

**2019 ANNUAL GROUNDWATER AND SURFACE WATER MONITORING REPORT
HAILEYBURY WASTE DISPOSAL SITE
HAILEYBURY, ONTARIO**

Submitted to:

The City of Temiskaming Shores

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1.0 INTRODUCTION

Wood Environment & Infrastructure Solutions, a Division of Wood Canada Limited (Wood), was retained by The City of Temiskaming Shores (the City) to prepare the 2019 annual groundwater and surface water monitoring report for the Haileybury Waste Disposal Site (the Site). The following report provides a detailed evaluation and summary of the 2019 monitoring data and was completed to constitute the 2019 Annual Monitoring Report to be submitted to the Ministry of the Environment, Conservation and Parks (MECP) in accordance with Subsection 6 of Condition 6 of Certificate of Approval (C of A) No. A570402, provided in Appendix A. This document also includes groundwater flow directions and a review of the historical and current groundwater and surface water geochemical data and geochemical trends. The groundwater quality is evaluated with respect to MECP Guideline B-7 and both groundwater and surface water are assessed according to a previously established Trigger Mechanism for the Site.

1.1 Site Location

The Site is located approximately 9 kilometres (km) southwest of Haileybury, Ontario, Lot 1, Concession 2, within the City of Temiskaming Shores, in the District of Temiskaming. The Universal Transverse Mercator (UTM) coordinates of the Site are 593843 Easting and 5252782 Northing, Zone 17, relative to the North American Datum (NAD) 1983 (collected via handheld Global Positioning System (GPS), accuracy +/- 5 metres (m)). The location of the Site is presented on Figure 1; a Site plan, including all monitoring locations, is presented as Figure 2.

1.2 Ownership and Key Personnel

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

Site Contact Representative:

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1.3 Description and Development of the Site

The Site is operated under Provisional C of A No. A570402, issued on 10 November 1998 and amended on 10 November 1999, 27 April 2009 and 18 December 2009. The Provisional C of A allows for the use of a 5.8 hectare (ha) waste fill area within a total Site area of 32.4 ha (Appendix A), as illustrated on Figure 3. The Site was originally approved in 1998, but had been in operation prior to that time, since 1975 (Story Environmental Inc. (Story), 2013). The Site is approved to accept solid non-hazardous municipal waste for disposal and has a maximum approved capacity of 470,000 cubic metres (m³), including daily and intermediate cover. The service area for the Site includes the City of Temiskaming Shores and the Town of Cobalt.

The City completed the acquisition of additional land downgradient of the Site in the fall of 2013. The negotiations for the acquisition had been ongoing since 2004, at which time the City was issued a letter of non-compliance by the MECP and was required to obtain all applicable property for the use of a 28 ha Contaminant Attenuation Zone (CAZ). The purchase of this property was passed as By-Law No. 2013-198 in December 2013. The locations of the property purchased in 2013 and the CAZ are illustrated on Figure 4.

No operations problems were encountered at the Site in 2019, and no complaints were received. As required by the C of A, a battery-operated methane gas monitor is installed at the Site in order to ensure that the Site building is free of any potential landfill gas accumulation.

1.3.1 Waste Quantities Received

As weigh scales are not in place at the Site, daily records are kept in order to estimate the amount of uncompacted waste received at the Site. The Haileybury Landfill accepted approximately 29,365.8 cubic metres (m³) of uncompacted waste in 2019. Monthly estimates of uncompacted waste are illustrated below in Table 1.

All refrigerators received at the Haileybury Landfill are tagged by licensed technicians, indicating that all potential ozone depleting substances (i.e., refrigerants) have been removed.

1.3.2 On-Site Resource Recovery Activities

Designated resource recovery areas are available at the landfill.

Tires: Tires are accepted at the Site in a designated area and stockpiled for shipment to a recycler. A total of 1,064 tires (1,058 passenger/light truck tires, 4 medium truck tires and 2 agriculture drive and logger skidder tires) were collected from the landfill during 2019 and sent for recycling.

Scrap Metal: Scrap metal is accepted at the Site in a designated area and is sorted and removed from the Site regularly for recycling. No scrap metal was transferred off-Site during 2019.

Table 1: Waste Quantities Received in 2019

Month	Total Annual Uncompacted Waste (m ³)
January	1,934.3
February	636.1
March	1,884.6
April	1,961.8
May	2,988.6
June	2,614.0
July	3,270.0
August	2,972.6
September	2,919.6
October	3,670.1
November	2,275.3
December	2,238.6
ANNUAL TOTAL	29,365.8

1.3.3 Site Capacity

Occasional topographical surveys are conducted at the Site in order to accurately track the landfill capacity consumed and remaining, and the associated estimated remaining life span of the Site. The remaining capacity of the Site is estimated on an annual basis, however an accurate estimate can only be calculated on the years that a Site survey is undertaken.

The most recent topographical survey conducted at the Site was undertaken in June 2019 by Exp Services Inc. (Exp). The contours within the fill area obtained from the 2019 survey are presented on Figure 3. The 2019 topographical survey was completed by Exp in conjunction with a technical memorandum dated 9 October 2019, which outlines the estimated site life of the landfill. Exp has calculated the available remaining capacity of the Site to be approximately 57,005 m³ at the time of the June 2019 survey. Exp used a waste generation rate of 21,488 m³, estimated historically by Wood as part of a separate study, to calculate an approximate remaining life span of 2.7 years as of June 2019. Given the Site's short remaining life, it is recommended that a survey be undertaken during the spring of 2020 to accurately track remaining capacity as the Site approaches closure.

1.4 Monitoring and Reporting Program Objectives and Requirements

Previous investigations resulted in the instrumentation of the Site with a variety of groundwater monitoring wells and identification of the three existing surface water monitoring stations (SW-3 through SW-5). A total of 14 monitoring wells are currently used for monitoring purposes and

two additional wells have been confirmed destroyed (TW-1 and TW-3). Eight of the 14 wells currently comprising the monitoring network are sampled three times annually (TW-4, TW-6, TW-8, TW-9, TW-13, TW-15 and TW-16), and four wells are sampled once annually, in the spring (TW-10, TW-12, TW-14 and TW-17). The other three remaining wells are not sampled, but are retained for water level measurements (TW-5, TW-7 and TW-11). Static groundwater levels are measured at each of the 14 wells in the monitoring network during each of the three annual monitoring events. Surface water is sampled concurrently with groundwater during the spring and fall events. The locations of groundwater and surface water monitoring stations composing the monitoring network 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 assess the water quality conditions at the Site, given the context of our contract, with respect to existing environmental regulations within the applicable jurisdiction.
5. The Site history interpreted herein relies on information supplied by others, such as local, provincial and federal agencies, as well as Site personnel. No attempt has been made to independently verify the accuracy of such information, unless specifically noted in our report.
6. Our interpretations relating to the landfill-derived leachate plume at the Site are described in this report. Where testing was performed, it was executed in accordance with our contract for these services. It should be noted that other compounds or materials not tested for may be present in the Site environment.
7. The conclusions of this report are based, in part, on the information provided by others. The possibility remains that unexpected environmental conditions may be encountered at the Site in locations not specifically investigated. Should such an event occur, 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

Borehole logs detailing soil and groundwater conditions for the monitoring well network are provided in Appendix B. In summary, the subsurface conditions at the Site consist of sand and gravel over bedrock, with an additional layer of till between the sand unit and bedrock in some areas (Story, 2013). Bedrock outcrops are reported along the northern and eastern boundaries of the Site, with depths to bedrock in mid-Site areas varying from 16 m to 22 m below original grade (Story, 2013). The bedrock surface is reported to slope from the north and east towards the southwest (Story, 2013).

Static water levels were recorded by Wood at each of the wells during the spring, summer and fall 2019 groundwater monitoring events. Appendix C presents the groundwater elevations measured during the 2019 groundwater monitoring events. Figures 5A through 5C present the inferred groundwater elevation contours and groundwater flow directions for the 2019 monitoring events. In general, the recorded static groundwater levels indicate groundwater flow across the Site towards the west. The inferred groundwater flow direction appears to mimic the reported bedrock elevation contours, as described by Story (Story, 2013).

2.2 Surface Water Features

Surface water features on-Site include a small, intermittent stream, which flows from a swampy area east of the Site, and along the southern Site boundary, discharging to an unnamed tributary to South Wabi Creek after crossing Firstbrooke Line Road. The unnamed tributary is situated southwest of the Site, west of both Firstbrooke Line Road and the Trans Canada Pipeline right-of-way, and flows to the northwest, discharging to South Wabi Creek, which eventually discharges to Moose Lake before flowing into Lake Temiskaming via Wabi Creek.

3.0 DESCRIPTION OF MONITORING PROGRAM

3.1 Monitoring Locations

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

Table 2: Monitoring Locations On-Site

Monitoring Location	Easting Zone 16 NAD 83	Northing Zone 16 NAD 83	Collection Method	Accuracy	Collection Personnel	Date Collected
TW-4	593656	5252867	Handheld GPS	+/- 5 m	Trained Wood field crew	26 May 2013
TW-5	593835	5252876				
TW-6	593605	5252915				
TW-7	593553	5252777				
TW-8	593910	5253100				
TW-9	593553	5252965				
TW-10	593486	5252824				
TW-11	593519	5252961				
TW-12	593356	5252963				
TW-13	593472	5253010				
TW-14	593381	5252937				
TW-15	593369	5253024				
TW-16	593282	5252995				
TW-17	593517	5252798				
SW-3	593258	5252942				
SW-4	593538	5252661				
SW-5	593843	5252782				

According to the groundwater elevation data collected to date, TW-8 is considered unlikely to be impacted by landfill leachate since it is located east and upgradient of the Site. TW-8 is therefore considered to be representative of background (i.e., non-impacted) water quality conditions, and allows a determination of Site compliance to be undertaken using MECP Guideline B-7.

Wells TW-4 and TW-6 are situated within the fill area, and are consequently considered to be source monitoring wells. Located slightly downgradient of the waste fill area, wells TW-9 and TW-13 are representative of immediate downgradient water quality conditions. Wells TW-12, TW-14, TW-15 and TW-16 are located further downgradient of the waste deposits, with TW-16 being representative of the downgradient property boundary, as it is situated the furthest downgradient of the Site and within the property comprising the CAZ. Wells TW-10 and TW-17 are situated in a position crossgradient of the Site, as the inferred groundwater flow direction is toward the northwest in the vicinity of these wells.

Table 3 presents a summary of the available construction details and respective on-Site positions of the groundwater monitoring wells. Construction details are based on borehole logs prepared by others (Appendix B).

Table 3: Groundwater Monitoring Well Construction Details

Well ID	Condition	Total Depth (mbgs)	Screened Interval (mbgs)	Unit Screened	On-Site Position
TW-3	Destroyed prior to spring 2015 monitoring event.				
TW-4	Good	10.67	7.67 – 10.67	Sand	Source
TW-6	Good	8.84	8.84 - 7.34	Sand	Source
TW-8	Good	2.44	0.94 – 2.44	Sand	Upgradient
TW-9	Good	12.95	11.45 – 12.95	Sand	Downgradient
TW-10	Good	6.7	5.2 – 6.7	Sand	Crossgradient
TW-12	Good	8.7	7.2 – 8.7	Sand and Bedrock	Downgradient
TW-13	Good	14.7	11.7 – 14.7	Sand	Downgradient
TW-14	Good	13.7	10.7 – 13.7	Sand	Downgradient
TW-15	Good	13.1	10.1 – 13.1	Sand	Downgradient
TW-16	Good	7.7	6.2 – 7.7	Sand	Downgradient
TW-17	Good	4.0	2.5 – 4.0	Silt	Crossgradient

Table 4 presents a summary of the surface water monitoring locations. Surface water monitoring stations SW-3 and SW-4 are situated along the unnamed tributary to South Wabi Creek, and are representative of downstream and upstream water quality conditions, respectively. Station SW-5 is situated adjacent to the Site, at the intermittent stream, on the downstream side of the Site access road. Locations of all sampling stations are indicated on Figure 2.

Table 4: Surface Water Monitoring Stations Summary

Station ID	Watercourse	Position
SW-3	Unnamed Tributary to South Wabi Creek	Downstream
SW-4	Unnamed Tributary to South Wabi Creek	Upstream
SW-5	Intermittent Stream	Adjacent to Site

3.2 Monitoring Frequency

As per previous annual monitoring events, groundwater was sampled three times annually by Wood, during the spring, summer and fall of 2019, and surface water was sampled twice, in the spring and fall. Sampling events occurred on the following dates:

- Spring – 25 May 2019;
- Summer – 24 July 2019; and,
- Fall – 24 September 2019.

3.3 Field and Laboratory Parameters and Analysis

Geochemical analyses for general chemistry, metals and nitrogen cycle parameters were completed on all samples collected. A detailed list of laboratory results for these parameters is included in Appendix D. Field parameters for both groundwater and surface water comprised temperature, pH, conductivity and dissolved solids. Static water level measurements were also recorded for groundwater. 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 ensure the sample was 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. Care was taken during collection of surface water samples to ensure that a representative sample was collected, and that underlying sediments were not disturbed. Samples were submitted under chain of custody, in a temperature controlled setting (i.e., in a cooler, on ice) to a 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 2019 are provided in Appendix D.

The 2019 groundwater monitoring data were reviewed by comparison to the current MECP Ontario Drinking Water Standards (ODWS). Environmental compliance of groundwater quality was evaluated according to MECP Guideline B-7. The 2019 surface water monitoring data were reviewed by comparison to the current MECP Provincial Water Quality Objectives (PWQO), as well as the Canadian Water Quality Guidelines (CWQG) and the Aquatic Protection Values (APV) from Table 3.1 of the 2011 MECP document *Rationale for the Development of Soil and Groundwater Standards for use at Contaminated Sites in Ontario*.

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

As a minimum, for every ten groundwater or surface water samples collected, one field duplicate sample was collected and included in the laboratory submission for analysis. Three field duplicate samples were collected during the spring sampling event, two for groundwater and one for surface water; one field duplicate sample was collected during the summer sampling event, for groundwater; and two field duplicate samples were collected during the fall event, one for groundwater and one for surface water. Samples were submitted to a CALA accredited laboratory that is MECP certified for the analysis of drinking water samples. Laboratory blanks and duplicates were used to ensure sample integrity. 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 and surface water are provided in Appendices E and F, respectively. Water quality data dating back to 2010 are presented for both groundwater and surface water.

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 and/or surface water duplicate samples were collected during each sampling event. All duplicate data are provided in Appendix D and are summarized in Appendices E and F. Groundwater duplicate samples were collected from TW-15 and TW-17 during the spring monitoring event, from TW-16 during the summer monitoring event, and from TW-15 during the fall monitoring event. Surface water duplicate samples were collected from SW-4 during the spring event and from SW-3 during the fall event.

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 aluminum in groundwater during the spring monitoring event.

4.3 Groundwater Flow Monitoring

As discussed in Section 2.1, the recorded static groundwater levels indicate groundwater flow from the fill area towards the west. Static groundwater elevations are presented in Appendix C. Groundwater elevations, inferred groundwater elevation contours and groundwater flow directions for the 2019 groundwater monitoring events are illustrated on Figures 5A through 5C.

In addition to the current groundwater elevation data, historical groundwater elevations were reviewed in order to identify any trends or inconsistencies in the data. Overall, the reported static groundwater elevations are consistent with those recorded during historical sampling efforts. A time-elevation graph was developed for all monitoring wells from 2003 to 2019, presented in Appendix G. The available groundwater elevation data indicate relatively stable elevations over time.

4.4 Groundwater Quality Monitoring

Samples were collected from all applicable wells during all three 2019 monitoring events. Data summary tables are provided in Appendix E. A photographic inventory of the monitoring wells is provided in Appendix H. The condition of each monitoring well was confirmed during the 2019 monitoring events, with no noticeable requirement for maintenance or repair at the time of the fall event. As discussed above, TW-3 was destroyed prior to the spring 2015 monitoring event.

4.4.1 Background Water Quality

Background water quality at TW-8 is characterized by moderate concentrations of dissolved organic carbon (DOC), and low concentrations of alkalinity, chloride, sulphate, hardness, total dissolved solids (TDS) and metals parameters. Iron and manganese are quantified at high levels compared to the ODWS in background water, and therefore these parameters are unreliable for evaluating landfill performance. In accordance with the inferred groundwater flow direction, concentrations of landfill indicator parameters quantified at this location are

considered to be representative of regional background water quality in the aquifer intersected by the well screen.

ODWS exceedances quantified in TW-8 during 2019 are shown as bold entries in the associated geochemical summary table provided in Appendix E, and included iron and manganese. Iron and manganese are aesthetic objectives and have been established to assess potential taste, odour or colour problems that may interfere with good water quality control practices. Exceedances of these parameters do not constitute a health hazard, and can likely be attributed to elevated compounds produced by natural processes occurring in the aquifer.

4.4.2 Source Strength Water Quality

On-Site (i.e., source) groundwater quality conditions are measured by monitoring wells TW-4 and TW-6. Water quality in TW-4 and TW-6 is generally characterized by elevated concentrations of most analytical parameters, in comparison to background water quality. It is noted, however, that these wells are situated immediately downgradient of recent waste deposits, but are crossgradient to historical waste deposits. Water quality is typically noticeably degraded in TW-4, as compared to TW-6. The varying water quality conditions reported across the fill area may be indicative of waste deposits of varying ages or possibly different types of waste in the vicinity of, or upgradient of, each of the source monitoring wells. Water quality in TW-6 indicates higher than usual concentrations of indicator parameters, as compared to the historical monitoring record for this location, during the summer and fall 2019 monitoring events. The fall 2019 results are particularly elevated in comparison to historical results. These results could potentially be indicative of an increasing trend at this location as waste deposition at the Site progresses over time.

4.4.3 Crossgradient Water Quality

Water quality conditions are similar in crossgradient wells TW-10 and TW-17. Groundwater in both wells is characterized by concentrations of most parameters at levels similar to, or lower than, background with the exceptions of aluminum, chloride and sodium, which are marginally elevated. These concentrations are not interpreted to be indicative of an impact to groundwater quality.

4.4.4 Downgradient Water Quality

Monitoring wells TW-9 and TW-13 measure water quality conditions immediately downgradient of the fill area, and directly downgradient of historical waste deposits. When compared to background conditions, concentrations of analytical parameters in both wells are elevated. Concentrations in these downgradient wells are higher than those reported in TW-4 and TW-6, likely as a result of their location slightly further north and more directly downgradient of the older waste deposits at the Site. Groundwater quality in TW-9 is similar to that of TW-13, despite TW-13 being situated at a distance slightly further downgradient. A seasonal trend is apparent at TW-13, which indicates lower concentrations of indicator parameters during the annual spring sampling events, compared to the summer and fall events each year. This trend is consistent over time, with the exception of the spring 2018 monitoring event, and is

particularly evident during 2019, as illustrated in the data summary table provided in Appendix E.

Water quality further downgradient of the Site is measured by monitoring wells TW-12, TW-14 and TW-15, situated immediately west of the pipeline right-of-way. All three wells are located generally downgradient of the fill area, however only TW-15 is situated directly hydraulically downgradient of the waste deposits. Groundwater flow in the immediate vicinity of TW-12 and TW-14 is towards the northwest, therefore these wells may not be within the groundwater plume. For the purposes of this report, they have been considered downgradient monitors, in order to ensure that any potential future impacts to groundwater at these locations are identified, should groundwater flow patterns in this area change as a result of Site activities or those on adjacent properties. At this time, the data available to date indicate that water quality in wells TW-12 and TW-14 is dissimilar to that of TW-15.

Water quality in TW-12 is generally similar to that of TW-14, with concentrations of parameters such as alkalinity, sulphate, hardness and barium quantified at slightly higher concentrations in TW-12. Both wells quantify levels of most indicator parameters that are similar to, or lower than, background well TW-8, with the exceptions of the parameters listed above in TW-12, which are marginally elevated. Water quality at downgradient monitoring locations TW-12 and TW-14 is comparable to characteristics reported at crossgradient wells TW-10 and TW-17, situated to the southeast of TW-12 and TW-14.

Groundwater quality in TW-15 is characterized by elevated concentrations of most parameters in comparison to background conditions, with the exception of iron, which is higher at background. An improvement in water quality is noted in TW-15, however, in comparison to TW-13.

TW-16 is the furthest downgradient monitoring well, and is therefore considered to be representative of the downgradient property boundary. TW-16 is located in the eastern portion of the CAZ property acquired in 2013, and additional land is available within the CAZ, downgradient of TW-16, for continued natural attenuation, if necessary. Groundwater quality in TW-16 is characterized by concentrations of all parameters at levels similar to, or lower than, those reported in background monitoring well TW-8, and indicates a further improvement in water quality as compared to TW-15. No impact to groundwater quality is apparent at this downgradient location, and water quality indicates successful natural attenuation downgradient of the Site.

4.4.5 Field Parameter Measurements

Field parameters were measured at all monitoring wells at the time of sampling, and are presented in Tables 5A through 5C.

Table 5A: Spring 2019 Groundwater Field Parameter Measurements

Well ID	Temperature (°C)	pH	Conductivity (mS/cm)	Dissolved Solids (mg/L)
TW-4	6.9	6.45	682	223
TW-6	5.9	6.83	313	157
TW-8	5.7	6.56	140	70
TW-9	11.1	6.81	1865	933
TW-10	7.6	5.79	102	51
TW-12	7.8	7.66	201	101
TW-13	5.5	6.65	154	77
TW-14	9.6	6.32	89	45
TW-15	10.4	6.71	729	365
TW-16	8.6	7.46	287	144
TW-17	7.0	6.10	138	69

Table 5B: Summer 2019 Groundwater Field Parameter Measurements

Well ID	Temperature (°C)	pH	Conductivity (mS/cm)	Dissolved Solids (mg/L)
TW-4	11.9	6.57	594	297
TW-6	9.6	6.26	1356	678
TW-8	13.6	7.00	155	77
TW-9	13.1	6.98	1288	644
TW-13	11.1	6.75	2199	1100
TW-15	13.8	6.91	1288	644
TW-16	10.0	7.48	162	81

Table 5C: Fall 2019 Groundwater Field Parameter Measurements

Well ID	Temperature (°C)	pH	Conductivity (mS/cm)	Dissolved Solids (mg/L)
TW-4	10.7	6.95	845	423
TW-6	10.5	6.38	2811	1406
TW-8	12.3	7.26	237	119
TW-9	12.3	6.52	1609	805
TW-13	11.1	6.86	1650	825
TW-15	16.2	6.88	1056	528
TW-16	7.9	6.20	54	27

4.5 Surface Water Quality Monitoring

As discussed in Section 3.1, surface water monitoring stations SW-3 and SW-4 are representative of downstream and upstream water quality conditions, respectively. Station SW-5 is situated adjacent to the Site, on the intermittent stream, on the downstream side of the Site access road.

Samples were obtained at all three surface water monitoring stations during the both the spring and fall 2019 monitoring events. A photographic inventory of the monitoring stations is provided in Appendix H. Data summary tables are provided in Appendix F.

The results of the 2019 surface water monitoring indicate no PWQO, APV or CWQG exceedances in SW-3 or SW-4, with the exception of a marginal PWQO exceedance for phenols at upstream station SW-4 during the spring event. Water quality downstream of the Site at SW-3 is almost identical to that upstream of any potential landfill-derived impact to surface water quality at SW-4.

A number of parameters were quantified at elevated concentrations at SW-5 during the fall monitoring event, as compared to the historical monitoring record. It is possible that this is the result of sediment entrainment during sample collection, however, additional data are required in order to confirm this interpretation. The fall 2019 monitoring data for this station are not considered representative of actual water quality conditions. The spring 2019 water quality at SW-5 is consistent with that reported at this location historically, and is characterized by PWQO exceedances of phenols, low pH and iron, as well as an exceedance of the CWQG for low pH. Water quality at SW-5 is similar to that reported at SW-4, with the exception of high iron concentrations. Remaining analytical parameters are typically similar to, or lower than, those reported at upstream station SW-4.

4.5.1 Field Parameter Measurements

Field parameters were measured at all monitoring stations at the time of sampling, and are presented in Tables 6A and 6B.

Table 6A: Spring 2019 Surface Water Field Parameter Measurements

Station ID	Temperature (°C)	pH	Conductivity (mS/cm)	Dissolved Solids (mg/L)
SW-3	13.7	7.63	214	107
SW-4	14.9	7.21	240	120
SW-5	14.8	6.63	51	26

Table 6B: Fall 2019 Surface Water Field Parameter Measurements

Station ID	Temperature (°C)	pH	Conductivity (mS/cm)	Dissolved Solids (mg/L)
SW-3	14.0	7.16	434	217
SW-4	16.7	7.24	470	235
SW-5	13.5	7.06	165	83

5.0 ASSESSMENT, INTERPRETATION AND DISCUSSION

5.1 Groundwater Quality

5.1.1 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 present monitoring record. With respect to groundwater elevations, the data available indicate that the seasonal water table fluctuation has been relatively consistent since 2003, with two atypically low water levels reported; one in TW-10 during the fall 2015 monitoring event and one in TW-14 during the fall 2016 monitoring event. An elevation chart featuring the water table elevation in each monitoring well from 2003 to 2019 is presented in Appendix G.

A series of time-concentration graphs were developed for several select landfill indicator parameters (including alkalinity, barium, boron, chloride, DOC, hardness and TDS) for each monitoring well location from 1994 to 2019. These time-concentration graphs are presented in Appendix G.

Historical groundwater quality data indicate consistent concentrations of most parameters over time, with a few exceptions. Elevated and erratic concentrations of barium were reported during the period from 1998 to 2001 and during the years of 2002 and 2004 for the majority of wells. The results from these periods were not produced by Wood and are potentially typos contained in the inherited data. Elevated DOC concentrations were quantified in TW-10 during 2003 and in TW-16 during 2012; however, these concentrations appear to be anomalous when compared to the remainder of the historical monitoring record at these locations. All parameters graphed were quantified at elevated levels in TW-6 during the fall 2019 monitoring event. In the absence of additional data, it cannot be determined at this time whether the results of this sampling event are anomalous or potentially indicative of a developing trend at this location.

All parameters graphed indicate high concentrations and a high range of fluctuation in TW-13, where a seasonal trend is apparent, with low concentrations quantified during the spring monitoring events and higher concentrations quantified during the summer and fall monitoring events throughout most of the historical monitoring record. Elevated concentrations of the selected parameters are quantified consistently over time in TW-4, TW-9 and TW-15, as compared to background levels; these results are consistent with the proximity of these wells to the fill area. Increasing trends are apparent in TW-9, but appear to have stabilized during recent years. An erratic range of fluctuation is demonstrated in TW-6, which indicates no apparent trends. Water quality in the remaining monitoring wells is generally comparable to background conditions, with low and stable concentrations over time and no discernible trends.

5.1.2 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 policy was entitled “The Incorporation of the Reasonable Use Concept into MECP Groundwater Management Activities” and is referred to now as Guideline B-7 (formerly Policy 15-08). Simply stated, the policy 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 landfill (or Site) property boundaries.

In order to apply Guideline B-7, the appropriate resource use of the adjacent properties must be selected. At the Haileybury Landfill 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.

The background geochemical profile (based on the geometric mean of all results from TW-8) and the resultant values were applied along with the ODWS, to complete a Guideline B-7 analysis for all of the groundwater monitoring wells for the landfill indicator parameters. Appendix I presents the Guideline B-7 calculations for the 2019 monitoring results that have been developed using all valid background analytical data observed in TW-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 groundwater monitoring wells is also presented in Appendix I for the 2019 monitoring events. By the present assessment, monitoring wells TW-4, TW-6, TW-9, TW-13 and TW-15 exhibit non-compliance with Guideline B-7. Exceedances are indicated by bold and shaded entries in the tables provided in Appendix I.

Comparing concentrations observed in all groundwater monitoring wells during the 2019 sampling events to the maximum allowable concentrations (Appendix I), five health related (arsenic, barium, boron, nitrate and nitrite) and five non-health related (chloride, DOC, sodium, sulphate and TDS) parameter exceedances were reported at source and downgradient monitoring wells situated in close proximity to the fill area. The majority of the Guideline B-7 exceedances were quantified in wells TW-9, TW-13 and TW-6, with fewer exceeding concentrations reported in TW-4 and TW-15. No exceedances of the Guideline B-7 maximum allowable concentrations were quantified in TW-16.

In summary, the monitoring record indicates that a measurable water quality impact is occurring in the immediate vicinity of the waste deposits and in downgradient areas. Exceedances of the Guideline B-7 maximum allowable concentrations have been recorded on-Site during the present monitoring review and are interpreted to be landfill-derived; however, no exceedances were quantified at the monitoring well which is currently considered to be representative of the downgradient Site property boundary (i.e., TW-16). The Site is therefore in compliance with respect to Guideline B-7. Confirmation of these results through additional, regularly scheduled sampling in 2020 is recommended.

5.1.3 Trigger Level Monitoring Program

The 2012 annual monitoring report prepared by Story (Story, 2013) indicates that a Trigger Level Monitoring Program is in place for groundwater at the Site. Although no details of the program are provided in the report, it is stated that three trigger concentrations have been set, for chloride, sulphate and boron, to be evaluated at downgradient monitoring well TW-15. The trigger concentrations are 230 mg/L for chloride, 510 mg/L for sulphate and 3.5 mg/L for boron. No other trigger parameters are indicated.

By the present assessment, no trigger level exceedances were quantified in TW-15 during 2019. The Site is therefore in compliance with respect to groundwater quality, as determined by

the trigger level monitoring program presented by Story in the 2012 annual monitoring report.

It should be noted that the indicated trigger concentration for sulphate has been set at a value that is actually higher than the ODWS value for this parameter (i.e., 500 mg/L). It is recommended that a more appropriate trigger concentration be developed for sulphate (i.e., lower than the ODWS value). The Guideline B-7 maximum allowable concentration of 253 mg/L is recommended for use as the revised sulphate trigger concentration. It is noted that no trigger level exceedances would be quantified in TW-15 for sulphate should this revised trigger value be used.

5.2 Surface Water Quality

5.2.1 Surface Water Trend Analysis

The current and previous surface water quality data were reviewed with the objective of identifying any apparent trends or inconsistencies in the present monitoring record. A series of time-concentration graphs were developed for several select landfill indicator parameters (including barium, chloride, copper, sulphate and zinc) for each monitoring location from 2008 to 2019. These time-concentration graphs are presented in Appendix G.

Historical surface water quality data generally indicate consistent concentrations of most parameters over time. A seasonal trend is apparent at stations SW-3 and SW-4 for chloride and sulphate, which indicate almost identical patterns throughout the monitoring record. It is noted that water quality at SW-3 reported elevated concentrations of barium, copper and zinc between September 2015 and September 2017. Concentrations of these parameters at SW-3 have since returned to typical levels and are similar to those reported at SW-4. Low and stable concentrations of all parameters graphed are demonstrated at SW-4 throughout the historical monitoring record. Water quality at SW-5 is generally stable at low concentrations of most parameters, with the exception of an anomalous zinc concentration in 2013. As discussed previously, many parameters were quantified at elevated levels at SW-5 during the fall 2019 monitoring event; these results are interpreted to be anomalous based on the data available at this time.

5.2.2 Trigger Level Monitoring Program

The 2012 annual monitoring report prepared by Story (Story, 2013) indicates that a Trigger Level Monitoring Program is in place for surface water at the Site. Although no details of the Program are provided in the report, it is stated that two trigger concentrations have been set, for boron and unionized ammonia, to be evaluated at downstream surface water monitoring station SW-3. The trigger concentrations are 0.2 mg/L for boron and 0.02 mg/L for unionized ammonia (i.e., at the PWQO values). No other trigger parameters are indicated.

By the present assessment, no trigger level exceedances were quantified at SW-3 during 2019. The Site is therefore in compliance with respect to surface water quality, as determined by the trigger level monitoring program presented by Story in the 2012 annual monitoring report.

Similar to the groundwater trigger level monitoring program, Wood recommends that the surface water trigger level concentrations be reduced, to levels lower than the associated PWQO values. Trigger levels should not be set at the compliance values, but rather at slightly reduced levels, to allow time for modifications to Site operations should the trigger values be exceeded, and a resultant condition of non-compliance occur.

5.3 Adequacy of the Monitoring Program

It is Wood's opinion that the current groundwater and surface water 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 J.

6.0 CONCLUSIONS

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

1. Groundwater movement at the Site, as determined by water table elevations recorded at each of the monitoring wells, was determined as being directed away from the fill area to the west. TW-8 is situated (hydraulically) in a position considered to be representative of background conditions since it is located east of the Site. This monitoring well configuration allows a detailed evaluation of the Haileybury Landfill Site to be undertaken with respect to MECP Guideline B-7.
2. Groundwater quality suggests impacts (when compared to background) are occurring due to landfill-derived leachate in the wells immediate downgradient of the fill area, with a measureable improvement in groundwater quality with increased distance from the fill area. Furthest downgradient well TW-16 indicates no impact to groundwater quality. Crossgradient wells TW-10 and TW-17 and downgradient wells TW-12 and TW-14 indicate no landfill-derived impact, with water quality generally resembling background conditions.
3. A review of the 2019 surface water geochemical data from locations both upstream and downstream of the Site indicates no landfill-derived impact to surface water downstream of the Site at SW-3.
4. The current (2019) groundwater monitoring record indicates that the Site is continuing to operate as designed, as a natural attenuation type facility. Although a measurable water quality impact is occurring downgradient of the fill area, the current water quality results indicate that the Site is in compliance with respect to Guideline B-7 at compliance well TW-16.
5. Both groundwater and surface water are in compliance with respect to the trigger concentrations, as stated in the 2012 annual monitoring report (Story, 2013).
6. The Site has a calculated remaining capacity for waste of 57,005 m³, as of June 2019. This equates to a remaining Site life of 2.7 years.

7.0 RECOMMENDATIONS

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

1. The City should continue to monitor groundwater and surface water at the current sampling frequencies so that seasonal variations for certain parameters could be documented and understood.
2. Groundwater elevations at all existing monitoring wells should be measured during each groundwater sampling round to further confirm groundwater flow directions and establish seasonal fluctuations.
3. A topographical survey of the entire Site should be undertaken during the spring of 2020 in order to facilitate an accurate calculation of remaining capacity and Site life, given that the Site is approaching closure.
4. The trigger level monitoring programs for both groundwater and surface water should be re-evaluated and revised, with trigger concentrations reduced appropriately, so as to serve as an early warning program to prevent non-compliance.

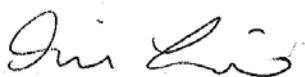
8.0 CLOSURE

This report has been prepared for the exclusive use of the City for specific application to this Site. The annual monitoring report was prepared in accordance with the verbal and written requests from the City 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:

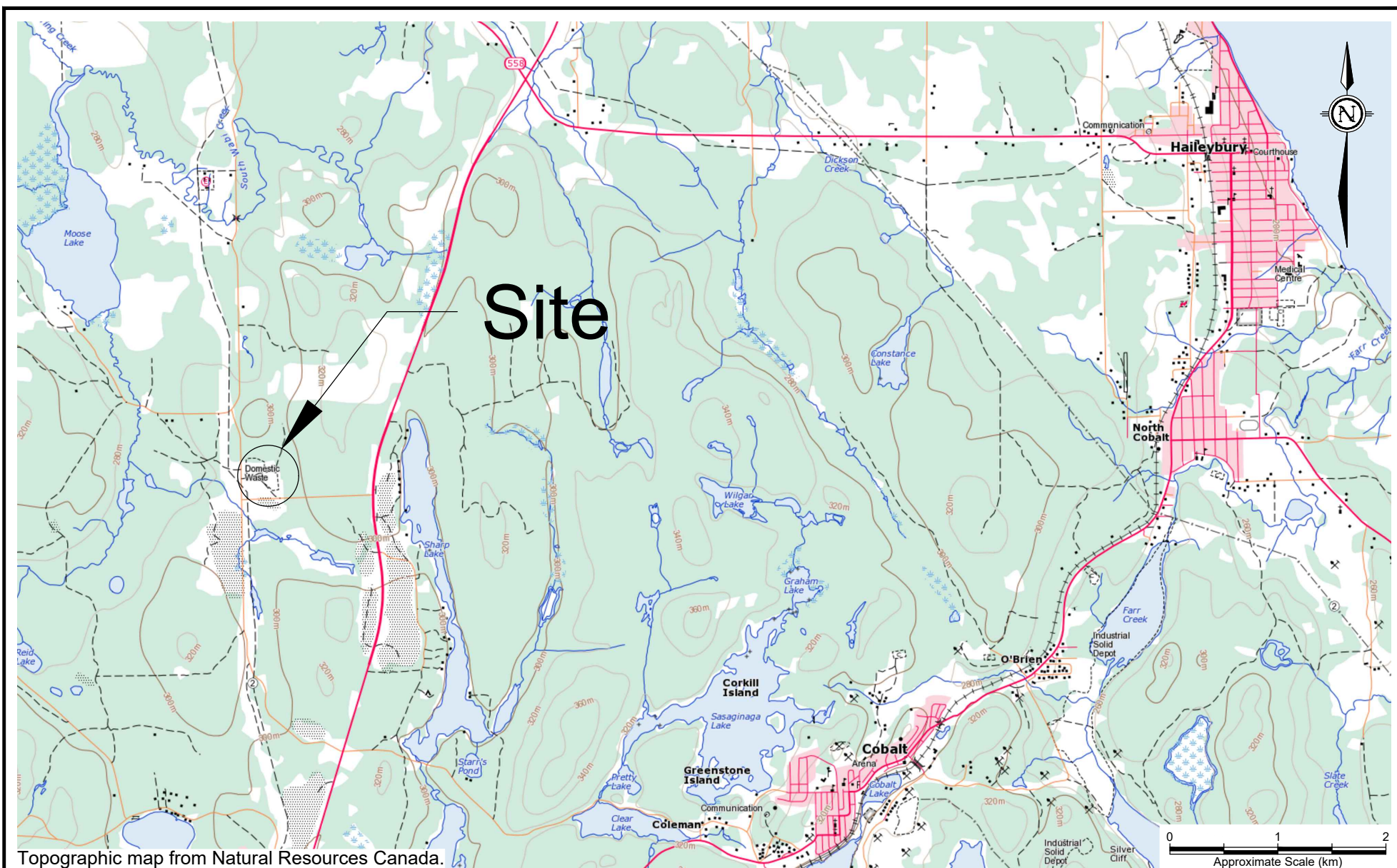




Brian Grant, P.Eng.
Senior Hydrogeologist

9.0 REFERENCES

Exp Services Inc. 2016. Haileybury Landfill Site Closure Plan, City of Temiskaming Shores, Final Report, December 2016.

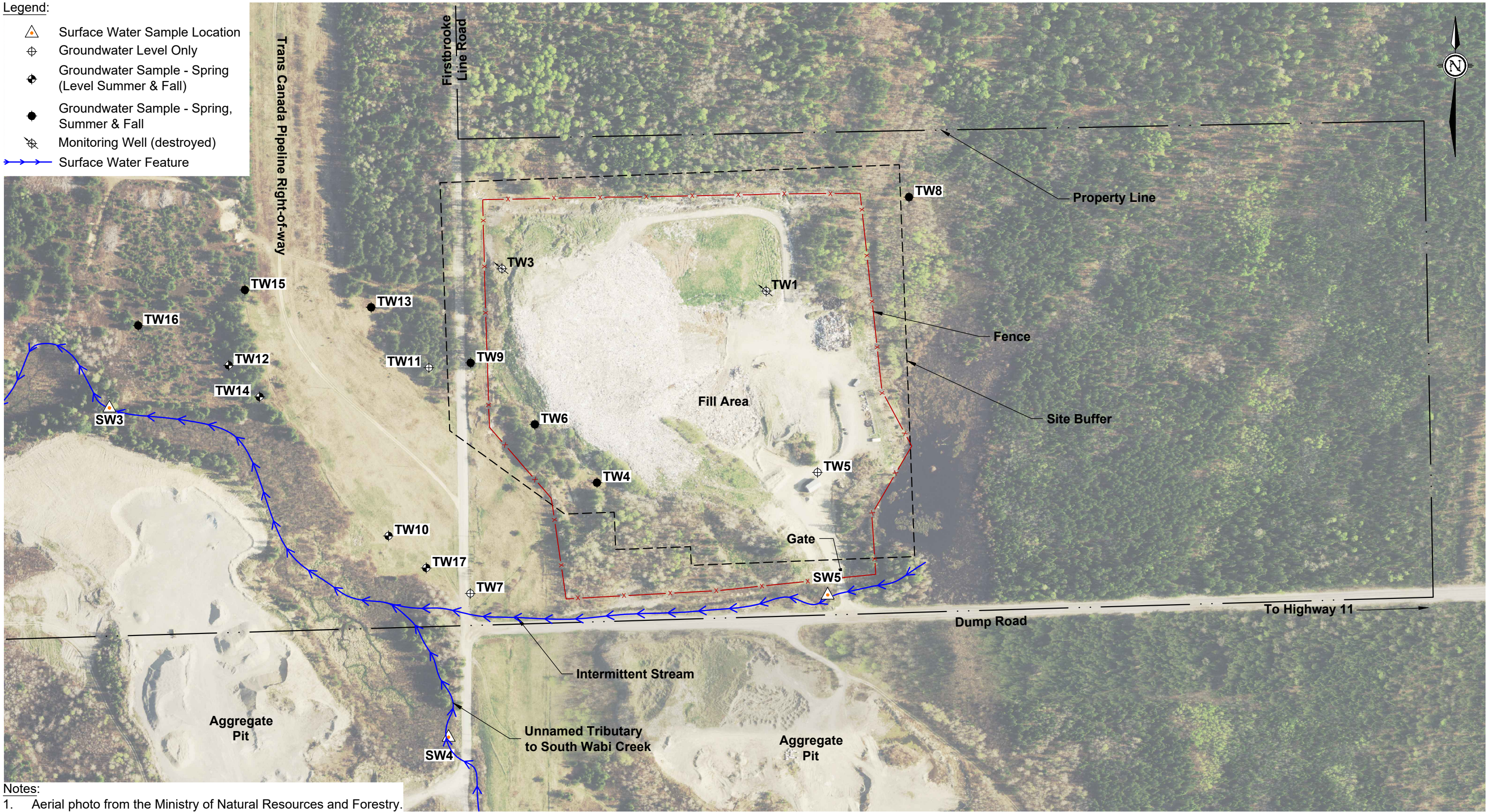
Exp Services Inc. 2019. 2019 Haileybury Landfill Site, – Job # NWL-01901034, Technical Memorandum, October 2019.



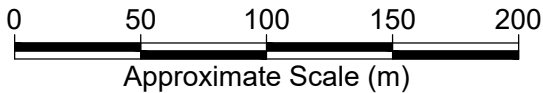
	<p>The City of Temiskaming Shores</p>	<p>DWN BY:</p> <p>KKJ</p>	<p>PROJECT</p> <p>2019 Annual Landfill Monitoring Report Haileybury Waste Disposal Site Temiskaming Shores, Ontario</p>	<p>REV. NO.: 1</p> <p>DATE: March 2020</p>
<p>Wood Environment & Infrastructure Solutions 131 Fielding Road Lively, Ontario P3Y 1L7 705-682-2632</p>		<p>CHK'D BY:</p> <p>BRG</p> <p>SCALE:</p> <p>as shown</p>	<p>TITLE</p> <p>Site Location Map</p>	<p>PROJECT NO: TY131010.2000</p> <p>FIGURE NO: 1</p>

Legend:

- △ Surface Water Sample Location
- ⊕ Groundwater Level Only
- ⬤ Groundwater Sample - Spring (Level Summer & Fall)
- ⬤ Groundwater Sample - Spring, Summer & Fall
- ⊗ Monitoring Well (destroyed)
- Surface Water Feature



Notes:
1. Aerial photo from the Ministry of Natural Resources and Forestry.



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Lively, Ontario
P3Y 1L7
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DWN BY: KKJ
CKD BY: BRG
DATUM: NAD 83
SCALE: as shown

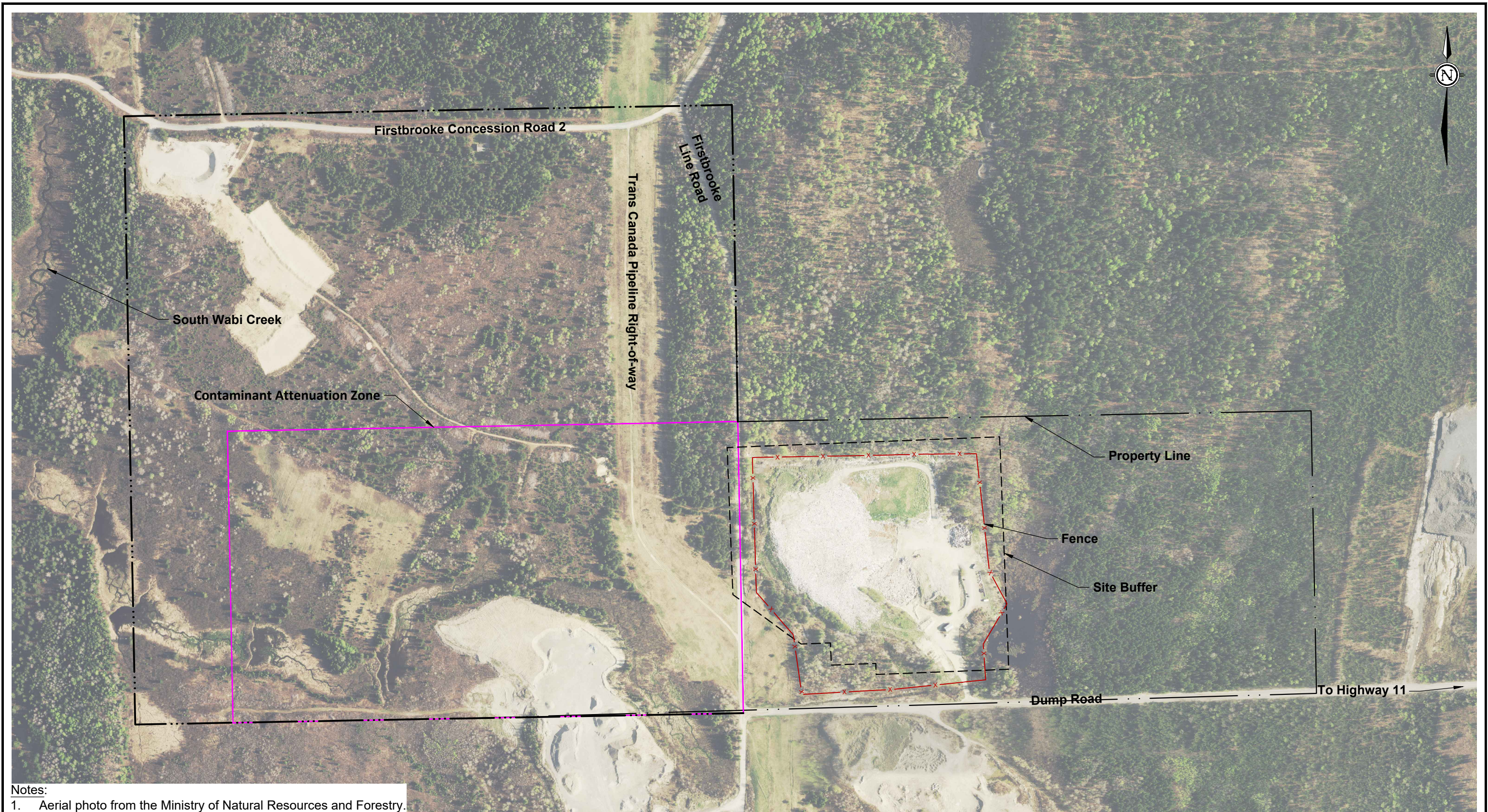
PROJECT
2019 Annual Landfill Monitoring Report
Haileybury Waste Disposal Site
Temiskaming Shores, Ontario
TITLE
Surface Water and Groundwater Monitoring Locations

DATE
March 2020
PROJECT No.
TY131010.2000
REV. No.
1
FIGURE No.
2






- Notes:
1. Aerial photo from the Ministry of Natural Resources and Forestry.
 2. Contours and site features surveyed by EXP in 2019.

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				KKJ		March 2020
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		BRG	TY131010.2000			
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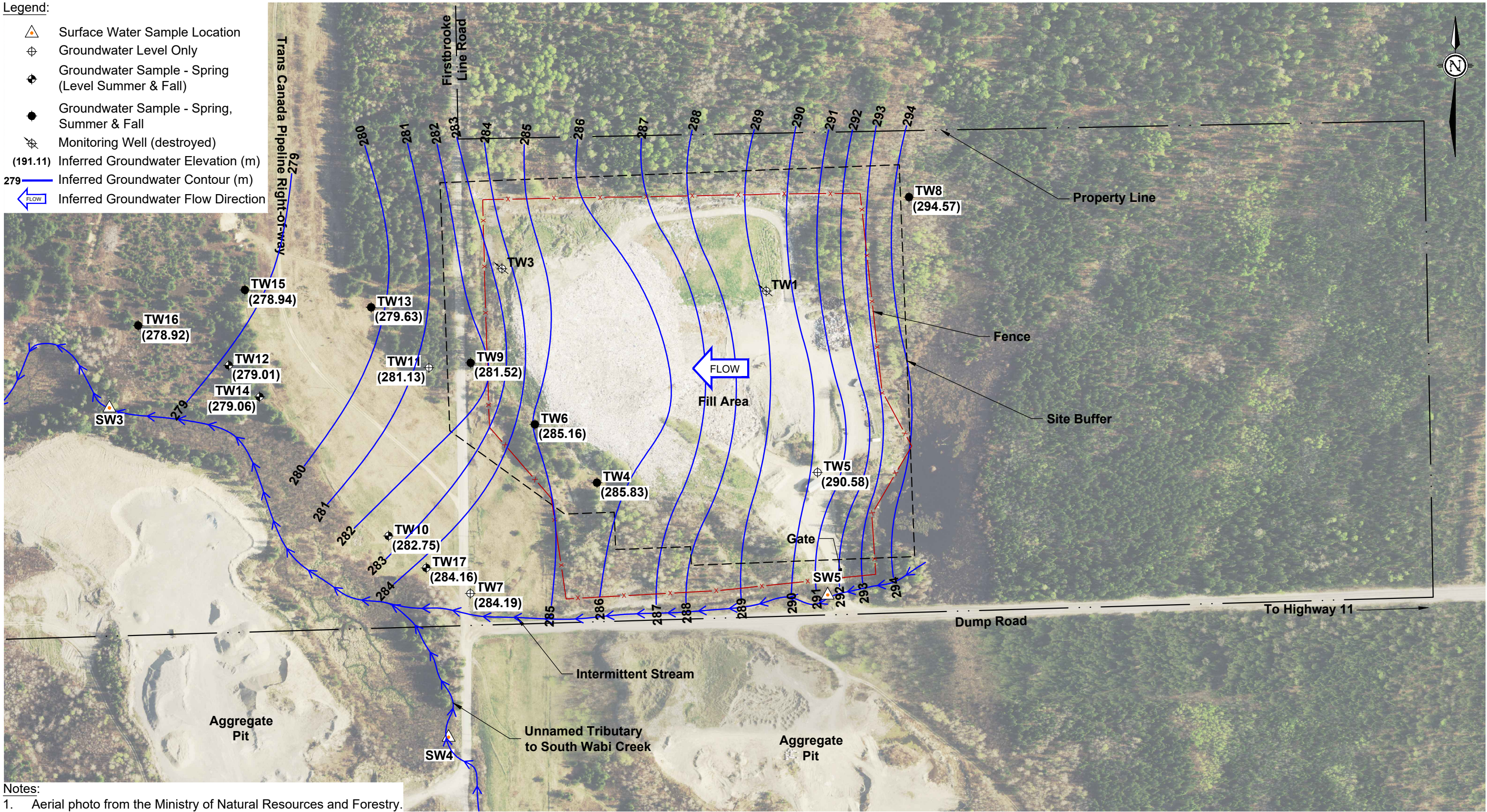


Notes:
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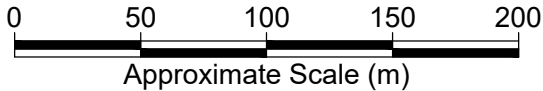
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				KKJ				PROJECT No. TY131010.2000		
				CKD BY:				REV. No. 1		
		Wood Environment & Infrastructure Solutions 131 Fielding Road Lively, Ontario P3Y 1L7 705-682-2632			BRG		TITLE Contaminant Attenuation Zone		FIGURE No. 4	
					DATUM:					
					NAD 83					
		SCALE:								
		as shown								

Legend:

- △ Surface Water Sample Location
- ⊕ Groundwater Level Only
- ⬮ Groundwater Sample - Spring (Level Summer & Fall)
- Groundwater Sample - Spring, Summer & Fall
- ⊗ Monitoring Well (destroyed)
- (191.11) Inferred Groundwater Elevation (m)
- 279 Inferred Groundwater Contour (m)
- ← FLOW Inferred Groundwater Flow Direction



Notes:
1. Aerial photo from the Ministry of Natural Resources and Forestry.



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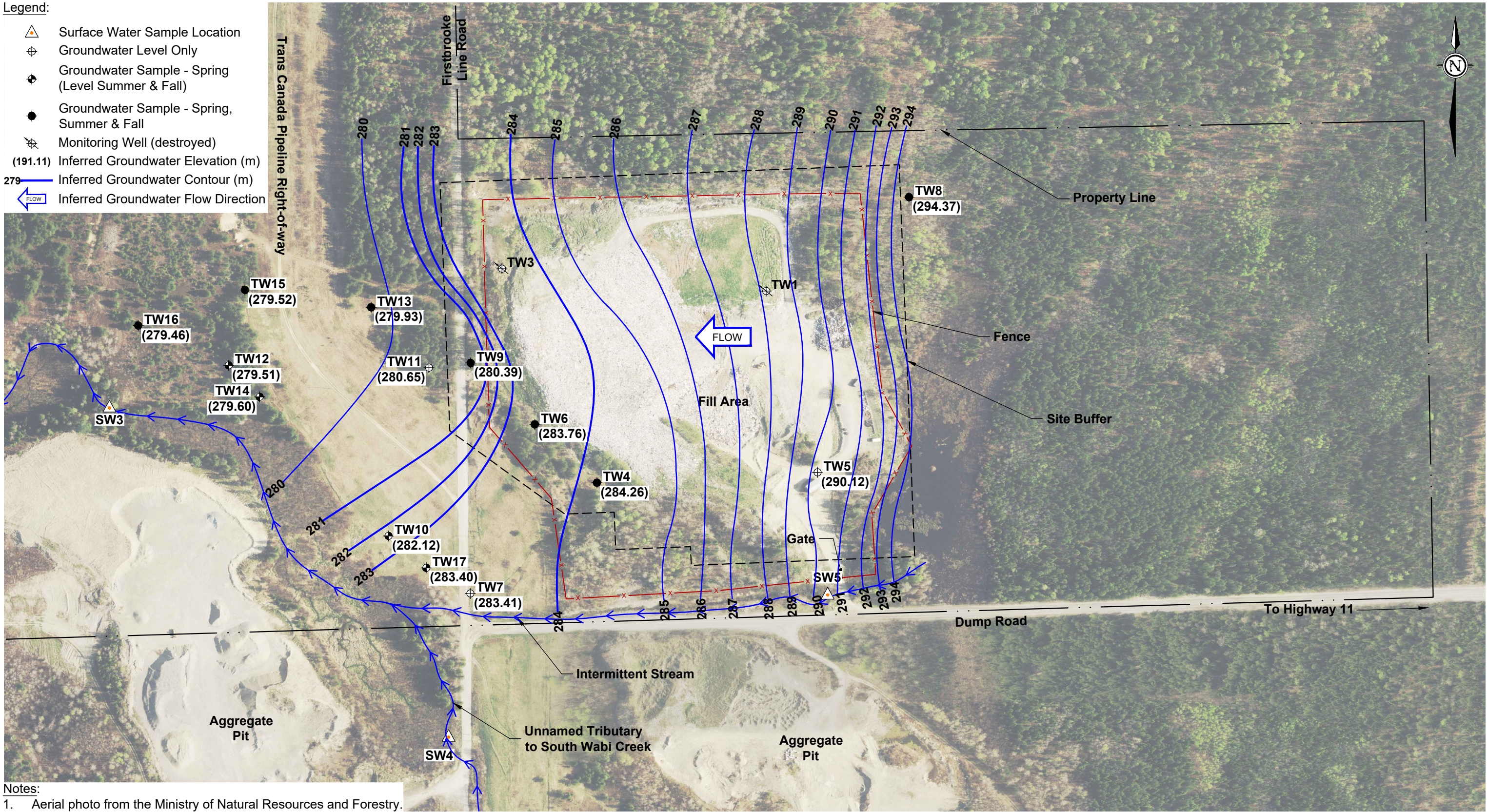


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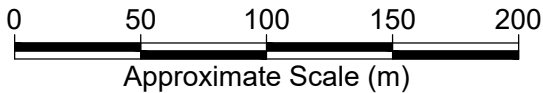
PROJECT
2019 Annual Landfill Monitoring Report
Haileybury Waste Disposal Site
Temiskaming Shores, Ontario
TITLE
Inferred Groundwater Contour Plan
May 2019

DATE
March 2020
PROJECT No.
TY131010.2000
REV. No.
1
FIGURE No.
5A

- Legend:
- △ Surface Water Sample Location
 - ⊕ Groundwater Level Only
 - ⬮ Groundwater Sample - Spring (Level Summer & Fall)
 - Groundwater Sample - Spring, Summer & Fall
 - ⊗ Monitoring Well (destroyed)
 - (191.11) Inferred Groundwater Elevation (m)
 - 279 Inferred Groundwater Contour (m)
 - ← FLOW Inferred Groundwater Flow Direction



Notes:
1. Aerial photo from the Ministry of Natural Resources and Forestry.



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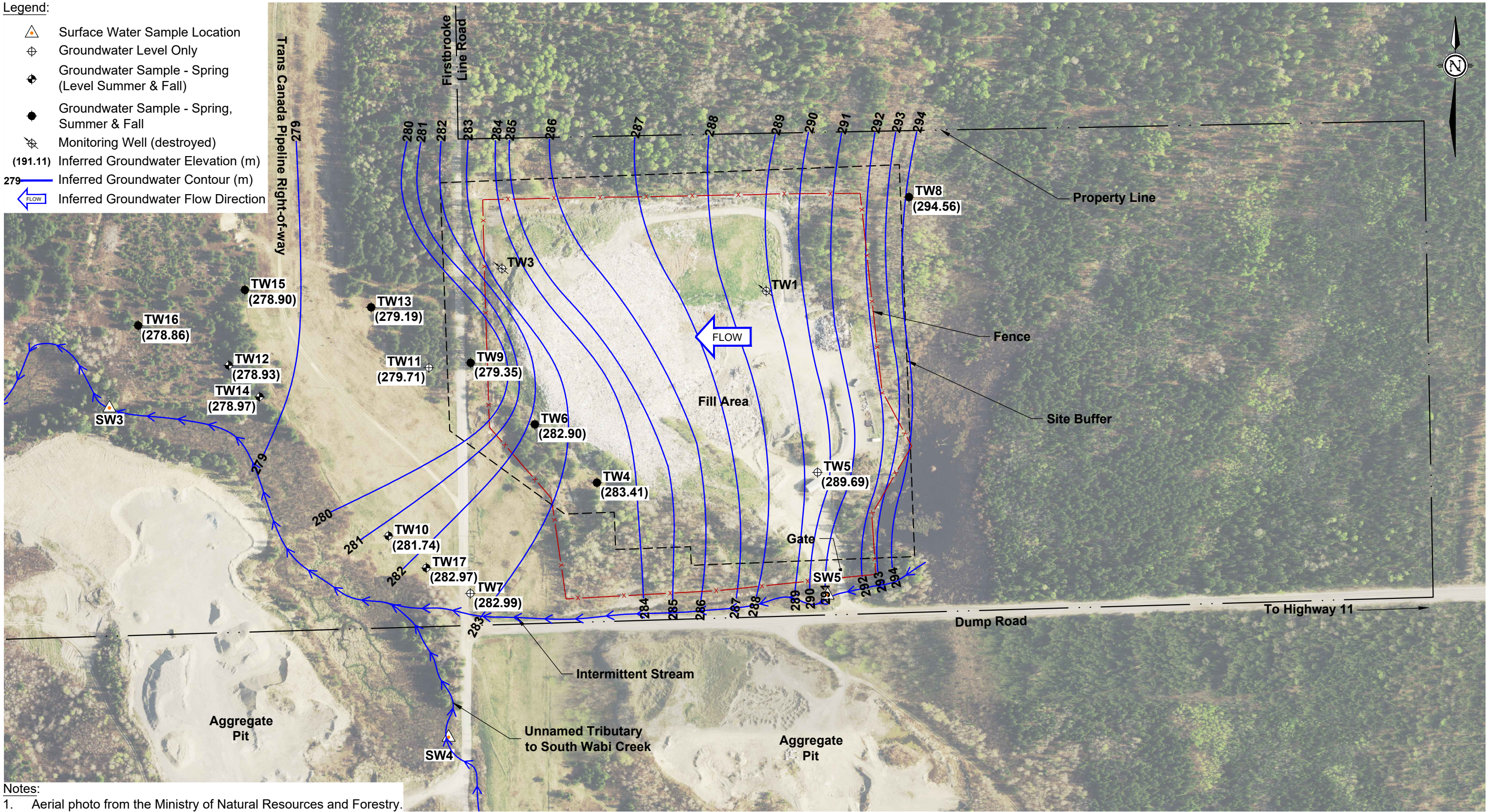


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DATUM: NAD 83
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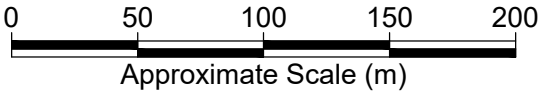


PROJECT
2019 Annual Landfill Monitoring Report
Haileybury Waste Disposal Site
Temiskaming Shores, Ontario
TITLE
Inferred Groundwater Contour Plan
July 2019

DATE
March 2020
PROJECT No.
TY131010.2000
REV. No.
1
FIGURE No.
5B

- Legend:
- △ Surface Water Sample Location
 - ⊕ Groundwater Level Only
 - ⬮ Groundwater Sample - Spring (Level Summer & Fall)
 - Groundwater Sample - Spring, Summer & Fall
 - ⊗ Monitoring Well (destroyed)
 - (191.11) Inferred Groundwater Elevation (m)
 - 279 Inferred Groundwater Contour (m)
 - ← FLOW Inferred Groundwater Flow Direction



Notes:
1. Aerial photo from the Ministry of Natural Resources and Forestry.

 <p>Approximate Scale (m)</p>	 <p>City of • Ville de Temiskaming Shores <small>Discover a whole new Ontario • Découvrez un tout nouvel Ontario</small></p>	<p>The City of Temiskaming Shores</p> <p>Wood Environment & Infrastructure Solutions 131 Fielding Road Lively, Ontario P3Y 1L7 705-682-2632</p> 	DWN BY: KKJ	PROJECT 2019 Annual Landfill Monitoring Report Haileybury Waste Disposal Site Temiskaming Shores, Ontario	DATE March 2020
			CKD BY: BRG		PROJECT No. TY131010.2000
			DATUM: NAD 83		REV. No. 1
			SCALE: as shown		FIGURE No. 5C

APPENDIX A

CERTIFICATE OF APPROVAL

NO. A570402

RECEIVED

JAN 13 2010

Ministry of the Environment
Ministère de l'EnvironnementAMENDMENT TO PROVISIONAL CERTIFICATE OF
APPROVAL
WASTE DISPOSAL SITE
NUMBER A570402
Notice No. 2
Issue Date: December 18, 2009

The Corporation of the City of Temiskaming Shores
325 Farr Dr PO Box 2250
Temiskaming Shores, Ontario
POJ 1K0

Site Location: Haileybury Landfill
Lot 1, Concession 2
Haileybury Town, District of Timiskaming
POJ 1K0

You are hereby notified that I have amended Provisional Certificate of Approval No. A570402 issued on November 10, 1998 and amended on November 10, 1999 and April 27, 2009 for the use and operation of a 5.8 hectare Landfill Site within a 32.4 hectare total site area , as follows:

Conditions 1 to 27 in the Certificate dated November 10, 1998 and Condition 1 in the notice dated November 10, 1999 are hereby revoked.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

"Certificate " means this entire provisional Certificate of Approval A570402 document, issued in accordance with section 39 of the *EPA*, and includes any notices, schedules to it, the application and the supporting documentation listed in Schedule "A";

"Director" means any *Ministry* employee appointed in writing by the Minister pursuant to section 5 of the *EPA* as a Director for the purposes of Part V of the *EPA*;

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

"Drainage Act" means *Drainage Act*, R.S.O. 1990, c.D. 17, as amended;

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

"Fill Area" means the portion of the *Site* where waste may be disposed as delineated by the "Limit of Sanitary Landfill Fill Area" shown on Sheet 10 of Item 2 in Schedule "A" and described in Item 5 in Schedule "A";

"finished compost" means compost that meets the time, temperature and turning requirements specified in Condition 11(1)(h) and the parameters listed in Schedule "B";

"leaf and yard waste" means waste consisting of leaves, grass clippings, natural Christmas trees and other plant materials, but not tree stumps, limbs or other woody materials in excess of seven (7) centimetres in diameter;

"Ministry" means the Ontario Ministry of the Environment;

"NMA " means *Nutrient Management Act* , 2002, S.O. 2002, c. 4, as amended from time to time;

"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 *Certificate*, and includes The Corporation of the City of Temiskaming Shores its successors and assigns;

"OWRA " means the *Ontario Water Resources Act* , R.S.O. 1990, c. O.40, as amended;

"PA " means the *Pesticides Act* , R.S.O. 1990, c. P-11, as amended 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 *EPA* or Section 17 of *PA* or Section 4 of *NMA* or Section 8 of *SDWA* .

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

"Regulation 347 " or "Reg. 347 " means Regulation 347, R.R.O. 1990, made under the *EPA*, as amended;

"rejected compost" means waste that has gone through the composting process but did not meet the time, temperature or turning requirements specified in Condition 11 (1) (h) or exceeds the parameters listed in Schedule "B". Rejected compost is considered a waste and must be handled and disposed in accordance with Ontario Regulation 347.

"SDWA" means *Safe Drinking Water Act*, 2002, S.O. 2002, c. 32, as amended from time to time;

"Site " means the 32.4 hectare landfill site including the *Fill Area* and buffer zone on Lot 1, Concession 2 in the Town of Haileybury, District of Timiskaming as shown on the Plan of Survey, Sheet No. 2 of Item 2 in Schedule "A";

"*Trained personnel*" means 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 *Certificate*; and

"*unfinished compost*" means waste that has gone through all but the final curing stage of the composting process.

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

TERMS AND CONDITIONS

1. GENERAL

Compliance

- (1) The *Owner* and *Operator* shall ensure compliance with all the conditions of this *Certificate* and shall ensure that any person authorized to carry out work on or operate any aspect of the *Site* is notified of this *Certificate* 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 *Certificate* .

In Accordance

- (3) Except as otherwise provided by this *Certificate*, the *Site* shall be designed, developed, built, operated and maintained in accordance with the documentation listed in the attached Schedule "A".

Interpretation

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

Other Legal Obligations

- (8) The issuance of, and compliance with, this *Certificate* 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* and *Operator* to furnish any further information related to compliance with this *Certificate*.

Adverse Effect

- (9) The *Owner* and *Operator* 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.
- (10) Despite an *Owner*, *Operator* or any other person fulfilling any obligations imposed by this *Certificate* the person remains responsible for any contravention of any other condition of this *Certificate* 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 Ownership

- (11) 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) the ownership of the *Site*;

- (b) the *Operator* of the *Site*;
 - (c) the address of the *Owner or Operator*; and
 - (d) the 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*, R. S. O. 1990, c. B.17, shall be included in the notification.
- (12) 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.
- (13) In the event of any change in *Ownership* of the works, other than change to a successor Owner, the *Owner* shall notify the successor of and provide the successor with a copy of this *Certificate*, and the *Owner* shall provide a copy of the notification to the *District Manager* and the *Director*.

Certificate of Requirement/Registration on Title -Site

- (14) The *Owner* shall:
- (a) Within sixty (60) days of the date of the issuance of this *Certificate*, submit to the *Director* for review, two copies of a completed Certificate of Requirement with a registerable description of the *Site*; and
 - (b) Within 10 calendar days of receiving the Certificate of Requirement authorized by the *Director*, register the Certificate of Requirement in the appropriate Land Registry Office on title to the *Site* and submit to the *Director* the duplicate registered copy immediately following registration.
- (15) Pursuant to Section 197 of the Environmental Protection Act, neither the *Owner* nor any person having an interest in the *Site* shall deal with the *Site* in any way without first giving a copy of this *Certificate* to each person acquiring an interest in the *Site* as a result of the dealing.

Certificate of Requirement/Registration on Title - Contaminant Attenuation Zone

- (16) The *Owner* shall:
- (a) Within 60 days of the date of the acquiring the ground water easement to the proposed contaminant attenuation zone and buffer lands, submit to the *Director* for review, two copies of a completed Certificate of Requirement with a registerable description of the Contaminant Attenuation Zone; and
 - (b) Within 10 calendar days of receiving the Certificate of Requirement authorized by the *Director*, register the Certificate of Requirement in the appropriate Land Registry Office on title to the Contaminant Attenuation Zone and submit to the

Director the duplicate registered copy immediately following registration.

Inspections by the Ministry

- (17) No person shall hinder or obstruct a *Provincial Officer* from carrying out any and all inspections authorized by the *OWRA*, the *EPA*, the *PA*, the *SDWA* or the *NMA*, of any place to which this *Certificate* 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 *Certificate* are kept;
 - (b) to have access to, inspect, and copy any records required to be kept by the conditions of this *Certificate*;
 - (c) to inspect the *Site*, related equipment and appurtenances;
 - (d) to inspect the practices, procedures, or operations required by the conditions of this *Certificate*; and
 - (e) to sample and monitor for the purposes of assessing compliance with the terms and conditions of this *Certificate* or the *EPA*, the *OWRA*, the *PA*, the *SDWA* or the *NMA*.

Information and Record Retention

- (18) Any information requested, by the *Ministry*, concerning the *Site* and its operation under this *Certificate*, including but not limited to any records required to be kept by this *Certificate* shall be provided to the *Ministry*, upon request, in a timely manner. Records shall be retained for *contaminating life span* of the *Site* except for as otherwise authorized in writing by the *Director*.
- (19) 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 *Certificate* 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 *Certificate* or any statute, regulation or other legal requirement; or
 - (b) acceptance by the *Ministry* of the information's completeness or accuracy.
- (20) The *Owner* shall ensure that a copy of this *Certificate*, in its entirety and including all its Notices of Amendment, and documentation listed in Schedule "A", are retained at the *Site* at all times.

2. SITE OPERATION

Operation

- (1) The *Site* shall be operated and maintained at all time including management and disposal of all waste in accordance with the *EPA*, *Regulation 347*, and the conditions of this

Certificate. At no time shall the discharge of a contaminant that causes or is likely to cause an adverse effect be permitted

Signs

- (2) A sign shall be installed and maintained at the main entrance/exit to the *Site* on which is legibly displayed the following information:
 - (a) the name of the *Site* and *Owner*;
 - (b) the number of the *Certificate*;
 - (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*.
- (3) The *Owner* shall install and maintain signs to direct vehicles to working face and any other recycling and composting areas including, but not limited to, used tires, waste metal, composting and used oil.
- (4) The *Owner* shall provide signs at all of the recycling and composting locations informing users what materials are acceptable and directing users to appropriate storage area.

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

- (5) 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

- (6) (a) Burning of waste at the *Site* is prohibited.

Site Access

- (7) Waste shall only be accepted during the following time periods:
Tuesday to Saturday - 8:30 a.m. to 4:30 p.m.
- (8) On-site equipment used for daily site preparation and closing activities may be operated one (1) hour before and one (1) hour after the hours of operation approved by this *Certificate*.
- (9) With the prior written approval from the *District Manager*, the time periods may be extended to accommodate seasonal or unusual quantities of waste.

Site Security

- (10) No waste shall be received, landfilled or removed from the *Site* unless a site supervisor or attendant is present and supervises the operations during operating hours. The *Site* shall be closed when a site attendant is not present to supervise landfilling operations.
- (11) The *Site* shall be operated and maintained in a safe and secure manner. During non-operating hours, the *Site* entrance and exit gates shall be locked and the *Site* shall be secured against access by unauthorized persons.

3. EMPLOYEE TRAINING

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

4. 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 all 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.

5. EMERGENCY RESPONSE

- (1) Any spills, fires or other emergency situations shall be forthwith reported directly to the *Ministry's* Spills Action Centre (1-800-268-6060) and shall be cleaned up immediately.
- (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).

6. RECORD KEEPING AND REPORTING

Daily Log Book

- (1) A daily log shall be maintained in written format and shall include the following information:
 - (a) the type, date and time of arrival, hauler, and quantity (tonnes) of all industrial and commercial 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 *Certificate*, including but not limited to any records required to be kept by this *Certificate* 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 *Certificate*. 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 April 30th of the year following the period being reported upon.
- (7) The Annual Report shall include the following:
- (a) the results and an interpretive analysis of the results of all leachate, groundwater surface water and landfill gas monitoring, including an assessment of the need to amend the monitoring programs;
 - (b) an assessment of the operation and performance of all engineered facilities, the need to amend the design or operation of the *Site*, and the adequacy of and need to implement the contingency plans;
 - (c) 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; previously existing site facilities; facilities installed during the reporting period; and site preparations and facilities planned for installation during the next reporting period;
 - (d) 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;
 - (e) a calculation of the remaining capacity of the *Site* and an estimate of the remaining *Site* life;
 - (f) a summary of the weekly, maximum daily and total annual quantity (tonnes) of waste received at the *Site*;
 - (g) a summary of any complaints received and the responses made;
 - (h) a discussion of any operational problems encountered at the *Site* and corrective action taken;
 - (i) any changes to the Design and Operations Report and the Closure Plan that have been approved by the *Director* since the last *Annual Report*;
 - (j) a report on the status of all monitoring wells and a statement as to compliance with *Ontario Regulation 903*;
 - (k) any other information with respect to the *Site* which the *Regional Director* may require from time to time; and
 - (l) a summary and analysis of all hydraulic and geochemical monitoring results.

7. LANDFILL DESIGN AND DEVELOPMENT

Approved Waste Types

- (1) Only solid non-hazardous municipal waste as defined under *Reg. 347* shall be accepted at the *Site* for landfilling.
- (2) The *Owner* shall develop and implement a program to inspect waste to ensure that the waste received at the *Site* is of a type approved for acceptance under this *Certificate*.
- (3) 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) business day from their occurrence.

Capacity

- (4) Waste disposal shall be limited to the *Fill Area*.
- (5)
 - (a) Waste may only be placed above ground level to the final contour elevations shown on Sheet No. 10 of Item 2 of Schedule "A";
 - (b) Waste may only be placed below ground level in trenches as shown in trenches on Sheet No. 4 of Item 2 of Schedule "A" and to depths of approximately 3 meters below ground level but not exceeding 3.66 meters;
 - (c) Approved maximum volumetric capacity of the *Site*, consisting of the waste, daily cover and intermediate cover, but excluding the final cover is 470,000 cubic metres.
- (6) There shall be no further final disposal of Waste in the Bulk Material Storage Area shown on Sheet No. 10 of Item 2 of Schedule "A".

Service Area

- (7) Only waste that is generated within the boundaries of the City of Temiskaming Shores and the Town of Cobalt may be accepted at the *Site*.

Cover

- (8) Alternative materials to soil may be used as weekly and interim cover material, based on an application with supporting information and applicable fee for a trial use or permanent use, submitted by the *Owner* to the *Director*, copied to the *District Manager* and as approved by the *Director* via an amendment to this *Certificate*. The alternative material shall be non-hazardous according to *Reg. 347* and will be expected to perform at least as well as soil in relation to the following functions:

- (a) Control of blowing litter, odours, dust, landfill gas, gulls, vectors, vermin and fires;
 - (b) Provision for an aesthetic condition of the landfill during the active life of the *Site*;
 - (c) Provision for vehicle access to the active tipping face; and
 - (d) Compatibility with the design of the *Site* for groundwater protection, leachate management and landfill gas management.
- (9) Cover material shall be applied as follows:
- (a) Daily Cover - Weather permitting, deposited waste should be covered at the end of each working day 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 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.

Stormwater Management Works Approvals

- (10) This *Certificate* does not provide an approval for any works subject to approval under the *OWRA*, *Drainage Act*, or any other legislation that may be applicable.
- (11) The *Owner* shall complete the construction of the swale ditches, the sedimentation ponds, and the diversion ditch as outlined in Section 3.2 of Item 3 of Schedule "A" within twelve (12) months from the date of this *Certificate*.
- (12) Within six (6) months of the date of this *Certificate*, the *Owner* shall submit to the *Director* an application for approval under the *OWRA* of the on-site stormwater management works. The *Owner* shall fulfil the requirement under the *Drainage Act*, or any other legislation that may be applicable.

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 groundwater as per documents in the 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 Wells and Monitors

- (5) The *Owner* shall ensure that all groundwater monitoring wells which form part of the monitoring program are properly capped, secured and protected from damage.
- (6) Where landfilling is to proceed around monitoring wells, suitable extensions shall be added to the wells and the wells shall be properly re-secured.
- (7) Any groundwater monitoring well 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.

Trigger Mechanisms and Contingency Plans

- (8) (a) Within one (1) year from the date of this *Certificate* , the *Owner* shall submit to the *Director* , for approval, and copies to the *District Manager* , details of a trigger mechanisms plan for surface water and groundwater quality monitoring for the purpose of initiating investigative activities into the cause of increased contaminant concentrations at the Contaminant Attenuation Zone (CAZ) limit.
- (b) Within one (1) year from the date of this *Certificate* , the *Owner* shall submit to the *Director* for approval, and copies to the *District Manager* , details of a contingency plan to be implemented in the event that the surface water or groundwater quality exceeds the a trigger mechanism at the CAZ limit.
- (9) In the event of a confirmed exceedence of a site-specific trigger level relating to leachate mounding or groundwater or surface water impacts due to leachate, the *Owner* shall immediately notify the *District Manager*, and an investigation into the cause and the need for implementation of remedial or contingency actions shall be carried out by the *Owner* in accordance with the approved trigger mechanisms and associated contingency plans.
- (10) If monitoring results, investigative activities and/or trigger mechanisms indicate the need to implement contingency measures, the *Owner* shall ensure that the following steps are taken:
 - (a) The *Owner* shall notify the *District Manager*, in writing of the need to implement contingency measures, no later than 30 days after confirmation of the exceedences;
 - (b) Detailed plans, specifications and descriptions for the design, operation and maintenance of the contingency measures shall be prepared and submitted by the *Owner* to the *District Manager* for approval; and
 - (c) The contingency measures shall be implemented by the *Owner* upon approval by the *District Manager* .
- (11) The *Owner* shall ensure that any proposed changes to the site-specific trigger levels for leachate impacts to the surface water or groundwater, are approved in advance by the *Director* via an amendment to this *Certificate*.

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 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 *Certificate* 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 seeking approval for amending the *Certificate*.

Contaminant Attenuation Zone

- (15) The proposed Contaminant Attenuation Zone of 28 hectares is hereby approved.
- (16) Within one (1) year from the date of this *Certificate*, the *Owner* shall complete acquiring the ground water easement (property rights) to the proposed contaminant attenuation zone.
- (17) The *Owner* must continue to own the property rights to the Contaminant Attenuation Zone for all of the contaminating life span of the *Site*.
- (18) The ownership of the property rights must include the right to:
- (a) discharge contaminants from the operations at the *Site* into the Contaminant Attenuation Zone;
 - (b) enter into the Contaminant Attenuation Zone and onto the surface above the Contaminant Attenuation Zone for purposes of testing, monitoring, intercepting contaminants and carrying out remedial work;
 - (c) install, operate and maintain works, for the purposes mentioned in clause (b), in the Contaminant Attenuation Zone, including on the surface above the Contaminant Attenuation Zone; and
 - (d) prevent the owner(s) of the land(s) in which the Contaminant Attenuation Zone is located from paving, erecting a structure or making any use of land(s) above or in the vicinity of the contaminant attenuation zone that would interfere with the functioning of the Contaminant Attenuation Zone or with the exercise of any of the rights mentioned in this subsection.
- (19) The *Owner* shall notify the *Director* in writing within thirty (30) days after any change in his, her or its ownership of the property rights in the Contaminant Attenuation Zone.
- (20) The *Owner* shall ensure that the written easement agreement, specified in Condition 8 (16) includes an agreement of the property owner(s) of the land(s) required for the Contaminant Attenuation Zone, to register a Certificate of Requirement on title to the land(s) to be used as the Contaminant Attenuation Zone.

9. CLOSURE PLAN

- (1) At least 3 years prior to the anticipated date of closure of this *Site*, 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 the following:
 - (a) a plan showing *Site* appearance after closure;
 - (b) a description of the proposed end use of the *Site*;
 - (c) a descriptions 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 life span 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*.

10. WASTE DIVERSION

- (1) The *Owner* shall ensure that:
 - (a) all bins and waste storage areas are clearly labelled;
 - (b) all lids or doors on bins shall be kept closed during non-operating hours and during the high wind events; and
 - (c) if necessary to prevent litter, waste storage areas shall be covered during the high winds events.

- (2) The *Owner* shall provide a segregated area for the storage of *Refrigerant Appliances* so that the following are ensured:
- (a) all *Refrigerant Appliances* have been tagged to indicate that the refrigerant has been removed by a licensed technician. The tag number shall be recorded in the log book and shall remain affixed to the appliance until transferred from the *Site*; or
 - (b) all *Refrigerant Appliances* accepted at the *Site*, which have not been tagged by a licensed technician to verify that the equipment no longer contains refrigerants, are stored segregated, in a clearly marked area, in an upright position and in a manner which allows for the safe handling and transfer from the *Site* for removal of refrigerants as required by O.Reg. 189; and
 - (c) all *Refrigerant Appliances* received on-site shall either have the refrigerant removed prior to being transferred from the *Site* or shall be shipped off-site only to facilities where the refrigerants can be removed by a licensed technician in accordance with O.Reg. 189.
- (3) Propane cylinders shall be stored in a segregated area in a manner which prevents cylinders from being knocked over or cylinder valves from breaking.
- (4) The *Owner* shall transfer waste and recyclable materials from the *Site* as follows:
- (a) recyclable materials shall be transferred off-site once their storage bins are full;
 - (b) scrap metal shall be transferred off-site at least twice a year;
 - (c) tires shall be transferred off-site as soon as a load for the contractor hired by the *Owner* has accumulated or as soon as the accumulated volume exceeds the storage capacity of its bunker; and
 - (d) immediately, in the event that waste is creating an odour or vector problem.
- (5) The *Owner* shall notify the appropriate contractors that waste and recyclable wastes that are to be transferred off-site are ready for removal. Appropriate notice time, as determined by the contract shall be accommodated in the notification procedure.

11. LEAF AND YARD WASTE COMPOSTING

On site *Leaf and Yard Waste* Composting shall be carried out subject to the following conditions:

- (1) The *Owner* shall ensure that composting is conducted in accordance with the "Interim Guidelines for the Production and Use of Aerobic Compost in Ontario" dated November 1991 or its latest amendment, and with the requirements as listed below:
- (a) waste accepted for composting shall be limited to leaf and yard waste. Leaf and yard waste received at the *Site* shall not exceed the maximum concentrations for metals listed in Schedule "B";
 - (b) no more than 2000 tonnes of leaf and yard waste, unfinished compost and finished

compost shall be stored on Site at any one time;

- (c) all activities associated with the composting operation shall take place on the designated pad constructed of wood chips;
 - (d) waste shall be incorporated into windrows within four (4) days of receipt. Finished compost shall be stored on Site for a maximum of twelve (12) months after the curing phase is complete;
 - (f) windrows shall be arranged in a manner which allows equipment access for efficient turning of windrows and to allow access for emergency vehicles;
 - (g) windrows shall be constructed at bulk densities and heights which promote aerobic conditions;
 - (h) all waste being composted shall be held at a temperature of at least 55 °C for a minimum of fifteen (15) cumulative days to ensure proper bacteria growth and pathogen inactivation. During this period, the temperature of the waste being composted shall be monitored and recorded on each day that the Site is in operation, and the windrows shall be turned a minimum of five (5) times. During the remainder of the composting process, the temperature shall be monitored and recorded on a weekly basis at a minimum; and
 - (i) compost shall be cured for a minimum of six (6) months.
- (2) (a) For the first two (2) years of operation, a representative composite sample of compost that has completed the curing phase shall be taken at least once per year and analyzed for the parameters listed in Schedule "B".
- (b) After two (2) years of operation, the sampling schedule may be adjusted with the prior written consent of the District Manager.
- (3) (a) *Finished compost* may be released from the *Site* for unrestricted use.
- (b) *Rejected compost* which meets the parameters listed in Schedule "B", but does not meet the requirements of Condition 10 (1), may be returned to the composting process as waste for re-processing.
- (c) *Rejected compost*, which does not meet the parameters listed in Schedule "B" shall be disposed of as waste or as daily cover.

Following items are added to the Schedule "A"

SCHEDULE "A"

8. Report titled "City of Temiskaming Shores, Application to amend Provincial Certificate of Approval Waste Disposal Site No. A570402, Appendices" dated June 2008.
9. Letter dated June 10, 2008 from Maria Story, P.Eng., Story Environmental Services, to Mr. Tesfaye Gebrezghi, P.Eng., Ministry of the Environment, Environmental Assessment and Approvals Branch.
10. Letter dated October 30, 2009 addressed to Larry McCormack, Senior Environmental Officer, Ministry of the Environment from Maria Story, P.Eng., Story Environmental Services RE: Corporation of the City of Temiskaming Shores Haileybury Landfill Site No. A570402-Recommendation Regarding Ongoing Monitoring Program.

Schedule "B"

This Schedule "B" forms part of Certificate of Approval No. A600903.

Parameter	Maximum Concentration
Metal:	
arsenic	13 ppm
cadmium	3 ppm
chromium	210 ppm
cobalt	34 ppm
copper	100 ppm
lead	150 ppm
mercury	0.8 ppm
molybdenum	5 ppm
nickel	62 ppm
selenium	2 ppm
zinc	500 ppm
Foreign material:	
plastic particles greater than 3 mm in any direction	1%
non-biodegradable material greater than 3 mm in any direction	2%

The reasons for this amendment to the Certificate of Approval are as follows:

GENERAL

1. The reason for Conditions 1(1), (2), (4), (5), (6), (7), (8), (9), (10), (18), (19) and (20) is to clarify the legal rights and responsibilities of the *Owner* and *Operator* under this Certificate of Approval.
2. The reasons for Condition 1(3) is 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.
3. The reasons for Condition 1(11) are 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.
4. The reasons for Condition 1(12) 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 Certificate of Approval.
5. The reason for Condition 1(13) is to ensure that the successor is aware of its legal responsibilities.
6. Conditions 1 (14), (15) and (16) are included, pursuant to subsection 197(1) of the *EPA* , to provide that any persons having an interest in the *Site* are aware that the land has been approved and used for the purposes of waste disposal.
7. The reason for Condition 1(17) 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 Certificate of 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* .

SITE OPERATION

8. The reasons for Conditions 2(1), 2(5) and 6(3) 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.
9. The reason for Conditions 2 (2), 2(3) and 2(4) is to ensure that users of the *Site* are fully aware of important information and restrictions related to *Site* operations and access under this *Certificate*.
10. The reason for Condition 2(6) (a) is that open burning of municipal waste is unacceptable because of concerns with air emissions, smoke and other nuisance affects, and the potential fire hazard.

11. The reasons for Condition 2(7), 2(8) and 2(9) are to specify the hours of operation for the landfill site and a mechanism for amendment of the hours of operation, as required.
12. The reasons for Condition 2(10) and 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.

EMPLOYEE TRAINING

13. The reason for Condition 3(1) 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.

COMPLAINTS RESPONSE PROCEDURE

14. The reason for Condition 4(1) is to ensure that any complaints regarding landfill operations at this *Site* are responded to in a timely and efficient manner.

EMERGENCY RESPONSE

15. Conditions 5(1) and 5(2) are included to ensure that emergency situations are reported to the Ministry to ensure public health and safety and environmental protection.
16. Conditions 5(3), 5(4) and 5(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.

RECORD KEEPING AND REPORTING

17. The reason for Conditions 6(1) and 6(2) is to ensure that accurate waste records are maintained to ensure compliance with the conditions in this Certificate of Approval (such as fill rate, site capacity, record keeping, annual reporting, and financial assurance requirements), the *EPA* and its regulations.
18. The reason for Conditions 6(4) and 6(5) is to ensure that detailed records of *Site* inspections are recorded and maintained for inspection and information purposes.
19. The reasons for Conditions 6(6) and 6(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.

LANDFILL DESIGN AND DEVELOPMENT

20. The reason for Conditions 7(1) to 7(7) inclusive is to specify the approved areas from which waste may be accepted at the *Site* and the types and amounts of waste that may be accepted for disposal at the *Site*, based on the *Owner*'s application and supporting documentation.
21. Condition 7(8) is to provide the *Owner* the process for getting the approval for alternative daily and intermediate cover material.
22. The reasons for Condition 7(9) are to ensure that daily/weekly and intermediate cover are used to control potential nuisance effects, to facilitate vehicle access on the *Site*, and to ensure an acceptable site appearance is maintained. 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*.
23. The reason for Conditions 7 (10), (11) and (12) are to make ensure that the *Owner* has obtained other approvals required to carry out the work and complete the construction of the swales and ditches in a timely manner.

LANDFILL MONITORING

24. 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*.
25. Condition 8(2) is included to provide the groundwater and surface water limits to prevent water pollution at the *Site*.
26. 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.
27. Conditions 8(5), 8(6) and 8(7) are included to ensure the integrity of the groundwater monitoring network so that accurate monitoring results are achieved and the natural environment is protected.
28. Conditions 8(8) to 8(11) inclusive are added to ensure the *Owner* has a plan with an organized set of procedures for identifying and responding to potential issues relating to groundwater and surface water contamination at the *Site's* compliance point.
29. Reasons for conditions 8(12), 8(13) and 8(14) are included to streamline the approval of the changes to the monitoring plan.
30. Condition 8(15) to 8(20) inclusive is included to require the *Owner* to obtain property rights to

land(s) that is required for a Contaminant Attenuation Zone that is necessary for attenuation of contamination resulting from the operation of the *Site* to bring the *Site* into compliance with Reasonable Use Policy Objectives.

CLOSURE PLAN

31. The reasons for Condition 9 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.

WASTE DIVERSION

32. Condition 10 is included to ensure that the recyclable materials are stored in their temporary storage location in a manner as to minimize a likelihood of an adverse effect or a hazard to the natural environment or any person.

This Notice shall constitute part of the approval issued under Provisional Certificate of Approval No. A570402 dated November 10, 1998 as amended

In accordance with Section 139 of the Environmental Protection Act, R.S.O. 1990, Chapter E-19, as amended, 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 approval or each term or condition in the 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.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the waste disposal site is located;

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, 15th Floor
Toronto, Ontario
MSG 1E5

AND

The Director
Section 39, *Environmental Protection Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

* Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca

The above noted waste disposal site is approved under Section 39 of the Environmental Protection Act.

DATED AT TORONTO this 18th day of December, 2009



Tesfaye Gebrezghi, P.Eng.

Director

Section 39, *Environmental Protection Act*

RM/

c: District Manager, MOE North Bay
Maria Story, P.Eng., Story Environmental Services

APPENDIX B

BOREHOLE LOGS

LOG of BOREHOLE

JOB No. 1H014-A

CLIENT TOWN OF HAILEYBURY

Method Hollow Stem Auger

Diometer I.D. 3 3/4"

ELEV M.P. (S) 295.905 AGL (S) 0.775m AGL GL 295.130m

BOREHOLE No TW 1/91 S and D ELEV. M.P. (D) 295.659 AGL (D) 0.57 m AGL GL 295.089 m Date March 8, 1991

SUBSURFACE PROFILE					SAMPLES			REMARKS
DEPTH meters	DESCRIPTION	SYMBOL	GROUND WATER	PIEZOMETER	NUMBER	TYPE	N. Blows/ft.	
0	Med. sand, light brown, slightly moist				1			TW 1/91(D) Piezometer construction is SCH 40 50 mm dia. pipe with 10 slot screen installed from 9.75m BGL to 8.23 m BGL
	Med./coarse sand, brown, dry				2	SS	15	
	Sandy silt, some clay, greyish brown, moist				3	SS		
5	Silty clay, some gravel, minor sand, few boulders, brownish grey, saturated				4	SS		Silica sand from 10.36 m BGL to 8.23 m BGL.
	Wet				5	SS	65	Bentonite seal from 8.23 m BGL to 7.5 m BGL.
					6	SS	46	Backfill with drillings to .5 m bentonite seal at surface.
9.6	Bedrock, near vertical+horizontal fracturing				7	SS		TW 1/91(S) Piezometer construction is SCH 40 50 mm dia. pipe with 10 slot screen installed from 6.01 m BGL to 4.57m BGL
					8	RC		
								Silica sand from 6.01 m BGL to 4.0 m BGL
								Backfill with drillings to .5 m bentonite seal at surface
								Water level taken on March 26/91 at TW 1/91(D) 7.44m BMP

SAMPLE TYPES

AS Auger Sh Shelby
RC Rock Core Sw Sidewall
SS Split Spoon

International Water Consultants Ltd.

SASKATOON - BARRIE - MONTREAL

LOG of BOREHOLE

JOB NO. 1H014-A
 CLIENT TOWN OF HAILEYBURY

Hollow Stem Auger
 Diam Drill
 Method HS - I.D. 3 3/4"
 Diameter DD - O.D. 3.78"

BOREHOLE NO TW 3/91 ELEV. M.P. 296.697 AGL M.P. 0.879 AGL GL 295.818 Date March 21, 1991

SUBSURFACE PROFILE					SAMPLES			REMARKS
DEPTH meters	DESCRIPTION	SYMBOL	GROUND WATER	PIEZOMETER	NUMBER	TYPE	N Blows/ft.	

0	Garbage & med. sand, dry, odour				1	SS		Piezometer construction is SCH 40 50 mm dia. pipe with 10 slot screen from 13.87 m BGL to 10.82 m BGL
					2	SS		
					3	SS		
5					4	SS		Silica sand from 14.63 m BGL to above the screen
					5	SS		Backfill with drillings
					6	SS		.5 m bentonite seal at surface
					7	SS	15	Water level taken on March 26/91 10.89 m BMP
10	Med. sand, black, slightly moist, strong odour				8	SS	14	
					9	RC		
	Bedrock, near vertical and subhorizontal fracturing				10	RC		
14.63								

SAMPLE TYPES

AS Auger Sh Shelby
 RC Rock Core Sw Sidewall
 SS Split Spoon

International Water Consultants Ltd.
 SASKATOON - BARRIE - MONTREAL

LOG of BOREHOLE

JOB NO. 1H014-A

CLIENT TOWN OF HAILEYBURY

Method Hollow Stem Auger

Diameter I.D. 3 3/4"

BOREHOLE No TW 4/91 ELEV. M.P. 288.660 AGL M.P. 0.654m AGL GL 288.006m Date March 15, 1991

SUBSURFACE PROFILE					SAMPLES			REMARKS
DEPTH meters	DESCRIPTION	SYMBOL	GROUND WATER	PIEZOMETER	NUMBER	TYPE	N. Blows/ft.	

0	Med./fine sand, reddish brown, slightly moist				1	SS		Piezometer construction is SCH 40 PVC 50 mm dia. pipe with 10 slot screen installed from 10.67 m BGL to 7.62 m BGL Silica sand from 10.67 m BGL to 6.1 m BGL .5 m bentonite seal at surface Water level taken on March 26/91 5.99 m BMP
					2	SS	14	
					3	SS	16	
5	Medium sand, brown, moist				4	SS	6	
					5	SS	6	
					6	SS	4	
10					7	SS		
					8	SS		
	Clay, some silt, minor sand, minor gravel, grey, moist				9	SS	18	
15					10	ss	100	
	Clay, some rocks, minor silt, few pebbles grey, hard, dry				11	SS	100	
16.5	Refusal							

SAMPLE TYPES

AS Auger Sh Shelby
RC Rock Core Sw Sidewall
SS Split Spoon

International Water Consultants Ltd.

SASKATOON - BARRIE - MONTREAL

LOG of BOREHOLE

JOB NO. 1H014-A

CLIENT TOWN OF HAILEYBURY

Method Hollow Stem Auger

Diameter I.D. 3 3/4"

BOREHOLE NO TW 5/91 ELEV. M.P. 297.019 AGL M.P. 1.04m AGL GL 295.979m Date March 12, 1991

SUBSURFACE PROFILE					SAMPLES			REMARKS
DEPTH meters	DESCRIPTION	SYMBOL	GROUND WATER	PIEZOMETER	NUMBER	TYPE	Blows/ft.	
0	Med., light brown sand, few stringers of coarser sand, minor pebbles, slightly moist				1	SS		Piezometer construction is SCH 40 PVC 50 mm dia. pipe with 10 slot screen installed from 6.70m to 9.75m BGL.
					2	SS	23	
					3	SS	13	
5	Silty clay, grey, very moist				4	SS	14	Bentonite bottom seal from 10.7m to 9.75m BGL, silica sand from 9.75m to 5.2m BGL, bentonite seal from 5.2 m to 4.5 m BGL, backfill to 0.5 m BGL, 0.5 m bentonite surface seal
	Fine sand, some silt, minor clay, few coarser components, yellowish brown, saturated				5	SS	4	
					6	SS	8	
10	Silty clay, minor sand, minor gravel, few larger rocks, grey, very hard, dry				7	SS	80	Water level taken on March 26/91 7.73 m BMP
					8	SS	7100	
					9	SS	7100	
	Clay, some to minor silt, minor gravel, grey, hard, dry				10	SS	7100	
	Wet				11	RC		
14	Bedrock, some fracturing							

SAMPLE TYPES

AS Auger Sh Shelby
RC Rock Core Sw Sidewall
SS Split Spoon

International Water Consultants Ltd.
SASKATOON - BARRIE - MONTREAL

LOG OF BOREHOLE

CLIENT TOWN OF HAILEYBURY

Method HSA

BOREHOLE No. TW 6/94

Diameter 10 cm ID

ELEV. M.P. 288.916 m.A.S.L. G.L. 288.112 m.A.S.L. M.P. 0.80 m

Date Nov 28/94

SUBSURFACE PROFILE					SAMPLES			REMARKS
DEPTH metres	DESCRIPTION	LOG	WATER LEVEL (m.B.G.L.)	PIEZOMETER	INTERVAL	TYPE	BLOWS/FT	
	brown fine grained SAND trace silt. medium dense							Piezometer Installation 50 mm PVC 10 slot screen Screen 7.32 - 8.84 m Sandpack 7.01 - 8.84 m Bentonite 0 - 7.01 m S.W.L. Dec 20/94 6.95 m.B.M.P.
					1	SS	10/19	
3.61	brown SILT and CLAY				2	SS	9/27	
	gray-brown fine to medium SAND. trace silt. medium dense to loose				3	SS	17/19	
5	saturated below 6 metres				4	SS	10/11	
					5	SS	9/13	
9.75					6	SS	8/15	SAND 1.5 m UP AUGERS WHEN RODS PULLED
10	end of hole 9.75 m							
15								

SAMPLE TYPES

AS	Auger	Sh	Shelby
RC	Rock Core	Sw	Sidewall
SS	Split Spoon	CS	Continuous Sampler

International Water Consultants Ltd.

MONTREAL - BARRE - SASKATOON

LOG OF BOREHOLE

CLIENT TOWN OF HAILEYBURY

Method HSA

BOREHOLE No. TW 7/98

Diameter 10 cm ID

ELEV. M.P. 284.961 m.A.S.L. G.L. 284.321 m.A.S.L. M.P. 0.64 m

Date Sept 10/98

SUBSURFACE PROFILE

SAMPLES

DEPTH metres	DESCRIPTION	LOG	WATER LEVEL (m.B.G.L.)	PIEZOMETER	INTERVAL	TYPE	BLOWS/FT	REMARKS
	brown fine silty SAND							Piezometer Installation
	saturated below 2 metres				1	SS	$\frac{7}{6}$	50 mm PVC 10 slot screen
	brown sandy SILT				2	SS	$\frac{1}{1}$	Bentonite 0 - 1.52 Sandpack 1.52 - 4.68 m Screen 4.68 - 6.2
5	brown silty SAND, gravel, stones				3	SS	$\frac{30}{58}$	S.W.L. Sept 10/98 3.2 m.B.M.P.
10	end of hole 6.2 m Includes Stick-up							
15								

SAMPLE TYPES

AS	Auger	Sh	Shelby Tube
RC	Rock Core	Sw	Sidewall
SS	Split Spoon	CS	Continuous Sampler

International Water Consultants Ltd.

MONTREAL - BARRIE - SASKATOON

LOG OF BOREHOLE

CLIENT TOWN OF HAILEYBURY



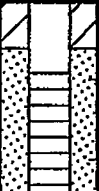
Method HSA

BOREHOLE No. TW 8/94

Diameter 10 cm ID

ELEV. M.P. 295.778 m.A.S.L. G.L. 294.941 m.A.S.L. M.P. 0.90 m

Date Nov 29/94

SUBSURFACE PROFILE					SAMPLES			REMARKS
DEPTH metres	DESCRIPTION	LOG	WATER LEVEL (m.B.G.L.)	PIEZOMETER	INTERVAL	TYPE	BLOWS/FT	
0.3	organic deposits gray silty fine SAND. trace gravel saturated below 0.3 m							Piezometer Installation 50 mm PVC 10 slot screen
2.44	REFUSAL TO AUGERING ON BEDROCK AT 2.44 m							Screen 0.92 - 2.44 m Sandpack 0.6 - 2.44 m Bentonite 0 - 0.6 m
5								S.W.L. Dec 20/94 1.25 m.B.M.P.
10								
15								

SAMPLE TYPES

AS	Auger	Sh	Shelby
RC	Rock Core	Sw	Sidewall
SS	Split Spoon	CS	Continuous
			Sampler

International Water Consultants Ltd.

MONTREAL - BARRIE - SASKATOON

LOG OF BOREHOLE

CLIENT TOWN OF HAILEYBURY

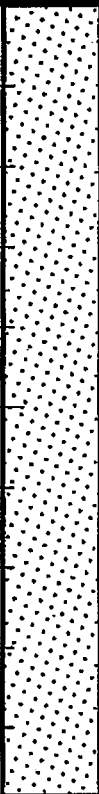

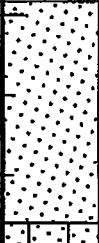


Method HSA

BOREHOLE No. TW 9/98 (Replaces MW2)

Diameter 10 cm ID

ELEV. M.P. 289.040 m.A.S.L. G.L. 288.300 m.A.S.L. M.P. 0.74 m

Date Sept 10/98

SUBSURFACE PROFILE					SAMPLES			REMARKS
DEPTH metres	DESCRIPTION	LOG	WATER LEVEL (m.B.G.L.)	PIEZOMETER	INTERVAL	TYPE	BLOWS/FT	
5	brown fine to medium SAND some coarse layers				1	SS	$\frac{5}{9}$	Piezometer Installation 50 mm PVC 10 slot screen Bentonite 0 - 10.53 Sandpack 10.53 - 11.43 m Screen 11.43 - 12.95 S.W.L. Sept 10/98 10.64 m.B.M.P.
					2	SS	$\frac{10}{15}$	
					3	SS	$\frac{11}{10}$	
					4	SS	$\frac{4}{5}$	
					5	SS	$\frac{8}{12}$	
10	grey medium SAND				6	SS	$\frac{10}{11}$	
					7	SS	$\frac{9}{12}$	
					8	SS	$\frac{12}{11}$	
15	brown silty SAND w stones end of hole 12.95 m Includes Stick-up							

SAMPLE TYPES

AS	Auger	Sh	Shelby Tube
RC	Rock Core	Sw	Sidewall
SS	Split Spoon	CS	Continuous Sampler

International Water Consultants Ltd.

MONTREAL - BARRIE - SASKATOON

LOG OF BOREHOLE

CLIENT TOWN OF HAILEYBURY

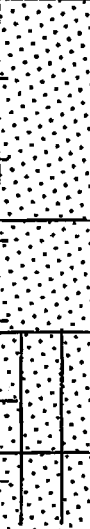


Method HSA

BOREHOLE No. TW 10/98

Diameter 10 cm ID

ELEV. M.P. 283.981 m.A.S.L. G.L. 283.301 m.A.S.L. M.P. 0.68 m

Date Sept 10/98

SUBSURFACE PROFILE					SAMPLES			REMARKS
DEPTH metres	DESCRIPTION	LOG	WATER LEVEL (m.B.G.L.)	PIEZOMETER	INTERVAL	TYPE	BLOWS/FT	
5	grey medium to coarse SAND some silt				1	SS	$\frac{7}{6}$	Piezometer Installation 50 mm PVC 10 slot screen Bentonite 0 - 4.58 Sandpack 4.58 - 5.18 m Screen 5.18 - 6.7 S.W.L. Sept 10/98 3.48 m.B.M.P.
	grey medium to coarse SAND some silt				2	SS	$\frac{1}{1}$	
	grey medium to coarse SAND with layers of silt (2 cm)				3	SS	$\frac{30}{58}$	
	grey medium to coarse SAND some silt				4	SS	$\frac{7}{13}$	
10	end of hole 6.7 m Includes Stick-up							
15								

SAMPLE TYPES

AS	Auger	Sh	Shelby Tube
RC	Rock Core	Sw	Sidewall
SS	Split Spoon	CS	Continuous Sampler

International Water Consultants Ltd.

MONTREAL - BARRIE - SASKATOON

BOREHOLE NO. TW-11

PAGE 1 OF 1

PROJECT NAME: HAILEYBURY LANDFILL SITE

PROJECT NO.: 041708.00

CLIENT: CITY OF TEMISKAMING SHORES

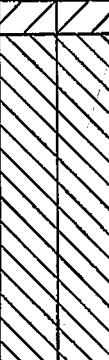
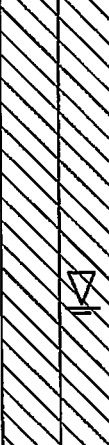
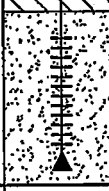
DATE: NOVEMBER 15, 2004

BOREHOLE TYPE: HOLLOW STEM AUGER, 203 mm (8") O.D.

SUPERVISOR: DJW

GROUND ELEVATION: _____

REVIEWER: BDT

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE				CONE PENETRATION			WATER CONTENT %			REMARKS	
				TYPE	N ^o VALUE	% WATER	% RECOVERY	ROD (%)	"N" VALUE			WATER CONTENT %			
									10	20	30	10	20		30
0															
2	FINE SAND; MEDIUM BROWN FINE SAND, TRACE SILT, MOIST.													STICK UP IS 0.79 m.	
4															
6															
8															
10	FINE TO MEDIUM SAND; GREY FINE TO MEDIUM SAND, TRACE SILT, MOIST TO SATURATED.													STATIC WATER LEVEL AT 9.0 mBGL ON DECEMBER 1, 2004.	
12															
14															
16															
18	BOREHOLE TERMINATED AT 13.3 m IN SAND.														
20															

BOREHOLE NO. TW-12

PAGE 1 OF 1

PROJECT NAME: HAILEYBURY LANDFILL SITE

PROJECT NO.: 041708.00

CLIENT: CITY OF TEMISKAMING SHORES


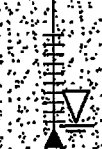
DATE: NOVEMBER 16, 2004

BOREHOLE TYPE: HOLLOW STEM AUGER, 203 mm (8") O.D.

SUPERVISOR: DJW

GROUND ELEVATION: _____

REVIEWER: BDT

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE					CONE PENETRATION			WATER CONTENT %			REMARKS
				TYPE	N° VALUE	% WATER	% RECOVERY	ROD (%)	N° VALUE			WATER CONTENT %			
									10	20	30	10	20	30	
									SHEAR STRENGTH			W _p W _L			
0	FINE SAND; LIGHT BROWN FINE SAND, TRACE TO SOME SILT, MOIST.														STICK UP IS 0.56 m.
2															
4															
6															
7.3															
8															
8.1	MEDIUM TO COARSE SAND; GREYISH BROWN AND BLACK MEDIUM TO COARSE SAND, TRACE FINE TO MEDIUM GRAVEL, MOIST TO WET.														STATIC WATER LEVEL AT 8.4 mBGL ON DECEMBER 1, 2004.
	BEDROCK:														
8.7	BOREHOLE TERMINATED AT 8.7 m IN BEDROCK.														
10															
12															
14															
16															
18															
20															

Story Environmental Services

Monitoring Well No.: TW13

Ontario Well Tag: A046737

Project:
Haileybury Landfill

Location:
Haileybury, ON

Drilling Method:
Hollow Stem Auger 200 mm

Project No.:
00608

Date Drilled:
15 11 2006

Logged By:
KJK

Ground Surface Elevation (m):
288.623

Top of Casing Elevation (m):
289.492



SPLIT SPOON



SHELBY



CUTTINGS







WATER LEVEL

DEPTH (m)	MOISTURE CONTENT (%)				BLOW COUNT	SAMPLE NO.	SAMPLE TYPE	STRATIGRAPHY	SOIL DESCRIPTION	MONITORING WELL INSTALLATION
	20	40	60	80						
0									TOPSOIL, black, clayey, some silt, trace sand, low plasticity, organics (rootlets), damp.	
1									SAND, brown, loose, poorly graded, fine to medium grained, rootlets to 1.0 m, homogeneous, damp.	
2									- light brown, fine grained at 1.7 m	
3									- damp to moist 3.0 m	
4									- moist at 3.7 m	
5										
6										
7									- coarse grained from 7.7 m to 7.9 m	
8									- loose to medium dense at 8.2 m	
9									- medium dense at 9.1 m	
									- silt seam (50 mm thick) at 9.4 m	

17/11/2006

Legend

-  50 mm Ø PVC pipe
-  50 mm Ø slotted PVC pipe
-  bentonite seal
-  clean silica sand backfill

Story Environmental Services

Monitoring Well No.: TW13

Ontario Well Tag: A046737

Project:
Haileybury Landfill

Location:
Haileybury, ON

Drilling Method: Hollow Stem Auger
Diameter (mm): 200 mm

Project No.:
00608

Date Drilled:
15 11 2006

Logged By:
KJK

Ground Surface Elevation (m):
288.623

Top of Casing Elevation (m):
289.492



SPLIT SPOON



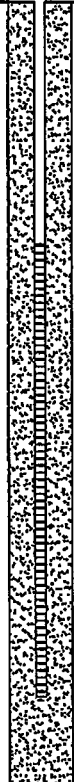
SHELBY







CUTTINGS



WATER LEVEL

DEPTH (m)	MOISTURE CONTENT (%)				BLOW COUNT	SAMPLE NO.	SAMPLE TYPE	STRATIGRAPHY	SOIL DESCRIPTION	MONITORING WELL INSTALLATION
	20	40	60	80						
10									- continued	
									- brown, coarse grained and wet at 10.7 m	
11										
12									- blackish grey, coarse grained, poorly graded, trace gravel at 12.2 m	
13									- slight odour at 13.4 m	
14										
15									End of Borehole at 15.2 m	
16										
17										
18										
19										

Legend

-  50 mm Ø PVC pipe
-  50 mm Ø slotted PVC pipe
-  bentonite seal
-  clean silica sand backfill

Story Environmental Services

Monitoring Well No.: TW14

Ontario Well Tag: A046737

Project:

Haileybury Landfill

Location:

Haileybury, ON

Drilling Method:

Hollow Stem Auger 200 mm

Diameter (mm):

Project No.:

00608

Date Drilled:

15 11 2006

Logged By:

KJK

Ground Surface Elevation (m):

285.887

Top of Casing Elevation (m):

286.673



SPLIT SPOON



SHELBY



CUTTINGS







WATER LEVEL

DEPTH (m)	MOISTURE CONTENT (%)				BLOW COUNT	SAMPLE NO.	SAMPLE TYPE	STRATIGRAPHY	SOIL DESCRIPTION	MONITORING WELL INSTALLATION
	20	40	60	80						
0									<p>TOPSOIL, black, clayey, some silt, trace sand, low plasticity, organics (rootlets), damp.</p> <p>SAND, brown (rustic), silty, loose, fine grained, some oxidation, organic odour, damp.</p> <p>- brown, poorly graded, homogeneous at 0.9 m</p>	
1									<p>- light brown to grey, some silt at 1.5 m</p>	
2										
3									<p>- light to olive brown at 3.7 m</p>	
4									<p>- medium dense, moist at 4.6 m</p> <p>- moist to wet at 4.9 m</p>	
5										
6									<p>- medium grained at 6.1 m</p>	
7										
8									<p>- wet at 8.5 m</p>	
9									<p>- sand is heaving at 9.1 m</p> <p>- coarse grained at 9.8 m</p>	

16/11/2006

Legend

-  50 mm Ø PVC pipe
-  50 mm Ø slotted PVC pipe
-  bentonite seal
-  clean silica sand backfill

Story Environmental Services

Monitoring Well No.: TW14

Ontario Well Tag: A046737

Project:

Haileybury Landfill

Location:

Haileybury, ON

Drilling Method:

Hollow Stem Auger

Diameter (mm):

200 mm

Project No.:

00608

Date Drilled:

15 11 2006

Logged By:

KJK

Ground Surface Elevation (m):

285.887

Top of Casing Elevation (m):

286.673



SPLIT SPOON



SHELBY







CUTTINGS



WATER LEVEL

DEPTH (m)	MOISTURE CONTENT (%)				BLOW COUNT	SAMPLE NO.	SAMPLE TYPE	STRATIGRAPHY	SOIL DESCRIPTION	MONITORING WELL INSTALLATION
	20	40	60	80						
10									- continued	
11										
12										
13										
14									End of Borehole at 13.7 m	
15										
16										
17										
18										
19										

Legend

-  50 mm Ø PVC pipe
-  50 mm Ø slotted PVC pipe
-  bentonite seal
-  clean silica sand backfill

Story Environmental Services

Monitoring Well No.: TW15

Ontario Well Tag: A058780

Project:

Haileybury Landfill

Location:

Haileybury, ON

Drilling Method:

Hollow Stem Auger 200 mm

Project No.:

00608

Date Drilled:

13 09 2007

Logged By:

KJK

Ground Surface Elevation (m):

286.883

Top of Casing Elevation (m):

287.791



SPLIT SPOON



SHELBY



CUTTINGS



WATER LEVEL

DEPTH (m)	MOISTURE CONTENT (%)				BLOW COUNT	SAMPLE NO.	SAMPLE TYPE	STRATIGRAPHY	SOIL DESCRIPTION	MONITORING WELL INSTALLATION
	20	40	60	80						
0									TOPSOIL, black, some clay and silt, trace sand, low plasticity, organics (rootlets), damp.	
1									SAND, brown, loose to medium dense, poorly graded, medium grained, organic (rootlets), dry.	
2									- coarse grained at 2.1 m	
3					2 3	3 4			- slight grey and moist at 3.5 m	
4					2 3	4 6			- dense at 5.0 m - auger resistance and pebble in split spoon at 5.2 m	
5					3 4	6 6			- grey at 6.1 m	
6					6 16	14			- cobble layer at 8.5 m	
7					6 13	16			- water 9.3 m	
8										
9										

Legend

-  50 mm Ø PVC pipe
-  50 mm Ø slotted PVC pipe
-  bentonite seal
-  clean silica sand backfill
-  slough native material

25/09/2007

Story Environmental Services

Monitoring Well No.: TW15

Ontario Well Tag: A058780

Project:
Haileybury Landfill

Location:
Haileybury, ON

Drilling Method:
Hollow Stem Auger

Diameter (mm):
200 mm

Project No.:
00608

Date Drilled:
13 09 2007

Logged By:
KJK

Ground Surface Elevation (m):
286.883

Top of Casing Elevation (m):
287.791



SPLIT SPOON



SHELBY



CUTTINGS








WATER LEVEL

MONITORING WELL
INSTALLATION

DEPTH (m)	MOISTURE CONTENT (%)				BLOW COUNT	SAMPLE NO.	SAMPLE TYPE	STRATIGRAPHY	SOIL DESCRIPTION	
	20	40	60	80						
10									- continued	
11										
12										
13										
14									End of Borehole at 13.4 m	
15										
16										
17										
18										
19										

Legend

-  50 mm Ø PVC pipe
-  50 mm Ø slotted PVC pipe
-  bentonite seal
-  clean silica sand backfill
-  slough native material

Story Environmental Services

Monitoring Well No.: TW16

Ontario Well Tag: A058780

Project:
Haileybury Landfill

Location:
Haileybury, ON

Drilling Method:
Hollow Stem Auger 200 mm

Project No.:
00608

Date Drilled:
13 09 2007

Logged By:
KJK

Ground Surface Elevation (m):
284.530

Top of Casing Elevation (m):
285.514

☒ SPLIT SPOON ☐ SHELBY ☒ CUTTINGS ☐ WATER LEVEL

MONITORING WELL
INSTALLATION

DEPTH (m)	MOISTURE CONTENT (%)				BLOW COUNT	SAMPLE NO.	SAMPLE TYPE	STRATIGRAPHY	SOIL DESCRIPTION
	20	40	60	80					
0									TOPSOIL, black, some clay and silt, trace sand, low plasticity, organics (rootlets), damp.
									SAND, brown, loose, medium to coarse grained, dry.
1									
					5	5			- course grained sand seams present in split spoon (less than 50 mm thick) and dry at 1.5 m
					6				
2									
3					3	5			- trace pebbles, sand coarse grained, dry to moist at 3.0 m
					4	6			
4									
					3	4			- grey at 4.6 m
					4	4			
5									
6					5	11			- very dense and difficult to advance auger from 6.1 m to 7.9 m
					8	6			- water at 6.4 m
7									
					9				
8									End of Borehole, Refusal at 7.9 m
9					6	13			
					16				

25/09/2008

Legend

-  50 mm Ø PVC pipe
-  50 mm Ø slotted PVC pipe
-  bentonite seal
-  clean silica sand backfill
-  slough native material

Story Environmental Services

Monitoring Well No.: TW17

Ontario Well Tag: A058780

Project:
Haileybury Landfill

Location:
Haileybury, ON

Drilling Method: Hollow Stem Auger
Diameter (mm): 200 mm

Project No.:
00608

Date Drilled:
14 09 2007

Logged By:
KJK

Ground Surface Elevation (m):
284.224

Top of Casing Elevation (m):
285.072



SPLIT SPOON




SHELBY



CUTTINGS



WATER LEVEL

DEPTH (m)	MOISTURE CONTENT (%)				BLOW COUNT	SAMPLE NO.	SAMPLE TYPE	STRATIGRAPHY	SOIL DESCRIPTION	MONITORING WELL INSTALLATION
	20	40	60	80						
0									TOPSOIL, black, clayey, some silt, organics (rootlets), damp.	 <p>24/09/2007</p>
									SAND, brown, medium dense, medium grained, damp.	
1									SILT, brown, some clay, trace sand, firm, medium plasticity, moist. - wet at 1.2 m	
2									- soft at 2.1 m	
3					0 0 1 2				- very soft at 3.0 m	
4									End of Borehole, Refusal at 4.0 m	
5										
6										
7										
8										
9										

Legend

-  50 mm Ø PVC pipe
-  50 mm Ø slotted PVC pipe
-  bentonite seal
-  clean silica sand backfill
-  slough native material

APPENDIX C

GROUNDWATER ELEVATIONS

Summary of Groundwater Elevations



Monitor No.	UTM Coordinates		Measuring Point Elevation (masl) ¹	Elevation of Water (masl) ¹																													
	Easting	Northing		May-03	Aug-03	Nov-03	May-04	Aug-04	Nov-04	May-05	Sep-05	Nov-05	May-06	Sep-06	Dec-06	Jun-07	Sep-07	Nov-07	May-08	Sep-08	Dec-08	May-09	Sep-09	Nov-09	May-10	Aug-10	Nov-10	May-11	Aug-11	Nov-11			
TW1	593793	5253023	295.66	288.95	288.50	288.93	289.08	288.45	288.35	288.80	289.22	288.87	288.85	288.36	288.90	288.65	288.22	288.23	289.03	288.35	288.45	289.22	288.23	Destroyed									
TW3	593578	5253041	296.70	285.34	285.31	285.38	285.39	285.26	285.09	285.30	286.13	285.27	285.28	285.14	ND	285.27	285.10	285.01	285.31	285.22	285.29	285.32	285.18	285.29	285.30	285.10	285.30	285.34	285.21	285.22			
TW4	593656	5252867	288.66	283.78	283.40	284.05	284.61	283.92	282.90	283.99	282.64	283.85	284.42	282.99	284.51	283.89	282.64	282.26	285.02	283.54	283.80	285.37	283.40	284.31	283.74	282.60	283.70	285.02	283.48	284.58			
TW5	593835	5252876	297.02	289.74	289.67	289.60	289.72	289.84	289.45	289.72	289.29	289.65	289.96	289.43	289.61	289.56	289.18	289.14	289.61	289.50	289.50	289.97	289.52	289.58	289.56	289.36	289.60	289.89	289.67	289.62			
TW6	593605	5252915	288.92	283.04	282.70	283.10	283.80	283.28	282.23	283.17	282.04	282.92	283.67	282.35	283.53	283.06	282.06	281.73	283.99	282.84	282.97	284.46	282.72	283.37	283.00	282.07	282.93	284.17	282.86	283.42			
TW7	593553	5252777	284.96	283.31	282.79	283.69	283.74	283.25	282.51	283.26	282.17	283.31	283.54	282.56	283.71	283.40	282.12	281.75	283.86	283.08	283.24	284.09	282.94	283.51	283.06	282.26	283.05	283.80	282.89	283.68			
TW8	593910	5253100	295.78	294.56	294.44	294.63	294.61	294.49	294.47	294.55	294.25	294.58	294.52	294.37	294.57	294.52	293.84	294.17	294.54	294.42	294.53	294.56	294.39	294.56	294.54	294.38	294.53	294.55	294.03	294.56			
TW9	593553	5252965	289.04	279.09	279.20	279.14	280.04	280.12	278.74	279.35	278.21	278.55	280.18	278.97	279.69	279.52	278.41	277.90	279.92	279.34	279.15	281.01	279.52	279.48	279.17	278.14	278.82	280.13	279.39	279.01			
TW10	593486	5252824	283.98	281.40	281.50	281.69	282.07	281.99	281.48	281.75	280.69	281.44	282.16	281.49	281.99	281.96	280.28	280.77	281.95	281.75	281.58	282.51	281.82	282.02	281.78	281.60	281.79	282.22	281.77	281.83			
TW11	593519	5252961	288.80					ND	278.98	279.01	278.24	278.41	279.96	279.19	279.57	279.56	278.63	278.12	279.48	279.39	279.12	280.91	279.77	279.51	279.10	278.25	278.61	279.80	279.47	279.06			
TW12	593356	5252963	287.26					ND	278.32	DRY	DRY	DRY	278.53	278.34	278.33	278.48	DRY	DRY	DRY	278.37	278.13	279.28	278.89	278.44	DRY	DRY	DRY	278.13	278.44	278.02			
TW13	593472	5253010	289.49												278.65	278.77	278.10	277.68	278.19	278.66	278.39	279.81	279.17	278.74	278.25	277.70	277.74	278.53	278.74	278.28			
TW14	593381	5252937	286.67												278.39	278.52	277.95	277.58	277.88	278.43	278.17	279.37	278.94	278.49	278.01	277.55	277.55	278.18	278.49	278.07			
TW15	593369	5253024	287.79														277.87	277.50	277.77	278.34	278.09	279.27	278.85	278.41	277.92	277.48	277.46	278.10	278.40	277.99			
TW16	593282	5252995	285.51														277.84	277.39	277.76	278.31	278.07	279.22	278.82	278.37	277.89	277.45	277.43	278.07	278.37	277.96			
TW17	593517	5252798	285.07														282.11	281.75	283.91	283.06	283.20	284.05	282.92	283.49	283.07	282.25	283.06	283.76	282.88	283.67			

Notes:
(1) masl - metres above sea level.
(2) ND - no data available.

Summary of Groundwater Elevations



Monitor No.	UTM Coordinates		Measuring Point Elevation (masl) ¹	Elevation of Water (masl) ¹																								
	Easting	Northing		May-12	Aug-12	Nov-12	May-13	Jul-13	Sep-13	Jun-14	Jul-14	Sep-14	May-15	Jul-15	Sep-15	May-16	Jul-16	Sep-16	May-17	Jul-17	Sep-17	May-18	Jul-18	Oct-18	May-19	Jul-19	Sep-19	
TW1	593793	5253023	295.66	Destroyed																								
TW3	593578	5253041	296.70	285.30	285.11	285.15	285.28	285.20	285.14	285.30	285.21	285.31	Destroyed															
TW4	593656	5252867	288.66	284.34	282.72	284.16	285.33	283.72	283.08	285.37	283.82	284.51	284.56	283.47	282.91	285.47	283.86	283.22	285.26	283.92	282.93	285.42	283.55	282.93	285.83	284.26	283.41	
TW5	593835	5252876	297.02	289.79	289.32	289.56	289.98	289.56	289.36	290.15	ND	290.05	290.02	289.86	289.26	290.31	290.02	289.68	290.02	289.92	289.47	289.97	289.68	289.47	290.58	290.12	289.69	
TW6	593605	5252915	288.92	283.57	282.19	282.86	284.42	283.11	282.49	284.62	283.22	283.70	283.87	282.91	282.34	284.56	283.29	282.65	284.35	283.32	282.40	284.46	283.00	282.40	285.16	283.76	282.90	
TW7	593553	5252777	284.96	283.46	282.14	283.93	284.03	283.08	282.58	284.02	ND	283.76	284.44	282.94	281.96	284.04	283.21	282.74	283.93	283.22	282.49	284.00	283.02	282.49	284.19	283.41	282.99	
TW8	593910	5253100	295.78	294.52	294.15	294.64	294.58	294.40	294.47	294.57	294.50	294.59	294.56	294.22	293.68	294.56	294.25	293.97	294.53	294.47	294.25	294.54	294.43	294.25	294.57	294.37	294.56	
TW9	593553	5252965	289.04	279.94	278.52	278.11	280.66	279.78	278.92	281.02	279.96	279.90	280.14	279.36	278.15	280.91	279.92	278.98	280.01	279.44	277.26	279.56	279.09	277.26	281.52	280.39	279.35	
TW10	593486	5252824	283.98	282.07	280.92	281.08	282.39	281.81	281.40	282.46	ND	282.13	282.16	281.50	278.64	282.45	281.86	281.26	282.11	281.79	280.86	282.03	281.43	280.86	282.75	282.12	281.74	
TW11	593519	5252961	288.80	279.94	278.81	278.28	280.45	279.96	279.23	280.82	ND	279.98	280.20	279.63	278.50	280.84	280.17	279.33	279.70	279.49	278.50	279.36	279.22	278.50	281.13	280.65	279.71	
TW12	593356	5252963	287.26	278.69	278.08	DRY	278.74	278.94	278.48	279.10	ND	278.86	278.93	278.73	278.19	279.08	279.19	278.59	<277.99	278.39	278.13	DRY	278.27	DRY	279.01	279.51	278.93	
TW13	593472	5253010	289.49	279.04	278.29	277.77	279.20	279.24	278.70	279.59	279.29	279.17	279.30	278.99	277.99	279.61	279.47	278.80	278.39	278.68	277.85	278.23	278.48	277.85	279.63	279.93	279.19	
TW14	593381	5252937	286.67	278.76	278.12	277.64	278.81	278.98	278.51	279.17	ND	277.91	279.00	278.78	278.25	279.15	279.20	<273.36	278.04	278.45	277.84	277.96	278.32	277.84	279.06	279.60	278.97	
TW15	593369	5253024	287.79	278.65	278.05	277.58	278.72	278.89	278.43	279.05	279.13	278.82	278.90	278.68	278.15	279.04	279.02	278.54	277.94	278.35	277.78	277.99	277.84	277.78	278.94	279.52	278.90	
TW16	593282	5252995	285.51	278.61	278.02	277.56	278.66	278.86	278.40	279.02	279.38	278.78	278.90	278.64	278.11	279.01	279.07	278.48	277.91	278.31	277.75	277.88	278.19	277.75	278.92	279.46	278.86	
TW17	593517	5252798	285.07	283.44	282.14	283.88	284.00	283.05	282.55	283.98	ND	283.71	283.59	282.90	281.73	283.99	283.19	282.71	283.90	283.22	282.47	283.96	283.00	282.47	284.16	283.40	282.97	

Notes:
(1) masl - metres above sea level.
(2) ND - no data available.

APPENDIX D

**2019 LABORATORY ANALYTICAL
REPORTS**

**CLIENT NAME: WOOD CANADA LTD.
131 FIELDING ROAD
LIVELY, ON P3Y1L7
(705) 682-2632**

ATTENTION TO: Emily Lemieux

PROJECT: TY131010

AGAT WORK ORDER: 19T472717

WATER ANALYSIS REVIEWED BY: Parvathi Malemath, Data Reviewer

DATE REPORTED: Jun 14, 2019

PAGES (INCLUDING COVER): 15

VERSION*: 1

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

***NOTES**

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



Certificate of Analysis

AGAT WORK ORDER: 19T472717

PROJECT: TY131010

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

CLIENT NAME: WOOD CANADA LTD.

ATTENTION TO: Emily Lemieux

SAMPLING SITE:

SAMPLED BY:

Haileybury Groundwater Package

DATE RECEIVED: 2019-05-29

DATE REPORTED: 2019-06-14

		SAMPLE DESCRIPTION:		TW-4		TW-6		TW-8		TW-9		TW-13	
		SAMPLE TYPE:		Water		Water		Water		Water		Water	
		DATE SAMPLED:		2019-05-25		2019-05-25		2019-05-25		2019-05-25		2019-05-25	
Parameter	Unit	G / S	RDL	231396	RDL	231397	231398	RDL	231399	RDL	231400		
BOD (5)	mg/L		5	<5	5	<5	<5	5	6	5	<5		
pH	pH Units		NA	7.60	NA	7.14	7.41	NA	7.55	NA	6.70		
Alkalinity (as CaCO ₃)	mg/L		5	237	5	96	88	5	824	5	55		
Electrical Conductivity	uS/cm		2	861	2	402	172	2	2080	2	133		
Total Hardness (as CaCO ₃)	mg/L		0.5	395	0.5	134	85.6	0.5	524	0.5	13.1		
Total Dissolved Solids	mg/L		20	486	20	220	84	20	970	20	54		
Fluoride	mg/L	1.5	0.25	<0.25	0.05	<0.05	<0.05	0.5	<0.5	0.05	<0.05		
Chloride	mg/L		0.50	22.7	0.10	15.7	0.67	1.0	145	0.10	0.94		
Nitrate as N	mg/L	10.0	0.25	13.1	0.05	7.32	<0.05	0.5	<0.5	0.05	<0.05		
Nitrite as N	mg/L	1.0	0.25	<0.25	0.05	<0.05	<0.05	0.5	<0.5	0.05	<0.05		
Sulphate	mg/L		0.50	146	0.10	56.6	4.06	1.0	109	0.10	4.04		
Phosphate as P	mg/L		0.50	<0.50	0.10	<0.10	<0.10	1.0	<1.0	0.10	<0.10		
Ammonia as N	mg/L		0.02	1.18	0.02	0.03	0.02	2	51	0.2	6.6		
Total Kjeldahl Nitrogen	mg/L		0.10	2.02	0.10	0.32	<0.10	0.50	59.5	0.10	7.48		
Organic Nitrogen	mg/L		0.10	0.84	0.10	0.29	<0.10	0.10	8.50	0.10	0.88		
Dissolved Organic Carbon	mg/L		0.5	5.2	0.5	4.4	2.3	0.5	21.1	0.5	6.1		
Chemical Oxygen Demand	mg/L		5	12	5	<5	7	10	102	5	18		
Phenols	mg/L		0.001	<0.001	0.001	<0.001	<0.001	0.001	0.009	0.001	<0.001		
Calcium	mg/L		0.05	117	0.05	35.1	20.1	0.25	138	0.05	3.25		
Magnesium	mg/L		0.05	24.9	0.05	11.3	8.59	0.25	43.5	0.05	1.21		
Sodium	mg/L	20	0.05	15.9	0.05	19.0	1.92	0.25	119	0.05	5.07		
Potassium	mg/L		0.05	14.1	0.05	4.87	0.52	0.25	50.5	0.05	6.59		
Aluminum	mg/L		0.004	0.008	0.004	<0.004	<0.004	0.004	0.012	0.004	0.087		
Arsenic	mg/L	0.010	0.003	<0.003	0.003	<0.003	<0.003	0.003	0.024	0.003	<0.003		
Barium	mg/L	1	0.002	0.085	0.002	0.025	0.005	0.002	0.314	0.002	0.012		
Beryllium	mg/L		0.001	<0.001	0.001	<0.001	<0.001	0.001	<0.001	0.001	<0.001		
Bismuth	mg/L		0.002	<0.002	0.002	<0.002	<0.002	0.002	<0.002	0.002	<0.002		
Boron	mg/L	5	0.010	0.475	0.010	0.432	<0.010	0.010	1.43	0.010	0.033		
Cadmium	mg/L	0.005	0.002	<0.002	0.002	<0.002	<0.002	0.002	<0.002	0.002	<0.002		
Chromium	mg/L	0.05	0.003	<0.003	0.003	<0.003	<0.003	0.003	0.013	0.003	0.003		

Certified By:





AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 19T472717

PROJECT: TY131010

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

CLIENT NAME: WOOD CANADA LTD.

SAMPLING SITE:

ATTENTION TO: Emily Lemieux

SAMPLED BY:

Haileybury Groundwater Package

DATE RECEIVED: 2019-05-29

DATE REPORTED: 2019-06-14

		SAMPLE DESCRIPTION:		TW-4		TW-6		TW-8		TW-9		TW-13	
		SAMPLE TYPE:		Water		Water		Water		Water		Water	
		DATE SAMPLED:		2019-05-25		2019-05-25		2019-05-25		2019-05-25		2019-05-25	
Parameter	Unit	G / S	RDL	231396	RDL	231397	231398	RDL	231399	RDL	231400		
Cobalt	mg/L		0.001	0.001	0.001	<0.001	<0.001	0.001	0.010	0.001	0.001		
Copper	mg/L		0.003	<0.003	0.003	0.004	<0.003	0.003	<0.003	0.003	0.004		
Iron	mg/L		0.010	0.071	0.010	<0.010	0.407	0.010	20.1	0.010	0.551		
Lead	mg/L	0.01	0.001	<0.001	0.001	<0.001	<0.001	0.001	<0.001	0.001	<0.001		
Manganese	mg/L		0.002	0.472	0.002	<0.002	0.164	0.002	3.50	0.002	0.087		
Mercury	mg/L	0.001	0.0001	<0.0001	0.0001	<0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001		
Molybdenum	mg/L		0.002	<0.002	0.002	<0.002	<0.002	0.002	<0.002	0.002	<0.002		
Nickel	mg/L		0.003	<0.003	0.003	<0.003	<0.003	0.003	0.010	0.003	<0.003		
Phosphorus	mg/L		0.05	<0.05	0.05	<0.05	<0.05	0.05	0.13	0.05	<0.05		
Selenium	mg/L	0.05	0.004	<0.004	0.004	<0.004	<0.004	0.004	<0.004	0.004	<0.004		
Silicon	mg/L		0.05	5.05	0.05	3.24	5.13	0.05	13.0	0.05	3.77		
Silver	mg/L		0.002	<0.002	0.002	<0.002	<0.002	0.002	<0.002	0.002	<0.002		
Strontium	mg/L		0.005	0.417	0.005	0.160	0.033	0.005	0.628	0.005	0.015		
Sulfur	mg/L		0.05	47.1	0.05	17.9	1.56	0.25	42.3	0.05	8.32		
Thallium	mg/L		0.006	<0.006	0.006	<0.006	<0.006	0.006	<0.006	0.006	<0.006		
Tin	mg/L		0.002	<0.002	0.002	<0.002	<0.002	0.002	<0.002	0.002	<0.002		
Titanium	mg/L		0.002	0.002	0.002	<0.002	<0.002	0.002	0.002	0.002	0.004		
Uranium	mg/L	0.02	0.002	<0.002	0.002	<0.002	<0.002	0.002	<0.002	0.002	<0.002		
Vanadium	mg/L		0.002	<0.002	0.002	<0.002	<0.002	0.002	0.007	0.002	0.002		
Zinc	mg/L		0.005	<0.005	0.005	<0.005	0.008	0.005	<0.005	0.005	<0.005		

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AGAT WORK ORDER: 19T472717

PROJECT: TY131010

5835 COOPERS AVENUE
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CLIENT NAME: WOOD CANADA LTD.

ATTENTION TO: Emily Lemieux

SAMPLING SITE:

SAMPLED BY:

Haileybury Groundwater Package

DATE RECEIVED: 2019-05-29

DATE REPORTED: 2019-06-14

		SAMPLE DESCRIPTION:		TW-15		TW-16		HB Gw Dup 1		TW-10		TW-12	
		SAMPLE TYPE:		Water		Water		Water		Water		Water	
		DATE SAMPLED:		2019-05-25		2019-05-25		2019-05-25		2019-05-25		2019-05-25	
Parameter	Unit	G / S	RDL	231401	RDL	231402	RDL	231403	RDL	231404	RDL	231405	RDL
BOD (5)	mg/L		5	7	5	<5	5	8	5	<5		<5	
pH	pH Units		NA	7.73	NA	7.51	NA	7.78	NA	6.54		7.81	
Alkalinity (as CaCO ₃)	mg/L		5	244	5	106	5	243	5	24		121	
Electrical Conductivity	uS/cm		2	720	2	240	2	686	2	87		261	
Total Hardness (as CaCO ₃)	mg/L		0.5	257	0.5	118	0.5	261	0.5	25.2		120	
Total Dissolved Solids	mg/L		20	412	20	124	20	424	20	38		120	
Fluoride	mg/L	1.5	0.10	<0.10	0.05	<0.05	0.10	<0.10	0.05	<0.05		<0.05	
Chloride	mg/L		0.20	26.9	0.10	9.35	0.20	25.3	0.10	6.21		1.16	
Nitrate as N	mg/L	10.0	0.10	8.88	0.05	0.07	0.10	8.25	0.05	1.18		0.12	
Nitrite as N	mg/L	1.0	0.10	0.22	0.05	<0.05	0.10	0.26	0.05	<0.05		<0.05	
Sulphate	mg/L		0.20	61.4	0.10	5.35	0.20	51.6	0.10	2.99		16.6	
Phosphate as P	mg/L		0.20	<0.20	0.10	<0.10	0.20	<0.20	0.10	<0.10		<0.10	
Ammonia as N	mg/L		0.10	3.79	0.02	<0.02	0.10	3.68	0.02	<0.02		0.05	
Total Kjeldahl Nitrogen	mg/L		0.10	4.66	0.10	<0.10	0.10	4.57	0.10	<0.10		<0.10	
Organic Nitrogen	mg/L		0.10	0.87	0.10	<0.10	0.10	0.89	0.10	<0.10		<0.10	
Dissolved Organic Carbon	mg/L		0.5	4.2	0.5	1.4	0.5	3.9	0.5	2.4		2.0	
Chemical Oxygen Demand	mg/L		5	7	5	<5	5	6	5	<5		<5	
Phenols	mg/L		0.001	<0.001	0.001	<0.001	0.001	<0.001	0.001	<0.001		<0.001	
Calcium	mg/L		0.05	76.4	0.05	36.8	0.05	76.9	0.05	6.73		39.0	
Magnesium	mg/L		0.05	16.2	0.05	6.36	0.05	16.7	0.05	2.05		5.54	
Sodium	mg/L	20	0.05	33.7	0.05	4.91	0.05	33.0	0.05	5.05		2.93	
Potassium	mg/L		0.05	12.3	0.05	0.59	0.05	11.5	0.05	0.45		1.21	
Aluminum	mg/L		0.004	<0.004	0.004	<0.004	0.004	<0.004	0.004	0.017		0.004	
Arsenic	mg/L	0.010	0.003	<0.003	0.003	<0.003	0.003	<0.003	0.003	<0.003		<0.003	
Barium	mg/L	1	0.002	0.126	0.002	0.009	0.002	0.122	0.002	0.005		0.015	
Beryllium	mg/L		0.001	<0.001	0.001	<0.001	0.001	<0.001	0.001	<0.001		<0.001	
Bismuth	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002		<0.002	
Boron	mg/L	5	0.010	0.929	0.010	0.011	0.010	0.881	0.010	0.010		<0.010	
Cadmium	mg/L	0.005	0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002		<0.002	
Chromium	mg/L	0.05	0.003	<0.003	0.003	<0.003	0.003	<0.003	0.003	<0.003		0.004	

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Certificate of Analysis

AGAT WORK ORDER: 19T472717

PROJECT: TY131010

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

CLIENT NAME: WOOD CANADA LTD.

SAMPLING SITE:

ATTENTION TO: Emily Lemieux

SAMPLED BY:

Haileybury Groundwater Package

DATE RECEIVED: 2019-05-29

DATE REPORTED: 2019-06-14

		SAMPLE DESCRIPTION:		TW-15		TW-16		HB Gw Dup 1		TW-10		TW-12	
		SAMPLE TYPE:		Water		Water		Water		Water		Water	
		DATE SAMPLED:		2019-05-25		2019-05-25		2019-05-25		2019-05-25		2019-05-25	
Parameter	Unit	G / S	RDL	231401	RDL	231402	RDL	231403	RDL	231404	RDL	231405	RDL
Cobalt	mg/L		0.001	0.003	0.001	<0.001	0.001	0.003	0.001	<0.001		<0.001	
Copper	mg/L		0.003	0.011	0.003	<0.003	0.003	0.011	0.003	<0.003		<0.003	
Iron	mg/L		0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010		<0.010	
Lead	mg/L	0.01	0.001	<0.001	0.001	<0.001	0.001	<0.001	0.001	<0.001		<0.001	
Manganese	mg/L		0.002	0.818	0.002	<0.002	0.002	0.757	0.002	<0.002		<0.002	
Mercury	mg/L	0.001	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001		<0.0001	
Molybdenum	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002		0.002	
Nickel	mg/L		0.003	0.005	0.003	<0.003	0.003	0.005	0.003	<0.003		<0.003	
Phosphorus	mg/L		0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05		<0.05	
Selenium	mg/L	0.05	0.004	<0.004	0.004	<0.004	0.004	<0.004	0.004	<0.004		<0.004	
Silicon	mg/L		0.05	5.85	0.05	5.22	0.05	5.76	0.05	3.68		5.25	
Silver	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002		<0.002	
Strontium	mg/L		0.005	0.205	0.005	0.044	0.005	0.201	0.005	0.022		0.086	
Sulfur	mg/L		0.05	29.8	0.05	2.39	0.05	28.0	0.05	1.11		3.36	
Thallium	mg/L		0.006	<0.006	0.006	<0.006	0.006	<0.006	0.006	<0.006		<0.006	
Tin	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002		<0.002	
Titanium	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002		<0.002	
Uranium	mg/L	0.02	0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002		<0.002	
Vanadium	mg/L		0.002	<0.002	0.002	0.003	0.002	<0.002	0.002	<0.002		<0.002	
Zinc	mg/L		0.005	<0.005	0.005	<0.005	0.005	<0.005	0.005	<0.005		<0.005	

Certified By:





AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 19T472717

PROJECT: TY131010

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CLIENT NAME: WOOD CANADA LTD.

ATTENTION TO: Emily Lemieux

SAMPLING SITE:

SAMPLED BY:

Haileybury Groundwater Package

DATE RECEIVED: 2019-05-29

DATE REPORTED: 2019-06-14

		SAMPLE DESCRIPTION:		TW-14	TW-17	HB Gw Dup 2
		SAMPLE TYPE:		Water	Water	Water
		DATE SAMPLED:		2019-05-25	2019-05-25	2019-05-25
Parameter	Unit	G / S	RDL	231406	231407	231408
BOD (5)	mg/L		5	<5	<5	<5
pH	pH Units		NA	6.96	7.55	7.54
Alkalinity (as CaCO ₃)	mg/L		5	28	97	100
Electrical Conductivity	uS/cm		2	88	225	233
Total Hardness (as CaCO ₃)	mg/L		0.5	30.0	107	115
Total Dissolved Solids	mg/L		20	30	112	142
Fluoride	mg/L	1.5	0.05	<0.05	<0.05	<0.05
Chloride	mg/L		0.10	4.18	8.91	8.96
Nitrate as N	mg/L	10.0	0.05	1.15	0.31	0.32
Nitrite as N	mg/L	1.0	0.05	<0.05	<0.05	<0.05
Sulphate	mg/L		0.10	3.52	6.92	6.90
Phosphate as P	mg/L		0.10	<0.10	<0.10	<0.10
Ammonia as N	mg/L		0.02	<0.02	0.04	0.04
Total Kjeldahl Nitrogen	mg/L		0.10	<0.10	<0.10	<0.10
Organic Nitrogen	mg/L		0.10	<0.10	<0.10	<0.10
Dissolved Organic Carbon	mg/L		0.5	1.0	2.6	2.5
Chemical Oxygen Demand	mg/L		5	7	<5	<5
Phenols	mg/L		0.001	<0.001	<0.001	<0.001
Calcium	mg/L		0.05	8.12	32.4	35.3
Magnesium	mg/L		0.05	2.36	6.31	6.49
Sodium	mg/L	20	0.05	4.49	4.75	4.96
Potassium	mg/L		0.05	0.40	0.62	0.64
Aluminum	mg/L		0.004	0.010	0.006	0.013
Arsenic	mg/L	0.010	0.003	<0.003	<0.003	<0.003
Barium	mg/L	1	0.002	0.003	0.006	0.006
Beryllium	mg/L		0.001	<0.001	<0.001	<0.001
Bismuth	mg/L		0.002	<0.002	<0.002	<0.002
Boron	mg/L	5	0.010	<0.010	0.012	<0.010
Cadmium	mg/L	0.005	0.002	<0.002	<0.002	<0.002
Chromium	mg/L	0.05	0.003	<0.003	<0.003	<0.003

Certified By:





Certificate of Analysis

AGAT WORK ORDER: 19T472717

PROJECT: TY131010

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CLIENT NAME: WOOD CANADA LTD.

SAMPLING SITE:

ATTENTION TO: Emily Lemieux

SAMPLED BY:

Haileybury Groundwater Package

DATE RECEIVED: 2019-05-29

DATE REPORTED: 2019-06-14

Parameter	Unit	SAMPLE DESCRIPTION:		TW-14	TW-17	HB Gw Dup 2
		SAMPLE TYPE:		Water	Water	Water
		DATE SAMPLED:		2019-05-25	2019-05-25	2019-05-25
		G / S	RDL	231406	231407	231408
Cobalt	mg/L		0.001	<0.001	<0.001	<0.001
Copper	mg/L		0.003	<0.003	<0.003	<0.003
Iron	mg/L		0.010	<0.010	<0.010	<0.010
Lead	mg/L	0.01	0.001	<0.001	<0.001	<0.001
Manganese	mg/L		0.002	<0.002	0.005	0.005
Mercury	mg/L	0.001	0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	mg/L		0.002	<0.002	<0.002	<0.002
Nickel	mg/L		0.003	<0.003	<0.003	<0.003
Phosphorus	mg/L		0.05	<0.05	<0.05	<0.05
Selenium	mg/L	0.05	0.004	<0.004	<0.004	<0.004
Silicon	mg/L		0.05	4.54	3.64	3.48
Silver	mg/L		0.002	<0.002	<0.002	<0.002
Strontium	mg/L		0.005	0.019	0.046	0.046
Sulfur	mg/L		0.05	1.30	2.36	2.54
Thallium	mg/L		0.006	<0.006	<0.006	<0.006
Tin	mg/L		0.002	<0.002	<0.002	<0.002
Titanium	mg/L		0.002	<0.002	<0.002	<0.002
Uranium	mg/L	0.02	0.002	<0.002	<0.002	<0.002
Vanadium	mg/L		0.002	<0.002	<0.002	<0.002
Zinc	mg/L		0.005	<0.005	<0.005	<0.005

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Ontario Drinking Water Quality Standards. Na value is 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.

231396-231408 Please note that Total Hardness (as CaCO₃) & Organic Nitrogen are calculated parameters.
Elevated RDLs indicate the degree of sample dilutions prior to analyses to keep analytes within the calibration range, reduce matrix interference and to avoid contaminating the instruments.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:





AGAT Laboratories

Guideline Violation

AGAT WORK ORDER: 19T472717

PROJECT: TY131010

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

CLIENT NAME: WOOD CANADA LTD.

ATTENTION TO: Emily Lemieux

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
231396	TW-4	O.Reg.169/03(mg/L)	Haileybury Groundwater Package	Nitrate as N	mg/L	10.0	13.1
231399	TW-9	O.Reg.169/03(mg/L)	Haileybury Groundwater Package	Arsenic	mg/L	0.010	0.024
231399	TW-9	O.Reg.169/03(mg/L)	Haileybury Groundwater Package	Sodium	mg/L	20	119
231401	TW-15	O.Reg.169/03(mg/L)	Haileybury Groundwater Package	Sodium	mg/L	20	33.7
231403	HB Gw Dup 1	O.Reg.169/03(mg/L)	Haileybury Groundwater Package	Sodium	mg/L	20	33.0

Quality Assurance

CLIENT NAME: WOOD CANADA LTD.

PROJECT: TY131010

SAMPLING SITE:

AGAT WORK ORDER: 19T472717

ATTENTION TO: Emily Lemieux

SAMPLED BY:

Water Analysis															
RPT Date: Jun 14, 2019			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Haileybury Groundwater Package

BOD (5)	231399	231399	6	6	NA	< 5	101%	75%	125%						
pH	231492		7.77	7.70	0.9%	NA	100%	90%	110%						
Alkalinity (as CaCO3)	231492		94	94	0.0%	< 5	99%	80%	120%						
Electrical Conductivity	231492		324	324	0.0%	< 2	96%	80%	120%						
Total Dissolved Solids	231396	231396	486	512	5.2%	< 20	94%	80%	120%						
Fluoride	231396	231396	<0.25	<0.25	NA	< 0.05	101%	90%	110%	106%	90%	110%	106%	80%	120%
Chloride	231396	231396	22.7	22.8	0.4%	< 0.10	93%	90%	110%	103%	90%	110%	105%	80%	120%
Nitrate as N	231396	231396	13.1	13.1	0.0%	< 0.05	94%	90%	110%	105%	90%	110%	105%	80%	120%
Nitrite as N	231396	231396	<0.25	<0.25	NA	< 0.05	NA	90%	110%	106%	90%	110%	108%	80%	120%
Sulphate	231396	231396	146	147	0.7%	< 0.10	96%	90%	110%	102%	90%	110%	103%	80%	120%
Phosphate as P	231396	231396	<0.50	<0.50	NA	< 0.10	104%	90%	110%	102%	90%	110%	108%	80%	120%
Ammonia as N	231988		0.30	0.31	3.3%	< 0.02	101%	90%	110%	95%	90%	110%	81%	80%	120%
Total Kjeldahl Nitrogen	231396	231396	2.02	1.97	2.5%	< 0.10	103%	80%	120%	101%	80%	120%	105%	70%	130%
Dissolved Organic Carbon	231400	231400	6.1	6.1	0.0%	< 0.5	93%	90%	110%	103%	90%	110%	103%	80%	120%
Chemical Oxygen Demand	231695		13	13	NA	< 5	106%	90%	110%	108%	90%	110%	90%	70%	130%
Phenols	231396	231396	<0.001	<0.001	NA	< 0.001	102%	90%	110%	101%	90%	110%	97%	80%	120%
Calcium	231397	231397	35.1	36.5	3.9%	< 0.05	93%	90%	110%	96%	90%	110%	91%	70%	130%
Magnesium	231397	231397	11.3	11.4	0.9%	< 0.05	94%	90%	110%	94%	90%	110%	90%	70%	130%
Sodium	231397	231397	19.0	19.7	3.6%	< 0.05	94%	90%	110%	94%	90%	110%	90%	70%	130%
Potassium	231397	231397	4.87	4.98	2.2%	< 0.05	92%	90%	110%	95%	90%	110%	90%	70%	130%
Aluminum	231396	231396	0.008	0.006	NA	< 0.004	100%	90%	110%	99%	90%	110%	99%	70%	130%
Arsenic	231396	231396	< 0.003	<0.003	NA	< 0.003	101%	90%	110%	101%	90%	110%	107%	70%	130%
Barium	231396	231396	0.085	0.083	2.4%	< 0.002	104%	90%	110%	106%	90%	110%	104%	70%	130%
Beryllium	231396	231396	< 0.001	<0.001	NA	< 0.001	91%	90%	110%	90%	90%	110%	100%	70%	130%
Bismuth	231396	231396	< 0.002	<0.002	NA	< 0.002	94%	90%	110%	102%	90%	110%	101%	70%	130%
Boron	231396	231396	0.475	0.492	3.5%	< 0.010	94%	90%	110%	93%	90%	110%	112%	70%	130%
Cadmium	231396	231396	< 0.002	<0.002	NA	< 0.002	101%	90%	110%	102%	90%	110%	102%	70%	130%
Chromium	231396	231396	< 0.003	<0.003	NA	< 0.003	102%	90%	110%	104%	90%	110%	105%	70%	130%
Cobalt	231396	231396	0.001	0.001	NA	< 0.001	103%	90%	110%	103%	90%	110%	97%	70%	130%
Copper	231396	231396	< 0.003	<0.003	NA	< 0.003	105%	90%	110%	107%	90%	110%	100%	70%	130%
Iron	231396	231396	0.071	0.059	18.5%	< 0.010	108%	90%	110%	99%	90%	110%	93%	70%	130%
Lead	231396	231396	< 0.001	<0.001	NA	< 0.001	101%	90%	110%	104%	90%	110%	100%	70%	130%
Manganese	231396	231396	0.472	0.464	1.7%	< 0.002	104%	90%	110%	105%	90%	110%	88%	70%	130%
Mercury	231396	231396	<0.0001	<0.0001	NA	< 0.0001	102%	90%	110%	104%	90%	110%	101%	80%	120%
Molybdenum	231396	231396	< 0.002	<0.002	NA	< 0.002	100%	90%	110%	99%	90%	110%	102%	70%	130%
Nickel	231396	231396	< 0.003	<0.003	NA	< 0.003	105%	90%	110%	106%	90%	110%	100%	70%	130%
Phosphorus	231396	231396	< 0.05	<0.05	NA	< 0.05	101%	90%	110%	99%	90%	110%	107%	70%	130%
Selenium	231396	231396	< 0.004	<0.004	NA	< 0.004	97%	90%	110%	96%	90%	110%	103%	70%	130%
Silicon	231396	231396	5.05	5.15	2.0%	< 0.05	96%	90%	110%	90%	90%	110%	82%	70%	130%

AGAT QUALITY ASSURANCE REPORT (V1)

Page 9 of 15

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

Results relate only to the items tested. Results apply to samples as received.



Quality Assurance

CLIENT NAME: WOOD CANADA LTD.

PROJECT: TY131010

SAMPLING SITE:

AGAT WORK ORDER: 19T472717

ATTENTION TO: Emily Lemieux

SAMPLED BY:

Water Analysis (Continued)

RPT Date: Jun 14, 2019			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
Silver	231396	231396	< 0.002	<0.002	NA	< 0.002	103%	90%	110%	108%	90%	110%	112%	70%	130%
Strontium	231396	231396	0.417	0.404	3.2%	< 0.005	100%	90%	110%	102%	90%	110%	89%	70%	130%
Sulfur	229026		10.7	11.3	5.5%	< 0.05	94%	90%	110%	98%	80%	130%	107%	70%	130%
Thallium	231396	231396	< 0.006	<0.006	NA	< 0.006	103%	90%	110%	104%	90%	110%	87%	70%	130%
Tin	231396	231396	< 0.002	<0.002	NA	< 0.002	101%	90%	110%	101%	90%	110%	101%	70%	130%
Titanium	231396	231396	0.002	<0.002	NA	< 0.002	98%	90%	110%	96%	90%	110%	96%	70%	130%
Uranium	231396	231396	< 0.002	<0.002	NA	< 0.002	96%	90%	110%	102%	90%	110%	117%	70%	130%
Vanadium	231396	231396	< 0.002	<0.002	NA	< 0.002	97%	90%	110%	100%	90%	110%	96%	70%	130%
Zinc	231396	231396	< 0.005	<0.005	NA	< 0.005	102%	90%	110%	104%	90%	110%	102%	70%	130%

Comments: NA signifies Not Applicable.

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

Certified By: _____



Method Summary

CLIENT NAME: WOOD CANADA LTD.

PROJECT: TY131010

SAMPLING SITE:
AGAT WORK ORDER: 19T472717

ATTENTION TO: Emily Lemieux

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
BOD (5)	INOR-93-6006	SM 5210 B	DO METER
pH	INOR-93-6000	SM 4500-H+ B	PC TITRATE
Alkalinity (as CaCO ₃)	INOR-93-6000	SM 2320 B	PC TITRATE
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
Total Hardness (as CaCO ₃)	MET-93-6105	EPA SW-846 6010C & 200.7	CALCULATION
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Fluoride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrate as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Phosphate as P	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Ammonia as N	INOR-93-6059	QuikChem 10-107-06-1-J & SM 4500 NH ₃ -F	LACHAT FIA
Total Kjeldahl Nitrogen	INOR-93-6048	QuikChem 10-107-06-2-I & SM 4500-Norg D	LACHAT FIA
Organic Nitrogen		SM 4500-Norg A	CALCULATION
Dissolved Organic Carbon	INOR-93-6049	EPA 415.1 & SM 5310 B	SHIMADZU CARBON ANALYZER
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Phenols	INOR-93-6050	MOE ROPHEN-E 3179 & SM 5530 D	TECHNICON AUTO ANALYZER
Calcium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Magnesium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Sodium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Potassium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Aluminum	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Arsenic	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Beryllium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Bismuth	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Chromium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Copper	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Iron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Manganese	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Mercury	MET-93-6100	EPA SW-846 7470 & 245.1	CVAAS
Molybdenum	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Nickel	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Phosphorus	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Selenium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Silicon	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Silver	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Strontium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Sulfur	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Thallium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Tin	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Titanium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS

Method Summary

CLIENT NAME: WOOD CANADA LTD.

PROJECT: TY131010

SAMPLING SITE:

AGAT WORK ORDER: 19T472717

ATTENTION TO: Emily Lemieux

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Uranium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Vanadium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Zinc	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS



Chain of Custody Record

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

Report Information:

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

Project Information:

Project: TY131010
Site Location: HAILEYBURY GW
Sampled By: WOOD
AGAT Quote #: 17252 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: _____

Regulatory Requirements:

☐ No Regulatory Requirement

(Please check all applicable boxes)

☐ Regulation 153/04

☐ Sewer Use

☐ Regulation 558

Table Indicate One

☐ Ind/Com

☐ Sanitary

☐ CCME

☐ Res/Park

☐ Storm

☐ Prov. Water Quality
Objectives (PWQO)

☐ Agriculture

Region Indicate One

☒ Other

Soil Texture (Check One)

☐ Coarse

☐ MISA

☐ Fine

ODWS
Indicate One

Is this submission for a
Record of Site Condition?

☐ Yes

☐ No

Report Guideline on
Certificate of Analysis

☐ Yes

☐ No

Sample Matrix Legend

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

Field Filtered - Metals, Hg, CrVI

0. Reg 153

All Metals ☐ 153 Metals (excl. Hydrides)
Hydride Metals ☐ 153 Metals (incl. Hydrides)

ORPs: ☐ B-HWS ☐ Cr ☐ CN
☐ C⁶⁺ ☐ EC ☐ FOC ☐ Hg
☐ pH ☐ SAR

Full Metals Scan

Regulation/Custom Metals

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

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

QUOTE # 17252

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Y / N	Metals and Inorganics	Field Filtered - Metals, Hg, CrVI	0. Reg 153	Nutrients	Volatiles	PHCs F1 - F4	ABNs	PAHs	PCBs	Organochlorine Pesticides	TCLP	Sewer Use
TW-4	May 25/19	13:00	8	GW		Y												
TW-6			8	GW		Y												
TW-8			8	GW		Y												
TW-9			8	GW		Y												
TW-13			8	GW	metals not filtered	Y												
TW-15			8	GW		Y												
TW-16			8	GW		Y												
HB GW Dup 1			8	GW		Y												
TW-10			8	GW		Y												
TW-12			8	GW		Y												
TW-14			8	GW		Y												

Samples Relinquished By (Print Name and Sign): <u>Dominique Courchesne</u>	Date: <u>28/05/19</u>	Time: <u>8 AM</u>	Samples Received By (Print Name and Sign): <u>Jay Patel</u>	Date: <u>29/05/19</u>	Time: <u>1:35pm</u>
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 1 of 2

Nº: **T 088430**



Sample Temperature Log

Client: WOOD - HB GW

COC# or Work Order #: _____

of Coolers: 3

of Submissions: _____

Arrival Temperatures - Branch/Driver

Cooler #1: 6.9 / 6.6 / 5.8

Cooler #2: 2.1 / 3.4 / 3.8

Cooler #3: 4.8 / 3.4 / 4.9

Cooler #4: _____ / _____ / _____

Cooler #5: _____ / _____ / _____

Cooler #6: _____ / _____ / _____

Cooler #7: _____ / _____ / _____

Cooler #8: _____ / _____ / _____

Cooler #9: _____ / _____ / _____

Cooler #10: _____ / _____ / _____

IR Gun ID: _____

Taken By: Jay Patel

Date (yyyy/mm/dd): 2019/05/24 Time: 1:35 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)

CLIENT NAME: WOOD CANADA LTD.
131 FIELDING ROAD
LIVELY, ON P3Y1L7
(705) 682-2632

ATTENTION TO: Emily Lemieux

PROJECT: TY131010

AGAT WORK ORDER: 19T472728

WATER ANALYSIS REVIEWED BY: Yris Verastegui, Report Reviewer

DATE REPORTED: Jun 06, 2019

PAGES (INCLUDING COVER): 9

VERSION*: 1

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

*NOTES

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



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 19T472728

PROJECT: TY131010

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

CLIENT NAME: WOOD CANADA LTD.

SAMPLING SITE:

ATTENTION TO: Emily Lemieux

SAMPLED BY:

Haileybury Surface Water Package

DATE RECEIVED: 2019-05-29

DATE REPORTED: 2019-06-06

Parameter	Unit	SAMPLE DESCRIPTION:		SW-3	SW-4	SW-5	HB SW DUP
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2019-05-25	2019-05-25	2019-05-25	2019-05-25
		G / S	RDL	228742	228751	228752	228753
pH	pH Units	6.5-8.5	NA	7.10	7.19	6.39	7.16
Alkalinity (as CaCO ₃)	mg/L		5	49	52	8	51
Electrical Conductivity	uS/cm		2	212	235	32	234
Total Hardness (as CaCO ₃)	mg/L		0.5	51.9	55.2	10.6	54.3
Total Dissolved Solids	mg/L		20	128	130	30	130
Total Suspended Solids	mg/L		10	<10	<10	<10	<10
Chloride	mg/L		0.10	38.1	44.4	2.42	44.0
Sulphate	mg/L		0.10	4.64	4.86	2.94	4.83
Ammonia as N	mg/L		0.02	0.03	0.03	0.04	0.03
Dissolved Organic Carbon	mg/L		0.5	8.1	8.4	6.4	8.2
Chemical Oxygen Demand	mg/L		5	12	22	15	21
Phenols	mg/L	0.001	0.001	0.001	0.002	0.002	0.002
Turbidity	NTU		0.5	3.6	0.6	1.6	0.6
Calcium	mg/L		0.05	14.7	15.6	2.83	15.4
Magnesium	mg/L		0.05	3.70	3.94	0.86	3.85
Sodium	mg/L		0.05	19.2	22.1	1.58	22.0
Potassium	mg/L		0.05	0.58	0.57	0.28	0.56
Aluminum (dissolved)	mg/L	0.075	0.004	0.026	0.023	0.047	0.026
Arsenic	mg/L	0.1	0.003	<0.003	<0.003	0.004	<0.003
Barium	mg/L		0.002	0.012	0.010	0.004	0.010
Beryllium	mg/L	0.011	0.001	<0.001	<0.001	<0.001	<0.001
Bismuth	mg/L		0.002	<0.002	<0.002	<0.002	<0.002
Boron	mg/L	0.20	0.010	<0.010	<0.010	<0.010	<0.010
Cadmium	mg/L	0.0002	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	mg/L		0.003	<0.003	<0.003	<0.003	<0.003
Cobalt	mg/L	0.0009	0.0005	<0.0005	<0.0005	0.0006	<0.0005
Copper	mg/L	0.005	0.002	0.002	<0.002	0.002	<0.002
Iron	mg/L	0.3	0.01	0.11	0.07	0.35	0.07
Lead	mg/L	0.005	0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L		0.002	0.016	0.013	0.022	0.009

Certified By:

Iris Veraistegui



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 19T472728

PROJECT: TY131010

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

CLIENT NAME: WOOD CANADA LTD.

ATTENTION TO: Emily Lemieux

SAMPLING SITE:

SAMPLED BY:

Haileybury Surface Water Package

DATE RECEIVED: 2019-05-29

DATE REPORTED: 2019-06-06

		SAMPLE DESCRIPTION:		SW-3	SW-4	SW-5	HB SW DUP
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2019-05-25	2019-05-25	2019-05-25	2019-05-25
Parameter	Unit	G / S	RDL	228742	228751	228752	228753
Molybdenum	mg/L	0.04	0.002	<0.002	<0.002	<0.002	<0.002
Nickel	mg/L	0.025	0.003	<0.003	<0.003	<0.003	<0.003
Phosphorus	mg/L		0.05	<0.05	<0.05	<0.05	<0.05
Selenium	mg/L	0.1	0.004	<0.004	<0.004	<0.004	<0.004
Silicon	mg/L		0.05	1.10	0.89	0.91	0.87
Silver	mg/L	0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Strontium	mg/L		0.005	0.034	0.035	0.014	0.036
Sulfur	mg/L		0.05	1.65	1.78	1.02	1.72
Thallium	mg/L	0.0003	0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Tin	mg/L		0.002	<0.002	<0.002	<0.002	<0.002
Titanium	mg/L		0.002	0.002	<0.002	<0.002	<0.002
Uranium	mg/L	0.005	0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/L	0.006	0.002	<0.002	<0.002	<0.002	<0.002
Zinc	mg/L	0.02	0.005	<0.005	<0.005	<0.005	<0.005

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO (mg/L)

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.

228742-228753 Please note Total Hardness is a Calculated Parameter.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

Iris Veraistegui



Guideline Violation

AGAT WORK ORDER: 19T472728

PROJECT: TY131010

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

CLIENT NAME: WOOD CANADA LTD.

ATTENTION TO: Emily Lemieux

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
228751	SW-4	ON PWQO (mg/L)	Haileybury Surface Water Package	Phenols	mg/L	0.001	0.002
228752	SW-5	ON PWQO (mg/L)	Haileybury Surface Water Package	Iron	mg/L	0.3	0.35
228752	SW-5	ON PWQO (mg/L)	Haileybury Surface Water Package	Phenols	mg/L	0.001	0.002
228752	SW-5	ON PWQO (mg/L)	Haileybury Surface Water Package	pH	pH Units	6.5-8.5	6.39
228753	HB SW DUP	ON PWQO (mg/L)	Haileybury Surface Water Package	Phenols	mg/L	0.001	0.002



Quality Assurance

CLIENT NAME: WOOD CANADA LTD.

PROJECT: TY131010

SAMPLING SITE:

AGAT WORK ORDER: 19T472728

ATTENTION TO: Emily Lemieux

SAMPLED BY:

Water Analysis															
RPT Date: Jun 06, 2019			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Haileybury Surface Water Package

pH	229298		7.68	7.68	0.0%	NA	101%	90%	110%	NA			NA		
Alkalinity (as CaCO3)	229298		137	137	0.0%	< 5	112%	80%	120%	NA			NA		
Electrical Conductivity	229298		767	773	0.8%	< 2	92%	80%	120%	NA			NA		
Total Dissolved Solids	228930		290	288	0.7%	< 20	100%	80%	120%	NA			NA		
Total Suspended Solids	234400		98	103	5.0%	< 10	98%	80%	120%	NA			NA		
Chloride	232617		104	105	1.0%	< 0.10	103%	90%	110%	103%	90%	110%	107%	80%	120%
Sulphate	232617		26.7	26.9	0.7%	< 0.10	100%	90%	110%	105%	90%	110%	98%	80%	120%
Ammonia as N	231400		6.6	6.6	0.0%	< 0.02	101%	90%	110%	95%	90%	110%	98%	80%	120%
Dissolved Organic Carbon	228742	228742	8.1	8.0	1.2%	< 0.5	107%	90%	110%	109%	90%	110%	105%	80%	120%
Chemical Oxygen Demand	228742	228742	12	12	NA	< 5	95%	90%	110%	103%	90%	110%	103%	70%	130%
Phenols	225287		<0.001	<0.001	NA	< 0.001	102%	90%	110%	101%	90%	110%	96%	80%	120%
Turbidity	225287		13.6	15.0	9.8%	< 0.5	99%	90%	110%	NA			NA		
Calcium	231208		0.66	0.60	9.5%	< 0.05	100%	90%	110%	103%	90%	110%	100%	70%	130%
Magnesium	231208		0.77	0.69	11.0%	< 0.05	99%	90%	110%	102%	90%	110%	99%	70%	130%
Sodium	231208		184	170	7.9%	< 0.05	96%	90%	110%	98%	90%	110%	128%	70%	130%
Potassium	231208		0.25	0.21	NA	< 0.05	97%	90%	110%	100%	90%	110%	99%	70%	130%
Aluminum (dissolved)	228742	228742	0.026	0.026	0.0%	< 0.004	98%	90%	110%	101%	90%	110%	89%	70%	130%
Arsenic	228742	228742	<0.003	<0.003	NA	< 0.003	101%	90%	110%	96%	90%	110%	100%	70%	130%
Barium	228742	228742	0.012	0.012	0.0%	< 0.002	104%	90%	110%	103%	90%	110%	102%	70%	130%
Beryllium	228742	228742	<0.001	<0.001	NA	< 0.001	109%	90%	110%	105%	90%	110%	101%	70%	130%
Bismuth	228742	228742	<0.002	<0.002	NA	< 0.002	100%	90%	110%	99%	90%	110%	98%	70%	130%
Boron	228742	228742	<0.010	<0.010	NA	< 0.010	99%	90%	110%	100%	90%	110%	104%	70%	130%
Cadmium	228742	228742	<0.0001	<0.0001	NA	< 0.0001	99%	90%	110%	92%	90%	110%	93%	70%	130%
Chromium	228742	228742	<0.003	<0.003	NA	< 0.003	100%	90%	110%	97%	90%	110%	99%	70%	130%
Cobalt	228742	228742	<0.0005	<0.0005	NA	< 0.0005	96%	90%	110%	94%	90%	110%	95%	70%	130%
Copper	228742	228742	0.002	<0.002	NA	< 0.002	97%	90%	110%	98%	90%	110%	96%	70%	130%
Iron	228742	228742	0.11	0.12	8.7%	< 0.01	100%	90%	110%	96%	90%	110%	98%	70%	130%
Lead	228742	228742	<0.001	<0.001	NA	< 0.001	109%	90%	110%	109%	90%	110%	107%	70%	130%
Manganese	228742	228742	0.016	0.016	0.0%	< 0.002	107%	90%	110%	104%	90%	110%	104%	70%	130%
Molybdenum	228742	228742	<0.002	<0.002	NA	< 0.002	102%	90%	110%	97%	90%	110%	97%	70%	130%
Nickel	228742	228742	<0.003	<0.003	NA	< 0.003	99%	90%	110%	96%	90%	110%	96%	70%	130%
Phosphorus	228742	228742	<0.05	<0.05	NA	< 0.05	101%	90%	110%	99%	90%	110%	98%	70%	130%
Selenium	228742	228742	<0.004	<0.004	NA	< 0.004	99%	90%	110%	96%	90%	110%	95%	70%	130%
Silicon	228742	228742	1.10	1.03	6.6%	< 0.05	106%	90%	110%	94%	90%	110%	93%	70%	130%
Silver	228742	228742	<0.0001	<0.0001	NA	< 0.0001	103%	90%	110%	105%	90%	110%	107%	70%	130%
Strontium	228742	228742	0.034	0.035	2.9%	< 0.005	102%	90%	110%	99%	90%	110%	101%	70%	130%
Sulfur	229026		10.7	11.3	5.5%	< 0.05	94%	90%	110%	98%	80%	130%	107%	70%	130%
Thallium	228742	228742	<0.0003	<0.0003	NA	< 0.0003	106%	90%	110%	106%	90%	110%	87%	70%	130%
Tin	228742	228742	<0.002	<0.002	NA	< 0.002	91%	90%	110%	92%	90%	110%	92%	70%	130%



Quality Assurance

CLIENT NAME: WOOD CANADA LTD.

PROJECT: TY131010

SAMPLING SITE:

AGAT WORK ORDER: 19T472728

ATTENTION TO: Emily Lemieux

SAMPLED BY:

Water Analysis (Continued)

RPT Date: Jun 06, 2019			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
Titanium	228742	228742	0.002	0.003	NA	< 0.002	97%	90%	110%	89%	90%	110%	92%	70%	130%
Uranium	228742	228742	<0.002	<0.002	NA	< 0.002	98%	90%	110%	99%	90%	110%	112%	70%	130%
Vanadium	228742	228742	<0.002	<0.002	NA	< 0.002	97%	90%	110%	91%	90%	110%	94%	70%	130%
Zinc	228742	228742	<0.005	<0.005	NA	< 0.005	100%	90%	110%	102%	90%	110%	107%	70%	130%

Comments: NA signifies Not Applicable.

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

QA Qualifier for metals - Titanium: For a multi-element scan for lab control standards and matrix spikes, up to 10% of analytes may exceed the quoted limits by up to 10% absolute and it is considered acceptable.

Certified By:

Iris Veraestegui

QA Violation

CLIENT NAME: WOOD CANADA LTD.

AGAT WORK ORDER: 19T472728

PROJECT: TY131010

ATTENTION TO: Emily Lemieux

RPT Date: Jun 06, 2019			REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Sample Id	Sample Description	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
				Lower	Upper		Lower	Upper		Lower	Upper
Haileybury Surface Water Package											
Titanium	228742	SW-3	97%	90%	110%	89%	90%	110%	92%	70%	130%

Comments: NA signifies Not Applicable.

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

QA Qualifier for metals - Titanium: For a multi-element scan for lab control standards and matrix spikes, up to 10% of analytes may exceed the quoted limits by up to 10% absolute and it is considered acceptable.

Method Summary

CLIENT NAME: WOOD CANADA LTD.

PROJECT: TY131010

SAMPLING SITE:

AGAT WORK ORDER: 19T472728

ATTENTION TO: Emily Lemieux

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
pH	INOR-93-6000	SM 4500-H+ B	PC TITRATE
Alkalinity (as CaCO ₃)	INOR-93-6000	SM 2320 B	PC TITRATE
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
Total Hardness (as CaCO ₃)	MET-93-6105	EPA SW-846 6010C & 200.7	CALCULATION
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Total Suspended Solids	INOR-93-6028	SM 2540 D	BALANCE
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Ammonia as N	INOR-93-6059	QuikChem 10-107-06-1-J & SM 4500 NH ₃ -F	LACHAT FIA
Dissolved Organic Carbon	INOR-93-6049	EPA 415.1 & SM 5310 B	SHIMADZU CARBON ANALYZER
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Phenols	INOR-93-6050	MOE ROPHEN-E 3179 & SM 5530 D	TECHNICON AUTO ANALYZER
Turbidity	INOR-93-6044	SM 2130 B	NEPHELOMETER
Calcium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Magnesium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Sodium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Potassium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Aluminum (dissolved)	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Arsenic	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Beryllium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Bismuth	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Chromium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Copper	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Iron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Manganese	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Molybdenum	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Nickel	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Phosphorus	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Selenium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Silicon	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Silver	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Strontium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Sulfur	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Thallium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Tin	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Titanium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Uranium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Vanadium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Zinc	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS



Chain of Custody Record

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

Report Information:

Company: Wood
Contact: Emily Lemieux
Address: 131 Fleiding Rd, Lively, ON
P3Y 1L7
Phone: 705 682 2632 Fax: _____
Reports to be sent to: _____
1. Email: Emily.Lemieux@woodplc.com
2. Email: _____

Project Information:

Project: TY131010
Site Location: Haileybury SW
Sampled By: Wood
AGAT Quote #: 17252 PO: TY131010
Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:

Bill To Same: Yes ☒ No ☐

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

Regulatory Requirements:

(Please check all applicable boxes)

☐ Regulation 153/04 ☐ Sewer Use ☐ Regulation 558
Table Indicate One ☐ Sanitary ☐ CCME
☐ Ind/Com ☐ Storm ☒ Prov. Water Quality
☐ Res/Park ☐ Agriculture ☐ Objectives (PWQO)
Soil Texture (Check One) ☐ Coarse ☐ Fine ☐ MISA Indicate One

Is this submission for a Record of Site Condition?

☐ Yes ☐ No

Report Guideline on Certificate of Analysis

☐ Yes ☐ No

Sample Matrix Legend

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

Laboratory Use Only

Work Order #: 19T472728
Cooler Quantity: _____
Arrival Temperatures: 5.0 | 6.5 | 5.9
Custody Seal Intact: ☐ Yes ☐ No ☐ N/A
Notes: _____

Turnaround Time (TAT) Required:

Regular TAT ☒ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ 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

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Y / N	Metals and Inorganics	0. Reg 153	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 Biop PCBs	Sewer Use	AGAT Quote #	
SW-3	25/05/19	2 PM	7	SW		2														X	17252
SW-4	↓	↓	7	SW		2														X	
SW-5	↓	↓	7	SW		2														X	
HB SW DUP	↓	↓	7	SW		2														X	
				</																	

Date: <u>25/05/19</u> Time: <u>5:49 PM</u>	Samples Received By (Print Name and Sign): <u>Jane Raley</u>	Date: <u>29/5/19</u> Time: <u>1:00 PM</u>	
Date: _____ Time: _____	Samples Received By (Print Name and Sign): _____	Date: _____ Time: _____	Page <u>1</u> of <u>1</u>
Date: _____ Time: _____	Samples Received By (Print Name and Sign): _____	Date: _____ Time: _____	Nº: T088429

CLIENT NAME: WOOD CANADA LTD.
131 FIELDING ROAD
LIVELY, ON P3Y1L7
(705) 682-2632

ATTENTION TO: Emily Lemieux

PROJECT: Haliebury GW

AGAT WORK ORDER: 19T498244

WATER ANALYSIS REVIEWED BY: Yris Verastegui, Report Reviewer

DATE REPORTED: Aug 09, 2019

PAGES (INCLUDING COVER): 11

VERSION*: 1

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

*NOTES

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



Certificate of Analysis

AGAT WORK ORDER: 19T498244

PROJECT: Halieybury GW

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

CLIENT NAME: WOOD CANADA LTD.

ATTENTION TO: Emily Lemieux

SAMPLING SITE:

SAMPLED BY:

Haileybury Groundwater Package

DATE RECEIVED: 2019-07-29

DATE REPORTED: 2019-08-09

SAMPLE DESCRIPTION:				TW-4		TW-6		TW-8		TW-9	
SAMPLE TYPE:				Water		Water		Water		Water	
DATE SAMPLED:				2019-07-24		2019-07-24		2019-07-24		2019-07-24	
Parameter	Unit	G / S	RDL	386171	RDL	386172	RDL	386173	RDL	386174	
BOD (5)	mg/L		5	7	5	<5	5	<5	5	11	
pH	pH Units		NA	7.40	NA	6.79	NA	7.52	NA	7.28	
Alkalinity (as CaCO3)	mg/L		5	208	5	183	5	94	5	545	
Electrical Conductivity	uS/cm		2	847	2	1460	2	214	2	1770	
Total Hardness (as CaCO3) (Calculated)	mg/L		0.5	345	0.5	552	0.5	95.4	0.5	549	
Total Dissolved Solids	mg/L		20	476	20	880	20	132	20	846	
Fluoride	mg/L	1.5	0.25	<0.25	0.25	<0.25	0.05	<0.05	0.5	<0.5	
Chloride	mg/L		0.50	18.1	0.50	80.3	0.10	0.88	1.0	107	
Nitrate as N	mg/L	10.0	0.25	8.01	0.25	28.0	0.05	<0.05	0.5	<0.5	
Nitrite as N	mg/L	1.0	0.25	0.68	0.25	<0.25	0.05	<0.05	0.5	<0.5	
Sulphate	mg/L		0.50	129	0.50	346	0.10	3.76	1.0	148	
Phosphate as P	mg/L		0.50	<0.50	0.50	<0.50	0.10	<0.10	1.0	<1.0	
Ammonia as N	mg/L		0.02	1.40	0.02	<0.02	0.02	0.06	0.04	19.5	
Total Kjeldahl Nitrogen	mg/L		0.50	2.08	0.10	<0.10	0.10	0.12	0.50	20.2	
Organic Nitrogen	mg/L		0.10	0.68	0.10	<0.10	0.10	<0.10	0.10	0.70	
Dissolved Organic Carbon	mg/L		0.5	5.0	0.5	10.1	0.5	2.5	1.0	22.1	
Chemical Oxygen Demand	mg/L		5	14	5	22	5	<5	5	70	
Phenols	mg/L		0.001	<0.001	0.001	<0.001	0.001	<0.001	0.001	0.006	
Calcium	mg/L		0.05	102	0.10	147	0.05	22.0	0.10	145	
Magnesium	mg/L		0.05	21.9	0.10	44.8	0.05	9.82	0.10	45.4	
Sodium	mg/L	20	0.05	16.0	0.10	59.2	0.05	2.14	0.10	90.5	
Potassium	mg/L		0.05	13.0	0.10	10.9	0.05	0.49	0.10	29.0	
Aluminum	mg/L		0.004	<0.004	0.004	0.008	0.004	0.004	0.004	0.010	
Arsenic	mg/L	0.025	0.003	<0.003	0.003	<0.003	0.003	<0.003	0.003	0.018	
Barium	mg/L	1	0.002	0.068	0.002	0.094	0.002	0.004	0.002	0.112	
Beryllium	mg/L		0.001	<0.001	0.001	<0.001	0.001	<0.001	0.001	<0.001	
Bismuth	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002	
Boron	mg/L	5	0.010	0.569	0.010	1.39	0.010	0.016	0.010	1.33	
Cadmium	mg/L	0.005	0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002	

Certified By:

Iris Veraestegui



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 19T498244

PROJECT: Halieybury GW

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
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CLIENT NAME: WOOD CANADA LTD.

SAMPLING SITE:

ATTENTION TO: Emily Lemieux

SAMPLED BY:

Haileybury Groundwater Package

DATE RECEIVED: 2019-07-29

DATE REPORTED: 2019-08-09

SAMPLE DESCRIPTION:				TW-4		TW-6		TW-8		TW-9
SAMPLE TYPE:				Water		Water		Water		Water
DATE SAMPLED:				2019-07-24		2019-07-24		2019-07-24		2019-07-24
Parameter	Unit	G / S	RDL	386171	RDL	386172	RDL	386173	RDL	386174
Chromium	mg/L	0.05	0.003	<0.003	0.003	<0.003	0.003	<0.003	0.003	0.006
Cobalt	mg/L		0.001	0.001	0.001	0.002	0.001	<0.001	0.001	0.008
Copper	mg/L		0.003	<0.003	0.003	0.009	0.003	<0.003	0.003	<0.003
Iron	mg/L		0.010	0.254	0.010	<0.010	0.010	0.426	0.010	21.5
Lead	mg/L	0.01	0.001	<0.001	0.001	<0.001	0.001	<0.001	0.001	<0.001
Manganese	mg/L		0.002	0.360	0.002	<0.002	0.002	0.161	0.002	3.24
Mercury	mg/L	0.001	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001
Molybdenum	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002
Nickel	mg/L		0.003	<0.003	0.003	0.006	0.003	<0.003	0.003	0.008
Phosphorus	mg/L		0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	0.05
Selenium	mg/L	0.05	0.004	<0.004	0.004	<0.004	0.004	<0.004	0.004	<0.004
Silicon	mg/L		0.05	6.12	0.05	4.00	0.05	7.28	0.05	11.4
Silver	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002
Strontium	mg/L		0.005	0.348	0.005	0.603	0.005	0.038	0.005	0.459
Sulfur	mg/L		0.05	42.5	0.10	111	0.05	1.26	0.10	47.6
Thallium	mg/L		0.006	<0.006	0.006	<0.006	0.006	<0.006	0.006	<0.006
Tin	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002
Titanium	mg/L		0.002	<0.002	0.002	0.005	0.002	<0.002	0.002	0.002
Uranium	mg/L	0.02	0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002
Vanadium	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	0.003
Zinc	mg/L		0.005	<0.005	0.005	<0.005	0.005	<0.005	0.005	<0.005
% Difference/ Ion Balance (Calculated)	%		NA	0.295	NA	4.31	NA	0.793	NA	0.124

Certified By:

Iris Veraestegui



Certificate of Analysis

AGAT WORK ORDER: 19T498244

PROJECT: Halieybury GW

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<http://www.agatlabs.com>

CLIENT NAME: WOOD CANADA LTD.

ATTENTION TO: Emily Lemieux

SAMPLING SITE:

SAMPLED BY:

Haileybury Groundwater Package

DATE RECEIVED: 2019-07-29

DATE REPORTED: 2019-08-09

		SAMPLE DESCRIPTION:		TW-13		TW-15		TW-16		HB GW DUP1	
		SAMPLE TYPE:		Water		Water		Water		Water	
		DATE SAMPLED:		2019-07-24		2019-07-24		2019-07-24		2019-07-24	
Parameter	Unit	G / S	RDL	386175	RDL	386177	RDL	386178	RDL	386179	
BOD (5)	mg/L		5	13	5	<5	5	<5		<5	
pH	pH Units		NA	7.14	NA	7.56	NA	7.56		7.58	
Alkalinity (as CaCO3)	mg/L		5	1110	5	296	5	65		68	
Electrical Conductivity	uS/cm		2	2890	2	969	2	174		163	
Total Hardness (as CaCO3) (Calculated)	mg/L		0.5	668	0.5	352	0.5	69.6		65.2	
Total Dissolved Solids	mg/L		20	1250	20	568	20	86		82	
Fluoride	mg/L	1.5	1.0	<1.0	0.25	<0.25	0.05	<0.05		<0.05	
Chloride	mg/L		2.0	154	0.50	32.5	0.10	4.28		3.94	
Nitrate as N	mg/L	10.0	1.0	<1.0	0.25	5.96	0.05	0.21		0.18	
Nitrite as N	mg/L	1.0	1.0	<1.0	0.25	<0.25	0.05	<0.05		<0.05	
Sulphate	mg/L		2.0	11.6	0.50	93.5	0.10	5.28		4.89	
Phosphate as P	mg/L		2.0	<2.0	0.50	<0.50	0.10	<0.10		<0.10	
Ammonia as N	mg/L		1.0	75.4	0.02	1.67	0.02	0.03		0.02	
Total Kjeldahl Nitrogen	mg/L		2.5	84.5	0.10	2.64	0.10	0.11		<0.10	
Organic Nitrogen	mg/L		0.10	9.10	0.10	0.97	0.10	<0.10		<0.10	
Dissolved Organic Carbon	mg/L		1.0	54.8	0.5	4.1	0.5	1.6		2.4	
Chemical Oxygen Demand	mg/L		10	166	5	9	5	<5		<5	
Phenols	mg/L		0.001	0.016	0.001	<0.001	0.001	<0.001		<0.001	
Calcium	mg/L		0.25	186	0.05	105	0.05	21.0		19.6	
Magnesium	mg/L		0.25	49.4	0.05	21.8	0.05	4.16		3.96	
Sodium	mg/L	20	0.25	185	0.05	39.5	0.05	3.02		3.03	
Potassium	mg/L		0.25	57.9	0.05	14.1	0.05	0.46		0.45	
Aluminum	mg/L		0.004	0.043	0.004	<0.004	0.004	0.004		0.005	
Arsenic	mg/L	0.025	0.003	0.006	0.003	<0.003	0.003	<0.003		<0.003	
Barium	mg/L	1	0.002	0.316	0.002	0.094	0.002	0.003		0.005	
Beryllium	mg/L		0.001	<0.001	0.001	<0.001	0.001	<0.001		<0.001	
Bismuth	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002		<0.002	
Boron	mg/L	5	0.010	1.90	0.010	1.04	0.010	0.015		0.010	
Cadmium	mg/L	0.005	0.002	<0.002	0.002	<0.002	0.002	<0.002		<0.002	

Certified By:

Jris Veraistegui



Certificate of Analysis

AGAT WORK ORDER: 19T498244

PROJECT: Halieybury GW

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
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<http://www.agatlabs.com>

CLIENT NAME: WOOD CANADA LTD.

SAMPLING SITE:

ATTENTION TO: Emily Lemieux

SAMPLED BY:

Haileybury Groundwater Package

DATE RECEIVED: 2019-07-29

DATE REPORTED: 2019-08-09

		SAMPLE DESCRIPTION:		TW-13		TW-15		TW-16		HB GW DUP1	
		SAMPLE TYPE:		Water		Water		Water		Water	
		DATE SAMPLED:		2019-07-24		2019-07-24		2019-07-24		2019-07-24	
Parameter	Unit	G / S	RDL	386175	RDL	386177	RDL	386178		386179	
Chromium	mg/L	0.05	0.003	0.011	0.003	<0.003	0.003	<0.003		<0.003	
Cobalt	mg/L		0.001	0.010	0.001	0.001	0.001	<0.001		<0.001	
Copper	mg/L		0.003	<0.003	0.003	0.008	0.003	<0.003		<0.003	
Iron	mg/L		0.010	14.1	0.010	<0.010	0.010	<0.010		<0.010	
Lead	mg/L	0.01	0.001	<0.001	0.001	<0.001	0.001	<0.001		<0.001	
Manganese	mg/L		0.002	2.63	0.002	0.601	0.002	<0.002		<0.002	
Mercury	mg/L	0.001	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001		<0.0001	
Molybdenum	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002		<0.002	
Nickel	mg/L		0.003	0.024	0.003	0.006	0.003	<0.003		<0.003	
Phosphorus	mg/L		0.05	0.05	0.05	<0.05	0.05	<0.05		<0.05	
Selenium	mg/L	0.05	0.004	0.005	0.004	<0.004	0.004	<0.004		<0.004	
Silicon	mg/L		0.05	5.95	0.05	7.36	0.05	6.99		6.04	
Silver	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002		<0.002	
Strontium	mg/L		0.005	0.720	0.005	0.208	0.005	0.024		0.034	
Sulfur	mg/L		0.25	5.40	0.05	30.2	0.05	1.76		1.57	
Thallium	mg/L		0.006	<0.006	0.006	<0.006	0.006	<0.006		<0.006	
Tin	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002		<0.002	
Titanium	mg/L		0.002	0.005	0.002	<0.002	0.002	<0.002		<0.002	
Uranium	mg/L	0.02	0.002	0.002	0.002	<0.002	0.002	<0.002		<0.002	
Vanadium	mg/L		0.002	0.010	0.002	<0.002	0.002	<0.002		<0.002	
Zinc	mg/L		0.005	<0.005	0.005	<0.005	0.005	<0.005		<0.005	
% Difference/ Ion Balance (Calculated)	%		NA	2.68	NA	0.140	NA	0.306		4.50	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Ontario Drinking Water Quality Standards. Na value is 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.

386171-386179 Elevated RDLs indicate the degree of sample dilutions prior to the analysis to keep analytes within the calibration range, reduce matrix interference and/or to avoid contaminating the instrument.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

Iris Veraestegui



AGAT Laboratories

Guideline Violation

AGAT WORK ORDER: 19T498244

PROJECT: Haileybury GW

5835 COOPERS AVENUE
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CLIENT NAME: WOOD CANADA LTD.

ATTENTION TO: Emily Lemieux

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
386172	TW-6	O.Reg.169/03(mg/L)	Haileybury Groundwater Package	Nitrate as N	mg/L	10.0	28.0
386172	TW-6	O.Reg.169/03(mg/L)	Haileybury Groundwater Package	Sodium	mg/L	20	59.2
386174	TW-9	O.Reg.169/03(mg/L)	Haileybury Groundwater Package	Sodium	mg/L	20	90.5
386175	TW-13	O.Reg.169/03(mg/L)	Haileybury Groundwater Package	Sodium	mg/L	20	185
386177	TW-15	O.Reg.169/03(mg/L)	Haileybury Groundwater Package	Sodium	mg/L	20	39.5

Quality Assurance

CLIENT NAME: WOOD CANADA LTD.

PROJECT: Haliebury GW

SAMPLING SITE:

AGAT WORK ORDER: 19T498244

ATTENTION TO: Emily Lemieux

SAMPLED BY:

Water Analysis															
RPT Date: Aug 09, 2019			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Haliebury Groundwater Package

BOD (5)	386178	386178	<5	<5	NA	< 5	101%	75%	125%	NA			NA		
pH	386238		7.93	7.94	0.1%	NA	100%	90%	110%	NA			NA		
Alkalinity (as CaCO3)	386238		195	197	1.0%	< 5	98%	80%	120%	NA			NA		
Electrical Conductivity	386238		577	580	0.5%	< 2	103%	80%	120%	NA			NA		
Total Dissolved Solids	386196		1400	1450	3.5%	< 20	94%	80%	120%	NA			NA		
Fluoride	386172	386172	<0.25	<0.25	NA	< 0.05	108%	90%	110%	105%	90%	110%	105%	85%	115%
Chloride	386172	386172	80.3	83.2	3.5%	< 0.10	91%	90%	110%	103%	90%	110%	105%	85%	115%
Nitrate as N	386172	386172	28.0	28.6	2.1%	< 0.05	92%	90%	110%	102%	90%	110%	101%	85%	115%
Nitrite as N	386172	386172	<0.25	<0.25	NA	< 0.05	NA	90%	110%	104%	90%	110%	106%	85%	115%
Sulphate	386172	386172	346	355	2.6%	< 0.10	95%	90%	110%	104%	90%	110%	92%	85%	115%
Phosphate as P	386172	386172	<0.50	<0.50	NA	< 0.10	96%	90%	110%	103%	90%	110%	102%	85%	115%
Ammonia as N	392544		<0.02	<0.02	NA	< 0.02	100%	90%	110%	98%	90%	110%	84%	70%	130%
Total Kjeldahl Nitrogen	386228		5.15	5.05	2.0%	< 0.10	102%	80%	120%	105%	80%	120%	103%	70%	130%
Dissolved Organic Carbon	386228		7.2	7.1	1.4%	< 0.5	98%	90%	110%	92%	90%	110%	91%	80%	120%
Chemical Oxygen Demand	386171	386171	14	16	NA	< 5	106%	90%	110%	105%	90%	110%	84%	70%	130%
Phenols	386171	386171	<0.001	<0.001	NA	< 0.001	96%	90%	110%	101%	90%	110%	107%	80%	120%
Calcium	386179	386179	19.6	19.6	0.0%	< 0.05	97%	90%	110%	97%	90%	110%	96%	70%	130%
Magnesium	386179	386179	3.96	3.96	0.0%	< 0.05	104%	90%	110%	104%	90%	110%	94%	70%	130%
Sodium	386179	386179	3.03	3.05	0.7%	< 0.05	97%	90%	110%	97%	90%	110%	95%	70%	130%
Potassium	386179	386179	0.45	0.47	4.3%	< 0.05	96%	90%	110%	96%	90%	110%	95%	70%	130%
Aluminum	383965		<0.004	<0.004	NA	< 0.004	96%	90%	110%	96%	90%	110%	96%	70%	130%
Arsenic	383965		<0.003	<0.003	NA	< 0.003	99%	90%	110%	102%	90%	110%	110%	70%	130%
Barium	383965		0.113	0.101	11.2%	< 0.002	100%	90%	110%	107%	90%	110%	110%	70%	130%
Beryllium	383965		<0.001	<0.001	NA	< 0.001	103%	90%	110%	104%	90%	110%	110%	70%	130%
Bismuth	383965		<0.002	<0.002	NA	< 0.002	95%	90%	110%	97%	90%	110%	95%	70%	130%
Boron	383965		0.038	0.036	NA	< 0.010	105%	90%	110%	105%	90%	110%	110%	70%	130%
Cadmium	383965		<0.002	<0.002	NA	< 0.002	101%	90%	110%	101%	90%	110%	112%	70%	130%
Chromium	383965		<0.003	0.005	NA	< 0.003	101%	90%	110%	96%	90%	110%	99%	70%	130%
Cobalt	383965		<0.001	<0.001	NA	< 0.001	94%	90%	110%	95%	90%	110%	101%	70%	130%
Copper	383965		<0.003	<0.003	NA	< 0.003	98%	90%	110%	93%	90%	110%	92%	70%	130%
Iron	383965		1.32	1.21	8.7%	< 0.010	93%	90%	110%	105%	90%	110%	115%	70%	130%
Lead	383965		<0.001	<0.001	NA	< 0.001	92%	90%	110%	91%	90%	110%	99%	70%	130%
Manganese	383965		0.176	0.163	7.7%	< 0.002	91%	90%	110%	95%	90%	110%	104%	70%	130%
Mercury	386171	386171	<0.0001	<0.0001	NA	< 0.0001	100%	90%	110%	102%	80%	120%	94%	80%	120%
Molybdenum	383965		<0.002	<0.002	NA	< 0.002	100%	90%	110%	99%	90%	110%	109%	70%	130%
Nickel	383965		<0.003	<0.003	NA	< 0.003	99%	90%	110%	100%	90%	110%	103%	70%	130%
Phosphorus	383965		<0.05	<0.05	NA	< 0.05	105%	90%	110%	106%	90%	110%	114%	70%	130%
Selenium	383965		<0.004	<0.004	NA	< 0.004	97%	90%	110%	101%	90%	110%	113%	70%	130%
Silicon	383965		6.69	6.24	7.0%	< 0.05	96%	90%	110%	100%	90%	110%	102%	70%	130%



Quality Assurance

CLIENT NAME: WOOD CANADA LTD.

PROJECT: Halieybury GW

SAMPLING SITE:

AGAT WORK ORDER: 19T498244

ATTENTION TO: Emily Lemieux

SAMPLED BY:

Water Analysis (Continued)

RPT Date: Aug 09, 2019			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Silver	383965		<0.002	<0.002	NA	< 0.002	100%	90%	110%	104%	90%	110%	98%	70%	130%
Strontium	383965		1.50	1.38	8.3%	< 0.005	92%	90%	110%	92%	90%	110%	102%	70%	130%
Sulfur	386179	386179	1.57	1.56	0.6%	< 0.05	99%	90%	110%	98%	80%	130%	99%	70%	130%
Thallium	383965		<0.006	<0.006	NA	< 0.006	97%	90%	110%	100%	90%	110%	103%	70%	130%
Tin	383965		<0.002	<0.002	NA	< 0.002	101%	90%	110%	99%	90%	110%	109%	70%	130%
Titanium	383965		<0.002	<0.002	NA	< 0.002	97%	90%	110%	99%	90%	110%	98%	70%	130%
Uranium	383965		<0.002	<0.002	NA	< 0.002	92%	90%	110%	90%	90%	110%	94%	70%	130%
Vanadium	383965		<0.002	<0.002	NA	< 0.002	92%	90%	110%	102%	90%	110%	99%	70%	130%
Zinc	383965		0.008	0.006	NA	< 0.005	95%	90%	110%	98%	90%	110%	100%	70%	130%

Comments: NA signifies Not Applicable.

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

Certified By:

Iris Veraestegui

Method Summary

CLIENT NAME: WOOD CANADA LTD.

PROJECT: Halieybury GW

SAMPLING SITE:

AGAT WORK ORDER: 19T498244

ATTENTION TO: Emily Lemieux

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
BOD (5)	INOR-93-6006	SM 5210 B	DO METER
pH	INOR-93-6000	SM 4500-H+ B	PC TITRATE
Alkalinity (as CaCO ₃)	INOR-93-6000	SM 2320 B	PC TITRATE
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
Total Hardness (as CaCO ₃) (Calculated)	MET-93-6105	EPA SW-846 6010C & 200.7	CALCULATION
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Fluoride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrate as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Phosphate as P	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Ammonia as N	INOR-93-6059	SM 4500-NH ₃ H	LACHAT FIA
Total Kjeldahl Nitrogen	INOR-93-6048	QuikChem 10-107-06-2-I & SM 4500-Norg D	LACHAT FIA
Organic Nitrogen		SM 4500-Norg A	CALCULATION
Dissolved Organic Carbon	INOR-93-6049	EPA 415.1 & SM 5310 B	SHIMADZU CARBON ANALYZER
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Phenols	INOR-93-6050	MOE ROPHEN-E 3179 & SM 5530 D	TECHNICON AUTO ANALYZER
Calcium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Magnesium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Sodium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Potassium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Aluminum	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Arsenic	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Beryllium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Bismuth	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Chromium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Copper	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Iron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Manganese	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Mercury	MET-93-6100	EPA SW-846 7470 & 245.1	CVAAS
Molybdenum	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Nickel	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Phosphorus	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Selenium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Silicon	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Silver	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Strontium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Sulfur	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Thallium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Tin	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Titanium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Uranium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS

Method Summary

CLIENT NAME: WOOD CANADA LTD.

AGAT WORK ORDER: 19T498244

PROJECT: Halieybury GW

ATTENTION TO: Emily Lemieux

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Vanadium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Zinc	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
% Difference/ Ion Balance (Calculated)		SM 1030 E	CALCULATION



AGAT Laboratories

5835 Cooper's Avenue
Mississauga, Ontario L4Z 1V2
Ph: 905.712.5100 Fax: 905.712.5122
web@earth.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)

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: _____

Project Information:

Project: Halliburton GW
Site Location: Halliburton Landfill
Sampled By: Dominique Courchesne
AGAT Quote #: 17252 PO: TV131010
Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:

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

Regulatory Requirements:

(Please check all applicable boxes)

☐ Regulation 153/04 ☐ Sewer Use
☐ Table Indicate One ☐ Sanitary
☐ Ind/Com ☐ Res/Storm
☐ Agriculture ☐ Storm
Soil Texture (check one) ☐ Coarse ☐ Fine ☐ MSA
Region: _____ Indicate One
adus

Is this submission for a Record of Site Condition?
☐ Yes ☐ No
Report Guideline on Certificate of Analysis
☐ Yes ☐ No

Sample Matrix Legend

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

Field Filtered - Metals, Hg, CrVI

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Y/N
TW-4	Jul 24, 2004	1:00 PM	8	Water		✓
TW-6			8	Water		✓
TW-8			8	Water		✓
TW-9			8	Water		✓
TW-13			8	Water		✓
TW-15			8	Water		✓
TW-16			8	Water		✓
HB GW DUP1			8	Water		✓

Samples Requisitioned By (Print Name and Sign)	Date	Time	Samples Received By (Print Name and Sign)	Date	Time
<u>Dominique Courchesne</u>	<u>26 July 19</u>	<u>09:30</u>	<u>MANOS TOHN</u>	<u>July 24</u>	<u>9:50</u>
Samples Requisitioned By (Print Name and Sign)	Date	Time	Samples Received By (Print Name and Sign)	Date	Time
<u>Dominique Courchesne</u>	<u>26 July 19</u>	<u>10:30</u>			

Laboratory Use Only
Work Order #: 19T498244

Cooler Quantity: _____
Arrival Temperatures: 0 22.8 23.0 22.9
0 18.7 19.0 18.8
Custody Seal Intact: ☒ Yes ☐ No ☐ N/A
Notes: MELTED ICE

Turnaround Time (TAT) Required:

Regular TAT ☒ 5 to 7 Business Days
Rush TAT (Rush Surcharge Apply)
☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day
OR Date Required (Rush Surcharge 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

Metals and Inorganics	0, Reg 153
<input type="checkbox"/> All Metals <input type="checkbox"/> 153 Metals (excl. Hydrides)	
<input type="checkbox"/> Hydride Metals <input type="checkbox"/> 153 Metals (Incl. Hydrides)	
ORPs: <input type="checkbox"/> B-HWS <input type="checkbox"/> Cl <input type="checkbox"/> CN	
<input type="checkbox"/> Cr+ <input type="checkbox"/> EC <input type="checkbox"/> FOC <input type="checkbox"/> Hg	
<input type="checkbox"/> pH <input type="checkbox"/> SAR	
Full Metals Scan	
Regulation/Custom Metals	
Nutrients: <input type="checkbox"/> TP <input type="checkbox"/> NH ₃ <input type="checkbox"/> TKN	
<input type="checkbox"/> NO ₃ <input type="checkbox"/> NO ₂ <input type="checkbox"/> NO ₃ +NO ₂	
Volatiles: <input type="checkbox"/> VOC <input type="checkbox"/> BTEX <input type="checkbox"/> THM	
PHCs F1 - F4	
ABNs	
PAHs	
PCBs: <input type="checkbox"/> Total <input type="checkbox"/> Aroclors	
Organochlorine Pesticides	
TCLP: <input type="checkbox"/> M&I <input type="checkbox"/> VOCs <input type="checkbox"/> ABNs <input type="checkbox"/> B(a)P <input type="checkbox"/> PCBs	
Sewer Use	
Groundwater parameters	

CLIENT NAME: WOOD CANADA LTD.
131 FIELDING ROAD
LIVELY, ON P3Y1L7
(705) 682-2632

ATTENTION TO: Emily Lemieux

PROJECT: Haileybury GW

AGAT WORK ORDER: 19T522198

WATER ANALYSIS REVIEWED BY: Jacky Zhu, Spectroscopy Technician

DATE REPORTED: Oct 03, 2019

PAGES (INCLUDING COVER): 12

VERSION*: 1

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

*NOTES

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



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 19T522198

PROJECT: Haileybury GW

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

CLIENT NAME: WOOD CANADA LTD.

SAMPLING SITE:

ATTENTION TO: Emily Lemieux

SAMPLED BY: Dominique Courchesne

Haileybury Groundwater Package

DATE RECEIVED: 2019-09-25

DATE REPORTED: 2019-10-03

SAMPLE DESCRIPTION:				TW-4		TW-6		TW-8		TW-9	
SAMPLE TYPE:				Water		Water		Water		Water	
DATE SAMPLED:				2019-09-24		2019-09-24		2019-09-24		2019-09-24	
Parameter	Unit	G / S	RDL	560731	RDL	560762	RDL	560763	RDL	560764	
BOD (5)	mg/L		5	<5	5	<5	5	<5	5	<5	
pH	pH Units		NA	7.54	NA	7.43	NA	7.14	NA	7.49	
Alkalinity (as CaCO3)	mg/L		5	210	5	474	5	92	5	523	
Electrical Conductivity	uS/cm		2	794	2	2800	2	210	2	2140	
Total Hardness (as CaCO3) (Calculated)	mg/L		0.5	312	0.5	1030	0.5	90.5	0.5	728	
Total Dissolved Solids	mg/L		20	432	20	1750	20	114	20	1240	
Fluoride	mg/L	1.5	0.25	<0.25	1.0	<1.0	0.05	<0.05	0.5	<0.5	
Chloride	mg/L		0.50	15.1	2.0	157	0.10	0.68	1.0	127	
Nitrate as N	mg/L	10.0	0.25	6.39	1.0	38.9	0.05	<0.05	0.5	<0.5	
Nitrite as N	mg/L	1.0	0.25	<0.25	1.0	<1.0	0.05	<0.05	0.5	<0.5	
Sulphate	mg/L		0.50	106	2.0	625	0.10	3.61	1.0	364	
Phosphate as P	mg/L		0.50	<0.50	2.0	<2.0	0.10	<0.10	1.0	<1.0	
Ammonia as N	mg/L		0.02	1.27	0.02	0.53	0.02	0.03	0.04	13.3	
Total Kjeldahl Nitrogen	mg/L		0.10	1.93	0.10	2.61	0.10	<0.10	0.50	14.8	
Organic Nitrogen	mg/L		0.10	0.66	0.10	2.08	0.10	<0.10	0.10	1.50	
Dissolved Organic Carbon	mg/L		0.5	3.8	0.5	11.6	0.5	2.3	0.5	8.0	
Chemical Oxygen Demand	mg/L		5	<5	5	63	5	<5	5	61	
Phenols	mg/L		0.001	<0.001	0.001	0.003	0.001	<0.001	0.001	0.005	
Calcium	mg/L		0.05	92.4	0.25	272	0.05	20.8	0.25	184	
Magnesium	mg/L		0.05	19.7	0.25	85.0	0.05	9.36	0.25	65.1	
Sodium	mg/L	20	0.05	15.3	0.25	183	0.05	2.18	0.25	113	
Potassium	mg/L		0.05	12.8	0.25	25.2	0.05	0.71	0.25	35.4	
Aluminum	mg/L		0.004	<0.004	0.004	0.008	0.004	0.005	0.004	0.011	
Arsenic	mg/L	0.025	0.003	<0.003	0.003	<0.003	0.003	<0.003	0.003	0.021	
Barium	mg/L	1	0.002	0.066	0.002	0.252	0.002	0.005	0.002	0.170	
Beryllium	mg/L		0.001	<0.001	0.001	<0.001	0.001	<0.001	0.001	<0.001	
Bismuth	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002	
Boron	mg/L	5	0.010	0.476	0.010	6.01	0.010	0.185	0.010	2.47	
Cadmium	mg/L	0.005	0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002	

Certified By:



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 19T522198

PROJECT: Haileybury GW

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

CLIENT NAME: WOOD CANADA LTD.

SAMPLING SITE:

ATTENTION TO: Emily Lemieux

SAMPLED BY: Dominique Courchesne

Haileybury Groundwater Package

DATE RECEIVED: 2019-09-25

DATE REPORTED: 2019-10-03

SAMPLE DESCRIPTION:				TW-4		TW-6		TW-8		TW-9
SAMPLE TYPE:				Water		Water		Water		Water
DATE SAMPLED:				2019-09-24		2019-09-24		2019-09-24		2019-09-24
Parameter	Unit	G / S	RDL	560731	RDL	560762	RDL	560763	RDL	560764
Chromium	mg/L	0.05	0.003	<0.003	0.003	<0.003	0.003	<0.003	0.003	0.005
Cobalt	mg/L		0.001	0.001	0.001	0.008	0.001	<0.001	0.001	0.014
Copper	mg/L		0.003	<0.003	0.003	0.030	0.003	<0.003	0.003	<0.003
Iron	mg/L		0.010	0.596	0.010	<0.010	0.010	0.551	0.010	31.7
Lead	mg/L	0.01	0.001	<0.001	0.001	<0.001	0.001	<0.001	0.001	<0.001
Manganese	mg/L		0.002	0.363	0.002	0.004	0.002	0.185	0.002	4.50
Mercury	mg/L	0.001	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001
Molybdenum	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002
Nickel	mg/L		0.003	<0.003	0.003	0.014	0.003	<0.003	0.003	0.010
Phosphorus	mg/L		0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	0.05
Selenium	mg/L	0.05	0.004	<0.004	0.004	<0.004	0.004	<0.004	0.004	0.007
Silicon	mg/L		0.05	5.55	0.05	2.89	0.05	6.62	0.05	11.2
Silver	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002
Strontium	mg/L		0.005	0.328	0.005	1.17	0.005	0.033	0.005	0.670
Sulfur	mg/L		0.05	37.8	0.25	215	0.05	1.48	0.25	128
Thallium	mg/L		0.006	<0.006	0.006	<0.006	0.006	<0.006	0.006	<0.006
Tin	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002
Titanium	mg/L		0.002	<0.002	0.002	0.008	0.002	<0.002	0.002	0.006
Uranium	mg/L	0.02	0.002	<0.002	0.002	0.011	0.002	<0.002	0.002	<0.002
Vanadium	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	0.003
Zinc	mg/L		0.005	<0.005	0.005	0.005	0.005	<0.005	0.005	<0.005

Certified By:



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 19T522198

PROJECT: Haileybury GW

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

CLIENT NAME: WOOD CANADA LTD.

SAMPLING SITE:

ATTENTION TO: Emily Lemieux

SAMPLED BY: Dominique Courchesne

Haileybury Groundwater Package

DATE RECEIVED: 2019-09-25

DATE REPORTED: 2019-10-03

SAMPLE DESCRIPTION:				TW-13		TW-15		TW-16		HB GW DUP1	
SAMPLE TYPE:				Water		Water		Water		Water	
DATE SAMPLED:				2019-09-24		2019-09-24		2019-09-24		2019-09-24	
Parameter	Unit	G / S	RDL	560765	RDL	560766	RDL	560767	RDL	560768	
BOD (5)	mg/L		5	21	5	<5	5	<5	5	<5	
pH	pH Units		NA	7.70	NA	7.52	NA	6.73	NA	7.74	
Alkalinity (as CaCO3)	mg/L		5	867	5	400	5	33	5	387	
Electrical Conductivity	uS/cm		2	2300	2	1160	2	82	2	1130	
Total Hardness (as CaCO3) (Calculated)	mg/L		0.5	198	0.5	418	0.5	28.6	0.5	410	
Total Dissolved Solids	mg/L		20	734	20	612	20	50	20	626	
Fluoride	mg/L	1.5	1.0	<1.0	0.25	<0.25	0.05	<0.05	0.25	<0.25	
Chloride	mg/L		2.0	84.4	0.50	37.0	0.10	0.41	0.50	36.1	
Nitrate as N	mg/L	10.0	1.0	<1.0	0.25	4.42	0.05	<0.05	0.25	5.47	
Nitrite as N	mg/L	1.0	1.0	<1.0	0.25	<0.25	0.05	<0.05	0.25	<0.25	
Sulphate	mg/L		2.0	<2.0	0.50	82.0	0.10	3.01	0.50	75.8	
Phosphate as P	mg/L		2.0	<2.0	0.50	<0.50	0.10	<0.10	0.50	<0.50	
Ammonia as N	mg/L		2	123	0.02	1.27	0.02	<0.02	0.02	1.27	
Total Kjeldahl Nitrogen	mg/L		2.5	112	0.10	2.57	0.10	<0.10	0.10	2.25	
Organic Nitrogen	mg/L		0.10	<0.10	0.10	1.30	0.10	<0.10	0.10	0.98	
Dissolved Organic Carbon	mg/L		0.5	18.7	0.5	6.1	0.5	1.2	0.5	5.9	
Chemical Oxygen Demand	mg/L		10	117	5	8	5	<5	5	7	
Phenols	mg/L		0.001	0.012	0.001	0.001	0.001	<0.001	0.001	<0.001	
Calcium	mg/L		0.25	53.2	0.10	122	0.05	7.12	0.10	120	
Magnesium	mg/L		0.25	15.9	0.10	27.5	0.05	2.63	0.10	26.7	
Sodium	mg/L	20	0.25	128	0.10	48.7	0.05	3.65	0.10	45.7	
Potassium	mg/L		0.25	82.8	0.10	17.1	0.05	0.54	0.10	16.1	
Aluminum	mg/L		0.004	0.082	0.004	<0.004	0.004	0.018	0.004	<0.004	
Arsenic	mg/L	0.025	0.003	0.005	0.003	<0.003	0.003	<0.003	0.003	<0.003	
Barium	mg/L	1	0.002	0.183	0.002	0.108	0.002	0.002	0.002	0.110	
Beryllium	mg/L		0.001	<0.001	0.001	<0.001	0.001	<0.001	0.001	<0.001	
Bismuth	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002	
Boron	mg/L	5	0.010	1.58	0.010	1.02	0.010	0.013	0.010	1.12	
Cadmium	mg/L	0.005	0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002	

Certified By:



Certificate of Analysis

AGAT WORK ORDER: 19T522198

PROJECT: Haileybury GW

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

CLIENT NAME: WOOD CANADA LTD.

SAMPLING SITE:

ATTENTION TO: Emily Lemieux

SAMPLED BY: Dominique Courchesne

Haileybury Groundwater Package

DATE RECEIVED: 2019-09-25

DATE REPORTED: 2019-10-03

		SAMPLE DESCRIPTION:		TW-13		TW-15		TW-16		HB GW DUP1	
		SAMPLE TYPE:		Water		Water		Water		Water	
		DATE SAMPLED:		2019-09-24		2019-09-24		2019-09-24		2019-09-24	
Parameter	Unit	G / S	RDL	560765	RDL	560766	RDL	560767	RDL	560768	
Chromium	mg/L	0.05	0.003	0.012	0.003	<0.003	0.003	<0.003	0.003	<0.003	
Cobalt	mg/L		0.001	0.006	0.001	0.002	0.001	<0.001	0.001	0.003	
Copper	mg/L		0.003	<0.003	0.003	0.012	0.003	<0.003	0.003	0.014	
Iron	mg/L		0.010	3.41	0.010	<0.010	0.010	<0.010	0.010	<0.010	
Lead	mg/L	0.01	0.001	<0.001	0.001	<0.001	0.001	<0.001	0.001	<0.001	
Manganese	mg/L		0.002	0.704	0.002	0.760	0.002	<0.002	0.002	0.837	
Mercury	mg/L	0.001	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	
Molybdenum	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002	
Nickel	mg/L		0.003	0.014	0.003	0.006	0.003	<0.003	0.003	0.007	
Phosphorus	mg/L		0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	
Selenium	mg/L	0.05	0.004	0.004	0.004	<0.004	0.004	<0.004	0.004	<0.004	
Silicon	mg/L		0.05	5.05	0.05	7.17	0.05	5.09	0.05	8.15	
Silver	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002	
Strontium	mg/L		0.005	0.201	0.005	0.256	0.005	0.016	0.005	0.275	
Sulfur	mg/L		0.25	2.41	0.10	28.6	0.05	1.20	0.10	26.9	
Thallium	mg/L		0.006	<0.006	0.006	<0.006	0.006	<0.006	0.006	<0.006	
Tin	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002	
Titanium	mg/L		0.002	0.007	0.002	<0.002	0.002	<0.002	0.002	<0.002	
Uranium	mg/L	0.02	0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002	
Vanadium	mg/L		0.002	0.014	0.002	<0.002	0.002	<0.002	0.002	<0.002	
Zinc	mg/L		0.005	<0.005	0.005	<0.005	0.005	<0.005	0.005	<0.005	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Ontario Drinking Water Quality Standards. Na value is 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.

560731-560768 Elevated RDL indicates the degree of sample dilution prior to the analysis in order to keep analytes within the calibration range of the instrument and to reduce matrix interference.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



Guideline Violation

AGAT WORK ORDER: 19T522198

PROJECT: Haileybury GW

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

CLIENT NAME: WOOD CANADA LTD.

ATTENTION TO: Emily Lemieux

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
560762	TW-6	O.Reg.169/03(mg/L)	Haileybury Groundwater Package	Boron	mg/L	5	6.01
560762	TW-6	O.Reg.169/03(mg/L)	Haileybury Groundwater Package	Nitrate as N	mg/L	10.0	38.9
560762	TW-6	O.Reg.169/03(mg/L)	Haileybury Groundwater Package	Sodium	mg/L	20	183
560764	TW-9	O.Reg.169/03(mg/L)	Haileybury Groundwater Package	Sodium	mg/L	20	113
560765	TW-13	O.Reg.169/03(mg/L)	Haileybury Groundwater Package	Sodium	mg/L	20	128
560766	TW-15	O.Reg.169/03(mg/L)	Haileybury Groundwater Package	Sodium	mg/L	20	48.7
560768	HB GW DUP1	O.Reg.169/03(mg/L)	Haileybury Groundwater Package	Sodium	mg/L	20	45.7

Quality Assurance

CLIENT NAME: WOOD CANADA LTD.

PROJECT: Haileybury GW

SAMPLING SITE:

AGAT WORK ORDER: 19T522198

ATTENTION TO: Emily Lemieux

SAMPLED BY: Dominique Courchesne

Water Analysis															
RPT Date: Oct 03, 2019			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Haileybury Groundwater Package															
BOD (5)	560765	560765	21	23	NA	< 5	101%	75%	125%						
pH	561023		7.50	7.48	0.3%	NA	100%	90%	110%						
Alkalinity (as CaCO3)	561023		95	97	2.1%	< 5	99%	80%	120%						
Electrical Conductivity	561023		673	675	0.3%	< 2	104%	80%	120%						
Total Dissolved Solids	559922		294	284	3.5%	< 20	100%	80%	120%						
Fluoride	560731	560731	<0.25	<0.25	NA	< 0.05	108%	90%	110%	104%	90%	110%	105%	85%	115%
Chloride	560731	560731	15.1	15.4	2.0%	< 0.10	99%	90%	110%	105%	90%	110%	106%	85%	115%
Nitrate as N	560731	560731	6.39	6.70	4.7%	< 0.05	99%	90%	110%	103%	90%	110%	104%	85%	115%
Nitrite as N	560731	560731	<0.25	<0.25	NA	< 0.05	NA	90%	110%	102%	90%	110%	109%	85%	115%
Sulphate	560731	560731	106	108	1.9%	< 0.10	92%	90%	110%	97%	90%	110%	106%	85%	115%
Phosphate as P	560731	560731	<0.50	<0.50	NA	< 0.10	98%	90%	110%	103%	90%	110%	103%	85%	115%
Ammonia as N	560762	560762	0.53	0.53	0.0%	< 0.02	102%	90%	110%	99%	90%	110%	90%	70%	130%
Total Kjeldahl Nitrogen	569102		14.2	14.3	0.7%	< 0.10	103%	80%	120%	96%	80%	120%	92%	70%	130%
Dissolved Organic Carbon	560731	560731	3.8	3.8	0.0%	< 0.5	103%	90%	110%	97%	90%	110%	87%	80%	120%
Chemical Oxygen Demand	559922		8	9	NA	< 5	98%	90%	110%	105%	90%	110%	115%	70%	130%
Phenols	571965		<0.001	<0.001	NA	< 0.001	104%	90%	110%	104%	90%	110%	107%	80%	120%
Calcium	562262		59.3	58.7	1.0%	< 0.05	97%	90%	110%	97%	90%	110%	97%	70%	130%
Magnesium	562262		23.3	23.0	1.3%	< 0.05	94%	90%	110%	93%	90%	110%	93%	70%	130%
Sodium	562262		17.9	17.7	1.1%	< 0.05	99%	90%	110%	98%	90%	110%	97%	70%	130%
Potassium	562262		1.90	1.87	1.6%	< 0.05	102%	90%	110%	102%	90%	110%	98%	70%	130%
Aluminum	560780		0.315	0.320	1.6%	< 0.004	96%	90%	110%	98%	90%	110%	101%	70%	130%
Arsenic	560780		<0.003	<0.003	NA	< 0.003	103%	90%	110%	104%	90%	110%	104%	70%	130%
Barium	560780		0.039	0.038	2.6%	< 0.002	99%	90%	110%	100%	90%	110%	90%	70%	130%
Beryllium	560780		<0.001	<0.001	NA	< 0.001	96%	90%	110%	96%	90%	110%	103%	70%	130%
Bismuth	560780		<0.002	<0.002	NA	< 0.002	104%	90%	110%	102%	90%	110%	100%	70%	130%
Boron	560780		<0.010	<0.010	NA	< 0.010	99%	90%	110%	93%	90%	110%	103%	70%	130%
Cadmium	560780		<0.002	<0.002	NA	< 0.002	100%	90%	110%	101%	90%	110%	104%	70%	130%
Chromium	560780		<0.003	<0.003	NA	< 0.003	101%	90%	110%	100%	90%	110%	100%	70%	130%
Cobalt	560780		0.003	0.003	NA	< 0.001	99%	90%	110%	101%	90%	110%	99%	70%	130%
Copper	560780		0.004	0.005	NA	< 0.003	101%	90%	110%	105%	90%	110%	102%	70%	130%
Iron	560780		0.893	0.929	4.0%	< 0.010	106%	90%	110%	106%	90%	110%	124%	70%	130%
Lead	560780		<0.001	<0.001	NA	< 0.001	98%	90%	110%	100%	90%	110%	101%	70%	130%
Manganese	560780		0.318	0.309	2.9%	< 0.002	107%	90%	110%	106%	90%	110%	105%	70%	130%
Mercury	562247		<0.0001	<0.0001	NA	< 0.0001	102%	90%	110%	98%	80%	120%	97%	80%	120%
Molybdenum	560780		<0.002	<0.002	NA	< 0.002	102%	90%	110%	98%	90%	110%	102%	70%	130%
Nickel	560780		0.008	0.008	NA	< 0.003	99%	90%	110%	103%	90%	110%	97%	70%	130%
Phosphorus	560780		<0.05	<0.05	NA	< 0.05	99%	90%	110%	99%	90%	110%	111%	70%	130%
Selenium	560780		<0.004	<0.004	NA	< 0.004	100%	90%	110%	99%	90%	110%	103%	70%	130%
Silicon	560780		2.07	2.24	7.9%	< 0.05	99%	90%	110%	99%	90%	110%	95%	70%	130%

Quality Assurance

CLIENT NAME: WOOD CANADA LTD.

PROJECT: Haileybury GW

SAMPLING SITE:

AGAT WORK ORDER: 19T522198

ATTENTION TO: Emily Lemieux

SAMPLED BY: Dominique Courchesne

Water Analysis (Continued)

RPT Date: Oct 03, 2019			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Silver	560780		<0.002	<0.002	NA	< 0.002	98%	90%	110%	108%	90%	110%	108%	70%	130%
Strontium	560780		0.043	0.045	4.5%	< 0.005	98%	90%	110%	99%	90%	110%	99%	70%	130%
Sulfur	562262		3.46	3.43	0.9%	< 0.05	101%	90%	110%	100%	80%	130%	105%	70%	130%
Thallium	560780		<0.006	<0.006	NA	< 0.006	100%	90%	110%	105%	90%	110%	100%	70%	130%
Tin	560780		<0.002	<0.002	NA	< 0.002	98%	90%	110%	95%	90%	110%	94%	70%	130%
Titanium	560780		0.002	0.003	NA	< 0.002	100%	90%	110%	101%	90%	110%	96%	70%	130%
Uranium	560780		<0.002	<0.002	NA	< 0.002	100%	90%	110%	95%	90%	110%	93%	70%	130%
Vanadium	560780		<0.002	<0.002	NA	< 0.002	94%	90%	110%	99%	90%	110%	94%	70%	130%
Zinc	560780		0.083	0.080	3.7%	< 0.005	102%	90%	110%	104%	90%	110%	106%	70%	130%

Comments: NA signifies Not Applicable.

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

Certified By:





Method Summary

CLIENT NAME: WOOD CANADA LTD.

PROJECT: Haileybury GW

SAMPLING SITE:

AGAT WORK ORDER: 19T522198

ATTENTION TO: Emily Lemieux

SAMPLED BY: Dominique Courchesne

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
BOD (5)	INOR-93-6006	SM 5210 B	DO METER
pH	INOR-93-6000	SM 4500-H+ B	PC TITRATE
Alkalinity (as CaCO ₃)	INOR-93-6000	SM 2320 B	PC TITRATE
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
Total Hardness (as CaCO ₃) (Calculated)	MET-93-6105	EPA SW-846 6010C & 200.7	CALCULATION
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Fluoride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrate as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Phosphate as P	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Ammonia as N	INOR-93-6059	SM 4500-NH ₃ H	LACHAT FIA
Total Kjeldahl Nitrogen	INOR-93-6048	QuikChem 10-107-06-2-I & SM 4500-Norg D	LACHAT FIA
Organic Nitrogen		SM 4500-Norg A	CALCULATION
Dissolved Organic Carbon	INOR-93-6049	EPA 415.1 & SM 5310 B	SHIMADZU CARBON ANALYZER
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Phenols	INOR-93-6050	MOE ROPHEN-E 3179 & SM 5530 D	TECHNICON AUTO ANALYZER
Calcium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Magnesium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Sodium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Potassium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Aluminum	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Arsenic	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Beryllium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Bismuth	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Chromium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Copper	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Iron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Manganese	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Mercury	MET-93-6100	EPA SW-846 7470 & 245.1	CVAAS
Molybdenum	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Nickel	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Phosphorus	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Selenium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Silicon	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Silver	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Strontium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Sulfur	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Thallium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Tin	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Titanium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Uranium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS

Method Summary

CLIENT NAME: WOOD CANADA LTD.

AGAT WORK ORDER: 19T522198

PROJECT: Haileybury GW

ATTENTION TO: Emily Lemieux

SAMPLING SITE:

SAMPLED BY: Dominique Courchesne

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Vanadium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Zinc	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS



Chain of Custody Record

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

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: emily.lemieux@woodplc.com
1. Email: emily.lemieux@woodplc.com
2. Email: _____

Project Information:

Project: Haileybury GW
Site Location: _____
Sampled By: _____
AGAT Quote #: 17252 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: _____

Regulatory Requirements:

(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

Sample Matrix Legend

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

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 ☐ NH₃ ☐ TKN

☐ NO₃ ☐ NO₂ ☐ NO₂+NO₃

Volatiles: ☐ VOC ☐ BTEX ☐ THM

PHCs F1 - F4

ABNs

PAHs

PCBs: ☐ Total ☐ Aroclors

Organochlorine Pesticides

TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs

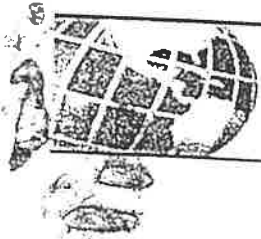
Sewer Use

Groundwater parameters

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Y / N	Field Filtered - Metals, Hg, CrVI	Metals and Inorganics	ORPs	Cr ⁶⁺	pH	SAR	Full Metals Scan	Regulation/Custom Metals	Nutrients	Volatiles	PHCs F1 - F4	ABNs	PAHs	PCBs	Organochlorine Pesticides	TCLP	Sewer Use	Groundwater parameters
TW-4	24/09/19	1400	8	Water		Y																		
TW-6			8	Water		Y																		
TW-8			8	Water		Y																		
TW-9			8	Water		Y																		
TW-13			8	Water		Y																		
TW-15			8	Water		Y																		
TW-16			8	Water		Y																		
HB GW DUP1			8	Water		Y																		

Samples Relinquished By (Print Name and Sign): <u>Dominique Courchesne</u>	Date: <u>24/09/19</u>	Time: <u>1800</u>	Samples Received By (Print Name and Sign): <u>Sina</u>	Date: <u>19/9/25</u>	Time: <u>945</u>
Samples Relinquished By (Print Name and Sign): <u>D Courchesne</u>	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 1 of 1



AGAT

Laboratories

Sample Temperature Log

Client: WOOD

of Coolers: 5
Arrival Temperatures - Branch/Driver

Cooler #1: 76 / 7 / 68

Cooler #2: 73 / 74 / 76

Cooler #3: 8 / 79 / 77

Cooler #4: 66 / 64 / 57

Cooler #5: 73 / 71 / 69

Cooler #6: _____ / _____ / _____

Cooler #7: _____ / _____ / _____

Cooler #8: _____ / _____ / _____

Cooler #9: _____ / _____ / _____

Cooler #10: _____ / _____ / _____

IR Gun ID: _____

Taken By: Simon

Date (yyyy/mm/dd): 19/9/25 Time: 9:40 AM / PM

COC# or Work Order #: 19TS22198

of Submissions: 3
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 _____

CLIENT NAME: WOOD CANADA LTD.
131 FIELDING ROAD
LIVELY, ON P3Y1L7
(705) 682-2632

ATTENTION TO: Emily Lemieux

PROJECT: Haileybury SW

AGAT WORK ORDER: 19T522183

WATER ANALYSIS REVIEWED BY: Nivine Basily, Inorganics Report Writer

DATE REPORTED: Oct 04, 2019

PAGES (INCLUDING COVER): 9

VERSION*: 1

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

*NOTES

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



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 19T522183

PROJECT: Haileybury SW

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

CLIENT NAME: WOOD CANADA LTD.

SAMPLING SITE:

ATTENTION TO: Emily Lemieux

SAMPLED BY:

Haileybury Surface Water Package

DATE RECEIVED: 2019-09-25

DATE REPORTED: 2019-10-04

Parameter	Unit	SAMPLE DESCRIPTION:		SW-3		SW-4		SW-5		BH SW DUP	
		SAMPLE TYPE:		Water		Water		Water		Water	
		DATE SAMPLED:		2019-09-24		2019-09-24		2019-09-24		2019-09-24	
		G / S	RDL	559922	559923	RDL	559924	RDL	559925		
pH	pH Units	6.5-8.5	NA	7.60	7.58	NA	7.02	NA	7.62		
Alkalinity (as CaCO ₃)	mg/L		5	85	89	5	39	5	84		
Electrical Conductivity	uS/cm		2	571	589	2	131	2	570		
Total Hardness (as CaCO ₃) (Calculated)	mg/L		0.5	102	105	0.5	37.8	0.5	102		
Total Dissolved Solids	mg/L		20	294	286	20	94	20	268		
Total Suspended Solids	mg/L		10	<10	<10	10	61	10	<10		
Chloride	mg/L		0.50	97.3	124	0.10	9.62	0.50	128		
Sulphate	mg/L		0.10	4.60	5.62	0.10	2.48	0.10	4.43		
Ammonia as N	mg/L		0.02	<0.02	<0.02	0.02	0.42	0.02	<0.02		
Dissolved Organic Carbon	mg/L		0.5	5.8	5.2	0.5	14.0	0.5	5.8		
Chemical Oxygen Demand	mg/L		5	8	<5	5	39	5	8		
Phenols	mg/L	0.001	0.001	0.001	0.001	0.001	0.012	0.001	<0.001		
Turbidity	NTU		0.5	0.8	1.0	0.5	110	0.5	0.9		
Calcium	mg/L		0.05	28.4	29.4	0.05	11.0	0.05	28.4		
Magnesium	mg/L		0.05	7.62	7.73	0.05	2.51	0.05	7.63		
Sodium	mg/L		0.05	57.6	59.8	0.05	4.72	0.05	57.4		
Potassium	mg/L		0.05	0.64	0.49	0.05	3.34	0.05	0.64		
Aluminum (dissolved)	mg/L	0.075	0.004	<0.004	0.004	0.004	0.021	0.004	0.004		
Arsenic	mg/L	0.1	0.003	<0.003	<0.003	0.003	0.239	0.003	<0.003		
Barium	mg/L		0.002	0.016	0.016	0.002	0.029	0.002	0.015		
Beryllium	mg/L	*	0.001	<0.001	<0.001	0.001	<0.001	0.001	<0.001		
Bismuth	mg/L		0.002	<0.002	<0.002	0.002	<0.002	0.002	<0.002		
Boron	mg/L	0.20	0.010	<0.010	<0.010	0.010	0.012	0.010	<0.010		
Cadmium	mg/L	0.0002	0.0001	<0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001		
Chromium	mg/L		0.003	<0.003	<0.003	0.003	0.004	0.003	<0.003		
Cobalt	mg/L	0.0009	0.0005	<0.0005	<0.0005	0.0005	0.0233	0.0005	<0.0005		
Copper	mg/L	0.005	0.002	<0.002	<0.002	0.002	0.021	0.002	<0.002		
Iron	mg/L	0.3	0.01	0.10	0.01	0.01	3.17	0.01	0.10		
Lead	mg/L	**	0.001	<0.001	<0.001	0.001	0.016	0.001	<0.001		

Certified By:

Divine Basily



Certificate of Analysis

AGAT WORK ORDER: 19T522183

PROJECT: Haileybury SW

5835 COOPERS AVENUE
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<http://www.agatlabs.com>

CLIENT NAME: WOOD CANADA LTD.

SAMPLING SITE:

ATTENTION TO: Emily Lemieux

SAMPLED BY:

Haileybury Surface Water Package

DATE RECEIVED: 2019-09-25

DATE REPORTED: 2019-10-04

		SAMPLE DESCRIPTION:		SW-3	SW-4	SW-5		BH SW DUP	
		SAMPLE TYPE:		Water	Water	Water		Water	
		DATE SAMPLED:		2019-09-24	2019-09-24	2019-09-24		2019-09-24	
Parameter	Unit	G / S	RDL	559922	559923	RDL	559924	RDL	559925
Manganese	mg/L		0.002	0.012	0.007	0.002	0.175	0.002	0.014
Molybdenum	mg/L	0.04	0.002	<0.002	<0.002	0.002	<0.002	0.002	<0.002
Nickel	mg/L	0.025	0.003	<0.003	<0.003	0.003	0.041	0.003	<0.003
Phosphorus	mg/L		0.05	<0.05	<0.05	0.05	0.06	0.05	<0.05
Selenium	mg/L	0.1	0.004	<0.004	<0.004	0.004	<0.004	0.004	<0.004
Silicon	mg/L		0.05	2.10	1.65	0.05	3.10	0.05	2.09
Silver	mg/L	0.0001	0.0001	<0.0001	<0.0001	0.0001	0.0002	0.0001	<0.0001
Strontium	mg/L		0.005	0.069	0.064	0.005	0.042	0.005	0.065
Sulfur	mg/L		0.05	1.71	2.02	0.05	1.21	0.05	1.70
Thallium	mg/L	0.0003	0.0003	<0.0003	<0.0003	0.0003	<0.0003	0.0003	<0.0003
Tin	mg/L		0.002	<0.002	<0.002	0.002	<0.002	0.002	<0.002
Titanium	mg/L		0.002	<0.002	<0.002	0.002	0.040	0.002	<0.002
Uranium	mg/L	0.005	0.002	<0.002	<0.002	0.002	<0.002	0.002	<0.002
Vanadium	mg/L	0.006	0.002	<0.002	<0.002	0.002	0.003	0.002	<0.002
Zinc	mg/L	0.03	0.005	<0.005	<0.005	0.005	0.036	0.005	<0.005

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO (mg/L) * Dependent on Hardness as CaCO₃ **Dependent on alkalinity as CaCO₃
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.

559922-559923 Elevated RDL indicates the degree of sample dilution prior to the analysis in order to keep analytes within the calibration range of the instrument and to reduce matrix interference.

559925 Elevated RDL indicates the degree of sample dilution prior to the analysis in order to keep analytes within the calibration range of the instrument and to reduce matrix interference.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

Divine Basily



Guideline Violation

AGAT WORK ORDER: 19T522183

PROJECT: Haileybury SW

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
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CLIENT NAME: WOOD CANADA LTD.

ATTENTION TO: Emily Lemieux

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
559924	SW-5	ON PWQO 2015 (mg/L)	Haileybury Surface Water Package	Arsenic	mg/L	0.1	0.239
559924	SW-5	ON PWQO 2015 (mg/L)	Haileybury Surface Water Package	Cobalt	mg/L	0.0009	0.0233
559924	SW-5	ON PWQO 2015 (mg/L)	Haileybury Surface Water Package	Copper	mg/L	0.005	0.021
559924	SW-5	ON PWQO 2015 (mg/L)	Haileybury Surface Water Package	Iron	mg/L	0.3	3.17
559924	SW-5	ON PWQO 2015 (mg/L)	Haileybury Surface Water Package	Nickel	mg/L	0.025	0.041
559924	SW-5	ON PWQO 2015 (mg/L)	Haileybury Surface Water Package	Phenols	mg/L	0.001	0.012
559924	SW-5	ON PWQO 2015 (mg/L)	Haileybury Surface Water Package	Silver	mg/L	0.0001	0.0002
559924	SW-5	ON PWQO 2015 (mg/L)	Haileybury Surface Water Package	Zinc	mg/L	0.03	0.036



Quality Assurance

CLIENT NAME: WOOD CANADA LTD.

PROJECT: Haileybury SW

SAMPLING SITE:

AGAT WORK ORDER: 19T522183

ATTENTION TO: Emily Lemieux

SAMPLED BY:

Water Analysis															
RPT Date: Oct 04, 2019			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Haileybury Surface Water Package

pH	556582		8.09	7.96	1.6%	NA	99%	90%	110%						
Alkalinity (as CaCO3)	556582		254	238	6.5%	< 5	97%	80%	120%						
Electrical Conductivity	556582		682	683	0.1%	< 2	106%	80%	120%						
Total Dissolved Solids	559922	559922	294	284	3.5%	< 20	100%	80%	120%						
Total Suspended Solids	559925	559925	<10	<10	NA	< 10	100%	80%	120%						
Chloride	560786		54.6	54.9	0.5%	< 0.10	106%	90%	110%	106%	90%	110%	96%	85%	115%
Sulphate	560786		8.41	7.59	10.3%	< 0.10	91%	90%	110%	106%	90%	110%	108%	85%	115%
Ammonia as N	562262		0.04	0.04	NA	< 0.02	100%	90%	110%	99%	90%	110%	83%	70%	130%
Dissolved Organic Carbon	559448		40.4	41.1	1.7%	< 0.5	102%	90%	110%	105%	90%	110%	96%	80%	120%
Chemical Oxygen Demand	559922	559922	8	9	NA	< 5	98%	90%	110%	105%	90%	110%	115%	70%	130%
Phenols	571965		<0.001	<0.001	NA	< 0.001	104%	90%	110%	104%	90%	110%	107%	80%	120%
Turbidity	560780		2.9	2.9	0.0%	< 0.5	101%	90%	110%						
Calcium	559922	559922	28.4	28.4	0.0%	< 0.05	97%	90%	110%	98%	90%	110%	96%	70%	130%
Magnesium	559922	559922	7.62	7.65	0.4%	< 0.05	95%	90%	110%	96%	90%	110%	94%	70%	130%
Sodium	559922	559922	57.6	57.5	0.2%	< 0.05	98%	90%	110%	97%	90%	110%	97%	70%	130%
Potassium	559922	559922	0.64	0.63	1.6%	< 0.05	102%	90%	110%	103%	90%	110%	98%	70%	130%
Aluminum (dissolved)	567248		0.220	0.222	0.9%	< 0.004	104%	90%	110%	102%	90%	110%	82%	70%	130%
Arsenic	559922	559922	<0.003	<0.003	NA	< 0.003	92%	90%	110%	97%	90%	110%	90%	70%	130%
Barium	559922	559922	0.016	0.016	0.0%	< 0.002	96%	90%	110%	97%	90%	110%	93%	70%	130%
Beryllium	559922	559922	<0.001	<0.001	NA	< 0.001	106%	90%	110%	108%	90%	110%	113%	70%	130%
Bismuth	559922	559922	<0.002	<0.002	NA	< 0.002	106%	90%	110%	108%	90%	110%	99%	70%	130%
Boron	559922	559922	<0.010	<0.010	NA	< 0.010	102%	90%	110%	100%	90%	110%	94%	70%	130%
Cadmium	559922	559922	<0.0001	<0.0001	NA	< 0.0001	98%	90%	110%	98%	90%	110%	99%	70%	130%
Chromium	559922	559922	<0.003	<0.003	NA	< 0.003	96%	90%	110%	103%	90%	110%	94%	70%	130%
Cobalt	559922	559922	<0.0005	<0.0005	NA	< 0.0005	96%	90%	110%	101%	90%	110%	93%	70%	130%
Copper	559922	559922	<0.002	<0.002	NA	< 0.002	94%	90%	110%	102%	90%	110%	93%	70%	130%
Iron	559922	559922	0.10	0.11	9.5%	< 0.01	99%	90%	110%	110%	90%	110%	79%	70%	130%
Lead	559922	559922	<0.001	<0.001	NA	< 0.001	101%	90%	110%	105%	90%	110%	98%	70%	130%
Manganese	559922	559922	0.012	0.012	0.0%	< 0.002	92%	90%	110%	103%	90%	110%	92%	70%	130%
Molybdenum	559922	559922	<0.002	<0.002	NA	< 0.002	99%	90%	110%	101%	90%	110%	100%	70%	130%
Nickel	559922	559922	<0.003	<0.003	NA	< 0.003	101%	90%	110%	108%	90%	110%	100%	70%	130%
Phosphorus	559922	559922	<0.05	<0.05	NA	< 0.05	94%	90%	110%	99%	90%	110%	97%	70%	130%
Selenium	559922	559922	<0.004	<0.004	NA	< 0.004	92%	90%	110%	97%	90%	110%	91%	70%	130%
Silicon	559922	559922	2.10	2.10	0.0%	< 0.05	91%	90%	110%	98%	90%	110%	88%	70%	130%
Silver	559922	559922	<0.0001	<0.0001	NA	< 0.0001	102%	90%	110%	100%	90%	110%	99%	70%	130%
Strontium	559922	559922	0.069	0.069	0.0%	< 0.005	91%	90%	110%	99%	90%	110%	92%	70%	130%
Sulfur	559922	559922	1.71	1.72	0.6%	< 0.05	100%	90%	110%	101%	80%	130%	107%	70%	130%
Thallium	559922	559922	<0.0003	<0.0003	NA	< 0.0003	106%	90%	110%	108%	90%	110%	102%	70%	130%
Tin	559922	559922	<0.002	<0.002	NA	< 0.002	96%	90%	110%	94%	90%	110%	92%	70%	130%



Quality Assurance

CLIENT NAME: WOOD CANADA LTD.

PROJECT: Haileybury SW

SAMPLING SITE:

AGAT WORK ORDER: 19T522183

ATTENTION TO: Emily Lemieux

SAMPLED BY:

Water Analysis (Continued)

RPT Date: Oct 04, 2019			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
Titanium	559922	559922	<0.002	<0.002	NA	< 0.002	94%	90%	110%	99%	90%	110%	94%	70%	130%
Uranium	559922	559922	<0.002	<0.002	NA	< 0.002	105%	90%	110%	101%	90%	110%	100%	70%	130%
Vanadium	559922	559922	<0.002	<0.002	NA	< 0.002	90%	90%	110%	98%	90%	110%	93%	70%	130%
Zinc	559922	559922	<0.005	<0.005	NA	< 0.005	101%	90%	110%	107%	90%	110%	96%	70%	130%

Comments: NA signifies Not Applicable.

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

Certified By: _____

Divine Basily

Method Summary

CLIENT NAME: WOOD CANADA LTD.

PROJECT: Haileybury SW

SAMPLING SITE:

AGAT WORK ORDER: 19T522183

ATTENTION TO: Emily Lemieux

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
pH	INOR-93-6000	SM 4500-H+ B	PC TITRATE
Alkalinity (as CaCO ₃)	INOR-93-6000	SM 2320 B	PC TITRATE
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
Total Hardness (as CaCO ₃) (Calculated)	MET-93-6105	EPA SW-846 6010C & 200.7	CALCULATION
Total Dissolved Solids	INOR-93-6028	SM 2540 C	BALANCE
Total Suspended Solids	INOR-93-6028	SM 2540 D	BALANCE
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Ammonia as N	INOR-93-6059	SM 4500-NH ₃ H	LACHAT FIA
Dissolved Organic Carbon	INOR-93-6049	EPA 415.1 & SM 5310 B	SHIMADZU CARBON ANALYZER
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Phenols	INOR-93-6050	MOE ROPHEN-E 3179 & SM 5530 D	TECHNICON AUTO ANALYZER
Turbidity	INOR-93-6044	SM 2130 B	NEPHELOMETER
Calcium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Magnesium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Sodium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Potassium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Aluminum (dissolved)	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Arsenic	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Beryllium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Bismuth	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Chromium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Copper	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Iron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Manganese	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Molybdenum	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Nickel	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Phosphorus	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Selenium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Silicon	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Silver	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Strontium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Sulfur	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Thallium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Tin	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Titanium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Uranium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Vanadium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Zinc	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS



AGAT

Laboratories

Sample Temperature Log

Client: WOOD

COC# or Work Order #: _____

of Coolers: 5

of Submissions: 3

Arrival Temperatures - Branch/Driver

Cooler #1: 76 / 7 / 68

Cooler #2: 73 / 74 / 76

Cooler #3: 8 / 79 / 77

Cooler #4: 66 / 64 / 57

Cooler #5: 73 / 71 / 69

Cooler #6: _____ / _____ / _____

Cooler #7: _____ / _____ / _____

Cooler #8: _____ / _____ / _____

Cooler #9: _____ / _____ / _____

Cooler #10: _____ / _____ / _____

IR Gun ID: _____

Taken By: Simon

Date (yyyy/mm/dd): 19/9/25 Time: 9:40 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 _____

APPENDIX E

**SUMMARY OF GROUNDWATER
GEOCHEMICAL ANALYSES**

Groundwater Geochemical Results
TW-4



Parameters	Units	ODWS ⁽¹⁾	2010			2011			2012			2013			2014			2015			2016			2017			2018			2019		
General Chemistry			May	Aug	Nov	May	Aug	Nov	May	Aug	Nov	May	July	Sep	June	July	Sep	May	July	Sep	May	July	Sep	May	July	Sep	May	July	Oct	May	July	Sep
Alkalinity	mg/L	30-500 OG ⁽²⁾	302	355	326	229	238	209	260	320	340	475	488	450	528	568	535	428	483	516	582	537	482	340	363	434	193	264	275	237	208	210
Dissolved Organic Carbon	mg/L	5 AO ⁽³⁾	7.7	8.3	5.1	3.6	3	2.9	5.1	9.9	6.9	9.0	10.1	14.2	17.5	14.3	9.8	9.3	13.8	6.9	8.3	10.6	7.7	7.6	7.4	9.5	4.4	6.0	6.9	5.2	5.0	3.8
Chloride	mg/L	250 AO	120	100	30	39	30	32	66	91	45	78.5	69.2	41.4	86.0	81.7	39.5	61.6	102.0	<0.50	40.0	30.9	23.5	40.2	21.9	32	14.3	15.4	14.9	22.7	18.1	15.1
Sulphate	mg/L	500 OG	360	320	290	270	220	220	260	330	260	251	307	270	220	195	151	212	254	195	123	144	173	233	188	169	110	122	121	146	129	106
Fluoride	mg/L	1.5 MAC ⁽⁴⁾	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.25	<0.5	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	
Hardness	mg/L	80-100 OG	759	738	539	489	420	410	610	680	570	702	766	619	738	712	519	629	825	706	577	563	565	509	451	486	285	347	398	395	345	312
Nitrate	mg/L	10 MAC	<0.1	<0.1	<0.1	0.3	1	0.3	8.1	8.3	4.7	10.1	12.0	7.07	15.1	12.9	7.54	11.0	10.0	5.23	3.0	3.0	2.29	10.8	2.09	4.77	1.67	2.76	2.83	13.1	8.01	6.39
Nitrite	mg/L	1 MAC	0.02	<0.01	0.02	0.02	0.09	0.02	0.83	1.4	0.41	<0.5	0.95	0.49	<0.5	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	<0.10	<0.25	<0.25	0.68	<0.25
Organic Nitrogen	mg/L	0.15 OG	0.58	0.83	0.59	0.45	0.64	0.58	0.305	0.805	1.34	1.03	1.17	0.67	2.09	1.36	1.31	1.41	1.59	1.78	1.78	0.82	1.74	0.93	0.83	<0.10	0.52	0.45	0.45	0.84	0.68	0.66
Orthophosphate	mg/L		<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<1.0	<1.0	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.20	<0.20	<0.50	<0.50	<0.50	<0.50
Phenols	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.012	<0.001	<0.001	<0.001	
Ammonia	mg/L		0.12	0.17	0.11	0.05	0.06	<0.05	<0.05	<0.05	0.16	<0.02	<0.02	<0.02	0.14	0.15	0.13	0.58	0.99	0.61	4.96	4.90	3.46	7.7	6.8	7.2	2.53	2.87	2.88	1.18	1.4	1.27
BOD	mg/L		<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5	<5	<5	<5	<5	6	<5	<5	<5	<5	7	16	<5	<5	9	<5	7	<5	
Chemical Oxygen Demand (COD)	mg/L		29	36	22	19	20	20	16	33	25	47	27	31	53	47	28	26	35	36	26	19	21	17	27	22	<5	12	14	12	14	<5
Total Dissolved Solids	mg/L	500 AO	974	934	738	642	600	582	824	1130	850	944	1140	920	1190	1000	868	858	1050	994	734	776	768	732	656	714	426	484	518	486	476	432
Total Kjeldahl Nitrogen (TKN)	mg/L		0.7	1	0.7	0.5	0.7	0.6	0.33	0.83	1.5	1.03	1.17	0.67	2.23	1.51	1.44	1.99	2.58	2.39	6.74	5.72	5.2	8.63	7.63	7.21	3.05	3.32	3.33	2.02	2.08	1.93
pH	pH Units	6.5-8.5 OG										7.52	7.27	7.89	7.26	7.74	7.39	7.74	7.85	7.90	7.77	7.70	7.35	7.55	8.06	7.92	6.95	7.52	7.69	7.60	7.40	7.54
Electrical Conductivity	uS/cm											1580	1630	1380	1670	1690	1460	1380	1630	1560	1300	1350	1300	1190	1070	1200	657	777	861	861	847	794
% Difference/ Ion Balance	%											2.2	1.2	3.5	0.5	1.7	2.3	1.9	1.9		2.92		0.913	5.3	3.64	4.49					0.295	
Elements																																
Aluminum	mg/L	0.1 OG	0.007	0.006	0.006	<0.005	0.0053	<0.005	<0.005	<0.005	<0.005	0.01	0.011	<0.004	<0.004	0.004	<0.004	0.010	0.006	<0.004	0.012	0.012	<0.004	<0.004	<0.004	0.005	<0.004	<0.004	0.016	0.008	<0.004	<0.004
Arsenic	mg/L	0.01 MAC	0.01	0.01	0.01	0.01	0.0056	0.008	0.0021	0.0016	0.0037	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Barium	mg/L	1 MAC	0.14	0.14	0.099	0.073	0.067	0.059	0.087	0.12	0.1	0.128	0.138	0.109	0.129	0.131	0.122	0.119	0.133	0.138	0.121	0.124	0.104	0.129	0.1	0.127	0.065	0.056	0.082	0.085	0.068	0.066
Beryllium	mg/L											<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bismuth	mg/L											<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Boron	mg/L	5 IMAC	1.3	1.2	1.1	0.71	0.78	0.64	0.82	1.0	1.0	1.16	1.07	1.10	1.26	1.35	1.23	1.05	1.00	1.22	0.948	0.88	0.658	0.741	0.862	0.922	0.675	0.597	0.572	0.475	0.569	0.476
Cadmium	mg/L	0.005 MAC	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Calcium	mg/L		190	190	130	120	110	100	160	180	150	188	204	165	194	187	137	172	225	194	155	153	157	144	127	131	79.3	96.9	110	117	102	92.4
Chromium	mg/L	0.05 MAC	<0.005	<0.005	<0.005																											

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) Interim Maximum Acceptable Concentration (IMAC) within ODWS.
- (6) ODWS exceedances indicated by **bold** entries.

Groundwater Geochemical Results
TW-10



Parameters	Units	ODWS ⁽¹⁾	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
General Chemistry			May	May	May	May	June	May	May	May	May	May
Alkalinity	mg/L	30-500 OG ⁽²⁾	31	38	46	40	30	30	32	37	30	24
Dissolved Organic Carbon	mg/L	5 AO ⁽³⁾	2.6	3.1	4.4	3.1	2.9	2.2	2.1	2.8	3.1	2.4
Chloride	mg/L	250 AO	46	46	20	11.7	6.62	8.82	8.14	7.1	11.2	6.21
Sulphate	mg/L	500 OG	5	6	5	6.21	3.98	3.25	4.2	4.2	3.85	2.99
Fluoride	mg/L	1.5 MAC ⁽⁴⁾	<0.1	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Hardness	mg/L	80-100 OG	62.2	62.6	41	36	27	34.7	30.5	30.1	38.8	25.2
Nitrate	mg/L	10 MAC	<0.1	<0.1	0.6	1.49	1.25	0.93	1.73	0.87	1.22	1.18
Nitrite	mg/L	1 MAC	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Organic Nitrogen	mg/L	0.15 OG	0.275	0.175	0.215	0.12	0.55	<0.10	0.47	0.15	0.20	<0.10
Orthophosphate	mg/L		<0.01	<0.01	<0.01	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Phenols	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ammonia	mg/L		<0.05	<0.05	<0.05	<0.02	0.05	<0.02	<0.02	<0.02	<0.02	<0.02
BOD	mg/L		2	<2	<2	<5	<5	<5	<5	<5	<5	<5
Chemical Oxygen Demand (COD)	mg/L		5	9	9.7	28	8	<5	5	<5	<5	<5
Total Dissolved Solids	mg/L	500 AO	158	156	78	82	60	64	62	56	108	38
Total Kjeldahl Nitrogen (TKN)	mg/L		0.3	0.2	0.24	0.12	0.6	<0.10	0.47	0.15	0.20	<0.10
pH	pH Units	6.5-8.5 OG				6.55	6.70	6.88	6.80	6.75	6.41	6.54
Electrical Conductivity	uS/cm					148	106	105	99	107	126	87
% Difference/ Ion Balance	%					0.4	0.4	1.7	8.03	7.63		
Elements												
Aluminum	mg/L	0.1 OG	0.021	0.051	0.034	0.028	0.028	0.022	0.032	0.022	0.019	0.017
Arsenic	mg/L	0.01 MAC	<0.001	<0.001	<0.001	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Barium	mg/L	1 MAC	0.009	0.01	0.0056	0.005	0.004	0.004	0.005	0.005	0.005	0.005
Beryllium	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bismuth	mg/L					<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Boron	mg/L	5 IMAC	<0.01	<0.01	<0.01	<0.010	0.015	<0.010	0.025	0.031	0.067	0.010
Cadmium	mg/L	0.005 MAC	<0.0001	0.0001	<0.0001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Calcium	mg/L		16	16	11	9.18	7.15	9	7.91	7.64	10.1	6.73
Chromium	mg/L	0.05 MAC	<0.005	<0.005	<0.005	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Cobalt	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	mg/L	1 AO	0.002	0.002	0.0026	<0.003	0.004	<0.003	<0.003	<0.003	<0.003	<0.003
Iron	mg/L	0.3 AO	<0.1	<0.1	<0.1	0.013	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Lead	mg/L	0.01 MAC	<0.0005	<0.0005	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001
Magnesium	mg/L		5.4	5.5	3.5	3.06	2.18	2.97	2.62	2.68	3.29	2.05
Manganese	mg/L	0.05 AO	0.038	0.11	0.049	0.03	0.003	<0.002	0.004	0.002	<0.002	<0.002
Mercury	mg/L	0.001 MAC	<0.0001	<0.0001			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	mg/L					<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Nickel	mg/L					<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Phosphorus	mg/L					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Potassium	mg/L		0.86	1	0.76	0.92	0.55	0.64	0.67	0.57	0.70	0.45
Selenium	mg/L	0.05 MAC	<0.002	<0.002	<0.002	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Silicon	mg/L					3.6	3.77	4.03	3.77	4.53	4.64	3.68
Silver	mg/L					<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Sodium	mg/L	200 AO	19	26	20	14.3	9.16	7.07	6.73	7.34	7.77	5.05
Strontium	mg/L		0.055	0.052	0.033	0.027	0.021	0.025	0.021	0.026	0.029	0.022
Sulphur	mg/L					2.26	1.15	1.34	0.93	1.52	1.37	1.11
Thallium	mg/L					<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Tin	mg/L					<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Titanium	mg/L					<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Uranium	mg/L	0.02 MAC				<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/L					<0.002	<0.002	<0.002	<0.010	<0.002	<0.002	<0.002
Zinc	mg/L	5 AO	<0.005	0.007	<0.005	<0.005	0.007	0.007	0.005	<0.005	<0.005	<0.005

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) Interim Maximum Acceptable Concentration (IMAC) within ODWS.
(6) ODWS exceedances indicated by **bold** entries.

Groundwater Geochemical Results
TW-12



Parameters	Units	ODWS ⁽¹⁾	2013	2014	2015	2016	2017	2018	2019
General Chemistry			May	June	May	May	May	May	May
Alkalinity	mg/L	30-500 OG ⁽²⁾	107	80	71	91	Insufficient volume to obtain sample	Dry	121
Dissolved Organic Carbon	mg/L	5 AO ⁽³⁾	1.1	1.4	1.0	1.2			2.0
Chloride	mg/L	250 AO	0.98	1.16	0.95	1.32			1.16
Sulphate	mg/L	500 OG	9.79	11.3	6.78	13			16.6
Fluoride	mg/L	1.5 MAC ⁽⁴⁾	<0.05	<0.05	<0.05	<0.05			<0.05
Hardness	mg/L	80-100 OG	115	98	73.4	90			120
Nitrate	mg/L	10 MAC	0.1	0.06	0.06	0.08			0.12
Nitrite	mg/L	1 MAC	<0.05	<0.05	<0.05	<0.05			<0.05
Organic Nitrogen	mg/L	0.15 OG	<0.10	0.37	<0.10	0.24			<0.10
Orthophosphate	mg/L		<0.10	<0.10	<0.10	<0.10			<0.10
Phenols	mg/L		<0.001	<0.001	<0.001	<0.001			<0.001
Ammonia	mg/L		<0.02	0.08	<0.02	0.07			0.05
BOD	mg/L		<5	<5	<5	<5			<5
Chemical Oxygen Demand (COD)	mg/L		21	<5	<5	<5			<5
Total Dissolved Solids	mg/L	500 AO	126	116	102	112			120
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.10	0.45	<0.10	0.31			<0.10
pH	pH Units	6.5-8.5 OG	7.59	7.84	7.79	7.72			7.81
Electrical Conductivity	uS/cm		237	196	150	197			261
% Difference/ Ion Balance	%		1.7	7	0.2	4.81			
Elements									
Aluminum	mg/L	0.1 OG	0.011	0.008	0.012	0.014			0.004
Arsenic	mg/L	0.01 MAC	<0.003	<0.003	<0.003	<0.003			<0.003
Barium	mg/L	1 MAC	0.013	0.011	0.008	0.011			0.015
Beryllium	mg/L		<0.001	<0.001	<0.001	<0.001			<0.001
Bismuth	mg/L		<0.002	<0.002	<0.002	<0.002			<0.002
Boron	mg/L	5 IMAC	<0.010	<0.010	<0.010	0.013			<0.010
Cadmium	mg/L	0.005 MAC	<0.002	<0.002	<0.002	<0.002			<0.002
Calcium	mg/L		38.2	31.6	23.6	29.1			39.0
Chromium	mg/L	0.05 MAC	<0.003	<0.003	<0.003	<0.003			0.004
Cobalt	mg/L		<0.001	<0.001	<0.001	<0.001			<0.001
Copper	mg/L	1 AO	<0.003	<0.003	<0.003	<0.003			<0.003
Iron	mg/L	0.3 AO	0.01	<0.010	<0.010	<0.010			<0.010
Lead	mg/L	0.01 MAC	<0.002	<0.002	<0.002	<0.002			<0.001
Magnesium	mg/L		4.83	4.54	3.51	4.21			5.54
Manganese	mg/L	0.05 AO	<0.002	<0.002	<0.002	<0.002			<0.002
Mercury	mg/L	0.001 MAC		<0.0001	<0.0001	<0.0001			<0.0001
Molybdenum	mg/L		<0.002	<0.002	<0.002	<0.002			0.002
Nickel	mg/L		<0.003	<0.003	<0.003	<0.003			<0.003
Phosphorus	mg/L		<0.05	<0.05	<0.05	<0.05			<0.05
Potassium	mg/L		1.44	1.72	0.98	0.99			1.21
Selenium	mg/L	0.05 MAC	<0.004	<0.004	<0.004	<0.004			<0.004
Silicon	mg/L		6.65	5.76	5.16	5.26			5.25
Silver	mg/L		<0.002	<0.002	<0.002	<0.002			<0.002
Sodium	mg/L	200 AO	2.7	3.5	2.42	2.47			2.93
Strontium	mg/L		0.097	0.11	0.066	0.073			0.086
Sulphur	mg/L		3.47	3.62	2.61	2.61			3.36
Thallium	mg/L		<0.006	<0.006	<0.006	<0.006			<0.006
Tin	mg/L		<0.002	<0.002	<0.002	<0.002			<0.002
Titanium	mg/L		<0.002	<0.002	<0.002	<0.002			<0.002
Uranium	mg/L	0.02 MAC	<0.002	<0.002	<0.002	<0.002			<0.002
Vanadium	mg/L		<0.002	<0.002	<0.002	<0.010			<0.002
Zinc	mg/L	5 AO	<0.005	<0.005	<0.005	<0.005			<0.005

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) Interim Maximum Acceptable Concentration (IMAC) within ODWS.
- (6) ODWS exceedances indicated by **bold** entries.

Wood Project No.: **TY131010**

Groundwater Geochemical Results
TW-14



Parameters	Units	ODWS ⁽¹⁾	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
General Chemistry			May	May	May	May	June	May	May	May	May	May
Alkalinity	mg/L	30-500 OG ⁽²⁾	44	33	45	44	29	34	39	36	35	28
Dissolved Organic Carbon	mg/L	5 AO ⁽³⁾	0.7	0.7	0.76	0.9	0.9	1.1	0.8	0.9	1.6	1.0
Chloride	mg/L	250 AO	5	4	12	7.09	4.26	2.22	4.1	4.21	3.63	4.18
Sulphate	mg/L	500 OG	5	5	6	4.0	3.83	3.15	4.5	3.81	3.77	3.52
Fluoride	mg/L	1.5 MAC ⁽⁴⁾	<0.1	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Hardness	mg/L	80-100 OG	45.2	37.3	50	43	32.0	30.6	35.6	31.8	33.3	30.0
Nitrate	mg/L	10 MAC	1.5	1.1	0.86	1.14	1.22	1.04	1.62	1.4	1.58	1.15
Nitrite	mg/L	1 MAC	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Organic Nitrogen	mg/L	0.15 OG	0.28	0.18	0.21	<0.10	0.28	<0.10	0.22	0.13	0.45	<0.10
Orthophosphate	mg/L		<0.01	<0.01	0.021	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Phenols	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ammonia	mg/L		<0.05	<0.05	<0.05	<0.02	0.09	<0.02	<0.02	<0.02	0.02	<0.02
BOD	mg/L		<2	<2	<2	<5	<5	<5	<5	<5	<5	<5
Chemical Oxygen Demand (COD)	mg/L		5	8	8.2	21	<5	<5	<5	<5	<5	7
Total Dissolved Solids	mg/L	500 AO	76	60	100	70	52	54	70	54	86	30
Total Kjeldahl Nitrogen (TKN)	mg/L		0.3	0.2	0.23	<0.10	0.37	<0.10	0.22	0.13	0.47	<0.10
pH	pH Units	6.5-8.5 OG				6.71	7.07	7.29	7.18	7.31	6.94	6.96
Electrical Conductivity	uS/cm					127	98	88	102	98	99	88
% Difference/ Ion Balance	%					2.8	4.6	1.0	6.9	8.02		
Elements												
Aluminum	mg/L	0.1 OG	<0.005	<0.005	0.0053	0.005	<0.004	<0.004	0.005	0.011	<0.004	0.010
Arsenic	mg/L	0.01 MAC	<0.001	<0.001	<0.001	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Barium	mg/L	1 MAC	<0.005	<0.005	0.003	0.004	0.003	0.003	0.003	0.005	0.003	0.003
Beryllium	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bismuth	mg/L					<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Boron	mg/L	5 IMAC	<0.01	<0.01	<0.01	0.01	<0.010	0.011	0.011	0.016	0.031	<0.010
Cadmium	mg/L	0.005 MAC	<0.0001	<0.0001	<0.0001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Calcium	mg/L		12	10	14	11.7	8.64	8.22	9.5	8.28	8.76	8.12
Chromium	mg/L	0.05 MAC	<0.005	<0.005	<0.005	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Cobalt	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	mg/L	1 AO	0.003	<0.001	<0.001	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Iron	mg/L	0.3 AO	<0.1	<0.1	<0.1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Lead	mg/L	0.01 MAC	<0.0005	<0.0005	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001
Magnesium	mg/L		3.7	3	3.8	3.27	2.56	2.45	2.88	2.71	2.78	2.36
Manganese	mg/L	0.05 AO	<0.002	<0.002	0.0093	<0.002	<0.002	<0.002	<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	<0.0001	<0.0001
Molybdenum	mg/L					<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Nickel	mg/L					<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Phosphorus	mg/L					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Potassium	mg/L		0.48	0.51	0.57	0.55	0.42	0.44	0.55	0.44	0.48	0.40
Selenium	mg/L	0.05 MAC	<0.002	<0.002	<0.002	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Silicon	mg/L					6.22	5.19	5.63	5.41	6.09	5.93	4.54
Silver	mg/L					<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Sodium	mg/L	200 AO	6	5.8	7.2	7.15	6.71	5.58	5.45	5.05	5.0	4.49
Strontium	mg/L		0.031	0.022	0.028	0.026	0.018	0.019	0.021	0.023	0.021	0.019
Sulphur	mg/L					1.47	1.15	1.3	0.97	1.32	1.3	1.3
Thallium	mg/L					<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Tin	mg/L					<0.002	<0.002	<0.002	<0.002	0.002	<0.002	<0.002
Titanium	mg/L					<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Uranium	mg/L	0.02 MAC				<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/L					<0.002	<0.002	<0.002	<0.010	<0.002	<0.002	<0.002
Zinc	mg/L	5 AO	<0.005	<0.005	<0.005	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

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) Interim Maximum Acceptable Concentration (IMAC) within ODWS.
- (6) ODWS exceedances indicated by **bold** entries.

Wood Project No.: **TY131010**

Groundwater Geochemical Results
TW-17



Parameters	Units	ODWS ⁽¹⁾	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
General Chemistry			May	May	May	May	June	May	May	May	May	May
Alkalinity	mg/L	30-500 OG ⁽²⁾	117	101	95	102	105	102	92	109	84	97
Dissolved Organic Carbon	mg/L	5 AO ⁽³⁾	2.1	2.1	2.3	2.0	2.2	1.9	2.1	6.3	2.9	2.6
Chloride	mg/L	250 AO	5	5	4.0	7.7	6.76	7.12	7.63	6.77	9.76	8.91
Sulphate	mg/L	500 OG	59	5	5.0	5.82	11.5	8.09	7.84	13.8	6.04	6.92
Fluoride	mg/L	1.5 MAC ⁽⁴⁾	<0.1	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Hardness	mg/L	80-100 OG	66.0	64.3	72	118	127	116	95.4	114	111	107
Nitrate	mg/L	10 MAC	0.2	0.2	0.17	0.3	0.55	0.52	0.35	0.63	0.48	0.31
Nitrite	mg/L	1 MAC	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Organic Nitrogen	mg/L	0.15 OG	5.9	2.86	2.72	0.17	0.28	0.23	0.41	0.26	0.27	<0.10
Orthophosphate	mg/L		0.02	<0.01	0.022	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Phenols	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ammonia	mg/L		0.1	0.14	0.076	<0.02	0.08	<0.02	<0.02	<0.02	<0.02	0.04
BOD	mg/L		<2	<2	<2	<5	<5	<5	<5	<5	<5	<5
Chemical Oxygen Demand (COD)	mg/L		66	28	55	24	6	<5	9	5	<5	<5
Total Dissolved Solids	mg/L	500 AO	126	132	122	122	142	142	124	134	162	112
Total Kjeldahl Nitrogen (TKN)	mg/L		6	3	2.8	0.17	0.36	0.23	0.41	0.26	0.27	<0.10
pH	pH Units	6.5-8.5 OG				7.57	7.87	7.71	7.69	7.82	7.07	7.55
Electrical Conductivity	uS/cm					238	267	237	211	253	229	225
% Difference/ Ion Balance	%					3.8	3.3	2.1	2.7	3.89		
Elements												
Aluminum	mg/L	0.1 OG	0.013	0.018	0.022	0.040	0.045	0.037	0.037	0.014	0.025	0.006
Arsenic	mg/L	0.01 MAC	<0.001	<0.001	<0.001	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Barium	mg/L	1 MAC	<0.005	<0.005	0.0034	0.004	0.005	0.005	0.005	0.005	0.004	0.006
Beryllium	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bismuth	mg/L					<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Boron	mg/L	5 IMAC	<0.01	<0.01	<0.01	<0.010	0.011	0.01	0.012	0.02	0.027	0.012
Cadmium	mg/L	0.005 MAC	<0.0001	<0.0001	<0.0001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Calcium	mg/L		19	18	21	36.4	38.4	35	27.4	32.8	32.0	32.4
Chromium	mg/L	0.05 MAC	<0.005	<0.005	<0.005	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Cobalt	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	mg/L	1 AO	0.002	0.002	0.0017	<0.003	0.004	<0.003	<0.003	<0.003	<0.003	<0.003
Iron	mg/L	0.3 AO	<0.1	<0.1	<0.1	0.029	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Lead	mg/L	0.01 MAC	<0.0005	<0.0005	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001
Magnesium	mg/L		4.5	4.7	5	6.7	7.53	6.91	6.55	7.83	7.43	6.31
Manganese	mg/L	0.05 AO	0.019	0.015	0.0057	0.015	0.003	0.006	<0.002	0.002	0.007	0.005
Mercury	mg/L	0.001 MAC	<0.0001	<0.0001			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	mg/L					<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Nickel	mg/L					<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Phosphorus	mg/L					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Potassium	mg/L		0.33	0.32	0.41	0.56	0.44	0.61	0.91	0.75	0.81	0.62
Selenium	mg/L	0.05 MAC	<0.002	<0.002	<0.002	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Silicon	mg/L					4.23	3.9	4.15	3.74	4.28	4.44	3.64
Silver	mg/L					<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Sodium	mg/L	200 AO	3.6	4.5	3.6	4.72	4.34	5.09	4.49	4.6	4.81	4.75
Strontium	mg/L		0.035	0.038	0.045	0.035	0.039	0.041	0.034	0.053	0.038	0.046
Sulphur	mg/L					2.15	3.21	3.16	1.76	4.57	1.98	2.36
Thallium	mg/L					<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Tin	mg/L					<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Titanium	mg/L					0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Uranium	mg/L	0.02 MAC				<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/L					<0.002	<0.002	<0.002	<0.010	<0.002	<0.002	<0.002
Zinc	mg/L	5 AO	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

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) Interim Maximum Acceptable Concentration (IMAC) within ODWS.
(6) ODWS exceedances indicated by **bold** entries.



2019 Groundwater Duplicate Data

Parameters	Units	May-19						Jul-19			Sep-19		
		TW-15	HB GW DUP1	Relative Percent Difference (%)	TW-17	HB GW DUP2	Relative Percent Difference (%)	TW-16	HB GW DUP1	Relative Percent Difference (%)	TW-15	HB GW DUP1	Relative Percent Difference (%)
General Chemistry													
Alkalinity	mg/L	244	243	0.411	97	100	(3.046)	65	68	(4.511)	400	387	3.304
Dissolved Organic Carbon	mg/L	4.2	3.9	7.407	2.6	2.5	3.922	1.6	2.4	(40.000)	6.1	5.9	3.333
Chloride	mg/L	26.9	25.3	6.130	8.9	9.0	(0.560)	4.28	3.94	8.273	37	36.1	2.462
Sulphate	mg/L	61.4	51.6	17.345	6.92	6.9	0.289	5.3	4.89	7.670	82.0	75.8	7.858
Fluoride	mg/L	<0.10	<0.10	NC	<0.05	<0.05	NC	<0.05	<0.05	NC	<0.25	<0.25	NC
Hardness	mg/L	257	261	(1.544)	107	115	(7.207)	69.6	65.2	6.528	418	410	1.932
Nitrate	mg/L	8.88	8.25	7.356	0.31	0.32	(3.175)	0.21	0.18	15.385	4.42	5.47	(21.234)
Nitrite	mg/L	0.22	0.26	(16.667)	<0.05	<0.05	NC	<0.05	<0.05	NC	<0.25	<0.25	NC
Organic Nitrogen	mg/L	0.87	0.89	(2.273)	<0.10	<0.10	NC	<0.10	<0.10	NC	1.30	0.98	28.070
Orthophosphate	mg/L	<0.20	<0.20	NC	<0.10	<0.10	NC	<0.10	<0.10	NC	<0.50	<0.50	NC
Phenols	mg/L	<0.001	<0.001	NC	<0.001	<0.001	NC	<0.001	<0.001	NC	0.001	<0.001	NC
Ammonia	mg/L	3.79	3.68	2.945	0.04	0.04	0.000	0.03	0.02	40.000	1.27	1.27	0.000
BOD	mg/L	7	8	(13.333)	<5	<5	NC	<5	<5	NC	<5	<5	NC
Chemical Oxygen Demand (COD)	mg/L	7	6	15.385	<5	<5	NC	<5	<5	NC	8	7	13.333
Total Dissolved Solids	mg/L	412	424	(2.871)	112	142	(23.622)	86	82	4.762	612	626	(2.262)
Total Kjeldahl Nitrogen (TKN)	mg/L	4.66	4.57	1.950	<0.10	<0.10	NC	0.11	<0.10	NC	2.57	2.25	13.278
pH	pH Units	7.73	7.78	(0.645)	7.55	7.54	0.133	7.56	7.58	(0.264)	7.52	7.74	(2.883)
Electrical Conductivity	uS/cm	720	686	4.836	225	233	(3.493)	174	163	6.528	1160	1130	2.620
Elements													
Aluminum	mg/L	<0.004	<0.004	NC	0.006	0.013	(73.684)	0.004	0.005	(22.222)	<0.004	<0.004	NC
Arsenic	mg/L	<0.003	<0.003	NC	<0.003	<0.003	NC	<0.003	<0.003	NC	<0.003	<0.003	NC
Barium	mg/L	0.126	0.122	3.226	0.006	0.006	0.000	0.003	0.005	(50.000)	0.108	0.110	(1.835)
Beryllium	mg/L	<0.001	<0.001	NC	<0.001	<0.001	NC	<0.001	<0.001	NC	<0.001	<0.001	NC
Bismuth	mg/L	<0.002	<0.002	NC	<0.002	<0.002	NC	<0.002	<0.002	NC	<0.002	<0.002	NC
Boron	mg/L	0.929	0.881	5.304	0.012	<0.010	NC	0.015	0.010	40.000	1.02	1.12	(9.346)
Cadmium	mg/L	<0.002	<0.002	NC	<0.002	<0.002	NC	<0.002	<0.002	NC	<0.002	<0.002	NC
Calcium	mg/L	76.4	76.9	(0.652)	32.4	35.3	(8.567)	21.0	19.6	6.897	122	120	1.653
Chromium	mg/L	<0.003	<0.003	NC	<0.003	<0.003	NC	<0.003	<0.003	NC	<0.003	<0.003	NC
Cobalt	mg/L	0.003	0.003	0.000	<0.001	<0.001	NC	<0.001	<0.001	NC	0.002	0.003	(40.000)
Copper	mg/L	0.011	0.011	0.000	<0.003	<0.003	NC	<0.003	<0.003	NC	0.012	0.014	(15.385)
Iron	mg/L	<0.010	<0.010	NC	<0.010	<0.010	NC	<0.010	<0.010	NC	<0.010	<0.010	NC
Lead	mg/L	<0.001	<0.001	NC	<0.001	<0.001	NC	<0.001	<0.001	NC	<0.001	<0.001	NC
Magnesium	mg/L	16.2	16.7	(3.040)	6.3	6.5	(2.813)	4.16	3.96	4.926	27.5	26.7	2.952
Manganese	mg/L	0.818	0.757	7.746	0.005	0.005	0.000	<0.002	<0.002	NC	0.760	0.837	(9.643)
Mercury	mg/L	<0.0001	<0.0001	NC	<0.0001	<0.0001	NC	<0.0001	<0.0001	NC	<0.0001	<0.0001	NC
Molybdenum	mg/L	<0.002	<0.002	NC	<0.002	<0.002	NC	<0.002	<0.002	NC	<0.002	<0.002	NC
Nickel	mg/L	0.005	0.005	0.000	<0.003	<0.003	NC	<0.003	<0.003	NC	0.006	0.007	(15.385)
Phosphorus	mg/L	<0.05	<0.05	NC	<0.05	<0.05	NC	<0.05	<0.05	NC	<0.05	<0.05	NC
Potassium	mg/L	12.3	11.5	6.723	0.62	0.64	(3.175)	0.46	0.45	2.198	17.1	16.1	6.024
Selenium	mg/L	<0.004	<0.004	NC	<0.004	<0.004	NC	<0.004	<0.004	NC	<0.004	<0.004	NC
Silicon	mg/L	5.85	5.76	1.550	3.64	3.48	4.494	6.99	6.04	14.582	7.17	8.15	(12.794)
Silver	mg/L	<0.002	<0.002	NC	<0.002	<0.002	NC	<0.002	<0.002	NC	<0.002	<0.002	NC
Sodium	mg/L	33.7	33.0	2.099	4.75	4.96	(4.325)	3.02	3.03	(0.331)	48.7	45.7	6.356
Strontium	mg/L	0.205	0.201	1.970	0.046	0.046	0.000	0.024	0.034	(34.483)	0.256	0.275	(7.156)
Sulphur	mg/L	29.8	28.0	6.228	2.36	2.54	(7.347)	1.76	1.57	11.411	28.6	26.9	6.126
Thallium	mg/L	<0.006	<0.006	NC	<0.006	<0.006	NC	<0.006	<0.006	NC	<0.006	<0.006	NC
Tin	mg/L	<0.002	<0.002	NC	<0.002	<0.002	NC	<0.002	<0.002	NC	<0.002	<0.002	NC
Titanium	mg/L	<0.002	<0.002	NC	<0.002	<0.002	NC	<0.002	<0.002	NC	<0.002	<0.002	NC
Uranium	mg/L	<0.002	<0.002	NC	<0.002	<0.002	NC	<0.002	<0.002	NC	<0.002	<0.002	NC
Vanadium	mg/L	<0.002	<0.002	NC	<0.002	<0.002	NC	<0.002	<0.002	NC	<0.002	<0.002	NC
Zinc	mg/L	<0.005	<0.005	NC	<0.005	<0.005	NC	<0.005	<0.005	NC	<0.005	<0.005	NC

Notes:
(1) NC - not calculable as one or both concentrations are below the laboratory method detection limit
(2) Relative percent differences exceeding 50% are presented as bold and shaded entries

APPENDIX F

**SUMMARY OF SURFACE WATER
GEOCHEMICAL ANALYSES**

Surface Water Geochemical Results
SW-3



Parameters	Units	PWQO ¹	APV ²	CWQG ³	2010		2011		2012		2013		2014		2015		2016		2017		2018		2019	
General Chemistry					May	Aug	May	Aug	May	Aug	May	Sept	June	Sept	May	Sept	May	Sept	May	Sept	May	Oct	May	Sept
Alkalinity	mg/L				55	87	48	86	59	83	42	87	47	72	66	65	41	82	47	90	40	83	49	85
Chemical Oxygen Demand (COD)	mg/L				20	28	25	20	20	20	20	20	91	12	13	434	22	1110	105	107	7	<5	12	8
Total Dissolved Solids	mg/L				102	222	104	294	142	212	142	180	140	204	172	198	110	258	120	224	140	292	128	294
Total Suspended Solids	mg/L				<10	<10	<10	<10	<10	<10	<10	<10	126	<10	<10	788	44	322	141	482	<10	20	<10	<10
Ammonia	mg/L				<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.02	0.07	0.05	<0.02	0.16	<0.02	0.08	<0.02	0.14	<0.02	<0.02	0.03	<0.02
Turbidity	NTU				1.3	1.00	0.70	0.8	1.3	0.8	1	1.8	7.2	1.5	2.0	29.9	8.0	917	27.2	193	1.4	5.2	3.6	0.8
Un-ionized Ammonia	mg/L	0.02			<0.00069	<0.00065	<0.00105	<0.00030	<0.00129	<0.00105	<0.0004	<0.0008	0.00013	0.00085	<0.00024	0.00006	<0.000028	0.00054	<0.000054	<0.000336	<0.0001	<0.0001	0.00024	<0.00005
Chloride	mg/L		180	128	18	49	21	52	33	68	29.5	46.8	41.5	64.7	54.1	70.9	37.4	96.9	32.8	66.5	31.1	102	38.1	97.3
Dissolved Organic Carbon	mg/L				7.6	8.3	6.7	6.7	6.8	7.1	6.6	11.2	7.2	8.3	5.8	8.5	7.3	4.6	6.5	10.5	7.7	5.2	8.1	5.8
Sulphate	mg/L				<1	<1	3.0	<1	5.0	2.0	4.0	4.52	2.9	8.25	5.5	5.84	4.6	4.54	4.5	0.84	5.47	6.24	4.64	4.6
Hardness	mg/L				58.5	92.1	55.2	88.0	67.0	100	54.4	150	63	89.6	75.1	90.5	49.2	111	44.6	98.3	50.4	107	51.9	102
Phenols	mg/L	0.001	0.961	0.004	<0.001	<0.001	<0.001	<0.001	0.0027	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	0.001	0.001
Phosphorus	mg/L				0.03	<0.02	0.015	<0.1	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	0.27	<0.05	0.21	<0.05	0.23	<0.05	<0.05	<0.05	<0.05
pH	pH units	6.5 - 8.5		6.5 - 9.0							6.71	7.03	7.43	7.87	7.65	7.51	8.66	7.04	7.5	7.61	7.27	7.50	7.10	7.60
Conductivity	uS/cm										196	305	231	382	299	385	207	516	204	380	204	536	212	571
Elements																								
Aluminum	mg/L	0.075			0.027	0.012	0.038	0.018	0.056	0.013	0.027	0.016	0.056	0.01	0.014	0.019	0.029	0.005	0.017	0.019	0.020	0.007	0.026	<0.004
Arsenic	mg/L	0.1	0.15		<0.001	0.0010	<0.001	<0.001	<0.001	<0.001	<0.003	<0.003	<0.003	<0.003	<0.003	0.007	<0.003	0.012	<0.003	0.008	<0.003	<0.003	<0.003	<0.003
Barium	mg/L		2.3		0.007	0.01	0.01	0.013	0.009	0.015	0.007	0.01	0.011	0.012	0.008	0.063	0.02	0.155	0.018	0.088	0.008	0.019	0.012	0.016
Beryllium	mg/L	0.011	0.0053								<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bismuth	mg/L										<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Boron	mg/L	0.2	3.55	1.5	<0.01	<0.01	0.0100	0.02	<0.01	<0.01	<0.010	<0.010	0.01	<0.010	<0.010	<0.010	0.059	0.033	<0.010	0.014	<0.010	0.014	<0.010	<0.010
Cadmium	mg/L	0.0002	0.00021	0.000017	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<i>0.0002</i>	<0.0001	<u><i>0.0009</i></u>	<i>0.0001</i>	<i>0.0002</i>	<0.0001	<0.0001	<0.0001	<0.0001
Calcium	mg/L				16.0	25.0	15.0	26.0	19.0	27.0	15.1	50.3	17.2	24.8	20.6	25.1	13.1	31.1	12	27.4	13.9	29.7	14.7	28.4
Chromium	mg/L	0.0089	0.064		<0.005	<0.005	<0.005	<0.005	<0.005	0.011	<0.003	<0.003	<0.003	<0.003	<0.003	0.006	<0.003	0.004	<0.003	<0.003	<0.003	0.004	<0.003	<0.003
Cobalt	mg/L	0.0009	0.0052		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0036	<0.0005	<u>0.0278</u>	0.0008	<u>0.0064</u>	<0.0005	<0.0005	<0.0005	<0.0005
Copper	mg/L	0.005	0.0069		0.001	<0.001	0.0010	<0.001	0.0016	0.0021	<0.002	<0.002	<0.002	<0.002	<0.002	<u>0.007</u>	<0.002	<u>0.03</u>	0.003	<u>0.009</u>	<0.002	<0.002	0.002	<0.002
Iron	mg/L	0.3			0.2	0.3	0.2	0.2	0.2	0.31	0.11	0.16	0.38	0.11	0.16	17.1	0.65	73.4	2.88	31.8	0.06	0.03	0.11	0.10
Lead	mg/L		0.002		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.001	<u>0.004</u>	<0.001	<u>0.004</u>	0.001	<u>0.006</u>	<0.001	<0.001	<0.001	<0.001
Magnesium	mg/L				4.5	7.20	4.30	7.4	5.2	7.8	4.06	6.01	4.88	6.71	5.74	6.75	4.01	8.02	3.55	7.25	3.82	8.08	3.70	7.62
Manganese	mg/L				0.024	0.0	0.0	0.0	0.1	0.0	0.023	0.005	0.053	0.014	0.02	0.631	0.021	2.22	0.104	0.93	0.011	0.016	0.016	0.012
Molybdenum	mg/L		0.73								<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Nickel	mg/L	0.025	0.039								<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.01	<0.003	0.004	<0.003	<0.003	<0.003	<0.003
Potassium																	0.48	1.22	0.43	1.11	0.59	0.54	0.58	0.64
Selenium	mg/L	0.1	0.005		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Silicon	mg/L										0.91	1.44	2.5	1.78	0.49	4.45	2.55	4.16	2.73	4.18	1.37	2.35	1.10	2.10
Silver	mg/L	0.0001	0.00012								<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Sodium	mg/L		180		13	38.000	15.000	39	24	44	15.8	26.8	19.6	37.5	29.2	34.2	21	50.3	19.2	31.1	18.5	53.6	19.2	57.6
Strontium	mg/L				0.04	0.057	0.033	0.063	0.042	0.065	0.032	0.051	0.039	0.057	0.04	0.069	0.029	0.136	0.038	0.094	0.032	0.075	0.034	0.069
Sulphur	mg/L										1.58	0.85	1.03	3.1	1.9	1.97	1220	1.83	1.59	0.64	1.98	3.06	1.65	1.71
Thallium	mg/L	0.0003	0.04								<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Tin	mg/L										<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Titanium	mg/L										<0.002	<0.002	<0.002	<0.002	<0.002	0.028	0.002	0.032	0.01	0.031	<0.002	<0.002	0.002	<0.002
Uranium	mg/L	0.005	0.033								<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/L	0.006	0.02		<0.001	<0.001	<0.001	<0.0005	<0.0005	0.00	<0.002	<0.002	<0.002	<0.002	<0.002	0.007	<0.002	<u>0.094</u>	<0.002	0.010	<0.002	<0.002	<0.002	<0.002
Zinc	mg/L	0.03	0.089	0.03	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.016	<0.005	<0.005	<0.005	0.005	0.026	<0.005	<u>0.103</u>	0.008	0.028	<0.005	<0.005	<0.005	<0.005

Notes:
(1) PWQO - Provincial Water Quality Objectives.
(2) APV - Aquatic Protection Value from *Rationale for the Development of Soil and Groundwater Standards for use at Contaminated Site in Ontario* , Table 3.1.
(3) CWQG - Canadian Water Quality Guidelines.
(4) Exceedences of the PWQO are indicated by **BOLD** entries.
(5) Exceedences of the APV are indicated by underlined entries.
(6) Exceedences of the CWQG are indicated by *italicized* entries.

Surface Water Geochemical Results
SW-4



Parameters	Units	PWQO ¹	APV ²	CWQG ³	2010		2011		2012		2013		2014		2015		2016		2017		2018		2019	
General Chemistry					May	Aug	May	Aug	May	Aug	May	Sept	June	Sept	May	Sept	May	Sept	May	Sept	May	Oct	May	Sept
Alkalinity	mg/L				50	80	50	85	61	84	26	45	36	73	66	97	55	92	53	84	55	82	52	89
Chemical Oxygen Demand (COD)	mg/L				20	28	25	23	20	19	33	44	47	16	16	9	17	7	13	30	5	<5	22	<5
Total Dissolved Solids	mg/L				102	210	110	260	194	220	56	90	64	208	172	262	156	276	138	228	142	288	130	286
Total Suspended Solids	mg/L				<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Ammonia	mg/L				<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.02	0.05	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	0.03	<0.02
Turbidity	NTU				0.9	0.80	1.00	0.5	0.9	1.1	0.6	1.8	1.5	<0.5	1.1	0.5	4.3	2.9	0.9	0.8	1.2	1.4	0.6	1.0
Un-ionized Ammonia	mg/L	0.02			<0.00120	<0.00126	<0.00128	<0.00037	<0.00087	<0.00107	<0.00004	<0.00002	0.000055	0.00063	<0.00019	<0.000032	<0.000126	<0.0001	<0.00016	<0.00033	<0.000172	<0.000118	0.00018	<0.0001
Chloride	mg/L		180	128	19	44	22	61	35	68	1.61	2.71	0.94	67.6	57.2	95.5	59.6	98.2	44.1	77.7	34.9	103	44.4	124
Dissolved Organic Carbon	mg/L				7.5	8.5	6.7	7.2	<0.2	7.6	9.8	21.8	11.9	8.7	6.8	3.1	7.1	5.2	7.7	8.6	6.8	5.4	8.4	5.2
Sulphate	mg/L				<1	<1	4.0	1.0	5.0	2.0	1.6	1.76	0.6	8.56	5.7	5.30	7.3	4.83	6.4	6.41	5.9	6.21	4.86	5.62
Hardness	mg/L				62	85	59	89	70	100	30.7	73.3	38.4	91.9	77.4	114	69.5	115	56.7	93.5	52.4	107	55.2	105
Phenols	mg/L	0.001	0.961	0.004	<0.001	<0.001	<0.001	<0.001	0.0018	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	0.001
Phosphorus	mg/L				0.03	<0.02	0.018	0.003	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
pH	pH units	6.5 - 8.5		6.5 - 9.0							6.40	6.88	7.24	7.81	7.68	8.01	7.15	7.92	7.86	7.89	7.38	7.64	7.19	7.58
Conductivity	uS/cm										64	92	77	398	314	520	290	544	250	419	223	540	235	589
Elements																								
Aluminum	mg/L	0.075			0.029	0.020	0.028	0.013	0.041	0.019	0.052	0.063	0.046	0.009	0.010	0.007	0.019	<0.004	0.023	0.007	0.030	0.010	0.023	0.004
Arsenic	mg/L	0.1	0.15		<0.001	<0.001	0.0010	<0.001	<0.001	<0.001	<0.003	<0.003	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Barium	mg/L		2.3		0.007	0.01	0.01	0.013	0.010	0.015	0.003	0.006	0.006	0.012	0.007	0.014	0.011	0.014	0.01	0.014	0.008	0.022	0.010	0.016
Beryllium	mg/L	0.011	0.0053								<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bismuth	mg/L										<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Boron	mg/L	0.2	3.55	1.5	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.01	0.016	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium	mg/L	0.0002	0.00021	0.000017	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Calcium	mg/L				17	23	16	25	20	29	7.86	23.4	9.97	25.5	21.3	31.5	19.1	31.9	15.5	26.3	14.5	29.6	15.6	29.4
Chromium	mg/L	0.0089	0.064		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.003	<0.003	<0.003	<0.003	<0.003	0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Cobalt	mg/L	0.0009	0.0052		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Copper	mg/L	0.005	0.0069		0.001	<0.001	<0.001	<0.001	0.0021	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Iron	mg/L	0.3			0.1	0.2	0.2	0.2	0.7	0.2	0.08	0.40	0.61	0.15	0.11	0.030	0.17	0.030	<0.01	0.040	0.06	<0.01	0.07	0.01
Lead	mg/L		0.002		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Magnesium	mg/L				4.8	6.70	4.60	7.4	5.5	8.4	2.68	3.61	3.27	6.86	5.87	8.51	5.3	8.52	4.38	6.76	3.94	8.0	3.94	7.73
Manganese	mg/L				0.033	0.0	0.0	0.0	0.1	0.0	0.004	0.009	0.039	0.025	0.017	0.006	0.017	0.012	0.01	0.012	0.008	0.003	0.013	0.007
Molybdenum	mg/L		0.73								<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Nickel	mg/L	0.025	0.039								<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Potassium																	0.65	0.62	0.45	0.63	0.61	0.59	0.57	0.49
Selenium	mg/L	0.1	0.005		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Silicon	mg/L										0.56	2.05	0.34	1.53	0.28	2.21	1.04	2.12	0.5	1.8	1.09	2.44	0.89	1.65
Silver	mg/L	0.0001	0.00012								<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Sodium	mg/L		180		15	34	17	39	26	46	2.68	2.87	1.88	39.7	31.1	51	29.2	54.7	22.9	39.2	21.0	52.9	22.1	59.8
Strontium	mg/L				0.036	0.054	0.039	0.062	0.044	0.069	0.016	0.025	0.025	0.058	0.037	0.072	0.042	0.068	0.043	0.063	0.032	0.077	0.035	0.064
Sulphur	mg/L										0.76	0.51	0.4	3.18	1.95	1.88	1570	2.28	2.15	2.3	2.10	2.98	1.78	2.02
Thallium	mg/L	0.0003	0.04								<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Tin	mg/L										<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Titanium	mg/L										<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.004	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Uranium	mg/L	0.005	0.033								<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/L	0.006	0.02		<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Zinc	mg/L	0.03	0.089	0.03	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Notes:
(1) PWQO - Provincial Water Quality Objectives.
(2) APV - Aquatic Protection Value from *Rationale for the Development of Soil and Groundwater Standards for use at Contaminated Site in Ontario*, Table 3.1.
(3) CWQG - Canadian Water Quality Guidelines.
(4) Exceedences of the PWQO are indicated by **BOLD** entries.
(5) Exceedences of the APV are indicated by underlined entries.
(6) Exceedences of the CWQG are indicated by *italicized* entries.

Surface Water Geochemical Results
SW-5



Parameters	Units	PWQO ¹	APV ²	CWQG ³	2010		2011	2012	2013		2014		2015		2016		2017		2018		2019	
General Chemistry					May	Aug	May	May	May	Sept	June	Sept	May	Sept	May	Sept	May	Sept	May	Oct	May	Sept
Alkalinity	mg/L				12	17	11	12	8	12	11	10	15	Insufficient	9	Dry	9	26	7	Dry	8	39
Chemical Oxygen Demand (COD)	mg/L				26	40	30	25	20	29	38	23	32	Water	19		13	41	<5		15	39
Total Dissolved Solids	mg/L				30	36.000	28.000	28	42	74	46	44	50	to Sample	36		34	58	66		30	94
Total Suspended Solids	mg/L				<10	<10	<10	<10	<10	<10	15	<10	<10		<10		<10	15	<10		<10	61
Ammonia	mg/L				<0.05	<0.05	<0.05	<0.05	<0.02	0.05	0.12	0.06	0.05		<0.02		0.02	0.95	<0.02		0.04	0.42
Turbidity	NTU				3.2	1.70	2	1.1	0.8	3.2	3.7	3	6.5		2.3		2.3	10.8	3.1		1.6	110
Un-ionized Ammonia	mg/L	0.02			<0.00021	<0.00011	<0.00071	<0.00063	<0.00003	0.000011	0.000087	0.000114	0.000155		0.000004		<0.0000138	<0.00304	<0.000054		0.00011	0.0011
Chloride	mg/L		180	128	2	2	3	3	5.24	10.6	3.1	3.42	6.22		2.14		2.55	4.15	0.94		2.42	9.62
Dissolved Organic Carbon	mg/L				8.7	13.7	8.9	8.4	6.2	13	11.7	12.2	9.2		7.7		6.2	13.5	8		6.4	14
Sulphate	mg/L				1	6	<1	1	3.3	4.04	2.0	1.65	1.0		2.9		3.0	0.35	0.67		2.94	2.48
Hardness	mg/L				16.5	24.0	18.3	16.0	16.1	43.2	16.7	16.1	18.3		11		9.9	21.7	10.1		10.6	37.8
Phenols	mg/L	0.001	0.961	0.004	<0.001	<0.001	<0.001	0.0024	<0.001	<0.001	<0.001	<0.001	0.003		<0.001		<0.001	0.002	<0.001		0.002	0.012
Phosphorus	mg/L				0.02	0.04	0.023	<0.1	<0.05	<0.05	<0.05	<0.05	0.1		<0.05		<0.05	<0.05	<0.05		<0.05	0.06
pH	pH units	6.5 - 8.5		6.5 - 9.0					5.98	5.92	6.66	6.59	6.81		6.25		7.08	7.15	6.40		6.39	7.02
Conductivity	uS/cm								49	78	44	45	56		34		34	64	35		32	131
Elements																						
Aluminum	mg/L	0.075			0.072	0.120	0.15	0.064	0.063	0.062	0.149	0.086	0.085		0.052		0.037	0.033	0.042		0.047	0.021
Arsenic	mg/L	0.1	0.15		<0.001	0.0010	0.001	<0.001	<0.003	<0.003	<0.003	<0.003	<0.003		<0.003		<0.003	<0.003	<0.003		0.004	0.239
Barium	mg/L		2.3		<0.005	0.01	0.005	0.0035	0.004	0.007	0.006	0.005	0.008		0.005		0.005	0.01	0.004		0.004	0.029
Beryllium	mg/L	0.011	0.0053						<0.001	<0.001	<0.001	<0.001	<0.001		<0.001		<0.001	<0.001	<0.001		<0.001	<0.001
Bismuth	mg/L								<0.002	<0.002	<0.002	<0.002	<0.002		<0.002		<0.002	<0.002	<0.002		<0.002	<0.002
Boron	mg/L	0.2	3.55	1.5	<0.01	<0.01	<0.01	<0.01	<0.010	<0.010	0.016	<0.010	<0.010		0.035		<0.010	<0.010	<0.010		<0.010	0.012
Cadmium	mg/L	0.0002	0.00021	0.000017	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<i>0.0001</i>	<i>0.0003</i>		<0.0001		<0.0001	<0.0001	<0.0001		<0.0001	<0.0001
Calcium	mg/L				4.3	6.3	4.7	4.1	4.36	14.0	4.53	4.22	4.79		2.89		2.59	5.92	2.61		2.83	11.0
Chromium	mg/L	0.0089	0.064		<0.005	<0.005	<0.005	<0.005	<0.003	<0.003	<0.003	<0.003	0.005		<0.003		<0.003	<0.003	<0.003		<0.003	0.004
Cobalt	mg/L	0.0009	0.0052		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0007	0.0012	0.0008	0.0016		<0.0005		<0.0005	0.0023	<0.0005		0.0006	0.0233
Copper	mg/L	0.005	0.0069		0.004	0.0030	0.004	0.0025	0.002	0.002	0.004	0.002	0.002		<0.002		0.002	<0.002	0.002		0.002	0.021
Iron	mg/L	0.3			0.7	0.7	0.7	0.4	0.14	1.11	1.17	1.09	5.65		0.46		0.34	3.45	0.45		0.35	3.17
Lead	mg/L		0.002		<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001		<0.001	<0.001	<0.001		<0.001	<u>0.016</u>
Magnesium	mg/L				1.4	2.00	1.6	1.3	1.27	2.0	1.32	1.35	1.53		0.93		0.83	1.68	0.87		0.86	2.51
Manganese	mg/L				0.026	0.0	0.0	0.019	0.012	0.08	0.102	0.076	0.158		0.023		0.018	0.279	0.027		0.022	0.175
Molybdenum	mg/L		0.73						<0.002	<0.002	<0.002	<0.002	<0.002		<0.002		<0.002	<0.002	<0.002		<0.002	<0.002
Nickel	mg/L	0.025	0.039						<0.003	<0.003	<0.003	<0.003	<0.003		<0.003		<0.003	<0.003	<0.003		<0.003	0.041
Potassium															0.28		0.14	0.82	0.29		0.28	3.34
Selenium	mg/L	0.1	0.005		<0.002	<0.002	<0.002	<0.002	<0.004	<0.004	<0.004	<0.004	<0.004		<0.004		<0.004	<0.004	<0.004		<0.004	<0.004
Silicon	mg/L								1.55	1.13	1.28	3.43	0.89		0.87		0.96	1.11	0.96		0.91	3.1
Silver	mg/L	0.0001	0.00012						<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		<0.0001		<0.0001	<0.0001	<0.0001		<0.0001	0.0002
Sodium	mg/L		180		2.2	1.700	2.6	2.6	2.77	3.91	2.01	1.99	3.13		1.61		1.74	2.45	1.87		1.58	4.72
Strontium	mg/L				0.02	0.032	0.02	0.018	0.016	0.03	0.019	0.019	0.02		0.013		0.016	0.028	0.013		0.014	0.042
Sulphur	mg/L								1.38	1.61	0.89	0.75	0.53		774		1.03	0.49	0.88		1.02	1.21
Thallium	mg/L	0.0003	0.04						<0.0003	<0.0003	<0.0003	<0.0003	<0.0003		<0.0003		<0.0003	<0.0003	<0.0003		<0.0003	<0.0003
Tin	mg/L								<0.002	<0.002	<0.002	<0.002	<0.002		<0.002		<0.002	<0.002	<0.002		<0.002	<0.002
Titanium	mg/L								<0.002	<0.002	0.004	0.003	0.009		<0.002		<0.002	0.003	0.003		<0.002	0.04
Uranium	mg/L	0.005	0.033						<0.002	<0.002	<0.002	<0.002	<0.002		<0.002		<0.002	<0.002	<0.002		<0.002	<0.002
Vanadium	mg/L	0.006	0.02		<0.001	<0.001	<0.001	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002		<0.002		<0.002	<0.002	<0.002		<0.002	0.003
Zinc	mg/L	0.03	0.089	0.03	0.022	0.005	0.015	0.0079	0.007	0.077	0.013	0.011	0.024		0.008		0.016	<0.005	0.005		<0.005	0.036

Notes:
(1) PWQO - Provincial Water Quality Objectives.
(2) APV - Aquatic Protection Value from *Rationale for the Development of Soil and Groundwater Standards for use at Contaminated Site in Ontario*, Table 3.1.
(3) CWQG - Canadian Water Quality Guidelines.
(4) Exceedences of the PWQO are indicated by **BOLD** entries.
(5) Exceedences of the APV are indicated by underlined entries.
(6) Exceedences of the CWQG are indicated by *italicized* entries.

2019 Surface Water Duplicate Data

Parameters	Units	May-19			Sep-19		
		SW-4	HB SW DUP	Relative Percent Difference (%)	SW-3	HB SW DUP	Relative Percent Difference (%)
General Chemistry							
Alkalinity	mg/L	52	51	1.942	85	84	1.183
Chemical Oxygen Demand (COD)	mg/L	22	21	4.651	8	8	0.000
Total Dissolved Solids	mg/L	130	130	0.000	294	268	9.253
Total Suspended Solids	mg/L	<10	<10	NC	<10	<10	NC
Ammonia	mg/L	0.03	0.03	0.000	<0.02	<0.02	NC
Turbidity	NTU	0.6	0.6	0.000	0.8	0.9	(11.765)
Chloride	mg/L	44	44	0.905	97.3	128	(27.253)
Dissolved Organic Carbon	mg/L	8.4	8.2	2.410	5.8	5.8	0.000
Sulphate	mg/L	4.86	4.83	0.619	4.60	4.43	3.765
Hardness	mg/L	55.2	54.3	1.644	102	102	0.000
Phenols	mg/L	0.002	0.002	0.000	0.001	<0.001	NC
Phosphorus	mg/L	<0.05	<0.05	NC	<0.05	<0.05	NC
pH	pH units	7.19	7.16	0.418	7.60	7.62	(0.263)
Conductivity	uS/cm	235	234	0.426	571	570	0.175
Elements							
Aluminum	mg/L	0.023	0.026	(12.245)	<0.004	0.004	NC
Arsenic	mg/L	<0.003	<0.003	NC	<0.003	<0.003	NC
Barium	mg/L	0.010	0.010	0.000	0.016	0.015	6.452
Beryllium	mg/L	<0.001	<0.001	NC	<0.001	<0.001	NC
Bismuth	mg/L	<0.002	<0.002	NC	<0.002	<0.002	NC
Boron	mg/L	<0.010	<0.010	NC	<0.010	<0.010	NC
Cadmium	mg/L	<0.0001	<0.0001	NC	<0.0001	<0.0001	NC
Calcium	mg/L	15.6	15.4	1.290	28.4	28.4	0.000
Chromium	mg/L	<0.003	<0.003	NC	<0.003	<0.003	NC
Cobalt	mg/L	<0.0005	<0.0005	NC	<0.0005	<0.0005	NC
Copper	mg/L	<0.002	<0.002	NC	<0.002	<0.002	NC
Iron	mg/L	0.07	0.07	0.000	0.10	0.10	0.000
Lead	mg/L	<0.001	<0.001	NC	<0.001	<0.001	NC
Magnesium	mg/L	3.94	3.85	2.311	7.62	7.63	(0.131)
Manganese	mg/L	0.013	0.009	36.364	0.012	0.014	(15.385)
Molybdenum	mg/L	<0.002	<0.002	NC	<0.002	<0.002	NC
Nickel	mg/L	<0.003	<0.003	NC	<0.003	<0.003	NC
Potassium	mg/L	0.57	0.56	1.770	0.64	0.64	0.000
Selenium	mg/L	<0.004	<0.004	NC	<0.004	<0.004	NC
Silicon	mg/L	0.89	0.87	2.273	2.10	2.09	0.477
Silver	mg/L	<0.0001	<0.0001	NC	<0.0001	<0.0001	NC
Sodium	mg/L	22.1	22.0	0.454	57.6	57.4	0.348
Strontium	mg/L	0.035	0.036	(2.817)	0.069	0.065	5.970
Sulphur	mg/L	1.78	1.72	3.429	1.71	1.70	0.587
Thallium	mg/L	<0.0003	<0.0003	NC	<0.0003	<0.0003	NC
Tin	mg/L	<0.002	<0.002	NC	<0.002	<0.002	NC
Titanium	mg/L	<0.002	<0.002	NC	<0.002	<0.002	NC
Uranium	mg/L	<0.002	<0.002	NC	<0.002	<0.002	NC
Vanadium	mg/L	<0.002	<0.002	NC	<0.002	<0.002	NC
Zinc	mg/L	<0.005	<0.005	NC	<0.005	<0.005	NC

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

APPENDIX G

TREND ANALYSIS

The City of Temiskaming Shores

2019 Annual Groundwater and Surface Water Monitoring Report

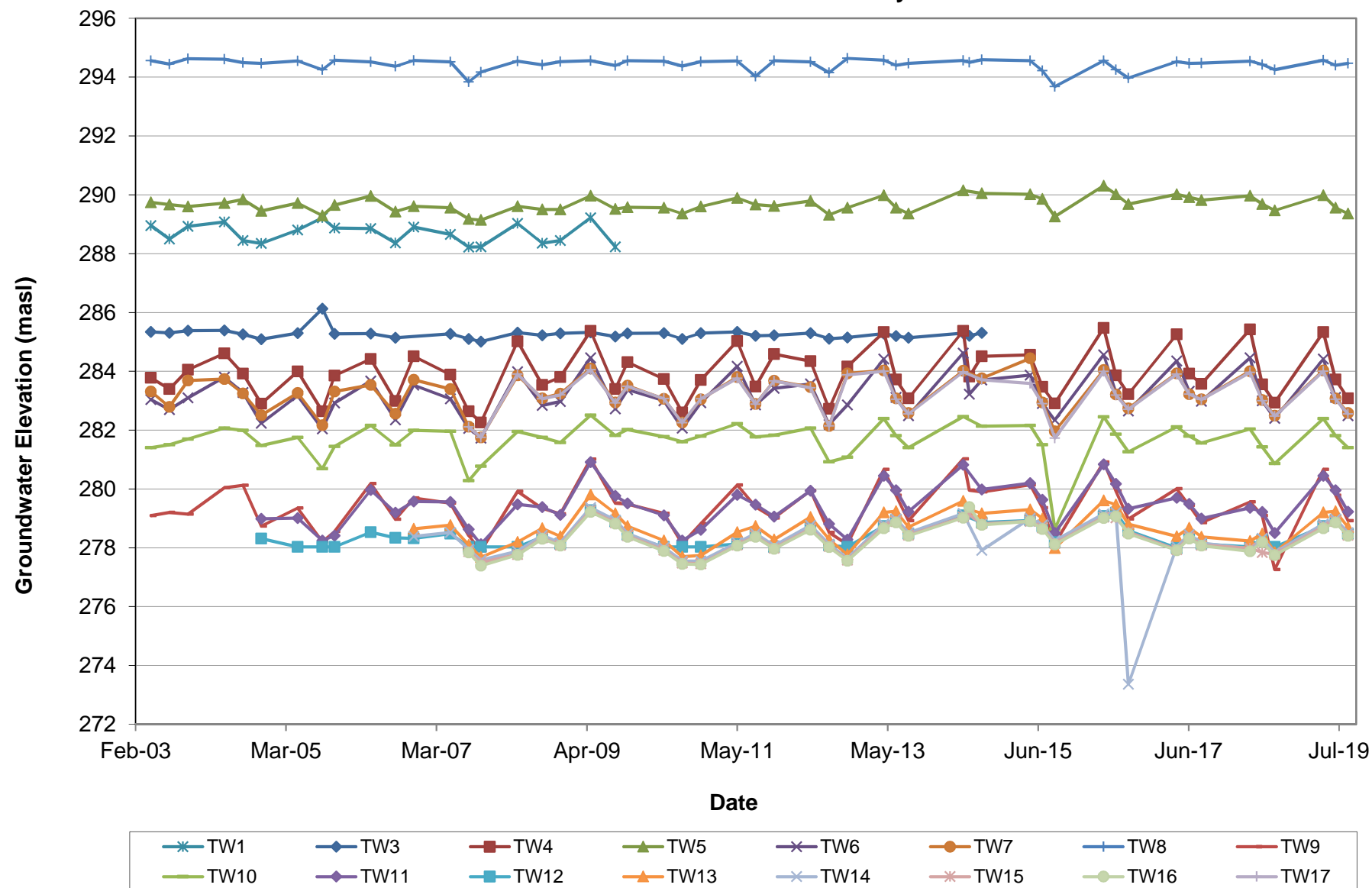
Haileybury Waste Disposal Site

Haileybury, Ontario

March 2020



Groundwater Elevation Trend Analysis



The City of Temiskaming Shores

2019 Annual Groundwater and Surface Water Monitoring Report

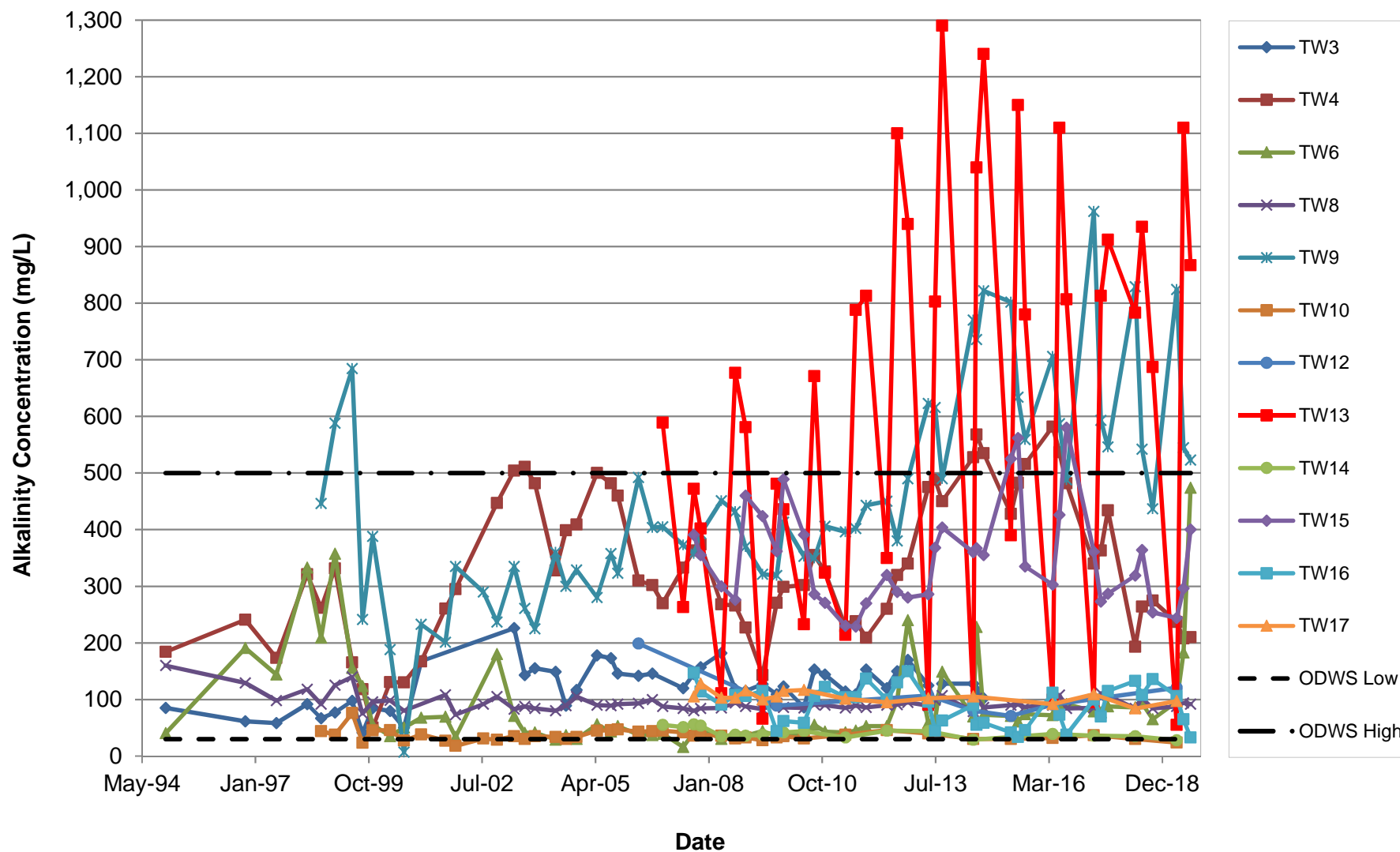
Haileybury Waste Disposal Site

Haileybury, Ontario

March 2020



Alkalinity Trend Analysis - Groundwater



The City of Temiskaming Shores

2019 Annual Groundwater and Surface Water Monitoring Report

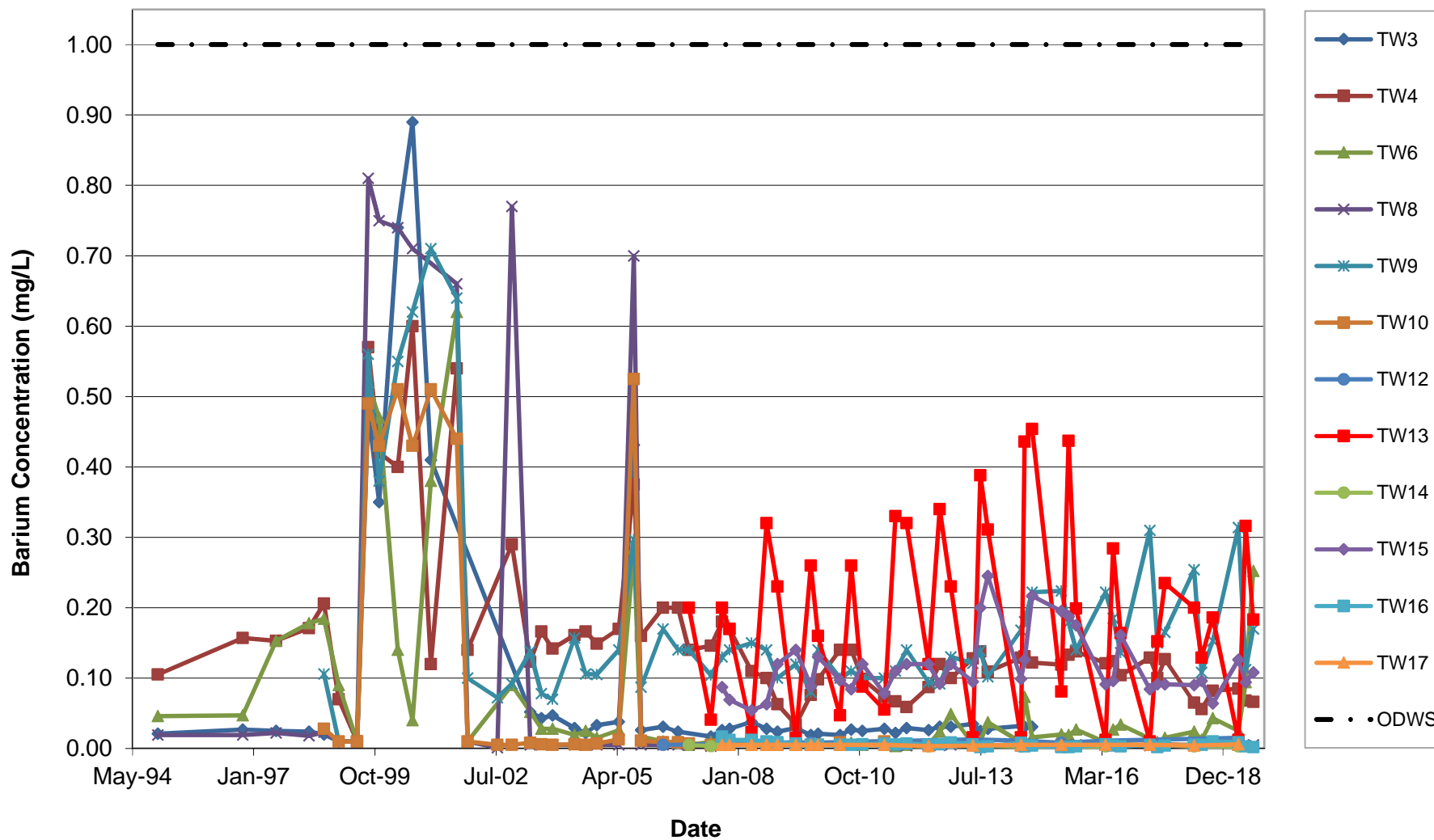
Haileybury Waste Disposal Site

Haileybury, Ontario

March 2020



Barium Trend Analysis - Groundwater



The City of Temiskaming Shores

2019 Annual Groundwater and Surface Water Monitoring Report

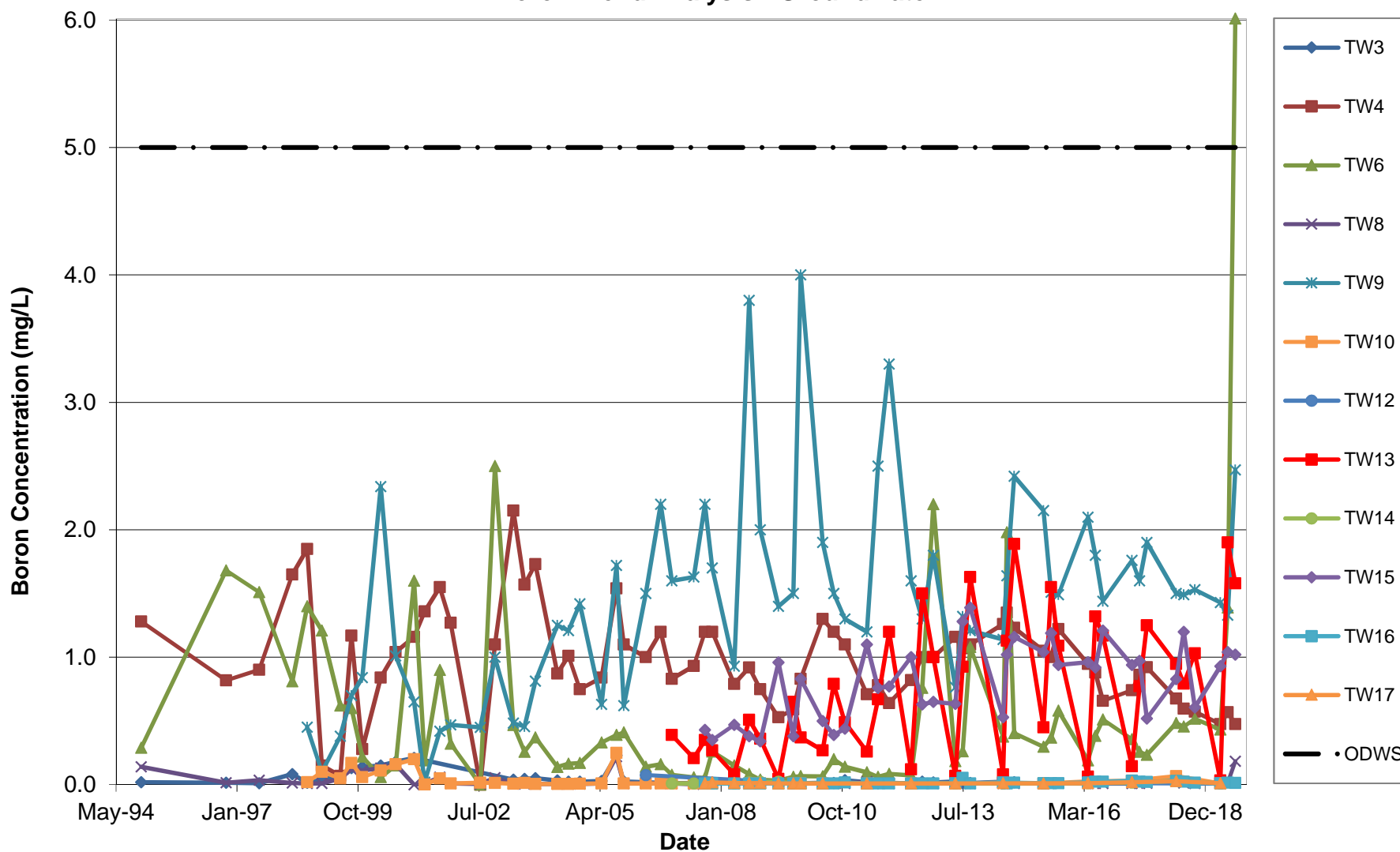
Haileybury Waste Disposal Site

Haileybury, Ontario

March 2020



Boron Trend Analysis - Groundwater



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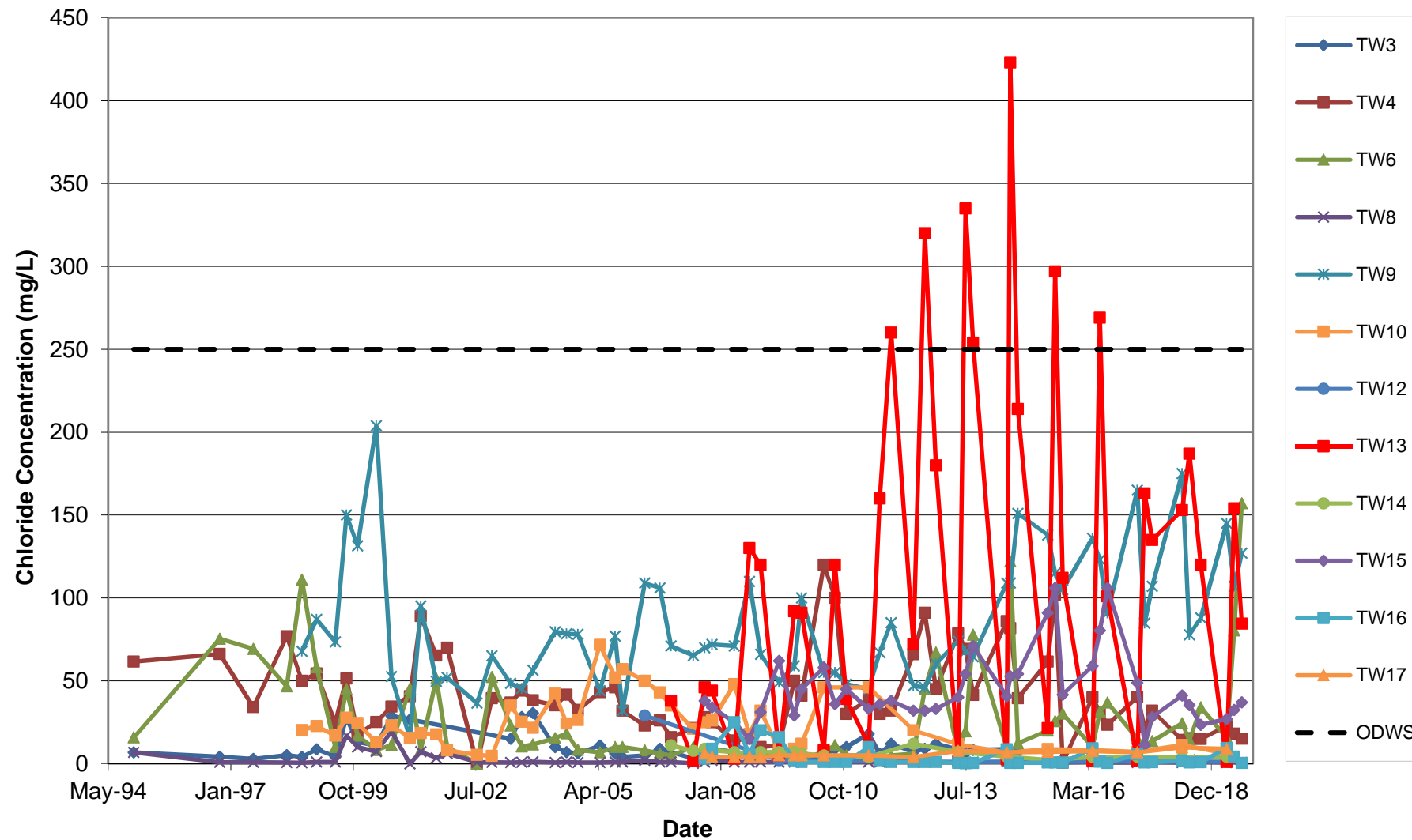
Haileybury Waste Disposal Site

Haileybury, Ontario

March 2020



Chloride Trend Analysis - Groundwater



The City of Temiskaming Shores

2019 Annual Groundwater and Surface Water Monitoring Report

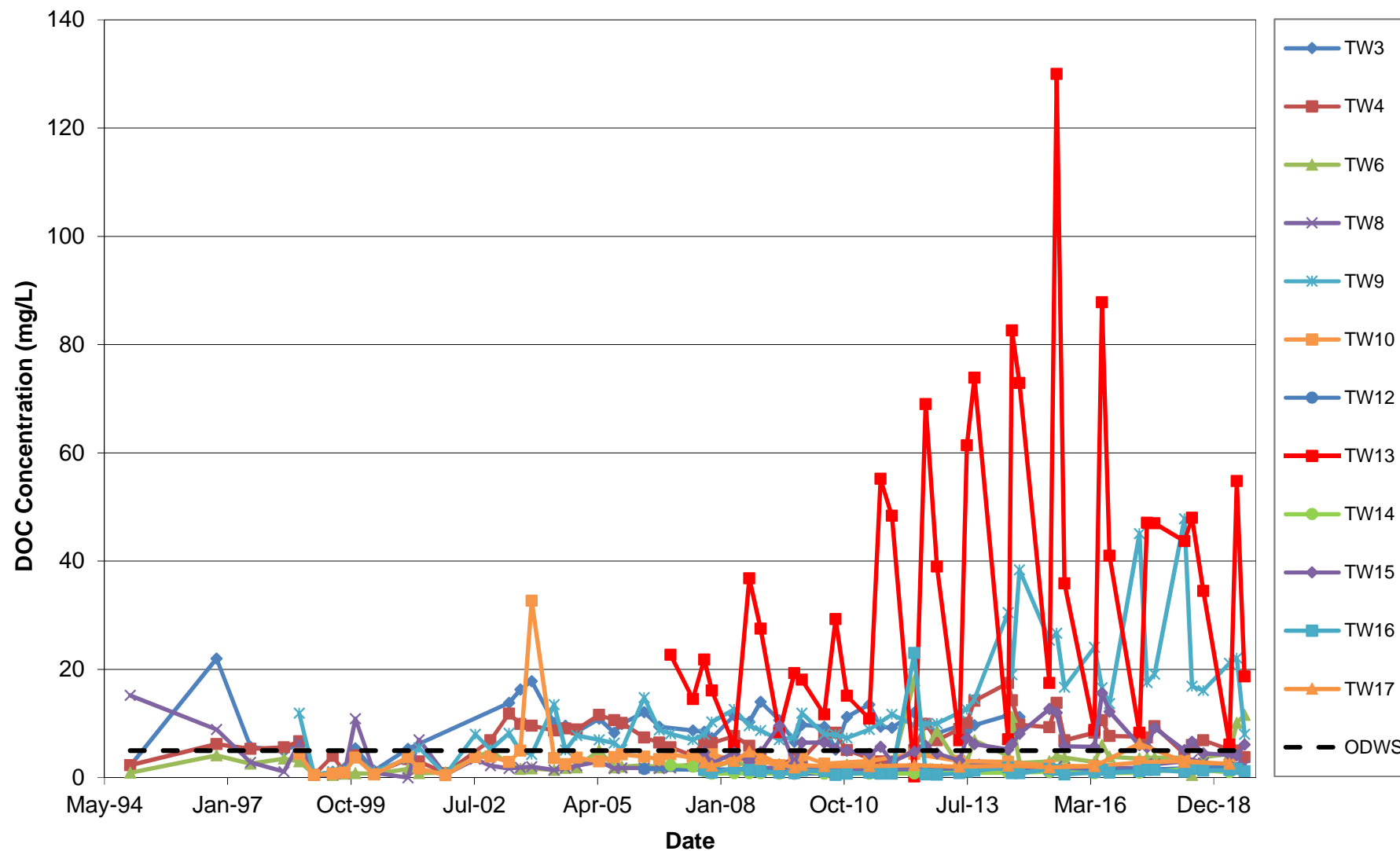
Haileybury Waste Disposal Site

Haileybury, Ontario

March 2020



Dissolved Organic Carbon Trend Analysis - Groundwater



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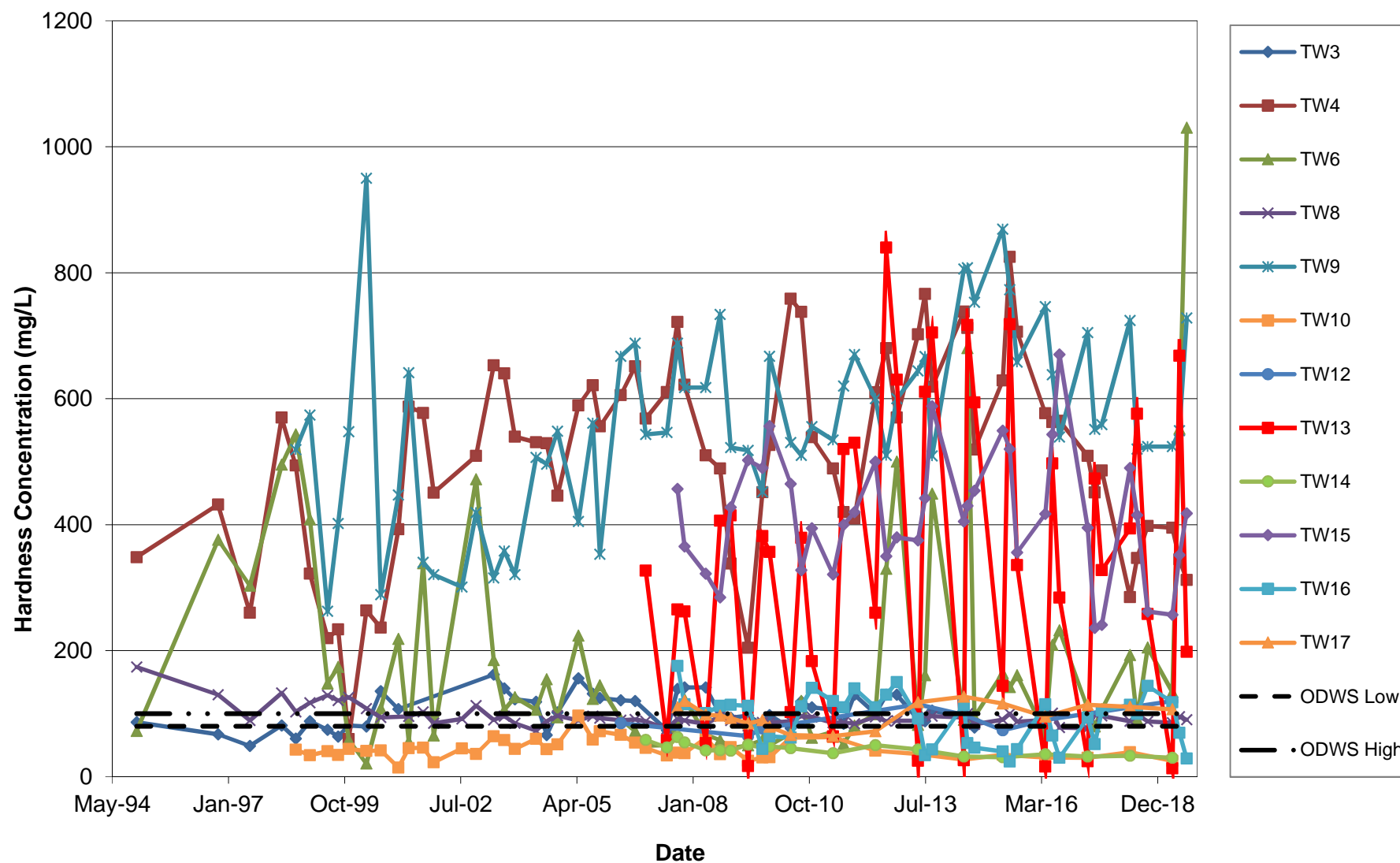
Haileybury Waste Disposal Site

Haileybury, Ontario

March 2020



Hardness Trend Analysis - Groundwater



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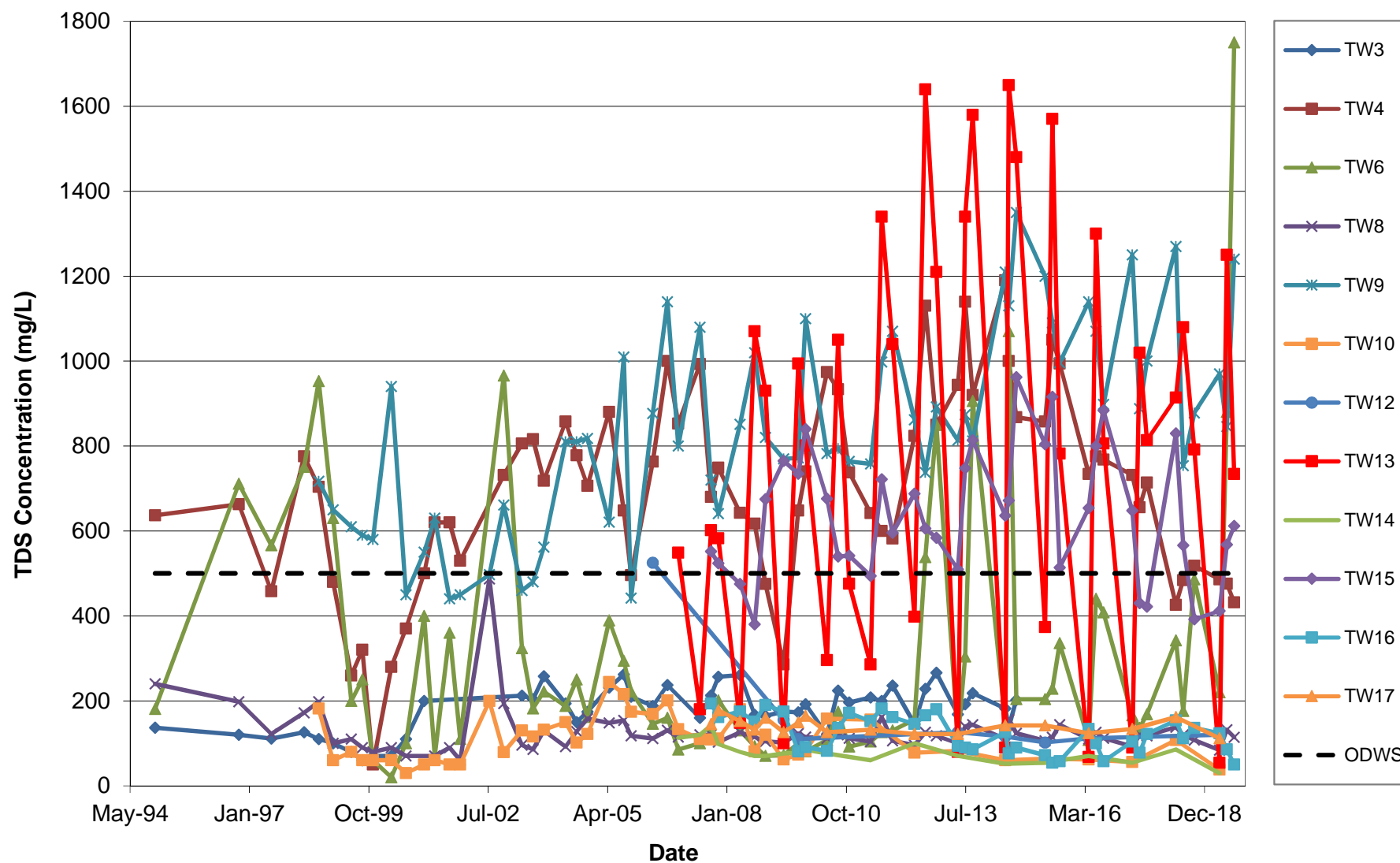
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Total Dissolved Solids Trend Analysis - Groundwater



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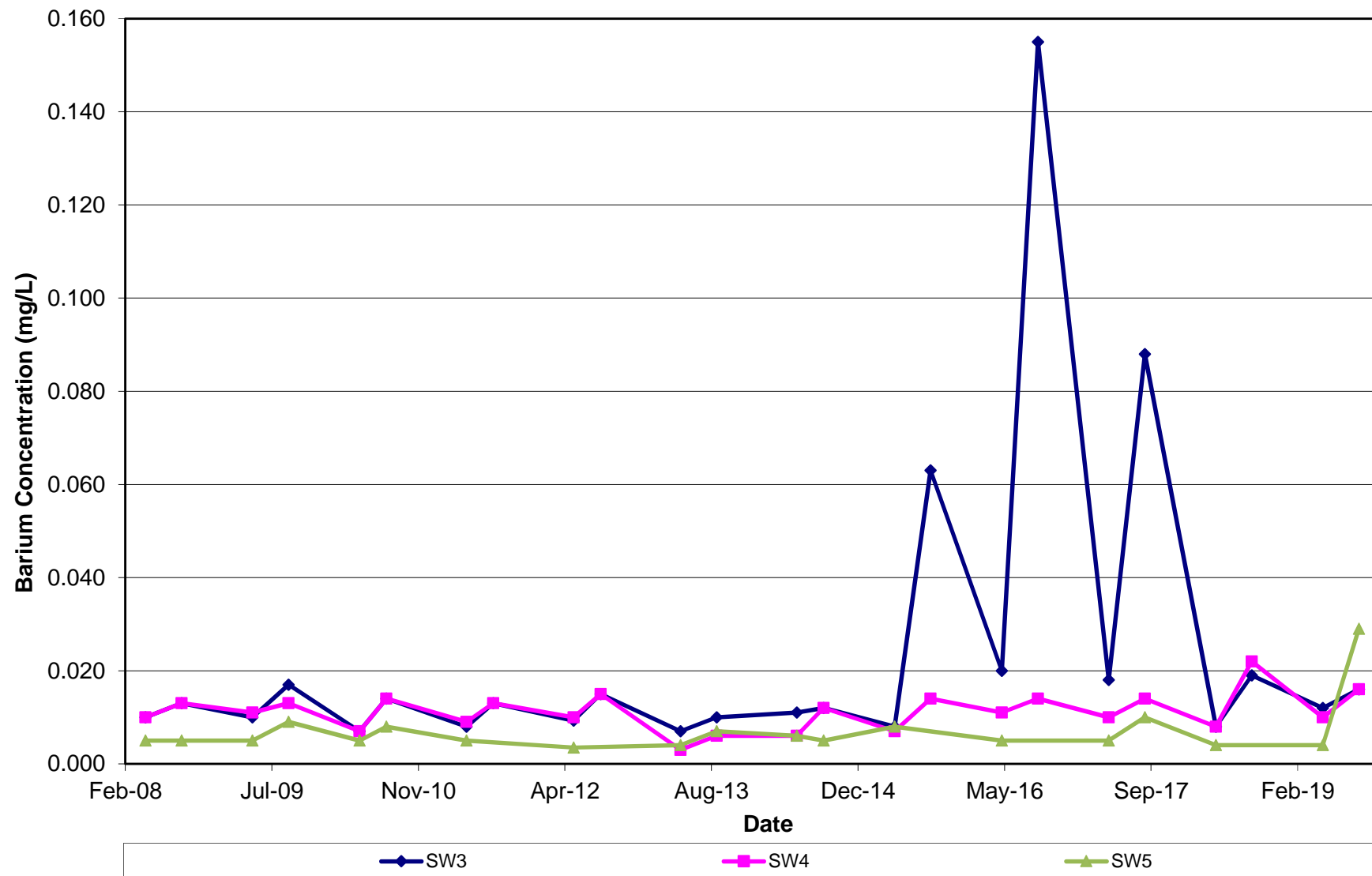
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Haileybury, Ontario

March 2020



Barium Trend Analysis - Surface Water



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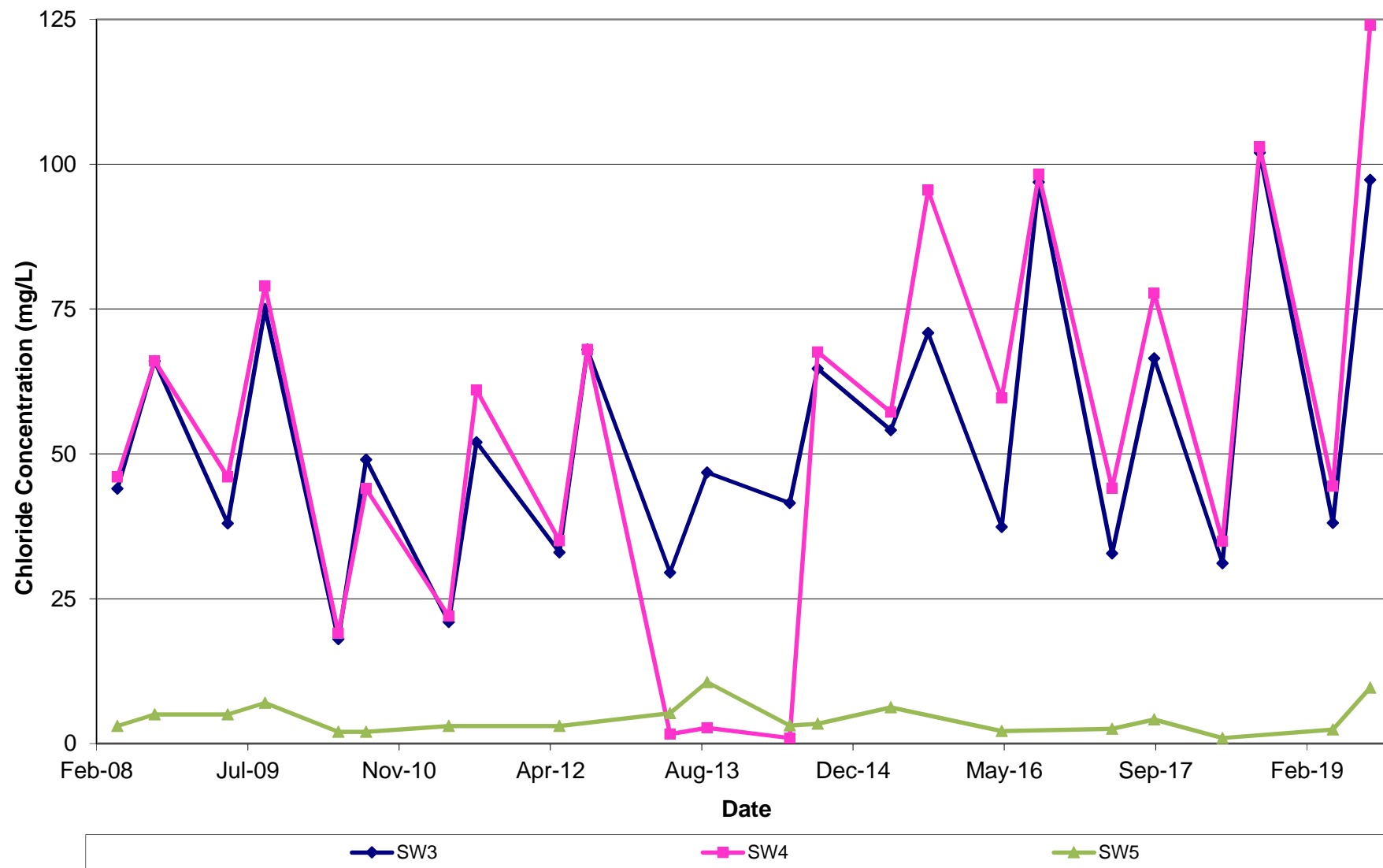
Haileybury Waste Disposal Site

Haileybury, Ontario

March 2020



Chloride Trend Analysis - Surface Water



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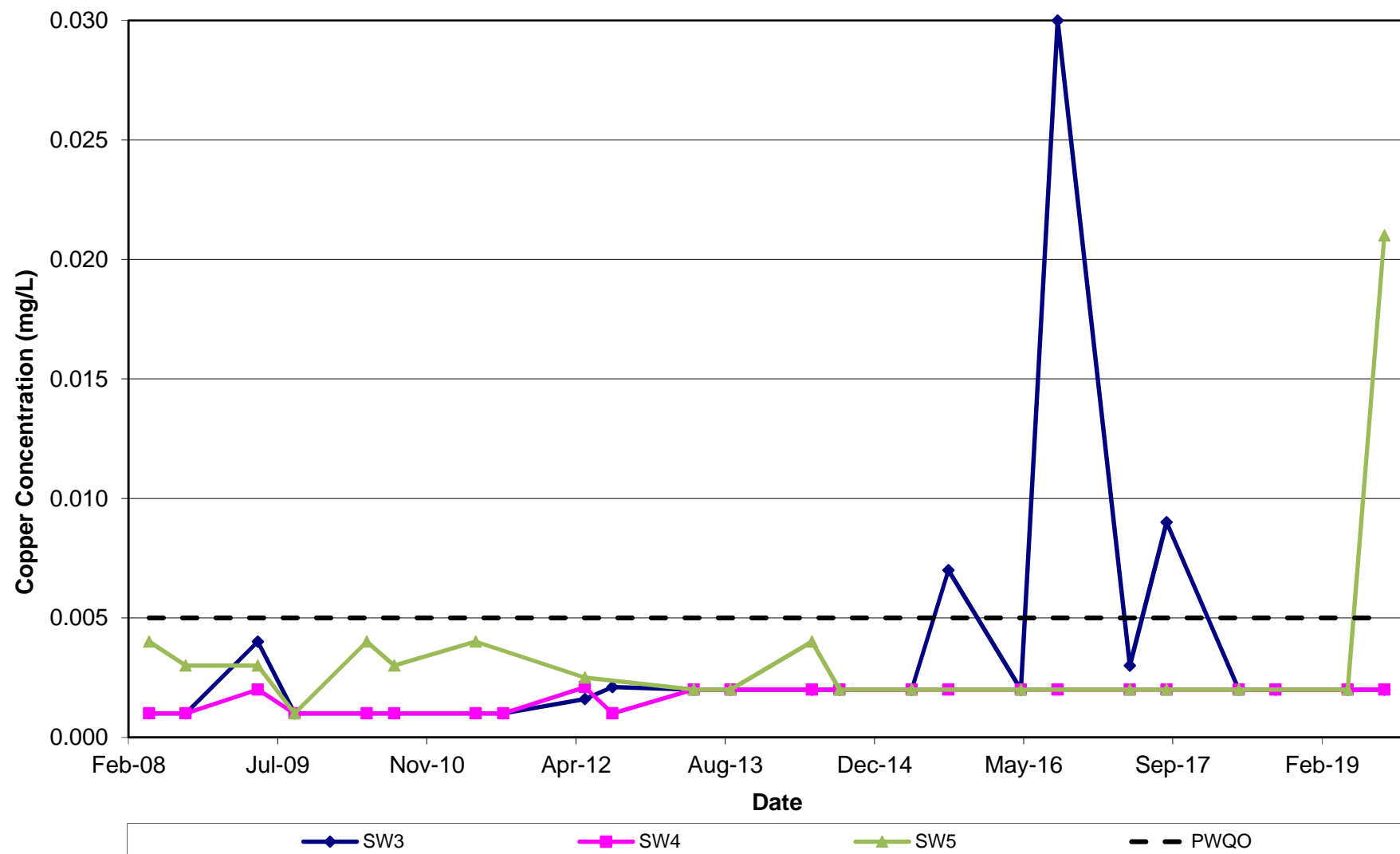
Haileybury Waste Disposal Site

Haileybury, Ontario

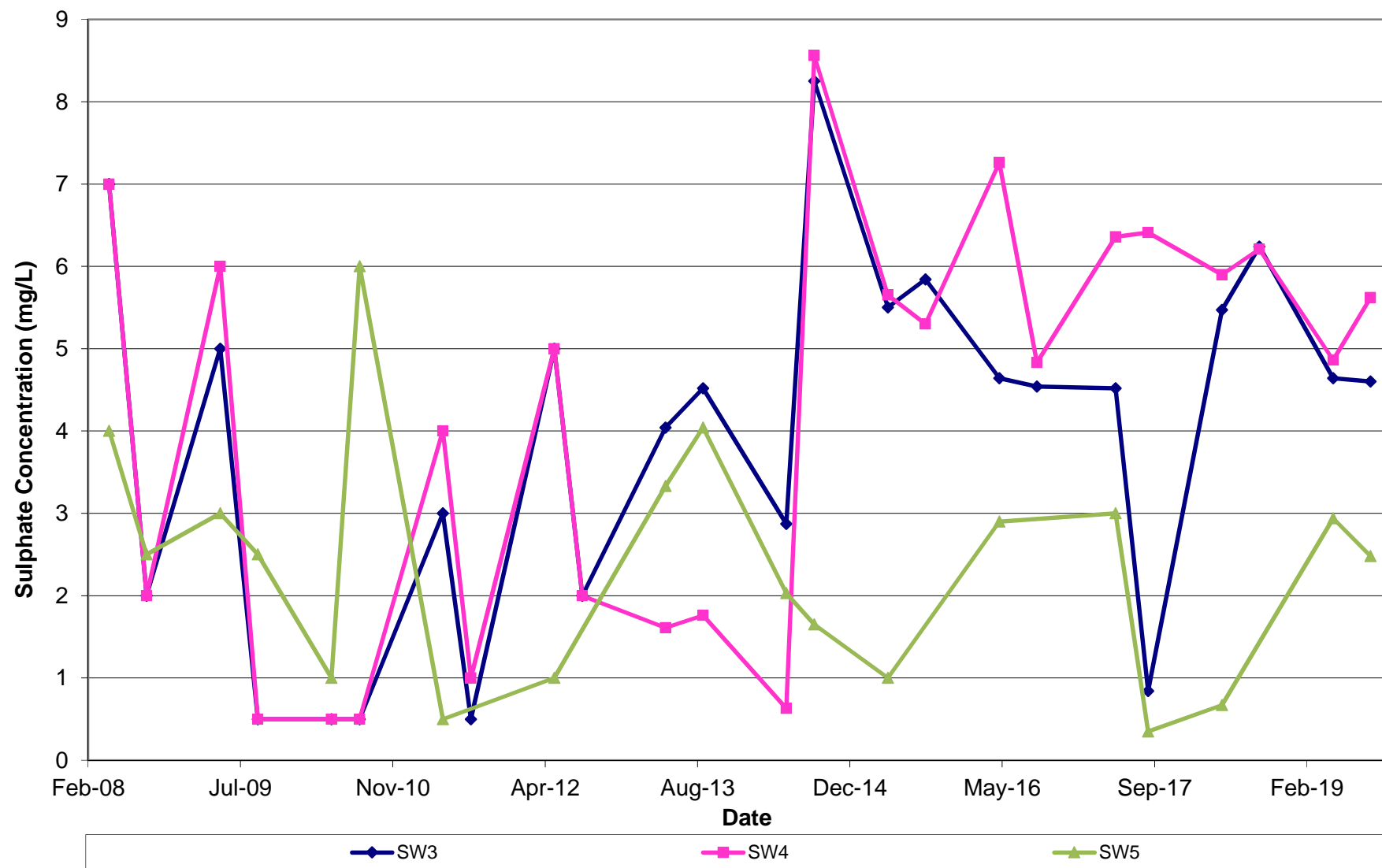
March 2020



Copper Trend Analysis - Surface Water



Sulphate Trend Analysis - Surface Water



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2019 Annual Groundwater and Surface Water Monitoring Report

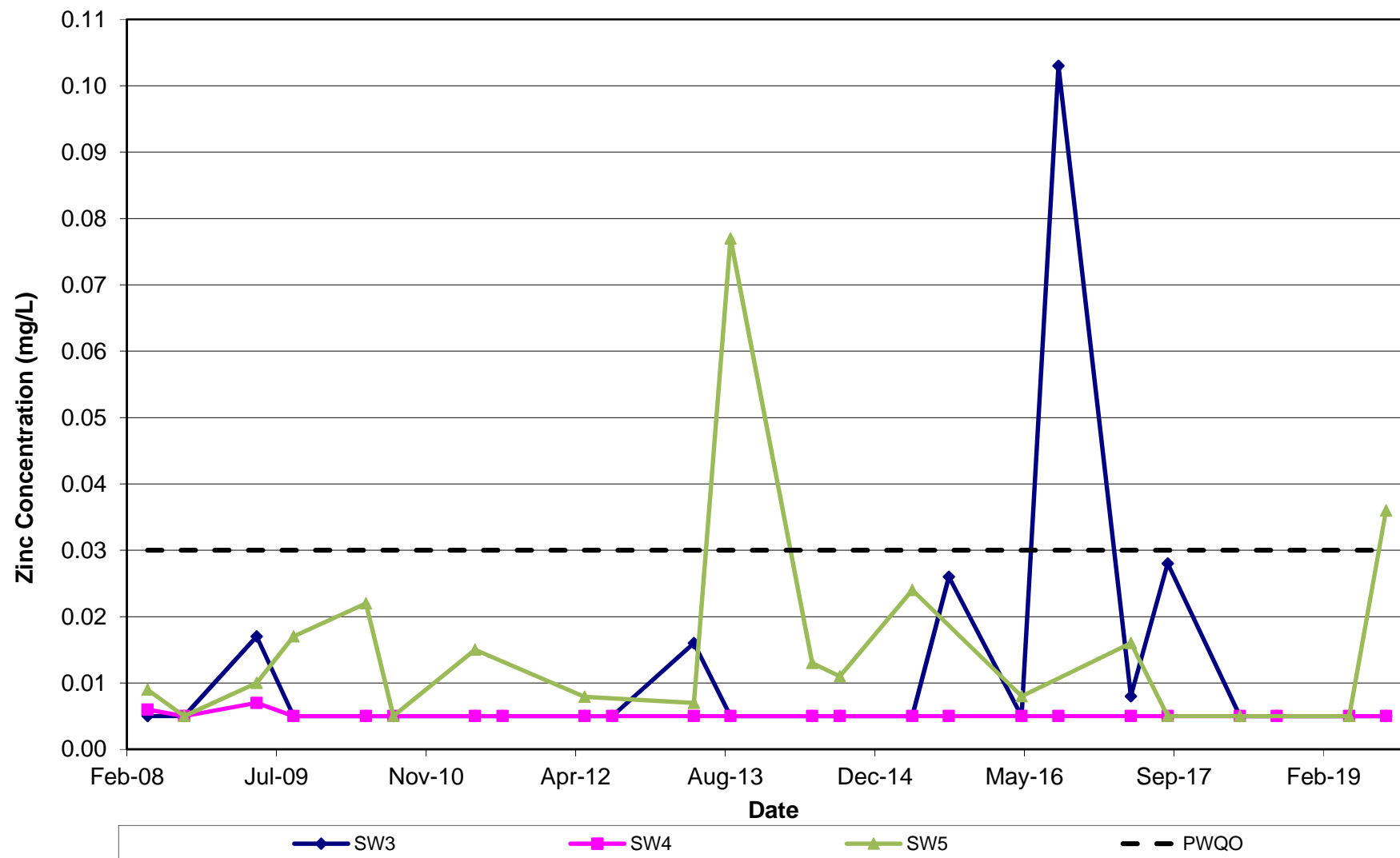
Haileybury Waste Disposal Site

Haileybury, Ontario

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Zinc Trend Analysis - Surface Water



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Haileybury Waste Disposal Site

Haileybury, Ontario

March 2020



APPENDIX H

**PHOTOGRAPHIC INVENTORY OF
GROUNDWATER AND SURFACE
WATER MONITORING LOCATIONS**



The City of Temiskaming Shores

2019 Annual Groundwater and Surface Water Monitoring Report

Haileybury Waste Disposal Site

Haileybury, Ontario

March 2020



**TW-4
2019**



**TW-4
2019**



**TW-5
2019**



**TW-5
2019**

The City of Temiskaming Shores

2019 Annual Groundwater and Surface Water Monitoring Report

Haileybury Waste Disposal Site

Haileybury, Ontario

March 2020



**TW-6
2019**



**TW-6
2019**



TW-7
2019



TW-7
2019



TW-8
2019



TW-8
2019



TW-9
2019



TW-9
2019



TW-10
2019



TW-10
2019



TW-11
2019



TW-11
2019



TW-12
2019



TW-12
2019



TW-13
2019



TW-13
2019



TW-14
2019



TW-14
2019



TW-15
2019



TW-15
2019



TW-16
2019



TW-16
2019



TW-17
2019



TW-17
2019

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2019 Annual Groundwater and Surface Water Monitoring Report

Haileybury Waste Disposal Site

Haileybury, Ontario

March 2020



**SW-3
2019**



**SW-3
2019**



**SW-4
2019**



**SW-4
2019**



**SW-5
2019**



**SW-5
2019**

APPENDIX I

GUIDELINE B-7 CALCULATIONS

The City of Temiskaming Shores

2019 Annual Groundwater and Surface Water Monitoring Report
Haileybury Waste Disposal Site
Haileybury, Ontario
March 2020



Guideline B-7 Calculations Spring 2019 Monitoring Event

Guideline B-7 Calculations				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)	TW-4 (mg/L)	TW-6 (mg/L)	TW-9 (mg/L)	TW-10 (mg/L)	TW-12 (mg/L)	TW-13 (mg/L)	TW-14 (mg/L)	TW-15 (mg/L)	TW-16 ⁽⁵⁾ (mg/L)	TW-17 (mg/L)
Health Related				x=0.25 ⁽²⁾									
Arsenic	0.01	0.001	0.004	<0.003	<0.003	0.024	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Barium	1	0.007	0.255	0.085	0.025	0.314	0.005	0.015	0.012	0.003	0.126	0.009	0.006
Boron	5	0.009	1.257	0.475	0.432	1.43	0.010	<0.010	0.033	<0.010	0.929	0.011	0.012
Cadmium	0.005	0.0002	0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Chromium	0.05	0.0023	0.014	<0.003	<0.003	0.013	<0.003	0.004	0.003	<0.003	<0.003	<0.003	<0.003
Lead	0.01	0.0006	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nitrate-N	10	0.056	2.54	13.1	7.32	<0.5	1.18	0.12	<0.05	1.15	8.88	0.07	0.31
Nitrite-N	1	0.019	0.26	<0.25	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	0.22	<0.05	<0.05
Non-Health Related				x=0.50 ⁽²⁾									
Chloride	250	1.08	125.5	22.7	15.7	145	6.21	1.16	0.94	4.18	26.9	9.35	8.91
Copper	1	0.002	0.50	<0.003	0.004	<0.003	<0.003	<0.003	0.004	<0.003	0.011	<0.003	<0.003
DOC	5	2.00	3.5	5.2	4.4	21.1	2.4	2.0	6.1	1.0	4.2	1.4	2.6
Sodium	200	2.63	101.3	15.9	19.0	119	5.05	2.93	5.07	4.49	33.7	4.91	4.75
Sulphate	500	6.53	253.3	146	56.6	109	2.99	16.6	4.04	3.52	61.4	5.35	6.92
TDS	500	119	310	486	220	970	38	120	54	30	412	124	112
Zinc	5	0.006	2.50	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Notes:

- (1) Average of valid sampling rounds at TW-8.
- (2) Defined according to Guideline B-7 (MECP, 1994).
- (3) ODWS - Ontario Drinking Water Standards (MECP, 2001).
- (4) **BOLD and shaded** indicates an exceedance of the Maximum Concentration.
- (5) Downgradient property boundary well (i.e., compliance point).

The City of Temiskaming Shores

2019 Annual Groundwater and Surface Water Monitoring Report
Haileybury Waste Disposal Site
Haileybury, Ontario
March 2020



Guideline B-7 Calculations Summer 2019 Monitoring Event

Guideline B-7 Calculations				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)	TW-4 (mg/L)	TW-6 (mg/L)	TW-9 (mg/L)	TW-13 (mg/L)	TW-15 (mg/L)	TW-16 ⁽⁵⁾ (mg/L)
Health Related				x=0.25 ⁽²⁾					
Arsenic	0.01	0.001	0.004	<0.003	<0.003	0.018	0.006	<0.003	<0.003
Barium	1	0.007	0.255	0.068	0.094	0.112	0.316	0.094	0.003
Boron	5	0.009	1.257	0.569	1.39	1.33	1.90	1.04	0.015
Cadmium	0.005	0.0002	0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Chromium	0.05	0.0023	0.014	<0.003	<0.003	0.006	0.011	<0.003	<0.003
Lead	0.01	0.0006	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nitrate-N	10	0.056	2.54	8.01	28.0	<0.5	<1.0	5.96	0.21
Nitrite-N	1	0.019	0.26	0.68	<0.25	<0.5	<1.0	<0.25	<0.05
Non-Health Related				x=0.50 ⁽²⁾					
Chloride	250	1.07	125.5	18.1	80.3	107	154	32.5	4.28
Copper	1	0.002	0.50	<0.003	0.009	<0.003	<0.003	0.008	<0.003
DOC	5	2.01	3.5	5.0	10.1	22.1	54.8	4.1	1.6
Sodium	200	2.62	101.3	16.0	59.2	90.5	185	39.5	3.02
Sulphate	500	6.48	253.2	129	346	148	11.6	93.5	5.28
TDS	500	119	310	476	880	846	1250	568	86
Zinc	5	0.006	2.50	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Notes:

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

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

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

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

(5) Downgradient property boundary well (i.e., compliance point).

The City of Temiskaming Shores

2019 Annual Groundwater and Surface Water Monitoring Report
Haileybury Waste Disposal Site
Haileybury, Ontario
March 2020



Guideline B-7 Calculations Fall 2019 Monitoring Event

Guideline B-7 Calculations				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)	TW-4 (mg/L)	TW-6 (mg/L)	TW-9 (mg/L)	TW-13 (mg/L)	TW-15 (mg/L)	TW-16 ⁽⁵⁾ (mg/L)
Health Related				x=0.25 ⁽²⁾					
Arsenic	0.01	0.001	0.004	<0.003	<0.003	0.021	0.005	<0.003	<0.003
Barium	1	0.007	0.255	0.066	0.252	0.170	0.183	0.108	0.002
Boron	5	0.010	1.257	0.476	6.01	2.47	1.58	1.02	0.013
Cadmium	0.005	0.0002	0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Chromium	0.05	0.0023	0.014	<0.003	<0.003	0.005	0.012	<0.003	<0.003
Lead	0.01	0.0006	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nitrate-N	10	0.055	2.54	6.39	38.9	<0.5	<1.0	4.42	<0.05
Nitrite-N	1	0.019	0.26	<0.25	<1.0	<0.5	<1.0	<0.25	<0.05
Non-Health Related				x=0.50 ⁽²⁾					
Chloride	250	1.07	125.5	15.1	157	127	84.4	37.0	0.41
Copper	1	0.002	0.50	<0.003	0.030	<0.003	<0.003	0.012	<0.003
DOC	5	2.01	3.5	3.8	11.6	8.0	18.7	6.1	1.2
Sodium	200	2.61	101.3	15.3	183	113	128	48.7	3.65
Sulphate	500	6.42	253.2	106	625	364	<2.0	82.0	3.01
TDS	500	119	310	432	1750	1240	734	612	50
Zinc	5	0.006	2.50	<0.005	0.005	<0.005	<0.005	<0.005	<0.005

Notes:

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

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

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

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

(5) Downgradient property boundary well (i.e., compliance point).

APPENDIX J

**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	Haileybury Waste Disposal Site
Location (e.g. street address, lot, concession)	~9 km southwest of Haileybury, Ontario, Lot 1, Concession 2, within the City of Temiskaming Shores, in the District of Temiskaming
GPS Location (taken within the property boundary at front gate/ front entry)	593843 Easting and 5252782 Northing, NAD83 Zone 17
Municipality	The City of Temiskaming Shores
Client and/or Site Owner	The City of Temiskaming Shores
Monitoring Period (Year)	2019
This Monitoring Report is being submitted under the following:	
Certificate of Approval No.:	A570402
Director's Order No.:	
Provincial Officer's Order No.:	
Other:	

Report Submission Frequency	<input checked="" type="radio"/> Annual <input type="radio"/> Other	Specify (Type Here):
The site is:	<input checked="" type="radio"/> Active <input type="radio"/> Inactive <input type="radio"/> 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?	<input type="radio"/> Yes <input checked="" type="radio"/> 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)	<input type="radio"/> Yes <input checked="" type="radio"/> 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:	<input checked="" type="radio"/> Yes <input type="radio"/> 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):	<input checked="" type="radio"/> Yes <input type="radio"/> No <input type="radio"/> 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

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.		<input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> 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:		<input type="radio"/> Yes <input type="radio"/> No <input checked="" type="radio"/> 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	
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):		<input checked="" type="radio"/> Yes <input type="radio"/> No	If no, specify (Type Here):

Sampling and Monitoring Program Results/WDS Conditions and Assessment:

<p>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.</p>	<p><input checked="" type="radio"/> Yes <input type="radio"/> No</p>	<p>If no, the potential design and operational concerns/ exceptions are as follows (Type Here):</p>	
<p>6) The site meets compliance and assessment criteria.</p>	<p><input checked="" type="radio"/> Yes <input type="radio"/> No</p>	<p>If no, list and explain exceptions (Type Here):</p>	
<p>7) The site continues to perform as anticipated. There have been no unusual trends/ changes in measured leachate and groundwater levels or concentrations.</p>	<p><input checked="" type="radio"/> Yes <input type="radio"/> No</p>	<p>If no, list exceptions and explain reason for increase/change (Type Here):</p>	
<p>1) Is one or more of the following risk reduction practices in place at the site:</p> <p>(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</p> <p>(b) There is a predictive monitoring program in-place (modeled indicator concentrations projected over time for key locations); or</p> <p>(c) The site meets the following two conditions (typically achieved after 15 years or longer of site operation):</p> <p><i>i.</i>The site has developed stable leachate mound(s) and stable leachate plume geometry/concentrations; and</p> <p><i>ii.</i>Seasonal and annual water levels and water quality fluctuations are well understood.</p>	<p><input checked="" type="radio"/> Yes <input type="radio"/> No</p>	<p>Note which practice(s):</p>	<p><input type="checkbox"/> (a) <input type="checkbox"/> (b) <input checked="" type="checkbox"/> (c)</p>
<p>9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):</p>	<p><input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> Not Applicable</p>	<p>If yes, list value(s) that are/have been exceeded and follow-up action taken (Type Here):</p>	

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

Type Here

☐ The following change(s) to the monitoring program is/are recommended:

☒ No Changes to site design and operation are recommended

Type Here

☐ The following change(s) to the site design and operation is/are recommended:

Name:	Brian Grant		
Seal:	Add Image		
Signature:	<div><div>brian.grant</div><div>Digitally signed by brian.grant Date: 2020.02.24 11:59:18 -05'00'</div></div>	Date:	24-Feb-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:	<div></div>	Date:	Select Date
Signature:	<div></div>	Date:	Select Date

<h2>Surface Water WDS Verification:</h2>		
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)	Intermittent stream and unnamed tributary to South Wabi Creek.	
Distance(s)	Intermittent stream is situated immediately adjacent to site, flowing along the southern property boundary. Unnamed tributary to South Wabi Creek is situated 100 m from the southwest corner of the site property at its nearest point.	
Based on all available information and site knowledge, it is my opinion that:		
<h3>Sampling and Monitoring Program Status:</h3>		
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:	<input checked="" type="radio"/> Yes <input type="radio"/> No	If no, identify issues (Type Here):
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):	<input checked="" type="radio"/> Yes <input type="radio"/> No <input type="radio"/> 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

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.		<input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> 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:		<input type="radio"/> Yes <input type="radio"/> No <input checked="" type="radio"/> 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):	<input checked="" type="radio"/> Yes <input type="radio"/> No	If no, specify (Type Here):	

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
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)?	<input checked="" type="radio"/> Yes <input type="radio"/> No	No exceedances were detected.

<p>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.</p>	<p><input checked="" type="radio"/> Yes</p> <p><input type="radio"/> No</p>	
<p>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)):</p>	<p><input checked="" type="radio"/> Yes</p> <p><input type="radio"/> No</p> <p><input type="radio"/> Not Known</p> <p><input type="radio"/> Not Applicable</p>	<p>No remedial measures are necessary.</p>
<p>9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):</p>	<p><input type="radio"/> Yes</p> <p><input checked="" type="radio"/> No</p> <p><input type="radio"/> Not Applicable</p>	<p>If yes, list value(s) that are/have been exceeded and follow-up action taken (Type Here)</p>

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:

<div><input checked="" type="radio"/> No Changes to the monitoring program are recommended</div> <div><input type="radio"/> The following change(s) to the monitoring program is/are recommended:</div>	Type Here
<div><input checked="" type="radio"/> No changes to the site design and operation are recommended</div> <div><input type="radio"/> The following change(s) to the site design and operation is/are recommended:</div>	Type Here

CEP Signature	 brian.grant Digitally signed by brian.grant Date: 2020.02.24 11:59:58 -05'00'	
Relevant Discipline	Hydrogeologist	
Date:	24-Feb-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