2021 Annual Monitoring Report

Chapman Waste Disposal Site
Magnetawan, Ontario

Prepared for:

Municipality of Magnetawan
4304 Highway 520
Magnetawan, Ontario P0A 1P0

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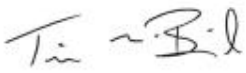

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1.0 INTRODUCTION

Pinchin Ltd. (Pinchin) was retained by the Corporation of the Municipality of Magnetawan (Municipality) to prepare the 2021 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 2021 monitoring data and was completed to constitute the 2021 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) now referred to as Environmental Compliance Approval (ECA) Number **A521202** and the applicable regulatory requirements during the spring and fall of 2021. 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 illustrated on Figure 2.

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 was used in the following sections of this report to calculate groundwater elevation contours.

A topographic survey of the Site was completed by Pinchin using an Unmanned Aerial Vehicle (UAV) in 2021 and was utilized for the purpose of calculating the remaining waste capacity and remaining lifespan for the Site. The 2021 topographic survey is presented on Figure 3.

The results of the previous topographic survey completed in 2019 indicated that the Site had an approximate remaining capacity of 38, 267.60 cubic meters (m^3) 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 2019 topographic UAV survey.

In comparing the 2019 and 2021 surveys, an additional 4,750 m^3 of material was deposited at the Site between 2019 and 2021, resulting in a remaining landfill capacity of approximately 33,517.60 m^3, as of 2021. The landfill volume consumed over the approximate two-year period between the 2019 and 2021 surveys equates to an estimated annual average deposition rate of approximately 2,375 m^3 per year. Given the calculated remaining landfill capacity of 33,517.60 m^3 and the annual deposition rate of 2,375 m^3, the remaining lifespan of the Site is estimated to be approximately 14 years, as of 2021.

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.

662 Falconbridge Road, Unit 3

Sudbury, ON P3A 4S4

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 copy of the Site's CofA is provided in Appendix II. 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, landfill boundary and property boundary 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 "*Landfill Leachate Evaluation, Chapman Waste Disposal Site*" completed by Pinchin Ltd. for the Corporation of the Municipality of Magnetawan dated July 6, 2018;
- 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);
- 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); and
- Report entitled "*2020 Annual Monitoring Report, Chapman Waste Disposal Site, Magnetawan, Ontario*" completed by Pinchin Ltd. for the Corporation of the Municipality of Magnetawan dated February 5, 2021.

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 does not detail the monitoring and reporting requirements for the Site. 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 2021 monitoring and annual reporting. A copy of the CofA for the Site is provided in Appendix II.

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 the contract. The conclusions presented herein are based solely upon the scope of services and time and budgetary limitations described in the 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 the 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. Pinchin's 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 the 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 this report;
- Pinchin's 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 the 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 the conclusions presented herein 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 course 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 coarse 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 III. 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 2021 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. A summary of the spring and fall 2021 groundwater elevations, as measured by Pinchin personnel, are presented in Table 1 (all tables are provided in Appendix IV).

In general, the historic static groundwater levels exist within 6.5 m of surface for most wells, with the deepest depth to water in 2021 (5.49 mbgs) recorded at BH2 during the spring 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 4 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, the 2019 and 2020 Pinchin Monitoring Reports 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. In accordance with comments received from the MECP, the Guideline B-7 calculation was completed in 2020 using an average of the results from the new upgradient monitoring wells BH3-II and BH11.

Based on a review of the historical data at BH3 and the new data at BH3-II and BH11, 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 TDS, iron, nitrate, DOC, and manganese parameters within the groundwater samples analyzed at the furthest downgradient monitoring locations were in exceedance of the Guideline B-7 criteria in 2020.

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 and SW3.

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 minor 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 pH (low), iron, aluminum, and cobalt; which were also observed at background monitoring location SW1. In addition, concentrations of phosphorus during spring, and cadmium in fall were observed to exceed the PWQO at SW2. These concentrations were interpreted to be anomalous and were recommended to be confirmed during future monitoring events. 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 Municipality 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. The proposed trigger level program developed as part of this study has been included in the annual monitoring reports for comparison purposes only at this time. In accordance with comments received from the MECP, the trigger level program is currently being revised and will be submitted to the MECP for approval under separate cover as a stand-alone document.

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 2021 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 2021 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" (ODWQS), 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), dated 2018 and updated in 2021;
- Ontario Regulation 903 R.R.O. 1990 "*Wells*", under the Ontario Water Resources Act, as amended in 2019;
- 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 (CWQG).

3.2 Groundwater Monitoring Well Locations

Seven (7) 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 4. 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 2021 sampling events, with the exception of BH6-II during the spring and fall due to dry conditions observed at the time of the respective monitoring events.

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 and BH3-II which has the PVC riser too tall to close the casing lid. A photographic log of all groundwater monitoring wells is provided in Appendix V.

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 III. Construction details for the other existing monitoring wells at the Site are unknown as the borehole logs for the historic monitoring wells are not currently available.

Well ID	Condition	Total Depth (mbgs)	Screened Interval (mbgs)	Unit Screened
BH3-II	Riser tall	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
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 summarizes 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

Monitoring Well ID	Location	Rationale
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 (3) historical points for surface water monitoring, SW, SW2 and SW3. All surface water monitoring locations were monitored during the spring and fall 2021 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

In accordance with comments received from the MECP, an additional sample was collected from the leachate seep during the spring and fall 2021 monitoring events.

The locations of the surface water monitoring locations are illustrated on Figure 4. Details regarding the surface water monitoring locations are provided in Table 2. Photos of all surface water monitoring locations are provided in Appendix V.

3.4 Monitoring Frequency

As per previous annual monitoring events, groundwater and surface water was sampled twice annually by Pinchin during 2021, in the spring and fall. Groundwater and surface water sampling events occurred on the following dates:

- Spring – May 12, 2021; and
- Fall – October 6 & 7, 2021.

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. Monitoring well BH4-II was also sampled for mercury and volatile organic compounds (VOCs). At the time of sample collection, field readings were measured for the following parameters: temperature, pH, conductivity, oxidation reduction potential (ORP) and dissolved oxygen (DO).

3.5.2 Surface Water Monitoring Parameters

Surface water samples were submitted for laboratory analysis of the parameters listed in in the previous monitoring reports. At the time of sample collection, field readings were measured for the following parameters: 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^{tm} 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^{tm} 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, SGS Canada Inc. (SGS) in Lakefield, 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 SGS. 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. While this trigger level monitoring program has been developed following industry standard/best management practices it is subject to revision. These revisions are currently underway and will be submitted to the MECP for review under a separate cover. Following acceptance of the revised trigger level monitoring program, the evaluation of the Site performance will be completed utilizing the new criteria. However, for the purpose of consistency, this annual monitoring report will be evaluated versus the existing program.

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 (i.e., the Guideline B-7 C_m value will be calculated based on the 75th percentile of the 10 most recent background values at BH3-II and BH11).

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™ 100-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. Additionally, in accordance with MECP comments, flows were measured at the surface water monitoring locations during the spring and fall monitoring events in 2021.

The following field parameters were measured during the 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 no 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 25ºC;

- *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 IV.

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 SGS 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.

SGS'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 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.

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, for which the ODWQS have been established.

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 with "*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 contaminates 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 2021 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 based 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	Trigger Level Concentration (mg/L)
BH6-III BH7-II BH8-I	TDS	279.0
	Chloride	126.5
	Sodium	100.9
	Sulphate	253.3
	Nitrate as N	3.51
	Nitrite as N	0.25
	Iron	0.175
	Manganese	0.031
	Arsenic	0.0029
	Barium	0.27
	Boron	1.27
	Cadmium	0.0013
	Chromium	0.014
	Copper	0.50
	Lead	0.0027
	Zinc	2.51

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. To implement Guideline B-7, groundwater samples collected from the applicable downgradient monitoring wells (i.e., BH5-II, BH6-III, BH7-II, BH8-I and BH9-I) 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 2019-2021 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 VI. 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 2021 monitoring period, concentrations of hardness (low), alkalinity (low), dissolved organic carbon (DOC) turbidity and pH (low) were quantified outside of the recommended levels specified in the ODWQS. Hardness, alkalinity, DOC, turbidity and pH 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. These concentrations are considered to be representative of local background groundwater quality.

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 2021 monitoring period, concentrations of pH (low), hardness (low), alkalinity (low) and turbidity were quantified outside of the recommended levels specified in the ODWQS. pH, hardness, alkalinity, 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. These concentrations are considered to be representative of local background groundwater quality.

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. Monitoring wells BH4 and BH4-II are situated in closest proximity to the waste deposits and can be used to estimate the source strength prior to the further downgradient monitoring locations.

Monitoring Well BH4

In comparison to background water quality, groundwater observed immediately east of the waste fill area at BH4 is generally 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. During the 2021 monitoring period, elevated hardness (high), DOC, nitrate 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 spring at BH4 to be in exceedance of the ODWQS. 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 is generally 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, total dissolved solids (TDS), nitrate, manganese, and turbidity concentrations were identified at BH4-II that exceeded the ODWQS. Hardness, DOC, TDS, 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.

During the 2021 monitoring events, parameters of mercury and VOCs were not detected in the samples collected in both the spring and fall.

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 is generally observed to have marginally elevated 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. During the 2021 monitoring period, concentrations of hardness (low), DOC and turbidity were observed to be outside of the values stated by 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 hardness (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 during the 2021 monitoring period.

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 is generally 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. During the 2021 monitoring period, 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.

Monitoring Well BH2

In comparison to background water quality, groundwater observed immediately east of the waste fill area at BH2 is generally 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. During the 2021 monitoring period, elevated hardness (high), DOC, iron, manganese, and turbidity concentrations were identified at BH2 that exceeded 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.

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 is generally 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. During the 2021 monitoring period, elevated hardness (high), DOC, iron, manganese and turbidity concentrations were identified at BH5-II that exceeded the ODWQS and/or Guideline B-7. The concentration of aluminum at BH5-II observed during the spring was also in exceedance of the ODWQS and the Guideline B-7, however, is interpreted to be anomalous. 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.

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 2021 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 is generally 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. During the 2021 monitoring period, elevated hardness (high), DOC, nitrate and manganese concentrations were identified at BH6-III that exceeded the ODWQS and/or the Guideline B-7 Criteria. 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 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.

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

Monitoring Well BH7-II

In comparison to background water quality, groundwater observed east of the Site at BH7-II is generally 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. During the 2021 monitoring period, elevated pH (low), hardness (low), alkalinity (low), aluminum, iron and turbidity concentrations were identified at BH7-II that exceeded 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. It is noted that the concentrations of iron quantified at BH7-II during the spring and fall of 2021 are elevated compared to the historic record and should be confirmed during the next monitoring period.

Monitoring well BH7-II is located near the creek flowing from the south of the Site and was therefore also compared to the applicable APV standards. All parameter concentrations at BH7-II satisfied the APV during the 2021 sampling events.

Monitoring Well BH8-I

In comparison to background water quality, groundwater observed east of the Site at BH8-I is generally observed to have higher concentrations of conductivity, alkalinity, TDS, nitrate, chloride, sulphate, calcium, sodium, and potassium, indicating temperate impacts from the landfill. During the 2021 monitoring period, elevated aluminum, hardness (high), DOC, manganese, iron and turbidity concentrations were identified at BH8-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. The concentration of aluminum at BH5-II observed during the spring was also in exceedance of the ODWQS and the Guideline B-7, however, is interpreted to be anomalous.

Monitoring well BH8-I is located near the creek east of the Site and was therefore also compared to the applicable APV standards. All parameter concentrations at BH8-I satisfied the APV during the 2021 sampling events.

Monitoring Well BH9-I

In comparison to background water quality, groundwater observed east of the Site at BH9-I is generally 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. During the 2021 monitoring period, elevated hardness (high), TDS, DOC, iron, manganese, and turbidity concentrations were identified at BH9-I that exceeded 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. The quantified fall 2021 TDS concentration is considered to be anomalous at this time as this concentration is 1.5 to 2 times the remainder of the values within the limited database.

Monitoring well BH9-I is located near the creek east of the Site and was therefore also 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.

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 VII. 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 2019-2021; 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, BH4 and BH5-II which are demonstrating increasing trends. Chloride, nitrate and DOC concentrations at BH4 have generally been high, 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 consisting of the running geometric mean value of the 10 most recent successive sampling events for the trigger locations, BH6-III, BH7-II and BH8-I, in comparison to the Site-specific trigger level concentrations (based on a modified Guideline B-7 calculation) is provided in Table 19.

A single trigger level exceedance was quantified at BH6-III and BH8-I for manganese using the geometric mean of the available database at each of these trigger wells versus the modified Guideline B-7 (based on the 75th percentile of the background concentrations at the historic background well BH3). It should be noted that at the time of preparation of this report, only 6 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

During the spring and fall of 2021, 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 SW3	Chloride	APV	180	135
	Nitrate as N	CWQG	2.90	2.175
	Nitrite as N	CWQG	0.06	0.045
	Iron	APV	1.0	0.75
	Arsenic	PWQO	0.10	0.075
	Barium	APV	2.30	1.725
	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 2021. 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 23. Copies of the laboratory analytical reports are presented in Appendix VI.

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 2021 sampling events, which is consistent with the observations at this location throughout the historical monitoring record.

Samples collected at the observed leachate seep location (SEEP) during 2021 indicated elevated levels of most parameters when compared to the background surface water conditions at SW1. Concentrations of iron, total phosphorous, boron, chromium and cobalt were identified to be in exceedance of the PWQO and/or CWQG.

Minor leachate impacts are observed at the downstream surface water monitoring location SW3, with exceedances quantified for iron and cobalt during 2021. 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 iron and aluminum 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 at SW3 and lower still at downstream monitoring location SW2. This interpretation should be confirmed during future monitoring.

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 VIII. It should be noted that the SEEP location currently only has data available for 2021; therefore, further monitoring is required in order to interpret accurate trends at this location.

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 24.

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

During the spring and fall of 2021, 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 20 through 23.

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.

4.11 Surface Water Flow Measurement Results

Stream flow measurements were conducted on each of the surface water monitoring stations during the fall 2021 monitoring event. Flow measurements are summarized below in the following table.

Sample Station	Fall 2021 (m^3/s)
SW1	0.0165
SW2	0.075
SW3	0.022

4.12 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 May 12, 2021, the depth to groundwater was observed to range from 318.82 meters above sea level (masl) at BH3-II to 287.37 masl at BH5-II. During the fall monitoring event on October 6 & 7, 2021, the depth to groundwater was observed to range from 318.90 masl at BH3-II to 287.37 masl at BH5-II.

Accurate triangulation of the water table elevations was undertaken for the 2021 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 5 and 6, respectively. The presentation of the groundwater contours and the associated inferred groundwater flow direction for the 2021 sampling events, as illustrated on Figures 5 and 6, confirms the

previous findings of earlier Annual Monitoring Reports which indicate groundwater flow is directed towards the east.

4.13 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.

4.14 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/formal approval of a CAZ for this Site.

4.15 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 continue to 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.

4.15.1 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 wells BH3-II and BH11 appear to have minor derived impacts and as such, have been used within this report for assessing the Site's water quality data to Guideline B-7 RUC (i.e. background wells).

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 and BH3-II which has the PVC riser too tall to close the casing lid.

Borehole logs for several of the wells on-Site are currently not available. The borehole logs for the new monitoring wells installed in September 2018 are provided in Appendix III.

4.15.2 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.

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

No supplemental monitoring was completed as part of the 2021 monitoring program completed by Pinchin.

4.17 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. Additionally, in accordance with comments received from the MECP, the trigger level program is currently being revised and will be submitted to the MECP for approval under separate cover as a stand-alone document.

The results for the 2021 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 three exceedances of the trigger level concentrations were quantified at BH6-III and BH8-I. However, at the time of preparation of this report, only 6 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.

4.17.1 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.

4.18 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.

4.19 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 ensure regular maintenance is occurring as needed. At the time of the monitoring event no significant damage or concerns were noted.

4.20 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 2021 monitoring program.

4.21 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 2021 are provided in Tables 25 and 26 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	BH11
	SW DUP	SW1
Fall	GW DUP1	BH10-I
	GW DUP2	BH11
	SW DUP	SW1

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 the exception of aluminum in GW DUP1 during the spring and total suspended solids in GW DUP2 during the fall.

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 (SGS) 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 SGS 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 2021 water quality monitoring program:

- Groundwater samples were collected from all monitoring wells at the Site on May 12 and October 6 & 7, 2021, with the exception of BH6-II in the spring and fall due to dry conditions at the time of sampling. All groundwater samples were submitted for laboratory analysis of parameters identified in the previous monitoring reports. Samples collected at monitoring well BH4-II were also submitted for analysis of mercury and VOCs. 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 May 12 and October 6 & 7, 2021and were submitted for laboratory analysis of parameters identified in the previous monitoring reports. Surface water quality was assessed based on the PWQO, CWQG and the trigger level monitoring program;

- During the spring monitoring event, the depth to groundwater was observed to range from 318.82 masl at BH3-II to 287.37 masl at BH5-II. During the fall monitoring event, the depth to groundwater was observed to range from 318.90 masl at BH3-II to 287.37 masl at BH5-II. 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 and BH9-I;
    - Hardness (low) at BH3-II, BH7-II, BH10-II and BH11;
    - Nitrate at BH4 and BH4-II;
    - DOC at BH1, BH2, BH3-II, BH4, BH4-II, BH5-II, BH8-I, BH9-I and BH10-I;
    - Manganese at BH1, BH2, BH4-II, BH5-II, BH6-III, BH8-I and BH9-I;
    - Turbidity at all wells except BH1 and BH6-III;
    - Iron at BH2, BH7-II and BH9-I;
    - Aluminum at BH5-II, BH7-II and BH8-I;
    - TDS at BH4-II and BH9-I;
    - Alkalinity (low) at BH3-II, BH7-II and BH11; and
    - pH (low) at BH3-II, BH7-II 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
    - 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 BH6-III;
    - DOC at all locations;
    - Aluminum at BH5-II, BH7-II and BH8-I;
    - Iron at all locations except BH6-III; and
    - Manganese at all locations except BH7-II.

- 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 SW1 and SW2;
  - Iron at all locations;
  - Aluminum at SW1 and SW2;
  - Cobalt at SW3 and SEEP;
  - Phosphorous at SEEP;
  - Boron at SEEP; and
  - Chromium at SEEP.

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. Concentrations of aluminum at BH5-II, BH7-II and BH8-I are interpreted to be anomalous. 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. Monitoring well BH4-II should also be analysed for mercury and VOCs. 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 2022 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 riser at well BH3-II should be cut; 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 IX.

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 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.

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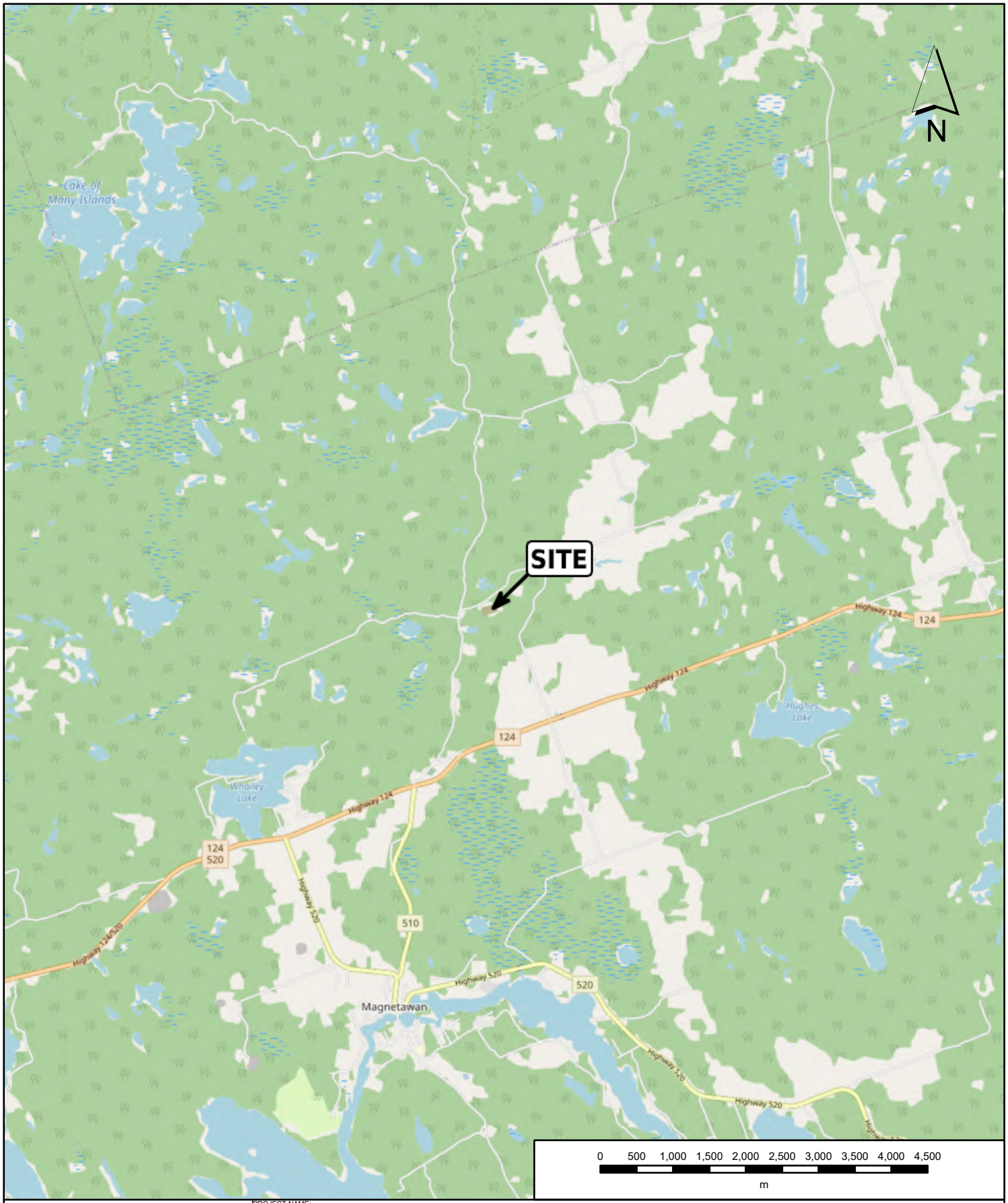
Template: Groundwater Monitoring Report Template, EDR, May 28, 2019

APPENDIX I
Figures



PINCHIN

PROJECT NAME:	2021 ANNUAL MONITORING REPORT
CLIENT NAME:	MUNICIPALITY OF MAGNETAWAN
PROJECT LOCATION:	CHAPMAN WASTE DISPOSAL SITE, MAGNETAWAN, ONTARIO
FIGURE NAME:	KEY MAP
FIGURE NUMBER	1

PROJECT NUMBER:	SCALE:	DRAWN BY:	REVIEWED BY:	DATE:
225335.006	1:100,000	DM	AV	MARCH 2022

LEGEND

- SITE BOUNDARY
- UAV IMAGE
- 1.2Ha. PROPOSED LANDFILL BOUNDARY
- ACTIVE FILL AREA
- TREE LINE

LEGEND IS COLOUR DEPENDENT. NON-COLOUR COPIES MAY ALTER INTERPRETATION.

PINCHIN

PROJECT NAME:
2021 ANNUAL MONITORING REPORT

CLIENT NAME:
MUNICIPALITY OF MAGNETAWAN

PROJECT LOCATION:
CHAPMAN WASTE DISPOSAL SITE, MAGNETAWAN, ONTARIO

FIGURE NAME:
SITE PLAN

PROJECT NUMBER:	SCALE:
225335.006	AS SHOWN
DRAWN BY:	REVIEWED BY:
DM	AV
DATE:	FIGURE NUMBER:
MARCH 2022	2

LEGEND

- SITE BOUNDARY
- UAV IMAGE
- 1.2Ha. PROPOSED LANDFILL BOUNDARY
- MAJOR CONTOURS (1.0m)
- MINOR CONTOURS (0.5m)
- TREE LINE

2019 v 2021 VOLUME CHANGE = 4750m³

0 25 50 Meters

LEGEND IS COLOUR DEPENDENT. NON-COLOUR COPIES MAY ALTER INTERPRETATION.

PINCHIN

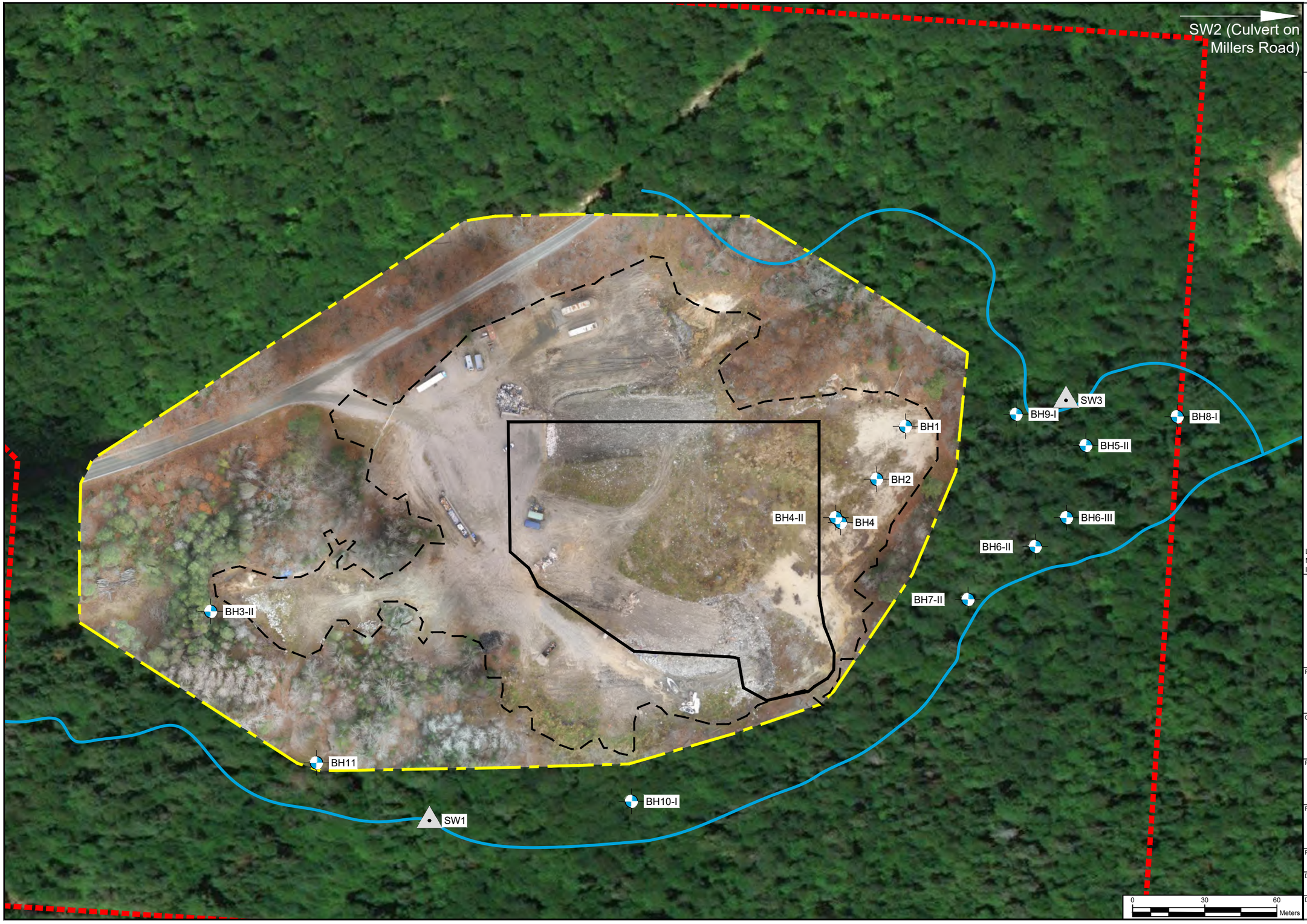
PROJECT NAME:
2021 ANNUAL MONITORING REPORT

CLIENT NAME:
MUNICIPALITY OF MAGNETAWAN

PROJECT LOCATION:
CHAPMAN WASTE DISPOSAL SITE, MAGNETAWAN, ONTARIO

FIGURE NAME:
TOPOGRAPHIC SURVEY

PROJECT NUMBER:	SCALE:
225335.006	AS SHOWN
DRAWN BY:	REVIEWED BY:
DM	AV
DATE:	FIGURE NUMBER:
MARCH 2022	3



LEGEND

- SITE BOUNDARY
- UAV IMAGE
- 1.2Ha. PROPOSED LANDFILL BOUNDARY
- CREEK
- TREE LINE
- MONITORING WELL
- SURFACE WATER WELL

LEGEND IS COLOUR DEPENDENT. NON-COLOUR COPIES MAY ALTER INTERPRETATION.

PINCHIN

PROJECT NAME:
2021 ANNUAL MONITORING REPORT

CLIENT NAME:
MUNICIPALITY OF MAGNETAWAN

PROJECT LOCATION:
CHAPMAN WASTE DISPOSAL SITE, MAGNETAWAN, ONTARIO

FIGURE NAME:
MONITORING LOCATIONS

PROJECT NUMBER:	SCALE:
225335.006	AS SHOWN
DRAWN BY:	REVIEWED BY:
DM	AV
DATE:	FIGURE NUMBER:
MARCH 2022	4

LEGEND

- SITE BOUNDARY
- UAV IMAGE
- TREE LINE
- MONITORING WELL
- 100.0 BOREHOLE ELEVATION (masl.)
- 100.0 GROUNDWATER CONTOUR ELEVATION (masl.)
- GROUNDWATER CONTOUR LINES
- GROUNDWATER FLOW DIRECTION

LEGEND IS COLOUR DEPENDENT. NON-COLOUR COPIES MAY ALTER INTERPRETATION.

PINCHIN

PROJECT NAME:
2021 ANNUAL MONITORING REPORT

CLIENT NAME:
MUNICIPALITY OF MAGNETAWAN

PROJECT LOCATION:
CHAPMAN WASTE DISPOSAL SITE, MAGNETAWAN, ONTARIO

FIGURE NAME:
INFERRED GROUNDWATER CONTOUR PLAN - SPRING 2021

PROJECT NUMBER:	SCALE:
225335.006	AS SHOWN
DRAWN BY:	REVIEWED BY:
DM	AV
DATE:	FIGURE NUMBER:
MARCH 2022	5

LEGEND

- SITE BOUNDARY
- UAV IMAGE
- TREE LINE
- MONITORING WELL
- 100.0 BOREHOLE ELEVATION (masl.)
- 100.0 GROUNDWATER CONTOUR ELEVATION (masl.)
- GROUNDWATER CONTOUR LINES
- FLOW GROUNDWATER FLOW DIRECTION

LEGEND IS COLOUR DEPENDENT. NON-COLOUR COPIES MAY ALTER INTERPRETATION.

PINCHIN

PROJECT NAME:
2021 ANNUAL MONITORING REPORT

CLIENT NAME:
MUNICIPALITY OF MAGNETAWAN

PROJECT LOCATION:
CHAPMAN WASTE DISPOSAL SITE, MAGNETAWAN, ONTARIO

FIGURE NAME:
INFERRED GROUNDWATER CONTOUR PLAN - FALL 2021

PROJECT NUMBER:	SCALE:
225335.006	AS SHOWN
DRAWN BY: DM	REVIEWED BY: AV
DATE: MARCH 2022	FIGURE NUMBER: 6

APPENDIX II

Certificate of Approval

Ministry of the Environment
Ontario

Provisional Certificate No. A 521202

PROVISIONAL CERTIFICATE OF APPROVAL
WASTE DISPOSAL SITE

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

Township of Chapman
Box 70, R.R. # 1
Magnetawan, Ontario
P0A 1P0

for the use and operation of a 1.2 hectare dump site

all in accordance with the following plans and specifications:

Located: Lot 108, Concession A
Township of Chapman
District of Parry Sound

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

and subject to the following conditions:

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

Dated this 20th day of March, 1980.

Director, Section 39,
The Environmental Protection Act, 1971

APPENDIX III

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 (ft / m)	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Sample #	Recovery (%)
0 / 0		Ground Surface	0.00			
		Sand Brown sand, some gravel, dry, no PHC odour or staining.		Riser; Bentonite		
10 / 3			3.05			
		Sand and Silt Grey sand and silt, damp, no PHC odour or staining.	3.66		SS1	
		Sand and Silt Grey sand and silt, saturated, no PHC odour or staining.		Screen; Silica Sand	SS2	
20 / 6			6.10			
		End of Borehole				

Contractor: CCC

Drilling Method: Hollow Auger

Well Casing Size: 5.08 cm

957 Cambrian Heights Drive
Suite 203
Sudbury, ON P3C 5S5

Grade Elevation: NA

Top of Casing Elevation: NA

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 (ft / m)	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Sample #	Recovery (%)
0 / 0		Ground Surface	0.00			
		Sand Coarse brown sand, some gravel, dry, no PHC odour or staining.		Riser; Bentonite		
10 / 3			3.05			
		Sand and Gravel Coarse brown sand and gravel, trace cobbles, damp, no PHC odour or staining.			SS1	
13 / 4			3.96			
		Bedrock Bedrock. Auger refusal on assumed bedrock. Sand seam at 20'.		Screen; Silica Sand		
27 / 8			8.44			
		End of Borehole				

Contractor: CCC

Drilling Method: Hollow Auger

Well Casing Size: 5.08 cm

957 Cambrian Heights Drive
Suite 203
Sudbury, ON P3C 5S5

Grade Elevation: NA

Top of Casing Elevation: NA

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 (ft / m)	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Sample #	Recovery (%)
0 / 0		Ground Surface	0.00			
0–10 / 0–3		***Sand and Gravel*** Coarse sand and gravel, some cobbles, damp, no PHC odour or staining.	3.05	Riser; Bentonite		
10–13 / 3–4		***Sand and Gravel*** Coarse sand and gravel, large cobbles, damp, no PHC odour or staining.	3.96		SS1	
13–20 / 4–6		***Bedrock*** Bedrock. Auger refusal on assumed bedrock.	6.30	Screen; Silica Sand		
20 / 6		End of Borehole				

Contractor: CCC

Drilling Method: Hollow Auger

Well Casing Size: 5.08 cm

957 Cambrian Heights Drive

Suite 203

Sudbury, ON P3C 5S5

Grade Elevation: NA

Top of Casing Elevation: NA

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 (ft / m)	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Sample #	Recovery (%)
0 / 0		Ground Surface	0.00			
0–13 / 0–4		***Sand*** Coarse, brown sand with some gravel, no PHC odour or staining.	4.27	Riser; Bentonite		
					SS1	
13–20 / 4–6		***Sand and Gravel*** Coarse, brown sand and gravel, trace cobbles, no PHC odour or staining.	6.05	Screen; Silica Sand		
					SS2	
20 / 6		End of Borehole				

Contractor: CCC

Drilling Method: Hollow Auger

Well Casing Size: 5.08 cm

957 Cambrian Heights Drive

Suite 203

Sudbury, ON P3C 5S5

Grade Elevation: NA

Top of Casing Elevation: NA

Sheet: 1 of 1

Log of Borehole: BH9-I

Project #: 225335.001 **Logged By:** KM

Project: Hydrogeology Assessment

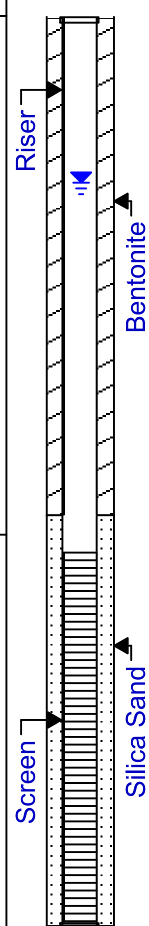
Client: Municipality of Magnetawan

Location: Chapman Waste Disposal Site, Magnetawan, Ontario

Drill Date: September 28, 2018 **Project Manager:** TM

SUBSURFACE PROFILE					SAMPLE	
Depth (ft / m)	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Sample #	Recovery (%)
0 ft / 0 m		Ground Surface	0.00			
0–14 ft / 0–4.27 m		***Sand*** Coarse brown sand, damp, no PHC odour or staining.	4.27	Riser; Bentonite	SS1	
14–27 ft / 4.27–8.23 m		***Sand and Silt*** Coarse brown sand and fine brown sand and silt, trace gravel, saturated, no PHC odour or staining. Refusal at 27' on assumed bedrock.	8.23	Screen; Silica Sand	AS1 AS2	
		End of Borehole				

Depth scale: ft 0–30; m 0–9



Contractor: CCC

Drilling Method: Hollow Auger

Well Casing Size: 5.08 cm

957 Cambrian Heights Drive

Suite 203

Sudbury, ON P3C 5S5

Grade Elevation: NA

Top of Casing Elevation: NA

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 (ft / m)	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Sample #	Recovery (%)
0 / 0		Ground Surface	0.00			
		Sand Coarse, brown sand, some gravel, trace cobbles, damp, no PHC odour or staining.	1.52	Riser, Bentonite		
		Bedrock Refusal on assumed bedrock.	4.88	Screen, Silica Sand		
		End of Borehole				

1 m = 3 ft; 2 m = 6 ft; 3 m = 9 ft; 4 m = 13 ft; 5 m = 16 ft; 6 m = 19 ft; 7 m = 23 ft

Contractor: CCC

Drilling Method: Hollow Auger

Well Casing Size: 5.08 cm

957 Cambrian Heights Drive
Suite 203
Sudbury, ON P3C 5S5

Grade Elevation: NA

Top of Casing Elevation: NA

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 (ft / m)	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Sample #	Recovery (%)
0 / 0		Ground Surface	0.00			
0–3 / 0–1		***Sand and Silt*** Brown sand with silt, damp, no PHC odour or staining.		Riser; Bentonite	SS1	
10–16 / 3–5		***Sand*** Coarse, brown sand, saturated, no PHC odour or staining.	3.05	Screen; Silica Sand	SS2 AS1	
16 / 5		End of Borehole	4.88			

Contractor: CCC

Drilling Method: Hollow Auger

Well Casing Size: 5.08 cm

957 Cambrian Heights Drive
Suite 203
Sudbury, ON P3C 5S5

Grade Elevation: NA

Top of Casing Elevation: NA

Sheet: 1 of 1

APPENDIX IV
Summary Tables

TABLE 1
Groundwater Monitoring Well Data
Chapman Waste Disposal Site
Magnetawan , Ontario

Well ID Number	Date (dd/mm/yyyy)	Ground Surface Elevation (masl)	TOC Elevation (masl)	Height of TOC from Ground Surface (m)	Water Level Measurement from TOC (m)	Total Well Depth from TOC (m)	Depth to Groundwater (mbgs)	Calculated Water Level Elevation (masl)	UTM Coordinates			Comments
									Zone	Northing (m)	Easting (m)	
BH1	24-Sep-03	313.01	314.06		6.99			307.50	17	606939	5063235	
	12-May-04				6.46			308.03				
	27-Oct-04				7.11			307.38				
	15-May-05				6.41			308.38				
	26-Oct-05				7.52			306.97				
	8-May-06				6.41			308.08				
	2-Nov-06				6.66			306.97				
	8-May-07				6.65			308.08				
	24-Oct-07				7.07			307.83				
	7-May-08				6.12			307.84				
	29-Oct-08				6.75			307.74				
	11-May-09				7.71			306.78				
	15-Oct-09				6.76			307.73				
	2-Jun-10				6.31			308.18				
	21-Oct-10				6.98			307.51				
	26-Jun-11				6.50			307.99				
	27-Oct-11				6.71			307.78				
	9-May-12				6.47			308.02				
	4-Oct-12				6.94			307.55				
	30-May-13				5.50			308.99				
	24-Oct-13				6.67			307.82				
	8-May-14				5.42			309.07				
	30-Oct-14				6.33			308.16				
	13-May-15				6.31			308.18				
	22-Oct-15				6.93			307.56				
	13-Oct-16				6.83			307.66				
	18-May-17				5.80			308.69				
	25-Oct-17				6.41			308.08				
	2-May-18				6.01			308.48				
	17-Oct-18				6.60			307.89				
	11-Jun-19			1.03	6.10	11.25	5.07	308.39				
	26-Sep-19			0.94	6.79	11.20	5.85	307.70				
	1-Jun-20			0.94	6.56	10.74	5.62	307.50				
	30-Sep-20			1.03	6.75	11.20	5.72	307.31				No well cap
	12-May-21			1.14	6.45	11.34	5.31	307.23				No well cap
	6-Oct-21			1.14	6.55	11.27	5.41	307.13				
BH2	24-Sep-03	313.22	313.68		6.524			307.16	17	606927	5063213	
	12-May-04				6.05			307.63				
	27-Oct-04				6.69			306.99				
	15-May-05				5.87			307.81				
	26-Oct-05				6.62			307.06				
	8-May-06				5.9			307.78				
	2-Nov-06				6.15			307.53				
	8-May-07				6.12			307.56				
	24-Oct-07				6.62			307.06				
	7-May-08				5.56			308.12				
	29-Oct-08				6.26			307.42				
	11-May-09				5.69			307.99				
	15-Oct-09				6.24			307.44				
	2-Jun-10				6.37			307.31				
	21-Oct-10				6.51			307.17				
	26-Jun-11				5.82			307.86				
	27-Oct-11				6.2			307.48				
	9-May-12				5.49			308.19				
	4-Oct-12				6.45			307.23				
	30-May-13				4.85			308.83				
	24-Oct-13				6.13			307.55				
	8-May-14				4.73			308.95				
	30-Oct-14				5.78			307.90				
	13-May-15				5.77			307.91				
	22-Oct-15				6.46			307.22				
	13-Oct-16				6.36			307.32				
	18-May-17				5.2			308.48				
	25-Oct-17				5.9			307.78				
	2-May-18				5.47			308.21				
	17-Oct-18				6.08			307.60				
	11-Jun-19			0.39	5.57	9.80	5.18	308.11				
	26-Sep-19			0.36	6.08	9.68	5.72	307.60				
	1-Jun-20			0.36	6.04	6.72	5.68	307.64				
	30-Sep-20			0.41	6.28	9.71	5.87	307.40				No well cap
	12-May-21			0.42	5.91	9.73	5.49	307.77				
	6-Oct-21			0.42	5.82	9.78	5.40	307.86				

TABLE 1
Groundwater Monitoring Well Data
Chapman Waste Disposal Site
Magnetawan , Ontario

Well ID Number	Date (dd/mm/yyyy)	Ground Surface Elevation (masl)	TOC Elevation (masl)	Height of TOC from Ground Surface (m)	Water Level Measurement from TOC (m)	Total Well Depth from TOC (m)	Depth to Groundwater (mbgs)	Calculated Water Level Elevation (masl)	UTM Coordinates			Comments
									Zone	Northing (m)	Easting (m)	
BH3	24-Sep-03	N/A	314.49		7.15			319.48	17	N/A	N/A	
	12-May-04				6.39			320.24				
	27-Oct-04				7.36			319.27				
	15-May-05				6.33			320.30				
	26-Oct-05				7.36			319.27				
	8-May-06				6.78			319.85				
	2-Nov-06				7.07			319.56				
	8-May-07				6.48			320.15				
	24-Oct-07				7.6			319.03				
	7-May-08				7.93			318.70				
	29-Oct-08				7.96			318.67				
	11-May-09				6.44			320.19				
	15-Oct-09				7.12			319.51				
	2-Jun-10				4.52			322.11				
	21-Oct-10				7.52			319.11				
	26-Jun-11				5.95			320.68				
	27-Oct-11				7.38			319.25				
	9-May-12				6.55			320.08				
	4-Oct-12				7.53			319.10				
	30-May-13				5.38			321.25				
	24-Oct-13				6.91			319.72				
	8-May-14				5.32			321.31				
	30-Oct-14				6.52			320.11				
	13-May-15				6.39			320.24				
	22-Oct-15				7.47			319.16				
	13-Oct-16				7.4			319.23				
	18-May-17				5.86			308.63				
	25-Oct-17				-			-				
	2-May-18				-			-				
	17-Oct-18				-			-				
	11-Jun-19	**DESTROYED**										
	26-Sep-19											
	1-Jun-20											
	30-Sep-20											
BH3-II	11-Jun-19	322.4	323.3	0.80	3.54	6.70	2.74	319.74	17	606650	5063158	Installed new tubing.
	26-Sep-19			0.77	4.55	6.50	3.78	318.73				
	1-Jun-20			0.77	4.04	6.50	3.27	319.24				
	30-Sep-20			0.81	4.5	6.54	3.69	318.78				
	12-May-21			0.83	4.46	6.58	3.63	318.82				
	6-Oct-21			0.83	4.38	6.57	3.55	318.90				
BH4	24-Sep-03	314.00	314.38		6.19			308.59	17	606912	5063195	
	12-May-04				5.67			309.11				
	27-Oct-04				-			-				
	15-May-05				5.79			308.99				
	26-Oct-05				-			-				
	8-May-06				5.77			309.01				
	2-Nov-06				-			-				
	8-May-07				6.2			308.58				
	24-Oct-07				6			308.78				
	7-May-08				6.24			308.54				
	29-Oct-08				5.82			308.96				
	11-May-09				-			-				
	15-Oct-09				5.64			309.14				
	2-Jun-10				6.85			307.93				
	21-Oct-10				6.01			308.77				
	26-Jun-11				6.46			308.32				
	27-Oct-11				5.49			309.29				
	9-May-12				5.69			309.09				
	4-Oct-12				5.86			308.92				
	30-May-13				5.25			309.53				
	24-Oct-13				5.53			309.25				
	8-May-14				5.14			309.64				
	30-Oct-14				5.66			309.12				
	13-May-15				5.63			309.15				
	22-Oct-15				6.39			308.39				
	13-Oct-16				5.99			308.79				
	18-May-17				5.43			309.35				
	25-Oct-17				6.19			308.59				
	2-May-18				-			-				
	17-Oct-18				5.52			309.26				
	11-Jun-19			0.35	5.67	6.34	5.32	309.11				
	26-Sep-19			0.28	5.75	6.38	5.47	309.03				
	1-Jun-20			No sample								
	30-Sep-20			0.37	5.9	6.35	5.53	308.48				No well cap
	12-May-21			0.36	5.77	6.42	5.41	308.61				No well cap
	6-Oct-21			0.36	5.45	6.34	5.09	308.93				
BH4-II	11-Jun-19	313.67	314.61	0.73	5.87	8.51	5.14	-	17	606910	5063197	Needs new tubing.
	26-Sep-19			0.63	8.42	5.87	7.79	-				Installed new tubing.
	1-Jun-20			0.63	6.07	8.58	5.44	308.54				
	30-Sep-20			0.74	6.05	8.39	5.31	308.56				
	12-May-21			0.74	5.94	8.50	5.20	308.67				
	6-Oct-21			0.74	5.72	8.60	4.98	308.89				

TABLE 1
Groundwater Monitoring Well Data
Chapman Waste Disposal Site
Magnetawan , Ontario

Well ID Number	Date (dd/mm/yyyy)	Ground Surface Elevation (masl)	TOC Elevation (masl)	Height of TOC from Ground Surface (m)	Water Level Measurement from TOC (m)	Total Well Depth from TOC (m)	Depth to Groundwater (mbgs)	Calculated Water Level Elevation (masl)	UTM Coordinates			Comments
									Zone	Northing (m)	Easting (m)	
BH5-II	24-Sep-03	291.00	291.84		-			-	17	607014	5063227	
	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				-			-				
	26-Jun-11				-			-				
	27-Oct-11				4.66			287.18				
	9-May-12				4.45			287.39				
	4-Oct-12				4.72			287.12				
	30-May-13				4.30			287.54				
	24-Oct-13				4.54			287.30				
	8-May-14				4.20			287.64				
	30-Oct-14				4.45			287.39				
	13-May-15				4.37			287.47				
	22-Oct-15				4.71			287.13				
	13-Oct-16				4.67			287.17				
	18-May-17				4.32			287.52				
	25-Oct-17				4.47			287.37				
	2-May-18				4.21			287.63				
	17-Oct-18				4.52			287.32				
	11-Jun-19			0.94	4.43	6.93	3.49	287.41				
	26-Sep-19			0.84	4.64	6.84	3.80	287.20				
	1-Jun-20			0.84	4.5	6.84	3.66	287.34				
	30-Sep-20			0.96	4.62	6.95	3.66	287.22				
	12-May-21			0.96	4.47	6.93	3.51	287.37				
	6-Oct-21			0.96	4.47	6.92	3.51	287.37				
BH6-II	24-Sep-03	N/A	N/A		-			-	17	606993	5063185	
	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				-			-				
	26-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			1.00	DRY	2.99	DRY	DRY				
	26-Sep-19			1.05	DRY	2.90	DRY	DRY				
	1-Jun-20			DRY								
	30-Sep-20			1.17	DRY	2.98	DRY	DRY				No cap, no tubing.
	12-May-21			2.98	DRY	1.17	DRY	DRY				
	6-Oct-21			2.97	DRY	-	DRY	DRY				

TABLE 1
Groundwater Monitoring Well Data
Chapman Waste Disposal Site
Magnetawan , Ontario

Well ID Number	Date (dd/mm/yyyy)	Ground Surface Elevation (masl)	TOC Elevation (masl)	Height of TOC from Ground Surface (m)	Water Level Measurement from TOC (m)	Total Well Depth from TOC (m)	Depth to Groundwater (mbgs)	Calculated Water Level Elevation (masl)	UTM Coordinates			Comments
									Zone	Northing (m)	Easting (m)	
BH6-III	11-Jun-19	292.76	293.47	0.88	4.02	6.10	3.14	-	17	607006	5063197	Installed new tubing.
	26-Sep-19			0.62	5.11	6.51	4.49	-				
	1-Jun-20			0.62	4.36	6.51	3.74	289.11				
	30-Sep-20			0.67	4.83	6.57	4.16	288.64				
	12-May-21			0.67	4.21	6.52	3.54	289.26				
	6-Oct-21			0.67	4.65	6.63	3.98	288.82				
BH7-II	24-Sep-03	309.12	310.02		-			-	17	606965	5063163	
	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				-			-				
	26-Jun-11				-			-				
	27-Oct-11				1.90			308.12				
	9-May-12				1.73			308.29				
	4-Oct-12				2.08			307.94				
	30-May-13				1.54			308.48				
	24-Oct-13				1.66			308.36				
	8-May-14				1.47			308.55				
	30-Oct-14				1.60			308.42				
	13-May-15				1.63			308.39				
	22-Oct-15				2.15			307.87				
	13-Oct-16				-			-				
	18-May-17				1.64			308.38				
	25-Oct-17				1.72			308.30				
	2-May-18				1.29			308.73				
	17-Oct-18				1.88			308.14				
	11-Jun-19			0.94	1.67	2.78	0.73	308.35				
	26-Sep-19			0.87	1.92	2.73	1.05	308.10				
	1-Jun-20			0.87	1.91	2.73	1.04	308.11				
	30-Sep-20			0.99	2	2.81	1.01	308.02				
	12-May-21			1.00	1.84	2.79	0.84	308.18				
	6-Oct-21			1.00	1.00	2.80	0.00	309.02				
BH8-I	11-Jun-19	290.86	291.72	0.83	4.17	6.71	3.34	-	17	607052	5063239	Red/orange in colour. Needs new tubing.
	26-Sep-19			0.76	6.58	4.30	5.82	-				Installed new tubing.
	1-Jun-20			0.76	4.2	6.58	3.44	287.52				
	30-Sep-20			0.85	4.24	6.69	3.39	287.48				
	12-May-21			0.85	4.15	6.65	3.30	287.57				
	6-Oct-21			0.85	4.16	6.70	3.31	287.56				
BH9-I	11-Jun-19	292.05	292.76	0.67	2.33	8.21	1.66	-	17	606985	5063240	Installed new tubing.
	26-Sep-19			0.62	2.4	8.09	1.78	-				
	1-Jun-20			0.62	2.49	8.02	1.87	290.27				
	30-Sep-20			0.65	2.65	8.11	2	290.11				
	12-May-21			0.65	2.45	8.14	1.80	290.31				
	6-Oct-21			0.65	2.46	8.13	1.81	290.30				
BH10-I	11-Jun-19	314.62	315.17	0.71	2.07	5.27	1.36	-	17	606825	5063079	
	26-Sep-19			0.64	2.13	5.11	1.49	-				Purged dry.
	1-Jun-20			0.64	2.22	5.11	1.58	312.95				
	30-Sep-20			0.70	2.24	5.32	1.54	312.93				Purged dry.
	12-May-21			0.70	2.3	5.30	1.60	317.82				
	6-Oct-21			0.70	2.06	5.32	1.36	318.06				
BH11	11-Jun-19	319.34	320.12	0.79	1.24	5.18	0.45	318.88	17	606694	5063095	Needs new tubing.
	26-Sep-19			0.70	1.73	5.13	1.03	318.39				Installed new tubing.
	1-Jun-20			0.70	1.5	5.13	0.80	318.62				
	30-Sep-20			0.82	1.72	5.14	0.9	318.40				
	12-May-21			0.79	1.42	5.13	0.63	318.70				
	6-Oct-21			0.79	1.66	5.20	0.87	318.46				Purged dry.

Notes:

mbgs	Meters below ground surface
masl	Meters above sea level
TOC	Top of casing
NA	No data available

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	12-May-21	7-Oct-21	
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	7.17	6.74	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	407	286	-
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**	**125**	**104**	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	243	146	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	143	108	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	31.0	12	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	20.0	17	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	39.1	33	-
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	6.55	5.53	-
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	9.2	9.14	-
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	6.0	5	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	2.77	0.96	-
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	1.0	4.42	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	<0.05	0.12	<0.10	0.16	<0.05	<0.05	< 0.03	< 0.03	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	3.38	0.35	-
Phenolics	mg/L	-	-	-	-	-	-	-	-	-	-	-	<0.001	<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	< 0.002	< 0.002	-
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**	**7.0**	**6.0**	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	15	10.0	-
Iron	mg/L	0.05	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	<0.0.1	<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	<0.1	<0.0001	<0.010	<0.010	0.016	0.032	< 0.007	0.01	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**	**4.19**	**0.67**	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	< 0.03	< 0.03	-
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	< 0.03		-
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	1.0	0.79	5
Total Suspended Solids	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<10	<10	<10	<10	14	13	5	<2	6	<2	12	<10	72	<10	11	4	17	-
BOD	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	3	<2	<2	<2	<2	3	<2	<2	<2	<2	<5	<5	<5	-	< 4	< 4	-
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	NC	2.32	1	0.72	1.48	0.1	NC	0.1	-8.4	-14.3	-14.3	-16.6	-	-	-	-	-	-	-	-
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	0.00019	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.002	<0.002	<0.0001	<0.0001	< 0.00005	< 0.00005	-
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	0.027	0.01	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	< 0.0009	< 0.0009	0.006
Arsenic	mg/L		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	0.0011	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.003	<0.003	0.002	0.002	0.0007	0.0004	0.010
Barium	mg/L	0.023	0.224	0.038	0.12	0.072	0.14	0.095	0.12	0.029	0.2	0.032	0.15	0.041	-	0.035	0.15	0.12	0.1	0.041	0.34	0.23	0.24	0.17	0.14	0.071	0.105	0.301	0.177	0.162	0.088	0.165	0.177	0.103	0.078	0.093	0.07	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	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.0005	<0.0005	0.000015	0.000008	-
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	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	< 0.00001	< 0.00001	-
Boron	mg/L	0.01	0.187	0.02	0.07	0.057	0.14	0.1	0.17	0.02	0.19	0.068	0.22	0.089	-	0.061	0.14	0.2	0.24	0.12	0.62	0.24	0.53	0.24	0.2	0.19	0.266	0.628	0.351	0.332	0.256	0.551	0.329	0.280	0.277	0.238	0.277	5
Cadmium	mg/L	-	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.00015	0.00036	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	0.0002	0.0001	<0.0001	0.0001	<0.001	<0.001	<0.0001	<0.0001	0.000069	0.00004	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	<0.005	<0.001	0.001	<0.001	0.005	<0.001	<0.003	<0.003	<0.002	0.003	0.00051	0.00036	0.05
Cobalt	mg/L	-	0.0002	-	-	-	-	-	-	0.011	0.0084	0.0099	<0.0005	-	0.0077	0.0051	<0.0005	<0.0005	<0.0005	0.0014	0.00092	0.0049	0.0045	0.0035	0.0034	0.003	0.008	0.0072	0.008	0.0044	0.008	0.005	0.0076	0.0053	0.0061	0.00071	-
Copper	mg/L	-	0.0019	0.0006	-	0.002	0.001	0.001	0.006	-	0.002	0.002	0.003	0.002	-	<0.001	0.001	0.002	0.0025	0.0021	0.015	0.0068	0.0086	0.0096	0.006	0.0051	0.0058	0.0104	0.009	0.0067	0.0061	0.010	0.009	0.008	0.007	0.007	0.0049	1
Molybdenum	mg/L	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	-	<0.001	<0.001	<0.0005	<0.0005	<0.0005	0.0017	0.00098	<0.0005	<0.0005	0.00061	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.002	<0.002	<0.002	<0.002	0.00039	0.0002	-
Nickel	mg/L	-	0.001	-	0.002	-	0.001	-	-	-	0.002	-	0.002	0.003	-	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	0.0026	0.0021	0.0014	<0.001	0.002	0.004	0.002	0.002	0.001	<0.003	<0.003	<0.003	<0.003	0.0013	0.0008	-
Phosphate	mg/L	-	-	-		-	-	-	-	-	-	-	<0.1	<0.1	-	<0.1		<0.1	<0.1	-	-	-	-	-	-	-	<0.0002	<0.0002	<0.0002	<0.2	<0.2	<0.20	-	-	-	-	-	-
Lead	mg/L	-	-	-	-	-	0.0007	-	-	-	-	-	<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	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.001	<0.0005	<0.0005	< 0.00009	< 0.00009	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	0.002	<0.001	0.00008	0.00009	0.05
Sillicon	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	3.6	2.8	3.8	4.3	4.7	4.6	3.6	3.63	3.46	5.56	5.35	3.15	-	-	-	0.18	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	-	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	0.0001	< 0.00006	-
Strontium	mg/L	0.039	0.173	0.051	0.12	0.11	0.15	0.15	0.22	0.046	0.2	0.045	0.23	0.064	-	0.058	0.19	0.15	0.095	0.057	0.31	0.23	0.26	0.18	0.15	0.13	0.187	0.534	0.299	0.262	0.198	0.419	0.379	0.245	<0.0003	0.234	0.21	-
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	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.010	0.00011	0.00011	-
Uranium	mg/L	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0048	0.0023	0.0015	0.00066	0.0006	0.00049	0.0007	0.0034	0.0015	0.001	0.001	0.004	<0.002	0.0006	<0.002	0.0006	0.00043	0.02
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	-	<0.0001	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	0.00052	<0.0005	<0.0005	<0.0005	<0.0005	0.0023	<0.0005	<0.0005	<0.0005	0.0082	<0.0005	<0.002	<0.002	<0.002	<0.005	0.00017	0.00006	-
Zinc	mg/L	0.093	-	-	-	-	-	-	0.007	-	0.009	-	<0.005	0.012	-	<0.005	<0.005	<0.005	<0.005	0.0082	0.0085	0.009	0.0075	0.0096	0.013	<0.005	<0.005	<0.005	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	0.002	0.003	5
Field Measurements																																							
Temperature	oC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13.2	10.9	9.3	11.27	8.96	11.2	-
pH	pH Units	6.8	7.0	7.9	8.6	8.6	6.8	7.1	7	7.4	6.7	8	5.9	6.16	6.24	7.8	6.34	7.66	7.25	9.03	6.86	6.87	6.41	6.52	6.74	5.31	6.31	6.61	-	7.15	6.8	6.7	6.2	6.1	6.4	13.6	6.5	-
Coductivity	uS/cm	64	268	92	166	124	229	191	229	70	799	345	168	114	128	221	210	265	218	96	386	351	523	306	225	204	228	0.73	-	0.46	0.54	711.00	416.30	421.90	274.00	257.00	170.00	-
Oxidation Reduction Potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	148.4	210.1	330	99.6	160.9	-
Dissolved Oxygen	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.5	1.23	6.96	8.24	1.96	1.52	-

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 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	12-May-21	7-Oct-21	
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	7.44	6.81	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	659	717	-
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**	**244**	**318**	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	400	411	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	269	332	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	26.0	22.0	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	24.7	25.7	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	75.0	94.0	-
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	13.8	20.3	-
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	11.00	7.63	-
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	32.0	72.0	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	5.33	0.06	-
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	0.09	0.4	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	< 0.03	< 0.03	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	5.93	0.41	-
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	< 0.002	< 0.002	-
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**	**11.1**	**11.0**	**11.0**	5
Chemical Oxygen Demand	mg/L		24	27	77	21	11	-	17	15	35	9	7	7	7	9	11	21	17	28	31	37	35	44	36	33	55	45	30	31	34	25	26	34	<5	32	13	-
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**	**7.120**	**0.704**	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**	**4.17**	**2.22**	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	0.20	0.07	-
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	< 0.03	-	-
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**	**35**	**10**	5
Total Suspended Solids	mg/L															-	-	-	-	-	210	510	140	140	66	62	222	24	47	50	152	289	230	152	841	15	117	-
BOD	mg/L															-	-	-	-	-	<2	<2	<2	<2	<2	<2	4	3	<2	<2	<2	<5	<5	<5	-	14	< 4	-
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	<0.002	<0.002	<0.0001	< 0.00005	< 0.00005	-
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	0.021	0.006	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	< 0.0009	< 0.0009	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	<0.001	<0.003	<0.003	0.001	<0.001	0.0007	0.0004	0.010
Barium	mg/L	0.128	0.119	0.082	0.082	0.11	0.12	0.096	0.07	0.081	0.11	0.039	0.067	0.05	0.086	0.1	0.1	0.15	0.13	0.17	0.13	0.23	0.16	0.29	0.27	0.24	0.212	0.257	0.033	0.179	0.168	0.216	0.186	0.182	0.187	0.216	0.163	1.00
Beryllium	mg/L	-	-	-	-	-	-	-	-	-	-	-	<0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.0005	<0.0005	0.00001	< 0.000007	-
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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	< 0.00001	< 0.00001	-
Boron	mg/L	0.21	0.175	0.142	0.12	0.13	0.17	0.17	0.11	0.085	0.2	0.078	0.11	0.071	0.12	0.16	0.2	0.24	0.25	0.27	0.35	0.41	0.36	0.66	0.84	0.81	0.638	0.47	0.083	0.753	0.542	0.419	0.642	0.585	0.643	0.542	0.606	5
Cadmium	mg/L	-	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.00015	0.00015	0.00013	0.00015	0.00019	0.00013	<0.0001	0.0003	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.001	<0.0001	<0.0001	0.000079	0.000081	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	<0.005	<0.005	0.002	0.002	<0.001	0.006	<0.001	<0.003	<0.003	<0.002	<0.002	0.00091	0.00047	0.05
Cobalt	mg/L	0.021	0.0065	0.0035	0.0025	0.0038	0.004	0.0028	0.0019	0.0023	0.0029	0.011	0.011	0.014	0.0015	0.01	0.0061	0.0029	0.0028	0.0033	0.0027	0.0047	0.0025	0.0051	0.0057	0.0048	0.0037	0.0101	0.003	0.0029	0.004	0.008	0.004	0.0038	0.0030	0.0061	0.0036	-
Copper	mg/L	-	0.002	0.0006	-	0.006	0.005	0.001	-	0.001	0.001	0.002	0.003	0.003	0.002	0.002	0.002	0.002	0.0013	0.0028	0.0018	0.0044	0.0028	0.0081	0.0097	0.0085	0.0076	0.0038	0.0005	0.006	0.0066	<0.003	0.004	0.003	0.005	0.003	0.003	1
Molybdenum	mg/L	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.0005	0.00064	<0.0005	0.00089	0.00053	0.00088	0.001	<0.0005	<0.0005	<0.0005	0.0006	0.0008	<0.002	<0.002	<0.002	0.01	0.00077	0.00074	-
Nickel	mg/L	-	0.003	0.003	0.002	0.004	0.003	0.002	0.001	0.001	0.002	0.002	0.002	0.003	0.001	0.002	0.002	0.002	0.0015	0.0034	0.0014	0.0034	0.0021	0.0053	0.0052	0.0032	0.004	0.004	<0.001	0.003	0.003	<0.003	0.003	<0.003	<0.003	0.0018	0.002	-
Phosphate	mg/L	-	-	-		0.093	0.079	-	-	-	-	-	<0.1	<0.1	-	<0.1	-	<0.1	<0.1	-	-	-	-	-	-	-	<0.0002	<0.2	<0.0002		<0.0002	<0.40	-	-	-	-	-	-
Lead	mg/L	-	0.0006	-	-	0.0011	0.0015	-	-	-	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0005	<0.0005	< 0.00009	< 0.00009	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	0.002	<0.004	<0.004	0.007	0.001	0.00014	0.00012	0.05
Sillicon	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.6	4.6	3.9	4.6	3.7	3.9	4.8	3.8	3.55	4.59	2.11	3.87	2.71	-	-	-	0.513	-	-	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.0001	<0.001	<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	0.00011	0.00008	-
Strontium	mg/L	0.306	0.19	0.184	0.2	0.2	0.18	0.2	0.14	0.19	0.19	0.12	0.14	0.13	0.21	0.25	0.2	0.35	0.29	0.37	0.21	0.53	0.2	0.68	0.76	0.67	0.505	0.257	0.075	0.566	0.506	0.391	0.638	0.527	<0.0003	0.476	0.549	-
Titanium	mg/L	-	0.03	-	-	0.11	0.078	-	-	-	-	0.018	<0.005	0.007	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	0.002	<0.010	0.00085	0.00022	-
Uranium	mg/L		0.0006	0.0002	0.0002																0.00062	0.00055	0.00097	0.0022	0.004	0.0049	0.0037	0.0037	0.0001	0.0043	0.0035	0.003	0.005	0.004	<0.002	0.004	0.004	0.02
Vanadium	mg/L	-	0.0046	-	-	0.006	0.007	-	0.001	-	0.001	0.002	0.001	<0.001		<0.0001	<0.001	<0.0005	<0.0005	<0.0005	0.0017	<0.0005	0.0011	<0.0005	<0.0005	<0.0005	0.0049	0.0013	<0.0005	0.0132	<0.0005	<0.002	<0.002	<0.002	0.015	0.00131	0.00027	-
Zinc	mg/L	0.02	0.006	-	-	0.036	0.008	-	-	-	0.007	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.018	0.014	0.0081	0.0059	<0.005	0.0091	<0.005	0.009	<0.005	0.01	<0.005	0.008	<0.005	<0.005	<0.005	-	0.004	0.004	5
Field Measurements																																						
Temperature	oC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.7	10.9	9.6	11.36	12.4	11.7	-
pH	pH Units	6.8	7	7.7	8.5	8.5	7.02	6.98	7	7	6.7	7.61	5.8	5.85	6.52	6.14	6.42	7.13	7	8.57	7.07	6.57	6.82	6.35	7	6.3	5.61	6.57	-	7.09	7.08	6.75	6.3	6.22	6.37	13.32	6.32	-
Coductivity	uS/cm	466	366	297	279	318	313	279	197	248	902	482	109	203	262	370	98	478	200	550	314	679	445	721	699	684	458	0.77	-	0.85	0.81	633.7	653	728	551	480	600	-
Oxidation Reduction Potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	170.1	170.6	270.6	341.3	30.5	156	-
Dissolved Oxygen	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.5	1.32	1.03	11.07	2.19	1.63	-

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

Parameter	Units	Sample Designation																												ODWQS
		Sample Collection Date (dd/mm/yyyy)																												
		BH-3																												
		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	
pH Lab	pH Units	**4.49**	**6.16**	**6.01**	6.65	7.09	6.9	6.7	**6**	6.9	6.7	6.8	**5.9**	**6.2**	**6.4**	**6.15**	**6.24**	**6.46**	**6.25**	**5.72**	**6.45**	**5.01**	**6.1**	**6.42**	**6.12**	**6.18**	**6.1**	**6.1**	6.5-8.5
Conductivity	µS/cm	560	41	46	31.9	37	34	39	134	41	89	44	54	40	60	69	70	40	46	41	61	63	33	38	70	37	64	85	-
Hardness	mg/L	**242**	**12**	**13**	**11.5**	**12**	**12**	**13**	**27**	**11**	**17**	**16**	**18**	**14**	**19**	**17**	**22**	**12**	**17**	**17**	**20**	**15**	**11**	**11**	**18**	**11**	**19**	**22**	80-100
Total Dissolved Solids	mg/L	395	92	36	480	130	34	27	66	25	60	30	37	30	40	42	40	22	30	<10	68	56	32	58	58	44	46	120	500
Alkalinity	mg/L	-	**6.6**	**3**	**11.1**	**8**	**8**	**7**	**2**	**5**	**3**	**5**	**7**	**10**	**6**	**7**	**6**	**6**	**6.1**	**4.1**	**3.8**	<1	**4.5**	**8.5**	**5.3**	**8.2**	**7**	**14**	30-500
Chloride	mg/L	4.6	1.4	0.9	1.63	2	2	1	30	3	17	4	5	2	6	12	7	2	2	2	3	3	1	1	14	2.1	3	5	250
Sodium	mg/L	11.4	0.8	0.9	1.2	1.3	1.1	1.3	2.2	2.4	4.4	2.2	1.7	1.6	1.7	1.6	2.4	1.1	1.3	1.1	1.3	1.2	1	1.1	1.4	2	3.31	3.13	200
Calcium	mg/L	87	4.3	4.4	5	4.3	4.2	4.4	9.2	3.6	5.8	5.1	6.1	4.8	6.3	5.7	7.3	4.1	5.5	5.7	6.7	5	3.8	3.8	6	3.7	6.51	7.55	-
Magnesium	mg/L	6	0.41	0.51	0.71	0.67	0.44	0.62	1.1	0.45	0.68	0.68	0.73	0.6	0.82	0.76	0.8	0.49	0.65	0.78	0.83	0.59	0.37	0.39	0.76	0.42	0.546	0.647	-
Potassium	mg/L	2	0.9	0.7	1.1	0.78	0.85	0.87	1	0.69	0.95	0.69	0.8	0.67	0.62	0.8	1.1	0.8	0.82	0.73	0.62	0.44	0.41	0.79	0.55	0.54	0.858	1.01	-
Sulphate	mg/L	272	6.4	10.4	6.4	6	6	6	3	6	6	5	5	4	3	4	4	4	4	4	5	12	3	4	2	3.1	10	7	500.0
Ammonia	mg/L	0.28	0.03	-	0.07	-	-	-	-	-	-	-	<0.05	<0.05		<0.05	<0.005	<0.05	<0.05	<0.05	0.18	<0.05	<0.05	<0.05	<0.05	<0.05	0.04	0.01	-
Nitrate as N	mg/L	0.4	0.2	0.2	0.2	0.2	0.2	0.7	1.1	0.2	2	0.5	2.4	0.3	2	0.6	1.9	0.8	1.4	1	3.2	1.2	0.68	0.48	0.28	<0.1	1.6	2.8	10
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	<0.01	<0.01	<0.01	<0.05	<0.05	1
Total Kjeldahl Nitrogen	mg/L	-	1.36	0.68	2.6	2.7	1	1.6	2.4	2.7	1.7	1.1	1.8	2.3	1.6	<1	1.5	2	0.76	<0.23	0.43	0.78	0.42	0.34	0.24	0.23	0.2	0.2	-
Phenolics	mg/L	-	-	-	-	0.002			-	-	-	-		<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	**68.7**	**95.8**	**26.2**	4	**32.1**	**18.4**	**12.8**	**18.1**	**26.1**	**12.5**	**7.7**	1.9	2.7	1.7	1.7	1.8	1.7	1.5	1.9	2.1	2.4	2.6	2.6	2.7	2.7	3.9	3.4	5
Chemical Oxygen Demand	mg/L		254	64	110	110	56	36	60	96	47	21	51	67	15	17	32	61	14	13	13	4.9	7.4	13	4.2	7.8	29	20	-
Iron	mg/L	**56.2**	0.09	**0.4**	**1.9**	**2.1**	0.055	**1.6**	0.073	0.25	-	**0.64**	<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	<0.1	<0.1	0.3
Manganese	mg/L	**3.01**	0.02	0.028	0.045	**0.092**	0.015	**0.087**	0.028	0.011	0.026	**0.053**	0.046	0.045	0.018	**0.056**	0.011	0.016	0.0058	0.0052	0.0092	0.018	0.0068	0.0034	0.019	0.013	<0.005	0.011	0.05
Phosphorus	mg/L	9.9	4.8	5.4	3.7	4	2.5	3.8	2.8	2.9	2.6	3	3	2.8	2.9	3	3	3	0.13	0.48	0.13	0.18	0.099	0.29	0.39	0.1	0.13	0.08	-
Orthophosphate	mg/L	-	-	-	-	0.013	-	-	-	-	-	-	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.014	<0.01	0.01	<0.01	-	-	-	-	-
Turbidity	NTU	-	**24**	**8.8**	**627**	**636**	**792**	**3170**	**1880**	**159**	**910**	**150**	**1900**	**770**	**660**	**500**	**290**	**120**	**120**	**320**	**34**	**81**	**45**	**63**	**37**	**51**	**40.4**	**35.1**	5
Total Suspended Solids	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	74	140	270	550	62	73	-
BOD	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2	<2	<2	<2	-
Anion Sum		-	-	-	-	-	-	-	-	0.331	0.796	0.362	0.56	0.384		0.598	0.534	0.314	0.362	0.278	0.488	0.399	0.252	0.321	0.583	0.288	0.54	0.78	-
Cation Sum		-	-	-	-	-	-	-	-	0.385	0.576	0.524	0.472	0.389		0.447	0.568	0.319	0.414	0.426	0.498	0.386	0.288	0.303	0.456	0.332	0.54	0.59	-
Ion Balance	%	-	-	-	-	-	-	-	-	NC	NC	NC	NC	NC		NC	NC	NC	NC	NC	NC	NC	NC		NC	NC	-0.2	-	-
Silver	mg/L	-	-	-	0.0007	-	-	-	-	-	-	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.00013	<0.0001	<0.0001	<0.0001	<0.0001	-
Aluminum	mg/L	6.93	0.103	0.648	1.2	2.1	0.1	1.9	0.18	0.32	0.1	0.69	0.11	0.13	0.045	0.11	0.055	0.068	0.073	0.076	0.1	0.13	0.11	0.11	0.16	0.12	0.097	0.093	-
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.010
Barium	mg/L	0.121	0.013	0.014	0.022	0.021	0.012	0.022	0.026	0.011	0.021	0.018	0.017	0.011	0.017	0.018	0.027	0.013	0.018	0.018	0.021	0.021	0.017	0.018	0.022	0.013	0.029	0.059	1.00
Beryllium	mg/L	0.0013	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-
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	<0.001	<0.001	-
Boron	mg/L	0.01	0.006	-	-	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.015	0.019	<0.01	0.023	0.017	<0.01	0.023	0.024	5
Cadmium	mg/L	-	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.00018	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<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	<0.005	<0.005	<0.001	<0.001	0.05
Cobalt	mg/L	0.124	0.0002	0.0005	0.001	0.002	-	0.0018	-	-	0.011	0.0016	0.01	0.023	0.0009	0.01	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0006	-
Copper	mg/L	0.015	0.001	0.0017	0.006	0.005	-	0.004	-	0.001	-	0.003	0.001	<0.001	0.002	0.001	<0.001	<0.001	0.0011	0.0015	0.0012	0.0011	0.0011	0.0026	0.0014	0.0011	0.0024	0.0017	1
Molybdenum	mg/L	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0005	-
Nickel	mg/L	0.13	-	-	0.001	0.001	0.001	0.001	-	-	0.001	-	0.001	0.004	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	-
Phosphate	mg/L	-	-	-	-	**0.94**	-	**0.1**	-	-	-	-	<0.1	<0.1	-	<0.1	-	<0.1	<0.1	-	-	-	-	-	-	-	<0.0002	<0.0002	0.01
Lead	mg/L	-	0.0005	-	0.0009	0.0012	0.0009	0.001	-	-	-	-	<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	<0.0001	<0.0001	0.01
Selenium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	-
Sillicon	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.8	2.5	2.5	2.9	2.4	2.5	2.9	2.7	2.01	2.46	-
Tin	mg/L	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.005	-
Strontium	mg/L	0.167	0.022	0.025	0.028	0.026	0.02	0.026	0.054	0.028	0.034	0.033	0.039	0.033	0.043	0.044	0.058	0.031	0.037	0.047	0.048	0.033	0.028	0.029	0.045	0.034	0.061	0.086	-
Titanium	mg/L	-	-	0.015	0.069	0.086	-	0.077	-	0.013	-	0.027	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-
Uranium	mg/L	-	-	0.0002	0.0003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.00011	<0.0001	<0.0001	0.02
Vanadium	mg/L	-	-	-	0.002	0.003	-	0.003	-	-	-	-	<0.001	<0.001	-	<0.0001	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0005	<0.0005	-
Zinc	mg/L	1.29	0.005	0.009	-	0.009	-	0.006	-	-	0.009	-	<0.005	0.01	0.008	<0.005	0.005	<0.005	0.011	0.016	0.015	0.0068	0.014	0.015	0.012	0.0062	0.036	0.122	5
Field Measurements																													
Temperature	oC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH	pH Units	6.6	6.9	7.7	8.7	8.6	7.08	7.04	7.2	7	7.4	8.2	5.6	6.03	6.04	6.42	5.99	7.44	7.86	8.98	7.42	6.6	5.92	6.35	6.06	5.71	6.49	5.92	-
Coductivity	uS/cm	464	36	61	54	47	48	55	74	85	253	378	46	73	53	70	135	339	77	132	48	36	40	22	37	45	85	0.1	-
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 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	12-May-21	7-Oct-21	
pH Lab	pH Units	6.58	**6.37**	6.57	**6.17**	6.55	**6.16**	6.5-8.5
Conductivity	µS/cm	56	65	49	70	39	42	-
Hardness	mg/L	**4.9**	**4.1**	**6.7**	**22.4**	**5.8**	**5.6**	80-100
Total Dissolved Solids	mg/L	84	42	42	48	< 30	110	500
Alkalinity	mg/L	**18**	**20**	**17**	**16**	**11**	**13**	30-500
Chloride	mg/L	1.54	0.85	1.44	12.7	2.0	4.0	250
Sodium	mg/L	11.7	10.6	5.27	3.98	3.90	7.74	200
Calcium	mg/L	1.53	1.29	2.12	7.43	1.86	1.76	-
Magnesium	mg/L	0.26	0.22	0.35	0.93	0.28	0.29	-
Potassium	mg/L	0.54	0.44	0.71	1.27	0.50	0.32	-
Sulphate	mg/L	5.64	6.33	4.94	5.38	10.00	15.00	500
Ammonia	mg/L	<0.02	0.12	<0.02	<0.02	< 0.04	0.04	-
Nitrate as N	mg/L	0.10	0.12	0.11	0.16	0.12	0.22	10
Nitrite as N	mg/L	<0.05	<0.05	<0.05	<0.05	< 0.03	< 0.03	1
Total Kjeldahl Nitrogen	mg/L	0.57	0.24	0.21	0.16	0.07	0.13	-
Phenolics	mg/L	0.001	<0.001	<0.001	<0.001	< 0.002	< 0.002	-
Dissolved Organic Carbon	mg/L	**5.6**	3.8	**8.4**	2.2	2.0	**9.0**	5
Chemical Oxygen Demand	mg/L	29	11	<5	<5	9	10	-
Iron	mg/L	<0.010	<0.010	0.018	0.028	0.031	0.043	0.3
Manganese	mg/L	0.022	0.008	0.018	0.05	0.01	0.01	0.05
Phosphorus	mg/L	12.2	4.90	3.36	0.42	2.48	1.97	-
Orthophosphate	mg/L		<0.10	<0.10	<0.10	0.08	-	-
Turbidity	NTU	**1140**	**1460**	**899**	**201**	**90.6**	**443**	5
Total Suspended Solids	mg/L	7390	4650	4490	954	3590	2580	-
BOD	mg/L	<5	<5	<5	-	< 4	< 4	-
Anion Sum		-	-	-	-	-	-	-
Cation Sum		-	-	-	-	-	-	-
Ion Balance	%	-	-	-	-	-	-	-
Silver	mg/L	<0.002	<0.002	<0.0001	<0.0001	< 0.00005	< 0.00005	-
Aluminum	mg/L	0.078	**0.112**	0.053	0.070	0.071	0.094	0.1
Antimony	mg/L	<0.003	<0.003	<0.001	<0.001	< 0.0009	< 0.0009	0.006
Arsenic	mg/L	<0.003	<0.003	0.001	<0.001	0.0007	0.0016	0.010
Barium	mg/L	0.006	0.003	0.003	0.018	0.005	0.002	1.00
Beryllium	mg/L	<0.001	<0.001	<0.0005	<0.0005	0.000026	0.000038	-
Bismuth	mg/L	<0.002	<0.002	<0.002	<0.002	< 0.00001	< 0.00001	-
Boron	mg/L	0.020	0.051	0.019	<0.010	0.013	0.036	5
Cadmium	mg/L	<0.001	<0.001	<0.0001	<0.0001	0.000016	0.000007	0.005
Chromium	mg/L	<0.003	<0.003	<0.002	<0.002	0.00023	0.00024	0.05
Cobalt	mg/L	<0.001	<0.001	<0.0005	<0.0005	0.000175	0.000149	-
Copper	mg/L	<0.003	0.006	<0.001	0.003	0.0004	0.0025	1
Molybdenum	mg/L	0.006	0.006	<0.002	<0.002	0.001	0.001	-
Nickel	mg/L	<0.003	<0.003	<0.003	<0.003	0.0002	0.0002	-
Phosphate	mg/L	<0.10	-	-	-	-	-	-
Lead	mg/L	<0.001	<0.001	<0.0005	<0.0005	0.0001	< 0.00009	0.01
Selenium	mg/L	<0.004	<0.004	<0.001	<0.001	< 0.00004	< 0.00004	0.05
Sillicon	mg/L	-	-	-	0.063	-	-	-
Tin	mg/L	<0.002	<0.002	<0.002	0.006	< 0.00006	< 0.00006	-
Strontium	mg/L	0.014	0.007	0.020	<0.0003	0.022	0.018	-
Titanium	mg/L	<0.002	0.002	<0.002	<0.010	0.001	0.00165	-
Uranium	mg/L	<0.002	<0.002	0.0012	<0.002	0.000574	0.000958	0.02
Vanadium	mg/L	<0.002	<0.002	<0.002	<0.005	0.00012	0.00021	-
Zinc	mg/L	<0.005	0.019	<0.005	-	< 0.002	0.004	5
Field Measurements								
Temperature	oC	8.4	10.5	6.8	9.49	6.98	10.5	-
pH	pH Units	6.48	5.68	5.86	5.8	4.4	5.3	-
Coductivity	uS/cm	63.4	48.4	45.8	30.00	22.00	37.00	-
Oxidation Reduction Potential	mV	105.1	179.4	304.7	385.4	262.9	270.9	-
Dissolved Oxygen	mg/L	4.34	4.84	5.36	9.2	5.9	4.41	-

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	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	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	12-May-21	7-Oct-21	
pH Lab	pH Units	**6.27**	DRY	INSV	DRY	INSV	DRY	-	INSV	INSV	INSV	INSV	**6.4**	7.1	7.01	**5.74**	**6.41**	7.35	6.6	7.38	7.25	7.12	7.34	7.12	INSV	INSV	INSV	DRY	7.2	7.56	INSV	INSV	7.03	7.87	6.82	6.5-8.5
Conductivity	µS/cm	94	-	-	-	-	-	-	-	-	-	-	119	208	222	383	435	920	950	1500	1200	1500	1200	970	-	-	-	-	603	730	-	-	499	572	468	-
Hardness	mg/L	**25**	-	-	-	-	-	-	-	-	-	-	**39**	**62**	**71**	**69**	**73**	**200**	**210**	**370**	**320**	**500**	**470**	**420**	-	-	-	-	**228**	**350**	-	-	**247**	**259**	**222**	80-100
Total Dissolved Solids	mg/L	110	-	-	-	-	-	-	-	-	-	-	75	140	150	260	292	**512**	**608**	**1020**	**866**	**1010**	**880**	**672**	-	-	-	-	370	484	-	-	342	391	285	500
Alkalinity	mg/L	**8.5**	-	-	-	-	-	-	-	-	-	-	**22**	49	**13**	**2**	**13**	170	95	230	170	260	160	130	-	-	-	-	227	184	-	-	203	161	191	30-500
Chloride	mg/L	1.4	-	-	-	-	-	-	-	-	-	-	3	15	22	35	38	110	97	110	88	73	33	21	-	-	-	-	5	5.67	-	-	2.7	4	3	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	6.48	8.01	200
Calcium	mg/L	7.9	-	-	-	-	-	-	-	-	-	-	13	20	23	21	22	55	60	110	96	160	150	140	-	-	-	-	79.7	123	-	-	86.8	91.7	79	-
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	7.4	6.02	-
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	8.8	11	-
Sulphate	mg/L	15.3	-	-	-	-	-	-	-	-	-	-	7	7	14	63	50	76	38	220	180	370	370	290	-	-	-	-	63	137	-	-	69.7	79	49	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	0.13	0.06	-
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	**11.1**	5.24	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	0.04	< 0.03	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	0.64	0.51	-
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	< 0.002	< 0.002	-
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**	**11**	3	5
Chemical Oxygen Demand	mg/L	12	-	-	-	-	-	-	-	-	-	-	<4	5	46	20	31	100	58	160	130	120	66	41	-	-	-	-	40	22	-	-	<5	41	< 8	-
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	0.054	0.012	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	0.0039	0.0037	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	-	-	-	-	0.05	0.12	-	-	0.37	2.68	0.5	-
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	< 0.03	-	-
Turbidity	NTU	**5.6**	-	-	-	-	-	-	-	-	-	-	**370**	3.4	**1900**	**44**	**220**	**93**	**73**	**7.8**	**180**	**240**	**93**	**52**	-	-	-	-	**55.3**	**30.5**	-	-	**149**	**49.6**	**15**	5
Total Suspended Solids	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	990	210	400	290	-	-	-	-	97	172	-	-	250	2110	1160	-
BOD	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2	<2	<2	-	-	-	-	<2	<5	-	-	-	< 4	< 4	-
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	< 0.00005	<0.00005	-
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	0.037	0.021	0.1
Antimony	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	-	-	-	<0.0005	<0.003	-	-	<0.001	< 0.0009	< 0.0009	0.006
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0014	<0.001	0.003	<0.001	<0.001	-	-	-	-	0.001	<0.003	-	-	0.001	0.0004	0.0005	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	0.0789	0.0958	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	0.00001	0.00001	-
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	< 0.00001	< 0.00001	-
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	0.335	0.491	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	0.000017	0.000017	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	0.0006	0.00062	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	0.000297	0.000402	-
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	0.0035	0.0052	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	0.00072	0.00046	-
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	0.0006	0.0008	-
Phosphate	mg/L	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	<0.1	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	<0.0002	<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	0.00026	<0.00009	0.01
Selenium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.002	<0.002	-	-	-	-	0.002	<0.004	-	-	<0.001	0.0001	0.00019	0.05
Sillicon	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	0.0001	<0.00006	-
Strontium	mg/L	0.064	-	-	-	-	-	-	-	-	-	-	0.098	0.14	0.19	0.15	0.15	0.28	0.35	0.44	0.39	0.5	0.45	0.42	-	-	-	-	0.276	0.395	-	-	<0.0003	0.305	0.265	-
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	<0.002	-	-	<0.010	0.00307	0.00033	-
Uranium	mg/L	-	-	-	-	-	-	-	-	-	-	-								0.0058	0.0031	0.0072	0.0025	0.003	-	-	-	-	0.0016	0.003	-	-	<0.002	0.00282	0.00139	0.02
Vanadium	mg/L	-	-	-	-	-	-	-	-	-	-	-	<0.001		<0.0001	<0.001	<0.0005	<0.0005	<0.0005	0.00052	0.00054	<0.0005	<0.0005	<0.0005	-	-	-	-	<0.0005	<0.002	-	-	<0.005	0.00034	0.00034	-
Zinc	mg/L	0.035	-	-	-	-	-	-	-	-	-	-	0.008	0.013	0.009	0.007	0.066	0.031	0.0083	0.0089	0.0072	0.023	0.006	0.0062	-	-	-	-	0.006	<0.005	-	-	-	< 0.002	0.003	5
Field Measurements																																			
Temperature	oC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	13.16	11.52	11.6	-
pH	pH Units	6.7	-	8.7	-	7.93	-	6.9	6.1	7	7.5	6.7	5.38	6.87	6.91	5.47	6.94	7.56	8.59	7.17	6	6.72	5.73	7.27	5.65	6.49	-	-	6.62		-	-	6.52	7.23	5.88	-
Coductivity	uS/cm	97	-	114	-	248	-	74	82	364	300	52	144	290	325	198	451	381	789	734	1111	1361	953	711	795	6.57	-	-	0.63		-	-	413.0	381.0	375.0	-
Oxidation Reduction Potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	309.3	146.8	239	-
Dissolved Oxygen	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	12.03	9.02	6.13	-

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	12-May-21	7-Oct-21	
pH Lab	pH Units	7.46	7.16	7.07	6.96	7.30	6.93	6.5-8.5
Conductivity	µS/cm	768	826	779	507	731	590	-
Hardness	mg/L	**342**	**323**	**308**	**227**	**356**	**260**	80-100
Total Dissolved Solids	mg/L	**570**	450	494	332	**563**	351	500
Alkalinity	mg/L	191	240	230	235	231	229	30-500
Chloride	mg/L	7.09	4.78	6.77	4.83	7.00	5.00	250
Sodium	mg/L	16.0	12.9	13.3	10.4	12.8	10.1	200
Calcium	mg/L	117	109	104	78.2	124	89.5	-
Magnesium	mg/L	12.0	12.3	11.8	7.8	11.5	8.8	-
Potassium	mg/L	16.3	15.5	14.0	12.5	12.8	12.4	-
Sulphate	mg/L	91.9	67.3	78.6	59.6	60.0	67.0	500
Ammonia	mg/L	0.54	0.11	<0.02	0.19	< 0.04	0.14	-
Nitrate as N	mg/L	**28.7**	**16.7**	**17.3**	6.7	**21.1**	5.3	10
Nitrite as N	mg/L	<0.10	<0.25	<0.10	<0.05	< 0.03	< 0.03	1
Total Kjeldahl Nitrogen	mg/L	<0.10	0.17	0.86	1.05	< 0.05	0.61	-
Phenolics	mg/L	<0.001	0.001	<0.001	<0.001	< 0.002	< 0.002	-
Dissolved Organic Carbon	mg/L	**10.7**	**8.6**	**9.9**	**13.2**	**11.0**	**15.0**	5
Chemical Oxygen Demand	mg/L	16	21	22	12	32	36	-
Iron	mg/L	<0.010	<0.010	0.013	0.015	0.02	0.046	0.3
Manganese	mg/L	**0.292**	**0.386**	**0.328**	**0.263**	**0.252**	**0.322**	0.05
Phosphorus	mg/L	0.12	0.07	<0.02	<0.02	< 0.03	< 0.03	-
Orthophosphate	mg/L	-	<0.50	<0.20	<0.10	< 0.03	-	-
Turbidity	NTU	**79.7**	**74.6**	**28.0**	2.1	4.7	**14.8**	5
Total Suspended Solids	mg/L	242	44	46	11	5	9	-
BOD	mg/L	<5	<5	<5	-	< 4	< 4	-
Anion Sum		-	-	-	-	-	-	-
Cation Sum		-	-	-	-	-	-	-
Ion Balance	%	-	-	-	-	-	-	-
Silver	mg/L	<0.002	<0.002	<0.0001	<0.0001	< 0.00005	< 0.00005	-
Aluminum	mg/L	0.025	0.035	0.017	0.069	0.021	0.021	0.1
Antimony	mg/L	<0.003	<0.003	<0.001	<0.001	< 0.0009	< 0.0009	0.006
Arsenic	mg/L	<0.003	<0.003	0.001	0.002	0.0005	0.0007	0.010
Barium	mg/L	0.130	0.119	0.091	0.079	0.102	0.083	1.00
Beryllium	mg/L	<0.001	<0.001	<0.0005	<0.0005	0.000011	0.000017	-
Bismuth	mg/L	<0.002	<0.002	<0.002	<0.002	0.00001	< 0.00001	-
Boron	mg/L	0.519	0.473	0.488	0.495	0.514	0.523	5
Cadmium	mg/L	<0.001	<0.001	<0.0001	<0.0001	0.000039	0.000039	0.005
Chromium	mg/L	<0.003	<0.003	<0.002	<0.002	0.00073	0.00067	0.05
Cobalt	mg/L	0.002	0.002	0.002	0.002	0.001	0.002	-
Copper	mg/L	0.009	0.010	0.008	0.008	0.008	0.009	1
Mercury	mg/L	-	-	-	-	< 0.00001	< 0.00001	0.001
Molybdenum	mg/L	<0.002	<0.002	<0.002	<0.002	0.00096	0.00089	-
Nickel	mg/L	<0.003	0.004	0.010	<0.003	0.002	0.0023	-
Phosphate	mg/L	<0.20	-	-	-	-	-	-
Lead	mg/L	<0.001	<0.001	<0.0005	<0.0005	< 0.00009	< 0.00009	0.01
Selenium	mg/L	<0.004	<0.004	<0.001	<0.001	0.00014	0.0002	0.05
Sillicon	mg/L	-	-	-	0.263	-	-	-
Tin	mg/L	<0.002	<0.002	<0.002	0.002	0.00014	0.00007	-
Strontium	mg/L	0.384	0.392	<0.002	<0.0003	0.406	0.311	-
Titanium	mg/L	<0.002	0.002	<0.002	<0.010	0.001	0.000	-
Uranium	mg/L	<0.002	0.005	0.0062	<0.002	0.0050	0.005	0.02
Vanadium	mg/L	<0.002	<0.002	<0.002	<0.005	0.0003	0.0004	-
Zinc	mg/L	<0.005	<0.005	<0.005	-	< 0.002	0.003	5
Benzene	mg/L	-	-	-	-	<0.0005	<0.0005	0.001
1,4-Dichlorobenzene	mg/L	-	-	-	-	<0.0005	<0.0005	0.005
Dichloromethane	mg/L	-	-	-	-	<0.0005	<0.0005	0.05
Toluene	mg/L	-	-	-	-	<0.0005	<0.0005	0.06
Vinyl Chloride	mg/L	-	-	-	-	<0.0002	<0.0002	0.001
Field Measurements								
Temperature	oC	10.1	10.5	9.9	12.7	10.47	13.1	-
Coductivity	uS/cm	847.0	586.0	719.0	387.0	491.0	489.0	-
Oxidation Reduction Potential	mV	165.5	142.1	398.2	335.4	160.1	226.4	-
Dissolved Oxygen	mg/L	5.23	2.14	3.79	10.77	4.25	1.1	-

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 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	12-May-21	7-Oct-21	
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	7.24	6.56	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	337	366	-
Hardness	mg/L	**75**	**69**	**59**	**63**	88	**68**	**78**	**70**	**110**	**181**	**122**	**119**	**47**	**127**	96.0	**142**	**136**	**226**	**132**	**158**	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	203	206	500
Alkalinity	mg/L	46	56	31	39	54	44	52	49	48	66	57	58	59	85	57	83	90	115	89	114	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	10.0	17.0	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	10.9	12.9	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	36.9	49.7	-
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	9.64	8.36	-
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	4.27	5.60	-
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	49.0	56.0	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	0.25	0.16	-
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	2.07	3.62	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	0.09	< 0.03	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	0.44	0.28	-
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	< 0.002	< 0.002	-
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**	4.0	**14.0**	5
Chemical Oxygen Demand	mg/L	42	63	48	49	31	35	26	24	12	64	66	34	53	33	<5	14	13	<5	16	8	-
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	0.182	0.123	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**	**0.174**	**0.098**	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	0.55	0.18	-
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	< 0.03	-	-
Turbidity	NTU	**430**	0.5	**980**	**140**	**860**	**590**	**860**	**210**	**400**	**778**	**860**	**471**	**595**	**424**	**258**	**273**	**95.9**	**225**	**21.9**	**14.5**	5
Total Suspended Solids	mg/L	-	-	-	10000	3000	8100	3700	4200	3800	2020	6690	1720	1830	870	1730	2380	2000	761	1400	612	-
BOD	mg/L	-	-	-	<2	<2	<2	<2	<2	<2	9	<2	2	7	<2	<5	<5	<5	-	< 4	< 4	-
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	< 0.00005	< 0.00005	-
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	**0.117**	0.078	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	< 0.0009	< 0.0009	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	0.0002	0.0003	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	0.107	0.126	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	0.000019	0.000015	-
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	<0002	<0.002	< 0.00001	< 0.00001	-
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	0.295	0.331	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	0.000036	0.000019	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	0.00044	0.00047	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	0.00066	0.000395	-
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	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	0.00022	0.00023	-
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	0.0021	0.0011	-
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	< 0.00009	< 0.00009	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	0.00006	0.00008	0.05
Sillicon	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	< 0.00006	< 0.00006	-
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	0.244	0.255	-
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	0.011	0.00656	-
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	0.000243	0.000255	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	0.00044	0.00036	-
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	-	0.002	0.009	5
Field Measurements																						
Temperature	oC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.2	9.2	7.4	9.89	6.72	9.9	-
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	13.89	5.94	-
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	201	281	-
Oxidation Reduction Potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	211.2	437.3	229.7	264.2	121.4	237.6	-
Dissolved Oxygen	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.04	4.35	1.74	9.83	3.72	4.1	-

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 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																				
		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	12-May-21	7-Oct-21	
pH Lab	pH Units	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	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
Sillicon	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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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	12-May-21	7-Oct-21		
pH Lab	pH Units	7.04	6.99	6.85	6.70	7.16	7.09	6.5-8.5	-
Conductivity	µS/cm	309	465	381	352	324	379	-	-
Hardness	mg/L	**123**	**158**	**140**	**142**	**134**	**159**	80-100	-
Total Dissolved Solids	mg/L	184	232	216	206	189	246	500	-
Alkalinity	mg/L	72	101	97	130	82	115	30-500	-
Chloride	mg/L	6.03	12.9	7.79	11.9	7.0	16.0	250	180
Sodium	mg/L	11.0	13.2	10.9	17.2	9.0	14.2	200	180
Calcium	mg/L	35.9	47.5	41.1	42.6	39.5	49.0	-	-
Magnesium	mg/L	7.98	9.60	8.99	8.73	8.47	8.89	-	-
Potassium	mg/L	5.49	7.47	6.09	7.86	6.06	8.53	-	-
Sulphate	mg/L	65.7	66.8	68.1	57.5	56.0	57.0	500	-
Ammonia	mg/L	0.30	0.79	<0.02	0.65	0.23	0.47	-	-
Nitrate as N	mg/L	1.60	3.36	2.23	2.48	2.41	3.31	10	-
Nitrite as N	mg/L	<0.05	<0.05	<0.05	<0.05	< 0.03	< 0.03	1	-
Total Kjeldahl Nitrogen	mg/L	0.52	1.30	0.70	1.13	0.30	0.60	-	-
Phenolics	mg/L	<0.001	<0.001	<0.001	<0.001	< 0.002	< 0.002	-	0.961
Dissolved Organic Carbon	mg/L	2.9	**5.3**	4.6	4.8	4.0	5.0	5	-
Chemical Oxygen Demand	mg/L	<5	12	16	<5	11	13	-	-
Iron	mg/L	<0.010	<0.010	0.019	<0.010	0.01	0.03	0.3	-
Manganese	mg/L	**0.404**	**0.615**	**0.450**	**0.898**	**0.469**	**0.541**	0.05	-
Phosphorus	mg/L	0.25	0.12	0.16	0.70	0.05	0.03	-	-
Orthophosphate	mg/L	-	<0.10	<0.10	<0.10	< 0.03	-	-	-
Turbidity	NTU	**36.7**	**24.5**	**60.4**	**213.0**	3.8	3.4	5	-
Total Suspended Solids	mg/L	42	66	107	190	158	228	-	-
BOD	mg/L	<5	<5	<5	-	< 4	< 4	-	-
Anion Sum		-	-	-	-	-	-	-	-
Cation Sum		-	-	-	-	-	-	-	-
Ion Balance	%	-	-	-	-	-	-	-	-
Silver	mg/L	<0.002	<0.002	<0.0001	<0.0001	< 0.00005	< 0.00005	-	0.00012
Aluminum	mg/L	0.013	0.015	0.011	0.030	0.009	0.017	0.1	-
Antimony	mg/L	<0.003	<0.003	<0.001	<0.001	< 0.0009	< 0.0009	0.006	1.6
Arsenic	mg/L	<0.003	<0.003	<0.001	<0.001	0.0002	0.0002	0.01	0.15
Barium	mg/L	0.096	0.124	0.093	0.116	0.100	0.123	1.00	2.3
Beryllium	mg/L	<0.001	<0.001	<0.0005	<0.0005	0.000013	0.000011	-	0.0053
Bismuth	mg/L	<0.002	<0.002	<0.002	<0.002	< 0.00001	< 0.00001	-	-
Boron	mg/L	0.207	0.341	0.265	0.287	0.256	0.287	5	3.55
Cadmium	mg/L	<0.001	<0.001	<0.0001	<0.0001	0.000021	0.000048	0.005	0.00021
Chromium	mg/L	<0.003	<0.003	<0.002	<0.002	0.00041	0.00025	0.05	0.064
Cobalt	mg/L	<0.001	<0.001	0.0007	0.001	0.00223	0.000876	-	0.0052
Copper	mg/L	0.006	0.007	0.005	0.007	0.005	0.007	1	0.0069
Molybdenum	mg/L	<0.002	<0.002	<0.002	<0.002	0.00039	0.00042	-	0.73
Nickel	mg/L	<0.003	0.005	0.004	0.005	0.004	0.004	-	0.039
Phosphate	mg/L	<0.10	-	-	-	-	-	-	-
Lead	mg/L	<0.001	<0.001	<0.0005	<0.0005	< 0.00009	< 0.00009	0.01	0.002
Selenium	mg/L	<0.004	<0.004	0.002	<0.001	< 0.00004	0.00009	0.05	0.005
Sillicon	mg/L	-	-	-	0.325	-	-	-	-
Tin	mg/L	<0.002	<0.002	<0.002	0.002	0.00011	< 0.00006	-	-
Strontium	mg/L	0.225	0.292	0.280	<0.0003	0.342	0.436	-	-
Titanium	mg/L	<0.002	<0.002	<0.002	<0.010	0.00007	0.00116	-	-
Uranium	mg/L	<0.002	<0.002	<0.0005	<0.002	0.000278	0.000395	0.02	0.033
Vanadium	mg/L	<0.002	<0.002	<0.002	<0.005	0.00011	0.00018	-	0.02
Zinc	mg/L	0.005	0.005	<0.005	-	0.013	0.006	5	0.089
Field Measurements									
Temperature	oC	8.3	9.8	7.2	10.24	6.76	9.4	-	-
pH	pH Units	6.4	5.8	6.1	6.2	12.7	5.6	-	-
Coductivity	uS/cm	338.8	321.1	371.1	27.1	198.0	285.0	-	-
Oxidation Reduction Potential	mV	209.4	427.5	250.2	279.6	145.7	232.3	-	-
Dissolved Oxygen	mg/L	2.48	1.7	4.06	12.15	3.28	1.51	-	-

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
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 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	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	12-May-21	7-Oct-21		
pH Lab	pH Units	6.67	**6.36**	**6.15**	6.63	**6.07**	**6.21**	**6.24**	**6.05**	**6.44**	DRY	**5.9**	**6.4**	**6.1**	**6.1**	**6.34**	**5.92**	**6.43**	**5.95**	6.93	**5.91**	6.5-8.5	-
Conductivity	µS/cm	46	61	67	38	50	42	35	26	31	-	78	51	22	14	34	32	50	18	50	14	-	-
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**	**15.2**	**5.7**	80-100	-
Total Dissolved Solids	mg/L	38	100	110	130	88	82	324	336	192	-	90	56	22	14	28	36	36	<20	49	31	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**	**15**	**3**	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	1.00	1.00	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	2.16	1.09	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	3.35	1.25	-	-
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	1.65	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	1.33	0.92	-	-
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	10.00	8.00	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	< 0.04	< 0.04	-	-
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	0.18	0.22	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	< 0.03	< 0.03	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	0.06	0.11	-	-
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	< 0.002	< 0.002	-	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	3.0	4.0	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	< 8	< 8	-	-
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	**0.378**	**0.311**	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	0.013	0.007	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	0.26	0.31	-	-
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	0.03		-	-
Turbidity	NTU	**1700**	**430**	**420**	**150**	**170**	**180**	**500**	**330**	**380**	-	**1710**	**1580**	**2420**	**1720**	**2300**	**2470**	**3850**	**2640**	**74.2**	**105**	5	-
Total Suspended Solids	mg/L	-	-	-	1100	430	3700	2400	1400	910	-	2530	1920	3550	1820	4160	2290	4180	3510	1330	921	-	-
BOD	mg/L	-	-	-	<2	<2	<2	<2	<2	<2	-	<2	<2	<2	<2	<5	<5	<5	-	< 4	< 4	-	-
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	< 0.00005	< 0.00005	-	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	**0.260**	**0.334**	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	< 0.0009	< 0.0009	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	< 0.0002	0.0002	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	0.024	0.012	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	0.00009	0.000084	-	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	0.00002	< 0.00001	-	-
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	0.009	0.012	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	0.000013	0.000006	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	0.00042	0.00063	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	0.00055	0.00045	-	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	0.0014	0.0026	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	0.00008	0.00007	-	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	0.0009	0.0006	-	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	0.00075	0.00024	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	0.0001	0.00005	0.05	0.005
Sillicon	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	< 0.00006	< 0.00006	-	-
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	0.030	0.010	-	-
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	0.020	0.011	-	-
Uranium	mg/L	-	-	-	0.00013	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	<0.0001	0.0001	<0.0001	<0.002	<0.002	<0.0005	<0.002	0.000316	0.000249	0.02	0.033
Vanadium	mg/L	0.0043	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0005	0.0008	<0.0005	<0.002	<0.002	<0.002	<0.005	0.00071	0.00089	-	0.02
Zinc	mg/L	0.013	<0.005	0.0079	0.0069	0.0069	0.018	0.0087	0.0094	0.0087	-	0.008	0.008	<0.005	0.013	<0.005	0.006	<0.005	-	0.004	0.003	5	0.089
Field Measurements																							
Temperature	oC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.5	11.9	8.3	11.17	7.16	11.8	-	-
pH	pH Units	6.73	7.38	8.93	6.82	7.46	5.61	7	8.19	6.7	-	6.62	-	7.2	7.9	6.2	5.2	5.78	5.76	13.96	6.28	-	-
Coductivity	uS/cm	168	48	57	24	33	76	17	35	37	-	0.05	-	0.03	0.003	42.3	24.7	46.5	16	29	15	-	-
Oxidation Reduction Potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	201.6	411.5	249.9	295.3	72.3	212.1	-	-
Dissolved Oxygen	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.22	8.08	4.38	10.1	9.58	8.65	-	-

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
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 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	12-May-21	7-Oct-21		
pH Lab	pH Units	7.16	7.13	7.01	6.73	7.26	6.76	6.5-8.5	-
Conductivity	µS/cm	376	459	427	352	366	395	-	-
Hardness	mg/L	**135**	**131**	**130**	**126**	**118**	**111**	80-100	-
Total Dissolved Solids	mg/L	200	224	194	206	211	237	500	-
Alkalinity	mg/L	98	103	131	140	119	147	30-500	-
Chloride	mg/L	16.8	30.6	20.3	27.2	21.0	34.0	250	180
Sodium	mg/L	14.3	19.7	16.5	19.6	15.5	18.5	200	180
Calcium	mg/L	42.3	41.3	40.7	40.0	37.4	35.6	-	-
Magnesium	mg/L	7.06	6.87	6.91	6.30	6.03	5.38	-	-
Potassium	mg/L	10.0	9.4	10.40	10.40	10.00	9.16	-	-
Sulphate	mg/L	55.2	26.1	35.7	18.6	20.0	19.0	500	-
Ammonia	mg/L	0.26	1.71	2.70	1.29	1.97	2.13	-	-
Nitrate as N	mg/L	1.98	4.63	2.43	3.58	1.84	1.91	10	-
Nitrite as N	mg/L	0.25	0.12	0.06	<0.05	0.24	< 0.03	1	-
Total Kjeldahl Nitrogen	mg/L	6.10	4.10	4.96	2.27	2.71	2.52	-	-
Phenolics	mg/L	0.003	0.002	<0.001	<0.001	< 0.002	< 0.002	-	0.961
Dissolved Organic Carbon	mg/L	4.9	**6.0**	**6.4**	**5.8**	5.0	**6.0**	5	-
Chemical Oxygen Demand	mg/L	154	130	221	19	41	29	-	-
Iron	mg/L	<0.010	<0.010	0.039	0.014	0.214	0.031	0.3	-
Manganese	mg/L	**1.39**	**0.94**	**1.56**	**1.22**	**1.26**	**0.96**	0.05	-
Phosphorus	mg/L	2.98	3.36	1.22	0.80	0.71	0.70	-	-
Orthophosphate	mg/L	-	<0.10	<0.10	<0.10	0.2		-	-
Turbidity	NTU	**7380**	**1450**	**629**	**473**	**29.8**	**20.9**	5	-
Total Suspended Solids	mg/L	6680	3300	2180	1550	931	873	-	-
BOD	mg/L	9	<5	10	-	< 4	< 4	-	-
Anion Sum		-	-	-	-	-		-	-
Cation Sum		-	-	-	-	-		-	-
Ion Balance	%	-	-	-	-	-		-	-
Silver	mg/L	<0.002	<0.002	<0.0001	<0.0001	< 0.00005	< 0.00005	-	0.00012
Aluminum	mg/L	0.033	0.035	0.031	0.067	**0.124**	0.024	0.1	-
Antimony	mg/L	<0.003	<0.003	<0.001	<0.001	< 0.0009	< 0.0009	0.006	1.6
Arsenic	mg/L	<0.003	<0.003	<0.001	<0.001	0.0004	0.0003	0.01	0.15
Barium	mg/L	0.183	0.147	0.162	0.146	0.160	0.121	1.00	2.3
Beryllium	mg/L	<0.001	<0.001	<0.0005	<0.0005	0.000023	0.000011	-	0.0053
Bismuth	mg/L	<0.002	<0.002	<0.002	<0.002	< 0.00001	< 0.00001	-	-
Boron	mg/L	0.230	0.343	0.286	0.271	0.281	0.297	5	3.55
Cadmium	mg/L	<0.001	<0.001	<0.0001	<0.0001	0.000061	0.000044	0.005	0.00021
Chromium	mg/L	<0.003	<0.003	<0.002	<0.002	0.00073	0.00041	0.05	0.064
Cobalt	mg/L	<0.001	<0.001	<0.0005	<0.0005	0.00065	0.000532	-	0.0052
Copper	mg/L	0.004	0.004	0.003	0.004	0.004	0.003	1	0.0069
Molybdenum	mg/L	<0.002	<0.002	<0.002	<0.002	0.00017	0.00014	-	0.73
Nickel	mg/L	<0.003	<0.003	<0.003	<0.003	0.0007	0.0006	-	0.039
Phosphate	mg/L	<0.10	-	-	-	-		-	-
Lead	mg/L	<0.001	<0.001	<0.0005	<0.0005	0.00022	< 0.00009	0.01	0.002
Selenium	mg/L	<0.004	<0.004	0.002	<0.001	0.00006	0.00009	0.05	0.005
Sillicon	mg/L	-	-	-	0.205	-		-	-
Tin	mg/L	<0.002	<0.002	<0.002	0.006	< 0.00006	0.00007	-	-
Strontium	mg/L	0.233	0.235	0.234	<0.0003	0.228	0.204	-	-
Titanium	mg/L	<0.002	<0.002	<0.002	<0.010	0.00641	0.00077	-	-
Uranium	mg/L	<0.002	<0.002	<0.0005	<0.002	0.000433	0.000227	0.02	0.033
Vanadium	mg/L	<0.002	<0.002	<0.002	<0.005	0.00048	0.00016	-	0.02
Zinc	mg/L	<0.005	<0.005	<0.005	-	0.002	0.003	5	0.089
Field Measurements									
Temperature	oC	7.7	9.5	6.7	10.24	7.28	10.8	-	-
pH	pH Units	6.5	6.0	6.1	6.3	12.3	6.0	-	-
Coductivity	uS/cm	423.2	321.3	414.5	268	227	296	-	-
Oxidation Reduction Potential	mV	204.8	440.6	238.2	230.4	114.7	239.3	-	-
Dissolved Oxygen	mg/L	0.8	2.01	1.31	10.8	2.6	1.34	-	-

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
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	12-May-21	7-Oct-21		
pH Lab	pH Units	7.40	7.17	6.99	6.85	7.25	6.75	6.5-8.5	-
Conductivity	µS/cm	479	574	608	441	534	485	-	-
Hardness	mg/L	**197**	**143**	**155**	**140**	**176**	**153**	80-100	-
Total Dissolved Solids	mg/L	260	240	300	240	294	**520**	500	-
Alkalinity	mg/L	152	168	192	201	174	189	30-500	-
Chloride	mg/L	15.5	38.6	26.2	33.5	23.0	42.0	250	180
Sodium	mg/L	11.4	22.5	21.6	22.8	22.0	25.0	200	180
Calcium	mg/L	63.9	45.6	48.1	44.6	54.3	48.6	-	-
Magnesium	mg/L	9.19	7.16	8.40	7.02	9.67	7.68	-	-
Potassium	mg/L	8.04	12.30	10.9	11.1	11.5	11.5	-	-
Sulphate	mg/L	65.9	20.0	58.4	16.9	57.0	19.0	500	-
Ammonia	mg/L	3.58	6.60	6.18	6.83	6.50	7.07	-	-
Nitrate as N	mg/L	0.92	<0.05	<0.05	<0.05	0.08	0.06	10	-
Nitrite as N	mg/L	<0.05	<0.05	0.06	<0.05	0.04	< 0.03	1	-
Total Kjeldahl Nitrogen	mg/L	4.00	7.46	7.96	7.40	7.15	6.66	-	-
Phenolics	mg/L	0.002	0.001	0.002	<0.001	< 0.002	< 0.002	-	0.961
Dissolved Organic Carbon	mg/L	**6.8**	**9.2**	**9.8**	**10.4**	**9.0**	**12.0**	5	-
Chemical Oxygen Demand	mg/L	35	33	45	16	43	27	-	-
Iron	mg/L	0.133	**3.76**	**8.08**	**8.71**	**14.3**	**10.1**	0.3	-
Manganese	mg/L	**2.06**	**4.48**	**5.28**	**4.79**	**6.20**	**5.43**	0.05	-
Phosphorus	mg/L	2.09	0.70	1.61	3.29	0.76	0.26	-	-
Orthophosphate	mg/L	-	<0.10	<0.10	<0.10	0.08	-	-	-
Turbidity	NTU	**4050**	**777**	**1120**	**777**	**182**	**138**	5	-
Total Suspended Solids	mg/L	2090	1980	3320	1160	1350	325	-	-
BOD	mg/L	<5	<5	<5	-	< 4	< 4	-	-
Anion Sum		-	-	-	-	-	-	-	-
Cation Sum		-	-	-	-	-	-	-	-
Ion Balance	%	-	-	-	-	-	-	-	-
Silver	mg/L	<0.002	<0.002	<0.0001	<0.0001	< 0.00005	< 0.00005	-	0.00012
Aluminum	mg/L	0.017	**0.213**	0.032	0.042	0.067	0.025	0.1	-
Antimony	mg/L	<0.003	<0.003	<0.001	<0.001	< 0.0009	< 0.0009	0.006	1.6
Arsenic	mg/L	<0.003	<0.003	0.001	0.002	0.0007	0.0005	0.01	0.15
Barium	mg/L	0.103	0.134	0.137	0.110	0.144	0.127	1.00	2.3
Beryllium	mg/L	<0.001	<0.001	<0.0005	<0.0005	0.000028	0.000017	-	0.0053
Bismuth	mg/L	<0.002	<0.002	<0.002	<0.002	< 0.00001	< 0.00001	-	-
Boron	mg/L	0.344	0.320	0.419	0.237	0.435	0.309	5	3.55
Cadmium	mg/L	<0.001	<0.001	<0.0001	<0.0001	0.000018	0.000024	0.005	0.00021
Chromium	mg/L	<0.003	<0.003	<0.002	<0.002	0.00091	0.00092	0.05	0.064
Cobalt	mg/L	0.006	0.016	0.022	0.019	0.026	0.021	-	0.0052
Copper	mg/L	0.004	0.008	0.004	0.003	0.003	0.004	1	0.0069
Molybdenum	mg/L	<0.002	<0.002	<0.002	<0.002	0.0006	0.00059	-	0.73
Nickel	mg/L	<0.003	<0.003	<0.003	<0.003	0.0025	0.0024	-	0.039
Phosphate	mg/L	<0.10	-	-	-	-	-	-	-
Lead	mg/L	<0.001	<0.001	<0.0005	<0.0005	< 0.00009	< 0.00009	0.01	0.002
Selenium	mg/L	<0.004	<0.004	0.003	<0.001	0.00016	0.00012	0.05	0.005
Sillicon	mg/L	-	-	-	0.246	-	-	-	-
Tin	mg/L	<0.002	<0.002	<0.002	0.006	0.00007	0.00006	-	-
Strontium	mg/L	0.275	0.300	0.318	<0.0003	0.349	0.296	-	-
Titanium	mg/L	0.002	0.013	<0.002	<0.010	0.003	0.001	-	-
Uranium	mg/L	<0.002	<0.002	0.0015	<0.002	0.00157	0.00112	0.02	0.033
Vanadium	mg/L	<0.002	<0.002	<0.002	<0.005	0.00107	0.00087	-	0.02
Zinc	mg/L	<0.005	<0.005	<0.005	-	0.004	0.006	5	0.089
Field Measurements									
Temperature	oC	8.1	9.2	8.4	9.89	7.38	9.9	-	-
pH	pH Units	6.5	6.1	6.2	6.3	11.9	6.1	-	-
Coductivity	uS/cm	532.2	4.0	599.1	353	359	405	-	-
Oxidation Reduction Potential	mV	203.8	318.4	230.4	287.2	60	52.2	-	-
Dissolved Oxygen	mg/L	1.19	1.54	2.07	12.85	2.36	1.43	-	-

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
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 *Sample Collection Date (dd/mm/yyyy)* BH10-I						ODWQS	APV
		11-Jun-19	23-Sep-19	1-Jun-20	30-Sep-20	12-May-21	7-Oct-21		
pH Lab	pH Units	7.08	7.11	**6.49**	6.69	7.32	6.59	6.5-8.5	-
Conductivity	µS/cm	289	601	86	465	186	224	-	-
Hardness	mg/L	**115**	**214**	90.9	**215**	**61.3**	**69.7**	80-100	-
Total Dissolved Solids	mg/L	188	338	150	328	114	137	500	-
Alkalinity	mg/L	47	76	**7**	106	38	60	30-500	-
Chloride	mg/L	4.10	10.30	3.54	9.84	2.00	4.00	250	180
Sodium	mg/L	9.14	18.10	8.09	15.60	5.26	7.30	200	180
Calcium	mg/L	30.2	56.7	23.8	57.9	15.8	18.9	-	-
Magnesium	mg/L	9.60	17.50	7.6	17.0	5.3	5.5	-	-
Potassium	mg/L	5.52	7.64	4.35	7.17	3.16	4.32	-	-
Sulphate	mg/L	84.2	165.0	58	152	32	51	500	-
Ammonia	mg/L	0.11	0.15	<0.02	<0.02	< 0.04	< 0.04	-	-
Nitrate as N	mg/L	1.24	2.22	1.10	2.57	3.18	1.85	10	-
Nitrite as N	mg/L	<0.05	<0.05	<0.05	<0.05	< 0.03	< 0.03	1	-
Total Kjeldahl Nitrogen	mg/L	0.44	0.68	0.36	0.41	0.09	0.11	-	-
Phenolics	mg/L	<0.001	0.001	<0.001	<0.001	< 0.002	< 0.002	-	0.961
Dissolved Organic Carbon	mg/L	**5.6**	**5.9**	**6.6**	**7.8**	5.0	**6.0**	5	-
Chemical Oxygen Demand	mg/L	11	21	20	<5	8	12	-	-
Iron	mg/L	<0.010	<0.010	0.024	0.032	0.024	0.019	0.3	-
Manganese	mg/L	**0.067**	0.016	0.005	0.006	0.003	0.001	0.05	-
Phosphorus	mg/L	1.73	1.58	1.20	0.73	0.43	0.14	-	-
Orthophosphate	mg/L	-	<0.10	<0.10	<0.10	< 0.03		-	-
Turbidity	NTU	**982**	**1940**	**583**	**187**	**50**	**5.91**	5	-
Total Suspended Solids	mg/L	1130	2060	1320	796	776	166	-	-
BOD	mg/L	<5	<5	<5	-	5	< 4	-	-
Anion Sum		-	-	-	-	-		-	-
Cation Sum		-	-	-	-	-		-	-
Ion Balance	%	-	-	-	-	-		-	-
Silver	mg/L	<0.002	<0.002	<0.0001	<0.0001	0.00008	< 0.00005	-	0.00012
Aluminum	mg/L	0.049	0.045	0.069	0.045	0.053	0.059	0.1	-
Antimony	mg/L	<0.003	<0.003	<0.001	<0.001	< 0.0009	< 0.0009	0.006	1.6
Arsenic	mg/L	<0.003	<0.003	<0.001	<0.001	< 0.0002	< 0.0002	0.01	0.15
Barium	mg/L	0.111	0.148	0.079	0.190	0.063	0.082	1.00	2.3
Beryllium	mg/L	<0.001	<0.001	<0.0005	<0.0005	0.000008	0.00001	-	0.0053
Bismuth	mg/L	<0.002	<0.002	<0.002	<0.002	< 0.00001	< 0.00001	-	-
Boron	mg/L	0.446	0.790	0.367	0.807	0.218	0.284	5	3.55
Cadmium	mg/L	<0.001	<0.001	<0.0001	<0.0001	0.000003	0.000004	0.005	0.00021
Chromium	mg/L	<0.003	<0.003	<0.002	<0.002	0.00049	0.00045	0.05	0.064
Cobalt	mg/L	0.001	<0.001	<0.0005	<0.0005	0.000191	0.000107	-	0.0052
Copper	mg/L	0.008	0.008	0.005	0.007	0.004	0.004	1	0.0069
Molybdenum	mg/L	<0.002	<0.002	<0.002	<0.002	0.00011	0.00021	-	0.73
Nickel	mg/L	0.004	0.003	<0.003	<0.003	0.001	0.0006	-	0.039
Phosphate	mg/L	<0.10	-	-	-	-		-	-
Lead	mg/L	<0.001	<0.001	<0.0005	<0.0005	< 0.00009	< 0.00009	0.01	0.002
Selenium	mg/L	<0.004	<0.004	0.002	<0.001	0.00005	0.00009	0.05	0.005
Sillicon	mg/L	-	-	-	0.321	-		-	-
Tin	mg/L	<0.002	<0.002	<0.002	0.003	0.00007	0.00007	-	-
Strontium	mg/L	0.187	0.343	0.149	<0.0003	0.100	0.110	-	-
Titanium	mg/L	<0.002	0.003	<0.002	<0.010	0.000	0.00049	-	-
Uranium	mg/L	<0.002	<0.002	0.0007	<0.002	0.00068	0.000637	0.02	0.033
Vanadium	mg/L	<0.002	<0.002	<0.002	<0.005	0.00036	0.00055	-	0.02
Zinc	mg/L	0.007	0.009	<0.005	-	< 0.002	0.003	5	0.089
Field Measurements									
Temperature	oC	10.1	11.4	7.2	11.09	7.62	10.9	-	-
pH	pH Units	6.5	6.1	6.0	6.4	13.5	5.8	-	-
Coductivity	uS/cm	311.4	416.3	252.1	369	120	201	-	-
Oxidation Reduction Potential	mV	158.2	179.3	292	358.7	153.9	209.3	-	-
Dissolved Oxygen	mg/L	9.19	8.14	8.07	10.91	12.58	6.62	-	-

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
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	12-May-21	7-Oct-21	
pH Lab	pH Units	**6.38**	**6.33**	6.77	**6.12**	6.81	**6.21**	6.5-8.5
Conductivity	µS/cm	82	94	248	37	92	107	-
Hardness	mg/L	**25.1**	**23.5**	**25.6**	**7.5**	**24.6**	**36.3**	80-100
Total Dissolved Solids	mg/L	60	66	66	34	60	49	500
Alkalinity	mg/L	**7**	**10**	49	**15**	**11**	**12**	30-500
Chloride	mg/L	13.5	12.6	13.5	2.3	15.0	20.0	250
Sodium	mg/L	3.52	3.89	4.01	5.12	3.75	4.71	200
Calcium	mg/L	8.18	7.76	8.45	2.42	8.24	11.60	-
Magnesium	mg/L	1.14	0.99	1.09	0.36	0.98	1.76	-
Potassium	mg/L	1.38	1.34	1.28	0.70	1.16	1.51	-
Sulphate	mg/L	4.93	5.64	5.63	4.20	4.00	4.00	500
Ammonia	mg/L	0.07	0.12	<0.02	<0.02	< 0.04	< 0.04	-
Nitrate as N	mg/L	0.40	0.20	0.15	0.09	0.21	0.21	10
Nitrite as N	mg/L	<0.05	<0.05	<0.05	<0.05	< 0.03	< 0.03	1
Total Kjeldahl Nitrogen	mg/L	0.18	0.19	0.21	0.20	0.34	< 0.05	-
Phenolics	mg/L	<0.001	<0.001	<0.001	<0.001	< 0.002	< 0.002	-
Dissolved Organic Carbon	mg/L	1.8	2.0	2.5	4.3	< 1	< 1	5
Chemical Oxygen Demand	mg/L	<5	<5	<5	<5	< 8	< 8	-
Iron	mg/L	<0.010	<0.010	0.011	0.08	0.018	0.017	0.3
Manganese	mg/L	0.021	0.016	0.012	0.017	0.024	0.021	0.05
Phosphorus	mg/L	0.87	0.90	1.84	2.42	0.63	0.47	-
Orthophosphate	mg/L	-	<0.10	<0.10	<0.10	0.08	-	-
Turbidity	NTU	**368**	**216**	**320**	**771**	**23.9**	**12.4**	5
Total Suspended Solids	mg/L	1760	1110	430	3210	820	1330	-
BOD	mg/L	<5	<5	<5	-	< 4	< 4	-
Anion Sum		-	-	-	-	-	-	-
Cation Sum		-	-	-	-	-	-	-
Ion Balance	%	-	-	-	-	-	-	-
Silver	mg/L	<0.002	<0.002	<0.0001	<0.0001	< 0.00005	< 0.00005	-
Aluminum	mg/L	0.030	0.034	0.033	**0.239**	0.027	0.013	0.1
Antimony	mg/L	<0.003	<0.003	<0.001	<0.001	< 0.0009	< 0.0009	0.006
Arsenic	mg/L	<0.003	<0.003	<0.001	0.001	< 0.0002	< 0.0002	0.010
Barium	mg/L	0.019	0.019	0.017	0.007	0.021	0.021	1.00
Beryllium	mg/L	<0.001	<0.001	<0.0005	<0.0005	0.000042	0.000036	-
Bismuth	mg/L	<0.002	<0.002	<0.002	<0.002	< 0.00001	< 0.00001	-
Boron	mg/L	<0.010	<0.010	<0.010	0.018	0.027	0.026	5
Cadmium	mg/L	<0.001	<0.001	<0.0001	<0.0001	0.000008	0.000018	0.005
Chromium	mg/L	<0.003	<0.003	<0.002	<0.002	0.00029	0.00016	0.05
Cobalt	mg/L	<0.001	<0.001	<0.0005	<0.0005	0.000115	0.000063	-
Copper	mg/L	<0.003	<0.003	<0.001	0.002	0.0009	0.0003	1
Molybdenum	mg/L	<0.002	<0.002	<0.002	<0.002	0.00041	0.00006	-
Nickel	mg/L	<0.003	<0.003	<0.003	<0.003	0.0002	0.0003	-
Phosphate	mg/L	<0.10	-	-	-	-	-	-
Lead	mg/L	<0.001	<0.001	<0.0005	<0.0005	< 0.00009	< 0.00009	0.01
Selenium	mg/L	<0.004	<0.004	<0.001	0.011	0.00005	< 0.00004	0.05
Sillicon	mg/L	-	-	-	0.024	-	-	-
Tin	mg/L	<0.002	<0.002	<0.002	0.003	< 0.00006	< 0.00006	-
Strontium	mg/L	0.081	0.075	0.077	<0.0003	0.090	0.094	-
Titanium	mg/L	<0.002	<0.002	<0.002	<0.010	0.00045	0.00027	-
Uranium	mg/L	<0.002	<0.002	<0.0005	<0.002	0.000067	0.000049	0.02
Vanadium	mg/L	<0.002	<0.002	<0.002	<0.005	0.00007	0.00005	-
Zinc	mg/L	<0.005	<0.005	<0.005	-	0.002	< 0.002	5
Field Measurements								
Temperature	oC	12.3	11.3	7.8	10.61	7.99	10.5	-
pH	pH Units	6.3	5.9	5.3	6.1	14.1	5.3	-
Coductivity	uS/cm	86	63.6	88.5	59	53	69	-
Oxidation Reduction Potential	mV	109.9	178.8	323.9	337.5	135.5	275.4	-
Dissolved Oxygen	mg/L	9.06	7.11	6.29	9.19	12.21	4.62	-

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.

PINCHIN

TABLE 17
B-7 Guideline Calculations - Spring 2021
Chapman Waste Disposal Site
Magnetawan, Ontario

Parameter	Units	Sample Designation Sample Collection Date (dd/mm/yyyy)					ODWQS	Guideline B-7 Calculation Cm = Cb + x (Cr - Cb)			
		BH5-II	BH6-III	BH-7-II	BH8-I	BH9-I		Cb	x	Cr	Cm
		12-May-21	12-May-21	12-May-21	12-May-21	12-May-21					
pH Lab	pH Units	7.24	7.16	6.93	7.26	7.25	6.5-8.5	6.50	0.5	6.5-8.5	6.5 - 7.5
Hardness	mg/L	132.0	134	15.2	118	176	80-100	10.2	0.5	80-100	NC
Total Dissolved Solids	mg/L	203	189	49	211	**294**	500	42.2	0.5	500	271
Alkalinity	mg/L	89	82	15	119	174	30-500	14.53	0.5	30-500	NC
Chloride	mg/L	10.00	7.00	1.00	21.0	23.0	250	3.79	0.5	250	126.9
Sodium	mg/L	10.90	9.0	2.16	15.5	22.0	200	5.04	0.5	200	102.5
Sulphate	mg/L	49.0	56.0	10.00	20.0	57.0	500.0	5.84	0.5	500	252.9
Nitrate as N	mg/L	2.07	2.41	0.18	1.84	0.08	10	0.15	0.25	10	2.6
Nitrite as N	mg/L	0.09	< 0.03	< 0.03	0.24	0.04	1	0.031	0.25	1	0.27
Dissolved Organic Carbon	mg/L	**4**	**4**	3	**5**	**9**	5	2.6	0.5	5	3.8
Iron	mg/L	**0.182**	0.01	**0.378**	**0.214**	**14.3**	0.3	0.013	0.5	0.3	0.157
Manganese	mg/L	**0.174**	**0.47**	0.013	**1.26**	**6.20**	0.05	0.015	0.5	0.05	0.032
Turbidity	NTU	21.9	3.8	74.2	29.8	182	5	299.2	0.5	5	NC
Aluminum	mg/L	**0.117**	0.009	**0.260**	**0.124**	0.067	0.1	0.055	0.5	0.1	0.1
Antimony	mg/L	< 0.0009	< 0.0009	< 0.0009	< 0.0009	< 0.0009	0.006	0.0007	0.25	0.006	0.002
Arsenic	mg/L	0.0002	0.0002	< 0.0002	0.0004	0.0007	0.010	0.0008	0.25	0.01	0.0031
Barium	mg/L	0.107	0.100	0.024	0.160	0.144	1.00	0.0081	0.25	1	0.26
Boron	mg/L	0.295	0.256	0.009	0.281	0.435	5	0.0123	0.25	5	1.26
Cadmium	mg/L	0.000036	0.000021	0.000013	0.000061	0.000018	0.005	0.0001	0.25	0.005	0.0013
Chromium	mg/L	0.00044	0.00041	0.00042	0.00073	0.00091	0.05	0.0009	0.25	0.05	0.013
Copper	mg/L	0.0022	0.005	0.0014	0.004	0.003	1	0.0010	0.5	1	0.50
Lead	mg/L	< 0.00009	< 0.00009	0.00075	0.00022	< 0.00009	0.01	0.0003	0.25	0.01	0.0027
Selenium	mg/L	0.00006	< 0.00004	0.0001	0.00006	0.00016	0.05	0.0006	0.25	0.05	0.013
Uranium	mg/L	0.000243	0.000278	0.000316	0.000433	0.00157	0.02	0.00064	0.25	0.02	0.0055
Zinc	mg/L	0.002	0.013	0.004	0.002	0.004	5	0.003	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

PINCHIN

TABLE 18
B-7 Guideline Calculations - Fall 2021
Chapman Waste Disposal Site
Magnetawan, Ontario

Parameter	Units	Sample Designation					ODWQS	Guideline B-7 Calculation Cm = Cb + x (Cr - Cb)			
		Sample Collection Date (dd/mm/yyyy)									
		BH5-II	BH6-III	BH7-II	BH8-I	BH9-I		Cb	x	Cr	Cm
		7-Oct-21	7-Oct-21	7-Oct-21	7-Oct-21	7-Oct-21					
pH Lab	pH Units	6.56	7.09	5.91	6.76	6.75	6.5-8.5	6.45	0.5	6.5-8.5	NC
Hardness	mg/L	158	159	5.7	111	153	80-100	10.8	0.5	80-100	NC
Total Dissolved Solids	mg/L	206	246	31	237	**520**	500	46.3	0.5	500	273
Alkalinity	mg/L	114	115	3.00	147	189	30-500	14.17	0.5	30-500	NC
Chloride	mg/L	17.0	16.0	1.00	34.0	42.0	250	4.37	0.5	250	127.2
Sodium	mg/L	12.9	14.2	1.09	18.5	25.0	200	5.19	0.5	200	102.6
Sulphate	mg/L	56.0	57.0	8.00	19.0	19.0	500	6.12	0.5	500	253.1
Nitrate as N	mg/L	**3.62**	**3.31**	0.22	1.91	0.06	10	0.16	0.25	10	2.6
Nitrite as N	mg/L	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	1	0.027	0.25	1	0.27
Dissolved Organic Carbon	mg/L	**14.0**	**5.0**	**4.0**	**6.0**	**12.0**	5	2.5	0.5	5	3.8
Iron	mg/L	0.123	0.03	**0.311**	0.031	**10.1**	0.3	0.015	0.5	0.3	0.157
Manganese	mg/L	**0.098**	**0.541**	0.007	**0.96**	**5.43**	0.05	0.015	0.5	0.05	0.032
Turbidity	NTU	14.5	3.4	105	20.9	138	5	237.1	0.5	5	NC
Aluminum	mg/L	0.078	0.017	**0.334**	0.024	0.025	0.1	0.051	0.5	0.1	0.1
Antimony	mg/L	< 0.0009	< 0.0009	< 0.0009	< 0.0009	< 0.0009	0.006	0.0006	0.25	0.006	0.0020
Arsenic	mg/L	0.0003	0.0002	0.0002	0.0003	0.0005	0.01	0.0007	0.25	0.01	0.0030
Barium	mg/L	0.126	0.123	0.012	0.121	0.127	1.00	0.0078	0.25	1	0.26
Boron	mg/L	0.331	0.287	0.012	0.297	0.309	5	0.0143	0.25	5	1.26
Cadmium	mg/L	0.000019	0.000048	0.000006	0.000044	0.000024	0.005	0.0001	0.25	0.005	0.0013
Chromium	mg/L	0.00047	0.00025	0.00063	0.00041	0.00092	0.05	0.0007	0.25	0.05	0.013
Copper	mg/L	0.003	0.007	0.0026	0.003	0.004	1	0.0010	0.5	1	0.50
Lead	mg/L	< 0.00009	< 0.00009	0.00024	< 0.00009	< 0.00009	0.01	0.0002	0.25	0.01	0.0026
Selenium	mg/L	0.00008	0.00009	0.00005	0.00009	0.00012	0.05	0.0003	0.25	0.05	0.013
Uranium	mg/L	0.000255	0.000395	0.000249	0.000227	0.00112	0.02	0.00053	0.25	0.02	0.0054
Zinc	mg/L	0.009	0.006	0.003	0.003	0.006	5	0.003	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)			
		BH6-III	BH7-II	BH8-I		Cb	x	Cr	Cm
TDS	mg/L	211	31.1	212	500	58.0	0.5	500	279
Chloride	mg/L	9.65	0.62	24.2	250	3.00	0.5	250	126.5
Sodium	mg/L	12.3	1.73	17.2	200	1.85	0.5	200	100.9
Sulphate	mg/L	61.6	4.26	26.7	500	6.50	0.50	500	253.3
Nitrate as N	mg/L	2.49	0.18	2.56	10	1.35	0.25	10	3.51
Nitrite as N	mg/L	0.021	0.023	0.074	1	0.005	0.25	1	0.25
Iron	mg/L	0.009	0.063	0.021	0.3	0.05	0.5	0.3	0.175
Manganese	mg/L	**0.54**	0.0084	**1.20**	0.05	0.01	0.5	0.050	0.031
Arsenic	mg/L	0.00053	0.0005	0.00064	0.01	0.001	0.25	0.01	0.0029
Barium	mg/L	0.11	0.0109	0.15	1	0.022	0.25	1	0.27
Boron	mg/L	0.27	0.011	0.28	5	0.022	0.25	5.0	1.27
Cadmium	mg/L	0.00009	0.00006	0.00011	0.005	0.0001	0.25	0.01	0.0013
Chromium	mg/L	0.0008	0.00072	0.00094	0.05	0.003	0.25	0.05	0.014
Copper	mg/L	0.0060	0.0013	0.0036	1	0.001	0.5	1	0.50
Lead	mg/L	0.0002	0.00021	0.00023	0.01	0.00025	0.25	0.01	0.0027
Zinc	mg/L	0.0048	0.0043	0.0025	5	0.016	0.5	5	2.51

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	12-May-21	7-Oct-21		
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	6.64	5.90	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	63	48	-	-
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	14.9	13.7	-	-
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	60	54	-	-
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	5	3	-	-
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	15.0	14.0	-	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	4.16	4.58	-	-
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	4.60	4.22	-	-
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	0.84	0.77	-	-
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	0.44	0.56	-	-
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	< 2	<2	-	-
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	< 0.04	0.04	-	-
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	-	-	-	-	0.000828	0.000169	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	< 0.06	<0.06	-	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	< 0.03	<0.03	-	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	0.20	0.08	-	-
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	<0.001	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	5.0	15.0	-	-
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	16	25	-	-
Biological Oxygen Demand	mg/L	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	4	<2	<2	<2	<5	<2	<5	<5	<5	-	< 4	<4	-	-
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**	0.212	**0.401**	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	0.034	0.041	-	-
Phosphorus	mg/L	**4.5**	-	-	<.05	**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	0.01	0.01	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	< 0.03	-	-	-
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	5	5	-	-
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	< 0.00005	<0.00005	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**	**0.115**	**0.177**	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	< 0.0009	<0.0009	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	< 0.0002	<0.0002	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	0.0253	0.0224	-	-
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	0.000027	0.000030	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	< 0.00001	<0.00001	-	-
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	0.010	<0.010	<0.010	0.005	0.02	0.20	1.5
Cadmium	mg/L	0.0001	-	0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.00015	0.0001	<0.0001	<0.0001	**0.00024**	<0.0005	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.000031	0.000034	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	<0.005	<0.005	<0.001	<0.001	<0.001	<0.003	<0.001	<0.003	<0.003	<0.003	<0.003	0.0003	0.0003	0.0089	0.001
Cobalt	mg/L	0.0006	-	-	-	**0.00140**	0.00089	0.00052	**0.00099**	**0.00110**	0.00089	0.00075	**0.00110**	**0.00100**	**0.00120**	<0.0025	0.0009	0.0006	0.0005	-	0.0007	**0.0012**	**0.0014**	0.0006	0.0006	0.000527	0.000888	0.0009	-
Copper	mg/L	-	-	0.002	-	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0023	<0.0025	0.0006	<0.0005	<0.0005	<0.002	0.0008	<0.001	<0.003	0.002	<0.001	0.0005	0.0004	0.005	0.004
Molybdenum	mg/L	-	-	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0029	<0.0005	0.0041	<0.0005	-	<0.0005	<0.002	<0.002	<0.002	<0.002	< 0.00004	<0.00004	0.04	0.073
Nickel	mg/L	-	-	-	-	0.001	0.0011	<0.001	<0.001	<0.001	<0.001	<0.001	0.0014	<0.001	<0.001	<0.005	0.001	<0.001	<0.001	-	<0.001	<0.003	<0.003	<0.003	<0.003	0.0005	0.0011	0.025	0.15
Phosphate	mg/L	-	-		-											<0.0002	<0.2	<0.2	<0.2	-	<0.2	<0.10	-	-	-	-	-	-	-
Lead	mg/L	0.0009	-	0.0018	-	<0.0005	0.00096	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0021	0.0025	0.0002	0.0003	0.0003	<0.001	0.0001	<0.001	<0.001	<0.001	<0.001	0.00025	0.00028	0.005	0.007
Selenium	mg/L	-	-	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0025	<0.001	<0.001	<0.001	-	<0.001	<0.004	<0.004	<0.004	<0.004	0.00005	<0.00004	0.1	0.001
Sillicon	mg/L	-	-	-	-		2.8	4.5	1.8	2.6	1.8	1.8	3.8	1.6	4.8	<0.005	2.26	2.63	1.77	-	2.49	2.07	2.79	3.19	2.67	2.62	2.8	-	-
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	18.1	<0.005	<0.005	<0.005	-	<0.005	<0.002	<0.002	<0.002	<0.002	< 0.00006	0.0003	-	-
Strontium	mg/L	0.021	0.025	-	0.016	0.047	0.049	0.07	0.034	0.029	0.061	0.061	0.04	0.024	0.076	<0.025	0.068	0.059	0.025	-	0.056	0.031	0.061	0.074	0.037	0.0554	0.0477	-	-
Titanium	mg/L	-	0.007	-	<0.005	<0.005	0.0093	<0.005	<0.005	<0.005	<0.005	<0.005	0.0094	<0.005	0.038	0.099	<0.005	<0.005	<0.005	-	<0.005	0.002	0.003	0.007	0.016	0.002	0.002	-	-
Uranium	mg/L	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.00016	<0.025	<0.0001	<0.0001	<0.0001	-	<0.0001	<0.002	<0.002	<0.002	<0.002	0.000023	0.000019	0.005	0.015
Vanadium	mg/L	-	-	-	<0.001	<0.0005	0.0008	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0016	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.002	<0.002	<0.002	<0.002	0.00025	0.00027	0.006	-
Zinc	mg/L	0.009	0.015	0.01	0.007	0.012	0.012	<0.005	0.013	0.013	0.018	0.018	0.012	0.0098	0.012	<0.0025	0.029	0.007	0.007	0.007	0.011	0.013	0.016	0.007	0.007	0.008	0.009	0.03	0.093
Dissolved Mercury	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	-	-	-	-	-	-	-	0.0002	0.000026
Field Measurements																													
Temperature	oC	5.1	14.3	-	-	-	11.5	14.6	5.5	11.8	11.8	6.3	11.2	-	8.2	-	-	-	6.4	11.9	-	18	15.3	13.2	13	10.42	11.9		
pH	pH Units	7.6	8.2	5.51	-	6.2	6.95	8.87	6.72	7.33	7.19	7.19	6.52	7.96	7.12	7.01	6.98	-	7.98	5.62	7.3	6.5	6.8	5.9	5.5	-	5.1		
Conductivity	uS/cm	66	44	37	-	48	59	123	22	18	59	59	172	17	78	157	0.09	-	0.04	131.2	0.08	41.10	58.40	70.50	30.00	39.00	38.00		
Oxidation Reduction Potential	mV	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	146.7	186.7	311.5	365.1	184.5	279.4		
Dissolved Oxygen	mg/L	5.51	4.01	5.96	-	1.45	6.4	6.72	6.16	11.31	5.85	5.85	7.81	9.36	7.23	-	-	-	-	8.92	-	7.99	6.66	8.16	10.9	26.42	7.1		

Notes:

PWQO	Provincial Water Quality Objective
CWQG	Canadian Water Quality Guidelines
BOLD	Exceeds PWQO
UNDERLINED	Exceeds CWQG
SHADED ONLY	RDL exceeds standard
INSV	Insufficient volume to allow for sampling

TABLE 21
Surface Water Quality Results - SW2
Chapman Waste Disposal Site
Magnetawan, Ontario

Parameter	Units	Sample Designation *Sample Collection Date (dd/mm/yyyy)* SW2																	PWQO	CWQG
		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	12-May-21	7-Oct-21		
pH Lab	pH Units	7.2	6.3	6.8	6.5	6.1	6.8	DRY	7.2	7.4	6.4	6.7	6.72	6.43	6.43	5.85	6.29	6.37	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	10	68	-	-
Hardness	mg/L	19	11	23	13	12	34	-	29	26	8	19	19.8	28.4	4.3	3.3	2.7	23.2	-	-
Total Dissolved Solids	mg/L	52	40	62	24	38	84	-	102	26	18	42	40	66	22	<20	< 30	40	-	-
Alkalinity	mg/L	12	3	12	6.8	4.2	14	-	21	40	<5	12	8	7	<5	<5	2	10	-	-
Alkalinity Bicarbonate		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	6	3	8	5	4	12	-	9	7	3	6	6.99	11.1	2.12	0.3	< 1	9.0	-	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	0.34	5.27	-	-
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	0.69	7.01	-	-
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	0.24	1.38	-	-
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	0.09	1.38	-	-
Sulphate	mg/L	7	4	9	4	4	11	-	13	9	4	7	4.74	10.6	1.99	1.5	< 2	8.0	-	-
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	< 0.04	0.08	-	-
Un-ionized Ammonia		0.0035	0	0.0003	0.0001	0.0002	0	-	0.003	0.018	0.0001	0.0001	-	-	-	0.00029	0.000452	0.000541	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	< 0.06	0.21	-	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	< 0.03	<0.03	-	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	0.20	0.19	-	-
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	<0.001	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	3.0	7.0	-	-
Chemical Oxygen Demand	mg/L	21	19	12	11	9.1	7.4	-	29	16	13	21	16	22	6	<5	< 8	14	-	-
Biological Oxygen Dema-	mg/L	<2	<2	<2	<2	<2	<2	-	<2	<2	<2	<2	<5	<5	<5	-	< 4	<4	-	-
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	0.401	0.195	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	0.018	0.035	-	-
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	0.009	<0.003	0.03	-
Orthophosphate	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-		<0.10	<0.10	<0.10	< 0.03	-	-	-
Total Suspended Solids	mg/L	<10	<10	<10	<10	4	20	-	<2	11	6	<2	<10	<10	<10	<10	< 2	6	-	-
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	< 0.00005	<0.00005	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	0.03	**0.085**	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	< 0.0009	<0.0009	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	< 0.0002	<0.0002	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	0.009	0.031	-	-
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	0.000017	0.00003	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	< 0.00001	<0.00001	-	-
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	0.002	0.041	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**	0.000012	0.000017	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	0.00026	0.00031	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**	0.000637	0.000234	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	0.0003	0.0006	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	< 0.00004	<0.00004	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	0.0004	0.0008	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	0.00015	0.00011	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	0.00004	<0.00004	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	0.58	3.41	-	-
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	< 0.00006	0.00019	-	-
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	0.010	0.058	-	-
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	0.0006	0.00202	-	-
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	0.000006	0.00004	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	0.00016	0.00016	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	0.005	0.006	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	13.0	12.2		
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	5.39	7.00		
Conductivity	uS/cm	48	21	80	27	17	85	-	0.12	-	1.55	0.07	67.6	416.30	20.2	8.00	7.00	57.00		
Oxidation Reduction Potentia	mV	-	-	-	-	-	-	-	-	-	-	-	122.9	148.4	320.8	313.5	215.7	35		
Dissolved Oxygen	mg/L	7.47	12.16	8.17	11.71	11.28	11.86	-	-	-	-	-	9.1	1.23	6.9	11.65	11	8.39		

Notes:

PWQO	Provincial Water Quality Objective
CWQG	Canadian Water Quality Guidelines
BOLD	Exceeds PWQO
UNDERLINED	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)* / SW3																				PWQO	CWQG
		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	12-May-21	7-Oct-21		
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**	7.56	6.68	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	126	87	-	-
Hardness	mg/L	42	61	55	10	57	21	14	76	88	95	20	17	-	25	35.6	96.6	77.1	21.4	35.4	29.1	-	-
Total Dissolved Solids	mg/L	82	138	128	14	124	64	18	146	186	216	34	24	174	26	52	198	128	42	91	57	-	-
Alkalinity, total	mg/L	55	71	76	7	64	28	10	67	89	102	13	23	-	30	37	38	72	36	41	30	-	-
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	10.0	10.0	-	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	6.3	6.7	-	-
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	11.0	9.3	-	-
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	1.94	1.46	-	-
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	2.33	2.44	-	-
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	6.0	2.0	-	-
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	0.80	0.68	-	-
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	0.00612	0.00113	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	0.49	0.27	-	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	< 0.03	<0.03	-	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	1.06	0.87	-	-
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	<0.001	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	5.0	5.0	-	-
Chemical Oxygen Demand	mg/L	25	24	21	20	17	15	11	7.4	48	33	17	<10	26	18	7	17	13	<5	9	13	-	-
Biological Oxygen Demand	mg/L	<2	6	<2	<2	<2	<2	<2	<2	11	<2	<2	<2	<5	<2	<5	<5	<5	-	< 4	<4	-	-
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**	**0.44**	**0.55**	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	0.80	0.48	-	-
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	0.01	<0.003	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	< 0.03	-	-	-
Total Suspended Solids	mg/L	<10	<10	<10	11	<10	10	<1	<10	65	6	14	39	<10	21	<10	30	<10	<10	< 2	3	-	-
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	< 0.00005	<0.00005	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	0.022	0.015	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	< 0.0009	<0.0009	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	< 0.0002	<0.0002	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	0.026	0.022	-	-
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	0.00001	1.3E-05	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	< 0.00001	<0.00001	-	-
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	0.095	0.057	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	0.000016	0.000015	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	0.00037	0.00026	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**	**0.0023**	**0.0018**	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	0.001	0.001	0.005	0.004
Molybdenum	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0093	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.002	<0.002	<0.002	<0.002	0.00006	0.00004	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	0.0008	0.0008	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	< 0.00009	0.00014	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	< 0.00004	<0.00004	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	1.72	2.51	-	-
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	0.00007	0.00021	-	-
Strontium	mg/L	0.11	0.15	0.12	0.023	0.13	0.049	0.029	0.15	0.195	0.187	0.049	0.038	-	0.054	0.069	0.218	0.147	0.068	0.076	0.062	-	-
Titanium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0059	<0.025	<0.005	<0.005	<0.005	-	<0.005	<0.002	0.009	0.006	0.005	0.001	0.001	-	-
Uranium	mg/L	0.00019	0.00013	0.00042	<0.0001	0.00031	0.00011	<0.0001	0.00013	0.0008	0.0004	<0.0001	0.0001	-	<0.0001	<0.002	<0.002	<0.002	<0.002	0.00011	7.3E-05	0.005	0.015
Vanadium	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0025	0.0013	<0.0005	<0.0005	-	<0.0005	<0.002	<0.002	<0.002	<0.002	0.00015	0.0002	0.006	-
Zinc	mg/L	0.0065	0.0074	0.0054	0.0067	<0.005	0.0071	<0.005	<0.005	<0.025	<0.005	0.009	0.007	<0.005	0.007	0.006	0.012	<0.005	<0.005	0.004	0.005	0.03	0.093
Dissolved Mercury	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	-	-	-	-	-		-	0.0002	0.000026
Field Measurements																							
Temperature	oC	10.5	11.6	10.8	4.2	7.7	4.6	7.8	7.6	8.4	16.2	-		13.7	7	13.1	11.8	11.3	11.92	8.85	13.2		
pH	pH Units	7.02	8.9	6.56	7.58	6.8	6.94	6.28	6.68	5.83	6.89	-	-	6.4	7.13	6.57	6.55	6.64	6.49	12.08	6.45		
Conductivity	uS/cm	169	248	173	20	201	68	30	176	328	0.33	-	-	24.3	0.09	126.3	262.4	242.7	63	81	83		
Oxidation Reduction Potential	mV	-	-	-	-	-	-	-	-	-	-	-	-		-	186.3	428	174.9	239.2	59.7	62.8		
Dissolved Oxygen	mg/L	5.87	4.84	8.69	12.67	6.31	10.96	11.59	5.55	-	-	-	-	9.76	-	5.65	4.71	6.35	14.16	10.08	7.65		

Notes:

PWQO	Provincial Water Quality Objective
CWQG	Canadian Water Quality Guidelines
BOLD	Exceeds PWQO
UNDERLINED	Exceeds CWQG
SHADED ONLY	RDL exceeds standard
INSV	Insufficient volume to allow for sampling

TABLE 23
Surface Water Quality Results - SEEP
Chapman Waste Disposal Site
Magnetawan, Ontario

Parameter	Units	Sample Designation *Sample Collection Date (dd/mm/yyyy)* SEEP		PWQO	CWQG
		12-May-21	7-Oct-21		
pH lab	pH Units	7.72	6.91	6.5-8.5	6.5-9.0
Conductivity	µS/cm	413	379	-	-
Hardness	mg/L	123.0	112.0	-	-
Total Dissolved Solids	mg/L	269	229	-	-
Alkalinity, total	mg/L	143	147	-	-
Alkalinity Bicarbonate	mg/L	-	-	-	-
Chloride	mg/L	30.0	34.0	-	120
Sodium	mg/L	21.0	21.2	-	-
Calcium	mg/L	38.8	36.1	-	-
Magnesium	mg/L	6.37	5.31	-	-
Potassium	mg/L	8.64	9.27	-	-
Sulphate	mg/L	19.0	8.0	-	-
Ammonia as N	mg/L	3.44	3.98	-	-
Un-ionized Ammonia	mg/L	0.0125	0.0015	0.02	0.019
Nitrate as N	mg/L	0.88	0.70	-	13
Nitrite as N	mg/L	< 0.03	<0.03	-	0.06
Total Kjeldahl Nitrogen	mg/L	4.03	4.16	-	-
Phenolics	mg/L	< 0.001	<0.001	0.001	0.004
Dissolved Organic Carbon	mg/L	8.0	7.0	-	-
Chemical Oxygen Demand	mg/L	20	31	-	-
Biological Oxygen Demand	mg/L	< 4	5	-	-
Iron	mg/L	**2.66**	**36.3**	0.30	0.30
Manganese	mg/L	4.65	6.97	-	-
Phosphorus, total	mg/L	0.004	**0.044**	0.03	-
Orthophosphate	mg/L	< 0.03	-	-	-
Total Suspended Solids	mg/L	3	36	-	-
Anion Sum		-	-	-	-
Cation Sum		-	-	-	-
Ion Balance	%	-	-	-	-
Silver	mg/L	< 0.00005	<0.00005	0.0001	0.00025
Aluminum	mg/L	0.005	0.006	0.075	0.1
Antimony	mg/L	< 0.0009	<0.00009	0.02	-
Arsenic	mg/L	< 0.0002	0.0013	0.10	0.01
Barium	mg/L	0.107	0.209	-	-
Beryllium	mg/L	0.000009	0.000071	1.1	-
Bismuth	mg/L	< 0.00001	<0.00001	-	-
Boron	mg/L	**0.336**	0.197	0.20	1.50
Cadmium	mg/L	0.000022	0.000052	0.00020	0.00026
Chromium	mg/L	0.00062	0.00161	0.0089	0.001
Cobalt	mg/L	**0.0145**	**0.0335**	0.0009	-
Copper	mg/L	0.002	0.004	0.005	0.004
Molybdenum	mg/L	0.00022	0.00068	0.04	0.073
Nickel	mg/L	0.0018	0.0027	0.025	0.15
Phosphate as P	mg/L		-	-	-
Lead	mg/L	< 0.00009	0.00086	0.005	0.007
Selenium	mg/L	0.00007	0.00007	0.1	0.001
Silicon	mg/L	4.88	7.01	-	-
Tin	mg/L	< 0.00006	0.0002	-	-
Strontium	mg/L	0.252	0.224	-	-
Titanium	mg/L	0.001	0.014	-	-
Uranium	mg/L	0.000404	0.000927	0.005	0.015
Vanadium	mg/L	0.00027	0.00164	0.006	-
Zinc	mg/L	< 0.002	0.004	0.03	0.093
Dissolved Mercury	mg/L	-	-	0.0002	0.000026
Field Measurements					
Temperature	oC	13.25	10	-	-
pH	pH Units	13.05	6.58	-	-
Conductivity	uS/cm	301	310	-	-
Oxidation Reduction Potentia	mV	71.5	69.3	-	-
Dissolved Oxygen	mg/L	8.06	3.54	-	-

Notes:

PWQO

CWQG

BOLD
UNDERLINED
SHADED ONLY

INSV

TABLE 24
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	30.5	9.8
Nitrate as N	mg/L	CWQG	2.9	2.18	0.13	0.42
Nitrite as N	mg/L	CWQG	0.06	0.045	0.023	0.023
Iron	mg/L	APV	1	0.75	0.22	0.56
Arsenic	mg/L	PWQO	0.1	0.075	0.0006	0.001
Barium	mg/L	APV	2.3	1.73	0.025	0.036
Boron	mg/L	APV	3.55	2.66	0.024	0.08
Copper	mg/L	PWQO	0.005	0.0038	0.0007	0.0007
Zinc	mg/L	PWQO	0.03	0.023	0.0072	0.0050

Notes:

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

TABLE 25
Groundwater Duplicate Data
Chapman Waste Disposal Site
Magnetawan, Ontario

Parameter	Units	RDL	PQL	12-May-21						7-Oct-21					
				BH4-II	GW DUP 1	Relative Percent Difference (%)	BH11	GW DUP 2	Relative Percent Difference (%)	BH10-I	GW DUP 1	Relative Percent Difference (%)	BH11	GW DUP 2	Relative Percent Difference (%)
pH Lab	pH Units	NA		7.3	7.35	0.68	6.81	6.6	3.13	6.59	6.66	1.06	6.21	6.25	0.64
Conductivity	µS/cm	2	10	731	734	0.41	92	86	6.74	224	221	1.35	107	110	2.76
Hardness	mg/L	0.5	2.5	356	359	0.84	25	24	1.64	69.7	79.2	12.76	36.3	39.1	7.43
Total Dissolved Solids	mg/L	20	100	563	543	3.62	60	71	NC	137	123	10.77	49	60	NC
Alkalinity	mg/L	5	25	231	229	0.87	11	8	NC	60	52	14.29	12	11	NC
Chloride	mg/L	0.20	1	7	7	0.00	15	19	23.53	4	4	0.00	20.0	20	0.00
Sodium	mg/L	0.05	0.25	12.8	13.3	3.83	3.75	3.49	7.18	7.30	8.16	11.13	4.71	4.86	3.13
Calcium	mg/L	0.05	0.25	124	125	0.80	8.24	8.14	1.22	18.9	21.5	12.87	11.60	12.3	5.86
Magnesium	mg/L	0.05	0.25	11.5	11.3	1.75	0.975	0.943	3.34	5.5	6.21	13.04	1.76	2.01	13.26
Potassium	mg/L	0.05	0.25	12.8	13.1	2.32	1.16	1.12	3.51	4.32	4.74	9.27	1.51	1.54	1.97
Sulphate	mg/L	0.20	1	60	60	0.00	4	5	22.22	51	51	0.00	4.00	4	0.00
Ammonia	mg/L	0.2	1	< 0.04	< 0.04	NC	< 0.04	< 0.04	NC	< 0.04	< 0.04	NC	< 0.04	0.04	NC
Nitrate as N	mg/L	0.10	0.5	21.1	21.2	0.47	0.21	0.2	4.88	1.85	1.86	0.54	0.21	0.21	NC
Nitrite as N	mg/L	0.10	0.5	< 0.03	< 0.03	NC	< 0.03	< 0.03	NC	< 0.03	< 0.03	NC	< 0.03	< 0.03	NC
Total Kjeldahl Nitrogen	mg/L	0.10	0.5	< 0.05	< 0.05	NC	0.34	0.1	NC	0.11	< 0.05	NC	< 0.05	0.05	NC
Phenolics	mg/L	0.001	0.005	< 0.002	< 0.002	NC	< 0.002	< 0.002	NC	< 0.002	< 0.002	NC	< 0.002	< 0.002	NC
Dissolved Organic Carbon	mg/L	0.5	2.5	11	12	8.70	< 1	2	NC	6.0	6	0.00	< 1	2	NC
Chemical Oxygen Demand	mg/L	5	25	32	31	3.17	< 8	< 8	NC	12	10	NC	< 8	< 8	NC
Iron	mg/L	0.010	0.05	0.02	0.017	16.22	0.018	0.019	NC	0.019	0.023	NC	0.017	0.008	NC
Manganese	mg/L	0.002	0.01	0.252	0.249	1.20	0.0235	0.0228	3.02	0.001	0.00148	NC	0.021	0.0175	15.79
Phosphorus	mg/L	0.02	0.1	< 0.03	< 0.03	NC	0.63	0.57	10.00	0.14	0.13	7.41	0.47	0.46	2.15
Turbidity	NTU	0.5	2.5	4.73	1.75	NC	23.9	38.2	46.05	5.91	5.58	5.74	12.4	14.8	17.65
Total Suspended Solids	mg/L	10	50	5	111	NC	820	803	2.09	166	20	NC	1330	156	**158.01**
BOD	mg/L	5	25	< 4	< 4	NC	< 4	< 4	NC	< 4	< 4	NC	< 4	< 4	NC
Silver	mg/L	0.002	0.01	< 0.00005	< 0.00005	NC	< 0.00005	< 0.00005	NC	< 0.00005	< 0.00005	NC	< 0.00005	< 0.00005	NC
Aluminum	mg/L	0.004	0.02	0.021	0.045	**72.73**	0.027	0.024	11.76	0.059	0.076	25.19	0.013	0.011	NC
Antimony	mg/L	0.003	0.015	< 0.0009	< 0.0009	NC	< 0.0009	< 0.0009	NC	< 0.0009	< 0.0009	NC	< 0.0009	< 0.0009	NC
Arsenic	mg/L	0.003	0.015	0.0005	0.0005	NC	< 0.0002	< 0.0002	NC	< 0.0002	< 0.0002	NC	< 0.0002	< 0.0002	NC
Barium	mg/L	0.002	0.01	0.102	0.102	0.00	0.0207	0.0215	3.79	0.082	0.0803	2.09	0.0207	0.0213	2.86
Beryllium	mg/L	0.001	0.005	0.000011	0.000011	NC	0.000042	0.000043	NC	0.000010	0.000011	NC	0.000036	0.000037	NC
Bismuth	mg/L	0.002	0.01	0.00001	< 0.00001	NC	< 0.00001	< 0.00001	NC	< 0.00001	< 0.00001	NC	< 0.00001	< 0.00001	NC
Boron	mg/L	0.010	0.05	0.514	0.491	4.58	0.027	0.043	NC	0.284	0.251	12.34	0.026	0.024	NC
Cadmium	mg/L	0.001	0.005	0.000039	0.000064	NC	0.000008	0.00002	NC	0.000004	0.000004	NC	0.000018	0.000015	NC
Chromium	mg/L	0.003	0.015	0.00073	0.0008	NC	0.00029	0.00027	NC	0.00045	0.0005	NC	0.00016	0.00014	NC
Cobalt	mg/L	0.001	0.005	0.00134	0.00139	NC	0.000115	0.0001	NC	0.000107	0.000122	NC	0.000063	0.000053	NC
Copper	mg/L	0.003	0.015	0.008	0.0078	NC	0.0009	0.0004	NC	0.004	0.0031	NC	0.0003	0.0002	NC
Molybdenum	mg/L	0.002	0.01	0.00096	0.001	NC	0.00041	0.00007	NC	0.00021	0.00018	NC	0.00006	< 0.00004	NC
Nickel	mg/L	0.003	0.015	0.0021	0.0019	NC	0.0002	< 0.0001	NC	0.0006	0.0006	NC	0.0003	0.0003	NC
Phosphate	mg/L	0.20	1	< 0.03	< 0.03	NC	0.08	< 0.03	NC			-			-
Lead	mg/L	0.001	0.005	< 0.00009	< 0.00009	NC	< 0.00009	0.00011	NC	< 0.00009	< 0.00009	NC	< 0.00009	< 0.00009	NC
Selenium	mg/L	0.004	0.02	0.00014	0.0002	NC	0.00005	0.00004	NC	0.00009	0.00009	NC	< 0.00004	< 0.00004	NC
Tin	mg/L	0.002	0.01	0.00014	0.0001	NC	< 0.00006	< 0.00006	NC	0.00007	0.00009	NC	< 0.00006	< 0.00006	NC
Strontium	mg/L	0.005	0.025	0.406	0.414	1.95	0.0904	0.0875	3.26	0.11	0.125	12.77	0.0938	0.0942	0.43
Titanium	mg/L	0.002	0.01	0.00063	0.00065	NC	0.00045	0.00042	NC	0.00049	0.00063	NC	0.00027	0.00035	NC
Uranium	mg/L	0.002	0.01	0.00503	0.00489	NC	0.000067	0.000064	NC	0.000637	0.000646	NC	0.000049	0.000044	NC
Vanadium	mg/L	0.002	0.01	0.0003	0.00029	NC	0.00007	0.00006	NC	0.00055	0.00061	NC	0.00005	0.00006	NC
Zinc	mg/L	0.005	0.025	< 0.002	0.008	NC	0.002	< 0.002	NC	0.003	0.004	NC	< 0.002	< 0.002	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 26
Surface Water Duplicate Data
Chapman Waste Disposal Site
Magnetawan, Ontario

Parameter	Units	RDL	PQL	12-May-21			7-Oct-21		
				SW1	SW DUP	Relative Percent Difference (%)	SW1	SW DUP	Relative Percent Difference (%)
pH	pH Units	NA		6.64	6.47	2.59	5.90	5.77	2.23
Electrical Conductivity	µS/cm	2	10	63	59	6.56	48	46	4.26
Total Hardness (as CaCO3) (Calculated)	mg/L	0.5	2.5	14.90	15.10	1.33	13.7	15.2	10.38
Total Dissolved Solids	mg/L	20	100	60	63	NC	54	46	NC
Alkalinity (as CaCO3)	mg/L	5	25	5	3	NC	3	2	NC
Chloride	mg/L	0.10	0.5	15	15	0.00	14.0	14	0.00
Sodium	mg/L	0.05	0.25	4.16	4.23	1.67	4.58	3.91	15.78
Calcium	mg/L	0.05	0.25	4.6	4.66	1.30	4.22	4.81	13.07
Magnesium	mg/L	0.05	0.25	0.837	0.84	0.36	0.77	0.766	0.00
Potassium	mg/L	0.05	0.25	0.443	0.46	3.77	0.56	0.503	10.90
Sulphate	mg/L	0.10	0.5	< 2	< 2	NC	<2	<2	NC
Ammonia as N	mg/L	0.02	0.1	< 0.04	< 0.04	NC	0.04	0.04	NC
Nitrate as N	mg/L	0.05	0.25	< 0.06	0.07	NC	<0.06	<0.06	NC
Nitrite as N	mg/L	0.05	0.25	< 0.03	< 0.03	NC	<0.03	<0.03	NC
Total Kjeldahl Nitrogen	mg/L	0.10	0.5	0.2	0.18	NC	0.08	0.23	NC
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	5	6	18.18	15.0	12	22.22
Chemical Oxygen Demand	mg/L	5	25	16	17	NC	25	23	NC
BOD (5)	mg/L	5	25	< 4	< 4	NC	<4	<4	NC
Iron	mg/L	0.010	0.05	0.212	0.223	5.06	0.401	0.399	0.50
Manganese	mg/L	0.002	0.01	0.0342	0.0329	3.87	0.041	0.0417	2.43
Total Phosphorus	mg/L	0.02	0.1	0.009	0.011	NC	0.01	0.005	NC
Total Suspended Solids	mg/L	10	50	5	16	NC	5	6	NC
Silver	mg/L	0.0001	0.0005	< 0.00005	< 0.00005	NC	<0.00005	<0.00005	NC
Aluminum-dissolved	mg/L	0.004	0.02	0.115	0.12	4.26	0.177	0.179	1.12
Antimony	mg/L	0.003	0.015	< 0.0009	< 0.0009	NC	<0.0009	<0.0009	NC
Arsenic	mg/L	0.003	0.015	< 0.0002	< 0.0002	NC	<0.0002	0.0003	NC
Barium	mg/L	0.002	0.01	0.0253	0.0254	0.39	0.0224	0.0236	5.22
Beryllium	mg/L	0.001	0.005	0.000027	0.00003	NC	0.000030	0.000042	NC
Bismuth	mg/L	0.002	0.01	< 0.00001	< 0.00001	NC	<0.00001	<0.00001	NC
Boron	mg/L	0.010	0.05	0.005	0.019	NC	0.02	0.021	NC
Cadmium	mg/L	0.0001	0.0005	0.000031	0.000029	NC	0.000034	0.000024	NC
Chromium	mg/L	0.003	0.015	0.0003	0.00029	NC	0.0003	0.00031	NC
Cobalt	mg/L	0.0005	0.0025	0.000527	0.000593	NC	0.000888	0.000876	NC
Copper	mg/L	0.003	0.015	0.0005	0.0005	NC	0.0004	0.005	NC
Molybdenum	mg/L	0.002	0.01	< 0.00004	< 0.00004	NC	<0.00004	<0.00004	NC
Nickel	mg/L	0.003	0.015	0.0005	0.0006	NC	0.0011	0.0009	NC
Ortho Phosphate as P	mg/L	0.10	0.5	< 0.03	< 0.03	NC	-	-	-
Lead	mg/L	0.001	0.005	0.00025	0.00024	NC	0.00028	0.0003	NC
Selenium	mg/L	0.004	0.02	0.00005	0.00006	NC	<0.00004	0.00013	NC
Silicon	mg/L	0.05	0.25	2.62	2.8	6.64	2.8	2.85	1.77
Tin	mg/L	0.002	0.01	< 0.00006	0.00013	NC	0.0003	0.00016	NC
Strontium	mg/L	0.005	0.025	0.0554	0.0572	3.20	0.0477	0.0469	1.69
Titanium	mg/L	0.002	0.01	0.00191	0.00151	NC	0.002	0.00227	NC
Uranium	mg/L	0.002	0.01	0.000023	0.000019	NC	0.000019	0.000016	NC
Vanadium	mg/L	0.002	0.01	0.00025	0.00027	NC	0.00027	0.00024	NC
Zinc	mg/L	0.005	0.025	0.008	0.007	NC	0.009	0.008	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 V

Photoplates

	**BH1**

	**BH1**

	**BH2**

	**BH2**

	**BH3-II**

	**BH3-II**

	**BH4**

	**BH4**

	**BH4-II**

	**BH4-II**

	**BH5-II**

	**BH5-II**

	**BH6-II**

	**BH6-II**

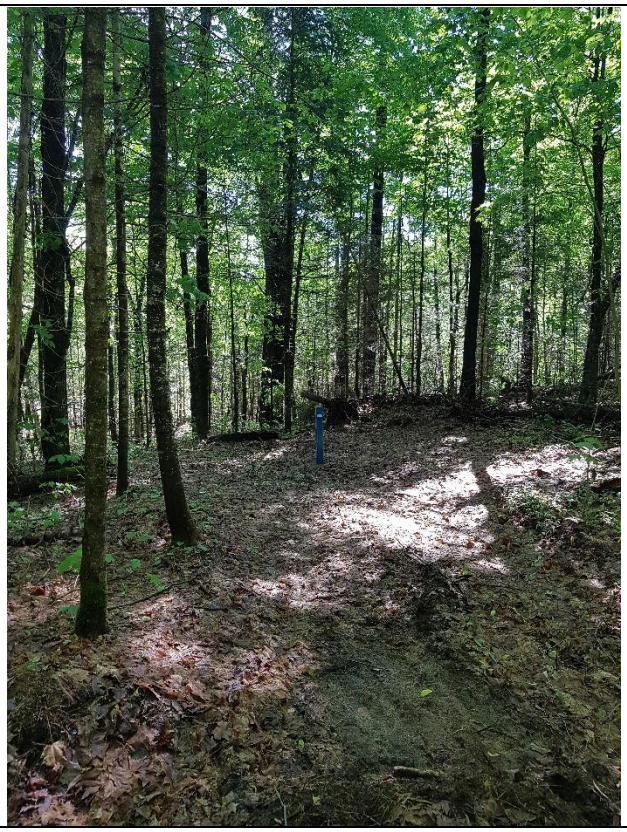
BH6-III

BH6-III

	**BH7-II**

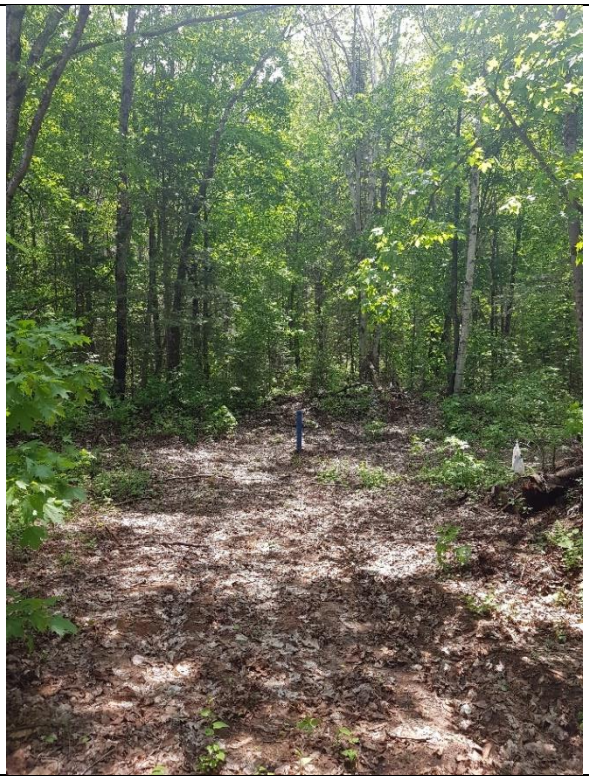
	**BH7-II**

	**BH8-I**

	**BH8-I**

	**BH9-I**

	**BH9-I**

	**BH10-I**
	**BH10-I**

BH11

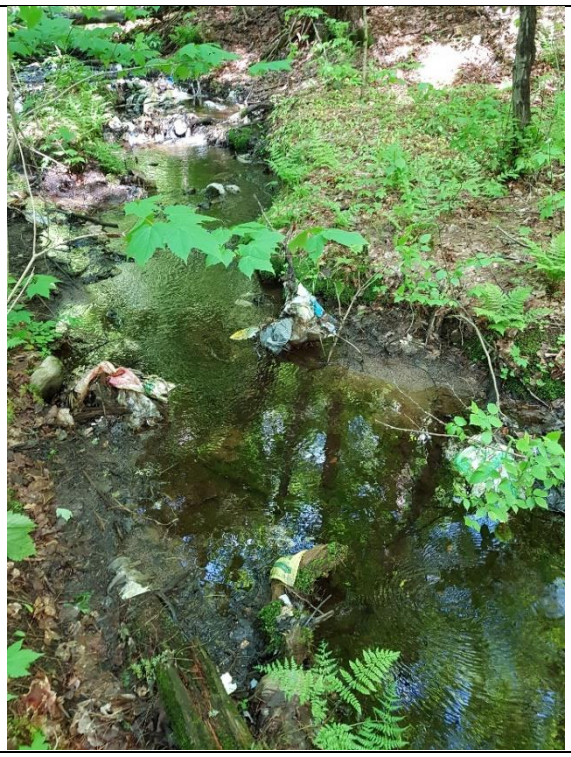
BH11

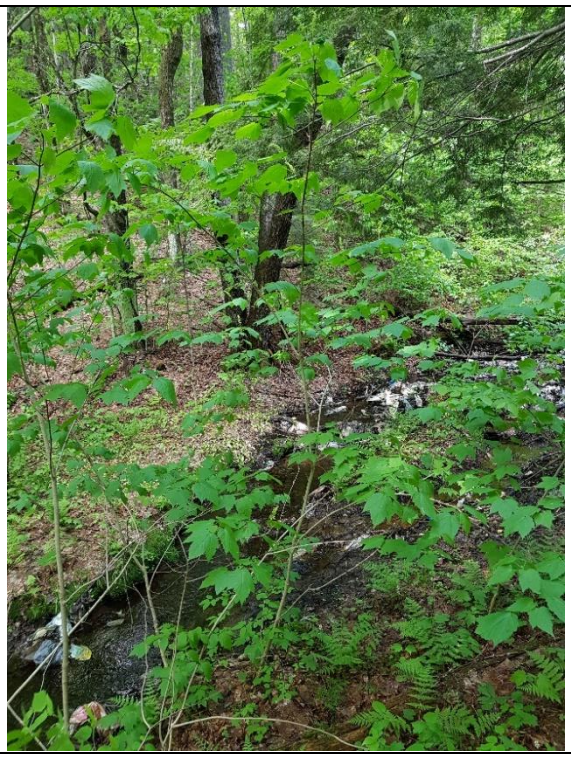
	**SW1**

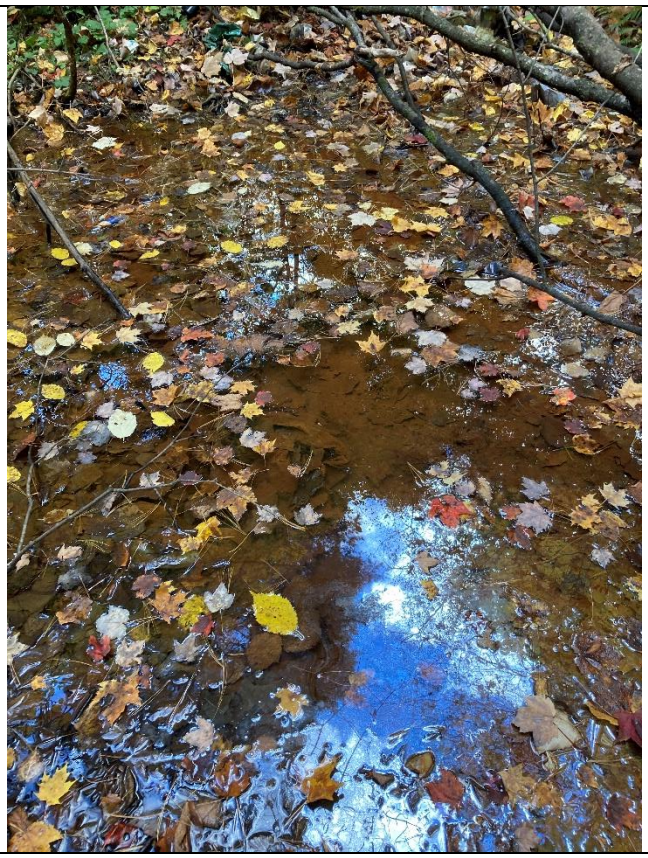
	**SW1**

		**SW2**

		**SW2**

	**SW3**

	**SW3**

		**SEEP**

APPENDIX VI

Laboratory Certificates of Analysis

FINAL REPORT

CA15280-MAY21 R

225335.003-Chapman Landfill SW

Prepared for

Pinchin Ltd

FINAL REPORT

CA15280-MAY21 R

First Page

CLIENT DETAILS

Client	Pinchin Ltd
Address	957 Cambrian Heights Drive, Suite 203 Sudbury, ON P3C 5S5. Canada
Contact	Alana Valle
Telephone	705-521-0560
Facsimile	
Email	avalle@Pinchin.com
Project	225335.003-Chapman Landfill SW
Order Number	
Samples	Surface Water (5)

LABORATORY DETAILS

Project Specialist	Brad Moore Hon. B.Sc
Laboratory	SGS Canada Inc.
Address	185 Concession St., Lakefield ON, K0L 2H0
Telephone	705-652-2143
Facsimile	705-652-6365
Email	brad.moore@sgs.com
SGS Reference	CA15280-MAY21
Received	05/14/2021
Approved	05/28/2021
Report Number	CA15280-MAY21 R
Date Reported	05/28/2021

COMMENTS

Temperature of Sample upon Receipt: 5 degrees C
Cooling Agent Present:Yes
Custody Seal Present:yes

Chain of Custody Number:NA

TSS sample #10 had more visible solids than all other samples

SIGNATORIES

Brad Moore Hon. B.Sc

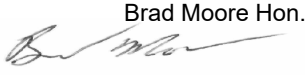


TABLE OF CONTENTS

Client: Pinchin Ltd
Project: 225335.003-Chapman Landfill SW
Project Manager: Alana Valle
Samplers: Alana Valle

PACKAGE: **General Chemistry** (WATER)

L1 = PWQO_L / WATER / - - Table 2 - General - July 1999 PIBS 3303E

	Sample Number	6	7	8	9	10		
	Sample Name	SW1	SW2	SW3	SEEP	SW DUP		
	Sample Matrix	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water		
	Sample Date	12/05/2021	12/05/2021	12/05/2021	12/05/2021	12/05/2021		
Parameter	**Units**	**RL**	**L1**	**Result**	**Result**	**Result**	**Result**	**Result**
General Chemistry								
Biochemical Oxygen Demand (BOD5)	mg/L	2		< 4↑	< 4↑	< 4↑	< 4↑	< 4↑
Total Suspended Solids	mg/L	2		5	< 2	< 2	3	16
Alkalinity	mg/L as CaCO3	2		5	2	41	143	3
Conductivity	uS/cm	2		63	10	126	413	59
Colour	TCU	3		39	15	13	12	37
Total Dissolved Solids	mg/L	30		60	< 30	91	269	63
Chemical Oxygen Demand	mg/L	8		16	< 8	9	20	17
Total Kjeldahl Nitrogen (N)	as N mg/L	0.05		0.20	0.20	1.06	4.03	0.18
Ammonia+Ammonium (N)	as N mg/L	0.04		< 0.04	< 0.04	0.80	3.44	< 0.04
Dissolved Organic Carbon	mg/L	1		5	3	5	8	6
Phosphorus (total reactive)	mg/L	0.03		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Metals and Inorganics								
Sulphate	mg/L	2		< 2	< 2	6	19	< 2
Nitrite (as N)	as N mg/L	0.03		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L	0.06		< 0.06	< 0.06	0.49	0.88	0.07
Hardness	mg/L as CaCO3	0.05		14.9	2.7	35.4	123	15.1
Silver (total)	mg/L	0.00005	0.0001	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Aluminum (0.2µm)	mg/L	0.001	0.015	**0.115**	**0.030**	**0.022**	0.005	**0.120**
Arsenic (total)	mg/L	0.0002	0.005	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Barium (total)	mg/L	0.00002		0.0253	0.0087	0.0260	0.107	0.0254
Beryllium (total)	mg/L	0.000007	0.011	0.000027	0.000017	0.000010	0.000009	0.000030

Client: Pinchin Ltd
Project: 225335.003-Chapman Landfill SW
Project Manager: Alana Valle
Samplers: Alana Valle

PACKAGE: **Metals and Inorganics** (WATER)

L1 = PWQO_L / WATER / - - Table 2 - General - July 1999 PIBS 3303E

	Sample Number	6	7	8	9	10		
	Sample Name	SW1	SW2	SW3	SEEP	SW DUP		
	Sample Matrix	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water		
	Sample Date	12/05/2021	12/05/2021	12/05/2021	12/05/2021	12/05/2021		
Parameter	**Units**	**RL**	**L1**	**Result**	**Result**	**Result**	**Result**	**Result**
Metals and Inorganics (continued)								
Boron (total)	mg/L	0.002	0.2	0.005	0.002	0.095	0.336	0.019
Calcium (total)	mg/L	0.01		4.60	0.69	11.0	38.8	4.66
Cadmium (total)	mg/L	0.000003	0.0001	0.000031	0.000012	0.000016	0.000022	0.000029
Cobalt (total)	mg/L	0.000004	0.0009	0.000527	0.000637	0.00230	0.0145	0.000593
Chromium (total)	mg/L	0.00008	0.1	0.00030	0.00026	0.00037	0.00062	0.00029
Copper (total)	mg/L	0.0002	0.001	0.0005	0.0003	0.0007	0.0017	0.0005
Iron (total)	mg/L	0.007	0.3	0.212	0.401	0.437	2.66	0.223
Potassium (total)	mg/L	0.009		0.443	0.094	2.33	8.64	0.460
Magnesium (total)	mg/L	0.001		0.837	0.237	1.94	6.37	0.840
Manganese (total)	mg/L	0.00001		0.0342	0.0177	0.798	4.65	0.0329
Molybdenum (total)	mg/L	0.00004	0.04	< 0.00004	< 0.00004	0.00006	0.00022	< 0.00004
Sodium (total)	mg/L	0.01		4.16	0.34	6.26	21.0	4.23
Nickel (total)	mg/L	0.0001	0.025	0.0005	0.0004	0.0008	0.0018	0.0006
Lead (total)	mg/L	0.00009	0.011 0.02 0.025	0.00025	0.00015	< 0.00009	< 0.00009	0.00024
Phosphorus (total)	mg/L	0.003	0.01	0.009	0.009	0.012	0.004	0.011
Zinc (total)	mg/L	0.002	0.02	0.008	0.005	0.004	< 0.002	0.007
Antimony (total)	mg/L	0.0009	0.02	< 0.0009	< 0.0009	< 0.0009	< 0.0009	< 0.0009
Bismuth (total)	mg/L	0.00001		< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Selenium (total)	mg/L	0.00004	0.1	0.00005	0.00004	< 0.00004	0.00007	0.00006
Silicon (total)	mg/L	0.02		2.62	0.58	1.72	4.88	2.80

Client: Pinchin Ltd
Project: 225335.003-Chapman Landfill SW
Project Manager: Alana Valle
Samplers: Alana Valle

PACKAGE: **Metals and Inorganics** (WATER)

L1 = PWQO_L / WATER / - - Table 2 - General - July 1999 PIBS 3303E

	Sample Number	6	7	8	9	10		
	Sample Name	SW1	SW2	SW3	SEEP	SW DUP		
	Sample Matrix	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water		
	Sample Date	12/05/2021	12/05/2021	12/05/2021	12/05/2021	12/05/2021		
Parameter	**Units**	**RL**	**L1**	**Result**	**Result**	**Result**	**Result**	**Result**
Metals and Inorganics (continued)								
Strontium (total)	mg/L	0.00002		0.0554	0.00978	0.0756	0.252	0.0572
Tin (total)	mg/L	0.00006		< 0.00006	< 0.00006	0.00007	< 0.00006	0.00013
Titanium (total)	mg/L	0.00005		0.00191	0.00060	0.00051	0.00058	0.00151
Uranium (total)	mg/L	0.000002	0.005	0.000023	0.000006	0.000111	0.000404	0.000019
Vanadium (total)	mg/L	0.00001	0.006	0.00025	0.00016	0.00015	0.00027	0.00027
Other (ORP)								
pH	No unit	0.05	0.1 8.6	6.64	6.29	7.56	7.72	6.47
Chloride	mg/L	1		15	< 1	10	30	15
Phenols								
4AAP-Phenolics	mg/L	0.001	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	PWQO_L / WATER / - - Table 2 - General - July 1999 PIBS 3303E L1
SW1				
Aluminum (dissolved)	SM 3030/EPA 200.8	mg/L	0.115	0.015
SW2				
Aluminum (dissolved)	SM 3030/EPA 200.8	mg/L	0.030	0.015
Iron	SM 3030/EPA 200.8	mg/L	0.401	0.3
pH	SM 4500	No unit	6.29	0.1
SW3				
Aluminum (dissolved)	SM 3030/EPA 200.8	mg/L	0.022	0.015
Cobalt	SM 3030/EPA 200.8	mg/L	0.00230	0.0009
Iron	SM 3030/EPA 200.8	mg/L	0.437	0.3
Phosphorus	SM 3030/EPA 200.8	mg/L	0.012	0.01
SEEP				
Boron	SM 3030/EPA 200.8	mg/L	0.336	0.2
Cobalt	SM 3030/EPA 200.8	mg/L	0.0145	0.0009
Copper	SM 3030/EPA 200.8	mg/L	0.0017	0.001
Iron	SM 3030/EPA 200.8	mg/L	2.66	0.3
SW DUP				
Aluminum (dissolved)	SM 3030/EPA 200.8	mg/L	0.120	0.015
Phosphorus	SM 3030/EPA 200.8	mg/L	0.011	0.01
pH	SM 4500	No unit	6.47	0.1

QC SUMMARY

Alkalinity

Method: SM 2320 I Internal ref.: ME-CA-IENVIEWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Alkalinity	EWL0315-MAY21	mg/L as CaCO3	2	< 2	0	20	104	80	120	NA		

Ammonia by SFA

Method: SM 4500 I Internal ref.: ME-CA-IENVISFA-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Ammonia+Ammonium (N)	SKA0183-MAY21	mg/L	0.04	<0.04	1	10	95	90	110	88	75	125
Ammonia+Ammonium (N)	SKA0219-MAY21	mg/L	0.04	<0.04	1	10	97	90	110	NV	75	125

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 325.2 | Internal ref.: ME-CA-[ENVIEWL-LAK-AN-026

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chloride	DIO5076-MAY21	mg/L	1	<1	12	20	98	80	120	102	75	125
Sulphate	DIO5076-MAY21	mg/L	2	<2	1	20	101	80	120	95	75	125

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENVIIC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nitrite (as N)	DIO0335-MAY21	mg/L	0.03	<0.03	ND	20	97	80	120	97	75	125
Nitrate (as N)	DIO0335-MAY21	mg/L	0.06	<0.06	ND	20	101	80	120	101	75	125

QC SUMMARY

Biochemical Oxygen Demand

Method: SM 5210 I Internal ref.: ME-CA-IENVIEWL-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Biochemical Oxygen Demand (BOD5)	BOD0038-MAY21	mg/L	2	< 2	19	30	88	70	130	99	70	130

Carbon by SFA

Method: SM 5310 I Internal ref.: ME-CA-IENVISFA-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Dissolved Organic Carbon	SKA0179-MAY21	mg/L	1	<1	0	20	98	90	110	101	75	125

Chemical Oxygen Demand

Method: HACH 8000 I Internal ref.: ME-CA-IENVIEWL-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chemical Oxygen Demand	EWL0357-MAY21	mg/L	8	<8	ND	20	112	80	120	100	75	125

QC SUMMARY

Colour

Method: SM 2120 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Colour	EWL0387-MAY21	TCU	3	< 3	0	10	105	80	120	NA		

Conductivity

Method: SM 2510 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Conductivity	EWL0315-MAY21	uS/cm	2	< 2	0	20	99	90	110	NA		

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-IENVISPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Silver (total)	EMS0076-MAY21	mg/L	0.00005	<0.00005	ND	20	106	90	110	93	70	130
Aluminum (0.2µm)	EMS0076-MAY21	mg/L	0.001	<0.001	13	20	102	90	110	100	70	130
Arsenic (total)	EMS0076-MAY21	mg/L	0.0002	<0.0002	14	20	107	90	110	105	70	130
Barium (total)	EMS0076-MAY21	mg/L	0.00002	<0.00002	9	20	105	90	110	129	70	130
Beryllium (total)	EMS0076-MAY21	mg/L	0.000007	<0.00007	3	20	94	90	110	86	70	130
Boron (total)	EMS0076-MAY21	mg/L	0.002	<0.002	5	20	94	90	110	100	70	130
Bismuth (total)	EMS0076-MAY21	mg/L	0.00001	<0.00001	ND	20	97	90	110	81	70	130
Calcium (total)	EMS0076-MAY21	mg/L	0.01	<0.01	15	20	91	90	110	97	70	130
Cadmium (total)	EMS0076-MAY21	mg/L	0.000003	<0.000003	20	20	105	90	110	106	70	130
Cobalt (total)	EMS0076-MAY21	mg/L	0.000004	<0.000004	14	20	109	90	110	98	70	130
Chromium (total)	EMS0076-MAY21	mg/L	0.00008	<0.00008	2	20	104	90	110	87	70	130
Copper (total)	EMS0076-MAY21	mg/L	0.0002	<0.0002	2	20	106	90	110	78	70	130
Iron (total)	EMS0076-MAY21	mg/L	0.007	<0.007	13	20	99	90	110	111	70	130
Potassium (total)	EMS0076-MAY21	mg/L	0.009	<0.009	20	20	91	90	110	99	70	130
Magnesium (total)	EMS0076-MAY21	mg/L	0.001	<0.001	12	20	90	90	110	94	70	130
Molybdenum (total)	EMS0076-MAY21	mg/L	0.00004	<0.00004	5	20	95	90	110	100	70	130
Sodium (total)	EMS0076-MAY21	mg/L	0.01	<0.01	15	20	92	90	110	94	70	130
Nickel (total)	EMS0076-MAY21	mg/L	0.0001	<0.0001	20	20	104	90	110	84	70	130
Lead (total)	EMS0076-MAY21	mg/L	0.00009	<0.00001	12	20	107	90	110	92	70	130
Phosphorus (total)	EMS0076-MAY21	mg/L	0.003	<0.003	0	20	90	90	110	NV	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS (continued)

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-IENVISPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Antimony (total)	EMS0076-MAY21	mg/L	0.0009	<0.0009	16	20	98	90	110	103	70	130
Selenium (total)	EMS0076-MAY21	mg/L	0.00004	<0.00004	20	20	93	90	110	99	70	130
Silicon (total)	EMS0076-MAY21	mg/L	0.02	<0.02	8	20	90	90	110	NV	70	130
Tin (total)	EMS0076-MAY21	mg/L	0.00006	<0.00006	6	20	94	90	110	NV	70	130
Strontium (total)	EMS0076-MAY21	mg/L	0.00002	<0.00002	15	20	108	90	110	82	70	130
Titanium (total)	EMS0076-MAY21	mg/L	0.00005	<0.00005	3	20	95	90	110	NV	70	130
Uranium (total)	EMS0076-MAY21	mg/L	0.000002	<0.000002	3	20	104	90	110	90	70	130
Vanadium (total)	EMS0076-MAY21	mg/L	0.00001	<0.00001	18	20	104	90	110	100	70	130
Zinc (total)	EMS0076-MAY21	mg/L	0.002	<0.002	10	20	104	90	110	94	70	130
Manganese (total)	EMS0098-MAY21	mg/L	0.00001	<0.00001	1	20	101	90	110	89	70	130
Manganese (total)	EMS0129-MAY21	mg/L	0.00001	<0.00001	4	20	105	90	110	105	70	130

pH

Method: SM 4500 | Internal ref.: ME-CA-IENVIEWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0315-MAY21	No unit	0.05	NA	2		101			NA		

QC SUMMARY

Phenols by SFA

Method: SM 5530B-D | Internal ref.: ME-CA-[ENVISFA-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
4AAP-Phenolics	SKA0170-MAY21	mg/L	0.001	<0.001	ND	10	95	90	110	100	75	125

Reactive Phosphorus by SFA

Method: SM 4500-P F | Internal ref.: ME-CA-[ENVISFA-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Phosphorus (total reactive)	SKA0168-MAY21	mg/L	0.03	<0.03	2	10	104	90	110	99	75	125

Solids Analysis

Method: SM 2540C | Internal ref.: ME-CA-[ENVIEWL-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Dissolved Solids	EWL0304-MAY21	mg/L	30	<30	0	20	99	90	110	NA		

QC SUMMARY

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-[ENVIEWL-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Suspended Solids	EWL0342-MAY21	mg/L	2	< 2	0	10	100	90	110	NA		

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENVISFA-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen (N)	SKA0178-MAY21	mg/L	0.05	<0.05	ND	10	103	90	110	121	75	125

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates 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 Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS	Insufficient sample for analysis.
RL	Reporting Limit.
↑	Reporting limit raised.
↓	Reporting limit lowered.
NA	The sample was not analysed for this analyte
ND	Non Detect

Samples analysed as received. Solid samples expressed on a dry weight basis. "Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act" published by the Ministry and dated March 9, 2004 as amended.

-- End of Analytical Report --

Request for Laboratory Services and CHAIN OF CUSTODY (General)

SGS Environmental Services - Lakefield: 185 Concession St., Lakefield, ON K0L 2H0 Phone: 705-652-2000 Toll Free: 877-747-7658 Fax: 705-652-6365 Web: www.ca.sgs.com {4}

SGS Environmental Services - London: 657 Consortium Court, London, ON, N6E 2S8 Phone: 519-672-4500 Toll Free: 877-848-8060 Fax: 519-672-0361 Web: www.ca.sgs.com {4}

Laboratory Information Section

Received Date (mm/dd/yyyy): ~~05/14/2021~~ 05/13/2021 Ryan Lawrence

Received Time (After Hours Only): 14:30

LAB LIMS #: Mal 15280 OM

Temperature Upon Receipt (°C): 5x3

Billing & Reporting Information

Invoice/Receipt to {3}:

Company:	Pinchin
Attention:	Alana Valle
Address:	203-957 Cambrian Heights Drive Sudbury, Ontario P3C 5S5
Email:	avalle@pinchin.com

Project Name/Number: 225335.003-Chapman Landfill SW

P.O. #:

Quote #: 2021 254

Attached Parameter List: ☐ YES ☑ NO

Turnaround Time

Is *Rush Turnaround Time Required? ☐ YES ☑ NO

Specify:

* Rush TA Requests Require Lab Approval

Client Information/Report To:

Client Lab #:

Company Name:		Phone Number:	705.507.9479
Contact Name:		Fax Number:	
Address:		E-mail:	
Copy to:			

Sample Information

Sample Identifier	Date Sampled (mm/dd/yy)	Time Sampled	# of Bottles	Analysis Requested (please enter the analysis required below and check off which analysis applies to each sample)
				SW Package
SW1	5/12/21	9AM-1PM	9	X
SW2	↓	↓	9	X
SW3			9	X
SEEP			9	X
SW DUP			9	X

Sampled By {1}: (Name) Alana Valle (Signature) AV Date: 05/12/21 (mm/dd/yy)

Relinquished by {2}: (Name) Alana Valle (Signature) AV Date: 05/12/21 (mm/dd/yy)

Note: {1} Submission of samples to SGS is acknowledgement that you have been provided direction on sample collection/handling and transportation of samples. {2} Submission of samples to SGS is considered authorization for completion of work. Signatures may appear on this form or be retained on file in the contract, or in an alternative format (e.g. shipping documents). {3} Results may be sent by email to an unlimited number of addresses for no additional cost. Fax is available upon request. {4} Completion of work may require the subcontracting of samples between the London and Lakefield laboratories.

OM RTN 10:00

P. 332 896 289 680

FINAL REPORT

CA15284-MAY21 R

225335.003-Chapman Landfill GW

Prepared for

Pinchin Ltd

FINAL REPORT

CA15284-MAY21 R

First Page

CLIENT DETAILS

Client	Pinchin Ltd
Address	957 Cambrian Heights Drive, Suite 203 Sudbury, ON P3C 5S5. Canada
Contact	Alana Valle
Telephone	705-521-0560
Facsimile	
Email	avalle@Pinchin.com
Project	225335.003-Chapman Landfill GW
Order Number	
Samples	Ground Water (14)

LABORATORY DETAILS

Project Specialist	Brad Moore Hon. B.Sc
Laboratory	SGS Canada Inc.
Address	185 Concession St., Lakefield ON, K0L 2H0
Telephone	705-652-2143
Facsimile	705-652-6365
Email	brad.moore@sgs.com
SGS Reference	CA15284-MAY21
Received	05/14/2021
Approved	05/28/2021
Report Number	CA15284-MAY21 R
Date Reported	05/28/2021

COMMENTS

Temperature of Sample upon Receipt: 2 degrees C
Cooling Agent Present:Yes
Custody Seal Present:yes

Chain of Custody Number:NA

SIGNATORIES

Brad Moore Hon. B.Sc

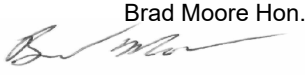


TABLE OF CONTENTS

Client: Pinchin Ltd
Project: 225335.003-Chapman Landfill GW
Project Manager: Alana Valle
Samplers: Alana Valle

PACKAGE: **BTEX** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

Sample Number					11								
Sample Name					BH4-II								
Sample Matrix					Ground Water								
Sample Date					12/05/2021								
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**								
BTEX													
Benzene	µg/L	0.5			< 0.5								
Toluene	µg/L	0.5			< 0.5								
General Chemistry													
Biochemical Oxygen Demand (BOD5)	mg/L	2			< 4 ↑	14	< 4 ↑	< 4 ↑	< 4 ↑	< 4 ↑	< 4 ↑	< 4 ↑
Total Suspended Solids	mg/L	2			4	15	3590	2110	5	1400	158	1330
Alkalinity	mg/L as CaCO3	2	500		143	269	11	161	231	89	82	15
Conductivity	uS/cm	2			407	659	39	572	731	337	324	50
Total Dissolved Solids	mg/L	30	500		243	400	< 30	391	563	203	189	49
Turbidity	NTU	0.10	5	1	1.01	35.1	90.6	49.6	4.73	21.9	3.75	74.2
Chemical Oxygen Demand	mg/L	8			15	32	9	41	32	16	11	< 8
Phosphorus (total reactive)	mg/L	0.03			< 0.03	< 0.03	0.08	< 0.03	< 0.03	< 0.03	< 0.03	0.03
Total Kjeldahl Nitrogen (N)	as N mg/L	0.05			3.38	5.93	0.07	0.64	< 0.05	0.44	0.30	0.06
Ammonia+Ammonium (N)	as N mg/L	0.04			2.77	5.33	< 0.04	0.13	< 0.04	0.25	0.23	< 0.04
Dissolved Organic Carbon	mg/L	1	5		7	11	2	11	11	4	4	3

FINAL REPORT

CA15284-MAY21 R

Client: Pinchin Ltd
Project: 225335.003-Chapman Landfill GW
Project Manager: Alana Valle
Samplers: Alana Valle

PACKAGE: **Metals and Inorganics** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	7	8	9	10	11	12	13	14
				Sample Name	BH1	BH2	BH3-II	BH4	BH4-II	BH5-II	BH6-III	BH7-II
				Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
				Sample Date	12/05/2021	12/05/2021	12/05/2021	12/05/2021	12/05/2021	12/05/2021	12/05/2021	12/05/2021
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Metals and Inorganics												
Phosphorus (total)	mg/L	0.03			< 0.03	0.20	2.48	2.68	< 0.03	0.55	0.05	0.26
Sulphate	mg/L	2	500		6	32	10	79	60	49	56	10
Nitrite (as N)	as N mg/L	0.03		1	< 0.03	< 0.03	< 0.03	0.04	< 0.03	0.09	< 0.03	< 0.03
Nitrate (as N)	as N mg/L	0.06		10	0.96	0.09	0.12	11.1	21.1	2.07	2.41	0.18
Hardness (dissolved)	mg/L as CaCO3	0.05	100		125	244	5.8	259	356	132	134	15.2
Silver (dissolved)	mg/L	0.00005			< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Aluminum (dissolved)	mg/L	0.001			0.027	0.021	0.071	0.037	0.021	0.117	0.009	0.260
Arsenic (dissolved)	mg/L	0.0002		0.01	0.0007	0.0007	0.0007	0.0004	0.0005	0.0002	0.0002	< 0.0002
Barium (dissolved)	mg/L	0.00002		1	0.0928	0.216	0.0049	0.0789	0.102	0.107	0.0998	0.0241
Beryllium (dissolved)	mg/L	0.000007			0.000015	0.000010	0.000026	0.000010	0.000011	0.000019	0.000013	0.000090
Boron (dissolved)	mg/L	0.002		5	0.238	0.542	0.013	0.335	0.514	0.295	0.256	0.009
Bismuth (dissolved)	mg/L	0.00001			< 0.00001	< 0.00001	< 0.00001	< 0.00001	0.00001	< 0.00001	< 0.00001	0.00002
Calcium (dissolved)	mg/L	0.01			39.1	75.0	1.86	91.7	124	36.9	39.5	3.35
Cadmium (dissolved)	mg/L	0.000003		0.005	0.000069	0.000079	0.000016	0.000017	0.000039	0.000036	0.000021	0.000013
Cobalt (dissolved)	mg/L	0.000004			0.00614	0.00611	0.000175	0.000297	0.00134	0.00066	0.00223	0.00055
Chromium (dissolved)	mg/L	0.00008		0.05	0.00051	0.00091	0.00023	0.00060	0.00073	0.00044	0.00041	0.00042
Copper (dissolved)	mg/L	0.0002	1		0.0065	0.0029	0.0004	0.0035	0.0080	0.0022	0.0046	0.0014
Iron (dissolved)	mg/L	0.007	0.3		< 0.007	7.12	0.031	0.054	0.020	0.182	0.010	0.378
Potassium (dissolved)	mg/L	0.009			9.19	11.0	0.497	8.80	12.8	4.27	6.06	1.33
Magnesium (dissolved)	mg/L	0.001			6.55	13.8	0.281	7.40	11.5	9.64	8.47	1.65

Client: Pinchin Ltd
Project: 225335.003-Chapman Landfill GW
Project Manager: Alana Valle
Samplers: Alana Valle

PACKAGE: **Metals and Inorganics** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

					Sample Number	7	8	9	10	11	12	13	14
					Sample Name	BH1	BH2	BH3-II	BH4	BH4-II	BH5-II	BH6-III	BH7-II
					Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
					Sample Date	12/05/2021	12/05/2021	12/05/2021	12/05/2021	12/05/2021	12/05/2021	12/05/2021	12/05/2021
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Metals and Inorganics (continued)													
Manganese (dissolved)	mg/L	0.00001	0.05		4.19	4.17	0.0096	0.0039	0.252	0.174	0.469	0.0133
Molybdenum (dissolved)	mg/L	0.00004			0.00039	0.00077	0.00066	0.00072	0.00096	0.00022	0.00039	0.00008
Sodium (dissolved)	mg/L	0.01	200	20	20.0	24.7	3.90	6.48	12.8	10.9	9.01	2.16
Nickel (dissolved)	mg/L	0.0001			0.0013	0.0018	0.0002	0.0006	0.0021	0.0021	0.0038	0.0009
Lead (dissolved)	mg/L	0.00009		0.01	< 0.00009	< 0.00009	0.00010	0.00026	< 0.00009	< 0.00009	< 0.00009	0.00075
Antimony (dissolved)	mg/L	0.0009		0.006	< 0.0009	< 0.0009	< 0.0009	< 0.0009	< 0.0009	< 0.0009	< 0.0009	< 0.0009
Selenium (dissolved)	mg/L	0.00004		0.05	0.00008	0.00014	< 0.00004	0.00010	0.00014	0.00006	< 0.00004	0.00010
Strontium (dissolved)	mg/L	0.00002			0.234	0.476	0.0218	0.305	0.406	0.244	0.342	0.0295
Thallium (dissolved)	mg/L	0.000005			0.000106	0.000006	0.000007	0.000014	0.000039	0.000022	0.000041	0.000028
Tin (dissolved)	mg/L	0.00006			0.00010	0.00011	< 0.00006	0.00010	0.00014	< 0.00006	0.00011	< 0.00006
Titanium (dissolved)	mg/L	0.00005			0.00011	0.00085	0.00137	0.00307	0.00063	0.0110	0.00007	0.02021
Tungsten (dissolved)	mg/L	0.00002			< 0.00002	< 0.00002	< 0.00002	< 0.00002	0.00098	0.00006	0.00160	< 0.00002
Uranium (dissolved)	mg/L	0.000002		0.02	0.00060	0.00405	0.000574	0.00282	0.00503	0.000243	0.000278	0.000316
Vanadium (dissolved)	mg/L	0.00001			0.00017	0.00131	0.00012	0.00034	0.00030	0.00044	0.00011	0.00071
Zinc (dissolved)	mg/L	0.002	5		0.002	0.004	< 0.002	< 0.002	< 0.002	0.002	0.013	0.004

Client: Pinchin Ltd
Project: 225335.003-Chapman Landfill GW
Project Manager: Alana Valle
Samplers: Alana Valle

PACKAGE: **Other (ORP)** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

					Sample Number	7	8	9	10	11	12	13	14
					Sample Name	BH1	BH2	BH3-II	BH4	BH4-II	BH5-II	BH6-III	BH7-II
					Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
					Sample Date	12/05/2021	12/05/2021	12/05/2021	12/05/2021	12/05/2021	12/05/2021	12/05/2021	12/05/2021
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Other (ORP)													
pH	No unit	0.05	8.5		7.17	7.44	6.55	7.87	7.30	7.24	7.16	6.93
Chloride	mg/L	1	250		31	26	2	4	7	10	7	1
Mercury (total)	mg/L	0.00001							< 0.00001			
Phenols													
4AAP-Phenolics	mg/L	0.002			< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
VOCs													
1,4-Dichlorobenzene	µg/L	0.5			< 0.5							
Dichloromethane	µg/L	0.5			< 0.5							
Vinyl Chloride	µg/L	0.2			< 0.2							

Client: Pinchin Ltd
Project: 225335.003-Chapman Landfill GW
Project Manager: Alana Valle
Samplers: Alana Valle

PACKAGE: **General Chemistry** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

					Sample Number	15	16	17	18	19	20
					Sample Name	BH8-I	BH9-I	BH10-I	BH11-I	GW DUP 1	GW DUP 2
					Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
					Sample Date	12/05/2021	12/05/2021	12/05/2021	12/05/2021	12/05/2021	12/05/2021
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
General Chemistry											
Biochemical Oxygen Demand (BOD5)	mg/L	2			< 4 ↑	< 4 ↑	5	< 4 ↑	< 4 ↑	< 4 ↑
Total Suspended Solids	mg/L	2			931	1350	776	820	111	803
Alkalinity	mg/L as CaCO3	2	500		119	174	38	11	229	8
Conductivity	uS/cm	2			366	534	186	92	734	86
Total Dissolved Solids	mg/L	30	500		211	294	114	60	543	71
Turbidity	NTU	0.10	5	1	29.8	182	50.0	23.9	1.75	38.2
Chemical Oxygen Demand	mg/L	8			41	43	8	< 8	31	< 8
Phosphorus (total reactive)	mg/L	0.03			0.20	0.08	< 0.03	0.08	< 0.03	< 0.03
Total Kjeldahl Nitrogen (N)	as N mg/L	0.05			2.71	7.15	0.09	0.34	< 0.05	0.10
Ammonia+Ammonium (N)	as N mg/L	0.04			1.97	6.50	< 0.04	< 0.04	< 0.04	< 0.04
Dissolved Organic Carbon	mg/L	1	5		5	9	5	< 1	12	2
Metals and Inorganics											
Phosphorus (total)	mg/L	0.03			0.71	0.76	0.43	0.63	< 0.03	0.57
Sulphate	mg/L	2	500		20	57	32	4	60	5
Nitrite (as N)	as N mg/L	0.03		1	0.24	0.04	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L	0.06		10	1.84	0.08	3.18	0.21	21.2	0.20
Hardness (dissolved)	mg/L as CaCO3	0.05	100		118	176	61.3	24.6	359	24.2
Silver (dissolved)	mg/L	0.00005			< 0.00005	< 0.00005	0.00008	< 0.00005	< 0.00005	< 0.00005
Aluminum (dissolved)	mg/L	0.001			0.124	0.067	0.053	0.027	0.045	0.024
Arsenic (dissolved)	mg/L	0.0002		0.01	0.0004	0.0007	< 0.0002	< 0.0002	0.0005	< 0.0002
Barium (dissolved)	mg/L	0.00002		1	0.160	0.144	0.0630	0.0207	0.102	0.0215

Client: Pinchin Ltd
Project: 225335.003-Chapman Landfill GW
Project Manager: Alana Valle
Samplers: Alana Valle

PACKAGE: **Metals and Inorganics** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

					Sample Number	15	16	17	18	19	20
					Sample Name	BH8-I	BH9-I	BH10-I	BH11-I	GW DUP 1	GW DUP 2
					Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
					Sample Date	12/05/2021	12/05/2021	12/05/2021	12/05/2021	12/05/2021	12/05/2021
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Metals and Inorganics (continued)											
Beryllium (dissolved)	mg/L	0.000007			0.000023	0.000028	0.000008	0.000042	0.000011	0.000043
Boron (dissolved)	mg/L	0.002		5	0.281	0.435	0.218	0.027	0.491	0.043
Bismuth (dissolved)	mg/L	0.00001			< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Calcium (dissolved)	mg/L	0.01			37.4	54.3	15.8	8.24	125	8.14
Cadmium (dissolved)	mg/L	0.000003		0.005	0.000061	0.000018	0.000003	0.000008	0.000064	0.000020
Cobalt (dissolved)	mg/L	0.000004			0.00065	0.0262	0.000191	0.000115	0.00139	0.00010
Chromium (dissolved)	mg/L	0.00008		0.05	0.00073	0.00091	0.00049	0.00029	0.00080	0.00027
Copper (dissolved)	mg/L	0.0002	1		0.0036	0.0028	0.0036	0.0009	0.0078	0.0004
Iron (dissolved)	mg/L	0.007	0.3		0.214	14.3	0.024	0.018	0.017	0.019
Potassium (dissolved)	mg/L	0.009			10.0	11.5	3.16	1.16	13.1	1.12
Magnesium (dissolved)	mg/L	0.001			6.03	9.67	5.31	0.975	11.3	0.943
Manganese (dissolved)	mg/L	0.00001	0.05		1.26	6.20	0.0027	0.0235	0.249	0.0228
Molybdenum (dissolved)	mg/L	0.00004			0.00017	0.00060	0.00011	0.00041	0.00100	0.00007
Sodium (dissolved)	mg/L	0.01	200	20	15.5	22.0	5.26	3.75	13.3	3.49
Nickel (dissolved)	mg/L	0.0001			0.0007	0.0025	0.0006	0.0002	0.0019	< 0.0001
Lead (dissolved)	mg/L	0.00009		0.01	0.00022	< 0.00009	< 0.00009	< 0.00009	< 0.00009	0.00011
Antimony (dissolved)	mg/L	0.0009		0.006	< 0.0009	< 0.0009	< 0.0009	< 0.0009	< 0.0009	< 0.0009
Selenium (dissolved)	mg/L	0.00004		0.05	0.00006	0.00016	0.00005	0.00005	0.00020	0.00004
Strontium (dissolved)	mg/L	0.00002			0.228	0.349	0.0998	0.0904	0.414	0.0875
Thallium (dissolved)	mg/L	0.000005			0.000093	0.000076	0.000022	0.000007	0.000040	0.000007

Client: Pinchin Ltd
Project: 225335.003-Chapman Landfill GW
Project Manager: Alana Valle
Samplers: Alana Valle

PACKAGE: **Metals and Inorganics** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

					Sample Number	15	16	17	18	19	20
					Sample Name	BH8-I	BH9-I	BH10-I	BH11-I	GW DUP 1	GW DUP 2
					Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
					Sample Date	12/05/2021	12/05/2021	12/05/2021	12/05/2021	12/05/2021	12/05/2021
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Metals and Inorganics (continued)											
Tin (dissolved)	mg/L	0.00006			< 0.00006	0.00007	0.00007	< 0.00006	0.00010	< 0.00006
Titanium (dissolved)	mg/L	0.00005			0.00641	0.00289	0.00044	0.00045	0.00065	0.00042
Tungsten (dissolved)	mg/L	0.00002			0.00012	< 0.00002	0.00232	< 0.00002	0.00095	< 0.00002
Uranium (dissolved)	mg/L	0.000002		0.02	0.000433	0.00157	0.00068	0.000067	0.00489	0.000064
Vanadium (dissolved)	mg/L	0.00001			0.00048	0.00107	0.00036	0.00007	0.00029	0.00006
Zinc (dissolved)	mg/L	0.002	5		0.002	0.004	< 0.002	0.002	0.008	< 0.002
Other (ORP)											
pH	No unit	0.05	8.5		7.26	7.25	7.32	6.81	7.35	6.60
Chloride	mg/L	1	250		21	23	2	15	7	19
Phenols											
4AAP-Phenolics	mg/L	0.002			< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03 L1	ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03 L2
BH1					
Turbidity	SM 2130	NTU	1.01		1
Hardness (dissolved)	SM 3030/EPA 200.7	mg/L as CaCO3	125	100	
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	4.19	0.05	
Dissolved Organic Carbon	SM 5310	mg/L	7	5	
BH2					
Turbidity	SM 2130	NTU	35.1	5	1
Hardness (dissolved)	SM 3030/EPA 200.7	mg/L as CaCO3	244	100	
Iron (dissolved)	SM 3030/EPA 200.8	mg/L	7.12	0.3	
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	4.17	0.05	
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	24.7		20
Dissolved Organic Carbon	SM 5310	mg/L	11	5	
BH3-II					
Turbidity	SM 2130	NTU	90.6	5	1
BH4					
Nitrate as Nitrogen	EPA300/MA300-Ions1.3	as N mg/L	11.1		10
Turbidity	SM 2130	NTU	49.6	5	1
Hardness (dissolved)	SM 3030/EPA 200.7	mg/L as CaCO3	259	100	
Dissolved Organic Carbon	SM 5310	mg/L	11	5	
BH4-II					
Nitrate as Nitrogen	EPA300/MA300-Ions1.3	as N mg/L	21.1		10
Turbidity	SM 2130	NTU	4.73		1
Total Dissolved Solids	SM 2540C	mg/L	563	500	
Hardness (dissolved)	SM 3030/EPA 200.7	mg/L as CaCO3	356	100	
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	0.252	0.05	
Dissolved Organic Carbon	SM 5310	mg/L	11	5	
BH5-II					
Turbidity	SM 2130	NTU	21.9	5	1
Hardness (dissolved)	SM 3030/EPA 200.7	mg/L as CaCO3	132	100	
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	0.174	0.05	
BH6-III					
Turbidity	SM 2130	NTU	3.75		1
Hardness (dissolved)	SM 3030/EPA 200.7	mg/L as CaCO3	134	100	
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	0.469	0.05	
BH7-II					

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03 L1	ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03 L2
BH7-II (continued)					
Turbidity	SM 2130	NTU	74.2	5	1
Iron (dissolved)	SM 3030/EPA 200.8	mg/L	0.378	0.3	
BH8-I					
Turbidity	SM 2130	NTU	29.8	5	1
Hardness (dissolved)	SM 3030/EPA 200.7	mg/L as CaCO3	118	100	
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	1.26	0.05	
BH9-I					
Turbidity	SM 2130	NTU	182	5	1
Hardness (dissolved)	SM 3030/EPA 200.7	mg/L as CaCO3	176	100	
Iron (dissolved)	SM 3030/EPA 200.8	mg/L	14.3	0.3	
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	6.20	0.05	
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	22.0		20
Dissolved Organic Carbon	SM 5310	mg/L	9	5	
BH10-I					
Turbidity	SM 2130	NTU	50.0	5	1
BH11-I					
Turbidity	SM 2130	NTU	23.9	5	1
GW DUP 1					
Nitrate as Nitrogen	EPA300/MA300-Ions1.3	as N mg/L	21.2		10
Turbidity	SM 2130	NTU	1.75		1
Total Dissolved Solids	SM 2540C	mg/L	543	500	
Hardness (dissolved)	SM 3030/EPA 200.7	mg/L as CaCO3	359	100	
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	0.249	0.05	
Dissolved Organic Carbon	SM 5310	mg/L	12	5	
GW DUP 2					
Turbidity	SM 2130	NTU	38.2	5	1

QC SUMMARY

Alkalinity

Method: SM 2320 I Internal ref.: ME-CA-IENVIEWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Alkalinity	EWL0299-MAY21	mg/L as CaCO3	2	2	2	20	100	80	120	NA		

Ammonia by SFA

Method: SM 4500 I Internal ref.: ME-CA-IENVISFA-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Ammonia+Ammonium (N)	SKA0171-MAY21	mg/L	0.04	<0.04	ND	10	97	90	110	84	75	125
Ammonia+Ammonium (N)	SKA0183-MAY21	mg/L	0.04	<0.04	1	10	95	90	110	88	75	125

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 325.2 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-026

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chloride	DIO5065-MAY21	mg/L	1	<1	0	20	107	80	120	95	75	125
Sulphate	DIO5065-MAY21	mg/L	2	<2	13	20	102	80	120	91	75	125
Chloride	DIO5081-MAY21	mg/L	1	<1	2	20	101	80	120	94	75	125
Sulphate	DIO5081-MAY21	mg/L	2	<2	0	20	104	80	120	94	75	125

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENV]IC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nitrite (as N)	DIO0341-MAY21	mg/L	0.03	<0.03	ND	20	99	80	120	102	75	125
Nitrate (as N)	DIO0341-MAY21	mg/L	0.06	<0.06	0	20	100	80	120	98	75	125
Nitrite (as N)	DIO0342-MAY21	mg/L	0.03	<0.03	ND	20	97	80	120	100	75	125
Nitrate (as N)	DIO0342-MAY21	mg/L	0.06	<0.06	1	20	101	80	120	103	75	125

QC SUMMARY

Biochemical Oxygen Demand

Method: SM 5210 I Internal ref.: ME-CA-IENVIEWL-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Biochemical Oxygen Demand (BOD5)	BOD0038-MAY21	mg/L	2	< 2	19	30	88	70	130	99	70	130

Carbon by SFA

Method: SM 5310 I Internal ref.: ME-CA-IENVISFA-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Dissolved Organic Carbon	SKA0175-MAY21	mg/L	1	<1	ND	20	100	90	110	114	75	125

Chemical Oxygen Demand

Method: HACH 8000 I Internal ref.: ME-CA-IENVIEWL-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chemical Oxygen Demand	EWL0354-MAY21	mg/L	8	<8	6	20	106	80	120	102	75	125
Chemical Oxygen Demand	EWL0357-MAY21	mg/L	8	<8	ND	20	112	80	120	100	75	125

QC SUMMARY

Conductivity

Method: SM 2510 I Internal ref.: ME-CA-[ENVIEWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Conductivity	EWL0299-MAY21	uS/cm	2	2	1	20	99	90	110	NA		

Mercury by CVAAS

Method: EPA 7471A/SM 3112B I Internal ref.: ME-CA-[ENVISPE-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Mercury (total)	EHG0020-MAY21	mg/L	0.00001	< 0.00001	ND	20	101	80	120	101	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-IENVISPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Silver (dissolved)	EMS0080-MAY21	mg/L	0.00005	<0.00005	ND	20	106	90	110	94	70	130
Aluminum (dissolved)	EMS0080-MAY21	mg/L	0.001	<0.001	5	20	102	90	110	101	70	130
Arsenic (dissolved)	EMS0080-MAY21	mg/L	0.0002	<0.0002	ND	20	107	90	110	106	70	130
Barium (dissolved)	EMS0080-MAY21	mg/L	0.00002	<0.00002	2	20	105	90	110	91	70	130
Beryllium (dissolved)	EMS0080-MAY21	mg/L	0.000007	<0.00007	ND	20	94	90	110	95	70	130
Boron (dissolved)	EMS0080-MAY21	mg/L	0.002	<0.002	17	20	94	90	110	100	70	130
Bismuth (dissolved)	EMS0080-MAY21	mg/L	0.00001	<0.00001	ND	20	97	90	110	93	70	130
Calcium (dissolved)	EMS0080-MAY21	mg/L	0.01	<0.01	7	20	91	90	110	97	70	130
Cadmium (dissolved)	EMS0080-MAY21	mg/L	0.000003	<0.000003	0	20	105	90	110	94	70	130
Cobalt (dissolved)	EMS0080-MAY21	mg/L	0.000004	<0.000004	8	20	109	90	110	94	70	130
Chromium (dissolved)	EMS0080-MAY21	mg/L	0.00008	<0.00008	10	20	104	90	110	95	70	130
Copper (dissolved)	EMS0080-MAY21	mg/L	0.0002	<0.0002	13	20	106	90	110	102	70	130
Iron (dissolved)	EMS0080-MAY21	mg/L	0.007	<0.007	ND	20	99	90	110	111	70	130
Potassium (dissolved)	EMS0080-MAY21	mg/L	0.009	<0.009	8	20	91	90	110	99	70	130
Magnesium (dissolved)	EMS0080-MAY21	mg/L	0.001	<0.001	6	20	90	90	110	82	70	130
Manganese (dissolved)	EMS0080-MAY21	mg/L	0.00001	<0.00001	1	20	106	90	110	88	70	130
Molybdenum (dissolved)	EMS0080-MAY21	mg/L	0.00004	<0.00004	5	20	95	90	110	128	70	130
Sodium (dissolved)	EMS0080-MAY21	mg/L	0.01	<0.01	9	20	92	90	110	94	70	130
Nickel (dissolved)	EMS0080-MAY21	mg/L	0.0001	<0.0001	4	20	104	90	110	91	70	130
Lead (dissolved)	EMS0080-MAY21	mg/L	0.00009	<0.00001	1	20	107	90	110	102	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS (continued)

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-IENVISPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Antimony (dissolved)	EMS0080-MAY21	mg/L	0.0009	<0.0009	ND	20	98	90	110	96	70	130
Selenium (dissolved)	EMS0080-MAY21	mg/L	0.00004	<0.00004	ND	20	93	90	110	92	70	130
Tin (dissolved)	EMS0080-MAY21	mg/L	0.00006	<0.00006	ND	20	94	90	110	NV	70	130
Strontium (dissolved)	EMS0080-MAY21	mg/L	0.00002	<0.00002	8	20	108	90	110	101	70	130
Titanium (dissolved)	EMS0080-MAY21	mg/L	0.00005	<0.00005	3	20	95	90	110	NV	70	130
Thallium (dissolved)	EMS0080-MAY21	mg/L	0.000005	<0.000005	ND	20	104	90	110	98	70	130
Uranium (dissolved)	EMS0080-MAY21	mg/L	0.000002	<0.000002	0	20	104	90	110	100	70	130
Vanadium (dissolved)	EMS0080-MAY21	mg/L	0.00001	<0.00001	3	20	104	90	110	98	70	130
Tungsten (dissolved)	EMS0080-MAY21	mg/L	0.00002	<0.00002	ND	20	93	90	110	NV	70	130
Zinc (dissolved)	EMS0080-MAY21	mg/L	0.002	<0.002	1	20	104	90	110	103	70	130
Boron (dissolved)	EMS0087-MAY21	mg/L	0.002	<0.002	11	20	99	90	110	105	70	130
Strontium (dissolved)	EMS0087-MAY21	mg/L	0.00002	<0.00002	3	20	104	90	110	90	70	130

QC SUMMARY

pH

Method: SM 4500 I Internal ref.: ME-CA-[ENVIEWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
pH	EWL0299-MAY21	No unit	0.05	NA	0		100			NA		

Phenols by SFA

Method: SM 5530B-D I Internal ref.: ME-CA-[ENVISFA-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
4AAP-Phenolics	SKA0170-MAY21	mg/L	0.002	<0.002	ND	10	95	80	120	100	75	125

QC SUMMARY

Phosphorus by SFA

Method: SM 4500-P J | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-003

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Phosphorus (total)	SKA0176-MAY21	mg/L	0.03	<0.03	6	10	107	90	110	105	75	125
Phosphorus (total)	SKA0196-MAY21	mg/L	0.03	<0.03	3	10	98	90	110	101	75	125
Phosphorus (total)	SKA0208-MAY21	mg/L	0.03	<0.03	0	10	94	90	110	91	75	125

Reactive Phosphorus by SFA

Method: SM 4500-P F | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Phosphorus (total reactive)	SKA0182-MAY21	mg/L	0.03	<0.03	ND	10	96	90	110	92	75	125

QC SUMMARY

Solids Analysis

Method: SM 2540C | Internal ref.: ME-CA-IENVIEWL-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Dissolved Solids	EWL0304-MAY21	mg/L	30	<30	0	20	99	90	110	NA		

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-IENVIEWL-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Suspended Solids	EWL0334-MAY21	mg/L	2	< 2	1	10	98	90	110	NA		
Total Suspended Solids	EWL0326-MAY21	mg/L	2	< 2	2	10	100	90	110	NA		

QC SUMMARY

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen (N)	SKA0178-MAY21	mg/L	0.05	<0.05	ND	10	103	90	110	121	75	125
Total Kjeldahl Nitrogen (N)	SKA0200-MAY21	mg/L	0.05	<0.05	0	10	96	90	110	89	75	125

Turbidity

Method: SM 2130 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-003

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Turbidity	EWL0294-MAY21	NTU	0.10	< 0.10	0	10	99	90	110	NA		

QC SUMMARY

Volatile Organics

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENVIGC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
1,4-Dichlorobenzene	GCM0299-MAY21	µg/L	0.5	<0.5	ND	30	99	60	130	136	50	140
Benzene	GCM0299-MAY21	µg/L	0.5	<0.5	ND	30	86	60	130	131	50	140
Dichloromethane	GCM0299-MAY21	µg/L	0.5	<0.5	ND	30	92	60	130	125	50	140
Toluene	GCM0299-MAY21	µg/L	0.5	<0.5	ND	30	87	60	130	133	50	140
Vinyl Chloride	GCM0299-MAY21	µg/L	0.2	<0.2	ND	30	64	60	130	119	50	140

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.
Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.
LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.
Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.
Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.
RL: Reporting limit
RPD: Relative percent difference
AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.
Duplicate Qualifier: for duplicates 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 Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

QC SUMMARY

LEGEND

FOOTNOTES

NSS Insufficient sample for analysis.
RL Reporting Limit.
↑ Reporting limit raised.
↓ Reporting limit lowered.
NA The sample was not analysed for this analyte
ND Non Detect

Samples analysed as received. Solid samples expressed on a dry weight basis. "Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act" published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated. This document is issued, on the Client's behalf, by the Company under its General Conditions of Service available on request and accessible at http://www.sgs.com/terms_and_conditions.htm. The Client's attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any other holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents.

-- End of Analytical Report --

SGS

Request for Laboratory Services and CHAIN OF CUSTODY (General)

SGS Environmental Services - Lakefield: 185 Concession St., Lakefield, ON K0L 2H0 Phone: 705-652-2000 Toll Free: 877-747-7658 Fax: 705-652-6365 Web: www.ca.sgs.com {4}

SGS Environmental Services - London: 657 Consortium Court, London, ON, N6E 2S8 Phone: 519-672-4500 Toll Free: 877-848-8060 Fax: 519-672-0361 Web: www.ca.sgs.com {4}

Laboratory Information Section

Received Date (mm/dd/yyyy): 05/13/2021 Ryan Lawrence — LAB LIMS #: May 15284 DM

Received Time (After Hours Only): 14:30 — Temperature Upon Receipt (°C): 2, 2, 4

Billing & Reporting Information

Invoice/Receipt to {3}:

Company: Pinchin
Attention: Alana Valle
Address: 203-957 Cambrian Heights Drive, Sudbury, Ontario, P3C 5S5
Email: avalle@pinchin.com

Quote #: 2021 254

Attached Parameter List: ☐ YES ☑ NO

Turnaround Time

Is *Rush Turnaround Time Required? ☐ YES ☑ NO

Specify:

* Rush TA Requests Require Lab Approval

Project Name/Number: 225335.003-Chapman Landfill GW — P.O. #:

Client Information/Report To:

Client Lab #:

Company Name:		Phone Number:	705.507.9479
Contact Name:		Fax Number:	
Address:		E-mail:	
Copy to:			

Sample Information

TURBs UAL — all processed as KW

Sample Identifier	Date Sampled (mm/dd/yy)	Time Sampled	# of Bottles	Analysis Requested: GW Package	Mercury and VOC's						
✓ BH1	5/12/21	9AM-1PM	9	X							
✓ BH2	↓	↓	9	X							
✓ BH3-II			9	X							
✓ BH4			9	X							
✓ BH4-II			12	X	X						
✓ BH5-II			9	X							
~~BH6-II~~				~~X~~							
✓ BH6-III	5/12/21	9AM-1PM	9	X							
✓ BH7-II	↓	↓	9	X							
✓ BH8-I			9	X							
✓ BH9-I			9	X							
✓ BH10-I			9	X							
✓ BH11-I			9	X							
✓ GW DUP 1			9	X							
✓ GW DUP 2	↓	↓	9	X							

Sampled By {1}:	(Name) Alana Valle	(Signature) AV.	Date: 05/12/21	(mm/dd/yy)
Relinquished by {2}:	(Name) Alana Valle	(Signature) AV.	Date: 05/12/21	(mm/dd/yy)

Note: {1} Submission of samples to SGS is acknowledgement that you have been provided direction on sample collection/handling and transportation of samples. {2} Submission of samples to SGS is considered authorization for completion of work. Signatures may appear on this form or be retained on file in the contract, or in an alternative format (e.g. shipping documents). {3} Results may be sent by email to an unlimited number of addresses for no additional cost. Fax is available upon request. {4} Completion of work may require the subcontracting of samples between the London and Lakefield laboratories.

DM 10:00

FINAL REPORT

CA15286-OCT21 R

225335.003-Chapman Landfill SW

Prepared for

Pinchin Ltd

FINAL REPORT

CA15286-OCT21 R

First Page

CLIENT DETAILS		LABORATORY DETAILS	
Client	Pinchin Ltd	Project Specialist	Maarit Wolfe, Hon.B.Sc
		Laboratory	SGS Canada Inc.
Address	957 Cambrian Heights Drive, Suite 203 Sudbury, ON P3C 5S5. Canada	Address	185 Concession St., Lakefield ON, K0L 2H0
Contact	Alana Valle	Telephone	705-652-2000
Telephone	705-521-0560	Facsimile	705-652-6365
Facsimile		Email	Maarit.Wolfe@sgs.com
Email	avalle@Pinchin.com	SGS Reference	CA15286-OCT21
Project	225335.003-Chapman Landfill SW	Received	10/08/2021
Order Number		Approved	10/21/2021
Samples	Surface Water (5)	Report Number	CA15286-OCT21 R
		Date Reported	10/21/2021

COMMENTS

Temperature of Sample upon Receipt: 6 degrees C
Cooling Agent Present:Yes
Custody Seal Present:Yes

Chain of Custody Number:NA

COD spike low, results accepted based on all other QC-

SIGNATORIES

Maarit Wolfe, Hon.B.Sc

TABLE OF CONTENTS

Client: Pinchin Ltd
Project: 225335.003-Chapman Landfill SW
Project Manager: Alana Valle
Samplers: Alana Valle

PACKAGE: **PWQO - General Chemistry** (WATER)

L1 = PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E

	Sample Number	6	7	8	9	10		
	Sample Name	SW1	SW2	SW3	SEEP	SW DUP		
	Sample Matrix	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water		
	Sample Date	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021		
Parameter	**Units**	**RL**	**L1**	**Result**	**Result**	**Result**	**Result**	**Result**
General Chemistry								
Biochemical Oxygen Demand (BOD5)	mg/L	2		< 4 ↑	< 4 ↑	< 4 ↑	5	< 4 ↑
Total Suspended Solids	mg/L	2		5	6	3	36	6
Colour	TCU	3		67	34	27	24	67
Alkalinity	mg/L as CaCO3	2		3	10	30	147	2
Conductivity	uS/cm	2		48	68	87	379	46
Total Dissolved Solids	mg/L	30		54	40	57	229	46
Chemical Oxygen Demand	mg/L	8		25	14	13	31	23
Total Kjeldahl Nitrogen (N)	as N mg/L	0.05		0.08	0.19	0.87	4.16	0.23
Ammonia+Ammonium (N)	as N mg/L	0.04		0.04	0.08	0.68	3.98	0.04
Phosphorus (total reactive)	mg/L	0.03		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Dissolved Organic Carbon	mg/L	1		15	7	5	7	12

Client: Pinchin Ltd
Project: 225335.003-Chapman Landfill SW
Project Manager: Alana Valle
Samplers: Alana Valle

PACKAGE: **PWQO - Metals and Inorganics**
(WATER)

L1 = PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E

	Sample Number	6	7	8	9	10		
	Sample Name	SW1	SW2	SW3	SEEP	SW DUP		
	Sample Matrix	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water		
	Sample Date	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021		
Parameter	**Units**	**RL**	**L1**	**Result**	**Result**	**Result**	**Result**	**Result**
Metals and Inorganics								
Sulphate	mg/L	2		< 2	8	2	8	< 2
Nitrite (as N)	as N mg/L	0.03		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L	0.06		< 0.06	0.21	0.27	0.70	< 0.06
Hardness	mg/L as CaCO3	0.05		13.7	23.2	29.1	112	15.2
Silver (total)	mg/L	0.00005	0.0001	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Aluminum (0.2µm)	mg/L	0.001	0.015	**0.177**	**0.065**	0.015	0.006	**0.179**
Arsenic (total)	mg/L	0.0002	0.005	< 0.0002	< 0.0002	< 0.0002	0.0013	0.0003
Barium (total)	mg/L	0.00002		0.0224	0.0310	0.0217	0.209	0.0236
Beryllium (total)	mg/L	0.000007	0.011	0.000030	0.000030	0.000013	0.000071	0.000042
Boron (total)	mg/L	0.002	0.2	0.020	0.041	0.057	0.197	0.021
Calcium (total)	mg/L	0.01		4.22	7.01	9.26	36.1	4.81
Cadmium (total)	mg/L	0.000003	0.0001	0.000034	0.000017	0.000015	0.000052	0.000024
Cobalt (total)	mg/L	0.000004	0.0009	0.000888	0.000234	**0.00175**	**0.0335**	0.000876
Chromium (total)	mg/L	0.00008		0.00030	0.00031	0.00026	0.00161	0.00031
Copper (total)	mg/L	0.0002	0.001	0.0004	0.0006	0.0007	**0.0037**	0.0005
Iron (total)	mg/L	0.007	0.3	**0.401**	0.195	**0.548**	**36.3**	**0.399**
Potassium (total)	mg/L	0.009		0.561	1.38	2.44	9.27	0.503
Magnesium (total)	mg/L	0.001		0.766	1.38	1.46	5.31	0.766
Manganese (total)	mg/L	0.00001		0.0407	0.0351	0.477	6.97	0.0417

Client: Pinchin Ltd
Project: 225335.003-Chapman Landfill SW
Project Manager: Alana Valle
Samplers: Alana Valle

PACKAGE: **PWQO - Metals and Inorganics**
(WATER)

L1 = PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E

			Sample Number	6	7	8	9	10
			Sample Name	SW1	SW2	SW3	SEEP	SW DUP
			Sample Matrix	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
			Sample Date	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021
Parameter	**Units**	**RL**	**L1**	**Result**	**Result**	**Result**	**Result**	**Result**
Metals and Inorganics (continued)								
Molybdenum (total)	mg/L	0.00004	0.04	< 0.00004	< 0.00004	0.00004	0.00068	< 0.00004
Sodium (total)	mg/L	0.01		4.58	5.27	6.67	21.2	3.91
Nickel (total)	mg/L	0.0001	0.025	0.0011	0.0008	0.0008	0.0027	0.0009
Lead (total)	mg/L	0.00009	0.001	0.00028	0.00011	0.00014	0.00086	0.00030
Phosphorus (total)	mg/L	0.003	0.01	0.005	< 0.003	< 0.003	0.044	0.005
Antimony (total)	mg/L	0.0009	0.02	< 0.0009	< 0.0009	< 0.0009	< 0.0009	< 0.0009
Selenium (total)	mg/L	0.00004	0.1	< 0.00004	< 0.00004	< 0.00004	0.00007	0.00013
Strontium (total)	mg/L	0.00002		0.0477	0.0578	0.0619	0.224	0.0469
Zinc (total)	mg/L	0.002	0.02	0.009	0.006	0.005	0.004	0.008
Bismuth (total)	mg/L	0.00001		< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Silicon (total)	mg/L	0.02		2.80	3.41	2.51	7.01	2.85
Tin (total)	mg/L	0.00006		0.00032	0.00019	0.00021	0.00020	0.00016
Titanium (total)	mg/L	0.00005		0.00207	0.00202	0.00081	0.0135	0.00227
Uranium (total)	mg/L	0.000002	0.005	0.000019	0.000040	0.000073	0.000927	0.000016
Vanadium (total)	mg/L	0.00001	0.006	0.00027	0.00016	0.00020	0.00164	0.00024

Client: Pinchin Ltd
Project: 225335.003-Chapman Landfill SW
Project Manager: Alana Valle
Samplers: Alana Valle

PACKAGE: **PWQO - Other (ORP)** (WATER)

L1 = PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E

			Sample Number	6	7	8	9	10
			Sample Name	SW1	SW2	SW3	SEEP	SW DUP
			Sample Matrix	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
			Sample Date	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021
Parameter	**Units**	**RL**	**L1**	**Result**	**Result**	**Result**	**Result**	**Result**
Other (ORP)								
pH	No unit	0.05	8.5	5.90	6.37	6.68	6.91	5.77
Chloride	mg/L	1		14	9	10	34	14

PACKAGE: **PWQO - Phenols** (WATER)

L1 = PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E

			Sample Number	6	7	8	9	10
			Sample Name	SW1	SW2	SW3	SEEP	SW DUP
			Sample Matrix	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
			Sample Date	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021
Parameter	**Units**	**RL**	**L1**	**Result**	**Result**	**Result**	**Result**	**Result**
Phenols								
4AAP-Phenolics	mg/L	0.001	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E L1
SW1				
Aluminum (dissolved)	SM 3030/EPA 200.8	µg/L	0.177	0.015
Iron	SM 3030/EPA 200.8	µg/L	0.401	0.3
SW2				
Aluminum (dissolved)	SM 3030/EPA 200.8	µg/L	0.065	0.015
SW3				
Cobalt	SM 3030/EPA 200.8	µg/L	0.00175	0.0009
Iron	SM 3030/EPA 200.8	µg/L	0.548	0.3
SEEP				
Cobalt	SM 3030/EPA 200.8	µg/L	0.0335	0.0009
Copper	SM 3030/EPA 200.8	µg/L	0.0037	0.001
Iron	SM 3030/EPA 200.8	µg/L	36.3	0.3
Phosphorus	SM 3030/EPA 200.8	µg/L	0.044	0.01
SW DUP				
Aluminum (dissolved)	SM 3030/EPA 200.8	µg/L	0.179	0.015
Iron	SM 3030/EPA 200.8	µg/L	0.399	0.3

QC SUMMARY

Alkalinity

Method: SM 2320 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Alkalinity	EWL0282-OCT21	mg/L as CaCO3	2	< 2	1	20	91	80	120	NA		

Ammonia by SFA

Method: SM 4500 I Internal ref.: ME-CA-[ENV]SFA-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Ammonia+Ammonium (N)	SKA0109-OCT21	mg/L	0.04	<0.04	2	10	105	90	110	98	75	125

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 325.2 | Internal ref.: ME-CA-[ENVIEWL-LAK-AN-026

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chloride	DIO5038-OCT21	mg/L	1	<1	1	20	104	80	120	87	75	125
Sulphate	DIO5038-OCT21	mg/L	2	<2	0	20	99	80	120	99	75	125

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENVIIC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nitrite (as N)	DIO0196-OCT21	mg/L	0.03	<0.03	ND	20	96	90	110	100	75	125
Nitrate (as N)	DIO0196-OCT21	mg/L	0.06	<0.06	1	20	104	90	110	107	75	125

QC SUMMARY

Biochemical Oxygen Demand

Method: SM 5210 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Biochemical Oxygen Demand (BOD5)	BOD0017-OCT21	mg/L	2	< 2	8	30	99	70	130	NV	70	130
Biochemical Oxygen Demand (BOD5)	BOD0020-OCT21	mg/L	2	< 2	16	30	102	70	130	124	70	130

Carbon by SFA

Method: SM 5310 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Dissolved Organic Carbon	SKA0122-OCT21	mg/L	1	<1	1	20	108	90	110	99	75	125

QC SUMMARY

Chemical Oxygen Demand

Method: HACH 8000 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chemical Oxygen Demand	EWL0334-OCT21	mg/L	8	<8	7	20	94	80	120	98	75	125
Chemical Oxygen Demand	EWL0364-OCT21	mg/L	8	<8	ND	20	102	80	120	73	75	125

Colour

Method: SM 2120 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Colour	EWL0288-OCT21	TCU	3	< 3	ND	10	100	80	120	NA		

Conductivity

Method: SM 2510 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Conductivity	EWL0282-OCT21	uS/cm	2	< 2	0	20	99	90	110	NA		

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-IENVISPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Silver (total)	EMS0067-OCT21	mg/L	0.00005	<0.00005	ND	20	101	90	110	106	70	130
Aluminum (0.2µm)	EMS0067-OCT21	mg/L	0.001	<1	ND	20	109	90	110	119	70	130
Arsenic (total)	EMS0067-OCT21	mg/L	0.0002	<0.0002	10	20	108	90	110	101	70	130
Barium (total)	EMS0067-OCT21	mg/L	0.00002	<0.00002	7	20	95	90	110	80	70	130
Beryllium (total)	EMS0067-OCT21	mg/L	0.000007	<0.00007	ND	20	97	90	110	98	70	130
Boron (total)	EMS0067-OCT21	mg/L	0.002	<0.002	6	20	103	90	110	95	70	130
Bismuth (total)	EMS0067-OCT21	mg/L	0.00001	<0.00001	8	20	95	90	110	91	70	130
Calcium (total)	EMS0067-OCT21	mg/L	0.01	<0.01	1	20	106	90	110	107	70	130
Cadmium (total)	EMS0067-OCT21	mg/L	0.000003	<0.000003	5	20	98	90	110	96	70	130
Cobalt (total)	EMS0067-OCT21	mg/L	0.000004	<0.000004	13	20	99	90	110	98	70	130
Chromium (total)	EMS0067-OCT21	mg/L	0.00008	<0.00008	ND	20	100	90	110	114	70	130
Copper (total)	EMS0067-OCT21	mg/L	0.0002	<0.0002	7	20	96	90	110	92	70	130
Iron (total)	EMS0067-OCT21	mg/L	0.007	<0.007	11	20	94	90	110	100	70	130
Potassium (total)	EMS0067-OCT21	mg/L	0.009	<0.009	0	20	96	90	110	92	70	130
Magnesium (total)	EMS0067-OCT21	mg/L	0.001	<0.001	5	20	94	90	110	97	70	130
Manganese (total)	EMS0067-OCT21	mg/L	0.00001	<0.00001	2	20	98	90	110	90	70	130
Molybdenum (total)	EMS0067-OCT21	mg/L	0.00004	<0.00004	4	20	101	90	110	103	70	130
Sodium (total)	EMS0067-OCT21	mg/L	0.01	<0.01	4	20	95	90	110	96	70	130
Nickel (total)	EMS0067-OCT21	mg/L	0.0001	<0.0001	14	20	96	90	110	109	70	130
Lead (total)	EMS0067-OCT21	mg/L	0.00009	<0.00001	ND	20	105	90	110	106	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS (continued)

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-003

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Phosphorus (total)	EMS0067-OCT21	mg/L	0.003	<0.003	8	20	91	90	110	NV	70	130
Antimony (total)	EMS0067-OCT21	mg/L	0.0009	<0.0009	ND	20	107	90	110	110	70	130
Selenium (total)	EMS0067-OCT21	mg/L	0.00004	<0.00004	5	20	101	90	110	87	70	130
Silicon (total)	EMS0067-OCT21	mg/L	0.02	<0.02	1	20	100	90	110	NV	70	130
Tin (total)	EMS0067-OCT21	mg/L	0.00006	<0.00006	ND	20	97	90	110	NV	70	130
Strontium (total)	EMS0067-OCT21	mg/L	0.00002	<0.00002	3	20	93	90	110	98	70	130
Titanium (total)	EMS0067-OCT21	mg/L	0.00005	<0.00005	2	20	95	90	110	NV	70	130
Uranium (total)	EMS0067-OCT21	mg/L	0.000002	<0.000002	4	20	93	90	110	95	70	130
Vanadium (total)	EMS0067-OCT21	mg/L	0.00001	<0.00001	3	20	100	90	110	97	70	130
Zinc (total)	EMS0067-OCT21	mg/L	0.002	<0.002	ND	20	96	90	110	101	70	130

pH

Method: SM 4500 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0282-OCT21	No unit	0.05	NA	0		100			NA		

QC SUMMARY

Phenols by SFA

Method: SM 5530B-D | Internal ref.: ME-CA-IENVISFA-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
4AAP-Phenolics	SKA0130-OCT21	mg/L	0.001	<0.001	ND	10	101	90	110	95	75	125

Reactive Phosphorus by SFA

Method: SM 4500-P F | Internal ref.: ME-CA-IENVISFA-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Phosphorus (total reactive)	SKA0127-OCT21	mg/L	0.03	<0.03	ND	10	104	90	110	84	75	125

Solids Analysis

Method: SM 2540C | Internal ref.: ME-CA-IENVIEWL-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Dissolved Solids	EWL0302-OCT21	mg/L	30	<30	0	20	102	90	110	NA		

QC SUMMARY

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Suspended Solids	EWL0277-OCT21	mg/L	2	< 2	3	10	99	90	110	NA		
Total Suspended Solids	EWL0279-OCT21	mg/L	2	< 2	4	10	109	90	110	NA		

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen (N)	SKA0114-OCT21	mg/L	0.05	<0.05	ND	10	107	90	110	109	75	125
Total Kjeldahl Nitrogen (N)	SKA0139-OCT21	mg/L	0.05	<0.05	ND	10	110	90	110	101	75	125

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates 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 Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS Insufficient sample for analysis.
RL Reporting Limit.
↑ Reporting limit raised.
↓ Reporting limit lowered.
NA The sample was not analysed for this analyte
ND Non Detect

Samples analysed as received. Solid samples expressed on a dry weight basis. "Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act" published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated. This document is issued, on the Client's behalf, by the Company under its General Conditions of Service available on request and accessible at http://www.sgs.com/terms_and_conditions.htm. The Client's attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any other holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents.

-- End of Analytical Report --

SGS

Request for Laboratory Services and CHAIN OF CUSTODY (General)

SGS Environmental Services - Lakefield: 185 Concession St., Lakefield, ON K0L 2H0 Phone: 705-652-2000 Toll Free: 877-747-7658 Fax: 705-652-6365 Web: www.ca.sgs.com {4}

SGS Environmental Services - London: 657 Consortium Court, London, ON, N6E 2S8 Phone: 519-672-4500 Toll Free: 877-848-8060 Fax: 519-672-0361 Web: www.ca.sgs.com {4}

Laboratory Information Section

Received Date (mm/dd/yyyy): OCT 08 2021	LAB LIMS #: Oct 15286
Received Time (After Hours Only): __ : __	Temperature Upon Receipt (°C): 6 X 3

Billing & Reporting Information

Invoice/Receipt to {3}:	
Company:	Pinchin
Attention:	Alana Valle
Address:	203-957 Cambrian Heights Drive Sudbury, Ontario P3C 5S5
Email:	avalle@pinchin.com

Quote #: 2021 254

Attached Parameter List: ☐ YES ☑ NO

Turnaround Time

Is *Rush Turnaround Time Required? ☐ YES ☑ NO

Specify:

* Rush TA Requests Require Lab Approval

Project Name/Number:	225335.003-Chapman Landfill SW	P.O. #:	

Client Information/Report To:

				Client Lab #:
Company Name:		Phone Number:	705.507.9479	
Contact Name:		Fax Number:		
Address:		E-mail:		
Copy to:				

Sample Information

	Sample Identifier	Date Sampled (mm/dd/yy)	Time Sampled	# of Bottles	Analysis Requested (please enter the analysis required below and check off which analysis applies to each sample)							
		✓			SW Package							
✓	SW1	10/7/21	9-11AM	9	X							
✓	SW2	↓	↓	9	X							
✓	SW3			9	X							
✓	SEEP			9	X							
✓	SW DUP			9	X							

Sampled By {1}:	(Name) Alana Valle	(Signature) AV	Date:	10/07/21	(mm/dd/yy)
Relinquished by {2}:	(Name) Alana Valle	(Signature) AV	Date:	10/07/21	(mm/dd/yy)

Note: {1} Submission of samples to SGS is acknowledgement that you have been provided direction on sample collection/handling and transportation of samples. {2} Submission of samples to SGS is considered authorization for completion of work. Signatures may appear on this form or be retained on file in the contract, or in an alternative format (e.g. shipping documents). {3} Results may be sent by email to an unlimited number of addresses for no additional cost. Fax is available upon request. {4} Completion of work may require the subcontracting of samples between the London and Lakefield laboratories.

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FINAL REPORT

CA15288-OCT21 R1

225335.003-Chapman Landfill GW

Prepared for

Pinchin Ltd

FINAL REPORT

First Page

CLIENT DETAILS

Client	Pinchin Ltd
Address	957 Cambrian Heights Drive, Suite 203 Sudbury, ON P3C 5S5. Canada
Contact	Alana Valle
Telephone	705-521-0560
Facsimile	
Email	avalle@Pinchin.com
Project	225335.003-Chapman Landfill GW
Order Number	
Samples	Ground Water (14)

LABORATORY DETAILS

Project Specialist	Brad Moore Hon. B.Sc
Laboratory	SGS Canada Inc.
Address	185 Concession St., Lakefield ON, K0L 2H0
Telephone	705-652-2143
Facsimile	705-652-6365
Email	brad.moore@sgs.com
SGS Reference	CA15288-OCT21
Received	10/08/2021
Approved	10/20/2021
Report Number	CA15288-OCT21 R1
Date Reported	03/24/2022

COMMENTS

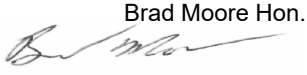
Temperature of Sample upon Receipt: 6 degrees C
Cooling Agent Present:Yes
Custody Seal Present:Yes

Chain of Custody Number:NA

COD spike low, results accepted based on all other QC

SIGNATORIES

Brad Moore Hon. B.Sc



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Client: Pinchin Ltd
Project: 225335.003-Chapman Landfill GW
Project Manager: Alana Valle
Samplers: Alana Valle

MATRIX: WATER

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

Parameter	Units	RL	L1	L2	Sample Number	7	8	9	10	11	12	13	14
					Sample Name	BH1	BH2	BH3-II	BH4	BH4-II	BH5-II	BH6-III	BH7-II
					Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
					Sample Date	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021
						Result	Result	Result	Result	Result	Result	Result	Result
BTEX													
Benzene	µg/L	0.5		1		---	---	---	---	< 0.5	---	---	---
Toluene	µg/L	0.5		60		---	---	---	---	< 0.5	---	---	---
General Chemistry													
Turbidity	NTU	0.10	5	1		0.79	10.4	443	15.0	14.8	14.5	3.36	105
Phosphorus (total reactive)	mg/L	0.03				< 0.03	< 0.03	0.23	< 0.03	< 0.03	< 0.03	< 0.03	0.04
Biochemical Oxygen Demand (BOD5)	mg/L	2				< 4 ↑	< 4 ↑	< 4 ↑	< 4 ↑	< 4 ↑	< 4 ↑	< 4 ↑	< 4 ↑
Total Suspended Solids	mg/L	2				17	117	2580	1160	9	612	228	921
Alkalinity	mg/L as CaCO3	2	500			108	332	13	191	229	114	115	3
Conductivity	uS/cm	2				286	717	42	468	590	366	379	14
Total Dissolved Solids	mg/L	30	500			146	411	110	285	351	206	246	31
Chemical Oxygen Demand	mg/L	8				10	13	10	< 8	36	8	13	< 8
Total Kjeldahl Nitrogen (N)	as N mg/L	0.05				0.35	0.41	0.13	0.51	0.61	0.28	0.60	0.11
Ammonia+Ammonium (N)	as N mg/L	0.04				0.96	0.06	0.04	0.06	0.14	0.16	0.47	< 0.04
Dissolved Organic Carbon	mg/L	1	5			6	11	9	3	15	14	5	4

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L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

					Sample Number	7	8	9	10	11	12	13	14
					Sample Name	BH1	BH2	BH3-II	BH4	BH4-II	BH5-II	BH6-III	BH7-II
					Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
					Sample Date	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021
Parameter		**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Metals and Inorganics													
Phosphorus (total)		mg/L	0.03			< 0.03	0.07	1.97	0.50	< 0.03	0.18	0.03	0.31
Sulphate		mg/L	2	500		5	72	15	49	67	56	57	8
Nitrite (as N)	as N	mg/L	0.03		1	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N	mg/L	0.06		10	4.42	0.40	0.22	5.24	5.27	3.62	3.31	0.22
Hardness (dissolved)	mg/L as CaCO3		0.05	100		104	318	5.56	222	260	158	159	5.73
Silver (dissolved)		mg/L	0.00005			< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Aluminum (dissolved)		mg/L	0.001			0.010	0.006	0.094	0.021	0.021	0.078	0.017	0.334
Arsenic (dissolved)		mg/L	0.0002		0.01	0.0004	0.0004	0.0016	0.0005	0.0007	0.0003	0.0002	0.0002
Barium (dissolved)		mg/L	0.00002		1	0.0662	0.163	0.00219	0.0958	0.0828	0.126	0.123	0.0121
Beryllium (dissolved)		mg/L	0.000007			0.000008	< 0.000007	0.000038	0.000010	0.000017	0.000015	0.000011	0.000084
Boron (dissolved)		mg/L	0.002		5	0.277	0.606	0.036	0.491	0.523	0.331	0.287	0.012
Bismuth (dissolved)		mg/L	0.00001			< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Calcium (dissolved)		mg/L	0.01			32.7	94.0	1.76	79.0	89.5	49.7	49.0	1.25
Cadmium (dissolved)		mg/L	0.000003		0.005	0.000036	0.000081	0.000007	0.000017	0.000039	0.000019	0.000048	0.000006
Cobalt (dissolved)		mg/L	0.000004			0.000707	0.00355	0.000149	0.000402	0.00182	0.000395	0.000876	0.000450
Chromium (dissolved)		mg/L	0.00008		0.05	0.00036	0.00047	0.00024	0.00062	0.00067	0.00047	0.00025	0.00063
Copper (dissolved)		mg/L	0.0002	1		0.0049	0.0026	0.0025	0.0052	0.0089	0.0033	0.0069	0.0026
Iron (dissolved)		mg/L	0.007	0.3		0.009	0.704	0.043	0.012	0.046	0.123	0.030	0.311
Potassium (dissolved)		mg/L	0.009			9.14	7.63	0.317	11.0	12.4	5.60	8.53	0.921
Magnesium (dissolved)		mg/L	0.001			5.53	20.3	0.285	6.02	8.82	8.36	8.89	0.631
Manganese (dissolved)		mg/L	0.00001	0.05		0.670	2.22	0.00928	0.00370	0.322	0.0981	0.541	0.00742
Sodium (dissolved)		mg/L	0.01	200	20	17.2	25.7	7.74	8.01	10.1	12.9	14.2	1.09

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MATRIX: WATER

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

					Sample Number	7	8	9	10	11	12	13	14
					Sample Name	BH1	BH2	BH3-II	BH4	BH4-II	BH5-II	BH6-III	BH7-II
					Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
					Sample Date	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Metals and Inorganics (continued)													
Lead (dissolved)	mg/L	0.00009		0.01	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	0.00024
Antimony (dissolved)	mg/L	0.0009		0.006	< 0.0009	< 0.0009	< 0.0009	< 0.0009	< 0.0009	< 0.0009	< 0.0009	< 0.0009
Selenium (dissolved)	mg/L	0.00004		0.05	0.00009	0.00012	< 0.00004	0.00019	0.00020	0.00008	0.00009	0.00005
Strontium (dissolved)	mg/L	0.00002			0.206	0.549	0.0180	0.265	0.311	0.255	0.436	0.0102
Zinc (dissolved)	mg/L	0.002	5		0.003	0.004	0.004	0.003	0.003	0.009	0.006	0.003
Molybdenum (dissolved)	mg/L	0.00004			0.00015	0.00074	0.00137	0.00046	0.00089	0.00023	0.00042	0.00007
Nickel (dissolved)	mg/L	0.0001			0.0008	0.0020	0.0002	0.0008	0.0023	0.0011	0.0036	0.0006
Thallium (dissolved)	mg/L	0.000005			0.000054	< 0.000005	< 0.000005	0.000013	0.000037	0.000013	0.000031	0.000013
Tin (dissolved)	mg/L	0.00006			< 0.00006	0.00008	< 0.00006	< 0.00006	0.00007	< 0.00006	< 0.00006	< 0.00006
Titanium (dissolved)	mg/L	0.00005			0.00011	0.00022	0.00165	0.00033	0.00036	0.00656	0.00116	0.0108
Tungsten (dissolved)	mg/L	0.00002			< 0.00002	0.00004	0.00014	0.00006	0.00070	0.00034	0.00171	< 0.00002
Uranium (dissolved)	mg/L	0.000002		0.02	0.000427	0.00371	0.000958	0.00139	0.00462	0.000255	0.000395	0.000249
Vanadium (dissolved)	mg/L	0.00001			0.00006	0.00027	0.00021	0.00034	0.00035	0.00036	0.00018	0.00089

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L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

					Sample Number	7	8	9	10	11	12	13	14
					Sample Name	BH1	BH2	BH3-II	BH4	BH4-II	BH5-II	BH6-III	BH7-II
					Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
					Sample Date	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Other (ORP)													
pH	No unit	0.05	8.5		6.74	6.81	6.16	6.82	6.93	6.56	7.09	5.91
Chloride	mg/L	1	250		12	22	4	3	5	17	16	1
Mercury (total)	mg/L	0.00001			---	---	---	---	< 0.00001	---	---	---
Phenols													
4AAP-Phenolics	mg/L	0.002			< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
VOCs													
1,4-Dichlorobenzene	µg/L	0.5			---	---	---	---	< 0.5	---	---	---
Dichloromethane	µg/L	0.5			---	---	---	---	< 0.5	---	---	---
Vinyl Chloride	µg/L	0.2			---	---	---	---	< 0.2	---	---	---

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L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

					Sample Number	15	16	17	18	19	20
					Sample Name	BH8-I	BH9-I	BH10-I	BH11-I	GW DUP 1	GW DUP 2
					Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
					Sample Date	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
General Chemistry											
Turbidity	NTU	0.10	5	1	20.9	138	5.91	12.4	5.58	14.8
Phosphorus (total reactive)	mg/L	0.03			< 0.03	0.03	< 0.03	0.04	< 0.03	0.03
Biochemical Oxygen Demand (BOD5)	mg/L	2			< 4↑	< 4↑	< 4↑	< 4↑	< 4↑	< 4↑
Total Suspended Solids	mg/L	2			873	325	166	1330	20	156
Alkalinity	mg/L as CaCO3	2	500		147	189	60	12	52	11
Conductivity	uS/cm	2			395	485	224	107	221	110
Total Dissolved Solids	mg/L	30	500		237	520	137	49	123	60
Chemical Oxygen Demand	mg/L	8			29	27	12	< 8	10	< 8
Total Kjeldahl Nitrogen (N)	as N mg/L	0.05			2.52	6.66	0.11	< 0.05	< 0.05	0.05
Ammonia+Ammonium (N)	as N mg/L	0.04			2.13	7.07	< 0.04	< 0.04	< 0.04	0.04
Dissolved Organic Carbon	mg/L	1	5		6	12	6	< 1	6	2

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L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

					Sample Number	15	16	17	18	19	20
					Sample Name	BH8-I	BH9-I	BH10-I	BH11-I	GW DUP 1	GW DUP 2
					Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
					Sample Date	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021
Parameter		**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Metals and Inorganics											
Phosphorus (total)		mg/L	0.03			0.70	0.26	0.14	0.47	0.13	0.46
Sulphate		mg/L	2	500		19	19	51	4	51	4
Nitrite (as N)	as N	mg/L	0.03		1	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N	mg/L	0.06		10	1.91	0.06	1.85	0.21	1.86	0.21
Hardness (dissolved)		mg/L as CaCO3	0.05	100		111	153	69.7	36.3	79.2	39.1
Silver (dissolved)		mg/L	0.00005			< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Aluminum (dissolved)		mg/L	0.001			0.024	0.025	0.059	0.013	0.076	0.011
Arsenic (dissolved)		mg/L	0.0002		0.01	0.0003	0.0005	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Barium (dissolved)		mg/L	0.00002		1	0.121	0.127	0.0820	0.0207	0.0803	0.0213
Beryllium (dissolved)		mg/L	0.000007			0.000011	0.000017	0.000010	0.000036	0.000011	0.000037
Boron (dissolved)		mg/L	0.002		5	0.297	0.309	0.284	0.026	0.251	0.024
Bismuth (dissolved)		mg/L	0.00001			< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Calcium (dissolved)		mg/L	0.01			35.6	48.6	18.9	11.6	21.5	12.3
Cadmium (dissolved)		mg/L	0.000003		0.005	0.000044	0.000024	0.000004	0.000018	0.000004	0.000015
Cobalt (dissolved)		mg/L	0.000004			0.000532	0.0213	0.000107	0.000063	0.000122	0.000053
Chromium (dissolved)		mg/L	0.00008		0.05	0.00041	0.00092	0.00045	0.00016	0.00050	0.00014
Copper (dissolved)		mg/L	0.0002	1		0.0032	0.0036	0.0044	0.0003	0.0031	0.0002
Iron (dissolved)		mg/L	0.007	0.3		0.031	10.1	0.019	0.017	0.023	0.008
Potassium (dissolved)		mg/L	0.009			9.16	11.5	4.32	1.51	4.74	1.54
Magnesium (dissolved)		mg/L	0.001			5.38	7.68	5.45	1.76	6.21	2.01
Manganese (dissolved)		mg/L	0.00001	0.05		0.957	5.43	0.00127	0.0205	0.00148	0.0175
Sodium (dissolved)		mg/L	0.01	200	20	18.5	25.0	7.30	4.71	8.16	4.86

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L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

					Sample Number	15	16	17	18	19	20
					Sample Name	BH8-I	BH9-I	BH10-I	BH11-I	GW DUP 1	GW DUP 2
					Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
					Sample Date	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Metals and Inorganics (continued)											
Lead (dissolved)	mg/L	0.00009		0.01	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009
Antimony (dissolved)	mg/L	0.0009		0.006	< 0.0009	< 0.0009	< 0.0009	< 0.0009	< 0.0009	< 0.0009
Selenium (dissolved)	mg/L	0.00004		0.05	0.00009	0.00012	0.00009	< 0.00004	0.00009	< 0.00004
Strontium (dissolved)	mg/L	0.00002			0.204	0.296	0.110	0.0938	0.125	0.0942
Zinc (dissolved)	mg/L	0.002	5		0.003	0.006	0.003	< 0.002	0.004	< 0.002
Molybdenum (dissolved)	mg/L	0.00004			0.00014	0.00059	0.00021	0.00006	0.00018	< 0.00004
Nickel (dissolved)	mg/L	0.0001			0.0006	0.0024	0.0006	0.0003	0.0006	0.0003
Thallium (dissolved)	mg/L	0.000005			0.000066	0.000072	0.000026	< 0.000005	0.000024	< 0.000005
Tin (dissolved)	mg/L	0.00006			0.00007	0.00006	0.00007	< 0.00006	0.00009	< 0.00006
Titanium (dissolved)	mg/L	0.00005			0.00077	0.00067	0.00049	0.00027	0.00063	0.00035
Tungsten (dissolved)	mg/L	0.00002			0.00004	0.00007	0.00151	< 0.00002	0.00141	0.00006
Uranium (dissolved)	mg/L	0.000002		0.02	0.000227	0.00112	0.000637	0.000049	0.000646	0.000044
Vanadium (dissolved)	mg/L	0.00001			0.00016	0.00087	0.00055	0.00005	0.00061	0.00006

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L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	15	16	17	18	19	20
				Sample Name	BH8-I	BH9-I	BH10-I	BH11-I	GW DUP 1	GW DUP 2
				Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
				Sample Date	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021	07/10/2021
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Other (ORP)										
pH	No unit	0.05	8.5		6.76	6.75	6.59	6.21	6.66	6.25
Chloride	mg/L	1	250		34	42	4	20	4	20
Phenols										
4AAP-Phenolics	mg/L	0.002			< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03 L1	ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03 L2
BH1					
Hardness (dissolved)	SM 3030/EPA 200.7	mg/L as CaCO3	104	100	
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	0.670	0.05	
Dissolved Organic Carbon	SM 5310	mg/L	6	5	
BH2					
Turbidity	SM 2130	NTU	10.4	5	1
Hardness (dissolved)	SM 3030/EPA 200.7	mg/L as CaCO3	318	100	
Iron (dissolved)	SM 3030/EPA 200.8	mg/L	0.704	0.3	
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	2.22	0.05	
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	25.7		20
Dissolved Organic Carbon	SM 5310	mg/L	11	5	
BH3-II					
Turbidity	SM 2130	NTU	443	5	1
Dissolved Organic Carbon	SM 5310	mg/L	9	5	
BH4					
Turbidity	SM 2130	NTU	15.0	5	1
Hardness (dissolved)	SM 3030/EPA 200.7	mg/L as CaCO3	222	100	
BH4-II					
Turbidity	SM 2130	NTU	14.8	5	1
Hardness (dissolved)	SM 3030/EPA 200.7	mg/L as CaCO3	260	100	
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	0.322	0.05	
Dissolved Organic Carbon	SM 5310	mg/L	15	5	
BH5-II					
Turbidity	SM 2130	NTU	14.5	5	1
Hardness (dissolved)	SM 3030/EPA 200.7	mg/L as CaCO3	158	100	
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	0.0981	0.05	
Dissolved Organic Carbon	SM 5310	mg/L	14	5	
BH6-III					
Turbidity	SM 2130	NTU	3.36		1
Hardness (dissolved)	SM 3030/EPA 200.7	mg/L as CaCO3	159	100	
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	0.541	0.05	
BH7-II					
Turbidity	SM 2130	NTU	105	5	1
Iron (dissolved)	SM 3030/EPA 200.8	mg/L	0.311	0.3	

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03 L1	ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03 L2
BH8-I					
Turbidity	SM 2130	NTU	20.9	5	1
Hardness (dissolved)	SM 3030/EPA 200.7	mg/L as CaCO3	111	100	
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	0.957	0.05	
Dissolved Organic Carbon	SM 5310	mg/L	6	5	
BH9-I					
Turbidity	SM 2130	NTU	138	5	1
Total Dissolved Solids	SM 2540C	mg/L	520	500	
Hardness (dissolved)	SM 3030/EPA 200.7	mg/L as CaCO3	153	100	
Iron (dissolved)	SM 3030/EPA 200.8	mg/L	10.1	0.3	
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	5.43	0.05	
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	25.0		20
Dissolved Organic Carbon	SM 5310	mg/L	12	5	
BH10-I					
Turbidity	SM 2130	NTU	5.91	5	1
Dissolved Organic Carbon	SM 5310	mg/L	6	5	
BH11-I					
Turbidity	SM 2130	NTU	12.4	5	1
GW DUP 1					
Turbidity	SM 2130	NTU	5.58	5	1
Dissolved Organic Carbon	SM 5310	mg/L	6	5	
GW DUP 2					
Turbidity	SM 2130	NTU	14.8	5	1

QC SUMMARY

Alkalinity

Method: SM 2320 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Alkalinity	EWL0282-OCT21	mg/L as CaCO3	2	< 2	1	20	91	80	120	NA		

Ammonia by SFA

Method: SM 4500 I Internal ref.: ME-CA-[ENV]SFA-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Ammonia+Ammonium (N)	SKA0109-OCT21	mg/L	0.04	<0.04	2	10	105	90	110	98	75	125

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 325.2 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-026

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chloride	DIO5038-OCT21	mg/L	1	<1	1	20	104	80	120	87	75	125
Sulphate	DIO5038-OCT21	mg/L	2	<2	0	20	99	80	120	99	75	125
Chloride	DIO5039-OCT21	mg/L	1	<1	ND	20	101	80	120	109	75	125
Sulphate	DIO5039-OCT21	mg/L	2	<2	7	20	99	80	120	93	75	125

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENV]IC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nitrite (as N)	DIO0196-OCT21	mg/L	0.03	<0.03	ND	20	96	90	110	100	75	125
Nitrate (as N)	DIO0196-OCT21	mg/L	0.06	<0.06	1	20	104	90	110	107	75	125
Nitrite (as N)	DIO0198-OCT21	mg/L	0.03	<0.03	ND	20	97	90	110	90	75	125
Nitrate (as N)	DIO0198-OCT21	mg/L	0.06	<0.06	0	20	103	90	110	108	75	125

QC SUMMARY

Biochemical Oxygen Demand

Method: SM 5210 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Biochemical Oxygen Demand (BOD5)	BOD0014-OCT21	mg/L	2	< 2	1	30	115	70	130	122	70	130

Carbon by SFA

Method: SM 5310 I Internal ref.: ME-CA-[ENV]SFA-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Dissolved Organic Carbon	SKA0122-OCT21	mg/L	1	<1	1	20	108	90	110	99	75	125
Dissolved Organic Carbon	SKA0135-OCT21	mg/L	1	<1	ND	20	105	90	110	106	75	125

QC SUMMARY

Chemical Oxygen Demand

Method: HACH 8000 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chemical Oxygen Demand	EWL0334-OCT21	mg/L	8	<8	7	20	94	80	120	98	75	125
Chemical Oxygen Demand	EWL0364-OCT21	mg/L	8	<8	ND	20	102	80	120	73	75	125
Chemical Oxygen Demand	EWL0365-OCT21	mg/L	8	<8	8	20	96	80	120	101	75	125

Conductivity

Method: SM 2510 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Conductivity	EWL0282-OCT21	uS/cm	2	< 2	0	20	99	90	110	NA		

QC SUMMARY

Mercury by CVAAS

Method: EPA 7471A/SM 3112B | Internal ref.: ME-CA-[ENVISPE-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Mercury (total)	EHG0012-OCT21	mg/L	0.00001	< 0.00001	ND	20	105	80	120	110	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-IENVISPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Silver (dissolved)	EMS0075-OCT21	mg/L	0.00005	<0.00005	ND	20	97	90	110	95	70	130
Aluminum (dissolved)	EMS0075-OCT21	mg/L	0.001	<0.001	4	20	91	90	110	128	70	130
Arsenic (dissolved)	EMS0075-OCT21	mg/L	0.0002	<0.0002	10	20	101	90	110	101	70	130
Barium (dissolved)	EMS0075-OCT21	mg/L	0.00002	<0.00002	7	20	92	90	110	92	70	130
Beryllium (dissolved)	EMS0075-OCT21	mg/L	0.000007	<0.00007	7	20	100	90	110	104	70	130
Boron (dissolved)	EMS0075-OCT21	mg/L	0.002	<0.002	5	20	100	90	110	103	70	130
Bismuth (dissolved)	EMS0075-OCT21	mg/L	0.00001	<0.00001	ND	20	105	90	110	111	70	130
Calcium (dissolved)	EMS0075-OCT21	mg/L	0.01	<0.01	5	20	99	90	110	102	70	130
Cadmium (dissolved)	EMS0075-OCT21	mg/L	0.000003	<0.000003	6	20	98	90	110	119	70	130
Cobalt (dissolved)	EMS0075-OCT21	mg/L	0.000004	<0.000004	5	20	97	90	110	104	70	130
Chromium (dissolved)	EMS0075-OCT21	mg/L	0.00008	<0.00008	14	20	95	90	110	109	70	130
Copper (dissolved)	EMS0075-OCT21	mg/L	0.0002	<0.0002	4	20	95	90	110	106	70	130
Iron (dissolved)	EMS0075-OCT21	mg/L	0.007	<0.007	3	20	99	90	110	NV	70	130
Potassium (dissolved)	EMS0075-OCT21	mg/L	0.009	<0.009	5	20	103	90	110	105	70	130
Magnesium (dissolved)	EMS0075-OCT21	mg/L	0.001	<0.001	2	20	99	90	110	99	70	130
Manganese (dissolved)	EMS0075-OCT21	mg/L	0.00001	<0.00001	5	20	98	90	110	108	70	130
Molybdenum (dissolved)	EMS0075-OCT21	mg/L	0.00004	<0.00004	2	20	97	90	110	97	70	130
Sodium (dissolved)	EMS0075-OCT21	mg/L	0.01	<0.01	4	20	95	90	110	100	70	130
Nickel (dissolved)	EMS0075-OCT21	mg/L	0.0001	<0.0001	5	20	94	90	110	97	70	130
Lead (dissolved)	EMS0075-OCT21	mg/L	0.00009	<0.00001	5	20	97	90	110	98	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS (continued)

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-IENVISPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Antimony (dissolved)	EMS0075-OCT21	mg/L	0.0009	<0.0009	ND	20	103	90	110	95	70	130
Selenium (dissolved)	EMS0075-OCT21	mg/L	0.00004	<0.00004	14	20	97	90	110	121	70	130
Tin (dissolved)	EMS0075-OCT21	mg/L	0.00006	<0.00006	ND	20	93	90	110	NV	70	130
Strontium (dissolved)	EMS0075-OCT21	mg/L	0.00002	<0.00002	6	20	96	90	110	96	70	130
Titanium (dissolved)	EMS0075-OCT21	mg/L	0.00005	<0.00005	17	20	95	90	110	NV	70	130
Thallium (dissolved)	EMS0075-OCT21	mg/L	0.000005	<0.000005	ND	20	93	90	110	102	70	130
Uranium (dissolved)	EMS0075-OCT21	mg/L	0.000002	<0.000002	2	20	94	90	110	103	70	130
Vanadium (dissolved)	EMS0075-OCT21	mg/L	0.00001	<0.00001	10	20	97	90	110	104	70	130
Tungsten (dissolved)	EMS0075-OCT21	mg/L	0.00002	<0.00002	15	20	98	90	110	NV	70	130
Zinc (dissolved)	EMS0075-OCT21	mg/L	0.002	<0.002	2	20	91	90	110	107	70	130

pH

Method: SM 4500 | Internal ref.: ME-CA-IENVIEWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0282-OCT21	No unit	0.05	NA	0		100			NA		

QC SUMMARY

Phenols by SFA

Method: SM 5530B-D | Internal ref.: ME-CA-[ENVISFA-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
4AAP-Phenolics	SKA0130-OCT21	mg/L	0.002	<0.002	ND	10	101	80	120	95	75	125

Phosphorus by SFA

Method: SM 4500-P J | Internal ref.: ME-CA-[ENVISFA-LAK-AN-003

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Phosphorus (total)	SKA0123-OCT21	mg/L	0.03	<0.03	5	10	105	90	110	89	75	125
Phosphorus (total)	SKA0143-OCT21	mg/L	0.03	<0.03	2	10	97	90	110	96	75	125

Reactive Phosphorus by SFA

Method: SM 4500-P F | Internal ref.: ME-CA-[ENVISFA-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Phosphorus (total reactive)	SKA0115-OCT21	mg/L	0.03	<0.03	5	10	100	90	110	102	75	125

QC SUMMARY

Solids Analysis

Method: SM 2540C | Internal ref.: ME-CA-IENVIEWL-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Dissolved Solids	EWL0299-OCT21	mg/L	30	<30	3	20	103	90	110	NA		
Total Dissolved Solids	EWL0302-OCT21	mg/L	30	<30	0	20	102	90	110	NA		
Total Dissolved Solids	EWL0370-OCT21	mg/L	30	<30	NV	20	97	90	110	NA		

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-IENVIEWL-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Suspended Solids	EWL0253-OCT21	mg/L	2	< 2	0	10	99	90	110	NA		
Total Suspended Solids	EWL0256-OCT21	mg/L	2	< 2	2	10	101	90	110	NA		
Total Suspended Solids	EWL0277-OCT21	mg/L	2	< 2	3	10	99	90	110	NA		
Total Suspended Solids	EWL0279-OCT21	mg/L	2	< 2	4	10	109	90	110	NA		
Total Suspended Solids	EWL0287-OCT21	mg/L	2	< 2	2	10	101	90	110	NA		

QC SUMMARY

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen (N)	SKA0114-OCT21	mg/L	0.05	<0.05	ND	10	107	90	110	109	75	125
Total Kjeldahl Nitrogen (N)	SKA0139-OCT21	mg/L	0.05	<0.05	ND	10	110	90	110	101	75	125

Turbidity

Method: SM 2130 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-003

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Turbidity	EWL0193-OCT21	NTU	0.10	< 0.10	3	10	99	90	110	NA		

QC SUMMARY

Volatile Organics

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENVIGC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
1,4-Dichlorobenzene	GCM0184-OCT21	µg/L	0.5	<0.5	ND	30	99	60	130	97	50	140
Benzene	GCM0184-OCT21	µg/L	0.5	<0.5	ND	30	103	60	130	100	50	140
Dichloromethane	GCM0184-OCT21	µg/L	0.5	<0.5	ND	30	104	60	130	103	50	140
Toluene	GCM0184-OCT21	µg/L	0.5	<0.5	ND	30	101	60	130	100	50	140
Vinyl Chloride	GCM0184-OCT21	µg/L	0.2	<0.2	ND	30	116	50	140	111	50	140

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.
Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.
LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.
Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.
Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.
RL: Reporting limit
RPD: Relative percent difference
AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.
Duplicate Qualifier: for duplicates 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 Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

QC SUMMARY

LEGEND

FOOTNOTES

NSS	Insufficient sample for analysis.
RL	Reporting Limit.
↑	Reporting limit raised.
↓	Reporting limit lowered.
NA	The sample was not analysed for this analyte
ND	Non Detect

Data reported represent the sample as submitted to SGS. Solid samples expressed on a dry weight basis.
"Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.
Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the "Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act and Excess Soil Quality" published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated.

SGS Canada Inc. statement of conformity decision rule does not consider uncertainty when analytical results are compared to a specified standard or regulation.

This report supersedes all previous versions.

-- End of Analytical Report --

SGS

Request for Laboratory Services and CHAIN OF CUSTODY (General)

SGS Environmental Services - Lakefield: 185 Concession St., Lakefield, ON K0L 2H0 Phone: 705-652-2000 Toll Free: 877-747-7658 Fax: 705-652-6365 Web: www.ca.sgs.com {4}

SGS Environmental Services - London: 657 Consortium Court, London, ON, N6E 2S8 Phone: 519-672-4500 Toll Free: 877-848-8060 Fax: 519-672-0361 Web: www.ca.sgs.com {4}

Laboratory Information Section

Received Date (mm/dd/yyyy): OCT 08 2021	LAB LIMS #: Oct 15288
Received Time (After Hours Only): __:__	Temperature Upon Receipt (°C): 6 x 3

Billing & Reporting Information

Invoice/Receipt to {3}:

Company:	Pinchin
Attention:	Alana Valle
Address:	203-957 Cambrian Heights Drive Sudbury, Ontario P3C 5S5
Email:	avalle@pinchin.com

Quote #: 2021 254

Attached Parameter List: ☐ YES ☑ NO

Turnaround Time

Is *Rush Turnaround Time Required? ☐ YES ☑ NO

Specify:

* Rush TA Requests Require Lab Approval

Project Name/Number:	225335.003-Chapman Landfill GW	P.O. #:	

Client Information/Report To:

Client Lab #:

Company Name:		Phone Number:	705.507.9479
Contact Name:		Fax Number:	
Address:		E-mail:	
Copy to:			

Sample Information

Sample Identifier	Date Sampled (mm/dd/yy)	Time Sampled	# of Bottles	Analysis Requested: GW Package	Mercury and VOC's						
✓ BH1	10/7/21	9-11AM	9	X							
✓ BH2	↓	↓	9	X							
✓ BH3-II			9	X							
✓ BH4			9	X							
✓ BH4-II			12	X	X						
✓ BH5-II	↓	↓	9	X							
~~BH6-II~~				~~X~~							
✓ BH6-III	10/7/21	9-11AM	9	X							
✓ BH7-II	↓	↓	9	X							
✓ BH8-I			9	X							
✓ BH9-I			9	X							
✓ BH10-I			9	X							
✓ BH11-I			9	X							
✓ GW DUP 1			9	X							
✓ GW DUP 2	↓	↓	9	X							

Sampled By {1}:	(Name) Alana Valle	(Signature) AV	Date:	10/07/21	(mm/dd/yy)
Relinquished by {2}:	(Name) Alana Valle	(Signature) AV	Date:	10/07/21	(mm/dd/yy)

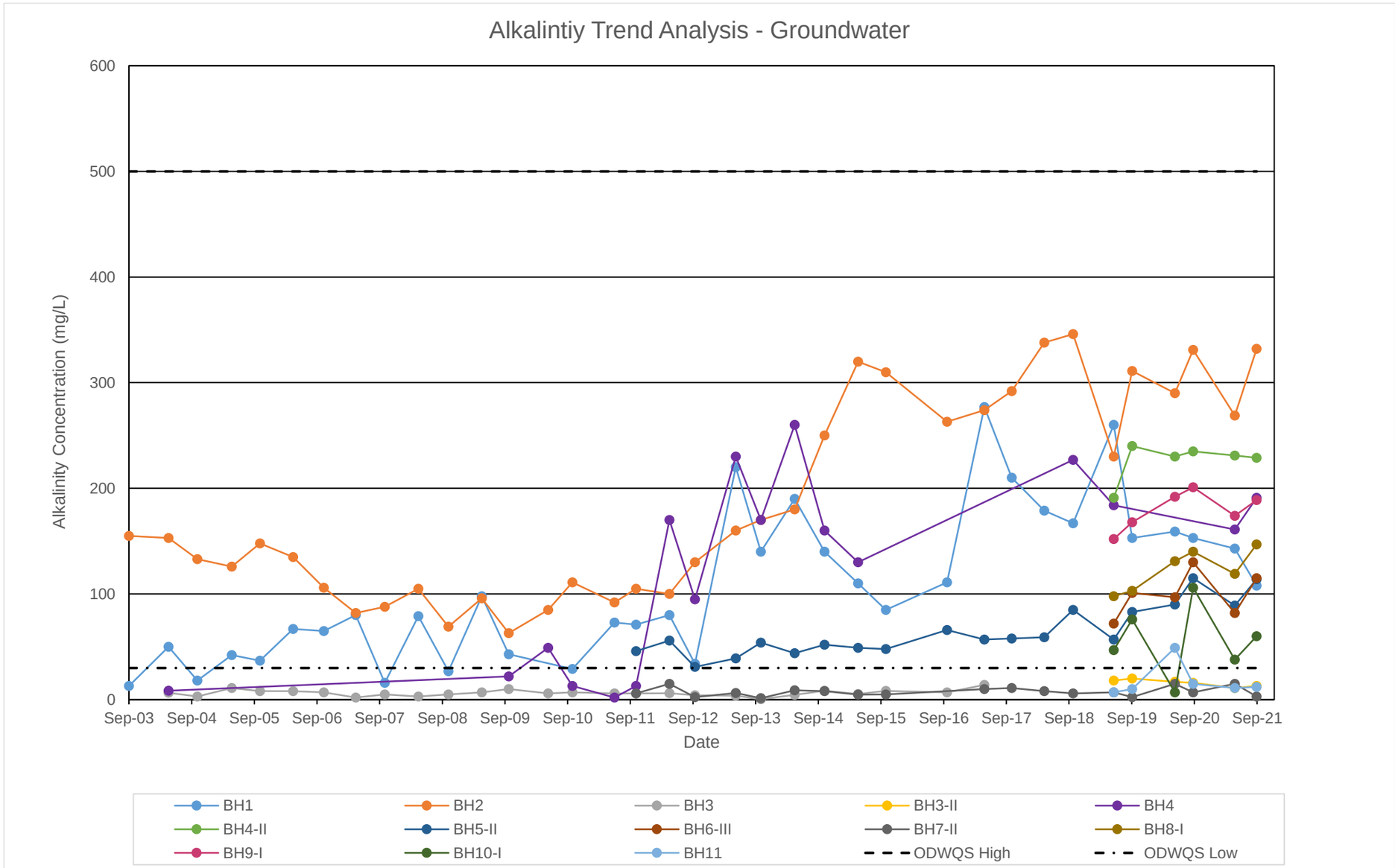
Note: {1} Submission of samples to SGS is acknowledgement that you have been provided direction on sample collection/handling and transportation of samples. {2} Submission of samples to SGS is considered authorization for completion of work. Signatures may appear on this form or be retained on file in the contract, or in an alternative format (e.g. shipping documents). {3} Results may be sent by email to an unlimited number of addresses for no additional cost. Fax is available upon request. {4} Completion of work may require the subcontracting of samples between the London and Lakefield laboratories.

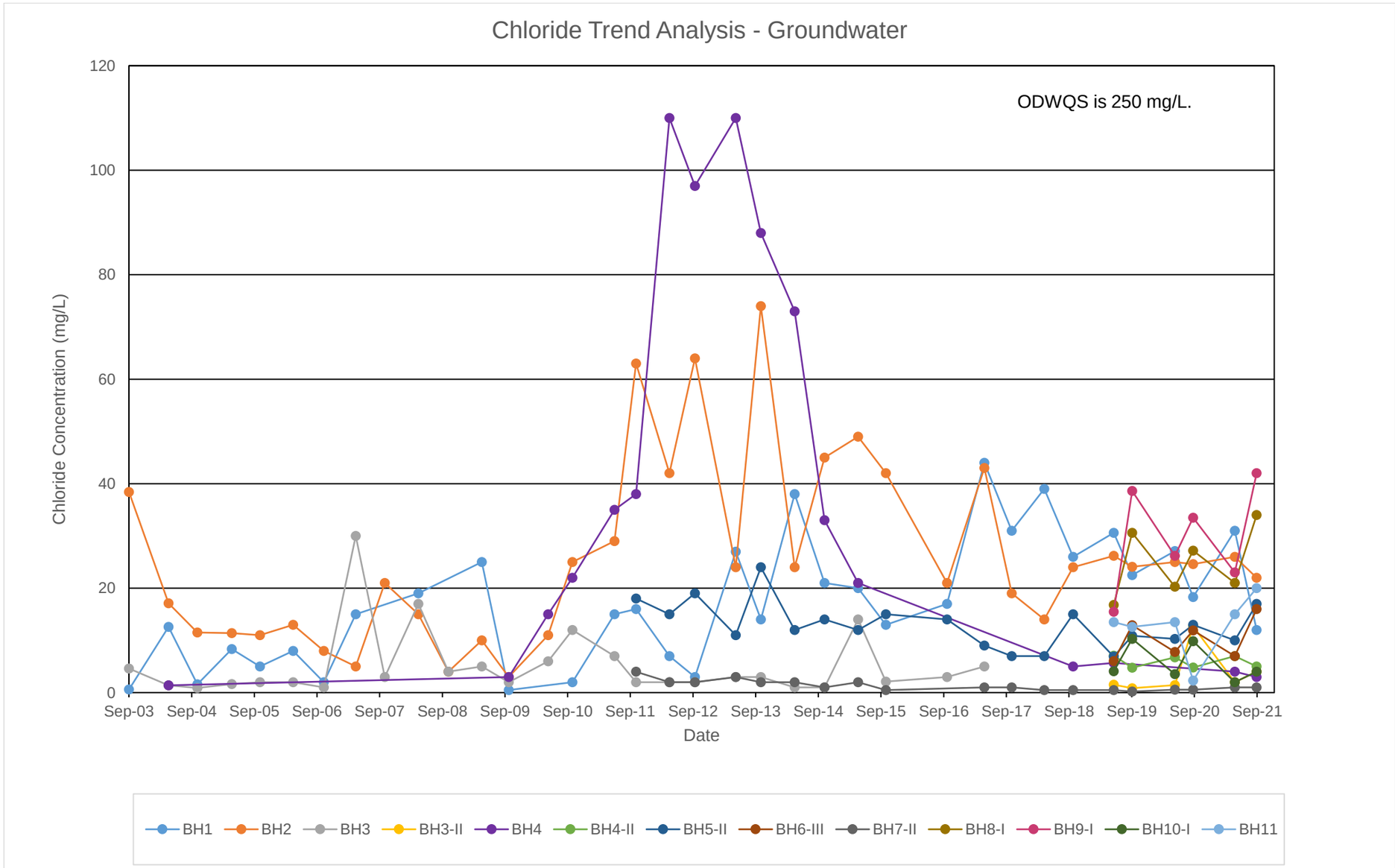
333165130696
333165130704

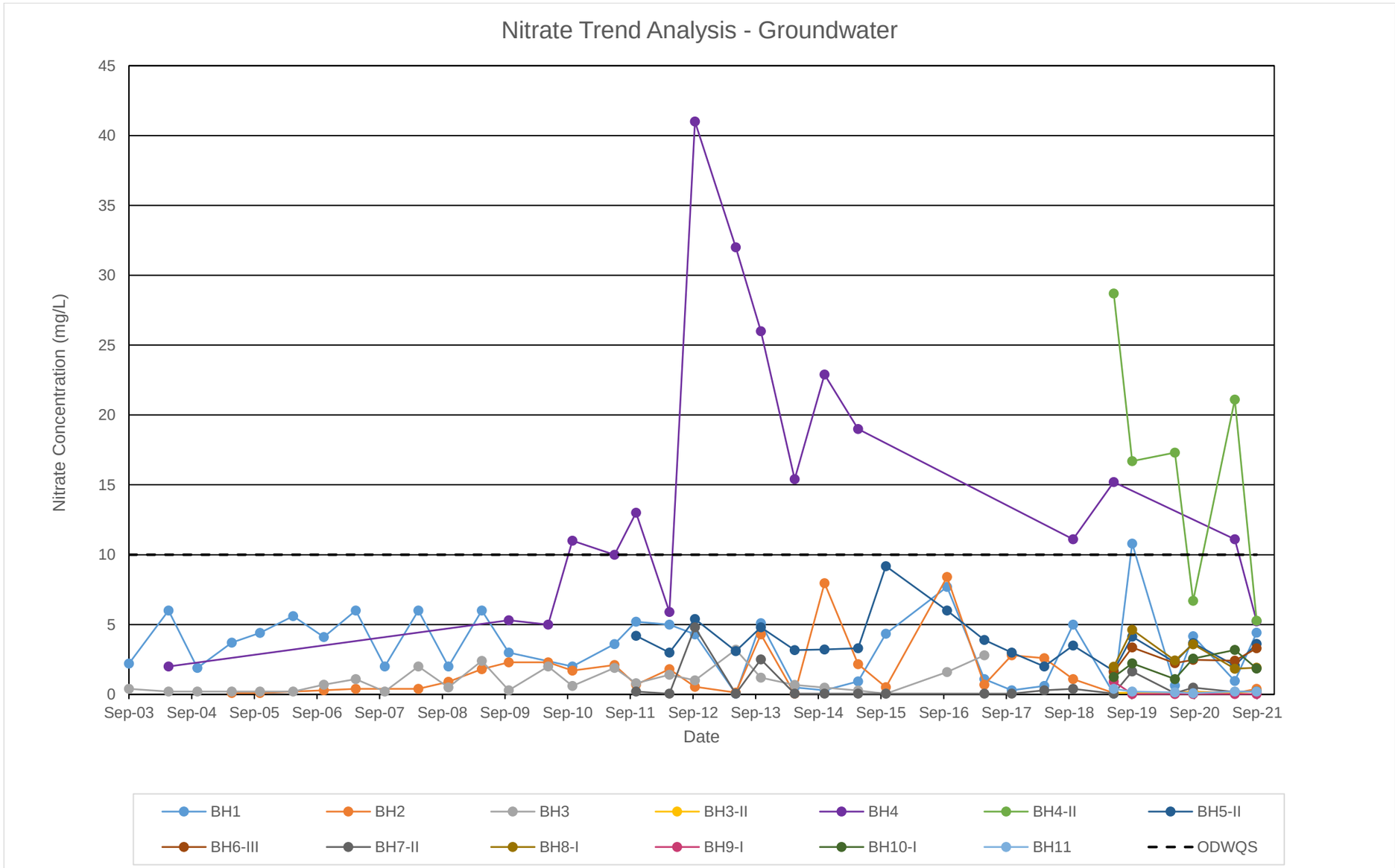
333165130670
333165130712
333165130746
11.00

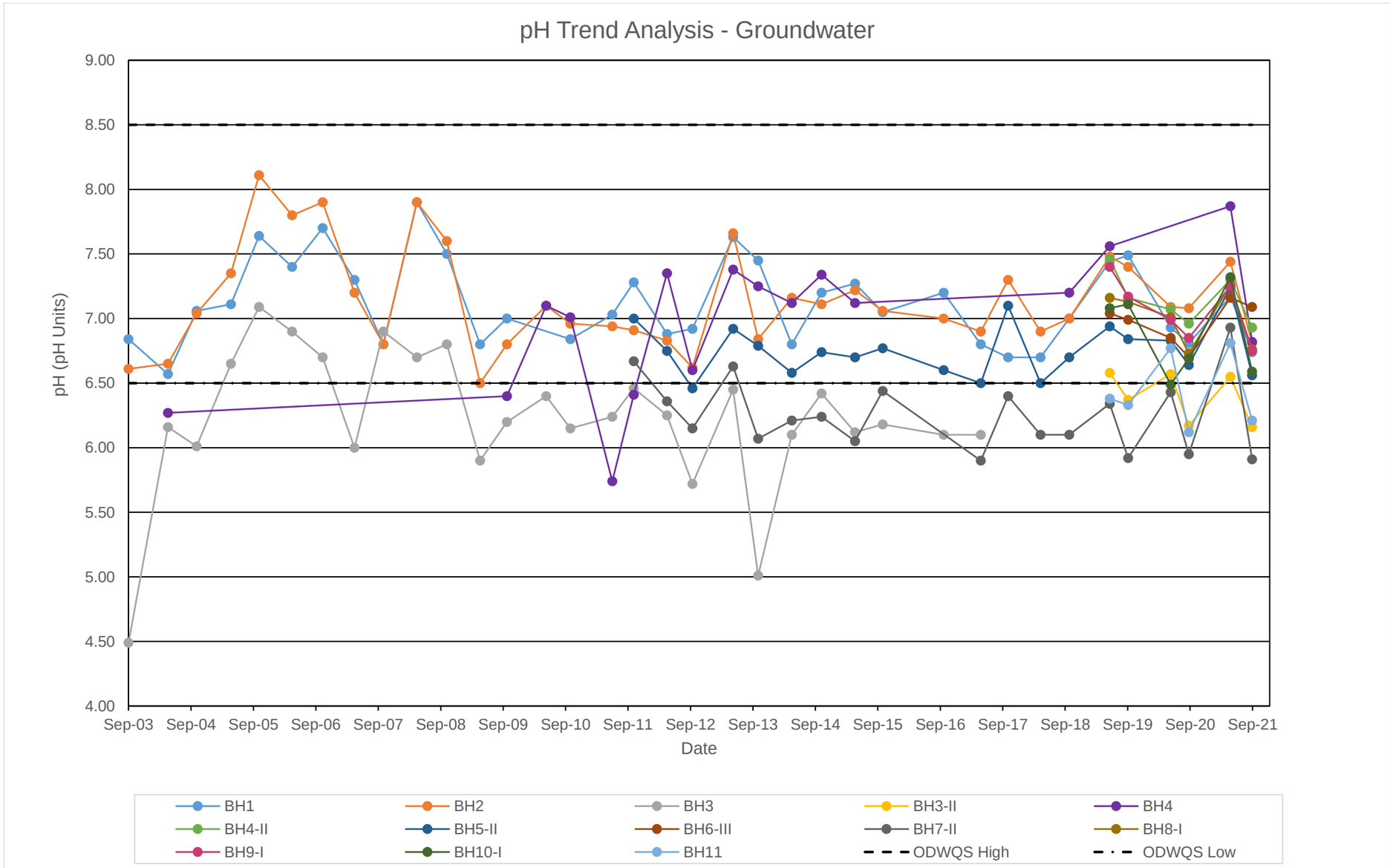
APPENDIX VII

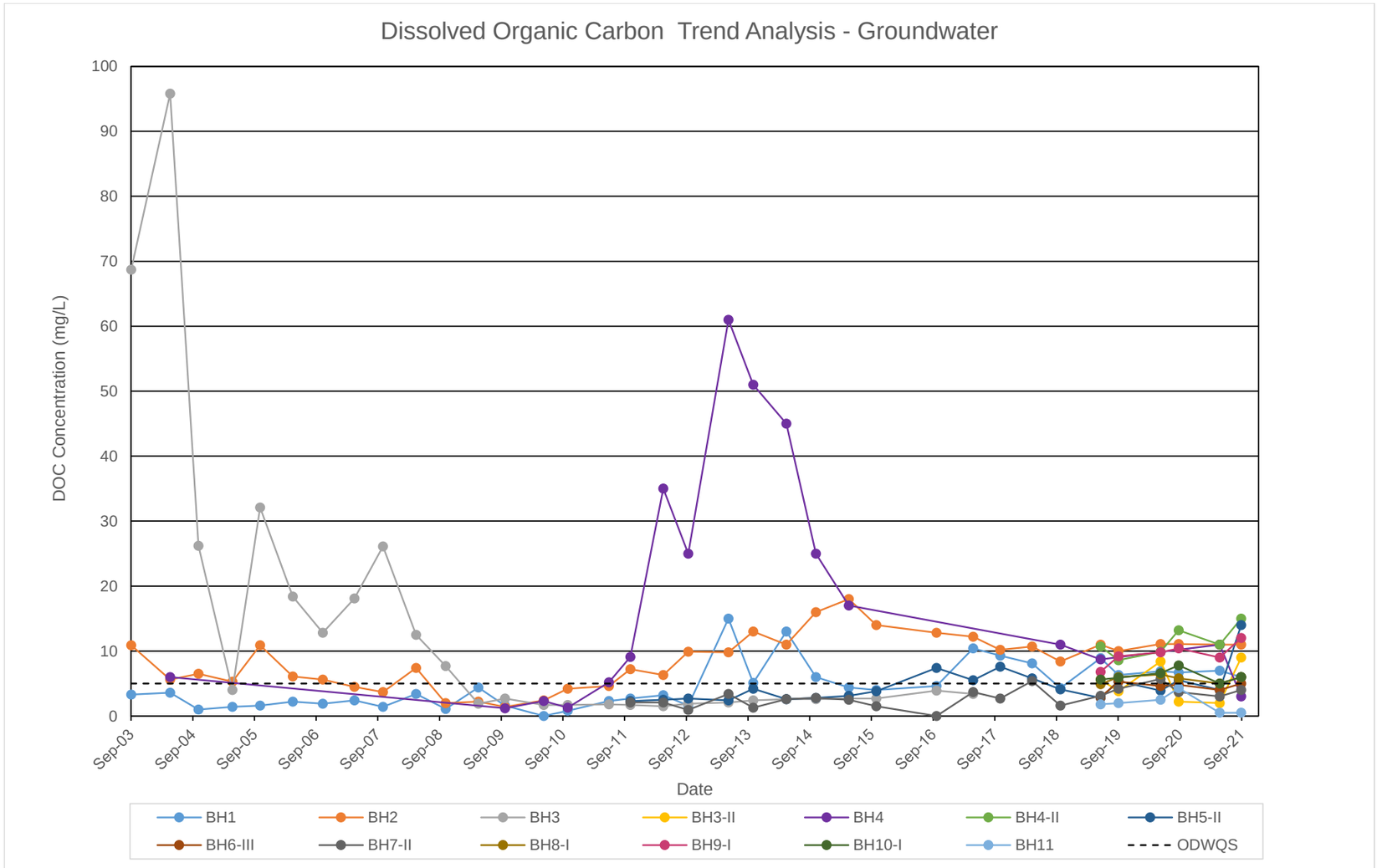
Groundwater Trend Analysis


Alkalintiy Trend Analysis - Groundwater
Alkalinity Concentration (mg/L)
600
500
400
300
200
100
0
Sep-03
Sep-04
Sep-05
Sep-06
Sep-07
Sep-08
Sep-09
Sep-10
Sep-11
Sep-12
Sep-13
Sep-14
Sep-15
Sep-16
Sep-17
Sep-18
Sep-19
Sep-20
Sep-21
Date
BH1
BH2
BH3
BH3-II
BH4
BH4-II
BH5-II
BH6-III
BH7-II
BH8-I
BH9-I
BH10-I
BH11
ODWQS High
ODWQS Low


Chloride Trend Analysis - Groundwater
ODWQS is 250 mg/L.
Chloride Concentration (mg/L)
120
100
80
60
40
20
0
Sep-03
Sep-04
Sep-05
Sep-06
Sep-07
Sep-08
Sep-09
Sep-10
Sep-11
Sep-12
Sep-13
Sep-14
Sep-15
Sep-16
Sep-17
Sep-18
Sep-19
Sep-20
Sep-21
Date
BH1
BH2
BH3
BH3-II
BH4
BH4-II
BH5-II
BH6-III
BH7-II
BH8-I
BH9-I
BH10-I
BH11

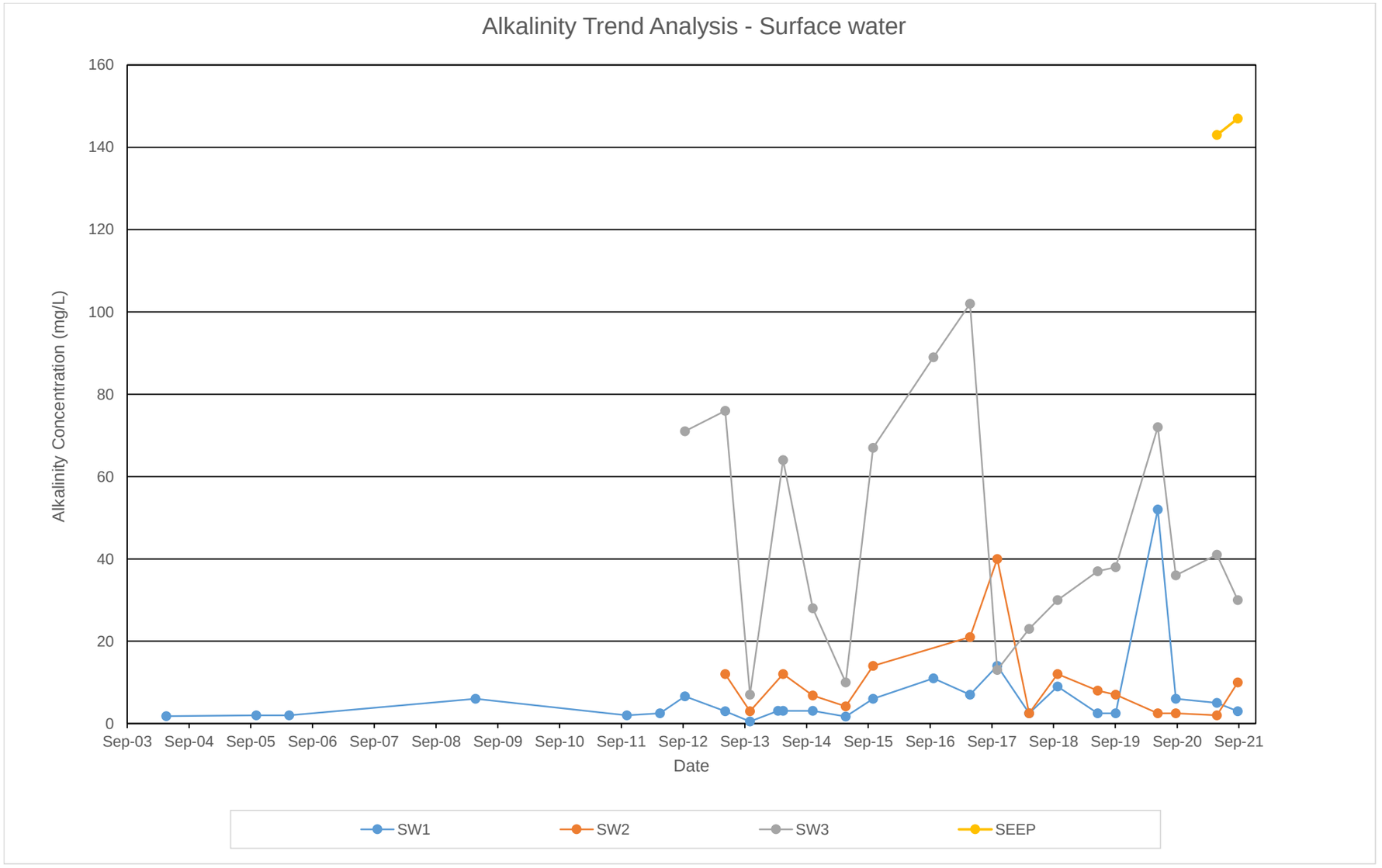

Nitrate Trend Analysis - Groundwater
Nitrate Concentration (mg/L)
45
40
35
30
25
20
15
10
5
0
Sep-03
Sep-04
Sep-05
Sep-06
Sep-07
Sep-08
Sep-09
Sep-10
Sep-11
Sep-12
Sep-13
Sep-14
Sep-15
Sep-16
Sep-17
Sep-18
Sep-19
Sep-20
Sep-21
Date
BH1
BH2
BH3
BH3-II
BH4
BH4-II
BH5-II
BH6-III
BH7-II
BH8-I
BH9-I
BH10-I
BH11
ODWQS

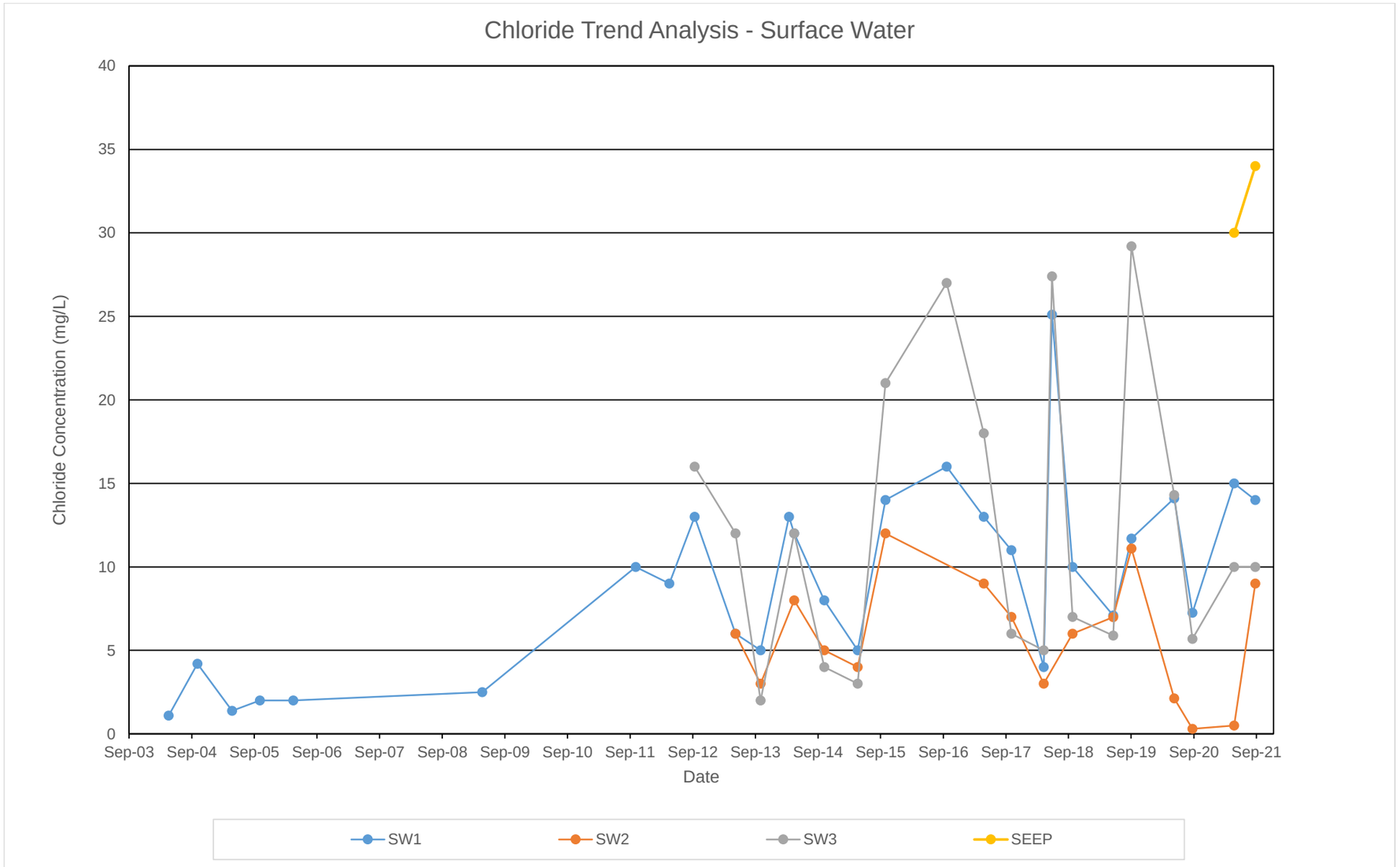

pH Trend Analysis - Groundwater
pH (pH Units)
9.00
8.50
8.00
7.50
7.00
6.50
6.00
5.50
5.00
4.50
4.00
Sep-03
Sep-04
Sep-05
Sep-06
Sep-07
Sep-08
Sep-09
Sep-10
Sep-11
Sep-12
Sep-13
Sep-14
Sep-15
Sep-16
Sep-17
Sep-18
Sep-19
Sep-20
Sep-21
Date
BH1
BH2
BH3
BH3-II
BH4
BH4-II
BH5-II
BH6-III
BH7-II
BH8-I
BH9-I
BH10-I
BH11
ODWQS High
ODWQS Low

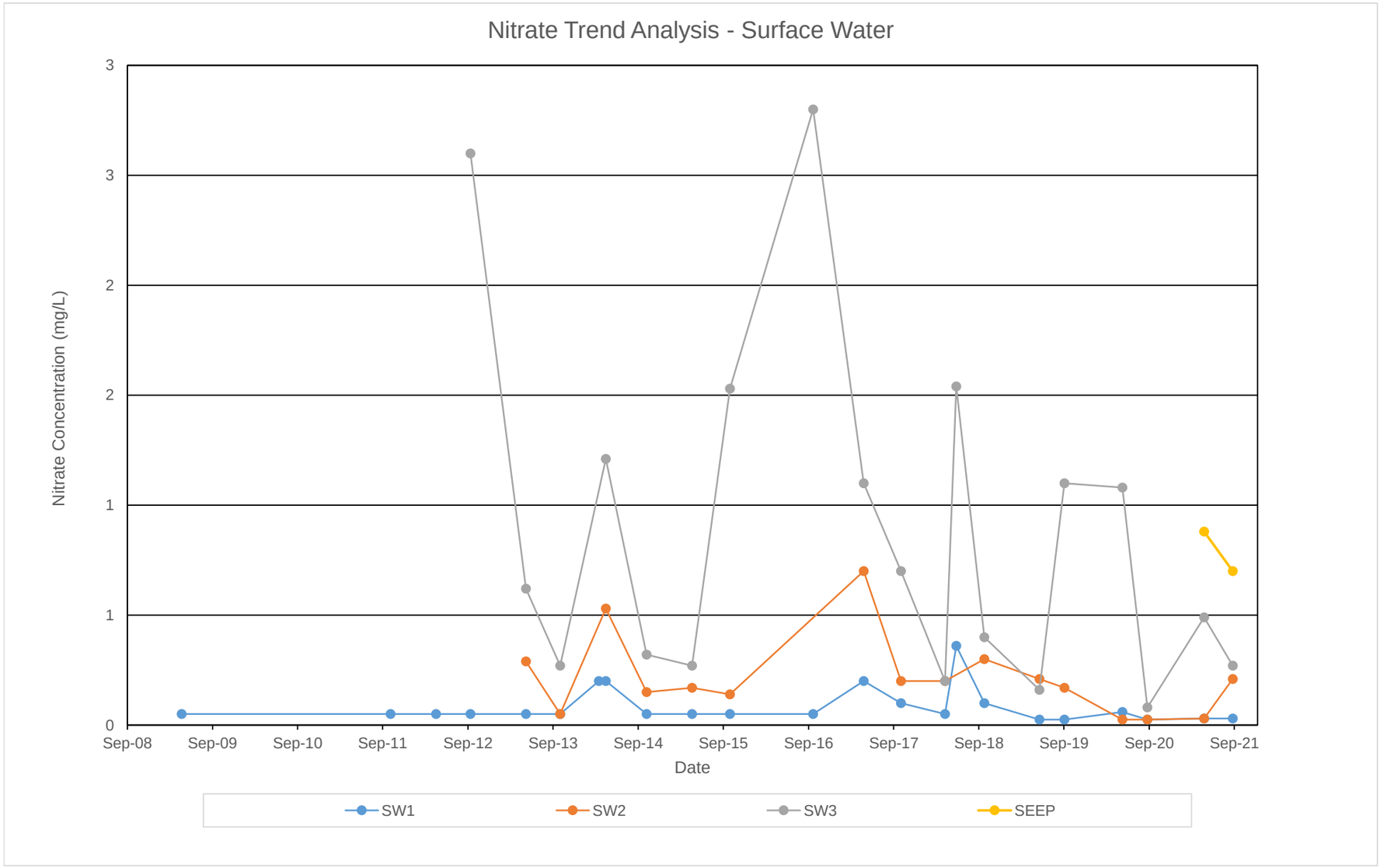

Dissolved Organic Carbon Trend Analysis - Groundwater
DOC Concentration (mg/L)
100
90
80
70
60
50
40
30
20
10
0
Sep-03
Sep-04
Sep-05
Sep-06
Sep-07
Sep-08
Sep-09
Sep-10
Sep-11
Sep-12
Sep-13
Sep-14
Sep-15
Sep-16
Sep-17
Sep-18
Sep-19
Sep-20
Sep-21
Date
BH1
BH2
BH3
BH3-II
BH4
BH4-II
BH5-II
BH6-III
BH7-II
BH8-I
BH9-I
BH10-I
BH11
ODWQS

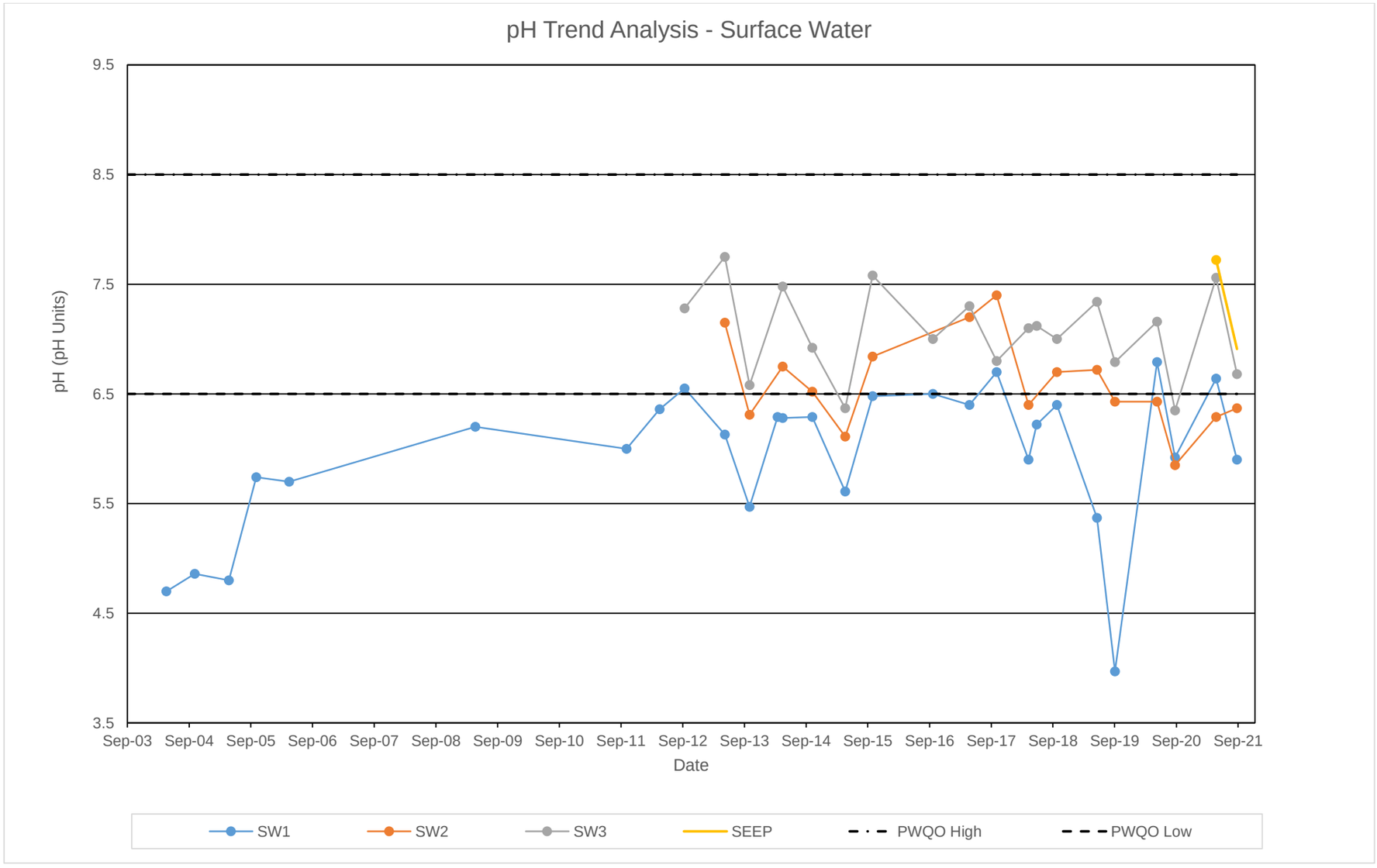
APPENDIX VIII

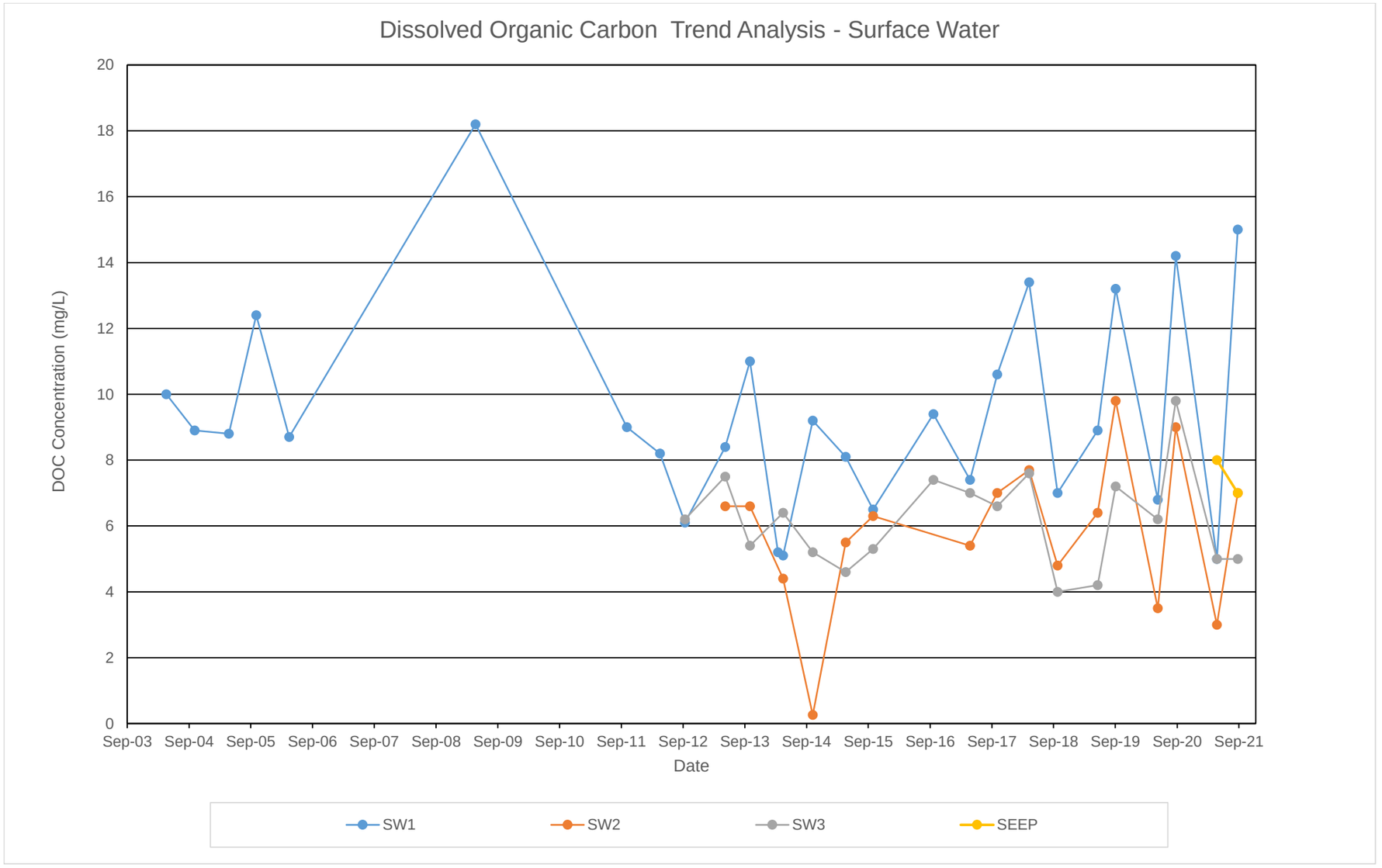
Surface Water Trend Analysis


Alkalinity Trend Analysis - Surface water
Alkalinity Concentration (mg/L)
160
140
120
100
80
60
40
20
0
Sep-03
Sep-04
Sep-05
Sep-06
Sep-07
Sep-08
Sep-09
Sep-10
Sep-11
Sep-12
Sep-13
Sep-14
Sep-15
Sep-16
Sep-17
Sep-18
Sep-19
Sep-20
Sep-21
Date
SW1
SW2
SW3
SEEP


Chloride Trend Analysis - Surface Water
Chloride Concentration (mg/L)
40
35
30
25
20
15
10
5
0
Sep-03
Sep-04
Sep-05
Sep-06
Sep-07
Sep-08
Sep-09
Sep-10
Sep-11
Sep-12
Sep-13
Sep-14
Sep-15
Sep-16
Sep-17
Sep-18
Sep-19
Sep-20
Sep-21
Date
SW1
SW2
SW3
SEEP


Nitrate Trend Analysis - Surface Water
Nitrate Concentration (mg/L)
3
3
2
2
1
1
0
Sep-08
Sep-09
Sep-10
Sep-11
Sep-12
Sep-13
Sep-14
Sep-15
Sep-16
Sep-17
Sep-18
Sep-19
Sep-20
Sep-21
Date
SW1
SW2
SW3
SEEP


pH Trend Analysis - Surface Water
pH (pH Units)
9.5
8.5
7.5
6.5
5.5
4.5
3.5
Sep-03
Sep-04
Sep-05
Sep-06
Sep-07
Sep-08
Sep-09
Sep-10
Sep-11
Sep-12
Sep-13
Sep-14
Sep-15
Sep-16
Sep-17
Sep-18
Sep-19
Sep-20
Sep-21
Date
SW1
SW2
SW3
SEEP
PWQO High
PWQO Low


Dissolved Organic Carbon Trend Analysis - Surface Water
DOC Concentration (mg/L)
0
2
4
6
8
10
12
14
16
18
20
Sep-03
Sep-04
Sep-05
Sep-06
Sep-07
Sep-08
Sep-09
Sep-10
Sep-11
Sep-12
Sep-13
Sep-14
Sep-15
Sep-16
Sep-17
Sep-18
Sep-19
Sep-20
Sep-21
Date
SW1
SW2
SW3
SEEP

APPENDIX IX

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	Chapman Waste Disposal Site
Location (e.g. street address, lot, concession)	Lot 108, Concession A, within the Municipality of Magnetawan, District of Parry Sound, Ontario
GPS Location (taken within the property boundary at front gate/ front entry)	Universal Transverse Mercator (UTM) coordinates Zone 17U, 606831 meters (m) Easting and 5063200 m Northing (North American Datum 1983)
Municipality	Magnetawan
Client and/or Site Owner	Corporation of the Municipality of Magnetawan
Monitoring Period (Year)	2021
This Monitoring Report is being submitted under the following:	
Certificate of Approval No.:	A521202
Director's Order No.:	Type Here
Provincial Officer's Order No.:	Type Here
Other:	Type Here

Report Submission Frequency	◉ **Annual** ○ **Other**	Specify (Type Here):
The site is:	◉ **Active** ○ **Inactive** ○ **Closed**	
If closed, specify C of A, control or authorizing document closure date:		Select Date
Has the nature of the operations at the site changed during this monitoring period?	○ **Yes** ◉ **No**	
If yes, provide details:	Type Here	
Have any measurements been taken since the last reporting period that indicate landfill gas volumes have exceeded the MOE limits for subsurface or adjacent buildings? (i. e. exceeded the LEL for methane)	○ Yes ◉ No	

Groundwater WDS Verification:

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

Sampling and Monitoring Program Status:

1) The monitoring program continues to effectively characterize site conditions and any groundwater discharges from the site. All monitoring wells are confirmed to be in good condition and are secure:	(●) **Yes** ( ) **No**	If no, list exceptions (Type Here):
2) All groundwater, leachate and WDS gas sampling and monitoring for the monitoring period being reported on was successfully completed as required by Certificate(s) of Approval or other relevant authorizing/control document(s):	( ) **Yes** (●) **No** ( ) **Not Applicable**	If no, list exceptions below or attach information.

Groundwater Sampling Location	**Description/Explanation for change (change in name or location, additions, deletions)**	**Date**
BH6-II	Dry	Spring and fall 2021
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date

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

Groundwater Sampling Location	**Description/Explanation for change (change in name or location, additions, deletions)**	**Date**
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date

4) All field work for groundwater investigations was done in accordance with standard operating procedures as established/outlined per the Technical Guidance Document (including internal/external QA/QC requirements) (Note: A SOP can be from a published source, developed internally by the site owner's consultant, or adopted by the consultant from another organization):	◉ **Yes** ○ **No**	If no, specify (Type Here):

Sampling and Monitoring Program Results/WDS Conditions and Assessment:

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

Groundwater CEP Declaration:

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

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

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

27-Mar-2022

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:**	It is recommended that the leachate seep to surface be mitigated via re-alignment of the seasonal stream and enhancement of the CAZ. Following these remedial efforts the three-tier trigger level monitoring program, developed as part of the 2019 Leachate Management Plan Study and to be updated in 2022, should be implemented for the Site. Design and approval of this strategy is currently underway.
◉ **No Changes to site design and operation are recommended**	
○ **The following change(s) to the site design and operation is/ are recommended:**	Type Here

Name:	Tim McBride		
Seal:	Add Image		
Signature:	Tim McBride 2022.03.27 13:37: 45-04'00'	**Date:**	27-Mar-2022
CEP Contact Information:	Tim McBride		
Company:	Pinchin Ltd.		
Address:	662 Falconbridge Road, Unit 3 Sudbury, ON P3A 4S4		
Telephone No.:	705.521.0560	Fax No. :	705.521.1309
E-mail Address:	tmcbride@pinchin.com		
Co-signers for additional expertise provided:			
Signature:		**Date:**	Select Date
Signature:		**Date:**	Select Date

Surface Water WDS Verification:

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

Name (s)	Unnamed creek to the south of the Site Unnamed creek to the east of the Site
Distance(s)	Approximately 50 m south of the Site Approximately 50 m east of the Site

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

Sampling and Monitoring Program Status:

1) The current surface water monitoring program continues to effectively characterize the surface water conditions, and includes data that relates upstream/background and downstream receiving water conditions:	◉ Yes ○ No	If no, identify issues (Type Here):
2) All surface water sampling for the monitoring period being reported was successfully completed in accordance with the Certificate(s) of Approval or relevant authorizing/control document(s) (if applicable):	◉ Yes ○ No ○ **Not applicable (No C of A, authorizing / control document applies)**	If no, specify below or provide details in an attachment.

Surface Water Sampling Location	Description/Explanation for change (change in name or location, additions, deletions)	Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date

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

Surface Water Sampling Location	**Description/Explanation for change (change in name or location, additions, deletions)**	**Date**
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date

4) All field work for surface water investigations was done in accordance with standard operating procedures, including internal/external QA/QC requirements, as established/ outlined as per the Technical Guidance Document, MOE 2010, or as amended. (Note: A SOP can be from a published source, developed internally by the site owner's consultant, or adopted by the consultant from another organization):	◉ **Yes** ○ **No**	If no, specify (Type Here):

Sampling and Monitoring Program Results/WDS Conditions and Assessment:

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

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

Parameter	Compliance or Assessment Criteria or Background	Amount by which Compliance or Assessment Criteria or Background Exceeded
e.g. Nickel	e.g. C of A limit, PWQO, background	e.g. X% above PWQO
Iron pH	PWOQ and APV	SW2
Aluminum	PWQO	SW2
Type Here	Type Here	Type Here
Type Here	Type Here	Type Here
6) In my opinion, any exceedances listed in Question 5 are the result of non-WDS related influences (such as background, road salting, sampling site conditions)?	◉ **Yes** ○ **No**	If yes, specify (Type Here)

7) All monitoring program surface water parameter concentrations fall within a stable or decreasing trend. The site is not characterized by historical ranges of concentrations above assessment and compliance criteria.	(●) **Yes** ( ) **No**	If no, list parameters and stations that is outside the expected range. Identify whether parameter concentrations show an increasing trend or are within a high historical range (Type Here)
8) For the monitoring program parameters, does the water quality in the groundwater zones adjacent to surface water receivers exceed assessment or compliance criteria (e.g. , PWQOs, CWQGs, or toxicity values for aquatic biota (APVs)):	(●) Yes ( ) No ( ) Not Known ( ) Not Applicable	APV exceedances quantified for copper at BH6-III and cobalt at BH9-I.
9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):	( ) **Yes** ( ) **No** (●) **Not Applicable**	If yes, list value(s) that are/have been exceeded and follow-up action taken (Type Here)

Surface Water CEP Declaration:

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

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

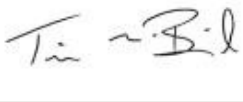
If any exceptions or potential concerns have been noted in the questions in the checklist attached to this declaration, it is my opinion that these exceptions and concerns are minor in nature or will be rectified for future monitoring events. Where this is not the case, the circumstances concerning the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

27-Mar-2022

Recommendations:

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

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

CEP Signature	 Tim McBride 2022.03.27 13:38:44-04'00'
Relevant Discipline	Hydrogeology
Date:	27-Mar-2022
CEP Contact Information:	Tim McBride
Company:	Pinchin Ltd.
Address:	662 Falconbridge Road, Unit 3 Sudbury, ON P3A 4S4
Telephone No.:	705.521.0560
Fax No. :	705.521.1309
E-mail Address:	tmcbride@pinchin.com

Save As **Print Form**