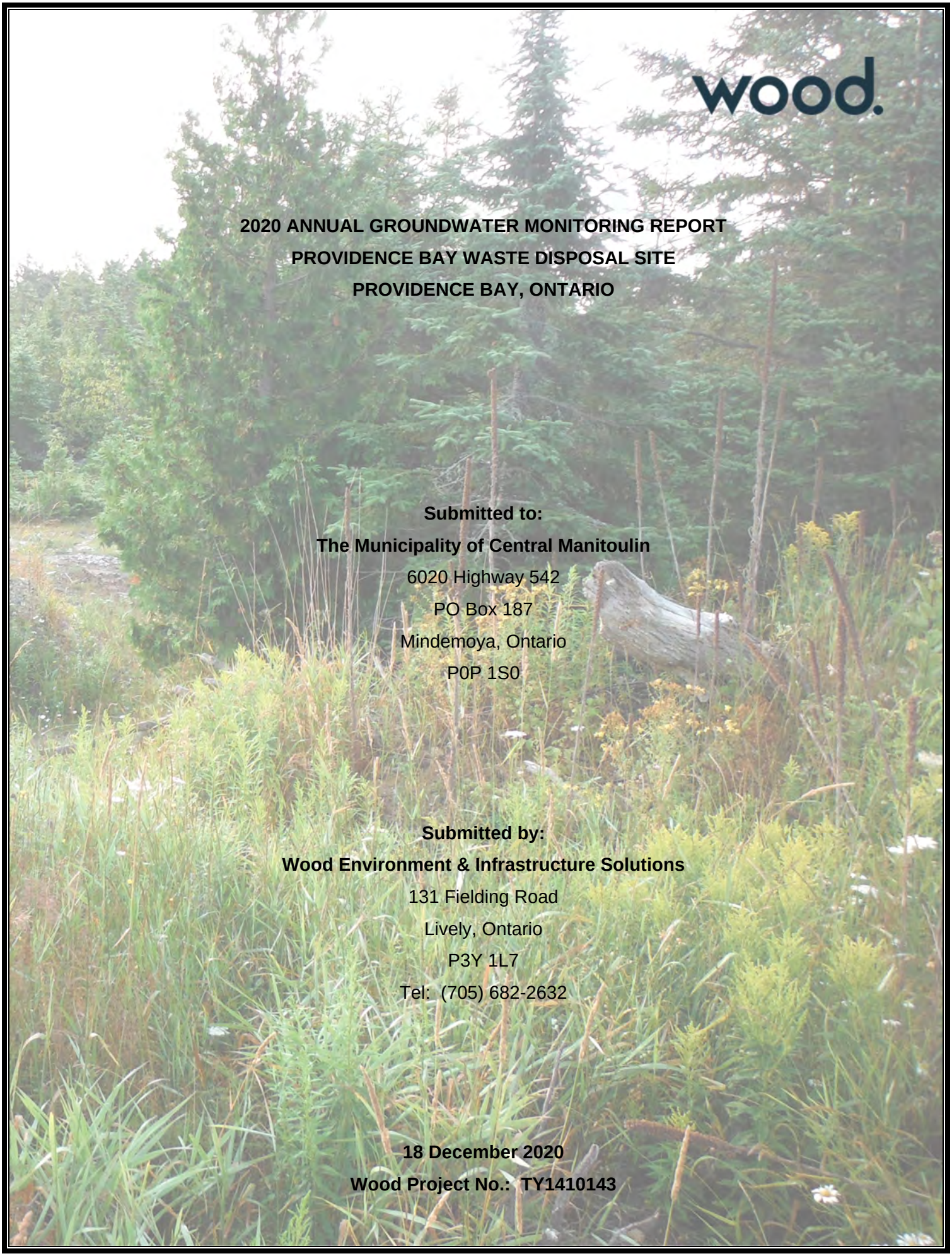

2020 ANNUAL GROUNDWATER MONITORING REPORT
PROVIDENCE BAY WASTE DISPOSAL SITE
PROVIDENCE BAY, ONTARIO

Submitted to:

The Municipality of Central Manitoulin

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Mindemoya, Ontario

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18 December 2020

Wood Project No.: TY1410143

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1.0 INTRODUCTION

Wood Environment & Infrastructure Solutions, a Division of Wood Canada Limited (Wood), was retained by The Municipality of Central Manitoulin (the Municipality) to prepare the 2020 annual groundwater monitoring report for the Providence Bay Waste Disposal Site (the Site). The following report provides a detailed evaluation and summary of the 2020 monitoring data and was completed to constitute the 2020 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:

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1.3 Description and Development of the Site

The landfill is currently active, and operates under Environmental Compliance Approval (ECA) No. A550702, issued 18 March 1980 and amended 21 September 2016, attached as Appendix A. The Site accepts commercial and domestic wastes, specifically solid non-hazardous municipal waste, and services the Municipality of Central Manitoulin, with an estimated 1,900 residents (Gamsby and Mannerow Limited (GM), 2014). The Site is approved for a 4.1 hectare (ha) fill area, however, there is no maximum approved capacity of the Site. 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.

As required by the recently amended ECA, an updated Design and Operations Plan was submitted to the MECP by 30 June 2020. At this time, the MECP has provided acknowledgment of receipt, but the Plan has not yet been approved by the Director and no further approval or comment has been received from the MECP regarding the continued operation of the Site.

No operations problems were encountered at the Site in 2020, and no complaints were received. There were no areas of excavation at the Site during 2020. No site works were undertaken during 2020; with the exception of grinding of wood material, no site works are currently planned for 2021.

1.3.1 Site Capacity

Landfilling activity in 2020 was located on the southwest edge of the fill area, as presented on Figure 2. It is expected that waste deposition in 2021 will be in the same general area. As weigh scales are not in place at the Site, mass and therefore volume estimates of incoming waste is not tracked. Capacity assessments are completed annually, however, based on annual topographical surveys, which offer a more accurate volume estimate than incoming volumes of uncompacted waste.

A topographical survey was undertaken 2 November 2020, in order to assess the annual change in waste volume at the Site and is presented on Figure 3. A total volume of existing waste of approximately 44,253 cubic metres (m^3) was measured during completion of the 2020 survey, including both waste and cover material. The previous topographical survey undertaken at the Site was completed on 2 October 2019, at which time a total volume of waste and cover material of approximately 42,356 m^3 was measured. An annual deposition rate of approximately 1,750 m^3 has therefore been calculated for the calendar year. This is slightly higher than previous years.

Although no maximum allowable capacity is stated in the Site's ECA, a theoretical maximum capacity of 107,895 m^3 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 63,642 m^3, as of November 2020. Assuming an annual deposition rate of 1,750 m^3, this equates to an estimated remaining life expectancy of approximately 36 years.

1.4 Monitoring and Reporting Program Objectives and Requirements

Historical Site investigations completed by others resulted in the instrumentation of the Site with a variety of groundwater monitoring wells and identification of adjacent residential water well monitoring locations. The current groundwater monitoring program is comprised of 18 groundwater monitoring wells (OW-1, OW-2, OW-3A, OW-3B, OW-4 through OW-11, OW-12A/B, OW-13A/B and OW-14A/B) 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 in April 2002 and OW-6 through OW-8 in December 2003. OW-9 through OW-11 were installed by Amec Foster Wheeler[1] in August 2014. Well nests OW-12A/B, OW-13A/B and OW-14A/B were installed by Amec Foster Wheeler in July 2017. The locations of all groundwater monitoring wells are presented on Figure 2.

1.5 Assumptions and Limitations

Wood'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 Wood.
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 potentially future Site.
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.

[1] Amec Foster Wheeler was purchased by John Wood Group PLC (Wood) and is now a subsidiary of the group known as Wood Environment & Infrastructure Solutions.

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, Wood must be notified in order that we may determine if modifications to our conclusions are necessary.
8. The utilization of Wood's services during future monitoring at the Site will allow Wood 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. Wood accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

2.0 PHYSICAL SETTING

2.1 Geology and Hydrogeology

The subsurface soil conditions in the vicinity of the Site are comprised of 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 Wood at each of the wells during the November 2020 groundwater monitoring event. Appendix C presents the groundwater elevations measured during the 2020 groundwater monitoring event. Figure 4 presents the inferred groundwater elevation contours and groundwater flow directions for the November 2020 monitoring event. In general, the recorded static groundwater levels indicate localized groundwater flow across the Site to the north and northwest in the immediate vicinity of the waste deposits. The overall groundwater flow direction is inferred to be away from the Site towards the west and northwest, ultimately discharging to Lake Huron, which is situated approximately 500 m downgradient of the Site.

3.0 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.

Table 1: Monitoring Locations On-Site

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

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 therefore 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. OW-1 and well nest OW-14A/B are located crossgradient from the fill area. All remaining wells are situated at various distances and in various directions downgradient of the waste deposits and are considered representative of the landfill leachate impacts. The downgradient property boundaries are represented by OW-6, OW-7, OW-9, OW-10, OW-11, OW-12A/B and OW-13A/B, as presented on Figure 2.

Table 2: Groundwater Monitoring Well Construction Details

Well ID	Condition	Total Depth (mbgs)[1]	Screened Interval (mbgs)	Unit Screened	On-Site Position
OW-1	Good	13.34	8.4 - 13.34	Bedrock	Crossgradient
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	Riser broken at ground surface within casing	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
OW-12A	Good	13.4	11.9 - 13.4	Bedrock	Downgradient
OW-12B	Good	17.1	14.1 - 17.1	Bedrock	Downgradient
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

Notes:
(1) mbgs indicates m below ground surface.

3.2 Monitoring Frequency

Groundwater is sampled by Wood once annually, during the fall. The annual monitoring event occurred on 3 November 2020. The annual sampling event for 2020 was undertaken later in the year, as compared to previous years, in an attempt to capture higher groundwater table elevations, as limited well volumes and recoveries have been an ongoing challenge at the Site historically.

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 and dissolved solids. All field equipment was maintained and calibrated 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 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 "*Guidance on Sampling for Use at Contaminated Sites in Ontario*" (revised December 1996) and the above-noted SOP.

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 Wood. Laboratory analytical reports for 2020 are provided in Appendix D. The 2020 groundwater monitoring data were reviewed by comparison to the current MECP Ontario Drinking Water Standards (ODWS).

3.5 Quality Assurance for Sampling and Analysis

Wood 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 quality assurance, all work is supervised and internally reviewed by senior staff members.

Field sampling equipment decontamination is completed in accordance with accepted protocols. As a minimum, sampling equipment is washed with detergent solution and rinsed with distilled water between sampling. 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. Two field duplicate samples were collected during the 2020 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.

4.0 MONITORING RESULTS

4.1 Historical Data

Historical data for groundwater dating back to 2002 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 acceptable limits.

As a quality control measure, groundwater duplicate samples were collected during the annual sampling event. All duplicate data are provided in Appendix D and summarized in Appendix E. The groundwater duplicate samples were collected from OW-14B and OW-10, and identified as PB DUP1 and PB DUP2, 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%), with the exception of copper in PB DUP2, and are therefore interpreted to indicate no sampling or laboratory biases during 2020.

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 and northwest. Static groundwater levels are presented in Appendix C; inferred groundwater flow directions for the November 2020 groundwater monitoring event are illustrated on Figure 4.

In addition to the current groundwater elevation data, previous groundwater elevations were reviewed to identify any trends or inconsistencies in the data. Overall, the reported static groundwater elevations are consistent with those recorded during previous sampling efforts. The available groundwater elevation data indicate relatively stable elevations over time, particularly since 2006. 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 2020.

4.4 Groundwater Quality Monitoring

Samples were collected from all 18 groundwater monitoring wells during the November 2020 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 Background Water Quality

Background water quality in upgradient monitoring well OW-8 is characterized by high 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. 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, these concentrations are considered to be representative of Site-specific background water quality in the aquifer intersected by the well screen.

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 systems (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.

4.4.2 Crossgradient Water Quality

Groundwater quality in OW-1, situated east and crossgradient of the fill area, is characterized by elevated concentrations of most parameters, as compared to background monitor OW-8. Recently installed well nest OW-14, situated southwest of the active fill area, exhibits differing water quality in the shallow and deep aquifers. 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. Water quality in deep monitoring well OW-14B is 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.

4.4.3 On-Site Downgradient Water Quality

Monitoring wells 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-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 were quantified at levels similar to background conditions.

Well nest OW-3A/B is located northwest of the active fill area and is situated mid-Site. The shallow and deep aquifers are monitored at this location by OW-3A and OW-3B, respectively, and report differing water quality. Water quality in shallow downgradient well OW-3A is characterized by elevated concentrations of most parameters analyzed, as compared to background. Groundwater quality in the deep aquifer at this location, in OW-3B, is characterized by low concentrations of DOC, and elevated concentrations of chloride, TDS, boron and sodium, as compared to water quality in OW-8. A detectable concentration of toluene was quantified in OW-3B, at a level below the ODWS.

Groundwater quality in OW-5, situated northwest of well nest OW-3 and downgradient of Site activities, is characterized by slightly elevated concentrations of most landfill indicator parameters, with the exception of DOC, which was quantified at a concentration lower than background. It is noted that concentrations of indicator parameters were lower at this location during 2019 and 2020 than during recent historical events, potentially indicating a decreasing landfill-derived impact in OW-5.

OW-2 is situated downgradient of Site activities to the north. Groundwater quality at this location is 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-9, OW12-A/B and OW-13A/B to the west of the Site, OW-6 to the northwest of the Site, and OW-10 and OW-11 to the north of the Site, as illustrated on Figure 2. It is noted that OW-7 is located on property not currently owned by the Municipality.

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

Recently installed 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 OW-13B, but at levels lower than those quantified in the shallow installation. A detectable concentration of toluene was quantified in OW-13A, below the ODWS.

OW-9, located west of the Site and at the west property boundary line, 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.

Recently installed well nest OW-12 is situated along the western property boundary of the Site, north of OW-9, and reports slightly higher concentrations of indicator parameters in OW-12B, the deeper of the two installations, as compared to OW-12A. Groundwater quality in shallow installation OW-12A is characterized by elevated concentrations of barium, boron and sodium, and low concentrations of alkalinity, chloride, DOC and TDS, as compared to background. Water quality in the deeper installation, OW-12B, is characterized by elevated concentrations of TDS, barium and boron, in comparison to water quality at background monitor OW-8. Toluene was quantified at detectable concentrations in both OW-12A and OW-12B during 2019, but was reported to be non-detect in both wells during the 2020 monitoring event.

During an historical monitoring event conducted in October 2017, additional parameters were analyzed at OW-12B in order to confirm a potential presence of petroleum hydrocarbons (PHCs) in groundwater initially observed during a supplemental sampling event in May 2017, which was conducted as part of a separate hydrogeological investigation. Detectable levels of PHCs were quantified in October 2017, as shown in the associated data summary table presented in Appendix E, resulting in the recommendation to continue with the analysis of these extra parameters at this monitoring well during future monitoring events. An insufficient volume of water and slow recovery prevented the collection of additional samples during the two 2018 sampling events, one of which was supplemental. Obtaining a sufficient sample volume at OW-12B is an ongoing challenge and collection of extra sample volume is not realistic at this well on an ongoing basis. Based on the available data, the source of the PHCs quantified 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 off-Site 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.

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 location is characterized by concentrations of most parameters at levels similar to or lower than background, with the exceptions of sulphate, TDS and boron, 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. 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 DOC, which is 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 and boron, in comparison to background water quality in OW-8.

4.4.5 Groundwater Field Parameter Measurements

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

Table 3: November 2020 Groundwater Field Parameter Measurements

Well ID	Temperature (ºC)	pH	Conductivity (mS/cm)	Dissolved Solids (mg/L)
OW-1	7.5	7.75	842	421
OW-2	8.0	8.63	463	232
OW-3A	8.8	7.76	1042	521
OW-3B	7.3	8.40	637	319
OW-4	8.9	7.63	513	257
OW-5	7.0	8.53	749	375
OW-6	7.6	8.36	544	272
OW-7	6.7	8.83	588	294
OW-8	7.6	7.44	495	248
OW-9	5.9	8.47	500	250
OW-10	8.8	7.84	640	320
OW-11	Insufficient volume			
OW-12A	7.8	8.66	363	182
OW-12B	Insufficient volume			
OW-13A	9.8	7.66	1348	674
OW-13B	9.1	8.12	684	342
OW-14A	8.0	8.16	888	444
OW-14B	7.7	8.30	458	229

4.4.6 Residential Well Monitoring

Two residential wells are integrated into the Site annual monitoring program. Samples were obtained at one of the two locations during the November 2020 monitoring event; no sample could be obtained at the Irving residence during 2020. The results of the residential well sampling are summarized and compared to the ODWS, with any exceedances identified by bold entries (Appendix E). As shown on Figure 2, both residential monitoring locations are situated west, and therefore downgradient, of the Site.

Groundwater quality in the Paquet residential water well is characterized by concentrations of all parameters analyzed at levels similar to background. A high TDS concentration, exceeding the ODWS, was quantified at this location during 2019; however, the 2020 results have confirmed that the 2019 concentration was anomalous and not representative of actual TDS concentrations at this location.

As indicated above, no sample could be obtained at the Irving residence during the 2020 monitoring event; however, water quality in the Irving residential water well was previously characterized in 2019 by concentrations of all parameters at levels similar to, or lower than, background, with the exceptions of TDS and boron, which were marginally elevated in comparison to OW-8. These parameter concentrations 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. The only parameters exceeding the ODWS at this location during the September 2019 monitoring event were microbial parameters, unrelated to the landfill (Appendix E).

In summary, a review of the most recent (i.e., 2019 and 2020) geochemical data from the neighbouring residential water supply wells indicates that these locations are not currently experiencing evidence of a landfill-derived impact.

5.0 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 November 2020 monitoring data, which are presented on Figure 5. The contours observed for chloride are interpreted to be aligned with the inferred groundwater contours at the Site (Figure 4). 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 inferred chloride concentration contours suggest that the landfill-derived impacts are contained to within a distance of approximately 200 m to the north and west of the fill area.

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 November 2020 monitoring event. The selected section is shown on Figure 6 and includes 11 monitoring wells, of which three 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, 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 previous 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.

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 2020. These time-concentration graphs are presented in Appendix F. Although results for wells OW-9 through OW-11, installed in 2014, and well nests OW-12 through OW-14, installed in 2017, have been included in the appended charts, trends cannot be discussed for these monitoring locations until additional data have been compiled. It is noted, however, that the results for OW-9 and OW-11 for the initial monitoring event in 2014, as well as for OW-12B for the initial event 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.

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. Landfill indicator parameters may be increasing over time in OW-3A, however additional data points are required in order to confirm this increasing trend. 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.

Unique 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 policy 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). In addition, operational guidelines have been established 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 (from OW-8), the geometric mean of the valid concentrations of each applicable ODWS parameter 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 2020 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, and a well-by-well comparison of the performance of each of the parameters at all of the downgradient groundwater monitoring wells is also presented in Appendix H for the 2020 monitoring events. By the present assessment, wells OW-1, OW-3A, OW-5, OW-13A, OW-13B

and OW-14A exhibit non-compliance with Guideline B-7 during the fall 2020 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 2020 monitoring event.

Comparing concentrations observed in the groundwater monitoring wells during the 2020 sampling event to the maximum allowable concentration (MAC) (Appendix H), three non-health related parameter exceedances are noted. Alkalinity, DOC and TDS exceeded the MAC in OW-3A, OW-13A and OW-14A. TDS also exceeded the MAC in OW-1, OW-5 and OW-13B, at levels not substantially elevated above the allowable limit. As previously discussed, DOC is elevated at background and is therefore not an ideal indicator of landfill-derived impacts.

In summary, the monitoring record indicates that a measurable water quality impact is occurring crossgradient and downgradient of the waste deposits in select monitoring wells. Crossgradient impacts in OW-1 are considered marginal and are not necessarily landfill-derived, but rather are potentially the result of background water quality conditions, especially given the hydraulic positioning of OW-1 in comparison to the waste deposits. Impacts quantified in OW-3A, OW-5, OW-14A and well nest OW-13 for alkalinity and TDS are interpreted to be Site-derived. 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. Confirmation of these results through additional, regularly scheduled sampling in 2021 is recommended.

A preliminary contaminant attenuation zone (CAZ) was calculated by Wood as part of a groundwater assessment completed in December 2018 (Wood, 2018). It was estimated at that time based on the available data that the required CAZ was 241 m surrounding the fill area. Based on this estimated CAZ radius and the results of the 2020 Guideline B-7 assessment discussed above, the Site is currently in compliance, as no wells outside of the 241 m radius have quantified exceedances of the Guideline B-7 MACs during the current annual monitoring program. It should be noted that the well nest at the OW-13 location is situated within the CAZ distance, and is on the municipal property line. As such, it is possible that the private lands immediately adjacent to this location (i.e., immediately west) do not comply with B-7, which warrants further evaluation of the required additional CAZ area in this corner of the municipal property boundaries. Additional monitoring wells would be needed to verify the CAZ requirements.

5.4 Adequacy of the Monitoring Program

It is Wood's opinion that the current groundwater monitoring program 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.

6.0 CONCLUSIONS

Based on the results of the current (2020) monitoring program, the following conclusions have been made:

1. 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 north and west.
2. The current monitoring record indicates a landfill-derived impact to groundwater quality in the shallow aquifer in monitoring wells downgradient of the waste fill area. Water quality conditions in recently installed OW-12B, the deeper of the two installations at this well nest, indicate a potential impact to groundwater quality; however, water quality in this well is not fully understood at this time, given the small data set available to date. It is noted that detectable concentrations of PHC parameters have been quantified in OW-12B during historical sampling events, however it is possible that the PHC presence at this location may be naturally occurring.
3. The inferred chloride concentration contours suggest that the landfill-derived impacts are contained to within an approximate distance of 200 m to the north and west 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.
4. Groundwater quality at the Site is stable over time at all monitoring locations, including residential water wells downgradient of the Site. The data indicate a potential increasing trend in concentrations of landfill indicator parameters in OW-3A, however additional samples are required in order to confirm this trend.
5. Alkalinity, DOC and TDS, all non-health related parameters, exceeded the MACs, as calculated using Guideline B-7. DOC is not interpreted to be an appropriate landfill indicator parameter for this site, due to the high background concentration. The exceedance in crossgradient well OW-1 is marginal and is not necessarily landfill-derived. The exceedances in wells OW-3A, OW-5, OW-14A and well nest OW-13, however, are interpreted to be indicative of a landfill-derived impact to groundwater quality. It is noted that the flow of groundwater in the vicinity of well nest OW-13 is to the northwest, which allows for additional downgradient attenuation on the western portion of the Municipality-owned property.
6. Based on the previously estimated CAZ, discussed in the 2018 hydrogeology report, a radius of 241 m downgradient of the fill pile is needed to meet Guideline B-7. Adequate downgradient attenuation appears to be available northwest of the fill pile, in the direction of groundwater movement, and downgradient wells beyond 241 m currently comply with B-7; however, the CAZ may need to be expanded slightly west of the OW-13 nest, which will require further evaluation.

7.0 RECOMMENDATIONS

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

1. The Municipality should continue with the current frequency of groundwater monitoring, 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 round to further confirm groundwater flow directions.
3. OW-7 should be repaired during 2021, as the riser is broken at ground surface within the protective casing.
4. The compliance of land immediately adjacent to well nest OW-13 should be evaluated though the installation of additional monitoring wells, in order to verify the CAZ estimates developed in the 2018 hydrogeology study (Wood, 2018).

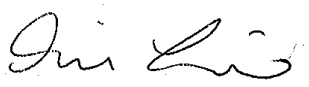
8.0 CLOSURE

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,

Wood Environment & Infrastructure Solutions,
a Division of Wood Canada Limited

Prepared by:



Emily Lemieux, B.Sc.
Environmental Scientist

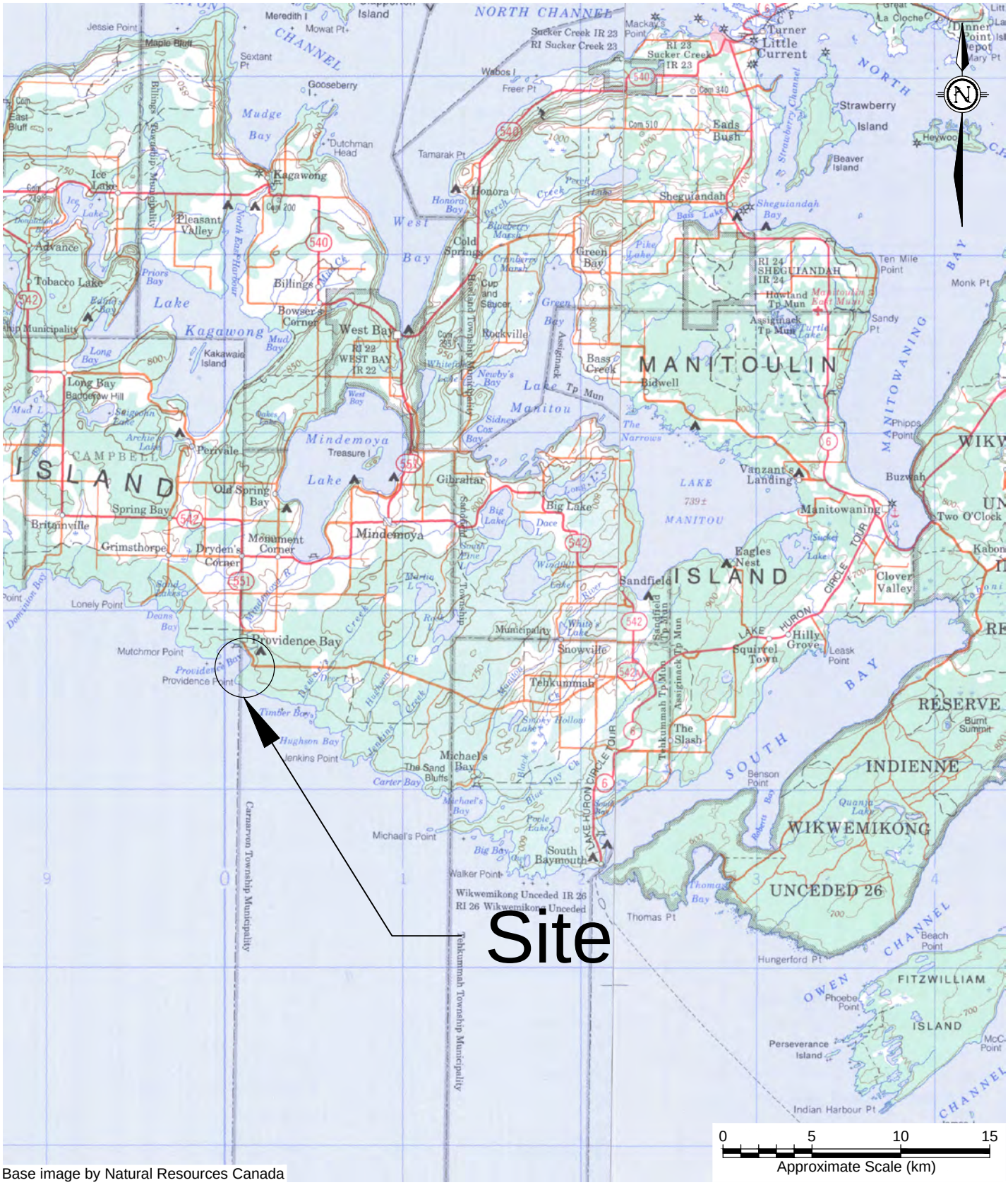
Reviewed by:

Brian Grant, P.Eng.
Hydrogeologist

9.0 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. Groundwater Assessment Report, Providence Bay Waste Disposal Site, Providence Bay, Ontario. December 2018.



Wood Environment & Infrastructure Solutions
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Lively, Ontario
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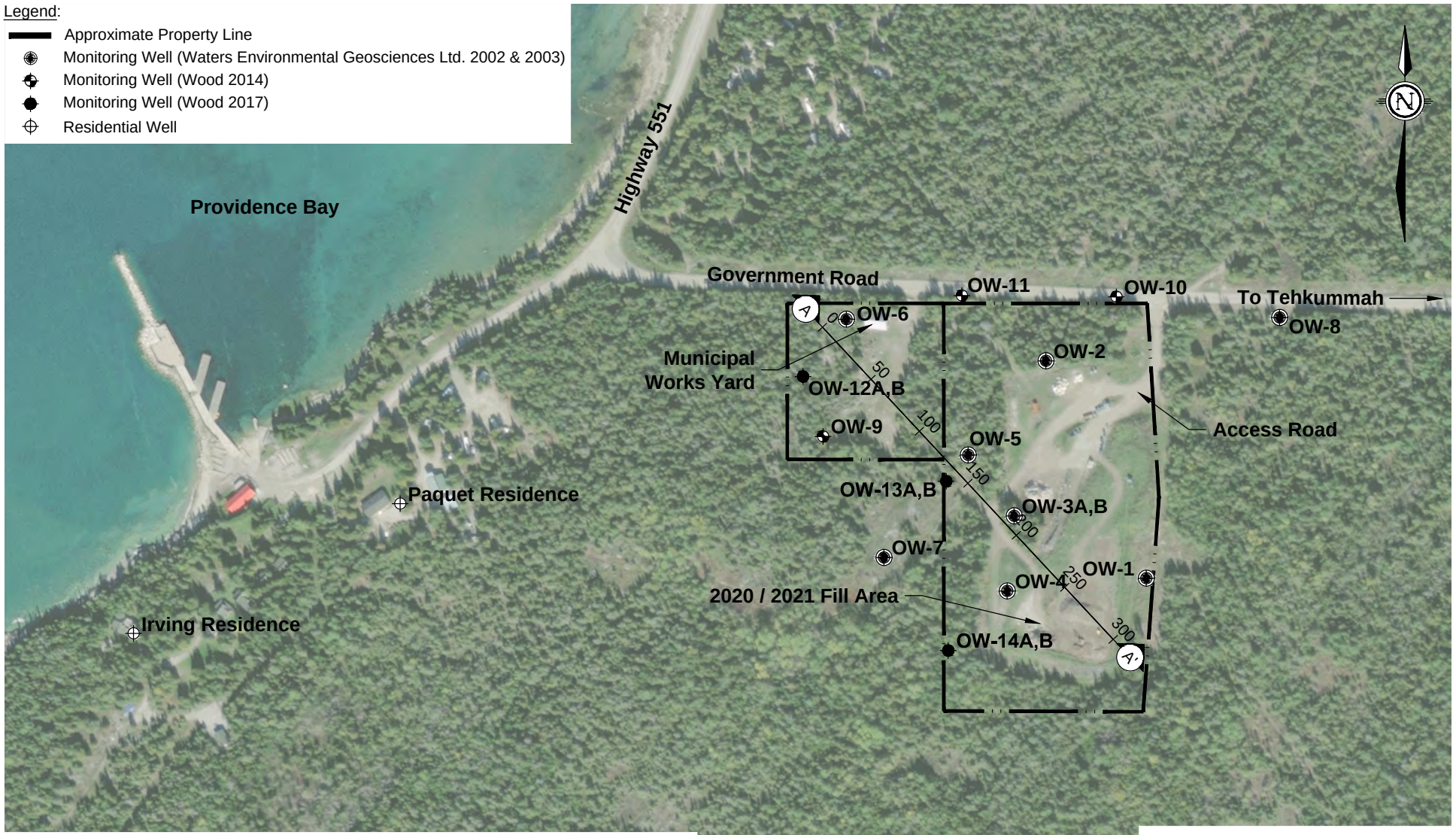
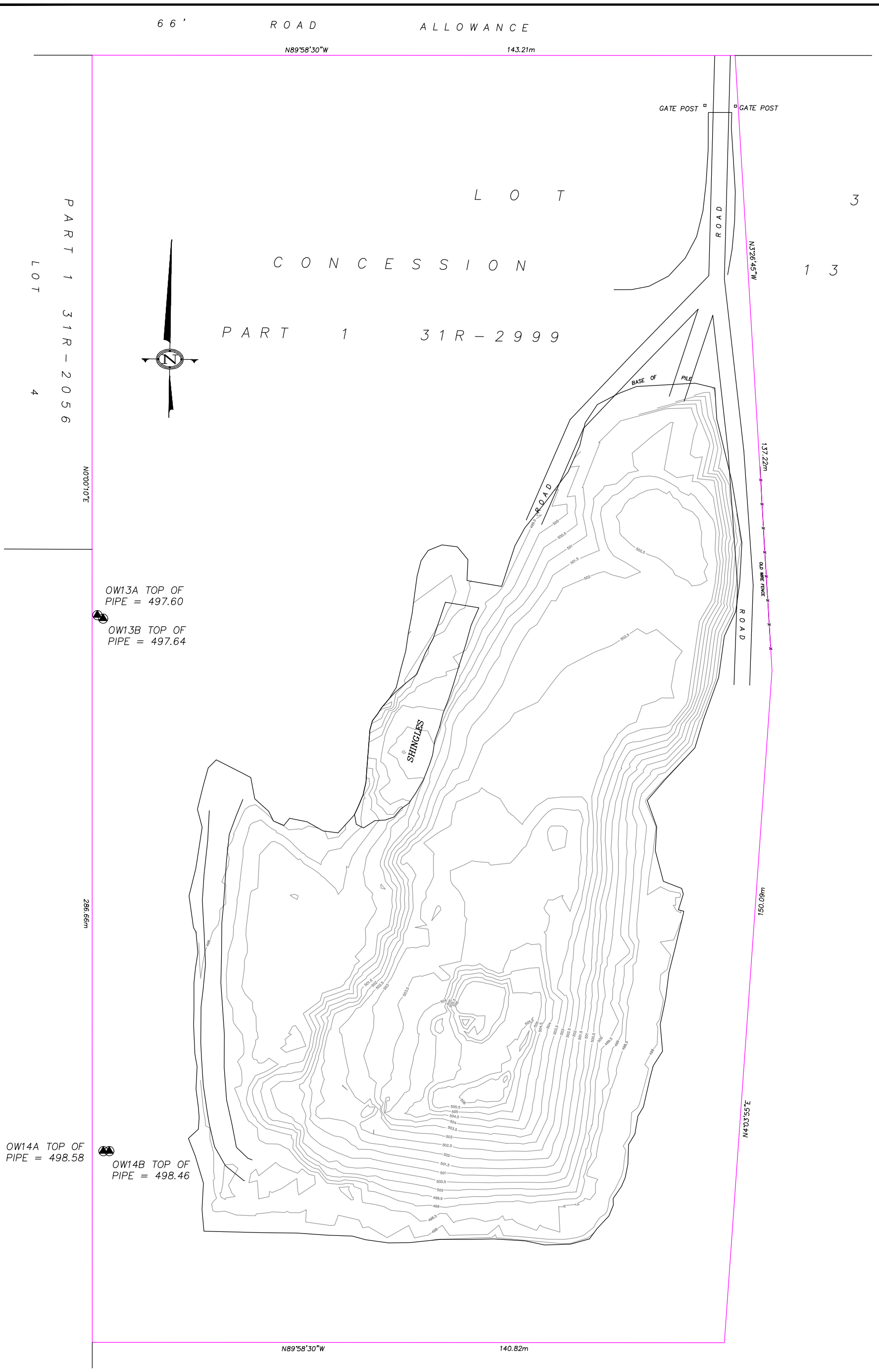
Municipality of Central Manitoulin

PROJECT: 2020 Annual Groundwater Monitoring Report Providence Bay Waste Disposal Site, Providence Bay, Ontario	DWN BY: KKJ	CHK'D BY: BRG	DATE: December 2020 PROJECT NO: TY1410143
TITLE: Site Location Map	REV. NO.: 1	SCALE: as shown	FIGURE NO: 1



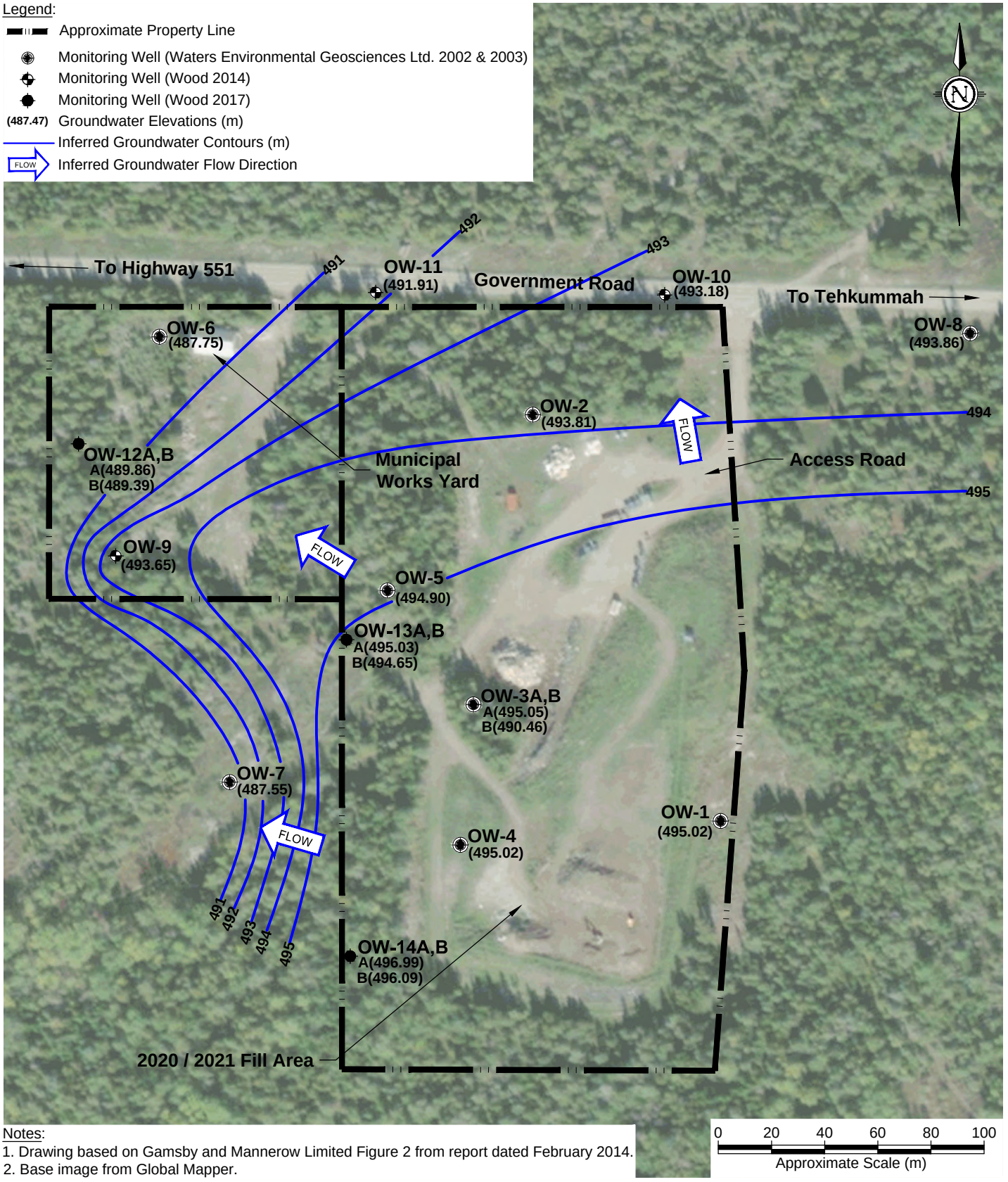
Notes:
1. Drawing based on Gamsby and Mannerow Limited Figure 2 from report dated February 2014.
2. Base image from Global Mapper.

Municipality of Central Manitoulin		DWN BY: KKJ	PROJECT: 2020 Annual Groundwater Monitoring Report Providence Bay Waste Disposal Site Providence Bay, Ontario	REV. NO.: 1
		CHK'D BY: BRG		DATE: December 2020
Wood Environment & Infrastructure Solutions 131 Fielding Road Lively, Ontario P3Y 1L7 705-682-2632	wood.	SCALE: as shown	TITLE: Site Plan	PROJECT NO: TY1410143
				FIGURE NO: 2



Notes:
Survey taken on 2 November 2020 provided by Keatley Surveying Ltd.

Municipality of Central Manitoulin		DWN BY: KKJ	PROJECT: 2020 Annual Groundwater Monitoring Report Providence Bay Waste Disposal Site Providence Bay, Ontario	REV. NO.: 1
		CHK'D BY: BRG		DATE: December 2020
Wood Environment & Infrastructure Solutions 131 Fielding Road Lively, Ontario P3Y 1L7 705-682-2632	wood.	SCALE: as shown	TITLE: 2020 Topographical Survey	PROJECT NO: TY1410143 FIGURE NO: 3



Notes:
1. Drawing based on Gamsby and Mannerow Limited Figure 2 from report dated February 2014.
2. Base image from Global Mapper.

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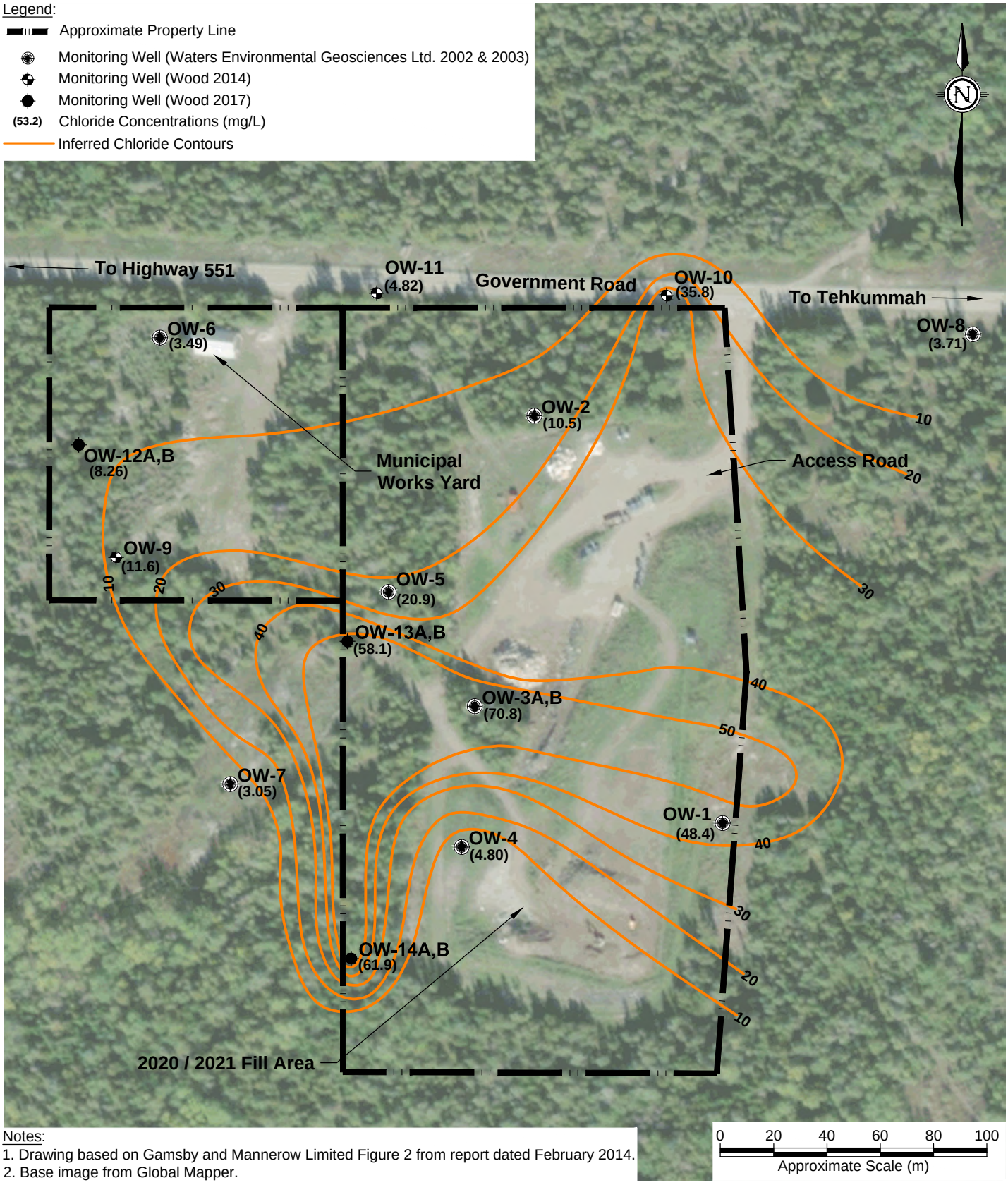
Municipality of Central Manitoulin

PROJECT	DWN BY:	CHK'D BY:	DATE:
2020 Annual Groundwater Monitoring Report Providence Bay Waste Disposal Site, Providence Bay, Ontario	KKJ	BRG	December 2020
			PROJECT NO: TY1410143
TITLE	REV. NO.:	SCALE:	FIGURE NO:
Inferred Groundwater Contours - November 2020	1	as shown	4



Notes:
1. Drawing based on Gamsby and Mannerow Limited Figure 2 from report dated February 2014.
2. Base image from Global Mapper.

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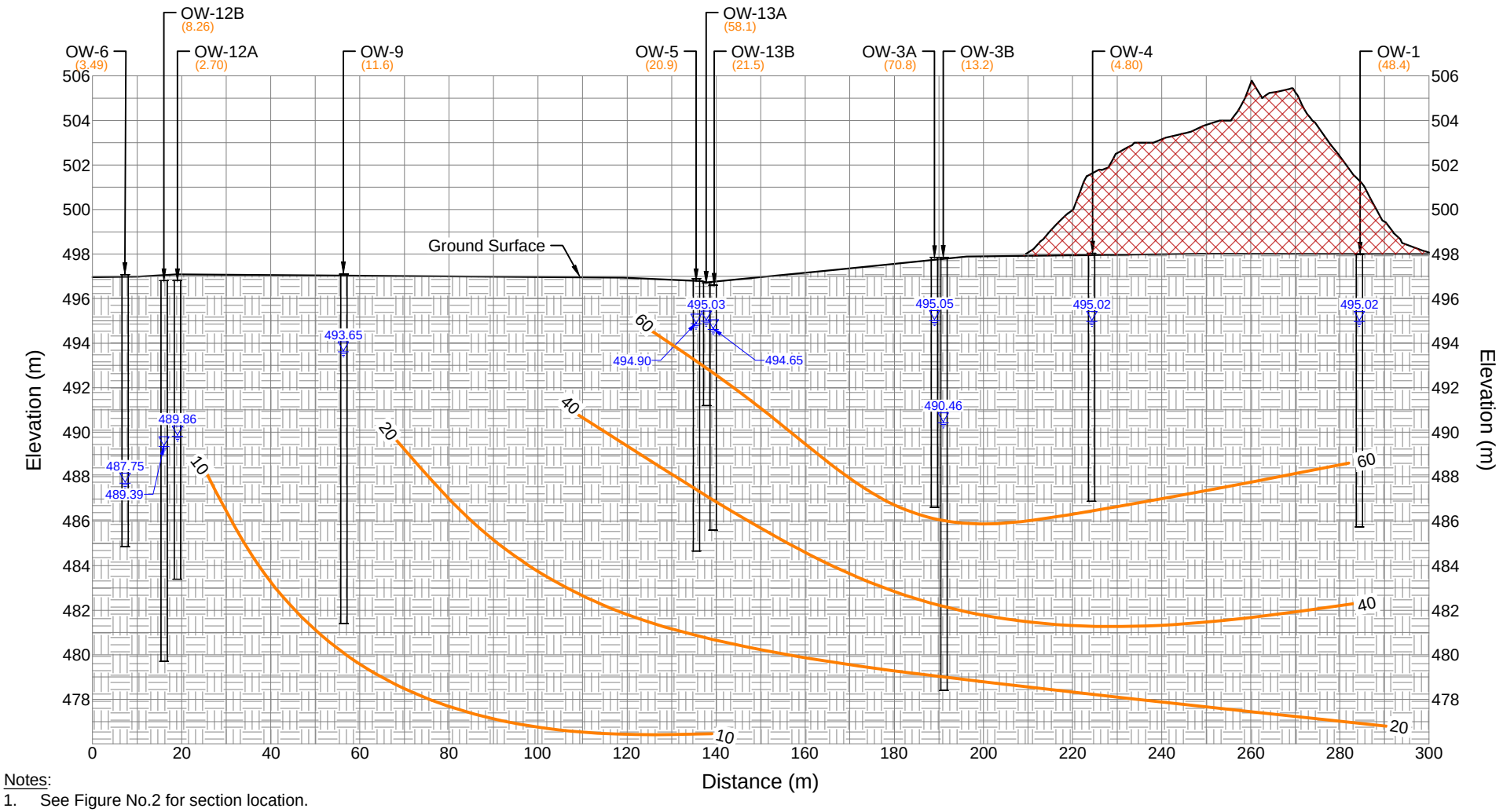
PROJECT: 2020 Annual Groundwater Monitoring Report Providence Bay Waste Disposal Site, Providence Bay, Ontario	DWN BY: KKJ	CHK'D BY: BRG	DATE: December 2020 PROJECT NO: TY1410143
TITLE: Inferred Chloride Contour Plan - November 2020	REV. NO.: 1	SCALE: as shown	FIGURE NO: 5

Legend:
- Ground Surface Profile
- Measured Groundwater Elevation

Concentrations:
- (20.2) Chloride Concentrations (mg/L)
- Interpolated Chloride Concentration Contour (mg/L)

Stratigraphy:
- Waste (Keatley 2 Nov. 2020)
- Bedrock



Notes:
1. See Figure No.2 for section location.
2. Vertical exaggeration factor of five (5) shown.
3. Ground surface generated from borehole data and survey taken on 2 October 2019 provided by Keatley Surveying Ltd.

Municipality of Central Manitoulin	DWN BY: KKJ	PROJECT: 2020 Annual Groundwater Monitoring Report, Providence Bay Waste Disposal Site, Providence Bay, Ontario	REV. NO.: 1	
	CHK'D BY: BRG		DATE: December 2020	
Wood Environment & Infrastructure Solutions 131 Fielding Road Lively, Ontario P3Y 1L7 705-682-2632	SCALE: as shown	TITLE: Inferred Chloride Section - November 2020	PROJECT NO: TY1410143	FIGURE NO: 6

APPENDIX A

CERTIFICATE OF APPROVAL

NO. A550702

Government of Ontario, trillium logo

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER A550702
Issue Date: September 21, 2016

The Corporation of the Municipality of Central Manitoulin
6020 Highway 542 PO Box 187, Mindemoya
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 Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

the use and operation of a 4.1 hectare landfilling site and 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 1.2 hectare municipal works yard and property, as shown in figure 3 of the Design and Operations Plan, item 2 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;

"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 and Climate Change;

"Municipal Hazardous or Special Waste", "MHSW" or "HHW" means municipal hazardous waste or municipal special waste as defined by Ontario Regulation 542/06 made under the Waste Diversion Act 2002;

"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, as shown on figure 3 of the Design and Operations plan, item 2 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.

"Waste Electrical and Electronic Equipment" or "WEEE" means devices listed in Schedules 1 through 7 of Ontario Regulation 393/04.

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) If not completed previously, the Owner shall, within thirty (30) calendar days from the date of issuance of this Approval, submit to the Director documents confirming that a contaminant attenuation zone (CAZ) has been established, in either fee simple or by way of a groundwater easement.

(a) If rights are obtained in fee simple, the Owner shall provide:

(i) documentation evidencing ownership of the CAZ obtained in compliance with O.Reg. 232/98, as amended;
(ii) a completed Certificate of Requirement and supporting documents containing a registerable description of the CAZ; and
(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 of the CAZ.

(b) Within fifteen (15) calendar days of receiving a Certificate of Requirement signed or 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 a written verification that the Certificate of Requirement has been registered on title.

(c) If rights are obtained by way of a groundwater easement, the Owner shall:

(i) provide a copy of the easement agreement;
(ii) provide a plan of survey signed and sealed by an Ontario Land Surveyor for the CAZ;
(ii) submit proof of registration on title of the groundwater easement to the Director;

(d) 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): Saturday and Sunday - 2:00 pm - 6:00 pm

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

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

Adverse Effect

(4) The Site shall be operated and maintained at all times including management and disposal of all waste, in accordance with the EPA, Regulation 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.

Approved Waste Types

(5) The Site may accept solid non-hazardous waste as defined in Reg. 347 for landfilling.

(6) 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.

(7) 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 disposal or 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.

Design and Operations Plan

(8) The Owner shall operate the Site in accordance with the Design and Operations Plan dated December 13, 2013, item 2 of Schedule "A", with the exception of the following sections, which are excluded from this Approval:

i. 5.7.1.2 Limits of Landfilling
ii. 5.7.1.3 Base Contours
iii. 5.7.1.4 Final Contours
iv. 5.7.1.5 Landfilling Design Capacity
v. 5.7.1.6 Site Life
vi. 5.8 Site Phasing and Development

Waste Landfilling

(9) The Owner is authorized to continue filling waste at the Site until July 30, 2019, or until a new Design and Operations Plan or a Closure Plan is approved by the Director for the Site, whichever occurs earlier.

(10) The Owner shall ensure that landfilling is done using:

(a) maximum 4 horizontal to 1 vertical (4H:1V) side slopes;

(b) maximum 20H:1V top slopes;
(c) 4:1 volume ratio of waste to daily/intermediate cover; and

(d) adequate buffer.

(11) No waste shall be received for disposal at the Site except during public waste drop off hours and while the Site is under the supervision of the Site attendant. During non-operating hours, the Site entrance gate shall be locked and secured against access by unauthorized persons.

(12) Waste shall be deposited in a manner that minimizes the exposure of the working face of the landfilling area and shall be compacted before cover material is applied.

(13) Scavenging and burning of waste at the landfill are prohibited.

(14) Disposal of asbestos waste in the landfill is hereby approved subject to the following conditions:

(a) During the transportation or unloading thereof, any asbestos waste that is loose or in a container that is punctured, broken or leaking shall be packaged, immediately on discovery, in a six-mil polyethylene bag;

(b) Where containers of asbestos waste are being unloaded, the unloading shall be carried out so that no loose asbestos or punctured, broken or leaking containers of asbestos waste are landfilled;
(c) Asbestos waste may be deposited only at locations in the Site that have been adapted for the purpose of receiving asbestos waste or are otherwise suitable for that purpose;
(d) Asbestos waste may be deposited at the Site only while the depositing is being supervised by the Operator of the Site or a person designated by the Operator for the purpose and the person supervising is not also operating machinery or the truck involved;
(e) Where asbestos waste is deposited, at least 125 centimetres of garbage or cover material must be placed forthwith over the deposited asbestos waste in such a manner that direct contact with compaction equipment or other equipment operating on the Site is avoided;
(f) Every person handling asbestos waste or containers of asbestos waste, supervising the unloading of asbestos waste in bulk or cleaning asbestos waste residues from containers, vehicles or equipment shall wear protective clothing and personal respiratory equipment while so doing;
(g) Protective clothing that has been or is suspected of having been in contact with asbestos waste shall be changed at the site of the exposure and either properly disposed of as asbestos waste or washed at the end of the working day;
(h) Disposable protective clothing shall not be reused; and
(i) Every person directly or indirectly involved in the transportation, handling or management of asbestos waste shall take all precautions necessary to prevent asbestos waste from becoming airborne.

Cover

(15) The Owner shall ensure that cover material shall be applied as follows:

(a) Weekly Cover - Weather permitting, deposited waste shall be covered with 15 centimetres of clean soil or approved alternative weekly cover, at a minimum of once per week, in a manner acceptable to the District Manager so that no waste is exposed to the atmosphere;

(b) Intermediate Cover - In areas where landfilling has been temporarily discontinued for six (6) months or more, a minimum thickness of 300 millimetre of soil cover or an approved thickness of alternative cover material shall be placed; and

(c) Final Cover - In areas where landfilling has been completed to final waste contours within twelve (12) months from reaching final waste contours, a minimum 600 millimetre thick layer of soil of medium permeability and 150 millimetres of top soil (vegetative cover) shall be placed. Fill areas shall be progressively completed and rehabilitated as landfill development reaches final contours.

Alternative Weekly Cover Materials

(16) The Owner is authorized to use the following materials as alternative weekly cover at the Site:

i. construction/demolition wastes, consisting of size-reduced concrete, brick,asphalt shingles & slabs, gypsum board, woodwaste (treated, stained, painted);
ii. chipped brush and clean lumber, mixed with sand at a ratio of 1:1;
iii. partially composted leaf and yard waste-mixed with sand at a ratio of 1:1;
iv. flexible membranes (tarps, enviro cover systems); and
v. contaminated (non-hazardous) soils

(17) Alternative cover material listed in Condition 2(16) shall not be used either for intermediate cover or final cover.

Signs

(18) 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); and
(i) a warning against dumping outside the Site.

(19) The Owner shall install and maintain signs to direct vehicles to working face and waste diversion areas.

(20) 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

(21) 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

(22) (a) Burning of waste at the Site is prohibited.

(b) Notwithstanding Condition 2 (22) (a) above, burning of segregated, clean wood and brush at the landfill 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.

Temporary Storage of Construction & Demolition Waste

(23) The Owner shall store bulky items and construction and demolition waste for the purpose of grinding and/or chipping prior to landfilling and for the use of alternative weekly cover as follows:

(a) individual stockpiles shall not exceed a volume of 2000 m^3;
(b) waste piles shall be separated from each other by a minimum of nine (9) metres;
(c) an area around stockpiles of no less than 4.5 metres shall be kept free of vegetation; and
(d) waste shall not be stored more than twelve (12) months.

3. WASTE TRANSFER STATION

(1) Except as otherwise provided by these Conditions, the Transfer Station shall be operated in accordance with the Application for an ECA dated Dec. 15, 2013, and the supporting documentation, plans and specifications listed in 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	9 bins	45
OCC and paper fibre	2 bins	10
WEEE	1 bin	15
Scrap Metal	1 bin	30
Tires	area	30
Organics - leaf & yard waste	area	30
Construction & demolition	area	50

(3) The following categories of waste shall not be accepted at the Waste Transfer Station:

(a) Putrescible waste
(b) Pathological waste;
(c) PCBs;
(d) Radioactive;
(e) Explosive;
(f) Ammunition; and
(g) 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 may be equipped with drainage holes to permit the drainage of rainwater.

(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 (current ODP card) 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 once per year.

(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.

4. MHSW COLLECTION & TRANSFER EVENTS

(1) The Site may accept municipal hazardous or special waste (MHSW) collected only during annual 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 Hazardous and Special 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 hazardous 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 hazardous 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.

5. EMPLOYEE TRAINING

(1) A training plan for all employees that operate any aspect of the Site shall be developed and implemented 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 waste landfilling and/or 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).

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

(b) 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.

Surface Water and Ground Water

(3) The Owner shall monitor surface water and ground water in accordance with Item 2 in Schedule "A".

(4) 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 Investigation Plan

(5) Within three months of date of issue of this Approval, the Owner shall prepare either:

i. a groundwater investigation plan for the Site, and submit a copy to the District Manager; or
ii. a letter to the District Manager, stating intent to close the Site, and including: A timeframe for closure; and a timeframe for submission of a Closure Plan, to the Director for approval.

(6) if prepared, the groundwater investigation plan shall include:

i. a statement of objective
ii. monitoring well installation plan, with proposed well design (depths, screened depth)
iii. proposed field methodology- drilling methods, sampling methods
iv. a statement of the target investigation stratum
v. well sampling and analytical program
vi. schedule

(7) If the groundwater investigation plan is prepared, the Owner shall ensure that the plan is implemented, and that monitoring wells proposed in the plan are installed before July 30, 2017.

(8) (a) If the groundwater investigation plan is implemented, the Owner shall submit a finalized report on or before December 31, 2018.

(b) The Owner shall ensure that the report includes the findings and interpretation of the investigation, and a statement on the Owner's intended use or closure of the Site.

(9) The Owner shall submit either an updated Design and Operations Plan or a Closure Plan for the Site, to the Director, for Approval, on or before July 30, 2019

Groundwater Wells and Monitors

(10) The Owner shall ensure that all groundwater monitoring wells which form part of the monitoring program are properly capped, locked and protected from damage.

(11) 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

(12) 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.

(13) 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.

(14) 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 time of arrival, hauler, and quantity (tonnes) of all waste and cover material received at the Site;
(b) the area of the Site in which waste disposal operations are taking place;
(c) a record of litter collection activities and the application of any dust suppressants;
(d) a record of the daily inspections; and
(e) 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 and signature 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 and surface water monitoring, including an assessment of the need to amend the monitoring programs;
(b) site plans showing the existing contours of the Site; areas of landfilling operation during the reporting period; areas of intended operation during the next reporting period; areas of excavation during the reporting period; the progress of final cover, vegetative cover, and any intermediate cover application; facilities existing, added or removed during the reporting period; and site preparations and facilities planned for installation during the next reporting period;
(c) 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 calculation of the remaining capacity of the Site and an estimate of the remaining Site life;
(e) a summary of the weekly, maximum daily and total annual quantity (tonnes) of waste received at the Site;
(f) a summary of any complaints received and the responses made;
(g) a discussion of any operational problems encountered at the Site and corrective action taken;
(h) any changes to the Design and Operations Plan, and the Closure Plan that have been approved by the Director since the last Annual Report;
(i) a report on the status of all monitoring wells and a statement as to compliance with Ontario Regulation 903; and
(j) any other information with respect to the Site which the Regional Director may require from time to time.

10. CLOSURE PLAN

(1) At least 2 years prior to the anticipated date of closure of this Site, or:
prior to the deadline established in condition 8(9), 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 landfilling 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) completion, inspection and maintenance of the final cover and landscaping;
(iv) Site security;
(v) removal of unnecessary landfill-related structures, buildings and facilities;
(vi) final construction of any control, treatment, disposal and monitoring facilities for leachate, groundwater, surface water and landfill gas; and
(vii) a schedule indicating the time-period for implementing sub-conditions (i) to (vi) 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, surface water 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 Site shall be closed in accordance with the closure plan as approved by the Director.

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.

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.

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), 2(6), 2(7) and 2 (21) 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(8) 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(9) is to ensure that the Owner makes decisions about the Site within a specified timeframe, and communicates this to the Ministry.

The reason for Condition 2(10), and 2(12) is to ensure landfilling is done using a standard, acceptable approach.

The reasons for Condition 2(11) are to ensure that the Site is supervised by properly trained staff in a manner which does not result in a hazard or nuisance to the natural environment or any person and to ensure the controlled access and integrity of the Site by preventing unauthorized access when the Site is closed and no site attendant is on duty.

The reasons for Condition 2(13) and 2(22) 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.

The reason for Condition 2(14) is to ensure that the handling and disposal of asbestos is carried out in a manner that is safe for persons and protective of the environment.

The reasons for Conditions 2(15), 2(16) and 2(17) are to ensure that cover is used to control potential nuisance effects, to facilitate vehicle access on the Site, and to ensure an acceptable site appearance is maintained. Approved alternative cover materials are listed. The proper closure of a landfill site requires the application of a final cover which is aesthetically pleasing, controls infiltration, and is suitable for the end use planned for the Site.

The reason for Conditions 2(18), (19) and (20) 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(23) is to clarify the storage limits and approved procedures for construction & demolition waste.

3. WASTE TRANSFER STATION

Condition 3 is included to ensure that the recyclable materials 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 EVENTS

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) and 7(5) 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 and surface water limits to prevent water pollution at the Site.

Conditions 8(3) and 8(4) 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(5), 8(6), 8(7), 8(8) and 8(9) are included to clarify the requirements, and agreed-upon timelines for any further groundwater investigation work, to ensure that the Ministry has opportunity to review proposed workplan before implemented, and to review any results.

Conditions 8(10), 8(11), 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(12), 8(13) and 8(14) 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 reasons 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 March 18, 1980

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review 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 shall state:

1. 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;
2. 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:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. 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:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment and Climate Change
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or www.ert.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 21st day of September, 2016

Dale Gable, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

LM/
c: District Manager, MOECC Sudbury
David Bucholtz, Cambium Inc., The Corporation of the Municipality of Central Manitoulin

Ministry of the Environment
Ontario

Provisional Certificate No. A 550702

PROVISIONAL CERTIFICATE OF APPROVAL
WASTE DISPOSAL SITE

Under The Environmental Protection Act, 1971 and the regulations and subject to the limitations thereof, this Provisional Certificate of Approval is issued to:

Township of Carnarvon
Box 119
Mindemoya, Ontario
P0P 1S0

for the use and operation of a 4.1 hectare landfilling site

all in accordance with the following plans and specifications:

Located: Part Lot 3, Concession 13
Township of Carnarvon
District of Manitoulin

which includes the use of the site only for the receiving and disposal of the following categories of waste (NOTE: Use of the site for additional categories of wastes requires a new application and amendments to the Provisional Certificate of Approval) domestic and commercial wastes.

and subject to the following conditions:

1. No operation shall be carried out at the site after sixty days from this condition becoming enforceable unless this Certificate including the reasons for this condition has been registered by the applicant as an instrument in the appropriate Land Registry Office against title to the site and a duplicate registered copy thereof has been returned by the applicant to the Director.

Dated this 18th day of March, 19 80.

Director, Section 39,
The Environmental Protection Act, 1971

APPENDIX B

BOREHOLE LOGS

Borehole BH - 1	Figure 3	Waters Environmental Geosciences Ltd.
	Providence Bay Landfill	
Project Number 22-120	Date Started 14/04/2002 / Date Completed 14/04/2002	Drawn by : PAR / Checked by : PAR

Well Construction	Depth (m)	Elevation (m) Relative to Datum	Stratigraphy	Description	Sample Type	Standard Penetration Test (counts)	Natural Moisture Content (%) 20 40 60
	0.0	497.98 m		**Bedrock,** dolostone, grey brown			
	1.0						
	2.0						
	3.0						
	4.0						
	5.0						
	6.0						
	7.0						

(Continued onto Page 2)

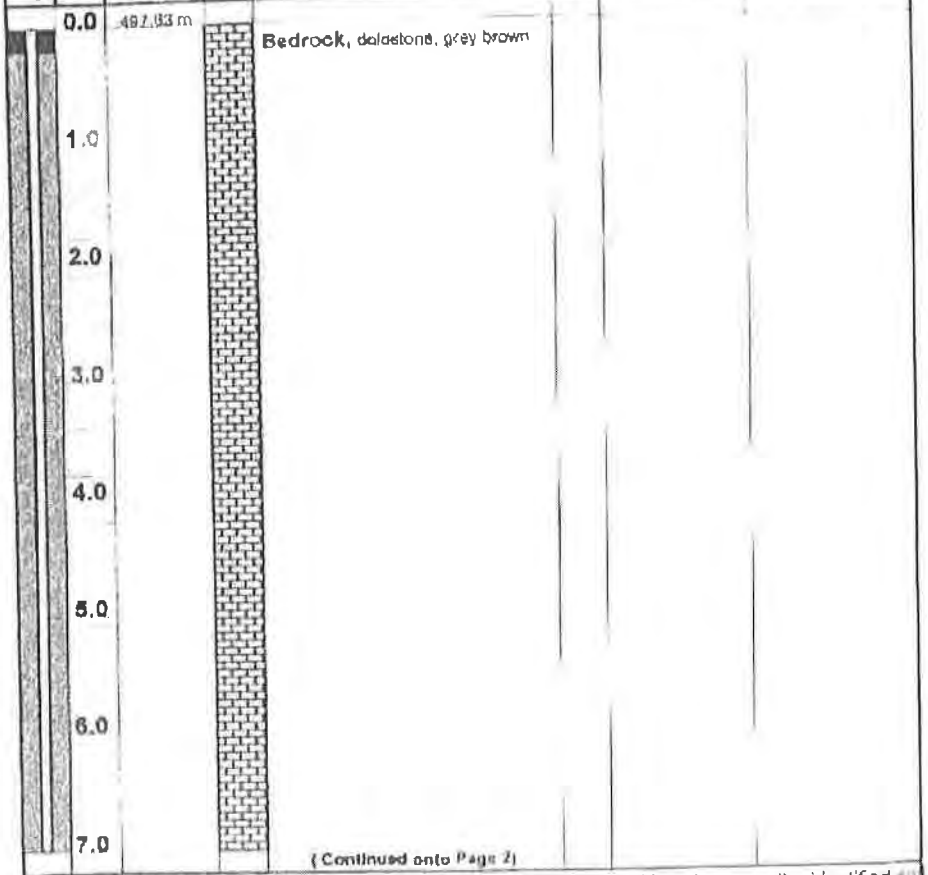
NOTE : Stratigraphic boundaries are approximate, and in-situ transitions between the identified so types may be gradual. Refer to the accompanying text for an interpretation.
Samples indicated as (AS) auger sample, (SS) split spoon or (NR) no recovery.
Water level on 01/06/2002 recorded as 495.22 m (relative to identified datum).

Borehole BH - 1	Figure 3	Waters Environmental Geosciences Ltd.
	Providence Bay Landfill	
Project Number 22-120	Date Started 14/04/2002 / Date Completed 14/04/2002	Drawn by : PAR / Checked by : PAR

Well Construction	Depth (m)	Elevation (m) Relative to Datum	Stratigraphy	Description	Sample Type	Standard Penetration Test (counts)	Natural Moisture Content (%) 20 40 60
				(Continued from Page 1)			
	7.0			**Bedrock,** dolostone, grey brown			
	8.0						
	9.0						
	10.0						
	11.0						
	12.0	485.74 m					
	13.0			**Borehole Terminated,** in dolostone bedrock at a depth of 12.24 m below grade.			
	14.0			**NOTE:** 1) Borehole BH-1 was advanced using 127 mm air rotary water well equipment. 2) Refer to the accompanying text for well construction details and an interpretation of the results.			

NOTE Stratigraphic boundaries are approximate, and in-situ transitions between the identified so types may be gradual. Refer to the accompanying text for an interpretation.
Samples indicated as (AS) auger sample, (SS) split spoon or (NR) no recovery.
Water level on 01/06/2002 recorded as 495.22 m (relative to identified datum).

Borehole BH - 2	Figure 4	Waters Environmental Geosciences Ltd.
	Providence Bay Landfill	
Project Number 22-120	Date Started 14/04/2002 / Date Completed 14/04/2002	Drawn by : PAR / Checked by : PAR



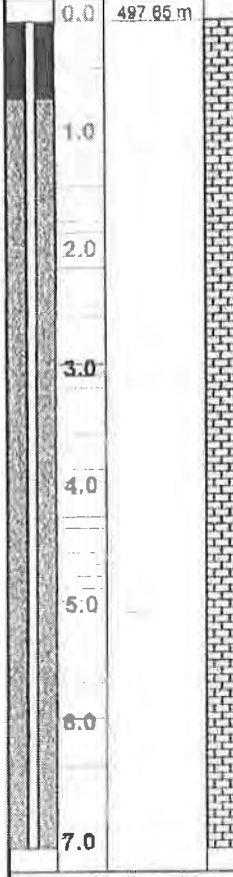
NOTE: Stratigraphic boundaries are approximate, and in-situ transitions between the identified soil types may be gradual. Refer to the accompanying text for an interpretation.
Samples indicated as (AS) auger sample, (SS) split spoon or (NR) no recovery.
Water level on 01/08/2002 recorded as 493.37 m (relative to identified datum).

Borehole BH - 2	Figure 4	Waters Environmental Geosciences Ltd.
	Providence Bay Landfill	
Project Number 22-120	Date Started 14/04/2002 / Date Completed 14/04/2002	Drawn by : PAR / Checked by : PAR

Well Construction	Depth (m)	Elevation (m) Relative to Datum	Stratigraphy	Description	Sample Type	Standard Penetration Test (counts)	Natural Moisture Content (%) 20 40 60
				(Continued from Page 1)			
	7.0			**Bedrock,** dolostone, grey brown			
	8.0						
	9.0						
	10.0						
	11.0						
	12.0	485.40 m					
				Borehole Terminated, in dolostone bedrock at a depth of 12.23 m below grade.			
	13.0			**NOTE:** 1) Borehole BH-2 was advanced using 127 mm air rotary water well equipment. 2) Refer to the accompanying text for well construction details and an interpretation of the results.			
	14.0						

NOTE : Stratigraphic boundaries are approximate, and in-situ transitions between the identified so types may be gradual. Refer to the accompanying text for an interpretation.
Samples indicated as (AS) auger sample, (SS) split spoon or (NR) no recovery.
Water level on 01/06/2002 recorded as 493.37 m (relative to identified datum)

Borehole BH - 3a	Figure 5	Waters Environmental Geosciences Ltd.
	Providence Bay Landfill	
Project Number 22-120	Date Started 13/04/2002 / Date Completed 13/04/2002	Drawn by : PAR Checked by : PAR



Depth (m)	Elevation (m) Relative to Datum	Description	Sample Type	Standard Penetration Test (counts)	Natural Moisture Content (%) 20 40 60
0.0	497.65 m	**Bedrock,** dolostone, grey brown			
1.0					
2.0					
3.0					
4.0					
5.0					
6.0					
7.0					

(Continued onto Page 2)

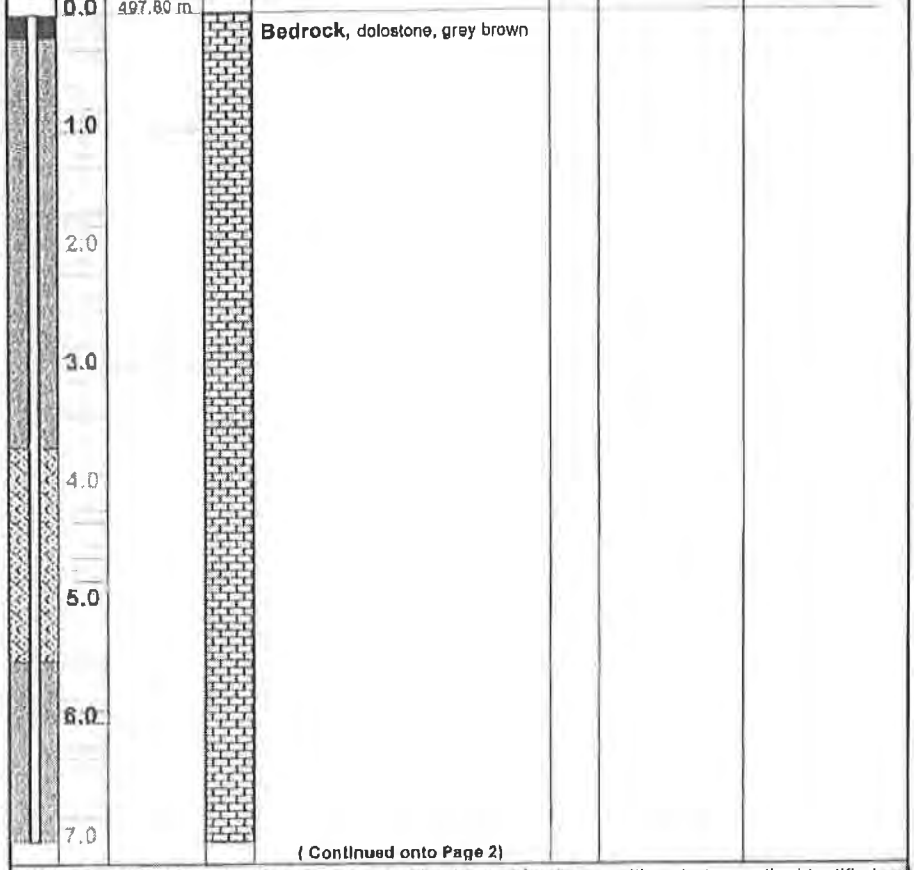
NOTE : Stratigraphic boundaries are approximate, and in-situ transitions between the identified so types may be gradual. Refer to the accompanying text for an interpretation.
Samples indicated as (AS) auger sample, (SS) split spoon or (NR) no recovery.
Water level on 01/06/2002 recorded as 495.29 m (relative to identified datum).

Borehole BH - 3a	Figure 5	Waters Environmental Geosciences Ltd.
	Providence Bay Landfill	
Project Number 22-120	Date Started 13/04/2002 / Date Completed 13/04/2002	Drawn by : PAR Checked by : PAR

Well Construction	Depth (m)	Elevation (m) Relative to Datum	Stratigraphy	Description	Sample Type	Standard Penetration Test (counts)	Natural Moisture Content (%) 20 40 60
	7.0			(Continued from Page 1)			
				Bedrock, dolostone, grey brown			
	8.0						
	9.0						
	10.0						
	11.0	488.62 m					
				Borehole Terminated, in dolostone bedrock at a depth of 11.23 m below grade.			
	12.0						
	13.0			**NOTE:** 1) Borehole BH-3a was advanced using 127 mm air rotary water well equipment. 2) Refer to the accompanying text for well construction details and an interpretation of the results.			
	14.0						

NOTE : Stratigraphic boundaries are approximate, and in-situ transitions between the identified soil types may be gradual. Refer to the accompanying text for an interpretation
Samples indicated as (AS) auger sample, (SS) split spoon or (NR) no recovery
Water level on 01/06/2002 recorded as 495.29 m (relative to identified datum)

Borehole BH - 3b	Figure 6	Waters Environmental Geosciences Ltd.
	Providence Bay Landfill	
Project Number 22-120	Date Started 13/04/2002 / Date Completed 13/04/2002	Drawn by : PAR / Checked by : PAR



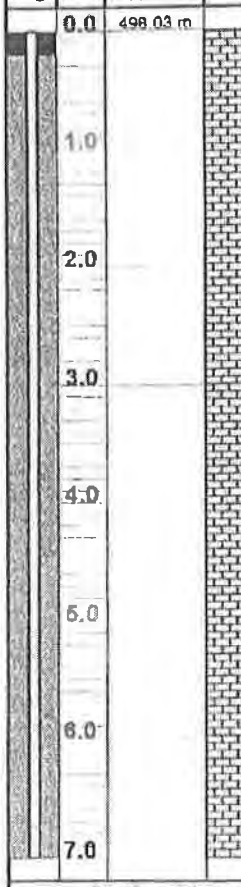
NOTE : Stratigraphic boundaries are approximate, and in-situ transitions between the identified soil types may be gradual. Refer to the accompanying text for an interpretation.
Samples indicated as (AS) auger sample, (SS) split spoon or (NR) no recovery.
Water level on 01/06/2002 recorded as 486.98 m (relative to identified datum).

Borehole BH - 3b	Figure 6	Waters Environmental Geosciences Ltd.
	Providence Bay Landfill	
Project Number 22-120	Date Started 13/04/2002 / Date Completed 13/04/2002	Drawn by : PAR / Checked by : PAR

Well Construction	Depth (m)	Elevation (m) Relative to Datum	Stratigraphy	Description	Sample Type	Standard Penetration Test (counts)	Natural Moisture Content (%) 20 40 80
				(Continued from Page 1)			
	7.0			**Bedrock,** dolostone, grey brown			
	8.0						
	9.0						
	10.0						
	11.0						
	12.0						
	13.0						
	14.0			(Continued onto Page 3)			

NOTE : Stratigraphic boundaries are approximate, and in-situ transitions between the identified so types may be gradual. Refer to the accompanying text for an interpretation.
Samples indicated as (AS) auger sample, (SS) split spoon or (NR) no recovery.
Water level on 01/06/2002 recorded as 486.98 m (relative to identified datum).

Borehole BH - 4	Figure 7	Waters Environmental Geosciences Ltd.
	Providence Bay Landfill	
Project Number 22-120	Date Started 14/04/2002 / Date Completed 14/04/2002	Drawn by : PAR / Checked by : PAR



Description	Sample Type	Standard Penetration Test (counts)	Natural Moisture Content (%) 20 40 60
Bedrock, dolostone, grey brown			

(Continued onto Page 2)

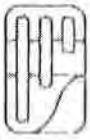
NOTE : Stratigraphic boundaries are approximate, and in-situ transitions between the identified soil types may be gradual. Refer to the accompanying text for an interpretation.
Samples indicated as (AS) auger sample, (SS) split spoon or (NR) no recovery
Water level on 01/06/2002 recorded as 495.39 m (relative to identified datum)

Borehole BH - 4	Figure 7	Waters Environmental Geosciences Ltd.
	Providence Bay Landfill	
Project Number 22-120	Date Started 14/04/2002	Date Completed 14/04/2002
	Drawn by : PAR	Checked by : PAR

Well Construction	Depth (m)	Elevation (m) Relative to Datum	Stratigraphy	Description	Sample Type	Standard Penetration Test (counts)	Natural Moisture Content (%) 20 40 60
				(Continued from Page 1)			
	7.0			**Bedrock,** dolostone, grey brown			
	8.0						
	9.0						
	10.0						
	11.0	488.89 m					
				Borehole Terminated, in dolostone bedrock at a depth of 11.14 m below grade.			
	12.0						
	13.0			**NOTE:** 1) Borehole BH-4 was advanced using 127 mm air rotary water well equipment. 2) Refer to the accompanying text for well construction details and an interpretation of the results.			
	14.0						

NOTE : Stratigraphic boundaries are approximate, and in-situ transitions between the identified soil types may be gradual. Refer to the accompanying text for an interpretation.
Samples indicated as (AS) auger sample, (SS) split spoon or (NR) no recovery.
Water level on 01/06/2002 recorded as 495.39 m (relative to identified datum).

Borehole BH - 5	Figure 6	Waters Environmental Geosciences Ltd.
	Providence Bay Landfill	
Project Number 22-120	Date Started 13/04/2002 / Date Completed 13/04/2002	Drawn by : PAR Checked by : PAR



Well Construction	Depth (m)	Elevation (m) Relative to Datum	Stratigraphy	Description	Sample Type	Standard Penetration Test (counts)	Natural Moisture Content (%) 20 40 60
	0.0	496.81 m		Bedrock, dolostone, grey brown			
	1.0						
	2.0						
	3.0						
	4.0						
	5.0						
	6.0						
	7.0						

(Continued onto Page 2)

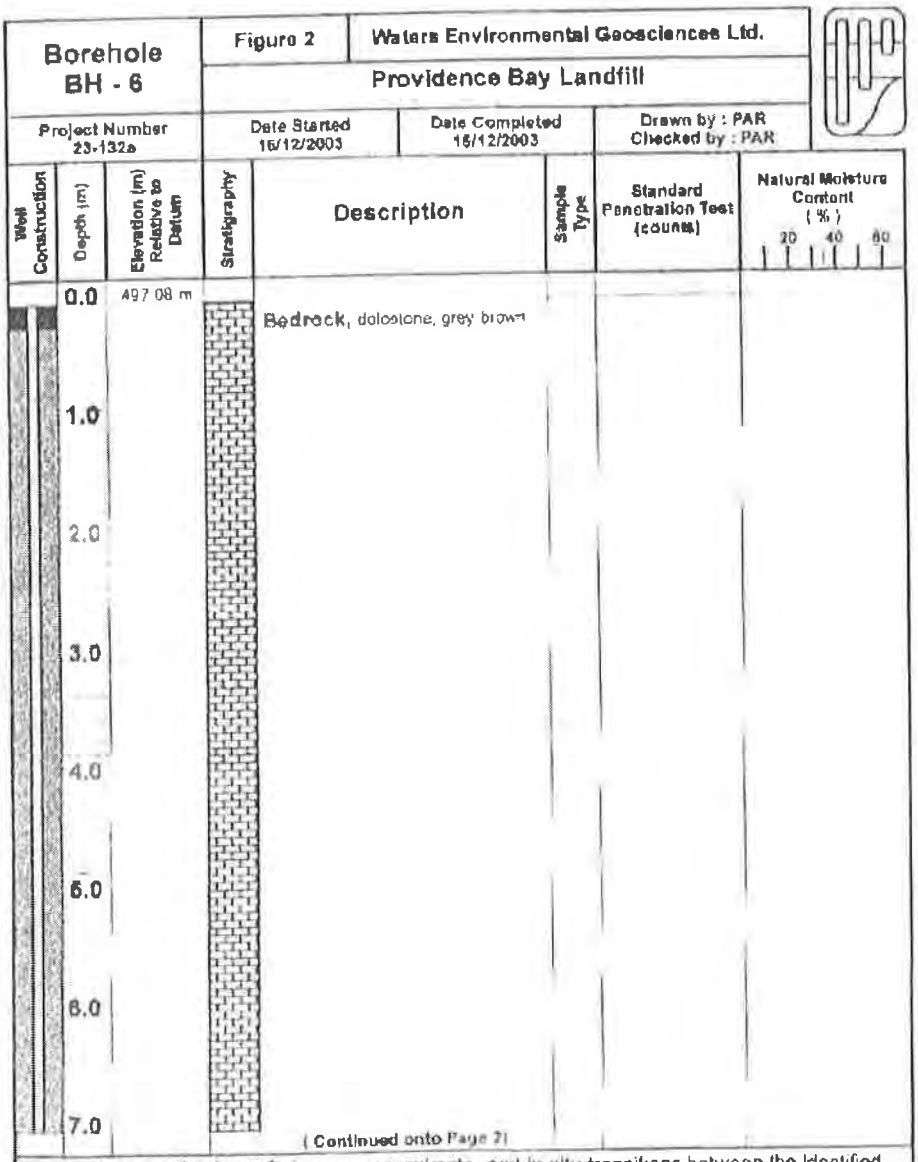
NOTE Stratigraphic boundaries are approximate, and in-situ transitions between the identified soil types may be gradual Refer to the accompanying text for an interpretation
Samples indicated as (AS) auger sample, (SS) split spoon or (NR) no recovery
Water level on 01/06/2002 recorded as 495.08 m (relative to identified datum)

Borehole BH - 5	Figure 8	Waters Environmental Geosciences Ltd.
	Providence Bay Landfill	
Project Number 22-120	Date Started 13/04/2002	Date Completed 13/04/2002	Drawn by : PAR Checked by : PAR

Well Construction	Depth (m)	Elevation (m) Relative to Datum	Stratigraphy	Description	Sample Type	Standard Penetration Test (counts)	Natural Moisture Content (%) 20 40 60
				(Continued from Page 1)			
	7.0			**Bedrock,** dolostone, grey brown			
	8.0						
	9.0						
	10.0						
	11.0						
	12.0	484.67 m					
				Borehole Terminated, in dolostone bedrock at a depth of 12.24 m below grade.			
	13.0			<u>NOTE:</u> 1) Borehole BH-5 was advanced using 127 mm air rotary water well equipment. 2) Refer to the accompanying text for well construction details and an interpretation of the results.			
	14.0						

NOTE : Stratigraphic boundaries are approximate, and in-situ transitions between the identified soil types may be gradual. Refer to the accompanying text for an interpretation.
Samples indicated as (AS) auger sample, (SS) split spoon or (NR) no recovery.
Water level on 01/06/2002 recorded as 495.08 m (relative to identified datum)

Borehole BH - 6	Figure 2	Waters Environmental Geosciences Ltd.
	Providence Bay Landfill	
Project Number 23-132a	Date Started 16/12/2003 / Date Completed 16/12/2003	Drawn by : PAR / Checked by : PAR



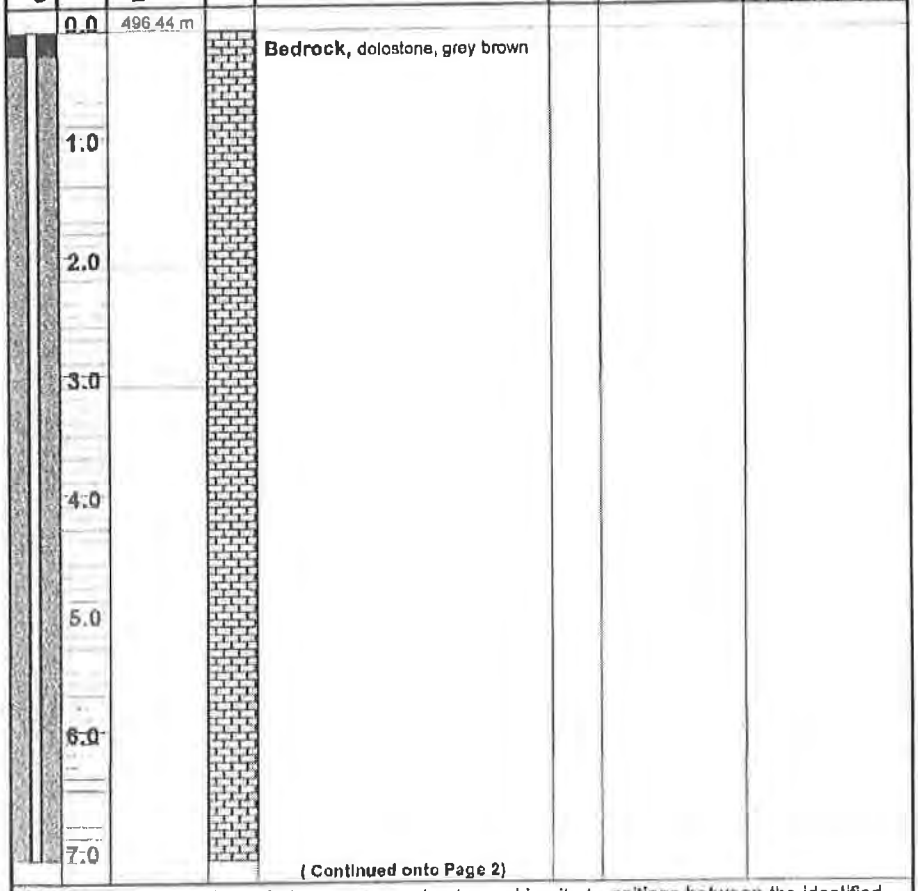
NOTE Stratigraphic boundaries are approximate, and in-situ transitions between the identified soil types may be gradual. Refer to the accompanying text for an interpretation
Samples indicated as (AS) auger sample, (SS) split spoon or (NR) no recovery.
Water level on 22/09/2004 recorded as 486.85 m relative to identified datum

Borehole BH - 6	Figure 2	Waters Environmental Geosciences Ltd.
	Providence Bay Landfill	
Project Number 23-132a	Date Started 16/12/2003 / Date Completed 16/12/2003	Drawn by : PAR / Checked by : PAR

Well Construction	Depth (m)	Elevation (m) Relative to Datum	Stratigraphy	Description	Sample Type	Standard Penetration Test (counts)	Natural Moisture Content (%) 20 40 60
	7.0			(Continued from Page 1)			
				Bedrock, dolostone, grey brown			
	8.0						
	9.0						
	10.0						
	11.0						
	12.0	484.83 m					
				Borehole Terminated, in dolostone bedrock at a depth of 12.23 m below grade.			
	13.0			**NOTE:** 1) Borehole BH-6 was advanced using 127 mm air rotary water well equipment. 2) Refer to the accompanying text for well construction details and an interpretation of the results.			
	14.0						

NOTE: Stratigraphic boundaries are approximate, and in-situ transitions between the identified soil types may be gradual. Refer to the accompanying text for an interpretation. Samples indicated as (AS) auger sample, (SS) split spoon or (NR) no recovery. Water level on 22/09/2004 recorded as 486.85 m (relative to identified datum)

Borehole BH - 7	Figure 3	Waters Environmental Geosciences Ltd.
	Providence Bay Landfill	
Project Number 23-132a	Date Started 16/12/2003 / Date Completed 16/12/2003	Drawn by : PAR / Checked by : PAR



NOTE : Stratigraphic boundaries are approximate, and in-situ transitions between the identified soil types may be gradual. Refer to the accompanying text for an interpretation.
Samples indicated as (AS) auger sample, (SS) split spoon or (NR) no recovery.
Water level on 22/09/2004 recorded as 491.26 m (relative to identified datum)

Borehole BH - 7	Figure 3	Waters Environmental Geosciences Ltd.
	Providence Bay Landfill	
Project Number 23-132a	Date Started 16/12/2003 / Date Completed 16/12/2003	Drawn by : PAR / Checked by : PAR

Well Construction	Depth (m)	Elevation (m) Relative to Datum	Stratigraphy	Description	Sample Type	Standard Penetration Test (counts)	Natural Moisture Content (%) 20 40 60
	7.0			(Continued from Page 1)			
	8.0			**Bedrock,** dolostone, grey brown			
	9.0						
	10.0						
	11.0						
	12.0	484.34 m					
	13.0			**Borehole Terminated,** in dolostone bedrock at a depth of 12.10 m below grade **NOTE:** 1) Borehole BH-7 was advanced using 127 mm air rotary water well equipment. 2) Refer to the accompanying text for well construction details and an interpretation of the results.			
	14.0						

NOTE : Stratigraphic boundaries are approximate, and in-situ transitions between the identified soil types may be gradual. Refer to the accompanying text for an interpretation.
Samples indicated as (AS) auger sample, (SS) split spoon or (NR) no recovery
Water level on 22/09/2004 recorded as 491.26 m (relative to identified datum)

Borehole BH - 8	Figure 4	Waters Environmental Geosciences Ltd.
	Providence Bay Landfill	
Project Number 23-132a	Date Started 16/12/2003 / Date Completed 16/12/2003	Drawn by : PAR / Checked by : PAR

Well Construction	Depth (m)	Elevation (m) Relative to Datum	Stratigraphy	Description	Sample Type	Standard Penetration Test (counts)	Natural Moisture Content (%) 20 40 60
	0.0	498.68 m		Bedrock, dolostone grey brown			
	1.0						
	2.0						
	3.0						
	4.0						
	5.0						
	6.0						
	7.0			(Continued onto Page 2)			

NOTE Stratigraphic boundaries are approximate, and in-situ transitions between the identified soil types may be gradual Refer to the accompanying text for an interpretation
Samples indicated as (AS) auger sample, (SS) split spoon or (NR) no recovery
Water level on 22/08/2004 recorded as 491 58 m (relative to identified datum)

Borehole BH - 8	Figure 4	Waters Environmental Geosciences Ltd.
	Providence Bay Landfill	
Project Number 23-13Za	Date Started 16/12/2003 / Date Completed 16/12/2003	Drawn by : PAR / Checked by : PAR

Well Construction	Depth (m)	Elevation (m) Relative to Datum	Stratigraphy	Description	Sample Type	Standard Penetration Test (counts)	Natural Moisture Content (%) 20 40 60
	7.0			(Continued from Page 1)			
				Bedrock, dolostone, grey brown			
	8.0						
	9.0						
	10.0						
	11.0						
	12.0						
		466.32 m					
				Borehole Terminated, in dolostone bedrock at a depth of 12.34 m below grade.			
	13.0			**NOTE:** 1) Borehole BH-8 was advanced using 127 mm air rotary water well equipment. 2) Refer to the accompanying text for well construction details and an interpretation of the results.			
	14.0						

NOTE : Stratigraphic boundaries are approximate, and in-situ transitions between the identified soil types may be gradual. Refer to the accompanying text for an interpretation.
Samples indicated as (AS) auger sample, (SS) split spoon or (NR) no recovery.
Water level on 22/09/2004 recorded as 491.58 m (relative to identified datum).

RECORD OF MONITORING WELL No. OW-09 Co-Ord. 0401645 E, 5056790 N

Project Number:	TY141014	Drilling Location:	West Edge of Property	Logged by:	DL
Project Client:	Municipality of Central Manitoulin	Drilling Method:	150 mm Downhole Hammer	Compiled by:	KKJ
Project Name:	2014-2018 Landfill Monitoring & Reporting	Drilling Machine:	Truck Mounted Drill	Reviewed by:	TIM
Project Location:	Providence Bay Landfill, Manitoulin, Ontario	Date Started:	7 Aug 14	Date Completed: 7 Aug 14	Revision No.: 2, 21/10/14

LITHOLOGY PROFILE | **SOIL SAMPLING** | **FIELD TESTING** | **LAB TESTING** | **COMMENTS**

Lithology Plot	DESCRIPTION Local Ground Surface Elevation:	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)
	BEDROCK Paleozoic -aged (Middle Silurian) Annabel Formation dolostone rocks of the Southern Province					0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0, 5.5, 6.0, 6.5, 7.0, 7.5, 8.0, 8.5, 9.0, 9.5, 10.0, 10.5, 11.0, 11.5, 12.0, 12.5, 13.0, 13.5, 14.0, 14.5, 15.0, 15.5	
	END OF BOREHOLE 15.7						

FIELD TESTING
Penetration Testing: ○ SPT ● DCPT
MTO Vane*: △ Intact ▲ Remould
Nilcon Vane*: ◇ Intact ◆ Remould
* Undrained Shear Strength (kPa): 15 30 45 60

LAB TESTING
Atterberg Limits: W_P W W_L (Plastic – Liquid)
✳ Passing 75 um (%)
○ Moisture Content (%)
20 40 60 80

INSTRUMENTATION INSTALLATION

COMMENTS
1 steel casing
1 riser pipe in bentonite
1 riser pipe in sand
1 slotted pipe in sand

AMEC Environment & Infrastructure
A Division of AMEC Americas Limited
131 Fielding Road
Lively, Ontario
Canada P3Y 1L7
Tel +1(705) 682-2632
Fax +1(705) 682-2260
www.amec.com

▽ No freestanding groundwater measured in open borehole on completion of drilling. ◪ Open to full depth upon completion of drilling.

Scale: 1 : 160

RECORD OF MONITORING WELL No. OW-10 Co-Ord. 0401859 E, 5056873 N

Project Number:	TY141014	Drilling Location:	Landfill Entrance	Logged by:	DL
Project Client:	Municipality of Central Manitoulin	Drilling Method:	150 mm Downhole Hammer	Compiled by:	KKJ
Project Name:	2014-2018 Landfill Monitoring & Reporting	Drilling Machine:	Truck Mounted Drill	Reviewed by:	TIM
Project Location:	Providence Bay Landfill, Manitoulin, Ontario	Date Started:	6 Aug 14	Date Completed: 6 Aug 14	Revision No.: 2, 21/10/14

LITHOLOGY PROFILE | **SOIL SAMPLING** | **FIELD TESTING** | **LAB TESTING** | **COMMENTS**

Lithology Plot	DESCRIPTION Local Ground Surface Elevation:	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	INSTRUMENTATION INSTALLATION
	BEDROCK Paleozoic -aged (Middle Silurian) Annabel Formation dolostone rocks of the Southern Province					0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0, 5.5, 6.0, 6.5, 7.0, 7.5, 8.0, 8.5, 9.0, 9.5, 10.0, 10.5, 11.0, 11.5, 12.0, 12.5, 13.0, 13.5, 14.0		
	END OF BOREHOLE 14.4							

FIELD TESTING
Penetration Testing: ○ SPT ● DCPT
MTO Vane*: △ Intact ▲ Remould
Nilcon Vane*: ◇ Intact ◆ Remould
* Undrained Shear Strength (kPa): 15 30 45 60

LAB TESTING
Atterberg Limits: W_P W W_L (Plastic – Liquid)
✳ Passing 75 um (%)
○ Moisture Content (%)
20 40 60 80

COMMENTS
1 steel casing
1 riser pipe in bentonite
1 riser pipe in sand
1 slotted pipe in sand

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A Division of AMEC Americas Limited
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Fax +1(705) 682-2260
www.amec.com

▽ No freestanding groundwater measured in open borehole on completion of drilling. ◪ Open to full depth upon completion of drilling.

Scale: 1 : 160

RECORD OF MONITORING WELL No. OW-11 Co-Ord. 0401744 E, 5056880 N

Project Number:	TY141014	Drilling Location:	Approx. 120 m West of Entrance	Logged by:	DL
Project Client:	Municipality of Central Manitoulin	Drilling Method:	150 mm Downhole Hammer	Compiled by:	KKJ
Project Name:	2014-2018 Landfill Monitoring & Reporting	Drilling Machine:	Truck Mounted Drill	Reviewed by:	TIM
Project Location:	Providence Bay Landfill, Manitoulin, Ontario	Date Started:	6 Aug 14	Date Completed: 6 Aug 14	Revision No.: 2, 21/10/14

LITHOLOGY PROFILE		SOIL SAMPLING						FIELD TESTING	LAB TESTING		COMMENTS
Lithology Plot	DESCRIPTION Local Ground Surface Elevation:	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	Penetration Testing: ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 15 30 45 60	Atterberg Limits: W_P W W_L; Plastic Liquid; ✳ Passing 75 um (%); ○ 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 (Middle Silurian) Annabel Formation dolostone rocks of the Southern Province					0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10.0 10.5 11.0 11.5 12.0 12.5 13.0 13.5 14.0 14.5					
	END OF BOREHOLE 14.6										

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▽ No freestanding groundwater measured in open borehole on completion of drilling. ◪ Open to full depth upon completion of drilling.

Scale: 1 : 160

RECORD OF MONITORING WELL No. OW-12A Co-Ord. 0401619 E, 5056825 N

Project Number: **TY1410142**
Project Client: **Municipality of Central Manitoulin**
Project Name: **Aquifer Instrumentation Plan - Providence Bay Waste Disposal Site**
Project Location: **Manitoulin, Ontario**

Drilling Location: **West Edge of Property**
Drilling Method: **150 mm Downhole Hammer**
Drilling Machine: **Truck Mounted Drill**
Date Started: **25 Jul 17** Date Completed: **25 Jul 17**

Logged by: **CJS**
Compiled by: **MAT**
Reviewed by: **ESL**
Revision No.: **1, 02/11/17**

LITHOLOGY PROFILE		SOIL SAMPLING						FIELD TESTING		INSTRUMENTATION INSTALLATION	COMMENTS
Lithology Plot	DESCRIPTION Local Ground Surface Elevation:	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	Penetration Testing: ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 20 40 60 80	★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ▲ Lower Explosive Limit ✳ Passing 75 um (%) ○ Moisture Content (%) 20 40 60 80		1 riser pipe in bentonite 1 riser pipe in sand 1 slotted pipe in sand
	BEDROCK AT SURFACE Dolostone (Amabel Formation)					1 2 3 4 5 6 7 8 9 ▽ 10 11 12 13					
	END OF BOREHOLE 13.4										

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▽ Groundwater depth on completion of drilling: 9.02 m.

■ Open to full depth on completion.

Scale: 1 : 160

RECORD OF MONITORING WELL No. OW-12B Co-Ord. 0401619 E, 5056825 N

Project Number: **TY1410142**
Project Client: **Municipality of Central Manitoulin**
Project Name: **Aquifer Instrumentation Plan - Providence Bay Waste Disposal Site**
Project Location: **Manitoulin, Ontario**

Drilling Location: **West Edge of Property**
Drilling Method: **150 mm Downhole Hammer**
Drilling Machine: **Truck Mounted Drill**
Date Started: **25 Jul 17** Date Completed: **25 Jul 17**

Logged by: **CJS**
Compiled by: **MAT**
Reviewed by: **ESL**
Revision No.: **1, 02/11/17**

LITHOLOGY PROFILE		SOIL SAMPLING						FIELD TESTING		INSTRUMENTATION INSTALLATION	COMMENTS
Lithology Plot	DESCRIPTION Local Ground Surface Elevation:	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	Penetration Testing: ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 20 40 60 80	★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ▲ Lower Explosive Limit ✳ Passing 75 um (%) ○ Moisture Content (%) 20 40 60 80		1 riser pipe in bentonite 1 riser pipe in sand 1 slotted pipe in sand
	BEDROCK AT SURFACE Dolostone (Amabel Formation)					0 1 2 3 4 5 6 7 8 9 10 11 12 13 ▽ 14 15 16 17					
	END OF BOREHOLE 17.1										

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▽ Groundwater depth on completion of drilling: 13.06 m.

■ Open to full depth on completion.

Scale: 1 : 160

RECORD OF MONITORING WELL No. OW-13A Co-Ord. 0401738 E, 5056741 N

Project Number: **TY1410142**
Project Client: **Municipality of Central Manitoulin**
Project Name: **Aquifer Instrumentation Plan - Providence Bay Waste Disposal Site**
Project Location: **Manitoulin, Ontario**
Drilling Location: **Northwest of Active Fill Area**
Drilling Method: **150 mm Downhole Hammer**
Drilling Machine: **Truck Mounted Drill**
Date Started: **24 Jul 17** Date Completed: **24 Jul 17**
Logged by: **CJS**
Compiled by: **MAT**
Reviewed by: **ESL**
Revision No.: **1, 02/11/17**

LITHOLOGY PROFILE		SOIL SAMPLING						FIELD TESTING		INSTRUMENTATION INSTALLATION	COMMENTS
Lithology Plot	DESCRIPTION Local Ground Surface Elevation:	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	Penetration Testing: ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 20 40 60 80	★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ▲ Lower Explosive Limit ✳ Passing 75 um (%) ○ Moisture Content (%) 20 40 60 80		1 riser pipe in bentonite 1 riser pipe in sand 1 slotted pipe in sand
	BEDROCK AT SURFACE Dolostone (Amabel Formation)					0 1 2 ▽ 3 4 5					
	END OF BOREHOLE 5.5										

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▽ Groundwater depth on completion of drilling: 2.30 m.

■ Open to full depth on completion.

Scale: 1 : 160

RECORD OF MONITORING WELL No. OW-13B Co-Ord. 0401738 E, 5056741 N

Project Number: **TY1410142**
Project Client: **Municipality of Central Manitoulin**
Project Name: **Aquifer Instrumentation Plan - Providence Bay Waste Disposal Site**
Project Location: **Manitoulin, Ontario**

Drilling Location: **Northwest of Active Fill Area**
Drilling Method: **150 mm Downhole Hammer**
Drilling Machine: **Truck Mounted Drill**
Date Started: **24 Jul 17** Date Completed: **24 Jul 17**

Logged by: **CJS**
Compiled by: **MAT**
Reviewed by: **ESL**
Revision No.: **1, 02/11/17**

LITHOLOGY PROFILE		SOIL SAMPLING						FIELD TESTING		INSTRUMENTATION INSTALLATION	COMMENTS
Lithology Plot	DESCRIPTION Local Ground Surface Elevation:	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	Penetration Testing: ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 20 40 60 80	★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ▲ Lower Explosive Limit ✳ Passing 75 um (%) ○ Moisture Content (%) 20 40 60 80		1 riser pipe in bentonite 1 riser pipe in sand 1 slotted pipe in sand
	BEDROCK AT SURFACE Dolostone (Amabel Formation)					1 2 3 ▽ 4 5 6 7 8 9 10					
	END OF BOREHOLE 11.0										

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▽ Groundwater depth on completion of drilling: 2.89 m.

▪ Open to full depth on completion.

Scale: 1 : 160

RECORD OF MONITORING WELL No. OW-14A Co-Ord. 0401722 E, 5056634 N

Project Number:	TY1410142	Drilling Location:	West Edge of Property	Logged by:	CJS
Project Client:	Municipality of Central Manitoulin	Drilling Method:	150 mm Downhole Hammer	Compiled by:	MAT
Project Name:	Aquifer Instrumentation Plan - Providence Bay Waste Disposal Site	Drilling Machine:	Truck Mounted Drill	Reviewed by:	ESL
Project Location:	Manitoulin, Ontario	Date Started:	24 Jul 17	Date Completed: 24 Jul 17	Revision No.: 1, 02/11/17

LITHOLOGY PROFILE

Lithology Plot

DESCRIPTION

Local Ground Surface Elevation:

BEDROCK AT SURFACE
Dolostone (Amabel Formation)

END OF BOREHOLE 6.9

SOIL SAMPLING

Sample Type | Sample Number | Recovery (%) | SPT 'N' Value

DEPTH (m) | **ELEVATION (m)**

FIELD TESTING

Penetration Testing
○ SPT ● DCPT
MTO Vane* △ Intact ▲ Remould
Nilcon Vane* ◇ Intact ◆ Remould
* Undrained Shear Strength (kPa) 20 40 60 80

★ Rinse pH Values 2 4 6 8 10 12
Soil Vapour Reading
△ parts per million (ppm) 100 200 300 400
▲ Lower Explosive Limit
✳ Passing 75 um (%)
○ Moisture Content (%)
20 40 60 80

INSTRUMENTATION INSTALLATION

COMMENTS

1 riser pipe in bentonite
1 riser pipe in sand
1 slotted pipe in sand

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▽ Groundwater depth on completion of drilling: 3.39 m.

Open to full depth on completion.

RECORD OF MONITORING WELL No. OW-14B Co-Ord. 0401722 E, 5056634 N

Project Number: **TY1410142**
Project Client: **Municipality of Central Manitoulin**
Project Name: **Aquifer Instrumentation Plan - Providence Bay Waste Disposal Site**
Project Location: **Manitoulin, Ontario**

Drilling Location: **West Edge of Property**
Drilling Method: **150 mm Downhole Hammer**
Drilling Machine: **Truck Mounted Drill**
Date Started: **24 Jul 17** Date Completed: **24 Jul 17**

Logged by: **CJS**
Compiled by: **MAT**
Reviewed by: **ESL**
Revision No.: **1, 02/11/17**

LITHOLOGY PROFILE		SOIL SAMPLING						FIELD TESTING		INSTRUMENTATION INSTALLATION	COMMENTS
Lithology Plot	DESCRIPTION Local Ground Surface Elevation:	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	Penetration Testing: ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 20 40 60 80	★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ▲ Lower Explosive Limit ✳ Passing 75 um (%) ○ Moisture Content (%) 20 40 60 80		1 riser pipe in bentonite 1 riser pipe in sand 1 slotted pipe in sand
	BEDROCK AT SURFACE Dolostone (Amabel Formation)					1 2 3 ▽ 4 5 6 7 8 9 10 11					
	END OF BOREHOLE 11.6										

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▽ Groundwater depth on completion of drilling: 3.05 m.

▪ Open to full depth on completion.

Scale: 1 : 160

APPENDIX C

GROUNDWATER ELEVATIONS

Summary of Groundwater Elevations

Monitor No.	Measuring Point Elevation (masl)[1]	Elevation of Water (masl)																								
		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	Aug-17	Oct-17	May-18	Sep-18	Sep-19	Nov-20
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
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
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
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
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
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
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
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
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
OW-9	497.95																		484.84	491.89	491.86		492.51		491.65	491.83	493.65
OW-10	499.17																		492.48	491.69	491.69		492.66		492.16	491.74	493.18
OW-11	497.94																		485.32	492.07	491.91		492.67		491.13	491.52	491.91
OW-12A	497.75																					488.87	489.45	489.28	489.18	489.04	489.86
OW-12B	497.70																					484.05	486.62	489.37	487.76	489.00	489.39
OW-13A	497.60																					493.90	494.81	494.76	494.57	494.00	495.03
OW-13B	497.64																					493.35	494.41	494.57	493.71	493.04	494.65
OW-14A	498.58																					496.02	496.52	496.86	495.48	495.30	496.99
OW-14B	498.46																					494.54	495.36	495.59	494.59	494.23	496.09

Notes:
(1) masl - metres above sea level.

APPENDIX D

2020 LABORATORY ANALYTICAL REPORTS

AGAT Laboratories

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CLIENT NAME: WOOD CANADA LTD.
131 FIELDING ROAD
LIVELY, ON P3Y1L7
(705) 682-2632
ATTENTION TO: Emily Lemieux
PROJECT: Providance Bay GW
AGAT WORK ORDER: 20T673696
TRACE ORGANICS REVIEWED BY: Oksana Gushyla, Trace Organics Lab Supervisor
WATER ANALYSIS REVIEWED BY: Yris Verastegui, Report Reviewer
DATE REPORTED: Nov 16, 2020
PAGES (INCLUDING COVER): 24
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 following analysis, unless expressly agreed otherwise in writing. Please contact your Client Project Manager if you require additional sample storage time.
- 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.

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Certificate of Analysis

AGAT WORK ORDER: 20T673696

PROJECT: Providance Bay GW

CLIENT NAME: WOOD CANADA LTD.

ATTENTION TO: Emily Lemieux

SAMPLING SITE:

SAMPLED BY:

Volatile Organic Compounds in Water (ug/L)

DATE RECEIVED: 2020-11-05 **DATE REPORTED: 2020-11-16**

		SAMPLE DESCRIPTION:		OW-1		OW-2		OW-3A		OW-3B	OW-4
		SAMPLE TYPE:		Water		Water		Water		Water	Water
		DATE SAMPLED:		2020-11-03 13:00		2020-11-03 13:00		2020-11-03 13:00		2020-11-03 13:00	2020-11-03 13:00
Parameter	**Unit**	**G / S**	**RDL**	**1652284**	**RDL**	**1652291**	**RDL**	**1652292**	**RDL**	**1652293**	**1652294**
Vinyl Chloride	µg/L		0.34	<0.34	0.17	<0.17	0.34	<0.34	0.17	<0.17	<0.17
Methylene Chloride	µg/L		0.60	<0.60	0.30	<0.30	0.60	<0.60	0.30	<0.30	<0.30
Benzene	µg/L		0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20
Toluene	µg/L	24	0.40	<0.40	0.20	<0.20	0.40	<0.40	0.20	1.5	<0.20
1,4-Dichlorobenzene	µg/L	1	0.20	<0.20	0.10	<0.10	0.20	<0.20	0.10	<0.10	<0.10
Surrogate	**Unit**	**Acceptable Limits**									
Toluene-d8	% Recovery	50-140		102	**1**	106	**2**	104	**1**	107	103
4-Bromofluorobenzene	% Recovery	50-140		76	**1**	77	**2**	75	**1**	78	76

		SAMPLE DESCRIPTION:		OW-5		OW-6		OW-7	OW-8		OW-9
		SAMPLE TYPE:		Water		Water		Water	Water		Water
		DATE SAMPLED:		2020-11-03 13:00		2020-11-03 13:00		2020-11-03 13:00	2020-11-03 13:00		2020-11-03 13:00
Parameter	**Unit**	**G / S**	**RDL**	**1652295**	**RDL**	**1652296**	**RDL**	**1652297**	**1652298**	**RDL**	**1652299**
Vinyl Chloride	µg/L		0.17	<0.17	0.34	<0.34	0.17	<0.17	<0.17	0.34	<0.34
Methylene Chloride	µg/L		0.30	<0.30	0.60	<0.60	0.30	<0.30	<0.30	0.60	<0.60
Benzene	µg/L		0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20	0.40	<0.40
Toluene	µg/L	24	0.20	<0.20	0.40	<0.40	0.20	<0.20	<0.20	0.40	<0.40
1,4-Dichlorobenzene	µg/L	1	0.10	<0.10	0.20	<0.20	0.10	<0.10	<0.10	0.20	<0.20
Surrogate	**Unit**	**Acceptable Limits**									
Toluene-d8	% Recovery	50-140		104	**2**	110	**1**	103	108	**2**	108
4-Bromofluorobenzene	% Recovery	50-140		76	**2**	77	**1**	76	78	**2**	76

Certified By:

AGAT Laboratories

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CANADA L4Z 1Y2
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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 20T673696

PROJECT: Providance Bay GW

CLIENT NAME: WOOD CANADA LTD.

ATTENTION TO: Emily Lemieux

SAMPLING SITE:

SAMPLED BY:

Volatile Organic Compounds in Water (ug/L)

DATE RECEIVED: 2020-11-05

DATE REPORTED: 2020-11-16

		SAMPLE DESCRIPTION:		OW-10	OW-11	OW-12A	OW-12B	OW-13A		OW-13B
		SAMPLE TYPE:		Water	Water	Water	Water	Water		Water
		DATE SAMPLED:		2020-11-03 13:00	2020-11-03 13:00	2020-11-03 13:00	2020-11-03 13:00	2020-11-03 13:00		2020-11-03 13:00
Parameter	**Unit**	**G / S**	**RDL**	**1652300**	**1652301**	**1652302**	**1652303**	**1652304**	**RDL**	**1652305**
Vinyl Chloride	µg/L		0.17	<0.17	<0.17	<0.17	<0.17	<0.17	0.34	<0.34
Methylene Chloride	µg/L		0.30	<0.30	<0.30	<0.30	<0.30	<0.30	0.60	<0.60
Benzene	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.40	<0.40
Toluene	µg/L	24	0.20	<0.20	<0.20	<0.20	<0.20	2.1	0.40	<0.40
1,4-Dichlorobenzene	µg/L	1	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.20	<0.20
Surrogate	**Unit**	**Acceptable Limits**								
Toluene-d8	% Recovery	50-140		103	96	103	104	107	**2**	103
4-Bromofluorobenzene	% Recovery	50-140		76	77	77	78	78	**2**	76

		SAMPLE DESCRIPTION:		OW-14A	OW-14B	PB-DUP1	PB-DUP2
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2020-11-03 13:00	2020-11-03 13:00	2020-11-03 13:00	2020-11-03 13:00
Parameter	**Unit**	**G / S**	**RDL**	**1652306**	**1652307**	**1652308**	**1652328**
Vinyl Chloride	µg/L		0.17	<0.17	<0.17	<0.17	<0.17
Methylene Chloride	µg/L		0.30	<0.30	<0.30	<0.30	<0.30
Benzene	µg/L		0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	24	0.20	<0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	1	0.10	<0.10	<0.10	<0.10	<0.10
Surrogate	**Unit**	**Acceptable Limits**					
Toluene-d8	% Recovery	50-140		102	102	106	111
4-Bromofluorobenzene	% Recovery	50-140		75	76	78	78

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Certificate of Analysis

AGAT WORK ORDER: 20T673696

PROJECT: Providance Bay GW

CLIENT NAME: WOOD CANADA LTD.

ATTENTION TO: Emily Lemieux

SAMPLING SITE:

SAMPLED BY:

Volatile Organic Compounds in Water (ug/L)

DATE RECEIVED: 2020-11-05 **DATE REPORTED: 2020-11-16**

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg 169/03 - Ontario Drinking Water Quality Standards - Aesthetic Objectives and Operational Guidelines
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.

1652284	Dilution factor=2 The sample was diluted because it was foamy. The reporting detection limit has been corrected for the dilution factor used. 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.
1652291	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.
1652292	Dilution factor=2 The sample was diluted because it was foamy. The reporting detection limit has been corrected for the dilution factor used. 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.
1652293-1652295	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.
1652296	Dilution factor=2 The sample was diluted because it was foamy. The reporting detection limit has been corrected for the dilution factor used. 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.
1652297-1652298	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.
1652299	Dilution factor=2 The sample was diluted because it was foamy. The reporting detection limit has been corrected for the dilution factor used. 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.
1652300-1652304	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.
1652305	Dilution factor=2 The sample was diluted because it was foamy. The reporting detection limit has been corrected for the dilution factor used. 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.
1652306-1652328	Xylenes total is a calculated parameter. The calculated value is the sum of m&p-Xylene + o-Xylene.

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AGAT WORK ORDER: 20T673696

PROJECT: Providance Bay GW

CLIENT NAME: WOOD CANADA LTD.

ATTENTION TO: Emily Lemieux

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Volatile Organic Compounds in Water (ug/L)

DATE RECEIVED: 2020-11-05

DATE REPORTED: 2020-11-16

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 *)

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SAMPLING SITE:

SAMPLED BY:

Providence Bay Groundwater Parameters

DATE RECEIVED: 2020-11-05

DATE REPORTED: 2020-11-16

SAMPLE DESCRIPTION:				OW-1		OW-2		OW-3A		OW-3B
SAMPLE TYPE:				Water		Water		Water		Water
DATE SAMPLED:				2020-11-03 13:00		2020-11-03 13:00		2020-11-03 13:00		2020-11-03 13:00
Parameter	Unit	G / S	RDL	1652284	RDL	1652291	RDL	1652292	RDL	1652293
Electrical Conductivity	µS/cm		2	888	2	466	2	1110	2	659
pH	pH Units	6.5-8.5	NA	8.00	NA	7.84	NA	7.98	NA	8.07
Total Dissolved Solids	mg/L	500	20	492	20	252	20	**654**	20	402
Alkalinity (as CaCO3)	mg/L	30-500	5	377	5	179	5	500	5	206
Chloride	mg/L	250	0.50	48.4	0.10	10.5	0.50	70.8	0.20	13.2
Nitrate as N	mg/L		0.25	<0.25	0.05	0.05	0.25	<0.25	0.10	0.83
Nitrite as N	mg/L		0.25	<0.25	0.05	<0.05	0.25	<0.25	0.10	<0.10
Sulphate	mg/L	500	0.50	49.6	0.10	52.2	0.50	28.6	0.20	118
Ammonia as N	mg/L		0.02	0.76	0.02	<0.02	0.02	0.44	0.02	<0.02
Total Phosphorus	mg/L		0.02	<0.02	0.02	0.05	0.02	0.05	0.02	0.05
Chemical Oxygen Demand	mg/L		5	30	5	7	5	37	5	12
Dissolved Organic Carbon	mg/L	5	0.5	**8.0**	0.5	2.1	0.5	**14.9**	0.5	4.9
Phenols	mg/L		0.001	0.002	0.001	0.002	0.001	0.003	0.001	0.002
Dissolved Calcium	mg/L		0.05	68.1	0.05	35.7	0.05	89.2	0.05	48.8
Dissolved Magnesium	mg/L		0.05	50.3	0.05	25.5	0.05	68.4	0.05	25.4
Dissolved Potassium	mg/L		0.05	7.97	0.05	4.58	0.05	10.2	0.05	5.86
Dissolved Sodium	mg/L		0.05	23.8	0.05	8.38	0.05	40.1	0.05	34.9
Dissolved Arsenic	mg/L		0.001	0.001	0.001	<0.001	0.001	0.001	0.001	<0.001
Dissolved Barium	mg/L		0.002	0.026	0.002	0.018	0.002	0.054	0.002	0.013
Dissolved Boron	mg/L		0.010	0.254	0.010	0.254	0.010	0.297	0.010	0.653
Dissolved Cadmium	mg/L		0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001
Dissolved Chromium	mg/L		0.002	<0.002	0.002	<0.002	0.002	0.002	0.002	<0.002
Dissolved Copper	mg/L		0.001	<0.001	0.001	0.001	0.001	0.003	0.001	0.004
Dissolved Iron	mg/L		0.010	0.468	0.010	<0.010	0.010	0.145	0.010	0.176
Dissolved Lead	mg/L		0.0005	<0.0005	0.0005	<0.0005	0.0005	<0.0005	0.0005	<0.0005
Dissolved Manganese	mg/L		0.002	0.004	0.002	<0.002	0.002	0.003	0.002	0.002
Dissolved Mercury	mg/L		0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001
Dissolved Zinc	mg/L		0.005	<0.005	0.005	<0.005	0.005	<0.005	0.005	<0.005
Lab Filtration Performed				Y		Y		Y		Y

Certified By: Iris Verástegui

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PROJECT: Providance Bay GW

CLIENT NAME: WOOD CANADA LTD.

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SAMPLING SITE:

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Providence Bay Groundwater Parameters

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		SAMPLE DESCRIPTION:		OW-4		OW-5		OW-6		OW-7
		SAMPLE TYPE:		Water		Water		Water		Water
		DATE SAMPLED:		2020-11-03 13:00		2020-11-03 13:00		2020-11-03 13:00		2020-11-03 13:00
Parameter	Unit	G / S	RDL	1652294	RDL	1652295	RDL	1652296	RDL	1652297
Electrical Conductivity	µS/cm		2	501	2	798	2	560	2	597
pH	pH Units	6.5-8.5	NA	8.05	NA	8.03	NA	7.89	NA	8.04
Total Dissolved Solids	mg/L	500	20	268	20	474	20	336	20	376
Alkalinity (as CaCO3)	mg/L	30-500	5	248	5	297	5	189	5	190
Chloride	mg/L	250	0.10	4.80	0.20	20.9	0.10	3.49	0.10	3.05
Nitrate as N	mg/L		0.05	<0.05	0.10	<0.10	0.05	0.10	0.05	0.45
Nitrite as N	mg/L		0.05	<0.05	0.10	<0.10	0.05	<0.05	0.05	<0.05
Sulphate	mg/L	500	0.10	24.9	0.20	116	0.10	98.0	0.20	119
Ammonia as N	mg/L		0.02	0.07	0.02	<0.02	0.02	<0.02	0.02	<0.02
Total Phosphorus	mg/L		0.02	0.04	0.02	0.50	0.02	0.04	0.02	0.20
Chemical Oxygen Demand	mg/L		5	10	5	17	5	<5	5	8
Dissolved Organic Carbon	mg/L	5	0.5	3.5	0.5	**6.7**	0.5	1.6	0.5	2.1
Phenols	mg/L		0.001	0.002	0.001	<0.001	0.001	<0.001	0.001	<0.001
Dissolved Calcium	mg/L		0.05	40.2	0.05	65.6	0.05	48.8	0.05	68.2
Dissolved Magnesium	mg/L		0.05	30.5	0.05	40.5	0.05	29.2	0.05	42.7
Dissolved Potassium	mg/L		0.05	4.90	0.05	6.84	0.05	4.66	0.05	4.38
Dissolved Sodium	mg/L		0.05	8.18	0.05	29.6	0.05	9.64	0.05	93.2
Dissolved Arsenic	mg/L		0.001	<0.001	0.001	<0.001	0.001	<0.001	0.001	0.001
Dissolved Barium	mg/L		0.002	0.018	0.002	0.020	0.002	0.013	0.002	0.024
Dissolved Boron	mg/L		0.010	0.213	0.010	0.390	0.010	0.428	0.010	0.364
Dissolved Cadmium	mg/L		0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001
Dissolved Chromium	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002
Dissolved Copper	mg/L		0.001	0.003	0.001	0.001	0.001	<0.001	0.001	0.002
Dissolved Iron	mg/L		0.010	<0.010	0.010	0.172	0.010	0.057	0.010	0.863
Dissolved Lead	mg/L		0.0005	<0.0005	0.0005	<0.0005	0.0005	<0.0005	0.0005	0.0012
Dissolved Manganese	mg/L		0.002	<0.002	0.002	0.008	0.002	0.004	0.002	0.040
Dissolved Mercury	mg/L		0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001
Dissolved Zinc	mg/L		0.005	<0.005	0.005	0.007	0.005	<0.005	0.005	<0.005
Lab Filtration Performed				Y		Y		Y		Y

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SAMPLE DESCRIPTION:				OW-8	OW-9		OW-10		OW-11	OW-12A
SAMPLE TYPE:				Water	Water		Water		Water	Water
DATE SAMPLED:				2020-11-03 13:00	2020-11-03 13:00		2020-11-03 13:00		2020-11-03 13:00	2020-11-03 13:00
Parameter	Unit	G / S	RDL	1652298	1652299	RDL	1652300	RDL	1652301	1652302
Electrical Conductivity	µS/cm		2	524	496	2	682	2	477	362
pH	pH Units	6.5-8.5	NA	8.02	7.90	NA	7.91	NA	7.88	7.96
Total Dissolved Solids	mg/L	500	20	270	272	20	374	20	278	202
Alkalinity (as CaCO3)	mg/L	30-500	5	286	179	5	294	5	186	149
Chloride	mg/L	250	0.10	3.71	11.6	0.20	35.8	0.10	4.82	2.70
Nitrate as N	mg/L		0.05	<0.05	0.29	0.10	0.70	0.05	<0.05	0.10
Nitrite as N	mg/L		0.05	<0.05	<0.05	0.10	<0.10	0.05	<0.05	<0.05
Sulphate	mg/L	500	0.10	6.29	62.5	0.20	23.2	0.10	62.6	35.8
Ammonia as N	mg/L		0.02	<0.02	<0.02	0.02	0.04	0.02	<0.02	0.03
Total Phosphorus	mg/L		0.02	0.41	0.06	0.02	0.06	0.02	1.47	0.05
Chemical Oxygen Demand	mg/L		5	34	6	5	14	5	37	10
Dissolved Organic Carbon	mg/L	5	0.5	**11.7**	2.1	0.5	**6.6**	0.5	3.5	2.7
Phenols	mg/L		0.001	<0.001	<0.001	0.001	<0.001	0.001	<0.001	<0.001
Dissolved Calcium	mg/L		0.05	49.6	40.7	0.05	68.3	0.05	40.6	25.8
Dissolved Magnesium	mg/L		0.05	29.2	26.2	0.05	30.1	0.05	24.2	15.8
Dissolved Potassium	mg/L		0.05	0.70	4.61	0.05	3.63	0.05	4.83	3.73
Dissolved Sodium	mg/L		0.05	2.35	9.68	0.05	13.0	0.05	9.87	16.9
Dissolved Arsenic	mg/L		0.001	<0.001	<0.001	0.001	<0.001	0.001	0.004	0.002
Dissolved Barium	mg/L		0.002	0.008	0.023	0.002	0.041	0.002	0.026	0.032
Dissolved Boron	mg/L		0.010	0.040	0.319	0.010	0.114	0.010	0.477	0.492
Dissolved Cadmium	mg/L		0.0001	<0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	<0.0001
Dissolved Chromium	mg/L		0.002	<0.002	<0.002	0.002	<0.002	0.002	<0.002	<0.002
Dissolved Copper	mg/L		0.001	0.002	<0.001	0.001	0.002	0.001	0.001	0.003
Dissolved Iron	mg/L		0.010	<0.010	<0.010	0.010	<0.010	0.010	0.076	<0.010
Dissolved Lead	mg/L		0.0005	<0.0005	<0.0005	0.0005	<0.0005	0.0005	<0.0005	<0.0005
Dissolved Manganese	mg/L		0.002	<0.002	0.016	0.002	0.006	0.002	0.026	0.014
Dissolved Mercury	mg/L		0.0001	<0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	<0.0001
Dissolved Zinc	mg/L		0.005	<0.005	<0.005	0.005	<0.005	0.005	<0.005	<0.005
Lab Filtration Performed				Y	Y		Y		Y	Y

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SAMPLING SITE:

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Providence Bay Groundwater Parameters

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DATE RECEIVED: 2020-11-05

DATE REPORTED: 2020-11-16

SAMPLE DESCRIPTION:				OW-12B		OW-13A		OW-13B		OW-14A
SAMPLE TYPE:				Water		Water		Water		Water
DATE SAMPLED:				2020-11-03 13:00		2020-11-03 13:00		2020-11-03 13:00		2020-11-03 13:00
Parameter	**Unit**	**G / S**	**RDL**	**1652303**	**RDL**	**1652304**	**RDL**	**1652305**	**RDL**	**1652306**
Electrical Conductivity	µS/cm		2	633	2	1470	2	730	2	948
pH	pH Units	6.5-8.5	NA	8.17	NA	7.99	NA	7.89	NA	8.04
Total Dissolved Solids	mg/L	500	20	364	20	**940**	20	408	20	**530**
Alkalinity (as CaCO3)	mg/L	30-500	5	239	5	**555**	5	303	5	404
Chloride	mg/L	250	0.20	8.26	0.50	58.1	0.20	21.5	0.50	61.9
Nitrate as N	mg/L		0.10	<0.10	0.25	<0.25	0.10	<0.10	0.25	<0.25
Nitrite as N	mg/L		0.10	<0.10	0.25	<0.25	0.10	<0.10	0.25	<0.25
Sulphate	mg/L	500	0.20	93.4	0.50	225	0.20	68.8	0.50	36.8
Ammonia as N	mg/L		0.02	0.02	0.02	0.47	0.02	0.20	0.02	<0.02
Total Phosphorus	mg/L		0.02	0.07	0.02	0.04	0.02	0.04	0.02	0.06
Chemical Oxygen Demand	mg/L		5	7	5	48	5	18	5	26
Dissolved Organic Carbon	mg/L	5	0.5	4.3	0.5	**20.6**	1.0	**7.2**	0.5	**10.8**
Phenols	mg/L		0.001	<0.001	0.001	0.003	0.001	0.001	0.001	<0.001
Dissolved Calcium	mg/L		0.05	49.8	0.05	159	0.05	66.5	0.05	82.3
Dissolved Magnesium	mg/L		0.05	35.4	0.05	70.8	0.05	42.3	0.05	59.2
Dissolved Potassium	mg/L		0.05	7.83	0.05	15.7	0.05	7.28	0.05	4.80
Dissolved Sodium	mg/L		0.05	14.0	0.05	37.6	0.05	14.9	0.05	11.5
Dissolved Arsenic	mg/L		0.001	0.003	0.001	0.002	0.001	0.002	0.001	0.003
Dissolved Barium	mg/L		0.002	0.032	0.002	0.081	0.002	0.039	0.002	0.050
Dissolved Boron	mg/L		0.010	0.540	0.010	0.472	0.010	0.310	0.010	0.125
Dissolved Cadmium	mg/L		0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001
Dissolved Chromium	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002
Dissolved Copper	mg/L		0.001	0.002	0.001	0.003	0.001	<0.001	0.001	0.003
Dissolved Iron	mg/L		0.010	<0.010	0.010	<0.010	0.010	0.127	0.010	0.059
Dissolved Lead	mg/L		0.0005	<0.0005	0.0005	<0.0005	0.0005	<0.0005	0.0005	<0.0005
Dissolved Manganese	mg/L		0.002	0.021	0.002	0.083	0.002	0.020	0.002	0.057
Dissolved Mercury	mg/L		0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001
Dissolved Zinc	mg/L		0.005	<0.005	0.005	<0.005	0.005	<0.005	0.005	<0.005
Lab Filtration Performed				Y		Y		Y		Y

Certified By: Iris Verástegui

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Certificate of Analysis

AGAT WORK ORDER: 20T673696

PROJECT: Providance Bay GW

CLIENT NAME: WOOD CANADA LTD.

ATTENTION TO: Emily Lemieux

SAMPLING SITE:

SAMPLED BY:

Providence Bay Groundwater Parameters

DATE RECEIVED: 2020-11-05

DATE REPORTED: 2020-11-16

Certified By: Iris Verástegui

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PROJECT: Providance Bay GW

CLIENT NAME: WOOD CANADA LTD.

ATTENTION TO: Emily Lemieux

SAMPLING SITE:

SAMPLED BY:

Providence Bay Groundwater Parameters

DATE RECEIVED: 2020-11-05

DATE REPORTED: 2020-11-16

		SAMPLE DESCRIPTION:		OW-14B	PB-DUP1		PB-DUP2
		SAMPLE TYPE:		Water	Water		Water
		DATE SAMPLED:		2020-11-03 13:00	2020-11-03 13:00		2020-11-03 13:00
Parameter	Unit	G / S	RDL	1652307	1652308	RDL	1652328
Electrical Conductivity	µS/cm		2	471	472	2	688
pH	pH Units	6.5-8.5	NA	7.96	8.06	NA	7.95
Total Dissolved Solids	mg/L	500	20	244	242	20	366
Alkalinity (as CaCO3)	mg/L	30-500	5	236	234	5	294
Chloride	mg/L	250	0.10	2.55	2.47	0.20	35.5
Nitrate as N	mg/L		0.05	<0.05	<0.05	0.10	0.68
Nitrite as N	mg/L		0.05	<0.05	<0.05	0.10	<0.10
Sulphate	mg/L	500	0.10	20.1	20.1	0.20	23.9
Ammonia as N	mg/L		0.02	0.03	0.03	0.02	0.03
Total Phosphorus	mg/L		0.02	0.05	0.05	0.02	0.05
Chemical Oxygen Demand	mg/L		5	8	9	5	15
Dissolved Organic Carbon	mg/L	5	0.5	4.5	3.4	0.5	**6.6**
Phenols	mg/L		0.001	<0.001	<0.001	0.001	<0.001
Dissolved Calcium	mg/L		0.05	37.3	37.1	0.05	68.0
Dissolved Magnesium	mg/L		0.05	28.0	28.0	0.05	30.2
Dissolved Potassium	mg/L		0.05	4.63	4.69	0.05	3.61
Dissolved Sodium	mg/L		0.05	8.11	8.15	0.05	13.0
Dissolved Arsenic	mg/L		0.001	0.002	0.002	0.001	0.001
Dissolved Barium	mg/L		0.002	0.024	0.023	0.002	0.043
Dissolved Boron	mg/L		0.010	0.220	0.200	0.010	0.121
Dissolved Cadmium	mg/L		0.0001	<0.0001	<0.0001	0.0001	<0.0001
Dissolved Chromium	mg/L		0.002	<0.002	<0.002	0.002	<0.002
Dissolved Copper	mg/L		0.001	<0.001	<0.001	0.001	0.005
Dissolved Iron	mg/L		0.010	<0.010	<0.010	0.010	<0.010
Dissolved Lead	mg/L		0.0005	<0.0005	<0.0005	0.0005	<0.0005
Dissolved Manganese	mg/L		0.002	0.017	0.018	0.002	0.006
Dissolved Mercury	mg/L		0.0001	<0.0001	<0.0001	0.0001	<0.0001
Dissolved Zinc	mg/L		0.005	<0.005	<0.005	0.005	<0.005
Lab Filtration Performed				Y	Y		Y

Certified By: Iris Verástegui

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Certificate of Analysis

AGAT WORK ORDER: 20T673696

PROJECT: Providance Bay GW

CLIENT NAME: WOOD CANADA LTD.

ATTENTION TO: Emily Lemieux

SAMPLING SITE:

SAMPLED BY:

Providence Bay Groundwater Parameters

DATE RECEIVED: 2020-11-05

DATE REPORTED: 2020-11-16

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg 169/03 - Ontario Drinking Water Quality Standards - Aesthetic Objectives and Operational Guidelines
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.

1652284-1652328 DOC analysis completed on a lab filtered sample.
For phenols analysis, sample was subsampled from plastic container.
Dilution required, RDL has been increased accordingly.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: Iris Verástegui

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Certificate of Analysis

AGAT WORK ORDER: 20T673696

PROJECT: Providance Bay GW

CLIENT NAME: WOOD CANADA LTD.

ATTENTION TO: Emily Lemieux

SAMPLING SITE:

SAMPLED BY:

Water Analysis - TKN

DATE RECEIVED: 2020-11-05

DATE REPORTED: 2020-11-16

		SAMPLE DESCRIPTION:		OW-1	OW-2	OW-3A	OW-3B	OW-4	OW-5	OW-6	OW-7
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		2020-11-03 13:00	2020-11-03 13:00	2020-11-03 13:00	2020-11-03 13:00	2020-11-03 13:00	2020-11-03 13:00	2020-11-03 13:00	2020-11-03 13:00
Parameter	**Unit**	**G / S**	**RDL**	**1652284**	**1652291**	**1652292**	**1652293**	**1652294**	**1652295**	**1652296**	**1652297**
Total Kjeldahl Nitrogen	mg/L		0.1	1.5	0.4	1.5	0.6	0.5	0.8	0.4	0.7

		SAMPLE DESCRIPTION:		OW-8	OW-9	OW-10	OW-11	OW-12A	OW-12B	OW-13A	OW-13B
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		2020-11-03 13:00	2020-11-03 13:00	2020-11-03 13:00	2020-11-03 13:00	2020-11-03 13:00	2020-11-03 13:00	2020-11-03 13:00	2020-11-03 13:00
Parameter	**Unit**	**G / S**	**RDL**	**1652298**	**1652299**	**1652300**	**1652301**	**1652302**	**1652303**	**1652304**	**1652305**
Total Kjeldahl Nitrogen	mg/L		0.1	0.6	0.4	0.6	0.8	0.4	0.7	1.4	0.7

		SAMPLE DESCRIPTION:		OW-14A	OW-14B	PB-DUP1	PB-DUP2
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2020-11-03 13:00	2020-11-03 13:00	2020-11-03 13:00	2020-11-03 13:00
Parameter	**Unit**	**G / S**	**RDL**	**1652306**	**1652307**	**1652308**	**1652328**
Total Kjeldahl Nitrogen	mg/L		0.1	0.6	0.3	0.4	0.5

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

Analysis performed at AGAT Calgary (unless marked by *)

Certified By: Iris Verástegui

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Exceedance Summary

AGAT WORK ORDER: 20T673696

PROJECT: Providance Bay GW

CLIENT NAME: WOOD CANADA LTD.

ATTENTION TO: Emily Lemieux

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
1652284	OW-1	ON 169/03 AO&OG	Providence Bay Groundwater Parameters	Dissolved Organic Carbon	mg/L	5	8.0
1652292	OW-3A	ON 169/03 AO&OG	Providence Bay Groundwater Parameters	Dissolved Organic Carbon	mg/L	5	14.9
1652292	OW-3A	ON 169/03 AO&OG	Providence Bay Groundwater Parameters	Total Dissolved Solids	mg/L	500	654
1652295	OW-5	ON 169/03 AO&OG	Providence Bay Groundwater Parameters	Dissolved Organic Carbon	mg/L	5	6.7
1652298	OW-8	ON 169/03 AO&OG	Providence Bay Groundwater Parameters	Dissolved Organic Carbon	mg/L	5	11.7
1652300	OW-10	ON 169/03 AO&OG	Providence Bay Groundwater Parameters	Dissolved Organic Carbon	mg/L	5	6.6
1652304	OW-13A	ON 169/03 AO&OG	Providence Bay Groundwater Parameters	Alkalinity (as CaCO3)	mg/L	30-500	555
1652304	OW-13A	ON 169/03 AO&OG	Providence Bay Groundwater Parameters	Dissolved Organic Carbon	mg/L	5	20.6
1652304	OW-13A	ON 169/03 AO&OG	Providence Bay Groundwater Parameters	Total Dissolved Solids	mg/L	500	940
1652305	OW-13B	ON 169/03 AO&OG	Providence Bay Groundwater Parameters	Dissolved Organic Carbon	mg/L	5	7.2
1652306	OW-14A	ON 169/03 AO&OG	Providence Bay Groundwater Parameters	Dissolved Organic Carbon	mg/L	5	10.8
1652306	OW-14A	ON 169/03 AO&OG	Providence Bay Groundwater Parameters	Total Dissolved Solids	mg/L	500	530
1652328	PB-DUP2	ON 169/03 AO&OG	Providence Bay Groundwater Parameters	Dissolved Organic Carbon	mg/L	5	6.6

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Quality Assurance

CLIENT NAME: WOOD CANADA LTD.

AGAT WORK ORDER: 20T673696

PROJECT: Providance Bay GW

ATTENTION TO: Emily Lemieux

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Nov 16, 2020			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Volatile Organic Compounds in Water (ug/L)															
Vinyl Chloride	1660854		<0.17	<0.17	NA	< 0.17	99%	50%	140%	84%	50%	140%	102%	50%	140%
Methylene Chloride	1660854		<0.30	<0.30	NA	< 0.30	81%	50%	140%	85%	60%	130%	77%	50%	140%
Benzene	1660854		<0.20	<0.20	NA	< 0.20	79%	50%	140%	73%	60%	130%	91%	50%	140%
Toluene	1660854		<0.20	<0.20	NA	< 0.20	102%	50%	140%	101%	60%	130%	80%	50%	140%
1,4-Dichlorobenzene	1660854		<0.10	<0.10	NA	< 0.10	105%	50%	140%	111%	60%	130%	94%	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:

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Quality Assurance

CLIENT NAME: WOOD CANADA LTD.

AGAT WORK ORDER: 20T673696

PROJECT: Providance Bay GW

ATTENTION TO: Emily Lemieux

SAMPLING SITE:

SAMPLED BY:

Water Analysis

RPT Date: Nov 16, 2020

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Providence Bay Groundwater Parameters															
Electrical Conductivity	1648772		4940	4970	0.6%	< 2	100%	90%	110%						
pH	1648772		8.00	8.01	0.1%	NA	100%	90%	110%						
Total Dissolved Solids	1652284	1652284	492	500	1.6%	< 20	92%	80%	120%						
Alkalinity (as CaCO3)	1648772		150	152	1.3%	< 5	97%	80%	120%						
Chloride	1652284	1652284	48.4	48.5	0.2%	< 0.10	94%	70%	130%	103%	80%	120%	104%	70%	130%
Nitrate as N	1652284	1652284	<0.25	<0.25	NA	< 0.05	102%	70%	130%	107%	80%	120%	106%	70%	130%
Nitrite as N	1652284	1652284	<0.25	<0.25	NA	< 0.05	97%	70%	130%	101%	80%	120%	101%	70%	130%
Sulphate	1652284	1652284	49.6	50.0	0.8%	< 0.10	102%	70%	130%	105%	80%	120%	105%	70%	130%
Ammonia as N	1647870		0.06	0.05	NA	< 0.02	112%	70%	130%	103%	80%	120%	98%	70%	130%
Total Phosphorus	1652306	1652306	0.06	0.05	NA	< 0.02	101%	70%	130%	97%	80%	120%	97%	70%	130%
Chemical Oxygen Demand	1654815		20	21	NA	< 5	96%	80%	120%	103%	90%	110%	92%	70%	130%
Dissolved Organic Carbon	1652479		2.0	2.1	NA	< 0.5	101%	90%	110%	101%	90%	110%	96%	80%	120%
Phenols	1684249		<0.001	<0.001	NA	< 0.001	104%	90%	110%	101%	90%	110%	101%	80%	120%
Dissolved Calcium	1652291	1652291	35.7	36.1	1.1%	< 0.05	94%	70%	130%	92%	80%	120%	90%	70%	130%
Dissolved Magnesium	1652291	1652291	25.5	25.7	0.8%	< 0.05	95%	70%	130%	92%	80%	120%	89%	70%	130%
Dissolved Potassium	1652291	1652291	4.58	4.64	1.3%	< 0.05	92%	70%	130%	90%	80%	120%	87%	70%	130%
Dissolved Sodium	1652291	1652291	8.38	8.45	0.8%	< 0.05	98%	70%	130%	96%	80%	120%	91%	70%	130%
Dissolved Arsenic	1652284	1652284	0.001	<0.001	NA	< 0.001	107%	70%	130%	86%	80%	120%	115%	70%	130%
Dissolved Barium	1652284	1652284	0.026	0.026	0.0%	< 0.002	100%	70%	130%	89%	80%	120%	103%	70%	130%
Dissolved Boron	1652284	1652284	0.254	0.252	0.8%	< 0.010	106%	70%	130%	89%	80%	120%	110%	70%	130%
Dissolved Cadmium	1652284	1652284	<0.0001	<0.0001	NA	< 0.0001	100%	70%	130%	110%	80%	120%	105%	70%	130%
Dissolved Chromium	1652284	1652284	<0.002	<0.002	NA	< 0.002	101%	70%	130%	112%	80%	120%	102%	70%	130%
Dissolved Copper	1652284	1652284	<0.001	<0.001	NA	< 0.001	103%	70%	130%	91%	80%	120%	103%	70%	130%
Dissolved Iron	1652284	1652284	0.468	0.412	12.7%	< 0.010	111%	70%	130%	105%	80%	120%	94%	70%	130%
Dissolved Lead	1652284	1652284	<0.0005	<0.0005	NA	< 0.0005	101%	70%	130%	90%	80%	120%	103%	70%	130%
Dissolved Manganese	1652284	1652284	0.004	0.004	NA	< 0.002	98%	70%	130%	86%	80%	120%	101%	70%	130%
Dissolved Mercury	1652284	1652284	<0.0001	<0.0001	NA	< 0.0001	100%	70%	130%	102%	80%	120%	101%	70%	130%
Dissolved Zinc	1652284	1652284	<0.005	<0.005	NA	< 0.005	104%	70%	130%	107%	80%	120%	105%	70%	130%

Comments: NA signifies Not Applicable.
If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Water Analysis - TKN

Total Kjeldahl Nitrogen	1652475		0.6	0.6	0.0%	< 0.1	83%	70%	130%	114%	80%	120%	98%	70%	130%

Certified By: Iris Verástegui

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Method Summary

CLIENT NAME: WOOD CANADA LTD.

AGAT WORK ORDER: 20T673696

PROJECT: Providance Bay GW

ATTENTION TO: Emily Lemieux

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Vinyl Chloride	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Methylene 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
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

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Method Summary

CLIENT NAME: WOOD CANADA LTD. **AGAT WORK ORDER: 20T673696**

PROJECT: Providance Bay GW **ATTENTION TO: Emily Lemieux**

SAMPLING SITE: **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
pH	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	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	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
Total Phosphorus	INOR-93-6057	modified from LACHAT 10-115-01-3A	LACHAT FIA
Chemical Oxygen Demand	INOR-93-6042	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
Dissolved Calcium	MET-93-6105	modified from EPA 6010D	ICP/OES
Dissolved Magnesium	MET-93-6105	modified from EPA 6010D	ICP/OES
Dissolved Potassium	MET-93-6105	modified from EPA 6010D	ICP/OES
Dissolved Sodium	MET-93-6105	modified from EPA 6010D	ICP/OES
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	CVAAS
Dissolved Zinc	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Lab Filtration Performed			FILTRATION
Total Kjeldahl Nitrogen	INST 0520	EPA 351.2	DISCRETE ANALYZER

8LGBHK

AGAT Laboratories

5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
Ph: 905.712.5100 Fax: 905.712.5122
webearth.agatlabs.com

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Laboratory Use Only
Work Order #: 20T673696.
Cooler Quantity:
Arrival Temperatures: See attached
Custody Seal Intact: ☐Yes ☐No ☐N/A
Notes: on ice

Report Information:
Company: Wood
Contact: Emily Lemieux
Address: 131 Fielding Road
Lively, ON P3Y 1L7
Phone: 705-682-2632 Fax: 705-682-2260
Reports to be sent to:
1. Email: emily.lemieux@woodplc.com
2. Email:

Regulatory Requirements: ☐ No Regulatory Requirement
(Please check all applicable boxes)

☐ Regulation 153/04
Table (Indicate One) ☐ Ind/Com ☐ Res/Park ☐ Agriculture
Soil Texture (Check One) ☐ Coarse ☐ Fine

☐ Sewer Use
☐ Sanitary ☐ Storm
Region (Indicate One) ☐ MISA

☐ Regulation 558
☐ CCME
☐ Prov. Water Quality Objectives (PWQO)
☒ Other ODWS (Indicate One)

Is this submission for a **Record of Site Condition?** ☐ Yes ☐ No

Report Guideline on *Certificate of Analysis* ☐ Yes ☐ No

Turnaround Time (TAT) Required:
Regular TAT ☑ 5 to 7 Business Days
Rush TAT (Rush Surcharges Apply)
☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day
OR Date Required (Rush Surcharges May Apply):
Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*
For 'Same Day' analysis, please contact your AGAT CPM

Project Information:
Project: Providence Bay GW
Site Location:
Sampled By:
AGAI Quote #: 42882 PO:
Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:
Bill To Same: Yes ☐ No ☐
Company:
Contact:
Address:
Email:

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

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Y/N
OW-1	3 NOV 20	1300	10	Water		Y
OW-2			10	Water		Y
OW-3A			10	Water		Y
OW-3B			10	Water		Y
OW-4			10	Water		Y
OW-5			16	Water		Y
OW-6			10	Water		Y
OW-7			16	Water		Y
OW-8			16	Water		Y
OW-9			10	Water		Y
OW-10			16	Water		Y

Field Filtered - Metals, Hg, CrVI

O. Reg 153
- Metals and Inorganics ☐ All Metals ☐ 153 Metals (excl. Hydrides) ☐ Hydride Metals ☐ 153 Metals (Incl. Hydrides)
- ORPs: ☐ B-HWS ☐ Cl ☐ CN ☐ Cr⁶⁺ ☐ EC ☐ FOC ☐ Hg ☐ pH ☐ SAR
- Full Metals Scan
- Regulation/Custom Metals
- Nutrients: ☐ TP ☐ NH_3 ☐ TKN ☐ NO_3 ☐ NO_2 ☐ NO_3+NO_2
- Volatiles: ☐ VOC ☐ BTEX ☐ THM
- PHCs F1 - F4
- ABNs
- PAHs
- PCBs: ☐ Total ☐ Aroclors
- Organochlorine Pesticides
- TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs
- Sewer Use
- Groundwater Column

Samples Relinquished By (Print Name and Sign)	Date	Time	Samples Received By (Print Name and Sign)	Date	Time
D. Courchesne D Courchesne	04 NOV 20	1000	SIMRAN	NOV 5/20	
				Date 10:00	Time am

Page 1 of 2
N°:

AGAT Laboratories

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Mississauga, Ontario L4Z 1Y2
Ph: 905.712.5100 Fax: 905.712.5122
webearth.agatlabs.com

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Laboratory Use Only
Work Order #: 20T673696

Cooler Quantity:
Arrival Temperatures:
Custody Seal Intact: ☐Yes ☐No ☐N/A
Notes:

Report Information:
Company: Wood
Contact: Emily Lemieux
Address: 131 Fielding Road
Lively, ON P3Y 1L7
Phone: 705-682-2632 Fax: 705-682-2260
Reports to be sent to:
1. Email: emily.lemieux@woodplc.com
2. Email:

Regulatory Requirements: ☐ No Regulatory Requirement
(Please check all applicable boxes)

☐ Regulation 153/04
Table (Indicate One) ☐ Ind/Com ☐ Res/Park ☐ Agriculture
Soil Texture (Check One) ☐ Coarse ☐ Fine

☐ Sewer Use
☐ Sanitary ☐ Storm
Region (Indicate One) ☐ MISA

☐ Regulation 558
☐ CCME
☐ Prov. Water Quality Objectives (PWQO)
☒ Other
6DWS (Indicate One)

Is this submission for a **Record of Site Condition?** ☐ Yes ☐ No

Report Guideline on *Certificate of Analysis* ☐ Yes ☐ No

Turnaround Time (TAT) Required:
Regular TAT ☑ 5 to 7 Business Days
Rush TAT (Rush Surcharges Apply)
☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day
OR Date Required (Rush Surcharges May Apply):
Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*
For 'Same Day' analysis, please contact your AGAT CPM

Project Information:
Project: Providence Bay GW
Site Location:
Sampled By:
AGAT Quote #: 42882 PO:
Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:
Bill To Same: Yes ☐ No ☐
Company:
Contact:
Address:
Email:

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

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Y / N	Field Filtered - Metals, Hg, CrVI	O. Reg 153: Metals and Inorganics ☐ All Metals ☐ 153 Metals (excl. Hydrides) ☐ Hydride Metals ☐ 153 Metals (incl. Hydrides)	ORPs: ☐ B-HWS ☐ Cl ☐ CN ☐ Cr6+ ☐ EC ☐ FOC ☐ Hg ☐ pH ☐ SAR	Full Metals Scan	Regulation/Custom Metals	Nutrients: ☐ TP ☐ NH_3 ☐ TKN ☐ NO_3 ☐ NO_2 ☐ NO_3+NO_2	Volatiles: ☐ VOC ☐ BTEX ☐ THM	PHCs F1 - F4	ABNs	PAHs	PCBs: ☐ Total ☐ Aroclors	Organochlorine Pesticides	TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	Sewer Use	Groundwater Column
OW-1	3 Nov 20	1300	10	Water	V.I. & TDS PARTIAL	Y															☑
~~OW-2~~ 12A	↓	↓	10	Water		Y															☑
~~OW-3~~ 12B			10	Water	V.I. & TDS PARTIAL	Y															☑
~~OW-3B~~ 13A			10	Water		Y															☑
~~OW-4~~ 13B			10	Water		Y															☑
~~OW-5~~ 14A			10	Water		Y															☑
~~OW-6~~ 14B			10	Water		Y															☑
~~OW-7~~ PB - DUP1			10	Water		Y															☑
~~OW-8~~ PBK - DUP2	↓	↓	10	Water		Y															☑
~~OW-9~~				Water																	☑
~~OW-10~~				Water																	☑

Samples Relinquished By (Print Name and Sign)	Date	Time	Samples Received By (Print Name and Sign)	Date	Time
D Lemieux / Lemieux.	04 Nov 20	1006			
Samples Relinquished By (Print Name and Sign)	Date	Time	Samples Received By (Print Name and Sign)	Date	Time
Samples Relinquished By (Print Name and Sign)	Date	Time	Samples Received By (Print Name and Sign)	Date	Time

Page 2 of 2
N°:

Document ID: DW-7S-1511-019
Pink Copy - Client | Yellow Copy - AGAT | White Copy- AGAT
Date Issued: March 16, 2018

AGAT Laboratories

Sample Temperature Log

Client: WOOD

# of Coolers: 8

COC# or Work Order #:

# of Submissions: 2

Arrival Temperatures - Branch/Driver

Cooler #1:	3.2	3.3	3.5
Cooler #2:	4.1	4.9	5.2
Cooler #3:	3.9	3.6	3.8
Cooler #4:	2.0	2.3	2.9
Cooler #5:	4.1	4.3	4.8
Cooler #6:	3.1	3.2	3.5
Cooler #7:	4.4	4.6	5.3
Cooler #8	4.3	4.8	4.7
Cooler #9:			
Cooler #10:			

IR Gun ID:

Taken By: SIMRAN

Date (yyyy/mm/dd): 2020/11/05 Time: 10 : 00 AM / PM

Arrival Temperatures - Laboratory

Cooler #1:			
Cooler #2:			
Cooler #3:			
Cooler #4:			
Cooler #5:			
Cooler #6:			
Cooler #7:			
Cooler #8			
Cooler #9:			
Cooler #10:			

IR Gun ID:

Taken By:

Date (yyyy/mm/dd): Time: : AM / 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

Page: of

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

CLIENT NAME: WOOD CANADA LTD.
131 FIELDING ROAD
LIVELY, ON P3Y1L7
(705) 682-2632
ATTENTION TO: Emily Lemieux
PROJECT: Providence Bay Residential GW
AGAT WORK ORDER: 20T673641
MICROBIOLOGY ANALYSIS REVIEWED BY: Nivine Basily, Inorganics Report Writer
WATER ANALYSIS REVIEWED BY: Yris Verastegui, Report Reviewer
DATE REPORTED: Nov 13, 2020
PAGES (INCLUDING COVER): 8
VERSION*: 1

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

*Notes

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 following analysis, unless expressly agreed otherwise in writing. Please contact your Client Project Manager if you require additional sample storage time.
- 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.

AGAT Laboratories

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FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 20T673641

PROJECT: Providence Bay Residential GW

CLIENT NAME: WOOD CANADA LTD.

ATTENTION TO: Emily Lemieux

SAMPLING SITE:

SAMPLED BY:

Total Coliforms & E. Coli (Using MI Agar)

DATE RECEIVED: 2020-11-05

DATE REPORTED: 2020-11-13

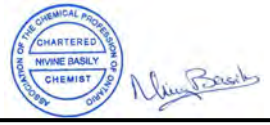
				SAMPLE DESCRIPTION:	Paquet
				SAMPLE TYPE:	Water
				DATE SAMPLED:	2020-11-03 17:00
Parameter	Unit	G / S	RDL	1647870	
Escherichia coli	CFU/100mL	0	1	ND	
Total Coliforms	CFU/100mL	0	1	ND	

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

1647870 ND - Not Detected.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 20T673641

PROJECT: Providence Bay Residential GW

CLIENT NAME: WOOD CANADA LTD.

ATTENTION TO: Emily Lemieux

SAMPLING SITE:

SAMPLED BY:

Groundwater Parameters

DATE RECEIVED: 2020-11-05

DATE REPORTED: 2020-11-13

					SAMPLE DESCRIPTION:	Paquet
					SAMPLE TYPE:	Water
					DATE SAMPLED:	2020-11-03 17:00
Parameter	Unit	G / S: A	G / S: B	RDL		1647870
Electrical Conductivity	µS/cm			2		519
pH	pH Units		6.5-8.5	NA		7.94
Total Dissolved Solids	mg/L		500	20		292[<B]
Alkalinity (as CaCO3)	mg/L		30-500	5		210
Chloride	mg/L		250	0.10		4.80[<B]
Nitrate as N	mg/L	10.0		0.05		<0.05
Nitrite as N	mg/L	1.0		0.05		<0.05
Sulphate	mg/L		500	0.10		68.6[<B]
Ammonia as N	mg/L			0.02		0.06
Total Phosphorus	mg/L			0.02		<0.02
Chemical Oxygen Demand	mg/L			5		<5
Total Kjeldahl Nitrogen	mg/L			0.10		0.16
Dissolved Organic Carbon	mg/L		5	0.5		1.9[<B]
Phenols	mg/L			0.001		<0.001
Dissolved Calcium	mg/L			0.05		51.7
Dissolved Magnesium	mg/L			0.05		27.6
Dissolved Potassium	mg/L			0.05		3.41
Dissolved Sodium	mg/L	20		0.05		5.75[<A]
Dissolved Arsenic	mg/L	0.01		0.001		<0.001
Dissolved Barium	mg/L	1.0		0.002		0.012[<A]
Dissolved Boron	mg/L	5.0		0.010		0.198[<A]
Dissolved Cadmium	mg/L	0.005		0.0001		<0.0001
Dissolved Chromium	mg/L	0.05		0.002		<0.002
Dissolved Copper	mg/L			0.001		0.003
Dissolved Iron	mg/L			0.010		<0.010
Dissolved Lead	mg/L	0.010		0.0005		<0.0005
Dissolved Manganese	mg/L			0.002		0.003
Dissolved Mercury	mg/L	0.001		0.0001		<0.0001
Dissolved Zinc	mg/L			0.005		0.015

Certified By: Iris Verástegui

AGAT Laboratories

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FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 20T673641

PROJECT: Providence Bay Residential GW

CLIENT NAME: WOOD CANADA LTD.

ATTENTION TO: Emily Lemieux

SAMPLING SITE:

SAMPLED BY:

Groundwater Parameters

DATE RECEIVED: 2020-11-05

DATE REPORTED: 2020-11-13

					SAMPLE DESCRIPTION:	Paquet
					SAMPLE TYPE:	Water
					DATE SAMPLED:	2020-11-03 17:00
Parameter	Unit	G / S: A	G / S: B	RDL	1647870	
Lab Filtration Performed					Y	

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

1647870 Metals, DOC, and Hg analysis completed on a lab filtered sample.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: Iris Verástegui

AGAT Laboratories

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MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
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Quality Assurance

CLIENT NAME: WOOD CANADA LTD.

AGAT WORK ORDER: 20T673641

PROJECT: Providence Bay Residential GW

ATTENTION TO: Emily Lemieux

SAMPLING SITE:

SAMPLED BY:

Microbiology Analysis

RPT Date: Nov 13, 2020			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Total Coliforms & E. Coli (Using MI Agar)															
Escherichia coli	1647446		ND	ND	NA	< 1									
Total Coliforms	1647446		ND	ND	NA	< 1									

Comments: ND - Not Detected, NA - % RPD Not Applicable

Certified By:

AGAT Laboratories

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

Quality Assurance

CLIENT NAME: WOOD CANADA LTD.

AGAT WORK ORDER: 20T673641

PROJECT: Providence Bay Residential GW

ATTENTION TO: Emily Lemieux

SAMPLING SITE:

SAMPLED BY:

Water Analysis

RPT Date: Nov 13, 2020			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Groundwater Parameters															
Electrical Conductivity	1648732		1790	1800	0.6%	< 2	101%	90%	110%						
pH	1648732		8.01	7.91	1.3%	NA	100%	90%	110%						
Total Dissolved Solids	1653388		82	84	NA	< 20	102%	80%	120%						
Alkalinity (as CaCO3)	1648732		259	263	1.5%	< 5	100%	80%	120%						
Chloride	1653839		15.8	15.6	1.3%	< 0.10	94%	70%	130%	105%	80%	120%	104%	70%	130%
Nitrate as N	1653839		<0.25	<0.25	NA	< 0.05	101%	70%	130%	103%	80%	120%	107%	70%	130%
Nitrite as N	1653839		<0.25	<0.25	NA	< 0.05	91%	70%	130%	97%	80%	120%	101%	70%	130%
Sulphate	1653839		14.7	14.4	2.1%	< 0.10	102%	70%	130%	102%	80%	120%	104%	70%	130%
Ammonia as N	1647870	1647870	0.06	0.05	NA	< 0.02	112%	70%	130%	103%	80%	120%	98%	70%	130%
Total Phosphorus	1624139		0.08	0.08	NA	< 0.02	101%	70%	130%	97%	80%	120%	99%	70%	130%
Chemical Oxygen Demand	1634385		<5	<5	NA	< 5	105%	80%	120%	105%	90%	110%	111%	70%	130%
Total Kjeldahl Nitrogen	1647870	1647870	0.16	0.19	NA	< 0.10	101%	70%	130%	103%	80%	120%	102%	70%	130%
Dissolved Organic Carbon	1654036		2.6	2.5	3.9%	< 0.5	103%	90%	110%	103%	90%	110%	100%	80%	120%
Phenols	1675437		<0.001	<0.001	NA	< 0.001	96%	90%	110%	98%	90%	110%	95%	80%	120%
Dissolved Calcium	1645660		46.4	47.0	1.3%	< 0.05	89%	70%	130%	93%	80%	120%	96%	70%	130%
Dissolved Magnesium	1645660		11.4	11.4	0.0%	< 0.05	90%	70%	130%	94%	80%	120%	96%	70%	130%
Dissolved Potassium	1645660		3.87	3.88	0.3%	< 0.05	88%	70%	130%	91%	80%	120%	92%	70%	130%
Dissolved Sodium	1645660		64.9	65.9	1.5%	< 0.05	93%	70%	130%	97%	80%	120%	97%	70%	130%
Dissolved Arsenic	1648314		<0.001	<0.001	NA	< 0.001	96%	70%	130%	104%	80%	120%	103%	70%	130%
Dissolved Barium	1648314		0.149	0.145	2.7%	< 0.002	99%	70%	130%	102%	80%	120%	97%	70%	130%
Dissolved Boron	1648314		0.063	0.059	6.6%	< 0.010	103%	70%	130%	105%	80%	120%	108%	70%	130%
Dissolved Cadmium	1648314		<0.0001	<0.0001	NA	< 0.0001	96%	70%	130%	101%	80%	120%	100%	70%	130%
Dissolved Chromium	1648314		<0.002	<0.002	NA	< 0.002	96%	70%	130%	101%	80%	120%	95%	70%	130%
Dissolved Copper	1648314		0.001	0.002	NA	< 0.001	96%	70%	130%	101%	80%	120%	93%	70%	130%
Dissolved Iron	1648314		<0.010	<0.010	NA	< 0.010	96%	70%	130%	108%	80%	120%	93%	70%	130%
Dissolved Lead	1648314		<0.0005	<0.0005	NA	< 0.0005	95%	70%	130%	98%	80%	120%	92%	70%	130%
Dissolved Manganese	1648314		0.421	0.423	0.5%	< 0.002	97%	70%	130%	101%	80%	120%	99%	70%	130%
Dissolved Mercury	1649232		<0.0001	<0.0001	NA	< 0.0001	100%	70%	130%	100%	80%	120%	90%	70%	130%
Dissolved Zinc	1648314		<0.005	<0.005	NA	< 0.005	96%	70%	130%	102%	80%	120%	96%	70%	130%

Comments: NA signifies Not Applicable.
If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Certified By: Iris Verástegui

AGAT Laboratories

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

Method Summary

CLIENT NAME: WOOD CANADA LTD.

AGAT WORK ORDER: 20T673641

PROJECT: Providence Bay Residential GW

ATTENTION TO: Emily Lemieux

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Microbiology Analysis			
Escherichia coli	MIC-93-7010	EPA 1604	Membrane Filtration
Total Coliforms	MIC-93-7010	EPA 1604	Membrane Filtration
Water Analysis			
Electrical Conductivity	INOR-93-6000	modified from SM 2510 B	PC TITRATE
pH	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	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	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
Total Phosphorus	INOR-93-6057	modified from LACHAT 10-115-01-3A	LACHAT FIA
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Total Kjeldahl Nitrogen	INOR-93-6048	modified from EPA 351.2 and SM 4500-NORG D	LACHAT FIA
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
Dissolved Calcium	MET-93-6105	modified from EPA 6010D	ICP/OES
Dissolved Magnesium	MET-93-6105	modified from EPA 6010D	ICP/OES
Dissolved Potassium	MET-93-6105	modified from EPA 6010D	ICP/OES
Dissolved Sodium	MET-93-6105	modified from EPA 6010D	ICP/OES
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	CVAAS
Dissolved Zinc	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Lab Filtration Performed			FILTRATION

AGAT Laboratories

MIBI

5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
Ph: 905.712.5100 Fax: 905.712.5122
webearth.agatlabs.com

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Laboratory Use Only

Work Order #: 20T673641

Cooler Quantity: 1 Sm Blue

Arrival Temperatures: 1.8 | 1.9 | 1.3

Custody Seal Intact: ☐Yes ☐No ☐N/A

Notes: On Ice

Report Information:

Company: Wood
Contact: Emily Lemieux
Address: 131 Fielding Road
Lively, ON P3Y 1L7
Phone: 705-682-2632 Fax: 705-682-2260
Reports to be sent to:
1. Email: emily.lemieux@woodplc.com
2. Email:

Regulatory Requirements: ☐ No Regulatory Requirement

(Please check all applicable boxes)

☐ Regulation 153/04
Table ____ *Indicate One*
☐ Ind/Com
☐ Res/Park
☐ Agriculture
Soil Texture *(Check One)*
☐ Coarse
☐ Fine

☐ Sewer Use
☐ Sanitary
☐ Storm
Region ____ *Indicate One*
☐ MISA

☐ Regulation 558
☐ CCME
☐ Prov. Water Quality Objectives (PWQO)
☒ Other
ODWS *Indicate One*

Is this submission for a **Record of Site Condition?** ☐ Yes ☐ No

Report Guideline on *Certificate of Analysis* ☐ Yes ☐ No

Turnaround Time (TAT) Required:

Regular TAT ☑ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply): ____

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

For 'Same Day' analysis, please contact your AGAT CPM

Project Information:

Project: Providence Bay Residential GW
Site Location:
Sampled By:
AGAT Quote #: 42882 PO:
Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:

Bill to Same: Yes ☐ No ☐

Company:
Contact:
Address:
Email:

Sample Matrix Legend

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

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI (Y/N)	O. Reg 153: Metals and Inorganics; All Metals; 153 Metals (excl. Hydrides); Hydride Metals; 153 Metals (Incl. Hydrides); ORPs: B-HWS, Cl, CN, Cr^{6+}, EC, F-, OC, Hg, pH, SAR	Full Metals Scan	Regulation/Custom Metals	Nutrients: TP, NH_3, TKN, NO_3, NO_2, NO_3+NO_2	Volatiles: VOC, BTEX, THM	PHCs F1 - F4	ABNs	PAHs	PCBs: Total, Aroclors	Organochlorine Pesticides	TCLP: M&I, VOCs, ABNs, B(a)P, PCBs	Sewer Use	Groundwater Column	E.coli and Total Coliform
Irving				Water														☑	☑
Paquet	03 Nov 20	17:00	11	Water		N												☑	☑

Samples Relinquished By (Print Name and Sign)	Date	Time	Samples Received By (Print Name and Sign)	Date	Time
D Courchesne / Courchesne.	04 Nov 20	10:00	SMRAN BRW	NOV 5/20	9:50am
Samples Relinquished By (Print Name and Sign)	Date	Time	Samples Received By (Print Name and Sign)	Date	Time
Samples Relinquished By (Print Name and Sign)	Date	Time	Samples Received By (Print Name and Sign)	Date	Time

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N°:

Document ID: DIV-7S-1511-C25

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Date Issued: March 16, 2015

APPENDIX E

SUMMARY OF GROUNDWATER GEOCHEMICAL ANALYSES

Groundwater Geochemical Results OW-1

Parameters	Units	ODWS [1]	Jun-02	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
General Chemistry																						
Alkalinity (Total as CaCO3)	mg/L	30-500 OG [2]	284.5	292.5	300	303	353	317	279	265	264	228	301	280	310	340	291	349	319	418	350	377
Ammonia	mg/L		0.07	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
Chloride	mg/L	250 AO [3]	47.5	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
COD	mg/L		-	16.5	19.5	5	23	27	17	10	13	26	21	11	14	19	12	15	20	16	15	30
Conductivity	umho/cm		823.5	773	766	753	928	790	700	651	647	605	788	720	780	850	818	850	722	978	878	888
Dissolved Organic Carbon (DOC)	mg/L	5 AO	4.2	**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**
Nitrate (N)	mg/L	10 MAC [4]	<0.2	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
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	<0.25	<0.25	<0.10	<0.25	<0.25	<0.25
pH	pH	6.5-8.5	7.87	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
Phenols	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	0.002
Total Phosphorus	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	0.06	0.16	0.11	<0.02	<0.02
Sulphate	mg/L	500 AO	121	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
Total Dissolved Solids (TDS)	mg/L	500 AO	**507**	**506**	**555**	**516**	**602**	**513**	377	410	420	400	**516**	384	476	462	414	478	394	**602**	418	492
TKN	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.96	2.38	0.86	1.37	1.47	1.5
Metals																						
Arsenic	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	0.001
Barium	mg/L	1 MAC	0.0235	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
Boron	mg/L	5 IMAC	0.11	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
Cadmium	mg/L	0.005 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0001
Calcium	mg/L		80.4	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
Chromium	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	0.005	<0.003	<0.002
Copper	mg/L	1 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.001
Iron	mg/L	0.3 AO	0.235	**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**
Lead	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0005
Magnesium	mg/L		57.6	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
Manganese	mg/L	0.05 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.004	0.007	0.007	0.004	0.005	0.004
Mercury	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<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
Sodium	mg/L	200 AO	16.3	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
Zinc	mg/L	5 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<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	<0.0002
Benzene	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004
Methylene Chloride(Dichloromethane)	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0006
Toluene	mg/L	0.024 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004
Vinyl Chloride	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00034

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.

Groundwater Geochemical Results OW-2

Parameters	Units	ODWS [1]	Jun-02	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
General Chemistry																						
Alkalinity (Total as CaCO3)	mg/L	30-500 OG [2]	496	286	276	261	234	226	246	200	196	245	206	190	180	180	177	194	208	193	185	179
Ammonia	mg/L		0.66	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
Chloride	mg/L	250 AO [3]	82	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
COD	mg/L		-	24	18	10	17	41	20	7	7	81	31	9.5	<4	8.1	<5	10	7	<5	<5	7
Conductivity	umho/cm		1370	850	794	801	771	708	792	622	588	739	592	530	500	480	553	534	524	519	513	466
Dissolved Organic Carbon (DOC)	mg/L	5 AO	**15.2**	**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
Nitrate (N)	mg/L	10 MAC [4]	<0.2	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
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
pH	pH	6.5-8.5	7.50	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
Phenols	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	0.002
Total Phosphorus	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	0.10	0.24	0.06	0.05	0.05
Sulphate	mg/L	500 AO	230	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
Total Dissolved Solids (TDS)	mg/L	500 AO	**933**	**560**	476	**568**	**530**	482	409	380	402	414	**608**	288	306	350	306	304	296	298	238	252
TKN	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.20	0.19	0.22	0.20	0.62	0.40
Metals																						
Arsenic	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.001
Barium	mg/L	1 MAC	0.029	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
Boron	mg/L	5 IMAC	0.29	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
Cadmium	mg/L	0.005 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0001
Calcium	mg/L		154	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
Chromium	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.002
Copper	mg/L	1 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	0.001
Iron	mg/L	0.3 AO	**3.87**	**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
Lead	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0005
Magnesium	mg/L		89.5	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
Manganese	mg/L	0.05 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.003	0.011	0.017	0.014	0.023	<0.002
Mercury	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<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
Sodium	mg/L	200 AO	51.2	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
Zinc	mg/L	5 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	0.007	<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
Benzene	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Methylene Chloride(Dichloromethane)	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Toluene	mg/L	0.024 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<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

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.

Groundwater Geochemical Results OW-3A

Parameters	Units	ODWS [1]	Jun-02	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
General Chemistry																						
Alkalinity (Total as CaCO3)	mg/L	30-500 OG [2]	246	297	244	250	281	306	283	277	256	259	282	290	260	290	274	376	**508**	424	351	500
Ammonia	mg/L		0.05	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
Chloride	mg/L	250 AO [3]	21.5	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
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
Conductivity	umho/cm		624	710	500	513	607	679	711	614	562	600	636	650	590	650	659	835	1040	957	809	1110
Dissolved Organic Carbon (DOC)	mg/L	5 AO	2.7	**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**
Nitrate (N)	mg/L	10 MAC [4]	<0.2	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
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	<0.25	<0.25	<0.25	<0.25	<0.25
pH	pH	6.5-8.5	7.95	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
Phenols	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	0.001	0.003
Total Phosphorus	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.09	0.26	0.09	0.23	0.03	0.05
Sulphate	mg/L	500 AO	65.7	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
Total Dissolved Solids (TDS)	mg/L	500 AO	363	**554**	330	324	316	411	388	390	365	392	374	336	340	328	362	436	**642**	**534**	372	**654**
TKN	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.32	0.38	1.0	0.78	0.76	1.50
Metals																						
Arsenic	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	0.001
Barium	mg/L	1 MAC	0.022	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
Boron	mg/L	5 IMAC	0.14	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
Cadmium	mg/L	0.005 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0001
Calcium	mg/L		56.5	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
Chromium	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	0.004	<0.003	0.002
Copper	mg/L	1 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	0.003
Iron	mg/L	0.3 AO	0.12	<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
Lead	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0005
Magnesium	mg/L		44.4	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
Manganese	mg/L	0.05 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.003	0.007	0.003	0.003	0.003	0.003
Mercury	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<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
Sodium	mg/L	200 AO	12	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
Zinc	mg/L	5 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	0.007	<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
Benzene	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004
Methylene Chloride(Dichloromethane)	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0006
Toluene	mg/L	0.024 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004
Vinyl Chloride	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00034

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.

Groundwater Geochemical Results OW-3B

Parameters	Units	ODWS [1]	Jun-02	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
General Chemistry																						
Alkalinity (Total as CaCO3)	mg/L	30-500 OG [2]	291	213	191	138	188	153	182	189	183	137	184	220	170	190	156	160	184	211	199	206
Ammonia	mg/L		0.27	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
Chloride	mg/L	250 AO [3]	219	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
COD	mg/L		-	21	11	12	36	81	44	14	11	<4	89	230	11	190	<5	<5	<5	<5	<5	12
Conductivity	umho/cm		1380	969	840	595	832	633	916	808	770	542	758	870	670	680	645	544	565	762	726	659
Dissolved Organic Carbon (DOC)	mg/L	5 AO	**8.8**	**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
Nitrate (N)	mg/L	10 MAC [4]	<0.2	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
Nitrite (N)	mg/L	1 MAC	<2.0	<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
pH	pH	6.5-8.5	7.80	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
Phenols	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	0.002
Total Phosphorus	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	0.08	0.1	0.06	0.08	0.05
Sulphate	mg/L	500 AO	183	202	229	154	175	149	184	187	180	110	150	190	150	170	133	111	119	147	139	118
Total Dissolved Solids (TDS)	mg/L	500 AO	**861**	**728**	**622**	**973**	**572**	437	458	**505**	490	354	444	**548**	442	466	362	314	352	-	392	402
TKN	mg/L				-	-	-	-	-	-	-	-	-	-	-	-	0.13	0.12	0.18	0.40	1.14	0.60
Metals																						
Arsenic	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.001
Barium	mg/L	1 MAC	0.021	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
Boron	mg/L	5 IMAC	0.64	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
Cadmium	mg/L	0.005 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0001
Calcium	mg/L		110	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
Chromium	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.002
Copper	mg/L	1 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	0.004
Iron	mg/L	0.3 AO	**0.54**	**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
Lead	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0005
Magnesium	mg/L		92.6	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
Manganese	mg/L	0.05 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.004	0.003	0.005	0.020	0.010	0.002
Mercury	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<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
Sodium	mg/L	200 AO	51.6	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
Zinc	mg/L	5 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<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
Benzene	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Methylene Chloride(Dichloromethane)	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Toluene	mg/L	0.024 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0015
Vinyl Chloride	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<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.

Groundwater Geochemical Results OW-4

Parameters	Units	ODWS [1]	Jun-02	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
General Chemistry																						
Alkalinity (Total as CaCO3)	mg/L	30-500 OG [2]	238	233	233	242	255	254	235	238	236	230	237	230	230	240	232	232	240	248	235	248
Ammonia	mg/L		0.03	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
Chloride	mg/L	250 AO [3]	3.1	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
COD	mg/L		-	9	8	10	7	21	8	19	6	38	19	17	25	13	<5	<5	<5	<5	<5	10
Conductivity	umho/cm		481	453	442	460	495	501	488	485	492	488	495	500	500	510	548	490	461	512	503	501
Dissolved Organic Carbon (DOC)	mg/L	5 AO	1.9	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
Nitrate (N)	mg/L	10 MAC [4]	<0.2	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
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	0.013	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
pH	pH	6.5-8.5	7.95	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
Phenols	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	0.002
Total Phosphorus	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	0.05	0.05	0.08	0.04
Sulphate	mg/L	500 AO	23.5	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
Total Dissolved Solids (TDS)	mg/L	500 AO	271	262	284	274	322	304	278	310	315	322	260	248	262	286	266	284	268	290	220	268
TKN	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.18	0.33	0.42	0.20	1.14	0.50
Metals																						
Arsenic	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.001
Barium	mg/L	1 MAC	0.02	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
Boron	mg/L	5 IMAC	0.16	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
Cadmium	mg/L	0.005 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0001
Calcium	mg/L		43.6	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
Chromium	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.002
Copper	mg/L	1 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	0.003
Iron	mg/L	0.3 AO	0.06	<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
Lead	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0005
Magnesium	mg/L		33.7	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
Manganese	mg/L	0.05 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	0.004	<0.002	<0.002	<0.002	<0.002
Mercury	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<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
Sodium	mg/L	200 AO	10.3	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
Zinc	mg/L	5 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	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	<0.0001	<0.0001	<0.0001	<0.0001
Benzene	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Methylene Chloride(Dichloromethane)	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Toluene	mg/L	0.024 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<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

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.

Groundwater Geochemical Results OW-5

Parameters	Units	ODWS [1]	Jun-02	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
General Chemistry																						
Alkalinity (Total as CaCO3)	mg/L	30-500 OG [2]	330	394	394	384	396	373	350	347	360	372	355	360	380	390	336	354	337	311	273	297
Ammonia	mg/L		0.09	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
Chloride	mg/L	250 AO [3]	119	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
COD	mg/L		-	21	30	21	32	32	21	23	120	27	30	24	22	76	16	15	38	10	<5	17
Conductivity	umho/cm		1090	915	1040	1020	1190	1180	1150	1130	1150	1150	1090	1100	1100	1200	1080	1010	868	877	781	798
Dissolved Organic Carbon (DOC)	mg/L	5 AO	**19.2**	**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**
Nitrate (N)	mg/L	10 MAC [4]	<0.2	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
Nitrite (N)	mg/L	1 MAC	<1.0	<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
pH	pH	6.5-8.5	7.81	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
Phenols	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Phosphorus	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.09	<0.05	1.28	0.84	0.36	0.5
Sulphate	mg/L	500 AO	124	92.3	267	218	219	256	251	243	260	220	200	210	210	220	176	180	150	131	119	116
Total Dissolved Solids (TDS)	mg/L	500 AO	**686**	**578**	**828**	**746**	**806**	**800**	**556**	**705**	**745**	**766**	**638**	**716**	**766**	**768**	**628**	**630**	**546**	**546**	386	474
TKN	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.40	0.42	0.36	0.33	1.23	0.8
Metals																						
Arsenic	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.001
Barium	mg/L	1 MAC	0.026	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
Boron	mg/L	5 IMAC	0.28	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
Cadmium	mg/L	0.005 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0001
Calcium	mg/L		110	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
Chromium	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.002
Copper	mg/L	1 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	0.001
Iron	mg/L	0.3 AO	**0.39**	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
Lead	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0005
Magnesium	mg/L		77	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
Manganese	mg/L	0.05 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.008	0.006	0.006	0.010	0.007	0.008
Mercury	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<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
Sodium	mg/L	200 AO	34.1	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
Zinc	mg/L	5 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.008	0.031	<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	<0.0001
Benzene	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Methylene Chloride(Dichloromethane)	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Toluene	mg/L	0.024 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<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

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.

Groundwater Geochemical Results OW-6

Parameters	Units	ODWS [1]	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
General Chemistry																					
Alkalinity (Total as CaCO3)	mg/L	30-500 OG [2]	274.5	215	208	225	241	232	213	215	183	197	200	190	190	173	184	182	192	173	189
Ammonia	mg/L		0.3	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
Chloride	mg/L	250 AO [3]	**318**	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
COD	mg/L		118	33	31	50	20	59	5	9	<4	9	7.1	8.2	<4	<5	<5	<5	<5	<5	<5
Conductivity	umho/cm		1755	875	794	832	736	708	626	641	554	591	600	560	560	551	550	509	557	531	560
Dissolved Organic Carbon (DOC)	mg/L	5 AO	**10.6**	**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
Nitrate (N)	mg/L	10 MAC [4]	<0.2	<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
Nitrite (N)	mg/L	1 MAC	<0.2	<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
pH	pH	6.5-8.5	7.68	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
Phenols	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Phosphorus	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	0.09	0.03	0.03	0.04
Sulphate	mg/L	500 AO	235	240	197	158	103	110	118	110	91	94	99	90	100	92.4	103	102	94.1	95.7	98.0
Total Dissolved Solids (TDS)	mg/L	500 AO	**1345**	**744**	498	**588**	450	415	400	420	358	354	362	368	336	264	312	328	328	280	336
TKN	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	0.12	0.20	<0.10	<0.10	0.82	0.40
Metals																					
Arsenic	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.001
Barium	mg/L	1 MAC	0.0695	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
Boron	mg/L	5 IMAC	0.472	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
Cadmium	mg/L	0.005 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0001
Calcium	mg/L		194	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
Chromium	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.002
Copper	mg/L	1 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.001
Iron	mg/L	0.3 AO	**1.08**	**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
Lead	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0005
Magnesium	mg/L		132.5	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
Manganese	mg/L	0.05 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	0.003	0.012	0.012	0.004
Mercury	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Potassium	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	5.34	5.15	5.2	5.14	5.3	4.66
Sodium	mg/L	200 AO	55.2	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
Zinc	mg/L	5 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	<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	<0.0002
Benzene	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004
Methylene Chloride(Dichloromethane)	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0006
Toluene	mg/L	0.024 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004
Vinyl Chloride	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00017	<0.00017	<0.00017	<0.00017	<0.00017	<0.00034

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.

Groundwater Geochemical Results OW-7

Parameters	Units	ODWS [1]	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
General Chemistry																					
Alkalinity (Total as CaCO3)	mg/L	30-500 OG [2]	338.5	298	233	241	241	245	212	238	209	186	230	210	200	152	175	194	195	189	190
Ammonia	mg/L		0.36	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
Chloride	mg/L	250 AO [3]	99.5	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
COD	mg/L		17	34	38	57	25	25	9	250	41	12	34	22	8	<5	<5	<5	<5	11	8
Conductivity	umho/cm		1075	955	804	793	754	747	680	719	716	634	700	680	640	588	582	568	603	596	597
Dissolved Organic Carbon (DOC)	mg/L	5 AO	**18.15**	**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
Nitrate (N)	mg/L	10 MAC [4]	0.2	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
Nitrite (N)	mg/L	1 MAC	<0.2	-	<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
pH	pH	6.5-8.5	7.69	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
Phenols	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Phosphorus	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	0.03	0.42	0.2
Sulphate	mg/L	500 AO	140.5	148	182	135	135	104	138	100	150	120	120	140	140	125	121	118	110	116	119
Total Dissolved Solids (TDS)	mg/L	500 AO	**694**	**684**	302	**522**	**522**	395	430	485	460	382	408	486	406	328	346	342	344	360	376
TKN	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	0.15	0.24	<0.10	0.12	4.53	0.7
Metals																					
Arsenic	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	0.003	0.001
Barium	mg/L	1 MAC	0.025	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
Boron	mg/L	5 IMAC	0.167	<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
Cadmium	mg/L	0.005 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0001
Calcium	mg/L		94	74	61	52	51	57	47	50	56	53	51	49	52	46.5	47.1	46.2	41.2	48.7	68.2
Chromium	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.002
Copper	mg/L	1 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	0.002
Iron	mg/L	0.3 AO	**4.44**	**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**
Lead	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.001	<0.001	0.0012
Magnesium	mg/L		73.3	58	45	39	36	42	32	34	38	35	37	32	34	29.9	30.9	31.2	27.7	31.4	42.7
Manganese	mg/L	0.05 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	0.006	<0.002	<0.002	0.011	0.040
Mercury	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<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
Sodium	mg/L	200 AO	35.1	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
Zinc	mg/L	5 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	<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
Benzene	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Methylene Chloride(Dichloromethane)	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Toluene	mg/L	0.024 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	<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

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.

Groundwater Geochemical Results OW-8

Parameters	Units	ODWS [1]	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
General Chemistry																					
Alkalinity (Total as CaCO3)	mg/L	30-500 OG [2]	236	246	256	278	284	264	275	276	279	276	270	290	290	257	266	286	283	232	286
Ammonia	mg/L		0.03	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
Chloride	mg/L	250 AO [3]	12.2	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
COD	mg/L		47	27	21	20	23	11	14	20	350	54	38	94	35	25	17	17	6	18	34
Conductivity	umho/cm		473	454	488	512	531	524	516	521	546	530	530	550	560	561	497	487	548	456	524
Dissolved Organic Carbon (DOC)	mg/L	5 AO	**6**	**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**
Nitrate (N)	mg/L	10 MAC [4]	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	<0.05	<0.05	<0.05	0.12	<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	<0.05	<0.05	<0.05
pH	pH	6.5-8.5	7.91	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
Phenols	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Phosphorus	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	0.61	0.38	0.51	0.46	0.61	0.41
Sulphate	mg/L	500 AO	18.2	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
Total Dissolved Solids (TDS)	mg/L	500 AO	308	318	384	472	358	312	325	340	348	288	288	322	306	322	274	276	292	226	270
TKN	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	0.40	0.22	0.28	0.32	2.3	0.6
Metals																					
Arsenic	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.001
Barium	mg/L	1 MAC	0.009	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
Boron	mg/L	5 IMAC	0.0025	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
Cadmium	mg/L	0.005 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0001
Calcium	mg/L		50.1	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
Chromium	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.002
Copper	mg/L	1 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	0.002
Iron	mg/L	0.3 AO	0.05	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
Lead	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0005
Magnesium	mg/L		30.7	32	39	35	33	38	34	36	34	36	34	32	37	36.6	33.3	34.5	31.4	30.0	29.2
Manganese	mg/L	0.05 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	0.003	0.006	0.004	<0.002
Mercury	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<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
Sodium	mg/L	200 AO	9.8	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
Zinc	mg/L	5 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	<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
Benzene	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Methylene Chloride(Dichloromethane)	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Toluene	mg/L	0.024 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	<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

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.

Groundwater Geochemical Results OW-9

Parameters	Units	ODWS [1]	Oct-14	Sep-15	Sep-16	Oct-17	Sep-18	Sep-19	Nov-20
General Chemistry									
Alkalinity (Total as CaCO3)	mg/L	30-500 OG [2]	296	181	190	189	219	177	179
Ammonia	mg/L		0.04	<0.02	0.07	0.08	<0.02	0.16	<0.02
Chloride	mg/L	250 AO [3]	76.2	8.56	7.95	11.6	19.3	6.2	11.6
COD	mg/L		19	7	<5	28	<5	<5	6
Conductivity	umho/cm		1000	567	541	505	623	499	496
Dissolved Organic Carbon (DOC)	mg/L	5 AO	**6.8**	2.5	2.3	4.0	2.5	2.2	2.1
Nitrate (N)	mg/L	10 MAC [4]	<0.25	<0.05	<0.05	<0.05	<0.10	0.06	0.29
Nitrite (N)	mg/L	1 MAC	<0.25	<0.05	<0.05	<0.05	<0.10	<0.05	<0.05
pH	pH	6.5-8.5	7.66	7.97	8.14	8.04	8.02	7.79	7.90
Phenols	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Phosphorus	mg/L		0.14	0.13	0.10	0.18	0.18	0.02	0.06
Sulphate	mg/L	500 AO	143	76.4	83.6	81.5	82	73.6	62.5
Total Dissolved Solids (TDS)	mg/L	500 AO	**598**	298	302	384	308	250	272
TKN	mg/L		0.37	0.22	0.16	0.3	0.19	0.39	0.4
Metals									
Arsenic	mg/L	0.01 MAC	<0.003	<0.003	<0.003	0.003	<0.003	<0.003	<0.001
Barium	mg/L	1 MAC	0.024	0.029	0.027	0.027	0.026	0.022	0.023
Boron	mg/L	5 IMAC	0.211	0.250	0.236	0.328	0.282	0.311	0.319
Cadmium	mg/L	0.005 MAC	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0001
Calcium	mg/L		83.3	51.3	52.2	46.8	46.2	44.6	40.7
Chromium	mg/L	0.05 MAC	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.002
Copper	mg/L	1 AO	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.001
Iron	mg/L	0.3 AO	0.092	0.294	0.031	0.248	0.028	<0.010	<0.010
Lead	mg/L	0.01 MAC	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0005
Magnesium	mg/L		54.8	30.3	32.3	31.5	31.7	28.3	26.2
Manganese	mg/L	0.05 AO	**0.086**	0.050	0.030	0.048	0.025	0.011	0.016
Mercury	mg/L	0.001 MAC	<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
Sodium	mg/L	200 AO	43.4	13.2	11.6	13.5	15.4	10.4	9.68
Zinc	mg/L	5 AO	<0.005	<0.005	0.008	<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
Benzene	mg/L	0.001 MAC	0.00027	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004
Methylene Chloride(Dichloromethane)	mg/L	0.05 MAC	<0.0003	<0.0004	<0.0004	<0.0003	<0.0003	<0.0003	<0.0006
Toluene	mg/L	0.024 AO	0.00035	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004
Vinyl Chloride	mg/L	0.001 MAC	<0.00017	<0.00018	<0.00018	<0.00017	<0.00017	<0.00017	<0.00034

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.

Groundwater Geochemical Results OW-10

Parameters	Units	ODWS [1]	Oct-14	Sep-15	Sep-16	Oct-17	Sep-18	Sep-19	Nov-20
General Chemistry									
Alkalinity (Total as CaCO3)	mg/L	30-500 OG [2]	299	274	392	360	312	254	294
Ammonia	mg/L		0.85	0.23	0.66	1.02	0.22	0.31	0.04
Chloride	mg/L	250 AO [3]	59.7	39.1	56.1	33.0	51.1	25.8	35.8
COD	mg/L		12	13	24	20	8	<5	14
Conductivity	umho/cm		799	838	1020	739	865	657	682
Dissolved Organic Carbon (DOC)	mg/L	5 AO	**6.8**	**5.2**	4.5	**6.8**	**5.6**	4.6	**6.6**
Nitrate (N)	mg/L	10 MAC [4]	0.22	<0.25	0.65	1.02	0.61	<0.10	0.7
Nitrite (N)	mg/L	1 MAC	<0.10	<0.25	<0.25	<0.10	<0.25	<0.10	<0.10
pH	pH	6.5-8.5	7.19	7.92	8.09	8.12	7.71	7.80	7.91
Phenols	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Phosphorus	mg/L		0.57	0.09	0.44	0.19	0.13	0.03	0.06
Sulphate	mg/L	500 AO	47.0	84.3	94.5	29.0	57.0	54.6	23.2
Total Dissolved Solids (TDS)	mg/L	500 AO	412	428	**584**	418	492	340	374
TKN	mg/L		1.17	0.56	1.06	1.46	0.53	0.68	0.6
Metals									
Arsenic	mg/L	0.01 MAC	<0.003	<0.003	0.003	0.003	<0.003	<0.003	<0.001
Barium	mg/L	1 MAC	0.052	0.059	0.081	0.058	0.055	0.050	0.041
Boron	mg/L	5 IMAC	0.145	0.200	0.207	0.206	0.195	0.237	0.114
Cadmium	mg/L	0.005 MAC	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0001
Calcium	mg/L		81.9	74.0	99.8	85.8	72.8	62.7	68.3
Chromium	mg/L	0.05 MAC	<0.003	<0.003	<0.003	<0.003	0.004	<0.003	<0.002
Copper	mg/L	1 AO	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.002
Iron	mg/L	0.3 AO	<0.010	**0.568**	**1.18**	**1.07**	0.022	<0.010	<0.010
Lead	mg/L	0.01 MAC	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0005
Magnesium	mg/L		41.9	46.2	60.7	38.3	40.5	37.0	30.1
Manganese	mg/L	0.05 AO	0.044	0.043	**0.081**	0.043	0.021	0.015	0.006
Mercury	mg/L	0.001 MAC	<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
Sodium	mg/L	200 AO	23.5	18.3	25.9	20.5	22.7	15.0	13.0
Zinc	mg/L	5 AO	0.005	0.006	0.008	<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
Benzene	mg/L	0.001 MAC	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002
Methylene Chloride(Dichloromethane)	mg/L	0.05 MAC	<0.0003	<0.0003	-	<0.0003	<0.0003	<0.0003	<0.0003
Toluene	mg/L	0.024 AO	<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

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.

Groundwater Geochemical Results OW-11

Parameters	Units	ODWS [1]	Oct-14	Sep-15	Sep-16	Oct-17	Sep-18	Sep-19	Nov-20
General Chemistry									
Alkalinity (Total as CaCO3)	mg/L	30-500 OG [2]	335	229	204	202	189	179	186
Ammonia	mg/L		0.03	<0.02	0.06	0.02	<0.02	0.14	<0.02
Chloride	mg/L	250 AO [3]	78.4	39.8	23.2	17.7	10.6	6.09	4.82
COD	mg/L		23	10	16	8	5	<5	37
Conductivity	umho/cm		1040	808	608	540	515	478	477
Dissolved Organic Carbon (DOC)	mg/L	5 AO	**10.5**	3.4	2.4	3.1	2.7	2.7	3.5
Nitrate (N)	mg/L	10 MAC [4]	<0.25	<0.25	<0.10	<0.10	<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
pH	pH	6.5-8.5	7.60	7.90	8.06	8.01	7.98	7.79	7.88
Phenols	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Phosphorus	mg/L		0.49	0.14	0.61	0.3	0.55	0.06	1.47
Sulphate	mg/L	500 AO	140	110	84.6	74.8	57.9	60.6	62.6
Total Dissolved Solids (TDS)	mg/L	500 AO	**656**	434	340	330	288	242	278
TKN	mg/L		0.4	0.52	<0.10	0.22	0.32	0.64	0.8
Metals									
Arsenic	mg/L	0.01 MAC	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.004
Barium	mg/L	1 MAC	0.021	0.023	0.021	0.024	0.023	0.019	0.026
Boron	mg/L	5 IMAC	0.271	0.324	0.344	0.398	0.441	0.436	0.477
Cadmium	mg/L	0.005 MAC	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0001
Calcium	mg/L		95.2	70.1	56.1	50.1	39.9	45.0	40.6
Chromium	mg/L	0.05 MAC	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.002
Copper	mg/L	1 AO	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.001
Iron	mg/L	0.3 AO	<0.010	0.077	<0.010	0.117	0.121	<0.010	0.076
Lead	mg/L	0.01 MAC	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0005
Magnesium	mg/L		54.9	43.0	35.1	33.6	25.3	26.2	24.2
Manganese	mg/L	0.05 AO	**0.078**	**0.169**	0.003	**0.059**	**0.071**	0.045	0.026
Mercury	mg/L	0.001 MAC	<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
Sodium	mg/L	200 AO	35.4	21.7	15.6	15	12.6	10.7	9.87
Zinc	mg/L	5 AO	<0.005	<0.005	0.023	<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
Benzene	mg/L	0.001 MAC	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Methylene Chloride(Dichloromethane)	mg/L	0.05 MAC	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Toluene	mg/L	0.024 AO	<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

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.

Groundwater Geochemical Results OW-12A

Parameters	Units	ODWS [1]	Aug-17	Oct-17	May-18	Sep-18	Sep-19	Nov-20
General Chemistry								
Alkalinity (Total as CaCO3)	mg/L	30-500 OG [2]	220	172	167	146	152	149
Ammonia	mg/L		0.12	0.08	0.10	0.1	0.24	0.03
Chloride	mg/L	250 AO [3]	22.6	9.18	3.72	2.57	2.72	2.70
COD	mg/L		18	<5	5	<5	<5	10
Conductivity	umho/cm		545	402	374	372	371	362
Dissolved Organic Carbon (DOC)	mg/L	5 AO	3.8	2.1	4.4	2.3	2.6	2.7
Nitrate (N)	mg/L	10 MAC [4]	<0.10	<0.05	<0.05	0.06	<0.05	0.10
Nitrite (N)	mg/L	1 MAC	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05
pH	pH	6.5-8.5	8.29	8.09	8.01	8.04	7.81	7.96
Phenols	mg/L		<0.001	0.002	<0.001	<0.001	<0.001	<0.001
Total Phosphorus	mg/L		0.40	0.09	0.22	0.19	0.02	0.05
Sulphate	mg/L	500 AO	37.3	41.1	38.3	36.9	35.0	35.8
Total Dissolved Solids (TDS)	mg/L	500 AO	296	226	192	196	162	202
TKN	mg/L		0.49	0.20	<0.10	0.31	0.53	0.40
Metals								
Arsenic	mg/L	0.01 MAC	<0.003	<0.003	<0.003	<0.003	<0.003	0.002
Barium	mg/L	1 MAC	0.039	0.039	0.038	0.032	0.031	0.032
Boron	mg/L	5 IMAC	0.287	0.384	0.437	0.471	0.449	0.492
Cadmium	mg/L	0.005 MAC	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0001
Calcium	mg/L		41.9	33.9	33.0	27.0	33.6	25.8
Chromium	mg/L	0.05 MAC	<0.003	<0.003	<0.003	<0.003	<0.003	<0.002
Copper	mg/L	1 AO	<0.003	<0.003	<0.003	<0.003	<0.003	0.003
Iron	mg/L	0.3 AO	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Lead	mg/L	0.01 MAC	<0.002	<0.002	<0.001	<0.001	<0.001	<0.0005
Magnesium	mg/L		26.7	22.1	21.3	17.7	20.8	15.8
Manganese	mg/L	0.05 AO	0.012	0.047	0.041	**0.089**	**0.058**	0.014
Mercury	mg/L	0.001 MAC	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Potassium	mg/L		4.27	4.50	4.81	4.79	4.66	3.73
Sodium	mg/L	200 AO	30.1	21.5	13.2	12.0	11.0	16.9
Zinc	mg/L	5 AO	<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	<0.00040	<0.0001	<0.0001	<0.0001
Benzene	mg/L	0.001 MAC	<0.0002	<0.0002	<0.00080	<0.0002	<0.0002	<0.0002
Methylene Chloride(Dichloromethane)	mg/L	0.05 MAC	<0.0003	<0.0003	<0.00120	<0.0003	<0.0003	<0.0003
Toluene	mg/L	0.024 AO	<0.0002	0.0032	<0.00080	<0.0002	0.00063	<0.0002
Vinyl Chloride	mg/L	0.001 MAC	<0.00017	<0.00017	<0.00068	<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.

Groundwater Geochemical Results OW-12B

Parameters	Units	ODWS [1]	Aug-17	Oct-17	May-18	Sep-18	Sep-19	Nov-20
General Chemistry								
Alkalinity (Total as CaCO3)	mg/L	30-500 OG [2]	175	221	246	238	225	239
Ammonia	mg/L		0.23	<0.02	0.02	<0.02	0.07	0.02
Chloride	mg/L	250 AO [3]	**586**	**261**	71	14.2	11.4	8.26
COD	mg/L		153	109	<5	12	21	7
Conductivity	umho/cm		2130	1240	845	666	611	633
Dissolved Organic Carbon (DOC)	mg/L	5 AO	4.6	**7.1**	**-**	2.6	3.0	4.3
Nitrate (N)	mg/L	10 MAC [4]	<0.5	<0.25	<0.25	<0.10	<0.10	<0.10
Nitrite (N)	mg/L	1 MAC	<0.5	<0.25	<0.25	<0.10	<0.10	<0.10
pH	pH	6.5-8.5	8.08	8.23	7.90	7.95	7.96	8.17
Phenols	mg/L		0.004	0.002	-	<0.001	<0.001	<0.001
Total Phosphorus	mg/L		0.08	<0.05	0.11	0.06	0.06	0.07
Sulphate	mg/L	500 AO	47.8	87.3	99	91.5	79.3	93.4
Total Dissolved Solids (TDS)	mg/L	500 AO	**1400**	**776**	**-**	372	302	364
TKN	mg/L		1.09	0.30	0.82	0.25	3.22	0.70
Metals								
Arsenic	mg/L	0.01 MAC	<0.003	<0.003	<0.003	<0.003	0.003	0.003
Barium	mg/L	1 MAC	0.090	0.053	0.034	0.041	0.028	0.032
Boron	mg/L	5 IMAC	0.243	0.349	0.423	0.470	0.496	0.540
Cadmium	mg/L	0.005 MAC	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0001
Calcium	mg/L		88.0	66.1	54.6	50.8	52.3	49.8
Chromium	mg/L	0.05 MAC	0.004	<0.003	0.004	<0.003	<0.003	<0.002
Copper	mg/L	1 AO	0.008	<0.003	0.069	<0.003	<0.003	0.002
Iron	mg/L	0.3 AO	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Lead	mg/L	0.01 MAC	<0.002	<0.002	0.004	<0.001	<0.001	<0.0005
Magnesium	mg/L		146	91.1	55.2	34.3	38.9	35.4
Manganese	mg/L	0.05 AO	0.023	0.023	0.016	**0.058**	0.017	0.021
Mercury	mg/L	0.001 MAC	<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
Sodium	mg/L	200 AO	58.5	38.1	27.7	17.6	16.2	14.0
Zinc	mg/L	5 AO	0.014	<0.005	0.079	<0.005	0.008	<0.005
Volatile Organic Compounds								
1,4-Dichlorobenzene	mg/L	0.005 MAC	<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
Methylene Chloride(Dichloromethane)	mg/L	0.05 MAC	<0.0003	<0.0003	-	<0.0003	<0.0003	<0.0003
Toluene	mg/L	0.024 AO	0.00054	0.00063	-	0.00056	0.00044	<0.0002
Vinyl Chloride	mg/L	0.001 MAC	<0.00017	<0.00017	-	<0.00017	<0.00017	<0.00017
Ethylbenzene	mg/L	0.0016 AO	-	<0.0001	-	-	-	-
m & p-Xylene	mg/L		-	<0.0002	-	-	-	-
o-Xylene	mg/L		-	<0.0001	-	-	-	-
Xylene Mixture (Total)	mg/L	0.02 AO	-	<0.0002	-	-	-	-
Petroleum Hydrocarbons								
F1 (C6 to C10)	mg/L		-	0.039	-	-	-	-
F2 (C10 to C16)	mg/L		-	0.18	-	-	-	-
F3 (C16 to C34)	mg/L		-	20	-	-	-	-
F4 (C34 to C50)	mg/L		-	35	-	-	-	-

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.

Groundwater Geochemical Results OW-13A

Parameters	Units	ODWS [1]	Aug-17	Oct-17	May-18	Sep-18	Sep-19	Nov-20
General Chemistry								
Alkalinity (Total as CaCO3)	mg/L	30-500 OG [2]	477	**542**	**505**	**574**	**581**	**555**
Ammonia	mg/L		0.41	0.70	0.31	0.93	1.33	0.47
Chloride	mg/L	250 AO [3]	69.5	66.4	54.5	51.5	53.2	58.1
COD	mg/L		49	48	32	35	35	48
Conductivity	umho/cm		1380	1360	1240	1510	1610	1470
Dissolved Organic Carbon (DOC)	mg/L	5 AO	**14.7**	**18.6**	**13.3**	**16.8**	**18.2**	**20.6**
Nitrate (N)	mg/L	10 MAC [4]	0.45	<0.25	<0.25	<0.25	<0.25	<0.25
Nitrite (N)	mg/L	1 MAC	0.49	<0.25	<0.25	<0.25	<0.25	<0.25
pH	pH	6.5-8.5	8.00	8.26	8.20	7.79	7.66	7.99
Phenols	mg/L		<0.001	<0.001	<0.001	0.002	0.002	0.003
Total Phosphorus	mg/L		0.16	0.22	0.15	0.06	<0.02	0.04
Sulphate	mg/L	500 AO	221	243	212	213	340	225
Total Dissolved Solids (TDS)	mg/L	500 AO	**920**	**988**	**798**	**1030**	**958**	**940**
TKN	mg/L		1.63	1.96	1.1	2.1	3.1	1.4
Metals								
Arsenic	mg/L	0.01 MAC	0.005	0.006	<0.003	0.004	0.004	0.002
Barium	mg/L	1 MAC	0.106	0.157	0.106	0.115	0.092	0.081
Boron	mg/L	5 IMAC	0.496	0.550	0.440	0.602	0.498	0.472
Cadmium	mg/L	0.005 MAC	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0001
Calcium	mg/L		159	180	152	183	209	159
Chromium	mg/L	0.05 MAC	0.004	<0.003	0.005	0.005	<0.003	<0.002
Copper	mg/L	1 AO	<0.003	<0.003	<0.003	<0.003	<0.003	0.003
Iron	mg/L	0.3 AO	0.031	**0.365**	<0.010	0.232	0.071	<0.010
Lead	mg/L	0.01 MAC	<0.002	<0.002	<0.001	<0.001	<0.001	<0.0005
Magnesium	mg/L		71.2	81.6	70.4	81.1	77.6	70.8
Manganese	mg/L	0.05 AO	**0.058**	**0.272**	**0.118**	**0.131**	**0.123**	**0.083**
Mercury	mg/L	0.001 MAC	<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
Sodium	mg/L	200 AO	41.0	45.9	36.5	45.5	43.8	37.6
Zinc	mg/L	5 AO	<0.005	0.007	<0.005	0.006	<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
Benzene	mg/L	0.001 MAC	<0.0002	<0.0002	<0.00020	<0.0002	<0.0002	<0.0002
Methylene Chloride(Dichloromethane)	mg/L	0.05 MAC	<0.0003	<0.0003	<0.00030	<0.0003	<0.0003	<0.0003
Toluene	mg/L	0.024 AO	<0.0002	<0.0002	<0.00020	0.0022	<0.0002	0.0021
Vinyl Chloride	mg/L	0.001 MAC	<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.

Groundwater Geochemical Results OW-13B

Parameters	Units	ODWS [1]	Aug-17	Oct-17	May-18	Sep-18	Sep-19	Nov-20
General Chemistry								
Alkalinity (Total as CaCO3)	mg/L	30-500 OG [2]	300	342	324	333	308	303
Ammonia	mg/L		0.11	0.14	0.20	0.19	0.35	0.2
Chloride	mg/L	250 AO [3]	29.1	25.9	23.5	23.4	23.7	21.5
COD	mg/L		19	21	11	5	11	18
Conductivity	umho/cm		763	784	696	843	807	730
Dissolved Organic Carbon (DOC)	mg/L	5 AO	**5.6**	**6.4**	4.9	**6.3**	**6.4**	**7.2**
Nitrate (N)	mg/L	10 MAC [4]	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10
Nitrite (N)	mg/L	1 MAC	<0.10	<0.25	<0.10	<0.25	<0.25	<0.10
pH	pH	6.5-8.5	8.00	8.09	8.04	7.79	7.70	7.89
Phenols	mg/L		<0.001	<0.001	<0.001	<0.001	0.001	0.001
Total Phosphorus	mg/L		0.06	0.13	0.07	0.05	0.03	0.04
Sulphate	mg/L	500 AO	76.1	95.3	64.0	87.9	95.1	68.8
Total Dissolved Solids (TDS)	mg/L	500 AO	478	488	372	**542**	458	408
TKN	mg/L		0.57	0.50	0.44	0.55	0.88	0.70
Metals								
Arsenic	mg/L	0.01 MAC	<0.003	<0.003	<0.003	<0.003	<0.003	0.002
Barium	mg/L	1 MAC	0.039	0.048	0.031	0.008	0.040	0.039
Boron	mg/L	5 IMAC	0.249	0.277	0.189	0.038	0.302	0.310
Cadmium	mg/L	0.005 MAC	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0001
Calcium	mg/L		64.7	77.8	64.8	69.3	75.5	66.5
Chromium	mg/L	0.05 MAC	<0.003	<0.003	0.003	<0.003	<0.003	<0.002
Copper	mg/L	1 AO	<0.003	<0.003	0.014	0.003	0.003	<0.001
Iron	mg/L	0.3 AO	<0.010	0.077	0.040	0.053	<0.010	0.127
Lead	mg/L	0.01 MAC	<0.002	<0.002	<0.001	<0.001	<0.001	<0.0005
Magnesium	mg/L		46.3	54.6	46.5	47.6	49.3	42.3
Manganese	mg/L	0.05 AO	0.022	0.029	0.022	0.010	0.017	0.020
Mercury	mg/L	0.001 MAC	<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
Sodium	mg/L	200 AO	18.9	18.9	15.3	17.1	17.1	14.9
Zinc	mg/L	5 AO	<0.005	<0.005	0.011	0.024	0.009	<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
Benzene	mg/L	0.001 MAC	<0.0002	<0.0002	<0.00040	<0.0002	<0.0002	<0.0004
Methylene Chloride(Dichloromethane)	mg/L	0.05 MAC	<0.0003	<0.0003	<0.00060	<0.0003	<0.0003	<0.0006
Toluene	mg/L	0.024 AO	<0.0002	<0.0002	<0.00040	<0.0002	<0.0002	<0.0004
Vinyl Chloride	mg/L	0.001 MAC	<0.00017	<0.00017	<0.00034	<0.00017	<0.00017	<0.00034

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.

Groundwater Geochemical Results OW-14A

Parameters	Units	ODWS [1]	Aug-17	Oct-17	May-18	Sep-18	Sep-19	Nov-20
General Chemistry								
Alkalinity (Total as CaCO3)	mg/L	30-500 OG [2]	330	360	383	353	362	404
Ammonia	mg/L		0.03	<0.02	<0.02	<0.02	0.08	<0.02
Chloride	mg/L	250 AO [3]	58.2	26.0	20.8	18.4	35.0	61.9
COD	mg/L		56	37	31	18	18	26
Conductivity	umho/cm		872	746	751	797	837	948
Dissolved Organic Carbon (DOC)	mg/L	5 AO	**6.7**	**7.4**	**12.3**	**8.0**	**7.7**	**10.8**
Nitrate (N)	mg/L	10 MAC [4]	<0.25	<0.10	<0.10	<0.25	<0.25	<0.25
Nitrite (N)	mg/L	1 MAC	<0.25	<0.10	<0.10	<0.25	<0.25	<0.25
pH	pH	6.5-8.5	8.14	8.29	8.23	8.04	7.91	8.04
Phenols	mg/L		<0.001	<0.001	<0.001	<0.001	0.001	<0.001
Total Phosphorus	mg/L		0.25	0.27	0.18	0.25	0.12	0.06
Sulphate	mg/L	500 AO	57.4	56.0	63.3	56.0	39.1	36.8
Total Dissolved Solids (TDS)	mg/L	500 AO	492	454	424	484	470	**530**
TKN	mg/L		0.62	0.33	0.34	0.58	1.28	0.6
Metals								
Arsenic	mg/L	0.01 MAC	<0.003	<0.003	<0.003	<0.003	0.005	0.003
Barium	mg/L	1 MAC	0.054	0.056	0.050	0.049	0.048	0.050
Boron	mg/L	5 IMAC	0.124	0.112	0.099	0.102	0.119	0.125
Cadmium	mg/L	0.005 MAC	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0001
Calcium	mg/L		66.9	75.2	77.2	68.7	79.3	82.3
Chromium	mg/L	0.05 MAC	<0.003	<0.003	<0.003	<0.003	<0.003	<0.002
Copper	mg/L	1 AO	<0.003	<0.003	<0.003	<0.003	<0.003	0.003
Iron	mg/L	0.3 AO	<0.010	<0.010	<0.010	<0.010	<0.010	0.059
Lead	mg/L	0.01 MAC	<0.002	<0.002	<0.001	<0.001	<0.001	<0.0005
Magnesium	mg/L		48.9	54.7	55.5	49.4	55.3	59.2
Manganese	mg/L	0.05 AO	0.029	**0.056**	**0.085**	**0.096**	**0.132**	**0.057**
Mercury	mg/L	0.001 MAC	<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
Sodium	mg/L	200 AO	39.0	14.7	9.89	7.82	8.1	11.5
Zinc	mg/L	5 AO	<0.005	<0.005	<0.005	0.007	<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
Benzene	mg/L	0.001 MAC	<0.0002	<0.0002	<0.00020	<0.0002	<0.0002	<0.0002
Methylene Chloride(Dichloromethane)	mg/L	0.05 MAC	<0.0003	<0.0003	<0.00030	<0.0003	<0.0003	<0.0003
Toluene	mg/L	0.024 AO	0.00036	<0.0002	<0.00020	0.00058	<0.0002	<0.0002
Vinyl Chloride	mg/L	0.001 MAC	<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.

Groundwater Geochemical Results OW-14B

Parameters	Units	ODWS [1]	Aug-17	Oct-17	May-18	Sep-18	Sep-19	Nov-20
General Chemistry								
Alkalinity (Total as CaCO3)	mg/L	30-500 OG [2]	253	246	254	236	224	236
Ammonia	mg/L		0.02	0.03	0.09	0.03	0.20	0.03
Chloride	mg/L	250 AO [3]	11.7	5.84	3.99	2.56	1.94	2.55
COD	mg/L		10	<5	<5	<5	<5	8
Conductivity	umho/cm		538	469	464	493	466	471
Dissolved Organic Carbon (DOC)	mg/L	5 AO	3.8	3.6	2.9	3.4	2.9	4.5
Nitrate (N)	mg/L	10 MAC [4]	<0.10	<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
pH	pH	6.5-8.5	8.09	8.13	8.03	7.91	7.77	7.96
Phenols	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Phosphorus	mg/L		0.17	0.13	0.10	0.04	0.02	0.05
Sulphate	mg/L	500 AO	24.1	21.5	21.9	19.9	20.5	20.1
Total Dissolved Solids (TDS)	mg/L	500 AO	280	260	220	250	222	244
TKN	mg/L		0.29	0.13	0.21	0.21	0.51	0.3
Metals								
Arsenic	mg/L	0.01 MAC	<0.003	<0.003	<0.003	<0.003	<0.003	0.002
Barium	mg/L	1 MAC	0.037	0.031	0.025	0.021	0.023	0.024
Boron	mg/L	5 IMAC	0.174	0.170	0.169	0.174	0.192	0.220
Cadmium	mg/L	0.005 MAC	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0001
Calcium	mg/L		42.2	41.1	41.5	37.0	40.4	37.3
Chromium	mg/L	0.05 MAC	<0.003	<0.003	<0.003	<0.003	<0.003	<0.002
Copper	mg/L	1 AO	<0.003	<0.003	0.005	<0.003	<0.003	<0.001
Iron	mg/L	0.3 AO	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Lead	mg/L	0.01 MAC	<0.002	<0.002	<0.001	<0.001	<0.001	<0.0005
Magnesium	mg/L		31.8	31.4	31.1	28.6	30.1	28.0
Manganese	mg/L	0.05 AO	0.011	0.016	0.015	0.009	0.014	0.017
Mercury	mg/L	0.001 MAC	<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
Sodium	mg/L	200 AO	19.1	14.7	11.1	9.18	8.58	8.11
Zinc	mg/L	5 AO	<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	<0.00010	<0.0001	<0.0001	<0.0001
Benzene	mg/L	0.001 MAC	<0.0002	<0.0002	<0.00020	<0.0002	<0.0002	<0.0002
Methylene Chloride(Dichloromethane)	mg/L	0.05 MAC	<0.0003	<0.0003	<0.00030	<0.0003	<0.0003	<0.0003
Toluene	mg/L	0.024 AO	<0.0002	<0.0002	<0.00020	<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

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.

Groundwater Geochemical Results Irving

Parameters	Units	ODWS (1)	Jun-02	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
General Chemistry																				
Alkalinity (Total as CaCO3)	mg/L	30-500 OG (2)	221.5	207	217.5	213	213	206	214	251	237	210	210	210	196	205	222	184	195	No
Ammonia	mg/L		0.04	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
Chloride	mg/L	250 AO (3)	4.45	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
COD	mg/L		-	5	<5	<4	<4	<4	<4	28	9	4.8	7	6	12	<5	<5	<5	<5	
Conductivity	umho/cm		508.5	502	544	509	547	528	549	541	571	550	550	530	570	535	544	549	554	
Dissolved Organic Carbon (DOC)	mg/L	5 AO	1.35	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	
Nitrate (N)	mg/L	10 MAC (4)	<0.2	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	
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	<0.05	<0.10	<0.05	
pH	pH	6.5-8.5	7.97	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	
Phenols	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	
Total Phosphorus	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.02	<0.02	
Sulphate	mg/L	500 AO	64.4	60.6	72.4	78.2	77	78	73	28	58	70	70	76	74.3	76.5	77.7	81.0	78.8	
Total Dissolved Solids (TDS)	mg/L	500 AO	312	294	330	352	320	330	355	346	308	308	322	286	302	290	326	308	378	
TKN	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	<0.10	<0.10	0.11	<0.10	0.26	
Metals																				
Arsenic	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	
Barium	mg/L	1 MAC	0.0145	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	
Boron	mg/L	5 IMAC	0.16	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	
Cadmium	mg/L	0.005 MAC	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.001	<0.002	<0.002	
Calcium	mg/L		59.6	53.9	57.1	64	63	55	57	58	61	57	54	58	58.6	58.1	53.8	56.2	56.6	
Chromium	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	0.004	
Copper	mg/L	1 AO	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	0.021	<0.003	<0.003	<0.003	
Iron	mg/L	0.3 AO	<0.01	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	
Lead	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.001	<0.001	
Magnesium	mg/L		33.05	34	29.4	37	35	30	33	33	35	35	29	33	31.0	32.1	31.1	31.3	30.7	
Manganese	mg/L	0.05 AO	-	-	-	-	-	-	-	-	-	-	-	-	0.003	0.003	0.003	0.003	0.003	
Mercury	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Potassium	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	3.80	3.73	3.67	3.66	3.68	
Sodium	mg/L	200 AO	6.6	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	
Zinc	mg/L	5 AO	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	0.008	0.010	
Microbiological Analysis																				
Escherichia coli	CFU	0 MAC	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1	**1**	<1	
Total Coliforms	CFU	0 MAC	-	-	-	-	-	-	-	-	-	-	-	-	<1	**1**	<1	**2**	**15**	

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.

Groundwater Geochemical Results Paquet

Parameters	Units	ODWS [1]	Jun-02	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
General Chemistry																						
Alkalinity (Total as CaCO3)	mg/L	30-500 OG [2]	218	216	209	216	220	244	230	228	218	210	210	210	210	210	189	202	209	No	200	210
Ammonia	mg/L		0.04	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
Chloride	mg/L	250 AO [3]	4.6	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
COD	mg/L		-	6	<5	<4	<4	<4	6	4	<4	12	8	25	16	<4	11	12	<5		<5	<5
Conductivity	umho/cm		511	498	507.5	501	530	539	535	582	524	545	552	550	560	520	573	547	497		517	519
Dissolved Organic Carbon (DOC)	mg/L	5 AO	1.6	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
Nitrate (N)	mg/L	10 MAC [4]	<0.2	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
Nitrite (N)	mg/L	1 MAC	<0.2	<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
pH	pH	6.5-8.5	7.95	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
Phenols	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001		<0.001	<0.001
Total Phosphorus	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.05		<0.02	<0.02
Sulphate	mg/L	500 AO	64	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
Total Dissolved Solids (TDS)	mg/L	500 AO	319	286	308	343	358	331	322	376	340	348	312	304	346	278	318	286	284		**620**	292
TKN	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.10	<0.10	0.11		0.45	0.16
Metals																						
Arsenic	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003		<0.003	<0.001
Barium	mg/L	1 MAC	0.015	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
Boron	mg/L	5 IMAC	0.17	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
Cadmium	mg/L	0.005 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002		<0.001	<0.0001
Calcium	mg/L		67.1	56.7	55	63	57	59	64	54	54	57	57	59	-	54	0.47	0.18	54.4		50.2	51.7
Chromium	mg/L	0.05 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003	<0.003		<0.003	<0.002
Copper	mg/L	1 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.056	0.032	0.140		<0.003	0.003
Iron	mg/L	0.3 AO	0.04	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
Lead	mg/L	0.01 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.004	<0.002	**0.012**		<0.001	<0.0005
Magnesium	mg/L		34.1	31.5	29.1	36	31	32	36	29	29	32	33	35	-	31	0.23	0.06	30.9		27.6	27.6
Manganese	mg/L	0.05 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	0.003		0.003	0.003
Mercury	mg/L	0.001 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001	<0.0001		<0.0001	<0.0001
Potassium	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.37	0.41	3.83		3.61	3.41
Sodium	mg/L	200 AO	6.7	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
Zinc	mg/L	5 AO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.032	0.021	0.304		0.006	0.015
Microbiological Analysis																						
Escherichia coli	CFU	0 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1		<1	<1
Total Coliforms	CFU	0 MAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1		<1	<1

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.

2020 Groundwater Duplicate Data

Parameters	Units	Nov-20					
		OW-14B	PB DUP1	Relative Percent Difference (%)	OW-10	PB DUP2	Relative Percent Difference (%)
General Chemistry							
Alkalinity (Total as CaCO3)	mg/L	236	234	0.851	294	294	0.000
Ammonia	mg/L	0.03	0.03	0.000	0.04	0.03	28.571
Chloride	mg/L	2.6	2.5	3.187	35.8	35.5	0.842
COD	mg/L	8	9	(11.765)	14	15	(6.897)
Conductivity	umho/cm	471	472	(0.212)	682	688	(0.876)
Dissolved Organic Carbon (DOC)	mg/L	4.5	3.4	27.848	6.6	6.6	0.000
Nitrate (N)	mg/L	<0.05	<0.05	**NC**	0.70	0.68	2.899
Nitrite (N)	mg/L	<0.05	<0.05	**NC**	<0.10	<0.10	**NC**
pH	pH	7.96	8.06	(1.248)	7.91	7.95	(0.504)
Phenols	mg/L	<0.001	<0.001	**NC**	<0.001	<0.001	**NC**
Total Phosphorus	mg/L	0.05	0.05	0.000	0.06	0.05	18.182
Sulphate	mg/L	20.1	20.1	0.000	23.2	23.9	(2.972)
Total Dissolved Solids (TDS)	mg/L	244	242	0.823	374	366	2.162
TKN	mg/L	0.30	0.40	(28.571)	0.60	0.50	18.182
Metals							
Arsenic	mg/L	0.002	0.002	0.000	<0.001	0.001	**NC**
Barium	mg/L	0.024	0.023	4.255	0.041	0.043	(4.762)
Boron	mg/L	0.22	0.20	9.524	0.114	0.121	(5.957)
Cadmium	mg/L	<0.0001	<0.0001	**NC**	<0.0001	<0.0001	**NC**
Calcium	mg/L	37.3	37.1	0.538	68.3	68.0	0.440
Chromium	mg/L	<0.002	<0.002	**NC**	<0.002	<0.002	**NC**
Copper	mg/L	<0.001	<0.001	**NC**	0.002	0.005	**(85.714)**
Iron	mg/L	<0.010	<0.010	**NC**	<0.010	<0.010	**NC**
Lead	mg/L	<0.0005	<0.0005	**NC**	<0.0005	<0.0005	**NC**
Magnesium	mg/L	28.0	28.0	0.000	30.1	30.2	(0.332)
Manganese	mg/L	0.017	0.018	(5.714)	0.006	0.006	0.000
Mercury	mg/L	<0.0001	<0.0001	**NC**	<0.0001	<0.0001	**NC**
Potassium	mg/L	4.63	4.69	(1.288)	3.63	3.61	0.552
Sodium	mg/L	8.11	8.15	(0.492)	13.0	13.0	0.000
Zinc	mg/L	<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**
Benzene	mg/L	<0.0002	<0.0002	**NC**	<0.0002	<0.0002	**NC**
Methylene Chloride(Dichloromethane)	mg/L	<0.0003	<0.0003	**NC**	<0.0003	<0.0003	**NC**
Toluene	mg/L	<0.0002	<0.0002	**NC**	<0.0002	<0.0002	**NC**
Vinyl Chloride	mg/L	<0.00017	<0.00017	**NC**	<0.00017	<0.00017	**NC**

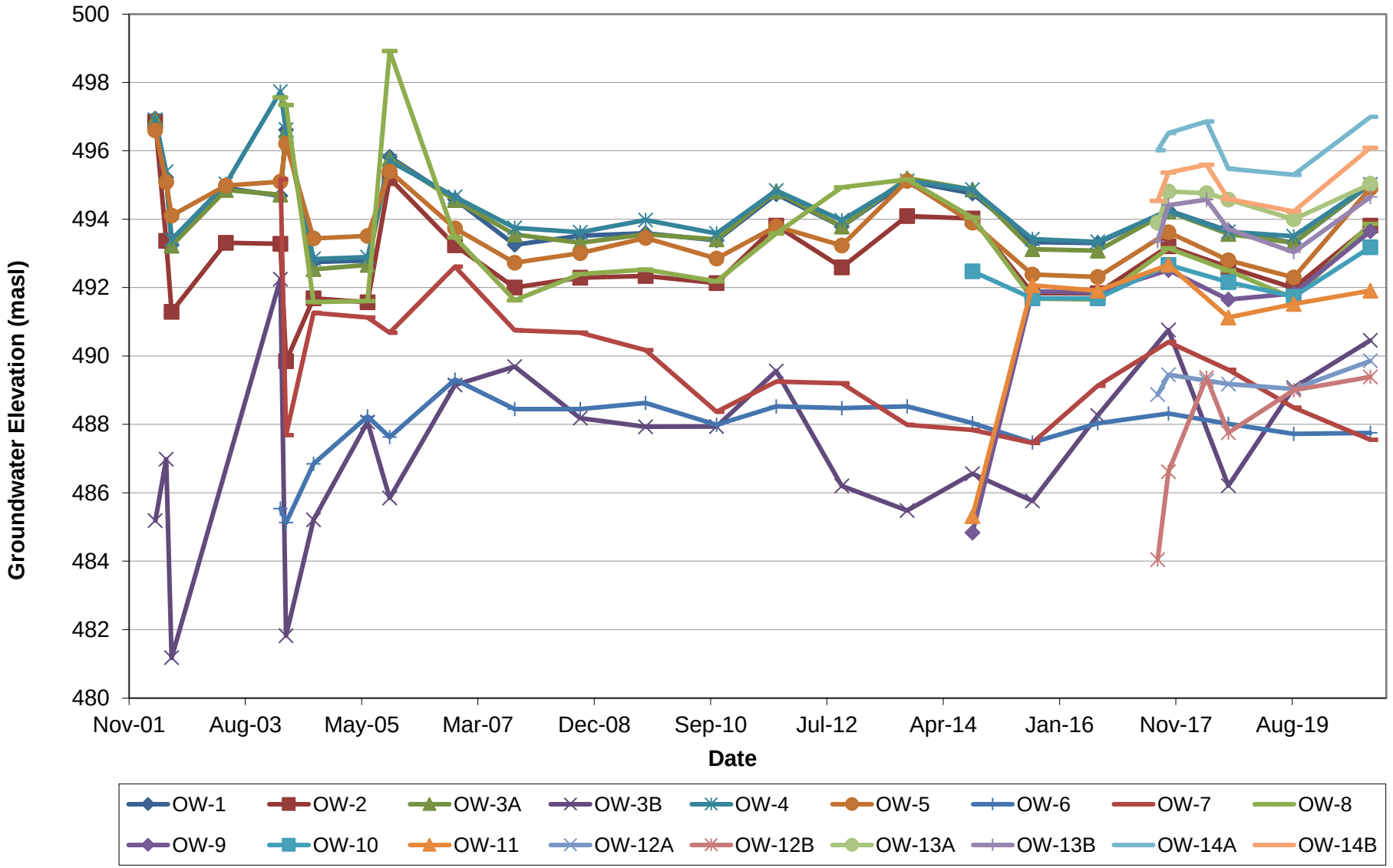
Notes:

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

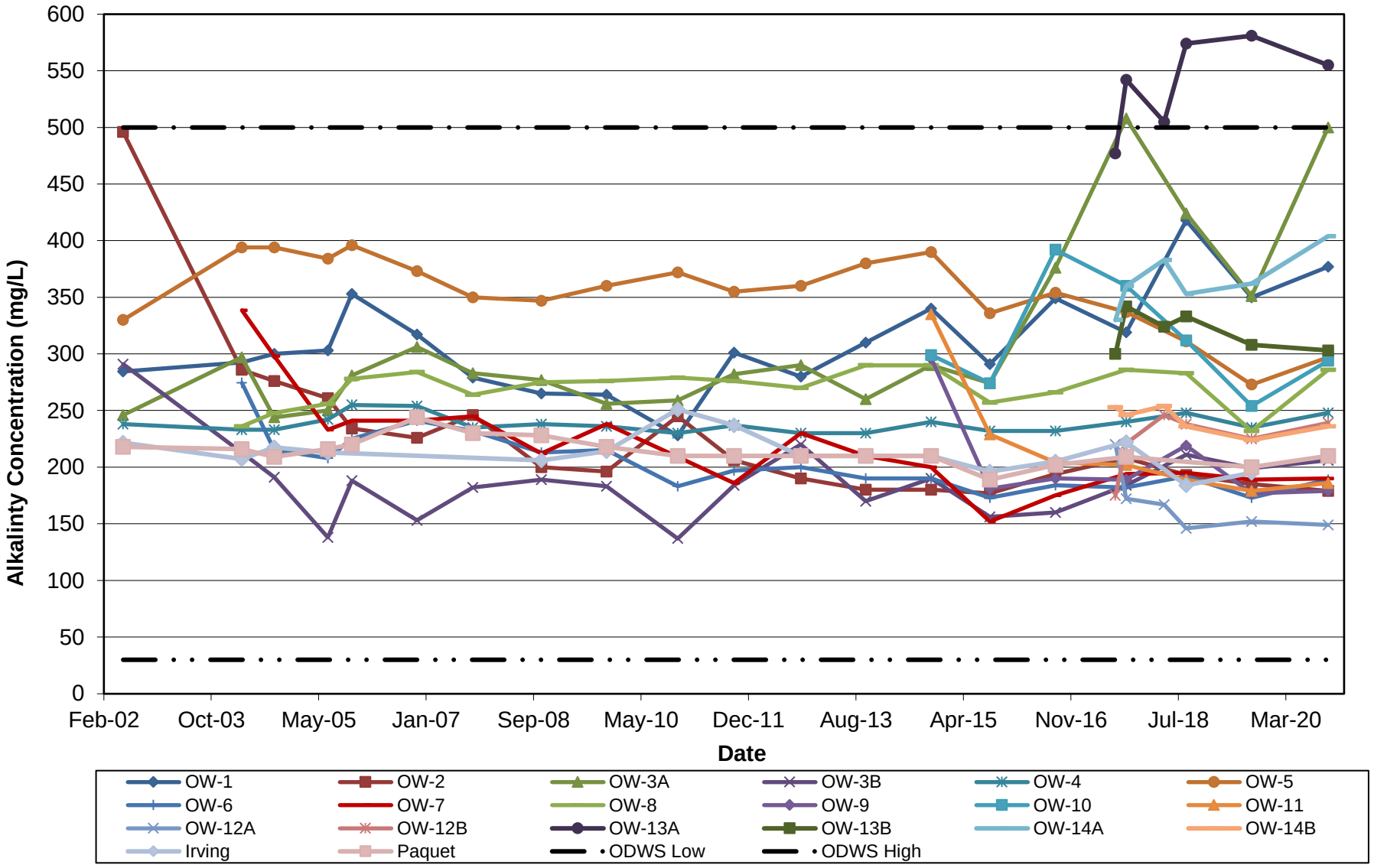
APPENDIX F

GROUNDWATER ELEVATION AND CHEMISTRY TREND ANALYSIS

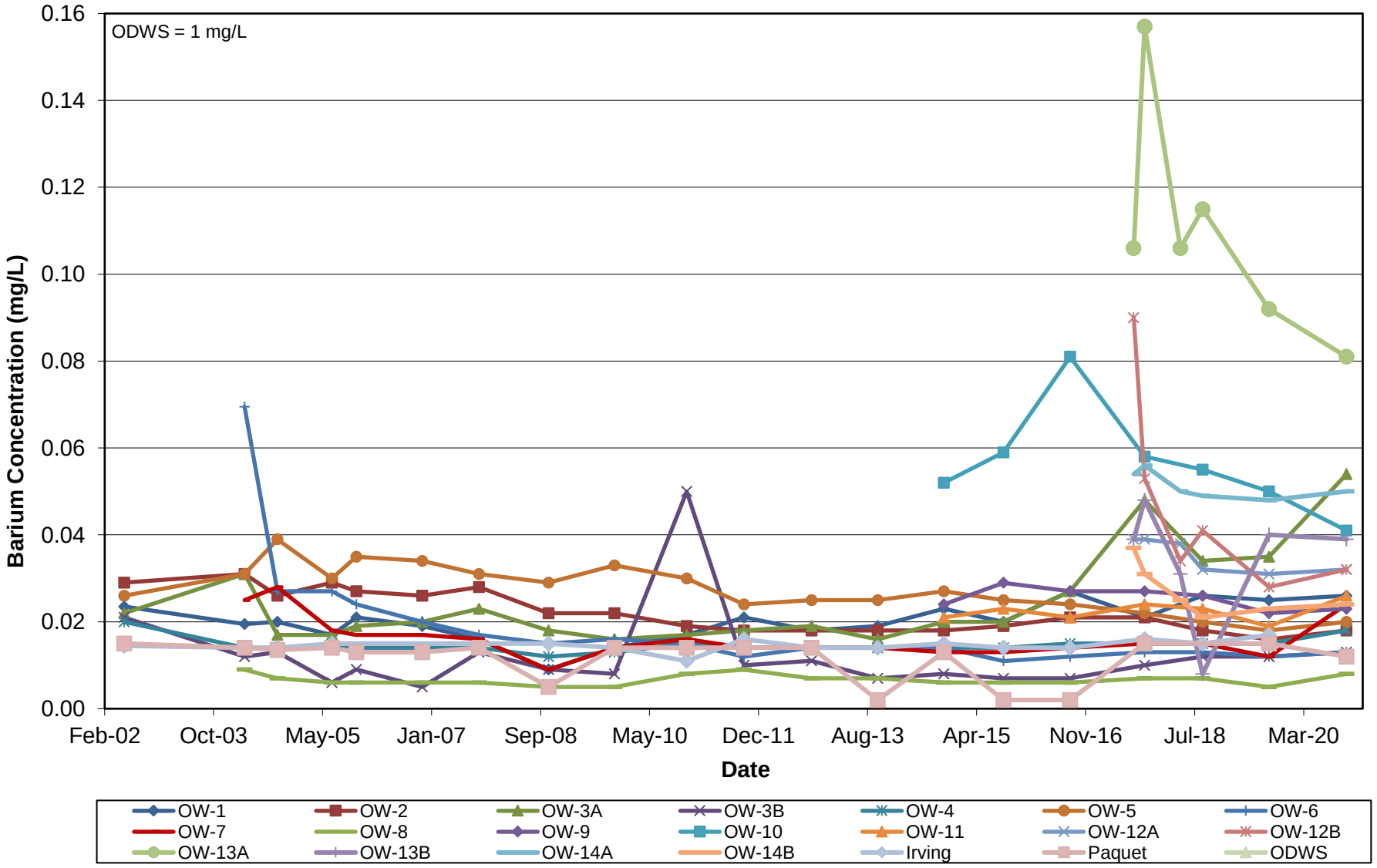
Groundwater Elevation Trend Analysis



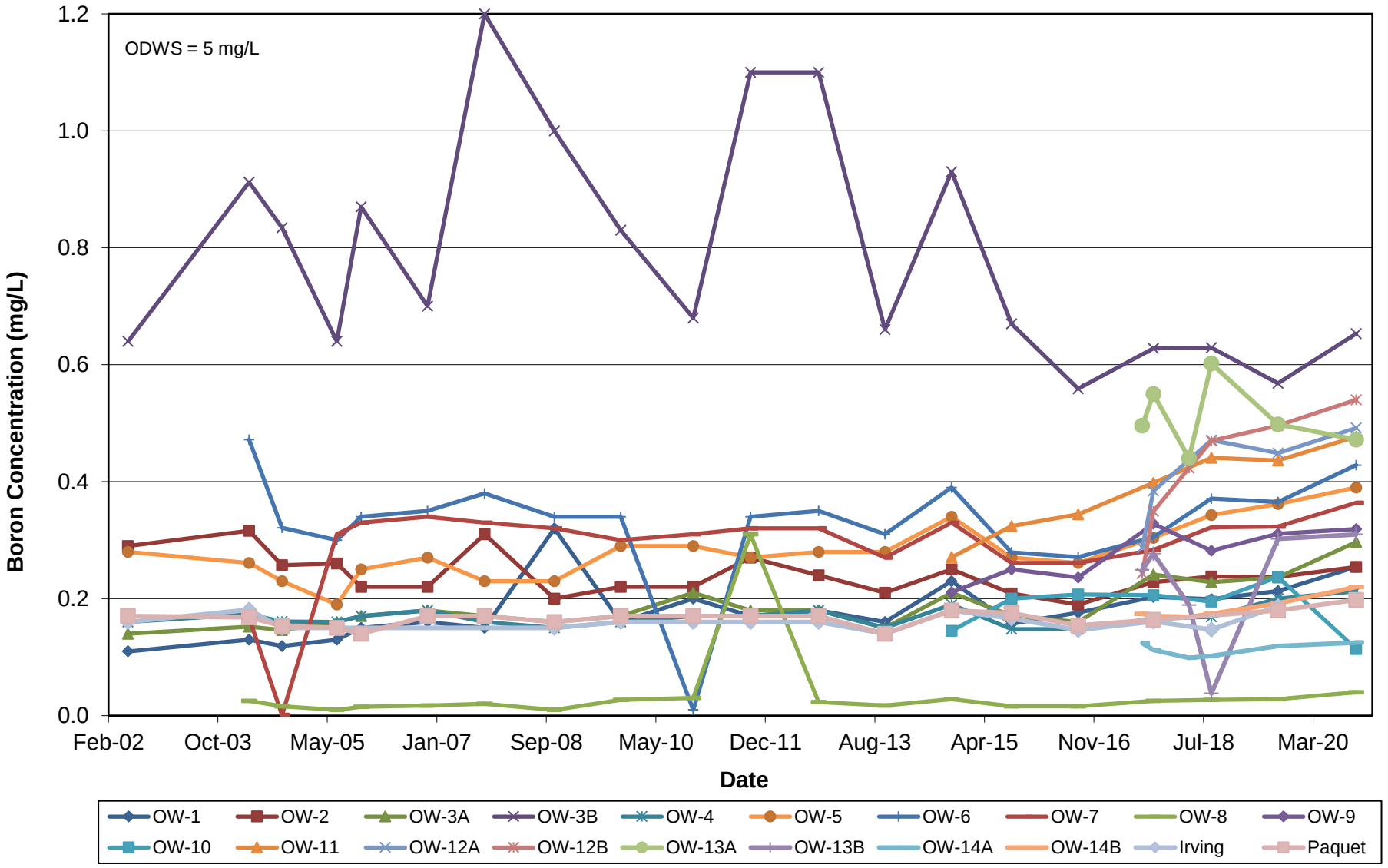
Alkalinty Trend Analysis - Groundwater



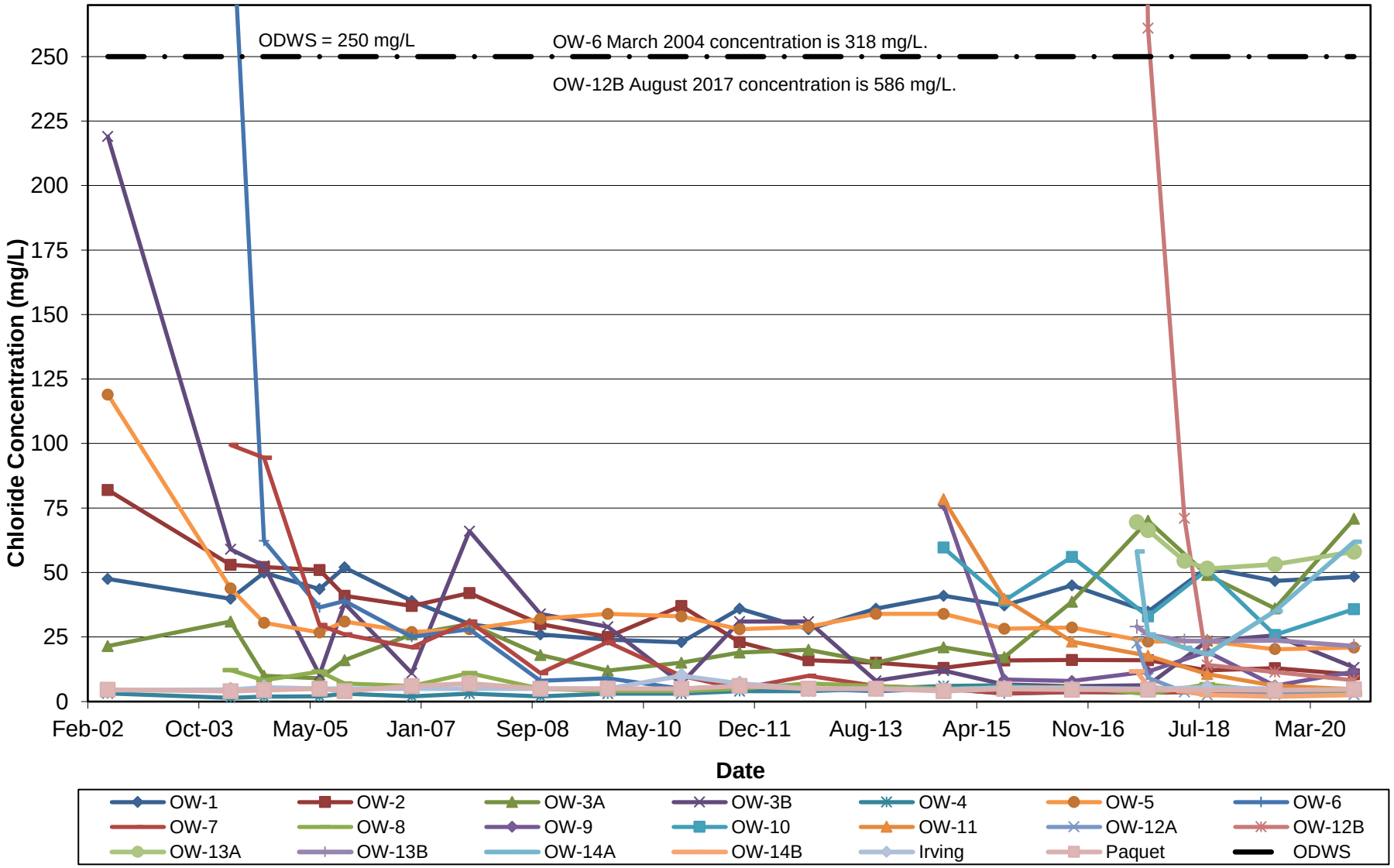
Barium Trend Analysis - Groundwater



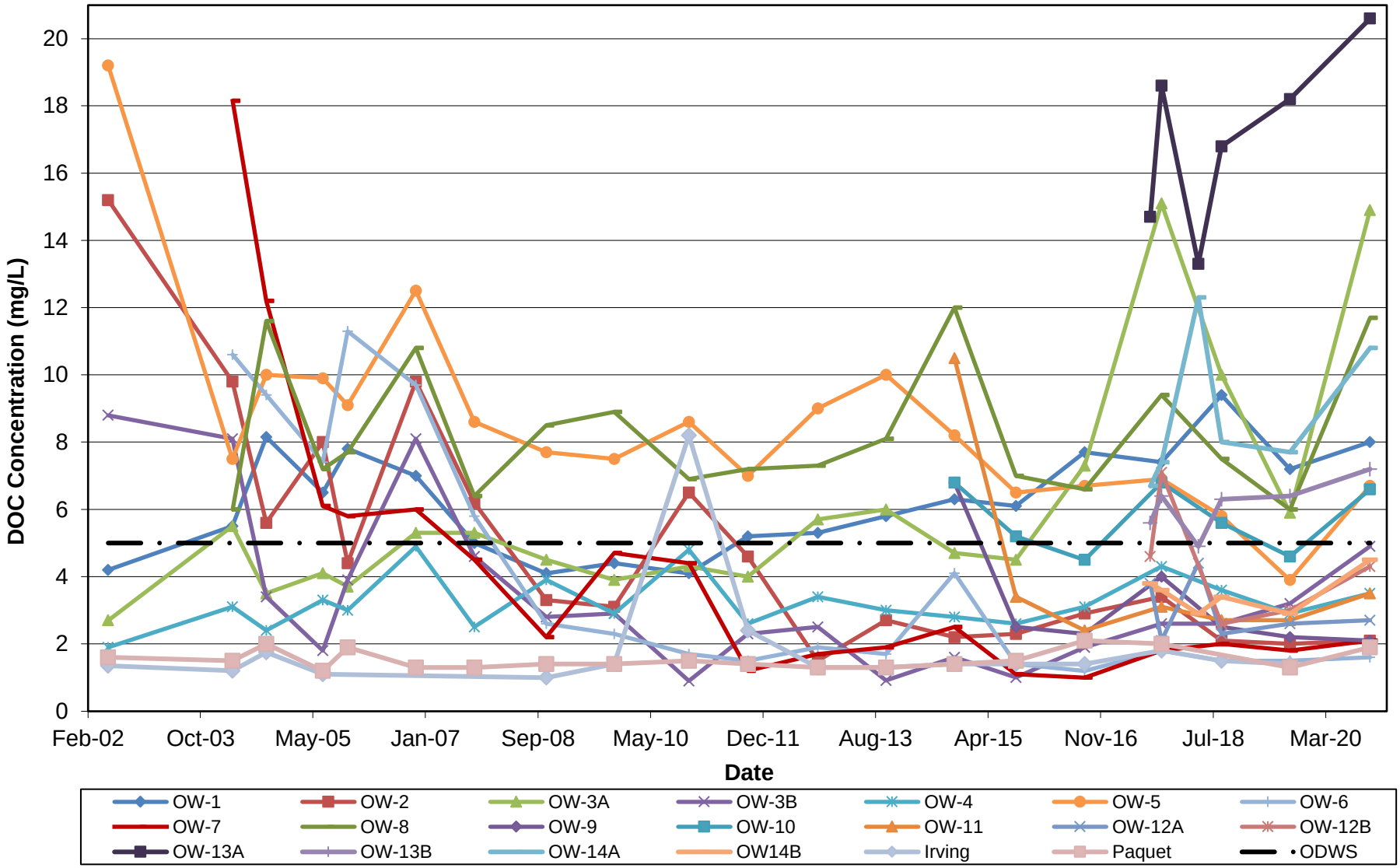
Boron Trend Analysis - Groundwater



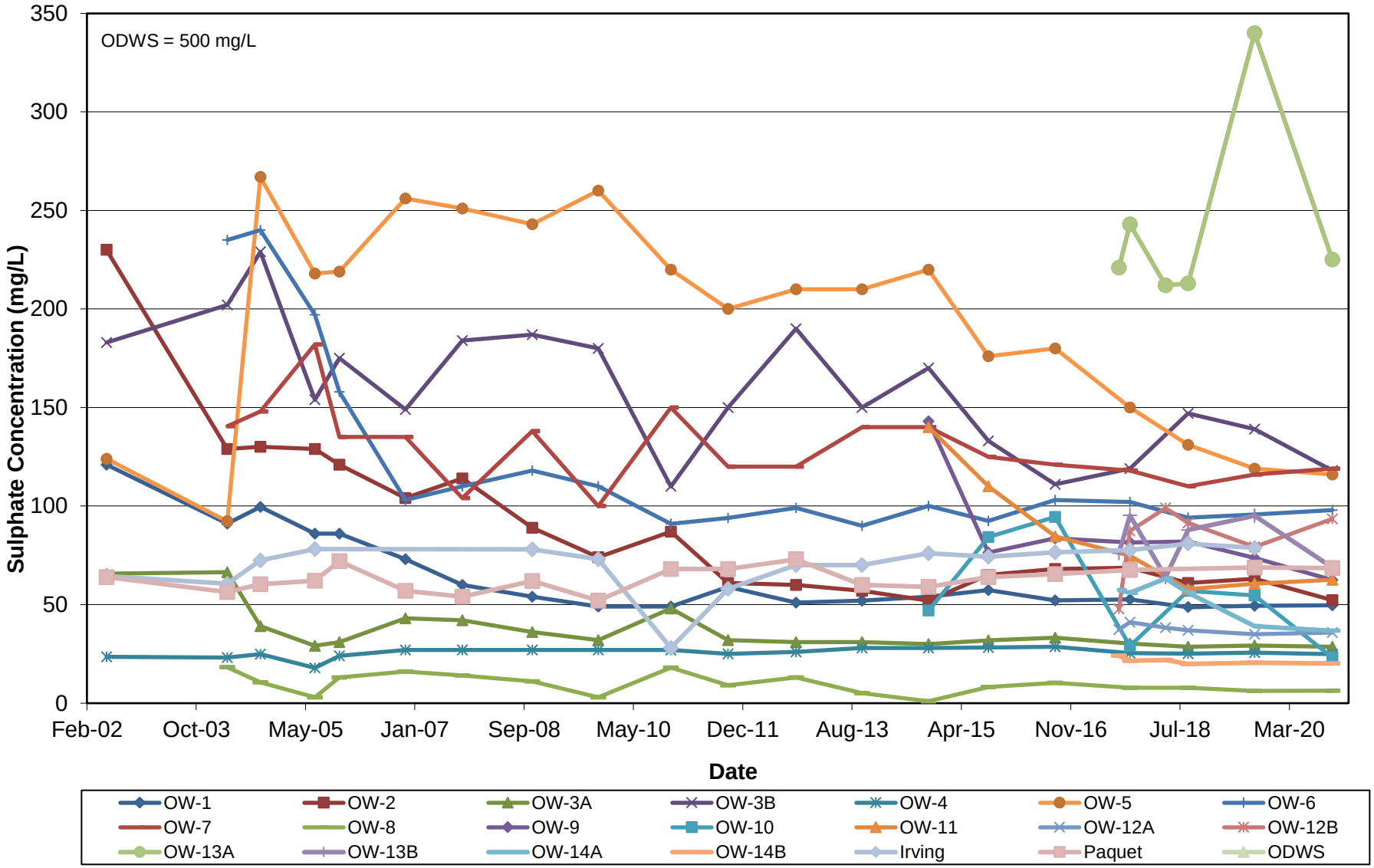
Chloride Trend Analysis - Groundwater



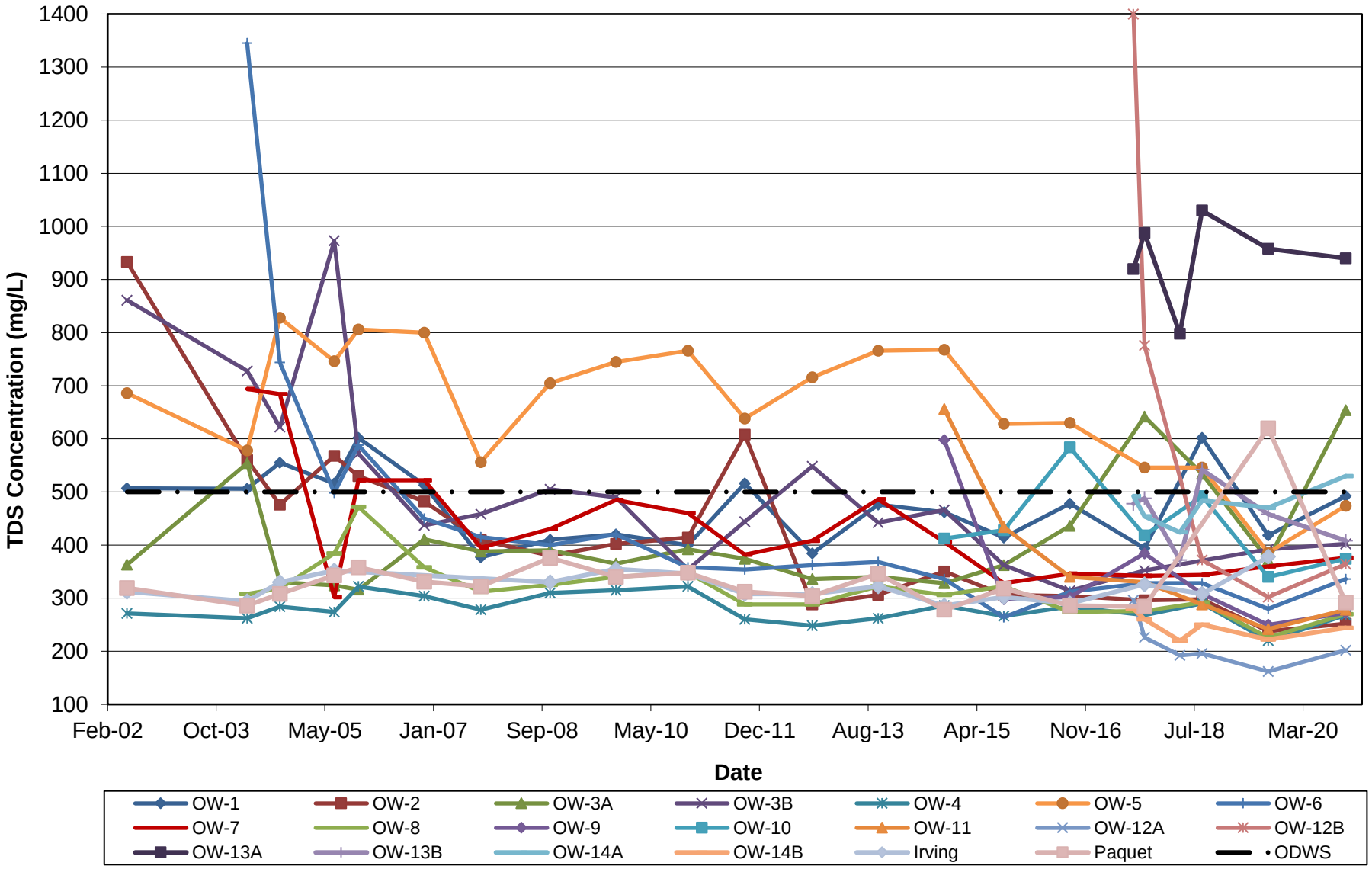
Dissolved Organic Carbon Trend Analysis - Groundwater



Sulphate Trend Analysis - Groundwater



Total Dissolved Solids Trend Analysis - Groundwater



APPENDIX G

PHOTOGRAPHIC INVENTORY OF GROUNDWATER MONITORING LOCATIONS

OW-1
2019

OW-1
2019

OW-2
2019

OW-2
2019

OW-3A
2019

OW-3B
2019

OW-3 Nest
2019

OW-4
2019

OW-4
2019

OW-5
2019

OW-5
2019

OW-6
2019

OW-6
2019

OW-7
2019

OW-7
2019

OW-8
2019

OW-8
2019

OW-9
2019

OW-9
2019

OW-10
2019

OW-11
2019

OW-11
2019

OW-12A
2019

OW-12B
2019

OW-12 Nest
2019

OW-13A
2019

OW-13B
2019

OW-13 Nest
2019

OW-14A
2019

OW-14B
2019

OW-14 Nest 2019

APPENDIX H

GUIDELINE B-7 CALCULATIONS

Reasonable Use Calculations (Guideline B-7)
November 2020 Monitoring Event

Reasonable Use Calculation (Guideline B-7)				Downgradient Monitoring Wells															
Parameter	**ODWS [3] C_r (mg/L)**	**Background Concentration $C_{b\,(1)}$ (mg/L)**	**Maximum Concentration $C_m=C_b+x(C_r-C_b)$ (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)**
Health Related			x=0.25 [2]																
Barium	1	0.007	0.255	0.026	0.018	0.054	0.013	0.018	0.020	0.013	0.024	0.023	0.041	0.026	0.032	0.032	0.081	0.039	0.050	0.024
Boron	5	0.021	1.27	0.254	0.254	0.297	0.653	0.213	0.390	0.428	0.364	0.319	0.114	0.477	0.492	0.540	0.472	0.310	0.125	0.220
Nitrate	10	0.052	2.54	<0.25	0.05	<0.25	0.83	<0.05	<0.10	0.10	0.45	0.29	0.70	<0.05	0.10	<0.10	<0.25	<0.10	<0.25	<0.05
Nitrite	1	0.014	0.26	<0.25	<0.05	<0.25	<0.10	<0.05	<0.10	<0.05	<0.05	<0.05	<0.10	<0.05	<0.05	<0.10	<0.25	<0.10	<0.25	<0.05
Non-Health Related			x=0.50 [2]																
Alkalinity	500	269.4	385	377	179	**500**	206	248	297	189	190	179	294	186	149	239	**555**	303	**404**	236
Chloride	250	5.84	128	48.4	10.5	70.8	13.2	4.80	20.9	3.49	3.05	11.6	35.8	4.82	2.70	8.26	58.1	21.5	61.9	2.55
DOC	5	8.05	8.05 [4]	8.0	2.1	**14.9**	4.9	3.5	6.7	1.6	2.1	2.1	6.6	3.5	2.7	4.3	**20.6**	7.2	**10.8**	4.5
Sodium	200	3.72	101.9	23.8	8.38	40.1	34.9	8.18	29.6	9.64	93.2	9.68	13.0	9.87	16.9	14.0	37.6	14.9	11.5	8.11
Sulphate	500	7.63	254	49.6	52.2	28.6	118	24.9	116	98.0	119	62.5	23.2	62.6	35.8	93.4	225	68.8	36.8	20.1
TDS	500	313.6	407	**492**	252	**654**	402	268	**474**	336	376	272	374	278	202	364	**940**	**408**	**530**	244

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)	2020
This Monitoring 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):
The site is:	◉ **Active** ○ **Inactive** ○ **Closed**	
If closed, specify C of A, control or authorizing document closure date:		
Has the nature of the operations at the site changed during this monitoring period?	○ **Yes** ◉ **No**	
If yes, provide details:		
Have 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	

Groundwater WDS Verification:

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**	If no, list exceptions (Type Here):
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):	◉ **Yes** ○ **No** ○ **Not Applicable**	If no, list exceptions below or attach information.

Groundwater Sampling Location	**Description/Explanation for change (change in name or location, additions, deletions)**	**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 groundwater, leachate and WDS gas sampling and monitoring requirements have been established or defined outside of a ministry C of A, authorizing, or control document.	◯ **Yes** ◉ **No** ◯ **Not Applicable**	
b) If yes, the sampling and monitoring identified under 3(a) for the monitoring period being reported on was successfully completed in accordance with established protocols, frequencies, locations, and parameters developed as per the Technical Guidance Document:	◯ **Yes** ◯ **No** ◉ **Not Applicable**	If no, list exceptions below or attach additional information.

Groundwater Sampling Location	**Description/Explanation for change (change in name or location, additions, deletions)**	**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**	Based on the preliminary CAZ estimated during the 2018 groundwater assessment, the Site requires additional land to be in compliance with Guideline B7. Private land immediately adjacent to and downgradient from well nest OW-13 may not be in compliance, based on the estimated CAZ requirement.	
6) The site meets compliance and assessment criteria.	○ **Yes** ◉ **No**	Guideline B-7 exceedances were quantified for OW-1, OW-3B, OW-5, OW-14A and well nest OW-13. As above, these wells fall within the previously estimated CAZ of 241 m. Land adjacent to well nest OW-13 may not be in compliance.	
7) The site continues to perform as anticipated. There have been no unusual trends/ changes in measured leachate and groundwater levels or concentrations.	◉ **Yes** ○ **No**		
1) Is one or more of the following risk reduction practices in place at the site: ***(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** ***(b)*** **There is a predictive monitoring program in-place (modeled indicator concentrations projected over time for key locations); or** ***(c)*** **The site meets the following two conditions (typically achieved after 15 years or longer of site operation):** ***i.*** **The site has developed stable leachate mound(s) and stable leachate plume geometry/concentrations; and** ***ii.*** **Seasonal and annual water levels and water quality fluctuations are well understood.**	◉ **Yes** ○ **No**	**Note which practice(s):**	☐ **(a)** ☐ **(b)** ☒ **(c)**
9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):	○ **Yes** ○ **No** ◉ **Not Applicable**	If yes, list value(s) that are/have been exceeded and follow-up action taken (Type Here):	

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**	
◉ **The following change(s) to the monitoring program is/are recommended:**	Additional monitoring wells are recommended west of well nest OW-13 to evaluate the need for additional CAZ land area.
◉ **No Changes to site design and operation are recommended**	
○ **The following change(s) to the site design and operation is/ are recommended:**	Type Here

Name:	Brian Grant		
Seal:	Add Image		
Signature:	Brian Grant Digitally signed by Brian Grant Date: 2020.12.02 12:58:05 -05'00'	**Date:**	2-Dec-2020
CEP Contact Information:	Brian Grant, P.Eng.		
Company:	Wood Environment & Infrastructure Solutions		
Address:	131 Fielding Road, Lively, Ontario, P3Y 1L7		
Telephone No.:	705-682-2632 x 235	Fax No. :	705-682-2260
E-mail Address:	brian.grant@woodplc.com		
Co-signers for additional expertise provided:			
Signature:		**Date:**	Select Date
Signature:		**Date:**	Select Date

Surface Water WDS Verification:

Provide the name of surface water body/bodies potentially receiving the WDS effluent and the approximate distance to the waterbody (including the nearest surface water body/bodies to the site):

Name (s)	Lake Huron
Distance(s)	500 m west

Based on all available information and site knowledge, it is my opinion that:

Sampling and Monitoring Program Status:

1) 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:	◉ Yes ○ No	Former surface water monitoring program discontinued historically.
2) 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):	○ Yes ○ No ◉ **Not applicable (No C of A, authorizing / control document applies)**	If no, specify below or provide details in an attachment.

Surface Water Sampling Location	Description/Explanation for change (change in name or location, additions, deletions)	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 sampling and monitoring program requirements for the monitoring period have been established outside of a ministry C of A or authorizing/control document.	◯ **Yes** ◯ **No** ◉ **Not Applicable**	
b) If yes, all surface water sampling and monitoring identified under 3 (a) was successfully completed in accordance with the established program from the site, including sampling protocols, frequencies, locations and parameters) as developed per the Technical Guidance Document:	◯ **Yes** ◯ **No** ◉ **Not Applicable**	If no, specify below or provide details in an attachment.

Surface Water Sampling Location	**Description/Explanation for change (change in name or location, additions, deletions)**	**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 program discontinued historically.

Sampling and Monitoring Program Results/WDS Conditions and Assessment:

5) 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**	If yes, specify (Type Here)

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.	◉ **Yes** ◯ **No**	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)):	◯ Yes ◯ No ◯ Not Known ◉ Not Applicable	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):	◯ **Yes** ◯ **No** ◉ **Not Applicable**	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 monitoring results for the waste disposal site:

◉ **No Changes to the monitoring program are recommended**	Former surface water monitoring program discontinued historically.
○ **The following change(s) to the monitoring program is/are recommended:**	
◉ **No changes to the site design and operation are recommended**	Type Here
○ **The following change(s) to the site design and operation is/are recommended:**	

CEP Signature	Brian Grant Digitally signed by Brian Grant Date: 2020.12.02 12:59:43 -05'00'
Relevant Discipline	Hydrogeologist
Date:	2-Dec-2020
CEP Contact Information:	Brian Grant
Company:	Wood Environment & Infrastructure Solutions
Address:	131 Fielding Road, Lively, Ontario, P3Y 1L7
Telephone No.:	705-682-2632 x 235
Fax No. :	705-682-2260
E-mail Address:	brian.grant@woodplc.com

Save As **Print Form**