



REVISED

2020 Annual Monitoring Report

Chapman Waste Disposal Site
Magnetawan, Ontario

Prepared for:

Municipality of Magnetawan

4304 Highway 520
Magnetawan, ON P0A 1P0

February 24, 2021

Pinchin File: 225335.003



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1.0 INTRODUCTION

Pinchin Ltd. (Pinchin) was retained by the Corporation of the Municipality of Magnetawan (Client) to prepare the 2020 annual groundwater and surface water monitoring report for the Chapman Waste Disposal Site (the Site). The following report provides a detailed evaluation and summary of the 2020 monitoring data and was completed to constitute the 2020 Annual Monitoring Report. This document includes, but is not limited to, a summary of historical geochemical data, a review/evaluation of the historical and current geochemical data (as well as groundwater flow), and a summary of geochemical trends.

The purpose of completing the monitoring program was to assess the hydraulic media for contaminants of concern as a compliance requirement under the Site Certificate of Approval (CofA) Number **A521202** and the applicable regulatory requirements during the spring and fall of 2020. To achieve the reporting objectives of this Site monitoring program, Pinchin carried out groundwater and surface water sampling at the Site in general accordance with the documents referenced within this report.

1.1 Location

The Site property is located in Lot 108, Concession A, within the Municipality of Magnetawan, District of Parry Sound, Ontario and is located approximately 5.5 kilometres (km) northeast of the Township of Magnetawan, Ontario. The Site is situated in an undeveloped area and the visibility of landfilling activities is limited from the adjacent roadway due to mature tree growth. The Site location is indicated on Figure 1 (all Figures are provided in Appendix I).

The Site is located at Universal Transverse Mercator (UTM) coordinates Zone 17U, 606,831 metres (m) Easting and 5,063,200 m Northing (North American Datum 1983). Landfill coordinates were obtained using a Global Positioning System and are accurate within 10 m.

1.1.1 Site Survey and Aerial Photography

At the time of preparation of this report, previous survey information of the Site and existing monitoring well elevations were provided to Pinchin for review. During September 2018, Pinchin installed additional monitoring wells at the Site. A survey of the top of casings for these newly installed wells was completed by Pinchin in 2020. The available top of casing monitoring well elevation data obtained from the previous survey and the 2020 survey has been used in the following sections of this report to calculate groundwater elevation contours.

A topographic survey of the Site was completed using an Unmanned Aerial Vehicle (UAV) in 2019 and was provided to Pinchin for the purpose of calculating the remaining waste capacity and remaining lifespan for the Site.



The results of the topographic survey indicated that the Site had an approximate remaining capacity of 38,267.60 cubic meters (m³) and an approximate remaining Site lifespan of 15 years. Pinchin completed a report for the Municipality of Magnetawan titled "Waste Capacity Study, Chapman Waste Disposal Site, Magnetawan, Ontario", dated September 24, 2019, which further discussed the results of the topographic UAV survey.

1.2 Ownership and Key Personnel

The Site is owned and operated by the Corporation of the Municipality of Magnetawan, located in Magnetawan, Ontario. The project was completed for the following representative on behalf of the Municipality:

Kerstin Vroom, Clerk/CAO

Municipality of Magnetawan Government Office

4304 Highway #520

Magnetawan, ON P0A 1P0

The Competent Environmental Practitioner (CEP) for the Site groundwater and surface water monitoring program was Mr. Tim McBride of Pinchin Ltd. Mr. McBride's contact information is provided below:

Mr. Tim McBride, B.Sc., P.Geo., Q.P.^{ESA}

Pinchin Ltd.

957 Cambrian Heights Drive, Suite #203

Sudbury, ON P3C 5S5

1.3 Description and Development of the Site

The Site is operated as a landfill for municipal and non-hazardous solid domestic and commercial wastes to be utilized by residences of the area. The Site was approved with a total fill area of 1.2 hectares (ha) within a 41-ha property. A road with a locked gate is located northwest of the Site which provides access to the Site from the southeast side of Rocky Road approximately 200 m east of the intersection of Rocky Road and Nipissing Road North. Landfilling began at the Site prior to 1980 and the active landfilling area is currently located within the central portion of the Site.

A map illustrating the site features is provided as Figure 2.



1.3.1 Site Document Review

Pinchin reviewed the following reports for the Site and are referenced within this document:

- Report entitled “*2017 Annual Monitoring Report, Chapman Waste Disposal Site, Magnetawan, Ontario*” completed by D.M. Wills Associates Limited for the Corporation of the Municipality of Magnetawan dated March 2018 (the 2017 D.M. Wills Monitoring Report);
- Report entitled “*2018 Annual Monitoring Report, Chapman Waste Disposal Site, Magnetawan, Ontario*” completed by D.M. Wills Associates Limited for the Corporation of the Municipality of Magnetawan dated March 2019 (the 2018 D.M. Wills Monitoring Report);
- Report entitled “*Leachate Management Plan Study, Chapman Waste Disposal Site, Magnetawan, Ontario*” completed by Pinchin Ltd. for the Corporation of the Municipality of Magnetawan dated April 30, 2019 (the 2019 Leachate Management Study Report);
- Report entitled “*Waste Capacity Study, Chapman Waste Disposal Site, Magnetawan, Ontario*” completed by Pinchin Ltd. for the Corporation of the Municipality of Magnetawan dated September 24, 2019 (the 2019 Waste Capacity Study Report); and
- Report entitled “*2019 Annual Monitoring Report, Chapman Waste Disposal Site, Magnetawan, Ontario*” completed by Pinchin Ltd. for the Corporation of the Municipality of Magnetawan dated December 12, 2019 (the 2019 Pinchin Monitoring Report).

A copy of these documents can be obtained from the Client. Pinchin has relied on the information available in the previous environmental reports reviewed for the Site as part of this assessment. Information reviewed within these reports is referenced in pertinent sections throughout this document.

1.4 Monitoring and Reporting Program Objectives and Requirements

The site specific CofA for the Site was not provided to Pinchin for review at the time of this monitoring period. The monitoring and reporting completed by Pinchin has been generally developed based on the Ministry of Environment, Conservation and Parks (MECP) document entitled “*Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water Technical Guidance Document*” dated November 2010, as well as the Client’s request for 2020 monitoring and annual reporting.



1.5 Assumptions and Limitations

Pinchin has assumed that the information generated from historical investigations is accurate and has been completed in accordance with standard engineering practices and regulations. It should be noted that the historical background information made available to Pinchin by the Client was limited, and as such, previous reports have been relied on for information where required.

The scope of the monitoring activities was limited to the parameters listed in the previous monitoring reports for groundwater and surface water and was limited to the immediate area surrounding the Site. The investigations were limited solely to the groundwater within the monitoring well installations on-Site and the surface water surrounding the Site. The investigation does not constitute an exhaustive investigation of the Site property or adjacent properties for potentially unknown contaminants and/or other unknown sources of environmental impact.

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

- 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;
- 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;
- 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 Pinchin;
- 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;
- 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;



- 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;
- 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, Pinchin must be notified in order that we may determine if modifications to our conclusions are necessary;
- The utilization of Pinchin's services during future monitoring at the Site will allow Pinchin 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; and
- 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. Pinchin 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

A detailed investigation of the Site geology and hydrogeology was outlined in the 2019 Leachate Management Study Report completed by Pinchin. Based on the report, the regional geology at the Site is dominated by the presence of shallow Precambrian bedrock, with a thin veneer of overburden deposits and frequent bedrock outcroppings. Details provided in the 2017 and 2018 D.M. Wills Monitoring Reports indicated that an incised bedrock low was observed, trending southwest to northeast, and was infilled with glaciolacustrine sand deposits of depths of up to 10 m. Based on these observations, the hydrogeological setting of the Site can best be described as a buried bedrock valley of low permeability, infilled with coarse granular materials of high permeability. This setting results in a flow system that is contained within the overburden infill materials, but heavily controlled by bedrock topography.

According to the 2019 Leachate Management Study Report, it has been suggested that the landfill development may have been initiated within a historical aggregate extraction pit, on the western half of the Site, with a bedrock high located in the central portion of the landfill footprint area. This second bedrock high trends easterly and results in bedrock outcrop east to the fill deposits with a significant topographic slope towards the south.



Pinchin installed seven new monitoring wells at the Site between September 26 to 28, 2018 for the Hydrogeology Assessment as part of the 2019 Leachate Management Plan Study. Based on the results of these well installations, the subsurface soil conditions at the Site are observed to consist of course sand or sand and silt overburden materials. Bedrock was encountered at the Site at depths of approximately 2 metres below ground surface (mbgs) to 4 mbgs in wells located towards the south and the east of the Site. Borehole logs for the newly installed monitoring wells on-Site are provided in Appendix II. No other borehole logs were provided to Pinchin for review.

Based on the 2019 Leachate Management Study report, the groundwater flow system most representative of the performance of the Site occurs within the underlying unconfined overburden aquifer. Bedrock drilling in the area suggests very competent rock with limited significant water-bearing fractures. The presence of a pronounced bedrock ridge located near the middle of the Site, which trends west to east, appears to present a buried bedrock valley. This feature confines the horizontal and vertical extent of the landfill leachate impacts, but also results in the discharge of these waters to the surface along a bedrock plane that outcrops in the incised valley associated with adjacent surface water features.

Static water levels were recorded by Pinchin in all of the accessible wells for each of the 2020 groundwater monitoring events. Water levels were measured prior to purging and developing in preparation for sampling, to ensure the water levels are representative of static conditions. Tables that summarize the spring and fall 2020 groundwater elevations, as measured by Pinchin personnel, are presented in Appendix III.

In general, the static groundwater levels exist within 6.5 m of surface for most wells, with the deepest depth to water (5.87 mbgs) recorded at BH-2, located directly east of the fill deposits, during the fall monitoring event. In the monitoring wells directly downgradient of the landfill deposits the static water levels range between 1 to 6 m below grade and become deeper with distance from the landfill footprint with static levels ranging between 3 to 6 m towards the eastern portion of the existing groundwater monitoring network (i.e. BH5-II, BH6-III and BH8-I).

Groundwater movement at the Site has been established (by water level contouring), as being directed in a west to east direction and is similar to that of the orientation of the buried bedrock valley, confirming the conceptual model of a flow system influenced by the underlying bedrock topography.

2.2 Surface Water Features

According to previous annual water quality monitoring reports, the 2019 Leachate Management Study Report and the findings of a Site visit completed by Pinchin, it is documented that two surface water features are present in the immediate vicinity of the Chapman Waste Disposal site.



The first creek exists along the southern perimeter of the landfill area, flowing from west to east. Surface water monitoring location SW1 is situated within this creek, in an upstream area. This creek flows year-round, with varying flow rates depending on meltwater and precipitation events. The second creek exists along the eastern perimeter of the landfill, flowing from north to southeast. Surface water monitoring location SW3 is situated within this creek. This creek is more ephemeral in nature, with very small flows outside of seasonal precipitation-based events. The 2019 Leachate Management Study Report indicates that there is currently a leachate seep located on the banks of the second tributary upstream of the confluence with the larger creek. Surface water monitoring location SW2 is situated downstream of the confluence of the two streams, at a culvert on Millers Road.

2.3 Historical Data

Pinchin reviewed the 2017 and 2018 D.M. Wills Annual Monitoring Reports and the 2019 Pinchin Monitoring Report to evaluate historical data and groundwater and surface water quality conditions. No other water quality data from the existing monitoring well network was available to review as part of this monitoring program.

2.3.1 Historical Groundwater Data

Monitoring well BH3 was determined to be located upgradient of the waste deposits and has historically been used to monitor background water quality at the Site. This monitoring well was observed during the fall 2017 sampling event to have been destroyed, as a result of earthmoving/landfilling operations at the Site. Monitoring well BH3-II was installed in 2018 by Pinchin as a replacement and is considered representative of background water quality at the Site. In 2019, an average of the historical results from previous background monitoring well BH3 and the current results from newly installed monitoring well BH3-II was applied as the source of background water quality for the Guideline B-7 calculations. Based on a review of the historical data at BH3 and the new data at BH3-II, background water quality conditions at the Site are characterized by low levels of landfill indicator parameters, with the exception of alkalinity which is generally below the acceptable range set by the Ontario Drinking Water Quality Standards (ODWQS).

Based on the results of the previous monitoring reports, significant landfill related impacts at the Site were not identified. The report indicated that moderate leachate impacts were observed immediately downgradient of the Site which naturally attenuated with further distance from the Site, however temperate leachate impacts were identified at the furthest downgradient wells. Elevated concentrations of hardness (high), nitrate, DOC, manganese, and turbidity parameters within the groundwater samples analyzed at the furthest downgradient monitoring locations were in exceedance of the Guideline B-7 criteria in 2019.

These parameters are all related to operational guidelines and/or aesthetic objectives associated with drinking water systems set by the ODWQS and are not considered to be an immediate significant human health or environmental concern originating from the Site, with the exception of nitrate which is a health-related parameter. The elevated concentrations of nitrate were only quantified in some downgradient wells and often fluctuate throughout the historical record. It was noted that these concentrations should be confirmed during future monitoring events. Furthermore, concentrations of nitrate quantified at the downgradient groundwater wells were not interpreted to be impacting the surface water quality at the Site as nitrate concentrations are observed to be at low levels at downstream monitoring location SW2.

2.3.2 Historical Surface Water Data

A review of the previous monitoring reports identified leachate effects at the immediately downgradient surface water location, SW3, and slight leachate effects at further downstream surface water location, SW2. The reports indicated that the leachate effects observed were relatively minor, with concentrations below the Provincial Water Quality Objectives (PWQO), except for naturally elevated iron, aluminum, phenols, and cobalt; which were also observed at background monitoring location SW1. Based on the results of the report, significant concentrations of landfill related contaminants were not observed at downgradient surface water receptors.

2.3.3 Historical Site Performance

The Site currently operates as a typical natural attenuation waste disposal facility. No liner or other leachate collection/management system is in place at the Site. The 2019 Leachate Management Plan Study report indicated that a leachate-impacted groundwater seep/spring had been identified in a downgradient area (east of the Site, upstream from SW3 and in the vicinity of well BH9), resulting in the discharge of said waters to an adjacent surface water feature. This discharge essentially short circuits the natural attenuation process and has the potential to have negative effects on the surface water feature. The Corporation of the Municipality of Magnetawan initiated a proactive approach to leachate management and retained Pinchin to complete the Leachate Management Plan Study. The surface water quality data collected for the study indicated that an impact from the leachate seep is being observed in the two adjacent creeks and it was recommended that steps should be taken to eliminate the seep. These steps include infilling the incised valley and relocating the creek to eliminate the seep, creating an extended CAZ boundary for additional leachate attenuation to occur prior to discharge to surface water bodies. The report also outlined a trigger level program and contingency plan, recommended to be implemented at the Site following the elimination of the seep to monitor the impacts.

3.0 METHODOLOGY

3.1 Scope of Work

The objectives of the monitoring program as requested by the Client included the following scope of work:

- Mobilization to the Site during the spring and fall of 2020 and collection of groundwater and surface water samples from the existing well network and surface water monitoring locations;
- Submission of the groundwater and surface water samples to an accredited analytical laboratory for analysis of the chemical parameters outlined in the previous monitoring reports; and
- Preparation of a report outlining the 2020 field work completed and the analytical results, an evaluation of the results and any subsequent recommendations.

The investigation methodology was also conducted in general accordance with, and reference is made to, the following regulatory and guidance documents:

- MECP document entitled "*Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario*", dated December 1996 (MECP Sampling Guideline);
- MECP document entitled "*Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act*", dated March 9, 2004 amended July 1, 2011 (Analytical Methods);
- Ontario Regulation 169/03 "*Ontario Drinking Water Quality Standards*" under the Safe Drinking Water Act", dated 2002;
- MECP document entitled "*Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines*", dated June 2003 (ODWQS Guideline);
- MECP document entitled "*Incorporation of the Reasonable Use Concept into MECPE Groundwater Management Activities, Guideline B-7 (formerly 15-08)*" (Guideline B-7), dated April 1994;
- MECP document entitled "*Determination of Contaminant Limits and Attenuation Zones, Procedure B-7-1*", (formerly referenced by 15-08);
- Ontario Regulation 903 R.R.O. 1990 "*Wells*", under the Ontario Water Resources Act;
- MECP document entitled "*Water Management Policies Guidelines Provincial Water Quality Objectives*" (PWQO), dated July 1994, revised February 1999;

- MECP document entitled “*Rationale for the Development of Soil and Groundwater Standards for Use at Contaminated Sites in Ontario*” (Table 3.1 - Aquatic Protection Values (APV)) dated April 15, 2011; and
- Canadian Council of Ministers of the Environment (CCME) document entitled “Canadian Environmental Quality Guidelines” (Water Quality Guidelines for the Protection of Freshwater Aquatic Life) dated 1999.

3.2 Groundwater Monitoring Well Locations

Seven overburden groundwater monitoring wells have historically been utilized at the Site (BH1, BH2, BH3, BH4, BH5-II, BH6-II and BH7-II). As part of the leachate management plan study completed by Pinchin, several additional monitoring wells were installed at the Site during September 2018 to support the existing monitoring well network. This included the addition of two new background wells (BH11 and BH3-II) to replace the previously destroyed BH3, one cross-gradient well (BH10-I), deeper nested wells at two existing monitoring locations which are consistently dry (BH4-II and BH6-III) and two additional downgradient wells (BH8-I and BH9-I). The locations of all the monitoring wells included in the current monitoring program are illustrated on Figure 3. Detailed locations with coordinates in NAD 83 and the available monitoring well elevations for top of casing are provided in Table 1.

All groundwater monitoring wells were sampled during the spring and fall 2020 sampling events, with the exception of BH4 during the spring and BH6-II during the spring and fall; due to these wells having insufficient volume to sample at the time of the respective monitoring events.

The following table presents a summary of the construction details and respective on-Site positions of the newly installed groundwater monitoring wells, based on the borehole logs provided in Appendix II. Construction details for the other existing monitoring wells at the Site are unknown as Pinchin was not provided any other borehole logs to review at the time of preparation of this report. All wells were inspected and found to be in good condition. No wells displayed evidence of a condition non-compliant with Ontario Regulation 903, with the exception of BH1, BH2, BH4 and BH6-II which were observed to be missing well caps. A photographic log of all groundwater monitoring wells is provided in Appendix IV.

Well ID	Condition	Total Depth (mbgs)	Screened Interval (mbgs)	Unit Screened
BH3-II	Good	6.10	3.05 – 6.10	Sand and silt
BH4-II	Good	8.44	5.1 – 8.44	Bedrock
BH6-III	Good	6.30	3.05 – 6.05	Bedrock

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Well ID	Condition	Total Depth (mbgs)	Screened Interval (mbgs)	Unit Screened
BH8-I	Good	6.05	3.0 – 6.05	Sand and gravel
BH9-I	Good	7.50	4.4 – 7.5	Sand and Silt
BH10-I	Good	4.88	1.8 – 4.88	Bedrock
BH11	Good	4.88	1.8 – 4.88	Sand and silt

The following table illustrates the location of each of the monitoring wells with respect to its rationale in the annual monitoring program.

Monitoring Well ID	Location	Rationale
BH1	East portion of the Site, adjacent to the waste deposits	Immediately Downgradient
BH2	East portion of the Site, adjacent to the waste deposits	Immediately Downgradient
BH3-II	West of the Site	Background
BH4	East portion of the Site, adjacent to the waste deposits	Immediately Downgradient
BH4-II	East portion of the Site, adjacent to the waste deposits	Immediately Downgradient
BH5-II	East of the Site	Downgradient
BH6-II	East of the Site	Downgradient
BH6-III	East of the Site	Downgradient
BH7-II	East of the Site	Downgradient
BH8-I	East of the Site	Downgradient
BH9-I	East of the Site	Downgradient
BH10-I	South of the Site	Cross-gradient
BH11	Southwest of the Site	Background

3.3 Surface Water Monitoring Locations

The Site has three historical points for surface water monitoring, SW1 through SW3. All surface water monitoring locations were monitored during the spring and fall 2020 sampling events. The following table illustrates the location of each of the surface water monitoring locations with respect to its rationale in the annual monitoring program.

Monitoring Well ID	Location	Rationale
SW1	Within the creek located south of the Site.	Upstream Monitoring Location
SW2	Downgradient of the intersection of the two intermittent creeks at the Site, at the culvert on Millers Road.	Further Downstream Monitoring Location
SW3	Within the creek located east of the Site.	Downstream Monitoring Location

The locations of the surface water monitoring locations are illustrated on Figure 3. Details regarding the surface water monitoring locations are provided in Table 2. Photos of all surface water monitoring locations are provided in Appendix IV.

3.4 Monitoring Frequency

As per previous annual monitoring events, groundwater and surface water was sampled twice annually by Pinchin during 2020, in the spring and fall. Groundwater and surface water sampling events occurred on the following dates:

- Spring – June 1, 2020; and
- Fall – September 30, 2020.

3.5 Monitoring Parameters

3.5.1 Groundwater Monitoring Parameters

Groundwater samples were submitted for laboratory analysis of the parameters listed in the previous monitoring reports. At the time of sample collection, field readings for the parameters temperature, pH, conductivity, oxidation reduction potential (ORP) and dissolved oxygen (DO) were measured.

3.5.2 Surface Water Monitoring Parameters

Surface water samples were submitted for laboratory analysis of the parameters listed in the previous monitoring reports. At the time of sample collection, field readings for the parameter's temperature, pH, conductivity, ORP and DO were measured.



3.6 Monitoring Procedures and Methods

3.6.1 Standard Operating Procedures

The following Pinchin Standard Operating Procedures (SOPs) were followed by Pinchin field personnel for each portion of this project:

- Groundwater Sampling SOP; and
- Surface Water Sampling SOP.

All Pinchin monitoring SOPs have been developed in accordance with the MECP Sampling Document and are consistent with standard engineering practices.

3.6.2 Groundwater Monitoring Activities

To perform the groundwater monitoring activities, the following tasks were conducted:

- Pinchin notified the Client prior to field activities, and subsequently mobilized staff from the local Sudbury office to the Site to complete the sampling program;
- Static groundwater levels were collected using a Solinst[™] water level tape. Measurements were collected from the top of riser pipe;
- During the monitoring events, groundwater from each monitoring well was purged prior to the collection of the sample, using a moderate-flow sample methodology via high-density polyethylene (HDPE) 3/8" tubing and a Waterra[™] inertial footvalve system. The HDPE system was chosen as an approved method to minimize sediment/particulate within each sample, and to minimize sample agitation and well trauma in accordance with the MECP Sampling Document. Pinchin purged a minimum of three well volumes to a maximum of six well volumes using the inertial pump system until the well volume column was representative of the surrounding formation. During purging activities, additional groundwater monitoring parameters were collected from each monitoring well using a YSI-556 water quality meter for measurement of field parameters. Sample residual was disposed of onto the ground surface, on-site and up-gradient within the landfill confines;
- Groundwater samples were collected using the HDPE system in accordance with the MECP Sampling Document. Dissolved metals were field-filtered using a dedicated in-line 0.45 micron disposable filter. Upon completion of field sampling and monitoring activities, all samples collected were submitted to the project laboratory, AGAT Laboratories (AGAT) in Mississauga, Ontario. All parameters were analyzed by the project laboratory using MECP approved procedures and are consistent with the analytical methods prescribed in the Analytical Methods document; and

- The groundwater samples collected were analyzed at the project laboratory for the parameters listed in the previous monitoring reports. Groundwater sample results were compared to the applicable ODWQS as applied in accordance with the ODWQS Guideline document. Groundwater wells located near surface water features were also compared to the applicable APV standards. Groundwater sample results were also compared to the reasonable usage parameters and were assessed using Guideline B-7 to establish and determine levels of contaminant discharges to the groundwater formation, which would be considered acceptable by the MECP from naturally attenuating landfill sites, with respect to human consumption and potable considerations.

3.6.3 *Surface Water Monitoring Activities*

To perform the surface water monitoring activities, the following tasks were conducted:

- Pinchin notified the Client prior to field activities, and subsequently mobilized staff from the local Sudbury office to the Site;
- All field activities at each monitoring location were initiated at down-stream locations working up-stream to avoid sediment disturbance and influencing sample integrity;
- Care was taken during collection of surface water samples to ensure that a representative sample was collected, and that underlying sediments were not disturbed. For the surface water samples only, no filtration was done (in accordance with MECP surface water sampling protocols). In the future, and as per previous monitoring events, the component of the samples identified for the analysis of aluminum should be field filtered;
- Surface water samples were collected during each sampling event using a direct grab sampling methodology in accordance with the MECP Sampling Document. Upon completion of field sampling and monitoring activities, all samples collected were submitted to AGAT. All parameters were analyzed by the project laboratory using MECP approved procedures and are consistent with the analytical methods prescribed in the Analytical Methods document;
- During sampling activities, surface water monitoring field parameters were collected at each surface water monitoring location using a YSI-556 water quality meter; and
- Surface water samples were analyzed during the monitoring event at the pre-determined monitoring locations for parameters listed in the previous monitoring reports. Sample results were compared to the applicable PWQO and CWQG criteria.

3.6.4 Groundwater and Surface Water Trigger Level Monitoring Program

As part of the 2019 Leachate Management Study Report completed by Pinchin in April 2019, a trigger level monitoring program and contingency plan has been proposed for the Chapman Waste Disposal Site, which is to be implemented at the Site following the elimination of the seep (as described in Section 2.3.3). The proposed Trigger Level Monitoring Program is a three-tiered program that includes routine monitoring (i.e. the semi-annual monitoring program), compliance monitoring and confirmation monitoring, as described below for discussion purposes but is not utilized for the determination of compliance as the other mitigation measures pertained to the seep have yet to be implemented.

Tier I – Routine Monitoring

Groundwater and surface water monitoring will continue to be conducted on a semi-annual basis, in the spring (May/June) and fall (October/November), for a comprehensive list of analytical parameters. The semi-annual monitoring program is part of the Tier I trigger program and is considered to be an “Alert Level” of monitoring.

Compliance evaluation parameters are defined as the site-specific leachate indicator parameters which have established ODWQS (for groundwater) and PWQO, CWQG or APV (for surface water). A trigger concentration is an agreed upon threshold of the leachate indicator parameters.

Based on the recent development of a suitable historic database of analytical results for several monitoring locations, having a sampling duration of over five years (i.e. 10 sampling events), with seasonal sampling frequency of twice per year, and the need to consider seasonality and changes or fluctuations in water quality, Pinchin has selected ‘Option B - 75th Percentile Non-compliance Window method’ from the MECP Guideline to be utilized for the trigger level assessment.

Given the existence of a statistically valid database (i.e. minimum of 8 to 10 water samples over a minimum two-year period) for each of the selected monitoring locations, subsequent semi-annual routine monitoring data can be incorporated, and a running average calculation can be used, based on the most recent ten successive sample events. However, it is cautioned that when using running averages or percentiles for compliance purposes, one must be cognizant of parameter concentrations over time, taking into account the historic variability of both short and long-term water quality/quantity impact trends. The sample period window must therefore be critically examined on a regular basis to ensure that it appropriately current and applicable during the lifetime of the landfill (i.e. accounting for relevant changes in Site operation and leachate generation changes in quality and quantity over time).

Historic background well parameter concentrations are typically low to moderate and consistent. As such, Pinchin has used monitoring location BH3 as the background location.

However, it should be noted that during the 2018 fall monitoring program new background wells (BH3-II and BH11) were installed, since BH3 was recently destroyed. Therefore, it is Pinchin's opinion that once the dataset becomes more robust, the new background wells will be utilized opposed to the historic data.

The existing background groundwater quality at BH3 comprises low pH, chloride, sulphate, hardness, and alkalinity levels, with moderate turbidity levels. These values are considered representative of regional background quality in the aquifer sampled by the well screen. The only ODWQS exceedances at this location are pH, hardness, alkalinity, and turbidity. As a result, these parameters have therefore not been used in the proposed groundwater Trigger Level Monitoring Program.

For groundwater, Tier I monitoring utilizes the ODWQS and RUC allowable limits as the initial trigger values, respectively. For surface water, the PWQO, CWQG or APV values will be used for Tier I monitoring. The trigger monitoring parameters, values and locations are outlined in Section 4.1.3 for groundwater and in Section 4.6.4 for surface water.

During Tier I monitoring, the geometric mean of the ten most recent successive monitoring events will be used to assess water quality at the given trigger monitoring locations. If, at the trigger monitoring locations, the geometric mean concentration of two or more parameters are found to exceed the 75th percentile limit RUC or surface water standard, then the Tier II monitoring is triggered.

Tier II – Confirmation Monitoring

Tier II Confirmation Monitoring program would be implemented if, at a single monitoring location, the geometric mean concentration (based on the last ten sampling events) for two or more parameters are found to exceed the 75th percentile RUC or the surface water standard. The Tier II Confirmation monitoring program consists of collecting water quality samples in duplicate from the location exhibiting the Tier I exceedance within forty-five days of receipt of the test results, in order to confirm the Tier I exceedances. If the duplicate samples indicate that Tier I trigger concentrations are not consecutively exceeded then Tier I monitoring will resume.

If the Tier I exceedance is confirmed, then the next step in the Tier II Confirmation Monitoring program will be to evaluate the degree, nature and potential source(s) of trigger level impact(s) identified in Tier I. As a first step, during the next scheduled monitoring event, the trigger parameter concentrations will be compared to the applicable standards (i.e. ODWQS and RUC for groundwater, and PWQO, CWQG or APV for surface water). This comparison will be utilized as an indicator of the timing and urgency of response. The comparison will also include parameter concentration trend analysis over time, with an emphasis on seasonality, if any, for trigger parameters.



An evaluation of the need to increase monitoring frequency, expand the trigger parameter list and/or establish additional trigger locations will also be undertaken. If the Tier II Confirmation Monitoring program indicates that the Site is out of compliance, as compared to the applicable standards, the Municipality will consult with MECP staff regarding the sampling analytical results and interpretation, and if required, the need for expansion of the established CAZ and/or implementation of an active leachate-impacted groundwater management strategy as outlined in Section 7.0 of the 2019 Leachate Management Plan Study.

Tier III – Compliance Monitoring

The Tier III Compliance Monitoring is a program designed to assess the effectiveness of any remedial measures that are implemented at the Site. The Tier III Compliance Monitoring program details would be determined in conjunction with the development and implementation of a preferred remedial measure arising out of evaluation of the Tier II monitoring results. The compliance performance trigger parameters, concentrations, locations, and monitoring frequency would be determined at that time. It is suggested that this program would consist of more frequent sampling of key trigger locations and analysis for a selected suite of parameters, including the trigger parameters, using the ODWQS and RUC allowable limits (for groundwater) and PWQO, CWQG or APV (for surface water), as Tier III compliance concentrations. Once compliance is confirmed at the Tier III level, and remedial measures have controlled and reduced the impact, the Tier III program would end and Tier I monitoring would resume.

3.6.5 Groundwater and Surface Water Field Measurements

Prior to sampling groundwater in the wells, Pinchin monitored groundwater depth using a Solinst™ 30-metre electronic water level meter. The water level tape is calibrated in 1.0 mm increments. Reproducibility of the depth measurements is generally within 2.0 mm or less.

Subsequent to groundwater depth measurement and during purging activities, additional groundwater monitoring parameters were collected from each monitoring well using a YSI-556 water quality meter for measurement of field parameters. Field parameters at each surface water monitoring location were also collected using the YSI-556.

The following field parameters were measured during the 2020 monitoring program:

- *Dissolved Oxygen (DO)* refers to the relative quantity of oxygen molecules which are dissolved or carried within a quantity of water. Oxygen enters water as rooted aquatic plants and algae undergo photosynthesis, and as oxygen is transferred across an air and water interface. Oxygen's solubility in water is indirectly correlated with water's temperature, salinity, and pressure.

DO concentrations have a significant effect on groundwater quality by regulating the valence state of trace of metals and constraining the bacterial metabolism of dissolved organic species;

- *Conductivity* is the measurement of water's capacity to pass an electrical current. It is considered to be a reasonable indicator of ionic activity and dissolved solids concentration levels. It is affected by the presence of inorganic dissolved solids which carry a negative charge such as chloride, nitrate, sulfate and phosphate anions or a positive charge such as sodium, magnesium, calcium, iron, and aluminum cations. Organic compounds such as oil and phenol do not conduct an electrical current very well and would therefore have low conductivity in water. Conductivity is also directly correlated to the water temperature. Specific conductivity is a measurement of conductivity values which have been compensated to 25°C;
- *pH* is a measure of water's acidic/basic properties on a logarithmic scale from 1 (strongly acidic) to 14 (strongly alkaline or basic). It determines the solubility and biological availability of chemical constituents such as nutrients and heavy metals. For example, in addition to affecting how much and what form of phosphorus is most abundant in the water, pH also determines whether aquatic life can use it. The degree to which heavy metals are soluble determines their toxicity. Metals tend to be more toxic at lower pH values because they are more soluble. Excessively high and low pHs can have serious environmental and health effects. A high pH may cause the release of iron, copper or lead into potable water, corrosion on water pipes and water using appliances and reduces the effectiveness of water disinfection with chlorine. Low pH values corrode substances such as metals and plastics. Fluctuations in groundwater pH values may be indicative of groundwater contamination;
- *Temperature*; has a dramatic influence on water quality. The rate of chemical reactions is generally correlated to temperature, which in turn affects the biological availability of nutrients within the water. As previously mentioned, oxygen's solubility in water is indirectly correlated with its temperature. Declining concentrations of oxygen within warming water is magnified by aquatic plants increasing metabolism as water temperature increases. Low concentrations of DO weaken aquatic plants resistance to disease, parasites, and other pollutants; and

- *Oxidation-reduction potential (ORP)* characterizes the oxidation-reduction state of the water on a scale from approximately -300mV (strongly reducing) up to +500mV (strongly oxidizing). The primary application of ORP is recording significant changes in the redox potential which is observed when purging a stagnant water column in piezometer and replacing it with “fresh” groundwater.

Field parameter data collected at the groundwater and surface water monitoring locations are provided in Appendix III.

3.6.6 *Record Keeping and Field Notes*

Field notes were collected during the water quality monitoring events and recorded relevant observations including, but not limited to:

- Dates and time of work being completed;
- Instrumentation and instrument condition;
- Calibration methods and results;
- Field parameter measurements;
- Field personnel conducting the investigations;
- Field methods used;
- Sampling location identifications;
- Sampling equipment and condition;
- Sample identification (i.e. type, media, number of containers, etc.);
- Sample preparation methods (i.e. preservatives, filtration, etc.);
- Field QA/QC measurements;
- Field and sample identifiers;
- Anomalous conditions (i.e. damage to monitoring wells);
- Photographs of monitoring wells and monitoring stations;
- Weather conditions at the time of the monitoring events; and
- Field conditions.

All raw data and field notes are preserved and retained in Pinchin’s custody.

3.7 Quality Assurance for Sampling and Analysis

Pinchin 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. As such, various QA/QC protocols were followed during the water quality sampling events to ensure that representative samples were obtained, and that representative analytical data were reported by the laboratory.

Field QA/QC protocols that were employed by Pinchin included the following:

- Clean, labelled, and pre-preserved (when applicable) sample containers were provided by the laboratory;
- Water quality samples were placed in laboratory-supplied sample jars;
- The monitoring wells were purged to remove stagnant water prior to sample collection so that representative groundwater samples could be obtained. Dedicated purging and sampling equipment was used for monitoring well development, purging and sampling to minimize the potential for cross-contamination;
- All water quality samples were placed in coolers on ice immediately upon collection, with appropriate sample temperatures maintained prior submission to the laboratory;
- Dedicated and disposable Nitrile™ gloves were used for all sample handling;
- All non-dedicated monitoring and sampling equipment (i.e. water level meter and YSI-556) was cleaned before initial use and between uses to minimize the potential for cross-contamination by washing with an Alconox™/potable water mixture followed by a deionized water rinse;
- Field duplicate groundwater and surface water samples were collected during the spring and fall sampling event (1 in 10); and
- Sample collection and handling procedures were performed in general accordance with the MECP Sampling Guideline.

The AGAT laboratory has an established QA/QC program and is a member of the Canadian Association for Laboratory Accreditation (CALA) and is accredited by the Standards Council of Canada (SCC) for specified environmental analyses.

AGAT's internal laboratory QA/QC consisted of the analysis of laboratory duplicate, method blank, matrix spike and spiked blank samples, an evaluation of relative percent difference calculations for laboratory duplicate samples, and an evaluation of surrogate recoveries for the method blank, matrix spike and spiked blank samples.

3.8 Data Quality Evaluation

In order to provide confidence in the data obtained, a comprehensive QA/QC component was included in the monitoring program. The QA/QC procedures developed for this monitoring program are prepared in accordance with MECP Sampling Document, and in most cases, exceed the minimum requirements.

Water quality samples collected by Pinchin were generated in accordance with acceptable procedures. No analytical hold times were exceeded for samples submitted for analyses and sample temperatures upon receipt at the project laboratory were below 10° Celsius.

Relative per cent difference (RPD) values (the absolute difference between two values divided by the average value and expressed as a per cent) were calculated between the parent sample and the field duplicate as part of the QA/QC program. RPD results of sample and duplicate analyses that are less than 50 percent indicate an acceptable level of analytical uncertainty. RPD values calculated for measured analyte concentrations for sample and duplicate pairs that exceed 50 per cent generally warrant discussion because they may indicate the presence of elevated analytical uncertainty and a potential for making interpretive errors based on the analysis results. Use of calculated RPD values to assess analytical uncertainty when using measured analyte concentrations for sample and sample duplicate pairs is not appropriate when either measured analyte concentration is within a multiple of 5 of the method detection limit (a value designated as the practical quantification limit (PQL)), where analytical uncertainty is typically elevated.

All field instrumentation calibration checks were completed by Pinchin field staff members prior to use on-Site. All field operations conducted by Pinchin field staff members were completed using standard equipment decontamination and sampling procedures, and no deviations from the sampling plan were noted.

4.0 ASSESSMENT, INTERPRETATION AND DISCUSSION

4.1 Groundwater Quality Monitoring

4.1.1 The Reasonable Use Criteria Assessment (RUC)

Guideline B-7, the "reasonable use concept" (RUC) approach, is the MECP's groundwater management strategy for mitigating the effect of contamination on properties adjacent to its source.



It establishes procedures for determining the reasonable use of groundwater on a property adjacent to sources of contaminants and establishes limits on the discharge of contaminants from facilities which dispose of waste into the shallow subsurface.

The application of “reasonable use” is outlined in Procedure B-7-1 “*Determination of Contaminant Limits and Attenuation Zones*”. The procedure determines the maximum concentration (C_m) of a particular contaminant that would be acceptable in the groundwater beneath an adjacent property and is calculated in accordance with the relationship:

$$C_m = C_b + x (C_r - C_b)$$

C_b – This is the background concentration of the particular groundwater contaminant in consideration before it has been affected by human activities. From this it is possible to calculate the extent of human activities impact on contaminant levels.

C_r – In accordance with the Ontario Water Management Guideline, this is the maximum concentration of a particular contaminant that should be present in the groundwater. This value is dependent on property’s use of the groundwater as outlined in B-7. It also allows for the total amount of contamination. Pinchin conservatively assumes that the reasonable use of the groundwater on-site is potentially for potable drinking purposes.

x – As determined by the MECP, this constant determines the extent which the contamination has on the groundwater’s use. For drinking water x is 0.5 for non-health related parameters or 0.25 for health related parameters. For other reasonable uses it is 0.5.

Contamination concentrations which exceed C_m may have an appreciable effect on the use of an adjacent property and as such the Site should be managed in a manner to minimize environmental damage, or the operation should be modified. It is acceptable to modify the operation of the disposal site to meet the specified limits. However, if these limits are exceeded, all waste disposals, except for that done in conjunction with a reasonable plan for closure or with remedial activities, should be terminated until the specified limits have been met, or until monitoring data indicate that these limits will be met.

Determination of the replacement of contaminated water supplies and the abatement of the contaminant plume must be made on a case-by-case basis in accordance of “*Resolution of Groundwater Quality Interference Problems*”, Guideline B-9. For the purpose of evaluating compliance with respect to the RUC, Pinchin has compared the calculated C_m values versus the applicable downgradient compliance monitoring wells.

4.1.2 The Ontario Drinking Water Quality Standards (ODWQS)

Through the establishment of the ODWQS, the province of Ontario has determined legally enforceable standards on contaminants in drinking water. The standards are designed to protect public health by restricting the quality of specific contaminants in drinking water. Three categories of contaminants are regulated under the Ontario Regulation 169/03 Drinking Water Standards:

- Microbiological – Originating from human and animals waste, coliforms and bacteria are common in the environment. Most are harmless however their presence may be indicative of other harmful bacteria in the water. Under the ODWQS, *Escherichia coli* (“E. Coli”), fecal coliforms and total coliforms must be non-detectable in drinking water;
- Chemical – ODWQS regulates maximum quantities of organic and inorganic chemicals allowed in drinking water. Industrial discharges or agricultural runoff are not necessarily removed by drinking water treatment. Consuming water exhibiting a greater concentration of these chemicals than the ODWQS may cause serious health problems; and
- Radiation – Natural and artificial radio nuclides are also regulated in the ODWQS. Standards are expressed as maximum allowable concentrations in becquerels per litre (“L”). Radiological contaminants include radio nuclides, such as radium 228, which are caused from the erosion of naturally occurring deposits, or artificial radio nuclides, such as tritium, released into the water by nuclear power plants. Radiological contaminants do not naturally occur within the study area and the disposal of radiological waste was not suspected in the Site and as a result radiation was not monitored for this study.

The ODWQS Guideline Document is the MECP technical guidance document which provides guidance on applicability of the ODWQS and also provides applicable interim guidelines where legal standards are absent. Both the ODWQS and Guideline B-7 were used in assessing the groundwater results obtained during the 2020 monitoring program.

4.1.3 Aquatic Protection Values (APV)

Under Ontario Regulation 153/04, the MECP have developed APVs to protect aquatic organisms exposed to contaminants from migration of contaminated groundwater to surface water. Protection of aquatic biota from migration of contaminants by overland flow is provided by a Site being designated an environmentally sensitive area if the property includes or is adjacent to a water body or includes land that is within 30 m of a water body.

APVs are designed to provide a scientifically defensible and reasonably conservative level of protection for most aquatic organisms from the migration of contaminated groundwater to surface water resources.

Groundwater monitoring wells nearest to the surface water features (BH6-III, BH7-II, BH8-I, BH9-I and BH10-I) are compared to the applicable APV standards to assess the potential impact of groundwater discharge to the surface water bodies.

4.1.4 Groundwater Trigger Mechanism

1. Trigger Location: Trigger monitoring locations shall be the nested monitoring wells BH6-III, BH7-II and BH8-I located on the east side of the landfill (i.e. downgradient of the fill areas).
2. Trigger Parameters and Compliance Criteria: The following table presents the RUC allowable limits and trigger concentrations currently proposed for the groundwater and parameters.

It should be noted that the calculated RUC concentrations and Tier I trigger level concentrations are dynamic and are subject to change in the future, based on the update of the running 75th percentile background value for the most recent ten successive sample events.

Groundwater Trigger Wells	Parameter	Reasonable Use Criteria Objective (mg/L)	Trigger Level Concentration (mg/L)
BH6-III BH7-II BH8-I	TDS	270	202.49
	Chloride	126.2	94.66
	Sodium	100.8	75.56
	Sulphate	252.4	189.27
	Nitrate as N	3.1	2.36
	Nitrite as N	0.25	0.19
	Iron	0.175	0.13
	Manganese	0.029	0.022
	Arsenic	0.0029	0.0022
	Barium	0.27	0.20
	Boron	1.26	0.95
	Cadmium	0.0013	0.0010
	Chromium	0.014	0.011
	Copper	0.50	0.38
	Lead	0.0026	0.0020
	Zinc	2.51	1.88

4.2 Groundwater Results

The following discussion of parameters documents the groundwater quality in comparison to the ODWQS standards and the calculated reasonable use criteria as per Guideline B-7. The reasonable criteria are MECP's groundwater management strategy for mitigating the effect of contamination on properties adjacent to its source. It establishes procedures for determining what constitutes the reasonable use of groundwater on a property adjacent to sources of contaminants and establishes limits on the discharge of contaminants from landfills which have a potential to migrate hydraulically downgradient and off-site and impair the current and future groundwater use at downgradient properties. To implement Guideline B-7, groundwater samples collected from downgradient monitoring wells have been compared to the calculated RUC values (C_m).

Historically, monitoring well BH3 was considered representative of background water quality and was used in the Guideline B-7 calculations, however this well was observed to have been destroyed during previous monitoring events. Newly installed monitoring wells BH3-II and BH11 are located furthest potentially hydraulically upgradient of the Site and have been used to estimate the background water quality coming onto the Site. An average of the current 2019-2020 results from newly installed monitoring wells BH3-II and BH11 has been applied as the source of background water quality for the Guideline B-7 calculations.

The analytical data for each well in comparison to the applicable regulatory criteria is provided in Tables 3 through 16. An evaluation of the RUC criteria in comparison to the downgradient compliance wells is provided in Tables 17 and 18 for the spring and fall events, respectively. Copies of the laboratory analytical reports are presented in Appendix V. The following is a breakdown of the water quality observed the monitoring well locations with comparison to the background quality and leachate being produced on-Site.

4.2.1 Background Water Quality Evaluation

Monitoring Well BH3-II

Background water quality observed west of the waste fill area at BH3-II did not identify elevated levels of common landfill-related contaminant parameters such as conductivity, total dissolved solids (TDS), chloride, sulphate, calcium, sodium, potassium, or nitrate. During the spring and fall sampling events, concentrations of hardness (low), alkalinity (low), dissolved organic carbon (DOC) and turbidity were quantified above the recommended levels specified in the ODWQS. Hardness, alkalinity, DOC, and turbidity are either operational guidelines or aesthetic objectives for drinking water systems set by the ODWQS and are not considered to be a significant environmental concern originating from the Site.

Monitoring Well BH11

Background water quality observed southwest of the waste fill area at BH11 did not identify elevated levels of common landfill-related contaminant parameters such as conductivity, TDS, chloride, sulphate, calcium, sodium, potassium, or nitrate; although, these concentrations are generally slightly higher compared to those quantified at BH3-II. During the spring and fall sampling events, concentrations of pH (low), hardness (low), alkalinity (low), aluminum and turbidity were quantified above the recommended levels specified in the ODWQS. pH, hardness, alkalinity, aluminum, and turbidity are either operational guidelines or aesthetic objectives for drinking water systems set by the ODWQS and are not considered to be a significant environmental concern originating from the Site.

4.2.2 Leachate Source Quality Evaluation

No groundwater monitoring wells in the existing monitoring well network are situated within the active landfill area to evaluate the source leachate quality.

4.2.3 Cross-gradient Water Quality Evaluation

Monitoring Well BH10-I

In comparison to background water quality, groundwater observed immediately south of the waste fill area at BH10-I was observed to have slightly higher concentrations of conductivity, TDS, chloride, sodium, calcium, and sulphate, indicating temperate impacts from the landfill. It is expected that the groundwater at this location is impacted with minor amounts of landfill leachate considering its close proximity to the Site. Elevated pH (low), hardness (high), alkalinity (low), DOC and turbidity concentrations were identified at BH10-I that exceeded the ODWQS. pH, hardness, DOC, and turbidity are either operational guidelines or aesthetic objectives for drinking water systems set by the ODWQS and are not considered to be a significant environmental concern originating from the Site. Furthermore, elevated concentrations of pH (low), DOC and turbidity are also quantified at the background monitoring location and therefore are not considered to be landfill derived.

Monitoring well BH10-I is located near the creek located south of the Site and was therefore compared to the applicable APV standards. All parameter concentrations at BH10-I satisfied the APV with the exception of copper during the fall monitoring event, which should be confirmed during the next sampling event.



4.2.4 Immediately Downgradient Water Quality Evaluation

Monitoring Well BH1

In comparison to background water quality, groundwater observed immediately east and downgradient of the waste fill area at BH1 was observed to have slightly higher concentrations of conductivity, TDS, chloride, sulphate, sodium, potassium, and nitrate, indicating temperate impacts from the landfill, which is consistent with historical observations at this location. It is expected that the groundwater at this location is impacted with minor amounts of landfill leachate considering its close proximity to the active fill zone. Elevated hardness (high), DOC and manganese concentrations were identified at BH1 that exceeded both the ODWQS. Hardness, DOC, and manganese are either operational guidelines or aesthetic objectives for drinking water systems set by the ODWQS and are not considered to be a significant environmental concern originating from the Site. Furthermore, elevated concentrations of DOC are also quantified at the background monitoring location and therefore are not considered to be landfill derived.

Concentrations of nitrate observed at this location are consistent with the considerable range of fluctuation throughout the historical monitoring record and have returned to concentrations within the ODWQS since the exceedance quantified in 2019. This concentration should be confirmed during the next sampling event.

Monitoring Well BH2

In comparison to background water quality, groundwater observed immediately east of the waste fill area at BH2 was observed to have higher concentrations of conductivity, alkalinity, TDS, chloride, sulphate, sodium, and potassium, indicating temperate impacts from the landfill, which is consistent with historical observations at this location. It is expected that the groundwater at this location is impacted with minor amounts of landfill leachate considering its close proximity to the active fill zone. Elevated hardness (high), DOC, iron, manganese, and turbidity concentrations were identified at BH2 that exceeded both the ODWQS. Hardness, DOC, iron, manganese, and turbidity are either operational guidelines or aesthetic objectives for drinking water systems set by the ODWQS and are not considered to be a significant environmental concern originating from the Site. Furthermore, elevated concentrations of DOC and turbidity are also quantified at the background monitoring location and therefore are not considered to be landfill derived.

Monitoring Well BH4

Downgradient monitoring well BH4 was observed to have insufficient volume at the time of sampling during the spring 2020 monitoring event, which is consistent with historical observations at this location.



In comparison to background water quality, groundwater observed immediately east of the waste fill area at BH4 was observed to have higher concentrations of conductivity, alkalinity, TDS, nitrate, chloride, sulphate, sodium, and calcium, indicating temperate impacts from the landfill, which is consistent with historical observations at this location. It is expected that the groundwater at this location is impacted with minor amounts of landfill leachate considering its close proximity to the active fill zone. In the fall, elevated hardness (high), DOC and turbidity concentrations were identified at BH4 that exceeded both the ODWQS. Hardness, DOC, and turbidity are either operational guidelines or aesthetic objectives for drinking water systems set by the ODWQS and are not considered to be a significant environmental concern originating from the Site. Furthermore, elevated concentrations of DOC and turbidity are also quantified at the background monitoring location and therefore are not considered to be landfill derived.

Nitrate (a health-related parameter) was quantified in the fall at BH4 to be in exceedance of the Guideline B-7. Concentrations of nitrate observed at this location have been consistently quantified at elevated levels throughout the historical monitoring record.

Monitoring Well BH4-II

In comparison to background water quality, groundwater observed immediately east of the waste fill area (nested with well BH4) at BH4-II was observed to have higher concentrations of conductivity, alkalinity, TDS, nitrate, chloride, sulphate, calcium, sodium, and potassium, indicating temperate impacts from the landfill, which are similar to those concentrations quantified at BH4.

It is expected that the groundwater at this location is impacted with minor amounts of landfill leachate considering its close proximity to the active fill zone. Elevated hardness (high), DOC, nitrate, manganese, and turbidity concentrations were identified at BH4-II that exceeded both the ODWQS. Hardness, DOC, manganese, and turbidity are either operational guidelines or aesthetic objectives for drinking water systems set by the ODWQS and are not considered to be a significant environmental concern originating from the Site. Furthermore, elevated concentrations of DOC and turbidity are also quantified at the background monitoring location and therefore are not considered to be landfill derived.

Nitrate (health-related parameter) was quantified at BH4-II to be in exceedance of the ODWQS. As only data since 2019 are available for this monitoring location, additional analytical data are required to confirm these concentrations.



4.2.5 Downgradient Water Quality Evaluation

Monitoring Well BH5-II

In comparison to background water quality, groundwater observed east of the Site at BH5-II was observed to have higher concentrations of conductivity, alkalinity, TDS, nitrate, chloride, sulphate, calcium, sodium, and potassium, indicating temperate impacts from the landfill, which is consistent with historical observations at this location. It is expected that the groundwater at this location is impacted with minor amounts of landfill leachate. Elevated hardness (high), nitrate, DOC, manganese, and turbidity concentrations were identified at BH5-II that exceeded both the ODWQS and/or the Guideline B-7 criteria. Hardness, DOC, manganese, and turbidity are either operational guidelines or aesthetic objectives for drinking water systems set by the ODWQS and are not considered to be a significant environmental concern originating from the Site. Furthermore, elevated concentrations of DOC and turbidity are also quantified at the background monitoring location and therefore are not considered to be landfill derived.

Nitrate (a health-related parameter) was quantified in the fall at BH5-II to be in exceedance of the Guideline B-7. Concentrations of nitrate observed at this location are consistent with the historical monitoring record.

Monitoring Well BH6-II

Downgradient monitoring well BH6-II was observed to be dry at the time of sampling during the spring and fall 2020 monitoring events, as is consistent with historical observations.

Monitoring Well BH6-III

In comparison to background water quality, groundwater observed east of the Site at BH6-III was observed to have slightly higher concentrations of conductivity, alkalinity, TDS, chloride, sulphate, calcium, and potassium, indicating minor impacts from the landfill.

It is expected that the groundwater at this location is impacted with minor amounts of landfill leachate. Elevated hardness (high), DOC, manganese and turbidity concentrations were identified at BH6-III that exceeded both the ODWS and/or the Guideline B-7 Criteria. Hardness, DOC, manganese, and turbidity are either operational guidelines or aesthetic objectives for drinking water systems set by the ODWQS and are not considered to be a significant environmental concern originating from the Site. Furthermore, elevated concentrations of DOC and turbidity are also quantified at the background monitoring location and therefore are not considered to be landfill derived.



Monitoring well BH6-III is located near the creek flowing from the south of the Site and was therefore compared to the applicable APV standards. All parameter concentrations at BH6-III satisfied the APV with the exception of copper during the fall monitoring event, which should be confirmed during the next sampling event.

Monitoring Well BH7-II

In comparison to background water quality, groundwater observed east of the Site at BH7-II was observed to have generally similar concentrations of conductivity, alkalinity, TDS, chloride, sulphate, calcium, sodium, and potassium, indicating very minor impacts from the landfill, which is consistent with historical observations at this location. Elevated pH (low), hardness (low), alkalinity (low), DOC and turbidity concentrations were identified at BH7-II that exceeded both the ODWQS and/or the Guideline B-7 criteria. These parameters are either operational guidelines or aesthetic objectives for drinking water systems set by the ODWQS and are not considered to be a significant environmental concern originating from the Site. Furthermore, elevated concentrations of pH (low), hardness (low), DOC and turbidity are also quantified at the background monitoring location and therefore are not considered to be landfill derived.

Monitoring well BH7-II is located near the creek flowing from the south of the Site and was therefore compared to the applicable APV standards. All parameter concentrations at BH7-II satisfied the APV during the 2020 sampling events.

Monitoring Well BH8-I

In comparison to background water quality, groundwater observed east of the Site at BH8-I was observed to have higher concentrations of conductivity, alkalinity, TDS, nitrate, chloride, sulphate, calcium, sodium, and potassium, indicating temperate impacts from the landfill. Elevated hardness (high), nitrate, DOC, manganese, and turbidity concentrations were identified at BH8-I that exceeded both the ODWQS and/or the Guideline B-7 criteria. Hardness, DOC, manganese, and turbidity are either operational guidelines or aesthetic objectives for drinking water systems set by the ODWQS and are not considered to be a significant environmental concern originating from the Site. Furthermore, elevated concentrations of DOC and turbidity are also quantified at the background monitoring location and therefore are not considered to be landfill derived.

Nitrate (a health-related parameter) was quantified in the fall at BH8-I to be in exceedance of the Guideline B-7. As only data since 2019 are available for this monitoring location, additional analytical data are required to confirm these concentrations.



Monitoring well BH8-I is located near the creek east of the Site and was therefore compared to the applicable APV standards. All parameter concentrations at BH8-I satisfied the APV during the 2020 sampling events.

Monitoring Well BH9-I

In comparison to background water quality, groundwater observed east of the Site at BH9-I was observed to have higher concentrations of conductivity, alkalinity, TDS chloride, sulphate, calcium, sodium, and potassium, indicating temperate impacts from the landfill. It is expected that the groundwater at this location is impacted with minor amounts of landfill leachate. Elevated hardness (high), TDS, DOC, iron, manganese, and turbidity concentrations were identified at BH9-I that exceeded both the ODWQS and/or the Guideline B-7 criteria. These parameters are either operational guidelines or aesthetic objectives for drinking water systems set by the ODWQS and are not considered to be a significant environmental concern originating from the Site. Furthermore, elevated concentrations of DOC and turbidity are also quantified at the background monitoring location and therefore are not considered to be landfill derived.

Monitoring well BH9-I is located near the creek east of the Site and was therefore compared to the applicable APV standards. All parameter concentrations at BH9-I satisfied the APV, with the exception of cobalt during both the spring and fall monitoring events, which should be confirmed during the next sampling event.

4.3 Groundwater Trend Analysis

A series of time versus concentration graphs were developed to evaluate the concentrations of several select landfill indicator parameters (including alkalinity, chloride, nitrate, pH, and dissolved organic carbon) at each monitoring well for the Site. Current and historical groundwater quality data was utilized to identify any apparent trends or inconsistencies in the water quality within the monitoring well network. The time versus concentration graphs are provided in Appendix VI. It should be noted that the newly installed monitoring wells (BH3-II, BH4-II, BH6-III, BH8-I, BH9-I, BH10-I and BH11) currently only have data available for 2019 and 2020; therefore, further monitoring is required in order to interpret accurate trends at these locations.

In general, the landfill indicator parameters are demonstrating fairly stable trends with respect to time at all monitoring well locations, with some exceptions. Concentrations of alkalinity are generally stable, with the exception of wells BH1, BH2 and BH4 which are demonstrating increasing trends. Chloride concentrations at BH4 have generally been high, but have been demonstrating a decreasing trend since 2013. Concentrations of nitrate are generally stable within a large range of fluctuation for most wells. Nitrate concentrations at BH4 and BH4-II are above the ODWQS, but have been demonstrating a decreasing trend since 2013.



Concentrations of pH are recently stable within the ODWQS range, except for BH3, BH7-II and BH11 which have stabilized at concentrations lower than the ODWQS. Concentrations of DOC have been stable since 2015, with concentrations at BH1, BH2, BH4 and BH5-II consistently above the ODWQS.

Further monitoring investigations are required, in order to confirm the interpreted trends observed during this monitoring period.

4.4 Groundwater Trigger Level Monitoring

A summary of the groundwater quality data running average of the 10 most recent successive sampling events for the trigger locations, BH6-III, BH7-II and BH8-I, in comparison to the trigger level concentrations is provided in Table 19.

Two trigger level exceedances were quantified at BH6-III for TDS and manganese and three trigger level exceedances were quantified at BH8-I for TDS, nitrate, and manganese. It should be noted that at the time of preparation of this report, only 4 successive sampling events have been completed for newly installed monitoring wells BH6-III and BH8-I; further monitoring is required to establish a more robust data set before an accurate evaluation of the trigger levels can be completed for these monitoring locations. It should be noted that the implementation of the trigger level monitoring program is only recommended once the proposed mitigation measures associated with the leachate seep are completed.

4.5 Groundwater Field Measurement Results

On June 1 and September 30, 2020 Pinchin collected groundwater monitoring parameters from each of the well locations using a YSI-556 water quality meter for measurement of field parameters. The field parameter measurements are provided in Tables 3 through 16.

A review of the field parameters for the project identified no significant concerns in the water quality during the monitoring events. The water quality at the Site monitoring locations did not change significantly between each of the monitoring locations and the measured field parameters were within the normal variability associated with shallow groundwater monitoring systems.

4.6 Surface Water Quality Monitoring

4.6.1 The Provincial Water Quality Objectives (PWQO)

The PWQO are numerical and narrative criteria which serve as chemical and physical indicators representing satisfactory levels for surface water and groundwater where it discharges to the surface. The PWQO are levels which are protective of the water quality for all forms of aquatic life during their indefinite exposures to the water. The PWQO levels include protection for anthropogenic recreational water uses where there is a high potential of exposure and are based on public health and aesthetic considerations.

In general, the PWQO stated that the surface water quality of a water body shall be “free from contaminating levels of substances and materials attributable to human activities which in themselves, or in combination with other factors can: settle to form objectionable deposits; float as debris or scum or oil or other matter to form nuisances; product objectionable colour, odour, taste, or turbidity; injure, are toxic to, or produce adverse physiological or behavioural responses in humans, animals, or plants; or enhance the production of undesirable aquatic life or result in the dominance of nuisance species”.

4.6.2 Canadian Water Quality Guidelines (CWQG)

The CWQG were developed by the Canadian Council of Resources and Environment, to provide basic scientific information about the effects of water quality parameters on uses in order to assess water quality issues and concerns and to establish water quality objectives for specific sites. The guidelines contain recommendations for chemical, physical, radiological, and biological parameters necessary to protect and enhance designated uses of water. They apply only to inland surface waters and groundwater, and not to estuarine and marine waterbodies. The rationale for each parameter is included to assist in the development of water quality objectives to suit local water conditions.

4.6.3 Surface Water Trigger Mechanism

1. Trigger Location: Trigger monitoring locations shall encompass all of the downstream surface water sample locations at the Site (SW2 and SW3).
2. Trigger Parameters and Compliance Criteria: The following table presents the PWQO, CWQG or APV allowable limits, trigger parameters and concentrations currently proposed for the surface water. The trigger level concentration is 75% of the guideline value considered appropriate for the Site.

Surface Water Trigger Locations	Parameter	Applicable Guideline	Objective (mg/L)	Trigger Level Concentration (mg/L)
SW2	Chloride	APV	180	135
	Nitrate as N	CWQG	2.90	2.175
	Nitrite as N	CWQG	0.06	0.045
SW3	Iron	APV	1.0	0.75
	Arsenic	PWQO	0.10	0.075
	Barium	APV	2.30	1.725

Surface Water Trigger Locations	Parameter	Applicable Guideline	Objective (mg/L)	Trigger Level Concentration (mg/L)
	Boron	APV	3.55	2.662
	Copper	PWQO	0.005	0.00375
	Zinc	PWQO	0.03	0.0225

4.7 Surface Water Results

Pinchin collected surface water samples from all surface water monitoring locations during the spring and fall monitoring events in 2020. Surface water samples were collected to monitor the surface water for contaminants of concern as a compliance requirement. A summary of water quality monitoring data relative to the regulatory standards is presented in the attached Tables 20 through 22. Copies of the laboratory analytical reports are presented in Appendix V.

Surface water monitoring location SW1, located within the creek along the south side of the Site, is considered representative of background water quality conditions and is characterized by naturally elevated concentrations of pH (low), phenols, iron, aluminum, and cobalt. Concentrations of pH (low), iron and aluminum exceeded the PWQO and/or CWQG during the 2020 sampling events, which is consistent with the observations at this location throughout the historical monitoring record.

Minor leachate impacts are observed at the downstream surface water monitoring location SW3, with exceedances quantified for pH (low), iron and cobalt. These impacts are interpreted to improve with distance from the Site, as lower concentrations are quantified at further downstream monitoring location, SW2. No PWQO exceedances were quantified at SW2, other than concentrations of pH (low), iron, aluminum and cobalt which are also naturally elevated at the background location. Additionally, concentrations of phosphorous in the spring and cadmium in the fall were quantified in exceedance of the standards at SW2; these concentrations are interpreted to be anomalous and should be confirmed during the next sampling event.

Additionally, concentrations of nitrate (health- related parameter) quantified at several of the downgradient groundwater monitoring wells are not interpreted to be impacting the surface water quality at the Site as nitrate concentrations are observed to be at low levels at the seepage source area SW3 and lower still at downstream monitoring location SW2. This interpretation should be confirmed during future monitoring.

It is noted that concentrations of chromium and selenium at all surface water monitoring locations were quantified below the laboratory reasonable detection limit, however the RDL is higher than the respective standards. Therefore, these concentrations are considered inconclusive of standard exceedances for these parameters.

4.8 Surface Water Trend Analysis

A series of time versus concentration graphs were developed to evaluate the concentrations of several select landfill indicator parameters (including alkalinity, chloride, nitrate, pH, and dissolved organic carbon) at each surface water monitoring location for the Site. Current and historical surface water quality data was utilized to identify any apparent trends or inconsistencies in the water quality at the Site. The time versus concentration graphs are provided in Appendix VII.

In general, the landfill indicator parameters are demonstrating stable trends with respect to time at all surface water monitoring locations within a large range of fluctuation, with the exception of SW3 which does not demonstrate an identifiable trend for alkalinity or nitrate.

Further monitoring investigations are required to confirm the trends observed during this monitoring period.

4.9 Surface Water Trigger Level Monitoring

A summary of the surface water quality data running average of the 10 most recent successive sampling events for the trigger locations, SW2 and SW3, in comparison to the trigger level concentrations is provided in Table 23.

Although the implementation of the trigger level monitoring program is only recommended once the proposed mitigation measures associated with the leachate seep are completed, all of the trigger level concentrations were satisfied at both surface water trigger level monitoring locations.

4.10 Surface Water Field Measurement Results

On June 1 and September 30, 2020, Pinchin collected surface water monitoring parameters from each surface water monitoring location using a YSI-556 water quality meter for real-time in-situ measurement of field parameters. The field parameter measurements are provided in Tables 18 through 20.

A review of the field parameters for the project identified no significant concerns in the water quality during the monitoring event. The quality at the surface water monitoring locations did not change significantly between each of the monitoring locations. Surface water flow measurements were not obtained, however, flow was observed at all surface water monitoring locations at the time of sampling.

4.11 Groundwater Flow Interpretation

The hydraulic flow vector was historically estimated to range to the east. The groundwater flow direction may be influenced by seasonal variations in the amount of precipitation, by aquifer heterogeneity and the buried fill material at the Site. Groundwater level trends indicate seasonal fluctuations in the depth to groundwater which is consistent with seasonal fluctuations in precipitation events. The depth to groundwater measurement results are presented in Table 1.

During the spring monitoring event on June 1, 2020, the depth to groundwater was observed to range from 0.80 mbgs at BH11 to 5.68 mbgs at BH2. During the fall monitoring event on September 30, 2020, the depth to groundwater was observed to range from 0.90 mbgs at BH11 to 5.87 mbgs at BH2.

Accurate triangulation of the water table elevations was undertaken for the 2020 sampling events using the available monitoring well system and the survey elevation data. Pinchin completed a survey in 2020 to obtain elevation data for the newly installed wells at the Site and more accurate elevation data for the historical wells. The inferred groundwater contours for both the spring and fall events are presented on Figures 4 and 5, respectively. The presentation of the groundwater contours and the associated inferred groundwater flow direction for the 2020 sampling events, as illustrated on Figures 4 and 5, confirms the previous findings of earlier Annual Monitoring Reports which indicate groundwater flow is directed towards the east.

4.12 Leachate Characterization

The Site is an operating landfill with minor operational or maintenance being overseen by the Municipality. The Site currently does not have a leachate collection system whereby leachate quality monitoring and characterization is being completed. Currently, there is no groundwater monitoring well included in the existing monitoring well network at the Site that is situated within the active landfill area or which is considered representative of source leachate water quality. Therefore, leachate at the Site cannot be characterized at the time of preparation of this report.

4.13 Contaminant Attenuation Zone

A Contaminant Attenuation Zone (CAZ) has not been established for the Site. However, it should be noted that based on the current observed water quality data, landfill derived leachate impacts appear to attenuate prior to the property boundary (although the current groundwater seep needs to be addressed). Future investigations should involve the development of a CAZ for this Site.

4.14 Adequacy of the Monitoring Program

At this time there is currently no formal monitoring program for the Site.



Pinchin recommends continuation of sampling the groundwater and surface water two times per year (spring and fall) to establish any notable trends or impacts emanating from the landfill. The results of inspection and monitoring will be reported annually to the MECP. After that time, and with the establishment of baseline data/source data leachate concentrations, a review of all data will then be used to establish the expected level of impact and the need and scope for long term monitoring.

During these sampling and reporting events, it is recommended that the monitoring well network be evaluated for adequacy and determine if there is a need for additional monitoring locations.

4.14.1 Monitoring Well Network Efficiency

Pinchin concludes that the current groundwater monitoring well network is considered adequate for evaluating the Chapman Waste Disposal Site geological and hydrogeological characteristics immediately to the east of the landfill (for evaluating downgradient groundwater quality migrating from the Site). The groundwater quality observed in monitoring well BH3-II appears to have minor derived impacts and as such, has been used within this report for assessing the Site's water quality data to Guideline B-7 RUC (i.e. background well).

Based on a visual inspection of the monitoring well installations, Pinchin concludes that the monitoring wells are in satisfactory condition, with the exception of monitoring wells BH1, BH2, BH4 and BH6-II which were observed to be missing well caps.

Borehole logs for several of the wells on-Site were not provided to Pinchin for review of the construction details. Borehole logs should be included as an appendix in every annual monitoring report. The borehole logs for the new monitoring wells installed in September 2018 are provided in Appendix II.

4.14.2 Background Monitoring Well Efficiency

Based on a review of the groundwater contaminant data from BH3 (Destroyed), BH3-II and BH11, as well as the assumed groundwater flow direction, monitoring well BH3-II has been identified as a best-case background location. A review of the dataset (as provided on Table 6) from BH3-II did not identify elevated levels of common landfill-related contaminant parameters, with the exception of alkalinity which is naturally lower than the ODWQS and DOC which is naturally elevated. At this time, monitoring well BH3-II is considered adequate for monitoring background groundwater quality.

4.15 Supplemental Monitoring: Sediment, Benthic and/or Toxicity Monitoring

No supplemental monitoring was completed as part of the 2020 monitoring program completed by Pinchin.

4.16 Assessment of the Need for Implementation of Contingency Measures

As part of the 2019 Leachate Management Study Report completed by Pinchin in April 2019, a trigger level monitoring program and contingency plan has been proposed for the Chapman Waste Disposal Site. The proposed Trigger Level Monitoring Program for groundwater and surface water is a three-tiered program that includes routine monitoring (i.e. the semi-annual monitoring program), compliance monitoring and confirmation monitoring, as described above in Section 3.6.4. It should be noted that the implementation of the trigger level monitoring program is only recommended once the proposed mitigation measures associated with the leachate seep are completed.

The results for the 2020 monitoring period were compared to the proposed trigger level monitoring program for discussion purposes only (and not a measure of compliance). The results of this comparison indicated that several exceedances of the trigger level concentrations were quantified at BH6-III and BH8-I. However, at the time of preparation of this report, only 4 successive sampling events have been completed for newly installed monitoring wells BH6-III and BH8-I; further monitoring is required to establish a more robust data set before an accurate evaluation of the trigger levels can be completed for these monitoring locations. All surface water trigger concentrations were satisfied.

It is Pinchin's opinion that contingency measures are not required for the Site at the time of preparation of this report.

4.16.1 Contingency Plan

Should the results of the Trigger Level Monitoring program during future monitoring events indicate that the long-term operation of the Site is resulting in significant impacts to the groundwater or surface water quality at the Site, the Municipality will consult with MECP staff regarding the sampling analytical results, their interpretation, and the development of a realistic schedule for implementation of a strategy to manage the leachate-impacted groundwater plume. Additional activities that could be performed at this time could include further leachate characterization and an increase in the groundwater and/or surface water monitoring frequency.

In the event of a confirmed groundwater or surface water exceedance of the trigger parameters and compliance criteria, it is proposed that the some or all of the following contingency measures will be implemented:

- Installation of additional monitoring wells located downgradient of the landfilling area and along the property boundary of the Site to confirm off-Site impacts are taking place;
- Acquisition of further downgradient lands and the extension of the contaminant attenuation zone;
- Application of low permeability final cover;



- Installation of a leachate collection system and treatment system; and/or
- Progressive closure program acceleration.

4.17 Waste Disposal Site Gas Impacts

At this time no evidence has been documented to suggest that methane gas generation from the Site is a significant concern.

4.18 Effectiveness of Engineered Controls

With the exception of the intermittent landfill cover, there are no operational engineered controls in effect at the Site. The Client should continue to maintain the integrity of the landfill cover as per the CofA. Annual monitoring and inspections should continue to be completed to ensure regular maintenance is occurring on an as needed basis. At the time of the monitoring event no significant damage or concerns were noted.

4.19 Control Systems Monitoring

Environmental control systems are designed, constructed, and utilized at some waste disposal sites to reduce or increase an environmental variable to an acceptable level, or to maintain an environmental variable within an acceptable range, in order to prevent a negative environmental outcome.

Certain environmental control systems such as a leachate collection system or a methane gas collection system can provide the basis for operator intervention to bring about or maintain a desired condition to operate the landfill. The Site does not currently operate any control systems; therefore, no control system monitoring was completed as part of the 2020 monitoring program.

4.20 QA/QC Results

In order to provide confidence in the data obtained, a comprehensive QA/QC component was included in the monitoring program. The QA/QC procedures developed for this monitoring program are prepared in accordance with MECP Sampling Document, and in most cases, exceed the minimum requirements.

Water quality samples collected by Pinchin were generated in accordance with acceptable procedures. No analytical hold times were exceeded for samples submitted for analyses and sample temperatures upon receipt at the project laboratory were below 10° Celsius.

Two groundwater duplicate sample pairs and one surface water duplicate sample pair were collected from the Site during the spring and fall sampling events and submitted for laboratory analysis of the full suite of analytical parameters. All duplicate data for 2020 are provided in Tables 24 and 25 for groundwater and surface water, respectively.

The following table summarizes the duplicate pairs for 2020:

Sampling Event	Duplicate Sample ID	Original Sample ID
Spring	GW DUP1	BH4-II
	GW DUP2	BH10-I
	SW DUP	SW3
Fall	GW DUP1	BH11
	GW DUP2	BH4-II
	SW DUP	SW3

The calculated RPDs for the original and field duplicate groundwater sample has been compared to the performance standards considered acceptable by Pinchin (i.e. 50%). Each of the calculated RPDs met the corresponding performance standard, with some exceptions. In the spring, the RPD was exceeded for turbidity in GWDUP1 and for alkalinity and turbidity for GWDUP2. In the fall, the RPD was exceeded for aluminum in both GWDUP1 and GWDUP2.

Upon review of the QA/QC results for spring and fall sampling programs, Pinchin has not identified any significant concerns that would warrant the invalidation of any of the field or laboratory data, and therefore considers the data generated as part of this program to be reliable.

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.

5.0 CONCLUSIONS

Based on the work completed, the following is a summary of the activities and findings of the 2020 water quality monitoring program:

- Groundwater samples were collected from all monitoring wells at the Site on June 1 and September 30, 2020, with the exception of BH4 in the spring and BH6-II in the spring and fall due to the wells being dry at the time of sampling. All groundwater samples were submitted for laboratory analysis of parameters identified in the previous monitoring reports. The groundwater quality was assessed based on the ODWQS, APV, Guideline B-7 and trigger level monitoring program;
- Surface water samples were collected from all monitoring locations on June 1 and September 30, 2020 and were submitted for laboratory analysis of parameters identified in the previous monitoring reports. Surface water quality was assessed based on the PWQO and CWQG and the trigger level monitoring program;
- During the spring monitoring event on June 1, 2020, the depth to groundwater was observed to range from 0.80 mbgs at BH11 to 5.68 mbgs at BH2. During the fall monitoring event on September 30, 2020, the depth to groundwater was observed to range from 0.90 mbgs at BH11 to 5.87 mbgs at BH2. Groundwater flow at the Site is interpreted to be directed towards the east;
- All reported concentrations in the groundwater samples submitted for analysis satisfied the respective ODWQS parameters with the exception the following:
 - Hardness (high) at BH1, BH2, BH4, BH4-II, BH5-II, BH6-III, BH8-I, BH9-I and BH10-I;
 - Hardness (low) at BH3-II, BH7-II and BH11;
 - Nitrate at BH4-II;
 - DOC at BH1, BH2, BH3-II, BH4, BH4-II, BH5-II, BH7-II, BH8-I and BH9-I;
 - Manganese at BH1, BH2, BH4-II, BH5-II, BH6-III, BH8-I, BH9-I and BH10-I;
 - Turbidity at all wells except BH1;
 - Iron at BH2 and BH9-I;
 - Aluminum at BH11;
 - Alkalinity (low) at BH3-II, BH7-II, BH10-I and BH11; and
 - pH (low) at BH7-II, BH10-I and BH11.

- All reported concentrations in the groundwater samples near surface water bodies submitted for analysis satisfied the respective APV parameters with the exception the following:
 - Copper at BH6-III and BH10-I; and
 - Cobalt at BH9-I.
- All reported concentrations in the groundwater samples collected from the downgradient monitoring wells met the applicable Guideline B-7 criteria for all parameters analyzed, with the exception of the following:
 - TDS at BH9-I;
 - Nitrate at BH5-II and BH8-I;
 - DOC at all locations;
 - Iron at BH9-I; and
 - Manganese at BH5-II, BH6-III, BH8-I and BH9-I;
- All reported concentrations in the surface water samples submitted for analysis satisfied the respective PWQO and/or CWQG parameters, with the exception of the following:
 - pH (low) at all locations;
 - Iron at all locations;
 - Aluminum at SW1 and SW2;
 - Cobalt at SW2 and SW3;
 - Phosphorous at SW2; and
 - Cadmium at SW2.

Based on the results obtained from the existing groundwater monitoring wells and surface water monitoring locations, Pinchin has not identified any significant landfill related impacts at the Site. Concentrations of TDS, iron, nitrate, DOC, and manganese parameters within the groundwater samples analyzed at the furthest downgradient monitoring locations (BH5-II, BH6-III, BH7-II, BH8-I and BH9-I) which exceeded the Guideline B-7 criteria are likely attributed to either naturally occurring conditions within the shallow unconfined aquifer on-site or from temperate impacts from leachate sourced from the waste deposits at the Site. All exceedances of the Guideline B-7 RUC are related to operational guidelines and/or aesthetic objectives associated with drinking water systems set by the ODWQS and are not considered to be an immediate significant human health or environmental concern originating from the Site, with the exception of nitrate which is a health-related parameter. The elevated concentrations of nitrate are only quantified in some downgradient wells and often fluctuate throughout the historical record.

Therefore, these concentrations should be confirmed during the next monitoring period. Furthermore, concentrations of nitrate quantified at the downgradient groundwater wells are not interpreted to be impacting the surface water quality at the Site as nitrate concentrations are observed to be at low levels at downstream monitoring locations SW3 (near-field) and SW2 (far-field).

6.0 RECOMMENDATIONS

Based on a review of the existing dataset and regulatory requirements to date, Pinchin recommends the following:

- Continue with routine monitoring of all the available groundwater monitoring wells and surface water monitoring locations. Groundwater and surface water monitoring shall be completed with analyses for the parameters identified in the historical monitoring record. It is recommended that groundwater and surface water monitoring be completed during the spring and late fall to generate a baseline data set, to evaluate trends, and to determine the need and scope of a long-term monitoring program for the Site. Considering the dataset completed thus far, it is Pinchin's opinion that sampling should continue in 2021 before the adequacy of the monitoring program can be fully evaluated;
- It is recommended that the three-tiered trigger level monitoring program, developed as part of the 2019 Leachate Management Plan Study be implemented for the Site once the mitigative measures for the seep are executed;
- Monitoring wells BH1, BH2, BH4 and BH6-II should be equipped with well caps during the next regularly scheduled sampling event; and
- The Client should continue to ensure that the requirements as specified in the CofA are complied with.

7.0 MONITORING AND SCREENING CHECKLIST

In accordance with the MECP Landfill Standards, the Monitoring and Screening Checklist for the Site completed by the Pinchin CEP is completed and provided in Appendix VIII.



8.0 DISCLAIMER

This Water Quality Monitoring Program was performed for the Corporation of the Municipality of Magnetawan (Client) in order to investigate the environmental condition of the groundwater and surface water at the Chapman Waste Disposal Site (Site). The term recognized environmental condition means the presence or likely presence of any hazardous substance on a property under conditions that indicate an existing release, past release, or a material threat of a release of a hazardous substance into structures on the property or into the ground, groundwater, or surface water of the property.

This Water Quality Monitoring Program does not quantify the extent of the current and/or recognized environmental condition or the cost of any remediation.

Conclusions derived are specific to the immediate area of study and cannot be extrapolated extensively away from sample locations. Samples have been analyzed for a limited number of contaminants that are expected to be present at the Site, and the absence of information relating to a specific contaminant does not indicate that it is not present.

No environmental site assessment can wholly eliminate uncertainty regarding the potential for recognized environmental conditions on a property. Performance of this Water Quality Monitoring Program to the standards established by Pinchin is intended to reduce, but not eliminate, uncertainty regarding the potential for recognized environmental conditions on the Site, and recognizes reasonable limits on time and cost.

This Water Quality Monitoring Program was performed in general compliance with currently acceptable practices for environmental site investigations, and specific Client requests, as applicable to this Site.

This report was prepared for the exclusive use of the Client, subject to the conditions and limitations contained within the duly authorized work plan. 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 the third parties. If additional parties require reliance on this report, written authorization from Pinchin will be required. Pinchin disclaims responsibility of consequential financial effects on transactions or property values, or requirements for follow-up actions and costs. No other warranties are implied or expressed. Furthermore, this report should not be construed as legal advice.

Pinchin will not be responsible for any consequential or indirect damages. Pinchin will only be held liable for damages resulting from the negligence of Pinchin. Pinchin will not be liable for any losses or damage if the Client has failed, within a period of two years following the date upon which the claim is discovered within the meaning of the Limitations Act, 2002 (Ontario), to commence legal proceedings against Pinchin to recover such losses or damage.



2020 Annual Monitoring Report

Chapman Waste Disposal Site, Magnetawan, Ontario
Municipality of Magnetawan

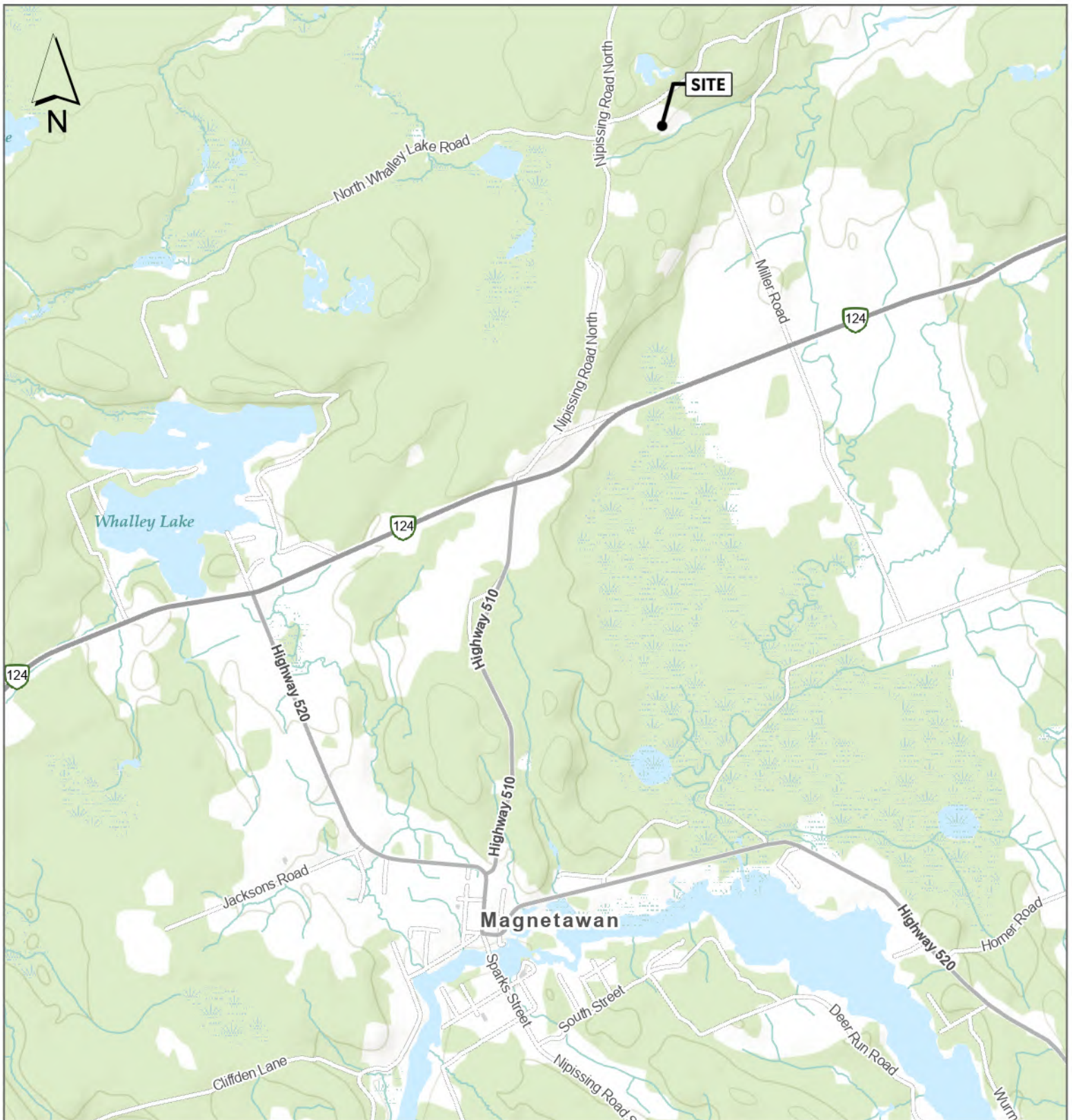
February 24, 2021
Pinchin File: 225335.003
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Pinchin makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this report, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation and these interpretations may change over time.

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Template: Groundwater Monitoring Report Template, EDR, May 28, 2019

APPENDIX I
Figures



SCALE

0 350 700 1050 1400 1750

Meters

1:35,000

PROJECT NAME

**2020 ANNUAL MONITORING
REPORT - CHAPMAN WASTE
DISPOSAL SITE**

NOTES, REFERENCES AND SOURCES

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Bureau,USDA,NR,CanParks,Canada

CLIENT

MUNICIPALITY OF MAGNETAWAN



**Municipality of
Magnetawan**

**TITLE
KEY MAP**

FIGURE

1

PROJECT

225335.003

DATE

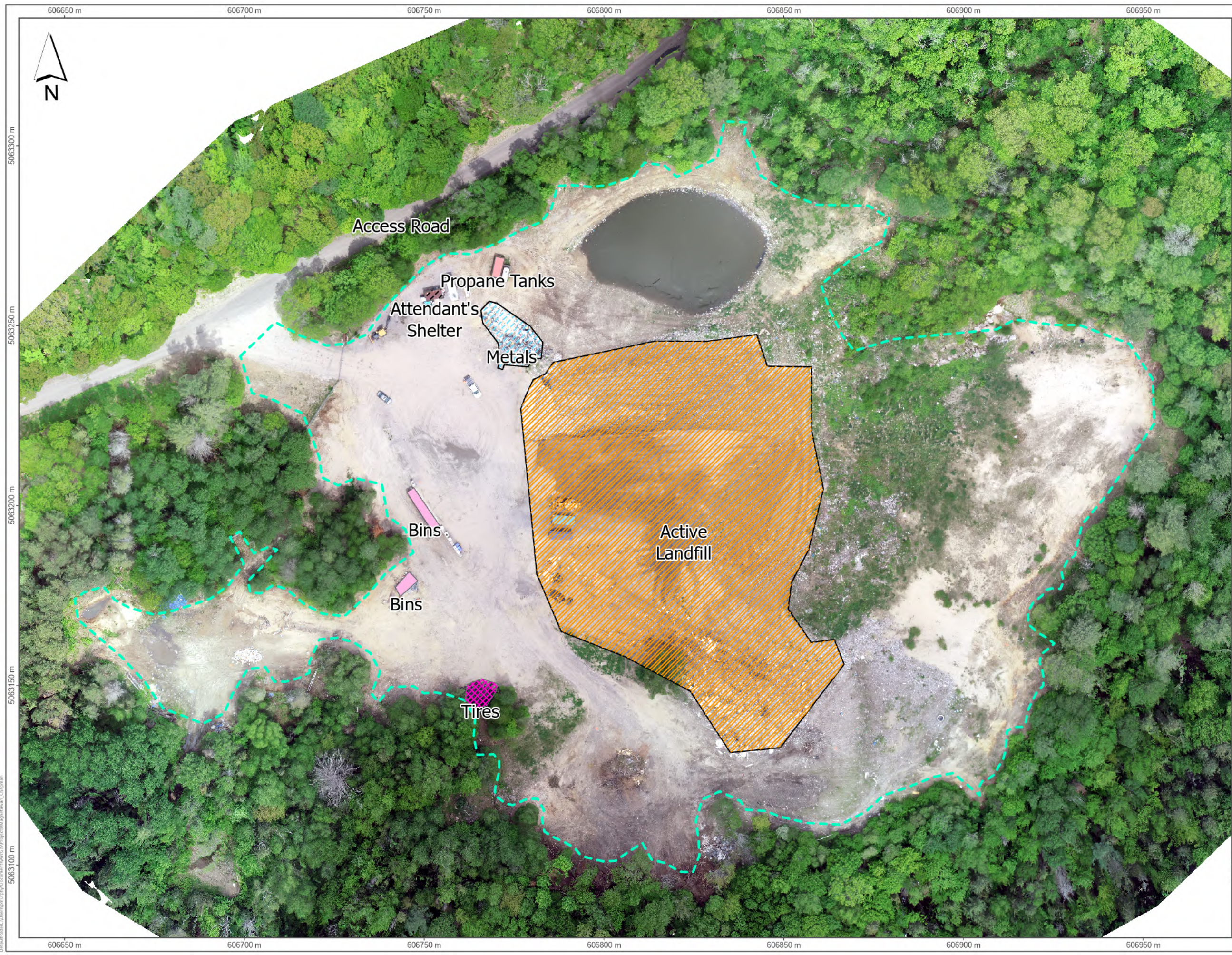
FEBRUARY 2021

PREPARED

PKM

REVIEWED

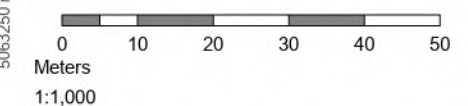
TIM



LEGEND

- Landfill Boundary
- Active Landfill
- Attendant's Shelter
- Bins
- Metals
- Propane Tanks
- Tires

SCALE



NOTES, REFERENCES AND SOURCES

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 - 4) Coordinate system: NAD 1983 UTM Zone 17N
- Sources:

Esri,NASANGA,USGS,Provinces,Ontario,Esri,HERE,Garmin,METI/
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KEY PLAN



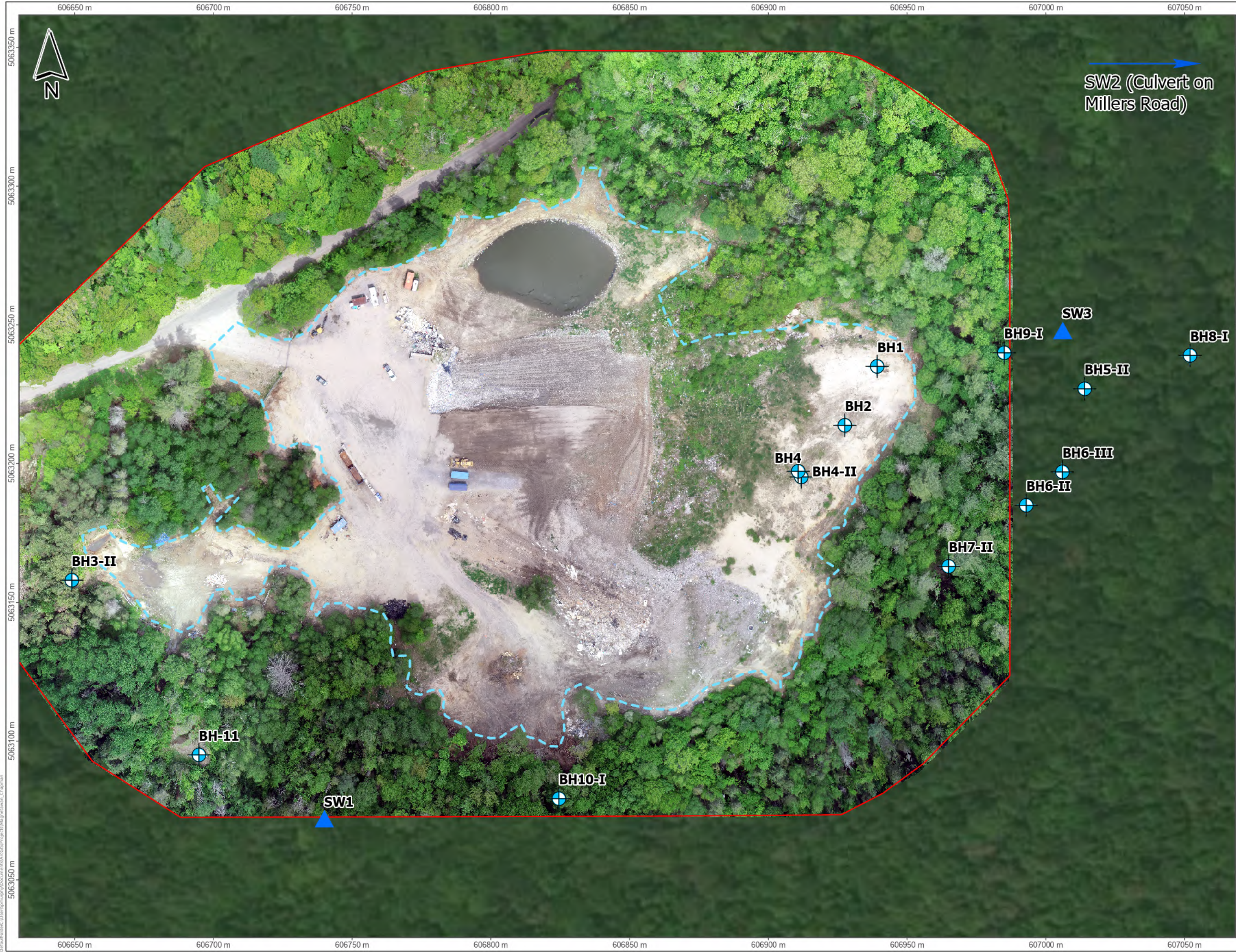
PROJECT LOCATION





CHAPMAN WASTE DISPOSAL SITE

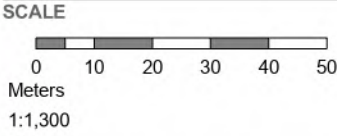
CLIENT

**MUNICIPALITY OF
MAGNETAWAN**

TITLE CHAPMAN LANDFILL LAYOUT PLAN		FIGURE 2	
PROJECT		225335.003	
DATE		FEBRUARY 2021	
PREPARED	PKM	REVIEWED	TIM



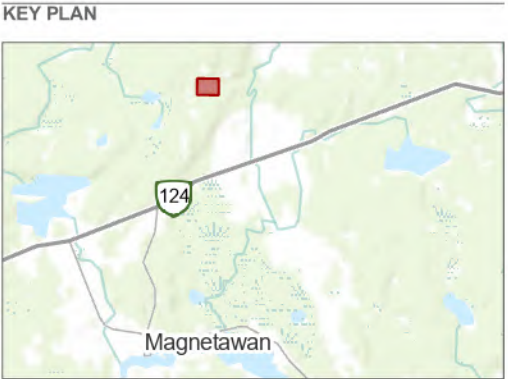
- LEGEND**
-  Landfill Boundary
 -  Surface Water Sample
 -  Monitoring Well
 -  UAV Survey Area



NOTES, REFERENCES AND SOURCES

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4) Coordinate system: NAD 1983 UTM Zone 17N

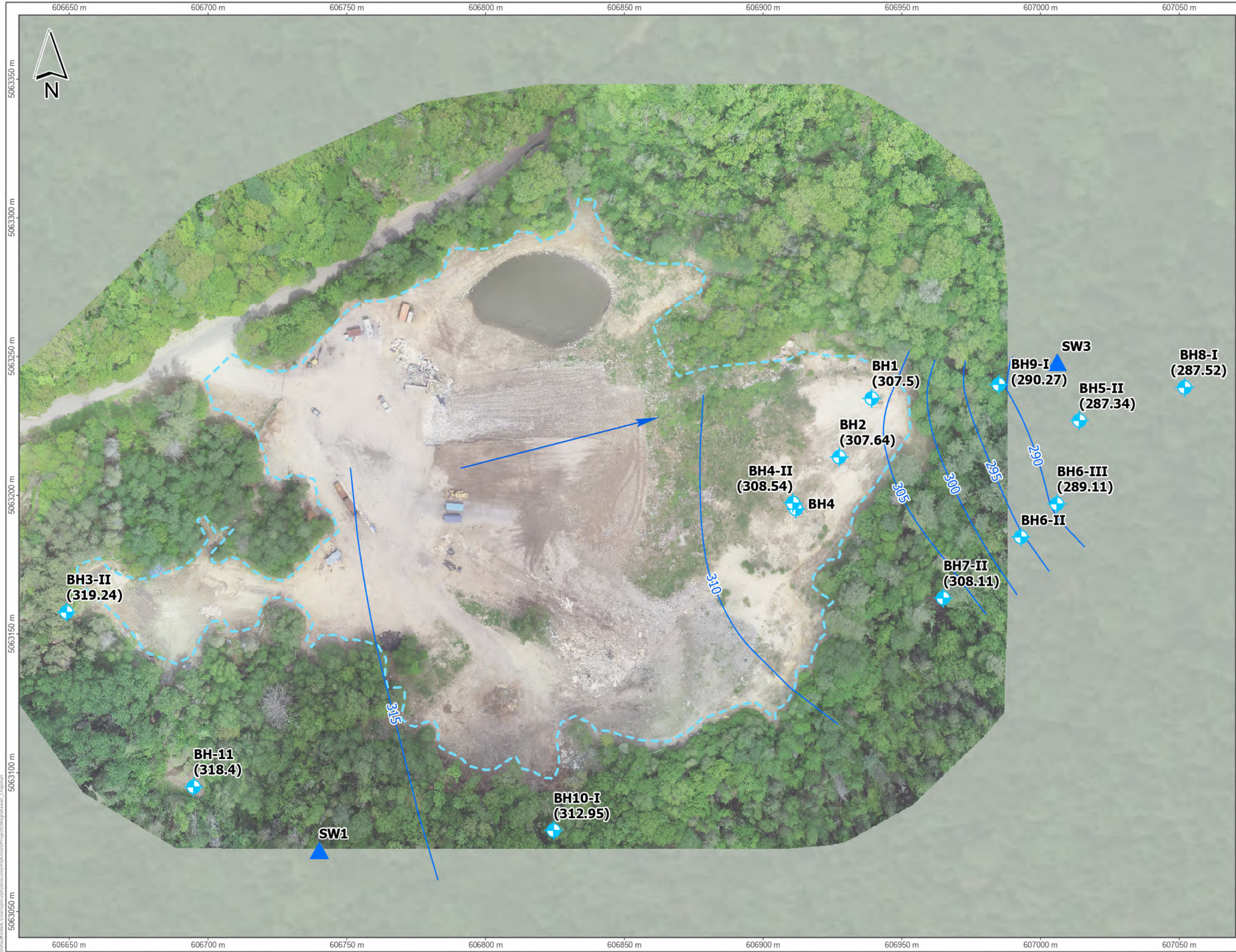
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NASA,USGS,EPA,NPS,USDA,NRCan,ParksCanada,Archipelago,
GeoEye,Maxar,Microsoft,Sources,NRCan,Esri,Canada,Canadian
CommunityMaps,contributors,EsriCanada








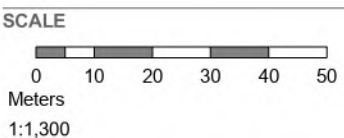
PROJECT LOCATION
CHAPMAN WASTE DISPOSAL SITE

CLIENT
MUNICIPALITY OF MAGNETAWAN

TITLE SAMPLE LOCATION PLAN		FIGURE 3	
PROJECT		225335.003	
DATE		FEBRUARY 2021	
PREPARED	PKM	REVIEWED	TIM



- LEGEND**
-  Landfill Boundary
 -  Surface Water Sample
 -  Monitoring Well
 -  Groundwater Contour (masl)
 -  Groundwater flow direction



NOTES, REFERENCES AND SOURCES

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4) Coordinate system: NAD 1983 CSRS UTM Zone 17N

Sources:

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NASA/USGS/EPANPS/USDA/NRCan/Parks Canada/Archipelago,
GeoEye/Maxar/Microsoft

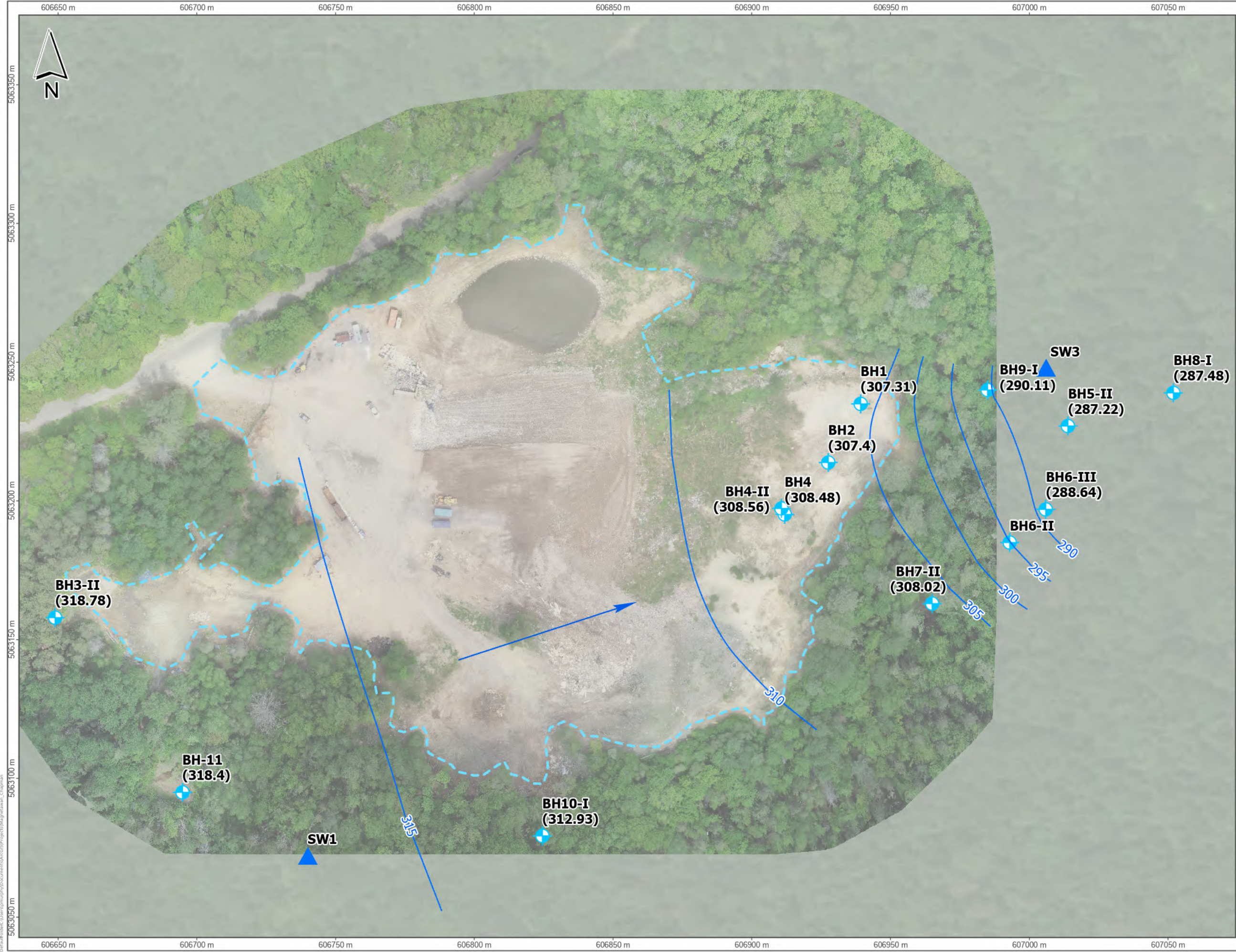







PROJECT LOCATION
CHAPMAN WASTE DISPOSAL SITE

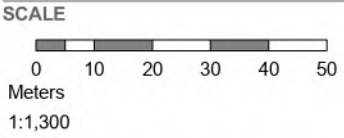
CLIENT
MUNICIPALITY OF MAGNETAWAN

TITLE GROUNDWATER CONTOUR PLAN (SPRING 2020)	FIGURE 4
---	---------------------------

PROJECT	225335.003
DATE	FEBRUARY 2021
PREPARED	PKM
REVIEWED	TIM

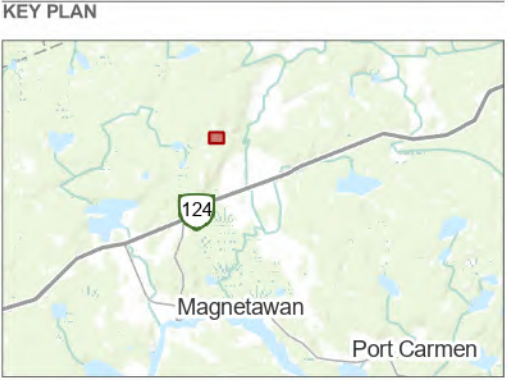


- LEGEND**
-  Landfill Boundary
 -  Surface Water Sample
 -  Monitoring Well
 -  Groundwater Contour (masl)
 -  Groundwater flow direction



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 - 4) Coordinate system: NAD 1983 CSRS UTM Zone 17N

Sources:
Esri/NASA/NGA/USGS/Provinces of Ontario/Esri/HERE/Garmin/METI/
NASA/USGS/EPANPS/USDA/NRCan/Parks Canada/Archipelago,
GeoEye/Maxar/Microsoft



PROJECT LOCATION
CHAPMAN WASTE DISPOSAL SITE

CLIENT
MUNICIPALITY OF MAGNETAWAN

TITLE GROUNDWATER CONTOUR PLAN (FALL 2020)	FIGURE 5
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PROJECT	225335.003
----------------	-------------------

DATE	FEBRUARY 2021
-------------	----------------------

PREPARED	PKM	REVIEWED	TIM
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APPENDIX II
Borehole Logs



Log of Borehole: BH3-II

Project #: 225335.001

Logged By: KM

Project: Hydrogeology Assessment

Client: Municipality of Magnetawan

Location: Chapman Waste Disposal Site, Magnetawan, Ontario

Drill Date: September 28, 2018

Project Manager: TM

SUBSURFACE PROFILE					SAMPLE	
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Sample #	Recovery (%)
0		Ground Surface	0.00			
1		Sand Brown sand, some gravel, dry, no PHC odour or staining.				
2						
3						
4						
5						
6						
7						
8						
9						
10			3.05			
11		Sand and Silt Grey sand and silt, damp, no PHC odour or staining.	3.66		SS1	
12						
13		Sand and Silt Grey sand and silt, saturated, no PHC odour or staining.				
14						
15						
16					SS2	
17						
18						
19						
20			6.10			
21		End of Borehole				
22						
23						
24						
25						

Contractor: CCC

957 Cambrian Heights Drive

Grade Elevation: NA

Drilling Method: Hollow Auger

Suite 203

Top of Casing Elevation: NA

Well Casing Size: 5.08 cm

Sudbury, ON P3C 5S5

Sheet: 1 of 1



Log of Borehole: BH4-II

Project #: 225335.001

Logged By: KM

Project: Hydrogeology Assessment

Client: Municipality of Magnetawan

Location: Chapman Waste Disposal Site, Magnetawan, Ontario

Drill Date: September 27, 2018

Project Manager: TM

SUBSURFACE PROFILE					SAMPLE	
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Sample #	Recovery (%)
0		Ground Surface	0.00			
1		Sand Coarse brown sand, some gravel, dry, no PHC odour or staining.				
2						
3						
4						
5						
6						
7						
8						
9						
10			3.05			
11		Sand and Gravel Coarse brown sand and gravel, trace cobbles, damp, no PHC odour or staining.			SS1	
12						
13			3.96			
14						
15		Bedrock Bedrock.				
16						
17		Auger refusal on assumed bedrock.				
18						
19						
20		Sandseam at 20'.				
21						
22						
23						
24						
25						
26						
27			8.44			
28		End of Borehole				
29						
30						

Contractor: CCC

957 Cambrian Heights Drive

Grade Elevation: NA

Drilling Method: Hollow Auger

Suite 203

Top of Casing Elevation: NA

Well Casing Size: 5.08 cm

Sudbury, ON P3C 5S5

Sheet: 1 of 1



Log of Borehole: BH6-III

Project #: 225335.001

Logged By: KM

Project: Hydrogeology Assessment

Client: Municipality of Magnetawan

Location: Chapman Waste Disposal Site, Magnetawan, Ontario

Drill Date: September 28, 2018

Project Manager: TM

SUBSURFACE PROFILE					SAMPLE	
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Sample #	Recovery (%)
0		Ground Surface	0.00			
1		Sand and Gravel Coarse sand and gravel, some cobbles, damp, no PHC odour or staining.				
2						
3						
4						
5						
6						
7						
8						
9						
10			3.05			
11		Sand and Gravel Coarse sand and gravel, large cobbles, damp, no PHC odour or staining.			SS1	
12						
13			3.96			
14		Bedrock Bedrock.				
15						
16						
17						
18						
19						
20		Auger refusal on assumed bedrock.				
21			6.30			
22		End of Borehole				
23						
24						
25						

Contractor: CCC

957 Cambrian Heights Drive

Grade Elevation: NA

Drilling Method: Hollow Auger

Suite 203

Top of Casing Elevation: NA

Well Casing Size: 5.08 cm

Sudbury, ON P3C 5S5

Sheet: 1 of 1



Log of Borehole: BH8-I

Project #: 225335.001

Logged By: KM

Project: Hydrogeology Assessment

Client: Municipality of Magnetawan

Location: Chapman Waste Disposal Site, Magnetawan, Ontario

Drill Date: September 27, 2018

Project Manager: TM

SUBSURFACE PROFILE					SAMPLE	
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Sample #	Recovery (%)
0		Ground Surface	0.00			
1		Sand Coarse, brown sand with some gravel, no PHC odour or staining.				
2						
3						
4						
5						
6						
7						
8						
9						
10						
11					SS1	
12						
13						
14			4.27			
15		Sand and Gravel Coarse, brown sand and gravel, trace cobbles, no PHC odour or staining.			SS2	
16						
17						
18						
19						
20			6.05			
21		End of Borehole				
22						
23						
24						
25						

Contractor: CCC

957 Cambrian Heights Drive

Grade Elevation: NA

Drilling Method: Hollow Auger

Suite 203

Top of Casing Elevation: NA

Well Casing Size: 5.08 cm

Sudbury, ON P3C 5S5

Sheet: 1 of 1



Log of Borehole: BH9-I

Project #: 225335.001

Logged By: KM

Project: Hydrogeology Assessment

Client: Municipality of Magnetawan

Location: Chapman Waste Disposal Site, Magnetawan, Ontario

Drill Date: September 28, 2018

Project Manager: TM

SUBSURFACE PROFILE					SAMPLE	
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Sample #	Recovery (%)
0		Ground Surface	0.00			
1		Sand Coarse brown sand, damp, no PHC odour or staining.				
2						
3						
4						
5						
6						
7						
8						
9						
10						
11					SS1	
12						
13						
14			4.27			
15		Sand and Silt Coarse brown sand and fine brown sand and silt, trace gravel, saturated, no PHC odour or staining.			AS1	
16						
17						
18						
19						
20						
21						
22						
23						
24					AS2	
25						
26						
27		Refusal at 27' on assumed bedrock.	8.23			
28		End of Borehole				
29						
30						

Contractor: CCC

957 Cambrian Heights Drive

Grade Elevation: NA

Drilling Method: Hollow Auger

Suite 203

Top of Casing Elevation: NA

Well Casing Size: 5.08 cm

Sudbury, ON P3C 5S5

Sheet: 1 of 1



Log of Borehole: BH10-I

Project #: 225335.001

Logged By: KM

Project: Hydrogeology Assessment

Client: Municipality of Magnetawan

Location: Chapman Waste Disposal Site, Magnetawan, Ontario

Drill Date: September 26, 2018

Project Manager: TM

SUBSURFACE PROFILE					SAMPLE	
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Sample #	Recovery (%)
0		Ground Surface	0.00			
1		Sand Coarse, brown sand, some gravel, trace cobbles, damp, no PHC odour or staining.				
2						
3						
4			1.52			
5		Bedrock Refusal on assumed bedrock.				
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16			4.88			
17		End of Borehole				
18						
19						
20						
21						
22						
23						
24						
25						

Contractor: CCC

957 Cambrian Heights Drive

Grade Elevation: NA

Drilling Method: Hollow Auger

Suite 203

Top of Casing Elevation: NA

Well Casing Size: 5.08 cm

Sudbury, ON P3C 5S5

Sheet: 1 of 1



Log of Borehole: BH11

Project #: 225335

Logged By: KM

Project: Hydrogeology Assessment

Client: Municipality of Magnetawan

Location: Chapman Waste Disposal Site, Magnetawan, Ontario

Drill Date: September 26, 2018

Project Manager: TM

SUBSURFACE PROFILE					SAMPLE	
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Sample #	Recovery (%)
0		Ground Surface	0.00			
1		Sand and Silt Brown sand with silt, damp, no PHC odour or staining.			SS1	
2						
3						
4						
5						
6						
7						
8						
9						
10			3.05			
11		Sand Coarse, brown sand, saturated, no PHC odour or staining.			SS2	
12						
13						
14						
15						
16			4.88		AS1	
17		End of Borehole				
18						
19						
20						
21						
22						
23						
24						
25						

Contractor: CCC

957 Cambrian Heights Drive

Grade Elevation: NA

Drilling Method: Hollow Auger

Suite 203

Top of Casing Elevation: NA

Well Casing Size: 5.08 cm

Sudbury, ON P3C 5S5

Sheet: 1 of 1

APPENDIX III
Summary Tables

TABLE 1 Groundwater Monitoring Well Data Chippewa Waste Disposal Site Municipality, Ontario														
Well ID Number	Date (dd/mm/yyyy)	Ground Surface Elevation (mmsl)	TWG Elevation (mmsl)	Height of TWG from Ground Surface (m)	Water Level - Measured from TWG (m)	Water Level - Calculated from TWG (m)	Water Level - Measured from TWG (m)	Water Level - Calculated from TWG (m)	UTM Coordinates			Comments		
									Zone	Nothing (m)	East (m)			
BH1	24-Sep-03	-	-	-	6.99	-	-	-	17	600930	506325	-		
	13-May-04	-	-	-	6.46	-	-	-	-	-	-	-		
	27-Oct-04	-	-	-	7.11	-	-	-	-	-	-	-		
	15-May-05	-	-	-	6.41	-	-	-	-	-	-	-		
	26-Oct-05	-	-	-	7.52	-	-	-	-	-	-	-		
	8-May-06	-	-	-	6.41	-	-	-	-	-	-	-		
	2-Nov-06	-	-	-	6.66	-	-	-	-	-	-	-		
	8-May-07	-	-	-	6.65	-	-	-	-	-	-	-		
	24-Oct-07	-	-	-	7.07	-	-	-	-	-	-	-		
	7-May-08	-	-	-	6.12	-	-	-	-	-	-	-		
	29-Oct-08	-	-	-	6.75	-	-	-	-	-	-	-		
	11-May-09	-	-	-	7.71	-	-	-	-	-	-	-		
	15-Oct-09	-	-	-	6.76	-	-	-	-	-	-	-		
	2-Jun-10	-	-	-	6.31	-	-	-	-	-	-	-		
	21-Oct-10	-	-	-	6.98	-	-	-	-	-	-	-		
	26-Jun-11	-	-	-	6.50	-	-	-	-	-	-	-		
	27-Oct-11	-	-	-	6.71	-	-	-	-	-	-	-		
	9-May-12	-	-	-	6.47	-	-	-	-	-	-	-		
	4-Oct-12	-	-	-	6.94	-	-	-	-	-	-	-		
	BH2	30-May-13	-	-	-	5.90	-	-	-	17	600927	506323	-	
24-Oct-13		-	-	-	6.07	-	-	-	-	-	-	-		
8-May-14		-	-	-	6.43	-	-	-	-	-	-	-		
30-Oct-14		-	-	-	6.33	-	-	-	-	-	-	-		
13-May-15		-	-	-	6.31	-	-	-	-	-	-	-		
22-Oct-15		-	-	-	6.93	-	-	-	-	-	-	-		
13-Oct-16		-	-	-	6.83	-	-	-	-	-	-	-		
18-May-17		-	-	-	5.80	-	-	-	-	-	-	-		
25-Oct-17		-	-	-	6.41	-	-	-	-	-	-	-		
2-May-18		-	-	-	6.01	-	-	-	-	-	-	-		
17-Oct-18		-	-	-	6.60	-	-	-	-	-	-	-		
11-Jun-19		-	-	-	1.03	6.10	11.25	5.07	-	-	-	-		
26-Sep-19		-	-	-	0.84	6.79	11.30	5.85	-	-	-	-		
1-Jun-20		-	-	-	0.94	6.56	10.74	5.62	-	-	-	-		
30-Sep-20		-	-	-	1.03	6.75	11.20	5.72	-	-	-	No well cap		
24-Sep-03		-	-	-	6.24	-	-	-	-	-	-	-		
12-May-04		-	-	-	6.05	-	-	-	-	-	-	-		
27-Oct-04		-	-	-	6.69	-	-	-	-	-	-	-		
15-May-05		-	-	-	5.87	-	-	-	-	-	-	-		
26-Oct-05		-	-	-	6.62	-	-	-	-	-	-	-		
8-May-06	-	-	-	5.9	-	-	-	-	-	-	-			
2-Nov-06	-	-	-	6.15	-	-	-	-	-	-	-			
8-May-07	-	-	-	6.12	-	-	-	-	-	-	-			
24-Oct-07	-	-	-	6.62	-	-	-	-	-	-	-			
7-May-08	-	-	-	5.56	-	-	-	-	-	-	-			
29-Oct-08	-	-	-	6.26	-	-	-	-	-	-	-			
11-May-09	-	-	-	5.69	-	-	-	-	-	-	-			
15-Oct-09	-	-	-	6.34	-	-	-	-	-	-	-			
2-Jun-10	-	-	-	6.37	-	-	-	-	-	-	-			
21-Oct-10	-	-	-	6.51	-	-	-	-	-	-	-			
26-Jun-11	-	-	-	5.82	-	-	-	-	-	-	-			
27-Oct-11	-	-	-	6.2	-	-	-	-	-	-	-			
9-May-12	-	-	-	5.49	-	-	-	-	-	-	-			
4-Oct-12	-	-	-	6.45	-	-	-	-	-	-	-			
30-May-13	-	-	-	6.85	-	-	-	-	-	-	-			
24-Oct-13	-	-	-	6.13	-	-	-	-	-	-	-			
8-May-14	-	-	-	4.73	-	-	-	-	-	-	-			
30-Oct-14	-	-	-	5.78	-	-	-	-	-	-	-			
13-May-15	-	-	-	5.77	-	-	-	-	-	-	-			
22-Oct-15	-	-	-	6.66	-	-	-	-	-	-	-			
13-Oct-16	-	-	-	6.36	-	-	-	-	-	-	-			
18-May-17	-	-	-	5.2	-	-	-	-	-	-	-			
25-Oct-17	-	-	-	5.9	-	-	-	-	-	-	-			
3-May-18	-	-	-	5.47	-	-	-	-	-	-	-			
17-Oct-18	-	-	-	6.08	-	-	-	-	-	-	-			
11-Jun-19	-	-	-	0.39	5.57	9.80	5.18	-	-	-	-			
26-Sep-19	-	-	-	0.56	6.08	9.68	5.72	-	-	-	-			
1-Jun-20	-	-	-	0.56	6.04	6.72	5.68	-	-	-	-			
30-Sep-20	-	-	-	0.41	6.28	9.71	5.87	-	-	-	No well cap			
24-Sep-03	-	-	-	6.15	-	-	-	-	-	-	-			
12-May-04	-	-	-	6.39	-	-	-	-	-	-	-			
27-Oct-04	-	-	-	5.36	-	-	-	-	-	-	-			
15-May-05	-	-	-	6.33	-	-	-	-	-	-	-			
26-Oct-05	-	-	-	7.36	-	-	-	-	-	-	-			
8-May-06	-	-	-	6.78	-	-	-	-	-	-	-			
2-Nov-06	-	-	-	7.07	-	-	-	-	-	-	-			
8-May-07	-	-	-	6.46	-	-	-	-	-	-	-			
24-Oct-07	-	-	-	7.6	-	-	-	-	-	-	-			
7-May-08	-	-	-	7.91	-	-	-	-	-	-	-			
29-Oct-08	-	-	-	7.96	-	-	-	-	-	-	-			
11-May-09	-	-	-	6.44	-	-	-	-	-	-	-			
15-Oct-09	-	-	-	7.12	-	-	-	-	-	-	-			
2-Jun-10	-	-	-	4.52	-	-	-	-	-	-	-			
21-Oct-10	-	-	-	7.52	-	-	-	-	-	-	-			
26-Jun-11	-	-	-	5.95	-	-	-	-	-	-	-			
27-Oct-11	-	-	-	7.38	-	-	-	-	-	-	-			
9-May-12	-	-	-	6.55	-	-	-	-	-	-	-			
4-Oct-12	-	-	-	7.53	-	-	-	-	-	-	-			
30-May-13	-	-	-	6.38	-	-	-	-	-	-	-			
24-Oct-13	-	-	-	6.91	-	-	-	-	-	-	-			
8-May-14	-	-	-	5.32	-	-	-	-	-	-	-			
30-Oct-14	-	-	-	6.52	-	-	-	-	-	-	-			
13-May-15	-	-	-	6.39	-	-	-	-	-	-	-			
22-Oct-15	-	-	-	7.47	-	-	-	-	-	-	-			
13-Oct-16	-	-	-	7.4	-	-	-	-	-	-	-			
18-May-17	-	-	-	5.46	-	-	-	-	-	-	-			
25-Oct-17	-	-	-	-	-	-	-	-	-	-	-			
3-May-18	-	-	-	-	-	-	-	-	-	-	-			
17-Oct-18	-	-	-	-	-	-	-	-	-	-	-			
11-Jun-19	-	-	-	-	-	-	-	-	-	-	-			
26-Sep-19	-	-	-	-	-	-	-	-	-	-	-			
1-Jun-20	-	-	-	-	-	-	-	-	-	-	-			
BH3	30-Sep-20	-	-	-	-	-	-	-	-	-	-	-		
	11-Jun-19	-	-	-	0.30	3.54	6.70	3.74	17	600650	506158	Installed new tubing.		
	26-Sep-19	-	-	-	0.77	4.55	6.50	3.78	-	-	-	-		
	1-Jun-20	-	-	-	0.77	4.04	6.50	3.27	-	-	-	-		
	30-Sep-20	-	-	-	0.81	4.5	6.54	3.69	-	-	-	-		
	24-Sep-03	-	-	-	6.19	-	-	-	-	-	-	-		
	12-May-04	-	-	-	5.67	-	-	-	-	-	-	-		
	27-Oct-04	-	-	-	-	-	-	-	-	-	-	-		
	15-May-05	-	-	-	5.79	-	-	-	-	-	-	-		
	26-Oct-05	-	-	-	-	-	-	-	-	-	-	-		
	8-May-06	-	-	-	5.77	-	-	-	-	-	-	-		
	2-Nov-06	-	-	-	-	-	-	-	-	-	-	-		
	8-May-07	-	-	-	6.2	-	-	-	-	-	-	-		
	24-Oct-07	-	-	-	6	-	-	-	-	-	-	-		
	7-May-08	-	-	-	6.24	-	-	-	-	-	-	-		
	29-Oct-08	-	-	-	5.82	-	-	-	-	-	-	-		
	11-May-09	-	-	-	5.64	-	-	-	-	-	-	-		
	15-Oct-09	-	-	-	6.85	-	-	-	-	-	-	-		
	2-Jun-10	-	-	-	6.01	-	-	-	-	-	-	-		
	21-Oct-10	-	-	-	6.60	-	-	-	-	-	-	-		
26-Jun-11	-	-	-	6.46	-	-	-	-	-	-	-			
27-Oct-11	-	-	-	5.49	-	-	-	-	-	-	-			
4-Oct-12	-	-	-	5.36	-	-	-	-	-	-	-			
30-May-13	-	-	-	5.28	-	-	-	-	-	-	-			
24-Oct-13	-	-	-	5.53	-	-	-	-	-	-	-			
8-May-14	-	-	-	5.14	-	-	-	-	-	-	-			
30-Oct-14	-	-	-	5.66	-	-	-	-	-	-	-			
13-May-15	-	-	-	5.63	-	-	-	-	-	-	-			
22-Oct-15	-	-	-	6.39	-	-	-	-	-	-	-			
13-Oct-16	-	-	-	5.99	-	-	-	-	-	-	-			
18-May-17	-	-	-	5.43	-	-	-	-	-	-	-			
25-Oct-17	-	-	-	6.18	-	-	-	-	-	-	-			
3-May-18	-	-	-	-	-	-	-	-	-	-	-			
17-Oct-18	-	-	-	-	-	-	-	-	-	-	-			
11-Jun-19	-	-	-	-	-	-	-	-	-	-	-			
26-Sep-19	-	-	-	-	-	-	-	-	-	-	-			
1-Jun-20	-	-	-	-	-	-	-	-	-	-	-			
BH4	30-Sep-20	-	-	-	0.35	5.67	6.34	5.32	17	600650	506158	Installed new tubing.		
	11-Jun-19	-	-	-	0.28	5.75	6.38	5.47	-	-	-	-		
	26-Sep-19	-	-	-	-	-	-	-	-	-	-	-		
	1-Jun-20	-	-	-	-	-	-	-	-	-	-	-		
	30-Sep-20	-	-	-	0.77	5.9	6.35	5.53	-	-	-	No well cap		
	24-Sep-03	-	-	-	6.23	-	-	-	-	-	-	Needs new tubing.		
	12-May-04	-	-	-	0.63	8.42	5.87	7.79	-	-	-	Installed new tubing.		
	27-Oct-04	-	-	-	0.63	6.07	6.58	3.44	17	600910	506197	-		
	15-May-05	-	-	-	0.74	6.05	6.39	5.31	-	-	-	-		
	26-Oct-05	-	-	-	-	-	-	-	-	-	-	-		
	8-May-06	-	-	-	-	-	-	-	-	-	-	-		
	2-Nov-06	-	-	-	-	-	-	-	-	-	-	-		
	8-May-07	-	-	-	-	-	-	-	-	-	-	-		
	24-Oct-07	-	-	-	-	-	-	-	-	-	-	-		
	7-May-08	-	-	-	-	-	-	-	-	-	-	-		
	29-Oct-08	-	-	-	-	-	-	-	-	-	-	-		
	11-May-09	-	-	-	-	-	-	-	-	-	-	-		
	15-Oct-09	-	-	-	-	-	-	-						

TABLE 2 Surface Water Monitoring Location Data Chapman Waste Disposal Site Magnetawan, Ontario				
Surface Water Monitoring Location	UTM Coordinates			Comments
	Zone	Easting (m)	Northing (m)	
SW1	17	606740	5063072	Flow observed.
SW2	17	607482	5063373	Upstream of culvert. Flow observed.
SW3	17	606914	5063195	Flow observed.

TABLE 3 Groundwater Quality Results - BH-1 Chapman Waste Disposal Site Magnetawan, Ontario																																					
Parameter	Units	Sample Designation																																ODWQS			
		Sample Collection Date (dd/mm/yyyy)																																			
		BH-1																																			
		24-Sep-03	12-May-04	27-Oct-04	15-May-05	26-Oct-05	8-May-06	2-Nov-06	8-May-07	24-Oct-07	7-May-08	29-Oct-08	11-May-09	15-Oct-09	2-Jun-10	21-Oct-10	23-Jun-11	27-Oct-11	9-May-12	4-Oct-12	30-May-13	24-Oct-13	8-May-14	30-Oct-14	13-May-15	22-Oct-15	13-Oct-16	18-May-17	25-Oct-17	2-May-18	17-Oct-18	11-Jun-19	26-Sep-19	1-Jun-20	30-Sep-20		
pH Lab	pH Units	6.84	6.57	7.06	7.11	7.64	7.4	7.7	7.3	6.8	7.9	7.5	6.8	7	-	6.84	7.03	7.28	6.88	6.92	7.63	7.45	6.8	7.2	7.27	7.05	7.2	6.8	6.7	6.7	7	7.44	7.49	6.93	6.81	6.5-8.5	
Conductivity	µS/cm	59	241	83	149	148	234	181	282	58	279	76	369	112	-	85	273	272	230	130	570	400	590	380	320	280	372	716	538	498	434	653	581	483	335	-	
Hardness	mg/L	16.1	68	23	70.7	47	80	70	100	20	87	22	130	31	-	29	93	79	59	32	150	100	140	84	74	73	118	238	157	125	122	230	140	131	113	80-100	
Total Dissolved Solids	mg/L	42	234	54	176	124	169	115	180	51	200	50	244	60	-	54	168	184	106	60	304	212	318	204	638	150	204	440	304	212	206	310	250	232	188	500	
Alkalinity	mg/L	13	50	18	42.3	37	67	65	80	16	79	27	98	43	-	29	73	71	80	34	220	140	190	140	110	85	111	277	210	179	167	260	153	159	153	30-500	
Chloride	mg/L	0.6	12.6	1.6	8.34	5	8	2	15	-	19	-	25	<1	-	2	15	16	7	3	27	14	38	21	20	13	17	44	31	39	26	30.6	22.5	27.1	18.3	250	
Sodium	mg/L	3.3	12.4	2	7	5	13	9	13	2.7	17	4.6	19	6.8	-	5.6	9.5	15	18	8.2	39	16	44	19	14	13	20.2	36	20	23.2	16.5	31.3	20.7	23.8	18.0	200	
Calcium	mg/L	4.83	21.2	7.2	19	16	25	22	31	6.4	27	6.8	41	11	-	9.7	31	26	19	10	46	34	44	27	23	23	40.5	71.5	50.1	38.7	37.4	78.6	48.7	42.0	34.8	-	
Magnesium	mg/L	0.99	3.64	1.29	3.7	3.3	4.2	3.4	5.8	1	4.5	1.1	6.2	1.2	-	1.1	3.8	3.4	3.1	1.5	7.5	4.5	7.9	4.2	4.2	3.9	4.13	14.5	7.7	6.84	6.88	8.27	4.36	6.34	6.27	-	
Potassium	mg/L	2	9.1	2.2	5.5	4.2	6	5.8	5.1	3.4	10	3.9	8.6	4.9	-	3.7	8.3	6.9	6.5	3.5	20	18	15	15	13	7	10.1	21.2	14.4	11.6	7.14	12.5	20.8	10.2	9.1	-	
Sulphate	mg/L	3.6	26.9	6.7	15.9	9	19	8	8	3	19	2	24	4	-	4.0	21	13	9	5	24	9	33	10	7	10	11	61	36	17	12	32.1	13.8	23.0	11.4	500	
Ammonia	mg/L	-	1.46	-	0.11	-	0.25	-	-	-	0.28	0.35	0.64	<0.05	-	<0.05	0.14	<0.05	0.72	0.11	9.2	7.1	7.7	9	8.4	2.6	1.44	7.19	8.55	7.51	2.87	7.2	7.18	3.76	3.53	-	
Nitrate as N	mg/L	2.2	6	1.9	3.7	4.4	5.6	4.1	6	2	6	2	6	3	-	2	3.6	5.2	5	4.3	<0.1	5.1	0.5	0.29	0.93	4.34	7.7	1.1	0.3	0.6	5	<0.10	10.8	0.6	4.2	10	
Nitrite as N	mg/L	-	-	-	-	-	-	-	-	-	-	0.2	0.1	<0.01	-	<0.01	<0.01	<0.01	0.049	0.024	0.045	0.022	<0.01	<0.01	0.02	0.111	<0.05	<0.05	<0.05	0.12	<0.10	0.16	<0.05	<0.05	1		
Total Kjeldahl Nitrogen	mg/L	-	1.8	0.12	0.6	0.4	0.7	0.5	0.6	0.8	1.5	0.8	1.6	0.5	-	<0.2	0.6	0.5	1.3	<0.1	10	8.8	7.8	8.4	8.6	3.1	1.6	8.8	10.7	7.6	3.6	7.46	7.74	4.81	3.80	-	
Phenolics	mg/L	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	0.0015	<0.001	0.0012	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	0.001	<0.001	<0.001	0.001	-		
Dissolved Organic Carbon	mg/L	3.3	3.6	1	1.4	1.6	2.2	1.9	2.4	1.4	3.4	1.1	4.4	1.6	-	0.8	2.3	2.7	3.2	1.6	15	5.1	13	6	4.4	4	4.6	10.4	9.3	8.1	4.3	8.9	6.3	6.9	6.7	5	
Chemical Oxygen Demand	mg/L	-	11	-	10	13	12	5	4	10	20	8	14	<4	-	23	10	11	14	8.6	42	5.6	36	14	6.2	<4	26	36	28	25	21	26	20	25	<5	-	
Iron	mg/L	0.05	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	<0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.0001	<0.010	<0.010	0.016	0.032	0.3		
Manganese	mg/L	0.011	0.195	0.023	0.098	0.007	0.071	0.01	0.007	0.003	0.22	0.025	0.4	<0.002	-	0.019	0.026	0.01	0.12	0.0066	0.66	0.27	3.5	2.3	1.8	1.5	0.453	4.26	7.81	12.9	3.6	2.47	1.00	4.26	4.41	0.05	
Phosphorus	mg/L	9.3	8.5	7.4	5.4	5.3	5.1	4.5	5.1	4.8	5.1	3.7	5.2	3.7	-	4.8	4.9	4.5	0.021	0.045	<0.02	<0.02	<0.02	0.032	0.041	<0.02	<0.01	<0.00001	0.02	<0.01	0.02	0.02	<0.02	<0.02	<0.02	-	
Orthophosphate	mg/L	-	-	-	-	0.008	-	-	-	-	-	-	<0.01	<0.01	-	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	<0.10	<0.10	<0.10	-		
Turbidity	NTU	-	19.3	3.4	25.9	72.9	47.8	39.6	11	26.9	38.6	2.3	3.8	4	-	15	6.9	2.3	1.2	3.3	1.5	0.5	<0.2	1	1	0.7	1.0	1.5	1.8	2.1	6.4	1.9	7.0	3.4	2.2	5	
Total Suspended Solids	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<10	<10	<10	<10	14	13	5	<2	6	<2	12	<10	72	<10	11	-	
BOD	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	3	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5	-	-		
Anion Sum		-	-	-	-	-	-	-	-	0.504	2.96	0.724	3.57	1.12	-	0.823	2.59	2.53	2.34	1.17	5.55	3.78	5.61	3.64	3.05	2.6	3.50	8.13	5.84	5.08	4.67	-	-	-	-	-	
Cation Sum		-	-	-	-	-	-	-	-	0.604	2.76	0.759	3.62	1.05	-	0.919	2.5	2.41	2.21	1.09	5.82	3.7	5.69	3.53	3.04	2.38	3.50	6.87	4.37	3.8	3.34	-	-	-	-	-	
Ion Balance	%	-	-	-	-	-	-	-	-	NC	NC	NC	0.6	NC	-	NC	NC	2.32	1	0.72	1.48	0.1	NC	0.1	-8.4	-14.3	-14.3	-	-	-	-	-	-	-	-	-	
Silver	mg/L	-	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.00019	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-		
Aluminum	mg/L	0.09	0.014	0.007	0.031	0.016	0.011	0.014	0.02	0.006	0.016	0.008	0.016	0.008	-	0.011	0.014	0.008	0.011	0.0081	0.023	0.015	0.03	0.024	0.023	0.017	0.012	0.026	0.029	0.027	0.016	0.022	0.032	0.045	0.026	0.1	
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.003	<0.003	<0.001	<0.001	0.006
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-																								

TABLE 4 Groundwater Quality Results - BH-2 Chapman Waste Disposal Site Magnetawan, Ontario																																				
Parameter	Units	Sample Designation																														ODWQS				
		Sample Collection Date (dd/mm/yyyy)																																		
		BH-2																																		
		24-Sep-03	12-May-04	27-Oct-04	15-May-05	26-Oct-05	8-May-06	2-Nov-06	8-May-07	24-Oct-07	7-May-08	29-Oct-08	11-May-09	15-Oct-09	2-Jun-10	21-Oct-10	23-Jun-11	27-Oct-11	9-May-12	4-Oct-12	30-May-13	24-Oct-13	8-May-14	30-Oct-14	13-May-15	22-Oct-15	13-Oct-16	18-May-17	25-Oct-17	2-May-18	17-Oct-18		11-Jun-19	26-Sep-19	1-Jun-20	30-Sep-20
pH Lab	pH Units	6.61	6.65	7.04	7.35	8.11	7.8	7.9	7.2	6.8	7.9	7.6	6.5	6.8	7.1	6.96	6.94	6.91	6.83	6.62	7.66	6.84	7.16	7.11	7.22	7.06	7.0	6.9	7.3	6.9	7.0	7.48	7.40	7.09	7.08	6.5-8.5
Conductivity	µS/cm	531	645	307	256	308	317	246	202	304	284	185	224	174	262	354	336	499	450	570	440	770	490	930	1000	960	954	740	778	820	820	596	923	798	690	-
Hardness	mg/L	183	103	101	116	130	98	100	76	110	98	68	78	68	120	140	110	180	160	190	100	280	110	370	430	350	380	222	305	389	298	239	349	299	493	80-100
Total Dissolved Solids	mg/L	309	262	180	313	2870	201	143	123	170	220	120	150	125	170	230	198	314	250	320	248	496	254	604	136	574	608	450	498	488	468	312	452	388	456	500
Alkalinity	mg/L	155	153	133	126	148	135	106	82	88	105	69	96	63	85	111	92	105	100	130	160	170	180	250	320	310	263	274	292	338	346	230	311	290	331	30-500
Chloride	mg/L	38.4	17.1	11.5	11.4	11	13	8	5	21	15	4	10	3	11	25	29	63	42	64	24	74	24	45	49	42	21	43	19	14	24	26.2	24.1	25.0	24.6	250
Sodium	mg/L	21.2	15.6	15.8	17	18	16	17	12	13	17	7.8	12	8.7	9.3	9.4	13	17	19	23	24	39	28	61	78	57	69.8	33.1	42.4	23.2	34.6	27.4	33.0	26.8	43.3	200
Calcium	mg/L	53.3	29.9	27.9	31	36	28	30	21	30	29	18	21	18	32	38	31	51	44	52	30	78	33	100	110	98	107	72.5	87.3	86.5	81.7	72.7	98.8	87.9	141.0	-
Magnesium	mg/L	12.2	6.87	7.49	8.7	10	6.7	7.5	5.4	8.1	6.4	5.5	6.2	5.5	8.9	11	7.8	14	12	14	5.9	22	5.6	28	34	25	27.4	9.9	21	41.9	22.9	13.9	24.9	19.3	34.3	-
Potassium	mg/L	11	12.7	4.7	6	6.7	13	7.9	6.7	5.7	11	3.2	5.6	4	4.6	4.3	6.3	5.7	5.7	5.9	18	6.5	17	7.7	7.5	6.4	5.93	19.1	5.69	5.36	7.1	11.9	6.7	9.29	10.00	-
Sulphate	mg/L	64.1	15.1	11.5	10.9	11	13	12	11	11	18	16	12	12	17	20	18	33	34	34	16	86	22	140	140	120	198	70	118	104	104	46.7	78.0	76.5	88.9	500
Ammonia	mg/L	1.82	3.94	0.92	3.64	0.54	4.53	2.15	1.54	1.14	2.8	0.3	1.1	0.12	0.07	<0.05	0.54	0.52	1.2	1	5.2	0.74	13	2.6	0.7	0.6	0.18	14.4	1.61	0.04	0.73	5.86	0.51	1.60	0.19	-
Nitrate as N	mg/L	-	-	-	0.1	0.1	-	0.3	0.4	-	0.4	0.9	1.8	2.3	2.3	1.7	2.1	0.7	1.8	0.55	0.13	4.3	<0.1	7.96	2.17	0.52	8.4	0.7	2.8	2.6	1.1	<0.20	<0.25	<0.1	0.2	10
Nitrite as N	mg/L	-	-	-	-	-	0.02	0.07	0.02	-	0.04	-	<0.01	<0.01	0.14	0.03	0.07	0.06	0.084	<0.01	<0.01	0.085	<0.01	0.109	0.044	0.015	0.32	<0.05	0.13	0.3	0.14	<0.20	<0.25	<0.1	<0.05	1
Total Kjeldahl Nitrogen	mg/L	-	3.85	1.21	6.6	1.5	4.8	3	5	1.7	5	1.1	1.6	1.1	1.4	<1	1.5	1.2	2.1	8.8	11	2.1	13	3.9	1.8	1.5	1.0	14.4	2.1	0.7	1.3	6.63	1.11	3.05	0.80	-
Phenolics	mg/L	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.003	0.0057	0.0012	0.0035	<0.001	0.0025	0.0013	<0.001	0.005	<0.001	<0.001	<0.001	<0.001	0.002	0.002	0.002	0.005	-
Dissolved Organic Carbon	mg/L	10.9	5.6	6.5	5.3	10.9	6.1	5.6	4.5	3.7	7.4	2	2.2	1.4	2.4	4.2	4.6	7.2	6.3	9.9	9.8	13	11	16	18	14	12.8	12.2	10.2	10.7	8.4	11.0	10.0	11.1	5	
Chemical Oxygen Demand	mg/L	-	24	27	77	21	11	-	17	15	35	9	7	7	9	11	21	17	28	31	37	35	44	36	33	55	45	30	31	34	25	26	34	<5	-	
Iron	mg/L	0.49	6.56	1.53	0.55	4.4	4.6	1.8	0.63	1.3	1	0.61	0.16	0.19	<0.1	<0.1	0.2	<0.1	<0.1	0.15	3.9	<0.1	1.3	<0.1	<0.1	<0.1	<0.1	4.9	0.455	<0.1	0.585	9.71	0.53	1.93	0.705	0.3
Manganese	mg/L	2.93	1.24	0.471	0.41	0.49	0.73	0.62	0.4	0.46	0.69	0.28	0.33	0.27	0.28	0.36	0.45	0.6	0.52	0.6	0.76	0.87	0.78	1.2	1.2	1.1	1.4	6.14	0.975	1.16	1.38	4.06	1.51	3.05	1.78	0.05
Phosphorus	mg/L	13.4	10	6.7	4.3	5.7	5.5	4.4	4.3	4.5	4.2	4	4.5	4.2	5	5.1	4.4	5.1	0.078	0.23	0.3	0.12	0.18	0.21	0.071	0.18	0.57	<0.01	0.02	0.05	0.1	0.46	0.57	0.09	0.08	-
Orthophosphate	mg/L	-	-	-	-	0.009	-	-	-	-	0.01	-	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	<0.50	<0.2	<0.10	-
Turbidity	NTU	-	3.4	10.2	410	1350	422	2350	3860	398	684	130	200	440	390	220	63	46	38	85	67	17	86	51	15	22	90.3	34.5	33.3	64.4	204	52.0	81.1	44.2	255	5
Total Suspended Solids	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	210	510	140	140	66	62	222	24	47	50	152	289	230	152	841	-
BOD	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2	<2	<2	<2	4	3	<2	<2	<5	<5	<5	-	-	
Anion Sum		-	-	-	-	-	-	-	-	2.57	2.92	1.86	2.58	1.75	2.55	3.47	3.18	4.62	4.02	5.2	4.15	7.64	4.7	9.65	11	9.95	10.6	8.18	9.04	9.71	9.85	-	-	-	-	-
Cation Sum		-	-	-	-	-	-	-	-	3.01	3.22	1.85	2.3	1.87	2.87	3.31	2.96	4.57	4.2	5.01	3.99	7.55	4.74	10.5	12.1	9.63	10.8	6.36	8.08	9.5	7.64	-	-	-	-	-
Ion Balance	%	-	-	-	-	-	-	-	-	7.81	4.86	NC	NC	NC	NC	2.4	3.52	0.51	2.28	1.84	2	0.59	0.41	4.36	5.09	1.59	0.9	-12.5	-5.6	1	-12.6	-	-	-	-	-
Silver	mg/L	-	-	-	-	-	-	-	-	-	-	-	<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	<0.0001	<0.0001	-	
Aluminum	mg/L	-	0.346	0.011	0.009	1.1	0.96	0.018	0.025	0.046	0.051	0.2	0.056	0.087	0.05	0.033	0.028	0.008	0.0099	0.014	0.027	0.01	0.019	0.011	0.01	0.0093	0.001	0.016	0.062	0.004	0.007	0.024	0.006	0.015	0.013	0.06
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																	

TABLE 5
Groundwater Quality Results - BH-3
Chapman Waste Disposal Site
Magnetawan, Ontario

[illegible]

Notes:

Ontario Drinking Water Quality Standards* Ontario Regulation 169/03 "Ontario Drinking Water Quality Standards" under the Safe Drinking Water Act", dated 2002, and "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines", dated June 2003.

BOLD	Exceeds ODWQS
INSV	Insufficient volume to allow for sampling
NC	Not Calculated
CNL	Could Not Locate
LS	Limited Sample
Units	All Units in mg/L Unless Otherwise Noted.

TABLE 6
Groundwater Quality Results - BH-3-II
Chapman Waste Disposal Site
Magnetawan, Ontario

Parameter	Units	Sample Designation				ODWQS
		Sample Collection Date (dd/mm/yyyy)				
		BH3-II				
		11-Jun-19	26-Sep-19	1-Jun-20	30-Sep-20	
pH Lab	pH Units	6.58	6.37	6.57	6.17	6.5-8.5
Conductivity	µS/cm	56	65	49	70	-
Hardness	mg/L	4.9	4.1	6.7	22.4	80-100
Total Dissolved Solids	mg/L	84	42	42	48	500
Alkalinity	mg/L	18	20	17	16	30-500
Chloride	mg/L	1.54	0.85	1.44	12.7	250
Sodium	mg/L	11.7	10.6	5.27	3.98	200
Calcium	mg/L	1.53	1.29	2.12	7.43	-
Magnesium	mg/L	0.26	0.22	0.35	0.93	-
Potassium	mg/L	0.54	0.44	0.71	1.27	-
Sulphate	mg/L	5.64	6.33	4.94	5.38	500
Ammonia	mg/L	<0.02	0.12	<0.02	<0.02	-
Nitrate as N	mg/L	0.10	0.12	0.11	0.16	10
Nitrite as N	mg/L	<0.05	<0.05	<0.05	<0.05	1
Total Kjeldahl Nitrogen	mg/L	0.57	0.24	0.21	0.16	-
Phenolics	mg/L	0.001	<0.001	<0.001	<0.001	-
Dissolved Organic Carbon	mg/L	5.6	3.8	8.4	2.2	5
Chemical Oxygen Demand	mg/L	29	11	<5	<5	-
Iron	mg/L	<0.010	<0.010	0.018	0.028	0.3
Manganese	mg/L	0.022	0.008	0.018	0.05	0.05
Phosphorus	mg/L	12.2	4.90	3.36	0.42	-
Orthophosphate	mg/L		<0.10	<0.10	<0.10	-
Turbidity	NTU	1140	1460	899	201	5
Total Suspended Solids	mg/L	7390	4650	4490	954	-
BOD	mg/L	<5	<5	<5	-	-
Anion Sum		-	-	-	-	-
Cation Sum		-	-	-	-	-
Ion Balance	%	-	-	-	-	-
Silver	mg/L	<0.002	<0.002	<0.0001	<0.0001	-
Aluminum	mg/L	0.078	0.112	0.053	0.070	0.1
Antimony	mg/L	<0.003	<0.003	<0.001	<0.001	0.006
Arsenic	mg/L	<0.003	<0.003	0.001	<0.001	0.010
Barium	mg/L	0.006	0.003	0.003	0.018	1.00
Beryllium	mg/L	<0.001	<0.001	<0.0005	<0.0005	-
Bismuth	mg/L	<0.002	<0.002	<0.002	<0.002	-
Boron	mg/L	0.020	0.051	0.019	<0.010	5
Cadmium	mg/L	<0.001	<0.001	<0.0001	<0.0001	0.005
Chromium	mg/L	<0.003	<0.003	<0.002	<0.002	0.05
Cobalt	mg/L	<0.001	<0.001	<0.0005	<0.0005	-
Copper	mg/L	<0.003	0.006	<0.001	0.003	1
Molybdenum	mg/L	0.006	0.006	<0.002	<0.002	-
Nickel	mg/L	<0.003	<0.003	<0.003	<0.003	-
Phosphate	mg/L	<0.10	-	-	-	-
Lead	mg/L	<0.001	<0.001	<0.0005	<0.0005	0.01
Selenium	mg/L	<0.004	<0.004	<0.001	<0.001	0.05
Sillicon	mg/L	-	-	-	0.063	-
Tin	mg/L	<0.002	<0.002	<0.002	0.006	-
Strontium	mg/L	0.014	0.007	0.020	<0.0003	-
Titanium	mg/L	<0.002	0.002	<0.002	<0.010	-
Uranium	mg/L	<0.002	<0.002	0.0012	<0.002	0.02
Vanadium	mg/L	<0.002	<0.002	<0.002	<0.005	-
Zinc	mg/L	<0.005	0.019	<0.005	-	5
Field Measurements						
Temperature	oC	8.4	10.5	6.8	9.49	-
pH	pH Units	6.48	5.68	5.86	5.8	6.5-8.5
Coductivity	uS/cm	63.4	48.4	45.8	30.00	-
Oxidation Reduction Potential	mV	105.1	179.4	304.7	385.4	-
Dissolved Oxygen	mg/L	4.34	4.84	5.36	9.2	-

Notes:

Ontario Drinking Water Quality Standards* Ontario Regulation 169/03 “Ontario Drinking Water Quality Standards” under the Safe Drinking Water Act”, dated 2002, and "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines”, dated June 2003.

BOLD	Exceeds ODWQS
INSV	Insufficient volume to allow for sampling
NC	Not Calculated
CNL	Could Not Locate
LS	Limited Sample
Units	All Units in mg/L Unless Otherwise Noted.

TABLE 7
Groundwater Quality Results - BH-4
Chapman Waste Disposal Site
Magnetawan, Ontario

Parameter	Units	Sample Designation																														ODWQS	
		Sample Collection Date (dd/mm/yyyy)																															
		BH-4																															
		12-May-04	10/27/2004 (DRY)	5/15/2005 (INSV)	10/26/2005 (DRY)	5/8/2006 9 (INSV)	11/2/2006 (DRY)	8-May-07	10/24/2007 (INSV)	5/7/2008 (INSV)	10/29/2008 (INSV)	5/11/2009 (INSV)	15-Oct-09	2-Jun-10	21-Oct-10	23-Jun-11	27-Oct-11	9-May-12	4-Oct-12	30-Mar-13	24-Oct-13	8-May-14	30-Oct-14	13-May-15	10/13/2016 (INSV)	5/18/2017 (INSV)	10/25/2017 (INSV)	5/2/2018 (DRY)	17-Oct-18	11-Jun-19	9/26/2019 (INSV)		6/1/2020 (INSV)
pH Lab	pH Units	6.27	-	-	-	-	-	-	-	-	-	6.4	7.1	7.01	5.74	6.41	7.35	6.6	7.38	7.25	7.12	7.34	7.12	-	-	-	-	7.2	7.56	-	-	7.03	6.5-8.5
Conductivity	µS/cm	94	-	-	-	-	-	-	-	-	-	119	208	222	383	435	920	950	1500	1200	1500	1200	970	-	-	-	-	603	730	-	-	499	-
Hardness	mg/L	25	-	-	-	-	-	-	-	-	-	39	42	71	69	73	200	210	370	320	500	470	420	-	-	-	-	228	350	-	-	247	80-100
Total Dissolved Solids	mg/L	110	-	-	-	-	-	-	-	-	-	75	140	150	260	292	512	608	1020	866	1010	880	672	-	-	-	-	370	484	-	-	342	500
Alkalinity	mg/L	8.5	-	-	-	-	-	-	-	-	-	22	49	13	2	13	170	95	230	170	260	160	130	-	-	-	-	227	184	-	-	203	30-500
Chloride	mg/L	1.4	-	-	-	-	-	-	-	-	-	3	15	22	35	38	110	97	110	88	73	33	21	-	-	-	-	5	5.67	-	-	2.7	250
Sodium	mg/L	1.9	-	-	-	-	-	-	-	-	-	3.3	10	11	37	42	94	90	140	100	98	60	37	-	-	-	-	11.5	11.6	-	-	8.57	200
Calcium	mg/L	7.9	-	-	-	-	-	-	-	-	-	13	20	23	21	22	55	60	110	96	160	150	140	-	-	-	-	79.7	123	-	-	86.8	-
Magnesium	mg/L	1.19	-	-	-	-	-	-	-	-	-	1.6	2.7	3.2	4.3	4.3	15	15	24	21	26	23	19	-	-	-	-	6.99	10.3	-	-	7.37	-
Potassium	mg/L	2.2	-	-	-	-	-	-	-	-	-	2.1	5.9	3	7.4	10	20	18	50	37	43	36	22	-	-	-	-	16.5	12.4	-	-	10.6	-
Sulphate	mg/L	15.3	-	-	-	-	-	-	-	-	-	7	7	14	63	50	76	38	220	180	370	370	290	-	-	-	-	63	137	-	-	69.7	500
Ammonia	mg/L	-	-	-	-	-	-	-	-	-	-	<0.05	0.07	0.07	0.08	<0.05	3.6	<0.05	7.1	<0.05	8.5	<0.05	<0.05	-	-	-	-	0.06	0.09	-	-	0.04	-
Nitrate as N	mg/L	2	-	-	-	-	-	-	-	-	-	5.3	5	11	10	13	5.9	41	32	26	15.4	22.9	19	-	-	-	-	11.1	15.2	-	-	6.71	10
Nitrite as N	mg/L	-	-	-	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.12	<0.01	<0.01	<0.01	<0.01	-	-	-	-	<0.05	<0.10	-	-	<0.05	1
Total Kjeldahl Nitrogen	mg/L	0.25	-	-	-	-	-	-	-	-	-	0.7	0.5	2	1.8	1.5	6.9	1.6	11	3.96	11	2.3	1.7	-	-	-	-	0.9	1.1	-	-	1.12	-
Phenolics	mg/L	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	0.0068	0.0041	0.0043	0.0041	0.0024	0.0011	<0.001	-	-	-	<0.001	<0.001	-	-	<0.001	-	
Dissolved Organic Carbon	mg/L	6	-	-	-	-	-	-	-	-	-	1.2	2.3	1.3	5.2	9.1	35	25	61	51	45	25	17	-	-	-	-	11	8.7	-	-	10.8	5
Chemical Oxygen Demand	mg/L	12	-	-	-	-	-	-	-	-	-	<4	5	46	20	31	100	58	160	130	120	66	41	-	-	-	-	40	22	-	-	<5	-
Iron	mg/L	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	<0.1	<0.010	-	-	0.141	0.3
Manganese	mg/L	0.143	-	-	-	-	-	-	-	-	-	0.021	0.042	0.035	0.29	0.23	1.8	1.3	1.7	1	1.5	0.36	0.048	-	-	-	-	<0.005	<0.002	-	-	0.028	0.05
Phosphorus	mg/L	5.6	-	-	-	-	-	-	-	-	-	3.1	5	4	3	3.1	0.28	0.23	0.2	1	0.12	0.44	0.15	-	-	-	-	0.005	0.12	-	-	0.37	-
Orthophosphate	mg/L	-	-	-	-	-	-	-	-	-	-	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-	<0.10	-
Turbidity	NTU	5.6	-	-	-	-	-	-	-	-	-	370	3.4	1900	44	220	93	73	7.8	180	240	93	52	-	-	-	-	55.3	30.5	-	-	149	5
Total Suspended Solids	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	990	210	400	290	-	-	-	-	97	172	-	-	250	-
BOD	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2	<2	<2	-	-	-	-	<2	<5	-	-	-	-
Anion Sum	-	-	-	-	-	-	-	-	-	-	-	1.06	1.9	1.96	3.09	3.32	8.5	8.35	14.7	11.5	16	13.3	10.6	-	-	-	-	6.77	-	-	-	-	-
Cation Sum	-	-	-	-	-	-	-	-	-	-	-	0.982	1.84	1.98	3.19	3.56	8.85	8.62	15.1	11.9	16	12.9	10.6	-	-	-	-	5.48	-	-	-	-	-
Ion Balance	%	-	-	-	-	-	-	-	-	-	-	NC	NC	NC	1.59	3.55	1.99	1.62	1.58	1.88	0.09	1.58	0.1	-	-	-	-	-10.5	-	-	-	-	-
Silver	mg/L	-	-	-	-	-	-	-	-	-	-	<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	<0.002	-	-	<0.0001	-
Aluminum	mg/L	0.017	-	-	-	-	-	-	-	-	-	0.011	0.01	0.018	0.084	0.11	0.046	0.067	0.11	0.1	0.079	0.066	0.039	-	-	-	-	0.028	0.018	-	-	0.085	0.1
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	-	-	<0.0005	<0.003	-	-	<0.001	0.006
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0014	<0.001	0.003	<0.001	<0.001	-	-	-	-	0.001	<0.003	-	-	0.001	0.010
Barium	mg/L	0.047	-	-	-	-	-	-	-	-	-	0.076	0.088	0.14	0.23	0.23	0.36	0.41	0.71	0.52	0.66	0.42	0.25	-	-	-	-	0.128	0.126	-	-	0.088	1.00
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	<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	<0.001	-	-	<0.0005	-	
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0021	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	-	-	<0.001	<0.002	-	-	<0.002	-
Boron	mg/L	0.011	-	-	-	-	-	-	-	-	-	0.033	0.15	0.025	0.13	0.22	0.2	0.2	0.69	0.66	0.79	0.73	0.56	-	-	-	-	0.504	0.397	-	-	0.421	5
Cadmium	mg/L	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001	<0.0001	0.0002	0.0001	0.00019	0.00034	0.00062	0.00025	0.00015	0.00022	<0.0001	-	-	-	<0.0001	<0.001	-	-	<0.0001	0.005	
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	<0.001	<0.003	-	-	<0.002	0.05	
Cobalt	mg/L	0.001	-	-	-	-	-	-	-	-	-	<0.0005	0.012	0.0005	0.0016	0.0018	0.0054	0.0049	0.0047	0.0042	0.0029	0.0017	0.00068	-	-	-	0.0007	<0.001	-	-	<0.0005	-	
Copper	mg/L	0.0009	-	-	-	-	-	-	-	-	-	<0.001	0.002	0.001	0.003	0.006	0.025	0.015	0.04	0.032	0.033	0.016	0.0079	-	-	-	0.0077	0.005	-	-	0.01	1	
Molybdenum	mg/L	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.0005	0.0007	0.00064	0.00085	0.0005	0.00064	<0.0005	<0.0005	-	-	-	<0.0005	<0.002	-	-	<0.002	-	
Nickel	mg/L	0.002	-	-	-	-	-	-	-	-	-	<0.001	0.001	0.002	0.003	0.004	0.0069	0.004	0.01	0.007	0.0088	0.004	0.0026	-	-	-	-	0.002	<0.003	-	-	<0.003	-
Phosphate	mg/L	-	-	-	-	-	-	-	-	-	-	<0.1	-	<0.1	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	<0.002	<0.20	-	-	-	-
Lead	mg/L	0.0005	-	-	-	-	-	-	-	-	-	<0.0005	<0.0005	0.0041	0.015	0.0016	0.0051	0.0058	0.0016	0.0013	0.00055	<0.0005	<0.0005	-	-	-	-	0.0001	<0.001	-	-	0.0008	0.01
Selenium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.002	<0.002	-	-	-	-	0.002	<0.004	-	-	<0.001	0.05
Silicon	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.1	3	2.3	3	2.9	3	2.5	-	-	-	-	2.38	-	-	-	0.272	-
Tin	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	-	-	-	<0.005	<0.002	-	-	0.003	-	
Strontium	mg/L	0.064	-	-	-	-	-	-	-	-	-	0.098	0.14	0.19	0.15	0.28	0.35	0.44	0.39	0.5	0.45	0.42	-	-	-	-	-	0.276	0.395	-	-	<0.0003	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0										

Notes:

Ontario Drinking Water Quality Standards* Ontario Regulation 169/03 "Ontario Drinking Water Quality Standards" under the Safe Drinking Water Act", dated 2002, and "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines", dated June 2003.

BOLD	Exceeds ODWQS
INSV	Insufficient volume to allow for sampling
NC	Not Calculated
CNL	Could Not Locate
LS	Limited Sample
Units	All Units in mg/L Unless Otherwise Noted.

TABLE 8 Groundwater Quality Results - BH4-II Chapman Waste Disposal Site Magnetawan, Ontario						
Parameter	Units	Sample Designation				ODWQS
		Sample Collection Date (dd/mm/yyyy)				
		BH4-II				
		11-Jun-19	26-Sep-19	1-Jun-20	30-Sep-20	
pH Lab	pH Units	7.46	7.16	7.07	6.96	6.5-8.5
Conductivity	µS/cm	768	826	779	507	-
Hardness	mg/L	342	323	308	227	80-100
Total Dissolved Solids	mg/L	570	450	494	332	500
Alkalinity	mg/L	191	240	230	235	30-500
Chloride	mg/L	7.09	4.78	6.77	4.83	250
Sodium	mg/L	16.0	12.9	13.3	10.4	200
Calcium	mg/L	117	109	104	78.2	-
Magnesium	mg/L	12.0	12.3	11.8	7.8	-
Potassium	mg/L	16.3	15.5	14.0	12.5	-
Sulphate	mg/L	91.9	67.3	78.6	59.6	500
Ammonia	mg/L	0.54	0.11	<0.02	0.19	-
Nitrate as N	mg/L	28.7	16.7	17.3	6.7	10
Nitrite as N	mg/L	<0.10	<0.25	<0.10	<0.05	1
Total Kjeldahl Nitrogen	mg/L	<0.10	0.17	0.86	1.05	-
Phenolics	mg/L	<0.001	0.001	<0.001	<0.001	-
Dissolved Organic Carbon	mg/L	10.7	8.6	9.9	13.2	5
Chemical Oxygen Demand	mg/L	16	21	22	12	-
Iron	mg/L	<0.010	<0.010	0.013	0.015	0.3
Manganese	mg/L	0.292	0.386	0.328	0.263	0.05
Phosphorus	mg/L	0.12	0.07	<0.02	<0.02	-
Orthophosphate	mg/L	-	<0.50	<0.20	<0.10	-
Turbidity	NTU	79.7	74.6	28.0	2.1	5
Total Suspended Solids	mg/L	242	44	46	11	-
BOD	mg/L	<5	<5	<5	-	-
Anion Sum		-	-	-	-	-
Cation Sum		-	-	-	-	-
Ion Balance	%	-	-	-	-	-
Silver	mg/L	<0.002	<0.002	<0.0001	<0.0001	-
Aluminum	mg/L	0.025	0.035	0.017	0.069	0.1
Antimony	mg/L	<0.003	<0.003	<0.001	<0.001	0.006
Arsenic	mg/L	<0.003	<0.003	0.001	0.002	0.010
Barium	mg/L	0.130	0.119	0.091	0.079	1.00
Beryllium	mg/L	<0.001	<0.001	<0.0005	<0.0005	-
Bismuth	mg/L	<0.002	<0.002	<0.002	<0.002	-
Boron	mg/L	0.519	0.473	0.488	0.495	5
Cadmium	mg/L	<0.001	<0.001	<0.0001	<0.0001	0.005
Chromium	mg/L	<0.003	<0.003	<0.002	<0.002	0.05
Cobalt	mg/L	0.002	0.002	0.002	0.002	-
Copper	mg/L	0.009	0.010	0.008	0.008	1
Molybdenum	mg/L	<0.002	<0.002	<0.002	<0.002	-
Nickel	mg/L	<0.003	0.004	0.010	<0.003	-
Phosphate	mg/L	<0.20	-	-	-	-
Lead	mg/L	<0.001	<0.001	<0.0005	<0.0005	0.01
Selenium	mg/L	<0.004	<0.004	<0.001	<0.001	0.05
Sillicon	mg/L	-	-	-	0.263	-
Tin	mg/L	<0.002	<0.002	<0.002	0.002	-
Strontium	mg/L	0.384	0.392	<0.002	<0.0003	-
Titanium	mg/L	<0.002	0.002	<0.002	<0.010	-
Uranium	mg/L	<0.002	0.005	0.0062	<0.002	0.02
Vanadium	mg/L	<0.002	<0.002	<0.002	<0.005	-
Zinc	mg/L	<0.005	<0.005	<0.005	-	5
Field Measurements						
Temperature	oC	10.1	10.5	9.9	12.7	-
pH	pH Units	6.6	6.1	6.3	6.4	6.5-8.5
Coductivity	uS/cm	847.0	586.0	719.0	387.0	-
Oxidation Reduction Potential	mV	165.5	142.1	398.2	335.4	-
Dissolved Oxygen	mg/L	5.23	2.14	3.79	10.77	-

Notes:

Ontario Regulation 169/03 “Ontario Drinking Water Quality Standards” under the Safe Drinking Water Act”, dated 2002, and “Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines”, dated June 2003.

BOLD	Exceeds ODWQS
INSV	Insufficient volume to allow for sampling
NC	Not Calculated
CNL	Could Not Locate
LS	Limited Sample
Units	All Units in mg/L Unless Otherwise Noted.

TABLE 9 Groundwater Quality Results - BH5-II Chapman Waste Disposal Site Magnetawan, Ontario																				
Parameter	Units	Sample Designation Sample Collection Date (dd/mm/yyyy) BH5-II																		ODWQS
		27-Oct-11	9-May-12	4-Oct-12	30-May-13	24-Oct-13	8-May-14	30-Oct-14	13-May-15	22-Oct-15	13-Oct-16	18-May-17	25-Oct-17	2-May-18	17-Oct-18	11-Jun-19	26-Sep-19	1-Jun-20	30-Sep-20	
pH Lab	pH Units	7	6.75	6.46	6.92	6.79	6.58	6.74	6.7	6.77	6.6	6.5	7.1	6.5	6.7	6.94	6.84	6.83	6.64	6.5-8.5
Conductivity	µS/cm	235	220	220	180	300	190	240	230	350	456	355	351	276	377	245	421	352	352	-
Hardness	mg/L	75	69	59	63	88	68	78	70	110	181	122	119	47	127	96.0	142	136	226	80-100
Total Dissolved Solids	mg/L	166	102	120	130	214	124	102	132	212	284	288	230	142	214	176	218	214	226	500
Alkalinity	mg/L	46	56	31	39	54	44	52	49	48	66	57	58	59	85	57	83	90	115	30-500
Chloride	mg/L	18	15	19	11	24	12	14	12	15	14	9	7	7	15	6.9	10.9	10.3	13.0	250
Sodium	mg/L	13	12	14	8.8	21	10	13	11	16	22.2	14.9	13.1	8.48	13.4	9.07	13.10	12.3	19.2	200
Calcium	mg/L	21	19	18	16	25	19	21	19	34	58.9	29.8	31.7	18.9	34.6	26.7	43.0	37.0	68.9	-
Magnesium	mg/L	5.6	5.3	3.4	5.4	6.4	5.3	6.5	5.7	6.1	8.32	11.6	9.64	<0.2	9.87	7.13	8.43	10.70	13.10	-
Potassium	mg/L	6.7	4.9	5.4	2.9	5.8	2.8	3.4	3.4	6.7	8.43	4.63	4.17	<0.001	4.57	3.94	5.10	4.77	8.10	-
Sulphate	mg/L	18	15	18	14	32	19	30	29	50	112	97	93	56	75	45.5	68.4	60.3	62.6	500
Ammonia	mg/L	0.1	0.15	0.1	0.11	0.19	0.14	0.16	0.17	0.12	0.22	0.23	0.14	0.16	0.33	0.31	0.17	0.22	0.27	-
Nitrate as N	mg/L	4.2	3	5.4	3.1	4.8	3.17	3.22	3.31	9.18	6.0	3.9	3	2	3.5	1.68	4.13	2.30	3.68	10
Nitrite as N	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	0.016	<0.05	<0.05	<0.05	<0.05	0.05	0.15	<0.05	<0.05	<0.05	1
Total Kjeldahl Nitrogen	mg/L	<	3.6	<1	2.1	1.6	<10	1.1	0.85	0.82	0.9	1	0.8	0.8	0.9	0.72	0.63	0.74	0.68	-
Phenolics	mg/L	<0.001	<0.001	0.0012	<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	-
Dissolved Organic Carbon	mg/L	2.3	2.5	2.7	2.4	4.2	2.6	2.8	3.1	3.8	7.4	5.5	7.6	5.8	4.1	2.8	5.4	3.9	5.5	5
Chemical Oxygen Demand	mg/L	42	63	48	49	31	35	26	24	12	64	66	34	53	33	<5	14	13	<5	-
Iron	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.010	<0.010	<0.010	0.012	0.3
Manganese	mg/L	0.42	0.11	0.024	0.032	0.092	0.046	0.062	0.067	0.075	0.193	0.124	0.123	0.074	0.158	0.139	0.067	0.171	0.144	0.05
Phosphorus	mg/L	11	26	11	11	3.8	9.4	4.9	7.5	2.9	1.72	2.46	0.62	1.23	0.62	1.05	0.29	1.14	3.32	-
Orthophosphate	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	<0.10	<0.10	<0.10	-
Turbidity	NTU	430	0.5	980	140	860	590	860	210	400	778	860	471	595	424	258	273	95.9	225	5
Total Suspended Solids	mg/L	-	-	-	10000	3000	8100	3700	4200	3800	2020	6690	1720	1830	870	1730	2380	2000	761	-
BOD	mg/L	-	-	-	<2	<2	<2	<2	<2	<2	9	<2	2	7	<2	<5	<5	<5	-	-
Anion Sum		2.13	2.08	1.92	1.62	2.76	1.85	2.29	2.17	3.06	4.46	3.68	3.5	2.69	3.92	-	-	-	-	-
Cation Sum		2.25	2.06	1.93	1.72	2.82	1.89	2.22	1.99	3.08	4.81	3.21	3.05	1.39	3.24	-	-	-	-	-
Ion Balance	%	NC	NC	NC	NC	NC	NC	-	NC	0.31	3.8	-6.9	-6.8		-9.6	-	-	-	-	-
Silver	mg/L	<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	<0.002	<0.002	<0.0001	<0.0001	-
Aluminum	mg/L	0.058	0.021	0.022	0.032	0.026	0.027	0.017	0.031	0.025	0.019	0.015	0.014	0.026	0.012	0.017	0.023	0.010	0.034	0.1
Antimony	mg/L	-	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.003	<0.003	<0.001	<0.001	0.006
Arsenic	mg/L	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.003	<0.003	<0.001	<0.001	0.010
Barium	mg/L	0.11	0.076	0.095	0.044	0.13	0.05	0.061	0.064	0.019	0.276	0.095	0.095	0.071	0.121	0.091	0.142	0.092	0.125	1.00
Beryllium	mg/L	<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	<0.001	<0.001	<0.0005	<0.0005	-
Bismuth	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	<0.002	<0.002	<0.002	<0.002	-
Boron	mg/L	0.16	0.15	0.14	0.092	0.21	0.1	0.16	0.13	0.26	0.391	0.21	0.257	0.176	0.289	0.215	0.326	0.267	0.310	5
Cadmium	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	0.00036	<0.0001	0.00019	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0001	0.0003	0.005
Chromium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	0.003	<0.001	<0.003	<0.003	<0.002	<0.002	0.05
Cobalt	mg/L	0.0059	0.0022	0.00093	0.00094	0.0015	0.00063	0.00062	<0.0005	0.00074	0.0007	0.0005	0.0005	<0.0005	0.0007	<0.001	<0.001	<0.0005	<0.0005	-
Copper	mg/L	0.002	0.002	0.0019	0.0017	0.0039	0.0013	0.0015	0.002	0.0033	0.0033	0.0021	0.0019	0.0012	0.003	<0.003	0.003	0.002	0.003	1
Molybdenum	mg/L	0.0006	<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	<0.002	<0.002	<0.002	<0.002	-
Nickel	mg/L	0.002	0.0015	<0.001	0.0016	0.0018	0.0014	0.0014	0.0016	<0.001	0.002	0.003	0.002	0.002	0.003	<0.003	<0.003	<0.003	<0.003	-
Phosphate	mg/L	<0.1	<0.1	-	-	-	-	-	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.10	-	-	-	-
Lead	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0005	<0.0005	0.01
Selenium	mg/L	-	-	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.004	<0.004	0.001	<0.001	0.05
Silicon	mg/L	-	-	4	4.4	3.9	4.2	4.1	4.4	3.5	3.36	3.73	4.29	3.47	3.1	-	-	-	0.22	-
Tin	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	0.002	-
Strontium	mg/L	0.16	0.12	0.15	0.11	0.19	0.11	0.13	0.13	0.25	0.265	0.178	0.23	0.142	0.224	0.198	0.239	0.226	<0.0003	-
Titanium	mg/L	<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	<0.002	<0.002	<0.002	<0.010	-
Uranium	mg/L	-	-	-	0.00012	0.00016	0.0001	<0.0001	0.0001	0.00016	0.0001	<0.0001	0.0001	<0.0001	0.0002	<0.002	<0.002	<0.0005	<0.002	0.02
Vanadium	mg/L	0.0006	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0017	<0.0005	<0.0005	0.0032	<0.0005	<0.002	<0.002	<0.002	<0.005	-
Zinc	mg/L	<0.005	<0.005	0.0053	0.0056	0.0065	0.0059	<0.005	0.055	<0.005	<0.005	0.005	0.009	<0.005	0.008	<0.005	<0.005	<0.005	-	5
Field Measurements																				
Temperature	oC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.2	9.2	7.4	9.89	-
pH	pH Units	6.5	6.97	8.89	7.56	7.45	6.16	6.52	6.04	5.42	5.91	6.67	-	8.48	6.3	6.4	5.8	5.91	6.32	6.5-8.5
Coductivity	uS/cm	230	204	210	136	275	229	198	140	140	447	0.37	-	0.4	0.36	319.20	293.40	346.1	285	-
Oxidation Reduction Potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	211.2	437.3	229.7	264.2	-
Dissolved Oxygen	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.04	4.35	1.74	9.83	-

Notes:

Ontario Regulation 169/03 “Ontario Drinking Water Quality Standards” under the Safe Drinking Water Act”, dated 2002, and “Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines”, dated June 2003.

Ontario Drinking Water Quality Standards*

BOLD	Exceeds ODWQS
INSV	Insufficient volume to allow for sampling
NC	Not Calculated
CNL	Could Not Locate
LS	Limited Sample
Units	All Units in mg/L Unless Otherwise Noted.

TABLE 10 Groundwater Quality Results - BH6-II Chapman Waste Disposal Site Magnetawan, Ontario																				
Parameter	Units	Sample Designation																		ODWQS
		Sample Collection Date (dd/mm/yyyy)																		
		BH6-II																		
		10/27/2011 (DRY)	5/9/2012 (DRY)	10/4/2012 (DRY)	5/30/2013 (DRY)	10/24/2013 (DRY)	5/8/2014 (DRY)	10/30/2014 (DRY)	5/13/2015 (DRY)	10/22/2015 (DRY)	10/13/2016 (DRY)	5/18/2017 (DRY)	10/25/2017 (DRY)	5/2/2018 (DRY)	10/17/2018 (DRY)	6/11/2019 (DRY)	9/26/2019 (DRY)	6/1/2020 (DRY)	9/30/2020 (DRY)	
pH Lab	pH Units	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.5-8.5
Conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	80-100
Total Dissolved Solids	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	500
Alkalinity	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30-500
Chloride	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	250
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	200
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	500.0
Ammonia	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate as N	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
Nitrite as N	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenolics	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
Chemical Oxygen Demand	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3
Manganese	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.05
Phosphorus	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Turbidity	NTU	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
Total Suspended Solids	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BOD	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anion Sum		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cation Sum		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ion Balance	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aluminum	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.006
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.010
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.00
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
Cadmium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.005
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.05
Cobalt	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Molybdenum	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
Selenium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.05
Silicon	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
Field Measurements																				
Temperature	oC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH	pH Units	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.5-8.5
Coductivity	uS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxidation Reduction Potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Oxygen	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

Ontario Drinking Water Quality Standards* Ontario Regulation 169/03 "Ontario Drinking Water Quality Standards" under the Safe Drinking Water Act", dated 2002, and "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines", dated June 2003.

BOLD	Exceeds ODWQS
INSV	Insufficient volume to allow for sampling
NC	Not Calculated
CNL	Could Not Locate
LS	Limited Sample
Units	All Units in mg/L Unless Otherwise Noted.

TABLE 11 Groundwater Quality Results - BH6-III Chapman Waste Disposal Site Magnetawan, Ontario							
Parameter	Units	Sample Designation				ODWQS	APV
		Sample Collection Date (dd/mm/yyyy)					
		BH6-III					
		11-Jun-19	26-Sep-19	1-Jun-20	30-Sep-20		
pH Lab	pH Units	7.04	6.99	6.85	6.70	6.5-8.5	-
Conductivity	µS/cm	309	465	381	352	-	-
Hardness	mg/L	123	158	140	142	80-100	-
Total Dissolved Solids	mg/L	184	232	216	206	500	-
Alkalinity	mg/L	72	101	97	130	30-500	-
Chloride	mg/L	6.03	12.9	7.79	11.9	250	180
Sodium	mg/L	11.0	13.2	10.9	17.2	200	180
Calcium	mg/L	35.9	47.5	41.1	42.6	-	-
Magnesium	mg/L	7.98	9.60	8.99	8.73	-	-
Potassium	mg/L	5.49	7.47	6.09	7.86	-	-
Sulphate	mg/L	65.7	66.8	68.1	57.5	500	-
Ammonia	mg/L	0.30	0.79	<0.02	0.65	-	-
Nitrate as N	mg/L	1.60	3.36	2.23	2.48	10	-
Nitrite as N	mg/L	<0.05	<0.05	<0.05	<0.05	1	-
Total Kjeldahl Nitrogen	mg/L	0.52	1.30	0.70	1.13	-	-
Phenolics	mg/L	<0.001	<0.001	<0.001	<0.001	-	0.961
Dissolved Organic Carbon	mg/L	2.9	5.3	4.6	4.8	5	-
Chemical Oxygen Demand	mg/L	<5	12	16	<5	-	-
Iron	mg/L	<0.010	<0.010	0.019	<0.010	0.3	-
Manganese	mg/L	0.404	0.615	0.450	0.898	0.05	-
Phosphorus	mg/L	0.25	0.12	0.16	0.70	-	-
Orthophosphate	mg/L		<0.10	<0.10	<0.10	-	-
Turbidity	NTU	36.7	24.5	60.4	213.0	5	-
Total Suspended Solids	mg/L	42	66	107	190	-	-
BOD	mg/L	<5	<5	<5	-	-	-
Anion Sum		-	-	-	-	-	-
Cation Sum		-	-	-	-	-	-
Ion Balance	%	-	-	-	-	-	-
Silver	mg/L	<0.002	<0.002	<0.0001	<0.0001	-	0.00012
Aluminum	mg/L	0.013	0.015	0.011	0.030	0.1	-
Antimony	mg/L	<0.003	<0.003	<0.001	<0.001	0.006	1.6
Arsenic	mg/L	<0.003	<0.003	<0.001	<0.001	0.01	0.15
Barium	mg/L	0.096	0.124	0.093	0.116	1.00	2.3
Beryllium	mg/L	<0.001	<0.001	<0.0005	<0.0005	-	0.0053
Bismuth	mg/L	<0.002	<0.002	<0.002	<0.002	-	-
Boron	mg/L	0.207	0.341	0.265	0.287	5	3.55
Cadmium	mg/L	<0.001	<0.001	<0.0001	<0.0001	0.005	0.00021
Chromium	mg/L	<0.003	<0.003	<0.002	<0.002	0.05	0.064
Cobalt	mg/L	<0.001	<0.001	0.0007	0.001	-	0.0052
Copper	mg/L	0.006	0.007	0.005	0.007	1	0.0069
Molybdenum	mg/L	<0.002	<0.002	<0.002	<0.002	-	0.73
Nickel	mg/L	<0.003	0.005	0.004	0.005	-	0.039
Phosphate	mg/L	<0.10	-	-	-	-	-
Lead	mg/L	<0.001	<0.001	<0.0005	<0.0005	0.01	0.002
Selenium	mg/L	<0.004	<0.004	0.002	<0.001	0.05	0.005
Silicon	mg/L	-	-	-	0.325	-	-
Tin	mg/L	<0.002	<0.002	<0.002	0.002	-	-
Strontium	mg/L	0.225	0.292	0.280	<0.0003	-	-
Titanium	mg/L	<0.002	<0.002	<0.002	<0.010	-	-
Uranium	mg/L	<0.002	<0.002	<0.0005	<0.002	0.02	0.033
Vanadium	mg/L	<0.002	<0.002	<0.002	<0.005	-	0.02
Zinc	mg/L	0.005	0.005	<0.005	-	5	0.089
Field Measurements							
Temperature	oC	8.3	9.8	7.2	10.24	-	
pH	pH Units	6.4	5.8	6.1	6.2	6.5-8.5	
Coductivity	uS/cm	338.8	321.1	371.1	27.1	-	
Oxidation Reduction Potential	mV	209.4	427.5	250.2	279.6	-	
Dissolved Oxygen	mg/L	2.48	1.7	4.06	12.15	-	

Notes:

Ontario Drinking Water Quality Standards*

Ontario Regulation 169/03 "Ontario Drinking Water Quality Standards" under the Safe Drinking Water Act", dated 2002, and "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines", dated June 2003.

APV	Aquatic Protection Values
BOLD	Exceeds ODWQS
<u>UNDERLINED</u>	Exceeds APV
INSV	Insufficient volume to allow for sampling
NC	Not Calculated
CNL	Could Not Locate
LS	Limited Sample
Units	All Units in mg/L Unless Otherwise Noted.

TABLE 12 Groundwater Quality Results - BH7-II Chapman Waste Disposal Site Magnetawan, Ontario																					
Parameter	Units	Sample Designation																		ODWQS	APV
		Sample Collection Date (dd/mm/yyyy)																			
		BH7-II																			
		27-Oct-11	9-May-12	4-Oct-12	30-May-13	24-Oct-13	8-May-14	30-Oct-14	13-May-15	22-Oct-15	10/13/2016 (DRY)	18-May-17	25-Oct-17	2-May-18	17-Oct-18	11-Jun-19	26-Sep-19	1-Jun-20	30-Sep-20		
pH Lab	pH Units	6.67	6.36	6.15	6.63	6.07	6.21	6.24	6.05	6.44	-	5.9	6.4	6.1	6.1	6.34	5.92	6.43	5.95	6.5-8.5	-
Conductivity	µS/cm	46	61	67	38	50	42	35	26	31	-	78	51	22	14	34	32	50	18	-	-
Hardness	mg/L	13	13	16	12	11	8.1	9.1	7.5	7.6	-	22	12	1.0	5.0	9.2	7.2	10.7	6.0	80-100	-
Total Dissolved Solids	mg/L	38	100	110	130	88	82	324	336	192	-	90	56	22	14	28	36	36	<20	500	-
Alkalinity	mg/L	6	15	2.4	6.4	1.4	8.9	8.1	4.8	4.9	-	10	11	8.0	6.0	7.0	<5	15	7	30-500	-
Chloride	mg/L	4	2	2	3	2	2	1	2	<1	-	1	1	<1	<1	0.49	0.22	0.58	0.58	250	180
Sodium	mg/L	3.1	4.6	3.6	2	2.4	3.7	1.2	1.5	1.3	-	2.89	1.7	3.07	0.674	2.35	1.42	3.13	0.97	200	180
Calcium	mg/L	3.1	3.2	4.1	2.9	3.1	2.3	2.3	2	2.1	-	1.48	2.79	0.466	1.2	2.07	1.58	2.30	1.35	-	-
Magnesium	mg/L	1.2	1.2	1.3	1	0.79	0.59	0.84	0.62	0.58	-	0.543	1.34	<0.2	0.468	0.97	0.80	1.20	0.63	-	-
Potassium	mg/L	1.2	1.9	0.75	1.3	1.2	1.2	1.3	1.4	1	-	1.03	1.48	0.874	0.471	1.42	0.58	1.48	0.55	-	-
Sulphate	mg/L	7	9	5	10	7	11	7	7	5.8	-	8	9	1	2	5.68	1.98	7.70	1.98	500	-
Ammonia	mg/L	0.08	<0.05	<0.05	0.13	<0.05	0.061	<0.05	<0.05	<0.05	-	0.03	0.06	0.04	0.02	0.11	0.13	<0.02	0.17	-	-
Nitrate as N	mg/L	0.2	<0.1	4.8	<0.1	2.5	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	0.3	0.4	0.06	1.64	0.08	0.49	10	-
Nitrite as N	mg/L	<0.01	<0.01	0.012	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	1	-
Total Kjeldahl Nitrogen	mg/L	5	2.1	<0.5	3.9	0.84	<1	1.2	0.32	<0.1	-	0.3	0.3	0.6	0.4	0.16	0.56	0.17	0.19	-	-
Phenolics	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	0.009	-	0.961
Dissolved Organic Carbon	mg/L	2.1	2.1	0.92	3.4	1.3	2.6	2.8	2.5	1.5	-	3.7	2.7	5.4	1.6	3.1	4.2	5.7	3.7	5	-
Chemical Oxygen Demand	mg/L	84	46	21	15	4.6	27	13	4.5	<4	-	51	35	46	45	<5	<5	<5	<5	-	-
Iron	mg/L	1.4	<0.1	0.13	<0.1	<0.1	0.14	<0.1	<0.1	<0.1	-	<0.1	<0.1	0.125	<0.1	<0.010	0.054	0.036	0.052	0.3	-
Manganese	mg/L	0.14	0.032	0.034	0.016	0.015	0.011	0.0031	0.0079	0.0036	-	0.012	0.006	<0.005	0.009	0.010	0.022	0.010	0.005	0.05	-
Phosphorus	mg/L	5.4	1.8	2.5	0.57	0.41	2.4	0.84	0.46	0.31	-	0.4	0.47	0.83	0.34	0.78	0.62	1.88	0.56	-	-
Orthophosphate	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.012	<0.01	-	-	-	-	-	-	-	<0.10	<0.10	<0.10	-	-
Turbidity	NTU	1700	430	420	150	170	180	500	330	380	-	1710	1580	2420	1720	2300	2470	3850	2640	5	-
Total Suspended Solids	mg/L	-	-	-	1100	430	3700	2400	1400	910	-	2530	1920	3550	1820	4160	2290	4180	3510	-	-
BOD	mg/L	-	-	-	<2	<2	<2	<2	<2	<2	-	<2	<2	<2	<2	<5	<5	<5	-	-	-
Anion Sum		0.395	0.539	0.538	0.418	0.425	0.47	0.343	0.292	0.238	-	0.4	0.44	0.23	0.22	-	-	-	-	-	-
Cation Sum		0.55	0.508	0.493	0.381	0.361	0.383	0.278	0.265	0.239	-	0.27	0.36	0.19	0.14	-	-	-	-	-	-
Ion Balance	%	NC	NC	NC	NC	NC	NC	-	-	NC	-	-	-	-	-	-	-	-	-	-	-
Silver	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.00024	<0.0001	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.002	<0.002	<0.0001	<0.0001	-	0.00012
Aluminum	mg/L	0.7	0.026	0.018	0.19	0.063	0.17	0.066	0.12	0.029	-	0.203	0.024	0.245	0.061	0.046	0.151	0.036	0.042	0.1	-
Antimony	mg/L	-	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.003	<0.003	<0.001	<0.001	0.006	1.6
Arsenic	mg/L	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.003	<0.003	<0.001	<0.001	0.01	0.15
Barium	mg/L	0.022	0.016	0.016	0.018	0.03	0.012	0.012	0.017	0.0086	-	0.014	0.018	0.004	0.007	0.014	0.014	0.012	0.005	1.00	2.3
Beryllium	mg/L	<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	<0.001	<0.001	<0.0005	<0.0005	-	0.0053
Bismuth	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	<0.002	<0.002	<0.002	<0.002	-	-
Boron	mg/L	<0.01	<0.01	<0.01	<0.01	0.017	<0.01	0.02	0.01	0.011	-	0.014	0.023	0.02	<0.01	0.010	0.029	<0.010	<0.010	5	3.55
Cadmium	mg/L	<0.0001	<0.0001	<0.0001	0.00016	<0.0001	0.00011	<0.0001	<0.0001	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0001	<0.0001	0.005	0.00021
Chromium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.001	<0.001	<0.001	<0.001	<0.003	<0.003	<0.002	<0.002	0.05	0.064
Cobalt	mg/L	0.0062	<0.0005	<0.0005	0.00077	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0005	<0.0005	0.0006	<0.001	<0.001	<0.0005	<0.0005	-	0.0052
Copper	mg/L	0.006	<0.001	0.0013	0.0028	0.0013	0.0012	0.0026	0.002	0.001	-	0.0018	0.001	0.0021	0.0021	<0.003	<0.003	<0.001	<0.001	1	0.0069
Molybdenum	mg/L	<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	<0.002	<0.002	<0.002	<0.002	-	0.73
Nickel	mg/L	0.002	<0.001	0.0011	<0.001	0.001	<0.001	0.001	<0.001	<0.001	-	0.001	<0.001	<0.001	<0.001	<0.003	<0.003	<0.003	<0.003	-	0.039
Phosphate	mg/L	<0.1	<0.1	-	-	-	-	-	-	-	-	<0.2	<0.2	<0.2	<0.0002	<0.10	-	-	-	-	-
Lead	mg/L	0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0001	<0.0001	0.0002	0.0001	<0.001	<0.001	<0.0005	<0.0005	0.01	0.002
Selenium	mg/L	-	-	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	-	<0.001	<0.001	<0.001	<0.001	<0.004	<0.004	<0.001	<0.001	0.05	0.005
Silicon	mg/L	-	5.8	3.9	4.3	3.2	4.8	4.1	4.3	4.6	-	5.17	6.09	2.3	2.41	-	-	-	0.013	-	-
Tin	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	0.008	-	-
Strontium	mg/L	0.024	0.023	0.04	0.023	0.032	0.013	0.015	0.016	0.012	-	0.017	0.027	<0.01	<0.01	0.018	0.017	0.020	<0.0003	-	-
Titanium	mg/L	0.04	<0.005	<0.005	<0.005	<0.005	0.0057	<0.005	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.002	0.006	<0.002	<0.010	-	-
Uranium	mg/L	-	-	-	0.00013	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	<0.0001	0.0001	<0.0001</						

TABLE 13 Groundwater Quality Results - BH8-I Chapman Waste Disposal Site Magnetawan, Ontario							
Parameter	Units	Sample Designation				ODWQS	APV
		Sample Collection Date (dd/mm/yyyy)					
		BH8-I					
		11-Jun-19	23-Sep-19	1-Jun-20	30-Sep-20		
pH Lab	pH Units	7.16	7.13	7.01	6.73	6.5-8.5	-
Conductivity	µS/cm	376	459	427	352	-	-
Hardness	mg/L	135	131	130	126	80-100	-
Total Dissolved Solids	mg/L	200	224	194	206	500	-
Alkalinity	mg/L	98	103	131	140	30-500	-
Chloride	mg/L	16.8	30.6	20.3	27.2	250	180
Sodium	mg/L	14.3	19.7	16.5	19.6	200	180
Calcium	mg/L	42.3	41.3	40.7	40.0	-	-
Magnesium	mg/L	7.06	6.87	6.91	6.30	-	-
Potassium	mg/L	10.0	9.4	10.40	10.40	-	-
Sulphate	mg/L	55.2	26.1	35.7	18.6	500	-
Ammonia	mg/L	0.26	1.71	2.70	1.29	-	-
Nitrate as N	mg/L	1.98	4.63	2.43	3.58	10	-
Nitrite as N	mg/L	0.25	0.12	0.06	<0.05	1	-
Total Kjeldahl Nitrogen	mg/L	6.10	4.10	4.96	2.27	-	-
Phenolics	mg/L	0.003	0.002	<0.001	<0.001	-	0.961
Dissolved Organic Carbon	mg/L	4.9	6.0	6.4	5.8	5	-
Chemical Oxygen Demand	mg/L	154	130	221	19	-	-
Iron	mg/L	<0.010	<0.010	0.039	0.014	0.3	-
Manganese	mg/L	1.39	0.94	1.56	1.22	0.05	-
Phosphorus	mg/L	2.98	3.36	1.22	0.80	-	-
Orthophosphate	mg/L	-	<0.10	<0.10	<0.10	-	-
Turbidity	NTU	7380	1450	629	473	5	-
Total Suspended Solids	mg/L	6680	3300	2180	1550	-	-
BOD	mg/L	9	<5	10	-	-	-
Anion Sum	-	-	-	-	-	-	-
Cation Sum	-	-	-	-	-	-	-
Ion Balance	%	-	-	-	-	-	-
Silver	mg/L	<0.002	<0.002	<0.0001	<0.0001	-	0.00012
Aluminum	mg/L	0.033	0.035	0.031	0.067	0.1	-
Antimony	mg/L	<0.003	<0.003	<0.001	<0.001	0.006	1.6
Arsenic	mg/L	<0.003	<0.003	<0.001	<0.001	0.01	0.15
Barium	mg/L	0.183	0.147	0.162	0.146	1.00	2.3
Beryllium	mg/L	<0.001	<0.001	<0.0005	<0.0005	-	0.0053
Bismuth	mg/L	<0.002	<0.002	<0.002	<0.002	-	-
Boron	mg/L	0.230	0.343	0.286	0.271	5	3.55
Cadmium	mg/L	<0.001	<0.001	<0.0001	<0.0001	0.005	0.00021
Chromium	mg/L	<0.003	<0.003	<0.002	<0.002	0.05	0.064
Cobalt	mg/L	<0.001	<0.001	<0.0005	<0.0005	-	0.0052
Copper	mg/L	0.004	0.004	0.003	0.004	1	0.0069
Molybdenum	mg/L	<0.002	<0.002	<0.002	<0.002	-	0.73
Nickel	mg/L	<0.003	<0.003	<0.003	<0.003	-	0.039
Phosphate	mg/L	<0.10	-	-	-	-	-
Lead	mg/L	<0.001	<0.001	<0.0005	<0.0005	0.01	0.002
Selenium	mg/L	<0.004	<0.004	0.002	<0.001	0.05	0.005
Sillicon	mg/L	-	-	-	0.205	-	-
Tin	mg/L	<0.002	<0.002	<0.002	0.006	-	-
Strontium	mg/L	0.233	0.235	0.234	<0.0003	-	-
Titanium	mg/L	<0.002	<0.002	<0.002	<0.010	-	-
Uranium	mg/L	<0.002	<0.002	<0.0005	<0.002	0.02	0.033
Vanadium	mg/L	<0.002	<0.002	<0.002	<0.005	-	0.02
Zinc	mg/L	<0.005	<0.005	<0.005	-	5	0.089
Field Measurements							
Temperature	oC	7.7	9.5	6.7	10.24	-	
pH	pH Units	6.5	6.0	6.1	6.3	6.5-8.5	
Coductivity	uS/cm	423.2	321.3	414.5	268	-	
Oxidation Reduction Potential	mV	204.8	440.6	238.2	230.4	-	
Dissolved Oxygen	mg/L	0.8	2.01	1.31	10.8	-	

Notes:

Ontario Regulation 169/03 "Ontario Drinking Water Quality Standards" under the Safe Drinking Water Act", dated 2002, and "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines", dated June 2003.

APV	Aquatic Protection Values
BOLD	Exceeds ODWQS
UNDERLINED	Exceeds APV
INSV	Insufficient volume to allow for sampling
NC	Not Calculated
CNL	Could Not Locate
LS	Limited Sample
Units	All Units in mg/L Unless Otherwise Noted.

TABLE 14 Groundwater Quality Results - BH9-I Chapman Waste Disposal Site Magnetawan, Ontario							
Parameter	Units	Sample Designation				ODWQS	APV
		Sample Collection Date (dd/mm/yyyy)					
		BH9-I					
		11-Jun-19	23-Sep-19	1-Jun-20	30-Sep-20		
pH Lab	pH Units	7.40	7.17	6.99	6.85	6.5-8.5	-
Conductivity	µS/cm	479	574	608	441	-	-
Hardness	mg/L	197	143	155	140	80-100	-
Total Dissolved Solids	mg/L	260	240	300	240	500	-
Alkalinity	mg/L	152	168	192	201	30-500	-
Chloride	mg/L	15.5	38.6	26.2	33.5	250	180
Sodium	mg/L	11.4	22.5	21.6	22.8	200	180
Calcium	mg/L	63.9	45.6	48.1	44.6	-	-
Magnesium	mg/L	9.19	7.16	8.40	7.02	-	-
Potassium	mg/L	8.04	12.30	10.9	11.1	-	-
Sulphate	mg/L	65.9	20.0	58.4	16.9	500	-
Ammonia	mg/L	3.58	6.60	6.18	6.83	-	-
Nitrate as N	mg/L	0.92	<0.05	<0.05	<0.05	10	-
Nitrite as N	mg/L	<0.05	<0.05	0.06	<0.05	1	-
Total Kjeldahl Nitrogen	mg/L	4.00	7.46	7.96	7.40	-	-
Phenolics	mg/L	0.002	0.001	0.002	<0.001	-	0.961
Dissolved Organic Carbon	mg/L	6.8	9.2	9.8	10.4	5	-
Chemical Oxygen Demand	mg/L	35	33	45	16	-	-
Iron	mg/L	0.133	3.76	8.08	8.71	0.3	-
Manganese	mg/L	2.06	4.48	5.28	4.79	0.05	-
Phosphorus	mg/L	2.09	0.70	1.61	3.29	-	-
Orthophosphate	mg/L	-	<0.10	<0.10	<0.10	-	-
Turbidity	NTU	4050	777	1120	777	5	-
Total Suspended Solids	mg/L	2090	1980	3320	1160	-	-
BOD	mg/L	<5	<5	<5	-	-	-
Anion Sum		-	-	-	-	-	-
Cation Sum		-	-	-	-	-	-
Ion Balance	%	-	-	-	-	-	-
Silver	mg/L	<0.002	<0.002	<0.0001	<0.0001	-	0.00012
Aluminum	mg/L	0.017	0.213	0.032	0.042	0.1	-
Antimony	mg/L	<0.003	<0.003	<0.001	<0.001	0.006	1.6
Arsenic	mg/L	<0.003	<0.003	0.001	0.002	0.01	0.15
Barium	mg/L	0.103	0.134	0.137	0.110	1.00	2.3
Beryllium	mg/L	<0.001	<0.001	<0.0005	<0.0005	-	0.0053
Bismuth	mg/L	<0.002	<0.002	<0.002	<0.002	-	-
Boron	mg/L	0.344	0.320	0.419	0.237	5	3.55
Cadmium	mg/L	<0.001	<0.001	<0.0001	<0.0001	0.005	0.00021
Chromium	mg/L	<0.003	<0.003	<0.002	<0.002	0.05	0.064
Cobalt	mg/L	0.006	0.016	0.022	0.019	-	0.0052
Copper	mg/L	0.004	0.008	0.004	0.003	1	0.0069
Molybdenum	mg/L	<0.002	<0.002	<0.002	<0.002	-	0.73
Nickel	mg/L	<0.003	<0.003	<0.003	<0.003	-	0.039
Phosphate	mg/L	<0.10	-	-	-	-	-
Lead	mg/L	<0.001	<0.001	<0.0005	<0.0005	0.01	0.002
Selenium	mg/L	<0.004	<0.004	0.003	<0.001	0.05	0.005
Silicon	mg/L	-	-	-	0.246	-	-
Tin	mg/L	<0.002	<0.002	<0.002	0.006	-	-
Strontium	mg/L	0.275	0.300	0.318	<0.0003	-	-
Titanium	mg/L	0.002	0.013	<0.002	<0.010	-	-
Uranium	mg/L	<0.002	<0.002	0.0015	<0.002	0.02	0.033
Vanadium	mg/L	<0.002	<0.002	<0.002	<0.005	-	0.02
Zinc	mg/L	<0.005	<0.005	<0.005	-	5	0.089
Field Measurements							
Temperature	oC	8.1	9.2	8.4	9.89	-	
pH	pH Units	6.5	6.1	6.2	6.3	6.5-8.5	
Coductivity	uS/cm	532.2	4.0	599.1	353	-	
Oxidation Reduction Potential	mV	203.8	318.4	230.4	287.2	-	
Dissolved Oxygen	mg/L	1.19	1.54	2.07	12.85	-	

Notes:

Ontario Regulation 169/03 "Ontario Drinking Water Quality Standards" under the Safe Drinking Water Act", dated 2002, and "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines", dated June 2003.

APV	Aquatic Protection Values
BOLD	Exceeds ODWQS
UNDERLINED	Exceeds APV
INSV	Insufficient volume to allow for sampling
NC	Not Calculated
CNL	Could Not Locate
LS	Limited Sample
Units	All Units in mg/L Unless Otherwise Noted.

TABLE 15 Groundwater Quality Results - BH10-I Chapman Waste Disposal Site Magnetawan, Ontario							
Parameter	Units	Sample Designation				ODWQS	APV
		Sample Collection Date (dd/mm/yyyy)					
		BH10-I					
		11-Jun-19	23-Sep-19	1-Jun-20	30-Sep-20		
pH Lab	pH Units	7.08	7.11	6.49	6.69	6.5-8.5	-
Conductivity	µS/cm	289	601	86	465	-	-
Hardness	mg/L	115	214	90.9	215	80-100	-
Total Dissolved Solids	mg/L	188	338	150	328	500	-
Alkalinity	mg/L	47	76	7	106	30-500	-
Chloride	mg/L	4.10	10.30	3.54	9.84	250	180
Sodium	mg/L	9.14	18.10	8.09	15.60	200	180
Calcium	mg/L	30.2	56.7	23.8	57.9	-	-
Magnesium	mg/L	9.60	17.50	7.6	17.0	-	-
Potassium	mg/L	5.52	7.64	4.35	7.17	-	-
Sulphate	mg/L	84.2	165.0	58	152	500	-
Ammonia	mg/L	0.11	0.15	<0.02	<0.02	-	-
Nitrate as N	mg/L	1.24	2.22	1.10	2.57	10	-
Nitrite as N	mg/L	<0.05	<0.05	<0.05	<0.05	1	-
Total Kjeldahl Nitrogen	mg/L	0.44	0.68	0.36	0.41	-	-
Phenolics	mg/L	<0.001	0.001	<0.001	<0.001	-	0.961
Dissolved Organic Carbon	mg/L	5.6	5.9	6.6	7.8	5	-
Chemical Oxygen Demand	mg/L	11	21	20	<5	-	-
Iron	mg/L	<0.010	<0.010	0.024	0.032	0.3	-
Manganese	mg/L	0.067	0.016	0.005	0.006	0.05	-
Phosphorus	mg/L	1.73	1.58	1.20	0.73	-	-
Orthophosphate	mg/L	-	<0.10	<0.10	<0.10	-	-
Turbidity	NTU	982	1940	583	187	5	-
Total Suspended Solids	mg/L	1130	2060	1320	796	-	-
BOD	mg/L	<5	<5	<5	-	-	-
Anion Sum		-	-	-	-	-	-
Cation Sum		-	-	-	-	-	-
Ion Balance	%	-	-	-	-	-	-
Silver	mg/L	<0.002	<0.002	<0.0001	<0.0001	-	0.00012
Aluminum	mg/L	0.049	0.045	0.069	0.045	0.1	-
Antimony	mg/L	<0.003	<0.003	<0.001	<0.001	0.006	1.6
Arsenic	mg/L	<0.003	<0.003	<0.001	<0.001	0.01	0.15
Barium	mg/L	0.111	0.148	0.079	0.190	1.00	2.3
Beryllium	mg/L	<0.001	<0.001	<0.0005	<0.0005	-	0.0053
Bismuth	mg/L	<0.002	<0.002	<0.002	<0.002	-	-
Boron	mg/L	0.446	0.790	0.367	0.807	5	3.55
Cadmium	mg/L	<0.001	<0.001	<0.0001	<0.0001	0.005	0.00021
Chromium	mg/L	<0.003	<0.003	<0.002	<0.002	0.05	0.064
Cobalt	mg/L	0.001	<0.001	<0.0005	<0.0005	-	0.0052
Copper	mg/L	0.008	0.008	0.005	0.007	1	0.0069
Molybdenum	mg/L	<0.002	<0.002	<0.002	<0.002	-	0.73
Nickel	mg/L	0.004	0.003	<0.003	<0.003	-	0.039
Phosphate	mg/L	<0.10	-	-	-	-	-
Lead	mg/L	<0.001	<0.001	<0.0005	<0.0005	0.01	0.002
Selenium	mg/L	<0.004	<0.004	0.002	<0.001	0.05	0.005
Silicon	mg/L	-	-	-	0.321	-	-
Tin	mg/L	<0.002	<0.002	<0.002	0.003	-	-
Strontium	mg/L	0.187	0.343	0.149	<0.0003	-	-
Titanium	mg/L	<0.002	0.003	<0.002	<0.010	-	-
Uranium	mg/L	<0.002	<0.002	0.0007	<0.002	0.02	0.033
Vanadium	mg/L	<0.002	<0.002	<0.002	<0.005	-	0.02
Zinc	mg/L	0.007	0.009	<0.005	-	5	0.089
Field Measurements							
Temperature	oC	10.1	11.4	7.2	11.09	-	
pH	pH Units	6.5	6.1	6.0	6.4	6.5-8.5	
Coductivity	uS/cm	311.4	416.3	252.1	369	-	
Oxidation Reduction Potential	mV	158.2	179.3	292	358.7	-	
Dissolved Oxygen	mg/L	9.19	8.14	8.07	10.91	-	

Notes:

Ontario Regulation 169/03 "Ontario Drinking Water Quality Standards" under the Safe Drinking Water Act", dated 2002, and "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines", dated June 2003.

APV	Aquatic Protection Values
BOLD	Exceeds ODWQS
UNDERLINED	Exceeds APV
INSV	Insufficient volume to allow for sampling
NC	Not Calculated
CNL	Could Not Locate
LS	Limited Sample
Units	All Units in mg/L Unless Otherwise Noted.

TABLE 16 Groundwater Quality Results - BH11 Chapman Waste Disposal Site Magnetawan, Ontario						
Parameter	Units	Sample Designation				ODWQS
		Sample Collection Date (dd/mm/yyyy)				
		BH11				
		11-Jun-19	23-Sep-19	1-Jun-20	30-Sep-20	
pH Lab	pH Units	6.38	6.33	6.77	6.12	6.5-8.5
Conductivity	µS/cm	82	94	248	37	-
Hardness	mg/L	25.1	23.5	25.6	7.5	80-100
Total Dissolved Solids	mg/L	60	66	66	34	500
Alkalinity	mg/L	7	10	49	15	30-500
Chloride	mg/L	13.5	12.6	13.5	2.3	250
Sodium	mg/L	3.52	3.89	4.01	5.12	200
Calcium	mg/L	8.18	7.76	8.45	2.42	-
Magnesium	mg/L	1.14	0.99	1.09	0.36	-
Potassium	mg/L	1.38	1.34	1.28	0.70	-
Sulphate	mg/L	4.93	5.64	5.63	4.20	500
Ammonia	mg/L	0.07	0.12	<0.02	<0.02	-
Nitrate as N	mg/L	0.40	0.20	0.15	0.09	10
Nitrite as N	mg/L	<0.05	<0.05	<0.05	<0.05	1
Total Kjeldahl Nitrogen	mg/L	0.18	0.19	0.21	0.20	-
Phenolics	mg/L	<0.001	<0.001	<0.001	<0.001	-
Dissolved Organic Carbon	mg/L	1.8	2.0	2.5	4.3	5
Chemical Oxygen Demand	mg/L	<5	<5	<5	<5	-
Iron	mg/L	<0.010	<0.010	0.011	0.08	0.3
Manganese	mg/L	0.021	0.016	0.012	0.017	0.05
Phosphorus	mg/L	0.87	0.90	1.84	2.42	-
Orthophosphate	mg/L	-	<0.10	<0.10	<0.10	-
Turbidity	NTU	368	216	320	771	5
Total Suspended Solids	mg/L	1760	1110	430	3210	-
BOD	mg/L	<5	<5	<5	-	-
Anion Sum		-	-	-	-	-
Cation Sum		-	-	-	-	-
Ion Balance	%	-	-	-	-	-
Silver	mg/L	<0.002	<0.002	<0.0001	<0.0001	-
Aluminum	mg/L	0.030	0.034	0.033	0.239	0.1
Antimony	mg/L	<0.003	<0.003	<0.001	<0.001	0.006
Arsenic	mg/L	<0.003	<0.003	<0.001	0.001	0.010
Barium	mg/L	0.019	0.019	0.017	0.007	1.00
Beryllium	mg/L	<0.001	<0.001	<0.0005	<0.0005	-
Bismuth	mg/L	<0.002	<0.002	<0.002	<0.002	-
Boron	mg/L	<0.010	<0.010	<0.010	0.018	5
Cadmium	mg/L	<0.001	<0.001	<0.0001	<0.0001	0.005
Chromium	mg/L	<0.003	<0.003	<0.002	<0.002	0.05
Cobalt	mg/L	<0.001	<0.001	<0.0005	<0.0005	-
Copper	mg/L	<0.003	<0.003	<0.001	0.002	1
Molybdenum	mg/L	<0.002	<0.002	<0.002	<0.002	-
Nickel	mg/L	<0.003	<0.003	<0.003	<0.003	-
Phosphate	mg/L	<0.10	-	-	-	-
Lead	mg/L	<0.001	<0.001	<0.0005	<0.0005	0.01
Selenium	mg/L	<0.004	<0.004	<0.001	0.011	0.05
Sillicon	mg/L	-	-	-	0.024	-
Tin	mg/L	<0.002	<0.002	<0.002	0.003	-
Strontium	mg/L	0.081	0.075	0.077	<0.0003	-
Titanium	mg/L	<0.002	<0.002	<0.002	<0.010	-
Uranium	mg/L	<0.002	<0.002	<0.0005	<0.002	0.02
Vanadium	mg/L	<0.002	<0.002	<0.002	<0.005	-
Zinc	mg/L	<0.005	<0.005	<0.005	-	5
Field Measurements						
Temperature	oC	12.3	11.3	7.8	10.61	-
pH	pH Units	6.3	5.9	5.3	6.1	6.5-8.5
Coductivity	uS/cm	86	63.6	88.5	59	-
Oxidation Reduction Potential	mV	109.9	178.8	323.9	337.5	-
Dissolved Oxygen	mg/L	9.06	7.11	6.29	9.19	-

Notes:

Ontario Regulation 169/03 "Ontario Drinking Water Quality Standards" under the Safe Drinking Water Act", dated 2002, and
Ontario Drinking Water Quality Standards* "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines", dated June 2003.

BOLD	Exceeds ODWQS
INSV	Insufficient volume to allow for sampling
NC	Not Calculated
CNL	Could Not Locate
LS	Limited Sample
Units	All Units in mg/L Unless Otherwise Noted.

TABLE 17 B-7 Guideline Calculations - Spring 2020 Chapman Waste Disposal Site Magnetawan, Ontario											
Parameter	Units	Sample Designation					ODWQS	Guideline B-7 Calculation			
		Sample Collection Date (dd/mm/yyyy)						Cm = Cb + x (Cr - Cb)			
		BH5-II	BH6-III	BH-7-II	BH8-I	BH9-I		Cb	x	Cr	Cm
		1-Jun-20	1-Jun-20	1-Jun-20	1-Jun-20	1-Jun-20					
pH Lab	pH Units	6.83	6.85	6.43	7.01	6.99	6.5-8.5	6.50	0.5	6.5-8.5	NC
Hardness	mg/L	136.0	140	10.7	130	155	80-100	11.3	0.5	80-100	NC
Total Dissolved Solids	mg/L	214	216	36	194	300	500	58.2	0.5	500	279
Alkalinity	mg/L	90	97	15	131	192	30-500	16.61	0.5	30-500	NC
Chloride	mg/L	10.30	7.79	0.58	20.3	26.2	250	4.04	0.5	250	127.0
Sodium	mg/L	12.30	10.9	3.13	16.5	21.6	200	5.74	0.5	200	102.9
Sulphate	mg/L	60.3	68.1	7.70	35.7	58.4	500.0	5.50	0.5	500.0	252.7
Nitrate as N	mg/L	2.30	2.23	0.08	2.43	<0.05	10	0.16	0.25	10	2.6
Nitrite as N	mg/L	<0.05	<0.05	<0.05	0.06	0.06	1	0.025	0.25	1	0.27
Dissolved Organic Carbon	mg/L	3.9	4.6	5.7	6.4	9.8	5	3.4	0.5	5	4.2
Iron	mg/L	<0.010	0.019	0.036	0.039	8.08	0.3	0.007	0.5	0.3	0.154
Manganese	mg/L	0.171	0.450	0.010	1.56	5.28	0.05	0.015	0.5	0.05	0.033
Turbidity	NTU	95.9	60.4	3850	629	1120	5	580.0	0.5	5	NC
Aluminum	mg/L	0.010	0.011	0.036	0.031	0.032	0.1	0.043	0.5	0.1	0.1
Antimony	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	0.006	0.0010	0.25	0.006	0.0022
Arsenic	mg/L	<0.001	<0.001	<0.001	<0.001	0.001	0.010	0.0012	0.25	0.010	0.0034
Barium	mg/L	0.092	0.093	0.012	0.162	0.137	1.00	0.0083	0.25	1.00	0.26
Boron	mg/L	0.267	0.265	<0.010	0.286	0.419	5	0.0116	0.25	5	1.26
Cadmium	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.005	0.0002	0.25	0.005	0.0014
Chromium	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	0.05	0.0013	0.25	0.05	0.013
Copper	mg/L	0.002	0.005	<0.001	0.003	0.004	1	0.0013	0.5	1	0.50
Lead	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.01	0.0004	0.25	0.01	0.0028
Selenium	mg/L	0.001	0.002	<0.001	0.002	0.003	0.05	0.0011	0.25	0.05	0.013
Uranium	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	0.0015	0.02	0.00082	0.25	0.02	0.0056
Zinc	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	5	0.004	0.5	5	2.50

Notes:

Ontario Drinking Water Quality Standards* Ontario Regulation 169/03 “Ontario Drinking Water Quality Standards” under the Safe Drinking Water Act”, dated 2002, and "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines”, dated June 2003.

BOLD	Exceeds Cm value.
INSV	Insufficient volume to allow for sampling
NC	Not Calculated due to the background concentration being in exceedance of the ODWQS.
CNL	Could Not Locate
LS	Limited Sample
Units	All Units in mg/L Unless Otherwise Noted.
Cb	Background Concentration
Cr	Maximum Acceptable Contaminant Concentration
x	Reduction Constant
Cm	Maximum Off-Site Acceptable Contaminant Concentration

TABLE 18 B-7 Guideline Calculations - Fall 2020 Chapman Waste Disposal Site Magnetawan, Ontario											
Parameter	Units	Sample Designation					ODWQS	Guideline B-7 Calculation			
		Sample Collection Date (dd/mm/yyyy)						Cm = Cb + x (Cr - Cb)			
		BH5-II	BH6-III	BH7-II	BH8-I	BH9-I		Cb	x	Cr	Cm
		30-Sep-20	30-Sep-20	30-Sep-20	30-Sep-20	30-Sep-20					
pH Lab	pH Units	6.64	6.70	5.95	6.73	6.85	6.5-8.5	6.41	0.5	6.5-8.5	NC
Hardness	mg/L	226	142	6.0	126	140	80-100	11.7	0.5	80-100	NC
Total Dissolved Solids	mg/L	226	206	<20	206	240	500	53.1	0.5	500	277
Alkalinity	mg/L	115	130	7.00	140	201	30-500	16.32	0.5	30-500	NC
Chloride	mg/L	13.0	11.9	0.58	27.2	33.5	250	4.35	0.5	250	127.2
Sodium	mg/L	19.2	17.2	0.97	19.6	22.8	200	5.41	0.5	200	102.7
Sulphate	mg/L	62.6	57.5	1.98	18.6	16.9	500	5.30	0.5	500.0	252.7
Nitrate as N	mg/L	3.68	2.48	0.49	3.58	<0.05	10	0.15	0.25	10	2.6
Nitrite as N	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	1	0.025	0.25	1	0.27
Dissolved Organic Carbon	mg/L	5.5	4.8	3.7	5.8	10.4	5	3.3	0.5	5	4.2
Iron	mg/L	0.012	<0.010	0.052	0.014	8.71	0.3	0.011	0.5	0.3	0.156
Manganese	mg/L	0.144	0.898	0.005	1.22	4.79	0.05	0.018	0.5	0.05	0.034
Turbidity	NTU	225	213.0	2640	473	777	5	526.4	0.5	5	NC
Aluminum	mg/L	0.034	0.030	0.042	0.067	0.042	0.1	0.058	0.5	0.1	0.1
Antimony	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	0.006	0.0008	0.25	0.006	0.0021
Arsenic	mg/L	<0.001	<0.001	<0.001	<0.001	0.002	0.01	0.0010	0.25	0.010	0.0033
Barium	mg/L	0.125	0.116	0.005	0.146	0.110	1.00	0.0090	0.25	1.00	0.26
Boron	mg/L	0.310	0.287	<0.010	0.271	0.237	5	0.0110	0.25	5	1.26
Cadmium	mg/L	0.0003	<0.0001	<0.0001	<0.0001	<0.0001	0.005	0.0002	0.25	0.005	0.0014
Chromium	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	0.05	0.0012	0.25	0.05	0.013
Copper	mg/L	0.003	0.007	<0.001	0.004	0.003	1	0.0015	0.5	1	0.50
Lead	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.01	0.0004	0.25	0.01	0.0028
Selenium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	0.05	0.0014	0.25	0.05	0.014
Uranium	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	0.02	0.00086	0.25	0.02	0.0056
Zinc	mg/L	-	-	-	-	-	5	0.004	0.5	5	2.50

Notes:

Ontario Drinking Water Quality Standards* Ontario Regulation 169/03 “Ontario Drinking Water Quality Standards” under the Safe Drinking Water Act”, dated 2002, and "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines", dated June 2003.

BOLD	Exceeds Cm value.
INSV	Insufficient volume to allow for sampling
NC	Not Calculated
CNL	Could Not Locate
LS	Limited Sample
Units	All Units in mg/L Unless Otherwise Noted.
Cb	Background Concentration
Cr	Maximum Acceptable Contaminant Concentration
x	Reduction Constant
Cm	Maximum Off-Site Acceptable Contaminant Concentration

TABLE 19 Groundwater Trigger Level Monitoring Results Chapman Waste Disposal Site Magnetawan, Ontario										
Parameter	Units	Sample Designation			ODWQS	Guideline B-7 Cm = Cb + x (Cr - Cb)				Trigger Level Concentration (75% of Cm)
		BH6-III	BH7-II	BH8-I		Cb	x	Cr	Cm	
TDS	mg/L	209	45.3	206	500	40.0	0.5	500	270	202
Chloride	mg/L	9.22	0.62	23.1	250	2.42	0.5	250	126	94.7
Sodium	mg/L	12.8	1.70	17.4	200	1.50	0.5	200	101	75.6
Sulphate	mg/L	64.4	3.98	31.3	500	4.73	0.50	500	252	189
Nitrate as N	mg/L	2.34	0.14	2.99	10	0.86	0.25	10	3.14	2.36
Nitrite as N	mg/L	0.025	0.018	0.082	1	0.005	0.25	1	0.25	0.19
Iron	mg/L	0.007	0.043	0.011	0.3	0.05	0.5	0.3	0.18	0.13
Manganese	mg/L	0.56	0.0074	1.26	0.05	0.01	0.5	0.050	0.029	0.022
Arsenic	mg/L	0.00087	0.0006	0.00087	0.01	0.001	0.25	0.01	0.0029	0.002
Barium	mg/L	0.11	0.0102	0.16	1	0.023	0.25	1	0.27	0.20
Boron	mg/L	0.27	0.011	0.28	5	0.013	0.25	5.0	1.26	0.94
Cadmium	mg/L	0.00016	0.00008	0.00016	0.005	0.0001	0.25	0.01	0.0013	0.001
Chromium	mg/L	0.0012	0.00099	0.00122	0.05	0.003	0.25	0.05	0.014	0.011
Copper	mg/L	0.0062	0.0012	0.0037	1	0.001	0.5	1	0.50	0.38
Lead	mg/L	0.0004	0.00019	0.00035	0.01	0.00018	0.25	0.01	0.0026	0.002
Zinc	mg/L	0.0040	0.0057	0.0025	5	0.016	0.5	5	2.51	1.88

Notes:

Ontario Drinking Water Quality Standards*	Ontario Regulation 169/03 “Ontario Drinking Water Quality Standards” under the Safe Drinking Water Act”, dated 2002, and "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines”, dated June 2003.
BOLD	Exceeds Trigger Level Concentration
Cb	Background Concentration - average of all valid sampling rounds at historical background location BH3 until a more robust data set is established for new background wells BH3-II and BH11
Cr	Maximum Acceptable Contaminant Concentration
x	Reduction Constant
Cm	Maximum Off-Site Acceptable Contaminant Concentration

TABLE 20 Surface Water Quality Results - SW1 Chapman Waste Disposal Site Magnetawan, Ontario																											
Parameter	Units	Sample Designation																							PWQO	CWQG	
		Sample Collection Date (dd/mm/yyyy)																									
		SW1																									
		16-May-05	26-Oct-05	8-May-06	14-May-09	27-Oct-11	9-May-12	4-Oct-12	30-May-13	24-Oct-13	8-May-14	8-Apr-14	30-Oct-14	13-May-15	22-Oct-15	13-Oct-16	18-May-17	25-Oct-17	2-May-18	19-Jun-18	17-Oct-18	11-Jun-19	26-Sep-19	1-Jun-20			30-Sep-20
pH Lab	pH Units	4.8	5.7	5.7	6.2	6.0	6.4	6.6	6.1	5.5	6.3	6.3	6.3	5.6	6.5	6.5	6.4	6.7	5.9	6.2	6.4	5.37	3.97	6.79	5.92	6.5-8.5	6.5-9.0
Conductivity	µS/cm	22.3	35	26	21	54	51	76	35	33	72	77	48	28	77	150	87	119	34	-	78	37	118	258	37	-	-
Hardness	mg/L	6.75	7.2	4	11	14	14	20	10	9.4	18	18	13	7.9	25	39	25	22	10	-	21	10.0	17.8	19.4	8.9	-	-
Total Dissolved Solids	mg/L	279	72	21	13	44	16	56	52	48	66	68	54	28	66	104	158	26	28	74	38	34	54	62	34	-	-
Alkalinity	mg/L	-	2	2	6	2	2.5	6.6	3	<1	3.1	3.1	3.1	1.7	6	11	7	14	<5	-	9	<5	<5	52	6	-	-
Alkalinity Bicarbonate		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-	-	-	-	-
Chloride	mg/L	1.38	2	2	<5	10	9	13	6	5	12	13	8	5	14	16	13	11	4	25.1	10	7.09	11.7	14.10	7.3	-	120
Sodium	mg/L	1.7	1.5		0.77	2.4	2.5	3.3	1.8	1.5	5.3	5.4	2.2	1.6	3.5	5.16	3.75	3.43	1.68	-	3.09	2.42	3.51	4.48	1.95	-	-
Calcium	mg/L	1.8	2.2	1.5	-	4.8	4.6	6.8	3.2	3	6	5.9	4.1	2.4	7.6	12.4	7.96	6.98	3.12	-	6.48	2.96	5.51	6.01	2.61	-	-
Magnesium	mg/L	0.38	0.43	0.3	-	0.93	0.79	1.3	0.53	0.54	0.95	0.96	0.69	0.45	1.4	1.98	1.31	1.21	0.556	-	1.16	0.64	0.99	1.07	0.59	-	-
Potassium	mg/L	-	0.34		-	2.1	0.68	1.8	0.51	0.62	0.75	0.76	0.77	0.5	1.5	2.15	0.841	0.923	0.551	-	0.677	0.23	0.80	0.84	0.59	-	-
Sulphate	mg/L	4.8	4	3	<5	5	2	3	2	<1	7	8	2	<1	4	27	13	11	5	4	10	0.90	13.8	2.79	1.4	-	-
Ammonia	mg/L	0.07	-	-	0.07	<0.05	0.099	0.063	0.074	<0.05	0.053	<0.05	<0.05	<0.05	0.069	0.02	0.01	0.02	0.02	0.05	0.01	0.09	0.08	<0.02	<0.02	-	-
Un-ionized Ammonia		0.0005	-	-	-	0	0.0002	0.0084	0.0001	0.0001	0.0002	0.0002	0	0.0009	0.0001	0.00003	0.00001	0.00005	0.000007	-	0.000011	-	-	-	-	0.02	0.019
Nitrate as N	mg/L	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.2	<0.1	<0.1	<0.1	<0.1	0.2	0.1	<0.1	0.36	0.1	<0.05	<0.05	0.06	<0.05	-	13
Nitrite as N	mg/L	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	0.06
Total Kjeldahl Nitrogen	mg/L	0.6	-	-	-	-	0.74	0.73	0.57	0.52	0.33	0.85	0.35	0.26	0.56	0.2	0.4	0.3	0.2	0.28	0.2	0.30	0.38	0.30	0.39	-	-
Phenolics	mg/L	-	0.001	-	<0.001	0.003	0.0031	<0.001	0.0014	0.0018	<0.001	<0.001	0.003	<0.001	<0.001	0.009	<0.001	0.002	<0.001	0.002	<0.001	0.001	0.003	0.001	<0.001	0.001	0.004
Dissolved Organic Carbon	mg/L	8.8	12.4	8.7	18.2	9	8.2	6.1	8.4	11	5.1	5.2	9.2	8.1	6.5	9.4	7.4	10.6	13.4	-	7	8.9	13.2	6.8	14.2	-	-
Chemical Oxygen Demand	mg/L	-	45	26	49	30	30	23	23	31	13	13	25	21	40	35	32	30	21	25	25	19	31	19	16	-	-
Biological Oxygen Demand	mg/L	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	4	<2	<2	<2	<2	<5	<2	<5	<5	<5	-	-	-
Iron	mg/L	0.72	1.50	1.60	-	0.5	1.00	0.52	0.68	0.42	0.26	0.26	1.10	0.52	3.30	<0.5	0.46	0.40	0.25	0.49	0.21	0.369	0.383	0.389	0.427	0.30	0.30
Manganese	mg/L	0.048	0.11	0.051	-	0.1	0.082	0.065	0.05	0.069	0.047	0.048	0.072	0.054	0.12	0.063	0.057	0.045	0.032	-	0.046	0.057	0.070	0.041	0.059	-	-
Phosphorus	mg/L	4.5	-	-	<0.5	3.5	0.026	0.003	0.019	0.01	0.003	0.007	0.017	0.012	0.13	<0.01	<0.01	0.03	<0.01	<0.02	<0.01	0.02	0.02	<0.02	<0.02	0.03	-
Orthophosphate	mg/L	-	0.009	-	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	<0.10	<0.10	<0.10	<0.10	-	-
Total Suspended Solids	mg/L	-	8	-	<10	<10	64	<10	<10	<10	<10	<10	<10	1	11	<2	15	8	6	<10	<2	<10	<10	18	<10	-	-
Bicarbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Turbidity	NTU	71	113	79	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anion Sum		-	-	-	-	0.411	0.333	0.564	0.267	0.141	0.583	0.617	0.33	0.167	0.59	1.24	0.79	0.82	0.28	-	0.66	-	-	-	-	-	-
Cation Sum		-	-	-	-	0.448	0.445	0.541	0.327	0.314	0.642	0.64	0.399	0.272	0.74	1.06	0.69	0.62	0.29	-	0.57	-	-	-	-	-	-
Ion Balance	%	-	-	-	-	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	-7.7	N/A	N/A	1	-	-7.5	-	-	-	-	-	-
Silver	mg/L	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001	<0.1	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	0.00025
Aluminum	mg/L	0.37	0.56	0.55	-	0.23	0.36	0.12	0.27	0.31	0.25	0.25	0.41	0.27	0.8	0.085	0.139	0.177	0.178	-	0.158	0.200	0.220	0.104	0.248	0.075	0.1
Antimony	mg/L	-	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.005	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.001	<0.003	<0.001	<0.001	0.02	-
Arsenic	mg/L	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001	<0.003	<0.001	<0.003	<0.003	<0.003	<0.003	0.005	0.005
Barium	mg/L	0.022	0.023	0.018	-	0.027	0.025	0.026	0.019	0.017	0.041	0.042	0.022	0.015	0.035	0.045	0.033	0.029	0.014	0.043	0.024	0.020	0.035	0.024	0.021	-	-
Beryllium	mg/L	-	-	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0025	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	1.1	-
Bismuth	mg/L	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.01	<0.001	<0.001	<0.001	-	<0.001	<0.002	<0.002	<0.002	<0.002	-	-
Boron	mg/L	-	-	-	-	<0.01	<0.01	0.021	<0.01	<0.01	0.015	0.014	0.014	<0.01	0.013	0.111	0.053	0.139	0.03	0.022	0.032	<0.010					

TABLE 21 Surface Water Quality Results - SW2 Chapman Waste Disposal Site Magnetawan, Ontario																		
Parameter	Units	Sample Designation Sample Collection Date (dd/mm/yyyy)															PWQO	CWQG
		SW2																
		30-May-13	24-Oct-13	8-May-14	30-Oct-14	13-May-15	22-Oct-15	10/13/2016 (DRY)	18-May-17	25-Oct-17	2-May-18	17-Oct-18	11-Jun-19	26-Sep-19	1-Jun-20	30-Sep-20		
pH Lab	pH Units	7.2	6.3	6.8	6.5	6.1	6.8	-	7.2	7.4	6.4	6.7	6.72	6.43	6.43	5.85	6.5-8.5	6.5-9.0
Conductivity	µS/cm	68	34	82	47	37	100	-	112	122	29	58	62	105	24	10	-	-
Hardness	mg/L	19	11	23	13	12	34	-	29	26	8	19	19.8	28.4	4.3	3.3	-	-
Total Dissolved Solids	mg/L	52	40	62	24	38	84	-	102	26	18	42	40	66	22	<20	-	-
Alkalinity	mg/L	12	3	12	6.8	4.2	14	-	21	40	<5	12	8	7	<5	<5	-	-
Alkalinity Bicarbonate		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	6	3	8	5	4	12	-	9	7	3	6	6.99	11.1	2.12	0.3	-	120
Sodium	mg/L	4.2	1.7	5.3	2.8	1.9	5.1	-	4.62	4.81	1.39	2.65	3.16	4.63	1.08	0.36	-	-
Calcium	mg/L	5.9	2.9	7.1	4.5	3.3	8.9	-	8.85	10.2	2.53	5.68	6.02	8.65	1.16	0.86	-	-
Magnesium	mg/L	1.2	0.66	1.4	0.94	0.69	2.4	-	1.76	<2.0	0.515	1.2	1.15	1.65	0.35	0.28	-	-
Potassium	mg/L	1.9	0.75	1.9	1.2	0.81	3.1	-	2.12	2.53	0.616	1.02	1.19	1.55	0.65	0.22	-	-
Sulphate	mg/L	7	4	9	4	4	11	-	13	9	4	7	4.74	10.6	1.99	1.5	-	-
Ammonia	mg/L	0.43	<0.05	0.27	0.13	<0.05	<0.05	-	0.35	1.42	0.06	0.03	0.19	0.12	<0.02	0.03	-	-
Un-ionized Ammonia		0.0035	0	0.0003	0.0001	0.0002	0	-	0.003	0.018	0.0001	0.0001	-	-	-	0.00029	0.02	0.019
Nitrate as N	mg/L	0.29	<0.1	0.53	0.15	0.17	0.14	-	0.7	0.2	0.2	0.3	0.21	0.17	<0.05	<0.05	-	13
Nitrite as N	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	0.06
Total Kjeldahl Nitrogen	mg/L	1.1	0.45	0.53	0.4	<0.5	0.18	-	0.6	1.4	0.2	0.2	0.43	0.41	0.22	0.42	-	-
Phenolics	mg/L	0.0012	<0.001	<0.001	0.001	<0.001	<0.001	-	<0.001	0.002	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	0.001	0.004
Dissolved Organic Carbon	mg/L	6.6	6.6	4.4	0.26	5.5	6.3	-	5.4	7	7.7	4.8	6.4	9.8	3.5	9.0	-	-
Chemical Oxygen Demand	mg/L	21	19	12	11	9.1	7.4	-	29	16	13	21	16	22	6	<5	-	-
Biological Oxygen Dema-	mg/L	<2	<2	<2	<2	<2	<2	-	<2	<2	<2	<2	<5	<5	<5	-	-	-
Iron	mg/L	0.26	0.34	0.14	0.5	0.59	1.40	-	<0.1	0.39	0.30	0.16	0.151	0.088	0.308	1.080	0.30	0.30
Manganese	mg/L	0.044	0.056	0.04	0.11	0.11	0.12	-	0.031	1.29	0.048	1.2	0.070	0.030	0.461	0.068	-	-
Phosphorus	mg/L	0.007	0.011	0.008	0.018	0.01	0.017	-	<0.01	0.01	<0.01	<0.01	0.02	<0.02	0.05	<0.02	0.03	-
Orthophosphate	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	<0.10	<0.10	<0.10	<0.10	-	-
Total Suspended Solids	mg/L	<10	<10	<10	<10	4	20	-	<2	11	6	<2	<10	<10	<10	<10	-	-
Anion Sum		0.577	0.229	0.7	0.358	0.286	0.847	-	1.02	1.19	0.26	0.58	-	-	-	-	-	-
Cation Sum		0.652	0.337	0.775	0.431	0.356	1.03	-	0.84	0.94	0.24	0.52	-	-	-	-	-	-
Ion Balance	%	NC	NC	-	NC	NC	NC	-	-9.6	N/A	-3.3	-5.1	-	-	-	-	-	-
Silver	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	0.00025
Aluminum	mg/L	0.16	0.25	0.18	0.26	0.40	0.89	-	0.082	0.042	0.12	0.12	0.110	0.099	0.097	0.071	0.075	0.1
Antimony	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.003	<0.001	<0.001	0.02	-
Arsenic	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.003	<0.003	<0.003	<0.003	0.10	0.01
Barium	mg/L	0.032	0.02	0.038	0.025	0.022	0.044	-	0.04	0.171	0.015	0.024	0.027	0.037	0.014	0.012	-	-
Beryllium	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	1.1	-
Bismuth	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	-	-
Boron	mg/L	0.044	<0.01	0.048	0.04	0.018	0.053	-	0.07	0.61	0.021	0.027	0.028	0.043	<0.010	<0.010	0.20	1.50
Cadmium	mg/L	<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	0.0003	0.00020	0.00026
Chromium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.001	<0.001	<0.001	<0.001	<0.003	<0.003	<0.003	<0.003	0.0089	0.001
Cobalt	mg/L	0.00053	0.00052	<0.0005	0.00087	0.0012	0.0011	-	<0.0005	0.0032	<0.0005	<0.0005	<0.0005	<0.0005	0.0028	0.0012	0.0009	-
Copper	mg/L	<0.001	0.0013	0.001	<0.001	0.0012	0.0025	-	0.0006	0.0048	<0.0005	0.0006	<0.001	<0.003	<0.001	<0.001	0.005	0.004
Molybdenum	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	0.0015	<0.0005	<0.0005	<0.002	<0.002	<0.002	<0.002	0.04	0.073
Nickel	mg/L	0.0011	0.0011	0.0022	0.0011	0.0017	0.0012	-	0.001	0.001	<0.001	<0.001	<0.003	<0.003	<0.003	<0.003	0.025	0.15
Phosphate	mg/L	-	-	-	-	-	-	-	<0.2	<0.2	<0.0002	<0.0002	<0.10	-	-	-	-	-
Lead	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	0.00051	0.0013	-	<0.0001	<0.0001	0.0002	0.0001	<0.001	<0.001	<0.001	<0.001	0.005	0.007
Selenium	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	-	<0.001	0.001	<0.001	<0.001	<0.004	<0.004	<0.004	<0.004	0.1	0.001
Sillicon	mg/L	2.5	2.6	2.6	3.8	2.2	5.1	-	2.27	3.55	1.72	2.43	2.31	3.47	2.87	1.01	-	-
Tin	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	-	-
Strontium	mg/L	0.049	0.027	0.061	0.035	0.029	0.073	-	0.076	0.528	0.02	0.047	0.045	0.074	0.010	0.020	-	-
Titanium	mg/L	<0.005	<0.005	<0.005	0.0054	0.013	0.075	-	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	0.019	0.01	-	-
Uranium	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	0.0033	<0.0001	<0.0001	<0.002	<0.002	<0.002	<0.002	0.005	0.015
Vanadium	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	0.00071	0.0018	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.002	<0.002	<0.002	<0.002	0.006	-
Zinc	mg/L	0.0084	0.016	0.0099	0.013	0.0078	0.01	-	0.007	0.009	0.01	0.012	0.008	0.007	0.012	<0.005	0.03	0.093
Dissolved Mercury		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0002	0.000026
Field Measurements																		
Temperature	oC	13.9	5.4	9	5.5	9.4	7.2	-	16.6	-	9.2	6.9	13.1	10.9	14.1	13.7		
pH	pH Units	7.52	6.49	6.74	6.83	7.45	6.57	-	7.68	-	9.16	7.18	6.9	6.20	5.4	6.08		
Coductivity	uS/cm	48	21	80	27	17	85	-	0.12	-	1.55	0.07	67.6	416.30	20.2	8.00		
Oxidation Reduction Potential	mV	-	-	-	-	-	-	-	-	-	-	-	122.9	148.4	320.8	313.5		
Dissolved Oxygen	mg/L	7.47	12.16	8.17	11.71	11.28	11.86	-	-	-	-	-	9.1	1.23	6.9	11.65		

Notes:

PWQO	Provincial Water Quality Objective
CWQG	Canadian Water Quality Guidelines
BOLD	Exceeds PWQO
<u>UNDERLINED</u>	Exceeds CWQG
SHADED ONLY	RDL exceeds standard

INSV Insufficient volume to allow for sampling
NC Not Calculated
CNL Could Not Locate
LS Limited Sample
Units All Units in mg/L Unless Otherwise Noted.

TABLE 22 Surface Water Quality Results - SW3 Chapman Waste Disposal Site Magnetawan, Ontario																					
Parameter	Units	Sample Designation Sample Collection Date (dd/mm/yyyy)																		PWQO	CWQG
		SW3																			
		9-May-12	4-Oct-12	30-May-13	24-Oct-13	8-May-14	30-Oct-14	13-May-15	22-Oct-15	13-Oct-16	18-May-17	25-Oct-17	2-May-18	19-Jun-18	17-Oct-18	11-Jun-19	26-Sep-19	1-Jun-20	30-Sep-20		
pH lab	pH Units	7.2	7.3	7.8	6.6	7.5	6.9	6.4	7.6	7.0	7.3	6.8	7.1	7.1	7.0	7.34	6.79	7.16	6.35	6.5-8.5	6.5-9.0
Conductivity	µS/cm	180	250	230	34	220	87	47	240	321	318	74	69	-	86	114	397	251	80	-	-
Hardness	mg/L	42	61	55	10	57	21	14	76	88	95	20	17	-	25	35.6	96.6	77.1	21.4	-	-
Total Dissolved Solids	mg/L	82	138	128	14	124	64	18	146	186	216	34	24	174	26	52	198	128	42	-	-
Alkalinity, total	mg/L	55	71	76	7	64	28	10	67	89	102	13	23	-	30	37	38	72	36	-	-
Alkalinity Bicarbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	108	-	-	-	-	-	-	-
Chloride	mg/L	12	16	12	2	12	4	3	21	27	18	6	5	27	7	5.88	29.2	14.30	5.7	-	120
Sodium	mg/L	14	15	15	1.6	13	4.9	2.3	12	10.9	14.3	2.84	2.96	-	3.29	4.83	16.8	12.00	3.6	-	-
Calcium	mg/L	15	21	18	3	17	7	3.9	22	28.7	29.2	6.15	5.25	-	7.71	11.3	30.8	23.9	6.6	-	-
Magnesium	mg/L	2.6	3.6	3.2	0.62	3.2	1.4	0.8	3.9	4.09	5.27	1.24	0.993	-	1.3	1.79	4.77	4.22	1.18	-	-
Potassium	mg/L	8.4	13	9.5	1.2	7.4	3.2	1.3	10	8.55	8.66	1.37	1.69	-	2.22	2.88	9.14	5.65	1.93	-	-
Sulphate	mg/L	8	8	12	2	17	4	4	8	14	31	8	3	16	3	6.70	75.5	21.10	2.4	-	-
Ammonia as N	mg/L	1.6	1.3	3.8	0.2	2.6	1.2	0.1	1.7	2.1	4.1	0.1	1.3	1.7	0.5	1.31	1.65	1.06	0.69	-	-
Un-ionized Ammonia	mg/L	0.0032	0.1862	0.0028	0.0009	0.0025	0.0013	0	0.0013	0.009	0.038	0.0005	0.0077	-	0.0027	-	-	0.00089	0.00066	0.02	0.019
Nitrate as N	mg/L	1.30	2.60	0.62	0.27	1.21	0.32	0.27	1.53	2.80	1.10	0.70	0.20	1.54	0.40	0.16	1.10	1.08	0.08	-	13
Nitrite as N	mg/L	0.080	0.160	0.032	<0.01	<0.01	0.025	<0.01	0.013	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	0.06
Total Kjeldahl Nitrogen	mg/L	2.2	2.5	4.4	0.8	2.8	1.4	0.57	2.1	2.6	4.3	0.3	1.3	2.1	0.8	1.49	2.12	1.30	0.95	-	-
Phenolics	mg/L	0.0013	<0.001	0.0014	<0.001	<0.001	0.0018	<0.001	<0.001	0.0040	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	0.001	0.004
Dissolved Organic Carbon	mg/L	6.3	6.2	7.5	5.4	6.4	5.2	4.6	5.3	7.4	7	6.6	7.6	-	4	4.2	7.2	6.2	9.8	-	-
Chemical Oxygen Demand	mg/L	25	24	21	20	17	15	11	7.4	48	33	17	<10	26	18	7	17	13	<5	-	-
Biological Oxygen Demand	mg/L	<2	6	<2	<2	<2	<2	<2	<2	11	<2	<2	<2	<5	<2	<5	<5	<5	-	-	-
Iron	mg/L	0.62	0.40	0.33	0.83	0.31	1.00	0.64	0.24	1.23	<0.1	0.2	1.70	0.013	5.60	0.411	5.82	0.298	0.81	0.30	0.30
Manganese	mg/L	0.25	0.91	0.5	0.072	0.23	0.23	0.063	0.56	3.03	1.72	0.069	0.57	-	0.46	0.613	5.49	0.943	1.21	-	-
Phosphorus, total	mg/L	0.03	0.011	0.008	0.023	0.003	0.028	0.016	0.009	0.03	<0.01	<0.01	<0.01	<0.02	0.01	0.02	0.02	0.03	<0.02	0.03	-
Orthophosphate	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	<0.10	<0.10	<0.10	-	-
Total Suspended Solids	mg/L	<10	<10	<10	11	<10	10	<1	<10	65	6	14	39	<10	21	<10	30	<10	<10	-	-
Anion Sum		1.71	2.26	2.13	0.257	2.06	0.786	0.388	2.19	3.03	3.27	0.66	0.67	-	0.89	-	-	-	-	-	-
Cation Sum		1.7	2.19	2.19	0.35	2.14	0.794	0.452	2.44	2.46	2.73	0.57	0.52	-	0.69	-	-	-	-	-	-
Ion Balance	%	NC	NC	NC	NC	NC	NC	NC	NC	-10.3	-8.9	N/A	<0.1	-	-12.7	-	-	-	-	-	-
Silver	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001	<0.1	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	0.00025
Aluminum	mg/L	0.170	0.130	0.086	0.160	0.082	0.150	0.100	0.076	0.019	0.190	0.096	0.025	-	0.071	0.035	0.016	0.013	0.048	0.075	0.1
Antimony	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0087	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.001	<0.003	<0.001	<0.001	0.02	-
Arsenic	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001	<0.003	<0.001	<0.003	<0.003	<0.003	<0.003	0.10	0.01
Barium	mg/L	0.063	0.095	0.069	0.017	0.074	0.033	0.021	0.082	0.13	0.085	0.028	0.029	0.061	0.022	0.033	0.154	0.040	0.028	-	-
Beryllium	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0025	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	1.1	-
Bismuth	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.035	<0.001	<0.001	<0.001	-	<0.001	<0.002	<0.002	<0.002	<0.002	-	-
Boron	mg/L	0.17	0.19	0.210	0.011	0.18	0.071	0.03	0.15	0.18	0.22	0.06	0.04	0.26	0.034	0.075	0.232	0.175	0.048	0.20	1.50
Cadmium	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	<0.0001	<0.0001	0.00020	0.00026
Chromium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.003	<0.001	<0.003	<0.003	<0.003	<0.003	0.0089	0.001
Cobalt	mg/L	0.00230	0.00410	0.00170	0.00096	0.00092	0.0024	0.0010	0.0022	0.0117	0.0021	<0.0005	0.0034	-	0.0016	0.0021	0.0166	0.0023	0.0031	0.0009	-
Copper	mg/L	0.0025	0.0024	0.0035	<0.001	0.0029	0.0012	<0.001	0.0022	0.00380	0.0023	<0.0005	<0.0005	<0.002	0.0009	0.001	0.004	<0.001	0.002	0.005	0.004
Molybdenum	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0093	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.002	<0.002	<0.002	<0.002	0.04	0.073
Nickel	mg/L	0.0013	0.0013	0.0018	0.0011	<0.001	<0.001	<0.001	<0.001	<0.005	0.001	<0.001	0.001	-	<0.001	<0.003	<0.003	<0.003	<0.003	0.025	0.15
Phosphate as P	mg/L	-	-	-	-	-	-	-	-	<0.0002	<0.2	<0.2	<0.2	-	<0.2	<0.10	-	-	-	-	-
Lead	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0014	<0.0001	<0.0001	0.0005	<0.001	0.0003	<0.001	<0.001	<0.001	<0.001	0.005	0.007
Selenium	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.005	<0.001	<0.001	<0.001	-	<0.001	<0.004	<0.004	<0.004	<0.004	0.1	0.001
Silicon	mg/L	2.8	4.3	2.8	1.4	2.6	2.1	1.3	3.9	18.2	2.9	2.71	1.36	-	1.17	1.44	4.79	3.18	2.24	-	-
Tin	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.025	<0.005	<0.005	<0.005	-	<0.005	<0.002	<0.002	<0.002	<0.002	-	-
Strontium																					

TABLE 23 Surface Water Trigger Level Monitoring Results Chapman Waste Disposal Site Magnetawan, Ontario						
Parameter	Units	Applicable Guideline	Objective	Trigger Level Concentration (75% of Objective)	Sample Designation	
					SW2	SW3
Chloride	mg/L	APV	180	135	36.1	11.5
Nitrate as N	mg/L	CWQG	2.9	2.18	0.15	0.58
Nitrite as N	mg/L	CWQG	0.06	0.045	0.018	0.025
Iron	mg/L	APV	1	0.75	0.28	0.49
Arsenic	mg/L	PWQO	0.1	0.075	0.0008	0.001
Barium	mg/L	APV	2.3	1.73	0.029	0.048
Boron	mg/L	APV	3.55	2.66	0.030	0.10
Copper	mg/L	PWQO	0.005	0.0038	0.0009	0.0011
Zinc	mg/L	PWQO	0.03	0.023	0.0079	0.0052

Notes:

PWQO	Provincial Water Quality Objective
APV	Aquatic Protection Values
CWQG	Canadian Water Quality Guidelines
BOLD	Exceeds Trigger Level Concentration

TABLE 24
Groundwater Duplicate Data
Chapman Waste Disposal Site
Magnetawan, Ontario

Parameter	Units	RDL	PQL	1-Jun-20						30-Sep-20					
				BH4-II	GW DUP 1	Relative Percent Difference (%)	BH10-I	GW DUP 2	Relative Percent Difference (%)	BH11	GW DUP 1	Relative Percent Difference (%)	BH4-II	GW DUP 2	Relative Percent Difference (%)
pH Lab	pH Units	NA		7.07	7.18	1.54	6.49	6.42	1.08	6.12	6.08	0.66	6.96	7.07	1.57
Conductivity	µS/cm	2	10	779	845	8.13	86	95	9.94	37	37	0.00	507	526	3.68
Hardness	mg/L	0.5	2.5	308.00	308.00	0.00	90.90	93.50	2.82	8	6	29.01	227	250	9.64
Total Dissolved Solids	mg/L	20	100	494	504	2.00	150	156	3.92	34	32	NC	332	332	0.00
Alkalinity	mg/L	5	25	230	247	7.13	7	14	66.67	15	16	NC	235	252	6.98
Chloride	mg/L	0.20	1	6.77	7.2	6.16	3.54	3.53	0.28	2.33	2.23	4.39	4.83	4.73	2.09
Sodium	mg/L	0.05	0.25	13.3	13.2	0.75	8.09	8.28	2.32	5.12	3.9	27.05	10.4	11.3	8.29
Calcium	mg/L	0.05	0.25	104	104	0.00	23.8	24.5	2.90	2.42	1.82	28.30	78.2	85.8	9.27
Magnesium	mg/L	0.05	0.25	11.8	11.8	0.00	7.64	7.86	2.84	0.36	0.26	32.26	7.75	8.63	10.74
Potassium	mg/L	0.05	0.25	14	13.8	1.44	4.35	4.45	2.27	0.7	0.53	27.64	12.5	13.1	4.69
Sulphate	mg/L	0.20	1	78.6	88.4	11.74	58	63.1	8.42	4.2	4.06	3.39	59.6	60.2	1.00
Ammonia	mg/L	0.2	1	<0.02	<0.02	NC	<0.02	<0.02	NC	<0.02	<0.02	NC	0.19	0.18	NC
Nitrate as N	mg/L	0.10	0.5	17.3	18.4	6.16	1.1	1.08	1.83	0.09	0.11	NC	6.7	6.63	1.05
Nitrite as N	mg/L	0.10	0.5	<0.10	<0.25	NC	<0.05	<0.05	NC	<0.05	<0.05	NC	<0.05	<0.05	NC
Total Kjeldahl Nitrogen	mg/L	0.10	0.5	0.86	0.93	7.82	0.36	0.35	NC	0.2	0.27	NC	1.05	1.01	3.88
Phenolics	mg/L	0.001	0.005	<0.001	0.001	NC	<0.001	0.003	NC	<0.001	<0.001	NC	<0.001	<0.001	NC
Dissolved Organic Carbon	mg/L	0.5	2.5	9.9	10.5	5.88	6.6	7.5	12.77	4.3	4.7	8.89	13.2	13.2	0.00
Chemical Oxygen Demand	mg/L	5	25	22	30	NC	20	22	NC	<5	<5	NC	12	14	NC
Iron	mg/L	0.010	0.05	0.013	0.018	NC	0.024	0.027	NC	0.08	0.056	35.29	0.015	0.017	NC
Manganese	mg/L	0.002	0.01	0.328	0.333	1.51	0.005	0.004	NC	0.017	0.014	19.35	0.263	0.283	7.33
Phosphorus	mg/L	0.02	0.1	<0.02	<0.02	NC	1.2	1.12	6.90	2.42	2.5	3.25	<0.02	<0.02	NC
Turbidity	NTU	0.5	2.5	28	14.4	64.15	583	1280	74.83	771	727	5.87	2.1	5.1	NC
Total Suspended Solids	mg/L	10	50	46	68	NC	1320	1610	19.80	3210	2710	16.89	11	11	NC
BOD	mg/L	5	25	<5	<5	NC	<5	<5	NC	<2	<2	NC	<2	3	NC
Silver	mg/L	0.002	0.01	<0.0001	<0.0001	NC	<0.0001	<0.0001	NC	<0.0001	<0.0001	NC	<0.0001	<0.0001	NC
Aluminum	mg/L	0.004	0.02	0.017	0.026	NC	0.069	0.056	20.80	0.239	0.094	87.09	0.069	0.038	57.94
Antimony	mg/L	0.003	0.015	<0.001	<0.001	NC	<0.001	<0.001	NC	<0.001	<0.001	NC	<0.001	<0.001	NC
Arsenic	mg/L	0.003	0.015	0.001	0.001	NC	<0.001	<0.001	NC	0.001	<0.001	NC	0.002	0.001	NC
Barium	mg/L	0.002	0.01	0.091	0.09	1.10	0.079	0.079	0.00	0.007	0.005	NC	0.079	0.076	3.87
Beryllium	mg/L	0.001	0.005	<0.0005	<0.0005	NC	<0.0005	<0.0005	NC	<0.0005	<0.0005	NC	<0.0005	<0.0005	NC
Bismuth	mg/L	0.002	0.01	<0.002	<0.002	NC	<0.002	<0.002	NC	<0.002	<0.002	NC	<0.002	<0.002	NC
Boron	mg/L	0.010	0.05	0.488	0.485	0.62	0.367	0.378	2.95	0.018	0.016	NC	0.495	0.484	2.25
Cadmium	mg/L	0.001	0.005	<0.0001	<0.0001	NC	<0.0001	<0.0001	NC	<0.0001	<0.0001	NC	<0.0001	<0.0001	NC
Chromium	mg/L	0.003	0.015	<0.002	<0.002	NC	<0.002	<0.002	NC	<0.002	<0.002	NC	<0.002	<0.002	NC
Cobalt	mg/L	0.001	0.005	0.002	0.0018	NC	<0.0005	<0.0005	NC	<0.0005	<0.0005	NC	0.0015	0.0018	NC
Copper	mg/L	0.003	0.015	0.008	0.009	NC	0.005	0.005	NC	0.002	<0.001	NC	0.008	0.008	NC
Molybdenum	mg/L	0.002	0.01	<0.002	<0.002	NC	<0.002	<0.002	NC	<0.002	<0.002	NC	<0.002	<0.002	NC
Nickel	mg/L	0.003	0.015	0.01	0.011	NC	<0.003	<0.003	NC	<0.003	<0.003	NC	<0.003	<0.003	NC
Phosphate	mg/L	0.20	1	<0.20	<0.50	NC	<0.10	<0.10	NC	<0.10	<0.10	NC	<0.10	<0.10	NC
Lead	mg/L	0.001	0.005	<0.0005	<0.0005	NC	<0.0005	<0.0005	NC	<0.0005	<0.0005	NC	<0.0005	<0.0005	NC
Selenium	mg/L	0.004	0.02	<0.001	0.003	NC	0.002	<0.001	NC	0.011	<0.001	NC	<0.001	<0.001	NC
Tin	mg/L	0.002	0.01	<0.002	<0.002	NC	<0.002	<0.002	NC	0.024	0.023	4.26	0.263	0.266	1.13
Strontium	mg/L	0.005	0.025	0.352	0.346	1.72	0.149	0.138	7.67	0.003	0.003	NC	0.002	<0.002	NC
Titanium	mg/L	0.002	0.01	<0.002	<0.002	NC	<0.002	<0.002	NC	<0.0003	<0.0003	NC	<0.0003	<0.0003	NC
Uranium	mg/L	0.002	0.01	0.0062	0.0061	NC	0.0007	0.0007	NC	<0.010	<0.010	NC	<0.010	<0.010	NC
Vanadium	mg/L	0.002	0.01	<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	0.025	<0.005	<0.005	NC	<0.005	<0.005	NC	<0.005	<0.005	NC	<0.005	<0.005	NC

Notes:

NC	Not calculable due to one or more of the concentrations being quantified over the reasonable detection limit (RDL) or the practical quantification limit (PQL).
BOLD	Bolded and shaded entries indicates that the relative percent difference (RPD) exceeds the industry standard of 50%.

TABLE 25 Surface Water Duplicate Data Chapman Waste Disposal Site Magnetawan, Ontario									
Parameter	Units	RDL	PQL	1-Jun-20			30-Sep-20		
				SW3	SW DUP	Relative Percent Difference (%)	SW3	SW DUP	Relative Percent Difference (%)
pH	pH Units	NA		7.16	7.33	2.35	6.35	6.4	0.78
Electrical Conductivity	µS/cm	2	10	251	250	0.40	80	81	1.24
Total Hardness (as CaCO3) (Calculated)	mg/L	0.5	2.5	77.10	75.00	2.76	21.40	22.00	2.76
Total Dissolved Solids	mg/L	20	100	128	130	1.55	42	44	4.65
Alkalinity (as CaCO3)	mg/L	5	25	72	72	0.00	36	39	8.00
Chloride	mg/L	0.10	0.5	14.3	14.5	1.39	5.69	5.63	1.06
Sodium	mg/L	0.05	0.25	12	11.8	1.68	3.6	3.69	2.47
Calcium	mg/L	0.05	0.25	23.9	23.3	2.54	6.61	6.81	2.98
Magnesium	mg/L	0.05	0.25	4.22	4.08	3.37	1.18	1.21	2.51
Potassium	mg/L	0.05	0.25	5.65	5.52	2.33	1.93	1.98	2.56
Sulphate	mg/L	0.10	0.5	21.1	21.1	0.00	2.41	2.44	1.24
Ammonia as N	mg/L	0.02	0.1	1.06	1.03	2.87	0.69	0.68	1.46
Nitrate as N	mg/L	0.05	0.25	1.08	1.12	3.64	0.08	0.08	NC
Nitrite as N	mg/L	0.05	0.25	<0.05	<0.05	NC	<0.05	<0.05	NC
Total Kjeldahl Nitrogen	mg/L	0.10	0.5	1.3	1.49	13.62	0.95	0.96	1.05
Phenols	mg/L	0.001	0.005	<0.001	<0.001	NC	<0.001	<0.001	NC
Dissolved Organic Carbon	mg/L	0.5	2.5	6.2	6	3.28	9.8	9.1	7.41
Chemical Oxygen Demand	mg/L	5	25	13	9	36.36	<5	8	NC
BOD (5)	mg/L	5	25	<5	<5	NC	3	3	NC
Iron	mg/L	0.010	0.05	0.298	0.277	7.30	0.81	0.822	1.47
Manganese	mg/L	0.002	0.01	0.943	0.903	4.33	1.21	1.21	0.00
Total Phosphorus	mg/L	0.02	0.1	0.03	<0.02	NC	<0.02	<0.02	NC
Total Suspended Solids	mg/L	10	50	<10	<10	NC	<10	<10	NC
Silver	mg/L	0.0001	0.0005	<0.0001	<0.0001	NC	<0.0001	<0.0001	NC
Aluminum-dissolved	mg/L	0.004	0.02	0.013	0.011	NC	0.048	0.049	2.06
Antimony	mg/L	0.003	0.015	<0.001	<0.001	NC	<0.001	<0.001	NC
Arsenic	mg/L	0.003	0.015	<0.003	<0.003	NC	<0.003	<0.003	NC
Barium	mg/L	0.002	0.01	0.04	0.038	5.13	0.028	0.029	3.51
Beryllium	mg/L	0.001	0.005	<0.0005	<0.0005	NC	<0.0005	<0.0005	NC
Bismuth	mg/L	0.002	0.01	<0.002	<0.002	NC	<0.002	<0.002	NC
Boron	mg/L	0.010	0.05	0.175	0.163	7.10	0.048	0.048	NC
Cadmium	mg/L	0.0001	0.0005	<0.0001	<0.0001	NC	<0.0001	<0.0001	NC
Chromium	mg/L	0.003	0.015	<0.003	<0.003	NC	<0.003	<0.003	NC
Cobalt	mg/L	0.0005	0.0025	0.0023	0.0021	NC	0.0031	0.0028	10.17
Copper	mg/L	0.003	0.015	<0.001	0.001	NC	0.002	<0.001	NC
Molybdenum	mg/L	0.002	0.01	<0.002	<0.002	NC	<0.002	<0.002	NC
Nickel	mg/L	0.003	0.015	<0.003	<0.003	NC	<0.003	<0.003	NC
Ortho Phosphate as P	mg/L	0.10	0.5	<0.10	<0.10	NC	<0.10	<0.10	NC
Lead	mg/L	0.001	0.005	<0.001	<0.001	NC	<0.001	<0.001	NC
Selenium	mg/L	0.004	0.02	<0.004	<0.004	NC	<0.004	<0.004	NC
Silicon	mg/L	0.05	0.25	3.18	3.11	2.23	2.24	2.37	5.64
Tin	mg/L	0.002	0.01	<0.002	<0.002	NC	<0.002	<0.002	NC
Strontium	mg/L	0.005	0.025	0.147	0.149	1.35	0.068	0.065	4.51
Titanium	mg/L	0.002	0.01	0.006	0.002	NC	0.005	<0.002	NC
Uranium	mg/L	0.002	0.01	<0.002	<0.002	NC	<0.002	<0.002	NC
Vanadium	mg/L	0.002	0.01	<0.002	<0.002	NC	<0.002	<0.002	NC
Zinc	mg/L	0.005	0.025	<0.005	0.005	NC	<0.005	<0.005	NC

Notes:

NC	Not calculable due to one or more of the concentrations being quantified over the reasonable detection limit (RDL) or the practical quantification limit (PQL).
BOLD	Bolded and shaded entries indicates that the relative percent difference (RPD) exceeds the industry standard of 50%.

APPENDIX IV
Photoplates

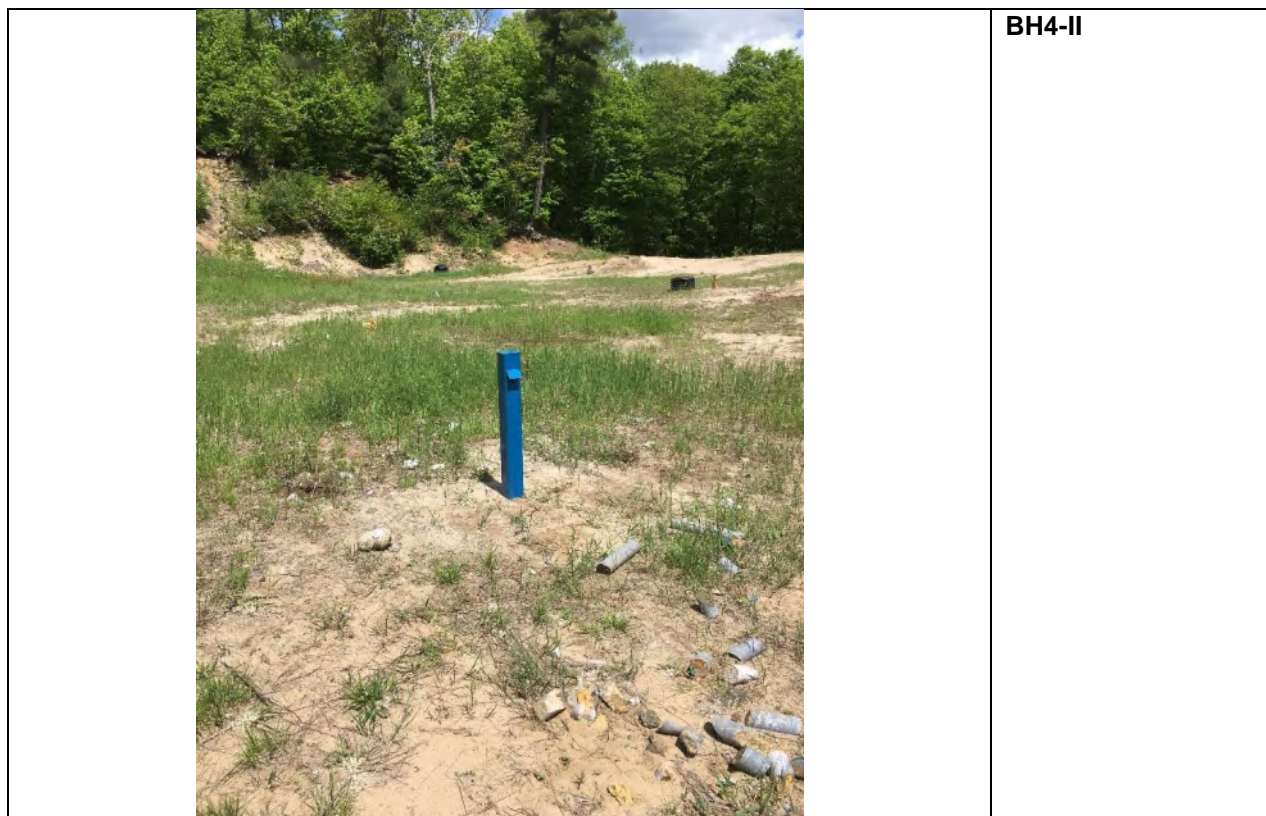










			BH4
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			BH4
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		<p>BH5-II</p>
		<p>BH5-II</p>

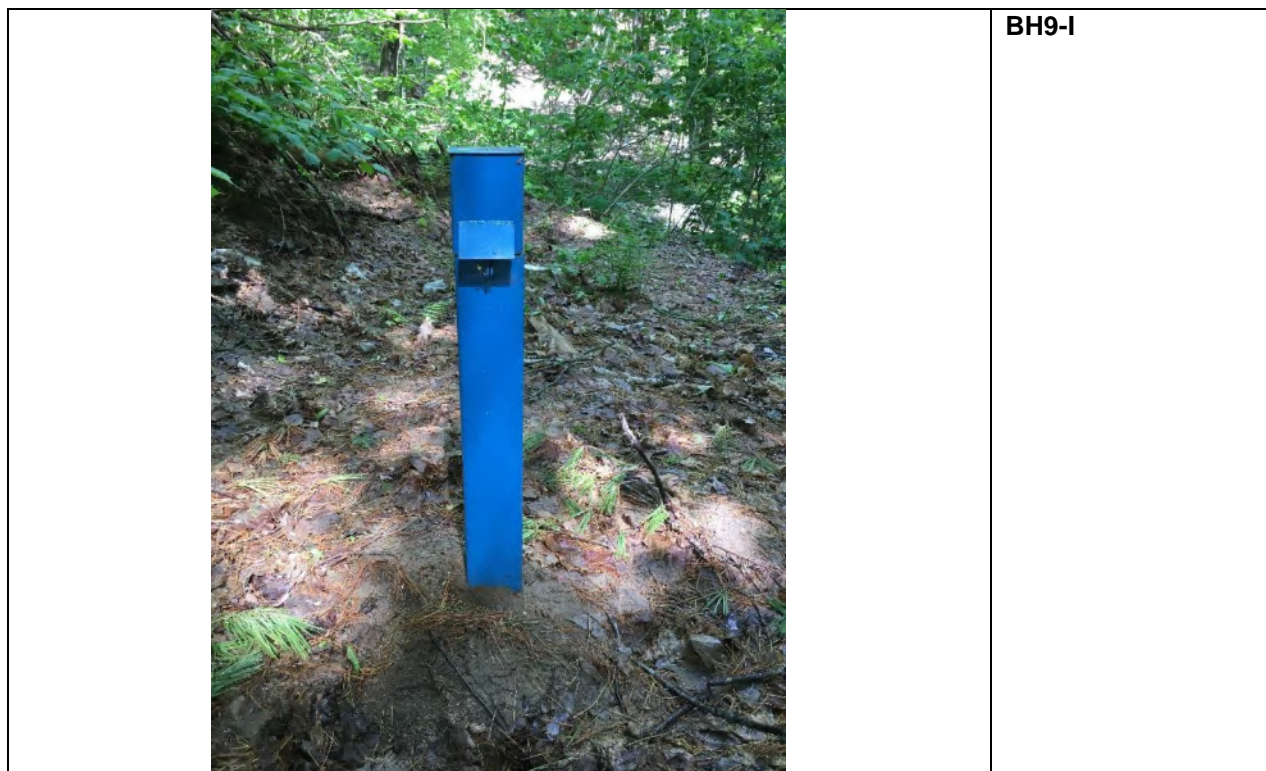
			BH6-II
			BH6-II







	 A photograph of a blue metal monitoring post, identified as BH6-III, installed in a rocky, wooded area. The post is a vertical rectangular metal structure with a small rectangular access panel near the top. It is surrounded by green foliage and rocks.		BH6-III
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		<p>BH6-III</p>
		<p>BH7-II</p>

	<p>BH7-II</p>
	<p>BH8-I</p>



			BH9-I
			BH10-I

		<p>BH10-I</p>
		<p>BH11</p>

		<p>BH11</p>
		<p>SW1</p>







			SW3
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APPENDIX V

Laboratory Certificates of Analysis

CLIENT NAME: PINCHIN LTD.
957 CAMBRIAN HEIGHTS DRIVE, UNIT 203
SUDBURY, ON P3C 5S5
(705) 521-0560

ATTENTION TO: Tim McBride

PROJECT: 225335 Chapman Landfill

AGAT WORK ORDER: 20U608588

WATER ANALYSIS REVIEWED BY: Yris Verastegui, Report Reviewer

DATE REPORTED: Jun 11, 2020

PAGES (INCLUDING COVER): 20

VERSION*: 1

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

***Notes**

Disclaimer:

- All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.
- All samples will be disposed of within 30 days following analysis, unless expressly agreed otherwise in writing. Please contact your Client Project Manager if you require additional sample storage time.
- AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.
- This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
- The test results reported herewith relate only to the samples as received by the laboratory.
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- All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.

Certificate of Analysis

AGAT WORK ORDER: 20U608588

PROJECT: 225335 Chapman Landfill

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

CLIENT NAME: PINCHIN LTD.

ATTENTION TO: Tim McBride

SAMPLING SITE:

SAMPLED BY:

Chapman Groundwater Parameters

DATE RECEIVED: 2020-06-03

DATE REPORTED: 2020-06-11

Parameter	Unit	SAMPLE DESCRIPTION:		BH-1		BH-2		BH-3-II		BH-4	
		SAMPLE TYPE:		Water		Water		Water		Water	
		DATE SAMPLED:		2020-06-01		2020-06-01		2020-06-01		2020-06-01	
		G / S	RDL	1168408	RDL	1168447	RDL	1168448	RDL	1168449	
BOD (5)	mg/L		5	<5	5	<5	5	<5	5	<5	
Electrical Conductivity	µS/cm		2	483	2	798	2	49	2	779	
pH	pH Units	6.5-8.5	NA	6.93	NA	7.09	NA	6.57	NA	7.07	
Hardness (as CaCO ₃) (Calculated)	mg/L	80-100	0.5	131	0.5	299	0.5	6.7	0.5	308	
Total Dissolved Solids	mg/L	500	20	232	20	388	20	42	20	494	
Total Suspended Solids	mg/L		10	<10	10	152	10	4490	10	46	
Alkalinity (as CaCO ₃)	mg/L	30-500	5	159	5	290	5	17	5	230	
Chloride	mg/L	250	0.10	27.1	0.20	25.0	0.10	1.44	0.20	6.77	
Nitrate as N	mg/L		0.05	0.64	0.10	<0.10	0.05	0.11	0.10	17.3	
Nitrite as N	mg/L		0.05	<0.05	0.10	<0.10	0.05	<0.05	0.10	<0.10	
Sulphate	mg/L	500	0.10	23.0	0.20	76.5	0.10	4.94	0.20	78.6	
Phosphate as P	mg/L		0.10	<0.10	0.20	<0.20	0.10	<0.10	0.20	<0.20	
Ammonia as N	mg/L		0.02	3.76	0.02	1.60	0.02	<0.02	0.02	<0.02	
Total Kjeldahl Nitrogen	mg/L		0.10	4.81	0.10	3.05	0.10	0.21	0.10	0.86	
Total Phosphorus	mg/L		0.02	<0.02	0.02	0.09	0.02	3.36	0.02	<0.02	
Chemical Oxygen Demand	mg/L		5	25	5	34	5	<5	5	22	
Dissolved Organic Carbon	mg/L	5	0.5	6.9	0.5	11.1	0.5	8.4	0.5	9.9	
Phenols	mg/L		0.001	<0.001	0.001	0.002	0.001	<0.001	0.001	<0.001	
Turbidity	NTU	5	0.5	3.4	0.5	44.2	0.5	899	0.5	28.0	
Dissolved Calcium	mg/L		0.05	42.0	0.05	87.9	0.05	2.12	0.05	104	
Dissolved Magnesium	mg/L		0.05	6.34	0.05	19.3	0.05	0.35	0.05	11.8	
Dissolved Potassium	mg/L		0.05	10.2	0.05	9.29	0.05	0.71	0.05	14.0	
Dissolved Sodium	mg/L		0.05	23.8	0.05	26.8	0.05	5.27	0.05	13.3	
Dissolved Aluminum	mg/L		0.004	0.045	0.004	0.015	0.004	0.053	0.004	0.017	
Dissolved Antimony	mg/L		0.001	<0.001	0.001	<0.001	0.001	<0.001	0.001	<0.001	
Dissolved Arsenic	mg/L		0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	
Dissolved Barium	mg/L		0.002	0.103	0.002	0.182	0.002	0.003	0.002	0.091	
Dissolved Beryllium	mg/L		0.0005	<0.0005	0.0005	<0.0005	0.0005	<0.0005	0.0005	<0.0005	
Dissolved Bismuth	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002	
Dissolved Boron	mg/L		0.010	0.280	0.010	0.585	0.010	0.019	0.010	0.488	

Certified By:



Certificate of Analysis

AGAT WORK ORDER: 20U608588

PROJECT: 225335 Chapman Landfill

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

CLIENT NAME: PINCHIN LTD.

ATTENTION TO: Tim McBride

SAMPLING SITE:

SAMPLED BY:


Chapman Groundwater Parameters

DATE RECEIVED: 2020-06-03

DATE REPORTED: 2020-06-11

SAMPLE DESCRIPTION:				BH-1		BH-2		BH-3-II		BH-4	
SAMPLE TYPE:				Water		Water		Water		Water	
DATE SAMPLED:				2020-06-01		2020-06-01		2020-06-01		2020-06-01	
Parameter	Unit	G / S	RDL	1168408	RDL	1168447	RDL	1168448	RDL	1168449	
Dissolved Cadmium	mg/L		0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	
Dissolved Chromium	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002	
Dissolved Cobalt	mg/L		0.0005	0.0076	0.0005	0.0038	0.0005	<0.0005	0.0005	0.0020	
Dissolved Copper	mg/L		0.001	0.008	0.001	0.003	0.001	<0.001	0.001	0.008	
Dissolved Iron	mg/L		0.010	0.016	0.010	1.93	0.010	0.018	0.010	0.013	
Dissolved Lead	mg/L		0.0005	<0.0005	0.0005	<0.0005	0.0005	<0.0005	0.0005	<0.0005	
Dissolved Manganese	mg/L		0.02	4.26	0.004	3.05	0.002	0.018	0.002	0.328	
Dissolved Molybdenum	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002	
Dissolved Nickel	mg/L		0.003	<0.003	0.003	<0.003	0.003	<0.003	0.003	0.010	
Dissolved Selenium	mg/L		0.001	0.002	0.001	0.007	0.001	<0.001	0.001	<0.001	
Dissolved Silver	mg/L		0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	
Dissolved Strontium	mg/L		0.005	0.245	0.005	0.527	0.005	0.020	0.005	0.352	
Dissolved Thallium	mg/L		0.0003	<0.0003	0.0003	<0.0003	0.0003	<0.0003	0.0003	<0.0003	
Dissolved Tin	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002	
Dissolved Titanium	mg/L		0.002	<0.002	0.002	0.002	0.002	<0.002	0.002	<0.002	
Dissolved Tungsten	mg/L		0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	
Dissolved Uranium	mg/L		0.0005	0.0006	0.0005	0.0037	0.0005	0.0012	0.0005	0.0062	
Dissolved Vanadium	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002	
Dissolved Zinc	mg/L		0.005	<0.005	0.005	<0.005	0.005	<0.005	0.005	<0.005	

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CLIENT NAME: PINCHIN LTD.

ATTENTION TO: Tim McBride

SAMPLING SITE:

SAMPLED BY:

Chapman Groundwater Parameters

DATE RECEIVED: 2020-06-03

DATE REPORTED: 2020-06-11

Parameter	Unit	SAMPLE DESCRIPTION:		BH-5-II		BH-6-III		BH-7-II		BH-8-I	
		SAMPLE TYPE:		Water		Water		Water		Water	
		DATE SAMPLED:		2020-06-01		2020-06-01		2020-06-01		2020-06-01	
		G / S	RDL	1168451	RDL	1168453	RDL	1168454	RDL	1168455	
BOD (5)	mg/L		5	<5	5	<5	5	<5	5	10	
Electrical Conductivity	µS/cm		2	352	2	381	2	50	2	427	
pH	pH Units	6.5-8.5	NA	6.83	NA	6.85	NA	6.43	NA	7.01	
Hardness (as CaCO ₃) (Calculated)	mg/L	80-100	0.5	136	0.5	140	0.5	10.7	0.5	130	
Total Dissolved Solids	mg/L	500	20	214	20	216	20	36	20	194	
Total Suspended Solids	mg/L		10	2000	10	107	10	4180	10	2180	
Alkalinity (as CaCO ₃)	mg/L	30-500	5	90	5	97	5	15	5	131	
Chloride	mg/L	250	0.10	10.3	0.10	7.79	0.10	0.58	0.10	20.3	
Nitrate as N	mg/L		0.05	2.30	0.05	2.23	0.05	0.08	0.05	2.43	
Nitrite as N	mg/L		0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	0.06	
Sulphate	mg/L	500	0.10	60.3	0.10	68.1	0.10	7.70	0.10	35.7	
Phosphate as P	mg/L		0.10	<0.10	0.10	<0.10	0.10	<0.10	0.10	<0.10	
Ammonia as N	mg/L		0.02	0.22	0.02	<0.02	0.02	<0.02	0.02	2.70	
Total Kjeldahl Nitrogen	mg/L		0.10	0.74	0.10	0.70	0.10	0.17	0.10	4.96	
Total Phosphorus	mg/L		0.02	1.14	0.04	0.16	0.02	1.88	0.02	1.22	
Chemical Oxygen Demand	mg/L		5	13	5	16	5	<5	25	221	
Dissolved Organic Carbon	mg/L	5	0.5	3.9	0.5	4.6	0.5	5.7	0.5	6.4	
Phenols	mg/L		0.001	<0.001	0.001	<0.001	0.001	<0.001	0.001	<0.001	
Turbidity	NTU	5	0.5	95.9	0.5	60.4	0.5	3850	0.5	629	
Dissolved Calcium	mg/L		0.05	37.0	0.05	41.1	0.05	2.30	0.05	40.7	
Dissolved Magnesium	mg/L		0.05	10.7	0.05	8.99	0.05	1.20	0.05	6.91	
Dissolved Potassium	mg/L		0.05	4.77	0.05	6.09	0.05	1.48	0.05	10.4	
Dissolved Sodium	mg/L		0.05	12.3	0.05	10.9	0.05	3.13	0.05	16.5	
Dissolved Aluminum	mg/L		0.004	0.010	0.004	0.011	0.004	0.036	0.004	0.031	
Dissolved Antimony	mg/L		0.001	<0.001	0.001	<0.001	0.001	<0.001	0.001	<0.001	
Dissolved Arsenic	mg/L		0.001	<0.001	0.001	<0.001	0.001	<0.001	0.001	<0.001	
Dissolved Barium	mg/L		0.002	0.092	0.002	0.093	0.002	0.012	0.002	0.162	
Dissolved Beryllium	mg/L		0.0005	<0.0005	0.0005	<0.0005	0.0005	<0.0005	0.0005	<0.0005	
Dissolved Bismuth	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002	
Dissolved Boron	mg/L		0.010	0.267	0.010	0.265	0.010	<0.010	0.010	0.286	

Certified By:

Iris Veraestegui

Certificate of Analysis

AGAT WORK ORDER: 20U608588

PROJECT: 225335 Chapman Landfill

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CLIENT NAME: PINCHIN LTD.

ATTENTION TO: Tim McBride

SAMPLING SITE:

SAMPLED BY:

Chapman Groundwater Parameters

DATE RECEIVED: 2020-06-03

DATE REPORTED: 2020-06-11

		SAMPLE DESCRIPTION:		BH-5-II		BH-6-III		BH-7-II		BH-8-I	
		SAMPLE TYPE:		Water		Water		Water		Water	
		DATE SAMPLED:		2020-06-01		2020-06-01		2020-06-01		2020-06-01	
Parameter	Unit	G / S	RDL	1168451	RDL	1168453	RDL	1168454	RDL	1168455	
Dissolved Cadmium	mg/L		0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	
Dissolved Chromium	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002	
Dissolved Cobalt	mg/L		0.0005	<0.0005	0.0005	0.0007	0.0005	<0.0005	0.0005	<0.0005	
Dissolved Copper	mg/L		0.001	0.002	0.001	0.005	0.001	<0.001	0.001	0.003	
Dissolved Iron	mg/L		0.010	<0.010	0.010	0.019	0.010	0.036	0.010	0.039	
Dissolved Lead	mg/L		0.0005	<0.0005	0.0005	<0.0005	0.0005	<0.0005	0.0005	<0.0005	
Dissolved Manganese	mg/L		0.002	0.171	0.002	0.450	0.002	0.010	0.004	1.56	
Dissolved Molybdenum	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002	
Dissolved Nickel	mg/L		0.003	<0.003	0.003	0.004	0.003	<0.003	0.003	<0.003	
Dissolved Selenium	mg/L		0.001	0.001	0.001	0.002	0.001	<0.001	0.001	0.002	
Dissolved Silver	mg/L		0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	
Dissolved Strontium	mg/L		0.005	0.226	0.005	0.280	0.005	0.020	0.005	0.234	
Dissolved Thallium	mg/L		0.0003	<0.0003	0.0003	<0.0003	0.0003	<0.0003	0.0003	<0.0003	
Dissolved Tin	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002	
Dissolved Titanium	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002	
Dissolved Tungsten	mg/L		0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	
Dissolved Uranium	mg/L		0.0005	<0.0005	0.0005	<0.0005	0.0005	<0.0005	0.0005	<0.0005	
Dissolved Vanadium	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002	
Dissolved Zinc	mg/L		0.005	<0.005	0.005	<0.005	0.005	<0.005	0.005	<0.005	

Certified By:





Certificate of Analysis

AGAT WORK ORDER: 20U608588

PROJECT: 225335 Chapman Landfill

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CLIENT NAME: PINCHIN LTD.

ATTENTION TO: Tim McBride

SAMPLING SITE:

SAMPLED BY:

Chapman Groundwater Parameters

DATE RECEIVED: 2020-06-03

DATE REPORTED: 2020-06-11

Parameter	Unit	SAMPLE DESCRIPTION:		BH-9-I		BH-Dup 1		BH-10-I		BH-11	
		SAMPLE TYPE:		Water		Water		Water		Water	
		DATE SAMPLED:		2020-06-01		2020-06-01		2020-06-01		2020-06-01	
		G / S	RDL	1168456	RDL	1168457	RDL	1171453	RDL	1171454	
BOD (5)	mg/L		5	<5	5	<5	5	<5	5	<5	
Electrical Conductivity	µS/cm		2	608	2	845	2	86	2	248	
pH	pH Units	6.5-8.5	NA	6.99	NA	7.18	NA	6.49	NA	6.77	
Hardness (as CaCO ₃) (Calculated)	mg/L	80-100	0.5	155	0.5	308	0.5	90.9	0.5	25.6	
Total Dissolved Solids	mg/L	500	20	300	20	504	20	150	20	66	
Total Suspended Solids	mg/L		10	3320	10	68	10	1320	10	430	
Alkalinity (as CaCO ₃)	mg/L	30-500	5	192	5	247	5	7	5	49	
Chloride	mg/L	250	0.10	26.2	0.50	7.20	0.10	3.54	0.10	13.5	
Nitrate as N	mg/L		0.05	<0.05	0.25	18.4	0.05	1.10	0.05	0.15	
Nitrite as N	mg/L		0.05	0.06	0.25	<0.25	0.05	<0.05	0.05	<0.05	
Sulphate	mg/L	500	0.10	58.4	0.50	88.4	0.10	58.0	0.10	5.63	
Phosphate as P	mg/L		0.10	<0.10	0.50	<0.50	0.10	<0.10	0.10	<0.10	
Ammonia as N	mg/L		0.04	6.18	0.02	<0.02	0.02	<0.02	0.02	<0.02	
Total Kjeldahl Nitrogen	mg/L		0.10	7.96	0.10	0.93	0.10	0.36	0.10	0.21	
Total Phosphorus	mg/L		0.02	1.61	0.02	<0.02	0.25	1.20	0.02	1.84	
Chemical Oxygen Demand	mg/L		5	45	5	30	5	20	5	5	
Dissolved Organic Carbon	mg/L	5	0.5	9.8	0.5	10.5	0.5	6.6	0.5	2.5	
Phenols	mg/L		0.001	0.002	0.001	0.001	0.001	<0.001	0.001	<0.001	
Turbidity	NTU	5	0.5	1120	0.5	14.4	0.5	583	0.5	320	
Dissolved Calcium	mg/L		0.05	48.1	0.05	104	0.05	23.8	0.05	8.45	
Dissolved Magnesium	mg/L		0.05	8.40	0.05	11.8	0.05	7.64	0.05	1.09	
Dissolved Potassium	mg/L		0.05	10.9	0.05	13.8	0.05	4.35	0.05	1.28	
Dissolved Sodium	mg/L		0.05	21.6	0.05	13.2	0.05	8.09	0.05	4.01	
Dissolved Aluminum	mg/L		0.004	0.032	0.004	0.026	0.004	0.069	0.004	0.033	
Dissolved Antimony	mg/L		0.001	<0.001	0.001	<0.001	0.001	<0.001	0.001	<0.001	
Dissolved Arsenic	mg/L		0.001	0.001	0.001	0.001	0.001	<0.001	0.001	<0.001	
Dissolved Barium	mg/L		0.002	0.137	0.002	0.090	0.002	0.079	0.002	0.017	
Dissolved Beryllium	mg/L		0.0005	<0.0005	0.0005	<0.0005	0.0005	<0.0005	0.0005	<0.0005	
Dissolved Bismuth	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002	
Dissolved Boron	mg/L		0.010	0.419	0.010	0.485	0.010	0.367	0.010	<0.010	

Certified By:

Iris Veraestegui

Certificate of Analysis

AGAT WORK ORDER: 20U608588

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CLIENT NAME: PINCHIN LTD.

ATTENTION TO: Tim McBride

SAMPLING SITE:

SAMPLED BY:

Chapman Groundwater Parameters

DATE RECEIVED: 2020-06-03

DATE REPORTED: 2020-06-11

		SAMPLE DESCRIPTION:		BH-9-I		BH-Dup 1		BH-10-I		BH-11	
		SAMPLE TYPE:		Water		Water		Water		Water	
		DATE SAMPLED:		2020-06-01		2020-06-01		2020-06-01		2020-06-01	
Parameter	Unit	G / S	RDL	1168456	RDL	1168457	RDL	1171453	RDL	1171454	
Dissolved Cadmium	mg/L		0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	
Dissolved Chromium	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002	
Dissolved Cobalt	mg/L		0.0005	0.0217	0.0005	0.0018	0.0005	<0.0005	0.0005	<0.0005	
Dissolved Copper	mg/L		0.001	0.004	0.001	0.009	0.001	0.005	0.001	<0.001	
Dissolved Iron	mg/L		0.010	8.08	0.010	0.018	0.010	0.024	0.010	0.011	
Dissolved Lead	mg/L		0.0005	<0.0005	0.0005	<0.0005	0.0005	<0.0005	0.0005	<0.0005	
Dissolved Manganese	mg/L		0.010	5.28	0.002	0.333	0.002	0.005	0.002	0.012	
Dissolved Molybdenum	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002	
Dissolved Nickel	mg/L		0.003	<0.003	0.003	0.011	0.003	<0.003	0.003	<0.003	
Dissolved Selenium	mg/L		0.001	0.003	0.001	0.003	0.001	0.002	0.001	<0.001	
Dissolved Silver	mg/L		0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	
Dissolved Strontium	mg/L		0.005	0.318	0.005	0.346	0.005	0.149	0.005	0.077	
Dissolved Thallium	mg/L		0.0003	<0.0003	0.0003	<0.0003	0.0003	<0.0003	0.0003	<0.0003	
Dissolved Tin	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002	
Dissolved Titanium	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002	
Dissolved Tungsten	mg/L		0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	
Dissolved Uranium	mg/L		0.0005	0.0015	0.0005	0.0061	0.0005	0.0007	0.0005	<0.0005	
Dissolved Vanadium	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002	
Dissolved Zinc	mg/L		0.005	<0.005	0.005	<0.005	0.005	<0.005	0.005	<0.005	

Certified By:

Iris Veraestegui



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 20U608588

PROJECT: 225335 Chapman Landfill

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

CLIENT NAME: PINCHIN LTD.

ATTENTION TO: Tim McBride

SAMPLING SITE:

SAMPLED BY:

Chapman Groundwater Parameters

DATE RECEIVED: 2020-06-03

DATE REPORTED: 2020-06-11

		SAMPLE DESCRIPTION:		BH-Dup 2
		SAMPLE TYPE:		Water
		DATE SAMPLED:		2020-06-01
Parameter	Unit	G / S	RDL	1171455
BOD (5)	mg/L		5	<5
Electrical Conductivity	µS/cm		2	95
pH	pH Units	6.5-8.5	NA	6.42
Hardness (as CaCO ₃) (Calculated)	mg/L	80-100	0.5	93.5
Total Dissolved Solids	mg/L	500	20	156
Total Suspended Solids	mg/L		10	1610
Alkalinity (as CaCO ₃)	mg/L	30-500	5	14
Chloride	mg/L	250	0.10	3.53
Nitrate as N	mg/L		0.05	1.08
Nitrite as N	mg/L		0.05	<0.05
Sulphate	mg/L	500	0.10	63.1
Phosphate as P	mg/L		0.10	<0.10
Ammonia as N	mg/L		0.02	<0.02
Total Kjeldahl Nitrogen	mg/L		0.10	0.35
Total Phosphorus	mg/L		0.25	1.12
Chemical Oxygen Demand	mg/L		5	22
Dissolved Organic Carbon	mg/L	5	0.5	7.5
Phenols	mg/L		0.001	0.003
Turbidity	NTU	5	0.5	1280
Dissolved Calcium	mg/L		0.05	24.5
Dissolved Magnesium	mg/L		0.05	7.86
Dissolved Potassium	mg/L		0.05	4.45
Dissolved Sodium	mg/L		0.05	8.28
Dissolved Aluminum	mg/L		0.004	0.056
Dissolved Antimony	mg/L		0.001	<0.001
Dissolved Arsenic	mg/L		0.001	<0.001
Dissolved Barium	mg/L		0.002	0.079
Dissolved Beryllium	mg/L		0.0005	<0.0005
Dissolved Bismuth	mg/L		0.002	<0.002
Dissolved Boron	mg/L		0.010	0.378

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CLIENT NAME: PINCHIN LTD.

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SAMPLING SITE:

SAMPLED BY:

Chapman Groundwater Parameters

DATE RECEIVED: 2020-06-03

DATE REPORTED: 2020-06-11

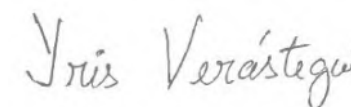
		SAMPLE DESCRIPTION:		BH-Dup 2
		SAMPLE TYPE:		Water
		DATE SAMPLED:		2020-06-01
Parameter	Unit	G / S	RDL	1171455
Dissolved Cadmium	mg/L		0.0001	<0.0001
Dissolved Chromium	mg/L		0.002	<0.002
Dissolved Cobalt	mg/L		0.0005	<0.0005
Dissolved Copper	mg/L		0.001	0.005
Dissolved Iron	mg/L		0.010	0.027
Dissolved Lead	mg/L		0.0005	<0.0005
Dissolved Manganese	mg/L		0.002	0.004
Dissolved Molybdenum	mg/L		0.002	<0.002
Dissolved Nickel	mg/L		0.003	<0.003
Dissolved Selenium	mg/L		0.001	<0.001
Dissolved Silver	mg/L		0.0001	<0.0001
Dissolved Strontium	mg/L		0.005	0.138
Dissolved Thallium	mg/L		0.0003	<0.0003
Dissolved Tin	mg/L		0.002	<0.002
Dissolved Titanium	mg/L		0.002	<0.002
Dissolved Tungsten	mg/L		0.010	<0.010
Dissolved Uranium	mg/L		0.0005	0.0007
Dissolved Vanadium	mg/L		0.002	<0.002
Dissolved Zinc	mg/L		0.005	<0.005

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg 169/03 - Ontario Drinking Water Quality Standards - Aesthetic Objectives and Operational Guidelines
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

1168408-1171455 DOC analysis completed on a lab filtered sample.

Elevated RDLs indicate the degree of sample dilutions prior to the analysis to keep analytes within the calibration range or reduce matrix interference.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:


Certificate of Analysis

AGAT WORK ORDER: 20U608588

PROJECT: 225335 Chapman Landfill

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CLIENT NAME: PINCHIN LTD.

ATTENTION TO: Tim McBride

SAMPLING SITE:

SAMPLED BY:

Chapman Surface Water Parameters

DATE RECEIVED: 2020-06-03

DATE REPORTED: 2020-06-11

		SAMPLE DESCRIPTION:		SW-1	SW-2	SW-3	SW-Dup 1
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2020-06-01	2020-06-01	2020-06-01	2020-06-01
Parameter	Unit	G / S	RDL	1171459	1171460	1171461	1171462
BOD (5)	mg/L		5	<5	<5	<5	<5
Electrical Conductivity	µS/cm		2	258	24	251	250
pH	pH Units	6.5-8.5	NA	6.79	6.43	7.16	7.33
Hardness (as CaCO ₃) (Calculated)	mg/L		0.5	19.4	4.3	77.1	75.0
Total Dissolved Solids	mg/L		20	62	22	128	130
Total Suspended Solids	mg/L		10	18	<10	<10	<10
Alkalinity (as CaCO ₃)	mg/L		5	52	<5	72	72
Chloride	mg/L		0.10	14.1	2.12	14.3	14.5
Nitrate as N	mg/L		0.05	0.06	<0.05	1.08	1.12
Nitrite as N	mg/L		0.05	<0.05	<0.05	<0.05	<0.05
Sulphate	mg/L		0.10	2.79	1.99	21.1	21.1
Ortho Phosphate as P	mg/L		0.10	<0.10	<0.10	<0.10	<0.10
Ammonia as N	mg/L		0.02	<0.02	<0.02	1.06	1.03
Total Phosphorus	mg/L	*	0.02	<0.02	0.05	0.03	<0.02
Chemical Oxygen Demand	mg/L		5	19	6	13	9
Dissolved Organic Carbon	mg/L		0.5	6.8	3.5	6.2	6.0
Total Kjeldahl Nitrogen	mg/L		0.10	0.30	0.22	1.30	1.49
Phenols	mg/L	0.001	0.001	0.001	<0.001	<0.001	<0.001
Colour	TCU		5	52	9	11	10
Total Calcium	mg/L		0.05	6.01	1.16	23.9	23.3
Total Magnesium	mg/L		0.05	1.07	0.35	4.22	4.08
Total Potassium	mg/L		0.05	0.84	0.65	5.65	5.52
Total Sodium	mg/L		0.05	4.48	1.08	12.0	11.8
Aluminum-dissolved	mg/L	0.075	0.004	0.104	0.097	0.013	0.011
Total Antimony	mg/L	0.020	0.001	<0.001	<0.001	<0.001	<0.001
Total Arsenic	mg/L	0.1	0.003	<0.003	<0.003	<0.003	<0.003
Total Barium	mg/L		0.002	0.024	0.014	0.040	0.038
Total Beryllium	mg/L	*	0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Total Bismuth	mg/L		0.002	<0.002	<0.002	<0.002	<0.002
Total Boron	mg/L	0.2	0.010	<0.010	<0.010	0.175	0.163

Certified By:



Certificate of Analysis

AGAT WORK ORDER: 20U608588

PROJECT: 225335 Chapman Landfill

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CLIENT NAME: PINCHIN LTD.

ATTENTION TO: Tim McBride

SAMPLING SITE:

SAMPLED BY:

Chapman Surface Water Parameters

DATE RECEIVED: 2020-06-03

DATE REPORTED: 2020-06-11

		SAMPLE DESCRIPTION:		SW-1	SW-2	SW-3	SW-Dup 1
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2020-06-01	2020-06-01	2020-06-01	2020-06-01
Parameter	Unit	G / S	RDL	1171459	1171460	1171461	1171462
Total Cadmium	mg/L	0.0002	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Chromium	mg/L		0.003	<0.003	<0.003	<0.003	<0.003
Total Cobalt	mg/L	0.0009	0.0005	0.0006	0.0028	0.0023	0.0021
Total Copper	mg/L	0.005	0.001	0.002	<0.001	<0.001	0.001
Total Iron	mg/L	0.3	0.010	0.389	0.308	0.298	0.277
Total Lead	mg/L	*	0.001	<0.001	<0.001	<0.001	<0.001
Total Manganese	mg/L		0.002	0.041	0.461	0.943	0.903
Total Molybdenum	mg/L	0.040	0.002	<0.002	<0.002	<0.002	<0.002
Total Nickel	mg/L	0.025	0.003	<0.003	<0.003	<0.003	<0.003
Total Selenium	mg/L	0.1	0.004	<0.004	<0.004	<0.004	<0.004
Total Silicon	mg/L		0.05	3.19	2.87	3.18	3.11
Total Silver	mg/L	0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Strontium	mg/L		0.005	0.074	0.010	0.147	0.149
Total Tin	mg/L		0.002	<0.002	<0.002	<0.002	<0.002
Total Titanium	mg/L		0.002	0.007	0.019	0.006	0.002
Total Uranium	mg/L	0.005	0.002	<0.002	<0.002	<0.002	<0.002
Total Vanadium	mg/L	0.006	0.002	<0.002	<0.002	<0.002	<0.002
Total Zinc	mg/L	0.030	0.005	0.007	0.012	<0.005	0.005
Lab Filtration Performed				Y	Y	Y	Y

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO * Variable - refer to guideline reference document
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.

1171459-1171462 Dissolved Aluminum and DOC analysis completed on a lab filtered sample.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



Guideline Violation

AGAT WORK ORDER: 20U608588

PROJECT: 225335 Chapman Landfill

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CLIENT NAME: PINCHIN LTD.

ATTENTION TO: Tim McBride

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
1168408	BH-1	ON 169/03 AO&OG	Chapman Groundwater Parameters	Dissolved Organic Carbon	mg/L	5	6.9
1168408	BH-1	ON 169/03 AO&OG	Chapman Groundwater Parameters	Hardness (as CaCO3) (Calculated)	mg/L	80-100	131
1168447	BH-2	ON 169/03 AO&OG	Chapman Groundwater Parameters	Dissolved Organic Carbon	mg/L	5	11.1
1168447	BH-2	ON 169/03 AO&OG	Chapman Groundwater Parameters	Hardness (as CaCO3) (Calculated)	mg/L	80-100	299
1168447	BH-2	ON 169/03 AO&OG	Chapman Groundwater Parameters	Turbidity	NTU	5	44.2
1168448	BH-3-II	ON 169/03 AO&OG	Chapman Groundwater Parameters	Alkalinity (as CaCO3)	mg/L	30-500	17
1168448	BH-3-II	ON 169/03 AO&OG	Chapman Groundwater Parameters	Dissolved Organic Carbon	mg/L	5	8.4
1168448	BH-3-II	ON 169/03 AO&OG	Chapman Groundwater Parameters	Hardness (as CaCO3) (Calculated)	mg/L	80-100	6.7
1168448	BH-3-II	ON 169/03 AO&OG	Chapman Groundwater Parameters	Turbidity	NTU	5	899
1168449	BH-4	ON 169/03 AO&OG	Chapman Groundwater Parameters	Dissolved Organic Carbon	mg/L	5	9.9
1168449	BH-4	ON 169/03 AO&OG	Chapman Groundwater Parameters	Hardness (as CaCO3) (Calculated)	mg/L	80-100	308
1168449	BH-4	ON 169/03 AO&OG	Chapman Groundwater Parameters	Turbidity	NTU	5	28.0
1168451	BH-5-II	ON 169/03 AO&OG	Chapman Groundwater Parameters	Hardness (as CaCO3) (Calculated)	mg/L	80-100	136
1168451	BH-5-II	ON 169/03 AO&OG	Chapman Groundwater Parameters	Turbidity	NTU	5	95.9
1168453	BH-6-III	ON 169/03 AO&OG	Chapman Groundwater Parameters	Hardness (as CaCO3) (Calculated)	mg/L	80-100	140
1168453	BH-6-III	ON 169/03 AO&OG	Chapman Groundwater Parameters	Turbidity	NTU	5	60.4
1168454	BH-7-II	ON 169/03 AO&OG	Chapman Groundwater Parameters	Alkalinity (as CaCO3)	mg/L	30-500	15
1168454	BH-7-II	ON 169/03 AO&OG	Chapman Groundwater Parameters	Dissolved Organic Carbon	mg/L	5	5.7
1168454	BH-7-II	ON 169/03 AO&OG	Chapman Groundwater Parameters	Hardness (as CaCO3) (Calculated)	mg/L	80-100	10.7
1168454	BH-7-II	ON 169/03 AO&OG	Chapman Groundwater Parameters	Turbidity	NTU	5	3850
1168454	BH-7-II	ON 169/03 AO&OG	Chapman Groundwater Parameters	pH	pH Units	6.5-8.5	6.43
1168455	BH-8-I	ON 169/03 AO&OG	Chapman Groundwater Parameters	Dissolved Organic Carbon	mg/L	5	6.4
1168455	BH-8-I	ON 169/03 AO&OG	Chapman Groundwater Parameters	Hardness (as CaCO3) (Calculated)	mg/L	80-100	130
1168455	BH-8-I	ON 169/03 AO&OG	Chapman Groundwater Parameters	Turbidity	NTU	5	629
1168456	BH-9-I	ON 169/03 AO&OG	Chapman Groundwater Parameters	Dissolved Organic Carbon	mg/L	5	9.8
1168456	BH-9-I	ON 169/03 AO&OG	Chapman Groundwater Parameters	Hardness (as CaCO3) (Calculated)	mg/L	80-100	155
1168456	BH-9-I	ON 169/03 AO&OG	Chapman Groundwater Parameters	Turbidity	NTU	5	1120
1168457	BH-Dup 1	ON 169/03 AO&OG	Chapman Groundwater Parameters	Dissolved Organic Carbon	mg/L	5	10.5
1168457	BH-Dup 1	ON 169/03 AO&OG	Chapman Groundwater Parameters	Hardness (as CaCO3) (Calculated)	mg/L	80-100	308
1168457	BH-Dup 1	ON 169/03 AO&OG	Chapman Groundwater Parameters	Total Dissolved Solids	mg/L	500	504
1168457	BH-Dup 1	ON 169/03 AO&OG	Chapman Groundwater Parameters	Turbidity	NTU	5	14.4
1171453	BH-10-I	ON 169/03 AO&OG	Chapman Groundwater Parameters	Alkalinity (as CaCO3)	mg/L	30-500	7
1171453	BH-10-I	ON 169/03 AO&OG	Chapman Groundwater Parameters	Dissolved Organic Carbon	mg/L	5	6.6
1171453	BH-10-I	ON 169/03 AO&OG	Chapman Groundwater Parameters	Turbidity	NTU	5	583
1171453	BH-10-I	ON 169/03 AO&OG	Chapman Groundwater Parameters	pH	pH Units	6.5-8.5	6.49
1171454	BH-11	ON 169/03 AO&OG	Chapman Groundwater Parameters	Hardness (as CaCO3) (Calculated)	mg/L	80-100	25.6
1171454	BH-11	ON 169/03 AO&OG	Chapman Groundwater Parameters	Turbidity	NTU	5	320
1171455	BH-Dup 2	ON 169/03 AO&OG	Chapman Groundwater Parameters	Alkalinity (as CaCO3)	mg/L	30-500	14
1171455	BH-Dup 2	ON 169/03 AO&OG	Chapman Groundwater Parameters	Dissolved Organic Carbon	mg/L	5	7.5
1171455	BH-Dup 2	ON 169/03 AO&OG	Chapman Groundwater Parameters	Turbidity	NTU	5	1280
1171455	BH-Dup 2	ON 169/03 AO&OG	Chapman Groundwater Parameters	pH	pH Units	6.5-8.5	6.42
1171459	SW-1	ON PWQO	Chapman Surface Water Parameters	Aluminum-dissolved	mg/L	0.075	0.104
1171459	SW-1	ON PWQO	Chapman Surface Water Parameters	Total Iron	mg/L	0.3	0.389



AGAT Laboratories

Guideline Violation

AGAT WORK ORDER: 20U608588

PROJECT: 225335 Chapman Landfill

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CLIENT NAME: PINCHIN LTD.

ATTENTION TO: Tim McBride

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
1171460	SW-2	ON PWQO	Chapman Surface Water Parameters	Aluminum-dissolved	mg/L	0.075	0.097
1171460	SW-2	ON PWQO	Chapman Surface Water Parameters	Total Cobalt	mg/L	0.0009	0.0028
1171460	SW-2	ON PWQO	Chapman Surface Water Parameters	Total Iron	mg/L	0.3	0.308
1171460	SW-2	ON PWQO	Chapman Surface Water Parameters	pH	pH Units	6.5-8.5	6.43
1171461	SW-3	ON PWQO	Chapman Surface Water Parameters	Total Cobalt	mg/L	0.0009	0.0023
1171462	SW-Dup 1	ON PWQO	Chapman Surface Water Parameters	Total Cobalt	mg/L	0.0009	0.0021

Quality Assurance

CLIENT NAME: PINCHIN LTD.

PROJECT: 225335 Chapman Landfill

SAMPLING SITE:

AGAT WORK ORDER: 20U608588

ATTENTION TO: Tim McBride

SAMPLED BY:

Water Analysis															
RPT Date: Jun 11, 2020			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

Chapman Groundwater Parameters

BOD (5)	1167974		<5	<5	NA	< 5	101%	75%	125%						
Electrical Conductivity	1168858		770	773	0.4%	< 2	105%	80%	120%						
pH	1168858		7.27	7.32	0.7%	NA	100%	90%	110%						
Total Dissolved Solids	1172553		186	192	3.2%	< 20	102%	80%	120%						
Total Suspended Solids	1177024		<10	<10	NA	< 10	104%	80%	120%						
Alkalinity (as CaCO3)	1168858		93	94	1.1%	< 5	96%	80%	120%						
Chloride	1168457	1168457	7.20	6.93	3.8%	< 0.10	92%	70%	130%	109%	80%	120%	105%	70%	130%
Nitrate as N	1168457	1168457	18.4	18.0	2.2%	< 0.05	96%	70%	130%	108%	80%	120%	101%	70%	130%
Nitrite as N	1168457	1168457	<0.25	<0.25	NA	< 0.05	90%	70%	130%	92%	80%	120%	105%	70%	130%
Sulphate	1168457	1168457	88.4	86.8	1.8%	< 0.10	95%	70%	130%	109%	80%	120%	103%	70%	130%
Phosphate as P	1168457	1168457	<0.50	<0.50	NA	< 0.10	97%	70%	130%	98%	80%	120%	98%	70%	130%
Ammonia as N	1168408	1168408	3.76	3.72	1.1%	< 0.02	96%	70%	130%	96%	80%	120%	95%	70%	130%
Total Kjeldahl Nitrogen	1168448	1168448	0.21	0.22	NA	< 0.10	100%	70%	130%	102%	80%	120%	94%	70%	130%
Total Phosphorus	1168448	1168448	3.36	3.37	0.3%	< 0.02	94%	70%	130%	96%	80%	120%	100%	70%	130%
Chemical Oxygen Demand	1168408	1168408	25	27	7.7%	< 5	103%	80%	120%	103%	90%	110%	105%	70%	130%
Dissolved Organic Carbon	1168408	1168408	6.9	6.7	2.9%	< 0.5	95%	90%	110%	102%	90%	110%	NA	80%	120%
Phenols	1168408	1168408	<0.001	<0.001	NA	< 0.001	94%	90%	110%	97%	90%	110%	105%	80%	120%
Turbidity	1168448	1168448	899	881	2.0%	< 0.5	100%	80%	120%						
Dissolved Calcium	1168408	1168408	42.0	39.4	6.4%	< 0.05	99%	70%	130%	99%	80%	120%	92%	70%	130%
Dissolved Magnesium	1168408	1168408	6.34	5.94	6.5%	< 0.05	105%	70%	130%	105%	80%	120%	99%	70%	130%
Dissolved Potassium	1168408	1168408	10.2	9.56	6.5%	< 0.05	100%	70%	130%	102%	80%	120%	96%	70%	130%
Dissolved Sodium	1168408	1168408	23.8	21.8	8.8%	< 0.05	99%	70%	130%	100%	80%	120%	92%	70%	130%
Dissolved Aluminum	1168408	1168408	0.045	0.046	2.2%	< 0.004	97%	70%	130%	96%	80%	120%	101%	70%	130%
Dissolved Antimony	1168408	1168408	<0.001	<0.001	NA	< 0.001	105%	70%	130%	101%	80%	120%	98%	70%	130%
Dissolved Arsenic	1168408	1168408	0.002	0.002	NA	< 0.001	101%	70%	130%	98%	80%	120%	99%	70%	130%
Dissolved Barium	1168408	1168408	0.103	0.102	1.0%	< 0.002	101%	70%	130%	99%	80%	120%	94%	70%	130%
Dissolved Beryllium	1168408	1168408	<0.0005	<0.0005	NA	< 0.0005	105%	70%	130%	95%	80%	120%	100%	70%	130%
Dissolved Bismuth	1168408	1168408	<0.002	<0.002	NA	< 0.002	93%	70%	130%	98%	80%	120%	97%	70%	130%
Dissolved Boron	1168408	1168408	0.280	0.279	0.4%	< 0.010	104%	70%	130%	100%	80%	120%	101%	70%	130%
Dissolved Cadmium	1168408	1168408	<0.0001	<0.0001	NA	< 0.0001	103%	70%	130%	101%	80%	120%	97%	70%	130%
Dissolved Chromium	1168408	1168408	<0.002	<0.002	NA	< 0.002	96%	70%	130%	94%	80%	120%	100%	70%	130%
Dissolved Cobalt	1168408	1168408	0.0076	0.0073	4.0%	< 0.0005	96%	70%	130%	96%	80%	120%	101%	70%	130%
Dissolved Copper	1168408	1168408	0.008	0.007	13.3%	< 0.001	98%	70%	130%	97%	80%	120%	101%	70%	130%
Dissolved Iron	1168408	1168408	0.016	0.012	NA	< 0.010	102%	70%	130%	99%	80%	120%	105%	70%	130%
Dissolved Lead	1168408	1168408	<0.0005	<0.0005	NA	< 0.0005	102%	70%	130%	92%	80%	120%	92%	70%	130%
Dissolved Manganese	1168408	1168408	4.26	4.24	0.5%	< 0.002	96%	70%	130%	93%	80%	120%	100%	70%	130%
Dissolved Molybdenum	1168408	1168408	<0.002	<0.002	NA	< 0.002	100%	70%	130%	99%	80%	120%	107%	70%	130%
Dissolved Nickel	1168408	1168408	<0.003	0.005	NA	< 0.003	98%	70%	130%	95%	80%	120%	99%	70%	130%
Dissolved Selenium	1168408	1168408	0.002	0.004	NA	< 0.001	101%	70%	130%	105%	80%	120%	101%	70%	130%

AGAT QUALITY ASSURANCE REPORT (V1)

Page 14 of 20

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: PINCHIN LTD.

AGAT WORK ORDER: 20U608588

PROJECT: 225335 Chapman Landfill

ATTENTION TO: Tim McBride

SAMPLING SITE:

SAMPLED BY:

Water Analysis (Continued)

RPT Date: Jun 11, 2020			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
Dissolved Silver	1168408	1168408	<0.0001	<0.0001	NA	< 0.0001	98%	70%	130%	96%	80%	120%	98%	70%	130%
Dissolved Strontium	1168408	1168408	0.245	0.236	3.7%	< 0.005	96%	70%	130%	93%	80%	120%	100%	70%	130%
Dissolved Thallium	1168408	1168408	<0.0003	<0.0003	NA	< 0.0003	103%	70%	130%	97%	80%	120%	97%	70%	130%
Dissolved Tin	1168408	1168408	<0.002	<0.002	NA	< 0.002	96%	70%	130%	88%	80%	120%	88%	70%	130%
Dissolved Titanium	1168408	1168408	<0.002	0.002	NA	< 0.002	99%	70%	130%	92%	80%	120%	100%	70%	130%
Dissolved Tungsten	1168408	1168408	<0.010	<0.010	NA	< 0.010	92%	70%	130%	84%	80%	120%	84%	70%	130%
Dissolved Uranium	1168408	1168408	0.0006	0.0006	NA	< 0.0005	104%	70%	130%	98%	80%	120%	97%	70%	130%
Dissolved Vanadium	1168408	1168408	<0.002	<0.002	NA	< 0.002	96%	70%	130%	93%	80%	120%	102%	70%	130%
Dissolved Zinc	1168408	1168408	<0.005	<0.005	NA	< 0.005	96%	70%	130%	98%	80%	120%	105%	70%	130%

Chapman Surface Water Parameters

BOD (5)	1171453	1171453	<5	<5	NA	< 5	101%	75%	125%						
Electrical Conductivity	1171862		411	407	1.0%	< 2	103%	80%	120%						
pH	1171862		7.72	7.79	0.9%	NA	100%	90%	110%						
Total Dissolved Solids	1168457	1168457	504	518	2.7%	< 20	102%	80%	120%						
Total Suspended Solids	1177024		<10	<10	NA	< 10	104%	80%	120%						
Alkalinity (as CaCO3)	1171862		208	211	1.4%	< 5	93%	80%	120%						
Chloride	1171739		57.0	56.3	1.2%	< 0.10	95%	70%	130%	107%	80%	120%	112%	70%	130%
Nitrate as N	1171739		<0.25	<0.25	NA	< 0.05	99%	70%	130%	107%	80%	120%	112%	70%	130%
Nitrite as N	1171739		<0.25	<0.25	NA	< 0.05	92%	70%	130%	104%	80%	120%	99%	70%	130%
Sulphate	1171739		<0.50	<0.50	NA	< 0.10	101%	70%	130%	107%	80%	120%	107%	70%	130%
Ortho Phosphate as P	1171739		<0.50	<0.50	NA	< 0.10	97%	70%	130%	105%	80%	120%	103%	70%	130%
Ammonia as N	1171454	1171454	<0.02	<0.02	NA	< 0.02	98%	70%	130%	99%	80%	120%	94%	70%	130%
Total Phosphorus	1171459	1171459	<0.02	<0.02	NA	< 0.02	98%	70%	130%	96%	80%	120%	88%	70%	130%
Chemical Oxygen Demand	1168448	1168448	<5	<5	NA	< 5	99%	80%	120%	96%	90%	110%	99%	70%	130%
Total Kjeldahl Nitrogen	1168448	1168448	0.21	0.22	NA	< 0.10	100%	70%	130%	102%	80%	120%	94%	70%	130%
Phenols	1168408	1168408	<0.001	<0.001	NA	< 0.001	94%	90%	110%	97%	90%	110%	105%	80%	120%
Colour	1177626		152	155	2.0%	< 5	99%	90%	110%						
Total Calcium	1177024		53.0	53.2	0.4%	< 0.05	99%	70%	130%	101%	80%	120%	97%	70%	130%
Total Magnesium	1177024		15.9	15.9	0.0%	< 0.05	104%	70%	130%	106%	80%	120%	102%	70%	130%
Total Potassium	1177024		4.54	4.59	1.1%	< 0.05	101%	70%	130%	103%	80%	120%	100%	70%	130%
Total Sodium	1177024		57.8	58.3	0.9%	< 0.05	99%	70%	130%	100%	80%	120%	96%	70%	130%
Aluminum-dissolved	1177024		< 0.004	< 0.004	NA	< 0.004	105%	70%	130%	105%	80%	120%	103%	70%	130%
Total Antimony	1177024		<0.005	<0.005	NA	< 0.001	103%	70%	130%	99%	80%	120%	97%	70%	130%
Total Arsenic	1177024		<0.003	<0.003	NA	< 0.003	104%	70%	130%	103%	80%	120%	105%	70%	130%
Total Barium	1177024		0.120	0.117	2.5%	< 0.002	100%	70%	130%	97%	80%	120%	95%	70%	130%
Total Beryllium	1177024		<0.0005	<0.0005	NA	< 0.0005	105%	70%	130%	99%	80%	120%	101%	70%	130%
Total Bismuth	1177024		<0.010	<0.010	NA	< 0.002	84%	70%	130%	102%	80%	120%	98%	70%	130%
Total Boron	1177024		0.074	0.079	6.5%	< 0.010	102%	70%	130%	99%	80%	120%	101%	70%	130%
Total Cadmium	1177024		<0.0005	<0.0005	NA	< 0.0001	103%	70%	130%	101%	80%	120%	98%	70%	130%

Quality Assurance

CLIENT NAME: PINCHIN LTD.

PROJECT: 225335 Chapman Landfill

SAMPLING SITE:

AGAT WORK ORDER: 20U608588

ATTENTION TO: Tim McBride

SAMPLED BY:

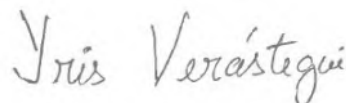
Water Analysis (Continued)

RPT Date: Jun 11, 2020			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Total Chromium	1177024		<0.015	<0.015	NA	< 0.003	104%	70%	130%	101%	80%	120%	98%	70%	130%
Total Cobalt	1177024		<0.0005	<0.0005	NA	< 0.0005	106%	70%	130%	101%	80%	120%	99%	70%	130%
Total Copper	1177024		<0.001	<0.001	NA	< 0.001	107%	70%	130%	103%	80%	120%	96%	70%	130%
Total Iron	1177024		0.129	0.124	4.0%	< 0.010	110%	70%	130%	105%	80%	120%	101%	70%	130%
Total Lead	1177024		<0.001	<0.001	NA	< 0.001	113%	70%	130%	91%	80%	120%	89%	70%	130%
Total Manganese	1177024		0.235	0.237	0.8%	< 0.002	102%	70%	130%	100%	80%	120%	93%	70%	130%
Total Molybdenum	1177024		<0.010	<0.010	NA	< 0.002	105%	70%	130%	103%	80%	120%	100%	70%	130%
Total Nickel	1177024		0.007	0.006	NA	< 0.003	108%	70%	130%	99%	80%	120%	93%	70%	130%
Total Selenium	1177024		<0.020	<0.020	NA	< 0.004	98%	70%	130%	97%	80%	120%	98%	70%	130%
Total Silicon	1177024		<0.25	0.27	NA	< 0.05	97%	70%	130%	96%	80%	120%	107%	70%	130%
Total Silver	1177024		<0.0005	<0.0005	NA	< 0.0001	105%	70%	130%	96%	80%	120%	84%	70%	130%
Total Strontium	1177024		0.463	0.439	5.3%	< 0.005	99%	70%	130%	99%	80%	120%	98%	70%	130%
Total Tin	1177024		<0.010	<0.010	NA	< 0.002	98%	70%	130%	97%	80%	120%	96%	70%	130%
Total Titanium	1177024		<0.010	<0.010	NA	< 0.002	101%	70%	130%	102%	80%	120%	94%	70%	130%
Total Uranium	1177024		<0.010	<0.010	NA	< 0.002	85%	70%	130%	101%	80%	120%	101%	70%	130%
Total Vanadium	1177024		<0.002	<0.002	NA	< 0.002	108%	70%	130%	100%	80%	120%	100%	70%	130%
Total Zinc	1177024		<0.005	<0.005	NA	< 0.005	104%	70%	130%	103%	80%	120%	95%	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.

Matrix spike: Spike level < native concentration. Matrix spike acceptance limits do not apply.

Certified By:


Method Summary

CLIENT NAME: PINCHIN LTD.

PROJECT: 225335 Chapman Landfill

SAMPLING SITE:
AGAT WORK ORDER: 20U608588

ATTENTION TO: Tim McBride

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
BOD (5)	INOR-93-6006	SM 5210 B	DO METER
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
pH	INOR-93-6000	modified from SM 4500-H+ B	PC TITRATE
Hardness (as CaCO ₃) (Calculated)	MET-93-6105	modified from EPA SW-846 6010C & 200.7 & SM 2340 B	CALCULATION
Total Dissolved Solids	INOR-93-6028	modified from EPA 1684, ON MOECC E3139, SM 2540C, D	BALANCE
Total Suspended Solids	INOR-93-6028	modified from EPA 1684, ON MOECC E3139, SM 2540C, D	BALANCE
Alkalinity (as CaCO ₃)	INOR-93-6000	SM 2320 B	PC TITRATE
Chloride	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Nitrate as N	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Phosphate as P	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Ammonia as N	INOR-93-6059	modified from SM 4500-NH ₃ H	LACHAT FIA
Total Kjeldahl Nitrogen	INOR-93-6048	modified from EPA 351.2 and SM 4500-NORG D	LACHAT FIA
Total Phosphorus	INOR-93-6057	modified from LACHAT 10-115-01-3A	LACHAT FIA
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Dissolved Organic Carbon	INOR-93-6049	EPA 415.1 & SM 5310 B	SHIMADZU CARBON ANALYZER
Phenols	INOR-93-6050	MOE ROPHEN-E 3179 & SM 5530 D	TECHNICON AUTO ANALYZER
Turbidity	INOR-93-6044	modified from SM 2130 B	NEPHELOMETER
Dissolved Calcium	MET-93-6105	modified from EPA 6010D	ICP/OES
Dissolved Magnesium	MET-93-6105	modified from EPA 6010D	ICP/OES
Dissolved Potassium	MET-93-6105	modified from EPA 6010D	ICP/OES
Dissolved Sodium	MET-93-6105	modified from EPA 6010D	ICP/OES
Dissolved Aluminum	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Antimony	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Arsenic	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Barium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Beryllium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Bismuth	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Boron	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Cadmium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Chromium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Cobalt	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Copper	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Iron	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Lead	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS

Method Summary

CLIENT NAME: PINCHIN LTD.

PROJECT: 225335 Chapman Landfill

SAMPLING SITE:
AGAT WORK ORDER: 20U608588

ATTENTION TO: Tim McBride

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Dissolved Manganese	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Molybdenum	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Nickel	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Selenium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Silver	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Strontium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Thallium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Tin	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Titanium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Tungsten	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Uranium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Vanadium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Zinc	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Ortho Phosphate as P	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Total Phosphorus	INOR-93-6022	modified from SM 4500-P B and SM 4500-P E	SPECTROPHOTOMETER
Colour	INOR-93-6046	SM 2120 B	SPECTROPHOTOMETER
Total Calcium	MET-93-6105	modified from EPA 6010D	ICP/OES
Total Magnesium	MET-93-6105	modified from EPA 6010D	ICP/OES
Total Potassium	MET-93-6105	modified from EPA 6010D	ICP/OES
Total Sodium	MET-93-6105	modified from EPA 6010D	ICP/OES
Aluminum-dissolved	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Total Antimony	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Arsenic	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Barium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Beryllium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Bismuth	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Boron	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Cadmium	MET -93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Chromium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Cobalt	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Copper	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS

Method Summary

CLIENT NAME: PINCHIN LTD.

PROJECT: 225335 Chapman Landfill

SAMPLING SITE:

AGAT WORK ORDER: 20U608588

ATTENTION TO: Tim McBride

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Total Iron	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Lead	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Manganese	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Molybdenum	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Nickel	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Selenium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Silicon	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Silver	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Strontium	INOR-93-6003	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Tin	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Titanium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Uranium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Vanadium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Zinc	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Lab Filtration Performed			FILTRATION

CLIENT NAME: PINCHIN LTD.
957 CAMBRIAN HEIGHTS DRIVE, UNIT 203
SUDBURY, ON P3C 5S5
(705) 521-0560

ATTENTION TO: Tim McBride

PROJECT: 225335.003 Chapman Landfill

AGAT WORK ORDER: 20U658703

WATER ANALYSIS REVIEWED BY: Yris Verastegui, Report Reviewer

DATE REPORTED: Oct 14, 2020

PAGES (INCLUDING COVER): 22

VERSION*: 1

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

***Notes**

Disclaimer:

- All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.
- All samples will be disposed of within 30 days following analysis, unless expressly agreed otherwise in writing. Please contact your Client Project Manager if you require additional sample storage time.
- AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.
- This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
- The test results reported herewith relate only to the samples as received by the laboratory.
- Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.
- All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.



Certificate of Analysis

AGAT WORK ORDER: 20U658703

PROJECT: 225335.003 Chapman Landfill

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

CLIENT NAME: PINCHIN LTD.

SAMPLING SITE:N/A

ATTENTION TO: Tim McBride

SAMPLED BY:N/A

BOD-Toronto										
DATE RECEIVED: 2020-10-02					DATE REPORTED: 2020-10-14					
SAMPLE DESCRIPTION:				BH-1	BH-2	BH-3-II	BH-4	BH-4-II	BH-5-II	BH-6-III
SAMPLE TYPE:				Water	Water	Water	Water	Water	Water	Water
DATE SAMPLED:				2020-09-30 16:00	2020-09-30 16:00	2020-09-30 16:00	2020-09-30 16:00	2020-09-30 16:00	2020-09-30 16:00	2020-09-30 16:00
Parameter	Unit	G / S	RDL	1509765	1509773	1509774	1509775	1509776	1509777	1509778
Biochemical Oxygen Demand, Total	mg/L	2	<2	<2	<2	<2	3	<2	<2	<2
SAMPLE DESCRIPTION:				BH-8-I	BH-9-I	BH10-1	BH11	BHDUP1	BHDUP2	SW-1
SAMPLE TYPE:				Water	Water	Water	Water	Water	Water	Water
DATE SAMPLED:				2020-09-30 16:00	2020-09-30 16:00	2020-09-30 16:00	2020-09-30 16:00	2020-09-30 16:00	2020-09-30 16:00	2020-09-30 16:00
Parameter	Unit	G / S	RDL	1509780	1509781	1509782	1509783	1509784	1509785	1509786
Biochemical Oxygen Demand, Total	mg/L	2	3	<2	<2	<2	<2	<2	3	<2
SAMPLE DESCRIPTION:				SW-3	SW-DUP1					
SAMPLE TYPE:				Water	Water					
DATE SAMPLED:				2020-09-30 16:00	2020-09-30 16:00					
Parameter	Unit	G / S	RDL	1509823	1509824					
Biochemical Oxygen Demand, Total	mg/L	2	3	3	3					

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard
Analysis performed at AGAT Halifax (unless marked by *)

Certified By:

Iris Veraistegui



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 20U658703

PROJECT: 225335.003 Chapman Landfill

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CLIENT NAME: PINCHIN LTD.

SAMPLING SITE:N/A

ATTENTION TO: Tim McBride

SAMPLED BY:N/A

Groundwater Parameters

DATE RECEIVED: 2020-10-02

DATE REPORTED: 2020-10-14

SAMPLE DESCRIPTION:				BH-1		BH-2		BH-3-II		BH-4		BH-4-II	
SAMPLE TYPE:				Water		Water		Water		Water		Water	
DATE SAMPLED:				2020-09-30		2020-09-30		2020-09-30		2020-09-30		2020-09-30	
				16:00		16:00		16:00		16:00		16:00	
Parameter	Unit	G / S: A	G / S: B	RDL	1509765	RDL	1509773	RDL	1509774	RDL	1509775	RDL	1509776
Electrical Conductivity	µS/cm			2	335	2	690	2	70		499		507
pH	pH Units		6.5-8.5	NA	6.81	NA	7.08	NA	6.17		7.03		6.96
Hardness (as CaCO ₃) (Calculated)	mg/L		80-100	0.5	113	0.5	493	0.5	22.4		247		227
Total Dissolved Solids	mg/L		500	20	188[<B]	20	456[<B]	20	48[<B]		342[<B]		332[<B]
Total Suspended Solids	mg/L			10	11	10	841	10	954		250		11
Alkalinity (as CaCO ₃)	mg/L		30-500	5	153	5	331	5	16		203		235
Chloride	mg/L		250	0.10	18.3[<B]	0.10	24.6[<B]	0.10	12.7[<B]		2.70[<B]		4.83[<B]
Nitrate as N	mg/L	10.0		0.05	4.16[<A]	0.05	0.20[<A]	0.05	0.16[<A]		6.71[<A]		6.70[<A]
Nitrite as N	mg/L	1.0		0.05	<0.05	0.05	<0.05	0.05	<0.05		<0.05		<0.05
Sulphate	mg/L		500	0.10	11.4[<B]	0.10	88.9[<B]	0.10	5.38[<B]		69.7[<B]		59.6[<B]
Ortho Phosphate as P	mg/L			0.10	<0.10	0.10	<0.10	0.10	<0.10		<0.10		<0.10
Ammonia as N	mg/L			0.03	3.53	0.02	0.19	0.02	<0.02		0.04		0.19
Total Phosphorus	mg/L			0.02	<0.02	0.02	0.08	0.02	0.42		0.37		<0.02
Chemical Oxygen Demand	mg/L			5	<5	5	<5	5	<5		<5		12
Total Kjeldahl Nitrogen	mg/L			0.10	3.80	0.10	0.80	0.10	0.16		1.12		1.05
Dissolved Organic Carbon	mg/L		5	0.5	6.7[>B]	0.5	11.1[>B]	0.5	2.2[<B]		10.8[>B]		13.2[>B]
Phenols	mg/L			0.001	0.001	0.001	0.005	0.001	<0.001		<0.001		<0.001
Turbidity	NTU		5	0.5	2.2[<B]	0.5	255[>B]	0.5	201[>B]		149[>B]		2.1[<B]
Dissolved Calcium	mg/L			0.05	34.8	0.05	141	0.05	7.43		86.8		78.2
Dissolved Magnesium	mg/L			0.05	6.27	0.05	34.3	0.05	0.93		7.37		7.75
Dissolved Potassium	mg/L			0.05	9.14	0.05	10.0	0.05	1.27		10.6		12.5
Dissolved Sodium	mg/L	20		0.05	18.0[<A]	0.05	43.3[>A]	0.05	3.98[<A]		8.57[<A]		10.4[<A]
Dissolved Aluminum	mg/L			0.004	0.026	0.004	0.013	0.004	0.070		0.085		0.069
Dissolved Antimony	mg/L	0.006		0.001	<0.001	0.001	<0.001	0.001	<0.001		<0.001		<0.001
Dissolved Arsenic	mg/L	0.01		0.001	0.002[<A]	0.001	<0.001	0.001	<0.001		0.001[<A]		0.002[<A]
Dissolved Barium	mg/L	1.0		0.002	0.078[<A]	0.002	0.187[<A]	0.002	0.018[<A]		0.088[<A]		0.079[<A]
Dissolved Beryllium	mg/L			0.0005	<0.0005	0.0005	<0.0005	0.0005	<0.0005		<0.0005		<0.0005
Dissolved Bismuth	mg/L			0.002	<0.002	0.002	<0.002	0.002	<0.002		<0.002		<0.002
Dissolved Boron	mg/L	5.0		0.010	0.277[<A]	0.100	0.643[<A]	0.010	<0.010		0.421[<A]		0.495[<A]

Certified By:

José Verástegui

Certificate of Analysis

AGAT WORK ORDER: 20U658703

PROJECT: 225335.003 Chapman Landfill

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<http://www.agatlabs.com>

CLIENT NAME: PINCHIN LTD.

SAMPLING SITE: N/A

ATTENTION TO: Tim McBride

SAMPLED BY: N/A

Groundwater Parameters

DATE RECEIVED: 2020-10-02

DATE REPORTED: 2020-10-14

		SAMPLE DESCRIPTION:			BH-1		BH-2		BH-3-II		BH-4		BH-4-II	
		SAMPLE TYPE:			Water		Water		Water		Water		Water	
		DATE SAMPLED:			2020-09-30		2020-09-30		2020-09-30		2020-09-30		2020-09-30	
					16:00		16:00		16:00		16:00		16:00	
Parameter	Unit	G / S: A	G / S: B	RDL	1509765	RDL	1509773	RDL	1509774	1509775	1509776			
Dissolved Cadmium	mg/L	0.005		0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001			
Dissolved Chromium	mg/L	0.05		0.002	0.003[<A]	0.002	<0.002	0.002	<0.002	<0.002	<0.002			
Dissolved Cobalt	mg/L			0.0005	0.0053	0.0005	0.0030	0.0005	<0.0005	<0.0005	0.0015			
Dissolved Copper	mg/L			0.001	0.007	0.001	0.005	0.001	0.003	0.010	0.008			
Dissolved Iron	mg/L			0.010	0.032	0.010	0.705	0.010	0.028	0.141	0.015			
Dissolved Lead	mg/L	0.010		0.0005	<0.0005	0.0005	<0.0005	0.0005	<0.0005	0.0008[<A]	<0.0005			
Dissolved Manganese	mg/L			0.010	4.41	0.020	1.777	0.002	0.050	0.028	0.263			
Dissolved Molybdenum	mg/L			0.002	<0.002	0.002	0.010	0.002	<0.002	<0.002	<0.002			
Dissolved Nickel	mg/L			0.003	<0.003	0.003	<0.003	0.003	<0.003	<0.003	<0.003			
Dissolved Selenium	mg/L	0.05		0.001	<0.001	0.001	0.001[<A]	0.001	<0.001	<0.001	<0.001			
Dissolved Silver	mg/L			0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001			
Dissolved Strontium	mg/L			0.005	0.180	0.005	0.513	0.005	0.063	0.272	0.263			
Dissolved Thallium	mg/L			0.0003	<0.0003	0.0003	<0.0003	0.0003	<0.0003	<0.0003	<0.0003			
Dissolved Tin	mg/L			0.002	<0.002	0.002	<0.002	0.002	<0.002	<0.002	<0.002			
Dissolved Titanium	mg/L			0.002	<0.002	0.002	<0.002	0.002	0.006	0.003	0.002			
Dissolved Tungsten	mg/L			0.010	<0.010	0.010	<0.010	0.010	<0.010	<0.010	<0.010			
Dissolved Uranium	mg/L	0.02		0.0005	0.0006[<A]	0.0005	0.0041[<A]	0.0005	<0.0005	0.0021[<A]	0.0035[<A]			
Dissolved Vanadium	mg/L			0.002	<0.002	0.002	<0.002	0.002	<0.002	<0.002	<0.002			
Dissolved Zinc	mg/L			0.005	<0.005	0.005	0.015	0.005	<0.005	<0.005	<0.005			
Lab Filtration Performed					Y		Y		Y	Y	Y			

Certified By:





Certificate of Analysis

AGAT WORK ORDER: 20U658703

PROJECT: 225335.003 Chapman Landfill

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

CLIENT NAME: PINCHIN LTD.

SAMPLING SITE:N/A

ATTENTION TO: Tim McBride

SAMPLED BY:N/A

Groundwater Parameters

DATE RECEIVED: 2020-10-02

DATE REPORTED: 2020-10-14

SAMPLE DESCRIPTION:					BH-5-II	BH-6-III	BH-7-II		BH-8-I		BH-9-I
SAMPLE TYPE:					Water	Water	Water		Water		Water
DATE SAMPLED:					2020-09-30 16:00	2020-09-30 16:00	2020-09-30 16:00		2020-09-30 16:00		2020-09-30 16:00
Parameter	Unit	G / S: A	G / S: B	RDL	1509777	1509778	1509779	RDL	1509780	RDL	1509781
Electrical Conductivity	µS/cm			2	352	352	18	2	352	2	441
pH	pH Units		6.5-8.5	NA	6.64	6.70	5.95	NA	6.73	NA	6.85
Hardness (as CaCO3) (Calculated)	mg/L		80-100	0.5	226	142	6.0	0.5	126	0.5	140
Total Dissolved Solids	mg/L		500	20	226[<B]	206[<B]	<20	20	206[<B]	20	240[<B]
Total Suspended Solids	mg/L			10	761	190	3510	10	1550	10	1160
Alkalinity (as CaCO3)	mg/L		30-500	5	115	130	7	5	140	5	201
Chloride	mg/L		250	0.10	13.0[<B]	11.9[<B]	0.58[<B]	0.10	27.2[<B]	0.10	33.5[<B]
Nitrate as N	mg/L	10.0		0.05	3.68[<A]	2.48[<A]	0.49[<A]	0.05	3.58[<A]	0.05	<0.05
Nitrite as N	mg/L	1.0		0.05	<0.05	<0.05	<0.05	0.05	<0.05	0.05	<0.05
Sulphate	mg/L		500	0.10	62.6[<B]	57.5[<B]	1.98[<B]	0.10	18.6[<B]	0.10	16.9[<B]
Ortho Phosphate as P	mg/L			0.10	<0.10	<0.10	<0.10	0.10	<0.10	0.10	<0.10
Ammonia as N	mg/L			0.02	0.27	0.65	0.17	0.02	1.29	0.04	6.83
Total Phosphorus	mg/L			0.02	3.32	0.70	0.56	0.02	0.80	0.02	3.29
Chemical Oxygen Demand	mg/L			5	<5	<5	<5	5	19	5	16
Total Kjeldahl Nitrogen	mg/L			0.10	0.68	1.13	0.19	0.10	2.27	0.10	7.40
Dissolved Organic Carbon	mg/L		5	0.5	5.5[>B]	4.8[<B]	3.7[<B]	0.5	5.8[>B]	1.0	10.4[>B]
Phenols	mg/L			0.001	<0.001	<0.001	0.009	0.001	<0.001	0.001	<0.001
Turbidity	NTU		5	0.5	225[>B]	213[>B]	2640[>B]	0.5	473[>B]	0.5	777[>B]
Dissolved Calcium	mg/L			0.05	68.9	42.6	1.35	0.05	40.0	0.05	44.6
Dissolved Magnesium	mg/L			0.05	13.1	8.73	0.63	0.05	6.30	0.05	7.02
Dissolved Potassium	mg/L			0.05	8.10	7.86	0.55	0.05	10.4	0.05	11.1
Dissolved Sodium	mg/L	20		0.05	19.2[<A]	17.2[<A]	0.97[<A]	0.05	19.6[<A]	0.05	22.8[>A]
Dissolved Aluminum	mg/L			0.004	0.034	0.030	0.042	0.004	0.067	0.004	0.042
Dissolved Antimony	mg/L	0.006		0.001	<0.001	<0.001	<0.001	0.001	<0.001	0.001	<0.001
Dissolved Arsenic	mg/L	0.01		0.001	<0.001	<0.001	<0.001	0.001	<0.001	0.001	0.002[<A]
Dissolved Barium	mg/L	1.0		0.002	0.125[<A]	0.116[<A]	0.005[<A]	0.002	0.146[<A]	0.002	0.110[<A]
Dissolved Beryllium	mg/L			0.0005	<0.0005	<0.0005	<0.0005	0.0005	<0.0005	0.0005	<0.0005
Dissolved Bismuth	mg/L			0.002	<0.002	<0.002	<0.002	0.002	<0.002	0.002	<0.002
Dissolved Boron	mg/L	5.0		0.010	0.310[<A]	0.287[<A]	<0.010	0.010	0.271[<A]	0.010	0.237[<A]

Certified By:

José Verástegui

Certificate of Analysis

AGAT WORK ORDER: 20U658703

PROJECT: 225335.003 Chapman Landfill

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<http://www.agatlabs.com>

CLIENT NAME: PINCHIN LTD.

SAMPLING SITE: N/A

ATTENTION TO: Tim McBride

SAMPLED BY: N/A

Groundwater Parameters

DATE RECEIVED: 2020-10-02

DATE REPORTED: 2020-10-14

SAMPLE DESCRIPTION:					BH-5-II	BH-6-III	BH-7-II	BH-8-I		BH-9-I	
SAMPLE TYPE:					Water	Water	Water	Water		Water	
DATE SAMPLED:					2020-09-30 16:00	2020-09-30 16:00	2020-09-30 16:00	2020-09-30 16:00		2020-09-30 16:00	
Parameter	Unit	G / S: A	G / S: B	RDL	1509777	1509778	1509779	RDL	1509780	RDL	1509781
Dissolved Cadmium	mg/L	0.005		0.0001	0.0003[<A]	<0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001
Dissolved Chromium	mg/L	0.05		0.002	<0.002	<0.002	<0.002	0.002	<0.002	0.002	<0.002
Dissolved Cobalt	mg/L			0.0005	<0.0005	0.0010	<0.0005	0.0005	<0.0005	0.0005	0.0190
Dissolved Copper	mg/L			0.001	0.003	0.007	<0.001	0.001	0.004	0.001	0.003
Dissolved Iron	mg/L			0.010	0.012	<0.010	0.052	0.010	0.014	0.010	8.71
Dissolved Lead	mg/L	0.010		0.0005	<0.0005	<0.0005	<0.0005	0.0005	<0.0005	0.0005	<0.0005
Dissolved Manganese	mg/L			0.002	0.144	0.898	0.005	0.020	1.22	0.020	4.79
Dissolved Molybdenum	mg/L			0.002	<0.002	<0.002	<0.002	0.002	<0.002	0.002	<0.002
Dissolved Nickel	mg/L			0.003	<0.003	0.005	<0.003	0.003	<0.003	0.003	<0.003
Dissolved Selenium	mg/L	0.05		0.001	<0.001	<0.001	<0.001	0.001	<0.001	0.001	<0.001
Dissolved Silver	mg/L			0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001
Dissolved Strontium	mg/L			0.005	0.220	0.325	0.013	0.005	0.205	0.005	0.246
Dissolved Thallium	mg/L			0.0003	<0.0003	<0.0003	<0.0003	0.0003	<0.0003	0.0003	<0.0003
Dissolved Tin	mg/L			0.002	<0.002	<0.002	<0.002	0.002	<0.002	0.002	<0.002
Dissolved Titanium	mg/L			0.002	0.002	0.002	0.008	0.002	0.006	0.002	0.006
Dissolved Tungsten	mg/L			0.010	<0.010	<0.010	<0.010	0.010	<0.010	0.010	<0.010
Dissolved Uranium	mg/L	0.02		0.0005	<0.0005	<0.0005	<0.0005	0.0005	<0.0005	0.0005	0.0009[<A]
Dissolved Vanadium	mg/L			0.002	<0.002	<0.002	<0.002	0.002	<0.002	0.002	<0.002
Dissolved Zinc	mg/L			0.005	<0.005	<0.005	<0.005	0.005	<0.005	0.005	<0.005
Lab Filtration Performed					Y	Y	Y		Y		Y

Certified By:

Iris Veraistegui



Certificate of Analysis

AGAT WORK ORDER: 20U658703

PROJECT: 225335.003 Chapman Landfill

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<http://www.agatlabs.com>

CLIENT NAME: PINCHIN LTD.

SAMPLING SITE:N/A

ATTENTION TO: Tim McBride

SAMPLED BY:N/A

Groundwater Parameters

DATE RECEIVED: 2020-10-02

DATE REPORTED: 2020-10-14

		SAMPLE DESCRIPTION:							
		SAMPLE TYPE:							
		DATE SAMPLED:							
		2020-09-30				2020-09-30			
		16:00				16:00			
Parameter	Unit	G / S: A	G / S: B	RDL	BH10-1 Water 1509782	RDL	BH11 Water 1509783	BHDUP1 Water 1509784	BHDUP2 Water 1509785
Electrical Conductivity	µS/cm			2	465	2	37	37	526
pH	pH Units		6.5-8.5	NA	6.69	NA	6.12	6.08	7.07
Hardness (as CaCO ₃) (Calculated)	mg/L		80-100	0.5	215	0.5	7.5	5.6	250
Total Dissolved Solids	mg/L		500	20	328[<B]	20	34[<B]	32[<B]	332[<B]
Total Suspended Solids	mg/L			10	796	10	3210	2710	11
Alkalinity (as CaCO ₃)	mg/L		30-500	5	106	5	15	16	252
Chloride	mg/L		250	0.10	9.84[<B]	0.10	2.33[<B]	2.23[<B]	4.73[<B]
Nitrate as N	mg/L	10.0		0.05	2.57[<A]	0.05	0.09[<A]	0.11[<A]	6.63[<A]
Nitrite as N	mg/L	1.0		0.05	<0.05	0.05	<0.05	<0.05	<0.05
Sulphate	mg/L		500	0.20	152[<B]	0.10	4.20[<B]	4.06[<B]	60.2[<B]
Ortho Phosphate as P	mg/L			0.10	<0.10	0.10	<0.10	<0.10	<0.10
Ammonia as N	mg/L			0.02	<0.02	0.02	<0.02	<0.02	0.18
Total Phosphorus	mg/L			0.02	0.73	0.02	2.42	2.50	<0.02
Chemical Oxygen Demand	mg/L			5	<5	5	<5	<5	14
Total Kjeldahl Nitrogen	mg/L			0.10	0.41	0.10	0.20	0.27	1.01
Dissolved Organic Carbon	mg/L		5	0.5	7.8[>B]	0.5	4.3[<B]	4.7[<B]	13.2[>B]
Phenols	mg/L			0.001	<0.001	0.001	<0.001	<0.001	<0.001
Turbidity	NTU		5	0.5	187[>B]	0.5	771[>B]	727[>B]	5.1[>B]
Dissolved Calcium	mg/L			0.05	57.9	0.05	2.42	1.82	85.8
Dissolved Magnesium	mg/L			0.05	17.0	0.05	0.36	0.26	8.63
Dissolved Potassium	mg/L			0.05	7.17	0.05	0.70	0.53	13.1
Dissolved Sodium	mg/L	20		0.05	15.6[<A]	0.05	5.12[<A]	3.90[<A]	11.3[<A]
Dissolved Aluminum	mg/L			0.004	0.045	0.004	0.239	0.094	0.038
Dissolved Antimony	mg/L	0.006		0.001	<0.001	0.001	<0.001	<0.001	<0.001
Dissolved Arsenic	mg/L	0.01		0.001	<0.001	0.001	0.001[<A]	<0.001	0.001[<A]
Dissolved Barium	mg/L	1.0		0.002	0.190[<A]	0.002	0.007[<A]	0.005[<A]	0.076[<A]
Dissolved Beryllium	mg/L			0.0005	<0.0005	0.0005	<0.0005	<0.0005	<0.0005
Dissolved Bismuth	mg/L			0.002	<0.002	0.002	<0.002	<0.002	<0.002
Dissolved Boron	mg/L	5.0		0.100	0.807[<A]	0.010	0.018[<A]	0.016[<A]	0.484[<A]

Certified By:

Iris Veraestegui



Certificate of Analysis

AGAT WORK ORDER: 20U658703

PROJECT: 225335.003 Chapman Landfill

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

CLIENT NAME: PINCHIN LTD.

SAMPLING SITE:N/A

ATTENTION TO: Tim McBride

SAMPLED BY:N/A

Groundwater Parameters

DATE RECEIVED: 2020-10-02

DATE REPORTED: 2020-10-14

		SAMPLE DESCRIPTION:							
		SAMPLE TYPE:							
		DATE SAMPLED:							
Parameter	Unit	G / S: A	G / S: B	RDL	BH10-1 Water 2020-09-30 16:00 1509782	RDL	BH11 Water 2020-09-30 16:00 1509783	BHDUP1 Water 2020-09-30 16:00 1509784	BHDUP2 Water 2020-09-30 16:00 1509785
Dissolved Cadmium	mg/L	0.005		0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001
Dissolved Chromium	mg/L	0.05		0.002	<0.002	0.002	<0.002	<0.002	<0.002
Dissolved Cobalt	mg/L			0.0005	<0.0005	0.0005	<0.0005	<0.0005	0.0018
Dissolved Copper	mg/L			0.001	0.007	0.001	0.002	<0.001	0.008
Dissolved Iron	mg/L			0.010	0.032	0.010	0.080	0.056	0.017
Dissolved Lead	mg/L	0.010		0.0005	<0.0005	0.0005	<0.0005	<0.0005	<0.0005
Dissolved Manganese	mg/L			0.002	0.006	0.002	0.017	0.014	0.283
Dissolved Molybdenum	mg/L			0.002	<0.002	0.002	<0.002	<0.002	<0.002
Dissolved Nickel	mg/L			0.003	<0.003	0.003	<0.003	<0.003	<0.003
Dissolved Selenium	mg/L	0.05		0.001	<0.001	0.001	0.011[<A]	<0.001	<0.001
Dissolved Silver	mg/L			0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001
Dissolved Strontium	mg/L			0.005	0.321	0.005	0.024	0.023	0.266
Dissolved Thallium	mg/L			0.0003	<0.0003	0.0003	<0.0003	<0.0003	<0.0003
Dissolved Tin	mg/L			0.002	<0.002	0.002	<0.002	<0.002	<0.002
Dissolved Titanium	mg/L			0.002	0.003	0.002	0.003	0.003	<0.002
Dissolved Tungsten	mg/L			0.010	<0.010	0.010	<0.010	<0.010	<0.010
Dissolved Uranium	mg/L	0.02		0.0005	0.0015[<A]	0.0005	0.0009[<A]	0.0008[<A]	0.0039[<A]
Dissolved Vanadium	mg/L			0.002	<0.002	0.002	<0.002	<0.002	<0.002
Dissolved Zinc	mg/L			0.005	<0.005	0.005	<0.005	<0.005	<0.005
Lab Filtration Performed					Y		Y	Y	Y

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: A Refers to O. Reg 169/03 - Ontario Drinking Water Quality Standards. Na value derived from O. Reg 248, B Refers to O. Reg 169/03 - Ontario Drinking Water Quality Standards - Aesthetic Objectives and Operational Guidelines
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

1509765-1509785 DOC analysis completed on a lab filtered sample.
Dilution required, RDL has been increased accordingly.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

Iris Veraistegui

Certificate of Analysis

AGAT WORK ORDER: 20U658703

PROJECT: 225335.003 Chapman Landfill

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CLIENT NAME: PINCHIN LTD.

SAMPLING SITE: N/A

ATTENTION TO: Tim McBride

SAMPLED BY: N/A

Surface Water Parameters

DATE RECEIVED: 2020-10-02

DATE REPORTED: 2020-10-14

		SAMPLE DESCRIPTION:		SW-1	SW-2	SW-3	SW-DUP1
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2020-09-30 16:00	2020-09-30 16:00	2020-09-30 16:00	2020-09-30 16:00
Parameter	Unit	G / S	RDL	1509786	1509822	1509823	1509824
Electrical Conductivity	µS/cm		2	37	10	80	81
pH	pH Units	6.5-8.5	NA	5.92	5.85	6.35	6.40
Hardness (as CaCO ₃) (Calculated)	mg/L		0.5	8.9	3.3	21.4	22.0
Total Dissolved Solids	mg/L		20	34	<20	42	44
Total Suspended Solids	mg/L		10	<10	<10	<10	<10
Alkalinity (as CaCO ₃)	mg/L		5	6	<5	36	39
Chloride	mg/L		0.10	7.25	0.30	5.69	5.63
Nitrate as N	mg/L		0.05	<0.05	<0.05	0.08	0.08
Nitrite as N	mg/L		0.05	<0.05	<0.05	<0.05	<0.05
Sulphate	mg/L		0.10	1.36	1.52	2.41	2.44
Ortho Phosphate as P	mg/L		0.10	<0.10	<0.10	<0.10	<0.10
Ammonia as N	mg/L		0.02	<0.02	0.03	0.69	0.68
Total Phosphorus	mg/L	*	0.02	<0.02	<0.02	<0.02	<0.02
Chemical Oxygen Demand	mg/L		5	16	<5	<5	8
Total Kjeldahl Nitrogen	mg/L		0.10	0.39	0.42	0.95	0.96
Dissolved Organic Carbon	mg/L		0.5	14.2	9.0	9.8	9.1
Phenols	mg/L	0.001	0.001	<0.001	<0.001	<0.001	<0.001
True Colour	TCU		5	98	56	71	62
Total Calcium	mg/L		0.05	2.61	0.86	6.61	6.81
Total Magnesium	mg/L		0.05	0.59	0.28	1.18	1.21
Total Potassium	mg/L		0.05	0.59	0.22	1.93	1.98
Total Sodium	mg/L		0.05	1.95	0.36	3.60	3.69
Aluminum-dissolved	mg/L	*	0.004	0.248	0.071	0.048	0.049
Total Antimony	mg/L	0.020	0.001	<0.001	<0.001	<0.001	<0.001
Total Arsenic	mg/L	0.1	0.003	<0.003	<0.003	<0.003	<0.003
Total Barium	mg/L		0.002	0.021	0.012	0.028	0.029
Total Beryllium	mg/L	*	0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Total Bismuth	mg/L		0.002	<0.002	<0.002	<0.002	<0.002
Total Boron	mg/L	0.2	0.010	<0.010	<0.010	0.048	0.048

Certified By:



Certificate of Analysis

AGAT WORK ORDER: 20U658703

PROJECT: 225335.003 Chapman Landfill

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CLIENT NAME: PINCHIN LTD.

SAMPLING SITE:N/A

ATTENTION TO: Tim McBride

SAMPLED BY:N/A

Surface Water Parameters

DATE RECEIVED: 2020-10-02

DATE REPORTED: 2020-10-14

		SAMPLE DESCRIPTION:		SW-1	SW-2	SW-3	SW-DUP1
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2020-09-30 16:00	2020-09-30 16:00	2020-09-30 16:00	2020-09-30 16:00
Parameter	Unit	G / S	RDL	1509786	1509822	1509823	1509824
Total Cadmium	mg/L	0.0002	0.0001	<0.0001	0.0003	<0.0001	<0.0001
Total Chromium	mg/L		0.003	<0.003	<0.003	<0.003	<0.003
Total Cobalt	mg/L	0.0009	0.0005	0.0006	0.0012	0.0031	0.0028
Total Copper	mg/L	0.005	0.001	<0.001	<0.001	0.002	<0.001
Total Iron	mg/L	0.3	0.010	0.427	1.08	0.810	0.822
Total Lead	mg/L	*	0.001	<0.001	<0.001	<0.001	<0.001
Total Manganese	mg/L		0.002	0.059	0.068	1.21	1.21
Total Molybdenum	mg/L	0.040	0.002	<0.002	<0.002	<0.002	<0.002
Total Nickel	mg/L	0.025	0.003	<0.003	<0.003	<0.003	<0.003
Total Selenium	mg/L	0.1	0.004	<0.004	<0.004	<0.004	<0.004
Total Silicon	mg/L		0.05	2.67	1.01	2.24	2.37
Total Silver	mg/L	0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Strontium	mg/L		0.005	0.037	0.020	0.068	0.065
Total Tin	mg/L		0.002	<0.002	<0.002	<0.002	<0.002
Total Titanium	mg/L		0.002	0.016	0.010	0.005	<0.002
Total Uranium	mg/L	0.005	0.002	<0.002	<0.002	<0.002	<0.002
Total Vanadium	mg/L	0.006	0.002	<0.002	<0.002	<0.002	<0.002
Total Zinc	mg/L	0.030	0.005	0.007	<0.005	<0.005	<0.005
Lab Filtration Performed				Y	Y	Y	Y

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO * Variable - refer to guideline reference document
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.

1509786-1509824 Dissolved Aluminum and DOC analysis completed on a lab filtered sample.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:




Exceedance Summary

AGAT WORK ORDER: 20U658703

PROJECT: 225335.003 Chapman Landfill

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CLIENT NAME: PINCHIN LTD.

ATTENTION TO: Tim McBride

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
1509765	BH-1	ON 169/03 AO&OG	Groundwater Parameters	Dissolved Organic Carbon	mg/L	5	6.7
1509765	BH-1	ON 169/03 AO&OG	Groundwater Parameters	Hardness (as CaCO3) (Calculated)	mg/L	80-100	113
1509773	BH-2	ON 169/03 AO&OG	Groundwater Parameters	Dissolved Organic Carbon	mg/L	5	11.1
1509773	BH-2	ON 169/03 AO&OG	Groundwater Parameters	Hardness (as CaCO3) (Calculated)	mg/L	80-100	493
1509773	BH-2	ON 169/03 AO&OG	Groundwater Parameters	Turbidity	NTU	5	255
1509773	BH-2	ON 169/03 MAC/IMAC	Groundwater Parameters	Dissolved Sodium	mg/L	20	43.3
1509774	BH-3-II	ON 169/03 AO&OG	Groundwater Parameters	Alkalinity (as CaCO3)	mg/L	30-500	16
1509774	BH-3-II	ON 169/03 AO&OG	Groundwater Parameters	Hardness (as CaCO3) (Calculated)	mg/L	80-100	22.4
1509774	BH-3-II	ON 169/03 AO&OG	Groundwater Parameters	Turbidity	NTU	5	201
1509774	BH-3-II	ON 169/03 AO&OG	Groundwater Parameters	pH	pH Units	6.5-8.5	6.17
1509775	BH-4	ON 169/03 AO&OG	Groundwater Parameters	Dissolved Organic Carbon	mg/L	5	10.8
1509775	BH-4	ON 169/03 AO&OG	Groundwater Parameters	Hardness (as CaCO3) (Calculated)	mg/L	80-100	247
1509775	BH-4	ON 169/03 AO&OG	Groundwater Parameters	Turbidity	NTU	5	149
1509776	BH-4-II	ON 169/03 AO&OG	Groundwater Parameters	Dissolved Organic Carbon	mg/L	5	13.2
1509776	BH-4-II	ON 169/03 AO&OG	Groundwater Parameters	Hardness (as CaCO3) (Calculated)	mg/L	80-100	227
1509777	BH-5-II	ON 169/03 AO&OG	Groundwater Parameters	Dissolved Organic Carbon	mg/L	5	5.5
1509777	BH-5-II	ON 169/03 AO&OG	Groundwater Parameters	Hardness (as CaCO3) (Calculated)	mg/L	80-100	226
1509777	BH-5-II	ON 169/03 AO&OG	Groundwater Parameters	Turbidity	NTU	5	225
1509778	BH-6-III	ON 169/03 AO&OG	Groundwater Parameters	Hardness (as CaCO3) (Calculated)	mg/L	80-100	142
1509778	BH-6-III	ON 169/03 AO&OG	Groundwater Parameters	Turbidity	NTU	5	213
1509779	BH-7-II	ON 169/03 AO&OG	Groundwater Parameters	Alkalinity (as CaCO3)	mg/L	30-500	7
1509779	BH-7-II	ON 169/03 AO&OG	Groundwater Parameters	Hardness (as CaCO3) (Calculated)	mg/L	80-100	6.0
1509779	BH-7-II	ON 169/03 AO&OG	Groundwater Parameters	Turbidity	NTU	5	2640
1509779	BH-7-II	ON 169/03 AO&OG	Groundwater Parameters	pH	pH Units	6.5-8.5	5.95
1509780	BH-8-I	ON 169/03 AO&OG	Groundwater Parameters	Dissolved Organic Carbon	mg/L	5	5.8
1509780	BH-8-I	ON 169/03 AO&OG	Groundwater Parameters	Hardness (as CaCO3) (Calculated)	mg/L	80-100	126
1509780	BH-8-I	ON 169/03 AO&OG	Groundwater Parameters	Turbidity	NTU	5	473
1509781	BH-9-I	ON 169/03 AO&OG	Groundwater Parameters	Dissolved Organic Carbon	mg/L	5	10.4
1509781	BH-9-I	ON 169/03 AO&OG	Groundwater Parameters	Hardness (as CaCO3) (Calculated)	mg/L	80-100	140
1509781	BH-9-I	ON 169/03 AO&OG	Groundwater Parameters	Turbidity	NTU	5	777
1509781	BH-9-I	ON 169/03 MAC/IMAC	Groundwater Parameters	Dissolved Sodium	mg/L	20	22.8
1509782	BH10-1	ON 169/03 AO&OG	Groundwater Parameters	Dissolved Organic Carbon	mg/L	5	7.8
1509782	BH10-1	ON 169/03 AO&OG	Groundwater Parameters	Hardness (as CaCO3) (Calculated)	mg/L	80-100	215
1509782	BH10-1	ON 169/03 AO&OG	Groundwater Parameters	Turbidity	NTU	5	187
1509783	BH11	ON 169/03 AO&OG	Groundwater Parameters	Alkalinity (as CaCO3)	mg/L	30-500	15
1509783	BH11	ON 169/03 AO&OG	Groundwater Parameters	Hardness (as CaCO3) (Calculated)	mg/L	80-100	7.5
1509783	BH11	ON 169/03 AO&OG	Groundwater Parameters	Turbidity	NTU	5	771
1509783	BH11	ON 169/03 AO&OG	Groundwater Parameters	pH	pH Units	6.5-8.5	6.12
1509784	BHDUP1	ON 169/03 AO&OG	Groundwater Parameters	Alkalinity (as CaCO3)	mg/L	30-500	16
1509784	BHDUP1	ON 169/03 AO&OG	Groundwater Parameters	Hardness (as CaCO3) (Calculated)	mg/L	80-100	5.6
1509784	BHDUP1	ON 169/03 AO&OG	Groundwater Parameters	Turbidity	NTU	5	727
1509784	BHDUP1	ON 169/03 AO&OG	Groundwater Parameters	pH	pH Units	6.5-8.5	6.08
1509785	BHDUP2	ON 169/03 AO&OG	Groundwater Parameters	Dissolved Organic Carbon	mg/L	5	13.2

Exceedance Summary

AGAT WORK ORDER: 20U658703

PROJECT: 225335.003 Chapman Landfill

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CLIENT NAME: PINCHIN LTD.

ATTENTION TO: Tim McBride

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
1509785	BHDUP2	ON 169/03 AO&OG	Groundwater Parameters	Hardness (as CaCO ₃) (Calculated)	mg/L	80-100	250
1509785	BHDUP2	ON 169/03 AO&OG	Groundwater Parameters	Turbidity	NTU	5	5.1
1509786	SW-1	ON PWQO	Surface Water Parameters	Total Iron	mg/L	0.3	0.427
1509786	SW-1	ON PWQO	Surface Water Parameters	pH	pH Units	6.5-8.5	5.92
1509822	SW-2	ON PWQO	Surface Water Parameters	Total Cadmium	mg/L	0.0002	0.0003
1509822	SW-2	ON PWQO	Surface Water Parameters	Total Cobalt	mg/L	0.0009	0.0012
1509822	SW-2	ON PWQO	Surface Water Parameters	Total Iron	mg/L	0.3	1.08
1509822	SW-2	ON PWQO	Surface Water Parameters	pH	pH Units	6.5-8.5	5.85
1509823	SW-3	ON PWQO	Surface Water Parameters	Total Cobalt	mg/L	0.0009	0.0031
1509823	SW-3	ON PWQO	Surface Water Parameters	Total Iron	mg/L	0.3	0.810
1509823	SW-3	ON PWQO	Surface Water Parameters	pH	pH Units	6.5-8.5	6.35
1509824	SW-DUP1	ON PWQO	Surface Water Parameters	Total Cobalt	mg/L	0.0009	0.0028
1509824	SW-DUP1	ON PWQO	Surface Water Parameters	Total Iron	mg/L	0.3	0.822
1509824	SW-DUP1	ON PWQO	Surface Water Parameters	pH	pH Units	6.5-8.5	6.40

Quality Assurance

CLIENT NAME: PINCHIN LTD.

PROJECT: 225335.003 Chapman Landfill

SAMPLING SITE: N/A

AGAT WORK ORDER: 20U658703

ATTENTION TO: Tim McBride

SAMPLED BY: N/A

Water Analysis															
RPT Date: Oct 14, 2020			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

Groundwater Parameters

Electrical Conductivity	1509720		65	64	1.6%	< 2	97%	90%	110%						
pH	1509720		6.73	6.45	4.2%	NA	100%	90%	110%						
Total Dissolved Solids	1503699		156	154	1.3%	< 20	94%	80%	120%						
Total Suspended Solids	1509723		61	62	1.6%	< 10	104%	80%	120%						
Alkalinity (as CaCO3)	1509720		37	32	14.5%	< 5	100%	80%	120%						
Chloride	1509780	1509780	27.2	26.9	1.1%	< 0.10	98%	70%	130%	106%	80%	120%	NA	70%	130%
Nitrate as N	1509780	1509780	3.58	3.48	2.8%	< 0.05	99%	70%	130%	107%	80%	120%	109%	70%	130%
Nitrite as N	1509780	1509780	<0.05	<0.05	NA	< 0.05	105%	70%	130%	106%	80%	120%	96%	70%	130%
Sulphate	1509780	1509780	18.6	18.5	0.5%	< 0.10	95%	70%	130%	100%	80%	120%	103%	70%	130%
Ortho Phosphate as P	1509780	1509780	<0.10	<0.10	NA	< 0.10	103%	70%	130%	97%	80%	120%	113%	70%	130%
Ammonia as N	1509715		<0.02	<0.02	NA	< 0.02	106%	70%	130%	101%	80%	120%	100%	70%	130%
Total Phosphorus	1509765	1509765	<0.02	<0.02	NA	< 0.02	102%	70%	130%	106%	80%	120%	105%	70%	130%
Chemical Oxygen Demand	1509718		18	17	NA	< 5	106%	80%	120%	102%	90%	110%	105%	70%	130%
Total Kjeldahl Nitrogen	1509765	1509765	3.80	3.83	0.8%	< 0.10	102%	70%	130%	99%	80%	120%	101%	70%	130%
Dissolved Organic Carbon	1511279		3.2	3.2	0.0%	< 0.5	103%	90%	110%	99%	90%	110%	113%	80%	120%
Phenols	1538616		<0.001	<0.001	NA	< 0.001	106%	90%	110%	95%	90%	110%	110%	80%	120%
Turbidity	1509765	1509765	2.2	2.4	NA	< 0.5	102%	80%	120%						
Dissolved Calcium	1509765	1509765	34.8	33.9	2.6%	< 0.05	103%	70%	130%	101%	80%	120%	101%	70%	130%
Dissolved Magnesium	1509765	1509765	6.27	6.07	3.2%	< 0.05	103%	70%	130%	101%	80%	120%	101%	70%	130%
Dissolved Potassium	1509765	1509765	9.14	8.89	2.8%	< 0.05	101%	70%	130%	99%	80%	120%	100%	70%	130%
Dissolved Sodium	1509765	1509765	18.0	17.4	3.4%	< 0.05	102%	70%	130%	100%	80%	120%	101%	70%	130%
Dissolved Aluminum	1509765	1509765	0.026	0.013	NA	< 0.004	93%	70%	130%	113%	80%	120%	117%	70%	130%
Dissolved Antimony	1509765	1509765	<0.001	<0.001	NA	< 0.001	98%	70%	130%	103%	80%	120%	101%	70%	130%
Dissolved Arsenic	1509765	1509765	0.002	0.002	NA	< 0.001	99%	70%	130%	102%	80%	120%	106%	70%	130%
Dissolved Barium	1509765	1509765	0.078	0.080	2.5%	< 0.002	90%	70%	130%	99%	80%	120%	95%	70%	130%
Dissolved Beryllium	1509765	1509765	<0.0005	<0.0005	NA	< 0.0005	101%	70%	130%	99%	80%	120%	101%	70%	130%
Dissolved Bismuth	1509765	1509765	<0.002	<0.002	NA	< 0.002	96%	70%	130%	96%	80%	120%	98%	70%	130%
Dissolved Boron	1509765	1509765	0.277	0.292	5.3%	< 0.010	97%	70%	130%	97%	80%	120%	99%	70%	130%
Dissolved Cadmium	1509765	1509765	<0.0001	0.0001	NA	< 0.0001	102%	70%	130%	99%	80%	120%	104%	70%	130%
Dissolved Chromium	1509765	1509765	0.003	<0.002	NA	< 0.002	99%	70%	130%	99%	80%	120%	94%	70%	130%
Dissolved Cobalt	1509765	1509765	0.0053	0.0048	9.9%	< 0.0005	98%	70%	130%	99%	80%	120%	93%	70%	130%
Dissolved Copper	1509765	1509765	0.007	0.007	0.0%	< 0.001	100%	70%	130%	100%	80%	120%	92%	70%	130%
Dissolved Iron	1509765	1509765	0.032	0.038	NA	< 0.010	97%	70%	130%	105%	80%	120%	94%	70%	130%
Dissolved Lead	1509765	1509765	<0.0005	<0.0005	NA	< 0.0005	94%	70%	130%	97%	80%	120%	94%	70%	130%
Dissolved Manganese	1509765	1509765	4.41	4.35	1.4%	< 0.002	104%	70%	130%	113%	80%	120%	NA	70%	130%
Dissolved Molybdenum	1509765	1509765	<0.002	<0.002	NA	< 0.002	100%	70%	130%	101%	80%	120%	98%	70%	130%
Dissolved Nickel	1509765	1509765	<0.003	<0.003	NA	< 0.003	99%	70%	130%	98%	80%	120%	98%	70%	130%
Dissolved Selenium	1509765	1509765	<0.001	<0.001	NA	< 0.001	108%	70%	130%	105%	80%	120%	109%	70%	130%
Dissolved Silver	1509765	1509765	<0.0001	<0.0001	NA	< 0.0001	99%	70%	130%	102%	80%	120%	96%	70%	130%

AGAT QUALITY ASSURANCE REPORT (V1)

Page 13 of 22

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: PINCHIN LTD.

PROJECT: 225335.003 Chapman Landfill

SAMPLING SITE: N/A

AGAT WORK ORDER: 20U658703

ATTENTION TO: Tim McBride

SAMPLED BY: N/A

Water Analysis (Continued)

RPT Date: Oct 14, 2020			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Dissolved Strontium	1509765	1509765	0.180	0.194	7.5%	< 0.005	85%	70%	130%	86%	80%	120%	82%	70%	130%
Dissolved Thallium	1509765	1509765	<0.0003	<0.0003	NA	< 0.0003	96%	70%	130%	102%	80%	120%	99%	70%	130%
Dissolved Tin	1509765	1509765	<0.002	<0.002	NA	< 0.002	110%	70%	130%	103%	80%	120%	107%	70%	130%
Dissolved Titanium	1509765	1509765	<0.002	<0.002	NA	< 0.002	119%	70%	130%	107%	80%	120%	116%	70%	130%
Dissolved Tungsten	1509765	1509765	<0.010	<0.010	NA	< 0.010	99%	70%	130%	93%	80%	120%	92%	70%	130%
Dissolved Uranium	1509765	1509765	0.0006	0.0006	NA	< 0.0005	94%	70%	130%	95%	80%	120%	98%	70%	130%
Dissolved Vanadium	1509765	1509765	<0.002	<0.002	NA	< 0.002	99%	70%	130%	99%	80%	120%	94%	70%	130%
Dissolved Zinc	1509765	1509765	<0.005	<0.005	NA	< 0.005	103%	70%	130%	109%	80%	120%	99%	70%	130%
Surface Water Parameters															
Electrical Conductivity	1509781	1509781	441	441	0.0%	< 2	96%	90%	110%						
pH	1509781	1509781	6.85	6.79	0.9%	NA	100%	90%	110%						
Total Dissolved Solids	1503699		156	154	1.3%	< 20	94%	80%	120%						
Total Suspended Solids	1509781	1509781	1160	1240	6.7%	< 10	104%	80%	120%						
Alkalinity (as CaCO3)	1509781	1509781	201	200	0.5%	< 5	102%	80%	120%						
Chloride	1509780	1509780	27.2	26.9	1.1%	< 0.10	98%	70%	130%	106%	80%	120%	NA	70%	130%
Nitrate as N	1509780	1509780	3.58	3.48	2.8%	< 0.05	99%	70%	130%	107%	80%	120%	109%	70%	130%
Nitrite as N	1509780	1509780	<0.05	<0.05	NA	< 0.05	105%	70%	130%	106%	80%	120%	96%	70%	130%
Sulphate	1509780	1509780	18.6	18.5	0.5%	< 0.10	95%	70%	130%	100%	80%	120%	103%	70%	130%
Ortho Phosphate as P	1509780	1509780	<0.10	<0.10	NA	< 0.10	103%	70%	130%	97%	80%	120%	113%	70%	130%
Ammonia as N	1509777	1509777	0.27	0.26	3.8%	< 0.02	105%	70%	130%	101%	80%	120%	96%	70%	130%
Total Phosphorus	1509786	1509786	<0.02	<0.02	NA	< 0.02	98%	70%	130%	97%	80%	120%	86%	70%	130%
Chemical Oxygen Demand	1509718		18	17	NA	< 5	106%	80%	120%	102%	90%	110%	105%	70%	130%
Total Kjeldahl Nitrogen	1509765	1509765	3.80	3.83	0.8%	< 0.10	102%	70%	130%	99%	80%	120%	101%	70%	130%
Dissolved Organic Carbon	1509781	1509781	10.4	10.0	3.9%	< 0.5	100%	90%	110%	100%	90%	110%	100%	80%	120%
Phenols	1509779	1509779	0.009	0.009	0.0%	< 0.001	101%	90%	110%	98%	90%	110%	106%	80%	120%
True Colour	1510025		29	28	3.5%	< 5	102%	90%	110%						
Total Calcium	1510487		43.42	42.54	2.0%	< 0.05	96%	70%	130%	88%	80%	120%	96%	70%	130%
Total Magnesium	1510487		11.22	11.17	0.4%	< 0.05	94%	70%	130%	86%	80%	120%	93%	70%	130%
Total Potassium	1510487		3.34	3.34	0.0%	< 0.05	95%	70%	130%	87%	80%	120%	94%	70%	130%
Total Sodium	1510487		39.51	38.90	1.6%	< 0.05	100%	70%	130%	92%	80%	120%	99%	70%	130%
Aluminum-dissolved	1510487		<0.004	<0.004	NA	< 0.004	95%	70%	130%	98%	80%	120%	95%	70%	130%
Total Antimony	1496660		<0.001	<0.001	NA	< 0.001	100%	70%	130%	101%	80%	120%	98%	70%	130%
Total Arsenic	1496660		<0.003	<0.003	NA	< 0.003	95%	70%	130%	91%	80%	120%	96%	70%	130%
Total Barium	1496660		<0.002	<0.002	NA	< 0.002	99%	70%	130%	100%	80%	120%	94%	70%	130%
Total Beryllium	1496660		<0.0005	<0.0005	NA	< 0.0005	100%	70%	130%	102%	80%	120%	94%	70%	130%
Total Bismuth	1496660		<0.02	<0.02	NA	< 0.002	103%	70%	130%	96%	80%	120%	101%	70%	130%
Total Boron	1496660		<0.010	<0.010	NA	< 0.010	103%	70%	130%	101%	80%	120%	93%	70%	130%
Total Cadmium	1496660		<0.0001	<0.0001	NA	< 0.0001	101%	70%	130%	99%	80%	120%	93%	70%	130%

Quality Assurance

CLIENT NAME: PINCHIN LTD.

PROJECT: 225335.003 Chapman Landfill

SAMPLING SITE: N/A

AGAT WORK ORDER: 20U658703

ATTENTION TO: Tim McBride

SAMPLED BY: N/A

Water Analysis (Continued)

RPT Date: Oct 14, 2020			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Total Chromium	1496660		<0.003	<0.003	NA	< 0.003	100%	70%	130%	101%	80%	120%	99%	70%	130%
Total Cobalt	1496660		<0.0005	<0.0005	NA	< 0.0005	99%	70%	130%	99%	80%	120%	96%	70%	130%
Total Copper	1496660		<0.001	<0.001	NA	< 0.001	100%	70%	130%	99%	80%	120%	99%	70%	130%
Total Iron	1496660		<0.010	<0.010	NA	< 0.010	114%	70%	130%	112%	80%	120%	108%	70%	130%
Total Lead	1496660		<0.001	<0.001	NA	< 0.001	97%	70%	130%	97%	80%	120%	98%	70%	130%
Total Manganese	1496660		<0.002	0.002	NA	< 0.002	107%	70%	130%	108%	80%	120%	100%	70%	130%
Total Molybdenum	1496660		<0.002	<0.002	NA	< 0.002	99%	70%	130%	100%	80%	120%	96%	70%	130%
Total Nickel	1496660		<0.003	<0.003	NA	< 0.003	101%	70%	130%	99%	80%	120%	98%	70%	130%
Total Selenium	1496660		<0.004	<0.004	NA	< 0.004	105%	70%	130%	99%	80%	120%	93%	70%	130%
Total Silicon	1496660		<0.05	<0.05	NA	< 0.05	101%	70%	130%	98%	80%	120%	90%	70%	130%
Total Silver	1496660		<0.0001	<0.0001	NA	< 0.0001	102%	70%	130%	96%	80%	120%	93%	70%	130%
Total Strontium	1496660		<0.005	<0.005	NA	< 0.005	97%	70%	130%	101%	80%	120%	93%	70%	130%
Total Tin	1496660		<0.002	<0.002	NA	< 0.002	94%	70%	130%	101%	80%	120%	94%	70%	130%
Total Titanium	1496660		0.009	<0.002	NA	< 0.002	92%	70%	130%	81%	80%	120%	83%	70%	130%
Total Uranium	1496660		<0.002	<0.002	NA	< 0.002	97%	70%	130%	101%	80%	120%	97%	70%	130%
Total Vanadium	1496660		<0.002	<0.002	NA	< 0.002	100%	70%	130%	101%	80%	120%	99%	70%	130%
Total Zinc	1496660		<0.05	<0.05	NA	< 0.005	100%	70%	130%	111%	80%	120%	108%	70%	130%

Comments: NA signifies Not Applicable.

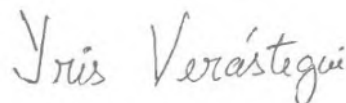
If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Matrix spike: Spike level < native concentration. Matrix spike acceptance limits do not apply.

BOD-Toronto

Biochemical Oxygen Demand, Total 1527483 4200 3900 7.4% < 2 93% 70% 130%

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

Certified By:


Method Summary

CLIENT NAME: PINCHIN LTD.
PROJECT: 225335.003 Chapman Landfill
SAMPLING SITE:N/A
AGAT WORK ORDER: 20U658703
ATTENTION TO: Tim McBride
SAMPLED BY:N/A

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Biochemical Oxygen Demand, Total	INOR-121-6023	SM 5210 B	INCUBATOR
Electrical Conductivity	INOR-93-6000	modified from SM 2510 B	PC TITRATE
pH	INOR-93-6000	modified from SM 4500-H+ B	PC TITRATE
Hardness (as CaCO ₃) (Calculated)	MET-93-6105	modified from EPA SW-846 6010C & 200.7 & SM 2340 B	CALCULATION
Total Dissolved Solids	INOR-93-6028	modified from EPA 1684,ON MOECC E3139,SM 2540C,D	BALANCE
Total Suspended Solids	INOR-93-6028	modified from EPA 1684,ON MOECC E3139,SM 2540C,D	BALANCE
Alkalinity (as CaCO ₃)	INOR-93-6000	SM 2320 B	PC TITRATE
Chloride	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Nitrate as N	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Ortho Phosphate as P	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Ammonia as N	INOR-93-6059	modified from SM 4500-NH ₃ H	LACHAT FIA
Total Phosphorus	INOR-93-6057	modified from LACHAT 10-115-01-3A	LACHAT FIA
Chemical Oxygen Demand	INOR-93-6042	SM 5220 D	SPECTROPHOTOMETER
Total Kjeldahl Nitrogen	INOR-93-6048	modified from EPA 351.2 and SM 4500-NORG D	LACHAT FIA
Dissolved Organic Carbon	INOR-93-6049	EPA 415.1 & SM 5310 B	SHIMADZU CARBON ANALYZER
Phenols	INOR-93-6072	modified from SM 5530 D	LACHAT FIA
Turbidity	INOR-93-6044	modified from SM 2130 B	NEPHELOMETER
Dissolved Calcium	MET-93-6105	modified from EPA 6010D	ICP/OES
Dissolved Magnesium	MET-93-6105	modified from EPA 6010D	ICP/OES
Dissolved Potassium	MET-93-6105	modified from EPA 6010D	ICP/OES
Dissolved Sodium	MET-93-6105	modified from EPA 6010D	ICP/OES
Dissolved Aluminum	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Antimony	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Arsenic	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Barium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Beryllium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Bismuth	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Boron	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Cadmium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Chromium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Cobalt	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Copper	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Iron	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Lead	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS

Method Summary

CLIENT NAME: PINCHIN LTD.
PROJECT: 225335.003 Chapman Landfill
SAMPLING SITE:N/A
AGAT WORK ORDER: 20U658703
ATTENTION TO: Tim McBride
SAMPLED BY:N/A

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Dissolved Manganese	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Molybdenum	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Nickel	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Selenium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Silver	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Strontium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Thallium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Tin	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Titanium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Tungsten	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Uranium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Vanadium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Zinc	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Lab Filtration Performed			FILTRATION
Total Phosphorus	INOR-93-6022	modified from SM 4500-P B and SM 4500-P E	SPECTROPHOTOMETER
True Colour	INOR-93-6046	SM 2120 B	SPECTROPHOTOMETER
Total Calcium	MET-93-6105	modified from EPA 6010D	ICP/OES
Total Magnesium	MET-93-6105	modified from EPA 6010D	ICP/OES
Total Potassium	MET-93-6105	modified from EPA 6010D	ICP/OES
Total Sodium	MET-93-6105	modified from EPA 6010D	ICP/OES
Aluminum-dissolved	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Total Antimony	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Arsenic	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Barium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Beryllium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Bismuth	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Boron	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Cadmium	MET -93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Chromium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Cobalt	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Copper	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS

Method Summary

CLIENT NAME: PINCHIN LTD.

PROJECT: 225335.003 Chapman Landfill

SAMPLING SITE: N/A

AGAT WORK ORDER: 20U658703

ATTENTION TO: Tim McBride

SAMPLED BY: N/A

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Total Iron	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Lead	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Manganese	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Molybdenum	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Nickel	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Selenium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Silicon	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Silver	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Strontium	INOR-93-6003	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Tin	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Titanium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Uranium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Vanadium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Zinc	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS

CHAIN OF CUSTODY RECORD

LABORATORY USE ONLY

Arrival Condition: ☐ Good ☐ Poor (complete "Notes")

Arrival Temperature:

AGAT Job Number:

Notes: On ice

Client Information

Company:	Pinchin Ltd.	
Contact:	Tim McBride	
Address:	957 Cambrian Heights, Unit # 203	
Sudbury ON P3C 5S5		
Phone:	705-521-0560	Fax:
PO#:		
Client Project #:	225335.003 Chapman Landfill	
AGAT Quotation #:		267698

Report Information

1. Name: Tim McBride
Email: tmcbride@Pinchin.com

2. Name: _____
Email: _____

3. Name: _____
Email: _____

4. Name: _____
Email: _____

Report Format

(Please "x"
those that
apply)

<input type="checkbox"/>	Single sample per page
<input checked="" type="checkbox"/>	Multiple samples per page
<input type="checkbox"/>	Results by Fax

Turnaround Time (TAT)*

(Please "x" the applicable box below)

Regular TAT:

x 5 to 7 working days

Rush TAT (Rush Surcharges Apply):

	3 to 5 days
	48 to 72 hours
	24 to 48 hours

Date Required (Rush surcharges may apply)

Regulatory Guideline Required:

(Please "x" those that apply)

<input type="checkbox"/>	Reg 153 Table	<input type="checkbox"/>	Sewer Use	<input type="checkbox"/>	PWQO
<input type="checkbox"/>	(indicate one)	<input type="checkbox"/>	Region	<input type="checkbox"/>	Reg 558
<input type="checkbox"/>	Ind/Com	<input type="checkbox"/>	(indicate one)	<input type="checkbox"/>	CCME
<input type="checkbox"/>	Res/Park	<input type="checkbox"/>	Sanitary	<input checked="" type="checkbox"/>	Other (indicate)
<input type="checkbox"/>	Ag	<input type="checkbox"/>	Storm	<input type="checkbox"/>	GW - ODWS
<input type="checkbox"/>	Med/Fine	<input type="checkbox"/>	Coarse	<input type="checkbox"/>	

Is this a drinking water sample
(potable water intended for
human consumption)?

	Yes
x	No

If "Yes" please use the Drinking Water Chain of Custody Record

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments - Site/Sample Info, Sample Containment																				
BH-1	30/09/20	11am-4pm	water	7		X	X	X	X	X	X	X	X	X											
BH-2			water	7		X	X	X	X	X	X	X	X	X											
BH-3-II			water	7		X	X	X	X	X	X	X	X	X											
BH-4			water	7		X	X	X	X	X	X	X	X	X											
BH-4-II			water	7		X	X	X	X	X	X	X	X	X											
BH-5-II			water	7		X	X	X	X	X	X	X	X	X											
BH-6-II			water	7		X	X	X	X	X	X	X	X	X											
BH-6-III	30/09/20	11am-4pm	water	7		X	X	X	X	X	X	X	X	X											
BH-7-II			water	7		X	X	X	X	X	X	X	X	X											
BH-8-I			water	7		X	X	X	X	X	X	X	X	X											
BH-9-I			water	7		X	X	X	X	X	X	X	X	X											

TOTAL # OF CONTAINERS

11

* Samples received after 2:00 PM will be logged in for the next business day. TAT is exclusive of weekends and statutory holidays

Sample Relinquished By (print name & sign)

Date/Time

Samples Received By (print name and sign)	
---	--

Date/Time

Special Instructions

PLEASE FILTER DOC AT SAMPLE RECEPTION

Sample Relinquished By (print name & sign)

Date/Time

Samples Received By (print name and sign)

Date/Time

3:15pm

Page 1 of 3



Sample Temperature Log

Client: Pinchin

COC# or Work Order #: 200658703

of Coolers: 4

of Submissions: 2

Arrival Temperatures - Branch/Driver

Cooler #1: 10.1 / 19.9 / 9.8
Cooler #2: 5.5 / 5.5 / 5.4
Cooler #3: 7.0 / 7.0 / 6.8
Cooler #4: 6.9 / 6.9 / 6.8
Cooler #5: _____ / _____ / _____
Cooler #6: _____ / _____ / _____
Cooler #7: _____ / _____ / _____
Cooler #8: _____ / _____ / _____
Cooler #9: _____ / _____ / _____
Cooler #10: _____ / _____ / _____

on ice

Arrival Temperatures - Laboratory

Cooler #1: 6.3 / 6.4 / 7.7
Cooler #2: 6.8 / 7.6 / 7.7
Cooler #3: 6.5 / 6.6 / 7.9
Cooler #4: 8.8 / 8.9 / 9.2
Cooler #5: 7.2 / 7.6 / 8.8
Cooler #6: 2.9 / 3.0 / 3.5
Cooler #7: 3.2 / 3.4 / 4.6
Cooler #8: _____ / _____ / _____
Cooler #9: _____ / _____ / _____
Cooler #10: _____ / _____ / _____

7 Coolers

IR Gun ID: _____

IR Gun ID: _____

Taken By: Katrice Bowers

Taken By: Simran

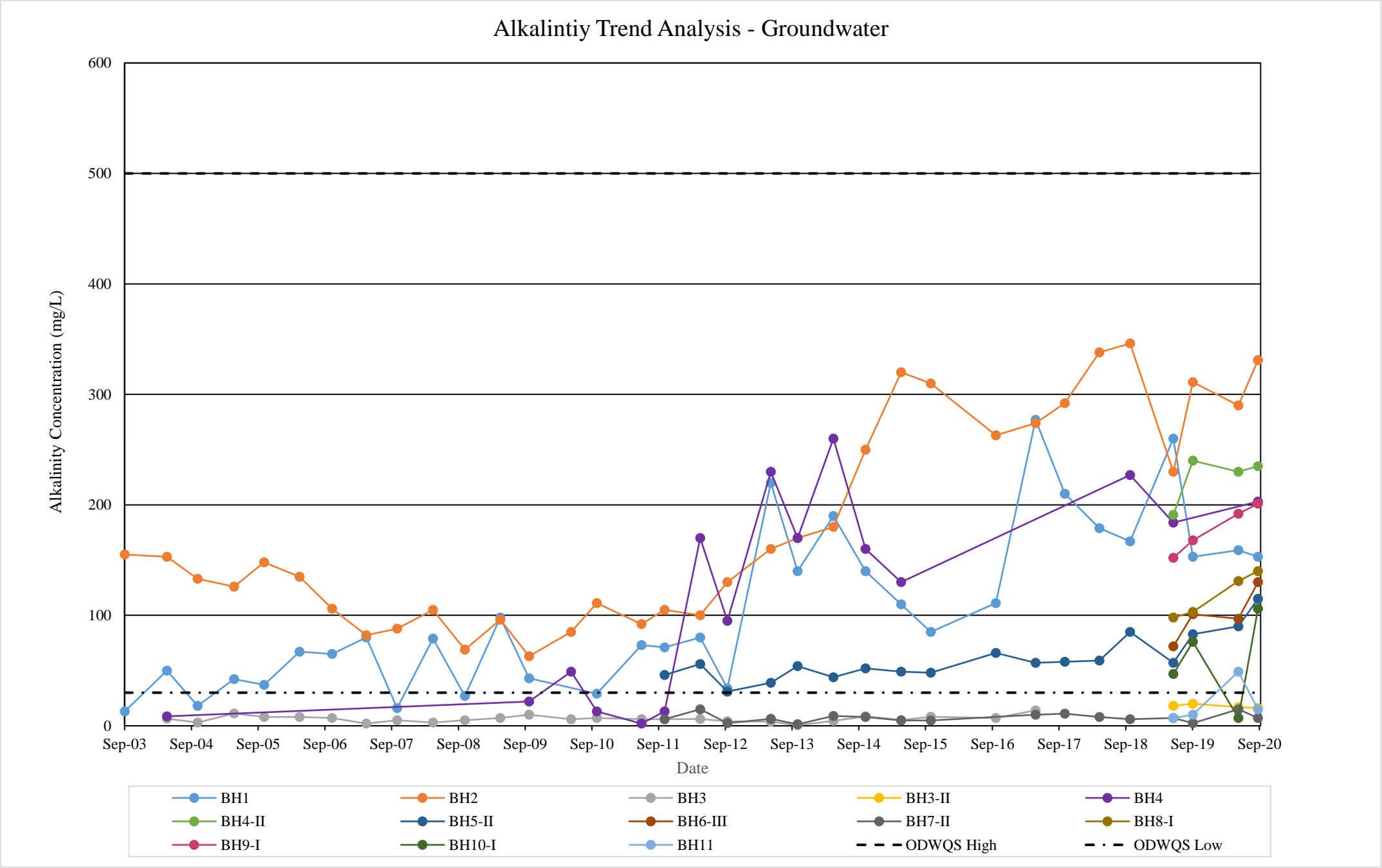
Date (yyyy/mm/dd): 2020/10/01 Time: 3:15 AM / PM

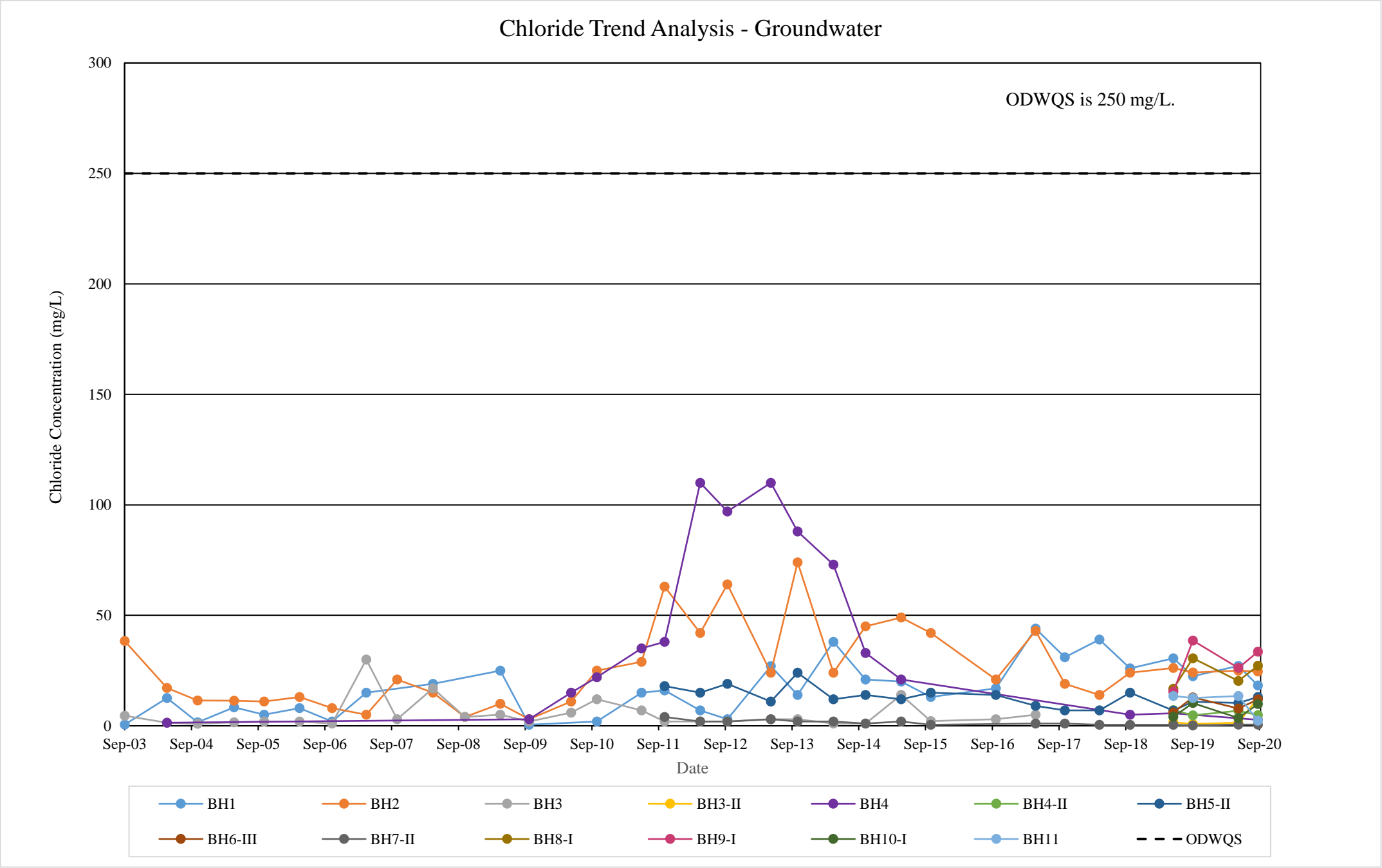
Date (yyyy/mm/dd): 2020/10/02 Time: 1:30 AM / PM

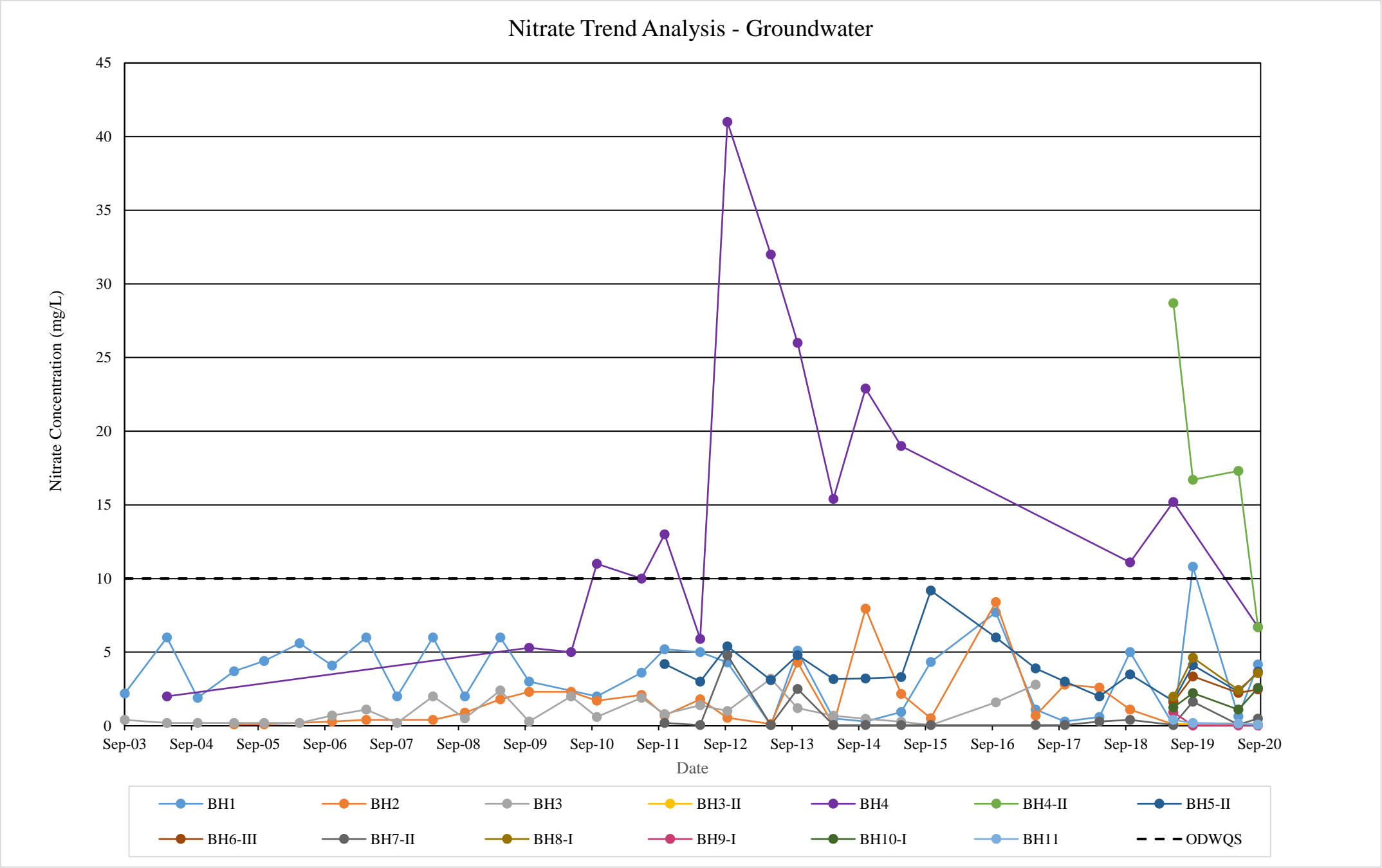
Instructions for use of this form: 1) complete all fields of info including total # of coolers and # of submissions rec'd, 2) photocopy and place in each submission prior to giving a WO#, 3) Proceed as normal, write the WO# and scan (please make sure to scan along with the COC)

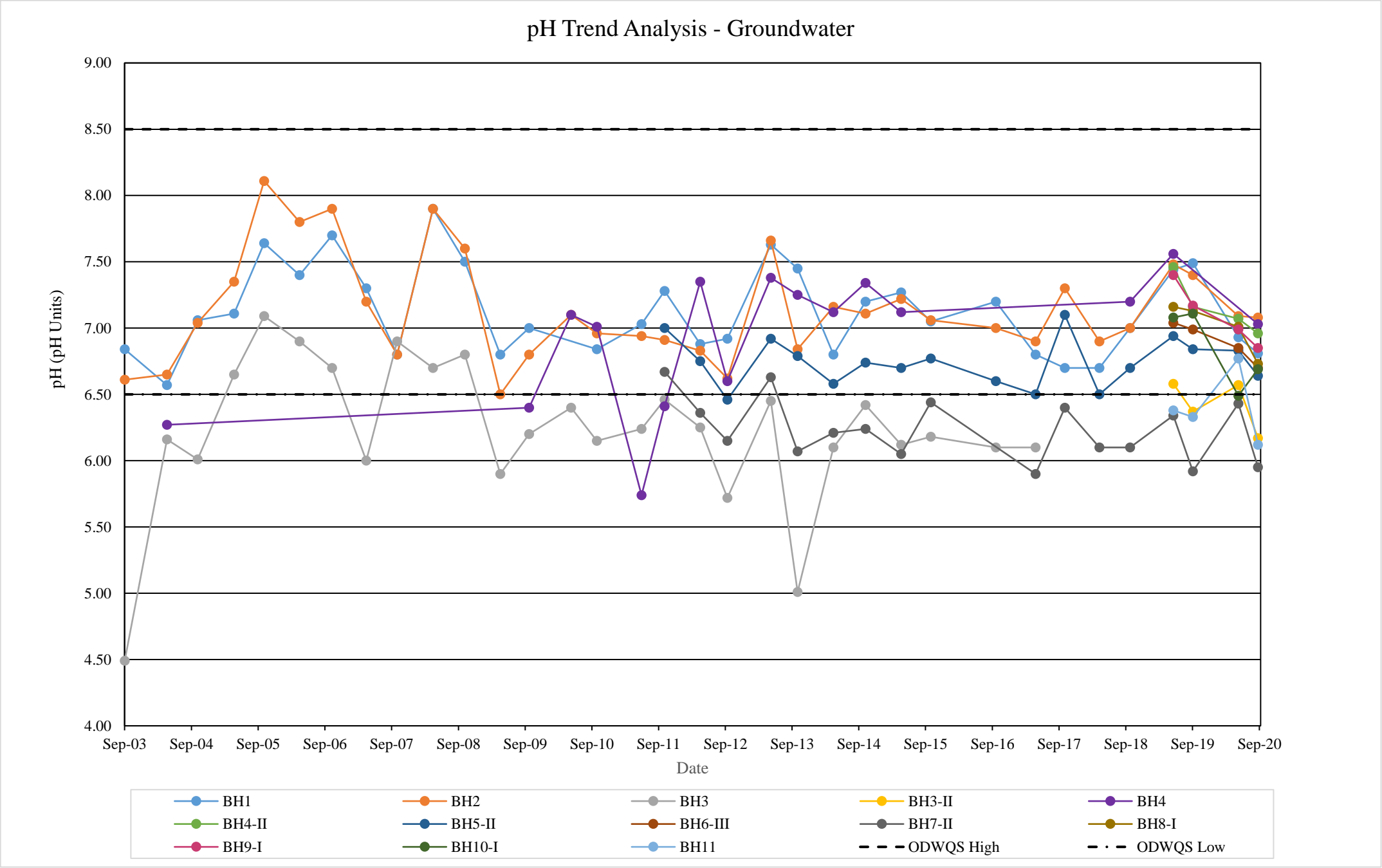
APPENDIX VI

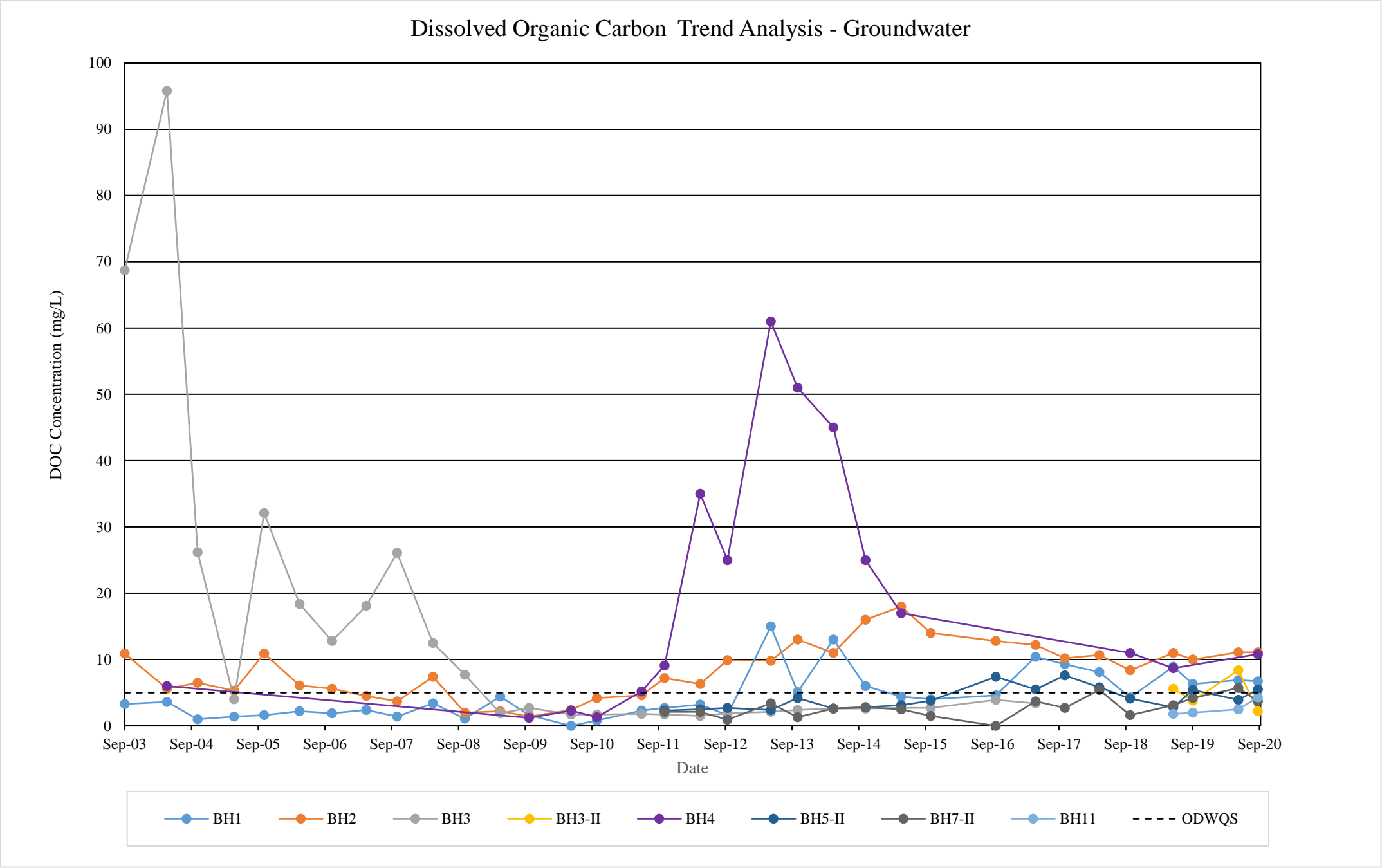
Groundwater Trend Analysis





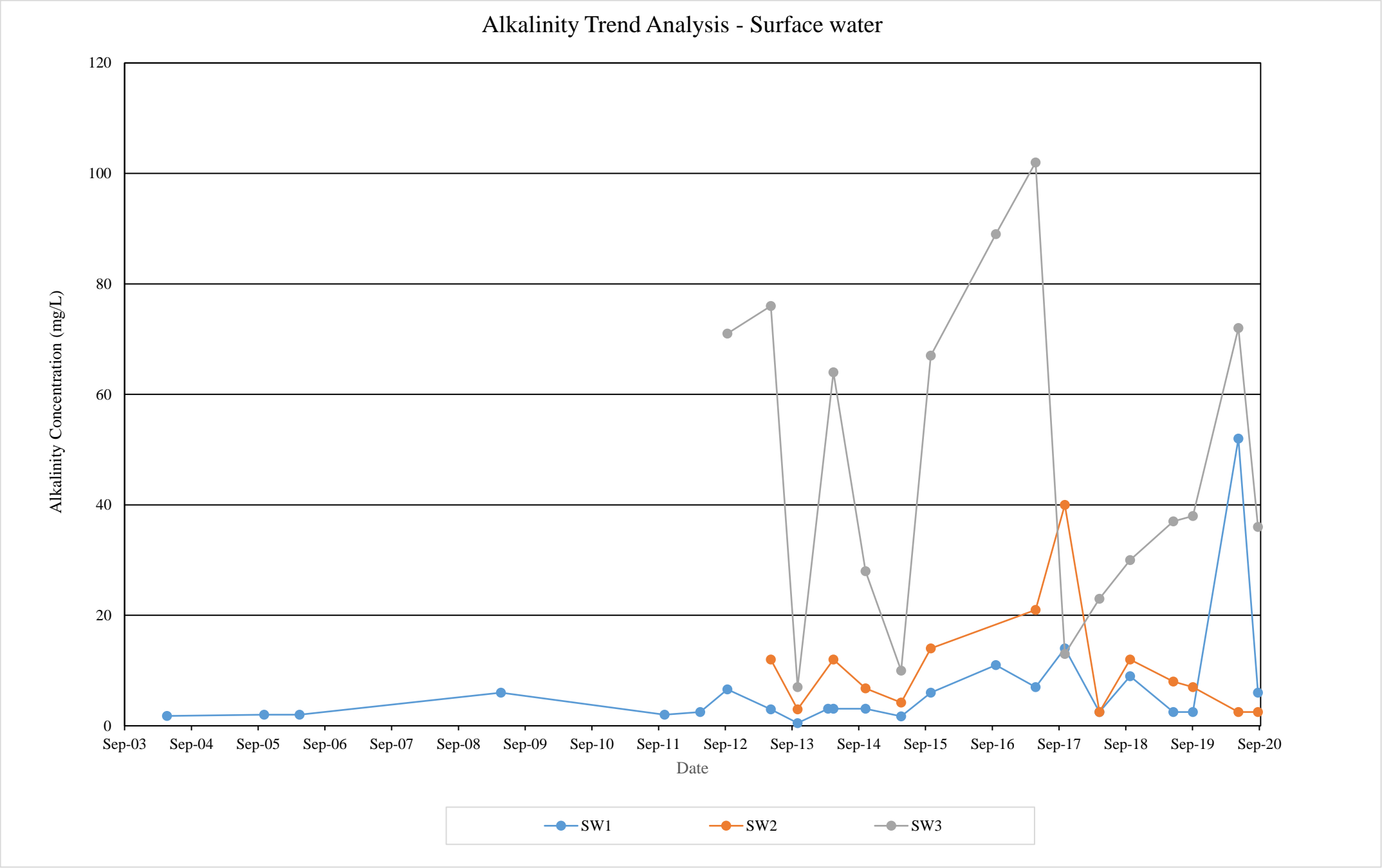


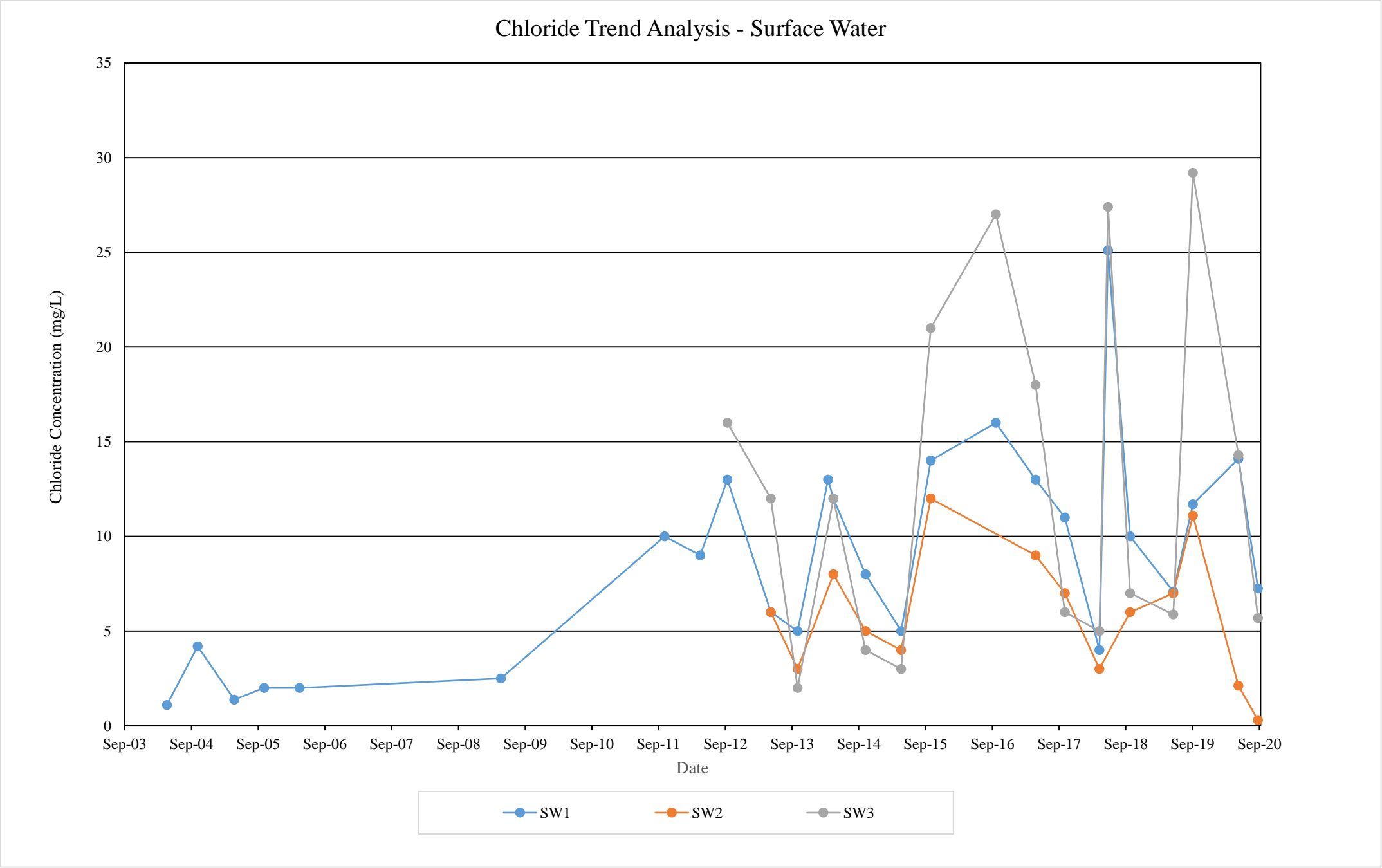


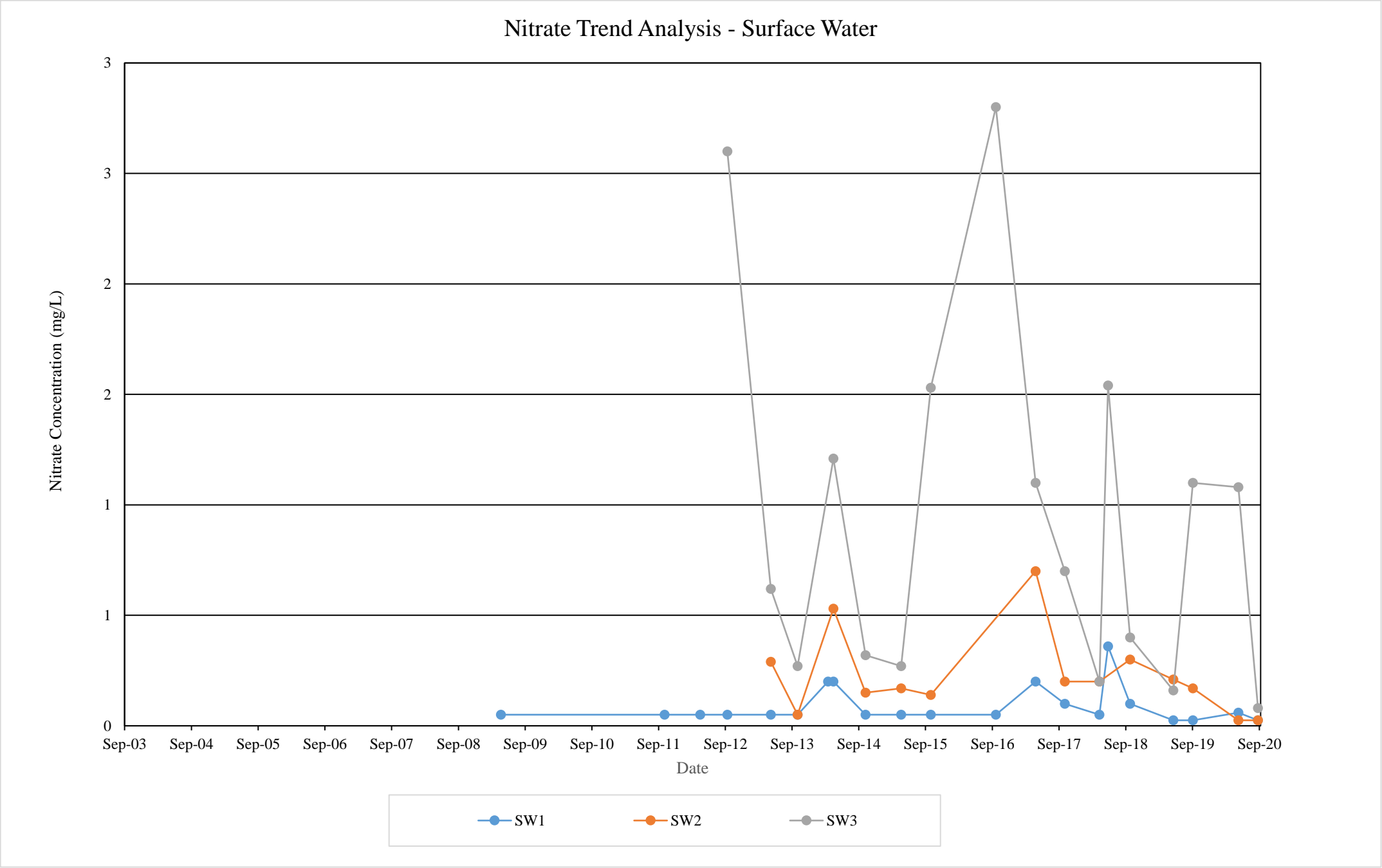


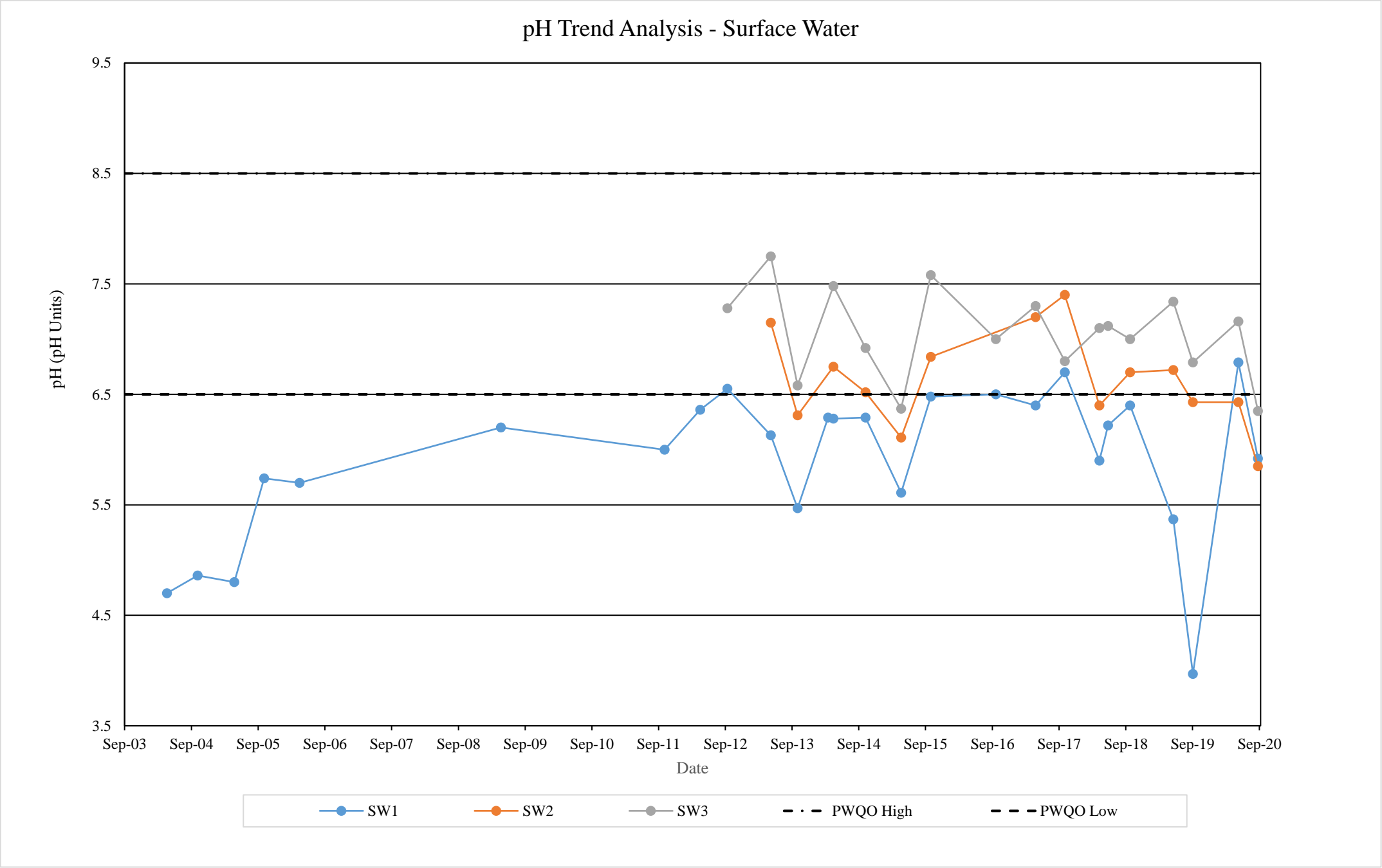
APPENDIX VII

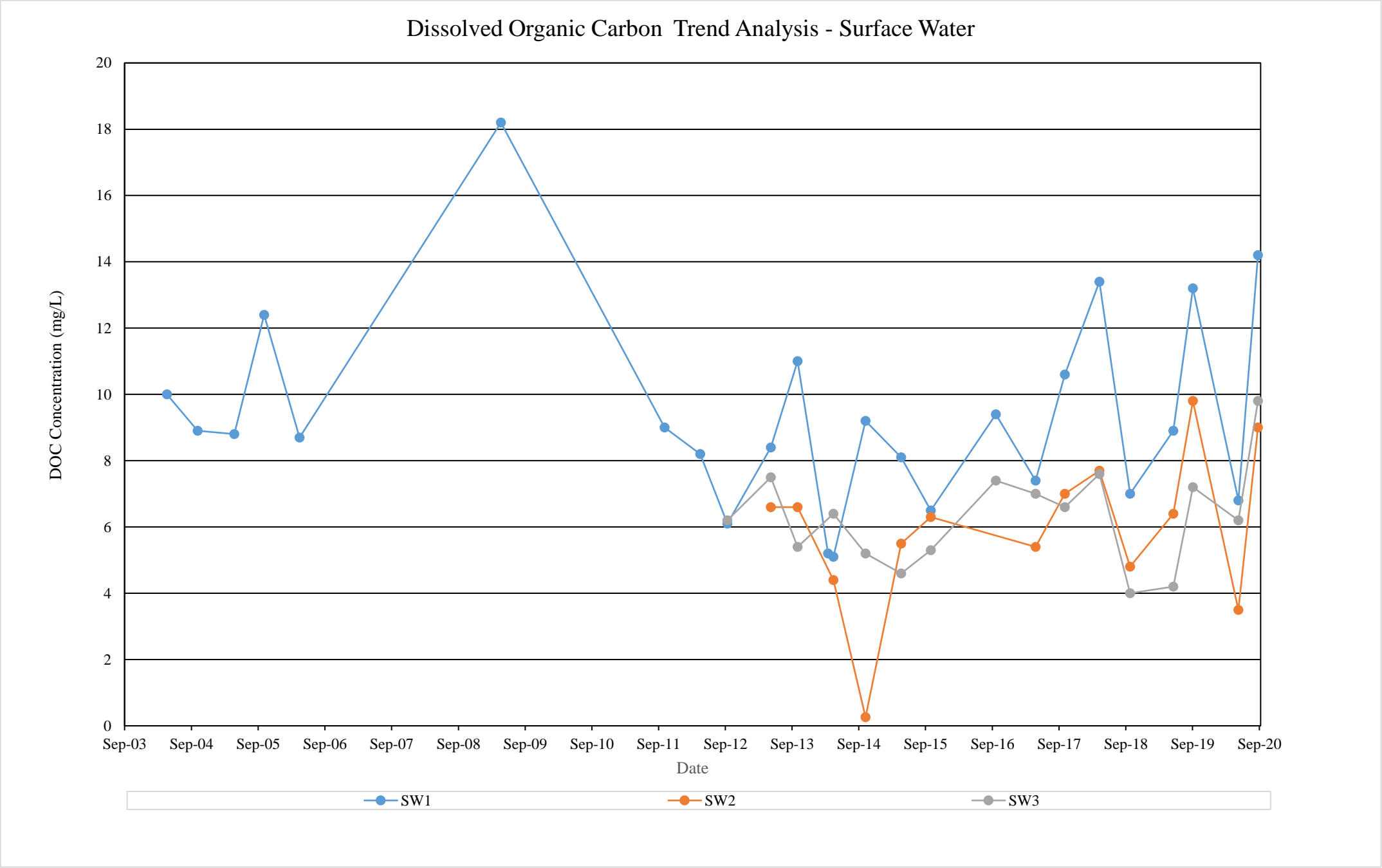
Surface Water Trend Analysis











APPENDIX VIII

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	
Location (e.g. street address, lot, concession)	
GPS Location (taken within the property boundary at front gate/ front entry)	
Municipality	
Client and/or Site Owner	
Monitoring Period (Year)	
This Monitoring Report is being submitted under the following:	
Certificate of Approval No.:	
Director's Order No.:	
Provincial Officer's Order No.:	
Other:	

Report Submission Frequency	<input type="radio"/> Annual <input type="radio"/> Other	
The site is:	<input 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 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 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 type="radio"/> Yes <input type="radio"/> No	
2) All groundwater, leachate and WDS gas sampling and monitoring for the monitoring period being reported on was successfully completed as required by Certificate(s) of Approval or other relevant authorizing/control document(s):	<input 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

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 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 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	
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 type="radio"/> Yes <input type="radio"/> No		

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 type="radio"/> Yes</p> <p><input type="radio"/> No</p>		
<p>6) The site meets compliance and assessment criteria.</p>	<p><input type="radio"/> Yes</p> <p><input type="radio"/> No</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 type="radio"/> Yes</p> <p><input type="radio"/> No</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 style="margin-left: 20px;"><i>i.</i> The site has developed stable leachate mound(s) and stable leachate plume geometry/concentrations; and</p> <p style="margin-left: 20px;"><i>ii.</i> Seasonal and annual water levels and water quality fluctuations are well understood.</p>	<p><input type="radio"/> Yes</p> <p><input type="radio"/> No</p>	<p>Note which practice(s):</p>	<p><input type="checkbox"/> (a)</p> <p><input type="checkbox"/> (b)</p> <p><input 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</p> <p><input type="radio"/> No</p> <p><input type="radio"/> Not Applicable</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

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

☐ No Changes to site design and operation are recommended

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

Name:			
Seal:	Add Image		
Signature:	<div></div>	Date:	
CEP Contact Information:			
Company:			
Address:			
Telephone No.:		Fax No. :	
E-mail Address:			
Co-signers for additional expertise provided:			
Signature:	<div></div>	Date:	
Signature:	<div></div>	Date:	

Surface Water WDS Verification:		
Provide the name of surface water body/bodies potentially receiving the WDS effluent and the approximate distance to the waterbody (including the nearest surface water body/bodies to the site):		
Name (s)		
Distance(s)		
Based on all available information and site knowledge, it is my opinion that:		
Sampling and Monitoring Program Status:		
1) The current surface water monitoring program continues to effectively characterize the surface water conditions, and includes data that relates upstream/background and downstream receiving water conditions:	<input type="radio"/> Yes <input type="radio"/> No	
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 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

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 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 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
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 type="radio"/> Yes <input type="radio"/> No		

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
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 type="radio"/> Yes <input type="radio"/> No	

<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 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 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>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 type="radio"/> No</p> <p><input type="radio"/> Not Applicable</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:

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

CEP Signature		
Relevant Discipline		
Date:		
CEP Contact Information:		
Company:		
Address:		
Telephone No.:		
Fax No. :		
E-mail Address:		