be aligned with the inferred groundwater contours at the Site. Contours indicate more elevated concentrations of chloride at monitoring locations immediately downgradient of the fill area, with a gradual decrease in concentration towards the north and west of the fill area. At the north boundary of the Site and along the south side of Government Road, chloride concentrations are not uniform and differ slightly from the groundwater elevation contours. This could potentially be the result of an impact related to road salt, which may be occurring in OW-10. The chloride concentration in deep well OW-17B is slightly elevated when compared to the upgradient water guality and could potentially be related to road salting or indicative of variation in groundwater guality within the deeper hydrostratigraphic unit and is not interpreted to be a result of landfill-derived impacts. The inferred chloride concentration contours suggest that the landfill-derived impacts are contained to within a distance of approximately 200 m to the north t of the fill area. Chloride concentrations remain elevated to the west of the fill area, therefore suggesting that landfill derived impacts may not be contained within the western CAZ boundary.

For the purpose of the delineation of the vertical groundwater plume, a section of the subsurface along the predominant direction of groundwater flow at the Site (i.e., northwest), was selected in order to evaluate the pattern of chloride concentrations for the fall 2023 monitoring event. The selected section is shown on Figure 5 and includes 15 monitoring wells, of which four are multi-level monitoring well nests. The inferred vertical concentration contours for chloride suggest attenuation of this parameter with depth at monitoring locations downgradient of OW-5. The nested wells indicate that chloride concentrations are more elevated in the shallow installation at OW-13, while the opposite is true at well nest OW-12 and OW-17, where the deeper of the two installations quantifies the higher chloride concentration. This pattern suggests that landfill impacts are shallow nearest the fill area, and deeper with distance as the plume migrates downgradient. Concentrations of chloride are attenuated with depth in the direction of groundwater flow, with impacts deepening as the plume migrates in a downgradient direction.

### 5.2 GROUNDWATER TREND ANALYSIS

The current and historical groundwater elevation and water quality data were reviewed with the objective of identifying any apparent trends or inconsistencies in the monitoring record. With respect to the groundwater elevations, the available data indicate relatively stable elevations over time (Appendix F), particularly since 2006. Groundwater elevations recorded in monitoring wells OW-9 and OW-11 during the 2014 monitoring event and in OW-12B during the August 2017 monitoring event appear to be the result of drilling effects and incomplete water level recovery following drilling and are not likely representative of actual groundwater elevations. Over the 2023 sampling event, the majority of the monitoring wells OW-8 and OW-9 recorded significantly lower groundwater elevations when compared to the historical monitoring record.

A series of time-concentration graphs were developed for several select typical groundwater landfill indicator parameters (including alkalinity, barium, boron, chloride, DOC, sulphate and TDS) for all monitoring wells from 2002 to 2023. These time-concentration graphs are presented in Appendix F. Recently installed monitoring wells OW-15A/B through OW-18 have been included as part of the time-concentration graphs, however trends cannot be discussed for these monitoring locations until additional data have been collected. The available data generally indicate stable concentrations of landfill indicator parameters throughout the monitoring record. No significant increasing or decreasing trends are apparent for any of the parameters graphed; however, most landfill indicator parameters appear to be increasing over time in OW-13A. Various anomalous results have been quantified throughout the monitoring record, including alkalinity and sulphate in OW-2 during June 2002, barium in OW-6 and OW-3B during March 2004 and November 2010, respectively, and chloride, DOC and TDS at various locations prior to 2005. In addition, the Paquet residential water well quantified an anomalous TDS concentration during 2019. DOC concentrations quantified in both the Irving and Paquet samples during 2021 may also be anomalous, as both are elevated in comparison to the historical monitoring record.

Results for wells OW-9 through OW-11, and well nests OW-12 through OW-14, installed in 2014 and 2017, respectively, closely follow the trends as set by the other monitoring wells. The only exception to this is OW-13A, which is noticeably higher in concentration of most landfill indicator parameters and presents an increasing trend over time. It is noted that the results for OW-9 and OW-11 in 2014, as well as for OW-12B in 2017, appear to be unrepresentative of actual groundwater conditions in these wells, as most parameters are elevated in comparison to the concentrations quantified at these locations since the initial sampling events.

Differing water quality characteristics are evident in OW-3B, specifically with respect to boron concentrations, which are consistently higher than those reported at the remainder of the monitoring well network. Similarly, a distinct groundwater quality is apparent in OW-5, indicative of a landfill-derived impact to groundwater, as illustrated by the elevated concentrations of landfill indicator parameters such as alkalinity, chloride and TDS reported at this location, as compared to background and non-impacted downgradient wells. In comparison, the Irving and Paquet residential water wells report similar and stable water quality throughout the historical monitoring record.

As previously discussed, elevated sulphate is reported to be naturally occurring in the vicinity of the Site as a result of the highly mineralized bedrock groundwater system (GM BluePlan Engineering, 2014). Sulphate concentrations are variable across the monitoring network, regardless of proximity to waste deposits. These results are consistent throughout the historical monitoring record, as illustrated by the sulphate trend chart. Sulphate has therefore been considered an inappropriate landfill indicator parameter, as it is not possible to distinguish naturally occurring concentrations from those that could potentially be landfill derived.

### 5.3 GUIDELINE B-7 CALCULATIONS

In September 1986, a guideline was introduced by the MECP to assist in the evaluation of groundwater impacts, especially for the case of landfill and/or lagoon operations. The guideline was entitled "The Incorporation of the Reasonable Use Concept into MECP Groundwater Management Activities" and is now referred to as Guideline B-7 (formerly Policy 15-08). Simply stated, the guideline sets groundwater contaminant discharge criteria for landfills and/or lagoons that may impair local water quality. The criteria are based on maintaining the protection of groundwater resources on the adjacent lands or properties.

The contaminant discharge criteria, which represent the maximum acceptable levels of contaminants that should not be exceeded, are established using a simple mathematical relationship that incorporates background (existing) water quality and the highest provincial water quality standards for the adjacent land use. Under Guideline B-7, water quality impacts will not be allowed to exceed the maximum calculated discharge criteria at the Site property boundaries.

In order to apply Guideline B-7, the appropriate resource use of the adjacent properties must be selected. For the Providence Bay Waste Disposal Site, the highest end use for groundwater on the adjacent properties is for drinking water purposes, for which the ODWS — Table 1 through Table 4 have been established. The purpose of the ODWS

is to

protect public health through the provision of safe drinking water. Water intended for human consumption shall not contain unsafe concentrations of toxic chemicals (health related parameters). Health related standards are established for parameters that, when present above a certain concentration, have known or suspected adverse health effects. At the same time, water should also be aesthetically acceptable. Colour, odour and turbidity are parameters that, when controlled, result in water that is clear, colourless and without objectionable or unpleasant taste or odour (non-health related parameters). As such, operational guidelines have been established within the ODWS for non-health related parameters that need to be controlled to ensure efficient and effective treatment and distribution of the water. As well, Guideline B-7 requires the identification of background water quality conditions in the underlying aquifer.

In order to establish the background geochemical profile, the geometric mean of the valid concentrations of each applicable ODWS parameter in OW-8 is calculated, and the resultant values are applied along with the ODWS, to complete a Guideline B-7 analysis for all of the on-Site groundwater monitoring wells for various landfill indicator parameters. Appendix H presents the Guideline B-7 calculations for the fall 2023 monitoring results that have been developed using all valid background analytical data observed in OW-8.

It should be noted that these Guideline B-7 values are much lower (i.e., more stringent) than the ODWS. A well-bywell comparison of the performance of each of the parameters at all of the downgradient groundwater monitoring wells is presented in Appendix H for the 2023 monitoring event. By the present assessment, wells OW-1, OW-3A, OW-13A, OW-13B, OW-14A, OW-15A, OW-15B, OW-16A, OW-16B, OW-17A, OW-17B and OW-18 exhibit Guideline B-7 exceedances during the fall 2023 monitoring event. The exceedances are indicated by bold and shaded entries in the table provided in Appendix H. In the event that the background concentration of a parameter exceeds the ODWS, the background level is considered the maximum allowable concentration not to be exceeded. This is the case for DOC during the 2023 monitoring event.

Comparing concentrations observed in the groundwater monitoring wells during the 2023 sampling event to the calculated maximum allowable concentration (Appendix H), three health related and all six non-health related parameter exceedances are noted. The health-related parameters in exceedance of the Guideline B-7 maximum concentration consist of barium, nitrate, and nitrite at OW-18; and nitrite at OW-13A. The non-health parameters that were exceeded consist of alkalinity, chloride, DOC, sodium, sulphate and TDS. Monitoring well OW-18 quantified an exceedance for all non-health related parameters, with the exception of sulphate. Alkalinity exceeded at OW-1, OW-3A, and OW-13A; chloride at OW-15A, OW-15B, and OW-16B; DOC at OW-1, OW-3A, OW-13A, OW-14A, OW-16A, OW-17A; and OW-17B; sodium at OW-15B; sulphate at OW-15B; and TDS at OW-1, OW-3A, OW-13A, OW-13A, OW-13B, OW-14A, OW-15A, OW-15B, OW-16A, and OW-16B. As previously discussed, DOC is elevated at background and is not an ideal indicator of landfill-derived impacts.

In summary, the monitoring record indicates that a measurable water quality impact is occurring downgradient of the waste deposits in select monitoring wells. Impacts in OW-1 are potentially landfill-derived, as trends in leachate indicator parameter concentrations over recent years suggests that the aquifer might be beginning to present effects related to leachate mounding within the fill area. Impacts quantified in OW-18 are interpreted to be Site-derived, which is expected given the wells placement immediately downgradient of the active fill area. Impacts quantified in OW-3A, OW-14A, and well nests OW-13, OW-15 and OW-16 are interpreted to be Site-derived. Impacts to crossgradient well nest OW-15 are not necessarily solely Site-derived, rather a potential compounding of background water quality conditions, given the hydraulic position of the well nest in relation to the fill area. It is important to note that although well nest OW-13 is situated at the west property boundary, the northwesterly flow of groundwater in this area allows for additional on-Site attenuation downgradient of these wells in the western portion of Municipality-owned land. Additional data are required in order to confirm the groundwater flow direction and water quality condition, following the inclusion of the 2022 monitoring wells.

An extension of the Site CAZ was calculated by Wood (WSP's predecessor), as presented in the Contaminant Attenuation Zone Reassessment (Wood, 2020). It was estimated that the required CAZ is comprised of an additional 110 m of property to the west, 90 m of property to the north, and 10 m of property to the east of the existing property boundaries. The CAZ was recently extended to the recommended boundaries through a groundwater easement, the extension was instrumented with monitoring wells on 12 December 2022 in order to monitor water quality after further attenuation downgradient of the non-compliant wells. Impacts quantified in

well

nests OW-15 and OW-16 are interpreted to be Site-derived, to a degree. Given the presence of these impacts, the extension of the CAZ has not brought the Site into compliance with respect to Guideline B-7 as previously anticipated. However, such impacts could be the result of drilling effects, therefore further sampling in 2024 may put the Site into compliance with respect to Guideline B-7.

### 5.4 ADEQUACY OF THE MONITORING PROGRAM

It is WSP's opinion that the current groundwater monitoring program with inclusion of the extension and monitoring of the CAZ is adequate with respect to the characterization of Site conditions, the evaluation of Site performance and the assessment of Site compliance. The Monitoring and Screening Checklist is provided in Appendix I.

### 6 CONCLUSIONS

Based on the results of the current (2023) monitoring program, the following conclusions have been made:

- Groundwater movement at the Site was determined by static groundwater level measurements recorded at each of the monitoring wells as being directed away from the Site towards the west and northwest in the shallow and intermediate hydrostratigraphic units and assume to be to the southwest in the deep hydrostratigraphic unit.
- 2. The current monitoring record indicates a landfill-derived impact to groundwater quality in monitoring wells downgradient of the waste fill area, but a noticeable improvement in water quality is apparent with increased distance downgradient.
- 3. Monitoring wellOW-12B, continues to quantify detectable concentrations of PHC parameters (i.e., fractions F3 and F4) during the 2023 monitoring event Given the general lack of quantifiable levels of PHC elsewhere within the monitoring network it is interpreted that the detectable concentrations of PHCs at this location may not be due to leachate derived impacts.
- 4. It is noted that deep monitoring wells OW-3B, OW-12B and OW-17B are screened within a deeper hydrostratigraphic unit as compared to background well OW-8, therefore elevated concentrations of certain parameters may not be indicative of landfill derived impacts, but a difference in water quality at depth.
- 5. Based on a review of the 2023 residential supply well geochemical data, no landfill-derived impact to groundwater quality are interpreted at these locations.
- 6. The inferred chloride concentration contours suggest that the landfill-derived impacts are contained to within an approximate distance of 200 m to the north of the fill area and are attenuated with depth in the direction of groundwater flow, with impacts deepening as the plume migrates in a downgradient direction. However, the inferred chloride contours suggest that landfill-derived impacts are not contained within the CAZ boundary to the west of the fill area, as quantified by well nests OW-15 and OW-16.
- 7. Groundwater quality at the Site is generally stable over time at all monitoring locations, including residential water wells downgradient of the Site. The data indicate an increasing trend in concentrations of landfill indicator parameters in OW-3A and to a lesser degree OW-1.
- 8. Three health and several non-health related parameters exceeded the calculated Guideline B-7 maximum concentration. Health related parameter exceedances include barium, nitrate and nitrite, and non-health related parameter exceedances include as well as alkalinity, chloride, DOC, sodium, sulphate and TDS. DOC and sulphate are interpreted to be inappropriate landfill indicator parameters for this Site, due to the high DOC background concentration and variability in the naturally occurring sulphate concentrations. The exceedances in wells OW-1, OW-3A, OW-14A, OW-18 and well nests OW-13, OW-15 and OW-16; however, are interpreted to be indicative of a landfill-derived impact to groundwater quality. No landfill derived impacts to groundwater quality were noted in CAZ boundary well nest OW-12 and OW-17, along the northwest and north boundaries, respectively.
- 9. The Site remains currently out of compliance with respect to Guideline B-7, as compliance was not achieved at the western CAZ extension. Exceedances noted in 2023 in the recently installed well nests OW-15 and OW-16 indicate a Site-derived impact to groundwater quality. However, such impacts could be the result of drilling effects, therefore further sampling in 2024 may put the Site into compliance with respect to Guideline B-7.

10. The Site ceased excepting waste as of 1 June 2023, at which time the Site is continuing to operate as a waste transfer station. The closure of the Site is anticipated to have a measurable improvement to groundwater quality in the immediate vicinity of the fill area upon completion of closure activities.

### 7 RECOMMENDATIONS

The following recommendations should be considered for inclusion in next year's monitoring program:

- 1. The Municipality should continue with groundwater monitoring in accordance with the September 2023 ECA, so that variations for certain parameters could be documented and understood.
- 2. Groundwater elevations at all existing monitoring wells should continue to be measured during the annual groundwater sampling event to confirm groundwater flow directions following the inclusion of the recently installed monitoring wells.
- 3. The recently installed monitoring wells within the additional CAZ should continue to be sampled during the next planned sampling event and be included in the annual monitoring program.

## **CLOSURE** 8

This report has been prepared for the exclusive use of the Municipality for specific application to this Site. The annual monitoring report was prepared in accordance with the verbal and written requests from the Municipality and generally accepted assessment practices, restricting the investigations to the assessment of the environmental compliance associated with the Site. No other warranty, expressed or implied is made.

Respectfully Submitted,

WSP E&I Canada Limited

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### 9 REFERENCES

Gamsby and Mannerow Limited. Annual Monitoring Report (2013), Providence Bay Landfill Site, Certificate of Approval No. A550702, the Municipality of Central Manitoulin. February 2014.

Wood Environment & Infrastructure Solutions. Contaminant Attenuation Zone Reassessment, Providence Bay Waste Disposal Site, Providence Bay, Ontario. February 2020.

Ontario Ministry of Environment, Conservation and Parks (MECP), Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act and Excess Soil Quality, Version 3.1, 19 February 2021.

# Figures
















APPENDIX A ENVIRONMENTAL COMPLIANCE APPROVAL NO. A550702



Ministry of the Environment, Conservation and Parks Ministère de l'Environnement, de la Protection de la nature et des Parcs

#### AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER A550702 Issue Date: September 5, 2023

Municipality of Central Manitoulin 6020 Highway 542 Post Office Box, No. 87 Central Manitoulin, Ontario P0P 1S0

Site Location: Providence Bay Landfill Geographic Township of Carnarvon Lot Part 3, Concession 13 Central Manitoulin Township, District of Manitoulin

You have applied under section 20.2 of Part II.1 of the <u>Environmental Protection Act</u>, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

the use and operation of a closed 4.1 hectare landfilling site and an operating waste transfer station

*For the purpose of this environmental compliance approval, the following definitions apply:* 

"Act" and "EPA" means Environmental Protection Act, R.S.O. 1990, c. E. 19, as amended;

"Approval" means this Environmental Compliance Approval and any Schedules to it, including the application and supporting documentation listed in Schedule "A";

"Blue box material" means municipal waste that consists solely of waste in one or more of the categories set out in Schedule 1 of the Ontario Regulation 101/94;

"Contaminant Attenuation Zone" or "CAZ" means the as described in Section 3.14.1 and Figure 3 of the Updated Design and Operations Plan, Item 6 of Schedule "A";

"Director" means any Ministry employee pursuant to section 20.3 of Part II.1 of the Act;

"District Manager" means the District Manager of the local district office of the Ministry in which the Site is geographically located;

"Hazardous or Subject Waste" means hazardous waste or subject waste as defined by Reg. 347;

"Leaf and Yard Waste" includes waste consisting of natural Christmas trees and other plant materials but not tree limbs or other woody materials in excess of seven (7) centimetres in diameter;

"Ministry" means the Ontario Ministry of the Environment, Parks and Conservation;

"OCC" means old corrugated cardboard;

"Operator " means any person, other than the Owner's employees, authorized by the Owner as having the charge, management or control of any aspect of the site, and includes its successors or assigns;

"Owner" means any person that is responsible for the establishment or operation of the Site being approved by this Approval, and includes Corporation of the Municipality of Central Manitoulin, its successors and assigns;

"OWRA" means the Ontario Water Resources Act, R.S.O. 1990, c. O-40, as amended from time to time;

"PA" means the Pesticides Act, R.S.O. 1990, c. P-11, as amend from time to time;

"Provincial Officer" means any person designated in writing by the Minister as a provincial officer pursuant to section 5 of the OWRA or section 5 of the Act or section 17 of PA;

"Putrescible waste" means waste that decomposes such as food waste;

"Reg. 347" means Regulation 347, R.R.O. 1990, made under the Act, as amended from time to time;

"Regional Director" means the Regional Director of the local Regional Office of the Ministry in which the Site is located;

"Residual waste" means waste that is destined for final disposal;

"Site" means the entire waste disposal site including the landfilling area and transfer station located at Part Lot 3, Concession 13, Central Manitoulin Township, District of Manitoulin, and shown on figures in the Attachment 2, Site and Survey Plans of the ECA Application, Item 5 of Schedule "A";

"Trained Personnel" means personnel knowledgeable in the following through instruction and/or practice:

- a. relevant waste management legislation, regulations and guidelines;
- b. major environmental concerns pertaining to the waste to be handled;
- c. occupational health and safety concerns pertaining to the processes and wastes to be handled;
- d. management procedures including the use and operation of equipment for the processes

and wastes to be handled;

- e. emergency response procedures;
- f. specific written procedures for the control of nuisance conditions;
- g. specific written procedures for refusal of unacceptable waste loads; and
- h. the requirements of this Approval.

"Electrical and Electronic Equipment" or "EEE" as defined in Ontario Regulation 522/20.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

#### **TERMS AND CONDITIONS**

#### **1. GENERAL**

#### Compliance

- (1) The Owner shall ensure compliance with all the conditions of this Approval and shall ensure that any person authorized to carry out work on or operate any aspect of the Site is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.
- (2) Any person authorized to carry out work on or operate any aspect of the Site shall comply with the conditions of this Approval.
- (3) The Site shall be operated and maintained, and the management and disposal of all waste shall be carried out, in accordance with the EPA, Reg. 347 and the conditions of this Approval. At no time shall the discharge of a contaminant that causes or is likely to cause an adverse effect be permitted.

#### In Accordance

(4) Except as otherwise provided for in this Approval, the Site shall be operated and maintained in accordance with the applications for this Approval, and the supporting documentation listed in Schedule "A".

#### Interpretation

- (5) Where there is a conflict between a provision of any document, including the application, referred to in this Approval, and the conditions of this Approval, the conditions in this Approval shall take precedence.
- (6) Where there is a conflict between the application and a provision in any documents listed in Schedule "A", the application shall take precedence, unless it is clear that the purpose of the document was to amend the application and that the Ministry approved the amendment.

- (7) Where there is a conflict between any two documents listed in Schedule "A", other than the application, the document bearing the most recent date shall take precedence.
- (8) The conditions of this Approval are severable. If any condition of this Approval, or the application of any condition of this Approval to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this Approval shall not be affected thereby.

#### **Other Legal Obligations**

- (9) The issuance of, and compliance with, this Approval does not:
  - (a) relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement; or
  - (b) limit in any way the authority of the Ministry to require certain steps be taken or to require the Owner to furnish any further information related to compliance with this Approval.
- (10) The Owner shall ensure that:
  - (a) all equipment discharging to air operating at the Site are approved under Section 9 of the Act; and
  - (b) all direct effluent discharges from this Site, including stormwater run-off, are managed in accordance with appropriate Municipal, Provincial and/or Federal Legislation, Regulations and By-laws.

#### **Adverse Effect**

- (11) The Owner shall take steps to minimize and ameliorate any adverse effect on the natural environment or impairment of water quality resulting from the Site, including such accelerated or additional monitoring as may be necessary to determine the nature and extent of the effect or impairment.
- (12) Despite an Owner, Operator or any other person fulfilling any obligations imposed by this Approval, the person remains responsible for any contravention of any other condition of this Approval or any applicable statute, regulation, or other legal requirement resulting from any act or omission that caused the adverse effect to the natural environment or impairment of water quality.

#### **Change of Owner**

- (13) The Owner shall notify the Director, in writing, and forward a copy of the notification to the District Manager, within 30 days of the occurrence of any changes in the following information:
  - (a) change of Owner or Operator of the Site, or both;
  - (b) change of address of the current Owner, or address of the new Owner;
  - (c) change of partners where the Owner or Operator is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, 1991 shall be included in the notification to the Director;

- (d) any change of name of the corporation where the Operator is or at any time becomes a corporation, and a copy of the most current "Initial Notice or Notice of Change" (form 1 or 2 of O. Reg. 182, Chapter C-39, R.R.O. 1990, as amended), filed under the Corporations Information Act shall be included in the notification to the Director.
- (14) No portion of this Site shall be transferred or encumbered prior to or after closing of the Site unless the Director is notified in advance and sufficient financial assurance is deposited with the Ministry to ensure that these conditions will be carried out.
- (15) In the event of any change in ownership of the Site, other than change to a successor municipality, the Owner shall notify the successor of, and provide the successor with a copy of this Approval, and the Owner shall provide a copy of the notification to the District Manager and the Director.

#### **Registration on Title Requirement**

- (16) Prior to dealing with the property in any way, the Owner shall provide a copy of this Approval and any amendments, to any person who will acquire an interest in the property as a result of the dealing.
- (17) (a) If not completed previously, within thirty (30) calendar days from the date of issuance of this Approval, the Owner shall submit to the Director a completed Certificate of Requirement which shall include:
  - (i) a plan of survey prepared, signed and sealed by an Ontario Land Surveyor, which shows the area of the Site where waste has been or is to be deposited at the Site;
  - (ii) proof of ownership of the Site;
  - (iii) a letter signed by a member of the Law Society of Upper Canada or other qualified legal practitioner acceptable to the Director, verifying the legal description provided in the Certificate of Requirement;
  - (iv) the legal abstract of the property; and
  - (v) any supporting documents including a registerable description of the Site.
  - (b) Within fifteen (15) calendar days of receiving a Certificate of Requirement authorized by the Director, the Owner shall:
    - (i) register the Certificate of Requirement in the appropriate Land Registry Office on the title to the property; and
    - (ii) submit to the Director written verification that the Certificate of Requirement has been registered on title.

#### **Registration on Title Requirement - Contaminant Attenuation Zone**

- (18) A contaminant attenuation zone (CAZ) has been established, by way of a groundwater easement and were registered on title, as documented in Items 13 and 14 of Schedule "A".
  - (a) The Owner shall not amend or remove or consent to the removal of the easement or CAZ from title without the prior written consent of the Director.

#### Inspections

- (19) No person shall hinder or obstruct a Provincial Officer from carrying out any and all inspections authorized by the Act, the OWRA or the PA, of any place to which this Approval relates, and without limiting the foregoing:
  - (a) to enter upon the premises where the approved works are located, or the location where the records required by the conditions of this Approval are kept;
  - (b) to have access to, inspect, and copy any records required to be kept by the conditions of this Approval;
  - (c) to inspect the Site, related equipment and appurtenances;
  - (d) to inspect the practices, procedures or operations required by the conditions of this Approval; and
  - (e) to sample and monitor for the purposes of assessing compliance with the terms and conditions of this Approval or the Act, the OWRA or the PA.

#### **Information and Record Retention**

- (20) Any information relating to this Approval and contained in Ministry files may be made available to the public in accordance with the provisions of the Freedom of Information and Protection of Privacy Act, R.S.O. 1990, C. F-31.
- (21) Any information requested, by the Ministry, concerning the Site and its operation under this Approval, including but not limited to any records required to be kept by this Approval shall be provided to the Ministry, upon request, in a timely manner.
- (22) The receipt of any information by the Ministry or the failure of the Ministry to prosecute any person or to require any person to take any action, under this Approval or under any statute, regulation or other legal requirement, in relation to the information, shall not be construed as:
  - (a) an approval, waiver, or justification by the Ministry of any act or omission of any person that contravenes any term or condition of this Approval or any statute, regulation or other legal requirement; or
  - (b) acceptance by the Ministry of the information's completeness or accuracy.
- (23) All records and monitoring data required by the conditions of this Approval must be kept on the Owner's premises for a minimum period of two (2) years from the date of their creation.

#### 2. SITE OPERATION

#### Service Area & Hours of Operation

- (1) The Site is approved to accept waste from within the Municipality of Central Manitoulin.
- (2) The hours of operation at the Site are: Seven days per week, from 7:00 am to 8:00 pm.

(3) a. The public waste drop off hours of the Site are established as:

Summer (Victoria Day to Labour Day, inclusive):

Thursday, Saturday and Sunday - 2:00 pm - 6:00 pm

Winter (Non-Summer Hours): Thursday and Saturday - 1:00 pm -5:00 pm

b. With the prior written approval from the District Manager, the time periods may be revised.

#### **Approved Waste Types**

- (4) The Owner shall maintain a program to inspect waste to ensure that the waste received at the Site is of a type approved for acceptance under this Approval.
- (5) The Owner shall ensure that all loads of waste are properly inspected by Trained Personnel prior to acceptance at the Site and that the waste vehicles are directed to the appropriate areas for transfer of the waste. The Owner shall notify the District Manager, in writing, of load rejections at the Site within one (1) week from their occurrence.

#### Landfill Design and Operations Plan

(6) No waste shall be placed in the landfill as it is closed.

#### Signs

- (7) A sign shall be installed and maintained at the main entrance/exit to the Site indicating, at a minimum, the following:
  - (a) the name of the Site and Owner;
  - (b) the number of the Approval;
  - (c) the name of the Operator;
  - (d) the normal hours of operation;
  - (e) the allowable and prohibited waste types;
  - (f) the telephone number to which complaints may be directed;
  - (g) a warning against unauthorized access;
  - (h) a twenty-four (24) hour emergency telephone number (if different from above);
  - (i) a warning against dumping outside the Site; and
  - (j) stating that the landfill is now closed.
- (8) The Owner shall install and maintain signs to direct vehicles to waste diversion areas.
- (9) The Owner shall provide signs at the transfer station informing users what materials are acceptable and directing users to appropriate storage areas.

#### Vermin, Vectors, Dust, Litter, Odour, Noise and Traffic

(10) The Site shall be operated and maintained such that the vermin, vectors, dust, litter, odour, noise and

traffic do not create a nuisance.

#### **Burning Waste Prohibited**

- (11) (a) Burning of waste at the Site is prohibited.
  - (b) Notwithstanding Condition 2 (23) (a) above, burning of segregated, clean wood and brush at the waste transfer station may be carried out in strict compliance with the Ministry of the Environment Document titled "Guideline C-7, Burning at Landfill Sites" dated April 1994.

#### **3. WASTE TRANSFER STATION**

- (1) Except as otherwise provided by these Conditions, the Waste Transfer Station shall be operated in accordance with the Transfer Station Operations Plan dated June 27, 2022, Item 10 of Schedule "A".
- (2) The Waste Transfer Station is approved for the types of waste and capacity as listed in the Table as follows:

Material	Storage Type	Storage Capacity
		(cubic metres)
Blue Box- commingled	Bin	120
Scrap Metal	Bin/Area	120
Tires	Area	50
MHSW	Drums/Area	75
Automotive Materials	Drums	15
EEE	Bin	80
Re-Use Centre	Covered Area	40
Leaf & Yard Waste	Area	2,000
Clean Wood/Brush	Area	2,000
Construction & Demolition	Area/Bin	3,000
Excess Soil	Area	10,000*
Solid Non-Hazardous Waste	Bin	240
Total Storage Capacity		17,725

- (3) The following categories of waste shall not be accepted at the Waste Transfer Station:
  - (a) Pathological waste;
  - (b) PCBs;
  - (c) Radioactive;
  - (d) Explosive;
  - (e) Ammunition; and
  - (f) Asbestos

- (4) The Owner shall ensure that all waste accepted for transfer shall be segregated either into bins with lids or doors, or in designated areas as defined by barriers. All bins and designated waste storage areas shall be clearly labelled.
- (5) All storage containers/bins used to store waste and/or recyclable materials shall be maintained in good condition to prevent leakage. The Owner shall immediately remove from service any leaking container. Containers/bins used to store clean scrap metal, furniture, construction materials, miscellaneous larger items may be allowed to be stored with open tops and equipped with drainage holes to permit the drainage of rainwater/melt water.
- (6) The Owner shall ensure that all white goods received at the Waste Transfer Station have been drained of any refrigerants, and have the appropriate paperwork demonstrating that the refrigerants have been removed. In the event the Owner accepts white goods that have not been drained, the Owner shall retain a certified technician to properly drain and tag the appliances on a quarterly basis.
- (7) The Owner shall remove all materials from the Waste Transfer Station, and remove them off Site, at a minimum of every six months for blue box recyclables; every other week in the summer and every six weeks in the winter for solid non-hazardous waste; and once per year for all other materials; unless specified elsewhere within this ECA.
- (8) In the event that waste cannot be removed from the Site and the storage capacities as approved in Condition 3(2) are reached, the Owner must cease accepting additional waste.
- (9) In the event that unacceptable waste is discovered on the Site, that waste shall be immediately be disposed of in accordance with the Act and Reg. 347.
- (10) The Owner shall ensure that the residual waste shall only be disposed of at a site for which an Approval has been issued by the Ministry or an appropriate government agency of another jurisdiction.
- (11) The Owner may have a licensed contractor chip brush and clean wood waste. Clean wood chips may be provided to the public for off-site use as ground cover.

#### **Re-Use Centre**

- (12) The Owner may establish and operate a Re-Use Centre that allows residents of the Municipality to drop off unwanted items that may be picked up by others. Those acquiring the items do not have to be residents of the Municipality.
- (13) All items received by the Re-Use Centre shall be sorted and any items that are deemed to be inappropriate for the Re-Use Centre shall be appropriately disposed. The Re-Use Centre will not accept refrigerant appliances, EEE, or MHSW, with the exception of good condition paints and stains as noted in Condition 4 (8).
- (14) The maximum footprint of the Re-Use Centre shall be 40 square meters, and the storage shall be kept

tidy at all times.

#### Solid Non-Hazardous Waste

(15) Solid non-hazardous waste will be collected in closed top bins and transferred off site at a minimum of every other week in the summer and every six weeks in the winter. The Owner may use waste compactors for collecting and transferring waste.

#### **Excess Soil**

- (16) The Site may accept soil and operate as a soils transfer station to receive excess soil for temporary storage. These soils must meet Table 1 and Table 2 standards of Ontario Regulation 406/19 and the soils accepted at the Site must be managed in accordance to Ontario Regulation 406/19.
- (17) Prior to accepting any any excess soil the Owner shall prepare an Excess Soil Operating Plan that complies with Ontario Regulation 406/19. The Owner shall ensure that all employees operating the Site shall be trained on the Excess Soil Operating Plan and that a copy of the plan is retained on Site.
- (18) Each excess soil pile shall not exceed 2,500 m<sup>3</sup> and a total maximum volume of 10,000 m<sup>3</sup>. The 10,000 m<sup>3</sup> volume maximum may be exceeded, as outlined in Ontario Regulation 406/19. The Director must be notified in advance of any project where greater than 10,000 m<sup>3</sup> of excess soils are expected to be brought to the Site and the notification will include a description of how the additional soils will be managed at the Site.
- (19) The soil piles shall be stored in a location greater than 30 m from any property boundary. Silt fencing shall be installed grown-gradient of any soil pile that is expected to be, or has been, on-site for greater than 30 days.
- (20) Excess soils shall not be stored on-site for more than two years without approval from the Director.

## 4. MHSW COLLECTION & TRANSFER

#### **MHSW Collection & Transfer Events**

- (1) The Site may accept hazardous or subject waste collected during annual Municipal Hazardous and Subject Waste (MHSW) collection events, from a residential source, carried to the Site by the generator, and limited to the following wastes:
  - i. paints, stains
  - ii. all battery types
  - iii. propane tanks
  - iv. medicines, pharmaceuticals
  - v. fluorescent light tubes
  - vi. personal electronic devices and cell phones
  - vii. computers, monitors, printers, fax machines, ink-jet cartridges
  - viii. oils, gasoline
  - ix. cleaners, chemicals
  - x. needles, syringes, lancets

- xi. pesticides, insecticides, herbicides
- xii. thermometers, thermostats
- xiii. televisions, DVD players and VCRs
- (2) The Owner shall notify the District Manager in writing thirty (30) days in advance of MHSW collection event and receive written approval of the District Manager prior to commencing operations.
- (3) The Owner shall ensure that all waste received as a result of the Municipal and Subject Waste Collection Day Program is transferred off-site within twenty-four (24) hours of when it was received.
- (4) The Owner shall ensure that wastes which by reason of their type and/or quantity which are to be bulked and shipped off-site, shall be transported, processed, or disposed of, at facilities which are licensed for such transport, processing, or disposal, by the Ministry in accordance with Regulation 347 and the EPA.
- (5) The Owner shall ensure that waste received during MHSW events shall be stored in the following manner:
  - (a) all storage containers shall be clearly labelled indicating the type and nature of the household waste stored as required by applicable legislation;
  - (b) liquid wastes shall be stored in secondary containment that is adequate to contain any spills or leaks or run-off;
  - (c) fluorescent tubes and bulbs shall be stored in plastic tubes and/or crush proof boxes;
  - (d) compressed gas cylinders shall be stored in cages in a manner which prevents cylinders from being knocked over or cylinder valves from breaking; and
  - (e) incompatible types of waste shall be segregated during storage.
- (6) The Owner shall ensure that all waste collected at the MHSW collection events shall be transported from the Site in accordance with the Act and Reg. 347, under an approved waste management system and disposed of at a waste disposal site certified to accept these types of wastes.
- (7) The Owner or Operator shall submit a report to the District Manager within seven (7) days after the occurrence of the MHSW collection event. The report shall contain, as a minimum, the following information:
  - (a) an estimate of the total tonnage received and shipped from the Site;
  - (b) a summary of any complaints regarding the operation of the site and any measures taken to mitigate the complaints; and
  - (c) a statement confirming the site has been cleaned and all waste material removed.

#### **MHSW Collection and Transfer**

(8) The Site may accept the following municipal hazardous or subject waste (MHSW) throughout the year for collection and transfer by an approved contractor. The maximum amount of waste to be stored at the Site will be limited to the following and the types of storage:

- i. Fluorescent light bulb and tubes stored in a segregated container in a manner which prevents them from breaking (Class 146).
- ii. Up to 50 compressed gas tanks that weigh greater than one pound each stored in an appropriately designed and constructed enclosed area.
- iii. Two 205 L polyethylene drums or equivalent of compressed gas tanks weighing less than or equal to one pound each.
- iv. 25 vehicle batteries stored on pallets or equivalent with a cover to shelter it from precipitation (Class 146).
- v. Up to 205 L bulk capacity in polyethylene drums or equivalent of lithium, dry cell, and rechargeable batteries.
- vi. Two 205 L polyethylene drums or equivalent, individually dedicated for the storage of aerosol cans (aerosols).
- vii. Up to five 205 L bulk polyethylene drums or equivalent, individually dedicated for the storage of automotive materials, which include empty plastic oil and antifreeze containers and oil filters. These materials must be collected in plastic bags within the containers to be transferred by a licensed contractor.
- viii. Up to four 205 L bulk polyethylene drums or equivalent of paints and stains in sealed containers. Paints and stains in good condition and made after 1975 may be placed in the Re-Use Centre and given away for reuse. No bulking of paint may occur.
- (9) The Owner shall ensure that all hazardous waste collected shall be transported from the Site in accordance with the Act and Reg. 347, with licensed contractor(s) and taken to site(s) certified to accept these types of wastes.

## 5. EMPLOYEE TRAINING

(1) A training plan for all employees that operate any aspect of the Site shall be developed, implemented, and maintained by the Owner or the Operator. Only Trained Personnel shall operate any aspect of the Site or carry out any activity required under this Approval.

## 6. COMPLAINTS RESPONSE PROCEDURE

- (1) If at any time the Owner receives complaints regarding the operation of the Site, the Owner shall respond to these complaints according to the following procedure:
  - (a) The Owner shall record and number each complaint, either electronically or in a log book, and shall include the following information: the nature of the complaint, the name, address and the telephone number of the complainant if the complainant will provide this information and the time and date of the complaint;
  - (b) The Owner, upon notification of the complaint, shall initiate appropriate steps to determine possible causes of the complaint, proceed to take the necessary actions to eliminate the cause of the complaint and forward a formal reply to the complainant; and
  - (c) The Owner shall complete and retain on-site a report written within one (1) week of the complaint date, listing the actions taken to resolve the complaint and any recommendations for

remedial measures, and managerial or operational changes to reasonably avoid the recurrence of similar incidents.

## 7. EMERGENCY RESPONSE

- (1) All Spills as defined in the EPA shall be immediately reported to the Ministry's Spills Action Centre at 1-800-268-6060 and shall be recorded in the log book as to the nature of the emergency situation, and the action taken for clean-up, correction and prevention of future occurrences.
- (2) In addition, the Owner shall submit, to the District Manager a written report within three (3) business days of the emergency situation, outlining the nature of the incident, remedial measures taken, handling of waste generated as a result of the emergency situation and the measures taken to prevent future occurrences at the Site.
- (3) All wastes resulting from an emergency situation shall be managed and disposed of in accordance with O.Reg. 347.
- (4) All equipment and materials required to handle the emergency situations shall be:
  - (a) kept on hand at all times that handling is undertaken at the Site; and
    - (b) adequately maintained and kept in good repair.
- (5) The Owner shall ensure that the emergency response personnel are familiar with the use of such equipment and its location(s).
- (6) The Owner shall ensure that the spill contingency and emergency response plan include procedures related to the care and control of all wastes allowed under this ECA.

#### 8. LANDFILL MONITORING

#### Landfill Gas

(1) The Owner shall ensure that any buildings or structures at the Site contain adequate ventilation systems to relieve any possible landfill gas accumulation. Routine monitoring for explosive methane gas levels shall be conducted in all buildings or structures at the Site, especially enclosed structures which at times are occupied by people.

#### **Compliance Limits**

- (2) The Site shall be operated in such a way as to ensure compliance with the following:
  - (a) Reasonable Use Guideline B-7 for the protection of the groundwater at the Site; and
  - Provincial Water Quality Objectives included in the July 1994 publication entitled Water Management Policies, Guidelines, Provincial Water Quality Objectives, as amended from time to time or limits set by the Regional Director, for the protection of the surface water at and off the

Site.

#### Groundwater

- (3) The Owner shall monitor groundwater in accordance with Section 4.0 of Item 9 in Schedule "A" and shown in Schedule "B".
- (4) If not already completed, within three (3) months of the issuance of this ECA, the Owner shall install the three nested groundwater monitoring wells and one leachate well as recommended in Item 7 of Schedule "A".
- (5) A certified Professional Geoscientist or Engineer possessing appropriate hydrogeologic training and experience shall execute or directly supervise the execution of the groundwater monitoring and reporting program.

#### **Groundwater Wells and Monitors**

- (6) The Owner shall ensure that all groundwater monitoring wells which form part of the monitoring program are properly capped, locked and protected from damage.
- (7) Any groundwater monitoring wells included in the on-going monitoring program that are damaged shall be assessed, repaired, replaced or decommissioned by the Owner, as required.
  - (a) The Owner shall repair or replace any monitoring well which is destroyed or in any way made to be inoperable for sampling such that no more than one regular sampling event is missed.
  - (b) All monitoring wells which are no longer required as part of the groundwater monitoring program, and have been approved by the District Manager for abandonment, shall be decommissioned by the Owner, as required, in accordance with O.Reg. 903, that will prevent contamination through the abandoned well. A report on the decommissioning of the well shall be included in the Annual Report for the period during which the well was decommissioned.

#### **Changes to the Monitoring Plan**

- (8) The Owner may request to make changes to the monitoring program(s) to the District Manager in accordance with the recommendations of the annual report. The Owner shall make clear reference to the proposed changes in a separate letter that shall accompany the annual report.
- (9) Within fourteen (14) days of receiving the written correspondence from the District Manager confirming that the District Manager is in agreement with the proposed changes to the environmental monitoring program, the Owner shall forward a letter identifying the proposed changes and a copy of the correspondences from the District Manager and all other correspondences and responses related to the changes to the monitoring program, to the Director requesting the Approval be amended to approve the proposed changes to the environmental monitoring plan prior to implementation.

(10) In the event any other changes to the environmental monitoring program are proposed outside of the recommendation of the annual report, the Owner shall follow current Ministry procedures for amending the Approval.

#### 9. INSPECTIONS, RECORD KEEPING & REPORTING

#### **Daily Log Book**

- (1) A daily log shall be maintained in written or electronic format and shall include the following information:
  - (a) the type, date, and quantity of all waste received at the Site;
  - (b) the date, type, quantity of all waste transferred from the Site;
  - (c) a record of litter collection activities and the application of any dust suppressants;
  - (d) a record of any waste refusals which shall include: amounts, reasons for refusal and actions taken;
  - (e) a record of the daily inspections; and
  - (f) a description of any out-of-service period of any control, treatment, disposal or monitoring facilities, the reasons for the loss of service, and action taken to restore and maintain service.
- (2) Any information requested, by the Director or a Provincial Officer, concerning the Site and its operation under this Approval, including but not limited to any records required to be kept by this Approval shall be provided to the Ministry, upon request.

#### **Daily Inspections and Log Book**

- (3) An inspection of the entire Site and all equipment on the Site shall be conducted each day the Site is in operation to ensure that: the Site is secure; that the operation of the Site is not causing any nuisances; that the operation of the Site is not causing any adverse effects on the environment and that the Site is being operated in compliance with this Approval. Any deficiencies discovered as a result of the inspection shall be remedied immediately, including temporarily ceasing operations at the Site if needed.
- (4) A record of the inspections shall be kept in a daily log book that includes:
  - (a) the name of person that conducted the inspection;
  - (b) the date and time of the inspection;
  - (c) the list of any deficiencies discovered;
  - (d) the recommendations for remedial action; and
  - (e) the date, time and description of actions taken.
- (5) A record shall be kept in the daily log book of all refusals of waste shipments, the reason(s) for refusal, and the origin of the waste, if known.

#### **Annual Report**

- (6) A written report on the development, operation and monitoring of the Site, shall be completed annually (the "Annual Report"). The Annual Report shall be submitted to the District Manager, by March 31st of the year following the period being reported upon.
- (7) The Annual Report shall include but not be limited to the following information:
  - (a) the results and an interpretive analysis of the results of all leachate, groundwater monitoring, including an assessment of the need to amend the monitoring programs;
  - (b) until the year following active landfilling: site plans showing the existing contours of the Site; areas of landfilling operation during the reporting period; areas of excavation during the reporting period; the progress of final cover, vegetative cover, and any intermediate cover application; and facilities existing, added or removed during the reporting period;
  - (c) until the year following active landfilling: calculations of the volume of waste, daily and intermediate cover, and final cover deposited or placed at the Site during the reporting period and a calculation of the total volume of Site capacity used during the reporting period;
  - (d) a summary of type and quantity of all wastes received and transferred from the Site and the destination;
  - (e) a summary of any complaints received and the responses made;
  - (f) a discussion of any operational problems encountered at the Site and corrective action taken;
  - (g) any changes to the Waste Transfer Design and Operations Plans, and/or the Closure Plan that have been approved by the Director since the last Annual Report;
  - (h) a report on the status of all monitoring wells and a statement as to compliance with Ontario Regulation 903; and
  - (i) any other information with respect to the Site which the Regional Director may require from time to time.

#### 10. CLOSURE PLAN

- (1) At least one year prior to the anticipated dated of closure of the Waste Transfer Station, the Owner shall submit to the Director for approval, with copies to the District Manager, a detailed Site closure plan pertaining to the termination of waste transfer operations at this Site, post-closure inspection, maintenance and monitoring, and end use. The plan shall include but not be limited to the following information:
  - (a) a plan showing Site appearance after closure;
  - (b) a description of the proposed end use of the Site;
  - (c) a description of the procedures for closure of the Site, including:
    - (i) advance notification of the public of the landfill closure;
    - (ii) posting of a sign at the Site entrance indicating the landfill is closed and identifying any alternative waste disposal arrangements;
    - (iii) Site security;
    - (iv) removal of unnecessary landfill-related structures, buildings and facilities;
    - (v) a schedule indicating the time-period for implementing sub-conditions (i) to (iv) above;

- (d) descriptions of the procedures for post-closure care of the Site, including:
  - (i) operation, inspection and maintenance of the control, treatment, disposal and monitoring facilities for leachate, groundwater and landfill gas;
  - (ii) record keeping and reporting; and
  - (iii) complaint contact and response procedures;
- (e) an assessment of the adequacy of and need to implement the contingency plans for leachate and methane gas; and
- (f) an updated estimate of the contaminating lifespan of the Site, based on the results of the monitoring programs to date.
- (2) The landfill portion of the Site shall be closed in accordance to the Closure Plan dated June 27, 2022, Item 9 of Schedule "A".

#### Schedule "A"

- 1. Environmental Compliance Approval Application, signed by Ruth Frawley, CAO/clerk, Municipality of Central Manitoulin, dated 2013/12/15
- 2. Attachment 1, Design and Operations Plan, Providence Bay Waste Disposal Site, by Cambium Inc., dated December 16, 2013.
- 3. Letter dated April 10, 2014, to Ranjani Munasinghe, Senior Waste Engineer, MOECC, from David Bucholtz, Senior Project Manager, Cambium Inc., RE: Clarification and Revision - Design and Operations Plan, Providence Bay Waste Disposal Site, Municipality of Central Manitoulin, District of Manitoulin
- 4. Letter dated July 7, 2015, to Lynda Mulcahy, Senior Review Engineer, MOECC, from David Bucholtz, Senior Project Manager, Cambium Inc., RE: Response to Review Comments, Application for ECA, Providence Bay Waste Disposal Site, MOECC ref. no. 0123-9ESKYB.
- 5. Environmental Compliance Approval Application, signed by Ruth Frawley, CAO/clerk, Municipality of Central Manitoulin, dated 2020/06/25
- 6. Attachment 4, Updated Design and Operations Plan, Providence Bay Waste Disposal Site, by Cambium Inc., dated June 25, 2020.
- 7. Contaminant Attenuation Zone Reassessment, Providence Bay Waste Disposal Site, Providence Bay, Ontario. by Wood Environment and Infrastructure Solutions, dated February 28, 2020.
- 8. Environmental Compliance Approval Application, signed by Ruth Frawley, CAO/clerk, Municipality of Central Manitoulin, dated March 23, 2022.
- 9. Providence Bay Landfill Closure Plan, Environmental Compliance Approval A550702. Cambium Inc. June 27, 2022.
- 10. Transfer Station Operations Plan, Providence Bay Waste Disposal Site, Environmental Compliance Approval A550702. Cambium Inc. June 27, 2022.
- 11. Memorandum of Understanding between The Municipality of Central Manitoulin and J.Bruce Irving. Signed and dated March 11, 2022.
- 12. Memorandum of Understanding between The Municipality of Central Manitoulin and Providence Bay Trailer Park Corporation c/o Irene Cornish. Signed and dated March 15, 2022.
- Registered Land Transfer Easement Statement. Registration No. MD26455. PIN 47115-2002 LT. Transferor: John Purvis Properties, Ltd. Transferee: Municipality of Central Manitoulin. September 30, 2022.
- 14. Registered Land Transfer Easement Statement. Registration No. MD26510. PIN 47114-0084 LT. Transferor: 1000175415 Ontario Inc. Transferee: Municipality of Central Manitoulin. October 11, 2022.

#### Schedule "B"

Location	Task	Frequency	Parameters
Groundwater OW1, OW2, OW3A, OW3B, OW4, OW5, OW6, OW7, OW8, OW9, OW10, OW11, OW12A, OW12B, OW13A, OW13B, OW14A, OW14B Three additional nested	<ul> <li>Groundwater Elevations</li> <li>Sample Collection</li> <li>Field measurements (pH, temperature, conductivity, dissolved oxygen (DO), and oxygen reduction potential (ORP))</li> </ul>	Once annually (Autumn)	alkalinity, ammonia, arsenic, barium, boron, cadmium, calcium, chloride, chromium, conductivity, copper, iron, lead, magnesium, manganese, mercury, nitrite, nitrate, TKN, pH, total phosphorus, potassium, sodium, TDS, sulphate, zinc, COD, DOC,
monitoring wells in CAZ One leachate well 2 QA/QC			phenols benzene, 1,4-dichlorobenzene, dichloromethane, toluene, vinyl chloride
Leachate well	Sample Collection	Once annually (Autumn)	BOD, TSS
Irving Well, Paquet Well (If given permission)	• Sample Collection	Once annually (Autumn)	alkalinity, ammonia, arsenic, barium, boron, cadmium, calcium, chloride, chromium, conductivity, copper, iron, lead, magnesium, manganese, mercury, nitrite, nitrate, TKN, pH, total phosphorus, potassium, sodium, TDS, sulphate, zinc, COD, DOC, phenols
			benzene, 1,4-dichlorobenzene, dichloromethane, toluene, vinyl chloride

*The reasons for the imposition of these terms and conditions are as follows:* 

#### **1. GENERAL**

The reason for Conditions 1(1), (2), (3), (5), (6), (7), (8), (9), (10), (11), (12), (21), (22) and (23) is to clarify the legal rights and responsibilities of the Owner and Operator under this Approval.

The reasons for Condition 1(4) are to ensure that the Site is designed, operated, monitored and maintained in accordance with the application and supporting documentation submitted by the Owner, and not in a manner which the Director has not been asked to consider.

The reasons for Condition 1(13) is to ensure that the Site is operated under the corporate name which appears on the application form submitted for this approval and to ensure that the Director is informed of any changes.

The reasons for Condition 1(14) are to restrict potential transfer or encumbrance of the Site without the approval of the Director and to ensure that any transfer of encumbrance can be made only on the basis that it will not endanger compliance with this Approval.

The reason for Condition 1(15) is to ensure that the successor is aware of its legal responsibilities.

The reasons for Condition 1(16), (17) and (18) are that the Part II.1 Director is an individual with authority pursuant to Section 197 of the Environmental Protection Act to require registration on title and provide any person with an interest in property before dealing with the property in any way to give a copy of the Approval to any person who will acquire an interest in the property as a result of the dealing.

Condition 1(18) requires that the establishment of the CAZ for the Site to be protective to the environment and human health.

The reason for Condition 1(19) is to ensure that appropriate Ministry staff has ready access to the Site for inspection of facilities, equipment, practices and operations required by the conditions in this Approval. This Condition is supplementary to the powers of entry afforded a Provincial Officer pursuant to the Act, the OWRA, the PA, the NMA and the SDWA.

Condition 1 (20) has been included in order to clarify what information may be subject to the Freedom of Information Act.

## 2. SITE OPERATION

The reasons for Condition 2(1), 2(2) and 2(3) are to ensure that users of the Site are fully aware of important information and restrictions related to Site operations and access under this Approval.

The reasons for Conditions 2(4), 2(5), and 2 (10) are to ensure that the Site is operated, inspected and maintained in an environmentally acceptable manner and does not result in a hazard or nuisance to the natural environment or any person.

The reasons for Condition 2(6) are to clarify which activities are currently approved for the Site. Portions of the Design and Operation report (related to design) are not approved.

The reason for Conditions 2(7), (8) and (9) is to ensure that users of the Site are fully aware of important information and restrictions related to Site operations and access under this Approval.

The reason for Condition 2(11) are open burning of municipal waste is unacceptable because of concerns with air emissions, smoke and other nuisance effects, and the potential fire hazard and to make sure burning of brush and wood are carried out in accordance with Ministry guidelines.

#### **3. WASTE TRANSFER STATION**

Condition 3 is included to ensure that the wastes are stored in their temporary storage location and transferred off-site in a manner as to minimize a likelihood of an adverse effect or a hazard to the natural environment or any person.

#### 4. MHSW COLLECTION & TRANSFER

The reasons for the Condition 4 are to approve collection of household hazardous waste and to ensure that the wastes are managed in a manner that protects the environment and the health and safety of the public.

#### **5. EMPLOYEE TRAINING**

The reason for Condition 5 is to ensure that the Site is supervised and operated by properly trained staff in a manner which does not result in a hazard or nuisance to the natural environment or any person.

#### 6. COMPLAINTS RESPONSE PROCEDURE

The reason for Condition 6 is to ensure that any complaints regarding landfill operations at this Site are responded to in a timely and efficient manner.

#### 7. EMERGENCY RESPONSE

Conditions 7(1) and 7(2) are included to ensure that emergency situations are reported to the Ministry to ensure public health and safety and environmental protection.

Conditions 7(3), 7(4), 7(5) and 7(6) are included to ensure that emergency situations are handled in a manner to minimize the likelihood of an adverse effect and to ensure public health and safety and environmental protection.

#### 8. LANDFILL MONITORING

Reasons for Condition 8(1) are to ensure that off-site migration of landfill gas is monitored and all buildings at the Site are free of any landfill gas accumulation, which due to a methane gas component may be explosive and thus create a danger to any persons at the Site.

Condition 8(2) is included to provide the groundwater limits to prevent water pollution at the Site.

Conditions 8(3), 8(4) and 8(5) are included to require the Owner to demonstrate that the Site is performing as designed and the impacts on the natural environment are acceptable. Regular monitoring allows for the analysis of trends over time and ensures that there is an early warning of potential problems so that any necessary remedial/contingency action can be taken.

Conditions 8(6) and 8(7), are included to ensure the integrity of the groundwater monitoring network so that accurate monitoring results are achieved and the natural environment is protected.

Conditions 8(8), 8(9) and 8(10) are included to streamline the approval of the changes to the monitoring plan.

# 9. INSPECTIONS, RECORD KEEPING & REPORTING

The reason for Conditions 9(1) and 9(2) is to ensure that accurate waste records are maintained to ensure compliance with the conditions in this Approval, the EPA and its regulations; and to ensure the information is made available to the Ministry upon request.

The reason for Conditions 9(3), 9(4) and 9(5) is to ensure that detailed records of Site inspections are recorded and maintained for inspection and information purposes.

The reasons for Conditions 9(6) and 9(7) are to ensure that regular review of site development, operations and monitoring data is documented and any possible improvements to site design, operations or monitoring programs are identified. An annual report is an important tool used in reviewing site activities and for determining the effectiveness of site design.

## **10. CLOSURE PLAN**

The reason for Condition 10 are to ensure that final closure of the Site is completed in an aesthetically pleasing manner, in accordance with Ministry standards, and to ensure the long-term protection of the health and safety of the public and the environment.

# Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). A550702 issued on September 21, 2016

In accordance with Section 139 of the *Environmental Protection Act*, you may by written notice served upon me and the Ontario Land Tribunal within 15 days after receipt of this notice, require a hearing by the Tribunal. Section 142 of the *Environmental Protection Act* provides that the notice requiring the hearing ("the Notice") shall state:

- a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
- b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the *Environmental Protection Act*, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

- 1. The name of the appellant;
- 2. The address of the appellant;
- 3. The environmental compliance approval number;
- 4. The date of the environmental compliance approval;
- 5. The name of the Director, and;
- 6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

Registrar\* Ontario Land Tribunal 655 Bay Street, Suite 1500 The Director appointed for the purposes of Part II.1 of the *Environmental Protection Act* Ministry of the Environment, Conservation and Parks Toronto, Ontario M5G 1E5 OLT.Registrar@ontario.ca 135 St. Clair Avenue West, 1st Floor Toronto, Ontario M4V 1P5

\* Further information on the Ontario Land Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349 or 1 (866) 448-2248, or www.oltt.gov.on.ca

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 5th day of September, 2023

Hot

Mohsen Keyvani, P.Eng. Director appointed for the purposes of Part II.1 of the *Environmental Protection Act* 

CM/

- c: District Manager, MECP Sudbury Patricia Mader
  - Municipal Coordinator Special Projects
  - , Municipality of Central Manitoulin

# APPENDIX B BOREHOLE LOGS

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1) Bon using 1 equipm 2) Ref for well interpre					BH-5 m air r he acc tructio r of the	was advanced otary water well companying text n details and an a results.				
NQ	TE St	ratigraphi	c bour	daries are a	ppro	ximate, and in	-situ t	ransitions betwe	en the	dentified
type	es may	be gradu ndicated r	al Re as (AS	fer to the aci ) auger sam	ple,	sanying text for (SS) split spoo	ranır nor(	NR) no recovery		ane 2 of

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-	BH	- 6			Pr	vidence B	ay Lar	ndfill	144
Pr	oject M	lumber 32a		Dete Starter	ż	Date Comple 15/12/200	etød 13	Drawn by : P Checked by :	AR PAR
Well Construction	Depth (m)	Elevadon (m) Relative to Detum	Stratigraphy	C	1029(	iption	Sample Type	Standard Penetration Test (counts)	Natural Moters Contont (%) 20 40
	1.0 2.0 3.0 4.0			Bedrock	1 dolosi	ione, grey diowa			
	5.0								
	8.0								
	11.0		T.T.T	1 Con	dimend	noto Paus 21			

E	ore	nole	Fl	gure 2	Waters E	nvironm	ental	Geosciences L	td.	1 1 1 1 1
_	BH ·	- 6			Provide	nce Bay	y Lar	ndfill		11107
Pr	oject N 23-13	umber 2a	E	Dato Started 16/12/2003	Dat	te Complet 16/12/2003	ed	Drawn by : F Checked by :	PAR	102
Construction	Depth (m)	Elevation (m) Relative to Datum	Stratigraphy	De	scriptio	n	Sample Type	Standard Penetration Test (counts)	Natur C 20	al Molsture content (%) 40 60
1000	7.0		罬	Bedrock, d	iolostone, gr	ey brown				
のないのないの言い	8.0									
	9.0		- All and a local statement							
			語語語							
	11.0		語語							
	12.0	404.63 m		Borobola	Terminat	ed. In				
	13.0			dolostone be 12.23 m belo	edrock at a c ow grade.	lepth of				
	1) Borehole BH-6 using 127 mm air r equipment. 2) Refer to the acc for well constructio interpretation of the					advanced water well anying text alls and an ulls,				

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P	lore	hole	Fi	gure 3	ental	Geosciences L	td,	1 MAD		
	BH	- 7			Pr	ovidence Bay	y Lar	ndfill		1410-
P	oject i 23-1	Number 32a		Date Started 16/12/2003		Date Complet 16/12/2003	ed	Drawn by : F Checked by :	PAR PAR	
Well Construction	Depth (m)	Bevation (m) Relative to Daturn	Stratigraphy	Di	esci	iption	Sample Type	Standard Penetration Test (counts)	Natur C 20	al Moiature ontent (%) 40 50
	0.0 1:0 2.0 3.0 4:0 5.0 5.0	496.44 m		Bedrock,	doloa	tone, grey brown				
NOT	E : SI	Iratigraphic	bour	darles are	appr	oximate, and in-	-situ ti	ansitions betwe	en the i	dentified
soil San Wat	iypes iples i ar loui	may be gr indicated a	adual is (AS	) auger sar l recorded	nple, as 49	(SS) split spool	n or (I to ide	IR) no recovery. antified datum)	P	nge 1 of 2

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DUIE	hole	FI	gure 3	Wa	iters Environm	iental	Geosciences L	.tcl.	IAN
BH	-7			Pr	ovidence Ba	y Lai	ndfill		ΙHU
Project   23-1	Number 32a		Date Started 16/12/2003		Date Complet 16/12/2003	ted	Drawn by : F Checked by :	PAR PAR	
Construction Depth (m)	Elevation (m) Relative to Datum	Stratigraphy	D	escr	iption	Sample Type	Standard Penetration Test (counte)	Natura Co 20	Molstu ontent (%)
7.0			( Conti	rom Page 1)					
8.0 9.0 10.0 11.0 12.0	7.0 7.0 8.0 9.0 10.0 11.0		Bedrock,	dolosi	ione, grey brown				
	112.0       484 34 m       Transmission         Borehole Terminated, in dolostone bedrock at a depth of 12 10 m below grade         13.0       NOTE:         1) Borehole BH-7 was advanced using 127 mm alr rotary water we equipment.         2) Refer to the accompanying to for well construction details and a brocker the accompanying to the result of the result.								
13.0									

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8	lore	hole	Fi	gure 4	Wet	ers Environn	nentał	Geosciences L	¥d
	BH	- 8			Pro	vidence Ba	iy Lai	ndfill	1440-7
Pr	oject † 23-1	Number 32a	2	Date Started 16/12/2003		Date Consple 16/12/200	tod C	Drawn by : P Checked by :	PAR
Construction	Depth (m)	Elevation (m) Relative to Deturn	Stratigraphy	De	scri	ption	Sample Type	Standard Penetration Test (counts)	Natural Moleture Content (%) 20 40 60
	0.0 1.D 2.0 5.0 4.0 5.0 6.0	499.68 m		Bedrock, d	1010310	ine grey browh			
11	7.0	•	r'r'i	Contin	ued o	into Page 2)			
NO soll San Wat	TE S types oples	tratigraph may be g indicated	ic boui redual as (AS	ndaries are a Refer to th 3) auger sam 4 recorded s	appro e acc aple, i as 49	ximate, and i companying te (SS) split spo 1.58 m (relativ	n silu ) at for a on or (1 /# to id	ransitions betwee in interpretation NR) no recovery entified datum	en the identified Page 1 of 2

Borehole	F	igure 4 Wa	iters Environme	ental	Geosciences L	₩
BH - 8		Pr	ovidence Bay	y Lai	ndfill	HHU-
Project Number 23-132a		Dete Startod 16/12/2003	Date Complete 16/12/2003	ed	Drawn by : P Checked by :	PAR
Construction Depth (m) Elevation (m) Relative to	Datum Stratigraphy	Descr	iption	Sample Type	Standard Penetration Test (counts)	Natural Molsture Content (%) 20 40 60 ]   ] [ 1 ]   ]
7.0	- CT	( Continued f	rom Page 1)			
8.0 9.0 10.0 11.0 12.0		Bedrock, dolosi	lone, gray brown			
13.0		Borehole Term dolostone bedrock 12.34 m below gra	<b>ninated,</b> in at a depth of ade.			
14.0		NOTE: 1) Borehole BH-8 using 127 mm air equipment. 2) Refer to the ac for well construction Interpretation of th	was advanced rotary water well companying text on details and an e results.			

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<b>R</b> Pro	ECORD	OF MONITORING	WE		No.	<u>ov</u>	<b>V-09</b>	<b>CO</b> Drilling I	-Ord.	0401645	5 E, 5056790 N		Logged by:	<b>)ec<sup>⊗</sup></b> ₅∟
Pro	ject Client:	Municipality of Central Manito	ulin				[	Drilling I	Method:	150 mm Do	ownhole Hammer		Compiled by:	<u>KKJ</u>
Pro	ject Name:	2014-2018 Landfill Monitoring	& Rep	orting			[	Drilling I	Machine:	Truck Moun	ted Drill		Reviewed by:	
Pro	ject Location:	Providence Bay Landfill, Mani	toulin,	Ontari	0		[	Date Sta	arted:	7 Aug 14	_ Date Completed: 7 Au	ıg 14	Revision No.:	<u>2, 21/10/14</u>
	LITH		sc	DIL SA	MPLI	NG			FIELD	TESTING	LAB TESTING		COMMEN	TS
Lithology Plot	Local Ground S		Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	Penetr D SPT MTO Vane A Intact Remould Undrained S 15 3	ationTesting ● DCPT * Nilcon Vane* ◇ Intact ◆ Remould thear Strength (kPa) 0 4,5 60	Atterberg Limits           Wp         W           Plastic         Liquid           ★         Passing 75 um (%)           O         Moisture Content (%)           20         40         60         80	INSTRUMENTATION INSTALLATION	steel casing riser pipe in bentonite riser pipe in sand slotted pipe in sand	
	BEDROCK Paleozoic -age Formation dolo	d (Middle Silurian) Annabel stone rocks of the Southern Province					0.5 1.0 2.5 3.0 4.0 4.5 5.5 6.0 6.5 7.0 7.5 8.0 8.5 10.0 10.5 11.0 11.5 12.0 11.5 12.0 11.5 12.0 11.5 12.0 12.5 10.0 11.5 12.0 12.5 10.0 12.5 10.0 12.5 10.0 12.5 10.0 12.5 10.0 12.5 10.0 12.5 10.0 12.5 10.0 10.5 10.5							
A Di 131 Live Can Tel + Fax www	vision of AMEC Fielding Road ly, Ontario ada P3Y 1L7 +1(705) 682-263 +1(705) 682-22 .amec.com	2 So freestal Americas Limited 2 Borehole details 60 from a qualified commissioned a	as prese Geotechr and the ac	ented, do nical Eng	not cons ineer. Als ying'Expl	titute a tl so, boreh anation o	horough ur horough ur hole inform	nderstand nation shore le Log'.	n completio	on of drilling. ential conditions pro	Open to full depth upon esent and requires interpretative he geotechnical report for which	n completion of c assistance it was	iniling. Si	cale: 1 : 160 age: 1 of 1

R Pro	ECORD	OF MONITORING	WE	LLI	No.	<u>ov</u>	<u>V-10</u>	<b>Co</b> Drilling	-Ord.	0401859 Landfill Entr	E, 5056873 N	<u> </u>	Logged by:	
Pro	ject Name:	2014-2018 Landfill Monitoring	& Rep	orting			' I	Drilling	Machine:	Truck Mount	ted Drill		Reviewed by:	TIM
Pro	ject Location:	Providence Bay Landfill, Man	itoulin,	Ontari	o			Date St	arted:	6 Aug 14	_ Date Completed: 6 Au	ıg 14	Revision No.:	2, 21/10/14
	LITH	OLOGY PROFILE	sc	NL SA	MPLI	NG			FIELD	TESTING	LAB TESTING		COMMEN	тѕ
Lithology Plot	Local Ground S	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	Penetra O SPT MTO Vane* △ Intact ▲ Remould * Undrained SI 15 30	ationTesting ● DCPT Nilcon Vane* ◇ Intact ◆ Remould hear Strength (kPa) ◆ 45 60	Atterberg Limits           Wp         W         WL           Plastic         Liquid           * Passing 75 um (%)         O Moisture Content (%)           20         40         60         80	I INSTRUMENTATION INSTALLATION	1 steel casing 1 riser pipe in bentonite 1 riser pipe in sand 1 slotted pipe in sand	
	BEDROCK Paleozoic -age Formation dold	d (Middle Silurian) Annabel stone rocks of the Southern Province HOLE 14.4 HOLE 14.4	nding gr	Sundwa	ter mear	sured in	0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	prehole o	n completion	n of drilling.			f drilling.	
A D 131 Live Can Tel Fax www	vision of AMEC Fielding Road ly, Ontario ada P3Y 1L7 +1(705) 682-263 +1(705) 682-22 v.amec.com	Americas Limited - Borehole detail from a qualifier commissioned	s as prese Geotechr and the ac	nted, do iical Eng compan	not cons ineer. Als ying'Expl	titute a ti so, boreh anation o	norough ui ole inform of Borehole	nderstand nation sho le Log'.	ing of all pote uld be read in	ential conditions pre conjunction with th	esent and requires interpretative e geotechnical report for which	assistance it was	So Pa	cale: 1 : 160 age: 1 of 1

<b>R</b> Pro	ECORD	OF MONITORING	WE		No.	<u>ov</u>	V-11	<b>C</b> C	D-Ord.	0401744 Approx. 120	E, 5056880 N		Logged by:	nec <sup>⊗</sup>
Pro	ject Client:	Municipality of Central Manito	ulin					Drilling	Method:	150 mm Do	ownhole Hammer		Compiled by:	<u>KKJ</u>
Pro	ject Name:	2014-2018 Landfill Monitoring	& Repo	orting				Drilling	Machine:	Truck Moun	ted Drill		Reviewed by:	ТІМ
Pro	ject Location:	Providence Bay Landfill, Manit	oulin,	Ontari	0			Date S	started:	6 Aug 14	Date Completed: 6 Au	ıg 14	Revision No.:	<u>2, 21/10/14</u>
	LITHO	DLOGY PROFILE	SC	IL SA	MPLI	NG			FIELD	TESTING	LAB TESTING		COMMEN	TS
Lithology Plot	Local Ground Su	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	Penetra ○ SPT MTO Vane* △ Intact ▲ Remould * Undrained Sh 1,5 30	tionTesting ● DCPT Nilcon Vane* ◇ Intact ◆ Remould hear Strength (kPa) 45 60	Atterberg Limits           Wp.         W         WL           Plastic         Liquid           ★         Passing 75 um (%)           O         Moisture Content (%)           20         40         60         80	INSTRUMENTATION INSTALLATION	1 steel casing 1 riser pipe in bentonite 1 riser pipe in sand 1 slotted pipe in sand	
	BEDROCK Paleozoic -aged Formation dolos	I (Middle Silurian) Annabel tone rocks of the Southern Province					0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5							
A Di 131 Live Can Tel Fax www	vision of AMEC A Fielding Road ly, Ontario ada P3Y 1L7 +1(705) 682-266 +1(705) 682-2266 v.amec.com	Borehole details 0 commissioned a	as prese Geotechn nd the ac	nted, do ical Engi company	not cons ineer. Als ying'Expl	titute a the o, boreh anation c	norough u ole inforn of Boreho	inderstar nation sh le Log'.	iding of all pote ould be read in	ntial conditions pro	esent and requires interpretative	assistance t was	- So Pa	cale: 1 : 160 age: 1 of 1

RI	ECORD	OF MONITORI	NG	WE		No.	<u>ov</u>	V-12/	<u>A</u> (	Co-Ord	<u>04016</u>	<u>19 E</u>	505	<u>682</u>	<u>5 N</u>				
Pro	ject Number	TY1410142							Dr	illing Location	: West Edge	of Prop	erty				Logged	by:	CJS
Pro	ject Client:	Municipality of Central Ma	anitouli	in					Dr	illing Method:	150 mm D	ownhol	e Hamm	ner			Compile	ed by:	MAT
Pro	ject Name:	Aquifer Instrumentation P Site	Plan - P	rovide	nce Ba	ay Was	te Dis	posal	Dr	illing Machine	Truck Mou	nted Dri	11				Review	ed by:	ESL
Pro	ject Location	: Manitoulin, Ontario							Da	ate Started:	25 Jul 17	_ Date	Comple	eted: 2	5 Jul 1	7	_ Revisio	n No.:	<u>1, 02/11/17</u>
	LITI	HOLOGY PROFILE		SC	DIL SA	MPLI	NG				FIELD	TESTIN	IG			_	CON	/MEN	TS
hology Plot		DESCRIPTION		Imple Type	Imple Number	scovery (%)	T 'N' Value	EPTH (m)	EVATION (m)	Penetrat ○ SPT MTO Vane* △ Intact ▲ Remould * Undrained She	ionTesting DCPT Nilcon Vane* Intact Remould ear Strength (kPa)	★ Rir     2     Soil     △ pai     100     ▲ Lon     ※ Pa     ○ Mo	se pH Valu 4 6 8 Vapour R ts per millio 200 3 ver Explosiv ssing 75 um isture Conte	es <u>10</u> 12 eading on (ppm) 300 400 ve Limit 1 (%) ent (%)	- )_	STRUMENTATION STALLATION	1 riser pipe in b	entonite and 1 sand	
	Local Ground BEDROCK	Surface Elevation: AT SURFACE		Sa	Sa	Re	2	Ë	Щ	20 40	60 80	20	40	60 80		ËË X ⊠			
	END OF BO	AT SURFACE Amabel Formation)	13.4					$ = \frac{1}{2} $											
		Amec Foster Wheeler Environment & Infrastructure 131 Fielding Road	∑ Gro	oundwat	er depti	h on cor	npletion	of drilling	j: <u>9.0</u> 2	<u>2 m</u> .		P Op	en to full c	depth on	comple	etion.			
am fos wh	ec ter eeler	Canada P3Y 1L7 Tel +1(705) 682-2632 Fax +1(705) 682-2260 www.amecfw.com	Borehol read in o	le details conjunct	as prese ion with	ented, do the enviro	not consonmental	stitute a the report for	orough which	n understanding o it was commissio	f all potential con oned and the acco	iditions pro ompanying	esent. Also Explanati	, borehole ion of Bo	e inform rehole L	ation s og'.	hould be	So Pa	cale: 1 : 160 age: 1 of 1

RI Pro	ECORD	OF MONITORI <u>TY1410142</u>	NG WI	ELL	No.	<u>OV</u>	<u>N-12</u>	<u>B</u> (	CO-Ord. 040161 rilling Location: West Edge of	<u>9 E, 5056825 N</u> of Property	Logged by:	CJS
Pro	ject Client:	Municipality of Central Ma	anitoulin					_ Dr	rilling Method: <u>150 mm Do</u>	wnhole Hammer	Compiled by:	MAT
Pro	ject Name:	Aquifer Instrumentation P	Plan - Provi	dence B	ay Wa	ste Dis	posal	_ Dr	rilling Machine: Truck Moun	ted Drill	Reviewed by:	ESL
Pro	ject Location	Site Manitoulin, Ontario						_ Da	ate Started: 25 Jul 17	_ Date Completed: 25 Jul 17	Revision No.:	<u>1, 02/11/17</u>
	LITI	HOLOGY PROFILE	5		AMPL	NG			FIELD T	ESTING	COMMEN	TS
ithology Plot		DESCRIPTION	ample Type	àample Number	tecovery (%)	sPT 'N' Value	JEPTH (m)	elevation (m)	PenetrationTesting ○ SPT ● DCPT MTO Vane* Nilcon Vane* △ Intact ▲ Remould ◆ Remould * Undrained Shear Strength (kPa)		1 riser pipe in bentonite 1 riser pipe in sand 1 slotted pipe in sand	
Ŵ	BEDROCK A	AT SURFACE		0,		0,		<u> </u>				
	END OF BO	REHOLE	17.1				$ \begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \\ 7 \\ 8 \\ 9 \\ 10 \\ 11 \\ 12 \\ 13 \\ 1 \\ 14 \\ 15 \\ 16 \\ 17 \\ 14 \\ 17 \\ 16 \\ 17 \\ 17 \\ 17 \\ 10 \\ 17 \\ 10 \\ 17 \\ 10 \\ 10$					
		Amec Foster Wheeler Environment & Infrastructure 131 Fielding Road Lively, Ontario	∑_ Groundv	/ater dep	th on co	mpletior	n of drillin	ng: <u>13.</u>	<u>.06 m</u> .	Open to full depth on completion.		
fos	eeler	Tel +1(705) 682-2632 Fax +1(705) 682-2260 www.amecfw.com	Borehole deta read in conju	ils as pres action with	sented, do the envir	o not con onmenta	stitute a th I report fo	horough or which	h understanding of all potential cond n it was commissioned and the accor	itions present. Also, borehole information shou npanying 'Explanation of Borehole Log'.	<sup>ld be</sup> So Pa	cale: 1 : 160 age: 1 of 1

Project Clear In Annuel Manifoldin, Plan - Providence Bay Wasto Disposal Sign Project Laterion Minifoldin, Ortania Sign Project Laterion Minifoldin, Ortania Sign Project Laterion Minifoldin, Ortania Sign Project Laterion Minifoldin, Ortania Sign DESCRIPTION Sign DESC	MAT
Bring Mathe         Agains         Ag	
Project Location Manitoulin, Ontario Benefici 2, 41.017 Del Gompéteir 2, 41.01	ESL
LITHOLOGY PROFILE         SOL SAMPLING         PIELD TESTING         COMMENT           DESCRIPTION         8         8         8         8         8         9	<u>1, 02/11/1</u>
DESCRIPTION         No. 1         Page of the second	TS
EEROCX AT SUPFACE         D <thd< th="">         D         <thd< th=""></thd<></thd<>	
END OF BOREHOLE       5.5         END OF BOREHOLE       5.5	
END OF BOREHOLE 5.5	
Amec Foster Wheeler Environment & Infrastructure 131 Fielding Road	

R	ECORE	OF MONITORI	NG \	WE		No.	<u>ov</u>	V-13I	<u>B</u> (	-Ord. <u>0401738 E, 50</u>	56741 N	<u>N</u>		
Pro	ject Number	: <u>TY1410142</u>							Dr	Location: Northwest of Active Fill A	Area		Logged by:	CJS
Pro	ject Client:	Municipality of Central Ma	anitouli	n 					Dr	Method: 150 mm Downhole Hami	mer		_ Compiled by:	MAT
Pro	ject Name:	Aquiter Instrumentation P Site	'lan - Pr	ovide	nce Ba	ay was	te Dis	posal	Dr	Machine: Iruck Mounted Drill			_ Reviewed by:	ESL
Pro	ject Location	i Manitoulin, Ontario							Da	tarted: <u>24 Jul 17</u> Date Comp	netea: <u>24 Ju</u>	17		<u>1, 02/11/17</u>
	LITI			SO	IL SA	MPLI	NG			FIELD TESTING	lues	z		ITS
ithology Plot		DESCRIPTION		ample Type	ample Number	kecovery (%)	sPT 'N' Value	)EPTH (m)	(m) (m)	PenetrationTesting SPT DCPT O Vane* Nilcon Vane* Intact Remould Remould drained Shear Strength (kPa) O Kather Strength (kPa)	3 10 12 Reading lion (ppm) 300 400 sive Limit Jm (%) ntent (%) e0 80	NSTRUMENTATIO NSTALLATION	1 slotted pipe in sand	
$\overline{\mathbb{X}}$	BEDROCK /	Surface Elevation: AT SURFACE Amabel Formation)		0	0	Ľ.	00		ш					
	END OF BO	Amabel Formation)	11.0					$ \lim_{n \to \infty} 1 $						
		Amec Foster Wheeler Environment & Infrastructure	∑_ Grou	undwat	er depth	n on cor	npletion	of drilling	: <u>2.8</u> 9	Open to full	I depth on com	pletion.		
am		131 Fielding Road Lively, Ontario Canada P3X 117											i	
fos	ster eeler	Tel +1(705) 682-2632 Fax +1(705) 682-2260 www.amecfw.com	Borehole read in c	e details onjuncti	as prese ion with t	ented, do the enviro	not con onmenta	stitute a tho I report for	orough which	rstanding of all potential conditions present. Als commissioned and the accompanying 'Explana	so, borehole info ation of Borehole	rmation sh e Log'.	nould be S	cale:1:160 age:1 of 1

R	ECORE	OF MONITORI	NG	WE		No.	<u>ov</u>	V-14	<u>A</u> (	Co-Ord. <u>0</u>	40172	<u>22 E, 5056</u>	<u>634  </u>	N		
Pro	ject Number	TY1410142							_ Dri	illing Location: <u>W</u>	est Edge	of Property			Logged by:	CJS
Pro	ject Client:	Municipality of Central Ma	anitouli	n					_ Dri	illing Method: 1	50 mm Do	ownhole Hammer			Compiled b	y: <u>MAT</u>
Pro	ject Name:	Aquifer Instrumentation P Site	Plan - Pi	rovide	nce Ba	ay Was	te Dis	posal	_ Dri	illing Machine: <u>Tr</u>	uck Moun	nted Drill			Reviewed b	by: ESL
Pro	ject Location	: Manitoulin, Ontario							_ Da	te Started: 24	Jul 17	_ Date Complete	d: <u>24 Ju</u>	l 17	Revision N	o.: <u>1, 02/11/17</u>
	LIT			SO	IL SA	MPLI	NG				FIELD T	* Rinse pH Values		z		ENTS
ithology Plot		DESCRIPTION		ample Type	ample Number	tecovery (%)	PT 'N' Value	EPTH (m)	(m) (TEVATION	PenetrationT ○ SPT ● MTO Vane* Nill △ Intact ◇ ▲ Remould ◆ * Undrained Shear Si	DCPT Con Vane* Intact Remould rength (kPa)	2 4 6 8 10 Soil Vapour Reat △ parts per million (r 100 200 300 ▲ Lower Explosive L ※ Passing 75 um (% ○ Moisture Content	12 ding pm) 400 imit ) %)	NSTRUMENTATIO NSTALLATION	1 slotted pipe in sand	i
$\overline{\mathbb{X}}$	BEDROCK	Surface Elevation: AT SURFACE Amabel Formation		S	S	œ	S S		Ш	20 40 6	1 80 		80		8	
	Dousione (r	anaderi omatori)						$ \begin{array}{c} 1 \\ 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \\ 6 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1$	<del>,</del>							
	END OF BO	REHOLE	6.9													
		Environment & Infrastructure 131 Fielding Road Lively, Ontario	- Gro	unawat	ei aeptr		ipietion	i oi arillin	iy: <u>3.3</u> 9	<u>2 111</u> .		Open to full dep	ui on con	ipietion.		
am fos wh	ec 🔊 ster eeler	Canada P3Y 1L7 Tel +1(705) 682-2632 Fax +1(705) 682-2260 www.amecfw.com	Borehole read in c	e details conjuncti	as prese on with t	ented, do the enviro	not con onmenta	stitute a th I report fo	horough or which	understanding of all p it was commissioned	ootential conc and the acco	ditions present. Also, bo mpanying 'Explanation	rehole info of Borehol	e Log'.	should be	Scale: 1 : 160 Page: 1 of 1

R	ECORE	OF MONITORI	NG	WE		No.	<u>ov</u>	V-14	<u>B</u> (	Co-Ord	<u>0401</u>	722	<u>2 E,</u>	<u>505</u>	<u> 6634</u>	1 N				
Pro	ject Number	TY1410142							Dri	illing Location	: West Edg	ge of	f Proper	ty				Logge	d by:	CJS
Pro	ject Client:	Municipality of Central Ma	anitouli	in					Dri	illing Method:	<u>150 mm</u>	Dov	vnhole	Hamme	er			Compi	iled by:	MAT
Pro	ject Name:	Aquifer Instrumentation P	Plan - P	rovide	nce Ba	ay Was	te Dis	posal	Dri	illing Machine	: Truck Mo	ounte	ed Drill					Review	wed by:	ESL
Pro	ject Location	: Manitoulin, Ontario							Da	te Started:	<u>24 Jul 17</u>	,	Date C	Complet	ted: 24	Jul	17	Revisi	on No.:	<u>1, 02/11/17</u>
-	LITI			SC	DIL SA	MPLI	NG				FIEL		* Rinse	nH Value		_	z	CO		TS
Lithology Plot	Local Ground	DESCRIPTION		Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	Penetrat ○ SPT MTO Vane* △ Intact ▲ Remould * Undrained She 20 40	OCPT     OCPT     Nilcon Van     OLPT     Nilcon Van     OLPT     Nilcon Van     Remould     Arrorethered     Strength (kf     60 80	ne* d Pa)	A Ruise 2 4 Soil Va △ parts   100 ▲ Lower * Passir ○ Moistu 20	6 8 pour Re per million 200 30 Explosive ng 75 um ( ure Conter 40 60	ading (ppm) 0 400 Limit (%) ot (%) 0 80	-	INSTRUMENTATIOI INSTALLATION	1 riser pipe in 1 slotted pipe	sand in sand	
$\overline{\mathbb{N}}$	BEDROCK / Dolostone (A	AT SURFACE Amabel Formation)														X				
	END OF BO	REHOLE	11.6																	
		Amec Foster Wheeler Environment & Infrastructure 131 Fielding Road	∑ Gro	oundwat	er depti	h on cor	npletion	of drilling	): <u>3.05</u>	<u>5 m</u> .			Open	to full de	epth on	comp	letion.			
am fos wh	ec ster eeler	Canada P3Y 1L7 Tel +1(705) 682-2632 Fax +1(705) 682-2260 www.amecfw.com	Borehol read in o	le details conjuncti	as prese ion with t	ented, do the enviro	not cons onmental	stitute a tho report for	orough which i	understanding o it was commissio	all potential oned and the a	conditi	ions prese panying 'E	nt. Also, I xplanatio	borehole In of Bore	inform ehole L	nation : _og'.	should be	So Pa	cale:1:160 age:1 of 1

ect Client	: Municipaloty of Central Mar	nitoulin					Drilling	Metho	od:	1	50 mn	n Soli	d Ste	m Au	lger					Compiled by:	СКС
ect Name	Extended CAZ Monitoring V	Vell Install	ations				Drilling	Mach	nine:	<u>Tra</u>	ack M	ounte	d Air	Hum	nmer	Drill				Reviewed by:	
ect Locati	on: Providence Bay landfil, Mar	itoulin, Or	ntario				Date S	tarted:	:	12	Dec 2	2022	_ Date	e Cor	nplet	ed: <u>'</u>	12 De	ec 20	22	Revision No.:	<u>1, 1/30</u>
1		SC	NL SA		NG		(L)	FI × Po 1	Penetra	enetror	STIN meter (k 3 4	<b>G</b> (g/cm <sup>2</sup> )		AB	Derg L	TINC imits	9 V. ●	ITATION	ON XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	COMMEN 1 riser pipe in concrete 1 riser pipe in bentonite 1 riser pipe in sand	ITS
Local Grou	DESCRIPTION	Sample Type	Sample Num	Recovery (%	SPT 'N' Valu	DEPTH (m)	ELEVATION	OSI MTO ∆Int ▲Re *Undr	PI Vane tact emould rained S 5 3	● ◇ ◇ ♦ ♦ ♦ ♦ 0 4	ICON V Intact Remo trength	/ane* t buld (kPa) t0	Pla * 1 0 1 20	stic Passin Moistu 4	g 75 un re Con 0 f	Liqui n (%) tent (%	) )	NSTRUMEN		1 slotted pipe in sand	
BEDROC	K					-											· · · ·		st	ckup 0.93 m	
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END OF	BOREHOLE	7.0				- 7.0															

roject Client:	Municipaloty of Central Ma	nitoulin				I	- Drilling N	lethod	l:	150	mm S	bolid	Stem /	Auger	r			Compiled by:	скс
roject Name:	Extended CAZ Monitoring	Well Installa	ations			I	- Drilling N	lachin	e:	Trac	k Mou	nted	Air Hu	imme	r Drill			Reviewed by:	CVU
roject Location:	Providence Bay landfil, Ma	nitoulin, Or	ntario				Date Star	ted:		12 D	ec 202	2	Date C	omple	eted:	12 D	ec 2022	Revision No.:	1, 1/30/2
LITH	OLOGY PROFILE	SO	IL SA	MPLI	NG			FIE	LDT	EST	TING	Т	LAE	3 TES	STIN	G		COMME	NTS
6	DESCRIPTION	ple Type	ple Number	overy (%)	'N' Value	TH (m)	VATION (m)	Pock 1 Per SPT TO V Intac Rem	ket Pene 2 netratio /ane* xt nould	etromet 3 onTes ● [ Nilco ◇ I	ter (kg/cn 4 sting DCPT DCPT on Vane ntact Remould	m²) e*	Atte W <sub>P</sub> Plastic * Pase O Mois	sing 75	Limits Liq um (%) ontent (%	S W <sub>L</sub> ⊸● uid	RUMENTATION	1 riser pipe in concrete 1 riser pipe in bentonite 1 riser pipe in sand 1 slotted pipe in sand	
Local Ground S	urface Elevation:	Sam	Sam	Reco	SPT	DEP		Undrain 1 <u>5</u>	ned Shea 3 <u>0</u>	ar Stre 45	ngth (kPa 60	a)	20	40	6 <u>0</u>	, 80			
						-		:	:		:					:		stickup 0.85 m	
						-		:	:		:		:		:	:			
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<u>X</u>						8.5		:	:	:	:		:	:	:	:			
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LITHOLOGY PROFILE	SO	IL SA	MPLI	NG			FIELD TESTING X Pocket Penetrometer (kg/cm <sup>2</sup> )	LAB TESTING	COMMENTS
DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	1         2         3         4           PenetrationTesting         0         SPT         ● DCPT           MTO Vane*         Nilcon Vane*         Intact           △         Remould         Remould         *           * Undrained Shear Strength (kPa)         15         30         45         60	Wp         W         With           Plastic         Liquid           * Passing 75 um (%)         O           O         Moisture Content (%)           20         40         60         80	U I riser pipe in bentonite F O I I riser pipe in sand U I I I riser pipe in sand U I I I riser pipe in sand U I I I I I I I I I I I I I I I I I I I
BEDROCK END OF BOREHOLE 12.0	S				9.0 9.5 10.0 11.5 11.5 12.0				

ject Name: ject Location: LITHC	Extended CAZ Monitoring Well Providence Bay landfil, Manito	Install											
Anne:       Extended CAZ Monitoring Well Installations       Drilling Machine:       Track Mounted Air Hummer Drill       Reviewe         act Name:       Providence Bay landfil, Manitoulin, Ontario       Date Started:       12 Dec 2022       Date Completed:       12 Dec 2022       Reviewe         LITHOLOGY PROFILE       SOIL SAMPLING       Flexibility       Participation       Atterburg Limits       CON         DESCRIPTION       8       9		Reviewed by:	CVU										
Aged Name:     Extended CAZ Monitoring Well Installations     Drilling Machine:     Track Mounted Air Hummer Drill     Review       aged Location:     Providence Bay landfil, Manitoulin, Ontario     Date Started:     12 Dec 2022     Date Completed:     12 Dec 2022     Date Completed:     12 Dec 2022     Date Completed:     12 Dec 2022     Date Started:     12 Dec 2022     Date Started:     Date Started:     12 Dec 2022     Date Started:     Date		Revision No.:	<u>1, 1/30/23</u>										
		SC	NL SA	MPLI	NG		FIE	ELD TE		LAB TESTING	z ara		ITS
Local Ground Suri		Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	A Pice 1 Pee 0 SP MTON △ Inta Rer Undrai 15	rnetration /ane* M /ane* M nould 4 ned Shear 30	a 4 Testing DCPT Vilcon Vane* > Intact > Remould Strength (kPa) 45 60	Atterberg Limits           Wp         W         WL           Plastic         Liquid           * Passing 75 um (%)         O Moisture Content (%)           20         40         60         80	INSTRUMENTATIO	1 riser pipe in concrete 1 riser pipe in bentonite 1 riser pipe in sand 1 slotted pipe in sand	
BEDROCK						- - - - 0.5		•					
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						- - 5.5 - -							
END OF BOREI	HOLE 6.1					- 6.0							
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roject Client:	Municipaloty of Central Mar	nitoulin				D	rilling Method:	150 mm Sol	id Stem Auger	Compiled by: CKC
roject Name:	Extended CAZ Monitoring V	Vell Installa	ations			D	rilling Machine:	Track Mounte	ed Air Hummer Drill	Reviewed by: <u>CVU</u>
roject Location:	Providence Bay landfil, Mar	nitoulin, Or	ntario			D	ate Started:	12 Dec 2022	_ Date Completed: <u>12 Dec 2022</u>	Revision No.: 1, 1/30/2
LITH	OLOGY PROFILE	SC	NL SA	MPLI	NG		FIELD	TESTING	LAB TESTING	COMMENTS
50-50	DESCRIPTION	nple Type	nple Number	covery (%)	T 'N' Value	РТН (m)	(m) X Pocket P 1 2 Penetra O SPT MTO Vane △ Intact ▲ Remould	enetrometer (kg/cm <sup>2</sup> ) 3 4 ationTesting ● DCPT * Nilcon Vane* ◇ Intact ● Remould + Remould	Atterberg Limits W <sub>c</sub> W W <sub>L</sub> Plastic Liquid * Passing 75 um (%) O Moisture Content (%)	1 riser pipe in concrete 1 riser pipe in bentonite 1 riser pipe in sand 1 slotted pipe in sand
Local Ground Su	urface Elevation:	Sar	Sar	Rec	R P	DEI	Undrained S U 15 3	near Strengtn (kPa) 0 45 60	20 40 60 80 ZZ	ckup 0.21 m
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						- - - - 6.5 - -				
						- 7.0 - - - - - 7.5 -				
						- 8.0 - -				

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		SC	IL SA	MPLI	NG			FIELD TESTING	LAB TESTING	
							ê	■ Pocket Penetrometer (kg/cm <sup>2</sup> ) 1 2 3 4	Atterberg Limits	Z I riser pipe in concrete
	DESCRIPTION	ample Type	ample Numbe	ecovery (%)	PT 'N' Value	EPTH (m)	LEVATION (n	PenetrationTesting ○ SPT ● DCPT MTO Vane* Nilcon Vane* △ Intact ◇ Intact ▲ Remould ◆ Remould * Undrained Shear Strength (kPa)	Plastic Liquid * Passing 75 um (%) O Moisture Content (%)	LOLLAND 1 riser pipe in sand ULLAND 1 slotted pipe in sand ULLAND 1 slotted pipe in sand
BED	ROCK	S	S I	<u> </u>	S		ш	15 30 45 60	20 40 60 80	
						- - - 9.0				》:目2) 後:目2月
						-				
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						10.0				
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						- 11.0 - -				
END	OF BOREHOLE 11.5					- 11.5				
		1								
		1								

Project Number: <u>TY</u>	- BOREHOLE NO 1410146.1000	). <u>(</u>	JVV	<u>I/A</u>	CO	-Ora	Drilling	Location:	<u>IE 5</u>	0569	<u>48.UN</u>	<u>4</u>			Logged by:	скс
Project Client: <u>Mu</u>	nicipaloty of Central Manito	ulin				C	- Drilling	Method:	150	mm Sol	id Stem A	uger			Compiled by:	СКС
Project Name: <u>Ext</u>	ended CAZ Monitoring Well	Install	ations			C	Drilling	Machine:	Trac	k Mount	ed Air Hu	mmer D	rill		Reviewed by:	CVU
Project Location: Pro	ovidence Bay landfil, Manitor	ulin, Oı	ntario			C	Date St	tarted:	<u>12 D</u>	ec 2022	_ Date Co	omplete	d: <u>12 De</u>	ec 2022	Revision No.:	<u>1, 1/30/23</u>
LITHOLO	DGY PROFILE	SC	IL SA	MPLI	NG			FIELD	TES	TING	LAB	TEST	ING		COMMEN	TS
DE	SCRIPTION	ype	lumber	(%)	alue	Ê	(m) NO	Pocket P 1 2 Penetra O SPT	enetromet 3 ationTes • [	ter (kg/cm²) 4 sting DCPT	Atte W <sub>P</sub> ■ Plastic	rberg Lir W	mits W⊾ Liquid	AENTATION ATION	1 riser pipe in concrete 1 riser pipe in bentonite 1 riser pipe in sand 1 slotted pipe in sand	-
Local Ground Surface	Elevation:	Sample T	Sample N	Recovery	SPT 'N' V	DEPTH (I	ELEVATI	Intact ▲ Intact ▲ Remould * Undrained S 15 3	NIIC ♦ F hear Stre 0 45	ntact Remould ngth (kPa)	* Pass O Mois 20	ing 75 um ture Conte 40 60	(%) nt (%) <u>80</u>		stick up 0.84 m	
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X						- - - 1.5 -			•							
						- - - 2.0				:			:			
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						- - 7.5 -			•							
END OF BOREHOL	LE 8.0					- 8.0										
√SP 31 Fielding Road	$\frac{\nabla}{2}$ Groundwater depth on cor	npletior	of drill	 ing: <u>5.2</u>	 <u>27 m</u> .	<u> </u>		: :	:	:		: :				
ively, Ontario 3Y 1L7 el: (705) 682-2632	Borehole details as preser from a qualified Geotechni commissioned and the acc	ited, do cal Eng	not cor ineer. A /ing'Exp	nstitute Also, bo planatio	a thoro rehole i on of Bo	ugh und nformati rehole Lo	erstan on sho og'.	ding of all po ould be read	otential in conji	conditior unction w	is present ith the geo	and requ technic	uires inter al report f	pretative a	assistance t was	Scale: 1 : 4

oject Client:	Municipaloty of Central Mar	nitoulin				I	Drilling	Meth	od:	15	50 mm	n Soli	id Ste	em A	uger					Compiled by:	СКС
ject Name:	Extended CAZ Monitoring W	ell Install	ations			I	Drilling	Mach	nine:	Tra	ack M	ounte	ed Air	r Hun	nmer	Drill				_ Reviewed by:	CVU
oject Location:	Providence Bay landfil, Man	itoulin, Oı	ntario			1	Date S	tarted	:	<u>12</u>	Dec 2	2022	_ Dat	te Co	mplet	ed: <u>'</u>	12 De	ec 202	2	Revision No.:	<u>1, 1/30</u>
LITH	OLOGY PROFILE	SC	IL SA	MPLI	NG			F	IELD	TES	STIN	G	L	.AB	TES	TING	)			COMMEN	ITS
	DESCRIPTION	ample Type	ample Number	scovery (%)	ът 'N' Value	EPTH (m)	-EVATION (m)	F OSI MTC △In ▲R *Undr	ocket Pr 1 2 Penetra PT Vane tract emould rained S	enetron ationT ● * Ni ◆ hear Si	neter (k 3 2 Festing DCP1 Icon V Intact Remo trength	g/cm <sup>2</sup> ) /ane* puld (kPa)	W ■ Pi ×	Atter V <sub>P</sub> astic Passir Moistu	berg L W Ə ng 75 ui ure Con	Limits V Liqui n (%) tent (%	/L d	STRUMENTATION		1 riser pipe in concrete 1 riser pipe in bentonite 1 riser pipe in sand 1 slotted pipe in sand	
Local Ground Su BEDROCK	rface Elevation:	Š	Š	ž	5	ā	Ш	1	53	) 4	56	0	2	0 4	40 €	8 0	0	N.	≧ (≯_) stic	скир	
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LITH	OLOGY PROFILE		so	IL SA	MPLI	NG			FIELD TESTING LAB TESTING COMM	ENTS
	DESCRIPTION	o an Turne O	odilipie i ype	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	★ Pocket Penetrometer (kg/cm²)       Atterberg Limits       I riser pipe in concr         1       2       4       Wp       W         PenetrationTesting       ●       ●       0         O SPT       DCPT       Plastic       Liquid         MTO Vane*       Nilcon Vane*       *       Passing 75 um (%)       0         A Remould       ●       Remould       0       Notice Content (%)       SUIT         15       30       45       60       20       40       60       80	rete xnite nd
ROCK							-			
							9.0			
							9.5 - -			
							- - - 10.0			
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							- - 16.0			
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							16.5			
							- - - 17.0			
OF BORE	HOLE	17.1					†			

roject Client	Municipaloty of Central Ma	nitoulin				ם ח	rilling Method	150 mm Sol	id Stem Auger		Compiled by	CKC
roject Name:	Extended CAZ Monitoring	Vell Instal	lations			D	rilling Machine:	Track Mount	ed Air Hummer Drill		_ Complied by: Reviewed by:	CVU
roject Location	Providence Bay landfil, Ma	nitoulin, O	ntario			D	ate Started:	12 Dec 2022	_ Date Completed: 12 Dec	2022	Revision No.:	1, 1/30/2
		S	DIL SA	MPLI	NG		FIELD	TESTING				JTS .
3	DESCRIPTION	sample Type	sample Number	(%) (%)	SPT 'N' Value	DEPTH (m)	(E) X Pocket P 1 2 Penetr ○ SPT MTO Vane △ Intact Wrdrained S 1 2 Penetr ○ SPT	enetrometer (kg/cm <sup>2</sup> ) 3 4 ationTesting ● DCPT * Nilcon Vane* ◇ Intact ◆ Remould hear Strength (kPa) 0 45 € 60	Atterberg Limits We W W. Plastic Liquid * Passing 75 um (%) O Moisture Content (%)	NSTRUMENTATION NSTALLATION	I riser pipe in concrete I riser pipe in bentonite I riser pipe in sand I slotted pipe in sand no installation, cave-in	
END OF BC	1 Surface Elevation: soil ace clay	0           1.2           7.0				$\square$					жир 0.86 m	
SP 1 Fielding Roz	모 Groundwater depth or	n completio	n of dril	ling: <u>6.</u>	1 <u>3 m</u> .							

# APPENDIX C GROUNDWATER ELEVATIONS

#### Summary of Groundwater Elevations

	Measuring													Elevat	tion of Water	(masl)												
Monitor No.	(masl) <sup>1</sup>	Apr-02	Jun-02	Jul-02	May-03	Mar-04	Apr-04	Sep-04	Jul-05	Nov-05	Nov-06	Oct-07	Oct-08	Oct-09	Nov-10	Oct-11	Oct-12	Oct-13	Oct-14	Sep-15	Sep-16	Oct-17	Sep-18	Sep-19	Nov-20	Nov-21	Nov-22	Oct-23
OW-1	499.11	496.94	495.22	493.25	494.91	494.68	496.61	492.75	492.79	495.82	494.58	493.25	493.52	493.59	493.38	494.73	493.78	495.11	494.75	493.33	493.30	494.26	493.66	493.31	495.02	493.45	494.05	496.21
OW-2	498.71	496.86	493.37	491.29	493.31	493.28	489.85	491.69	491.57	495.20	493.24	492.00	492.29	492.34	492.13	493.81	492.59	494.09	494.02	491.84	491.84	493.21	492.60	491.99	493.81	492.33	492.59	495.98
OW-3A	498.83	496.94	495.29	493.22	494.85	494.72	496.59	492.54	492.66	495.77	494.56	493.55	493.31	493.56	493.41	494.81	493.78	495.20	494.87	493.12	493.08	494.22	493.57	493.31	495.05	493.26	493.89	496.48
OW-3B	498.88	485.19	486.98	481.18		492.25	481.82	485.21	488.07	485.85	489.15	489.69	488.18	487.93	487.94	489.56	486.20	485.48	486.56	485.76	488.26	490.76	486.21	489.07	490.46	484.03	484.85	488.95
OW-4	499.07	496.91	495.39	493.40	495.03	497.73	496.62	492.84	492.89	495.70	494.65	493.75	493.62	493.98	493.58	494.84	493.97	495.12	494.87	493.42	493.34	494.25	493.63	493.50	495.02	493.35	494.32	496.17
OW-5	498.07	496.60	495.08	494.11	494.98	495.10	496.21	493.44	493.51	495.40	493.73	492.73	493.01	493.45	492.85	493.79	493.23	495.12	493.90	492.38	492.31	493.62	492.80	492.30	494.90	493.00	493.27	494.82
OW-6	498.22					485.54	485.13	486.85	488.23	487.63	489.31	488.45	488.45	488.63	487.99	488.53	488.48	488.53	488.04	487.47	488.03	488.32	488.02	487.72	487.75	487.35	487.11	487.40
OW-7	497.77					495.17	487.69	491.26	491.13	490.68	492.61	490.75	490.68	490.17	488.37	489.25	489.20	487.99	487.84	487.46	489.13	490.41	489.60	488.49	487.55	488.27	487.20	486.91
OW-8	499.78					497.56	497.34	491.58	491.61	498.92	493.47	491.63	492.40	492.53	492.18	493.58	494.93	495.16	494.05	491.68	491.65	493.15	492.50	491.69	493.86	492.44	492.58	488.06
OW-9	497.95																		484.84	491.89	491.86	492.51	491.65	491.83	493.65	492.24	492.46	485.02
OW-10	499.17																		492.48	491.69	491.69	492.66	492.16	491.74	493.18	492.05	492.17	496.67
OW-11	497.94																		485.32	492.07	491.91	492.67	491.13	491.52	491.91	490.29	489.68	489.91
OW-12A	497.75																		_ 			489.45	489.18	489.04	489.86	489.15	489.13	491.63
OW-12B	497.70																		_ 			486.62	487.76	489.00	489.39	487.78	488.76	488.84
OW-13A	497.60																		L			494.81	494.57	494.00	495.03	494.61	494.87	496.45
OW-13B	497.64																		L			494.41	493.71	493.04	494.65	493.73	493.92	496.71
OW-14A	498.58			<u> </u>															_ 			496.52	495.48	495.30	496.99	496.45	496.40	496.60
OW-14B	498.46																		L			495.36	494.59	494.23	496.09	495.08	494.90	496.52
OW-15A	497.03			<u> </u>															_ 								<u> </u>	496.30
OW-15B	497.03			<u> </u>															L								<u> </u>	496.56
OW-16A	497.69			Ē'				['											_								Ē'	496.18
OW-16B	497.41			'															L								'	494.23
OW-17A	496.88			<u> </u>															L								<u> </u>	491.49
OW-17B	496.98																		L									488.99
OW-18	499.06																											496.96

Notes: (1) masi - metres above sea level. APPENDIX D 2023 LABORATORY ANALYTICAL REPORTS



### CLIENT NAME: WSP E&I CANADA LIMITED 131 FIELDING ROAD LIVELY, ON P3Y1L7 (705) 682-2632 ATTENTION TO: Dominque Gagnon PROJECT: TY1410143.2023.FLD.1142.5730-00 AGAT WORK ORDER: 23T088719 TRACE ORGANICS REVIEWED BY: Pinkal Patel, Report Reviewer WATER ANALYSIS REVIEWED BY: Yris Verastegui, Inorganic Team Lead DATE REPORTED: Nov 16, 2023 PAGES (INCLUDING COVER): 27 VERSION\*: 1

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

\*Notes

Disclaimer:

- All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may
  incorporate modifications from the specified reference methods to improve performance.
- All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.
- AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.
- This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
- The test results reported herewith relate only to the samples as received by the laboratory.
- Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of
  merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines
  contained in this document.
- All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.
- For environmental samples in the Province of Quebec: The analysis is performed on and results apply to samples as received. A temperature above 6°C upon receipt, as indicated in the Sample Reception Notification (SRN), could indicate the integrity of the samples has been compromised if the delay between sampling and submission to the laboratory could not be minimized.

### **AGAT** Laboratories (V1)

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Member of: Association of Professional Engineers and Geoscientists of Alberta	
(APEGA)	
Western Envire Agricultural Laboratory Association (M/EALA)	

Western Enviro-Agricultural Laboratory Association (WEALA) Environmental Services Association of Alberta (ESAA) AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation. Measurement Uncertainty is not taken into consideration when stating conformity with a specified requirement.

Page 1 of 27



### Certificate of Analysis

AGAT WORK ORDER: 23T088719 PROJECT: TY1410143.2023.FLD.1142.5730-00

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

### CLIENT NAME: WSP E&I CANADA LIMITED

#### SAMPLING SITE: Providence Bay - GW

**ATTENTION TO: Domingue Gagnon** 

DATE REPORTED: 2023-11-16

SAMPLED BY:

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

DATE RECEIVED: 2023-11-03

			SAMPLE DESC	RIPTION:	OW-12B	
			SAMF	LE TYPE:	Water	
			DATE S	AMPLED:	2023-11-02 13:20	
Parameter	Unit	G / S: A	G / S: B	RDL	5423949	
F1 (C6 - C10)	µg/L			25	<25	
F1 (C6 to C10) minus BTEX	µg/L			25	<25	
F2 (C10 to C16)	µg/L			100	<100	
F3 (C16 to C34)	µg/L			100	462	
F4 (C34 to C50)	µg/L			100	953	
Gravimetric Heavy Hydrocarbons	µg/L			500	NA	
Sediment					1	
Surrogate	Unit	A	cceptable Limits			
Toluene-d8	%		50-140		98	
Terphenyl	% Recovery		60-140		85	
Comments: RDL - Reported D Reg 169/03 - Onta	etection Limit; Gario Drinking Water	6 / S - Guideli Quality Stan	ne / Standard: A F dards. Na value d	Refers to O. I	Reg 169/03 - Oı O. Reg 248	ntario Drinking Water Quality Standards - Aesthetic Objectives and Operational Guidelines, B Refers to O.

Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

5423949 The C6-C10 fraction is calculated using Toluene response factor.

Xylenes total is a calculated parameter. The calculated value is the sum of m&p-Xylene and o-Xylene.

C6-C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.

The calculated parameters are non-accredited. The parameters that are components of the calculation are accredited.

The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and nC34.

Gravimetric Heavy Hydrocarbons are not included in the Total C16 - C50 and are only determined if the chromatogram of the C34 - C50 Hydrocarbons indicated that hydrocarbons >C50 are present. The chromatogram has returned to baseline by the retention time of nC50.

Total C6-C50 results are corrected for BTEX contribution.

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

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

nC10, nC16 and nC34 response factors are within 10% of their average. C50 response factor is within 70% of nC10 + nC16 nC34 average.

- Linearity is within 15%.

Extraction and holding times were met for this sample.

Fractions 1-4 are quantified with the contribution of PAHs. Under Ontario Regulation 153/04, results are considered valid without determining the PAH contribution if not requested by the client. NA = Not Applicable

Sediment parameter is comment only based on visual inspection of the sample prior to extraction and is not an accredited test. Legend: 1 = no sediment present; 2 = sediment present; 3 = sediment present in trace amounts

Analysis performed at AGAT Toronto (unless marked by \*)

**Certified By:** 



# **Certificate of Analysis**

AGAT WORK ORDER: 23T088719 PROJECT: TY1410143.2023.FLD.1142.5730-00 5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.aqatlabs.com

### CLIENT NAME: WSP E&I CANADA LIMITED

SAMPLING SITE: Providence Bay - GW

#### ATTENTION TO: Dominque Gagnon

SAMPLED BY:

			Vola	tile Orgai	nic Compo	unds in Wa	ter (ug/L)				
DATE RECEIVED: 2023-11-03									DATE REPORT	ED: 2023-11-16	
			SAMPLE DI SA DAT	ESCRIPTION: MPLE TYPE: E SAMPLED:	OW-1 Water 2023-11-01 17:10	OW-2 Water 2023-11-01 17:40	OW-3A Water 2023-11-01 15:25	OW-3B Water 2023-11-01 16:10	OW-4 Water 2023-11-01 15:55	OW-5 Water 2023-11-01 16:25	OW-6 Water 2023-11-02 14:15
Parameter	Unit	G / S: A	G/S:B	RDL	5423719	5423726	5423727	5423728	5423729	5423730	5423731
1,4-Dichlorobenzene	µg/L	1	5	0.10	<0.10[ <a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<></td></a]<></td></a]<></td></a]<>	<0.10[ <a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<></td></a]<></td></a]<>	<0.10[ <a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<></td></a]<>	<0.10[ <a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<>	<0.10[ <a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""></a]<></td></a]<></td></a]<>	<0.10[ <a]< td=""><td>&lt;0.10[<a]< td=""></a]<></td></a]<>	<0.10[ <a]< td=""></a]<>
Benzene	µg/L		1	0.20	<0.20[ <b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.20[ <b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.20[ <b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.20[ <b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	<0.20[ <b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""></b]<></td></b]<></td></b]<>	<0.20[ <b]< td=""><td>&lt;0.20[<b]< td=""></b]<></td></b]<>	<0.20[ <b]< td=""></b]<>
Dichloromethane	mg/L		0.05	0.030	<0.030[ <b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.030[ <b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.030[ <b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.030[ <b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	<0.030[ <b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""></b]<></td></b]<></td></b]<>	<0.030[ <b]< td=""><td>&lt;0.030[<b]< td=""></b]<></td></b]<>	<0.030[ <b]< td=""></b]<>
Toluene	µg/L	24	60	0.20	<0.20[ <a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<></td></a]<></td></a]<></td></a]<>	<0.20[ <a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<></td></a]<></td></a]<>	<0.20[ <a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<></td></a]<>	<0.20[ <a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<>	<0.20[ <a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""></a]<></td></a]<></td></a]<>	<0.20[ <a]< td=""><td>&lt;0.20[<a]< td=""></a]<></td></a]<>	<0.20[ <a]< td=""></a]<>
Vinyl Chloride	µg/L		1	0.17	<0.17[ <b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.17[ <b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.17[ <b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.17[ <b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	<0.17[ <b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""></b]<></td></b]<></td></b]<>	<0.17[ <b]< td=""><td>&lt;0.17[<b]< td=""></b]<></td></b]<>	<0.17[ <b]< td=""></b]<>
Surrogate	Unit	A	cceptable Lim	its							
Toluene-d8	% Recovery		50-140		94	90	95	93	88	90	96
4-Bromofluorobenzene	% Recovery		50-140		106	114	114	110	112	111	113
			SAMPLE DI SA DAT	ESCRIPTION: MPLE TYPE: E SAMPLED:	OW-7 Water 2023-11-02 11:45	OW-8 Water 2023-11-02 14:40	OW-9 Water 2023-11-02 13:00	OW-10 Water 2023-11-01 18:00	OW-11 Water 2023-11-02 10:00	OW-12A Water 2023-11-02 13:10	OW-12B Water 2023-11-02 13:20
Parameter	Unit	G / S: A	G / S: B	RDL	5423732	5423733	5423734	5423735	5423736	5423737	5423949
1,4-Dichlorobenzene	µg/L	1	5	0.10	<0.10[ <a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<></td></a]<></td></a]<></td></a]<>	<0.10[ <a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<></td></a]<></td></a]<>	<0.10[ <a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<></td></a]<>	<0.10[ <a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<>	<0.10[ <a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""></a]<></td></a]<></td></a]<>	<0.10[ <a]< td=""><td>&lt;0.10[<a]< td=""></a]<></td></a]<>	<0.10[ <a]< td=""></a]<>
Benzene	µg/L		1	0.20	<0.20[ <b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.20[ <b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.20[ <b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.20[ <b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	<0.20[ <b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""></b]<></td></b]<></td></b]<>	<0.20[ <b]< td=""><td>&lt;0.20[<b]< td=""></b]<></td></b]<>	<0.20[ <b]< td=""></b]<>
Dichloromethane	mg/L		0.05	0.030	<0.030[ <b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.030[ <b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.030[ <b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.030[ <b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	<0.030[ <b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""></b]<></td></b]<></td></b]<>	<0.030[ <b]< td=""><td>&lt;0.030[<b]< td=""></b]<></td></b]<>	<0.030[ <b]< td=""></b]<>
Toluene	µg/L	24	60	0.20	<0.20[ <a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<></td></a]<></td></a]<></td></a]<>	<0.20[ <a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<></td></a]<></td></a]<>	<0.20[ <a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<></td></a]<>	<0.20[ <a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<>	<0.20[ <a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""></a]<></td></a]<></td></a]<>	<0.20[ <a]< td=""><td>&lt;0.20[<a]< td=""></a]<></td></a]<>	<0.20[ <a]< td=""></a]<>
Vinyl Chloride	µg/L		1	0.17	<0.17[ <b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.17[ <b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.17[ <b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.17[ <b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	<0.17[ <b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""></b]<></td></b]<></td></b]<>	<0.17[ <b]< td=""><td>&lt;0.17[<b]< td=""></b]<></td></b]<>	<0.17[ <b]< td=""></b]<>
Surrogate	Unit	А	cceptable Lim	its							
Toluene-d8	% Recoverv		. 50-140		92	88	92	100	96	92	98
4-Bromofluorobenzene	% Recovery		50-140		111	105	108	117	84	110	110

Jinkal Jouted

### Certified By:



# **Certificate of Analysis**

AGAT WORK ORDER: 23T088719 PROJECT: TY1410143.2023.FLD.1142.5730-00

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

### CLIENT NAME: WSP E&I CANADA LIMITED

SAMPLING SITE: Providence Bay - GW

### **ATTENTION TO: Dominque Gagnon**

SAMPLED BY:

			Vola	tile Organ	nic Compo	unds in Wa	ter (ug/L)				
DATE RECEIVED: 2023-11-03										ED: 2023-11-16	
			SAMPLE DE SA DAT	ESCRIPTION: MPLE TYPE: E SAMPLED:	OW-13A Water 2023-10-31 14:30	OW-13B Water 2023-10-31 14:10	OW-14A Water 2023-10-31 17:30	OW-14B Water 2023-10-31 17:10	OW-15A Water 2023-11-02 10:45	OW-15B Water 2023-11-02 10:55	OW-16A Water 2023-11-02 11:35
Parameter	Unit	G / S: A	G / S: B	RDL	5424090	5424118	5424119	5424120	5424195	5424196	5424197
1,4-Dichlorobenzene	µg/L	1	5	0.10	<0.10[ <a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<></td></a]<></td></a]<></td></a]<>	<0.10[ <a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<></td></a]<></td></a]<>	<0.10[ <a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<></td></a]<>	<0.10[ <a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<>	<0.10[ <a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""></a]<></td></a]<></td></a]<>	<0.10[ <a]< td=""><td>&lt;0.10[<a]< td=""></a]<></td></a]<>	<0.10[ <a]< td=""></a]<>
Benzene	µg/L		1	0.20	<0.20[ <b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.20[ <b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.20[ <b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.20[ <b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	<0.20[ <b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""></b]<></td></b]<></td></b]<>	<0.20[ <b]< td=""><td>&lt;0.20[<b]< td=""></b]<></td></b]<>	<0.20[ <b]< td=""></b]<>
Dichloromethane	mg/L		0.05	0.030	<0.030[ <b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.030[ <b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.030[ <b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.030[ <b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	<0.030[ <b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""></b]<></td></b]<></td></b]<>	<0.030[ <b]< td=""><td>&lt;0.030[<b]< td=""></b]<></td></b]<>	<0.030[ <b]< td=""></b]<>
Toluene	µg/L	24	60	0.20	<0.20[ <a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<></td></a]<></td></a]<></td></a]<>	<0.20[ <a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<></td></a]<></td></a]<>	<0.20[ <a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<></td></a]<>	<0.20[ <a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<>	<0.20[ <a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""></a]<></td></a]<></td></a]<>	<0.20[ <a]< td=""><td>&lt;0.20[<a]< td=""></a]<></td></a]<>	<0.20[ <a]< td=""></a]<>
Vinyl Chloride	µg/L		1	0.17	<0.17[ <b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.17[ <b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.17[ <b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.17[ <b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	<0.17[ <b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""></b]<></td></b]<></td></b]<>	<0.17[ <b]< td=""><td>&lt;0.17[<b]< td=""></b]<></td></b]<>	<0.17[ <b]< td=""></b]<>
Surrogate	Unit	A	cceptable Lim	its							
Toluene-d8	% Recovery		50-140		93	94	92	92	88	88	88
4-Bromofluorobenzene	% Recovery		50-140		103	110	83	107	109	110	110
			SAMPLE DE SA DAT	ESCRIPTION: MPLE TYPE: E SAMPLED:	OW-16B Water 2023-11-02 11:20	OW-17A Water 2023-11-02 09:20	OW-17B Water 2023-11-02 09:30	OW-18 Water 2023-11-02 12:30	PB DUP1 Water 2023-10-31 14:10	PB DUP2 Water 2023-10-31 17:10	PB DUP3 Water 2023-11-01 18:00
Parameter	Unit	G / S: A	G / S: B	RDL	5424198	5424201	5424202	5424205	5424295	5424296	5424299
1,4-Dichlorobenzene	µg/L	1	5	0.10	<0.10[ <a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<></td></a]<></td></a]<></td></a]<>	<0.10[ <a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<></td></a]<></td></a]<>	<0.10[ <a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<></td></a]<>	<0.10[ <a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<>	<0.10[ <a]< td=""><td>&lt;0.10[<a]< td=""><td>&lt;0.10[<a]< td=""></a]<></td></a]<></td></a]<>	<0.10[ <a]< td=""><td>&lt;0.10[<a]< td=""></a]<></td></a]<>	<0.10[ <a]< td=""></a]<>
Benzene	µg/L		1	0.20	<0.20[ <b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>0.59[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.20[ <b]< td=""><td>&lt;0.20[<b]< td=""><td>0.59[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.20[ <b]< td=""><td>0.59[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	0.59[ <b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	<0.20[ <b]< td=""><td>&lt;0.20[<b]< td=""><td>&lt;0.20[<b]< td=""></b]<></td></b]<></td></b]<>	<0.20[ <b]< td=""><td>&lt;0.20[<b]< td=""></b]<></td></b]<>	<0.20[ <b]< td=""></b]<>
Dichloromethane	mg/L		0.05	0.030	<0.030[ <b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.030[ <b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.030[ <b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.030[ <b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	<0.030[ <b]< td=""><td>&lt;0.030[<b]< td=""><td>&lt;0.030[<b]< td=""></b]<></td></b]<></td></b]<>	<0.030[ <b]< td=""><td>&lt;0.030[<b]< td=""></b]<></td></b]<>	<0.030[ <b]< td=""></b]<>
Toluene	µg/L	24	60	0.20	<0.20[ <a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<></td></a]<></td></a]<></td></a]<>	<0.20[ <a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<></td></a]<></td></a]<>	<0.20[ <a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<></td></a]<>	<0.20[ <a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<>	<0.20[ <a]< td=""><td>&lt;0.20[<a]< td=""><td>&lt;0.20[<a]< td=""></a]<></td></a]<></td></a]<>	<0.20[ <a]< td=""><td>&lt;0.20[<a]< td=""></a]<></td></a]<>	<0.20[ <a]< td=""></a]<>
Vinyl Chloride	µg/L		1	0.17	<0.17[ <b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.17[ <b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.17[ <b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	<0.17[ <b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	<0.17[ <b]< td=""><td>&lt;0.17[<b]< td=""><td>&lt;0.17[<b]< td=""></b]<></td></b]<></td></b]<>	<0.17[ <b]< td=""><td>&lt;0.17[<b]< td=""></b]<></td></b]<>	<0.17[ <b]< td=""></b]<>
Surrogate	Unit	Α	cceptable Lim	its							
Toluene-d8	% Recovery		50-140		94	86	95	74	94	96	87
4-Bromofluorobenzene	% Recovery		50-140		112	110	114	102	112	114	111

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: A Refers to O. Reg 169/03 - Ontario Drinking Water Quality Standards - Aesthetic Objectives and Operational Guidelines, B Refers to O. Reg 169/03 - Ontario Drinking Water Quality Standards. Na value derived from O. Reg 248

Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation. 5423719-5424299 Xylenes total is a calculated parameter. The calculated value is the sum of m&p-Xylene + o-Xylene.

1,3-Dichloropropene total is a calculated parameter. The calculated value is the sum of Cis-1,3-Dichloropropene and Trans-1,3-Dichloropropene. The calculated parameter is non-accredited. The parameters that are components of the calculation are accredited.

Analysis performed at AGAT Toronto (unless marked by \*)

**Certified By:**


AGAT WORK ORDER: 23T088719 PROJECT: TY1410143.2023.FLD.1142.5730-00 5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.aqatlabs.com

#### CLIENT NAME: WSP E&I CANADA LIMITED

SAMPLING SITE: Providence Bay - GW

**ATTENTION TO: Dominque Gagnon** 

SAMPLED BY:

					BOD & TSS (Water)
DATE RECEIVED: 2023-11-03					DATE REPORTED: 2023-11-16
	S	AMPLE DES	CRIPTION:	OW-18	
		SAM	PLE TYPE:	Water	
		DATE	SAMPLED:	2023-11-02 12:30	
Parameter	Unit	G/S	RDL	5424205	
BOD (5)	mg/L		2	27	
Total Suspended Solids	mg/L		10	3050	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Analysis performed at AGAT Toronto (unless marked by \*)

**Certified By:** 

Inis Verastegui



AGAT WORK ORDER: 23T088719 PROJECT: TY1410143.2023.FLD.1142.5730-00 5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.aqatlabs.com

#### CLIENT NAME: WSP E&I CANADA LIMITED

SAMPLING SITE: Providence Bay - GW

#### **ATTENTION TO: Dominque Gagnon**

SAMPLED BY:

			man			manutor					
DATE RECEIVED: 2023-11-0	3								DATE REPORTE	D: 2023-11-1	6
Provention	11-14	0/0.1	SAMPLE DE SA DAT	ESCRIPTION: MPLE TYPE: E SAMPLED:	OW-1 Water 2023-11-01 17:10	201	OW-2 Water 2023-11-01 17:40	221	OW-3A Water 2023-11-01 15:25		OW-3B Water 2023-11-01 16:10
Parameter	Unit	G/S:A	G / S: B	RDL	5423719	RDL	5423726	RDL	5423727	RDL	5423728
	pH Units	6.5-8.5		NA	7.54	NA	7.59	NA	7.56	NA	7.60
Electrical Conductivity	µS/cm	500		2	1020	2	451	2	1130	2	605
Alleslight (as CaCO2)	mg/L	500		10	590[>A]	10	246[ <a]< td=""><td>10</td><td>668[&gt;A]</td><td>10</td><td>368[<a]< td=""></a]<></td></a]<>	10	668[>A]	10	368[ <a]< td=""></a]<>
Alkalinity (as CaCO3)	mg/L	30-500		5	400	5	180	5	494	5	189
Chioride	mg/L	250	40.0	0.12	64.2[ <a]< td=""><td>0.10</td><td>9.52[<a]< td=""><td>0.12</td><td>79.6[<a]< td=""><td>0.10</td><td>18.5[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<>	0.10	9.52[ <a]< td=""><td>0.12</td><td>79.6[<a]< td=""><td>0.10</td><td>18.5[<a]< td=""></a]<></td></a]<></td></a]<>	0.12	79.6[ <a]< td=""><td>0.10</td><td>18.5[<a]< td=""></a]<></td></a]<>	0.10	18.5[ <a]< td=""></a]<>
Nitrate as N	mg/L		10.0	0.05	1.40[ <b]< td=""><td>0.05</td><td>&lt;0.05[<b]< td=""><td>0.05</td><td>&lt;0.05[<b]< td=""><td>0.05</td><td>0.72[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	0.05	<0.05[ <b]< td=""><td>0.05</td><td>&lt;0.05[<b]< td=""><td>0.05</td><td>0.72[<b]< td=""></b]<></td></b]<></td></b]<>	0.05	<0.05[ <b]< td=""><td>0.05</td><td>0.72[<b]< td=""></b]<></td></b]<>	0.05	0.72[ <b]< td=""></b]<>
Nitrite as N	mg/L	500	1.0	0.05	<0.05[ <b]< td=""><td>0.05</td><td>&lt;0.05[<b]< td=""><td>0.05</td><td>&lt;0.05[<b]< td=""><td>0.05</td><td>&lt;0.05[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	0.05	<0.05[ <b]< td=""><td>0.05</td><td>&lt;0.05[<b]< td=""><td>0.05</td><td>&lt;0.05[<b]< td=""></b]<></td></b]<></td></b]<>	0.05	<0.05[ <b]< td=""><td>0.05</td><td>&lt;0.05[<b]< td=""></b]<></td></b]<>	0.05	<0.05[ <b]< td=""></b]<>
	mg/L	500		0.10	53.1[ <a]< td=""><td>0.10</td><td>51.1[<a]< td=""><td>0.10</td><td>21.0[<a]< td=""><td>0.10</td><td>111[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<>	0.10	51.1[ <a]< td=""><td>0.10</td><td>21.0[<a]< td=""><td>0.10</td><td>111[<a]< td=""></a]<></td></a]<></td></a]<>	0.10	21.0[ <a]< td=""><td>0.10</td><td>111[<a]< td=""></a]<></td></a]<>	0.10	111[ <a]< td=""></a]<>
Ammonia as N	mg/L			0.02	1.84	0.02	0.02	0.02	0.52	0.02	<0.02
Chemical Oxygen Demand	mg/L	5		5	69	5	1.0[	5		5	24
Dissolved Organic Carbon	mg/L	5		0.5	9.3[>A]	0.5	1.9[ <a]< td=""><td>0.5</td><td>12.8[&gt;A]</td><td>0.5</td><td>5.0[A]</td></a]<>	0.5	12.8[>A]	0.5	5.0[A]
	mg/L			0.001	0.004	0.001	0.002	0.001	0.005	0.001	0.005
Total Kjeldani Nitrogen	mg/L			0.10	3.57	0.10	<0.10	0.10	1.59	0.10	0.39
Piece local October	mg/L			0.02	0.03	0.02	<0.02	0.02	<0.02	0.02	<0.02
Dissolved Calcium	mg/L			0.05	72.0	0.05	42.5	0.05	105	0.05	59.6
Dissolved Magnesium	mg/L			0.05	52.9	0.05	27.5	0.05	85.8	0.05	32.7
Dissolved Potassium	mg/L		00	0.50	11.7	0.50	4.26	0.50	13.8	0.50	7.82
Dissolved Sodium	mg/L		20	0.05	28.8[>B]	0.05	8.40[ <b]< td=""><td>0.05</td><td>52.9[&gt;B]</td><td>0.05</td><td>43.1[&gt;B]</td></b]<>	0.05	52.9[>B]	0.05	43.1[>B]
Dissolved Arsenic	mg/L		0.01	0.001	<0.001[ <b]< td=""><td>0.001</td><td>&lt;0.001[<b]< td=""><td>0.001</td><td>0.002[<b]< td=""><td>0.001</td><td>&lt;0.001[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	0.001	<0.001[ <b]< td=""><td>0.001</td><td>0.002[<b]< td=""><td>0.001</td><td>&lt;0.001[<b]< td=""></b]<></td></b]<></td></b]<>	0.001	0.002[ <b]< td=""><td>0.001</td><td>&lt;0.001[<b]< td=""></b]<></td></b]<>	0.001	<0.001[ <b]< td=""></b]<>
Dissolved Barium	mg/L		1.0	0.002	0.034[ <b]< td=""><td>0.002</td><td>0.015[<b]< td=""><td>0.002</td><td>0.048[<b]< td=""><td>0.002</td><td>0.012[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	0.002	0.015[ <b]< td=""><td>0.002</td><td>0.048[<b]< td=""><td>0.002</td><td>0.012[<b]< td=""></b]<></td></b]<></td></b]<>	0.002	0.048[ <b]< td=""><td>0.002</td><td>0.012[<b]< td=""></b]<></td></b]<>	0.002	0.012[ <b]< td=""></b]<>
Dissolved Boron	mg/L		5.0	0.010	0.262[ <b]< td=""><td>0.010</td><td>0.266[<b]< td=""><td>0.010</td><td>0.292[<b]< td=""><td>0.010</td><td>0.642[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	0.010	0.266[ <b]< td=""><td>0.010</td><td>0.292[<b]< td=""><td>0.010</td><td>0.642[<b]< td=""></b]<></td></b]<></td></b]<>	0.010	0.292[ <b]< td=""><td>0.010</td><td>0.642[<b]< td=""></b]<></td></b]<>	0.010	0.642[ <b]< td=""></b]<>
Dissolved Cadmium	mg/L		0.005	0.0001	<0.0001[ <b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	0.0001	<0.0001[ <b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""></b]<></td></b]<></td></b]<>	0.0001	<0.0001[ <b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""></b]<></td></b]<>	0.0001	<0.0001[ <b]< td=""></b]<>
Dissolved Chromium	mg/L		0.05	0.002	<0.002[ <b]< td=""><td>0.002</td><td>&lt;0.002[<b]< td=""><td>0.002</td><td>&lt;0.002[<b]< td=""><td>0.002</td><td>&lt;0.002[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	0.002	<0.002[ <b]< td=""><td>0.002</td><td>&lt;0.002[<b]< td=""><td>0.002</td><td>&lt;0.002[<b]< td=""></b]<></td></b]<></td></b]<>	0.002	<0.002[ <b]< td=""><td>0.002</td><td>&lt;0.002[<b]< td=""></b]<></td></b]<>	0.002	<0.002[ <b]< td=""></b]<>
Dissolved Copper	mg/L			0.001	<0.001	0.001	<0.001	0.001	<0.001	0.001	0.001
Dissolved Iron	mg/L		0.010	0.010	0.169	0.010	0.132	0.010	0.442	0.010	0.012
	mg/L		0.010	0.0005	0.0014[ <b]< td=""><td>0.0005</td><td>&lt;0.0005[<b]< td=""><td>0.0005</td><td>&lt;0.0005[<b]< td=""><td>0.0005</td><td>&lt;0.0005[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	0.0005	<0.0005[ <b]< td=""><td>0.0005</td><td>&lt;0.0005[<b]< td=""><td>0.0005</td><td>&lt;0.0005[<b]< td=""></b]<></td></b]<></td></b]<>	0.0005	<0.0005[ <b]< td=""><td>0.0005</td><td>&lt;0.0005[<b]< td=""></b]<></td></b]<>	0.0005	<0.0005[ <b]< td=""></b]<>
Dissolved Manganese	mg/L		0.001	0.002	0.005	0.002	0.014	0.002	0.004	0.002	0.002
	mg/L		0.001	0.0001	<0.0001[ <b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	0.0001	<0.0001[ <b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""></b]<></td></b]<></td></b]<>	0.0001	<0.0001[ <b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""></b]<></td></b]<>	0.0001	<0.0001[ <b]< td=""></b]<>
Dissolved Zinc	mg/L			0.005	0.007	0.005	<0.005	0.005	<0.005	0.005	<0.005

Manitoulin Landfill - Groundwater - Column 1

Inis Verastegui



AGAT WORK ORDER: 23T088719 PROJECT: TY1410143.2023.FLD.1142.5730-00 5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.aqatlabs.com

CLIENT NAME: WSP E&I CANADA LIMITED

SAMPLING SITE: Providence Bay - GW

**ATTENTION TO: Dominque Gagnon** 

SAMPLED BY:

### Manitoulin Landfill - Groundwater - Column 1

DATE RECEIVED: 2023-11-03

DATE REPORTED: 2023-11-16

**Certified By:** 

Inis Verastegui



AGAT WORK ORDER: 23T088719 PROJECT: TY1410143.2023.FLD.1142.5730-00

**ATTENTION TO: Domingue Gagnon** 

SAMPLED BY:

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

#### CLIENT NAME: WSP E&I CANADA LIMITED

SAMPLING SITE: Providence Bay - GW

#### Manitoulin Landfill - Groundwater - Column 1 DATE RECEIVED: 2023-11-03 DATE REPORTED: 2023-11-16 SAMPLE DESCRIPTION: OW-4 OW-5 OW-6 **OW-7** OW-8 OW-9 OW-10 SAMPLE TYPE: Water Water Water Water Water Water Water DATE SAMPLED: 2023-11-01 2023-11-01 2023-11-02 2023-11-02 2023-11-02 2023-11-02 2023-11-01 15:55 16:25 14:15 11:45 14:40 13:00 18:00 Parameter Unit G / S: A G / S: B RDL 5423729 5423730 5423731 5423732 5423733 5423734 5423735 NA 7.72 bН pH Units 6.5-8.5 7.77 7.54 7.58 7.46 7.60 7.47 550 Electrical Conductivity uS/cm 2 489 519 523 436 433 486 Total Dissolved Solids 500 10 328[<A] 238[<A] 272[<A] 312[<A] 308[<A] 270[<A] 276[<A] mg/L Alkalinity (as CaCO3) 5 210 175 180 mg/L 30-500 235 176 236 205 Chloride 13.3[<A] 3.64[<A] 3.59[<A] 4.22[<A] mg/L 250 0.10 7.89[<A] 3.75[<A] 22.6[<A] Nitrate as N mg/L 10.0 0.05 0.06[<B] <0.05[<B] 0.07[<B] 0.30[<B] 0.05[<B] <0.05[<B] <0.05[<B] Nitrite as N <0.05[<B] mg/L 1.0 0.05 <0.05[<B] <0.05[<B] <0.05[<B] <0.05[<B] <0.05[<B] <0.05[<B] Sulphate ma/L 500 0.10 28.4[<A] 72.6[<A] 107[<A] 109[<A] 13.3[<A] 51.7[<A] 19.8[<A] Ammonia as N mg/L 0.02 0.06 <0.02 < 0.02 < 0.02 < 0.02 0.97 < 0.02 Chemical Oxygen Demand 5 22 20 15 35 mg/L 24 15 34 Dissolved Organic Carbon mg/L 5 0.5 3.2[<A] 3.1[<A] 1.1[<A] 1.0[<A] 9.4[>A] 1.6[<A] 7.1[>A] Phenols 0.008 0.001 0.003 mg/L 0.001 0.002 0.003 0.003 0.004 0.10 0.26 0.49 <0.10 0.14 0.89 < 0.10 0.36 Total Kjeldahl Nitrogen mg/L Total Phosphorus mg/L 0.02 0.02 0.12 < 0.02 0.03 0.30 0.04 0.08 Dissolved Calcium mg/L 0.05 45.7 58.8 60.0 50.6 50.4 42.1 54.2 **Dissolved Magnesium** 0.05 37.8 40.2 38.5 34.5 33.8 30.1 32.9 mg/L Dissolved Potassium mg/L 0.50 6.11 7.51 5.86 5.86 1.00 5.75 4.97 **Dissolved Sodium** 20 0.05 27.5[>B] ma/L 10.2[<B] 12.6[<B] 26.4[>B] 3.76[<B] 11.6[<B] 16.1[<B] Dissolved Arsenic mg/L 0.01 0.001 <0.001[<B] <0.001[<B] <0.001[<B] <0.001[<B] <0.001[<B] <0.001[<B] <0.001[<B] **Dissolved Barium** mg/L 1.0 0.002 0.014[<B] 0.014[<B] 0.011[<B] 0.011[<B] 0.008[<B] 0.024[<B] 0.034[<B] Dissolved Boron 5.0 0.347[<B] 0.141[<B] mg/L 0.010 0.182[<B] 0.342[<B] 0.396[<B] 0.020[<B] 0.264[<B] Dissolved Cadmium 0.005 0.0001 mg/L <0.0001[<B] <0.0001[<B] <0.0001[<B] <0.0001[<B] <0.0001[<B] <0.0001[<B] <0.0001[<B] Dissolved Chromium mg/L 0.05 0.002 <0.002[<B] <0.002[<B] <0.002[<B] <0.002[<B] <0.002[<B] <0.002[<B] <0.002[<B] Dissolved Copper mg/L 0.001 < 0.001 < 0.001 < 0.001 < 0.001 0.001 < 0.001 0.002 Dissolved Iron mg/L 0.010 0.031 0.024 < 0.010 < 0.010 0.114 0.011 0.072 Dissolved Lead mg/L 0.010 0.0005 <0.0005[<B] <0.0005[<B] <0.0005[<B] <0.0005[<B] <0.0005[<B] <0.0005[<B] <0.0005[<B] Dissolved Manganese 0.002 0.006 0.004 0.005 < 0.002 0.010 mg/L < 0.002 0.009 Dissolved Mercurv ma/L 0.001 0.0001 <0.0001[<B] <0.0001[<B] <0.0001[<B] <0.0001[<B] <0.0001[<B] <0.0001[<B] <0.0001[<B] Dissolved Zinc 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 mg/L < 0.005

Inis Verastegui



AGAT WORK ORDER: 23T088719 PROJECT: TY1410143.2023.FLD.1142.5730-00 5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.aqatlabs.com

CLIENT NAME: WSP E&I CANADA LIMITED

SAMPLING SITE: Providence Bay - GW

**ATTENTION TO: Dominque Gagnon** 

SAMPLED BY:

### Manitoulin Landfill - Groundwater - Column 1

DATE RECEIVED: 2023-11-03

DATE REPORTED: 2023-11-16

**Certified By:** 

Inis Verastegui



AGAT WORK ORDER: 23T088719 PROJECT: TY1410143.2023.FLD.1142.5730-00

**ATTENTION TO: Domingue Gagnon** 

SAMPLED BY:

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

#### CLIENT NAME: WSP E&I CANADA LIMITED

SAMPLING SITE: Providence Bay - GW

#### Manitoulin Landfill - Groundwater - Column 1 DATE RECEIVED: 2023-11-03 **DATE REPORTED: 2023-11-16** SAMPLE DESCRIPTION: OW-11 **OW-12A OW-12B OW-13A** SAMPLE TYPE: Water Water Water Water DATE SAMPLED: 2023-11-02 2023-11-02 2023-11-02 2023-10-31 13:10 13:20 14:30 10:00 Parameter Unit G / S: A G / S: B RDL 5423736 5423737 RDL 5423949 RDL 5424090 NA 7.52 7.58 NA 7.77 7.52 рΗ pH Units 6.5-8.5 NA Electrical Conductivity uS/cm 2 477 357 2 551 2 1880 Total Dissolved Solids 500 10 280[<A] 208[<A] 10 10 314[<A] 1160[>A] mg/L Alkalinity (as CaCO3) 163 5 mg/L 30-500 5 180 226 5 751 Chloride 250 0.10 4.77[<A] 2.87[<A] 0.10 3.81[<A] 0.24 103[<A] ma/L Nitrate as N mg/L 10.0 0.05 <0.05[<B] <0.05[<B] 0.05 <0.05[<B] 0.07 <0.07[<B] Nitrite as N mg/L 1.0 0.05 <0.05[<B] <0.05[<B] 0.05 <0.05[<B] 0.05 0.28[<B] Sulphate mg/L 500 0.10 77.3[<A] 34.0[<A] 0.10 72.0[<A] 0.19 171[<A] Ammonia as N mg/L 0.02 < 0.02 0.04 0.02 0.06 0.03 9.77 5 5 87 Chemical Oxygen Demand mg/L 18 16 24 5 Dissolved Organic Carbon mg/L 5 0.5 1.6[<A] 1.6[<A] 0.5 2.0[<A] 0.5 22.9[>A] Phenols 0.001 0.002 0.004 0.001 0.007 mg/L 0.004 0.009 Total Kjeldahl Nitrogen 0.10 0.66 0.13 0.10 0.20 0.10 12.3 mg/L Total Phosphorus mg/L 0.02 0.08 0.07 0.02 0.02 0.03 < 0.02 Dissolved Calcium ma/L 0.05 51.2 37.9 0.05 56.2 0.05 184 **Dissolved Magnesium** 0.05 32.0 25.1 0.05 38.7 0.05 88.4 mg/L Dissolved Potassium mg/L 0.50 5.84 5.08 0.50 7.78 0.50 40.7 Dissolved Sodium 0.05 12.2[<B] 18.8[<B] 0.05 19.6[<B] 82.5[>B] ma/L 20 0.05 Dissolved Arsenic mg/L 0.01 0.001 <0.001[<B] <0.001[<B] 0.001 0.003[<B] 0.001 0.003[<B] 0.002 0.002 **Dissolved Barium** mg/L 1.0 0.002 0.015[<B] 0.029[<B] 0.027[<B] 0.151[<B] **Dissolved Boron** 5.0 0.010 0.534[<B] 0.010 0.845[<B] mg/L 0.010 0.465[<B] 0.466[<B] Dissolved Cadmium 0.005 0.0001 <0.0001[<B] 0.0001 <0.0001[<B] 0.0001 <0.0001[<B] mg/L <0.0001[<B] Dissolved Chromium mg/L 0.05 0.002 <0.002[<B] <0.002[<B] 0.002 <0.002[<B] 0.002 <0.002[<B] Dissolved Copper mg/L 0.001 < 0.001 < 0.001 0.001 < 0.001 0.001 0.002 Dissolved Iron mg/L 0.010 < 0.010 0.011 0.010 0.016 0.010 0.212 Dissolved Lead mg/L 0.010 0.0005 <0.0005[<B] <0.0005[<B] 0.0005 <0.0005[<B] 0.0005 <0.0005[<B] Dissolved Manganese 0.002 < 0.002 0.024 0.002 0.036 0.002 0.036 mg/L Dissolved Mercury ma/L 0.001 0.0001 <0.0001[<B] <0.0001[<B] 0.0001 <0.0001[<B] 0.0001 <0.0001[<B] Dissolved Zinc 0.005 < 0.005 < 0.005 0.005 < 0.005 0.005 0.005 mg/L



AGAT WORK ORDER: 23T088719 PROJECT: TY1410143.2023.FLD.1142.5730-00 5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.aqatlabs.com

CLIENT NAME: WSP E&I CANADA LIMITED

SAMPLING SITE: Providence Bay - GW

**ATTENTION TO: Dominque Gagnon** 

SAMPLED BY:

### Manitoulin Landfill - Groundwater - Column 1

DATE RECEIVED: 2023-11-03

DATE REPORTED: 2023-11-16

**Certified By:** 

Inis Verastegui



AGAT WORK ORDER: 23T088719 PROJECT: TY1410143.2023.FLD.1142.5730-00 5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.aqatlabs.com

#### CLIENT NAME: WSP E&I CANADA LIMITED

SAMPLING SITE: Providence Bay - GW

#### **ATTENTION TO: Dominque Gagnon**

SAMPLED BY:

DATE RECEIVED: 2023-11-0	3								DATE REPORTE	D: 2023-11-1	6
			SAMPLE DE SA DAT	ESCRIPTION: MPLE TYPE: E SAMPLED:	OW-13B Water 2023-10-31 14:10		OW-14A Water 2023-10-31 17:30		OW-14B Water 2023-10-31 17:10		OW-15A Water 2023-11-02 10:45
Parameter	Unit	G / S: A	G / S: B	RDL	5424118	RDL	5424119	RDL	5424120	RDL	5424195
рН	pH Units	6.5-8.5		NA	7.86	NA	7.95	NA	7.86	NA	7.84
Electrical Conductivity	µS/cm			2	746	2	909	2	457	2	1170
Total Dissolved Solids	mg/L	500		10	440[ <a]< td=""><td>10</td><td>562[&gt;A]</td><td>10</td><td>250[<a]< td=""><td>10</td><td>750[&gt;A]</td></a]<></td></a]<>	10	562[>A]	10	250[ <a]< td=""><td>10</td><td>750[&gt;A]</td></a]<>	10	750[>A]
Alkalinity (as CaCO3)	mg/L	30-500		5	314	5	368	5	233	5	214
Chloride	mg/L	250		0.10	26.5[ <a]< td=""><td>0.12</td><td>54.2[<a]< td=""><td>0.10</td><td>3.50[<a]< td=""><td>0.12</td><td>160[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<>	0.12	54.2[ <a]< td=""><td>0.10</td><td>3.50[<a]< td=""><td>0.12</td><td>160[<a]< td=""></a]<></td></a]<></td></a]<>	0.10	3.50[ <a]< td=""><td>0.12</td><td>160[<a]< td=""></a]<></td></a]<>	0.12	160[ <a]< td=""></a]<>
Nitrate as N	mg/L		10.0	0.05	<0.05[ <b]< td=""><td>0.05</td><td>&lt;0.05[<b]< td=""><td>0.05</td><td>&lt;0.05[<b]< td=""><td>0.05</td><td>&lt;0.05[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	0.05	<0.05[ <b]< td=""><td>0.05</td><td>&lt;0.05[<b]< td=""><td>0.05</td><td>&lt;0.05[<b]< td=""></b]<></td></b]<></td></b]<>	0.05	<0.05[ <b]< td=""><td>0.05</td><td>&lt;0.05[<b]< td=""></b]<></td></b]<>	0.05	<0.05[ <b]< td=""></b]<>
Nitrite as N	mg/L		1.0	0.05	<0.05[ <b]< td=""><td>0.05</td><td>0.23[<b]< td=""><td>0.05</td><td>&lt;0.05[<b]< td=""><td>0.05</td><td>&lt;0.05[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	0.05	0.23[ <b]< td=""><td>0.05</td><td>&lt;0.05[<b]< td=""><td>0.05</td><td>&lt;0.05[<b]< td=""></b]<></td></b]<></td></b]<>	0.05	<0.05[ <b]< td=""><td>0.05</td><td>&lt;0.05[<b]< td=""></b]<></td></b]<>	0.05	<0.05[ <b]< td=""></b]<>
Sulphate	mg/L	500		0.10	60.5[ <a]< td=""><td>0.10</td><td>60.1[<a]< td=""><td>0.10</td><td>19.7[<a]< td=""><td>0.10</td><td>188[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<>	0.10	60.1[ <a]< td=""><td>0.10</td><td>19.7[<a]< td=""><td>0.10</td><td>188[<a]< td=""></a]<></td></a]<></td></a]<>	0.10	19.7[ <a]< td=""><td>0.10</td><td>188[<a]< td=""></a]<></td></a]<>	0.10	188[ <a]< td=""></a]<>
Ammonia as N	mg/L			0.02	0.25	0.02	<0.02	0.02	<0.02	0.02	<0.02
Chemical Oxygen Demand	mg/L			5	27	5	39	5	23	5	47
Dissolved Organic Carbon	mg/L	5		0.5	6.7[>A]	0.5	9.1[>A]	0.5	2.9[ <a]< td=""><td>0.5</td><td>3.4[<a]< td=""></a]<></td></a]<>	0.5	3.4[ <a]< td=""></a]<>
Phenols	mg/L			0.001	0.003	0.001	0.004	0.001	0.003	0.001	0.020
Total Kjeldahl Nitrogen	mg/L			0.10	0.63	0.10	0.38	0.10	0.15	0.10	0.50
Total Phosphorus	mg/L			0.02	0.03	0.02	<0.02	0.02	0.05	0.02	0.19
Dissolved Calcium	mg/L			0.05	82.4	0.05	96.2	0.05	46.8	0.05	50.0
Dissolved Magnesium	mg/L			0.05	57.1	0.05	74.3	0.05	38.5	0.05	42.4
Dissolved Potassium	mg/L			0.50	10.3	0.50	6.34	0.50	5.99	0.50	7.56
Dissolved Sodium	mg/L		20	0.05	23.9[>B]	0.05	17.4[ <b]< td=""><td>0.05</td><td>10.6[<b]< td=""><td>0.05</td><td>37.5[&gt;B]</td></b]<></td></b]<>	0.05	10.6[ <b]< td=""><td>0.05</td><td>37.5[&gt;B]</td></b]<>	0.05	37.5[>B]
Dissolved Arsenic	mg/L		0.01	0.001	0.001[ <b]< td=""><td>0.001</td><td>0.001[<b]< td=""><td>0.001</td><td>&lt;0.001[<b]< td=""><td>0.001</td><td>0.002[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	0.001	0.001[ <b]< td=""><td>0.001</td><td>&lt;0.001[<b]< td=""><td>0.001</td><td>0.002[<b]< td=""></b]<></td></b]<></td></b]<>	0.001	<0.001[ <b]< td=""><td>0.001</td><td>0.002[<b]< td=""></b]<></td></b]<>	0.001	0.002[ <b]< td=""></b]<>
Dissolved Barium	mg/L		1.0	0.002	0.043[ <b]< td=""><td>0.002</td><td>0.035[<b]< td=""><td>0.002</td><td>0.017[<b]< td=""><td>0.002</td><td>0.031[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	0.002	0.035[ <b]< td=""><td>0.002</td><td>0.017[<b]< td=""><td>0.002</td><td>0.031[<b]< td=""></b]<></td></b]<></td></b]<>	0.002	0.017[ <b]< td=""><td>0.002</td><td>0.031[<b]< td=""></b]<></td></b]<>	0.002	0.031[ <b]< td=""></b]<>
Dissolved Boron	mg/L		5.0	0.010	0.313[ <b]< td=""><td>0.010</td><td>0.101[<b]< td=""><td>0.010</td><td>0.197[<b]< td=""><td>0.010</td><td>0.194[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	0.010	0.101[ <b]< td=""><td>0.010</td><td>0.197[<b]< td=""><td>0.010</td><td>0.194[<b]< td=""></b]<></td></b]<></td></b]<>	0.010	0.197[ <b]< td=""><td>0.010</td><td>0.194[<b]< td=""></b]<></td></b]<>	0.010	0.194[ <b]< td=""></b]<>
Dissolved Cadmium	mg/L		0.005	0.0001	<0.0001[ <b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	0.0001	<0.0001[ <b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""></b]<></td></b]<></td></b]<>	0.0001	<0.0001[ <b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""></b]<></td></b]<>	0.0001	<0.0001[ <b]< td=""></b]<>
Dissolved Chromium	mg/L		0.05	0.002	<0.002[ <b]< td=""><td>0.002</td><td>&lt;0.002[<b]< td=""><td>0.002</td><td>&lt;0.002[<b]< td=""><td>0.002</td><td>&lt;0.002[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	0.002	<0.002[ <b]< td=""><td>0.002</td><td>&lt;0.002[<b]< td=""><td>0.002</td><td>&lt;0.002[<b]< td=""></b]<></td></b]<></td></b]<>	0.002	<0.002[ <b]< td=""><td>0.002</td><td>&lt;0.002[<b]< td=""></b]<></td></b]<>	0.002	<0.002[ <b]< td=""></b]<>
Dissolved Copper	mg/L			0.001	<0.001	0.001	<0.001	0.001	<0.001	0.001	<0.001
Dissolved Iron	mg/L			0.010	0.229	0.010	0.093	0.010	0.024	0.010	<0.010
Dissolved Lead	mg/L		0.010	0.0005	<0.0005[ <b]< td=""><td>0.0005</td><td>&lt;0.0005[<b]< td=""><td>0.0005</td><td>&lt;0.0005[<b]< td=""><td>0.0005</td><td>&lt;0.0005[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	0.0005	<0.0005[ <b]< td=""><td>0.0005</td><td>&lt;0.0005[<b]< td=""><td>0.0005</td><td>&lt;0.0005[<b]< td=""></b]<></td></b]<></td></b]<>	0.0005	<0.0005[ <b]< td=""><td>0.0005</td><td>&lt;0.0005[<b]< td=""></b]<></td></b]<>	0.0005	<0.0005[ <b]< td=""></b]<>
Dissolved Manganese	mg/L			0.002	0.024	0.002	0.043	0.002	0.007	0.002	0.117
Dissolved Mercury	mg/L		0.001	0.0001	<0.0001[ <b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	0.0001	<0.0001[ <b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""></b]<></td></b]<></td></b]<>	0.0001	<0.0001[ <b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""></b]<></td></b]<>	0.0001	<0.0001[ <b]< td=""></b]<>
Dissolved Zinc	mg/L			0.005	<0.005	0.005	<0.005	0.005	<0.005	0.005	<0.005

Manitoulin Landfill - Groundwater - Column 1

Inis Verastegui



AGAT WORK ORDER: 23T088719 PROJECT: TY1410143.2023.FLD.1142.5730-00 5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

CLIENT NAME: WSP E&I CANADA LIMITED

SAMPLING SITE: Providence Bay - GW

**ATTENTION TO: Dominque Gagnon** 

SAMPLED BY:

### Manitoulin Landfill - Groundwater - Column 1

DATE RECEIVED: 2023-11-03

DATE REPORTED: 2023-11-16

**Certified By:** 

Inis Verastegui



AGAT WORK ORDER: 23T088719 PROJECT: TY1410143.2023.FLD.1142.5730-00 5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.aqatlabs.com

#### CLIENT NAME: WSP E&I CANADA LIMITED

SAMPLING SITE: Providence Bay - GW

#### **ATTENTION TO: Dominque Gagnon**

SAMPLED BY:

			Man			manutor					
DATE RECEIVED: 2023-11-0	3							D	ATE REPOR	FED: 2023-11-16	
			SAMPLE DI SA DAT	ESCRIPTION: MPLE TYPE: E SAMPLED:	OW-15B Water 2023-11-02 10:55		OW-16A Water 2023-11-02 11:35	OW-16B Water 2023-11-02 11:20		OW-17A Water 2023-11-02 09:20	
Parameter	Unit	G / S: A	G / S: B	RDL	5424196	RDL	5424197	5424198	RDL	5424201	
рН	pH Units	6.5-8.5		NA	7.73	NA	7.95	7.99	NA	7.51	
Electrical Conductivity	µS/cm			2	1970	2	989	1050	2	483	
Total Dissolved Solids	mg/L	500		10	1360[>A]	10	600[>A]	628[>A]	10	284[ <a]< td=""><td></td></a]<>	
Alkalinity (as CaCO3)	mg/L	30-500		5	194	5	381	215	5	235	
Chloride	mg/L	250		0.24	260[>A]	0.12	92.8[ <a]< td=""><td>171[<a]< td=""><td>0.10</td><td>11.1[<a]< td=""><td></td></a]<></td></a]<></td></a]<>	171[ <a]< td=""><td>0.10</td><td>11.1[<a]< td=""><td></td></a]<></td></a]<>	0.10	11.1[ <a]< td=""><td></td></a]<>	
Nitrate as N	mg/L		10.0	0.07	<0.07[ <b]< td=""><td>0.05</td><td>&lt;0.05[<b]< td=""><td>&lt;0.05[<b]< td=""><td>0.05</td><td>0.05[<b]< td=""><td></td></b]<></td></b]<></td></b]<></td></b]<>	0.05	<0.05[ <b]< td=""><td>&lt;0.05[<b]< td=""><td>0.05</td><td>0.05[<b]< td=""><td></td></b]<></td></b]<></td></b]<>	<0.05[ <b]< td=""><td>0.05</td><td>0.05[<b]< td=""><td></td></b]<></td></b]<>	0.05	0.05[ <b]< td=""><td></td></b]<>	
Nitrite as N	mg/L		1.0	0.05	<0.05[ <b]< td=""><td>0.05</td><td>&lt;0.05[<b]< td=""><td>&lt;0.05[<b]< td=""><td>0.05</td><td>&lt;0.05[<b]< td=""><td></td></b]<></td></b]<></td></b]<></td></b]<>	0.05	<0.05[ <b]< td=""><td>&lt;0.05[<b]< td=""><td>0.05</td><td>&lt;0.05[<b]< td=""><td></td></b]<></td></b]<></td></b]<>	<0.05[ <b]< td=""><td>0.05</td><td>&lt;0.05[<b]< td=""><td></td></b]<></td></b]<>	0.05	<0.05[ <b]< td=""><td></td></b]<>	
Sulphate	mg/L	500		0.19	538[>A]	0.10	31.9[ <a]< td=""><td>99.1[<a]< td=""><td>0.10</td><td>23.6[<a]< td=""><td></td></a]<></td></a]<></td></a]<>	99.1[ <a]< td=""><td>0.10</td><td>23.6[<a]< td=""><td></td></a]<></td></a]<>	0.10	23.6[ <a]< td=""><td></td></a]<>	
Ammonia as N	mg/L			0.02	<0.02	0.02	0.15	<0.02	0.02	<0.02	
Chemical Oxygen Demand	mg/L			5	43	5	63	28	5	42	
Dissolved Organic Carbon	mg/L	5		0.5	3.1[ <a]< td=""><td>0.5</td><td>11.4[&gt;A]</td><td>3.1[<a]< td=""><td>0.5</td><td>10.8[&gt;A]</td><td></td></a]<></td></a]<>	0.5	11.4[>A]	3.1[ <a]< td=""><td>0.5</td><td>10.8[&gt;A]</td><td></td></a]<>	0.5	10.8[>A]	
Phenols	mg/L			0.004	0.012	0.004	0.011	0.015	0.004	0.007	
Total Kjeldahl Nitrogen	mg/L			0.10	1.81	0.10	13.7	1.90	0.10	0.96	
Total Phosphorus	mg/L			0.02	0.33	0.02	0.07	0.02	0.02	0.07	
Dissolved Calcium	mg/L			0.05	153	0.05	92.3	56.7	0.05	58.1	
Dissolved Magnesium	mg/L			0.05	126	0.05	85.7	51.1	0.05	35.2	
Dissolved Potassium	mg/L			0.50	19.5	0.50	11.9	11.9	0.50	1.96	
Dissolved Sodium	mg/L		20	0.05	141[>B]	0.05	47.4[>B]	83.4[>B]	0.05	4.96[ <b]< td=""><td></td></b]<>	
Dissolved Arsenic	mg/L		0.01	0.001	0.009[ <b]< td=""><td>0.001</td><td>0.017[&gt;B]</td><td>0.006[<b]< td=""><td>0.001</td><td>&lt;0.001[<b]< td=""><td></td></b]<></td></b]<></td></b]<>	0.001	0.017[>B]	0.006[ <b]< td=""><td>0.001</td><td>&lt;0.001[<b]< td=""><td></td></b]<></td></b]<>	0.001	<0.001[ <b]< td=""><td></td></b]<>	
Dissolved Barium	mg/L		1.0	0.002	0.036[ <b]< td=""><td>0.002</td><td>0.082[<b]< td=""><td>0.045[<b]< td=""><td>0.002</td><td>0.011[<b]< td=""><td></td></b]<></td></b]<></td></b]<></td></b]<>	0.002	0.082[ <b]< td=""><td>0.045[<b]< td=""><td>0.002</td><td>0.011[<b]< td=""><td></td></b]<></td></b]<></td></b]<>	0.045[ <b]< td=""><td>0.002</td><td>0.011[<b]< td=""><td></td></b]<></td></b]<>	0.002	0.011[ <b]< td=""><td></td></b]<>	
Dissolved Boron	mg/L		5.0	0.010	0.551[ <b]< td=""><td>0.010</td><td>0.151[<b]< td=""><td>0.286[<b]< td=""><td>0.010</td><td>0.039[<b]< td=""><td></td></b]<></td></b]<></td></b]<></td></b]<>	0.010	0.151[ <b]< td=""><td>0.286[<b]< td=""><td>0.010</td><td>0.039[<b]< td=""><td></td></b]<></td></b]<></td></b]<>	0.286[ <b]< td=""><td>0.010</td><td>0.039[<b]< td=""><td></td></b]<></td></b]<>	0.010	0.039[ <b]< td=""><td></td></b]<>	
Dissolved Cadmium	mg/L		0.005	0.0001	<0.0001[ <b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""><td>&lt;0.0001[<b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""><td></td></b]<></td></b]<></td></b]<></td></b]<>	0.0001	<0.0001[ <b]< td=""><td>&lt;0.0001[<b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""><td></td></b]<></td></b]<></td></b]<>	<0.0001[ <b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""><td></td></b]<></td></b]<>	0.0001	<0.0001[ <b]< td=""><td></td></b]<>	
Dissolved Chromium	mg/L		0.05	0.002	<0.002[ <b]< td=""><td>0.002</td><td>&lt;0.002[<b]< td=""><td>&lt;0.002[<b]< td=""><td>0.002</td><td>&lt;0.002[<b]< td=""><td></td></b]<></td></b]<></td></b]<></td></b]<>	0.002	<0.002[ <b]< td=""><td>&lt;0.002[<b]< td=""><td>0.002</td><td>&lt;0.002[<b]< td=""><td></td></b]<></td></b]<></td></b]<>	<0.002[ <b]< td=""><td>0.002</td><td>&lt;0.002[<b]< td=""><td></td></b]<></td></b]<>	0.002	<0.002[ <b]< td=""><td></td></b]<>	
Dissolved Copper	mg/L			0.001	<0.001	0.001	<0.001	<0.001	0.001	0.001	
Dissolved Iron	mg/L			0.010	<0.010	0.010	0.083	<0.010	0.010	0.160	
Dissolved Lead	mg/L		0.010	0.0005	<0.0005[ <b]< td=""><td>0.0005</td><td>&lt;0.0005[<b]< td=""><td>&lt;0.0005[<b]< td=""><td>0.0005</td><td>&lt;0.0005[<b]< td=""><td></td></b]<></td></b]<></td></b]<></td></b]<>	0.0005	<0.0005[ <b]< td=""><td>&lt;0.0005[<b]< td=""><td>0.0005</td><td>&lt;0.0005[<b]< td=""><td></td></b]<></td></b]<></td></b]<>	<0.0005[ <b]< td=""><td>0.0005</td><td>&lt;0.0005[<b]< td=""><td></td></b]<></td></b]<>	0.0005	<0.0005[ <b]< td=""><td></td></b]<>	
Dissolved Manganese	mg/L			0.002	0.124	0.002	0.225	0.055	0.002	0.009	
Dissolved Mercury	mg/L		0.001	0.0001	<0.0001[ <b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""><td>&lt;0.0001[<b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""><td></td></b]<></td></b]<></td></b]<></td></b]<>	0.0001	<0.0001[ <b]< td=""><td>&lt;0.0001[<b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""><td></td></b]<></td></b]<></td></b]<>	<0.0001[ <b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""><td></td></b]<></td></b]<>	0.0001	<0.0001[ <b]< td=""><td></td></b]<>	
Dissolved Zinc	mg/L			0.005	<0.005	0.005	<0.005	< 0.005	0.005	<0.005	

Manitoulin Landfill - Groundwater - Column 1

Irús Verastegui



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SAMPLING SITE: Providence Bay - GW

**ATTENTION TO: Dominque Gagnon** 

SAMPLED BY:

### Manitoulin Landfill - Groundwater - Column 1

DATE RECEIVED: 2023-11-03

DATE REPORTED: 2023-11-16

**Certified By:** 

Inis Verastegui



AGAT WORK ORDER: 23T088719 PROJECT: TY1410143.2023.FLD.1142.5730-00 5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.aqatlabs.com

#### CLIENT NAME: WSP E&I CANADA LIMITED

SAMPLING SITE: Providence Bay - GW

#### **ATTENTION TO: Dominque Gagnon**

SAMPLED BY:

			Man			manator	oolullii i				
DATE RECEIVED: 2023-11-0	3								DATE REPORT	ED: 2023-11-16	
			SAMPLE DI SA DAT	ESCRIPTION: MPLE TYPE: E SAMPLED:	OW-17B Water 2023-11-02 09:30		OW-18 Water 2023-11-02 12:30		PB DUP1 Water 2023-10-31 14:10	PB DUP2 Water 2023-10-31 17:10	PB DUP3 Water 2023-11-01 18:00
Parameter	Unit	G / S: A	G / S: B	RDL	5424202	RDL	5424205	RDL	5424295	5424296	5424299
рН	pH Units	6.5-8.5		NA	7.69	NA	7.45	NA	7.80	7.85	7.62
Electrical Conductivity	µS/cm			2	469	2	4300	2	740	453	484
Total Dissolved Solids	mg/L	500		10	272[ <a]< td=""><td>10</td><td>2180[&gt;A]</td><td>10</td><td>426[<a]< td=""><td>252[<a]< td=""><td>268[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<>	10	2180[>A]	10	426[ <a]< td=""><td>252[<a]< td=""><td>268[<a]< td=""></a]<></td></a]<></td></a]<>	252[ <a]< td=""><td>268[<a]< td=""></a]<></td></a]<>	268[ <a]< td=""></a]<>
Alkalinity (as CaCO3)	mg/L	30-500		5	211	5	1560	5	313	230	213
Chloride	mg/L	250		0.10	16.2[ <a]< td=""><td>1.2</td><td>423[&gt;A]</td><td>0.10</td><td>26.7[<a]< td=""><td>3.52[<a]< td=""><td>23.1[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<>	1.2	423[>A]	0.10	26.7[ <a]< td=""><td>3.52[<a]< td=""><td>23.1[<a]< td=""></a]<></td></a]<></td></a]<>	3.52[ <a]< td=""><td>23.1[<a]< td=""></a]<></td></a]<>	23.1[ <a]< td=""></a]<>
Nitrate as N	mg/L		10.0	0.05	<0.05[ <b]< td=""><td>0.36</td><td>5.71[<b]< td=""><td>0.05</td><td>&lt;0.05[<b]< td=""><td>&lt;0.05[<b]< td=""><td>0.09[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	0.36	5.71[ <b]< td=""><td>0.05</td><td>&lt;0.05[<b]< td=""><td>&lt;0.05[<b]< td=""><td>0.09[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	0.05	<0.05[ <b]< td=""><td>&lt;0.05[<b]< td=""><td>0.09[<b]< td=""></b]<></td></b]<></td></b]<>	<0.05[ <b]< td=""><td>0.09[<b]< td=""></b]<></td></b]<>	0.09[ <b]< td=""></b]<>
Nitrite as N	mg/L		1.0	0.05	<0.05[ <b]< td=""><td>0.27</td><td>2.47[&gt;B]</td><td>0.05</td><td>&lt;0.05[<b]< td=""><td>&lt;0.05[<b]< td=""><td>&lt;0.05[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	0.27	2.47[>B]	0.05	<0.05[ <b]< td=""><td>&lt;0.05[<b]< td=""><td>&lt;0.05[<b]< td=""></b]<></td></b]<></td></b]<>	<0.05[ <b]< td=""><td>&lt;0.05[<b]< td=""></b]<></td></b]<>	<0.05[ <b]< td=""></b]<>
Sulphate	mg/L	500		0.10	25.8[ <a]< td=""><td>0.95</td><td>82.2[<a]< td=""><td>0.10</td><td>61.0[<a]< td=""><td>19.8[<a]< td=""><td>21.4[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<></td></a]<>	0.95	82.2[ <a]< td=""><td>0.10</td><td>61.0[<a]< td=""><td>19.8[<a]< td=""><td>21.4[<a]< td=""></a]<></td></a]<></td></a]<></td></a]<>	0.10	61.0[ <a]< td=""><td>19.8[<a]< td=""><td>21.4[<a]< td=""></a]<></td></a]<></td></a]<>	19.8[ <a]< td=""><td>21.4[<a]< td=""></a]<></td></a]<>	21.4[ <a]< td=""></a]<>
Ammonia as N	mg/L			0.02	<0.02	0.13	64.0	0.02	0.20	<0.02	0.13
Chemical Oxygen Demand	mg/L			5	36	10	311	5	33	20	55
Dissolved Organic Carbon	mg/L	5		0.5	8.5[>A]	0.5	32.9[>A]	0.5	8.3[>A]	2.7[ <a]< td=""><td>6.9[&gt;A]</td></a]<>	6.9[>A]
Phenols	mg/L			0.001	0.005	0.004	0.017	0.001	0.005	0.003	0.002
Total Kjeldahl Nitrogen	mg/L			0.10	0.59	0.14	125	0.10	0.62	<0.10	0.45
Total Phosphorus	mg/L			0.02	0.35	0.02	0.24	0.02	0.03	0.03	0.06
Dissolved Calcium	mg/L			0.05	54.7	0.05	178	0.05	76.0	44.1	53.8
Dissolved Magnesium	mg/L			0.05	32.2	0.05	123	0.05	52.8	35.4	31.9
Dissolved Potassium	mg/L			0.50	3.71	0.50	113	0.50	9.72	5.58	4.76
Dissolved Sodium	mg/L		20	0.05	18.9[ <b]< td=""><td>0.10</td><td>359[&gt;B]</td><td>0.05</td><td>23.2[&gt;B]</td><td>9.75[<b]< td=""><td>15.5[<b]< td=""></b]<></td></b]<></td></b]<>	0.10	359[>B]	0.05	23.2[>B]	9.75[ <b]< td=""><td>15.5[<b]< td=""></b]<></td></b]<>	15.5[ <b]< td=""></b]<>
Dissolved Arsenic	mg/L		0.01	0.001	0.004[ <b]< td=""><td>0.001</td><td>0.008[<b]< td=""><td>0.001</td><td>0.001[<b]< td=""><td>0.001[<b]< td=""><td>&lt;0.001[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	0.001	0.008[ <b]< td=""><td>0.001</td><td>0.001[<b]< td=""><td>0.001[<b]< td=""><td>&lt;0.001[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	0.001	0.001[ <b]< td=""><td>0.001[<b]< td=""><td>&lt;0.001[<b]< td=""></b]<></td></b]<></td></b]<>	0.001[ <b]< td=""><td>&lt;0.001[<b]< td=""></b]<></td></b]<>	<0.001[ <b]< td=""></b]<>
Dissolved Barium	mg/L		1.0	0.002	0.025[ <b]< td=""><td>0.002</td><td>0.292[<b]< td=""><td>0.002</td><td>0.043[<b]< td=""><td>0.017[<b]< td=""><td>0.033[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	0.002	0.292[ <b]< td=""><td>0.002</td><td>0.043[<b]< td=""><td>0.017[<b]< td=""><td>0.033[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	0.002	0.043[ <b]< td=""><td>0.017[<b]< td=""><td>0.033[<b]< td=""></b]<></td></b]<></td></b]<>	0.017[ <b]< td=""><td>0.033[<b]< td=""></b]<></td></b]<>	0.033[ <b]< td=""></b]<>
Dissolved Boron	mg/L		5.0	0.010	0.145[ <b]< td=""><td>0.010</td><td>0.663[<b]< td=""><td>0.010</td><td>0.325[<b]< td=""><td>0.213[<b]< td=""><td>0.151[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	0.010	0.663[ <b]< td=""><td>0.010</td><td>0.325[<b]< td=""><td>0.213[<b]< td=""><td>0.151[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	0.010	0.325[ <b]< td=""><td>0.213[<b]< td=""><td>0.151[<b]< td=""></b]<></td></b]<></td></b]<>	0.213[ <b]< td=""><td>0.151[<b]< td=""></b]<></td></b]<>	0.151[ <b]< td=""></b]<>
Dissolved Cadmium	mg/L		0.005	0.0001	<0.0001[ <b]< td=""><td>0.0001</td><td>0.0002[<b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""><td>&lt;0.0001[<b]< td=""><td>&lt;0.0001[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	0.0001	0.0002[ <b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""><td>&lt;0.0001[<b]< td=""><td>&lt;0.0001[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	0.0001	<0.0001[ <b]< td=""><td>&lt;0.0001[<b]< td=""><td>&lt;0.0001[<b]< td=""></b]<></td></b]<></td></b]<>	<0.0001[ <b]< td=""><td>&lt;0.0001[<b]< td=""></b]<></td></b]<>	<0.0001[ <b]< td=""></b]<>
Dissolved Chromium	mg/L		0.05	0.002	<0.002[ <b]< td=""><td>0.002</td><td>0.003[<b]< td=""><td>0.002</td><td>&lt;0.002[<b]< td=""><td>&lt;0.002[<b]< td=""><td>&lt;0.002[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	0.002	0.003[ <b]< td=""><td>0.002</td><td>&lt;0.002[<b]< td=""><td>&lt;0.002[<b]< td=""><td>&lt;0.002[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	0.002	<0.002[ <b]< td=""><td>&lt;0.002[<b]< td=""><td>&lt;0.002[<b]< td=""></b]<></td></b]<></td></b]<>	<0.002[ <b]< td=""><td>&lt;0.002[<b]< td=""></b]<></td></b]<>	<0.002[ <b]< td=""></b]<>
Dissolved Copper	mg/L			0.001	<0.001	0.001	0.016	0.001	<0.001	<0.001	0.002
Dissolved Iron	mg/L			0.010	0.022	0.010	0.553	0.010	0.229	0.037	0.074
Dissolved Lead	mg/L		0.010	0.0005	<0.0005[ <b]< td=""><td>0.0005</td><td>&lt;0.0005[<b]< td=""><td>0.0005</td><td>&lt;0.0005[<b]< td=""><td>&lt;0.0005[<b]< td=""><td>&lt;0.0005[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	0.0005	<0.0005[ <b]< td=""><td>0.0005</td><td>&lt;0.0005[<b]< td=""><td>&lt;0.0005[<b]< td=""><td>&lt;0.0005[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	0.0005	<0.0005[ <b]< td=""><td>&lt;0.0005[<b]< td=""><td>&lt;0.0005[<b]< td=""></b]<></td></b]<></td></b]<>	<0.0005[ <b]< td=""><td>&lt;0.0005[<b]< td=""></b]<></td></b]<>	<0.0005[ <b]< td=""></b]<>
Dissolved Manganese	mg/L			0.002	0.116	0.002	0.293	0.002	0.026	0.006	0.013
Dissolved Mercury	mg/L		0.001	0.0001	<0.0001[ <b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""><td>&lt;0.0001[<b]< td=""><td>&lt;0.0001[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<></td></b]<>	0.0001	<0.0001[ <b]< td=""><td>0.0001</td><td>&lt;0.0001[<b]< td=""><td>&lt;0.0001[<b]< td=""><td>&lt;0.0001[<b]< td=""></b]<></td></b]<></td></b]<></td></b]<>	0.0001	<0.0001[ <b]< td=""><td>&lt;0.0001[<b]< td=""><td>&lt;0.0001[<b]< td=""></b]<></td></b]<></td></b]<>	<0.0001[ <b]< td=""><td>&lt;0.0001[<b]< td=""></b]<></td></b]<>	<0.0001[ <b]< td=""></b]<>
Dissolved Zinc	mg/L			0.005	<0.005	0.005	<0.005	0.005	<0.005	<0.005	<0.005

Manitoulin Landfill - Groundwater - Column 1

Inis Verastegui



AGAT WORK ORDER: 23T088719 PROJECT: TY1410143.2023.FLD.1142.5730-00 5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

#### CLIENT NAME: WSP E&I CANADA LIMITED

#### SAMPLING SITE: Providence Bay - GW

**ATTENTION TO: Dominque Gagnon** 

SAMPLED BY:

#### Manitoulin Landfill - Groundwater - Column 1

#### DATE RECEIVED: 2023-11-03

DATE REPORTED: 2023-11-16

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: A Refers to O. Reg 169/03 - Ontario Drinking Water Quality Standards - Aesthetic Objectives and Operational Guidelines, B Refers to O. Reg 169/03 - Ontario Drinking Water Quality Standards. Na value derived from O. Reg 248

Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation. 5423719-5424299 Metals analysis completed on a filtered sample.

Dilution required, RDL has been increased accordingly.

Analysis performed at AGAT Toronto (unless marked by \*)

**Certified By:** 

Inis Verastegui



### **Exceedance Summary**

AGAT WORK ORDER: 23T088719 PROJECT: TY1410143.2023.FLD.1142.5730-00 5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

#### CLIENT NAME: WSP E&I CANADA LIMITED

#### ATTENTION TO: Dominque Gagnon

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
5423719	OW-1	ON 169/03 AO&OG	Manitoulin Landfill - Groundwater - Column 1	Dissolved Organic Carbon	mg/L	5	9.3
5423719	OW-1	ON 169/03 AO&OG	Manitoulin Landfill - Groundwater - Column 1	Total Dissolved Solids	mg/L	500	590
5423719	OW-1	ON 169/03 MAC/IMAC	Manitoulin Landfill - Groundwater - Column 1	Dissolved Sodium	mg/L	20	28.8
5423727	OW-3A	ON 169/03 AO&OG	Manitoulin Landfill - Groundwater - Column 1	Dissolved Organic Carbon	mg/L	5	12.8
5423727	OW-3A	ON 169/03 AO&OG	Manitoulin Landfill - Groundwater - Column 1	Total Dissolved Solids	mg/L	500	668
5423727	OW-3A	ON 169/03 MAC/IMAC	Manitoulin Landfill - Groundwater - Column 1	Dissolved Sodium	mg/L	20	52.9
5423728	OW-3B	ON 169/03 MAC/IMAC	Manitoulin Landfill - Groundwater - Column 1	Dissolved Sodium	mg/L	20	43.1
5423730	OW-5	ON 169/03 MAC/IMAC	Manitoulin Landfill - Groundwater - Column 1	Dissolved Sodium	mg/L	20	27.5
5423732	OW-7	ON 169/03 MAC/IMAC	Manitoulin Landfill - Groundwater - Column 1	Dissolved Sodium	mg/L	20	26.4
5423733	OW-8	ON 169/03 AO&OG	Manitoulin Landfill - Groundwater - Column 1	Dissolved Organic Carbon	mg/L	5	9.4
5423735	OW-10	ON 169/03 AO&OG	Manitoulin Landfill - Groundwater - Column 1	Dissolved Organic Carbon	mg/L	5	7.1
5424090	OW-13A	ON 169/03 AO&OG	Manitoulin Landfill - Groundwater - Column 1	Alkalinity (as CaCO3)	mg/L	30-500	751
5424090	OW-13A	ON 169/03 AO&OG	Manitoulin Landfill - Groundwater - Column 1	Dissolved Organic Carbon	mg/L	5	22.9
5424090	OW-13A	ON 169/03 AO&OG	Manitoulin Landfill - Groundwater - Column 1	Total Dissolved Solids	mg/L	500	1160
5424090	OW-13A	ON 169/03 MAC/IMAC	Manitoulin Landfill - Groundwater - Column 1	Dissolved Sodium	mg/L	20	82.5
5424118	OW-13B	ON 169/03 AO&OG	Manitoulin Landfill - Groundwater - Column 1	Dissolved Organic Carbon	mg/L	5	6.7
5424118	OW-13B	ON 169/03 MAC/IMAC	Manitoulin Landfill - Groundwater - Column 1	Dissolved Sodium	mg/L	20	23.9
5424119	OW-14A	ON 169/03 AO&OG	Manitoulin Landfill - Groundwater - Column 1	Dissolved Organic Carbon	mg/L	5	9.1
5424119	OW-14A	ON 169/03 AO&OG	Manitoulin Landfill - Groundwater - Column 1	Total Dissolved Solids	mg/L	500	562
5424195	OW-15A	ON 169/03 AO&OG	Manitoulin Landfill - Groundwater - Column 1	Total Dissolved Solids	mg/L	500	750
5424195	OW-15A	ON 169/03 MAC/IMAC	Manitoulin Landfill - Groundwater - Column 1	Dissolved Sodium	mg/L	20	37.5
5424196	OW-15B	ON 169/03 AO&OG	Manitoulin Landfill - Groundwater - Column 1	Chloride	mg/L	250	260
5424196	OW-15B	ON 169/03 AO&OG	Manitoulin Landfill - Groundwater - Column 1	Sulphate	mg/L	500	538
5424196	OW-15B	ON 169/03 AO&OG	Manitoulin Landfill - Groundwater - Column 1	Total Dissolved Solids	mg/L	500	1360
5424196	OW-15B	ON 169/03 MAC/IMAC	Manitoulin Landfill - Groundwater - Column 1	Dissolved Sodium	mg/L	20	141
5424197	OW-16A	ON 169/03 AO&OG	Manitoulin Landfill - Groundwater - Column 1	Dissolved Organic Carbon	mg/L	5	11.4
5424197	OW-16A	ON 169/03 AO&OG	Manitoulin Landfill - Groundwater - Column 1	Total Dissolved Solids	mg/L	500	600
5424197	OW-16A	ON 169/03 MAC/IMAC	Manitoulin Landfill - Groundwater - Column 1	Dissolved Arsenic	mg/L	0.01	0.017
5424197	OW-16A	ON 169/03 MAC/IMAC	Manitoulin Landfill - Groundwater - Column 1	Dissolved Sodium	mg/L	20	47.4
5424198	OW-16B	ON 169/03 AO&OG	Manitoulin Landfill - Groundwater - Column 1	Total Dissolved Solids	mg/L	500	628
5424198	OW-16B	ON 169/03 MAC/IMAC	Manitoulin Landfill - Groundwater - Column 1	Dissolved Sodium	mg/L	20	83.4
5424201	OW-17A	ON 169/03 AO&OG	Manitoulin Landfill - Groundwater - Column 1	Dissolved Organic Carbon	mg/L	5	10.8
5424202	OW-17B	ON 169/03 AO&OG	Manitoulin Landfill - Groundwater - Column 1	<b>Dissolved Organic Carbon</b>	mg/L	5	8.5
5424205	OW-18	ON 169/03 AO&OG	Manitoulin Landfill - Groundwater - Column 1	Alkalinity (as CaCO3)	mg/L	30-500	1560
5424205	OW-18	ON 169/03 AO&OG	Manitoulin Landfill - Groundwater - Column 1	Chloride	mg/L	250	423
5424205	OW-18	ON 169/03 AO&OG	Manitoulin Landfill - Groundwater - Column 1	Dissolved Organic Carbon	mg/L	5	32.9
5424205	OW-18	ON 169/03 AO&OG	Manitoulin Landfill - Groundwater - Column 1	Total Dissolved Solids	mg/L	500	2180
5424205	OW-18	ON 169/03 MAC/IMAC	Manitoulin Landfill - Groundwater - Column 1	Dissolved Sodium	mg/L	20	359
5424205	OW-18	ON 169/03 MAC/IMAC	Manitoulin Landfill - Groundwater - Column 1	Nitrite as N	mg/L	1.0	2.47
5424295	PB DUP1	ON 169/03 AO&OG	Manitoulin Landfill - Groundwater - Column 1	Dissolved Organic Carbon	mg/L	5	8.3
5424295	PB DUP1	ON 169/03 MAC/IMAC	Manitoulin Landfill - Groundwater - Column 1	Dissolved Sodium	mg/L	20	23.2
5424299	PB DUP3	ON 169/03 AO&OG	Manitoulin Landfill - Groundwater - Column 1	Dissolved Organic Carbon	mg/L	5	6.9



### **Quality Assurance**

#### CLIENT NAME: WSP E&I CANADA LIMITED

#### PROJECT: TY1410143.2023.FLD.1142.5730-00

AGAT WORK ORDER: 23T088719 ATTENTION TO: Dominque Gagnon SAMPLED BY:

SAMPLING SITE: Providence Bay - GW

### **Trace Organics Analysis**

RPT Date: Nov 16, 2023			C	UPLICAT	E		REFERE	NCE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured	Acce Lir	eptable nits	Recovery	Acce Lir	ptable nits	Recovery	Acce Lir	eptable nits
		Ia					value	Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - PHCs F1 - F4 (v	vith VOC) (	Water)													
F1 (C6 - C10)	5425965		<25	<25	NA	< 25	88%	60%	140%	80%	60%	140%	88%	60%	140%
F2 (C10 to C16)	5432765		< 100	< 100	NA	< 100	122%	60%	140%	71%	60%	140%	77%	60%	140%
F3 (C16 to C34)	5432765		< 100	< 100	NA	< 100	116%	60%	140%	64%	60%	140%	77%	60%	140%
F4 (C34 to C50)	5432765		< 100	< 100	NA	< 100	93%	60%	140%	90%	60%	140%	101%	60%	140%
Volatile Organic Compounds in W	/ater (ug/L)	1													
1,4-Dichlorobenzene	5425965		<0.10	<0.10	NA	< 0.10	97%	50%	140%	98%	60%	130%	107%	50%	140%
Benzene	5425965		<0.20	<0.20	NA	< 0.20	103%	50%	140%	103%	60%	130%	114%	50%	140%
Dichloromethane	5425965		<0.030	<0.030	NA	< 0.030	91%	50%	140%	108%	60%	130%	94%	50%	140%
Toluene	5425965		<0.20	<0.20	NA	< 0.20	95%	50%	140%	98%	60%	130%	106%	50%	140%
Vinyl Chloride	5425965		<0.17	<0.17	NA	< 0.17	108%	50%	140%	90%	50%	140%	118%	50%	140%

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

Certified By:

Imkal Jata

Page 19 of 27

AGAT QUALITY ASSURANCE REPORT (V1)

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific tests tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation. RPDs calculated using raw data. The RPD may not be reflective of duplicate values shown, due to rounding of final results.



### **Quality Assurance**

#### CLIENT NAME: WSP E&I CANADA LIMITED

#### PROJECT: TY1410143.2023.FLD.1142.5730-00

AGAT WORK ORDER: 23T088719

SAMPLED BY:

**ATTENTION TO: Dominque Gagnon** 

#### SAMPLING SITE: Providence Bay - GW

### Water Analysis

RPT Date: Nov 16, 2023				=	-	REFERE		TERIAL	METHOD			мат		KE
NFT Date: NOV 10, 2023		-		_	Method			ntable	METHOD			WIA I		
PARAMETER	Batch Sampl	e Dup #1	Dup #2	RPD	Blank	Measured Value	Lir	nits	Recovery	Li	nits	Recovery	Lir	nits
							Lower	Opper		Lower	Opper		Lower	opper
BOD & TSS (Water)	F 400700	0	0		0	4000/	750/	4050/						
BOD (5)	5420768	3	3	NA	< 2	100%	75%	125%						
Total Suspended Solids	5426974	<10	<10	NA	< 10	90%	80%	120%						
Manitoulin Landfill - Groundwate	er - Column 1													
рН	5423719 5423719	7.54	7.57	0.4%	NA	100%	90%	110%						
Electrical Conductivity	5423719 5423719	1020	1020	0.0%	< 2	100%	90%	110%						
Total Dissolved Solids	5423719 5423719	590	594	0.7%	< 10	100%	80%	120%						
Alkalinity (as CaCO3)	5423719 5423719	400	408	2.0%	< 5	91%	80%	120%						
Chloride	5424119 5424119	54.2	53.8	0.7%	< 0.10	100%	70%	130%	96%	80%	120%	101%	70%	130%
Nitrate as N	5424119 5424119	) <0.05	<0.05	NA	< 0.05	96%	70%	130%	95%	80%	120%	96%	70%	130%
Nitrite as N	5424119 5424119	0.23	0.22	NA	< 0.05	100%	70%	130%	95%	80%	120%	91%	70%	130%
Sulphate	5424119 5424119	60.1	59.9	0.3%	< 0.10	96%	70%	130%	96%	80%	120%	94%	70%	130%
Ammonia as N	5426079	0.02	0.03	NA	< 0.02	100%	70%	130%	104%	80%	120%	94%	70%	130%
Chemical Oxygen Demand	5426079	26	25	3.9%	< 5	101%	80%	120%	109%	90%	110%	72%	70%	130%
Dissolved Organic Carbon	5423719 5423719	9.3	9.6	3.2%	< 0.5	90%	90%	110%	97%	90%	110%	NA	80%	120%
Phenols	5414310	<0.001	0.001	NA	< 0.001	92%	90%	110%	98%	90%	110%	93%	80%	120%
Total Kjeldahl Nitrogen	5423719 5423719	3.57	3.57	0.0%	< 0.10	100%	70%	130%	97%	80%	120%	82%	70%	130%
Total Phosphorus	5424829	0.06	0.05	NA	< 0.02	102%	70%	130%	98%	80%	120%	103%	70%	130%
Dissolved Calcium	5447533	175	178	1.7%	< 0.05	118%	70%	130%	98%	80%	120%	97%	70%	130%
Dissolved Magnesium	5447533	65.6	71.7	8.9%	< 0.05	110%	70%	130%	100%	80%	120%	118%	70%	130%
Dissolved Potassium	5447533	16.8	16.5	1.8%	< 0.50	121%	70%	130%	106%	80%	120%	118%	70%	130%
Dissolved Sodium	5447533	323	309	4.4%	< 0.05	104%	70%	130%	105%	80%	120%	99%	70%	130%
Dissolved Arsenic	5447533	<0.001	<0.001	NA	< 0.001	102%	70%	130%	109%	80%	120%	108%	70%	130%
Dissolved Barium	5447533	0.155	0.156	0.6%	< 0.002	100%	70%	130%	100%	80%	120%	122%	70%	130%
Dissolved Boron	5447533	0.112	0.108	3.6%	< 0.010	100%	70%	130%	103%	80%	120%	107%	70%	130%
Dissolved Cadmium	5447533	<0.0001	<0.0001	NA	< 0.0001	100%	70%	130%	100%	80%	120%	117%	70%	130%
Dissolved Chromium	5447533	<0.002	<0.002	NA	< 0.002	100%	70%	130%	101%	80%	120%	104%	70%	130%
Dissolved Copper	5447533	0.003	0.002	NA	< 0.001	101%	70%	130%	101%	80%	120%	104%	70%	130%
Dissolved Iron	5447533	0.014	<0.010	NA	< 0.010	98%	70%	130%	96%	80%	120%	108%	70%	130%
Dissolved Lead	5447533	0.0055	0.0055	0.0%	< 0.0005	98%	70%	130%	112%	80%	120%	101%	70%	130%
Dissolved Manganese	5447533	0.004	<0.002	NA	< 0.002	98%	70%	130%	103%	80%	120%	108%	70%	130%
Dissolved Mercury	5423719 5423719	< 0.0001	<0.0001	NA	< 0.0001	103%	70%	130%	103%	80%	120%	96%	70%	130%
Dissolved Zinc	5447533	<0.005	<0.005	NA	< 0.005	102%	70%	130%	111%	80%	120%	108%	70%	130%
Manitoulin Landfill - Groundwate	er - Column 1													
pH	5424196 5424196	7.73	7.89	2.0%	NA	100%	90%	110%						
Electrical Conductivity	5424196 5424196	1970	1970	0.0%	< 2	95%	90%	110%						
Total Dissolved Solids	5424197 5424197	600	602	0.3%	< 10	100%	80%	120%						
Alkalinity (as CaCO3)	5424196 5424196	194	196	1.0%	< 5	93%	80%	120%						
Chloride	5433903	3.66	3 69	0.8%	< 0.10	104%	70%	130%	101%	80%	120%	101%	70%	130%
		0.00	0.00	0.070	. 0.10	.51/5	. 575	, 0		2373	0,0		. 575	, 0

#### AGAT QUALITY ASSURANCE REPORT (V1)

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



### **Quality Assurance**

#### CLIENT NAME: WSP E&I CANADA LIMITED

#### PROJECT: TY1410143.2023.FLD.1142.5730-00

AGAT WORK ORDER: 23T088719 **ATTENTION TO: Dominque Gagnon** SAMPLED BY:

#### SAMPLING SITE: Providence Bay - GW

			Water	<sup>.</sup> Ana	lysis	(Cor	ntinu	ed)							
RPT Date: Nov 16, 2023			C	UPLICATE	=		REFEREN	ICE MA	TERIAL	METHOD	BLANK		MAT	RIX SPI	KE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured	Acce Lir	ptable nits	Recoverv	Acce Lir	ptable nits	Recoverv	Acce Lir	ptable nits
		Id					value	Lower	Upper		Lower	Upper		Lower	Upper
Nitrate as N	5433903		0.32	0.30	4.5%	< 0.05	106%	70%	130%	102%	80%	120%	102%	70%	130%
Nitrite as N	5433903		<0.05	<0.05	NA	< 0.05	100%	70%	130%	98%	80%	120%	94%	70%	130%
Sulphate	5433903		250	251	0.7%	< 0.10	101%	70%	130%	99%	80%	120%	NA	70%	130%
Ammonia as N	5423731	5423731	<0.02	<0.02	NA	< 0.02	100%	70%	130%	104%	80%	120%	97%	70%	130%
Chemical Oxygen Demand	5423734	5423734	15	15	NA	< 5	102%	80%	120%	106%	90%	110%	72%	70%	130%
Dissolved Organic Carbon	5424195	5424195	3.4	3.3	3.0%	< 0.5	98%	90%	110%	97%	90%	110%	97%	80%	120%
Phenols	5425544		0.002	0.002	NA	< 0.001	90%	90%	110%	91%	90%	110%	102%	80%	120%
Total Kjeldahl Nitrogen	5424195	5424195	0.50	0.51	2.0%	< 0.10	108%	70%	130%	97%	80%	120%	87%	70%	130%
Total Phosphorus	5424119	5424119	<0.02	<0.02	NA	< 0.02	101%	70%	130%	97%	80%	120%	100%	70%	130%
Dissolved Calcium	5424201	5424201	58.1	57.5	1.0%	< 0.05	104%	70%	130%	102%	80%	120%	104%	70%	130%
Dissolved Magnesium	5424201	5424201	35.5	35.2	0.8%	< 0.05	106%	70%	130%	105%	80%	120%	112%	70%	130%
Dissolved Potassium	5424201	5424201	1.96	2.06	NA	< 0.50	100%	70%	130%	103%	80%	120%	105%	70%	130%
Dissolved Sodium	5424201	5424201	4.96	4.87	1.8%	< 0.05	114%	70%	130%	111%	80%	120%	112%	70%	130%
Dissolved Arsenic	5424201	5424201	<0.001	<0.001	NA	< 0.001	101%	70%	130%	107%	80%	120%	114%	70%	130%
Dissolved Barium	5424201	5424201	0.011	0.011	0.0%	< 0.002	105%	70%	130%	101%	80%	120%	106%	70%	130%
Dissolved Boron	5424201	5424201	0.039	0.038	NA	< 0.010	116%	70%	130%	119%	80%	120%	117%	70%	130%
Dissolved Cadmium	5424201	5424201	<0.0001	<0.0001	NA	< 0.0001	100%	70%	130%	101%	80%	120%	106%	70%	130%
Dissolved Chromium	5424201	5424201	<0.002	<0.002	NA	< 0.002	94%	70%	130%	98%	80%	120%	102%	70%	130%
Dissolved Copper	5424201	5424201	0.001	0.002	NA	< 0.001	94%	70%	130%	99%	80%	120%	101%	70%	130%
Dissolved Iron	5424201	5424201	0.160	0.181	12.3%	< 0.010	106%	70%	130%	113%	80%	120%	112%	70%	130%
Dissolved Lead	5424201	5424201	<0.0005	<0.0005	NA	< 0.0005	101%	70%	130%	93%	80%	120%	93%	70%	130%
Dissolved Manganese	5424201	5424201	0.009	0.009	NA	< 0.002	100%	70%	130%	105%	80%	120%	106%	70%	130%
Dissolved Mercury	5424197	5424197	<0.0001	<0.0001	NA	< 0.0001	104%	70%	130%	103%	80%	120%	100%	70%	130%
Dissolved Zinc	5424201	5424201	<0.005	0.017	NA	< 0.005	95%	70%	130%	102%	80%	120%	101%	70%	130%

Comments: NA signifies Not Applicable.

Duplicate NA: results are under 5X the RDL and will not be calculated.

Matrix spike NA: Spike level < native concentration. Matrix spike acceptance limits do not apply and are not calculated.

**Certified By:** 

Inis Verastegui

#### **AGAT** QUALITY ASSURANCE REPORT (V1)

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### **Method Summary**

#### CLIENT NAME: WSP E&I CANADA LIMITED

#### PROJECT: TY1410143.2023.FLD.1142.5730-00

#### AGAT WORK ORDER: 23T088719 **ATTENTION TO: Dominque Gagnon**

SAMPLED BY:

SAMPLING SITE: Providence Bay - 0	GW	SAMPLED BY:	
PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis		1	1
F1 (C6 - C10)	VOL-91-5010	modified from MOE PHC-E3421	(P&T)GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5010	modified from MOE PHC-E3421	(P&T)GC/FID
Toluene-d8	VOL-91- 5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
F2 (C10 to C16)	VOL-91-5010	modified from MOE PHC-E3421	GC/FID
F3 (C16 to C34)	VOL-91-5010	modified from MOE PHC-E3421	GC/FID
F4 (C34 to C50)	VOL-91-5010	modified from MOE PHC-E3421	GC/FID
Gravimetric Heavy Hydrocarbons	VOL-91-5010	modified from MOE PHC-E3421	BALANCE
Terphenyl	VOL-91-5010	modified from MOE PHC-E3421	GC/FID
Sediment			N/A
1,4-Dichlorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Benzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Dichloromethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Toluene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Vinyl Chloride	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Toluene-d8	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS



### **Method Summary**

#### CLIENT NAME: WSP E&I CANADA LIMITED

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# AGAT WORK ORDER: 23T088719

PROJECT: TY1410143.2023.FLD.1	142.5730-00	ATTENTION TO: I	Dominque Gagnon
SAMPLING SITE: Providence Bay -	GW	SAMPLED BY:	
PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
BOD (5)	INOR-93-6006	Modified from SM 5210 B	DO METER
Total Suspended Solids	INOR-93-6028	modified from EPA 1684,ON MOECC E3139,SM 2540C,D	BALANCE
рН	INOR-93-6000	modified from SM 4500-H+ B	PC TITRATE
Electrical Conductivity	INOR-93-6000	modified from SM 2510 B	PC TITRATE
Total Dissolved Solids	INOR-93-6028	modified from EPA 1684,ON MOECC E3139,SM 2540C,D	BALANCE
Alkalinity (as CaCO3)	INOR-93-6000	Modified from SM 2320 B	PC TITRATE
Chloride	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Nitrate as N	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Ammonia as N	INOR-93-6059	modified from SM 4500-NH3 H	LACHAT FIA
Chemical Oxygen Demand	INOR-93-6042	modified from SM 5220 A and SM 5220 D	SPECTROPHOTOMETER
Dissolved Organic Carbon	INOR-93-6049	modified from SM 5310 B	SHIMADZU CARBON ANALYZER
Phenols	INOR-93-6072	modified from SM 5530 D	LACHAT FIA
Total Kjeldahl Nitrogen	INOR-93-6048	modified from EPA 351.2 and SM 4500-NORG D	LACHAT FIA
Total Phosphorus	INOR-93-6057	modified from LACHAT 10-115-01-3A	LACHAT FIA
Dissolved Calcium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP/MS
Dissolved Magnesium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP/MS
Dissolved Potassium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP/MS
Dissolved Sodium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP/MS
Dissolved Arsenic	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Barium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Boron	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Cadmium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Chromium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Copper	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Iron	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Lead	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Manganese	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Mercury	MET-93-6100	modified from EPA 245.2 and SM 311: B	<sup>2</sup> CVAAS
Dissolved Zinc	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS

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	dominique.gagnon@w	sp.com				SW Sunace Water		Field	pu	Meta	1B-H IEC SAR	als			- F4		Tota	hlori	1&1	D g	S	X		
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	nation: WSP E&I Canada Limited	d				Regulatory Requirements: (Piease check all applicable boxes)		No Reg	ulate	ory Req	uire	nent	Cu	stody	Seal I	ntact		 []Yes		C	]No	4	□n/A
Contact:	Dominique Gagnon				_   _																		-
Address:	131 Fielding Road					Regulation 153/04Sewer	Use		L_Re	eguiation :	58		Tu	nar	ound	d Tir	ne (	TAT)	Req	luire	ed:		
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1. Email:	meg.russell@wsp.com				!  :	Soil Texture (Check One) Region	One		🖌 Ot	her				_ 3	Busir	ness	Г	28	usine	SS	m	Next I	Business
	dominique.gagnon@wsp.c	com				Coarse			0	DWS			1		ays		L	⊐ Day	'S			Day	
2. Email:	1.00.0.41				_	Fine MISA			-	Indicate C	ле	-		C	R Da	te Re	quireo	l (Rush	Surch	narge	s May	Apply)	:
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Project:	TY1410143.2023.FLD.11	142.5730-00				Record of Site Condition?		Certif	lcat	e of Ana	alysi	s		*1	Plea	ise pi	ovide	prior r	otifica	ation	for ru	sh TAT	lavs
Site Location:	Providence Bay - GW					🗆 Yes 🗖 No			/es		No	)				LAGIUS		WGGR	nus a	niu st		y 110110	
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lanı Quoto II.	Please note: If quotation number i	is not provided, client w	ill be billed full price	for analysis	-	Sample Matrix Legend	CrV		des)									Ê	4	lote			
<b>Invoice Inform</b> Company: Contact: Address:	Mation: WSP E&I Canada Limited ACCOUNTS PAYABLE	id	Bill To Same:	Yes 🗌 No		Gw     Ground Water       O     Oil       P     Paint       S     Soil       SD     Sediment	iltered - Metals, Hg	organics Ed Matala found Hindrida	oo imetals (exol. nyoriue 153 Metals (Incl. Hyd	IS II CI: II CN II FOC II HE	an	P DNH <sub>3</sub> TKN NO_HN <sub>3</sub> TKN	OC DBTEX DTHM				e Pesticides	VOCS CABNS B(a)	-	/ - Col I per q	er quotet		
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	dominique.gagnon@ws	sp.com					Fie	s and	de Me		etals	ation nts:	es:	Ť		Ê		Mg	Use	di	S L	Ω	$\sim$
Samp	le Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	e Comments/ Special Instructions	Y/N	Metal		ORPs: Cr <sup>6+</sup>	Full M	Regul: Nutrie	Volatl	PHCs	ABNs	POD5.	Organ	TCLP: [	Sewei	Con	2 T	BO	TS
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Chain of C	ustody Recor	d If this is a	Drinking Wat	abor er sample, pl	ato:	TIES	Ph: 9( stody Form (potable	vater c	2.5100 web	Fax: 905 earth.aga	.712.5 atlabs 5)	5122 .com		Co	oler Q ival Ti	uant empe	ity: ratur	es:			Şe	-	₩.	31	
Report Inform Company:	wSP E&I Canada Limited	d			0	Regulatory Require	ments:	No R	egulat	ory Rec	luire	me	nt	Cu No	stody	Seal	Intac	t:	ΞY	es		□No	,		]N/A
Contact: Address: Phone: Reports to be sent to:	Dominique Gagnon 131 Fielding Road Lively, ON P3Y 1L7 705-677-4684	Fax:70	05-682-2260			Regulation 153/04 Table Indicate One Ind/Com Res/Park Agriculture	Sewer Use			egulation CME rov. Water bjectives	558 Quali (PWQ0	ty D)		Tur Reg Rus	rnar gula sh T/	oun r TAT	d Ti F sh Sure	me	• <b>(ТА</b> 	<b>Г) Re</b> 5 to 7	<b>&gt;quii</b> Busine	r <b>ed:</b> ess Da	ays		
1. Email: 2. Email:	dominique.gagnon@wsp.com	com				Coarse	Indicate One			DWS Indicate	One				3 [ (	Busi ays <b>DR</b> Da	iness ate Re	equir	ed (Ru	2 Busi Jays Jsh Su	ness Ircharg	ges Mi	] Nex Day ay App	t Bus / /yly);	iness
Project Inform Project: Site Location:	nation: TY1410143.2023.FLD.11 Providence Bay - GW	142.5730-00			_	Is this submission f <b>Record of Site Condi</b> PYes N	or a tion? O	Re Cer	eport G tificat Yes	iuidelin e of An	e on alysi No	is D		F	*; For 'S	Ple TAT is ame	ase p exclu Day' (	orovia Isive analy	de prid of we	or noti ekend lease	ficatio 's and conta	n for i statut	rush Tr tory ho ur AG <b>f</b>	AT bliday:	5 M
AGAT Quote #: Invoice Inform Company: Contact: Address: Email:	233349 Please note: If quatefilian number i mation: WSP E&I Canada Limite ACCOUNTS PAYABLE APInvoice.Canada@wsp. dominique.gagnon@ws	PO: CC Is nat provided, client w d .com; meg.russe sp.com	926201607 III be billed full price Bill To Same: ell@wsp.com	far analysis. Yes D No		Sample Matrix Legen         B       Biota         GW       Ground Water         O       Oil         P       Paint         S       Soil         SD       Sediment         SW       Surface Water	p.	s and Inorganics	tetals 153 Metals (excl. Hydrides) 0	: CB-HWS CC: CCN CEC CDHg CSAR	letals Scan	ation/Custom Metals	nts:	Ies: OVOC OBTEX OTHM	F1 - F4			: 🗆 Total 🛛 Aroclors	nochlorine Pesticides	יושויא שי איז איז איז איז איז איז איז איז איז אי	np GW - Col 1 per quote	)Cs per quotet	EX/PHC(F1-F4)	0	2
Sample	e Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	e Comments/ Special Instructi	ions Y/N	Metal		ORPs CC <sup>*</sup>	Full N	Regul		Volati	PHCs	ABNs	PAHs	PCBs	Orgar TCI D.	Sewe	Con	Ž	BT	р Ч Г	1
OW-17A		110213	9:20	<u> </u>	GW		Y					_	-					-			V	~		_	-
OW-17B		11/02/23	9:30	11	GW		Y	-	-	_		_							-	-	~	~		-	+-
DW-18		11/02/15	12.30	12	GW		Y					-			_		-	-	-	+	~	~	_	-	-
PB DUPI		10/2/162	14.10		GW		Y	-	-	-		-		-					-	-					+-
PB DUP2		10/51/25	11.10	-11	GW		Y	-				-			_	-	-	-	-	4		~	-		+
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	Sample Ter	nperature Log			
Client:	SP EEII	COC# or Work Order #:			
# of Coolers: 56	inget Ismall	# of Submissions:		0	
Arriva	I Temperatures - Branch/Driver	Arrival	Temperatures - Lab	poratory	
Cooler #1:	3.9/3.8/3.4	Cooler #1:	/	/	
Cooler #2:	2.8,2.7,2.3	Cooler #2:	/	/	
Cooler #3:	3.813.513.0	Cooler #3:		/	
Cooler #4:	5.1,5.9,60	Cooler #4:	/	_/	
Cooler #5:	4.1, 4.0, 3.7	Cooler #5:	/	/	
Cooler #6:	3.8 1 3.71 3.6	Cooler #6:		_/	
Cooler #7:	/	Cooler #7;	1	1	
Cooler #8	//	Cooler #8		_1	
Cooler #9:	//	Cooler #9:	/	_/	
Cooler #10:	://	Cooler #10:	/	_/	
IR Gun ID:		IR Gun ID:		5.	
Taken By:		Taken By:			
Date (yyyy/mm/dd): 2023	11(03 Time: 9: 00 AN / PM	Date (yyyy/mm/dd):	Гіте:: АМ /	' PM	

Instructions for use of this form: 1) complete all fields of info including total # of coolers and # of submissions rec'd, 2) photocopy and place in each submission prior to giving a WO#, 3) Proceed as normal, write the WO# and scan (please make sure to scan along with the COC)

Document ID: SR-78-9511.003 Date Issued: 2017-2-23

of



#### CLIENT NAME: WSP E&I CANADA LIMITED 131 FIELDING ROAD LIVELY, ON P3Y1L7 (705) 682-2632 ATTENTION TO: Dominique Gagnon PROJECT: TY1410143.2023.FLD.1142.5730-00 AGAT WORK ORDER: 23T074344 MICROBIOLOGY ANALYSIS REVIEWED BY: Nivine Basily, Inorganics Report Writer TRACE ORGANICS REVIEWED BY: Nivine Basily, Inorganics Report Writer TRACE ORGANICS REVIEWED BY: Oksana Gushyla, Trace Organics Lab Supervisor WATER ANALYSIS REVIEWED BY: Yris Verastegui, Report Reviewer DATE REPORTED: Oct 05, 2023 PAGES (INCLUDING COVER): 11 VERSION\*: 1

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

\*Notes

Disclaimer:

- All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may
  incorporate modifications from the specified reference methods to improve performance.
- All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.
- AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.
- This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
- The test results reported herewith relate only to the samples as received by the laboratory.
- Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of
  merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines
  contained in this document.
- All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.
- For environmental samples in the Province of Quebec: The analysis is performed on and results apply to samples as received. A temperature above 6°C upon receipt, as indicated in the Sample Reception Notification (SRN), could indicate the integrity of the samples has been compromised if the delay between sampling and submission to the laboratory could not be minimized.

#### **AGAT** Laboratories (V1)

Member of: Association of Professional Engineers and Geoscientists of Alberta	
(APEGA)	
Mestern Franks Aprillional Laboratory Association (M/FALA)	

Western Enviro-Agricultural Laboratory Association (WEALA) Environmental Services Association of Alberta (ESAA) AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation. Measurement Uncertainty is not taken into consideration when stating conformity with a specified requirement.

Page 1 of 11



AGAT WORK ORDER: 23T074344 PROJECT: TY1410143.2023.FLD.1142.5730-00 5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.aqatlabs.com

#### CLIENT NAME: WSP E&I CANADA LIMITED

#### SAMPLING SITE: Providence Bay - Residential GW

**ATTENTION TO: Dominique Gagnon** 

SAMPLED BY:

### Total Coliforms & E.Coli (MI-Agar)

DATE RECEIVED: 2023-09-28						DATE REPORTED: 2023-10-05
	S.	AMPLE DES	CRIPTION:	Irving	Paquet	
		SAM	PLE TYPE:	Water	Water	
		DATE	SAMPLED:	2023-09-26 10:30	2023-09-26 10:00	
Parameter	Unit	G/S	RDL	5323634	5323834	
Escherichia coli	CFU/100mL			0	0	
Total Coliforms	CFU/100mL			4	1	

Comments:RDL - Reported Detection Limit;G / S - Guideline / Standard5323634-5323834Escherichia coli, Total ColiformsRDL = 1 CFU/100mL.

Analysis performed at AGAT Toronto (unless marked by \*)





AGAT WORK ORDER: 23T074344 PROJECT: TY1410143.2023.FLD.1142.5730-00

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

#### CLIENT NAME: WSP E&I CANADA LIMITED

#### SAMPLING SITE: Providence Bay - Residential GW

**ATTENTION TO: Dominique Gagnon** 

SAMPLED BY:

### Volatile Organic Compounds in Water (ug/L)

#### DATE RECEIVED: 2023-09-28

DATE RECEIVED: 2023-09-28						DATE REPORTED: 2023-10-05
		SAMPLE DESCRIF	PTION:	Irving	Paquet	
		SAMPLE	TYPE:	Water	Water	
		DATE SAM	PLED:	2023-09-26 10:30	2023-09-26 10:00	
Parameter	Unit	G/S F	RDL	5323634	5323834	
Vinyl Chloride	µg/L	(	).17	<0.17	<0.17	
Benzene	µg/L	(	).20	<0.20	<0.20	
Dichloromethane	µg/L	(	0.30	<0.30	<0.30	
Toluene	µg/L	(	).20	<0.20	<0.20	
1,4-Dichlorobenzene	µg/L	(	0.10	<0.10	<0.10	
Surrogate	Unit	Acceptable L	imits			
Toluene-d8	% Recovery	50-140		105	98	
4-Bromofluorobenzene	% Recovery	50-140		77	75	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

5323634-5323834 Xylenes total is a calculated parameter. The calculated value is the sum of m&p-Xylene + o-Xylene.

1,3-Dichloropropene total is a calculated parameter. The calculated value is the sum of Cis-1,3-Dichloropropene and Trans-1,3-Dichloropropene. The calculated parameter is non-accredited. The parameters that are components of the calculation are accredited.

Analysis performed at AGAT Toronto (unless marked by \*)



AGAT WORK ORDER: 23T074344 PROJECT: TY1410143.2023.FLD.1142.5730-00

CLIENT NAME: WSP E&I CANADA LIMITED

#### SAMPLING SITE: Providence Bay - Residential GW

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

**ATTENTION TO: Dominique Gagnon** 

SAMPLED BY:

#### **Central Manitoulin - GW Drinking Water Wells** DATE RECEIVED: 2023-09-28 DATE REPORTED: 2023-10-05 SAMPLE DESCRIPTION: Irving Paquet SAMPLE TYPE: Water Water DATE SAMPLED: 2023-09-26 2023-09-26 10:00 10:30 Parameter Unit G/S RDL 5323634 5323834 µS/cm 2 546 Electrical Conductivity 537 Hα pH Units NA 7.78 7.79 Total Dissolved Solids 10 314 308 mg/L Alkalinity (as CaCO3) mg/L 5 204 198 Chloride 0.10 6.47 4.94 mg/L Nitrate as N mg/L 0.05 < 0.05 < 0.05 Nitrite as N mg/L 0.05 < 0.05 < 0.05 Sulphate mg/L 0.10 73.4 74.6 Ammonia as N mg/L 0.02 < 0.02 0.02 5 Chemical Oxygen Demand mg/L <5 <5 Dissolved Organic Carbon mg/L 0.5 1.5 1.2 Phenols 0.001 0.005 0.006 mg/L Total Kjeldahl Nitrogen 0.10 < 0.10 < 0.10 mg/L Total Phosphorus mg/L 0.02 < 0.02 < 0.02 Dissolved Calcium mg/L 0.05 41.2 55.0 Dissolved Magnesium 0.05 16.6 25.1 mg/L Dissolved Potassium mg/L 0.50 4.58 2.95 Dissolved Sodium 0.05 6.00 mg/L 5.15 **Dissolved Arsenic** mg/L 0.001 < 0.001 < 0.001 0.002 0.014 **Dissolved Barium** mg/L 0.011 **Dissolved Boron** 0.113 0.163 mg/L 0.010 Dissolved Cadmium 0.0001 < 0.0001 < 0.0001 mg/L < 0.002 Dissolved Chromium mg/L 0.002 < 0.002 Dissolved Copper mg/L 0.001 0.002 < 0.001 Dissolved Iron mg/L 0.010 0.010 0.013 Dissolved Lead mg/L 0.0005 < 0.0005 < 0.0005 Dissolved Manganese 0.002 0.002 0.006 mg/L Dissolved Mercury ma/L 0.0001 < 0.0001 < 0.0001 Dissolved Zinc 0.005 < 0.005 < 0.005 mg/L

**Certified By:** 

Irús Verastegui



AGAT WORK ORDER: 23T074344 PROJECT: TY1410143.2023.FLD.1142.5730-00 5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

#### CLIENT NAME: WSP E&I CANADA LIMITED

#### SAMPLING SITE: Providence Bay - Residential GW

**ATTENTION TO: Dominique Gagnon** 

SAMPLED BY:

### Central Manitoulin - GW Drinking Water Wells

DATE RECEIVED: 2023-09-28						DATE REPORTED: 2023-10-05
		SAMPLE DES	CRIPTION:	Irving	Paquet	
		SAM	PLE TYPE:	Water	Water	
		DATE	SAMPLED:	2023-09-26 10:30	2023-09-26 10:00	
Parameter	Unit	G/S	RDL	5323634	5323834	
Lab Filtration Metals				9/29/2023	9/29/2023	
Lab Filtration DOC				9/29/2023	9/29/2023	
Lab Filtration mercury				9/29/2023	9/29/2023	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

5323634-5323834 Metals, Mercury & DOC analysis were completed on a lab filtered sample.

Analysis performed at AGAT Toronto (unless marked by \*)

**Certified By:** 

Inis Verastegui



### **Quality Assurance**

#### CLIENT NAME: WSP E&I CANADA LIMITED

#### PROJECT: TY1410143.2023.FLD.1142.5730-00

SAMPLING SITE: Providence Bay - Residential GW

AGAT WORK ORDER: 23T074344

**ATTENTION TO: Dominique Gagnon** 

SAMPLED BY:

			Mic	crobi	olog	y Ana	alysis	5							
RPT Date: Oct 05, 2023			[	OUPLICAT	E		REFEREN	NCE MA	TERIAL	METHOD	BLAN	( SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured	Acce Lir	ptable nits	Recoverv	Acce	eptable nits	Recoverv	Acce Lir	ptable nits
		Id					value	Lower	Upper	]	Lower	Upper		Lower	Upper
Total Coliforms & E.Coli (MI-Aga	r)														
Escherichia coli	5322441		0	0	NA										

NA

Escherichia coli	5322441	0	0
Total Coliforms	5322441	0	0

Comments: NA - % RPD Not Applicable.





#### **AGAT** QUALITY ASSURANCE REPORT (V1)

Page 6 of 11

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



### **Quality Assurance**

#### CLIENT NAME: WSP E&I CANADA LIMITED

#### PROJECT: TY1410143.2023.FLD.1142.5730-00

SAMPLING SITE: Providence Bay - Residential GW

AGAT WORK ORDER: 23T074344

**ATTENTION TO: Dominique Gagnon** 

SAMPLED BY:

			Trac	e Or	gani	cs Ar	nalys	is							
RPT Date: Oct 05, 2023			[	UPLICAT	E		REFEREN	NCE MA	TERIAL	METHOD	BLAN	( SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured	Acce Lir	eptable nits	Recovery	Acce Lir	eptable nits	Recovery	Acce Lir	ptable nits
		Id					value	Lower	Upper		Lower	Upper		Lower	Upper
Volatile Organic Compounds in W	/ater (ug/L)	)													
Vinyl Chloride	5325620		<0.17	<0.17	NA	< 0.17	107%	50%	140%	99%	50%	140%	110%	50%	140%
Benzene	5325620		<0.20	<0.20	NA	< 0.20	103%	50%	140%	100%	60%	130%	118%	50%	140%
Dichloromethane	5325620		<0.30	<0.30	NA	< 0.30	117%	50%	140%	107%	60%	130%	103%	50%	140%
Toluene	5325620		0.45	0.41	NA	< 0.20	99%	50%	140%	93%	60%	130%	102%	50%	140%
1,4-Dichlorobenzene	5325620		<0.10	<0.10	NA	< 0.10	111%	50%	140%	101%	60%	130%	92%	50%	140%

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

**Certified By:** 

#### **AGAT** QUALITY ASSURANCE REPORT (V1)

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### **Quality Assurance**

#### CLIENT NAME: WSP E&I CANADA LIMITED

#### PROJECT: TY1410143.2023.FLD.1142.5730-00

SAMPLING SITE: Providence Bay - Residential GW

AGAT WORK ORDER: 23T074344

**ATTENTION TO: Dominique Gagnon** 

#### SAMPLED BY:

				Wate	er Ar	nalys	is								
RPT Date: Oct 05, 2023				UPLICATE	=		REFERE	NCE MA	TERIAL	METHOD	BLAN		МАТ	RIX SPI	KE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured	Acce Lir	ptable nits	Recoverv	Acce	ptable nits	Recoverv	Acce Lir	ptable nits
		Ia					value	Lower	Upper		Lower	Upper		Lower	Upper
Central Manitoulin - GW Drink	king Water Wel	ls													
Electrical Conductivity	5324257		241	241	0.0%	< 2	106%	90%	110%						
рН	5324257		7.37	7.38	0.1%	NA	100%	90%	110%						
Total Dissolved Solids	5323789		438	448	2.3%	< 10	100%	80%	120%						
Alkalinity (as CaCO3)	5324257		93	100	7.3%	< 5	92%	80%	120%						
Chloride	5324027		65.9	74.5	12.3%	< 0.10	100%	70%	130%	102%	80%	120%	105%	70%	130%
Nitrate as N	5324027		<0.05	<0.05	NA	< 0.05	94%	70%	130%	103%	80%	120%	105%	70%	130%
Nitrite as N	5324027		<0.05	<0.05	NA	< 0.05	92%	70%	130%	96%	80%	120%	104%	70%	130%
Sulphate	5324027		239	261	8.8%	< 0.10	101%	70%	130%	103%	80%	120%	NA	70%	130%
Ammonia as N	5323789		0.04	0.03	NA	< 0.02	109%	70%	130%	104%	80%	120%	102%	70%	130%
Chemical Oxygen Demand	5320684		<5	<5	NA	< 5	104%	80%	120%	101%	90%	110%	98%	70%	130%
Dissolved Organic Carbon	5323975		0.6	0.6	NA	< 0.5	99%	90%	110%	108%	90%	110%	92%	80%	120%
Phenols	5338919		<0.001	<0.001	NA	< 0.001	94%	90%	110%	97%	90%	110%	104%	80%	120%
Total Kjeldahl Nitrogen	5320550		<0.10	<0.10	NA	< 0.10	101%	70%	130%	102%	80%	120%	91%	70%	130%
Total Phosphorus	5323634	5323634	<0.02	<0.02	NA	< 0.02	97%	70%	130%	101%	80%	120%	99%	70%	130%
Dissolved Calcium	5330257		433	358	19.0%	< 0.05	86%	70%	130%	104%	80%	120%	80%	70%	130%
Dissolved Magnesium	5330257		46.4	51.1	9.6%	< 0.05	97%	70%	130%	87%	80%	120%	84%	70%	130%
Dissolved Potassium	5330257		6.18	6.49	4.9%	< 0.50	101%	70%	130%	107%	80%	120%	101%	70%	130%
Dissolved Sodium	5330257		474	446	6.1%	< 0.05	94%	70%	130%	91%	80%	120%	NA	70%	130%
Dissolved Arsenic	5330257		<0.001	<0.001	NA	< 0.001	107%	70%	130%	104%	80%	120%	117%	70%	130%
Dissolved Barium	5330257		0.207	0.217	4.7%	< 0.002	98%	70%	130%	102%	80%	120%	108%	70%	130%
Dissolved Boron	5330257		0.012	0.011	NA	< 0.010	101%	70%	130%	102%	80%	120%	118%	70%	130%
Dissolved Cadmium	5330257		<0.0001	<0.0001	NA	< 0.0001	101%	70%	130%	103%	80%	120%	97%	70%	130%
Dissolved Chromium	5330257		<0.002	<0.002	NA	< 0.002	96%	70%	130%	97%	80%	120%	104%	70%	130%
Dissolved Copper	5330257		0.014	0.016	13.3%	< 0.001	97%	70%	130%	95%	80%	120%	94%	70%	130%
Dissolved Iron	5330257		0.022	0.020	NA	< 0.010	100%	70%	130%	101%	80%	120%	104%	70%	130%
Dissolved Lead	5330257		<0.0005	<0.0005	NA	< 0.0005	99%	70%	130%	99%	80%	120%	97%	70%	130%
Dissolved Manganese	5330257		0.041	0.047	13.6%	< 0.002	99%	70%	130%	97%	80%	120%	107%	70%	130%
Dissolved Mercury	5330257		<0.0001	<0.0001	NA	< 0.0001	104%	70%	130%	101%	80%	120%	101%	70%	130%
Dissolved Zinc	5330257		0.014	0.027	NA	< 0.005	101%	70%	130%	99%	80%	120%	115%	70%	130%

Comments: NA signifies Not Applicable.

Duplicate NA: results are under 5X the RDL and will not be calculated.

Matrix spike NA: Spike level < native concentration. Matrix spike acceptance limits do not apply and are not calculated.

Certified By:

Inis Verastegui

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### Method Summary

#### CLIENT NAME: WSP E&I CANADA LIMITED

#### PROJECT: TY1410143.2023.FLD.1142.5730-00

AGAT WORK ORDER: 23T074344

**ATTENTION TO: Dominique Gagnon** 

SAMPLING SITE: Providence Bay	- Residential GW	SAMPLED BY:					
PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE				
Microbiology Analysis	L	1					
Escherichia coli	MIC-93-7010	EPA 1604	Membrane Filtration				
Total Coliforms	MIC-93-7010	EPA 1604	Membrane Filtration				
Trace Organics Analysis							
Vinyl Chloride	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS				
Benzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS				
Dichloromethane	VOL-91- 5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS				
Toluene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS				
1,4-Dichlorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS				
Toluene-d8	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS				
4-Bromofluorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS				



# **Method Summary**

#### CLIENT NAME: WSP E&I CANADA LIMITED

#### PROJECT: TY1410143.2023.FLD.1142.5730-00

### AGAT WORK ORDER: 23T074344

ATTENTION TO: Dominique Gagnon

SAMPLING SITE: Providence Bay -	Residential GW	SAMPLED BY:									
PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE								
Water Analysis											
Electrical Conductivity	INOR-93-6000	modified from SM 2510 B	PC TITRATE								
рН	INOR-93-6000	modified from SM 4500-H+ B	PC TITRATE								
Total Dissolved Solids	INOR-93-6028	modified from EPA 1684,ON MOECC E3139,SM 2540C,D	BALANCE								
Alkalinity (as CaCO3)	INOR-93-6000	Modified from SM 2320 B	PC TITRATE								
Chloride	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH								
Nitrate as N	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH								
Nitrite as N	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH								
Sulphate	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH								
Ammonia as N	INOR-93-6059	modified from SM 4500-NH3 H	LACHAT FIA								
Chemical Oxygen Demand	INOR-93-6042	modified from SM 5220 A and SM 5220 D	SPECTROPHOTOMETER								
Dissolved Organic Carbon	INOR-93-6049	modified from SM 5310 B	SHIMADZU CARBON ANALYZER								
Phenols	INOR-93-6072	modified from SM 5530 D	LACHAT FIA								
Total Kjeldahl Nitrogen	INOR-93-6048	modified from EPA 351.2 and SM 4500-NORG D	LACHAT FIA								
Total Phosphorus	INOR-93-6057	modified from LACHAT 10-115-01-3A	LACHAT FIA								
Dissolved Calcium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP/MS								
Dissolved Magnesium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP/MS								
Dissolved Potassium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP/MS								
Dissolved Sodium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP/MS								
Dissolved Arsenic	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS								
Dissolved Barium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS								
Dissolved Boron	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS								
Dissolved Cadmium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS								
Dissolved Chromium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS								
Dissolved Copper	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS								
Dissolved Iron	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS								
Dissolved Lead	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS								
Dissolved Manganese	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS								
Dissolved Mercury	MET-93-6100	modified from EPA 245.2 and SM 3112 B	<sup>2</sup> CVAAS								
Dissolved Zinc	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS								
Lab Filtration Metals	SR-78-9001		FILTRATION								
Lab Filtration DOC	SR-78-9001		FILTRATION								
Lab Filtration mercury	SR-78-9001		FILTRATION								





5835 Coopers Avenue

Laboratory Use Only



NGAT 5.

Company

Contact:

Address:

Phone:

1. Email:

2. Email:

Project:

Site Location:

Sampled By:

AGAT Quote #:

Company:

Contact:

Address:

Email:

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# APPENDIX E SUMMARY OF GROUNDWATER GEOCHEMICAL ANALYSES

2023 Annual Groundwater Monitoring Report Providence Bay Waste Disposal Site Providence Bay, Ontario December 2023

Groundwater Ge	ochemical Results OW-1
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Parameters	Units	ODWS <sup>(1)</sup>	Mar-04	Sep-04	Jul-05	Nov-05	Nov-06	Oct-07	Oct-08	Oct-09	Nov-10	Oct-11	Oct-12	Oct-13	Oct-14	Sep-15	Sep-16	Oct-17	Sep-18	Sep-19	Nov-20	Nov-21	Nov-22	Oct-23
General Chemistry																								
Alkalinity (Total as CaCO3)	mg/L	30-500 OG	292.5	300	303	353	317	279	265	264	228	301	280	310	340	291	349	319	418	350	377	402	460	400
Ammonia	mg/L		0.12	0.10	0.12	0.09	0.10	0.06	<0.05	0.07	0.10	0.11	0.19	0.37	0.38	0.65	2.08	0.37	0.86	0.85	0.76	1.03	1.3	1.84
Chloride	mg/L	250 AO	39.8	49.9	43.6	52	39	30	26	24	23	36	28	36	41	37.2	45.0	34.8	51.8	46.7	48.4	55.6	62.2	64.2
COD	mg/L		16.5	19.5	5	23	27	17	10	13	26	21	11	14	19	12	15	20	16	15	30	10	34	69
Conductivity	umho/cm		773	766	753	928	790	700	651	647	605	788	720	780	850	818	850	722	978	878	888	938	1050	1020
Dissolved Organic Carbon (DOC)	mg/L	5 AO	5.5	8.15	6.5	7.8	7.0	5.0	4.1	4.4	4.1	5.2	5.3	5.8	6.3	6.1	7.7	7.4	9.4	7.2	8.0	9.7	11	9.3
Nitrate (N)	mg/L	10 MAC	0.2	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.25	<0.25	<0.10	<0.25	<0.25	<0.25	<0.05	<0.05	1.4
Nitrite (N)	mg/L	1 MAC	<0.2	-	<0.3	-	-	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.25	<0.25	<0.10	<0.25	<0.25	<0.25	<0.05	<0.05	<0.05
pН	pН	6.5-8.5	7.75	7.98	8.21	8.02	8.10	8.40	8.20	8.00	7.88	7.79	7.80	7.74	7.80	8.05	8.11	8.30	7.76	7.79	8.00	7.66	7.74	7.54
Phenols	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	0.002		0.075	0.004
Total Phosphorus	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	0.06	0.16	0.11	<0.02	<0.02	0.03	<0.02	0.03
Sulphate	mg/L	500 AO	91.1	99.6	86	86	73	60	54	49	49	59	51	52	54	57.3	52.1	52.6	48.7	49.4	49.6	49.6	48.4	53.1
Total Dissolved Solids (TDS)	mg/L	500 AO	506	555	516	602	513	377	410	420	400	516	384	476	462	414	478	394	602	418	492	564	568	590
TKN	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	0.96	2.38	0.86	1.37	1.47	1.5	2.07	2.59	3.57
Metals																								
Arsenic	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.003	< 0.003	< 0.003	< 0.003	<0.003	0.001	< 0.003	<0.001	<0.001
Barium	mg/L	1 MAC	0.0195	0.02	0.017	0.021	0.019	0.016	0.009	0.014	0.017	0.021	0.018	0.019	0.023	0.020	0.027	0.021	0.026	0.025	0.026	0.028	0.036	0.034
Boron	mg/L	5 IMAC	0.13	0.119	0.13	0.15	0.16	0.15	0.32	0.16	0.20	0.17	0.18	0.16	0.23	0.157	0.176	0.203	0.199	0.213	0.254	0.251	0.25	0.262
Cadmium	mg/L	0.005 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	< 0.002	< 0.002	<0.001	<0.001	<0.0001	<0.002	<0.0001	<0.0001
Calcium	mg/L		78.4	80	81	87	75	66	47	55	56	78	61	64	72	67.2	73.0	65.1	73.1	74.0	68.1	67.1	104	72
Chromium	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	•	-	< 0.003	< 0.003	<0.003	0.005	<0.003	<0.002	< 0.003	<0.002	<0.002
Copper	mg/L	1 AO	-	-	-	-	-	-	-	-	-	-	-	•	-	< 0.003	< 0.003	<0.003	< 0.003	<0.003	<0.001	< 0.003	<0.001	<0.001
Iron	mg/L	0.3 AO	0.345	0.445	0.75	0.41	0.33	0.23	<0.1	0.13	0.12	<0.1	0.25	0.22	0.24	0.226	0.292	0.275	0.217	0.109	0.468	0.054	0.482	0.169
Lead	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	•	-	<0.002	<0.002	<0.002	<0.001	<0.001	< 0.0005	<0.001	<0.0005	0.0014
Magnesium	mg/L		53.5	55.4	60	65	51	48	32	40	39	56	45	46	54	48.4	52.7	47.6	54.4	53.5	50.3	53.6	64.9	52.9
Manganese	mg/L	0.05 AO	-	-	-	-	-	-	-	-	-	-	-	•	-	0.004	0.007	0.007	0.004	0.005	0.004	0.003	0.003	0.005
Mercury	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	•	-	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Potassium	mg/L		-	-	-	-	-	-	-	-	-	-	-	•	-	7.53	8.73	8.09	8.54	8.46	7.97	9.23	15	11.7
Sodium	mg/L	200 AO	16.3	16.55	20	24	20	16	41	14	18	21	18	19	25	21.5	26.3	20.9	26.4	24.0	23.8	26.9	45.1	28.8
Zinc	mg/L	5 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.007
Volatile Organic Compounds																								
1,4-Dichlorobenzene	mg/L	0.005 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	< 0.0001	< 0.0001	< 0.0001	<0.0001	< 0.0002	<0.0001	<0.00010	<0.0001
Benzene	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	•	-	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0004	< 0.0002	<0.00020	< 0.0002
Methylene Chloride(Dichloromethai	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0006	< 0.0003	<0.00030	< 0.00003
Toluene	mg/L	0.024 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0004	< 0.0002	<0.00020	< 0.0002
Vinyl Chloride	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	< 0.00034	<0.00017	<0.00017	< 0.00017

Notes: (1) MECP Ontario Drinking Water Standards.

(2) OG: Operational Guideline within ODWS.

(3) AO: Aesthetic Objective within ODWS.

(4) MAC: Maximum Acceptable Concentration within ODWS.

(5) ODWS exceedances indicated by **bold** entries.

(6) "-" indicates no analytical result.
2023 Annual Groundwater Monitoring Report Providence Bay Waste Disposal Site Providence Bay, Ontario December 2023

#### Groundwater Geochemical Results OW-2

Parameters	Units	ODWS <sup>(1)</sup>	Mar-04	Sep-04	Jul-05	Nov-05	Nov-06	Oct-07	Oct-08	Oct-09	Nov-10	Oct-11	Oct-12	Oct-13	Oct-14	Sep-15	Sep-16	Oct-17	Sep-18	Sep-19	Nov-20	Nov-21	Nov-22	Oct-23
General Chemistry																								
Alkalinity (Total as CaCO3)	mg/L	30-500 OG	286	276	261	234	226	246	200	196	245	206	190	180	180	177	194	208	193	185	179	180	185	180
Ammonia	mg/L		0.18	0.09	0.27	<0.05	<0.05	0.12	<0.05	<0.05	0.2	0.15	<0.05	<0.05	<0.05	<0.02	0.16	0.03	<0.02	0.18	<0.02	0.08	0.02	0.02
Chloride	mg/L	250 AO	53	52.1	51	41	37	42	30	25	37	23	16	15	13	15.9	16.1	16.0	12.1	12.9	10.5	9.7	9.01	9.52
COD	mg/L		24	18	10	17	41	20	7	7	81	31	9.5	<4	8.1	<5	10	7	<5	<5	7	<5	11	21
Conductivity	umho/cm		850	794	801	771	708	792	622	588	739	592	530	500	480	553	534	524	519	513	466	467	454	451
Dissolved Organic Carbon (DOC)	mg/L	5 AO	9.8	5.6	8.0	4.4	9.8	6.2	3.3	3.1	6.5	4.6	1.5	2.7	2.2	2.3	2.9	3.4	2.1	2.0	2.1	3.1	1.8	1.9
Nitrate (N)	mg/L	10 MAC	0.2	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	0.06	<0.10	<0.05	<0.05	0.05	<0.05	<0.05	<0.05
Nitrite (N)	mg/L	1 MAC	<0.2	-	<0.3	-	-	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
рН	pН	6.5-8.5	7.76	7.92	8.18	8.16	8.20	8.00	8.10	7.70	7.87	7.90	7.89	7.90	7.93	7.87	8.01	8.02	7.91	7.85	7.84	7.78	7.79	7.59
Phenols	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	0.011	0.005	0.002
Total Phosphorus	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	0.10	0.24	0.06	0.05	0.05	0.08	0.03	<0.02
Sulphate	mg/L	500 AO	129	130	129	121	104	114	89	74	87	61	60	57	52	65.1	68.1	68.7	61.0	63.1	52.2	60.1	55.9	51.1
Total Dissolved Solids (TDS)	mg/L	500 AO	560	476	568	530	482	409	380	402	414	608	288	306	350	306	304	296	298	238	252	290	242	246
TKN	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	0.20	0.19	0.22	0.20	0.62	0.40	0.17	0.2	<0.10
Metals																								
Arsenic	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.003	<0.003	<0.003	<0.003	<0.003	<0.001	< 0.003	<0.001	<0.001
Barium	mg/L	1 MAC	0.031	0.026	0.029	0.027	0.026	0.028	0.022	0.022	0.019	0.018	0.018	0.018	0.018	0.019	0.021	0.021	0.018	0.016	0.018	0.014	0.016	0.015
Boron	mg/L	5 IMAC	0.316	0.257	0.26	0.22	0.22	0.31	0.20	0.22	0.22	0.27	0.24	0.21	0.25	0.209	0.190	0.228	0.238	0.237	0.254	0.247	0.239	0.266
Cadmium	mg/L	0.005 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0001	<0.002	0.0001	<0.0001
Calcium	mg/L		88.7	73.4	85	80	61	80	53	52	43	50	38	38	41	46.6	48.4	47.7	39.6	44.7	35.7	38.6	39.3	42.5
Chromium	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	<0.002	< 0.003	<0.002	<0.002
Copper	mg/L	1 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	0.001	< 0.003	<0.001	<0.001
Iron	mg/L	0.3 AO	1.28	1.06	1.0	0.37	<0.05	1.5	<0.1	0.14	<0.01	<0.1	<0.1	<0.1	<0.1	<0.010	<0.010	0.171	0.096	<0.010	<0.010	0.056	0.034	0.132
Lead	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.002	<0.002	<0.002	<0.001	<0.001	<0.0005	<0.001	< 0.0005	<0.0005
Magnesium	mg/L		62.2	52.2	62	56	46	58	42	38	32	36	29	27	30	32.9	34.1	35.0	28.5	30.9	25.5	27.5	29.3	27.5
Manganese	mg/L	0.05 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	0.003	0.011	0.017	0.014	0.023	<0.002	0.015	0.005	0.014
Mercury	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.0001	< 0.0001	<0.0001	< 0.0001	< 0.0001	<0.0001	< 0.0001	< 0.0001	<0.0001
Potassium	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	5.82	5.53	6.21	5.68	5.37	4.58	4.88	7.96	4.26
Sodium	mg/L	200 AO	22.5	16.8	19	14	11	20	11	11	9.6	12	10	8.5	11	10.1	9.87	10.9	9.68	9.55	8.38	8.68	11.3	8.4
Zinc	mg/L	5 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.005	0.007	<0.005	< 0.005	<0.005	< 0.005	< 0.005	< 0.005	<0.005
Volatile Organic Compounds																								
1,4-Dichlorobenzene	mg/L	0.005 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.0001
Benzene	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	<0.00020	< 0.0002
Methylene Chloride(Dichlorometha	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003	<0.0003	< 0.0003	<0.00030	< 0.00003
Toluene	mg/L	0.024 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.0002	< 0.0002	<0.0002	< 0.0002	<0.0002	<0.0002	< 0.0002	<0.00020	<0.0002
Vinyl Chloride	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017

Notes: (1) MECP Ontario Drinking Water Standards.

(2) OG: Operational Guideline within ODWS.

(3) AO: Aesthetic Objective within ODWS.

(4) MAC: Maximum Acceptable Concentration within ODWS.

(5) ODWS exceedances indicated by **bold** entries.

2023 Annual Groundwater Monitoring Report Providence Bay Waste Disposal Site Providence Bay, Ontario December 2023

#### Groundwater Geochemical Results OW-3A

Parameters	Units	ODWS <sup>(1)</sup>	Mar-04	Sep-04	Jul-05	Nov-05	Nov-06	Oct-07	Oct-08	Oct-09	Nov-10	Oct-11	Oct-12	Oct-13	Oct-14	Sep-15	Sep-16	Oct-17	Sep-18	Sep-19	Nov-20	Nov-21	Nov-22	Oct-23
General Chemistry																								
Alkalinity (Total as CaCO3)	mg/L	30-500 OG	297	244	250	281	306	283	277	256	259	282	290	260	290	274	376	508	424	351	500	471	505	494
Ammonia	mg/L		0.08	0.04	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	0.09	0.08	0.11	0.09	0.072	<0.02	0.07	0.14	0.14	0.21	0.44	0.3	0.7	0.52
Chloride	mg/L	250 AO	31	10	9	16	26	30	18	12	15	19	20	15	21	17.2	38.7	70.1	49.0	36.1	70.8	65.8	58.3	79.6
COD	mg/L		17	12	15	10	18	12	15	7	580	51	40	81	<4	8.0	15.0	48.0	21.0	12.0	37.0	37.0	36	56
Conductivity	umho/cm		710	500	513	607	679	711	614	562	600	636	650	590	650	659	835	1040	957	809	1110	1040	1020	1130
Dissolved Organic Carbon (DOC)	mg/L	5 AO	5.5	3.5	4.1	3.7	5.3	5.3	4.5	3.9	4.3	4.0	5.7	6.0	4.7	4.5	7.3	15.1	10.0	5.9	14.9	9.3	11	12.8
Nitrate (N)	mg/L	10 MAC	1.0	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.05	<0.05	<0.05
Nitrite (N)	mg/L	1 MAC	<0.2	-	<0.3	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.05	<0.05	<0.05
рН	pН	6.5-8.5	7.89	8.22	8.27	8.11	8.20	8.10	8.20	8.00	8.07	7.92	7.95	7.95	7.91	8.02	8.14	8.25	7.77	7.80	7.98	7.66	7.8	7.56
Phenols	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	0.001	0.003	0.037	0.005	0.005
Total Phosphorus	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	0.09	0.26	0.09	0.23	0.03	0.05	0.16	0.05	<0.02
Sulphate	mg/L	500 AO	66.5	39.1	29.1	31	43	42	36	32	48	32	31	31	30	31.8	33.2	30.2	28.6	29.2	28.6	24.4	24.1	21
Total Dissolved Solids (TDS)	mg/L	500 AO	554	330	324	316	411	388	390	365	392	374	336	340	328	362	436	642	534	372	654	616	540	668
TKN	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	0.32	0.38	1.0	0.78	0.76	1.50	2.06	1.78	1.59
Metals																								
Arsenic	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	< 0.003	< 0.003	< 0.003	<0.003	0.001	< 0.003	0.001	0.002
Barium	mg/L	1 MAC	0.031	0.017	0.017	0.019	0.020	0.023	0.018	<0.016	0.017	0.018	0.019	0.016	0.020	0.020	0.027	0.048	0.034	0.035	0.054	0.032	0.042	0.048
Boron	mg/L	5 IMAC	0.152	0.146	0.16	0.17	0.18	0.17	0.16	0.17	0.21	0.18	0.18	0.15	0.21	0.171	0.160	0.241	0.228	0.236	0.297	0.239	0.24	0.292
Cadmium	mg/L	0.005 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.002	< 0.002	<0.002	<0.001	<0.001	< 0.0001	<0.002	< 0.0001	<0.0001
Calcium	mg/L		62.3	44.6	54	54	61	68	53	47	48	55	54	45	55	55.7	75.7	101	69.7	66.1	89.2	62.8	78.3	105
Chromium	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.003	< 0.003	< 0.003	0.004	< 0.003	0.002	< 0.003	<0.002	<0.002
Copper	mg/L	1 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	0.003	< 0.003	<0.001	<0.001
Iron	mg/L	0.3 AO	<0.03	0.04	0.07	< 0.05	0.053	<0.1	<0.1	<0.1	0.13	<0.1	0.15	<0.1	0.14	0.032	0.155	0.225	0.113	<0.010	0.145	0.041	0.253	0.442
Lead	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	< 0.002	<0.002	<0.001	<0.001	< 0.0005	<0.001	< 0.0005	< 0.0005
Magnesium	mg/L		49.5	34.6	43	43	45	53	41	32	37	42	45	33	44	42.1	57.5	81	54.5	50.8	68.4	49.6	64.9	85.8
Manganese	mg/L	0.05 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	0.003	0.007	0.003	0.003	0.003	0.003	0.007	0.003	0.004
Mercury	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.0001
Potassium	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	6.52	6.89	10.1	8.58	7.32	10.2	7.96	13.5	13.8
Sodium	mg/L	200 AO	20.3	9.7	12	12	13	15	12	9.6	13	13	14	9.7	13	13.1	18.4	40.1	29.2	23.4	40.1	27	41.6	52.9
Zinc	mg/L	5 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.005	< 0.005	< 0.005	< 0.005	0.007	< 0.005	< 0.005	0.006	<0.005
Volatile Organic Compounds																								
1,4-Dichlorobenzene	mg/L	0.005 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0002	<0.0001	<0.0001
Benzene	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0004	< 0.0004	< 0.0002	< 0.0002
Methylene Chloride(Dichlorometha	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0006	< 0.0006	< 0.0003	< 0.00003
Toluene	mg/L	0.024 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0004	< 0.0004	< 0.0002	< 0.0002
Vinyl Chloride	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00034	<0.00034	<0.00017	< 0.00017

Notes: (1) MECP Ontario Drinking Water Standards.

(2) OG: Operational Guideline within ODWS.

(3) AO: Aesthetic Objective within ODWS.

(4) MAC: Maximum Acceptable Concentration within ODWS.

(5) ODWS exceedances indicated by **bold** entries.

2023 Annual Groundwater Monitoring Report Providence Bay Waste Disposal Site Providence Bay, Ontario December 2023

#### Groundwater Geochemical Results OW-3B

Parameters	Units	ODWS <sup>(1)</sup>	Mar-04	Sep-04	Jul-05	Nov-05	Nov-06	Oct-07	Oct-08	Oct-09	Nov-10	Oct-11	Oct-12	Oct-13	Oct-14	Sep-15	Sep-16	Oct-17	Sep-18	Sep-19	Nov-20	Nov-21	Nov-22	Oct-23
General Chemistry																								
Alkalinity (Total as CaCO3)	mg/L	30-500 OG	213	191	138	188	153	182	189	183	137	184	220	170	190	156	160	184	211	199	206	174	182	189
Ammonia	mg/L		0.26	0.15	0.06	0.18	<0.05	0.38	0.11	0.15	<0.05	0.25	0.33	<0.05	0.21	<0.02	0.08	<0.02	<0.02	0.10	<0.02	0.05	0.04	<0.02
Chloride	mg/L	250 AO	59	52.6	10.3	38	11	66	34	29	7	31	31	8	12	6.57	5.96	6.27	23.4	25.6	13.2	7.49	15.8	18.5
COD	mg/L		21	11	12	36	81	44	14	11	<4	89	230	11	190	<5	<5	<5	<5	<5	12	<5	19	24
Conductivity	umho/cm		969	840	595	832	633	916	808	770	542	758	870	670	680	645	544	565	762	726	659	602	573	605
Dissolved Organic Carbon (DOC)	mg/L	5 AO	8.1	3.4	1.8	3.9	8.1	4.6	2.8	2.9	0.9	2.3	2.5	0.91	1.6	1.0	1.9	2.6	2.6	3.2	4.9	2.2	5	5
Nitrate (N)	mg/L	10 MAC	0.4	0.8	0.8	0.3	0.4	0.1	0.4	0.4	0.6	0.03	<0.1	0.42	<0.01	0.46	0.25	0.20	0.47	0.73	0.83	0.35	0.28	0.72
Nitrite (N)	mg/L	1 MAC	<0.2	-	<0.3	-	-	0.03	0.02	<0.01	<0.01	0.20	<0.01	<0.01	<0.01	<0.05	<0.05	<0.10	<0.10	<0.10	<0.10	<0.05	< 0.05	<0.05
pН	pН	6.5-8.5	7.83	8.02	8.29	8.02	8.00	8.10	8.10	7.80	8.17	7.95	7.99	7.88	7.99	7.85	7.98	7.86	8.02	7.72	8.07	7.83	7.81	7.6
Phenols	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	0.046	0.01	0.005
Total Phosphorus	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	0.08	0.1	0.06	0.08	0.05	0.04	0.03	<0.02
Sulphate	mg/L	500 AO	202	229	154	175	149	184	187	180	110	150	190	150	170	133	111	119	147	139	118	138	99.6	111
Total Dissolved Solids (TDS)	mg/L	500 AO	728	622	973	572	437	458	505	490	354	444	548	442	466	362	314	352	-	392	402	388	338	368
TKN	mg/L			-	-	-	-	-	-	-	-	-	-	-	-	0.13	0.12	0.18	0.40	1.14	0.60	0.11	0.37	0.39
Metals																								
Arsenic	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	<0.001	< 0.003	0.001	<0.001
Barium	mg/L	1 MAC	0.012	0.013	0.006	0.009	0.005	0.013	0.009	0.008	<0.05	0.01	0.011	0.007	0.008	0.007	0.007	0.010	0.012	0.012	0.013	0.007	0.01	0.012
Boron	mg/L	5 IMAC	0.912	0.834	0.64	0.87	0.7	1.2	1.0	0.83	0.68	1.1	1.1	0.66	0.93	0.67	0.559	0.628	0.629	0.568	0.653	0.751	0.537	0.642
Cadmium	mg/L	0.005 MAC	-	-	-	-	-	÷	-	•	-	•	-	÷	-	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0001	<0.002	< 0.0001	<0.0001
Calcium	mg/L		90.3	78.3	46	71	37	89	71	60	31	62	70	42	55	44.7	41.3	49.6	60.8	55.9	48.8	44.1	59.3	59.6
Chromium	mg/L	0.05 MAC	-	-	-	-	-	÷	-	•	-	•	-	÷	-	<0.003	<0.003	<0.003	< 0.003	< 0.003	<0.002	< 0.003	< 0.002	< 0.002
Copper	mg/L	1 AO	-	-	-	-	-	÷	-	•	-	•	-	÷	-	<0.003	<0.003	<0.003	< 0.003	< 0.003	0.004	< 0.003	< 0.001	0.001
Iron	mg/L	0.3 AO	0.8	0.64	<0.05	0.54	<0.05	0.94	0.52	<0.1	<0.1	<0.1	<0.1	<0.1	0.11	<0.010	0.041	<0.010	0.225	<0.010	0.176	<0.010	0.029	0.012
Lead	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.001	<0.001	< 0.0005	<0.001	< 0.0005	< 0.0005
Magnesium	mg/L		56.1	48.5	25	43	20	54	40	30	17	35	41	21	30	22.8	21.8	27.0	31.9	29.3	25.4	24.0	29.2	32.7
Manganese	mg/L	0.05 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	0.004	0.003	0.005	0.020	0.010	0.002	0.004	0.006	0.002
Mercury	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Potassium	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	5.6	4.98	6.45	8.03	6.13	5.86	5.44	7.62	7.82
Sodium	mg/L	200 AO	51.5	47.6	62	48	62	47	40	44	54	38	43	45	45	49.5	39.3	34.4	34.1	29.9	34.9	37.5	39.4	43.1
Zinc	mg/L	5 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	< 0.005	<0.005	<0.005	<0.005	< 0.005	<0.005
Volatile Organic Compounds																								
1,4-Dichlorobenzene	mg/L	0.005 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Benzene	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Methylene Chloride(Dichloromethai	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.00003
Toluene	mg/L	0.024 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0015	< 0.0002	< 0.0002	< 0.0002
Vinyl Chloride	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	< 0.00017

Notes: (1) MECP Ontario Drinking Water Standards.

(2) OG: Operational Guideline within ODWS.

(3) AO: Aesthetic Objective within ODWS.

(4) MAC: Maximum Acceptable Concentration within ODWS.

(5) ODWS exceedances indicated by **bold** entries.

2023 Annual Groundwater Monitoring Report Providence Bay Waste Disposal Site Providence Bay, Ontario December 2023

Groundwater	Geochemical	Results	OW-4
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Parameters	Units	ODWS <sup>(1)</sup>	Mar-04	Sep-04	Jul-05	Nov-05	Nov-06	Oct-07	Oct-08	Oct-09	Nov-10	Oct-11	Oct-12	Oct-13	Oct-14	Sep-15	Sep-16	Oct-17	Sep-18	Sep-19	Nov-20	Nov-21	Nov-22	Oct-23
General Chemistry																								
Alkalinity (Total as CaCO3)	mg/L	30-500 OG	233	233	242	255	254	235	238	236	230	237	230	230	240	232	232	240	248	235	248	245	252	235
Ammonia	mg/L		0.05	0.04	0.07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.066	0.073	0.059	<0.02	0.06	0.3	0.08	0.13	0.07	0.1	0.09	0.06
Chloride	mg/L	250 AO	1.5	1.9	2	3	2	3	2	3	3	4	4	5	6	6.38	4.83	3.74	4.71	4.93	4.80	4.18	5.97	7.89
COD	mg/L		9	8	10	7	21	8	19	6	38	19	17	25	13	<5	<5	<5	<5	<5	10	<5	12	24
Conductivity	umho/cm		453	442	460	495	501	488	485	492	488	495	500	500	510	548	490	461	512	503	501	491	503	489
Dissolved Organic Carbon (DOC)	mg/L	5 AO	3.1	2.4	3.3	3.0	4.9	2.5	3.9	2.9	4.8	2.6	3.4	3.0	2.8	2.6	3.1	4.3	3.6	2.9	3.5	4.4	3.4	3.2
Nitrate (N)	mg/L	10 MAC	0.2	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06
Nitrite (N)	mg/L	1 MAC	<0.2	-	<0.3	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.013	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
рН	pН	6.5-8.5	8.01	8.14	8.29	8.12	8.10	8.20	8.20	8.00	8.05	8.00	7.99	7.97	8.01	8.02	8.22	8.21	7.94	7.87	8.05	7.86	7.93	7.77
Phenols	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	0.019	0.013	0.002
Total Phosphorus	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	0.05	0.05	0.08	0.04	0.03	0.02	0.02
Sulphate	mg/L	500 AO	23.1	24.9	17.9	24	27	27	27	27	27	25	26	28	28	28.2	28.6	25.4	25.1	25.6	24.9	26.3	26.9	28.4
Total Dissolved Solids (TDS)	mg/L	500 AO	262	284	274	322	304	278	310	315	322	260	248	262	286	266	284	268	290	220	268	200	264	272
TKN	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	0.18	0.33	0.42	0.20	1.14	0.50	0.17	0.27	0.26
Metals																								
Arsenic	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	< 0.003	< 0.003	<0.003	<0.001	< 0.003	<0.001	<0.001
Barium	mg/L	1 MAC	0.014	0.014	0.014	0.014	0.014	0.014	0.012	0.013	0.015	0.014	0.014	0.014	0.014	0.014	0.015	0.015	0.015	0.015	0.018	0.014	0.015	0.014
Boron	mg/L	5 IMAC	0.173	0.161	0.16	0.17	0.18	0.16	0.15	0.16	0.17	0.17	0.18	0.15	0.19	0.148	0.148	0.166	0.169	0.200	0.213	0.193	0.173	0.182
Cadmium	mg/L	0.005 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	< 0.002	< 0.002	<0.001	<0.001	<0.0001	<0.002	< 0.0001	<0.0001
Calcium	mg/L		43.3	41.8	49	48	44	44	43	42	43	44	44	40	44	46.9	44.5	42.9	39.4	44.1	40.2	39.2	50.1	45.7
Chromium	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.002	< 0.003	<0.002	<0.002
Copper	mg/L	1 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	0.003	< 0.003	<0.001	<0.001
Iron	mg/L	0.3 AO	<0.03	0.03	0.07	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.162	<0.010	<0.010	<0.010	<0.010	<0.010	0.018	0.028	0.031
Lead	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	< 0.002	<0.001	<0.001	< 0.0005	<0.001	< 0.0005	<0.0005
Magnesium	mg/L		33.5	32.7	37	36	35	34	31	33	32	34	36	29	35	35.0	33.7	33.1	30.6	33.2	30.5	31	39.2	37.8
Manganese	mg/L	0.05 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	0.004	< 0.002	<0.002	<0.002	<0.002	0.002	0.003	<0.002
Mercury	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.0001	< 0.0001	< 0.0001	<0.0001
Potassium	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	5.73	5.17	5.48	5.57	5.48	4.9	4.91	7.31	6.11
Sodium	mg/L	200 AO	9.1	8.5	9.3	9.4	9.2	9.0	8.3	8.3	8.1	8.3	9.2	7.4	6.3	9.09	8.17	8.87	8.66	8.56	8.18	7.78	9.21	10.2
Zinc	mg/L	5 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	0.006	< 0.005	< 0.005	< 0.005	<0.005	< 0.005	< 0.005	<0.005	< 0.005
Volatile Organic Compounds																								
1,4-Dichlorobenzene	mg/L	0.005 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.0001	<0.0001	< 0.0001	<0.0001
Benzene	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	÷	-	-	-	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	<0.0002
Methylene Chloride(Dichloromethal	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.00003
Toluene	mg/L	0.024 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	<0.00020
Vinyl Chloride	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	< 0.00017

Notes: (1) MECP Ontario Drinking Water Standards.

(2) OG: Operational Guideline within ODWS.

(3) AO: Aesthetic Objective within ODWS.

(4) MAC: Maximum Acceptable Concentration within ODWS.

(5) ODWS exceedances indicated by **bold** entries.

2023 Annual Groundwater Monitoring Report Providence Bay Waste Disposal Site Providence Bay, Ontario December 2023

#### Groundwater Geochemical Results OW-5

Parameters	Units	ODWS <sup>(1)</sup>	Mar-04	Sep-04	Jul-05	Nov-05	Nov-06	Oct-07	Oct-08	Oct-09	Nov-10	Oct-11	Oct-12	Oct-13	Oct-14	Sep-15	Sep-16	Oct-17	Sep-18	Sep-19	Nov-20	Nov-21	Nov-22	Oct-23
General Chemistry																								
Alkalinity (Total as CaCO3)	mg/L	30-500 OG	394	394	384	396	373	350	347	360	372	355	360	380	390	336	354	337	311	273	297	272	280	210
Ammonia	mg/L		0.14	0.17	0.26	0.21	0.2	0.14	0.08	0.21	0.16	0.09	0.1	0.11	0.1	<0.02	0.08	<0.02	<0.02	0.11	<0.02	0.04	0.03	<0.02
Chloride	mg/L	250 AO	43.9	30.5	26.8	31	27	28	32	34	33	28	29	34	34	28.2	28.7	23.2	23.4	20.3	20.9	20.0	21.9	13.3
COD	mg/L		21	30	21	32	32	21	23	120	27	30	24	22	76	16	15	38	10	<5	17	<5	25	22
Conductivity	umho/cm		915	1040	1020	1190	1180	1150	1130	1150	1150	1090	1100	1100	1200	1080	1010	868	877	781	798	740	753	550
Dissolved Organic Carbon (DOC)	mg/L	5 AO	7.5	10	9.9	9.1	12.5	8.6	7.7	7.5	8.6	7	9	10	8.2	6.5	6.7	6.9	5.8	3.9	6.7	5.7	5.7	3.1
Nitrate (N)	mg/L	10 MAC	0.3	0.2	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.25	<0.25	<0.25	<0.25	<0.10	<0.10	<0.05	<0.05	<0.05
Nitrite (N)	mg/L	1 MAC	<0.2	<0.2	<0.3	-	-	0.02	0.02	0.01	0.02	<0.01	<0.01	<0.01	0.021	<0.25	<0.25	<0.25	<0.25	<0.10	<0.10	<0.05	<0.05	<0.05
pН	pН	6.5-8.5	7.91	7.89	8.38	7.95	8.10	8.10	8.10	7.90	7.85	7.82	7.79	7.67	7.84	7.93	8.15	8.23	7.88	7.86	8.03	7.77	7.94	7.72
Phenols	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.008	0.095	0.008
Total Phosphorus	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	0.09	<0.05	1.28	0.84	0.36	0.5	0.15	0.24	0.12
Sulphate	mg/L	500 AO	92.3	267	218	219	256	251	243	260	220	200	210	210	220	176	180	150	131	119	116	122	113	72.6
Total Dissolved Solids (TDS)	mg/L	500 AO	578	828	746	806	800	556	705	745	766	638	716	766	768	628	630	546	546	386	474	428	422	328
TKN	mg/L		-	-	-	-	-	-	-	-	-	-	-	•	-	0.40	0.42	0.36	0.33	1.23	0.8	0.58	0.46	0.49
Metals																								
Arsenic	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	<0.001	< 0.003	<0.001	<0.001
Barium	mg/L	1 MAC	0.031	0.039	0.03	0.035	0.034	0.031	0.029	0.033	0.03	0.024	0.025	0.025	0.027	0.025	0.024	0.022	0.020	0.018	0.020	0.017	0.019	0.014
Boron	mg/L	5 IMAC	0.261	0.23	0.19	0.25	0.27	0.23	0.23	0.29	0.29	0.27	0.28	0.28	0.34	0.270	0.261	0.304	0.343	0.362	0.390	0.347	0.331	0.342
Cadmium	mg/L	0.005 MAC	-	-	-	-	-	-	-	÷	-	•	-	•	-	<0.002	<0.002	<0.002	<0.001	<0.001	< 0.0001	<0.002	< 0.0001	<0.0001
Calcium	mg/L		72.6	123	110	120	120	120	100	110	110	99	100	98	110	97.1	96.7	83.8	68.1	69.2	65.6	59.1	83.3	58.8
Chromium	mg/L	0.05 MAC	-	-	-	-	-	-	-	÷	-	•	-	•	-	< 0.003	< 0.003	< 0.003	<0.003	< 0.003	<0.002	< 0.003	<0.002	<0.002
Copper	mg/L	1 AO	-	-	-	-	-	-	-	÷	-	•	-	•	-	< 0.003	< 0.003	< 0.003	<0.003	< 0.003	0.001	< 0.003	<0.001	<0.001
Iron	mg/L	0.3 AO	0.08	0.83	1.2	1.2	0.7	1.1	0.57	0.98	0.56	<0.1	0.32	0.22	0.33	0.151	0.070	0.246	0.020	<0.010	0.172	0.025	0.08	0.024
Lead	mg/L	0.01 MAC	-	-	-	-	-	-	-	÷	-	•	-	•	-	<0.002	<0.002	<0.002	<0.001	<0.001	< 0.0005	<0.001	< 0.0005	<0.0005
Magnesium	mg/L		59.4	78.5	83	84	81	77	71	65	73	65	69	62	72	61.7	61.7	55.8	43.6	43.7	40.5	38.4	44.3	40.2
Manganese	mg/L	0.05 AO	-	-	-	-	-	-	-	÷	-	•	-	•	-	0.008	0.006	0.006	0.010	0.007	0.008	0.006	0.01	0.006
Mercury	mg/L	0.001 MAC	-	-	-	-	-	-	-	÷	-	•	-	•	-	<0.0001	< 0.0001	< 0.0001	<0.0001	< 0.0001	< 0.0001	<0.0001	< 0.0001	<0.0001
Potassium	mg/L		-	-	-	-	-	-	-	÷	-	•	-	•	-	9.54	8.70	9.36	7.74	7.39	6.84	6.57	9.76	7.51
Sodium	mg/L	200 AO	52.6	25.1	40	29	28	37	32	26	35	33	39	32	36	34.6	34.5	34	28.5	26.6	29.6	26.2	39.2	27.5
Zinc	mg/L	5 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	0.008	0.031	<0.005	<0.005	<0.005	0.007	<0.005	<0.005	<0.005
Volatile Organic Compounds																								
1,4-Dichlorobenzene	mg/L	0.005 MAC	-	-	-	-	-	-	-	-	-	-	-	•	-	<0.0001	< 0.0001	< 0.0001	<0.0001	< 0.0001	< 0.0001	<0.0001	< 0.0001	<0.0001
Benzene	mg/L	0.001 MAC	-	-	-	-	-	-	-	÷	-	•	-	•	-	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	<0.0002
Methylene Chloride(Dichloromethai	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003	<0.00003
Toluene	mg/L	0.024 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Vinyl Chloride	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	< 0.00017

Notes: (1) MECP Ontario Drinking Water Standards.

(2) OG: Operational Guideline within ODWS.

(3) AO: Aesthetic Objective within ODWS.

(4) MAC: Maximum Acceptable Concentration within ODWS.

(5) ODWS exceedances indicated by **bold** entries.

2023 Annual Groundwater Monitoring Report Providence Bay Waste Disposal Site Providence Bay, Ontario December 2023

Groundwater	Geochemical	Results OW-6
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Parameters	Units	ODWS <sup>(1)</sup>	Sep-04	Jul-05	Nov-05	Nov-06	Oct-07	Oct-08	Oct-09	Nov-10	Oct-11	Oct-12	Oct-13	Oct-14	Sep-15	Sep-16	Oct-17	Sep-18	Sep-19	Nov-20	Nov-21	Nov-22	Oct-23
General Chemistry																							
Alkalinity (Total as CaCO3)	mg/L	30-500 OG	215	208	225	241	232	213	215	183	197	200	190	190	173	184	182	192	173	189	180	179	175
Ammonia	mg/L		0.43	0.31	0.28	0.17	0.37	<0.05	0.15	<0.05	0.15	<0.05	0.07	0.057	<0.02	0.06	0.08	<0.02	0.18	<0.02	0.06	0.03	<0.02
Chloride	mg/L	250 AO	62.3	36.5	39	25	28	8.0	9.0	5.0	6.0	5.0	4.0	5	3.1	3.6	3.62	3.65	3.53	3.49	2.71	2.6	3.64
COD	mg/L		33	31	50	20	59	5	9	<4	9	7.1	8.2	<4	<5	<5	<5	<5	<5	<5	<5	15	20
Conductivity	umho/cm		875	794	832	736	708	626	641	554	591	600	560	560	551	550	509	557	531	560	519	505	519
Dissolved Organic Carbon (DOC)	mg/L	5 AO	9.4	7.4	11.3	9.7	5.8	2.6	2.3	1.7	1.5	1.9	1.7	4.1	1.4	1.2	1.8	1.5	1.5	1.6	1.8	1.3	1.1
Nitrate (N)	mg/L	10 MAC	<0.2	<0.2	0.1	<0.1	<0.1	0.2	<0.1	0.2	0.2	<0.1	0.1	<0.1	0.24	0.16	0.22	0.12	0.17	0.10	0.18	0.18	0.07
Nitrite (N)	mg/L	1 MAC	<0.2	<0.3	-	-	0.02	<0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
pН	pН	6.5-8.5	7.64	8.19	7.95	7.70	7.90	8.10	7.80	7.92	7.85	7.88	7.95	7.83	7.80	8.02	8.00	7.84	7.74	7.89	7.74	7.8	7.54
Phenols	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.027	0.005	0.003
Total Phosphorus	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	0.09	0.03	0.03	0.04	0.02	0.02	<0.02
Sulphate	mg/L	500 AO	240	197	158	103	110	118	110	91	94	99	90	100	92.4	103	102	94.1	95.7	98.0	99.4	93.6	107
Total Dissolved Solids (TDS)	mg/L	500 AO	744	498	588	450	415	400	420	358	354	362	368	336	264	312	328	328	280	336	298	290	312
TKN	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	0.12	0.20	<0.10	<0.10	0.82	0.40	<0.10	0.12	<0.10
Metals																							
Arsenic	mg/L	0.01 MAC	-	-	- 1	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.001	< 0.003	<0.001	<0.001
Barium	mg/L	1 MAC	0.027	0.027	0.024	0.02	0.017	0.015	0.016	0.015	0.012	0.014	0.014	0.014	0.011	0.012	0.013	0.013	0.012	0.013	0.013	0.017	0.011
Boron	mg/L	5 IMAC	0.321	0.30	0.34	0.35	0.38	0.34	0.34	0.01	0.34	0.35	0.31	0.39	0.279	0.271	0.305	0.371	0.365	0.428	0.371	0.334	0.396
Cadmium	mg/L	0.005 MAC	-	-	-	-	•	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0001	<0.002	<0.0001	<0.0001
Calcium	mg/L		99.8	91	79	70	73	59	57	54	55	54	49	55	49.6	53.5	48.8	45.4	51.1	48.8	46.9	55.3	60
Chromium	mg/L	0.05 MAC	-	-	- 1	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.002	< 0.003	<0.002	<0.002
Copper	mg/L	1 AO	-	-	- 1	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.001	< 0.003	0.002	<0.001
Iron	mg/L	0.3 AO	8.55	5.6	2.7	1.7	2.3	0.79	1.6	0.42	<0.1	0.17	0.76	0.37	<0.010	<0.010	<0.010	0.199	<0.010	0.057	0.01	0.042	<0.010
Lead	mg/L	0.01 MAC	-	-	- 1	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.001	<0.001	< 0.0005	<0.001	< 0.0005	< 0.0005
Magnesium	mg/L		65.7	63	55	43	45	37	35	36	35	37	30	35	30.6	33.2	33.3	28.9	31.2	29.2	29.5	31.6	38.5
Manganese	mg/L	0.05 AO	-	-	- 1	-	-	-	-	-	-	-	-	-	<0.002	<0.002	0.003	0.012	0.012	0.004	0.005	0.002	0.004
Mercury	mg/L	0.001 MAC	-	-	- 1	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Potassium	mg/L		-	-	- 1	-	-	-	-	-	-	-	-	-	5.34	5.15	5.2	5.14	5.3	4.66	4.75	5.72	5.86
Sodium	mg/L	200 AO	19.1	18	17	14	15	12	11	12	11	12	9.7	11	10.4	10.2	10.6	10.5	10.5	9.64	9.6	12.7	12.6
Zinc	mg/L	5 AO	-	-		-	-	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Volatile Organic Compounds																							
1,4-Dichlorobenzene	mg/L	0.005 MAC	-	-	- 1	-	-	-	-	-	-	-	-	-	< 0.0001	< 0.0001	<0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0001	<0.0001
Benzene	mg/L	0.001 MAC	-	-	- 1	-	-	-	-	-	-	-	-	-	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0004	< 0.0002	< 0.0002	< 0.0002
Methylene Chloride(Dichlorometha	mg/L	0.05 MAC	-	-	- 1	-	-	-	-	-	-	-	-	-	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0006	< 0.0003	< 0.0003	< 0.00003
Toluene	mg/L	0.024 AO	-	- I	- 1	-	-	-	-	-	-	-	-	-	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0004	< 0.0002	< 0.0002	< 0.0002
Vinyl Chloride	mg/L	0.001 MAC	-	- 1	-	-	-	-	-	-	-	-	-	-	<0.00017	<0.00017	< 0.00017	<0.00017	< 0.00017	< 0.00034	<0.00017	< 0.00017	< 0.00017

Notes: (1) MECP Ontario Drinking Water Standards.

(2) OG: Operational Guideline within ODWS.

(3) AO: Aesthetic Objective within ODWS.

(4) MAC: Maximum Acceptable Concentration within ODWS.

(5) ODWS exceedances indicated by **bold** entries.

Groundwater Geochemical Results	OW-7
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Parameters	Units	ODWS <sup>(1)</sup>	Sep-04	Jul-05	Nov-05	Nov-06	Oct-07	Oct-08	Oct-09	Nov-10	Oct-11	Oct-12	Oct-13	Oct-14	Sep-15	Sep-16	Oct-17	Sep-18	Sep-19	Nov-20	Nov-21	Nov-22	Oct-23
General Chemistry																							
Alkalinity (Total as CaCO3)	mg/L	30-500 OG	298	233	241	241	245	212	238	209	186	230	210	200	152	175	194	195	189	190	189	186	176
Ammonia	mg/L		0.43	0.12	<0.05	0.07	0.22	<0.05	0.52	0.2	<0.05	0.19	0.07	0.16	<0.02	0.05	<0.02	<0.02	0.06	<0.02	0.06	0.12	<0.02
Chloride	mg/L	250 AO	94.5	29.6	26	21	31	11	23	10	5	10	6	5	3.13	3.69	3.39	3.69	3.18	3.05	2.76	2.51	3.59
COD	mg/L		34	38	57	25	25	9	250	41	12	34	22	8	<5	<5	<5	<5	11	8	<5	12	15
Conductivity	umho/cm		955	804	793	754	747	680	719	716	634	700	680	640	588	582	568	603	596	597	569	567	523
Dissolved Organic Carbon (DOC)	mg/L	5 AO	12.2	6.1	5.8	6.0	4.5	2.2	4.7	4.4	1.2	1.7	1.9	2.5	1.1	1.0	1.8	2.0	1.8	2.1	2.1	1.6	1
Nitrate (N)	mg/L	10 MAC	0.2	<0.2	0.2	<0.1	<0.1	<0.1	0.2	0.2	0.3	<0.1	0.1	0.1	0.37	0.36	0.44	0.34	0.24	0.45	0.47	0.48	0.3
Nitrite (N)	mg/L	1 MAC	-	<0.3	-	-	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.05	<0.10	<0.10	<0.10	<0.10	<0.05	<0.05	<0.05	<0.05
pН	pН	6.5-8.5	7.91	8.28	7.99	8.10	8.10	8.20	7.80	7.90	7.95	7.96	7.93	7.96	7.87	8.13	8.16	7.96	7.87	8.04	7.78	7.87	7.58
Phenols	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.034	0.006	0.003
Total Phosphorus	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	0.03	0.42	0.2	0.06	0.04	0.03
Sulphate	mg/L	500 AO	148	182	135	135	104	138	100	150	120	120	140	140	125	121	118	110	116	119	123	120	109
Total Dissolved Solids (TDS)	mg/L	500 AO	684	302	522	522	395	430	485	460	382	408	486	406	328	346	342	344	360	376	362	340	308
TKN	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	0.15	0.24	<0.10	0.12	4.53	0.7	0.13	0.28	0.14
Metals																						i l	
Arsenic	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	< 0.003	<0.003	<0.003	0.003	0.001	<0.003	<0.001	<0.001
Barium	mg/L	1 MAC	0.028	0.018	0.017	0.017	0.016	0.009	0.014	0.016	0.014	0.014	0.014	0.013	0.013	0.014	0.015	0.015	0.012	0.024	0.011	0.013	0.011
Boron	mg/L	5 IMAC	<0.001	0.31	0.33	0.34	0.33	0.32	0.3	0.31	0.32	0.32	0.27	0.33	0.261	0.261	0.283	0.322	0.323	0.364	0.345	0.315	0.347
Cadmium	mg/L	0.005 MAC	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0001	<0.002	<0.0001	<0.0001
Calcium	mg/L		74	61	52	51	57	47	50	56	53	51	49	52	46.5	47.1	46.2	41.2	48.7	68.2	38.8	53.5	50.6
Chromium	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.002	<0.003	<0.002	<0.002
Copper	mg/L	1 AO	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	0.002	<0.003	<0.001	<0.001
Iron	mg/L	0.3 AO	0.33	0.06	<0.05	<0.05	0.13	<0.1	<0.1	0.46	<0.1	0.12	0.19	<0.1	<0.010	0.113	<0.010	<0.010	<0.010	0.863	0.018	0.02	<0.010
Lead	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.001	<0.001	0.0012	<0.001	< 0.0005	<0.0005
Magnesium	mg/L		58	45	39	36	42	32	34	38	35	37	32	34	29.9	30.9	31.2	27.7	31.4	42.7	26.7	31.9	34.5
Manganese	mg/L	0.05 AO	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	0.006	<0.002	<0.002	0.011	0.040	0.007	0.015	0.005
Mercury	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001	< 0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Potassium	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	5.69	5.49	6.16	5.89	5.8	4.38	5.04	6.96	5.86
Sodium	mg/L	200 AO	50.9	70	65	57	51	41	35	30	33	30	23	24	24.3	27.1	34.5	31.3	26.6	93.2	28	31.4	26.4
Zinc	mg/L	5 AO	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Volatile Organic Compounds																							
1,4-Dichlorobenzene	mg/L	0.005 MAC	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Benzene	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	<0.0002
Methylene Chloride(Dichloromethal	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.00003
Toluene	mg/L	0.024 AO	-	-	-	-	-	-	-	-	-	-	-	-	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Vinyl Chloride	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	< 0.00017	< 0.00017	< 0.00017	< 0.00017	< 0.00017	< 0.00017	< 0.00017	<0.00017	< 0.00017

Notes: (1) MECP Ontario Drinking Water Standards.

(2) OG: Operational Guideline within ODWS.

(3) AO: Aesthetic Objective within ODWS.

(4) MAC: Maximum Acceptable Concentration within ODWS.

(5) ODWS exceedances indicated by **bold** entries.

2023 Annual Groundwater Monitoring Report Providence Bay Waste Disposal Site Providence Bay, Ontario December 2023

Groundwater Ge	ochemical	Results	OW-8
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Parameters	Units	ODWS <sup>(1)</sup>	Sep-04	Jul-05	Nov-05	Nov-06	Oct-07	Oct-08	Oct-09	Nov-10	Oct-11	Oct-12	Oct-13	Oct-14	Sep-15	Sep-16	Oct-17	Sep-18	Sep-19	Nov-20	Nov-21	Nov-22	Oct-23
General Chemistry																							
Alkalinity (Total as CaCO3)	mg/L	30-500 OG	246	256	278	284	264	275	276	279	276	270	290	290	257	266	286	283	232	286	282	300	236
Ammonia	mg/L		0.05	0.07	<0.05	0.05	<0.05	<0.05	<0.05	0.09	0.14	0.05	0.12	0.06	<0.02	0.03	<0.02	<0.02	0.04	<0.02	0.08	0.03	<0.02
Chloride	mg/L	250 AO	8.2	11.6	7	6	11	5	4	4	5	7	6	5	5.42	5.62	2.9	6.67	3.72	3.71	1.86	2.89	3.75
COD	mg/L		27	21	20	23	11	14	20	350	54	38	94	35	25	17	17	6	18	34	13	27	34
Conductivity	umho/cm		454	488	512	531	524	516	521	546	530	530	550	560	561	497	487	548	456	524	494	537	436
Dissolved Organic Carbon (DOC)	mg/L	5 AO	11.6	7.2	7.7	10.8	6.4	8.5	8.9	6.9	7.2	7.3	8.1	12	7.0	6.6	9.4	7.5	6.0	11.7	10.5	9.6	9.4
Nitrate (N)	mg/L	10 MAC	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.05	0.12	<0.05	<0.05	<0.05	<0.05	0.05
Nitrite (N)	mg/L	1 MAC	-	<0.3	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
рН	pН	6.5-8.5	8.06	8.18	8.01	7.90	8.00	8.10	7.70	7.90	7.78	7.74	7.72	7.72	7.97	8.18	8.20	7.79	7.81	8.02	7.61	7.87	7.46
Phenols	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.036	0.017	0.004
Total Phosphorus	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	0.61	0.38	0.51	0.46	0.61	0.41	0.15	0.24	0.3
Sulphate	mg/L	500 AO	10.6	3	13	16	14	11	3	18	9	13	5	<1	8.16	10.3	7.82	7.85	6.23	6.29	3.94	9.91	13.3
Total Dissolved Solids (TDS)	mg/L	500 AO	318	384	472	358	312	325	340	348	288	288	322	306	322	274	276	292	226	270	290	294	270
TKN	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	0.40	0.22	0.28	0.32	2.3	0.6	0.35	0.55	0.89
Metals																							
Arsenic	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.001	<0.003	0.001	<0.001
Barium	mg/L	1 MAC	0.007	0.006	0.006	0.006	0.006	0.005	0.005	0.008	0.009	0.007	0.007	0.006	0.006	0.006	0.007	0.007	0.005	0.008	0.006	0.008	0.008
Boron	mg/L	5 IMAC	0.016	0.01	0.015	0.017	0.02	0.01	0.027	0.03	0.31	0.023	0.017	0.028	0.016	0.016	0.025	0.027	0.028	0.040	0.019	0.014	0.02
Cadmium	mg/L	0.005 MAC	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0001	<0.002	0.0003	<0.0001
Calcium	mg/L		53.9	65	58	60	66	56	59	55	60	56	54	62	59.3	55.6	56.2	47.9	49.3	49.6	50	64.8	50.4
Chromium	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.002	<0.003	<0.002	<0.002
Copper	mg/L	1 AO	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	0.002	0.003	0.001	0.001
Iron	mg/L	0.3 AO	0.22	0.1	<0.05	<0.05	<0.01	<0.01	<0.01	0.23	<0.01	<0.01	<0.01	<0.01	<0.010	<0.010	0.019	0.096	<0.010	<0.010	0.051	0.047	0.114
Lead	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.001	<0.001	< 0.0005	<0.001	< 0.0005	<0.0005
Magnesium	mg/L		32	39	35	33	38	34	36	34	36	34	32	37	36.6	33.3	34.5	31.4	30.0	29.2	30.1	40.6	33.8
Manganese	mg/L	0.05 AO	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	0.003	0.006	0.004	<0.002	0.022	0.008	0.009
Mercury	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	< 0.0001	< 0.0001	<0.0001	<0.0001	< 0.0001	<0.0001	<0.0001	<0.0001
Potassium	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	2.44	1.10	1.21	2.13	0.95	0.70	0.64	0.56	1
Sodium	mg/L	200 AO	2.5	3.4	3.1	3	3.9	3	2.4	2.6	4.1	8.4	3.4	3.2	3.81	4.12	4.85	6.72	2.72	2.35	2.96	2.51	3.76
Zinc	mg/L	5 AO	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Volatile Organic Compounds																							
1,4-Dichlorobenzene	mg/L	0.005 MAC	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	< 0.0001	<0.0001	<0.0001	< 0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Benzene	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	<0.0002
Methylene Chloride(Dichlorometha	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.00003
Toluene	mg/L	0.024 AO	-	-	-	-	-	-	-	-	-	-	-	-	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	<0.0002
Vinyl Chloride	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	< 0.00017	< 0.00017	<0.00017	< 0.00017	< 0.00017	< 0.00017	< 0.00017	<0.00017	< 0.00017

Notes: (1) MECP Ontario Drinking Water Standards.

(2) Operational Guideline (OG) within ODWS.

(3) Aesthetic Objective (AO) within ODWS.

(4) Maximum Acceptable Concentration (MAC) within ODWS.

(5) ODWS exceedances indicated by **bold** entries. (6) "-" indicates no analytical result.

Parameters	Units	ODWS <sup>(1)</sup>	Oct-14	Sep-15	Sep-16	Oct-17	Sep-18	Sep-19	Nov-20	Nov-21	Nov-22	Oct-23
General Chemistry												
Alkalinity (Total as CaCO3)	mg/L	30-500 OG	296	181	190	189	219	177	179	198	199	180
Ammonia	mg/L		0.04	<0.02	0.07	0.08	<0.02	0.16	<0.02	<0.02	0.06	0.97
Chloride	mg/L	250 AO	76.2	8.56	7.95	11.6	19.3	6.2	11.6	8.89	5.67	4.22
COD	mg/L		19	7	<5	28	<5	<5	6	<5	14	15
Conductivity	umho/cm		1000	567	541	505	623	499	496	499	488	433
Dissolved Organic Carbon (DOC)	mg/L	5 AO	6.8	2.5	2.3	4.0	2.5	2.2	2.1	2.4	1.9	1.6
Nitrate (N)	mg/L	10 MAC	<0.25	<0.05	<0.05	<0.05	<0.10	0.06	0.29	<0.05	<0.05	<0.05
Nitrite (N)	mg/L	1 MAC	<0.25	<0.05	<0.05	<0.05	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05
pН	pН	6.5-8.5	7.66	7.97	8.14	8.04	8.02	7.79	7.90	7.85	7.87	7.6
Phenols	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.052	0.01	0.001
Total Phosphorus	mg/L		0.14	0.13	0.10	0.18	0.18	0.02	0.06	0.07	0.14	0.04
Sulphate	mg/L	500 AO	143	76.4	83.6	81.5	82	73.6	62.5	73.1	63.7	51.7
Total Dissolved Solids (TDS)	mg/L	500 AO	598	298	302	384	308	250	272	300	282	238
TKN	mg/L		0.37	0.22	0.16	0.3	0.19	0.39	0.4	0.24	0.38	<0.10
Metals												
Arsenic	mg/L	0.01 MAC	<0.003	<0.003	<0.003	0.003	<0.003	<0.003	<0.001	0.003	0.002	<0.001
Barium	mg/L	1 MAC	0.024	0.029	0.027	0.027	0.026	0.022	0.023	0.023	0.024	0.024
Boron	mg/L	5 IMAC	0.211	0.250	0.236	0.328	0.282	0.311	0.319	0.357	0.291	0.264
Cadmium	mg/L	0.005 MAC	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0001	<0.002	<0.0001	<0.0001
Calcium	mg/L		83.3	51.3	52.2	46.8	46.2	44.6	40.7	81.4	55.4	42.1
Chromium	mg/L	0.05 MAC	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.002	<0.003	<0.002	<0.002
Copper	mg/L	1 AO	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.001	<0.003	<0.001	<0.001
Iron	mg/L	0.3 AO	0.092	0.294	0.031	0.248	0.028	<0.010	<0.010	0.445	0.055	0.011
Lead	mg/L	0.01 MAC	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.0005
Magnesium	mg/L		54.8	30.3	32.3	31.5	31.7	28.3	26.2	52.3	31.5	30.1
Manganese	mg/L	0.05 AO	0.086	0.050	0.030	0.048	0.025	0.011	0.016	0.054	0.031	<0.002
Mercury	mg/L	0.001 MAC	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Potassium	mg/L		9.74	6.14	5.49	5.95	6.42	5.25	4.61	5.38	8.63	5.75
Sodium	mg/L	200 AO	43.4	13.2	11.6	13.5	15.4	10.4	9.68	11.4	12.7	11.6
Zinc	mg/L	5 AO	<0.005	<0.005	0.008	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Volatile Organic Compounds												
1,4-Dichlorobenzene	mg/L	0.005 MAC	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001
Benzene	mg/L	0.001 MAC	0.00027	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	<0.0002	<0.0002
Methylene Chloride(Dichlorometha	mg/L	0.05 MAC	<0.0003	<0.0004	<0.0004	<0.0003	<0.0003	<0.0003	<0.0006	<0.0003	<0.0003	<0.00003
Toluene	mg/L	0.024 AO	0.00035	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	<0.0002	<0.0002
Vinyl Chloride	mg/L	0.001 MAC	<0.00017	<0.00018	<0.00018	<0.00017	<0.00017	<0.00017	<0.00034	<0.00017	<0.00017	<0.00017

#### Groundwater Geochemical Results OW-9

Notes: (1) MECP Ontario Drinking Water Standards. (2) OG: Operational Guideline within ODWS. (3) AO: Aesthetic Objective within ODWS.

(4) MAC: Maximum Acceptable Concentration within ODWS.(5) ODWS exceedances indicated by **bold** entries.

Parameters	Units	ODWS <sup>(1)</sup>	Oct-14	Sep-15	Sep-16	Oct-17	Sep-18	Sep-19	Nov-20	Nov-21	Nov-22	Oct-23
General Chemistry												
Alkalinity (Total as CaCO3)	mg/L	30-500 OG	299	274	392	360	312	254	294	294	273	205
Ammonia	mg/L		0.85	0.23	0.66	1.02	0.22	0.31	0.04	0.1	0.05	<0.02
Chloride	mg/L	250 AO	59.7	39.1	56.1	33.0	51.1	25.8	35.8	23.5	26.8	22.6
COD	mg/L		12	13	24	20	8	<5	14	<5	14	35
Conductivity	umho/cm		799	838	1020	739	865	657	682	650	629	486
Dissolved Organic Carbon (DOC)	mg/L	5 AO	6.8	5.2	4.5	6.8	5.6	4.6	6.6	6.6	5.9	7.1
Nitrate (N)	mg/L	10 MAC	0.22	<0.25	0.65	1.02	0.61	<0.10	0.7	0.10	0.26	<0.05
Nitrite (N)	mg/L	1 MAC	<0.10	<0.25	<0.25	<0.10	<0.25	<0.10	<0.10	<0.05	<0.05	<0.05
рН	pН	6.5-8.5	7.19	7.92	8.09	8.12	7.71	7.80	7.91	7.60	7.82	7.47
Phenols	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.043	0.006	0.003
Total Phosphorus	mg/L		0.57	0.09	0.44	0.19	0.13	0.03	0.06	0.02	0.06	0.08
Sulphate	mg/L	500 AO	47.0	84.3	94.5	29.0	57.0	54.6	23.2	42.6	37.6	19.8
Total Dissolved Solids (TDS)	mg/L	500 AO	412	428	584	418	492	340	374	404	336	276
TKN	mg/L		1.17	0.56	1.06	1.46	0.53	0.68	0.6	0.2	0.35	0.36
Metals												
Arsenic	mg/L	0.01 MAC	<0.003	<0.003	0.003	0.003	< 0.003	<0.003	<0.001	<0.003	<0.001	<0.001
Barium	mg/L	1 MAC	0.052	0.059	0.081	0.058	0.055	0.050	0.041	0.045	0.048	0.034
Boron	mg/L	5 IMAC	0.145	0.200	0.207	0.206	0.195	0.237	0.114	0.155	0.146	0.141
Cadmium	mg/L	0.005 MAC	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0001	<0.002	<0.0001	<0.0001
Calcium	mg/L		81.9	74.0	99.8	85.8	72.8	62.7	68.3	64.5	77.7	54.2
Chromium	mg/L	0.05 MAC	<0.003	<0.003	<0.003	<0.003	0.004	<0.003	<0.002	<0.003	<0.002	<0.002
Copper	mg/L	1 AO	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.002	<0.003	0.002	0.002
Iron	mg/L	0.3 AO	<0.010	0.568	1.18	1.07	0.022	<0.010	<0.010	0.016	0.021	0.072
Lead	mg/L	0.01 MAC	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.0005
Magnesium	mg/L		41.9	46.2	60.7	38.3	40.5	37.0	30.1	33.9	38.6	32.9
Manganese	mg/L	0.05 AO	0.044	0.043	0.081	0.043	0.021	0.015	0.006	0.007	0.006	0.01
Mercury	mg/L	0.001 MAC	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Potassium	mg/L		7.95	7.64	9.67	7.61	6.96	6.26	3.63	4.6	5.57	4.97
Sodium	mg/L	200 AO	23.5	18.3	25.9	20.5	22.7	15.0	13.0	10.8	17.8	16.1
Zinc	mg/L	5 AO	0.005	0.006	0.008	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Volatile Organic Compounds												
1,4-Dichlorobenzene	mg/L	0.005 MAC	<0.0001	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Benzene	mg/L	0.001 MAC	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Methylene Chloride(Dichlorometha	mg/L	0.05 MAC	<0.0003	<0.0003	-	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.00003
Toluene	mg/L	0.024 AO	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Vinyl Chloride	mg/L	0.001 MAC	<0.00017	<0.00017	-	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017

#### Groundwater Geochemical Results OW-10

Notes: (1) MECP Ontario Drinking Water Standards.

(2) OG: Operational Guideline within ODWS.(3) AO: Aesthetic Objective within ODWS.

(4) MAC: Maximum Acceptable Concentration within ODWS. (5) ODWS exceedances indicated by **bold** entries.

Parameters	Units	ODWS (1)	Oct-14	Sep-15	Sep-16	Oct-17	Sep-18	Sep-19	Nov-20	Nov-21	Nov-22	Oct-23
General Chemistry												
Alkalinity (Total as CaCO3)	mg/L	30-500 OG	335	229	204	202	189	179	186	184	181	180
Ammonia	mg/L		0.03	<0.02	0.06	0.02	<0.02	0.14	<0.02	<0.02	0.03	<0.02
Chloride	mg/L	250 AO	78.4	39.8	23.2	17.7	10.6	6.09	4.82	4.02	4.57	4.77
COD	mg/L		23	10	16	8	5	<5	37	11	7	18
Conductivity	umho/cm		1040	808	608	540	515	478	477	482	496	477
Dissolved Organic Carbon (DOC)	mg/L	5 AO	10.5	3.4	2.4	3.1	2.7	2.7	3.5	3.3	1.9	1.6
Nitrate (N)	mg/L	10 MAC	<0.25	<0.25	<0.10	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrite (N)	mg/L	1 MAC	<0.25	<0.25	<0.10	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
рН	pН	6.5-8.5	7.60	7.90	8.06	8.01	7.98	7.79	7.88	7.72	7.79	7.52
Phenols	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.027	0.009	0.004
Total Phosphorus	mg/L		0.49	0.14	0.61	0.3	0.55	0.06	1.47	0.49	0.08	0.08
Sulphate	mg/L	500 AO	140	110	84.6	74.8	57.9	60.6	62.6	78.3	83.3	77.3
Total Dissolved Solids (TDS)	mg/L	500 AO	656	434	340	330	288	242	278	258	274	280
TKN	mg/L		0.4	0.52	<0.10	0.22	0.32	0.64	0.8	0.44	0.34	0.66
Metals												
Arsenic	mg/L	0.01 MAC	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.004	<0.003	<0.001	<0.001
Barium	mg/L	1 MAC	0.021	0.023	0.021	0.024	0.023	0.019	0.026	0.017	0.033	0.015
Boron	mg/L	5 IMAC	0.271	0.324	0.344	0.398	0.441	0.436	0.477	0.452	0.414	0.465
Cadmium	mg/L	0.005 MAC	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0001	<0.002	<0.0001	<0.0001
Calcium	mg/L		95.2	70.1	56.1	50.1	39.9	45.0	40.6	41.5	49.6	51.2
Chromium	mg/L	0.05 MAC	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.002	<0.003	<0.002	<0.002
Copper	mg/L	1 AO	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.001	<0.003	<0.001	<0.001
Iron	mg/L	0.3 AO	<0.010	0.077	<0.010	0.117	0.121	<0.010	0.076	<0.010	<0.010	<0.010
Lead	mg/L	0.01 MAC	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.0005
Magnesium	mg/L		54.9	43.0	35.1	33.6	25.3	26.2	24.2	25.7	30.7	32
Manganese	mg/L	0.05 AO	0.078	0.169	0.003	0.059	0.071	0.045	0.026	0.004	<0.002	<0.002
Mercury	mg/L	0.001 MAC	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Potassium	mg/L		10.5	8.41	6.54	6.71	5.89	5.33	4.83	4.95	7.48	5.84
Sodium	mg/L	200 AO	35.4	21.7	15.6	15	12.6	10.7	9.87	9.43	13.8	12.2
Zinc	mg/L	5 AO	<0.005	<0.005	0.023	<0.005	<0.005	<0.005	<0.005	0.008	<0.005	<0.005
Volatile Organic Compounds												
1,4-Dichlorobenzene	mg/L	0.005 MAC	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Benzene	mg/L	0.001 MAC	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Methylene Chloride(Dichlorometha	mg/L	0.05 MAC	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.00003
Toluene	mg/L	0.024 AO	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Vinyl Chloride	mg/L	0.001 MAC	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017

#### Groundwater Geochemical Results OW-11

Notes: (1) MECP Ontario Drinking Water Standards.

(2) OG: Operational Guideline within ODWS.

(3) AO: Aesthetic Objective within ODWS.(4) MAC: Maximum Acceptable Concentration within ODWS.

Units

mg/L

mg/L

mg/L

mg/L

umho/cr

mg/L

mg/L

mg/L

pН

mg/L

ODWS<sup>(1)</sup>

30-500 OG

250 AO

5 AO

10 MAC

1 MAC

6.5-8.5

500 AO

500 AO

0.01 MAC

1 MAC

5 IMAC

0.005 MAC

0.05 MAC

1 AO

0.3 AO

0.01 MAC

0.05 AO

0.001 MAC

200 AO

5 AO

0.005 MAC

0.001 MAC

0.05 MAC

0.024 AO

0.001 MAC

Parameters

Ammonia

Chloride

Conductivity

Nitrate (N)

Nitrite (N)

Sulphate

TKN

Metals

Arsenic

Barium

Boron

Cadmium

Calcium Chromium

Copper

Iron

Lead

Magnesium

Manganese

Mercury Potassium

Sodium

Benzene

Toluene

Vinyl Chloride

Zinc.

Total Phosphorus

Total Dissolved Solids (TDS)

bН Phenols

Dissolved Organic Carbon (DOC)

COD

General Chemistry Alkalinity (Total as CaCO3) Aug-17

220

0.12

22.6

18

545

3.8

<0.10

<0.10

8.29

<0.001

0.40

37.3

296

0.49

< 0.003

0.039

0.287

< 0.002

41.9

< 0.003

< 0.003

<0.010

< 0.002

26.7

0.012

< 0.0001

4.27

30.1

<0.005

< 0.0001

< 0.0002

< 0.0003

< 0.0002

< 0.00017

Oct-17

172

0.08

9.18

<5

402

2.1

< 0.05

< 0.05

8.09

0.002

0.09

41.1

226

0.20

< 0.003

0.039

0.384

< 0.002

33.9

< 0.003

< 0.003

<0.010

< 0.002

22.1

0.047

< 0.0001

4.50

21.5

< 0.005

< 0.0001

<0.0002

< 0.0003

0.0032

< 0.00017

<0.001

21.3

0.041

<0.0001

4.81

13.2

< 0.005

< 0.00040

<0.00080

< 0.00120

<0.00080

< 0.00068

< 0.001

17.7

0.089

< 0.0001

4.79

12.0

< 0.005

< 0.0001

< 0.0002

< 0.0003

<0.0002

< 0.00017

< 0.001

20.8

0.058

< 0.0001

4.66

11.0

0.005

< 0.0001

< 0.0002

< 0.0003

0.00063

<0.00017

roundwater Ge	eochemical Results O	W-12A				
			-		-	
May-18	Sep-18	Sep-19	Nov-20	Nov-21	Nov-22	Oct-23
167	146	152	149	158	190	163
0.10	0.1	0.24	0.03	0.1	0.17	0.04
3.72	2.57	2.72	2.70	2.26	2	2.87
5	<5	<5	10	<5	8	16
374	372	371	362	351	356	357
4.4	2.3	2.6	2.7	1.4	1.6	1.6
<0.05	0.06	<0.05	0.10	<0.05	<0.05	<0.05
<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
8.01	8.04	7.81	7.96	7.82	7.88	7.58
<0.001	<0.001	<0.001	<0.001	0.015	<0.001	0.002
0.22	0.19	0.02	0.05	0.07	0.08	0.07
38.3	36.9	35.0	35.8	36.8	37.6	34
192	196	162	202	216	196	208
<0.10	0.31	0.53	0.40	0.13	0.22	0.13
<0.003	<0.003	<0.003	0.002	<0.003	<0.001	<0.001
0.038	0.032	0.031	0.032	0.027	0.034	0.029
0.437	0.471	0.449	0.492	0.432	0.429	0.466
<0.002	<0.001	<0.001	<0.0001	<0.002	<0.0001	<0.0001
33.0	27.0	33.6	25.8	28.2	39.2	37.9
<0.003	<0.003	<0.003	<0.002	<0.003	<0.002	<0.002
<0.003	<0.003	<0.003	0.003	<0.003	<0.001	<0.001
<0.010	<0.010	<0.010	<0.010	0.015	0.075	0.011

< 0.0005

15.8

0.014

< 0.0001

3.73

16.9

< 0.005

< 0.0001

< 0.0002

< 0.0003

< 0.0002

< 0.00017

< 0.001

17.7

0.042

< 0.0001

4.25

10.2

< 0.005

< 0.0001

< 0.0002

< 0.0003

< 0.0002

< 0.00017

<0.0005

18.4

0.041

< 0.0001

5.38

15.9

< 0.005

<0.0001

< 0.0002

<0.0003

<0.0002

< 0.00017

<0.0005

25.1

0.024

< 0.0001

5.08

18.8

< 0.005

< 0.0001

< 0.0002

< 0.00003

< 0.0002

< 0.00017

vsp

#### Gr

#### Notes:

(1) MECP Ontario Drinking Water Standards.

(2) OG: Operational Guideline within ODWS.

Volatile Organic Compounds 1,4-Dichlorobenzene

Methylene Chloride(Dichlorometh

(3) AO: Aesthetic Objective within ODWS.

(4) MAC: Maximum Acceptable Concentration within ODWS.

#### Groundwater Geochemical Results OW-12B

Parameters	Units	ODWS <sup>(1)</sup>	Aug-17	Oct-17	May-18	Sep-18	Sep-19	Nov-20	Nov-21	Nov-22	Oct-23
General Chemistry											
Alkalinity (Total as CaCO3)	mg/L	30-500 OG <sup>(2)</sup>	175	221	246	238	225	239	241	239	226
Ammonia	mg/L		0.23	<0.02	0.02	<0.02	0.07	0.02	0.03	0.09	0.06
Chloride	mg/L	250 AO <sup>(3)</sup>	586	261	71	14.2	11.4	8.26	4.97	3.73	3.81
COD	mg/L		153	109	<5	12	21	7	<5	<5	24
Conductivity	umho/cm		2130	1240	845	666	611	633	575	603	551
Dissolved Organic Carbon (DOC)	mg/L	5 AO	4.6	7.1	-	2.6	3.0	4.3	3.3	2.7	2
Nitrate (N)	mg/L	10 MAC (4)	<0.5	<0.25	<0.25	<0.10	<0.10	<0.10	<0.05	<0.05	<0.05
Nitrite (N)	mg/L	1 MAC	<0.5	<0.25	<0.25	<0.10	<0.10	<0.10	<0.05	<0.05	<0.05
pН	рН	6.5-8.5	8.08	8.23	7.90	7.95	7.96	8.17	7.79	7.96	7.77
Phenols	mg/L		0.004	0.002	-	<0.001	<0.001	<0.001	0.006	0.016	0.009
Total Phosphorus	mg/L		0.08	<0.05	0.11	0.06	0.06	0.07	0.03	0.02	<0.02
Sulphate	mg/L	500 AO	47.8	87.3	99	91.5	79.3	93.4	70.4	93.4	72
Total Dissolved Solids (TDS)	mg/L	500 AO	1400	776	-	372	302	364	330	352	314
TKN	mg/L		1.09	0.30	0.82	0.25	3.22	0.70	0.21	0.56	0.2
Metals											
Arsenic	mg/L	0.01 MAC	<0.003	<0.003	<0.003	<0.003	0.003	0.003	0.006	0.002	0.003
Barium	mg/L	1 MAC	0.090	0.053	0.034	0.041	0.028	0.032	0.026	0.034	0.027
Boron	mg/L	5 IMAC	0.243	0.349	0.423	0.470	0.496	0.540	0.530	0.494	0.534
Cadmium	mg/L	0.005 MAC	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0001	<0.002	<0.0001	<0.0001
Calcium	mg/L		88.0	66.1	54.6	50.8	52.3	49.8	76.1	86.9	56.2
Chromium	mg/L	0.05 MAC	0.004	<0.003	0.004	<0.003	<0.003	<0.002	<0.003	<0.002	<0.002
Copper	mg/L	1 AO	0.008	<0.003	0.069	<0.003	<0.003	0.002	<0.003	<0.001	<0.001
Iron	mg/L	0.3 AO	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.214	0.404	0.016
Lead	mg/L	0.01 MAC	<0.002	<0.002	0.004	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.0005
Magnesium	mg/L		146	91.1	55.2	34.3	38.9	35.4	51	51.2	38.7
Manganese	mg/L	0.05 AO	0.023	0.023	0.016	0.058	0.017	0.021	0.044	0.048	0.036
Mercury	mg/L	0.001 MAC	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Potassium	mg/L		42.8	23.7	15.3	7.35	9.98	7.83	7.4	9.13	7.78
Sodium	mg/L	200 AO	58.5	38.1	27.7	17.6	16.2	14.0	14.1	19.2	19.6
	mg/L	5 AO	0.014	<0.005	0.079	<0.005	0.008	<0.005	<0.005	<0.005	<0.005
Volatile Organic Compounds		0.005 144.0	0.0001	0.0004		0.0001	0.0001	0.0001	0.0001	0.0004	0.0004
1,4-Dichlorobenzene	mg/L	0.005 MAC	<0.0001	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Methylene Chloride (Diebleremethe	mg/L	0.001 MAC	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Telueze	mg/L	0.05 MAC	<0.0003	<0.0003	-	<0.0005	<0.0003	<0.0003	<0.0003	<0.0003	<0.00003
Visul Chlorida	mg/L	0.024 AO	0.00054	0.00063	-	0.00056	0.00044	<0.0002	<0.0002	<0.0002	<0.0002
Tthulhanzana	mg/L	0.001 MAC	<0.00017	<0.00017	-	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017
	mg/L	0.0016 AO	-	<0.0001	-	-	-	-	<0.0001	<0.0001	-
	mg/L		-	<0.0002	-	-	-	-	<0.0002	<0.0002	
Yvlene Mixture (Total)	mg/L	0.02.40	-	<0.0001	-	-	-	-	<0.0001	<0.0001	-
Petroleum Hydrocarbons	iiig/∟	0.02 AU	-	<0.000Z	-	-	-	-	<0.000Z	<0.000Z	-
F1 (C6 to C10)	ma/l			0.039					<0.025	<0.025	<0.025
F2 (C10 to C16)	mg/L		-	0.000	-	-	-	-	<0.020	<0.020	<0.020
F3 (C16 to C34)	mg/L		-	20	-	-	-	-	1	0.368	0.462
F4 (C34 to C50)	mg/L			20	-			-	23	1 44	0.402
-4 (034 10 030)	mg/∟		-	30	-	-	-	-	2.3	1.44	0.933

Notes: (1) MECP Ontario Drinking Water Standards. (2) OG: Operational Guideline within ODWS. (3) AO: Aesthetic Objective within ODWS.

(4) MAC: Maximum Acceptable Concentration within ODWS.

(5) ODWS exceedances indicated by **bold** entries.

Parameters	Units	ODWS (1)	Aug-17	Oct-17	May-18	Sep-18	Sep-19	Nov-20	Nov-21	Nov-22	Oct-23
General Chemistry											
Alkalinity (Total as CaCO3)	mg/L	30-500 OG	477	542	505	574	581	555	604	665	751
Ammonia	mg/L		0.41	0.70	0.31	0.93	1.33	0.47	1.33	1.02	9.77
Chloride	mg/L	250 AO	69.5	66.4	54.5	51.5	53.2	58.1	83.5	85.6	103
COD	mg/L		49	48	32	35	35	48	68	74	87
Conductivity	umho/cm		1380	1360	1240	1510	1610	1470	1480	1610	1880
Dissolved Organic Carbon (DOC)	mg/L	5 AO	14.7	18.6	13.3	16.8	18.2	20.6	24.6	25.3	22.9
Nitrate (N)	mg/L	10 MAC	0.45	<0.25	<0.25	<0.25	<0.25	<0.25	<0.05	<0.05	<0.07
Nitrite (N)	mg/L	1 MAC	0.49	<0.25	<0.25	<0.25	<0.25	<0.25	<0.05	<0.05	0.28
рН	pН	6.5-8.5	8.00	8.26	8.20	7.79	7.66	7.99	7.57	7.97	7.52
Phenols	mg/L		<0.001	<0.001	<0.001	0.002	0.002	0.003	0.065	0.086	0.007
Total Phosphorus	mg/L		0.16	0.22	0.15	0.06	<0.02	0.04	0.02	0.03	0.03
Sulphate	mg/L	500 AO	221	243	212	213	340	225	177	183	171
Total Dissolved Solids (TDS)	mg/L	500 AO	920	988	798	1030	958	940	1020	1060	1160
TKN	mg/L		1.63	1.96	1.1	2.1	3.1	1.4	3.86	2.95	12.3
Metals											
Arsenic	mg/L	0.01 MAC	0.005	0.006	<0.003	0.004	0.004	0.002	<0.003	<0.001	0.003
Barium	mg/L	1 MAC	0.106	0.157	0.106	0.115	0.092	0.081	0.083	0.122	0.151
Boron	mg/L	5 IMAC	0.496	0.550	0.440	0.602	0.498	0.472	0.538	0.594	0.845
Cadmium	mg/L	0.005 MAC	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0001	<0.002	<0.0001	<0.0001
Calcium	mg/L		159	180	152	183	209	159	150	195	184
Chromium	mg/L	0.05 MAC	0.004	<0.003	0.005	0.005	<0.003	<0.002	<0.003	<0.002	<0.002
Copper	mg/L	1 AO	<0.003	<0.003	<0.003	<0.003	<0.003	0.003	<0.003	<0.001	0.002
Iron	mg/L	0.3 AO	0.031	0.365	<0.010	0.232	0.071	<0.010	0.085	0.389	0.212
Lead	mg/L	0.01 MAC	<0.002	<0.002	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.0005
Magnesium	mg/L		71.2	81.6	70.4	81.1	77.6	70.8	69	86.1	88.4
Manganese	mg/L	0.05 AO	0.058	0.272	0.118	0.131	0.123	0.083	0.077	0.089	0.036
Mercury	mg/L	0.001 MAC	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Potassium	mg/L		16.1	17.9	14.0	19.1	21.4	15.7	17	25.8	40.7
Sodium	mg/L	200 AO	41.0	45.9	36.5	45.5	43.8	37.6	40.1	63	82.5
Zinc	mg/L	5 AO	<0.005	0.007	<0.005	0.006	<0.005	<0.005	<0.005	<0.005	0.005
Volatile Organic Compounds											
1,4-Dichlorobenzene	mg/L	0.005 MAC	<0.0001	<0.0001	<0.00010	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001
Benzene	mg/L	0.001 MAC	<0.0002	<0.0002	<0.00020	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	<0.0002
Methylene Chloride(Dichlorometha	mg/L	0.05 MAC	<0.0003	<0.0003	<0.00030	<0.0003	<0.0003	<0.0003	<0.0006	<0.0003	<0.00003
Toluene	mg/L	0.024 AO	<0.0002	<0.0002	<0.00020	0.0022	<0.0002	0.0021	0.00091	<0.0002	<0.0002
Vinyl Chloride	mg/L	0.001 MAC	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00034	<0.00017	<0.00017

#### Groundwater Geochemical Results OW-13A

Notes: (1) MECP Ontario Drinking Water Standards.

(2) OG: Operational Guideline within ODWS.(3) AO: Aesthetic Objective within ODWS.

(4) MAC: Maximum Acceptable Concentration within ODWS.

Parameters	Units	ODWS <sup>(1)</sup>	Aug-17	Oct-17	May-18	Sep-18	Sep-19	Nov-20	Nov-21	Nov-22	Oct-23
General Chemistry											
Alkalinity (Total as CaCO3)	mg/L	30-500 OG	300	342	324	333	308	303	339	330	314
Ammonia	mg/L		0.11	0.14	0.20	0.19	0.35	0.2	0.16	0.28	0.25
Chloride	mg/L	250 AO	29.1	25.9	23.5	23.4	23.7	21.5	28.8	26.7	26.5
COD	mg/L		19	21	11	5	11	18	7	23	27
Conductivity	umho/cm		763	784	696	843	807	730	810	788	746
Dissolved Organic Carbon (DOC)	mg/L	5 AO	5.6	6.4	4.9	6.3	6.4	7.2	6.7	8.1	6.7
Nitrate (N)	mg/L	10 MAC	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10	<0.05	<0.05	<0.05
Nitrite (N)	mg/L	1 MAC	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10	<0.05	<0.05	<0.05
pН	pН	6.5-8.5	8.00	8.09	8.04	7.79	7.70	7.89	7.81	7.82	7.86
Phenols	mg/L		<0.001	<0.001	<0.001	<0.001	0.001	0.001	0.051	0.008	0.003
Total Phosphorus	mg/L		0.06	0.13	0.07	0.05	0.03	0.04	0.09	0.04	0.03
Sulphate	mg/L	500 AO	76.1	95.3	64.0	87.9	95.1	68.8	92.7	70.4	60.5
Total Dissolved Solids (TDS)	mg/L	500 AO	478	488	372	542	458	408	464	442	440
TKN	mg/L		0.57	0.50	0.44	0.55	0.88	0.70	0.67	0.7	0.63
Metals											
Arsenic	mg/L	0.01 MAC	<0.003	<0.003	<0.003	<0.003	<0.003	0.002	<0.003	0.002	0.001
Barium	mg/L	1 MAC	0.039	0.048	0.031	0.008	0.040	0.039	0.029	0.046	0.043
Boron	mg/L	5 IMAC	0.249	0.277	0.189	0.038	0.302	0.310	0.255	0.293	0.313
Cadmium	mg/L	0.005 MAC	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0001	<0.002	<0.0001	<0.0001
Calcium	mg/L		64.7	77.8	64.8	69.3	75.5	66.5	55.6	87.1	82.4
Chromium	mg/L	0.05 MAC	<0.003	<0.003	0.003	<0.003	<0.003	<0.002	<0.003	<0.002	<0.002
Copper	mg/L	1 AO	<0.003	<0.003	0.014	0.003	0.003	<0.001	<0.003	<0.001	<0.001
Iron	mg/L	0.3 AO	<0.010	0.077	0.040	0.053	<0.010	0.127	<0.010	0.226	0.229
Lead	mg/L	0.01 MAC	<0.002	<0.002	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.0005
Magnesium	mg/L		46.3	54.6	46.5	47.6	49.3	42.3	39.8	50.5	57.1
Manganese	mg/L	0.05 AO	0.022	0.029	0.022	0.010	0.017	0.020	0.011	0.017	0.024
Mercury	mg/L	0.001 MAC	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Potassium	mg/L		8.21	8.87	7.24	8.05	8.33	7.28	7.05	10.3	10.3
Sodium	mg/L	200 AO	18.9	18.9	15.3	17.1	17.1	14.9	13.5	26.5	23.9
Zinc	mg/L	5 AO	<0.005	<0.005	0.011	0.024	0.009	<0.005	<0.005	<0.005	<0.005
Volatile Organic Compounds											
1,4-Dichlorobenzene	mg/L	0.005 MAC	<0.0001	<0.0001	<0.00020	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001
Benzene	mg/L	0.001 MAC	<0.0002	<0.0002	<0.00040	<0.0002	<0.0002	<0.0004	<0.0002	<0.0002	<0.0002
Methylene Chloride(Dichlorometha	mg/L	0.05 MAC	<0.0003	<0.0003	<0.00060	<0.0003	<0.0003	<0.0006	<0.0003	<0.0003	<0.00003
Toluene	mg/L	0.024 AO	<0.0002	<0.0002	<0.00040	<0.0002	<0.0002	<0.0004	0.00064	<0.0002	<0.0002
Vinyl Chloride	mg/L	0.001 MAC	<0.00017	<0.00017	<0.00034	<0.00017	<0.00017	<0.00034	<0.00017	<0.00017	<0.00017

#### Groundwater Geochemical Results OW-13B

Notes: (1) MECP Ontario Drinking Water Standards.

(1) MCC Original Dimining water obtained us.
(2) OG: Operational Guideline within ODWS.
(3) AO: Aesthetic Objective within ODWS.
(4) MAC: Maximum Acceptable Concentration within ODWS.

Parameters	Units	ODWS <sup>(1)</sup>	Aug-17	Oct-17	May-18	Sep-18	Sep-19	Nov-20	Nov-21	Nov-22	Oct-23
General Chemistry											
Alkalinity (Total as CaCO3)	mg/L	30-500 OG	330	360	383	353	362	404	422	444	368
Ammonia	mg/L		0.03	<0.02	<0.02	<0.02	0.08	<0.02	0.08	0.05	<0.02
Chloride	mg/L	250 AO	58.2	26.0	20.8	18.4	35.0	61.9	63.3	53.4	54.2
COD	mg/L		56	37	31	18	18	26	17	35	39
Conductivity	umho/cm		872	746	751	797	837	948	962	946	909
Dissolved Organic Carbon (DOC)	mg/L	5 AO	6.7	7.4	12.3	8.0	7.7	10.8	11.3	10.6	9.1
Nitrate (N)	mg/L	10 MAC	<0.25	<0.10	<0.10	<0.25	<0.25	<0.25	<0.05	<0.05	<0.05
Nitrite (N)	mg/L	1 MAC	<0.25	<0.10	<0.10	<0.25	<0.25	<0.25	<0.05	<0.05	0.23
рН	pН	6.5-8.5	8.14	8.29	8.23	8.04	7.91	8.04	7.93	8.09	7.95
Phenols	mg/L		<0.001	<0.001	<0.001	<0.001	0.001	<0.001	0.047		0.004
Total Phosphorus	mg/L		0.25	0.27	0.18	0.25	0.12	0.06	0.04	0.04	<0.02
Sulphate	mg/L	500 AO	57.4	56.0	63.3	56.0	39.1	36.8	51.3	60.3	60.1
Total Dissolved Solids (TDS)	mg/L	500 AO	492	454	424	484	470	530	656		562
TKN	mg/L		0.62	0.33	0.34	0.58	1.28	0.6	0.49	0.7	0.38
Metals											
Arsenic	mg/L	0.01 MAC	<0.003	<0.003	<0.003	<0.003	0.005	0.003	<0.003	0.003	0.001
Barium	mg/L	1 MAC	0.054	0.056	0.050	0.049	0.048	0.050	0.041	0.044	0.035
Boron	mg/L	5 IMAC	0.124	0.112	0.099	0.102	0.119	0.125	0.098	0.102	0.101
Cadmium	mg/L	0.005 MAC	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0001	<0.002	<0.0001	<0.0001
Calcium	mg/L		66.9	75.2	77.2	68.7	79.3	82.3	85.9	98.6	96.2
Chromium	mg/L	0.05 MAC	<0.003	<0.003	<0.003	<0.003	<0.003	<0.002	<0.003	<0.002	<0.002
Copper	mg/L	1 AO	<0.003	<0.003	<0.003	<0.003	<0.003	0.003	<0.003	<0.001	<0.001
Iron	mg/L	0.3 AO	<0.010	<0.010	<0.010	<0.010	<0.010	0.059	0.022	0.238	0.093
Lead	mg/L	0.01 MAC	<0.002	<0.002	<0.001	<0.001	<0.001	<0.0005	0.001	<0.0005	<0.0005
Magnesium	mg/L		48.9	54.7	55.5	49.4	55.3	59.2	64.2	76.3	74.3
Manganese	mg/L	0.05 AO	0.029	0.056	0.085	0.096	0.132	0.057	0.044	0.071	0.043
Mercury	mg/L	0.001 MAC	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Potassium	mg/L		5.38	5.48	4.96	4.95	4.91	4.8	5.42	7.2	6.34
Sodium	mg/L	200 AO	39.0	14.7	9.89	7.82	8.1	11.5	14.6	20.1	17.4
Zinc	mg/L	5 AO	<0.005	<0.005	<0.005	0.007	<0.005	<0.005	<0.005	<0.005	<0.005
Volatile Organic Compounds											
1,4-Dichlorobenzene	mg/L	0.005 MAC	<0.0001	<0.0001	<0.00010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Benzene	mg/L	0.001 MAC	<0.0002	<0.0002	<0.00020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Methylene Chloride(Dichlorometha	mg/L	0.05 MAC	<0.0003	<0.0003	<0.00030	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.00003
Toluene	mg/L	0.024 AO	0.00036	<0.0002	<0.00020	0.00058	<0.0002	<0.0002	0.00084	<0.0002	<0.0002
Vinyl Chloride	mg/L	0.001 MAC	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017

#### Groundwater Geochemical Results OW-14A

Notes: (1) MECP Ontario Drinking Water Standards.

(2) OG: Operational Guideline within ODWS.

(3) AO: Aesthetic Objective within ODWS.

(4) MAC: Maximum Acceptable Concentration within ODWS.

					Crown dwatar Co	achemical Deculto O					
					Groundwater Ge	ochemical Results O	WV-14D				
Parameters	Units	ODWS <sup>(1)</sup>	Aug-17	Oct-17	May-18	Sep-18	Sep-19	Nov-20	Nov-21	Nov-22	Oct-23
General Chemistry											
Alkalinity (Total as CaCO3)	mg/L	30-500 OG	253	246	254	236	224	236	239	243	233
Ammonia	mg/L		0.02	0.03	0.09	0.03	0.20	0.03	0.08	0.1	<0.02
Chloride	mg/L	250 AO	11.7	5.84	3.99	2.56	1.94	2.55	2.36	3.11	3.5
COD	mg/L		10	<5	<5	<5	<5	8	<5	13	23
Conductivity	umho/cm		538	469	464	493	466	471	458	470	457
Dissolved Organic Carbon (DOC)	mg/L	5 AO	3.8	3.6	2.9	3.4	2.9	4.5	3.3	3.1	2.9
Nitrate (N)	mg/L	10 MAC	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrite (N)	mg/L	1 MAC	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
pН	pН	6.5-8.5	8.09	8.13	8.03	7.91	7.77	7.96	7.94	8.03	7.86
Phenols	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.01	0.011	0.003
Total Phosphorus	mg/L		0.17	0.13	0.10	0.04	0.02	0.05	0.04	<0.02	0.05
Sulphate	mg/L	500 AO	24.1	21.5	21.9	19.9	20.5	20.1	21.6	22.4	19.7
Total Dissolved Solids (TDS)	mg/L	500 AO	280	260	220	250	222	244	258	256	250
TKN	mg/L		0.29	0.13	0.21	0.21	0.51	0.3	0.16	0.12	0.15
Metals											
Arsenic	mg/L	0.01 MAC	<0.003	<0.003	<0.003	<0.003	<0.003	0.002	<0.003	0.001	<0.001
Barium	mg/L	1 MAC	0.037	0.031	0.025	0.021	0.023	0.024	0.017	0.02	0.017
Boron	mg/L	5 IMAC	0.174	0.170	0.169	0.174	0.192	0.220	0.202	0.186	0.197
Cadmium	mg/L	0.005 MAC	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0001	<0.002	<0.0001	<0.0001
Calcium	mg/L		42.2	41.1	41.5	37.0	40.4	37.3	36.9	50.6	46.8
Chromium	mg/L	0.05 MAC	<0.003	<0.003	<0.003	<0.003	<0.003	<0.002	<0.003	<0.002	<0.002
Copper	mg/L	1 AO	<0.003	<0.003	0.005	<0.003	<0.003	<0.001	<0.003	<0.001	<0.001
Iron	mg/L	0.3 AO	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.043	0.024
Lead	mg/L	0.01 MAC	<0.002	<0.002	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.0005
Magnesium	mg/L		31.8	31.4	31.1	28.6	30.1	28.0	29.0	36.3	38.5
Manganese	mg/L	0.05 AO	0.011	0.016	0.015	0.009	0.014	0.017	0.010	0.008	0.007
Mercury	mg/L	0.001 MAC	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Potassium	mg/L		5.52	5.37	5.27	5.23	5.09	4.63	4.7	6.32	5.99
Sodium	mg/L	200 AO	19.1	14.7	11.1	9.18	8.58	8.11	7.67	11	10.6
Zinc	mg/L	5 AO	<0.005	<0.005	0.007	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Volatile Organic Compounds											
1,4-Dichlorobenzene	mg/L	0.005 MAC	<0.0001	<0.0001	<0.00010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Benzene	mg/L	0.001 MAC	<0.0002	<0.0002	<0.00020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Methylene Chloride(Dichlorometha	mg/L	0.05 MAC	<0.0003	<0.0003	<0.00030	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.00003
Toluene	mg/L	0.024 AO	<0.0002	<0.0002	<0.00020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Vinyl Chloride	mg/L	0.001 MAC	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017

Notes:

(1) MECP Ontario Drinking Water Standards.

(2) OG: Operational Guideline within ODWS.

(3) AO: Aesthetic Objective within ODWS.

(4) MAC: Maximum Acceptable Concentration within ODWS.

### Groundwater Geochemical Results OW-15A

Parameters	Units	ODWS <sup>(1)</sup>	Oct-23
General Chemistry			
Alkalinity (Total as CaCO3)	mg/L	30-500 OG	214
Ammonia	mg/L		<0.02
Chloride	mg/L	250 AO	160
СОД	mg/L		47
Conductivity	umho/cm		1170
Dissolved Organic Carbon (DOC)	mg/L	5 AO	3.4
Nitrate (N)	mg/L	10 MAC	<0.05
Nitrite (N)	mg/L	1 MAC	<0.05
рН	pН	6.5-8.5	7.84
Phenols	mg/L		0.02
Total Phosphorus	mg/L		0.19
Sulphate	mg/L	500 AO	188
Total Dissolved Solids (TDS)	mg/L	500 AO	750
ТКМ	mg/L		0.5
Metals			
Arsenic	mg/L	0.01 MAC	0.002
Barium	mg/L	1 MAC	0.031
Boron	mg/L	5 IMAC	0.194
Cadmium	mg/L	0.005 MAC	<0.0001
Calcium	mg/L		50
Chromium	mg/L	0.05 MAC	<0.002
Copper	mg/L	1 AO	<0.001
Iron	mg/L	0.3 AO	<0.010
Lead	mg/L	0.01 MAC	<0.0005
Magnesium	mg/L		42.4
Manganese	mg/L	0.05 AO	0.117
Mercury	mg/L	0.001 MAC	<0.0001
Potassium	mg/L		7.56
Sodium	mg/L	200 AO	37.5
Zinc	mg/L	5 AO	<0.005
Volatile Organic Compounds			
1,4-Dichlorobenzene	mg/L	0.005 MAC	<0.0001
Benzene	mg/L	0.001 MAC	<0.0002
Methylene Chloride(Dichloromethane)	mg/L	0.05 MAC	<0.00003
Toluene	mg/L	0.024 AO	<0.0002
Vinyl Chloride	mg/L	0.001 MAC	<0.00017

### Notes:

(1) MECP Ontario Drinking Water Standards.

(2) OG: Operational Guideline within ODWS.

(3) AO: Aesthetic Objective within ODWS.

(4) MAC: Maximum Acceptable Concentration within ODWS.

### Groundwater Geochemical Results OW-15B

Parameters	Units	ODWS <sup>(1)</sup>	Oct-23
General Chemistry			
Alkalinity (Total as CaCO3)	mg/L	30-500 OG	194
Ammonia	mg/L		<0.02
Chloride	mg/L	250 AO	260
СОД	mg/L		43
Conductivity	umho/cm		1970
Dissolved Organic Carbon (DOC)	mg/L	5 AO	3.1
Nitrate (N)	mg/L	10 MAC	<0.07
Nitrite (N)	mg/L	1 MAC	<0.05
рН	рН	6.5-8.5	7.73
Phenols	mg/L		0.012
Total Phosphorus	mg/L		0.33
Sulphate	mg/L	500 AO	538
Total Dissolved Solids (TDS)	mg/L	500 AO	1360
ТКМ	mg/L		1.81
Metals			
Arsenic	mg/L	0.01 MAC	0.009
Barium	mg/L	1 MAC	0.036
Boron	mg/L	5 IMAC	0.551
Cadmium	mg/L	0.005 MAC	<0.0001
Calcium	mg/L		153
Chromium	mg/L	0.05 MAC	<0.002
Copper	mg/L	1 AO	<0.001
Iron	mg/L	0.3 AO	<0.010
Lead	mg/L	0.01 MAC	<0.0005
Magnesium	mg/L		126
Manganese	mg/L	0.05 AO	0.124
Mercury	mg/L	0.001 MAC	<0.0001
Potassium	mg/L		19.5
Sodium	mg/L	200 AO	141
Zinc	mg/L	5 AO	<0.005
Volatile Organic Compounds			
1,4-Dichlorobenzene	mg/L	0.005 MAC	<0.0001
Benzene	mg/L	0.001 MAC	<0.0002
Methylene Chloride(Dichloromethane)	mg/L	0.05 MAC	<0.00003
Toluene	mg/L	0.024 AO	<0.0002
Vinyl Chloride	mg/L	0.001 MAC	<0.00017

### Notes:

(1) MECP Ontario Drinking Water Standards.

(2) OG: Operational Guideline within ODWS.

(3) AO: Aesthetic Objective within ODWS.

(4) MAC: Maximum Acceptable Concentration within ODWS.

### Groundwater Geochemical Results OW-16A

Parameters	Units	ODWS <sup>(1)</sup>	Oct-23
General Chemistry			
Alkalinity (Total as CaCO3)	mg/L	30-500 OG	381
Ammonia	mg/L		0.15
Chloride	mg/L	250 AO	92.8
COD	mg/L		63
Conductivity	umho/cm		989
Dissolved Organic Carbon (DOC)	mg/L	5 AO	11.4
Nitrate (N)	mg/L	10 MAC	<0.05
Nitrite (N)	mg/L	1 MAC	<0.05
рН	pН	6.5-8.5	7.95
Phenols	mg/L		0.011
Total Phosphorus	mg/L		0.07
Sulphate	mg/L	500 AO	31.9
Total Dissolved Solids (TDS)	mg/L	500 AO	600
ТКМ	mg/L		13.7
Metals			
Arsenic	mg/L	0.01 MAC	0.017
Barium	mg/L	1 MAC	0.082
Boron	mg/L	5 IMAC	0.151
Cadmium	mg/L	0.005 MAC	<0.0001
Calcium	mg/L		92.3
Chromium	mg/L	0.05 MAC	<0.002
Copper	mg/L	1 AO	<0.001
Iron	mg/L	0.3 AO	0.083
Lead	mg/L	0.01 MAC	<0.0005
Magnesium	mg/L		85.7
Manganese	mg/L	0.05 AO	0.225
Mercury	mg/L	0.001 MAC	<0.0001
Potassium	mg/L		11.9
Sodium	mg/L	200 AO	47.4
Zinc	mg/L	5 AO	<0.005
Volatile Organic Compounds			
1,4-Dichlorobenzene	mg/L	0.005 MAC	<0.0001
Benzene	mg/L	0.001 MAC	<0.0002
Methylene Chloride(Dichloromethane)	mg/L	0.05 MAC	<0.00003
Toluene	mg/L	0.024 AO	<0.0002
Vinyl Chloride	mg/L	0.001 MAC	<0.00017

### Notes:

(1) MECP Ontario Drinking Water Standards.

(2) OG: Operational Guideline within ODWS.

(3) AO: Aesthetic Objective within ODWS.

(4) MAC: Maximum Acceptable Concentration within ODWS.

### Groundwater Geochemical Results OW-16B

Parameters	Units	ODWS <sup>(1)</sup>	Oct-23
General Chemistry			
Alkalinity (Total as CaCO3)	mg/L	30-500 OG	215
Ammonia	mg/L		<0.02
Chloride	mg/L	250 AO	171
COD	mg/L		28
Conductivity	umho/cm		1050
Dissolved Organic Carbon (DOC)	mg/L	5 AO	3.1
Nitrate (N)	mg/L	10 MAC	<0.05
Nitrite (N)	mg/L	1 MAC	<0.05
pН	pН	6.5-8.5	7.99
Phenols	mg/L		0.015
Total Phosphorus	mg/L		0.02
Sulphate	mg/L	500 AO	99.1
Total Dissolved Solids (TDS)	mg/L	500 AO	628
ТКМ	mg/L		1.9
Metals			
Arsenic	mg/L	0.01 MAC	0.006
Barium	mg/L	1 MAC	0.045
Boron	mg/L	5 IMAC	0.286
Cadmium	mg/L	0.005 MAC	<0.0001
Calcium	mg/L		56.7
Chromium	mg/L	0.05 MAC	<0.002
Copper	mg/L	1 AO	<0.001
Iron	mg/L	0.3 AO	<0.010
Lead	mg/L	0.01 MAC	<0.0005
Magnesium	mg/L		51.1
Manganese	mg/L	0.05 AO	0.055
Mercury	mg/L	0.001 MAC	<0.0001
Potassium	mg/L		11.9
Sodium	mg/L	200 AO	83.4
Zinc	mg/L	5 AO	<0.005
Volatile Organic Compounds			
1,4-Dichlorobenzene	mg/L	0.005 MAC	<0.0001
Benzene	mg/L	0.001 MAC	<0.0002
Methylene Chloride(Dichloromethane)	mg/L	0.05 MAC	<0.00003
Toluene	mg/L	0.024 AO	<0.0002
Vinyl Chloride	mg/L	0.001 MAC	<0.00017

### Notes:

(1) MECP Ontario Drinking Water Standards.

(2) OG: Operational Guideline within ODWS.

(3) AO: Aesthetic Objective within ODWS.

(4) MAC: Maximum Acceptable Concentration within ODWS.

### Groundwater Geochemical Results OW-17A

Parameters	Units	ODWS <sup>(1)</sup>	Oct-23
General Chemistry			
Alkalinity (Total as CaCO3)	mg/L	30-500 OG	235
Ammonia	mg/L		<0.02
Chloride	mg/L	250 AO	11.1
COD	mg/L		42
Conductivity	umho/cm		483
Dissolved Organic Carbon (DOC)	mg/L	5 AO	10.8
Nitrate (N)	mg/L	10 MAC	0.05
Nitrite (N)	mg/L	1 MAC	<0.05
рН	pН	6.5-8.5	7.51
Phenols	mg/L		0.007
Total Phosphorus	mg/L		0.07
Sulphate	mg/L	500 AO	23.6
Total Dissolved Solids (TDS)	mg/L	500 AO	284
ТКМ	mg/L		0.96
Metals			
Arsenic	mg/L	0.01 MAC	<0.001
Barium	mg/L	1 MAC	0.011
Boron	mg/L	5 IMAC	0.039
Cadmium	mg/L	0.005 MAC	<0.0001
Calcium	mg/L		58.1
Chromium	mg/L	0.05 MAC	<0.002
Copper	mg/L	1 AO	0.001
Iron	mg/L	0.3 AO	0.16
Lead	mg/L	0.01 MAC	<0.0005
Magnesium	mg/L		35.2
Manganese	mg/L	0.05 AO	0.009
Mercury	mg/L	0.001 MAC	<0.0001
Potassium	mg/L		1.96
Sodium	mg/L	200 AO	4.96
Zinc	mg/L	5 AO	<0.005
Volatile Organic Compounds			
1,4-Dichlorobenzene	mg/L	0.005 MAC	<0.0001
Benzene	mg/L	0.001 MAC	<0.0002
Methylene Chloride(Dichloromethane)	mg/L	0.05 MAC	<0.00003
Toluene	mg/L	0.024 AO	<0.0002
Vinyl Chloride	mg/L	0.001 MAC	<0.00017

### Notes:

(1) MECP Ontario Drinking Water Standards.

(2) OG: Operational Guideline within ODWS.

(3) AO: Aesthetic Objective within ODWS.

(4) MAC: Maximum Acceptable Concentration within ODWS.

### Groundwater Geochemical Results OW-17B

Parameters	Units	ODWS <sup>(1)</sup>	Oct-23			
General Chemistry						
Alkalinity (Total as CaCO3)	mg/L	30-500 OG	211			
Ammonia	mg/L		<0.02			
Chloride	mg/L	250 AO	16.2			
COD	mg/L		36			
Conductivity	umho/cm		469			
Dissolved Organic Carbon (DOC)	mg/L	5 AO	8.5			
Nitrate (N)	mg/L	10 MAC	<0.05			
Nitrite (N)	mg/L	1 MAC	<0.05			
рН	рН	6.5-8.5	7.69			
Phenols	mg/L		0.005			
Total Phosphorus	mg/L		0.35			
Sulphate	mg/L	500 AO	25.8			
Total Dissolved Solids (TDS)	mg/L	500 AO	272			
TKN	mg/L		0.59			
Metals						
Arsenic	mg/L	0.01 MAC	0.004			
Barium	mg/L	1 MAC	0.025			
Boron	mg/L	5 IMAC	0.145			
Cadmium	mg/L	0.005 MAC	<0.0001			
Calcium	mg/L		54.7			
Chromium	mg/L	0.05 MAC	<0.002			
Copper	mg/L	1 AO	<0.001			
Iron	mg/L	0.3 AO	0.022			
Lead	mg/L	0.01 MAC	<0.0005			
Magnesium	mg/L		32.2			
Manganese	mg/L	0.05 AO	0.116			
Mercury	mg/L	0.001 MAC	<0.0001			
Potassium	mg/L		3.71			
Sodium	mg/L	200 AO	18.9			
Zinc	mg/L	5 AO	<0.005			
Volatile Organic Compounds						
1,4-Dichlorobenzene	mg/L	0.005 MAC	<0.0001			
Benzene	mg/L	0.001 MAC	<0.0002			
Methylene Chloride(Dichloromethane)	mg/L	0.05 MAC	<0.00003			
Toluene	mg/L	0.024 AO	<0.0002			
Vinyl Chloride	mg/L	0.001 MAC	<0.00017			

### Notes:

(1) MECP Ontario Drinking Water Standards.

(2) OG: Operational Guideline within ODWS.

(3) AO: Aesthetic Objective within ODWS.

(4) MAC: Maximum Acceptable Concentration within ODWS.



### Groundwater Geochemical Results OW-18

Parameters	Units	ODWS <sup>(1)</sup>	Oct-23
General Chemistry		-	
Alkalinity (Total as CaCO3)	mg/L	30-500 OG	1560
Ammonia	mg/L		64
Chloride	mg/L	250 AO	423
COD	mg/L		311
Conductivity	umho/cm		4300
Dissolved Organic Carbon (DOC)	mg/L	5 AO	32.9
Nitrate (N)	mg/L	10 MAC	5.71
Nitrite (N)	mg/L	1 MAC	2.47
рН	рН	6.5-8.5	7.45
Phenols	mg/L		0.017
Total Phosphorus	mg/L		0.24
Sulphate	mg/L	500 AO	82.2
Total Dissolved Solids (TDS)	mg/L	500 AO	2180
TKN	mg/L		125
Total Suspended Solids (TSS)	mg/L		3050
BOD (5)	mg/L		27
Metals			
Arsenic	mg/L	0.01 MAC	0.008
Barium	mg/L	1 MAC	0.292
Boron	mg/L	5 IMAC	0.663
Cadmium	mg/L	0.005 MAC	0.0002
Calcium	mg/L		178
Chromium	mg/L	0.05 MAC	0.003
Copper	mg/L	1 AO	0.016
Iron	mg/L	0.3 AO	0.553
Lead	mg/L	0.01 MAC	<0.0005
Magnesium	mg/L		123
Manganese	mg/L	0.05 AO	0.293
Mercury	mg/L	0.001 MAC	<0.0001
Potassium	mg/L		113
Sodium	mg/L	200 AO	359
Zinc	mg/L	5 AO	<0.005
Volatile Organic Compounds			
1,4-Dichlorobenzene	mg/L	0.005 MAC	<0.0001
Benzene	mg/L	0.001 MAC	0.00059
Methylene Chloride(Dichloromethane)	mg/L	0.05 MAC	<0.00003
Toluene	mg/L	0.024 AO	<0.0002
Vinyl Chloride	mg/L	0.001 MAC	<0.00017

#### Notes:

(1) MECP Ontario Drinking Water Standards.

(2) OG: Operational Guideline within ODWS.

(3) AO: Aesthetic Objective within ODWS.

(4) MAC: Maximum Acceptable Concentration within ODWS.

Parameters	Units	ODWS (1)	Mar-04	Oct-04	Jul-05	Apr-07	Oct-08	Oct-09	Nov-10	Oct-11	Oct-12	Oct-13	Oct-14	Sep-15	Sep-16	Oct-17	Sep-18	Sep-19	Nov-20	Oct-21	Nov-21	Nov-22	Oct-23
General Chemistry																							í .
Alkalinity (Total as CaCO3)	mg/L	30-500 OG	207	217.5	213	213	206	214	251	237	210	210	210	196	205	222	184	195	No	274	206	No	204
Ammonia	mg/L		0.03	0.03	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.07	0.07	0.02	0.10	0.04	<0.02	0.16	sample	0.04	0.05	sample	<0.02
Chloride	mg/L	250 AO	4.6	5.45	5	6	5	5	10	7	5	5	4.6	5.43	5.20	4.85	5.40	4.87	obtained	4.38	4.61	obtained	6.47
COD	mg/L		5	<5	<4	<4	<4	<4	28	9	4.8	7	6	12	<5	<5	<5	<5		<5	<5		<5
Conductivity	umho/cm		502	544	509	547	528	549	541	571	550	550	530	570	535	544	549	554		541	532		546
Dissolved Organic Carbon (DO	mg/L	5 AO	1.2	1.75	1.1	1.2	1.0	1.4	8.2	2.4	1.3	1.3	1.4	1.4	1.4	1.8	1.5	1.4		7.6	9.0		1.5
Nitrate (N)	mg/L	10 MAC	0.2	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.05	<0.10	<0.05		<0.05	<0.05		<0.05
Nitrite (N)	mg/L	1 MAC	<0.2	-	<0.3	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.10	<0.05		<0.05	<0.05		<0.05
pН	pН	6.5-8.5	7.91	7.95	8.27	7.90	8.00	7.80	8.07	7.93	7.99	7.96	7.97	8.02	8.18	8.31	8.00	7.91		8.04	7.83		7.78
Phenols	mg/L		-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001		0.006	0.008		0.005
Total Phosphorus	mg/L		-	-	-	-	-	-	-	-	-	-	-	< 0.05	< 0.05	<0.05	<0.02	<0.02		<0.02	<0.02		<0.02
Sulphate	mg/L	500 AO	60.6	72.4	78.2	77	78	73	28	58	70	70	76	74.3	76.5	77.7	81.0	78.8		79.5	78.7		73.4
Total Dissolved Solids (TDS)	mg/L	500 AO	294	330	352	320	330	355	346	308	308	322	286	302	290	326	308	378		308	318		314
TKN	mg/L		-	-	-	-	-	-	-	-	-	-	-	<0.10	<0.10	0.11	<0.10	0.26		<0.10	0.1		<0.10
Metals																							· · · · ·
Arsenic	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	< 0.003	<0.003	<0.003	< 0.003	<0.003		<0.001	0.001		<0.001
Barium	mg/L	1 MAC	0.014	0.014	0.015	0.014	0.015	0.014	0.011	0.016	0.014	0.014	0.015	0.014	0.014	0.016	0.015	0.017		0.014	0.013		0.011
Boron	mg/L	5 IMAC	0.181	0.15	0.15	0.16	0.15	0.16	0.16	0.16	0.16	0.14	0.18	0.166	0.146	0.161	0.147	0.187		0.165	0.168		0.113
Cadmium	mg/L	0.005 MAC	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.001	<0.002	<0.002		<0.0001	<0.0001		<0.0001
Calcium	mg/L		53.9	57.1	64	63	55	57	58	61	57	54	58	58.6	58.1	53.8	56.2	56.6		54	53.7		41.2
Chromium	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	< 0.003	<0.003	<0.003	< 0.003	0.004		<0.002	<0.002		<0.002
Copper	mg/L	1 AO	-	-	-	-	-	-	-	-	-	-	-	< 0.003	0.021	<0.003	< 0.003	< 0.003		0.003	0.007		0.002
Iron	mg/L	0.3 AO	0.05	<0.03	0.09	<0.1	<0.1	<0.1	0.21	<0.1	<0.1	<0.1	<0.1	<0.010	0.012	<0.010	<0.010	<0.010		<0.010	<0.010		0.01
Lead	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.001	<0.001		<0.0005	<0.0005		<0.0005
Magnesium	mg/L		34	29.4	37	35	30	33	33	35	35	29	33	31.0	32.1	31.1	31.3	30.7		30.7	30.3		16.6
Manganese	mg/L	0.05 AO	-	-	-	-	-	-	-	-	-	-	-	0.003	0.003	0.003	0.003	0.003		0.005	0.003		0.002
Mercury	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		<0.0001	<0.0001		<0.0001
Potassium	mg/L		-	-	-	-	-	-	-	-	-	-	-	3.80	3.73	3.67	3.66	3.68		3.6	3.65		4.58
Sodium	mg/L	200 AO	7.2	6.4	7.4	7.4	6.3	6.6	6.6	7.3	7.2	5.9	6.4	6.76	6.36	6.66	6.50	6.59		6.2	5.93		5.15
Zinc	mg/L	5 AO	-	-	-	-	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	0.008	0.010		<0.005	0.015		<0.005
Microbiological Analysis																							1
Escherichia coli	CFU	0 MAC	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1	1	<1		<1	<1		0

<1

1

<1

2

15

<1

7

4

#### Groundwater Geochemical Results Irving

Total Coliforms

Notes: (1) MECP Ontario Drinking Water Standards.

(2) OG: Operational Guideline within ODWS.

(3) AO: Aesthetic Objective within ODWS.

(4) MAC: Maximum Acceptable Concentration within ODWS.

CFU

0 MAC

-

-

-

-

-

-

-

(5) ODWS exceedances indicated by **bold** entries.

#### Groundwater Geochemical Results Paquet

Parameters	Units	ODWS <sup>(1)</sup>	Mar-04	Sep-04	Jul-05	Nov-05	Nov-06	Oct-07	Oct-08	Oct-09	Nov-10	Oct-11	Oct-12	Oct-13	Oct-14	Sep-15	Sep-16	Oct-17	Sep-18	Sep-19	Nov-20	Oct-21	Nov-21	Nov-22	Sep-23
General Chemistry																									
Alkalinity (Total as CaCO3)	mg/L	30-500 OG	216	209	216	220	244	230	228	218	210	210	210	210	210	189	202	209	No	200	210	206	206	No	198
Ammonia	mg/L		0.03	<0.03	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.12	0.074	<0.02	0.10	0.08	sample	0.35	0.06	0.05	0.05	sample	0.02
Chloride	mg/L	250 AO	4	4.35	5	4	6	7	5	5	5	6	5	5	4	4.90	4.55	4.53	obtained	4.34	4.80	4.61	4.61	obtained	4.94
COD	mg/L		6	<5	<4	<4	<4	6	4	<4	12	8	25	16	<4	11	12	<5		<5	<5	<5	<5		<5
Conductivity	umho/cm		498	507.5	501	530	539	535	582	524	545	552	550	560	520	573	547	497		517	519	532	532		537
Dissolved Organic Carbon (DO	mg/L	5 AO	1.5	2.0	1.2	1.9	1.3	1.3	1.4	1.4	1.5	1.4	1.3	1.3	1.4	1.5	2.1	2.0		1.3	1.9	9.0	9.0		1.2
Nitrate (N)	mg/L	10 MAC	0.2	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.10		<0.05	<0.05	<0.05	<0.05		<0.05
Nitrite (N)	mg/L	1 MAC	<0.2	<0.2	<0.3	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.10		<0.05	<0.05	<0.05	<0.05		<0.05
pН	pН	6.5-8.5	7.92	7.78	8.27	8.20	8.20	8.10	8.30	8.00	8.02	7.96	7.97	8.18	8.02	7.99	8.32	8.30		7.78	7.94	7.83	7.83		7.79
Phenols	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001		<0.001	<0.001	0.008	0.008		0.006
Total Phosphorus	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.05		<0.02	<0.02	<0.02	<0.02		<0.02
Sulphate	mg/L	500 AO	56.4	60.4	62.1	72	57	54	62	52	68	68	73	60	59	63.9	65.4	67.5		68.8	68.6	78.7	78.7		74.6
Total Dissolved Solids (TDS)	mg/L	500 AO	286	308	343	358	331	322	376	340	348	312	304	346	278	318	286	284		620	292	318	318		308
TKN	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	•	<0.10	<0.10	0.11		0.45	0.16	0.1	0.1		<0.10
Metals																									
Arsenic	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.003	<0.003	<0.003		<0.003	<0.001	0.001	0.001		<0.001
Barium	mg/L	1 MAC	0.014	0.0135	0.014	0.013	0.013	0.014	<0.005	0.014	0.014	0.014	0.014	<0.002	0.013	<0.002	<0.002	0.015		0.015	0.012	0.013	0.013		0.014
Boron	mg/L	5 IMAC	0.168	0.153	0.15	0.14	0.17	0.17	0.16	0.17	0.17	0.17	0.17	0.14	0.18	0.175	0.154	0.164		0.180	0.198	0.168	0.168		0.163
Cadmium	mg/L	0.005 MAC	-	-	•	-	-	-	-	-	-	-	-	-	1	<0.002	<0.002	<0.002		<0.001	< 0.0001	<0.0001	<0.0001		<0.0001
Calcium	mg/L		56.7	55	63	57	59	64	54	54	57	57	59	-	54	0.47	0.18	54.4		50.2	51.7	53.7	53.7		55
Chromium	mg/L	0.05 MAC	-	-	•	-	-	-	-	-	-	-	-	-	1	< 0.003	<0.003	<0.003		<0.003	<0.002	<0.002	<0.002		<0.002
Copper	mg/L	1 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	0.056	0.032	0.140		<0.003	0.003	0.007	0.007		<0.001
Iron	mg/L	0.3 AO	0.03	0.045	0.09	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.010	<0.010	0.062		<0.010	<0.010	<0.010	<0.010		0.013
Lead	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	0.004	<0.002	0.012		<0.001	< 0.0005	<0.0005	<0.0005		< 0.0005
Magnesium	mg/L		31.5	29.1	36	31	32	36	29	29	32	33	35	-	31	0.23	0.06	30.9		27.6	27.6	30.3	30.3		25.1
Manganese	mg/L	0.05 AO	-	-	•	-	-	-	-	-	-	-	-	-	1	<0.002	<0.002	0.003		0.003	0.003	0.003	0.003		0.006
Mercury	mg/L	0.001 MAC	-	-	•	-	-	-	-	÷	-	-	-	-	•	<0.0001	<0.0001	<0.0001		<0.0001	<0.0001	<0.0001	<0.0001		<0.0001
Potassium	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	•	0.37	0.41	3.83		3.61	3.41	3.65	3.65		2.95
Sodium	mg/L	200 AO	6.7	6.05	7.2	6.8	7.1	8.2	140	6.2	6.4	6.9	7.1	120	5.9	125	119	6.35		7.74	5.75	5.93	5.93		6
Zinc	mg/L	5 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	0.032	0.021	0.304		0.006	0.015	0.015	0.015		<0.005
Microbiological Analysis																									
Escherichia coli	CFU	0 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1		<1	<1	<1	<1		0
Total Coliforms	CFU	0 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1		<1	<1	7	7		1

Notes: (1) MECP Ontario Drinking Water Standards.

(2) OG: Operational Guideline within ODWS.

(3) AO: Aesthetic Objective within ODWS.

(4) MAC: Maximum Acceptable Concentration within ODWS.

(5) ODWS exceedances indicated by **bold** entries.

### 2023 Groundwater Duplicate Data

		Oct-23													
Parameters	Units	OW-13B	PB DUP1	Relative Percent Difference (%)	OW-14B	PB DUP2	Relative Percent Difference (%)	OW-10	PB DUP3	Relative Percent Difference (%)					
General Chemistry															
Alkalinity (Total as CaCO3)	mg/L	314	313	0.319	233	230	1.296	205	213	3.828					
Ammonia	mg/L	0.25	0.20	22.222	<0.02	<0.02	NC	<0.02	0.13	NC					
Chloride	mg/L	26.5	26.7	0.752	3.5	3.5	0.570	22.6	23.1	2.188					
COD	mg/L	27	33	20.000	23	20	13.953	35	55	44.444					
Conductivity	umho/cm	746	740	0.808	457	453	0.879	486	484	0.412					
Dissolved Organic Carbon (DOC)	mg/L	6.7	8.3	21.333	2.9	2.7	7.143	7.1	6.9	2.857					
Nitrate (N)	mg/L	<0.05	< 0.05	NC	<0.05	<0.05	NC	<0.05	0.09	NC					
Nitrite (N)	mg/L	<0.05	<0.05	NC	<0.05	<0.05	NC	<0.05	<0.05	NC					
рН	pН	7.86	7.80	0.766	7.86	7.85	0.127	7.47	7.62	1.988					
Phenols	mg/L	0.003	0.005	50.000	0.003	0.003	0.000	0.003	0.002	40.000					
Total Phosphorus	mg/L	0.03	0.03	0.000	0.05	0.03	50.000	0.08	0.06	28.571					
Sulphate	mg/L	60.5	61.0	0.823	19.7	19.8	0.506	19.8	21.4	7.767					
Total Dissolved Solids (TDS)	mg/L	440	426	3.233	250	252	0.797	276	268	2.941					
TKN	mg/L	0.63	0.62	1.600	0.15	<0.10	NC	0.36	0.45	22.222					
Metals															
Arsenic	mg/L	0.001	0.001	0.000	<0.001	0.001	NC	<0.001	<0.001	NC					
Barium	mg/L	0.043	0.043	0.000	0.017	0.017	0.000	0.034	0.033	2.985					
Boron	mg/L	0.313	0.325	3.762	0.197	0.213	7.805	0.141	0.151	6.849					
Cadmium	mg/L	<0.0001	<0.0001	NC	<0.0001	<0.0001	NC	<0.0001	<0.0001	NC					
Calcium	mg/L	82.4	76.0	8.081	46.8	44.1	5.941	54.2	53.8	0.741					
Chromium	mg/L	<0.002	<0.002	NC	<0.002	<0.002	NC	<0.002	< 0.002	NC					
Copper	mg/L	<0.001	<0.001	NC	<0.001	<0.001	NC	0.002	0.002	0.000					
Iron	mg/L	0.229	0.229	0.000	0.024	0.037	42.623	0.072	0.074	2.740					
Lead	mg/L	<0.0005	< 0.0005	NC	<0.0005	<0.0005	NC	<0.0005	<0.0005	NC					
Magnesium	mg/L	57.1	52.8	7.825	38.5	35.4	8.390	32.9	31.9	3.086					
Manganese	mg/L	0.024	0.026	8.000	0.007	0.006	15.385	0.01	0.013	26.087					
Mercury	mg/L	<0.0001	<0.0001	NC	<0.0001	<0.0001	NC	<0.0001	<0.0001	NC					
Potassium	mg/L	10.3	9.72	5.794	5.99	5.58	7.087	4.97	4.76	4.317					
Sodium	mg/L	23.9	23.2	2.972	10.6	9.8	8.354	16.1	15.5	3.797					
Zinc	mg/L	<0.005	<0.005	NC	<0.005	<0.005	NC	<0.005	<0.005	NC					
Volatile Organic Compounds															
1,4-Dichlorobenzene	mg/L	<0.0001	<0.0001	NC	<0.0001	<0.0001	NC	<0.0001	<0.0001	NC					
Benzene	mg/L	<0.0002	<0.0002	NC	<0.0002	<0.0002	NC	<0.0002	<0.0002	NC					
Methylene Chloride(Dichloromethane)	mg/L	<0.00003	< 0.00003	NC	<0.00003	< 0.00003	NC	<0.00003	<0.00003	NC					
Toluene	mg/L	<0.0002	<0.0002	NC	<0.0002	<0.0002	NC	<0.0002	<0.0002	NC					
Vinyl Chloride	mg/L	<0.00017	<0.00017	NC	<0.00017	<0.00017	NC	<0.00017	<0.00017	NC					

#### Notes:

(1) NC - not calculable as one or both concentrations are below the laboratory method detection limit.

# APPENDIX F GROUNDWATER ELEVATION AND CHEMISTRY TREND ANALYSIS

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Groundwater Elevation (masl)

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## Alkalinty Trend Analysis - Groundwater

**NS** 

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# **Barium Trend Analysis - Groundwater**



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# **Boron Trend Analysis - Groundwater**

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# **Chloride Trend Analysis - Groundwater**

**NS** 

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# **Dissolved Organic Carbon Trend Analysis - Groundwater**

**NS** 

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# Sulphate Trend Analysis - Groundwater

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# Total Dissolved Solids Trend Analysis - Groundwater

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# APPENDIX G PHOTOGRAPHIC INVENTORY OF GROUNDWATER MONITORING LOCATIONS































































































































# APPENDIX H GUIDELINE B-7 CALCULATIONS

#### The Municipality of Central Manitoulin

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Guideline B-7 Calculations 2023 Monitoring Event

Guideline B-7 Calculation													Down	gradient N	Aonitoring	g Wells											
Parameter	ODWS <sup>(3)</sup> C <sub>r</sub> (mg/L)	Background Concentration C <sub>b (1)</sub> (mg/L)	Maximum Concentration C <sub>m</sub> =C <sub>b</sub> +x(C <sub>r</sub> -C <sub>b</sub> (mg/L)	OW-1 (mg/L)	OW-2 (mg/L)	OW-3A (mg/L)	OW-3B (mg/L)	OW-4 (mg/L)	OW-5 (mg/L)	OW-6 (mg/L)	OW-7 (mg/L)	OW-9 (mg/L)	OW-10 (mg/L)	OW-11 (mg/L)	OW-12A (mg/L)	OW-12B (mg/L)	OW-13A (mg/L)	OW-13B (mg/L)	OW-14A (mg/L)	OW-14B (mg/L)	OW-15A (mg/L)	OW-15B (mg/L)	OW-16A (mg/L)	OW-16B (mg/L)	OW-17A (mg/L)	OW-17B (mg/L)	OW-18 (mg/L)
Health Rela	ited		x=0.25 <sup>(2)</sup>																								
Barium	1	0.007	0.255	0.034	0.015	0.048	0.012	0.014	0.014	0.011	0.011	0.024	0.034	0.015	0.029	0.027	0.151	0.043	0.035	0.017	0.031	0.036	0.082	0.045	0.011	0.025	0.292
Boron	5	0.021	1.27	0.262	0.266	0.292	0.642	0.182	0.342	0.396	0.347	0.264	0.141	0.465	0.466	0.534	0.845	0.313	0.101	0.197	0.194	0.551	0.151	0.286	0.039	0.145	0.663
Nitrate	10	0.050	2.54	1.4	<0.05	<0.05	0.72	0.06	<0.05	0.07	0.3	<0.05	<0.05	<0.05	<0.05	<0.05	<0.07	<0.05	<0.05	<0.05	<0.05	<0.07	<0.05	<0.05	0.05	<0.05	5.71
Nitrite	1	0.014	0.26	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.28	<0.05	0.23	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	2.47
Non-Health	Related		x=0.50 <sup>(2)</sup>																								
Alkalinity	500	270.1	385	400	180	494	189	235	210	175	176	180	205	180	163	226	751	314	368	233	214	194	381	215	235	211	1560
Chloride	250	5.52	128	64.2	9.5	79.6	18.5	7.89	13.3	3.64	3.59	4.2	22.6	4.77	2.87	3.81	103	26.5	54.2	3.5	160	260	92.8	171	11.1	16.2	423
DOC	5	8.16	8.16 ⁴	9.3	1.9	12.8	5.0	3.2	3.1	1.1	1.0	1.6	7.1	1.6	1.6	2.0	22.9	6.7	9.1	2.9	3.4	3.1	11.4	3.1	10.8	8.5	32.9
Sodium	200	3.68	101.8	28.8	8.4	52.9	43.1	10.20	27.5	12.6	26.4	11.6	16.1	12.20	18.8	19.6	82.5	23.9	17.4	10.60	37.50	141	47.40	83.40	4.96	18.9	359
Sulphate	500	7.39	254	53.1	51.1	21	111	28.4	72.6	107.0	109	51.7	19.8	77.3	34.0	72	171	60.5	60.1	19.7	188	538	31.9	99.1	23.6	25.8	82.2
TDS	500	312.4	406	590	246	668	368	272	328	312	308	238	276	280	208	314	1160	440	562	250	750	1360	600	628	284	272	2180

Notes:

(1) Average of valid sampling rounds at OW-8.

(2) Defined according to Guideline B-7 (MECP, 1994).

(3) ODWS - Ontario Drinking Water Standards (MECP, 2001).

(4) Background exceeds the ODWS, therefore the maximum concentration has been set at background.

(5) BOLD and shaded indicates an exceedance of the Maximum Concentration.

# APPENDIX I MONITORING AND SCREENING CHECKLIST

### Appendix D-Monitoring and Screening Checklist General Information and Instructions

#### General Information: The checklist is to be completed, and submitted with the Monitoring Report.

**Instructions:** A complete checklist consists of:

(a) a completed and signed checklist, including any additional pages of information which can be attached as needed to provide further details where indicated.

(b) completed contact information for the Competent Environmental Practitioner (CEP)

(c) self-declaration that CEP(s) meet(s) the qualifications as set out below and in Section 1.2 of the Technical Guidance Document.

#### Definition of Groundwater CEP:

For groundwater, the CEP must have expertise in hydrogeology and meet one of the following:

(a) the person holds a licence, limited licence or temporary licence under the Professional Engineers Act; or

(b) the person holds a certificate of registration under the *Professional Geoscientists Act, 2000* and is a practicing member, temporary, member or limited member of the Association of Professional Geoscientists of Ontario. O. Reg. 66/08, s. 2..

#### **Definition of Surface water CEP:**

A CEP for surface water assessments is a scientist, professional engineer or professional geoscientist as described in (a) and (b) above with demonstrated experience and post-secondary education, either a diploma or degree, in hydrology, aquatic ecology, limnology, aquatic biology, physical geography with specialization in surface water, and/or water resource management.

The type of scientific work that a CEP performs must be consistent with that person's education and experience. If an individual has appropriate training and credentials in both groundwater and surface water and is responsible for both areas of expertise, the CEP may then complete and validate both sections of the checklist.

Monitoring Report and Site Information						
Waste Disposal Site Name	Providence Bay Waste Disposal Site					
Location (e.g. street address, lot, concession)	4077 Government Road, part Lot 3, Concession 13, former Township of Carnarvon, District of Manitoulin					
GPS Location (taken within the property boundary at front gate/ front entry)	401859 Easting and 5056873 Northing, Zone 17					
Municipality	Central Manitoulin					
Client and/or Site Owner	Municipality of Central Manitoulin					
Monitoring Period (Year)	2023					
This M	Ionitoring Report is being submitted under the following:					
Certificate of Approval No.:	A550702					
Director's Order No.:						
Provincial Officer's Order No.:						
Other:						

Report Submission Frequency	● Annual ○ Other	Specify (Type Here):
	(•	Active
The site is:	C	Inactive
	C	Closed
If closed, specify C of A, control or aut	horizing document closure date:	1-Jun-2023
Has the nature of the operations at		
the site changed during this		Yes
	C	) No
If yes, provide details:	As of 1 June 2023, the Site ceased operate only as a waste transfer st	accepting waste, at which time the Site is continuing to
nave any measurements been taken since the last reporting period that indicate landfill gas volumes have exceeded the MOE limits for subsurface or adjacent buildings? (i. e. exceeded the LEL for methane)		● Yes ● No

<b>Groundwater WDS Verification:</b> Based on all available information about the site and site knowledge, it is my opinion that:								
Sampling and Monitoring Program Status:								
1) The monitoring program continues to effectively characterize site conditions and any groundwater discharges from the site. All monitoring wells are confirmed to be in good condition and are secure:	● Yes ○ No	:						
2) All groundwater, leachate and WDS gas sampling and monitoring for the monitoring period being reported on was successfully completed as required by Certificate(s) of Approval or other relevant authorizing/control document(s):	<ul> <li>Yes</li> <li>No</li> <li>Not Applicable</li> </ul>	ch information.						
Groundwater Sampling Location	Description/Explanation for cha (change in name or location, add	Date						
Type Here	Type Here	Select Date						
Type Here	Type Here	Select Date						
Type Here	Type Here	Select Date						
Type Here	Type Here		Select Date					

<ol> <li>a) Some or all groundwater, leach monitoring requirements have be outside of a ministry C of A, author</li> </ol>	ate and WDS gas sampling and een established or defined orizing, or control document.	<ul><li>○ Yes</li><li>● No</li><li>○ Not Applicable</li></ul>	
b) If yes, the sampling and monito the monitoring period being repo completed in accordance with est locations, and parameters develo Guidance Document:	pring identified under 3(a) for orted on was successfully ablished protocols, frequencies, ped as per the Technical	<ul> <li>Yes</li> <li>No</li> <li>Not Applicable</li> </ul>	If no, list exceptions below or attach additional information.
Groundwater Sampling Location	Description/Explanation for cha (change in name or location, add	Date	
Type Here	Type Here		Select Date
Type Here	Type Here	Select Date	
Type Here	Type Here	Select Date	
Type Here	Type Here		Select Date
4) All field work for groundwater investigations was done in accordance with standard operating procedures as established/outlined per the Technical Guidance Document (including internal/external QA/ QC requirements) (Note: A SOP can be from a published source, developed internally by the site owner's consultant, or adopted by the consultant from another organization):	● Yes ○ No	If no, specify (Type Here):	

	Sampling and Monitoring Program Results/WDS Conditions and Assessment:							
5)	The site has an adequate buffer, Contaminant Attenuation Zone (CAZ) and/or contingency plan in place. Design and operational measures, including the size and configuration of any CAZ, are adequate to prevent potential human health impacts and impairment of the environment.	● Yes ○ No						
6)	The site meets compliance and assessment criteria.	○ Yes ● No	Guideline B-7 exceedances were c OW-13A, OW-14A, OW-15A, OW-1 17A, OW-17B and OW-18.	quantified for OW-1, OW-3A, 5B, OW-16A, OW-16B, OW-				
7)	The site continues to perform as anticipated. There have been no unusual trends/ changes in measured leachate and groundwater levels or concentrations. Is one or more of the following risk reduction practices in place at the site:	● Yes ○ No						
	<ul> <li>at the site:</li> <li>(a) There is minimal reliance on natural attenuation of leachate due to the presence of an effective waste liner and active leachate collection/treatment; or</li> <li>(b) There is a predictive monitoring program in-place (modeled indicator concentrations projected over time for key locations); or</li> <li>(c) The site meets the following two conditions (typically achieved after 15 years or longer of site operation):</li> <li><i>i</i>.The site has developed stable leachate mound(s) and stable leachate plume geometry/concentrations; and</li> <li><i>ii</i>.Seasonal and annual water levels and water quality fluctuations are well understood.</li> </ul>	<ul> <li>Yes</li> <li>No</li> </ul>	Note which practice(s):	☐ (a) ☐ (b)  ★ (c)				
9)	Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):	<ul> <li>Yes</li> <li>No</li> <li>Not Applicable</li> </ul>	If yes, list value(s) that are/have be action taken (Type Here):	een exceeded and follow-up				

### **Groundwater CEP Declaration:**

I am a licensed professional Engineer or a registered professional geoscientist in Ontario with expertise in hydrogeology, as defined in Appendix D under Instructions. Where additional expertise was needed to evaluate the site monitoring data, I have relied on individuals who I believe to be experts in the relevant discipline, who have co-signed the compliance monitoring report or monitoring program status report, and who have provided evidence to me of their credentials.

I have examined the applicable Certificate of Approval and any other environmental authorizing or control documents that apply to the site. I have read and followed the Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water Technical Guidance Document (MOE, 2010, or as amended), and associated monitoring and sampling guidance documents, as amended from time to time. I have reviewed all of the data collected for the above-referenced site for the monitoring period(s) identified in this checklist. Except as otherwise agreed with the ministry for certain parameters, all of the analytical work has been undertaken by a laboratory which is accredited for the parameters analysed to *ISO/IEC 17025:2005 (E)- General requirements for the competence of testing and calibration laboratories,* or as amended from time to time by the ministry.

If any exceptions or potential concerns have been noted in the questions in the checklist attached to this declaration, it is my opinion that these exceptions and concerns are minor in nature and will be rectified for the next monitoring/reporting period. Where this is not the case, the circumstances concerning the exception or potential concern and my client's proposed action have been documented in writing to the Ministry of the Environment District Manager in a letter from me dated:

### **Recommendations:**

Based on my technical review of the monitoring results for the waste disposal site:

No changes to the monitoring program are recommended	No changes to the monitoring program are recommended at this time.
The following change(s) to the C monitoring program is/are recommended:	
<ul> <li>No Changes to site design and operation are recommended</li> </ul>	Type Here
The following change(s) to the	

Name:	Larry Rodricks						
Seal:	al: Add Image						
Signature:	VangColin	Date:	30-Jan-2024				
CEP Contact Information:	Larry Rodricks, P.Eng.						
Company:	WSP E&I Canada Limited						
Address:	ddress: N3H 4R7 Canada						
Telephone No.:	519-650-7108	Fax No. :					
E-mail Address:	-mail Address:						
Co-signers for additional expertise provided:							
Signature:		Date:	Select Date				
Signature:		Date:	Select Date				

Surface Water WDS Verification:								
Provide the name of surface water water water waterbody (including the nearest sur	body/bodies potentially receivir face water body/bodies to the sit	ng the WDS effluent and the ap e):	proximate distance to the					
Name (s)	Lake Huron							
Distance(s)	500 m west							
Based on all available information an	Based on all available information and site knowledge, it is my opinion that:							
Sampling and Monitoring Program Status:								
<ol> <li>The current surface water monitoring program continues to effectively characterize the surface water conditions, and includes data that relates upstream/background and downstream receiving water conditions:</li> </ol>	● Yes ○ No	Former surface water monitoring program discor historically.						
<ol> <li>All surface water sampling for the monitoring period being reported was successfully completed in accordance with the Certificate(s) of Approval or relevant authorizing/control document(s) (if applicable):</li> </ol>	<ul> <li>Yes</li> <li>No</li> <li>Not applicable (No C of A,</li> <li>authorizing / control document applies)</li> </ul>	If no, specify below or provide details in an attachment.						
Surface Water Sampling Location	Description/Expla (change in name or locat	Date						
Type Here	Type Here		Select Date					
Type Here	Type Here	Select Date						
Type Here	Type Here	Select Date						
Type Here	Type Here	Select Date						

3) a) Some or all surface water samp requirements for the monitoring outside of a ministry C of A or aut	ling and monitoring program period have been established horizing/control document.	<ul> <li>Yes</li> <li>No</li> <li>Not Applicable</li> </ul>			
b) If yes, all surface water samplin under 3 (a) was successfully comp established program from the site frequencies, locations and param Technical Guidance Document:	g and monitoring identified leted in accordance with the e, including sampling protocols, eters) as developed per the	<ul> <li>Yes</li> <li>No</li> <li>Not Applicable</li> </ul>	lf no, specify below or provide details in an attachment.		
Surface Water Sampling Location	Description/Expla (change in name or locat	Date			
Type Here	Type Here	Select Date			
Type Here	Type Here	Select Date			
Type Here	Type Here	Select Date			
Type Here	Type Here		Select Date		
4) All field work for surface water investigations was done in accordance with standard operating procedures, including internal/external QA/QC requirements, as established/ outlined as per the Technical Guidance Document, MOE 2010, or as amended. (Note: A SOP can be from a published source, developed internally by the site owner's consultant, or adopted by the consultant from another organization):	● Yes ○ No	Former surface water monitoring historically.	program discontinued		

## Sampling and Monitoring Program Results/WDS Conditions and Assessment:

The receiving water body meets surface water-related compliance criteria and assessment criteria:	
i.e., there are no exceedances of criteria, based on MOE legislation, regulations, Water	
Management Policies, Guidelines and Provincial Water Quality Objectives and other assessment	
criteria (e.g., CWQGs, APVs), as noted in Table A or Table B in the Technical Guidance Document	
(Section 4.6):	
	The receiving water body meets surface water-related compliance criteria and assessment criteria: i.e., there are no exceedances of criteria, based on MOE legislation, regulations, Water Management Policies, Guidelines and Provincial Water Quality Objectives and other assessment criteria (e.g., CWQGs, APVs), as noted in Table A or Table B in the Technical Guidance Document (Section 4.6):

• Yes

∩ No

If no, list parameters that exceed criteria outlined above and the amount/percentage of the exceedance as per the table below	or
provide details in an attachment:	

Parameter	Compliance or Assessment Criteria or Background	Amount by which Compliance or Assessment Criteria or Background Exceeded
e.g. Nickel	e.g. C of A limit, PWQO, background	e.g. X% above PWQO
		Former surface water monitoring program discontinued historically.
Type Here	Type Here	Type Here
Type Here	Type Here	Type Here
6) In my opinion, any exceedances listed in Question 5 are the result of non-WDS related influences (such as background, road salting, sampling site conditions)?	● Yes ○ No	Not Applicable as former surface water monitoring program discontinued historically.

7)	All monitoring program surface water parameter concentrations fall within a stable or decreasing trend. The site is not characterized by historical ranges of concentrations above assessment and compliance criteria.	<ul> <li>Yes</li> <li>No</li> </ul>	Former surface water monitoring program discontinued historically.
8)	For the monitoring program parameters, does the water quality in the groundwater zones adjacent to surface water receivers exceed assessment or compliance criteria (e.g. , PWQOs, CWQGs, or toxicity values for aquatic biota (APVs)):	<ul> <li>Yes</li> <li>No</li> <li>Not Known</li> <li>Not Applicable</li> </ul>	If yes, provide details and whether remedial measures are necessary (Type Here)
9)	Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):	<ul> <li>Yes</li> <li>No</li> <li>Not Applicable</li> </ul>	If yes, list value(s) that are/have been exceeded and follow-up action taken (Type Here)
### Surface Water CEP Declaration:

I, the undersigned hereby declare that I am a Competent Environmental Practitioner as defined in Appendix D under Instructions, holding the necessary level of experience and education to design surface water monitoring and sampling programs, conduct appropriate surface water investigations and interpret the related data as it pertains to the site for this monitoring period.

I have examined the applicable Certificate of Approval and any other environmental authorizing or control documents that apply to the site. I have read and followed the Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water Technical Guidance Document (MOE, 2010, or as amended) and associated monitoring and sampling guidance documents, as amended from time to time. I have reviewed all of the data collected for the above-referenced site for the monitoring period(s) identified in this checklist. Except as otherwise agreed with the ministry for certain parameters, all of the analytical work has been undertaken by a laboratory which is accredited for the parameters analysed to *ISO/IEC 17025:2005 (E)- General requirements for the competence of testing and calibration laboratories,* or as amended from time to time by the ministry.

If any exceptions or potential concerns have been noted in the questions in the checklist attached to this declaration, it is my opinion that these exceptions and concerns are minor in nature or will be rectified for future monitoring events. Where this is not the case, the circumstances concerning the exception or potential concern and my client's proposed action have been documented in writing to the Ministry of the Environment District Manager in a letter from me dated:

Recommendations:			
Based on my technical review of the n	nonitoring results for the waste disposal site:		
<ul> <li>No Changes to the monitoring program are recommended</li> </ul>	Former surface water monitoring program discontinued historically.		
The following change(s) to the			
No changes to the site design and operation are recommended	Type Here		
The following change(s) to the site C design and operation is/are recommended:			

CEP Signature	VangColin				
Relevant Discipline					
Date:	30-Jan-2024				
CEP Contact Information:	Larry Rodricks, P.Eng.				
Company:	WSP E&I Canada Limited				
Address:	900 Maple Grove Road, Unit 10 Cambridge, Ontario N3H 4R7 Canada				
Telephone No.:	519-650-7108				
Fax No. :					
E-mail Address:	larry.rodricks@wsp.com				
Save As		Print Form			

APPENDIX J Groundwater Easement Documents

#### SCHEDULE

WHEREAS the Transferor wishes to convey to the Transferee a groundwater easement on, over, under and through the Transferor's lands for the purposes hereinafter set out;

IN CONSIDERATION OF good and valuable consideration now received by each of the parties from the other, the Transferor hereby grants, conveys and transfers to the Transferee, the right, interest and groundwater easement on, over, under and through those lands of the Transferor described in the Transfer to which this forms a schedule (the "Transferor's Lands"), in order to comply with Amended Environmental Compliance Approval, number A550702, issued on August 2, 2022 by the Ministry of Environment Conservation and Parks for the Providence Bay Landfill;

1. To use the Transferor's Lands as a leachate attenuation zone to accommodate the migration of leachate in the groundwater from the Providence Bay Landfill Site, located on lands of described as PT LT 3 CON 13 CARNARVON AS IN CA1965; CENTRAL MANITOULIN (PIN 47115-1999 (LT)) (the "Landfill"), onto the Transferor's Lands;

2. To drill, install, operate, maintain, inspect, alter, remove, replace, reconstruct, enlarge and repair groundwater monitoring wells and other such systems or apparatus for conducting sub-surface investigations now located on or as may hereinafter be required to be located on the Transferor's Lands (``Groundwater Monitoring Works``) for the purpose of monitoring the location and movement and the testing of the chemical composition of any leachate that has migrated or may in the future migrate in the groundwater from the Landfill onto the Transferor's Lands; and

3. For each such purpose and all purposes necessary or incidental to the exercise of the rights hereby created, the Transferee, together with its officers, employees, agents, contractors and its or their vehicles, machinery, supplies and equipment, shall have access to the Transferor's Lands and such adjacent lands of the Transferor as may be necessary at all times on not less than 48 hours written notice to the Transferor, except in the case of an emergency, when no prior notice will be required.

Notwithstanding any act of the Transferee, the Transferor will execute such further and other documents of title and assurances in respect of the rights and easements herein reserved as may be reasonably required.

The Transferee shall, after carrying out all work on the Transferor's Lands, remove all surplus soil and debris and in all respects restore the surface of the Transferor's Lands so far as reasonably practical, in the Transferee's absolute discretion, to its former state at the Transferee's expense. For clarity, this obligation does not require removal of the Groundwater Monitoring Works or remediation of soil or groundwater.

The Transferor covenants and agrees with the Transferee that no other easement will be granted over the Transferor's Lands prior to registration of this grant of easement, and that any easement granted subsequent to the registration of this grant of easement shall in no way interfere with or diminish the easement and access herein granted.

Notwithstanding any rule of law or equity, all wells, pumps, pipes and other equipment and appurtenances brought onto, laid or erected upon or buried on the Transferor's Lands shall, at all times, remain the property of the Transferee notwithstanding that the same may be annexed or affixed to the freehold and shall, at any time, and from time to time be removable in whole or in part by the Transferee.

The Transferor shall not do or permit to be done anything that might damage or interfere with the normal operation and functioning of the groundwater easement herein described for the purposes for which it was established, designed and constructed. Without limiting the generality of the foregoing, the Transferor shall not drill or excavate or permit to be drilled or excavated on, in, over, through or under the Transferor's Lands any wells of any kind that might interfere with or manipulate the groundwater, or undertake or permit to be undertaken any excavation or erection of structures, without the prior written approval of the Transferee, which approval shall not be unreasonably withheld.

The rights, title, interest and obligations granted and contained herein shall be binding upon and enure to the benefit of the respective heirs, administrators, successors and assigns of the Transferor and Transferee.

This is an easement in gross.



I REQUI UNDER	RE THIS PLAN TO THE LAND TITLES .	PLAN 31R-4230			
		RE	RECEIVED AND DEPOSITED		
JUNE 1, DATE	2022	DA	TE 8 JUNE 2022		
			ni Vile		
	GOF ONTAF	REPRESENTATIVE FOR THE LAND REGISTRAR FOR THE LAND TITLES DIVISION OF MANITOULIN (31).			
PART	LOT	CONCESSION	PIN		
1	PART LOT 2	12		PART OF PIN 47114-0084	
2	PART LOT 3	12	PART OF PIN 47114-0084 (S PART OF PIN 47114-0289 (N		
3	PART LOT 2	13	PART OF PIN 47115-2002		
4	PART OF BETWEEN (	F ROAD ALLOWANCE CONCESSIONS 12 & 13		PART OF PIN 47114-0283	

LEGEND

	DENOTES	SURVEY MONUMENT FOUND				
	DENOTES	SURVEY MONUMENT PLANTED				
IB	DENOTES	IRON BAR				
RPL	DENOTES	ROCK PLUG				
RB	DENOTES	ROCK BAR				
Р	DENOTES	PLAN 31R-2999 BY R.D. HALLIDAY, O.L.S.				
		(W.J. KEATLEY LTD.)				
P1	DENOTES	PLAN 31R-2056 BY W.J. KEATLEY, O.L.S.				
P2	DENOTES	ORIGINAL SURVEY OF THE TOWNSHIP				
		OF CARNARVON				
MS	DENOTES	MEASURED				
NVM	DENOTES	NO VISIBLE MARKINGS				
1298	DENOTES	W.J. KEATLEY, O.L.S. (W.J. KEATLEY LTD.)				
1013	DENOTES	L.A. EMON, O.L.S.				
SRO	DENOTES	SURFACE RIGHTS ONLY				
MRO	DENOTES	MINING RIGHTS ONLY				

METRIC

DISTANCES & COORDINATES SHOWN HEREON ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999695

SCALE 1:1500							METRES		
Q	10	20	30	40	50	60	80	100	150

NOTE BEARINGS ARE UTM GRID, DERIVED FROM GPS OBSERVATIONS ON THE LINE BETWEEN ORP 'A' & ORP 'B' HAVING A BEARING OF N89°03'30"W REFERRED TO THE CENTRAL MERIDIAN OF UTM ZONE 17

(81° WEST LONGITUDE) NAD83 (CSRS)(1997.0)

FOR BEARING COMPARISONS, A ROTATION OF 0°55'00" CLOCKWISE WAS APPLIED TO PLANS.

OBSERVED REFERENCE POINTS (ORPs) DERIVED FROM GPS OBSERVATIONS USING THE PRECISE POINT POSITIONING (PPP) SERVICE, UTM ZONE 17, NAD83 (CSRS)(1997.0) COORDINATES TO RURAL ACCURACY PER SEC. 14(2) OF O.REG. 216/10 POINT ID NORTHING EASTING ORP 'A" 5056867.10 401875.59 ORP 'B' 5056871.27 401622.45 COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

PLAN OF SURVEY OF PART OF LOTS 2 & 3, CONCESSION 12, PART OF LOT 2, CONCESSION 13, AND PART OF THE ROAD ALLOWANCE BETWEEN CONCESSIONS 12 & 13 TOWNSHIP OF CARNARVON (REGISTERED PLAN NO. 22) MUNICIPALITY OF THE TOWNSHIP OF CENTRAL MANITOULIN DISTRICT OF MANITOULIN

#### SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

1) THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT, THE LAND TITLES ACT, AND THE REGULATIONS MADE UNDER THEM.

2) THE SURVEY WAS COMPLETED ON THE 21ST DAY OF APRIL 2022.

JUNE 1, 2022 DATE

GORDON R. KEATLEY ONTARIO LAND SURVEYOR

DATE: MAY 24, 2022 SCALE = 1:1,500 FILE: 6199

> KEATLEY SURVEYING LTD. P.O. BOX 578 LITTLE CURRENT, ONTARIO 705-368-2221

# Appendix K

Limitations

## LIMITATIONS

- 1. The work performed in the preparation of this report and the conclusions presented are subject to the following:
  - a. The Standard Terms and Conditions which form a part of our Professional Services Contract;
  - 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, or the conclusions presented.
- 3. The conclusions presented in this report were based, in part, on visual observations of the Site and attendant structures. Our conclusions cannot and are not extended to include those portions of the Site or structures, which are not reasonably available, in WSP's opinion, for direct observation.
- 4. The environmental conditions at the Site were assessed, within the limitations set out above, having due regard for applicable environmental regulations as of the date of the inspection. A review of compliance by past owners or occupants of the Site with any applicable local, provincial or federal bylaws, orders-in-council, legislative enactments and regulations was not performed.
- 5. The Site history research included obtaining information from third parties and employees or agents of the owner. No attempt has been made to verify the accuracy of any information provided, unless specifically noted in our report.
- 6. Where testing was performed, it was carried out in accordance with the terms of our contract providing for testing. Other substances, or different quantities of substances testing for, may be present on-site and may be revealed by different or other testing not provided for in our contract.
- 7. Because of the limitations referred to above, different environmental conditions from those stated in our report may exist. Should such different conditions be encountered, WSP must be notified in order that it may determine if modifications to the conclusions in the report are necessary.
- 8. The utilization of WSP's services during the implementation of any remedial measures will allow WSP to observe compliance with the conclusions and recommendations contained in the report. WSP's involvement will also allow for changes to be made as necessary to suit field conditions as they are encountered.
- 9. 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 the part, or any reliance thereon or decisions made based on any information or conclusions 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.
- 10. This report is not to be given over to any third party for any purpose whatsoever without the written permission of WSP.
- 11. Provided that the report is still reliable, and less than 12 months old, WSP will issue a third-party reliance letter to parties that the client identifies in writing, upon payment of the then current fee for such letters. All third parties relying on WSP's report, by such reliance agree to be bound by our proposal and WSP's standard reliance letter. WSP's standard reliance letter indicates that in no event shall WSP be liable for any damages, howsoever arising, relating to third-party reliance on WSP's report. No reliance by any party is permitted without such agreement.