Municipality of Greenstone

2019, 2020 and 2021 Environmental Quality Monitoring Report

Nakina Landfill
Municipality of Greenstone, Ontario

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EXP Services Inc.
1142 Roland Street
Thunder Bay, ON, P7B 5M4
Canada
T: + 1.807.623.9495
F: + 1.807.623.8070
www.exp.com

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1 Introduction

EXP Services Inc. (EXP) was commissioned by the Municipality of Greenstone to prepare the environmental quality monitoring report for the years 2019, 2020 and 2021 for the Nakina Landfill site, in general compliance with requirements contained in the document *Monitoring and Report for Waste Disposal Sites, Groundwater and Surface Water, Technical Guidance Document, Ministry of the Environment, Operations Division* (November 2010). The site is located about 2 km southwest of the community of Nakina on the south side of Highway 584, in the Municipality of Greenstone, as shown on Figure 1 in Appendix B. The GPS coordinates at the approximate centre of the site are NAD 83 16 U 517696E 5558646N.

The site is currently operating under Provisional Certificate of Approval (now termed an Environmental Compliance Approval or ECA) No. A591901, dated January 8, 1990 (see Appendix A). The ECA does not contain any environmental monitoring or reporting requirements. In order to bring the site into compliance with current Ministry of the Environment, Conservation and Parks (MECP) requirements for waste disposal sites, the Municipality intends to submit an application to amend the ECA. EXP has been engaged to provide assistance in this regard, including preparation of supporting documentation. Supporting documentation that has been prepared to date includes a Design and Operations Plan[1] and an Initial Hydrogeological Evaluation report[2]. Approval to proceed with the monitoring program as outlined in the Initial Hydrogeological Evaluation report was received from the MECP (formerly named Ministry of the Environment and Climate Change [MOECC]) via email on October 17, 2016; refer to Appendix A. On March 15, 2019, via email, the MECP indicated that they were also in general agreement with the draft D&O Plan and recommended that the Municipality proceed with an application to amend the ECA. EXP submitted an Updated D&O Plan[3] dated July 28, 2020; no MECP comments have been received to date.

Note that the Initial Hydrogeological Evaluation report recommended that the first tri-annual monitoring report be submitted by April 2018 for the 2015, 2016 and 2017 sampling events; however, since MECP approval to proceed with sampling was received in the fall of 2016, the MECP agreed, via email on February 15, 2017, that the initial groundwater monitoring report due date would be changed to April 2019, and would include sampling events from 2016, 2017 and 2018 (refer to Appendix A). As such, the initial monitoring report[4] was submitted on April 18, 2019.

This report represents the second monitoring report for the site and provides results for the 2019, 2020 and 2021 monitoring years in the context of available historical results (September

[1] EXP Services Inc. (2015). Draft *Design and Operations Plan, Nakina Landfill, Municipality of Greenstone, Ontario.* Project No. THB-00011119-CE - 100. April 22, 2015.
[2] EXP Services Inc. (2015). *Initial Hydrogeological Evaluation, Nakina, Landfill, Nakina, Ontario*. Project No. THB-00011119-CE - 500. March 16, 2015.
[3] EXP Services Inc. (2020). Draft *Updated Design and Operations Plan, Nakina Landfill, Municipality of Greenstone, Ontario*. Project No. THB-00011119-HE, July 28, 2020.
[4] EXP Services Inc. (2019). *2016, 2017 and 2018 Environmental Quality Monitoring Report, Nakina Landfill, Municipality of Greenstone, Ontario*. Project No. THB-00011119-GE, April 18, 2019.

2014) and applicable criteria. Analytical results for groundwater are compared to the MECP's Ontario Drinking Water Standards (ODWS, from *Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines,* June 2003), as well as to MECP Guideline B-7 (which incorporates the Reasonable Use concept into MECP groundwater management activities) and the MECP's Aquatic Protection Values (APV's, from Appendix B2 of *Rationale for the Development of Soil and Groundwater Standards for Use at Contaminated Sites in Ontario,* April 2011). Analytical results for surface water are compared to the MECP's 1994 Provincial Water Quality Objectives (PWQO), updated in 1999.

1.1 **Background**

It is believed that the site began receiving waste in late 1962, based on an initial Land Use Permit (No. 1289-35) understood to have been issued for the period November 30, 1962 to November 29, 1963. The site was not formally approved until April 11, 1973, under Provisional Certificate of Approval (C of A) No. 591901 (expired November 15, 1973 and subsequently renewed), issued for a Landfill Site with no other details or conditions indicated. However, in a review of the application, the MECP's Regional Engineer recommended that a Provisional C of A be issued with the following conditions:

1. The site should be properly signed.
2. Existing mounds of refuse must be properly covered.
3. The municipality should investigate the feasibility of operating a trench type landfill.

Supporting information submitted with the initial application indicates a 4-acre waste disposal footprint within a total site area of 5 acres. This is consistent with the MNDMNRF (Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry) Land Use Permit for a 5-acre (2 ha) site, in effect until it was updated on January 1, 1990 to reflect a 19.3 ha site. An amended C of A (No. A591901) for a 5-ha landfilling site within a total site area of 20 ha was issued on January 8, 1990, with no expiry date.

According to the C of A, the site is approved for disposal of the following categories of waste: domestic, non-hazardous solid waste and other (sewage sludge). Also, a buffer zone is required, extending 100 meters in all directions from the working area boundaries. Copies of the current C of A and any related documentation are found in Appendix A.

On August 14, 2014, on behalf of the Municipality of Greenstone, EXP submitted a Determination of Theoretical Approved Capacity letter for the Nakina Landfill to the MECP. Following review, the MECP issued a letter, dated October 20, 2016, indicating approval of a theoretical capacity of 118,600 m^3 for the site. The MECP letter is included in Appendix A.

Most recently, the MECP provided review comments (memorandum dated October 11, 2018 – see Appendix A) on the environmental monitoring aspects of the afore-referenced D&O Plan. The MECP memorandum indicated/recommended the following (with EXP's responses in **bold** font):

- It is recommended that the consultant preparing the groundwater and surface water monitoring report due in April 2019, references the following document during the report preparation: *Monitoring and Report for Waste Disposal Sites, Groundwater and Surface Water, Technical Guidance Document, Ministry of the Environment, Operations Division* (November 2010). **The current report is prepared in general accordance with the above referenced document.**

- The inclusion of a small (un-named) lake within the proposed contaminant attenuation zone is a concern with respect to potential impacts on surface water quality. Monitoring well MW5 (located ~ 40 m up-gradient from the small lake) recorded exceedances of the calculated B-7 criteria for TDS, DOC, alkalinity, manganese and mercury in September 2014. Groundwater seepage/flow at the site was estimated at ~1 m/day. Based on this information and the remaining lifespan of the site (~75 years), it is recommended that the surface water monitoring program for the small lake is reviewed by a MECP Surface Water Specialist. **EXP is awaiting the MECP Surface Water Specialist's review**.

- Considering the limited groundwater elevation data for the site and the proximity of the small (un-named) lake, it is recommended that additional down-gradient monitoring wells are installed northwest and northeast of the small lake; between MW3 and MW5, and MW4 and MW5, respectively. **EXP is in agreement**.

For a more detailed site history, refer to the draft Updated D&O Plan report, previously referenced.

2 Site Setting and Geology

As stated above, the Nakina Landfill (the site) is located about 2 km southwest of the community of Nakina on the south side of Highway 584, in the Municipality of Greenstone, as shown on Figures 1 and 2 in Appendix B.

Based on a review of geological mapping, the underlying native soil conditions at the site consist of bedrock knob with a subordinate landform consisting of sand and gravel kame, kame field, kame terrace, and kame moraine deposits. Local relief is mainly moderate, knobby and hummocky, with predominately dry surface conditions.

Surrounding features are also indicated on Figure 2. The nearest residence and nearest potable well are located within the Nakina townsite, about 1.5 km east of the site. The nearest waterbody is a small (apparently un-named) lake immediately south of the site. However, there is a marshy area along the treeline at the west edge of the waste footprint. Two more small lakes are located about 700 m north of the site, which immediately discharge to a larger lake (Balkam Lake).

Most of the area of the site itself is relatively flat. However, there is a slope toward a marshy area bordering the west part of the historical waste footprint, and a sand hill (source of cover and berm material) in the south-central part. Topographic surveys were conducted in 2012, 2014, 2019 and 2021 and are discussed later in this report.

Locally, surface drainage generally flows to the north towards Highway 584, to the south towards the un-named lake and to the west towards the marshy area at the west part of the site. There is no interceptor ditching at the site, and off-site surface drainage follows the topography in the area, which generally directs flow towards the lakes that surround the site.

3 Site Hydrogeology

There are five monitoring wells on the site: MW1, MW2, MW3, MW4 and MW5 (see Figures 3 & 4 in Appendix B). Wells MW2 to MW5 were installed in September 2014, as part of the Initial Hydrogeological Evaluation (previously referenced), and MW1 was historically installed by others (unable to locate the borehole log, and the installation date is unknown). The available Borehole Logs are found in Appendix C. Note that consideration of local topography and locations of nearby surface water bodies did not favour a particular groundwater flow direction; therefore, the decision was made to locate the four newer wells (MW2 to MW5) at the approximate cardinal compass points near the approved site boundaries.

In September 2014, an additional borehole (BH4A) was initially advanced about 120 m west of MW4 at the eastern property edge; however, BH4A was terminated due to auger refusal at about 16.8 m below ground surface as well as due to insufficient groundwater. BH4A was ultimately replaced by MW4.

Groundwater levels in the wells, measured during the current reporting period and historically, are summarized in Table 1 (Appendix D).

MW2 is located at the north part of the site and was dry during the well installation in 2014. In addition, MW2 was dry during all subsequent sampling events with the exception of May 2018 and May 2021. MW2 was advanced to refusal, at about 2.7 m depth or 335.0 m elevation (geodetic). No other dry wells were encountered on the site.

The groundwater elevation contours were generated for the site using the May 2021 results (only event in the current reporting period where a groundwater level was observed at MW2) and are presented on Figure 4. Similar to the Initial Hydrogeological Evaluation in 2014, the groundwater flow on site is generally to the southwest at a gradient of about 0.015 m/m (MW4 to MW5).

The soil conditions encountered on site generally consist of uniformly graded medium to fine grained sand. Some layers of sandy silt or sandy gravel were noted within the sand. Groundwater at the time of drilling was encountered at depths ranging between about 5.2 m and 16.6 m below ground surface.

Mechanical sieve analyses were performed on two samples (MW3-S5 and MW5-S7) for soil classification purposes and to allow for determination of the particle size corresponding to the 10% finer than fraction (D_{10}), which is used in the Hazen empirical estimation of hydraulic conductivity (K). The grain size results from the Initial Hydrogeological Evaluation are included in Appendix C (Borehole Logs and Grain Size Distributions).

The Hazen method of estimating hydraulic conductivity, where K (cm/s) = $[D_{10}\ (mm)]^2$, was originally determined for uniformly graded sands but it can provide a reasonable approximation of K for most cohesionless (non-plastic) soils. The calculated K values are provided in the table, below.

Saturated Coefficient of Permeability (*k*) Estimated from Grain Size Analysis				
Well No.	**Sample No.**	**Depth (m)**	**Soil Classification (USCS)**	***k*** **(cm/s)**
MW3	S5	10.9	Sand, trace gravel, trace silt, medium to fine grained	$2.0x10^{-2}$
MW5	S7	9.5	Sand, trace gravel, trace silt, medium grained	$3.2x10^{-2}$

The geometric mean hydraulic conductivity / permeability based on the results of the grain size analyses is about 2.5 $x10^{-2}$ cm/s or 21.6 metres per day.

Based on an average hydraulic gradient of 0.015 m/m and an assumed soil porosity of 0.3, the groundwater seepage/flow velocity may be calculated using Darcy's Law, V = K i / n, where in this case:

K (hydraulic conductivity) = 2.5 x 10^{-2} cm/s
i (hydraulic gradient) = 0.015 m/m
n (effective porosity) = 0.3 (assumed).

Based on the above values, the estimated groundwater seepage/flow velocity (V) = 1.1 m/day.

4 Monitoring/Reporting Requirements

As indicated in the Initial Hydrogeological Evaluation, and based on correspondence with the MECP, as well as on EXP's experience with other ECAs for natural attenuation landfills, the following information is included in the present report:

- a summary of the type and quantity of incoming waste accepted during the reporting period;
- discussion indicating the landfill capacity, current fill volume, volume filled in the last year, and the status of any control measures such as interim, final or progressive cover;
- a summary of the site's operation procedure and compliance as per the Design and Operations Plan;
- a summary of recycling operations;
- an accurately-scaled site plan illustrating the location of all buried wastes, the site boundaries, monitoring well locations, the location of the suggested contaminant attenuation zone, and any other significant site features;
- an accurately-scaled location map illustrating topography and the site relative to nearby potentially sensitive groundwater/surface water features (i.e., lakes, streams, wells), or any other potentially significant receptors;
- a section describing the field monitoring and sampling program including QA/QC measure and any variance from normal sampling procedures and/or conditions;
- a water table contour map based on current date;
- stratigraphic cross-sections which clearly illustrate the subsurface distribution of geological materials;
- borehole and monitoring well logs for all monitoring wells;
- tables presenting historical water chemistry and water level data, and graphs illustrating quality trends with time for key parameters at all monitoring locations;
- discussion and assessment of groundwater flow direction and velocities, estimates of leachate generation/impacts, effectiveness of mitigation measures, and compliance with the Reasonable Use Policy;
- recommendations as required for future mitigation, monitoring and site characterization activities;
- recommendations for trigger levels as related to contingency plans, considering the Reasonable Use Policy.

The 2019, 2020 and 2021 tri-annual report was due April 2022, with the next report due April 2025.

Note that other issues regarding site operations are discussed in detail in the Updated Design and Operations (D & O) Plan (referenced above). It is understood that any required additional operational information not included in the present report will be provided to the MECP by the Municipality of Greenstone.

5 Operational Information

5.1 Volume of Landfill Waste

Due to the dearth of historical records, and the fact that both the trench and area methods of waste placement have been utilized at the site, any estimates of current waste volumes will be imprecise. A maximum (worst case) estimate of the current waste volume can be arrived at by assuming that waste is buried to a depth of 7 m (the maximum historical waste depth according to the Municipality) across the entire 3.8 ha waste footprint utilized to about 2018. This would result in a waste (and interim cover) volume of 266,000 m^3. However, a more realistic (and in EXP's opinion, more defensible) estimate would be based on estimated annual waste deposition rates (i.e., annual volume increases). The site first began receiving waste in or around late 1962. However, the site was not formally approved until April 1973. Assuming the site did begin operating in 1962, it had already been receiving waste for some 52 years at the time EXP, on behalf of the Municipality, submitted their 2014 letter to the MECP for the Determination of Theoretical Approved Capacity[5]; the MECP approval letter, dated October 20, 2016, is included in Appendix A.

An initial topographic survey of the site was conducted on May 28, 2012, and the survey was repeated on June 26, 2014, November 10, 2019, and most recently September 8, 2021 (see Figures 3 and 4). Based on elevation differences (i.e., areas of both cut and fill) between the May 2012 and June 2014 surveys, Delta Survey determined that the increase in volume (waste and interim cover) associated with filling of the "open pit" is 1,188 m^3. This averages to some 570 m^3/yr. It is noted that the November 2019 survey only included a topographic survey at the waste pile location (i.e., fill area) and excluded the on-site "sand hill"/mound of soil used as a source for soil cover material (i.e., cut area); as a result, the 2019 volume increase was inflated since the on-site soil cover was essentially calculated twice. Due to this error, the November 2019 survey results have been excluded from the updated volume calculations. EXP calculated the volume difference on-site between the June 2014 and September 2021 topographic surveys; the volume increase is about 7,840 m^3, or about 1,080 m^3 per year (90 m^3 per month). This volume increase is nearly double that of the period between 2012 and 2014, and is suspected to be largely attributable to increased quantities of cover material.

Note that in 2014, Delta measured a decrease of some 3,500 m^3 in the volume of a "sand hill" in the south-central part of the landfill. The Municipality confirmed that this material was taken off-site in late 2012 and used to resurface Twin Lake Road in Nakina. This was done without proper authorization, and the Municipality was fined and required to pay the Crown for the cost of the sand/gravel. In addition, Delta determined that the volume of wood and demolition debris in a pile in the southeast part of the site decreased by some 500 m^3 between the 2012 and 2014 surveys. The Municipality has stated that none of this material was taken off site or burned. The apparent decrease may at least partly be attributable to compaction. In any

[5] EXP Services Inc. (2014). Letter for *Determination of Theoretical Approved Capacity, Nakina Landfill Site, Municipality of Greenstone.* EXP Ref. No. THB-00011119-CE. August 7, 2014.

event, the decreases in wood and sand/gravel volumes were not considered in the determination of the waste volume increase between May 2012 and June 2014.

The Municipality has provided EXP with the following estimates of annual waste volumes (uncompacted) received at the site since 2012:

2012: 1,213 m^3	2017: 1,208 m^3
2013: 1,584 m^3	2018: 1,291 m^3
2014: 1,597 m^3	2019: 922 m^3
2015: 1,250 m^3	2020: 963 m^3
2016: 1,138 m^3	2021: 1,180 m^3

The estimated annual waste volumes for the current reporting period are generally somewhat lower than the 2012 to 2018 estimates. However, the Municipality's estimates are quite similar to the recent topographic survey results indicating an annual volume increase of about 1,080 m^3/yr. (which also includes interim cover material – the Municipality's estimates do not). The Municipality's figures, which are not based on measured quantities, do not account for compaction. It is also possible that the surveyed quantities err on the low side, although this seems less likely. Considering all available information and allowing for a compaction ratio of 3:1 to 4:1, plus the addition of interim cover material, EXP suggests that an average annual *in situ* volume increase (waste and interim cover) of 1,000 m^3 going forward would represent a reasonable estimate.

Regarding historical waste volumes, Nakina was originally established as a railway town in the early 1900's, and was the site of a radar base during WW-II. The 1972 C of A application gives a "population served" of 674, while the application for the current C of A, dated March 1989, gives a figure of 650. The population has since decreased considerably to the current figure of about 400. However, the population was double that in the later 1970's when a paper mill was operating. Tourism is important to the local economy, and this industry results in increased volumes of waste requiring disposal, especially during the summer months.

EXP suggests that utilizing an average annual increase of 1,000 m^3 (compacted waste and interim cover) since the site first began receiving waste in about 1962 could provide a reasonable estimate of current landfill volume. This figure amounts to some 59,000 m^3. This is perhaps again a conservative estimate since garbage was historically burned on site (as recently as 1998 based on a historical MECP inspection letter).

Stratigraphic sections (based on Delta Survey plans June 2021) are given in Figures 5A and 5B.

5.2 Remaining Life Expectancy

As indicated above, as of December 2021, the waste volume, including interim cover, on site is estimated to be about 59,000 m^3, which represents about 50% of the approved 118,600 m^3 theoretical capacity. Based on an estimated annual waste and cover material volume

deposition rate of 1,000 m^3/yr. (current quantities to be confirmed – see below), it is estimated that the landfill will reach capacity in about 60 years (i.e., 2081).

The next updated contour survey will be provided with the Environmental Quality Monitoring Tri-Annual Report for the years 2022, 2023, and 2024 (due April 2025).

5.3 Operational Problems and Complaints

Municipality of Greenstone personnel advised that there were no operational problems or public complaints regarding the Nakina Landfill during the current reporting period.

5.4 Waste Types and Waste Diversion

The landfill only accepts solid non-hazardous municipal waste, including wood, as well as certain recyclable materials (see below).

It was recommended in the Updated Design and Operations Plan (referenced above) that a recycling depot (i.e., for standard recyclables such as glass, plastic, metal containers [steel and aluminum], tetra packs, paper and cardboard) be established at the site. It is understood that no action has yet been taken on this matter. However, the following recyclable materials are accepted at the site: used tires, scrap metal, batteries, electronic waste, fluorescent bulbs, refrigerators/freezers (tagged).

In the Updated D&O Plan, a household hazardous waste (HHW) depot was also recommended. Approval should be obtained from MECP. It is noted, however, that residents in the Nakina area are directed to use the HHW events at the Geraldton and Longlac Landfills.

Additional details concerning operation of the landfill are provided in the previously referenced Updated D&O Plan.

6 Field Procedures

6.1 Monitoring Well Condition

As indicated, EXP was commissioned to conduct two rounds of sampling (spring and fall), annually in 2019, 2020 and 2021.

At the time of monitoring, above-ground well components were inspected for compliance with O.Reg. 903. All monitoring wells were in compliance as of the fall 2021 sampling event.

6.2 Sampling Protocol

EXP personnel collected water samples on May 8 and October 28, 2019; May 13 and October 6 & 7, 2020; and May 19 and September 23, 2021. The fieldwork was to include collection of groundwater samples from all five monitoring wells, and one surface water location (un-named lake south of site) during all sampling events. However, MW2 was dry during every event except May 2021, and very little groundwater was noted at MW4 during the May 2019 and September 2021 events which resulted in partial chemical testing. In addition, field parameters at MW4 were not measured during the May 2020 sampling event due to insufficient groundwater.

Prior to purging, static water levels were measured in each sampled well using an electronic water level indicator. Between measurements, the stainless-steel probe of the indicator was rinsed with distilled water in order to prevent cross contamination of the wells. Each well was then purged (minimum 3 well volumes or to dryness) using the dedicated Waterra® sampling equipment and generally allowed to recover to at least 80% of static level prior to sampling (excludes low/insufficient water levels at MW4). Upon reaching at least 80% recovery, field measurements of pH, electrical conductivity and temperature were recorded for the groundwater samples (excluding the May 2020 event at MW4 – due to insufficient water). Groundwater samples were then collected directly from the dedicated Waterra sampling equipment into bottles provided precleaned and with appropriate preservatives by the laboratory. Surface water samples were collected directly from the water body using the unpreserved bottles supplied by the laboratory. Sample bottles containing preservatives were then filled from unpreserved sampling bottles.

Groundwater samples for metals, including mercury, were filtered in the field at the time of sample collection using in-line 0.45-micron filter cartridges. In accordance with standard MECP protocol, no field filtering was conducted on the surface water samples, except for mercury.

The water samples were placed in an insulated cooler for transport to EXP's offices in Thunder Bay. The samples were then picked up by a representative of Bureau Veritas Laboratories (BV Labs), in a secure cooler under chain of custody, and were ultimately sent via courier to their Standards Council of Canada certified and accredited laboratory in Mississauga, Ontario, for analysis of the required parameters.

7 Results and Discussion

The laboratory reports containing the groundwater and surface water analytical results for 2019, 2020 and 2021, are provided in Appendix E. The approved monitoring program consists of twice-annual (spring and fall) sampling of all wells and the surface water location. Samples are to be analyzed for the MECP's Landfill Standards Guideline (Schedule 5 – rev. 2010) "comprehensive" parameter list during each event.

Summary tables of the 2019, 2020, 2021 results, along with the historical results, are given in Appendix D (Tables 2 and 3), where they are compared to criteria given in the MECP's *Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines* (ODWS, June 2003). The ODWS criteria can be either standards (**Maximum Acceptable Concentrations** and **Interim Maximum Acceptable Concentrations**) or objectives (**Aesthetic Objectives** and **Operational Guidelines**). Because some groundwater flowing through the waste disposal site likely eventually discharges to the un-named lake located about 40 m south of the site, the analytical results for MW5 (furthest south well) are also compared to the MECP's **Aquatic Protection Values** (APVs). Surface water results are compared to the PWQOs. Analytical results in excess of criteria are highlighted in the summary tables. Graphs of concentrations versus time for selected parameters are found in Appendix G.

The results are discussed below in the context of MECP (mainly ODWS) criteria, with emphasis on the most recent (2021) results.

7.1 Background Conditions (MW4)

Monitoring well MW4 (screened from 4.0 to 8.5 m depth in sand to sandy silt, terminating on possible bedrock) is immediately upgradient of the identified waste footprint. As previously indicated, insufficient water was noted during the spring 2019 and fall 2021 events at this well, resulting in partial/limited chemical analyses results. In addition, field parameters were not obtained at this well during the spring 2020 event, also due to insufficient water. In 2021, no exceedances were noted at MW4; however, in 2019 and 2018, similar to historical results, exceedances for organic nitrogen were reported. This indicates that groundwater on and in the vicinity of the site can be naturally high in organic nitrogen.

In 2014, ODWS exceedances were noted for dissolved organic carbon (DOC) and manganese; however, since the initial sampling event, these parameters have been below ODWS criteria, suggesting that the 2014 exceedances were likely attributable to well construction effects (groundwater samples were collected one to two days following well installations).

7.2 Source Well Conditions (MW1)

Monitoring well MW1 (installed prior to 2014 - no borehole log information, including well screen depths, is available but the well extends about 7.8 m below ground surface) is located

north and downgradient of the eastern waste footprint. Exceedances of ODWS criteria in 2021, on at least one occasion, were noted for organic nitrogen, alkalinity and manganese. In 2019 and 2020, ODWS exceedances were also observed for total dissolved solids (TDS), DOC, and iron. All of the above listed exceedances have historically exceeded ODWS criteria since 2014; however, with the relocation of the waste pile to the east, it appears levels of these parameters, as well as most parameters at this location, exhibit a decreasing trend. Mercury levels exceeded the ODWS criterion in 2014; however, results have since been below applicable criteria and below laboratory detection limits, suggesting the 2014 mercury levels were attributable to well construction effects.

7.3 **Proximate Wells (MW2, MW3, MW5)**

Well MW2 (screened from 1.2 to 2.7 m depth in sand to sandy silt, terminating on possible bedrock) is located due north of the waste footprint. This well was dry at the time of installation in 2014, and during all other sampling events, except for May 2018 and May 2021 (i.e., groundwater data are available for only two events). In 2021, a single ODWS criterion exceedance was noted for organic nitrogen. Historically, an ODWS exceedance was reported for DOC.

Well MW3 (screened from 8.1 to 12.6 m depth in sand) is located in the west part of the site and south of Highway 584. Similar to historical results, in 2021, ODWS exceedances were noted for TDS, organic nitrogen, sodium and chloride. Conductivity values at MW3 are higher than at any of the other wells. The ODWS exceedances at MW3 (excluding organic nitrogen), as well as the high conductivity levels, suggest that these concentrations are largely attributable to salting of the highway, rather than landfill leachate.

Well MW5 (screened from 7.5 to 10.5 m depth, generally in sand) is located in the south part of the site, roughly 100 m from the waste footprint and about 40 m upgradient (north) of the small un-named lake. ODWS exceedances in 2021 included: TDS, DOC, organic nitrogen, alkalinity, manganese and vinyl chloride. The 2021 exceedances are similar to the historical results, with the exception of organic nitrogen. In addition, due to its proximity to a surface water body, the MW5 results were also compared with APV criteria; similar to historical results, copper exceeded the APV during all sampling events. In general, parameter levels at MW5 were similar to or higher than the “source well” MW1 (see table below).

7.4 **2021 Monitoring Well Results Summary**

The table below summarizes the average 2021 concentrations at all wells, with the highest concentrations on the site highlighted in ***bold italics***.

Parameter Levels in Monitoring Wells – 2021 Averages

Parameter (Concentration Units)	MW4 (Background)	MW1 ("Source Well")	MW2	MW3	MW5
Conductivity (µS/cm)	350	925	330	***2,400***	1,575
COD (mg/L)	18	23	15	8.4	***38.3***
TDS (mg/L)	165	493	145	***1,345***	910
DOC (mg/L)	2.95	4.25	3.2	1.95	***12.75***
Organic Nitrogen (mg/L)	0.15	0.45	0.41	0.15	***0.74***
Calcium (mg/L)	63	195	53	150	***268***
Sodium (mg/L)	2.1	3.8	2.7	***340***	60.8
Chloride (mg/L)	1.2	4.25	3.1	***605***	55
Nitrate (mg/L)	0.14	***1.1***	<0.10	0.61	0.17
Sulphate (mg/L)	<1.0	<1.0	<1.0	15	***60.5***
Alkalinity (mg/L)	190	525	170	285	***803***
Barium (mg/L)	0.011	0.046	0.0082	0.062	***0.086***
Boron (mg/L)	0.011	0.047	<0.01	0.012	***0.64***
Copper (mg/L)	0.0018	0.005	0.0026	0.0032	***0.02***
Iron (mg/L)	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese (mg/L)	0.0032	0.34	<0.002	0.0021	***2.18***

As shown above, concentrations at MW5 (south of site, near un-named lake) are generally higher than in the other wells, including "source well" MW1. MW3 has the highest concentrations for salt-related parameters (conductivity, TDS, sodium and chloride), with MW5 containing the second highest levels for these parameters. As is expected, background well MW4 did not have the highest concentrations of any of the parameters listed above.

7.5 Durov Plots

Durov plots of the major ion chemistry were prepared and are included in Appendix F. The results indicate that groundwater on the site is generally dominated by calcium bicarbonate (typical of Northern Ontario groundwater), except for MW3 which is dominated by sodium chloride (likely from road salting).

7.6 Time Series Charts

Time Series graphs depicting concentrations over the monitoring period have been prepared for selected parameters of interest (alkalinity, chloride, conductivity, copper, DOC, iron,

organic nitrogen, manganese and TDS), and are included in Appendix G. The following increasing or decreasing trends are suggested:

Summary of Apparent Trends

Well	Increasing	Decreasing
MW1 ("source" well)	None	Alkalinity, chloride, conductivity, copper, DOC, iron, organic nitrogen, manganese and TDS
MW2	None	None
MW3	Chloride, conductivity, TDS	None
MW4 (background)	None	None
MW5	Copper	None

Decreasing trends appear to be present for virtually all plotted parameters at "source" well MW1, while increasing trends appear to be present for salt-related parameters at MW3, and an increasing trend appears to be present for copper at MW5.

7.7 Reasonable Use Assessment

The MECP's Guideline B-7, which incorporates the Reasonable Use Policy (RUP) into the Ministry's groundwater management activities, allows off-site impacts from waste disposal sites within established guidelines based on ODWS criteria in order to allow for attenuation of impacts while protecting existing and potential downgradient groundwater users. The guideline allows for increases in concentrations up to 25 and 50 percent of the difference between background and ODWS concentrations for health-related and non-health-related parameters, respectively. The guideline applies only to groundwater at or beyond the attenuation zone boundary.

A 21.7 ha expansion to the total site area (attenuation zone) had been recommended in EXP's Initial Hydrogeological Evaluation (2014), as shown on Figure 6 in Appendix B. Based on the findings of the 2016 to 2018 monitoring program, a revised recommended attenuation expansion of 34.4 ha (for a total site area of 53.7 ha) was presented in the previous monitoring report, as shown on Figure 6. Based on the findings of the current monitoring report, the 2018 Revised Recommended Attenuation Zone appears to be justified.

RUP criteria for 2021 were calculated using the arithmetic mean of the most recent three years' results for background well MW4 (which is hydraulically upgradient of the waste footprint and has the highest groundwater elevation of any of the wells). The assessment is provided for all wells on Table 2 in Appendix D. The attenuation zone, by definition, is intended to allow for contaminant concentrations to decrease to Guideline B-7 levels as the groundwater migrates toward the attenuation boundary. Exceedances of RUP criteria are normal and not unexpected within an attenuation zone. Note, however, that the

recommended expanded attenuation zone for the Nakina Landfill has not yet been formally approved. Wells MW3 and MW5 are located furthest downgradient of the site and at/near the limits of the current site boundary; therefore, RUP criteria are considered most applicable to the results for these wells. Exceedances of the calculated criteria in 2021 are summarized in the following table.

Parameters Exceeding Guideline B-7 (RUP) Criteria in 2021		
Monitoring Well	**Exceedance(s)**	
	2021	**Historical**
MW1	TDS, DOC, organic nitrogen, alkalinity, manganese.	TDS, DOC, organic nitrogen, nitrate, alkalinity, iron, manganese.
MW2	Organic nitrogen	DOC
MW3	**TDS, sodium, chloride,**	**TDS, sodium, chloride,**
MW4 (background)	None	Organic nitrogen
MW5	**TDS, DOC, organic nitrogen, alkalinity, manganese, vinyl chloride.**	**TDS, DOC, organic nitrogen, alkalinity, manganese, vinyl chloride.**

Note: **Bold** indicates wells furthest downgradient of waste footprint (i.e., RUP criteria are potentially applicable).

Similar to the findings of the previous monitoring report, the results for the wells furthest downgradient of the waste footprint (i.e., MW3 and MW5) indicated a number of B-7 (RUP) criteria exceedances. As previously indicated, impact at MW3 is likely attributed to road salting activities on Highway 584 and not landfill leachate, as only salt-related parameters exceed criteria. Unlike MW3, exceedances of B-7 criteria at MW5 appear to be from historical landfill leachate, and include TDS, DOC, organic nitrogen, alkalinity, manganese and vinyl chloride. As previously discussed, MW5 is located between 50 to 150 m downgradient (south) of the waste footprint, and concentrations at MW5 are generally higher than at “source well” MW1. However, it should be noted that well MW5 is located at least 450 m upgradient (northeast) of the recommended expanded attenuation zone boundary, and B-7 criteria would no longer be applicable to this well following approval of the recommended expansion.

7.8 Surface Water Quality Results

No PWQO exceedances were observed at SW1 (un-named lake south of site) during the 2019, 2020 and 2021 events. Historically, exceedances for phenols and iron were noted during the fall 2018 sampling event; however, given that both phenols and iron have been generally undetectable at MW5, leachate impact is unlikely to have been responsible for the fall 2018 exceedances at SW1. Rather, it appears that these historical exceedances were anomalous; as phenol and iron levels have been below laboratory detection limits since the 2018 exceedances.

Of note, chromium results since 2014 have been below the laboratory detection limits; however, the laboratory detection limit for chromium is above the PWQO criterion.

7.9 QA/QC

7.9.1 Cation/Anion Balances

In general, a cation/anion balance difference of up to 10% is considered acceptable. However, since the chemistry of groundwater affected by landfills can be quite complex and may not be balanced by the method indicated, the anion-cation balances of background monitoring wells are considered to be a better indicator of the reliability of results.

Reported ion balances in the current reporting period were all below 10%, which is considered acceptable.

7.9.2 Duplicates and Blanks

In the current reporting period, one blind duplicate sample (i.e., a duplicate sample collected in the field and labelled with a different but logical sample number) was submitted to the laboratory for each of the sampling events. The blind duplicate samples were all collected from MW5 and labelled as MW6.

The relative percent difference (RPD) between the results for the sample and the field duplicate sample for each analysed parameter was calculated as the absolute value of the following:

$$RPD = \frac{(\text{Sample Result} - \text{Duplicate Result}) \times 100}{(\text{Sample Result} + \text{Duplicate Result}) / 2}$$

For the purposes of O.Reg. 153/04 (Records of Site Condition), the maximum RPD for laboratory duplicates that the MECP considers acceptable for most of the parameters reported in this study is 20%[6], with the exception of the following:

- Electrical conductivity – 10%
- pH – 0.3 pH units

Although there are no set standards for RPDs for field duplicates, which introduce sampling variability, EXP has generally considered that values up to 40% are acceptable.

For the current reporting period results (2019 to 2021), the following elevated RPD's (above 40%) were noted:

- ammonia (May 2021) = 45%
- pH (September 2021) = 0.32 pH units

Overall, agreement between the original and duplicate samples was good, with RPDs generally well below 40%. The differences for ammonia and pH indicated above do not affect the conclusions or recommendations of this report.

7.9.3 Hold Times

The samples were received by the laboratory within three days of collection. Based on the analysis dates reported by the laboratory, the MECP's recommended hold times appear to have been generally met.

7.9.4 Internal QA/QC

Internal quality control results (for blanks, spiked samples and lab duplicates) reported by the laboratory appear to be acceptable.

[6] MECP (2011). *Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act*, July 1, 2011.

8 Contingency Plan

In accordance with the MECP's review of the Initial Hydrogeological Evaluation (email dated October 17, 2016, included in Appendix A), a contingency plan and trigger mechanisms relative to groundwater and surface water quality are required for the site.

8.1 Trigger Levels

Trigger levels for implementation of one or more aspects of a groundwater and surface water Contingency Plan would consist of predicted or actual exceedances of applicable criteria at or beyond the attenuation zone boundaries. The applicable criteria for groundwater at the downgradient (west and south) recommended 2018 attenuation zone boundaries are Reasonable Use Policy (RUP) criteria calculated according to Guideline B-7.

8.1.1 Groundwater Protection

Although the predominant groundwater flow direction beneath the waste footprint is to the southwest (see Figure 4), there are only a limited number of wells on the site and no wells are located beyond the property boundary in the direction of groundwater flow. Monitoring wells MW3 and MW5 are the most downgradient wells at this site. MW3 is located near the west boundary of the 2018 recommended attenuation zone, while MW5 is located about 325 m from the south boundary of the 2018 recommended attenuation zone. Trigger levels at these two wells are parameter concentrations that are predicted to have the potential to result in exceedances of Reasonable Use Policy (RUP) Guideline B-7 criteria at the downgradient recommended attenuation zone boundaries, assuming a linear decrease in concentration with distance from the source well. However, as noted above, concentrations at MW5 were generally higher than "source well" MW1 (located near the north limit of the waste footprint), suggesting that MW5 results are more reflective of source concentrations than are MW1 results, as discussed further below.

The calculated 2021 trigger levels for protection of groundwater quality are presented in Table 4 in Appendix D.

Because the concentrations of parameters at the "source well" (MW1) were generally below the B-7 criteria, there are a number of non-calculable trigger levels (indicated as "n/a" on Table 4). Regardless, based on the calculations, at the west boundary (MW3), only TDS has the potential to exceed the B-7 criterion as a result of landfill leachate (as represented by concentrations in MW1); however, as previously discussed, salt parameters at this well location are elevated compared to the remaining wells on site (i.e., the high TDS results are likely attributed to road salting of the highway rather than leachate from the waste footprint). Concerning trigger calculation results for MW5, concentrations of TDS, DOC, organic nitrogen, alkalinity and manganese have the potential to exceed B-7 criteria at the 2018 recommended south attenuation zone boundary as a consequence of landfill leachate impact, assuming MW1 results represent source levels. It seems clear, however, that results at MW1 are not an accurate reflection of actual source levels. Rather, MW5 appears to be a better

source well, and results for a well located downgradient of MW5 would likely provide more realistic trigger values.

8.1.2 **Surface Water Protection**

Actual or predicted exceedances of APVs in any monitoring wells adjacent to water bodies could be used as trigger levels for protection of surface water quality.

As previously noted, a small unnamed lake is present immediately south of the current site boundary, but within the proposed expanded attenuation zone. The lake does not appear to have a permanent outflow and is not utilized recreationally. No current leachate impacts to the lake are apparent from the available monitoring data. However, exceedances of APVs at MW5 could suggest the potential for impact. As discussed, copper levels in MW5 have regularly exceeded the APV. However, copper levels in the lake itself are much lower (generally non-detectable) and are well below the PWQO. Therefore, at the present time, there appears to be no cause to implement contingency measures (see below) to protect surface water quality, but ongoing monitoring is indicated.

8.1.3 **Landfill Gas**

Landfill gas has not been identified as an issue of concern at this site, and no monitoring for downwell methane levels has been conducted. There are no permanent enclosed structures on or in the immediate vicinity of the site that are considered to have the potential to accumulate landfill gases to potentially hazardous levels. Therefore, a contingency plan for landfill gas should not be required at this time.

8.2 **Contingency Plan Measures**

Based on the 2018 recommended attenuation zone boundaries, and using MW1 as a source well, some trigger level exceedances were noted. New monitoring wells are proposed at the west and south boundaries of the revised attenuation zone, and several new upgradient wells (both “source” and “trigger”) are also proposed; refer to Figure 6 in Appendix B.

Should future monitoring results indicate or predict exceedances of applicable criteria indicating possible unacceptable current or future impact beyond the (proposed) attenuation zone boundary, the data would first be scrutinized to ensure that they are valid and representative of actual conditions. It might be appropriate to require additional monitoring data before any decisions on remedial actions are made. If it is determined that an unacceptable risk of criteria exceedances downgradient of the landfill is present, the following measures could be undertaken to reduce leachate volumes and/or strength:

- The groundwater table beneath the waste pile could be lowered through ditching to intercept upgradient surface water and possible shallow groundwater inflow, and/or through other site drainage improvements.

- Landfill waste possibly buried below the groundwater table in some areas could be excavated and deposited above the water table, or alternatively moved to a different approved location.

- The amount and frequency of cover material applications could be increased.

- Lower permeability cover material could be used.

- Volumes of waste deposited in the landfill could be restricted and/or reduced through increased recycling efforts.

- If necessary, active leachate control (e.g., interception via a “French drain” system and redirection or capture for recirculation or treatment) could be implemented.

If the above measures are not successful, as a last recourse, the landfill could require premature capping and closure.

Additional details on contingency measures which would enable the particular nature of the potential impact to be assessed and properly addressed are found in the Updated Design and Operations Plan.

9 Summary and Conclusions

Similar to the previous report findings, the 2019 to 2021 monitoring results continue to confirm that leachate with concentrations of several potential indicator parameters exceeding ODWS criteria is being generated at the site.

The groundwater flow direction on the site appears to be southwest, and the “source well” MW1, is located north of the waste footprint, and appears to be more cross-gradient than downgradient of the waste footprint, especially considering that the current waste placement is even further east and south of MW1. Monitoring well MW5, located roughly 100 m south and downgradient of the waste footprint, generally had the highest concentrations of parameters, with the exception of salt indicators (conductivity, TDS, sodium, chloride) which were highest at MW3 (attributable to salting of Highway 584).

Based on the current property boundary, wells MW3 and MW5 are located at/near the west and south boundaries, respectively, and RUP criteria are currently most applicable to results for these wells. Again similar to the previous report findings, RUP criteria exceedances at MW3 included TDS, sodium and chloride, all of which are likely attributable to road salting and not landfill leachate. RUP criteria exceedances at MW5 appear to be from landfill leachate and include TDS, DOC, organic nitrogen, alkalinity, manganese and vinyl chloride. However, it should be noted that well MW5 is located about 325 m from the recommended expanded attenuation zone boundary, and, as such, RUP criteria would no longer be applicable to this well in future.

Surface water results from SW1 (small un-named lake south of landfill), indicated no PWQO exceedances during the current reporting period. Historical exceedances for phenols and iron were noted during the fall 2018 sampling event, however, given that both phenols and iron have been generally undetectable at MW5, leachate impact is unlikely to be responsible for the fall 2018 exceedances at SW1. It is more likely that these historical exceedances are anomalous; as phenols and iron levels have been below laboratory detection limits since the 2018 exceedances.

Groundwater concentrations at MW5 were also compared to APV criteria, with copper exceeding the APV criterion during all sampling events; no other exceedances were noted. However, copper levels in the lake itself are much lower (generally non-detectable) and are well below the PWQO.

The results of the trigger calculations indicated potential exceedances of RUP criteria at the west and south boundaries of the 2018 recommended attenuation zone (note that neither the initial 2014 recommended attenuation zone nor the expanded 2018 recommended attenuation zone have been officially approved by the MECP). The trigger exceedances at MW5, which include TDS, DOC, organic nitrogen, alkalinity, and manganese, appear to be attributable to landfill leachate; however, the location of MW5, in EXP’s opinion, could be considered a “source well” based on its location relative to the waste footprint (roughly 100 m south and downgradient) and also considering that concentrations at this well were generally higher than

MW1 (“source well”). A well further downgradient of MW5 would likely provide more realistic trigger levels. The trigger exceedance for TDS at MW3 is attributed to highway salting rather than landfill leachate.

Using an average annual waste volume and interim cover of 1,000 m^3 per year (or 3,000 m^3 per reporting period), as discussed in Section 5.1, the estimated volume on site as of December 31, 2021 is about 59,000 m^3, which represents about 50% of the approved 118,600 m^3. Based on an estimated annual waste and cover material volume deposition rate of 1,000 m^3/yr., it is estimated that the landfill will reach capacity in about 60 years (2081). The next updated contour survey will be provided with the Environmental Quality Monitoring Tri-Annual Report for the years 2022, 2023, and 2024 (due April 2025).

10 Recommendations

The following recommendations remain largely unchanged from the previous report.

- Following its review of the draft Updated Design and Operations Plan, and Initial Hydrogeological Evaluation report, the MECP recommended that the Municipality proceed with the submission of an application to amend the ECA. The current report should be included as supporting documentation.

- Upon approval from the MECP regarding the revised (2018) attenuation zone boundaries (see Figure 6), where the Municipality does not own lands within the attenuation zone, these lands should either be procured from the current owner(s) (e.g., MNDMNRF, private) or written authorization to use the lands as attenuation lands should be obtained.

- In general, the analytical program should be continued in 2022 to 2024, with the next report due April 2025.

- A total of six (6) new monitoring wells are recommended. The new monitoring wells include one new source well (MW7, as recommended by the MECP), one proximate well located northeast of the small un-named lake (MW6, as recommended by the MECP), two trigger wells (MW8 and MW9), and two wells located at the 2018 revised recommended attenuation zone south and west boundaries (MW10 and MW11). The proposed well locations are shown on Figure 6.

- The Municipality should increase waste diversion and recycling activities to the extent possible/practical.

- The Municipality should seek MECP approval to operate an annual (summer) HHW depot at the site.

- An updated topographic survey, including ground surface and top of pipe elevations at the monitoring wells (including the new wells), as well as top of water at the small un-named lake should be conducted near the end of the next monitoring period (i.e., summer/fall 2024).

11 Closing Comments

This report has been prepared for and is intended for the use of the client (Municipality of Greenstone) and the MECP (for compliance assessment). The contents of this report may not be reproduced in whole or in part, or used or relied upon in whole or in part by any other party for any purpose whatsoever without the expressed written consent of EXP. Any use which a third party makes of this report, or any reliance on or decision made based on it, is the sole responsibility of such third party and EXP accepts no responsibility for any damages of any kind or nature whatsoever, suffered by any other third party as a result of decisions made or actions based upon this report. The findings are relevant for the date(s) of the investigation and should not be relied upon to represent conditions of other dates.

This report provides certain information concerning the results of the 2019 to 2021 groundwater and surface water monitoring program at the Nakina Landfill, as described herein. It is based on an authorized scope of work. Professional judgement was exercised in gathering and interpreting the information obtained and in the formulation of conclusions.

Conclusions regarding site conditions are based on observations of current and historical conditions and the results of limited chemical analyses. The groundwater and surface water results are only directly applicable to the actual locations sampled, and conditions could differ in areas not tested. Substances could also exist in forms not indicated by the limited analytical testing conducted. Additionally, the scope of work was based, in part, on rules and regulations that we understand to be current or expected at the time of the work. Changes in regulations, interpretations and/or enforcement policies may occur in the future. Such changes could be reflected in the degree of remediation actually required, if any, at the time of the action.

If additional relevant information becomes available concerning this site, such information should be provided to EXP so that our report may be reviewed and modified as necessary. EXP accepts no responsibility for the consequential effects of this factual report on the real or perceived value of this site, or on the ability to sell, finance or insure the property.

All reports, field data, notes, laboratory test data, calculations, estimates and other documents which are communicated by EXP to the client or third parties, are instruments of service and will be retained by EXP. These records will be stored in our files for a period of 10 years following submission of the final report, during which time they will be made available to the client, at all reasonable times, for review.

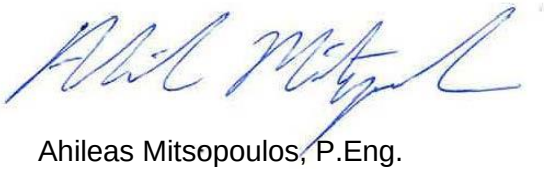
EXP has conducted the services reported herein in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practising in the same locality and under similar conditions as this project. No other representation, expressed or implied, is included or intended in this document.

We trust that this report is satisfactory for your present requirements. Should you have any questions, please contact the undersigned at your convenience.

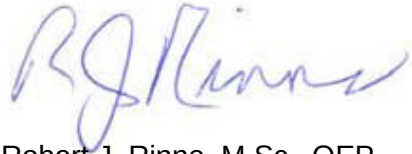
Yours truly,

EXP Services Inc.

Kole Pitkanen, B.Eng.
Engineering Technician



Ahileas Mitsopoulos, P.Eng.
Project Engineer



Robert J. Rinne, M.Sc., QEP
Senior Scientist

Demetri N. Georgiou, MASc., P.Eng.
Principal Engineer/Branch Manager

APPENDIX A –

Regulatory Documentation and Correspondence

Ahileas Mitsopoulos

From: Holenstein, Monika (MECP) <Monika.Holenstein@ontario.ca>
Sent: Friday, March 15, 2019 12:12 PM
To: Ahileas Mitsopoulos
Cc: Brian Aaltonen; Voca, Bryce (MECP)
Subject: Nakina WDS Design and Operations Plan

Ahileas

I apologize for the delay in responding to your request for comments on the April 2015 Draft Design and Operations Plan for the Nakina Landfill.

I have reviewed the Draft Design and Operations Plan and generally concur with the information as submitted. It will be a positive step for the Municipality to receive an amended ECA and have an operations plan that will ensure the orderly and efficient use of the site for many years. I have compared the Draft Design and Operations Plan to standard conditions on updated ECA's for Greenstone's other waste site. Based on this, I offer the following comments on the Draft Design and Operations Plan as well as more generally on the ECA amendment applications:

- It is my understanding that the theoretical capacity determination and ground/surface water monitoring plans have been accepted by the MECP through separate submissions and will be included in the ECA application plan;
- Please ensure that the "area of service" in the application and in the operating plan allows for the Municipality to accept waste from nearby indigenous communities (i.e. Aroland) as well as from surrounding areas such as Ring of Fire associated developments (eg road development in unorganized areas, exploration camps, etc).
- Please ensure the Design and Operations Plan includes the requirement clearly define the boundaries of the limit of waste by installing permanent markers that can be visible year-round as well as markers which clearly define the boundaries of the fill area to be used for waste disposal over the following year by installing markers visible to Site operators. If any of the development is to go above grade, markers indicating maximum height should be installed
- The annual report should include confirmation that required groundwater/surface water sampling programs have been completed as required by the ECA.
- The Design and Operations report should include requirements for initial and ongoing training for operators with respect to the following: the Approval and conditions attached to the Approval, conceptual design and operations; relevant waste management regulations and legislation; environmental concerns related to the waste being handled at the Site; occupational health and safety concerns pertaining to the waste being handled at the Site; fire fighting protocol; and emergency and contingency measures for the preventing of off-site impacts.
- I suggest the working area of the trench be minimized, to minimize the area requiring weekly cover. The Design and Operations Plan should provide guidance on this - for example, a 20 m section of the trench would be flagged so that waste is deposited in that section only. Consideration could be given to only opening up a smaller area of trench as needed. The 40 m trench presents an overly large working area with greater risk of windblown litter and wasted capacity due to requirement for weekly cover.
- The Design and Operations Plan should explicitly require compaction prior to cover to ensure maximum waste capacity. Waste shall be deposited in a manner that minimizes the area of exposed waste at the working face and shall be compacted before cover material is applied.

- The Design and Operations Plan should recommend more specific actions to control litter (eg. all practical steps should be taken to prevent the escape of litter from the Site. Periodic pick-up of litter at the Site and along roads in the vicinity of the Site shall be carried out as required, or every two weeks as a minimum. Property adjacent to the Site shall be inspected weekly and litter shall be collected if necessary, with permission of access from the property owner. Litter fencing shall be erected around the working area of the landfill. Etc).
- The "Burning of Solid Waste" section should include the requirement that if the clean wood/brush pile is to be burned, attendants must ensure that only brush and unpainted/untreated wood can be placed in that area. Previous inspections have identified issues with other waste types being deposited in the wood pile (mattresses, shingles, painted wood, etc). Prior to burning, any non clean wood waste must be removed.
- There should be a section on signage including entrance gate sign (with owner's name; Operator's name; Approval Number; Applicable Municipal By-Laws; The hours of operation; and Municipal government contact telephone number to call with complaints or in the event of an emergency) as well as signage for various waste deposition/disposal area (household waste, tires, batteries, recycling, scrap metal, clean wood waste, etc).
- Greenstone should give consideration to installing and maintaining an electric fence around the perimeter of the active disposal area to eliminate access for bears.

Please do not hesitate to contact me if you have any questions regarding the above comments or the path forward to amend the ECA. It is the MECP's expectation that you will proceed with the application to amend the ECA as soon as possible.

Monika

Monika Holenstein
Sr. Environmental Officer
Thunder Bay District
Ministry of the Environment, Conservation and Parks
435 James St. S., Suite 331
Thunder Bay, Ontario
P7E 6S7
(807)475-1699
E-mail: Monika.Holenstein@ontario.ca

Ahileas Mitsopoulos

From: Holenstein, Monika (MOECC) <Monika.Holenstein@ontario.ca>
Sent: Wednesday, February 15, 2017 10:40 AM
To: Ahileas Mitsopoulos; brian.aaltonen@greenstone.ca
Subject: FW: Nakina Landfill - Initial Hydrogeological Evaluation

Ahileas, Brian

Thanks for bringing to my attention that my email below did not address the sampling timing for the Nakina waste disposal site, which was the request in the original email! My apologies.

In the Initial Hydrogeological Evaluation for the Nakina site, you had recommended that the monitoring report be submitted after three years of sampling (i.e. six sampling events) with the first sampling event being conducted in the spring of 2015, as such the report would be submitted by April 2018. Since the first round of sampling was conducted in the fall 2016, you have requested that the first monitoring report be submitted by April 2019. This would allow 2.5 years of sampling (5 sampling events) rather than 1.5 years of sampling (3 sampling events) if the report is due April 2018 (originally proposed date).

The MOECC concurs with this approach and agrees that the first monitoring report should be submitted by April, 2019.

I will provide a letter from the District Manager regarding the monitoring changes at all of the sites in the next few months.

Please contact me if you have any concerns.

Monika

Monika Holenstein
Sr. Environmental Officer
Thunder Bay District
Ministry of the Environment and Climate Change
435 James St. S., Suite 331
Thunder Bay, Ontario
P7E 6S7
(807)475-1699
E-mail: Monika.Holenstein@ontario.ca

From: Holenstein, Monika (MOECC)
Sent: December 08, 2016 5:43 PM
To: Ahileas Mitsopoulos
Cc: brian.aaltonen@greenstone.ca; Stajkowski, Drew (MOECC)
Subject: RE: Nakina Landfill - Initial Hydrogeological Evaluation

Hi Ahileas – you've been very patient! Sorry for the delays – crazy busy!

On the Geraldton site - I did get a verbal ok from our hydrogeologist and we concur the intent is for every 3 year reporting – next one due in 2019. I can give you something more formal on that from the District Manager in the New Year.

I have had a quick look at the Beardmore D and O plan and generally, it looks reasonable. A few specific comments:

- The service area should be specified. I assume the Municipality of Greenstone, but may want to include some additional surrounding townships?

- Should have a section on signage.

- The Plan does not contain too much detail on operating areas – just south pit to be filled (estimated by January 2017), then north pit, then site closed.

- The operating plan should note that waste fill boundaries and final contours will be clearly marked and updated on an annual basis as needed.

- Litter Control section should outline what measures to be taken (i.e. snow fencing around working area, regular litter pick up, etc).

- Record Keeping section only requires records of industrial/commercial loads – should also have residential loads.

- Should include more detailed information on operator training – what will be included in the training (can get this from Longlac/Geraldton C of A's).

- In the burning of waste section – operating plan should require an area be established for brush and clean waste only (no painted or treated wood) and signed to ensure only appropriate woodwaste is burned.

- The notes on Figures 7 and 8 (grading and waste placement) should make it into the text of the report in the appropriate sections as they provided detail on how the development/closure will occur.

- The last inspection noted: *At the time of inspection, it was suggested to the municipality that this area could be better organized - with signs clearly indicating where drained fridges/freezers were to be kept versus those still to be drained.* Perhaps the Operating Plan should provide information on how the fridge/freezer area could be set up?

- The MOECC hydrogeologist had previously commented: *I concur with the consultant's recommendations regarding the size and location of the CAZ, as well as the recommendations for the monitoring program. The contingency plan provides a reasonable selection of contingency measures, but needs to be more specific on how contingency measures might be triggered. Specifically, a plan which references the monitoring program and applicable assessment criteria to establish trigger criteria for actions should be developed. With respect to the consultant's recommendations regarding cover for the final closure, the prescribed design may be warranted with respect to the current understanding of potential leachate impacts. However, a contingency which provides for a low permeability cap is needed if at closure (or beyond) the leachate concentrations increase to levels that are indicative of off-site*

impacts. It is recommended that the closure plan will need to be reviewed and details updated closer to the actual closure of the site."

I suggest you proceed with the ESR to increase the capacity. The current Certificate of Approval is clearly not appropriate for the current use at site and must be updated. Once in the ECA amendment process is underway, an updated D and O plan could be submitted and any final comments could be made at that time.

Please note as you proceed with ESR for improved capacity, that recent discussions with BZA (Rocky Bay) and the Department of Indigenous and Northern Affairs indicated that there is some interest in BZA to bring waste from that community to the Beardmore site.

Again, sorry for the delay,

Monika

Monika Holenstein
Sr. Environmental Officer
Thunder Bay District
Ministry of the Environment and Climate Change
435 James St. S., Suite 331
Thunder Bay, Ontario
P7E 6S7
(807)475-1699
E-mail: Monika.Holenstein@ontario.ca

From: Ahileas Mitsopoulos [mailto:ahileas.mitsopoulos@exp.com]
Sent: December 08, 2016 11:44 AM
To: Holenstein, Monika (MOECC)
Subject: RE: Nakina Landfill - Initial Hydrogeological Evaluation

Hi Monika,

Just wanted to follow-up again about this, as well as the clarification/issues at the Geraldton LF and Beardmore LF.

As a reminder,

Geraldton LF - ECA indicates report due in March 2017 but we provided a report in March/April 2016 for a three year period (2013, 2014 and 2015). We suspect the ECA intended March 2016. Please confirm that the next monitoring report for the Geraldton LF is due March 2019 (for the years 2016, 2017 and 2018).

Beardmore LF – The Beardmore LF likely reached 90% capacity in mid 2016. As such, a Closure Plan needs to be started but we discussed that **exp** would prepare an Environmental Screening Report to increase the capacity of the landfill to 100,000 m3. To do this we are still waiting for comments on the revised draft D&O Plan which was submitted in February 2016.

Thank you,

Ahileas Mitsopoulos, P.Eng. | exp
Project Engineer

exp Services Inc.
t: +1.807.623.9495 x223 | m: +1.807.620.6306 | e: Ahileas.Mitsopoulos@exp.com
1142 Roland Street
Thunder Bay, ON P7B 5M4
CANADA
exp.com | legal disclaimer
keep it green, read from the screen

From: Ahileas Mitsopoulos
Sent: Monday, November 28, 2016 10:20 AM
To: 'Holenstein, Monika (MOECC)' <Monika.Holenstein@ontario.ca>
Cc: 'Stajkowski, Drew (MOECC)' <Drew.Stajkowski@ontario.ca>; 'Brian Aaltonen' <brian.aaltonen@greenstone.ca>; Demetri Georgiou <demetri.georgiou@exp.com>; Rob Rinne <Rob.Rinne@exp.com>; 'Katherine Alton' <katherine.alton@greenstone.ca>
Subject: RE: Nakina Landfill - Initial Hydrogeological Evaluation

Hi Monika,

Just wanted to follow-up on this. Any word?

Thank you,

Ahileas Mitsopoulos, P.Eng. | exp
Project Engineer
exp Services Inc.
t: +1.807.623.9495 x223 | m: +1.807.620.6306 | e: Ahileas.Mitsopoulos@exp.com
1142 Roland Street
Thunder Bay, ON P7B 5M4
CANADA
exp.com | legal disclaimer
keep it green read from the screen

From: Ahileas Mitsopoulos
Sent: Monday, November 14, 2016 11:58 AM
To: 'Holenstein, Monika (MOECC)' <Monika.Holenstein@ontario.ca>
Cc: Stajkowski, Drew (MOECC) <Drew.Stajkowski@ontario.ca>; Brian Aaltonen <brian.aaltonen@greenstone.ca>; Demetri Georgiou <demetri.georgiou@exp.com>; Rob Rinne <Rob.Rinne@exp.com>; 'Katherine Alton' <katherine.alton@greenstone.ca>
Subject: RE: Nakina Landfill - Initial Hydrogeological Evaluation
Importance: High

Hi Monika,

Based on the comments below regarding the Initial Hydrogeological Evaluation of the Nakina Landfill, we conducted our first sampling event this fall at the landfill.

In the Initial Hydrogeological Evaluation, we recommended that the monitoring report be submitted after three years of sampling (i.e. six sampling events) with the first sampling event being conducted in the spring of 2015, as such the report would be submitted by April 2018. Since the first round of sampling was conducted in the fall 2016, we request that the first monitoring report be submitted by April 2019. This would allow 2.5 years of sampling (5 sampling events) rather than 1.5 years of sampling (3 sampling events) if the report is due April 2018 (originally proposed date).

Please advise if the first monitoring report submitted by April 2019 is acceptable.

Thank you,

Ahileas Mitsopoulos, P.Eng. | exp
Project Engineer
exp Services Inc.
t: +1.807.623.9495 x223 | m: +1.807.620.6306 | e: Ahileas.Mitsopoulos@exp.com
1142 Roland Street
Thunder Bay, ON P7B 5M4
CANADA

From: Holenstein, Monika (MOECC) [mailto:Monika.Holenstein@ontario.ca]
Sent: Monday, October 17, 2016 2:12 PM
To: Brian Aaltonen <brian.aaltonen@greenstone.ca>; Ahileas Mitsopoulos <ahileas.mitsopoulos@exp.com>
Cc: Stajkowski, Drew (MOECC) <Drew.Stajkowski@ontario.ca>
Subject: FW: Nakina Landfill - Initial Hydrogeological Evaluation

Brian, Ahileas
Below find the comments from the MOECC Hydrogeologist regarding the Initial Hydrogeological Evaluation – Nakina Landfill. No comments yet from MOECC Approvals Branch on the theoretical capacity work, but hopefully the application to amend ECA can move ahead....

Monika

Monika Holenstein
Sr. Environmental Officer
Thunder Bay District
Ministry of the Environment and Climate Change
435 James St. S., Suite 331
Thunder Bay, Ontario
P7E 6S7
(807)475-1699
E-mail: Monika.Holenstein@ontario.ca

From: Haslam, Simon (MOECC)
Sent: September 22, 2016 4:25 PM
To: Holenstein, Monika (MOECC)
Subject: Nakina Landfill - Initial Hydrogeological Evaluation

Ms. Holenstein,

I have completed a preliminary review of the groundwater-related portions of the report prepared by exp Services Inc., "*Municipality of Greenstone – Initial Hydrogeological Evaluation – Nakina Landfill – Nakina, Ontario,*" dated March 16, 2015. In general the report is reasonable and I am in agreement with the proposed actions moving forward. It is apparent that the site is not currently in compliance with Guideline B-7 ("*Incorporation of the Reasonable Use Concept into MOEE Groundwater Management Activities*", dated April 1994, as amended). However, the consultant has made recommendations to attempt to bring the site into compliance, which involves expansion of the contaminant attenuation zone (CAZ). Based on the initial evaluation, the consultant has provided the following recommendations.

1. Consideration of installation of an additional monitoring well in the future should monitoring results suggest the need.
2. Establishment of a surface water sampling location in the unnamed lake within the proposed CAZ.

3. Twice annual sampling of 5 monitoring wells and the surface water location with analyses for the Schedule 5 comprehensive list of parameters.
4. Submission of a monitoring report to the Ministry of the Environment and Climate Change (MOECC) once every 3 (three) years, with the first report due by April 30, 2018.
5. Reassessment of the monitoring program after 3 (three) full years of data have been obtained.
6. Future reports should include an assessment of compliance with Guideline B-7.

I concur with all of these recommendations. I note that since there is a surface water receiver within the proposed CAZ, it will be necessary to assess impacts to surface water using appropriate guidelines. Such an assessment, with appropriate guidelines, should be provided in future monitoring reports.

The proposed contingency plan appears reasonable. The consultant notes that the plan will be updated as additional monitoring results are collected and analysed. This method is reasonable and I suggest that a revised contingency plan be provided and assessed in the next monitoring report.

In summary:

- The site is not currently in compliance with Guideline B-7.
- The consultant has recommended actions to bring the site into compliance, including a proposed CAZ expansion.
- I provide the following recommendations related to groundwater:
    - The proposed CAZ expansion should be pursued and finalized as soon as is reasonable to attempt to bring the site into compliance with Guideline B-7.
    - The recommendations proposed by the consultant shall be implemented as soon as is reasonable, including twice annual monitoring and reporting once every 3 (three) years, with the first report due to the MOECC by April 30, 2018.
    - Appropriate guidelines shall be included in all future monitoring reports to assess potential impacts to the surface water receiver within the proposed CAZ expansion.
    - A revised contingency plan shall be provided and assessed in the next monitoring report.

If you have any questions regarding the above comments and recommendations, do not hesitate to contact the undersigned. The purpose of the preceding review is to provide advice to the MOECC regarding groundwater conditions based on the information provided in the above referenced documents. The conclusions, opinions and recommendations of the reviewer are based on the information provided by others, except where otherwise specifically noted. The MOECC cannot guarantee that the information that has been provided by others is accurate or complete. A lack of specific comment by the reviewer is not to be construed as endorsing the content or views expressed in the reviewed material.

Sincerely,
Simon

--

Simon R. Haslam, MASc, P.Eng. | Regional Hydrogeologist | 807.475.1428 | Ontario Ministry of the Environment and Climate Change | Northern Region Technical Support

Ahileas Mitsopoulos

From: Holenstein, Monika (MOECC) <Monika.Holenstein@ontario.ca>
Sent: Monday, October 17, 2016 2:12 PM
To: Brian Aaltonen; Ahileas Mitsopoulos
Cc: Stajkowski, Drew (MOECC)
Subject: FW: Nakina Landfill - Initial Hydrogeological Evaluation

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Monika

Monika Holenstein
Sr. Environmental Officer
Thunder Bay District
Ministry of the Environment and Climate Change
435 James St. S., Suite 331
Thunder Bay, Ontario
P7E 6S7
(807)475-1699
E-mail: Monika.Holenstein@ontario.ca

From: Haslam, Simon (MOECC)
Sent: September 22, 2016 4:25 PM
To: Holenstein, Monika (MOECC)
Subject: Nakina Landfill - Initial Hydrogeological Evaluation

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Sincerely,
Simon

--

Simon R. Haslam, MASc, P.Eng. | Regional Hydrogeologist | 807.475.1428 | Ontario Ministry of the Environment and Climate Change | Northern Region Technical Support

Ministry of the Environment, Conservation and Parks

435 James Street South
Suite 331
Thunder Bay ON P7E 6S7
Tel.: (807) 475-1546
Fax: (807) 475-1754

Ministère de l'Environnement, de la Protection de la nature et des Parcs

435, rue James sud
Bureau 331
Thunder Bay ON P7E 6S7
Tél. : (807) 475-1546
Téléc.: (807) 475-1754

October 11, 2018

M E M O R A N D U M

TO: Mike Landers
Senior Environmental Officer
Drinking Water and Environmental Compliance Division
Thunder Bay District Office

FROM: Shannon Heggie
Hydrogeologist
Technical Support Section
Drinking Water and Environmental Compliance Division
Thunder Bay Northern Region Office

RE: 2015 Design and Operations Plan
Nakina Landfill
Nakina, Municipality of Greenstone, Ontario
ECA #A591901

Introduction and Purpose

As requested, I have reviewed the groundwater-related portions of the report prepared by exp Services Inc. (the consultant), entitled: *Municipality of Greenstone, Design and Operations Plan, Nakina Landfill, Municipality of Greenstone, Ontario*, dated April 22, 2015.

The following resources were referenced for background site information:

- Exp letter: *Re: Certificate of Approval No. A591901, Nakina Waste Disposal Site, Municipality of Greenstone, District of Thunder Bay, EXP Ref. No. THB-00011119-FE*, prepared by Ahileas Mitsopoulos (Project Engineer) and Demetri Georgiou

(Principal Engineer/Branch Manager), sent to Mohsen Keyvani (Ministry of the Environment, Environmental Approvals Branch), dated January 3, 2018;

- Ministry of the Environment and Climate Change e-mail: *Nakina Landfill – Initial Hydrogeological Evaluation*, prepared by Simon Haslam (Regional Hydrogeologist), sent to Monika Holenstein (Senior Environmental Officer), dated September 22, 2016 4:24pm; and

- *Municipality of Greenstone, Initial Hydrogeological Evaluation, Nakina Landfill, Nakina, Ontario*, prepared by exp Services Inc., dated March 16, 2015.

Due to the inclusion of Small Lake in the proposed contaminant attenuation zone, and the proposed surface water monitoring station, I have forwarded this review to the Surface Water Team Leader for surface water review.

Background

The Nakina municipal landfill (the site) is located ~100 m south of Highway 584, and ~2 km south of the town of Nakina, in the Municipality of Greenstone, Ontario. The site began operations in ~1962. The site has an approved fill area of 5 ha within a total site area of 19.3 ha. In 2014, the fill area was ~3.8 ha. The current Environmental Compliance Approval for the site (ECA #A591901) authorizes disposal of domestic, non-hazardous solid waste and sewage sludge. In 2015, based on the estimated landfill capacity (128 550 m^3), the remaining site life span was estimated at ~75 years.

Topography in the vicinity of the site is rolling, with an abrupt rise at the eastern end of the site. The nearest surface water resource is Small Lake, located ~150 m south of the active fill area. Surface drainage is anticipated towards the west and a marshy area, and south towards Small Lake. Interpreted drainage from Small Lake is towards the west and a lake/wetland area, located ~750 m west of Small Lake. Subsurface soils are composed of sandy overburden on bedrock. Bedrock occurs at depths of 3 m along the north property limit to 17 m along the east property limit. Groundwater occurs at depths of 4.25-16.6 m. Groundwater flow is bedrock controlled and is interpreted as towards the southwest. Ministry data sources indicate that there are no registered active private water supply wells within 1 km of the site.

Discussion and Recommendations

Monitoring Program

The consultant proposed a bi-annual (spring and fall) groundwater and surface water monitoring program, with analyses for the Comprehensive parameters listed in Schedule 5 of the Landfill Standards Guideline. Groundwater monitoring locations include five (5) monitoring wells: MW1, MW2, MW3, MW4 and MW5.

It is my understanding that a monitoring report presenting and interpreting the available historical and current data will be prepared and submitted to the Ministry every three (3) years, with the first report due by April 30, 2019.

- It is recommended that the consultant preparing the groundwater and surface water monitoring report due in April 2019, references the following document during the report preparation: *Monitoring and Reporting for Waste Disposal Sites, Groundwater and Surface Water, Technical Guidance Document, Ministry of the Environment, Operations Division, November 2010.* I have sent a PDF copy of this document to Mike Landers (Senior Environmental Officer) for distribution.

Contaminant Attenuation Zone

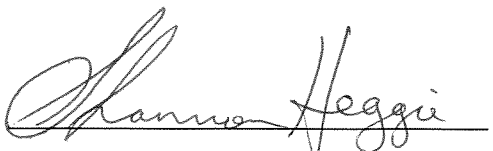
The consultant proposed a contaminant attenuation zone, expanding the site area to ~41 ha. The contaminant attenuation zone would extend south of the current property boundaries and includes Small Lake.

- The inclusion of Small Lake within the proposed contaminant attenuation zone is a concern with respect to potential impacts on surface water quality. Monitoring well MW5 (located ~40 m up-gradient from Small Lake) recorded exceedances of the calculated B-7 criteria for TDS, DOC, alkalinity, manganese and mercury in September 2014. Groundwater seepage/flow at the site was estimated at ~1 m/day. Based on this information and the remaining lifespan of the site (~75 years), it is recommended that the surface water monitoring program for Small Lake is reviewed by a MECP Surface Water Specialist.

- Considering the limited groundwater elevation data for the site and the proximity of Small Lake, it is recommended that additional down-gradient monitoring wells are installed northwest and northeast of Small Lake; between MW3 and MW5, and MW4 and MW5, respectively.

Closure

If you have any questions regarding the above comments and recommendations, do not hesitate to contact me. The purpose of the preceding review is to provide advice to the Ministry of the Environment, Conservation and Parks regarding groundwater and subsurface soil conditions based on the information provided in the above referenced documents. The conclusions, opinions and recommendations of the reviewer are based on information provided by others, except where otherwise specifically noted. The Ministry cannot guarantee that the information that has been provided by others is accurate or complete. A lack of specific comment by the reviewer is not to be construed as endorsing the content or views expressed in the reviewed material.



Shannon Heggie, M.Sc., P.Geo.
Hydrogeologist

c: Todd Kondrat (Surface Water Team Leader, MECP Northern Region)
Shannon Innis, Water Resources Supervisor, MECP Northern Region

File: SI TB NA H643 610, NAKINA, ZONE 16 MAP 42L2, NAKINA TWP OF, A591901, DOMESTIC

(U:\3_Landfills\Nakina_Municipal_Landfill\2015_Nakina_Municipal_Landfill_Design_&_Ops_Report_GW_Review_111018_SH_FINAL.doc)

Ministry of the Environment, Conservation and Parks
Investigations and Enforcement Branch
Thunder Bay District Office
331-435 James St S
Thunder Bay ON P7E 6S7
Fax: (807) 475-1777
Tel: 807 475 1418

Ministère de l'Environnement, de la Protection de la nature et des Parcs
Direction des enquêtes et de l'application des lois
Bureau du district de Thunder Bay
331-435 rue James S
Thunder Bay ON P7E 6S7
Télécopieur: (807) 475-1777
Tél 807 475 1418

Ontario

September 19, 2018

The Corporation of the Municipality of Greenstone
1800 Main St
Geraldton, Ontario, P0T 1M0
Canada

Dear Sir/Madam

RECEIVED
SEP 25 2018
The Corporation of the Municipality of Greenstone

RE: Nakina Waste Disposal Inpsection
Greenstone, District of Thunder Bay

Reference Number 8243-B45PES

Thanks for taking the time for the site inspection in regards to the Waste Disposal activities at the Nakina Waste Disposal Site.

Please review the reports for your files. Action items identified in Section 5.0 Action Required must be addressed by the assigned dates. If the deadlines cannot be met, the Owner must inform the under signed Environmental Officer five (5) days prior to the deadline date for consultation on the possible extension of these deadlines.

If you have any further question please do not hesitate to contact the undersigned Environmental Officer.
Yours truly,

Mike Landers
Investigations Officer
IEB Thunder Bay District

File Storage Number: TB NA HWY584 610

Ontario

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

Solid Non-Hazardous Waste Disposal Site Inspection Report

Client:	The Corporation of the Municipality of Greenstone Mailing Address: 1800 Main St, Post Office Box, 70, Geraldton, Ontario, Canada, P0T 1M0 Physical Address: 1800 Main St Geraldton, Greenstone, Municipality, District of Thunder Bay, Ontario, Canada, P0T 1M0 Telephone: (807)854-1100, Extension: 2060, FAX: (807)854-1150, email: brian.aaltonen@greenstone.ca Client #: 0380-4TKQAV, Client Type: Municipal Government, NAICS: 913910 Additional Address Info: Geraldton		
Inspection Site Address:	Nakina Landfill Site Address: South of Highway 584 2 Miles west of Nakina Townsite, Greenstone, Municipality, District of Thunder Bay District Office: Thunder Bay - District Site #: 3596-9N8GW2		
Contact Name:	Jean Noel Chain	**Title:**	Nakina Operations Supervisor
Contact Telephone:	(807)329-5361 ext	**Contact Fax:**	
Last Inspection Date:	2015/11/05		
Inspection Start Date:	2018/08/28	**Inspection Finish Date:**	2018/09/13
Region:	Northern		

1.0 INTRODUCTION

The purpose of this inspection is to assess compliance with Ministry of Environment, Conservation and Parks (MECP) legislation, specifically Regulation 347 and the waste management provisions of the Environmental Protection Act. The inspection consisted of a review of files and reports, as well as a site visit on August 28, 2018.

The Nakina Waste Disposal Site is owned and operated by the Municipality of Greenstone and serves the community of Nakina with a population of less than 400 people. The site is located on the east side of Hwy 584 approximately 3 km south of the Nakina town site.

The site appears to have been initially approved in 1972 and is currently operating under a Environmental Compliance Approval A591901, dated January 8, 1990.

The site was last inspected in the fall of 2015 and there were a number of actions required as a result of that inspection

2.0 INSPECTION OBSERVATIONS

Certificate of Approval Number(s):
The site appears to have been initially approved in 1972 and is currently operating under a ECA A591901 dated January 8, 1990.

In 2011, the Municipality provided a site survey and assurances that the site had not gone outside of the approved boundaries, but the survey did show that minimum buffers were not being met and that waste had been placed within an area that was required for buffers.

In May, 2012, MOECC provided a presentation to the Municipality of Greenstone council which highlighted that the Nakina site needed to amended the Certificate of Approval to address the inability of the current site to meet required buffers, the lack of a contaminant attenuation zone and the lack of an operational plan for the site. At that time there did not appear to be a clear plan of how the site would be developed and operated (eg. what areas are to be filled in what timeframe).

In August, 2014, the Municipality provided a letter to the MECP Approvals Branch outlining their approach for estimating theoretical capacity. Approvals Branch has not yet provided comments on this document.

In April, 2015, the consultant working with the Municipality provided a draft Design and Operations Plan to the Thunder Bay District for review. At the time of the inspection, it appeared that the Municipality is operating within the Design and Operations Plan.

The Municipality has yet to submit an application to amend the Enviromental Compliance Approval for the required extention for the attenuation zone for the site as previoulsy requested by the Ministry of Environment ,Conservation and Parks. The Municipality is wating for the written response to the Draft Design and Operations Plan.

2.1 FINANCIAL ASSURANCE:

Specifics:
Financial Assurance is not required for municipal waste disposal sites.

2.2 APPROVED AREA OF THE SITE:

Specifics:
The Environmental Compliance Approval is for the use and operation of a 5 hectare landfilling site with site area of 20 hectares. The site was surveyed in early 2011 in response to the previous MECP's inspec recommendations and in May, 2011 permanent markers at the outer limits of the fill area were establish markers will need to be refreshed as they were no longer identifiable at the time of the 2018 inspection. operation was also reviewed by the Municipality and their consultant and they concluded that there was remaining capacity at the site, however, the site did not comply with all required buffers. The Municipa required to apply for an amendment to the Environmental Compliance Approval to ensure the approval current design and operation at the site.

2.3 APPROVED CAPACITY:

Specifics:
The Environmental Compliance Approval does not specify an approved capacity. The Certificate of Approval approves an area of 5 hectares. In previous inspections the MECP identified the need to assess capacity of the site. In 2011, the Municipality had a consultant review existing approvals information and compared to actual site operation, The consultant determined that the site was generally still within approved operational limits. On August 7, 2014, the Municipality of Greenstone submitted a letter to Approvals Branch outlining their approach to calculating theoretical capacity of the site. The municipality concluded: "....the volume approved for placement at the Nakina Landfill site is 128,550 cubic meters".
On April 22, 2015 the Municipality Submitted their Design and Operation Plan for the Nakina Landfill site. It identified a current estimated volume of 53,000 cubic meters. Therefore providing an an estimated 75, 550 cubic meters.

The operator for the site explained the site receives roughly 1700 kg/month which roughly converts to 1.7 cubic meters/month.
The sawmill has resumed operation after being idle for roughly 10 years. It is expected that the monthly volume to the site is to increase slightly.

2.4 ACCESS CONTROL:

Specifics:
The site is in accordance with Reg 347 in regards to access as it is controlled by means of a locked gate and fencing. There is appropriate signage at the entrance to the site and there is an attendant on duty when waste is being disposed of. At the time of inspection, the site was closed.

Locked Gate

Access Signage

2.5 COVER MATERIAL:

Specifics:
At the time of inspection there was inadequate cover over the wastes at the west trench of the fill area. The operator did state that the equipment for the WDS was broken down for the last couple operating days for accepting waste. The operator was to receive the part and repair the equipment the shortly, which in turn he was going to compact and cover the waste.

uncovered waste

uncovered waste looking north east

The fill area to the west (large rectangular area running east/west) appears to be well organized and with adequate fill areas and cover material.

2.6 WASTE BURNING:

Specifics:
At the time of inspection there was no evidence of burning of waste at the site.

2.7 GROUNDWATER/SURFACEWATER IMPACT:

Specifics:

Although there was no obvious evidence of groundwater/ surface water impacts at the site, prior to 2014, there had not been any groundwater monitoring to determine whether or not the site was in compliance with the MECP's Reasonable Use Guideline. The Municipality employed a consultant to complete a groundwater evaluation in 2014. In 2015, Greenstone provided the MECP with Groundwater Evaluation for the Nakina Site. The report indicated that four groundwater monitoring wells had been installed in the fall of 2014 allowing for groundwater elevation contours to be established and groundwater flow direction determined. Groundwater flow has been determined to be from the site to the southwest. The initial groundwater study indicated reasonable use criteria may be exceeded on the southern site boundary and the attenuation zone should be extended to the south. The Municipality is preparing the second monitoring report, it is expected to be submitted by April 29, 2019.

The initial report provided recommendations to increase the dimensions of the attenuation zone to achieve compliance with the MECP's Reasonable Use criteria which MECP concurred in a letter (see section 6.0 for a copy of the letter to Monika Holenstein from Groundwater reviewer Simon Haslam).

In the 2015 inspection report it was identified that the MECP recommended that the Municipality proceed with an application to amend the Environmental Compliance Approval.

2.8 LEACHATE CONTROL SYSTEM:

Specifics:

There is no leachate control system required at this site as the site was designed and approved to be a naturally attenuating site. As discussed in Section 2.7 above, a recent Groundwater Evaluation has identified that the current attenuation zone is not adequate and must be expanded.

2.9 METHANE GAS CONTROL SYSTEM:

Specifics:

There is no methane gas control system required for this site. The consultant indicated that due to the small size of the site and permeable sand/gravel overburden in the area there is limited potential for methane gas production.

2.10 OTHER WASTES:

Specifics:

The site in generally well organized. Areas for depositing woodwaste, tires, electronics and scrap metal/white goods are all well signed and organized. There was a small amount of painted/treated wood in the wood pile. If the municipality intends to burn the untreated wood, painted/treated wood would first have to be removed.

E waste to be picked up by Pack Pros

Battery drop off area_then stored at main garage for Dutchak recycling pick up

Fridge drop off and tag area_to be picked by Dutchak Recycling

Tire drop area to be picked up by Licenced Operator with OTS.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

The outstanding issue identified in the last inspection report was for the Municipality to apply for an amendment to the Environmental Compliance Approval to ensure the approval reflects the current design and operation at the site.

The Municipality is awaiting for the review and comments of the Draft Design and Operation of the Nakina Lanfill site, as it is in part required for the application to amend ECA No. A591901 dated January 8, 1990.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?
No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?
No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?
No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?
Yes

Specifics:
The Municipality has submitted reports, which have been reviewed and commented by MECP groundwater Technical Support, which identifies for the requirements of a larger attenuation zone, the potential for environmental impact is noted. A second ground water report is being prepared by the Municipality for submission to the MECP for April 29,

2019. The ECA needs to reflect the recommendations for a larger attenuation zone and will required an amendment.
Was there any indication of minor administrative non-compliance?
No

Specifics:

5.0 ACTION(S) REQUIRED

By August 29, 2019 -

- Refresher work on the survey of the site,
- refresher of the markings for the fill boundaries,
- submitting groundwater studies and
- continue following the 2015 Draft Design and Operation plan until Ministry review is completed

All of the above requirements will ensure the operation of the site continues to comply with MOECP's legislation.

Also, work completed by the Municipality identified issues that require an amendment to the ECA (minimum buffer areas have not been maintained, the Municipality has developed a new Design and Operations Plan, and the consultant/MECP have identified need for an expanded Attenuation Zone at this site).

Also identified in the file review was a response from the MNRF stating that they will no longer be issuing an LUP for the site and that the Municipality begin the process to acquire the area required from the MNRF.

By August 29, 2019 - the Municipality is to submitted a progress report on acquiring the properties required for the Nakina Waste Disposal site and associated attenuation zone.

The Municipality shall proceed with submitting a complete application to amend the Environmental Compliance Approval # A591901 by August 29, 2019.

If the Municipality is unable to submit a complete application to the MECP approvals Branch located at 135 St Clair Ave W, Toronto, ON M4V 1P5, they are to contact the undersigned Senior Environmental Officer 5 working days prior to the deadline, for possible extensions of the required actions.

1. By August 29, 2019 -

   Refresher work on the survey of the site,
   refresher of the markings for the fill boundaries,
   submitting groundwater studies and
   continue following the Design and Operation plan

   All of the above requirements will ensure the operation of the site continues to comply with MOECP's legislation.

   Also, work completed by the Municipality identified issues that require an amendment to the Certificate of Approval (minimum buffer areas have not been maintained, the Municipality has developed a new Design and Operations Plan, and the consultant has identified need for an expanded Attenuation Zone at this site).

   Also identified in the file review was a response from the MNRF stating that they will no longer be issuing an LUP for the site and that the Municipality begin the process to acquire the area required from the MNRF.

   By August 29, 2019 - the Municipality is to submitted a progress report on acquiring the properties required for the Nakina Waste Disposal site and associated attenuation zone.

   The Municipality shall proceed with submitting a complete application to amend the Environmental Compliance approval # A591901 by August 29, 2019.

   If the Municipality is unable to submit a complete application to the MECP approvals Branch located at 135 St Clair Ave W, Toronto, ON M4V 1P5, they are to contact the undersigned Senior Environmental Officer 5 working days prior to the deadline, for possible extensions of the required actions.

6.0 OTHER INSPECTION FINDINGS

Below is the last reviewed and commented on report by the Ministry of Environment, Conservation and Parks in regar submitted March 2015 report from the Municipalities Consultant on the Nakina Waste disposal site.

Ms. Holenstein,

I have completed a preliminary review of the groundwater-related portions of the report prepared by exp Services Inc., *"Munic Greenstone – Initial Hydrogeological Evaluation – Nakina Landfill – Nakina, Ontario* ," dated March 16, 2015. In general the re reasonable and I am in agreement with the proposed actions moving forward. It is apparent that the site is not currently in cor with Guideline B-7 ("*Incorporation of the Reasonable Use Concept into MOEE Groundwater Management Activities* ", dated Ap amended). However, the consultant has made recommendations to attempt to bring the site into compliance, which involves e the contaminant attenuation zone (CAZ). Based on the initial evaluation, the consultant has provided the following recommen

1. Consideration of installation of an additional monitoring well in the future should monitoring results suggest the need.
2. Establishment of a surface water sampling location in the unnamed lake within the proposed CAZ.
3. Twice annual sampling of 5 monitoring wells and the surface water location with analyses for the Schedule 5 comprehens parameters.
4. Submission of a monitoring report to the Ministry of the Environment and Climate Change (MOECC) once every 3 (three) the first report due by April 30, 2018.
5. Reassessment of the monitoring program after 3 (three) full years of data have been obtained.
6. Future reports should include an assessment of compliance with Guideline B-7.

I concur with all of these recommendations. I note that since there is a surface water receiver within the proposed CAZ, it will b to assess impacts to surface water using appropriate guidelines. Such an assessment, with appropriate guidelines, should be pr future monitoring reports.

The proposed contingency plan appears reasonable. The consultant notes that the plan will be updated as additional monitori are collected and analysed. This method is reasonable and I suggest that a revised contingency plan be provided and assessed i monitoring report.

In summary:

- The site is not currently in compliance with Guideline B-7.
- The consultant has recommended actions to bring the site into compliance, including a proposed CAZ expansion.
- I provide the following recommendations related to groundwater:
  - The proposed CAZ expansion should be pursued and finalized as soon as is reasonable to attempt to bring the site into co with Guideline B-7.
  - The recommendations proposed by the consultant shall be implemented as soon as is reasonable, including twice annual and reporting once every 3 (three) years, with the first report due to the MOECC by April 30, 2018.
  - Appropriate guidelines shall be included in all future monitoring reports to assess potential impacts to the surface water r within the proposed CAZ expansion.
  - A revised contingency plan shall be provided and assessed in the next monitoring report.

If you have any questions regarding the above comments and recommendations, do not hesitate to contact the undersigned. T of the preceding review is to provide advice to the MOECC regarding groundwater conditions based on the information provide above referenced documents. The conclusions, opinions and recommendations of the reviewer are based on the information p others, except where otherwise specifically noted. The MOECC cannot guarantee that the information that has been provided accurate or complete. A lack of specific comment by the reviewer is not to be construed as endorsing the content or views expr reviewed material.

Sincerely,
Simon

--
Simon R. Haslam, MASc, P.Eng. | Regional Hydrogeologist | 807.475.1428 | Ontario Ministry of the Environment and Climate C
Northern Region Technical Support

7.0 INCIDENT REPORT

Applicable
0360-B4KP4H

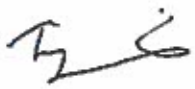
8.0 ATTACHMENTS

IMG_0621.JPG; IMG_0622.JPG; IMG_0623.JPG; IMG_0624.JPG; IMG_0625.JPG; IMG_0626.JPG; IMG_0627.JPG; IMG_0628.JPG; IMG_0629.JPG; IMG_0630.JPG; IMG_0631.JPG; IMG_0632.JPG; IMG_0633.JPG; IMG_0634.JPG; IMG_0635.JPG; IMG_0636.JPG; IMG_0637.JPG; IMG_0638.JPG; IMG_0639.JPG; IMG_0640.JPG

PREPARED BY:
Environmental Officer:
Name: **Mike Landers**
District Office: **IEB Thunder Bay District**
Date: **2018/09/13**
Signature

REVIEWED BY:
District Supervisor:
Name: **Tyler Manning**
District Office: **Thunder Bay District Office**
Date: **2018/09/14**

Signature:



File Storage Number: TB NA HWY584 610

"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

January 3, 2018

Ministry of the Environment and Climate Change
Environmental Approvals Branch
135 St. Clair Avenue West, Floor 1
Toronto, ON M4V 1P5

Attention: Mohsen Keyvani, P.Eng.

Via e-mail: historicaleca@ontario.ca

Re: Certificate of Approval No. A591901
Nakina Waste Disposal Site
Municipality of Greenstone, District of Thunder Bay
EXP Ref. No. THB-00011119-FE

Dear Mr. Keyvani:

On behalf of the Municipality of Greenstone, EXP Services Inc. (EXP) has prepared the following letter in response to the Ontario Ministry of the Environment and Climate Change (MOECC) inquiry letter, dated December 18, 2017 (attached), regarding the status of the waste facility and/or works regulated under the above noted Certificate of Approval. The following information was requested, and responses are provided:

1. Confirmation of the status of the facility / works (e.g., in operation, closed, decommissioned, etc.):
    - *The site is currently operating as a waste disposal site, and has been operating as such since the 1970s.*
    - *A draft Design and Operations Plan (D&O Plan) for the site, prepared by EXP and dated April 22, 2015, was submitted to the MOECC for review on April 24, 2015. No review comments from the MOECC have been received to date. As you are aware, a D&O Plan is required in connection with an application to amend the C of A (now called an Environmental Compliance Approval or ECA) to reflect current conditions and requirements, in general conformity to the MOE(CC)'s Landfill Standards publication. Upon receipt of comments, EXP and the Municipality of Greenstone will initiate the ECA application submission.*
    - *Prior to submitting the D&O Plan, EXP, on behalf of the Municipality of Greenstone, prepared an Initial Hydrogeological Evaluation of the Nakina Landfill, dated March*

1142 Roland Street, Thunder Bay, ON P7B 5M4, Canada
T: 1.807.623.9495 • www.exp.com

16, 2015, which outlined a proposed monitoring program. Review comments were received via email from the MOECC's Regional Hydrogeologist (Simon Haslam, MASc., P.Eng.) on October 17, 2016, confirming MOECC's acceptance of the proposed monitoring program. The groundwater and surface water monitoring program was initiated in the fall of 2016.

2. Confirmation of the current name and address of the owner / operator of the facility / works:
   - *Municipality of Greenstone*
     P.O. Box 70
     1800 Main Street
     Geraldton, ON P0T 1MO

     Tel: 1.807.854.1100

3. A name, phone number, and email address of the primary point of contact representing the owner / operator of the facility / works:
   - *Mr. Brian Aaltonen*
     Director of Public Services
     Municipality of Greenstone
     1800 Main Street.
     P.O. Box 70
     Geraldton, ON P0T 1M0

     Tel: 1.807.854.1100 ext. 2060

We trust the above information satisfies your current requirements.

Sincerely,
EXP Services Inc.

Ahileas Mitsopoulos, P.Eng.
Project Engineer

Demetri N. Georgiou, MASc., P.Eng
Principal Engineer / Branch Manager

Attach: MOECC Letter Re: Certificate of Approval No. A591901

c: Mike Landers, MOECC Thunder Bay (Mike.Landers@ontario.ca)
Brian Aaltonen, Municipality of Greenstone (Brian.Aaltonen@greenstone.ca)

Ministry of the Environment and Climate Change

Environmental Approvals Branch

135 St. Clair Avenue West
1st Floor
Toronto ON M4V 1P5
Tel.: 416 314-8001
Fax: 416 314-8452

Ministère de l'Environnement et de l'Action en matière de changement climatique

Direction des autorisations environnementales

135, avenue St. Clair Ouest
Rez-de-chaussée
Toronto ON M4V 1P5
Tél : 416 314-8001
Téléc. : 416 314-8452

Ontario

December 18, 2017

The Corporation Of The Township Of Nakina
PO Box 210
Nakina, ON P0T 1W0

Dear Owner/Operator:

RE: Certificate of Approval #A591901

The Ontario Ministry of the Environment and Climate Change (MOECC) is seeking confirmation on the status of the waste facility and/or works regulated under the above-noted Certificate of Approval. It is requested that you provide the following information related to the above-noted Certificate of Approval by January 15, 2018:

1. Confirmation of the status of the facility / works (e.g. in operation, closed, decommissioned, etc.);
2. Confirmation of the current name and address of the owner/operator of the facility / works;
3. A name, phone number, and email address of the primary point of contact representing the owner/operator of the facility / works;

Please provide the above-noted information by email to historicaleca@ontario.ca, or by regular mail.

Sincerely,

Mohsen Keyvani, P.Eng.
Supervisor, Approval Services Unit, Team 5

c. MOECC Thunder Bay District Office

Ahileas Mitsopoulos

From: Holenstein, Monika (MOECC) <Monika.Holenstein@ontario.ca>
Sent: Wednesday, February 15, 2017 10:40 AM
To: Ahileas Mitsopoulos; brian.aaltonen@greenstone.ca
Subject: FW: Nakina Landfill - Initial Hydrogeological Evaluation

Ahileas, Brian

Thanks for bringing to my attention that my email below did not address the sampling timing for the Nakina waste disposal site, which was the request in the original email! My apologies.

In the Initial Hydrogeological Evaluation for the Nakina site, you had recommended that the monitoring report be submitted after three years of sampling (i.e. six sampling events) with the first sampling event being conducted in the spring of 2015, as such the report would be submitted by April 2018. Since the first round of sampling was conducted in the fall 2016, you have requested that the first monitoring report be submitted by April 2019. This would allow 2.5 years of sampling (5 sampling events) rather than 1.5 years of sampling (3 sampling events) if the report is due April 2018 (originally proposed date).

The MOECC concurs with this approach and agrees that the first monitoring report should be submitted by April, 2019.

I will provide a letter from the District Manager regarding the monitoring changes at all of the sites in the next few months.

Please contact me if you have any concerns.

Monika

Monika Holenstein
Sr. Environmental Officer
Thunder Bay District
Ministry of the Environment and Climate Change
435 James St. S., Suite 331
Thunder Bay, Ontario
P7E 6S7
(807)475-1699
E-mail: Monika.Holenstein@ontario.ca

From: Holenstein, Monika (MOECC)
Sent: December 08, 2016 5:43 PM
To: Ahileas Mitsopoulos
Cc: brian.aaltonen@greenstone.ca; Stajkowski, Drew (MOECC)
Subject: RE: Nakina Landfill - Initial Hydrogeological Evaluation

Hi Ahileas – you've been very patient! Sorry for the delays – crazy busy!

On the Geraldton site - I did get a verbal ok from our hydrogeologist and we concur the intent is for every 3 year reporting – next one due in 2019. I can give you something more formal on that from the District Manager in the New Year.

I have had a quick look at the Beardmore D and O plan and generally, it looks reasonable. A few specific comments:

- The service area should be specified. I assume the Municipality of Greenstone, but may want to include some additional surrounding townships?

- Should have a section on signage.

- The Plan does not contain too much detail on operating areas – just south pit to be filled (estimated by January 2017), then north pit, then site closed.

- The operating plan should note that waste fill boundaries and final contours will be clearly marked and updated on an annual basis as needed.

- Litter Control section should outline what measures to be taken (i.e. snow fencing around working area, regular litter pick up, etc).

- Record Keeping section only requires records of industrial/commercial loads – should also have residential loads.

- Should include more detailed information on operator training – what will be included in the training (can get this from Longlac/Geraldton C of A's).

- In the burning of waste section – operating plan should require an area be established for brush and clean waste only (no painted or treated wood) and signed to ensure only appropriate woodwaste is burned.

- The notes on Figures 7 and 8 (grading and waste placement) should make it into the text of the report in the appropriate sections as they provided detail on how the development/closure will occur.

- The last inspection noted: *At the time of inspection, it was suggested to the municipality that this area could be better organized - with signs clearly indicating where drained fridges/freezers were to be kept versus those still to be drained.* Perhaps the Operating Plan should provide information on how the fridge/freezer area could be set up?

- The MOECC hydrogeologist had previously commented: *I concur with the consultant's recommendations regarding the size and location of the CAZ, as well as the recommendations for the monitoring program. The contingency plan provides a reasonable selection of contingency measures, but needs to be more specific on how contingency measures might be triggered. Specifically, a plan which references the monitoring program and applicable assessment criteria to establish trigger criteria for actions should be developed. With respect to the consultant's recommendations regarding cover for the final closure, the prescribed design may be warranted with respect to the current understanding of potential leachate impacts. However, a contingency which provides for a low permeability cap is needed if at closure (or beyond) the leachate concentrations increase to levels that are indicative of off-site*

impacts. It is recommended that the closure plan will need to be reviewed and details updated closer to the actual closure of the site."

I suggest you proceed with the ESR to increase the capacity. The current Certificate of Approval is clearly not appropriate for the current use at site and must be updated. Once in the ECA amendment process is underway, an updated D and O plan could be submitted and any final comments could be made at that time.

Please note as you proceed with ESR for improved capacity, that recent discussions with BZA (Rocky Bay) and the Department of Indigenous and Northern Affairs indicated that there is some interest in BZA to bring waste from that community to the Beardmore site.

Again, sorry for the delay,

Monika

Monika Holenstein
Sr. Environmental Officer
Thunder Bay District
Ministry of the Environment and Climate Change
435 James St. S., Suite 331
Thunder Bay, Ontario
P7E 6S7
(807)475-1699
E-mail: Monika.Holenstein@ontario.ca

From: Ahileas Mitsopoulos [mailto:ahileas.mitsopoulos@exp.com]
Sent: December 08, 2016 11:44 AM
To: Holenstein, Monika (MOECC)
Subject: RE: Nakina Landfill - Initial Hydrogeological Evaluation

Hi Monika,

Just wanted to follow-up again about this, as well as the clarification/issues at the Geraldton LF and Beardmore LF.

As a reminder,

Geraldton LF - ECA indicates report due in March 2017 but we provided a report in March/April 2016 for a three year period (2013, 2014 and 2015). We suspect the ECA intended March 2016. Please confirm that the next monitoring report for the Geraldton LF is due March 2019 (for the years 2016, 2017 and 2018).

Beardmore LF – The Beardmore LF likely reached 90% capacity in mid 2016. As such, a Closure Plan needs to be started but we discussed that **exp** would prepare an Environmental Screening Report to increase the capacity of the landfill to 100,000 m3. To do this we are still waiting for comments on the revised draft D&O Plan which was submitted in February 2016.

Thank you,

Ahileas Mitsopoulos, P.Eng. | exp
Project Engineer

exp Services Inc.
t: +1.807.623.9495 x223 | m: +1.807.620.6306 | e: Ahileas.Mitsopoulos@exp.com
1142 Roland Street
Thunder Bay, ON P7B 5M4
CANADA
exp.com | legal disclaimer
keep it green, read from the screen

From: Ahileas Mitsopoulos
Sent: Monday, November 28, 2016 10:20 AM
To: 'Holenstein, Monika (MOECC)' <Monika.Holenstein@ontario.ca>
Cc: 'Stajkowski, Drew (MOECC)' <Drew.Stajkowski@ontario.ca>; 'Brian Aaltonen' <brian.aaltonen@greenstone.ca>; Demetri Georgiou <demetri.georgiou@exp.com>; Rob Rinne <Rob.Rinne@exp.com>; 'Katherine Alton' <katherine.alton@greenstone.ca>
Subject: RE: Nakina Landfill - Initial Hydrogeological Evaluation

Hi Monika,

Just wanted to follow-up on this. Any word?

Thank you,

Ahileas Mitsopoulos, P.Eng. | exp
Project Engineer
exp Services Inc.
t: +1.807.623.9495 x223 | m: +1.807.620.6306 | e: Ahileas.Mitsopoulos@exp.com
1142 Roland Street
Thunder Bay, ON P7B 5M4
CANADA
exp.com | legal disclaimer
keep it green read from the screen

From: Ahileas Mitsopoulos
Sent: Monday, November 14, 2016 11:58 AM
To: 'Holenstein, Monika (MOECC)' <Monika.Holenstein@ontario.ca>
Cc: Stajkowski, Drew (MOECC) <Drew.Stajkowski@ontario.ca>; Brian Aaltonen <brian.aaltonen@greenstone.ca>; Demetri Georgiou <demetri.georgiou@exp.com>; Rob Rinne <Rob.Rinne@exp.com>; 'Katherine Alton' <katherine.alton@greenstone.ca>
Subject: RE: Nakina Landfill - Initial Hydrogeological Evaluation
Importance: High

Hi Monika,

Based on the comments below regarding the Initial Hydrogeological Evaluation of the Nakina Landfill, we conducted our first sampling event this fall at the landfill.

In the Initial Hydrogeological Evaluation, we recommended that the monitoring report be submitted after three years of sampling (i.e. six sampling events) with the first sampling event being conducted in the spring of 2015, as such the report would be submitted by April 2018. Since the first round of sampling was conducted in the fall 2016, we request that the first monitoring report be submitted by April 2019. This would allow 2.5 years of sampling (5 sampling events) rather than 1.5 years of sampling (3 sampling events) if the report is due April 2018 (originally proposed date).

Please advise if the first monitoring report submitted by April 2019 is acceptable.

Thank you,

Ahileas Mitsopoulos, P.Eng. | exp
Project Engineer
exp Services Inc.
t: +1.807.623.9495 x223 | m: +1.807.620.6306 | e: Ahileas.Mitsopoulos@exp.com
1142 Roland Street
Thunder Bay, ON P7B 5M4
CANADA

From: Holenstein, Monika (MOECC) [mailto:Monika.Holenstein@ontario.ca]
Sent: Monday, October 17, 2016 2:12 PM
To: Brian Aaltonen <brian.aaltonen@greenstone.ca>; Ahileas Mitsopoulos <ahileas.mitsopoulos@exp.com>
Cc: Stajkowski, Drew (MOECC) <Drew.Stajkowski@ontario.ca>
Subject: FW: Nakina Landfill - Initial Hydrogeological Evaluation

Brian, Ahileas
Below find the comments from the MOECC Hydrogeologist regarding the Initial Hydrogeological Evaluation – Nakina Landfill. No comments yet from MOECC Approvals Branch on the theoretical capacity work, but hopefully the application to amend ECA can move ahead....

Monika

Monika Holenstein
Sr. Environmental Officer
Thunder Bay District
Ministry of the Environment and Climate Change
435 James St. S., Suite 331
Thunder Bay, Ontario
P7E 6S7
(807)475-1699
E-mail: Monika.Holenstein@ontario.ca

From: Haslam, Simon (MOECC)
Sent: September 22, 2016 4:25 PM
To: Holenstein, Monika (MOECC)
Subject: Nakina Landfill - Initial Hydrogeological Evaluation

Ms. Holenstein,

I have completed a preliminary review of the groundwater-related portions of the report prepared by exp Services Inc., "*Municipality of Greenstone – Initial Hydrogeological Evaluation – Nakina Landfill – Nakina, Ontario,*" dated March 16, 2015. In general the report is reasonable and I am in agreement with the proposed actions moving forward. It is apparent that the site is not currently in compliance with Guideline B-7 ("*Incorporation of the Reasonable Use Concept into MOEE Groundwater Management Activities*", dated April 1994, as amended). However, the consultant has made recommendations to attempt to bring the site into compliance, which involves expansion of the contaminant attenuation zone (CAZ). Based on the initial evaluation, the consultant has provided the following recommendations.

1. Consideration of installation of an additional monitoring well in the future should monitoring results suggest the need.
2. Establishment of a surface water sampling location in the unnamed lake within the proposed CAZ.

3. Twice annual sampling of 5 monitoring wells and the surface water location with analyses for the Schedule 5 comprehensive list of parameters.
4. Submission of a monitoring report to the Ministry of the Environment and Climate Change (MOECC) once every 3 (three) years, with the first report due by April 30, 2018.
5. Reassessment of the monitoring program after 3 (three) full years of data have been obtained.
6. Future reports should include an assessment of compliance with Guideline B-7.

I concur with all of these recommendations. I note that since there is a surface water receiver within the proposed CAZ, it will be necessary to assess impacts to surface water using appropriate guidelines. Such an assessment, with appropriate guidelines, should be provided in future monitoring reports.

The proposed contingency plan appears reasonable. The consultant notes that the plan will be updated as additional monitoring results are collected and analysed. This method is reasonable and I suggest that a revised contingency plan be provided and assessed in the next monitoring report.

In summary:

- The site is not currently in compliance with Guideline B-7.
- The consultant has recommended actions to bring the site into compliance, including a proposed CAZ expansion.
- I provide the following recommendations related to groundwater:
    - The proposed CAZ expansion should be pursued and finalized as soon as is reasonable to attempt to bring the site into compliance with Guideline B-7.
    - The recommendations proposed by the consultant shall be implemented as soon as is reasonable, including twice annual monitoring and reporting once every 3 (three) years, with the first report due to the MOECC by April 30, 2018.
    - Appropriate guidelines shall be included in all future monitoring reports to assess potential impacts to the surface water receiver within the proposed CAZ expansion.
    - A revised contingency plan shall be provided and assessed in the next monitoring report.

If you have any questions regarding the above comments and recommendations, do not hesitate to contact the undersigned. The purpose of the preceding review is to provide advice to the MOECC regarding groundwater conditions based on the information provided in the above referenced documents. The conclusions, opinions and recommendations of the reviewer are based on the information provided by others, except where otherwise specifically noted. The MOECC cannot guarantee that the information that has been provided by others is accurate or complete. A lack of specific comment by the reviewer is not to be construed as endorsing the content or views expressed in the reviewed material.

Sincerely,
Simon

--

Simon R. Haslam, MASc, P.Eng. | Regional Hydrogeologist | 807.475.1428 | Ontario Ministry of the Environment and Climate Change | Northern Region Technical Support

Ministry of the Environment and Climate Change
1st Floor, 135 St Clair Ave W
Toronto, ON
M4V 1P5
Telephone:

Ministère de l'Environnement et de l'Action en matière de changement climatique
1er étage, 135 av St. Clair O
Toronto, ON
M4V 1P5
Téléphone :

Ontario

October 20, 2016

Brian Aaltonen, Director of Public Services
The Corporation of the Municipality of Greenstone
Post Office Box, No. 210
Nakina, Ontario
P0T 2H0

Dear Sir/Madam:

Re: Application for Approval
Notice to ECA # A591901 - Determination of Theoretical Approved Capacity
Greenstone Municipality, District of Thunder Bay
Reference Number 1344-9N8GXC

Your application dated August 14, 2014 regarding the theoretical approved capacity of Nakina Landfill Site, ECA NO. A591901 has been reviewed. The ministry is in agreement with the approach taken (using the Ministry's 1993 Landfill Determination document) which resulted in a volume calculation of 118,600 m^3. The existing waste in place can not be added to the calculation. Therfore, the ministry acknowledges the site has a theoretical capacity of 118,600 m^3.

An amendment to the ECA is not required at this time to accept this theoretical value and this application is now cancelled with the understanding that an application for amendment will soon be submitted to address the other concerns on record with the District Office.

We also emphasize that under section 20.2 of Part II.1 of the Environmental Protection Act, (Act) you are required to obtain an approval under section 20.3 of Part II.1 of the Act before construction, alteration, extension, replacement or change of use of a waste disposal site, including change of the type of waste handled at an approved site.

If you have any questions regarding the above, please contact Ben Hendry, Senior Waste Engineer at 416.314.7993.

Yours truly,

Dale D. Gable

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

BH/

c: District Manager, MOECC Thunder Bay - District
Robert J. Rinne/ Ahileas Mitsopoulos, Exp. Services Inc.

Ahileas Mitsopoulos

From: Holenstein, Monika (MOECC) <Monika.Holenstein@ontario.ca>
Sent: Monday, October 17, 2016 2:12 PM
To: Brian Aaltonen; Ahileas Mitsopoulos
Cc: Stajkowski, Drew (MOECC)
Subject: FW: Nakina Landfill - Initial Hydrogeological Evaluation

Brian, Ahileas
Below find the comments from the MOECC Hydrogeologist regarding the Initial Hydrogeological Evaluation – Nakina Landfill. No comments yet from MOECC Approvals Branch on the theoretical capacity work, but hopefully the application to amend ECA can move ahead....

Monika

Monika Holenstein
Sr. Environmental Officer
Thunder Bay District
Ministry of the Environment and Climate Change
435 James St. S., Suite 331
Thunder Bay, Ontario
P7E 6S7
(807)475-1699
E-mail: Monika.Holenstein@ontario.ca

From: Haslam, Simon (MOECC)
Sent: September 22, 2016 4:25 PM
To: Holenstein, Monika (MOECC)
Subject: Nakina Landfill - Initial Hydrogeological Evaluation

Ms. Holenstein,

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1. Consideration of installation of an additional monitoring well in the future should monitoring results suggest the need.
2. Establishment of a surface water sampling location in the unnamed lake within the proposed CAZ.
3. Twice annual sampling of 5 monitoring wells and the surface water location with analyses for the Schedule 5 comprehensive list of parameters.
4. Submission of a monitoring report to the Ministry of the Environment and Climate Change (MOECC) once every 3 (three) years, with the first report due by April 30, 2018.
5. Reassessment of the monitoring program after 3 (three) full years of data have been obtained.
6. Future reports should include an assessment of compliance with Guideline B-7.

I concur with all of these recommendations. I note that since there is a surface water receiver within the proposed CAZ, it will be necessary to assess impacts to surface water using appropriate guidelines. Such an assessment, with appropriate guidelines, should be provided in future monitoring reports.

The proposed contingency plan appears reasonable. The consultant notes that the plan will be updated as additional monitoring results are collected and analysed. This method is reasonable and I suggest that a revised contingency plan be provided and assessed in the next monitoring report.

In summary:

- The site is not currently in compliance with Guideline B-7.
- The consultant has recommended actions to bring the site into compliance, including a proposed CAZ expansion.
- I provide the following recommendations related to groundwater:
    - The proposed CAZ expansion should be pursued and finalized as soon as is reasonable to attempt to bring the site into compliance with Guideline B-7.
    - The recommendations proposed by the consultant shall be implemented as soon as is reasonable, including twice annual monitoring and reporting once every 3 (three) years, with the first report due to the MOECC by April 30, 2018.
    - Appropriate guidelines shall be included in all future monitoring reports to assess potential impacts to the surface water receiver within the proposed CAZ expansion.
    - A revised contingency plan shall be provided and assessed in the next monitoring report.

If you have any questions regarding the above comments and recommendations, do not hesitate to contact the undersigned. The purpose of the preceding review is to provide advice to the MOECC regarding groundwater conditions based on the information provided in the above referenced documents. The conclusions, opinions and recommendations of the reviewer are based on the information provided by others, except where otherwise specifically noted. The MOECC cannot guarantee that the information that has been provided by others is accurate or complete. A lack of specific comment by the reviewer is not to be construed as endorsing the content or views expressed in the reviewed material.

Sincerely,
Simon

--

Simon R. Haslam, MASc, P.Eng. | Regional Hydrogeologist | 807.475.1428 | Ontario Ministry of the Environment and Climate Change | Northern Region Technical Support

Ministry of the Environment
Northern Region
Thunder Bay District Office
Thunder Bay Area Office
331-435 James St S
Thunder Bay ON P7E 6S7
Fax: (807)475-1754
Tel: (807) 475-1699

Ministère de l'Environnement
Direction régionale du Nord
Bureau du district de Thunder Bay
Bureau du secteur de Thunder Bay
Bureau du district de Thunder Bay
331-435 rue James S
Thunder Bay ON P7E 6S7
Télécopieur: (807)475-1754
Tél:(807) 475-1699

Ontario

January 4, 2011

The Corporation of the Municipality of Greenstone
301 East St
Geraldton, Ontario, P0T 1M0
Canada
ATTN: Vance Czerwinski, Director of Public Services

Dear Mr. Czerwinski

RE: Inspection of Nakina Waste Disposal Site
Reference Number 2537-8BVLPZ

On October 20, 2010, I inspected the Nakina Ward Waste Disposal Site. A copy of the inspection report is enclosed. I recommend you share the reports with any public works staff involved with the operation of the waste disposal site. Please review the inspection and ensure that any of the required actions are completed on the dates provided.

The Inspection Report contains the following required actions:

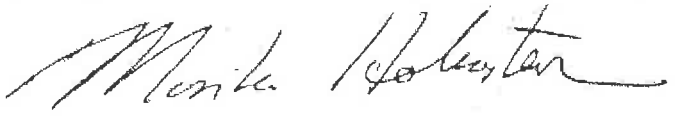
- By February 15, 2011, provide a report to the District Manager, Thunder Bay District on the whether or not the site has exceeded the approved fill area. If this report identifies that the site exceeds the approves site area, it must contain the municipality's plans achieve compliance with Ministry legislation (eg site closure, site expansion, establishment of an alternate site, etc).

- By February 15, 2011, provide a report to the District Manager, Thunder Bay District, as to the status of the Land Use Permit which was to be obtained by December 31, 1989 and confirmation a buffer zone exists and extends 100 meters in all directions from the working area boundaries.

- By May 15, 2011, ensure that the fill area and site boundaries are clearly marked with permanent markers.

If you have any questions with the inspection report, please do not hesitate to contact me at the above number.

Yours truly,



Monika Holenstein
Senior Environmental Officer
Thunder Bay District Office

File Storage Number: TB NA H643 610

Ontario

Ministry of the Environment
Ministère de l'Environnement

Solid Non-Hazardous Waste Disposal Site Inspection Report

Client:	The Corporation of the Municipality of Greenstone Mailing Address: 301 East St, Post Office Box, 70, Geraldton, Ontario, Canada, P0T 1M0 Physical Address: 301 East St, Greenstone, Municipality, District of Thunder Bay, Ontario, Canada, P0T 1M0 Telephone: (807)854-1100, FAX: (807)854-1468, email: administration@greenstone.ca Client #: 0380-4TKQAV, Client Type: Municipal Government		
Inspection Site Address:	Nakina Waste Disposal Site Address: Highway 643 2km west of the Town of Nakina, Greenstone, Municipality, District of Thunder Bay District Office: Thunder Bay - District GeoReference: ,		
Contact Name:	Jean Noel Chaine	**Title:**	Operations Working Foreman - Nakina
Contact Telephone:	(807)329-8599 **ext**	**Contact Fax:**	
Last Inspection Date:	2009/09/15		
Inspection Start Date:	2010/10/20	**Inspection Finish Date:**	2010/12/23
Region:	Northern		

1.0 INTRODUCTION

The purpose of this inspection was to assess compliance with Ministry of Environment legislation, specifically Regulation 347 and the waste management provisions of the Environmental Protection Act. The inspection consisted of a review of files and reports, as well as a site visit on October 20, 2010 and a discussion with Jean Noel Chaine at the public works yard.

The Nakina Waste Disposal Site is owned and operated by the Municipality of Greenstone and serves the community of Nakina with population of less than 400 people. The site is located on the south side of Hwy 584 approximately 3 km west of the Nakina townsite.
In the last few years, the municipality has begun to accept waste from the "Ring of Fire" mineral exploration camps which are located north of Nakina. A local scrap dealer is bringing the wastes in drums from the airport to the site and emptying the drums. The drums are being recycled. Accepting waste from outside of the municipal boundaries may having a significant impact on the site capacity.

The site appears to have been initially approved in 1972 and is currently operating under a Certificate of Approval A591901 dated January 8, 1990.

The site was last inspected in the fall of 2009 and there were a number of actions required as a result of that inspection. The purpose of this inspection was to evaluate the progress on addressing the issues identified last year.

2.0 INSPECTION OBSERVATIONS

Certificate of Approval Number(s):

The site appears to have been initially approved in 1972 and is currently operating under a Certificate of Approval A591901 dated January 8, 1990. The Certificate of Approval requires that a new Land Use Permit be obtained by December 31, 1989 and that a buffer zone exists and extends 100 meters in all directions from the working area boundaries. It remains unclear whether the

municipality complied with either of these two conditions.

2.1 FINANCIAL ASSURANCE:

There is no requirement for Financial Assurance for municipal waste disposal sites.

2.2 APPROVED AREA OF THE SITE:

The Certificate of Approval is for the use and operation of a 5 hectare landfilling site within a total site area of 20 hectares. Vance Czerwinski indicated that the site was recently surveyed but he had not received a report. At the time of inspection the footprint did not appear to be flagged. The need to identify and flag the footprint has been identified by the Ministry many times.

2.3 APPROVED CAPACITY:

The Nakina Waste Disposal site does not have a listed capacity, only a size restriction of 5 hectare fill area. In 1998, a letter from Ray Boivin with the MOE to the Clerk-Treasurer of the Town of Nakina indicates that the town had informed the MOE that the landfill would be at capacity within the next five years. The letter outlines the process to expand the existing waste disposal site, or to site a new landfill. It is the MOE's understanding that the site has now been surveyed and a report on capacity will be forthcoming early in the new year.

2.4 ACCESS CONTROL:

The site access is controlled by fences and a locked gate. The site is only open when attendants are on duty. The previous inspection required that the Municipality improve signage at the site, and a new sign has been installed.

2.5 COVER MATERIAL:

The wastes was adequately covered at the time of inspection. At the time of inspection a municipal employee was in the process of compacting and covering the current working area. The segregated wood area had not yet been covered.

2.6 WASTE BURNING:

There was no evidence of waste burning at the site at the time of inspection.

2.7 GROUNDWATER/SURFACEWATER IMPACT:

There was no evidence of groundwater/surface water impact at the time of inspection. Groundwater monitoring has not been required at this site.

2.8 LEACHATE CONTROL SYSTEM:

The site is considered naturally attenuating and there is no leachate control system.

2.9 METHANE GAS CONTROL SYSTEM:

There is no requirement for a methane gas control system at this site.

2.10 OTHER WASTES:

Metals are segregated and regularly removed by a local scrap metal company.

There is a segregated wood pile. Currently, the municipality plans to cover the segregated wood pile, which seems contrary to the intent of segregating materials. The Municipality could investigate the possibility of better segregation and burning untreated wood.

The municipality is accepting waste from the "Ring of Fire" mineral exploration camps which are located north of Nakina. Ring of Fires exploration camps waste is brought by air in steel drums, transferred to the Nakina site by a local scrap metal dealer and emptied. The empty drums are recycled. If the site is at or exceeding capacity, excepting wastes from outside of the municipal boundaries may not be acceptable.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

The previous inspections contained the following findings:

- Fill area and site boundaries have not been identified. According to information on the site files, it is likely that there is fill beyond approved limits at this site.
- There is currently no way to ascertain whether the fill area complies with the Certificate of Approval and whether or not a buffer zone exists as required by the Certificate of Approval.
- When the gate is closed there is no information about who to contact if there is a problem (eg fire) at the site.
- At the time of inspection, the segregated wood pile included a significant amount of non-wood items such as insulation, mattresses, shingles(see attached photos). The attendant appears to be allowing non wood items to be deposited in this area. If the municipality wishes to burn untreated wood products, there must be careful segregation of these materials. The municipal employee gave the impression that the material in the segregated wood area would eventually be covered, which seems contrary to the intent of segregating materials.

The previous inspection contained the following required actions:

By June 30, 2010, the landfilling area and site boundaries shall be clearly marked with permanent markers. **The site was surveyed in December 2010, and the site boundaries were marked, but the fill area was not flagged.**

By August 30, 2010, provide a report to the District Manager, Thunder Bay District on the whether or not the site has exceeded the approved fill area. If this report identifies that the site exceeds the approves site area, it must contain the municipalities plans achieve compliance with Ministry legislation (eg site closure, site expansion, establishment of an alternate site, etc). **This report has not been provided.**

Immediately ensure that only untreated wood is deposited in the segregated wood area. **It appeared that mostly wood was being deposited in the segregated wood area, and that in any case, the wood was being disposed of by burying in the site.**

By March 30, installed and maintained a sign at the main entrance/exit to the Site on which is legibly displayed the following information:

(a) the name of the Site and Owner;
(b) the number of the Certificate;
(c) the name of the Operator;
(d) the normal hours of operation;
(e) the allowable and prohibited waste types;
(f) the telephone number to which complaints may be directed;
(g) a warning against unauthorized access;
(h) a twenty-four (24) hour emergency telephone number (if different from above); and
(i) a warning against dumping outside the Site.

A new sign has been installed.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate ?

No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review

of relevant material ?
No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?
Yes

Specifics: Fill area has not been identified. According to information on the site files, it is likely that there is fill beyond approved limits at this site. A report on the results of surveying and an evaluation of site capacity has not been provided.

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?
Yes

Specifics: There is currently no way to ascertain whether the fill area complies with the Certificate of Approval and whether or not a buffer zone exists as required by the Certificate of Approval.

Was there any indication of minor administrative non-compliance?
Yes

Specifics:

5.0 ACTION(S) REQUIRED

By February 15, 2011, provide a report to the District Manager, Thunder Bay District on the whether or not the site has exceeded the approved fill area. If this report identifies that the site exceeds the approves site area, it must contain the municipality's plans achieve compliance with Ministry legislation (eg site closure, site expansion, establishment of an alternate site, etc).

By February 15, 2011, provide a report to the District Manager, Thunder Bay District, as to the status of the Land Use Permit which was to be obtained by December 31, 1989 and confirmation a buffer zone exists and extends 100 meters in all directions from the working area boundaries.

By May 15, 2011, ensure that the fill area and site boundaries are clearly marked with permanent markers.

6.0 OTHER INSPECTION FINDINGS

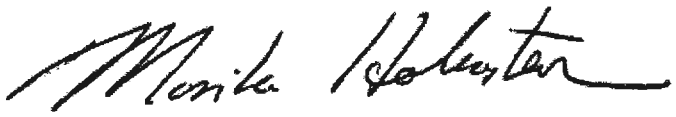
7.0 INCIDENT REPORT

Applicable
2241-7YCJME

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:

Name: Monika Holenstein
District Office: Thunder Bay District Office
Date: 2010/12/23
Signature



REVIEWED BY:
District Supervisor:
Name: Scott Sheriff
District Office: Thunder Bay District Office
Date: 2010/12/30

Signature:

File Storage Number: TB NA H643 610

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario **Public Lands Act**

LUP1176-1002846

Use shaded areas for corrections.

Name of Applicant/Permittee (Insert Corporate Name if Applicant is "Limited" or "Incorporated")	Area Code	Telephone No.
Municipality of Greenstone		

As Trustee for

Postal Address of Applicant/Permittee
P.O. Box 70

City, Town or Village	Prov./State	Country	Postal Code
Geraldton	Ontario	Canada	P0T 1M0

Location of Land

Lot	Concession/Block No.	Geographic Township	Municipality
		NAKINA	

U.T.M. Grid	Geographic Location	Area in ha
Zone 16 E. 518000 N. 5558000	Township of Nakina	19.30

As per sketch and description which is attached to the original permit for this site and forms part of this permit. A copy of this sketch and description is on file at the District Office and available for inspection by the applicant at any time during normal business hours

Land Required for the Purpose of	GST I.D. Number
FILLED LAND	R124668666

Fee(s) and Period of Land Use

Amount Due	Annual Fee (subject to adjustment)	Permit Effective Date	Permit Termination Date
$545.79	$483.00 + $62.79 (HST)	Jan 1, 2011	Dec 31, 2015

Note: Terms and Conditions applicable to all Land Use Permits are on the reverse side of this form.

Terms and Conditions applicable to this permit

Nakina Ward

NAK landfill

13245
534404
138006

Purpose
Waste Disposal Site

Sub-Purpose
Landfill

Applicant's certification

I certify that the information given herein is true and complete, and that I have read, fully understand, and agree to comply with all of the terms and conditions set out in this permit and that I am of the age of majority. I agree that this is the complete agreement between the parties hereto

Signature of Applicant (incl. Corporation Official)	Date Signed
	Dec. 13, 2010

Corporation Use Only

I have authority to bind the herein-named Corporation

Initials and Surname of Corporation Official (Please Print)	Signature of Corporation Official	Position

Ministry Approval

Under authority of the Regulations under the Public Lands Act, this Land Use Permit is hereby issued to the above applicant, subject to all terms and conditions contained herein and no other, and these shall be the exclusive terms and conditions applicable to the use of this land.

Signature of MNR Official	Date Signed	Cash Register Validation or Receipt No.	Amount Paid
	Dec 14, 2010	014922	$545.79

Personal information on this form is collected under authority of the Public Lands Act and will be used for the administration of that Act. Questions about this information should be directed to the local MNR Office, whose address and telephone number appear in the Ontario Government Telephone Directory.

1620(95-03)

Return all parts of this form to the District/Area Office for authorization.

The Corporation of the Township of Nakina

P.O. BOX 89 - NAKINA,ONTARIO - P0T 2H0

Phone 329 - 5361

OPERATION PLAN — NAKINA W.D.S.

METHOD OF OPERATION

TRENCH METHOD

-Excavated material will be used for final cover for the filled trench.
-Trench size will be approximately 12' x 18' x 25'.
-Movable barriers will be utilized to vary the location where the public may deposit waste.
-New trenches to be constructed spring and fall.

DAILY OPERATIONS

-Site will be open seven days a week from 8am to 6pm.
-Segregation of materials will be allocated for degradable goods, vehicles to be located at northwest corner.
-Litter will be controlled with fence if required.
-Signs to be posted stating the times the site will be open.

SITE CLOSURE

-This will include grading, compacting, and covering of waste with a minimum of 100 cm of coverage.

Ministry of the Environment
Ministère de l'Environnement
Ontario

Waste Disposal Site
Certificat d'autorisation provisoire de décharge

Provisional Certificate of Approval No. / *Certificat d'autorisation provisoire nº* **A 591901**

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

Aux termes de la Loi sur la protection de l'environnement et des règlements y afférents et sous réserve des restrictions qui s'y appliquent, ce Certificat provisoire d'autorisation est délivré à:

The Corporation of the Township of Nakina
P. O. Box 210
Nakina, Ontario
P0T 2H0

for use and operation of a 5 hectare landfilling site within a total site area of 20 hectares.

All in accordance with the following plans and specifications:

1. Application for a Certificate of Approval for waste disposal site (landfill) and supporting information.

LOCATED: 2 miles west of Nakina townsite
South of Highway 584
Zone 16
Nakina Map 42L2
U.T.M. Coordinates N5558430 E517620
District of Thunder Bay

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

Domestic, Non-Hazardous Solid Waste and other (sewage sludge)

and subject to the following categories:

1. Except as otherwise provided by these conditions, the waste disposal site shall be operated in accordance with the application dated March 17, 1989 and with the supporting information, plans and specifications submitted therein.

2. That a new Land Use Permit be obtained by December 31, 1989.

3. That a buffer zone exists and extends 100 meters in all directions from the working area boundaries.

Dated this / *Fait le* 8th day of / *jour de* January 19 90

Director, Section 38
Environmental Protection Act
Directeur, Section 38
Loi sur la protection de l'environnement

7/80

The following conditions are additional to the conditions shown on Provisional Certificate
Les conditions ci-dessous s'ajoutent à celles indiquées dans le Certificat d'autorisation
of Approval Number A 591901 dated
provisoire n° *fait le*

4. This Provisional Certificate of Approval revokes all of the old previously issued Provisional Certificates of Approval issued under Part V of the Environmental Protection Act for this site. The approval given herein, including the terms and conditions set out, replace all previously issued approval and related terms and conditions under Part V of the act for this site.

TO: The Corporation of the Township of Nakina
P. O. Box 210
Nakina, Ontario
P0T 2H0

You are hereby notified that Provisional Certificate of Approval No. A591901 has been issued to you subject to the conditions outlined therein.

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

1. The reason for condition 1 is to ensure that this waste disposal site is operated in accordance with the application submitted for the Provisional Certificate of Approval and not on a basis which the Director has not been asked to consider.

2. The reason for condition 2 is to ensure that the necessary land approval is obtained.

3. The reason for condition 3 is to ensure a buffer zone exists between the landfill area and other land uses.

4. The reason for condition 4 is to clearly set out and consolidate the current provision of the approval covering the operations of the site including the terms and conditions for this approval. By amending and re-issuing this Provisional Certificate of Approval in this manner, all interested parties are aware of the rights and obligations imposed by this approval.

You may by written notice served upon me and the Environmental Appeal Board within 15 days after receipt of this Notice, require a hearing by the Board.

This Notice should be served upon:

The Secretary
Environmental Appeal Board
112 St. Clair Ave. West
Suite 502
Toronto, Ontario
M4V 1N3

AND

The Director
Section 38
Ministry of the Environment
Northwestern Region
435 James Street South
Thunder Bay, Ontario
P7C 5G6

DATED at THUNDER BAY this 8th day of January, 1990.

Director
Section 38
Ministry of the Environment

Ministry of Natural Resources
Ontario

Land Use Permit

Permit No. LUP 22-00 674

Public Lands Act

Use shaded areas for corrections.

Name of Applicant/Permittee (Insert Corporate Name if Applicant is "Limited" or "Incorporated")
The Corporation of the Township of Nakina

Area Code: 807 | Telephone No.: 329-5361

As Trustee for

Postal Address of Applicant/Permittee
P. O. Box 210, Nakina, Ontario POT 2HO

City, Town or Village: Corporation of the Township of Nakina | Prov./State: Ontario | Country: Canada | Postal Code: POT 2HO

Location of Land
Lot XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
Township of Nakina | Municipality

U.T.M. Grid
Section 16 E. 518000 N. 5558000 | Geographic Location | Area in hectares 19.3±

As per sketch and description which is attached to the original permit for this site and forms part of this permit. A copy of this sketch and description is on file at the District Office and available for inspection by the applicant at any time during normal business hours.

Land Required for the Purpose of
Disposal Grounds

Fee(s) and Period of Land Use

Current Fee (Subject to adjust.)	Annual Fee Due	Permit Effective Date	Permit Termination Date
$ 483.00	$ 483.00	January 1, 1990	December 31, 1990

Note: Terms and Conditions applicable to all Land Use Permits are on the reverse side of this form.

Additional Terms and Conditions applicable to this permit

- All accumulated slash and debris caused by the site expansion is to be piled for burning and any burning is to be carried out between the months of October and April or when the weather is sufficiently wet.
- Ensure regular maintenance and cleanup of the site to prevent the accumulation of flammable debris to the point where it could be considered a fire hazard.
- As new disposal trenches are developed, the area around the trench is to be cleared of flammable debris and cleared down to mineral soil for a distance of thirty metres. The Geraldton Fire Operations Headquarters is to be contacted in order that an inspection may be carried out by an M.N.R. Fire Officer.

Applicant's Certification

I certify that the information given herein is true and complete, and that I have read, fully understand, and agree to comply with all of the terms and conditions set out in this permit and that I am of the age of majority. I agree that this is the complete agreement between the parties hereto.

Signature of Applicant (incl. Corporation Official): [signature] | Date signed: DEC. 21, 1989.

Corporation Use Only
I have authority to bind the herein-named Corporation.

Initials and Surname of Corporation Official (Please print): D/B/ HEWKIOSKI | Signature of Corporation Official: [signature] | Position: CLERK - TREASURER.

Ministry Approval
Under authority of the Regulations under the Public Lands Act, this Land Use Permit is hereby issued to the above applicant, subject to all terms and conditions contained herein and no other, and these shall be the exclusive terms and conditions applicable to the use of this land.

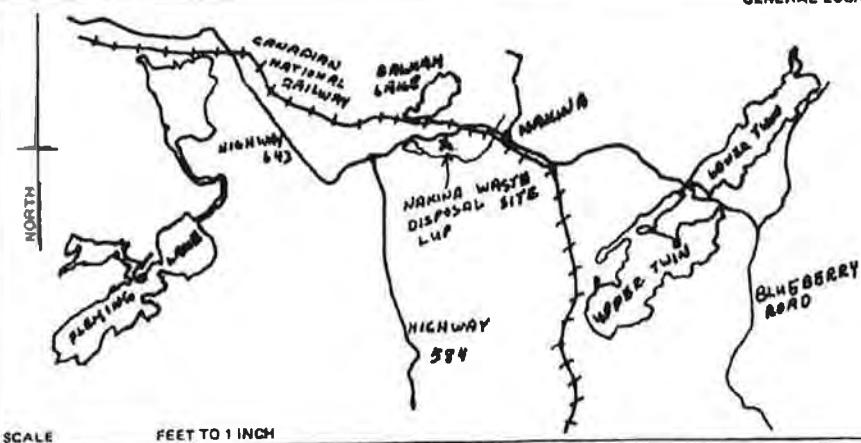
Amount Paid: $ 483.00 | Cash Register validation or Receipt No. | Signature of District Manager: [signature] | Date signed: 90/01/02

1620 (86/6)

483.00 CASH 4CL 0012 02-90

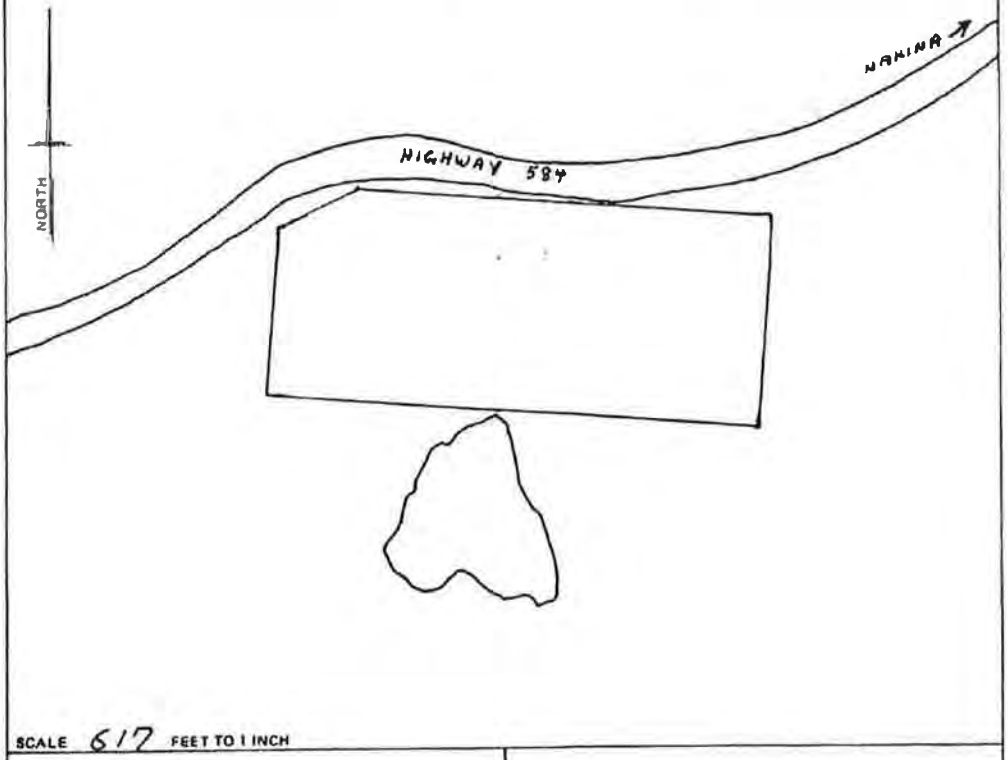
AND LOCATIONS FOR SPECIAL USE.

GENERAL LOCATION PLAN



SCALE FEET TO 1 INCH

NAKINA WASTE DISPOSAL SITE DETAIL PLAN



SCALE 617 FEET TO 1 INCH

PRIVATE USE ☐ COMMERCIAL USE ☐ SPECIAL USE ☐

LOT NO. OF PRELIMINARY SUBDIVISION ☐

INDIVIDUAL LOCATION ☐

LEVEL OF LAKE CONTROLLED BY A DAM YES ☐ NO ☐

BOUNDARIES COMPLETELY / PARTIALLY CUT OUT

PRELIMINARY SURVEY BY M. DAVIS

DATE OF PRELIMINARY SURVEY DECEMBER 7 19 81

NAME OF APPLICANT TOWNSHIP OF NAKINA

ADDRESS P.O. BOX 310 NAKINA, ONT. POT 1P0

REMARKS WASTE DISPOSAL SITE PER M.O.E. GUIDELINES 193 hot

MINISTRY OF NATURAL RESOURCES

GERALDTON DISTRICT OFFICE

ONTARIO PROVINCIAL GOVERNMENT

M.N.R. DATED DECEMBER 7 19 81

TOWNSHIP OF NAKINA

LOT ..... CONCESSION .....

APPROVED .....
District Manager

Ontario of the Environment

Ministère de l'Environnement

for a Waste Disposal Site (Landfill)

Demande de certificat d'autorisation d'un lieu d'élimination des déchets (enfouissement)

Numéro de demande

A591901

Important Note: If this application is for notification of changes in **use**, operations, or **ownership**, specify the MOE number on your certificate and fill in only the data which are being revised.

Remarque importante: *Si cette demande n'est utilisée que pour signifier des changements **d'utilisation**, d'exploitation ou de **propriétaire**, spécifier le numéro m. de l'E. de votre certificat et n'inscrire sur cette formule que les renseignements modifiés.*

1. Applicant *Demandeur*

☒ Municipal *Municipal* ☐ Provincial *Provincial* ☐ Other *Autre*

Name / *Nom*: THE CORPORATION OF THE TOWNSHIP OF NAKINA

Address / *Adresse*: BOX 210

Tel / *Tél*: (807)329-5361

City/Prov / *Ville/prov*: NAKINA ONTARIO

Postal Code / *Code postal*: POT 2HO

If applicant not Municipal or Provincial: / *Si le demandeur ne fait pas partie des catégories "municipal" ou "provincial":*

☐ Proprietorship *Entreprise à propriétaire unique*

☐ Corporation *Compagnie*

☐ Partnership *Société en nom collectif*

Proprietor's Name if Different from Applicant's / *Nom, si différent de celui du demandeur*

President's Name / *Nom du président*

Name All Partners / *Citer tous les associés*

2. Land Owner *Propriétaire du terrain*

Name / *Nom*: CROWN LAND

Address / *Adresse*:

3. Lessee *Locataire*

Name / *Nom*: TOWNSHIP OF NAKINA (land use permit)

Address / *Adresse*: P.O. BOX 210 NAKINA, ONTARIO POT 2HO

4. Site Operator *Exploitant du lieu*

Name / *Nom*: TOWNSHIP OF NAKINA

Title / *Titre*:

Address / *Adresse*:

5. Site Location *Emplacement du lieu*

☐ City *Cité* ☐ Town *Ville* ☐ Other (specify) *Autre (préciser)*

☐ Village *Village* ☒ Township *Canton*

site location noted on attached map

Name (City, Town, etc.) / *Nom (cité, ville, etc.)*: see L.U.P. # 22-00258

Concession / *Concession*:

Lot / *Lot n°*:

Part of Lot / *Partie de lot*:

Street Address / *Adresse*:

Include a copy of the plan of survey of any lands on which the site is to be located.
Joindre une copie du levé de tous les terrains sur lesquels le lieu sera situé.

6. Site Characteristics and Waste Categories
Caractéristiques du lieu et catégorie de déchets

A. Present Land Use / *Utilisation actuelle du terrain*: MUNICIPAL DISPOSAL SITE

B. Present Official Plan Designation of Site / *Désignation actuelle du lieu sur le plan officiel*: CROWN LAND

C. Present Zoning Category / *Catégorie de zonage actuelle*: CROWN LAND

D. Provide details of present land use of all adjoining properties on the location map.
Indiquer sur la carte l'utilisation actuelle des terres de toutes les propriétés adjacentes.

(See note below) / *(Voir remarque ci-dessous)*

E. Rate at Which Site Can Receive Wastes Per Day
Rythme de déversement possible des déchets quotidiennement

Waste Category / *Ord. ménagères*	Quantity (Tonnes, Cubic Metres, Litres) / *Quantité (tonnes, mètres cubes, litres)*
[X] Domestic / *Domestiques*	525 TONNES
[X] Commercial / *Commerciales*	275 TONNES

If any of the following are to be received at the site, attach a description of each including source.
Si des déchets des catégories suivantes doivent normalement être déversés dans le lieu d'élimination des déchets, joindre une description de chacune des catégories, y compris la provenance.

	Quantity / *Quantité*
[ ] Liquid Industrial / *Industriels liquides*	
[ ] Solid Hazardous / *Déchets solides dangereux*	
[ ] Non-Hazardous Solid Industrial / *Industriels solides non dangereux*	
[ ] Other / *Autres*	

F. No. of Days/Yr. Site Open / *Nombre de jours/année d'ouverture du lieu*: 365 days

G. Population Served / *Population desservie*: 650

H. Municipalities/Major Industries Served / *Noms de toutes les municipalités/grandes entreprises devant être desservies par le lieu*

TOWNSHIP OF NAKINA

I. Total Area of Site / *Superficie totale du lieu*: 20 — [X] Hectares / *Hectares* [ ] Acres / *Acres*

J. Total Area to be Filled / *Superficie totale à combler*: 5 — [X] Hectares / *Hectares* [ ] Acres / *Acres*

K. Estimated Site Capacity / *Capacité estimative du lieu*: 12,000 — [X] Tonnes / *Tonnes* [ ] Cubic Metres / *Mètres cubes*

Express rate per day and capacity in same measurement.
Utiliser les mêmes unités pour indiquer le taux par jour et la capacité estimative.

7. Site Enlargement Changes Only
En cas d'agrandissement de lieu seulement

A. Additional Life Expectancy / *Durée d'utilisation supplémentaire*: 10 Years / *années*

B. Additional Area Applied for / *Superficie supplémentaire demandée*: 8 Hectares / *hectares*

C. New Total Area of Site / *Nouvelle superficie totale du lieu*: 20 Hectares / *hectares*

D. New Potential Municipalities Served / *Noms des nouvelles municipalités pouvant être desservies*

9. Control System
Système de contrôle

A. Monitoring for
Contrôle des

	Yes / Oui	No / Non
Gas / Gaz	☐	☐ *
Ground Water / *Eaux souterraines*	☐	☒
Surface Water / *Eaux de surface*	☐	☒

B. Control System for
Système de contrôle

	Yes / Oui	No / Non
Gas / Gaz	☐	☒
Gas Utilization / *Utilisation des gaz*	☐	☒
Leachate / *Lixiviation*	☐	☒

). Documentation
Documents

List all supporting documents submitted with this Application.
Indiquer tous les documents d'appui accompagnant la présente demande

MINISTRY OF NATURAL RESOURES land use permit # 22-00258
MAP OF SITE LOCATION
SITE PLAN
AREA MAP 1:50,000
OPERATING PLAN

10. Signature
Signature

Applicant's Name - Printed
Nom du demandeur (lettres moulées)
ONIO LEWKOSKI

Title
Titre
CLERK - TREASURER

Signature
Signature

Date
Date
MARCH 17/89

Company Seal
(if applicable)
Sceau de la compagnie
(*si applicable*)

DATE OF PRELIMINARY SURVEY Nov. 29 1962

NAME OF APPLICANT Imp. Dist. of Nakina,

ADDRESS NAKINA, Ont

REMARKS for disposal grounds

Ontario

Ministry of the Environment

PROVISIONAL CERTIFICATE OF APPROVAL FOR A WASTE DISPOSAL SITE

Provisional Certificate No. 591901

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

Improvement District of Nakina

Nakina, Ontario.

for the Landfill

located 2 miles west of Townsite of Nakina and 1000 feet south of Site

Highway 584

subject to the following conditions

This Provisional Certificate expires on the 15th day of November, 1978

Dated this 11th day of April, 1973

Director, Waste Management Branch

MOE 14-201

Townsite and 1000 feet south
of highway 584, Nakina Township
5 acres

By, H. F. Wright,
Senior Inspector, Northern Region,
Waste Management Branch,
Ministry of the Environment,
1111 Victoria Avenue,
Thunder Bay "F", Ontario.

File No. A-5919.01

March 5th,1973.

This site was inspected on Tuesday, August 15th, 1972 by the writer.

The site is on a land use permit originally issued in 1962. The Improvement District of Nakina rents the land at an annual fee of five dollars.

The site serves six hundred and seventy-four people of the townsite and possibly a few scattered settlers in the immediate area.

PHYSIOGRAPHY:

The site is located on the edge of a sand depression with hills ranging from twenty feet to sixty feet high surrounding the site with the exception of one narrow gap at the northwest end.

There seems to be no major rock outcroppings. The hills south of the site are heavily wooded. The land between the site and highway 584 is covered with light scrub bush.

There is a small swampy area at the base of the dumping area. This swamp seems self contained with no visible outlet. The water may be a perched water table.

SOILS:

The basic soil is fine sand with some gravel deposits. This soil should be suitable for trenching and cover material.

SITE MANAGEMENT:

The municipality has in the past dug a trench. The main operation, however, seems to be dumping refuse over the bank into the swamp. Periodic bulldozing of the site and covering the refuse with sand have taken place. The municipality has also bulldozed the refuse in large irregular shaped mounds to clear space for dumping.

Our Branch has received information that the municipality has cleared some of the bush and constructed a new road to the site. The Ministry of Natural Resources has brought this to our attention but our Branch has not personally inspected the site.

...2

The site is operated as a dump with most of the on site work completed in the summer months. For a small municipality this operation is fair. There are no signs on the site. The municipality does clean up blowing papers, but there is no set programme.

The site is burned frequently, normally in the low fire hazard time in the Spring and Fall.

MUNICIPAL OFFICIALS:

The writer contacted Mr. E. N. Barvie, Secretary-Treasurer for the municipality and discussed the possible conversion of the site to a landfill operation. Trenches could be dug of sufficient size to serve the municipality. Mr. Barvie stated that the area was isolated and that the municipality on many occasions has tried to contract equipment for site maintenance but was unable to find any available.

RECOMMENDATIONS:

1. The municipality properly sign the site.

2. A trench type landfill operation should be investigated by the municipality.

3. Existing mounds of refuse should be bulldozed into the lower areas of the site and properly covered.

H. F. Wright

HFW/cjn

RECOMMENDATION OF REGIONAL ENGINEER

ISSUE	
RE-ISSUE	
UP-GRADE	

NOTE: This form shall be submitted by the Regional Engineer to Head Office along with the application form and all supporting information.

FIRST ISSUE

APPLICANT: The Corporation of the Improvement District of Nakina

FOR THE **WASTE DISPOSAL SITE** [x] **WASTE MANAGEMENT SYSTEM** [ ]

LOCATED AT Parcel of Land 2 miles west of Nakina Townsite, 1000 feet south of hwy. 584

SERVING .....

DATE APPLICATION RECEIVED: August 11th, 1972 T.B. File: A5919-01

ISSUE: Certificate of Approval [ ] Provisional Certificate of Approval [x] Provisional Certificate to Expire On November 15th, 1973

CONDITIONS:

1. The site should be properly signed.
2. Existing mounds of refuse must be properly covered.
3. The municipality should investigate the feasibility of operating a trench type landfill.

CIRCULATE TO:

REASONS FOR CIRCULATING:

REFUSE APPLICATION: [ ]

REVOKE [ ] SUSPEND [ ] REFUSE TO RE-ISSUE [ ] (Cert. No.....)

REASONS:

DATE: March 5th, 1973 T.B. SIGNED: .....

Regional Engineer

NORTHERN Region

TO AN APPLICATION FOR APPROVAL OF A LANDFILL DISPOSAL SITE A-5919

APPLICANT TO COMPLETE ITEMS 1-4 INCLUSIVE

1. SITE DETAILS

Applicant Improvement District of Nakina

Site Location 2 miles west of Nakina Townsite and 1000' south of Highway 584

Total area of Site	5 Acres
Total usable area for waste disposal	4 Acres
Anticipated Lifetime	2 Years
Distance to nearest watercourse	2 mi.
Distance to nearest potable well water supply	N.A. ft.
Depth of well noted above	N.A. ft.
Distance to dwelling	2 mi.
Distance to public road measured from working area	1,000 ft.
Distance to cemetery	4 mi.
Depth from original surface to bottom of waste	14 ft.
Depth from original surface to top of fill	10 ft.

Ground conditions encountered measured from original surface

Sand From ..... To .....
From ..... To .....
From ..... To .....
From ..... To .....

Depth to watertable below surface ..... ft.
on ..... 197 .....

General description of site (location, topography etc.)

Proposed use of land after site fully utilized

2. Wastes to be Disposed of Comprise

Domestic	100 %
Commercial	%
Industrial Waste	%
Hauled Liquid Industrial Waste	%
Agricultural Waste	%
Hazardous Waste	%
Hauled Sewage	%
*Other	%
	100%

*Describe

Origin and Composition of Principal Components of Waste (other than domestic and commercial)

FOR REGIONAL USE

Authorities Consulted:

Health Unit	☐ Objection	☐ No Objection
O.W.R.C.	☐ Objection	☐ No Objection
A.M.B.	☐ Objection	☐ No Objection
Municipality	☐ Objection	☐ No Objection
Conservation Authority	☐ Objection	☐ No Objection

Other

Inspection Record Forms Attached Yes ☐ No ☐

Number of Forms

Regional Engineer's Report Attached ☐

Ground water monitoring Yes ☐ No ☐

Surface water monitoring Yes ☐ No ☐

3. Quantities

Total Tons per Day 1/2

Total Gallons per Day

Estimated ☑ or Measured ☐

Site operated ..... days from ..... to .....

Population served 677

Names of Municipalities served Nakina

Official Plan ☑ Zoning Bylaw ☐

Site land zoned No

Adjacent land zoned No

Equipment Owned ☑ Rented ☐

4. The Following Documents are Attached

Copy land use permit, Department of Lands & Forests.

Sk. th. Map

Prepared by

L.H. Simons
Assistant Secretary-Treasurer,
Corporation of the Improvement District of Nakina

DATED

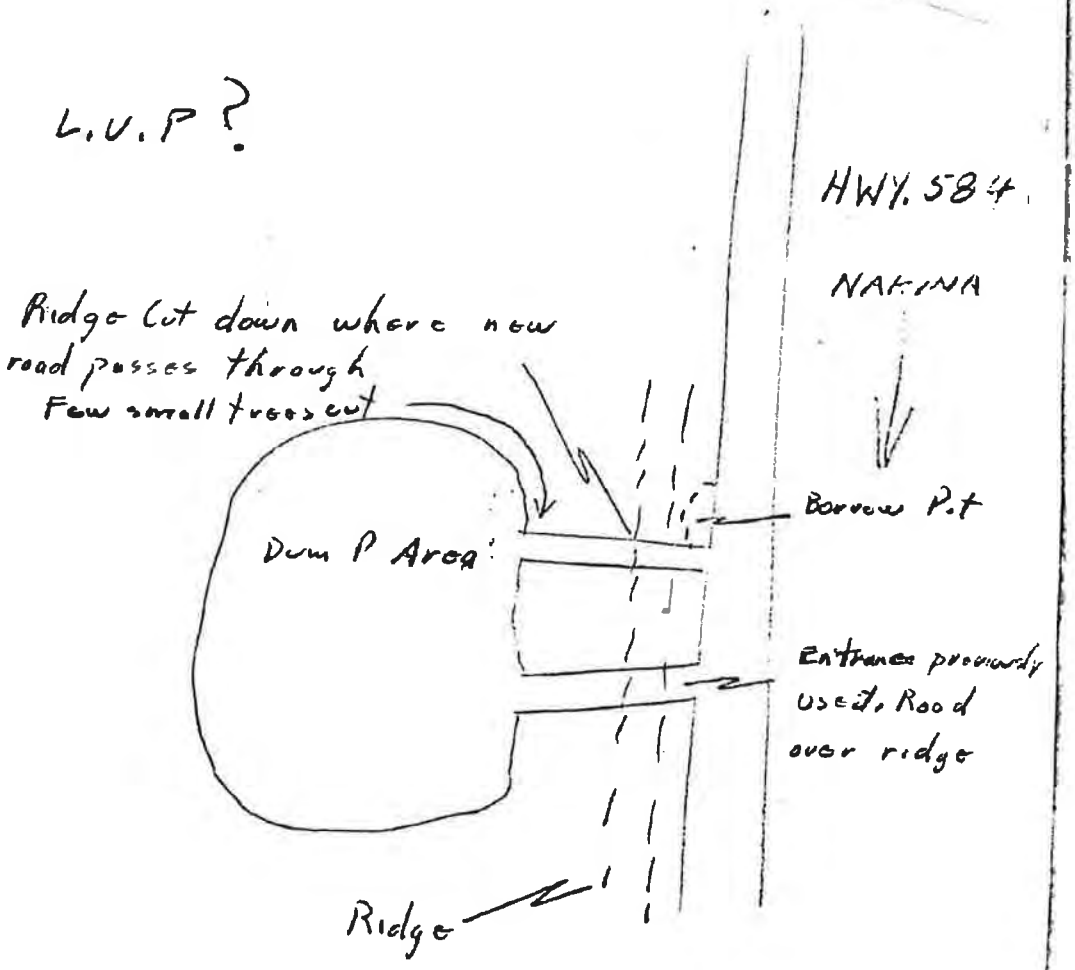
L. Simons
Signature of Owner (Applicant)

for SECRETARY TREASURER

No Carbon Paper Required

W M. 303 2-72

L.U.P?


HWY. 58 ↓
NAKINA
Ridge Cut down where new road passes through
Few small trees cut
Borrow P.t
Dump Area
Entrance previously used. Road over ridge
Ridge

ONTARIO

Waste Management Branch

APPLICATION FOR A CERTIFICATE OF APPROVAL FOR A WASTE DISPOSAL SITE

IMPORTANT NOTE

THIS FORM MUST BE SUBMITTED THROUGH THE OFFICE OF THE REGIONAL WASTE MANAGEMENT ENGINEER

Waste Management Branch
199 Victoria Avenue
THUNDER BAY, "F" ONT.

A-5919

(SEE SECOND SHEET FOR INSTRUCTIONS FOR COMPLETING THIS FORM)

1. Owner (Applicant)	Under the Environmental Protection Act and the Regulations, this application is made by:—	THE CORPORATION OF THE IMPROVEMENT DISTRICT OF NAKINA (Name) NAKINA, ONTARIO (Address)
2. Type of disposal site	For the ~~Reissue~~ Issue of a Certificate of Approval for a	Sanitary Landfill Site
3. Site location	Located	2 miles west of Nakina Townsite and 1000' south of Highway 584.
IF APPLICATION IS FOR REISSUE, COMPLETE SECTIONS 4 AND 5 (A OR B)		
4. Previous Certificate details	Certificate / Provisional Certificate of Approval:— for this site was issued on:—	No. 197
5. Changes.	(A) The following changes in use, operation or ownership (have occurred since the date of the original application) OR (are proposed)	WASTE MANAGEMENT BRANCH RECEIVED MAR 7 1973 NORTH BAY NORTHERN REGION
	(B) No change in use, operation or ownership of the site has occurred since the date of the original application.	☐
IF APPLICATION IS FOR ISSUE, COMPLETE SECTIONS 6, 7, 8 AND 9		
6. Operator.	The site will be operated in conformity with the Environmental Protection Act and the regulations by:—	Improvement District of Nakina (Name) RECEIVED AUG 11 1972 NORTHERN REGION Nakina, Ont. (Address)
7. Publication of Notice.	Notice of this application has been published in the on the following dates and a copy of the notice is attached.	N.A. (Name of Newspaper) ☐
8. Municipal Certificate (Non-municipal applicants only)	A certificate, that the site does not contravene any of the by-laws of the Signed by is attached.	N.A. (Municipality) (Name) (Position)
9. Additional information	The required supporting information to this application is attached.	☑

Dated this ninth day of August 19 72

for SECRETARY TREASURER
Signature of Owner-Applicant

W.M. 302 2-72

No Carbon Paper Required

ADMINISTRATIVE DISTRICT GERALDTON

ONTARIO

DEPARTMENT OF LANDS AND FORESTS

LAND USE PERMIT

Authority is granted to Improvement District of Nakina

of NAKINA, Ontario. to enter upon, occupy, and use,

for the purpose of municipal refuse dump

for the period from November 30, 1970 to November 29, 1971

That parcel, or tract of land, or building, described as follows:
(Give full description and area)

Parcel 2 miles west of the Nakina Townsite and 1000' south of Highway 584, Nakina Township - 5 acres.

This authority is granted under the following conditions:

RESERVING all trees of whatsoever kind standing, growing, or being upon the said land, with the right to timber licensees, if any, in the course of lumbering operations, to cut and remove same;

RESERVING also all gold, silver, and other minerals and all sand, gravel, and similar materials which are or shall be hereafter found in, on, or under the said land;

SUBJECT to the payment to the Treasurer of the Province of Ontario, or authorized agent, of the sum of $ 5.00 of lawful money of Canada, payable prior to issuance of this permit.

IT IS UNDERSTOOD AND AGREED that the acceptance of this permit, by the within-named permittee and the payment by the said permittee of the amount of money stated herein is for the period shown above (or part thereof) not in excess of one year; that a new permit must be obtained at the expiry or cancellation of this permit if continued use of the land is permitted and that this permit may be revoked or cancelled at any time by the Minister of Lands and Forests, or authorized agent, when it shall be deemed in the public interest so to do.

PROVIDED that if and when it is considered a survey of land described in this permit is necessary, it shall be done at the expense of the permittee;

PROVIDED that all buildings erected and all works constructed on said lands shall be made to the satisfaction of the Minister of Lands and Forests, or authorized agent, and shall be kept in clean and sanitary condition and that the permittee shall exercise all reasonable care and precaution against the outbreak of fire;

PROVIDED that this permit is granted upon the condition that the land described herein shall be used for the purposes only as hereinbefore described. Violation of this provision cancels permit automatically;

PROVIDED that this permit shall not be assigned or transferred;

PROVIDED that a sworn statement shall be submitted to the Minister of Lands and Forests at such times as may be demanded by him during the currency of this permit describing any operations thereunder and the condition of the buildings thereon;

PROVIDED that the following special conditions are complied with:

The permittee must comply with the Forest Fire Prevention Act.

WASTE MANAGEMENT BRANCH
RECEIVED
AUG 11 1972
THUNDER BAY
NORTHERN REGION
A-5919

PAYMENT COVERED BY
RECEIPT No. D094264
BLOTTER PAGE No. CB1510

ORIGINAL PERMIT No. 1289-35 19 62 -19 63

RENEWAL FOR PERMIT No. 2083-28 19 69 -19 70

SURCHARGE

RENTAL $5.00

TOTAL $ 5.00

(Signature of Authorized Forester)

W.K. Fullerton, District Forester.

Place GERALDTON, Ontario.

Date November 3, 1971.

PERMIT No 2229-30

3205

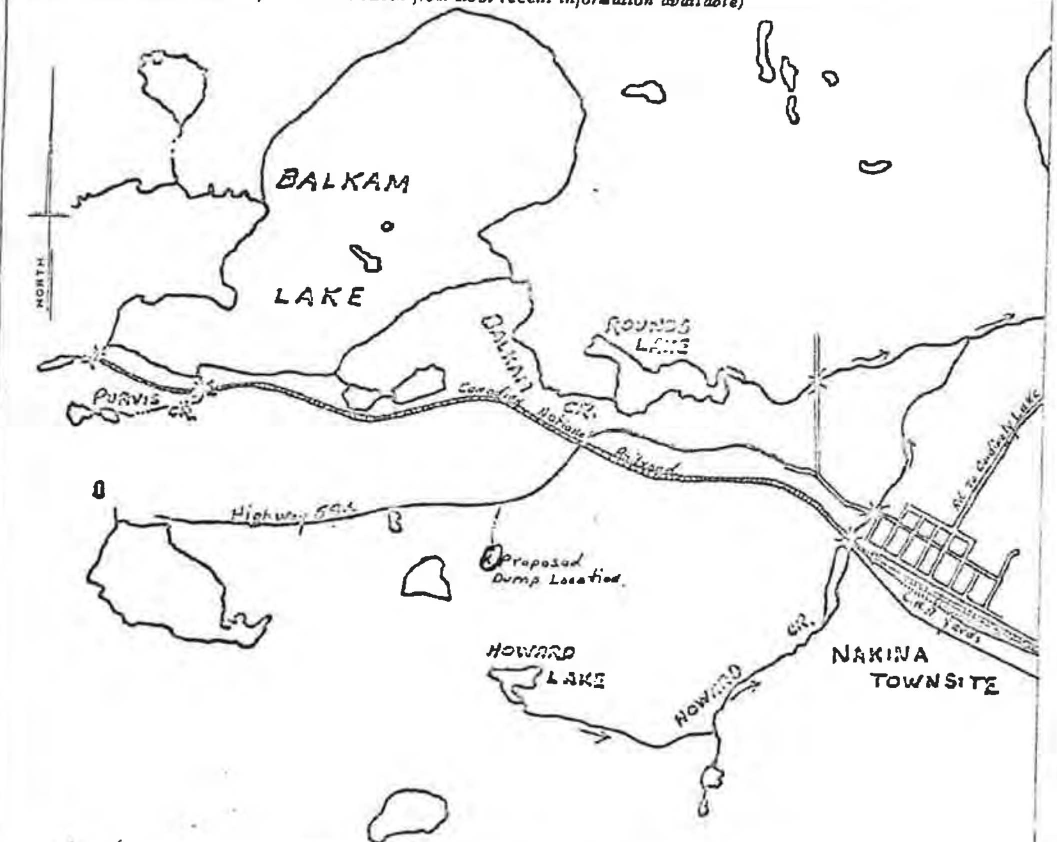
GENERAL LOCATION PLAN

NORTH

A-5919

SCALE FEET TO 1 INCH

DETAIL PLAN - *(Position of shore line taken from most recent information available)*



SCALE 40 chns. ~~FEET~~ TO 1 INCH (~~[illegible]~~)

PRIVATE USE ☐ COMMERCIAL USE ☐ SPECIAL USE ☐

LOT NO. OF PRELIMINARY SUBDIVISION ☐

INDIVIDUAL LOCATION ☐

LEVEL OF LAKE CONTROLLED BY A DAM YES ☐ NO ☐

BOUNDARIES COMPLETELY / PARTIALLY CUT OUT

PRELIMINARY SURVEY BY J.A. Murphy

DATE OF PRELIMINARY SURVEY Nov. 27 19 72

NAME OF APPLICANT Improvement Dist.

ADDRESS of Nakina

REMARKS

To be used by District Offices in submitting applications for summer resort locations and locations for special use.

DEPARTMENT OF LANDS AND FORESTS

Geraldton DISTRICT OFFICE

ONTARIO PROVINCIAL GOVERNMENT

Nov. 30 DATED 19 72

TOWNSHIP OF

LOT CONCESSION

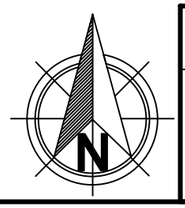
APPROVED

District Forester

APPENDIX B –

Figures

LIST OF FIGURES



exp.

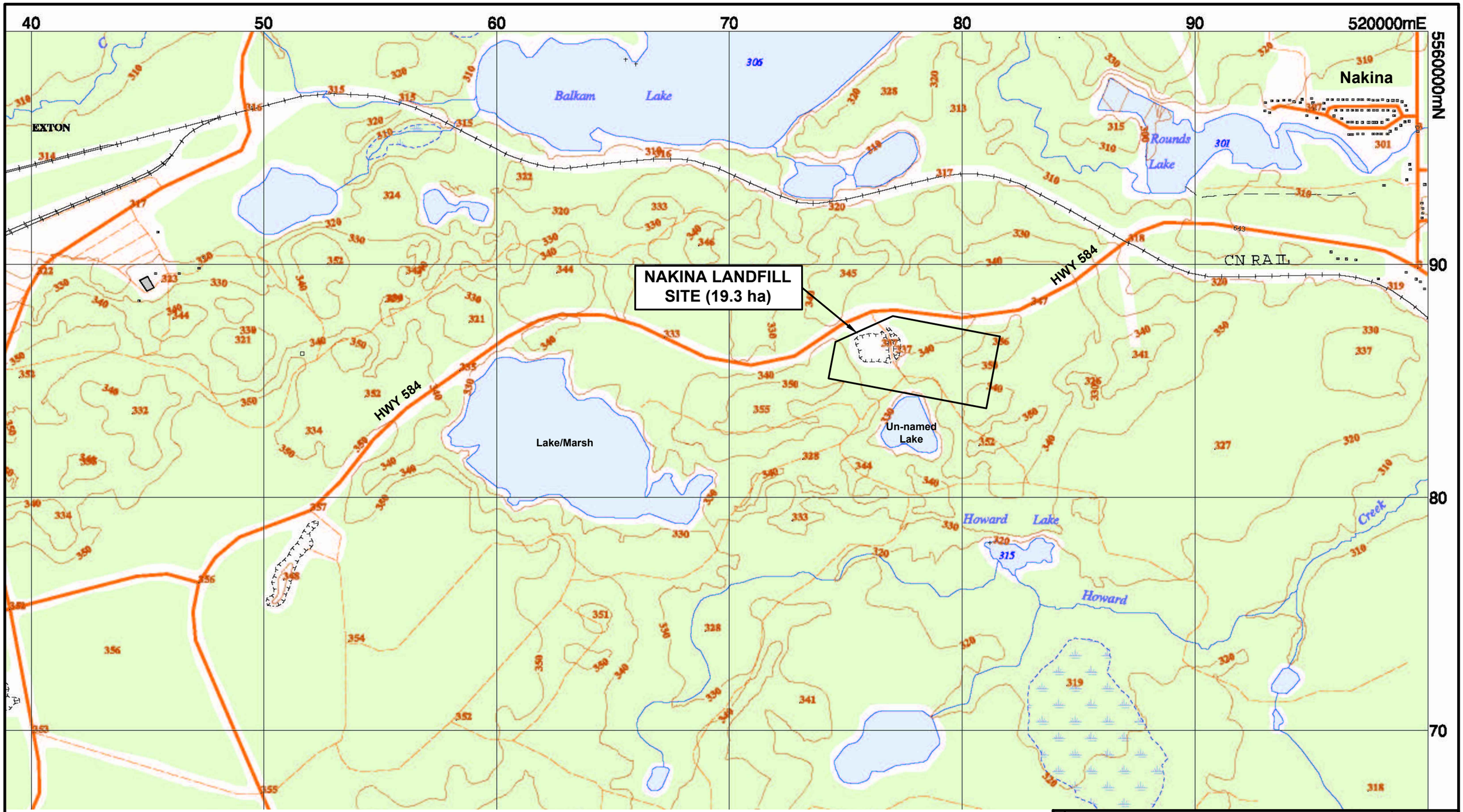
Thunder Bay, Ontario

FIGURE 1

SITE LOCATION PLAN

2019, 2020 and 2021 Monitoring Report
Nakina Landfill, Nakina, Ontario
Municipality of Greenstone

PROJECT NO.:	THB-00011119-JE
SCALE:	AS SHOWN
DRAWN BY:	SW
CHECKED BY:	AM
DATE:	April 30, 2022



150 0 150 300
IN METRES

NOTES:
1) REFERENCE: MINISTRY OF NATURAL RESOURCES ONTARIO BASE MAP NO. 20 16 5100 55500. NORTH AMERICAN DATUM 1983.

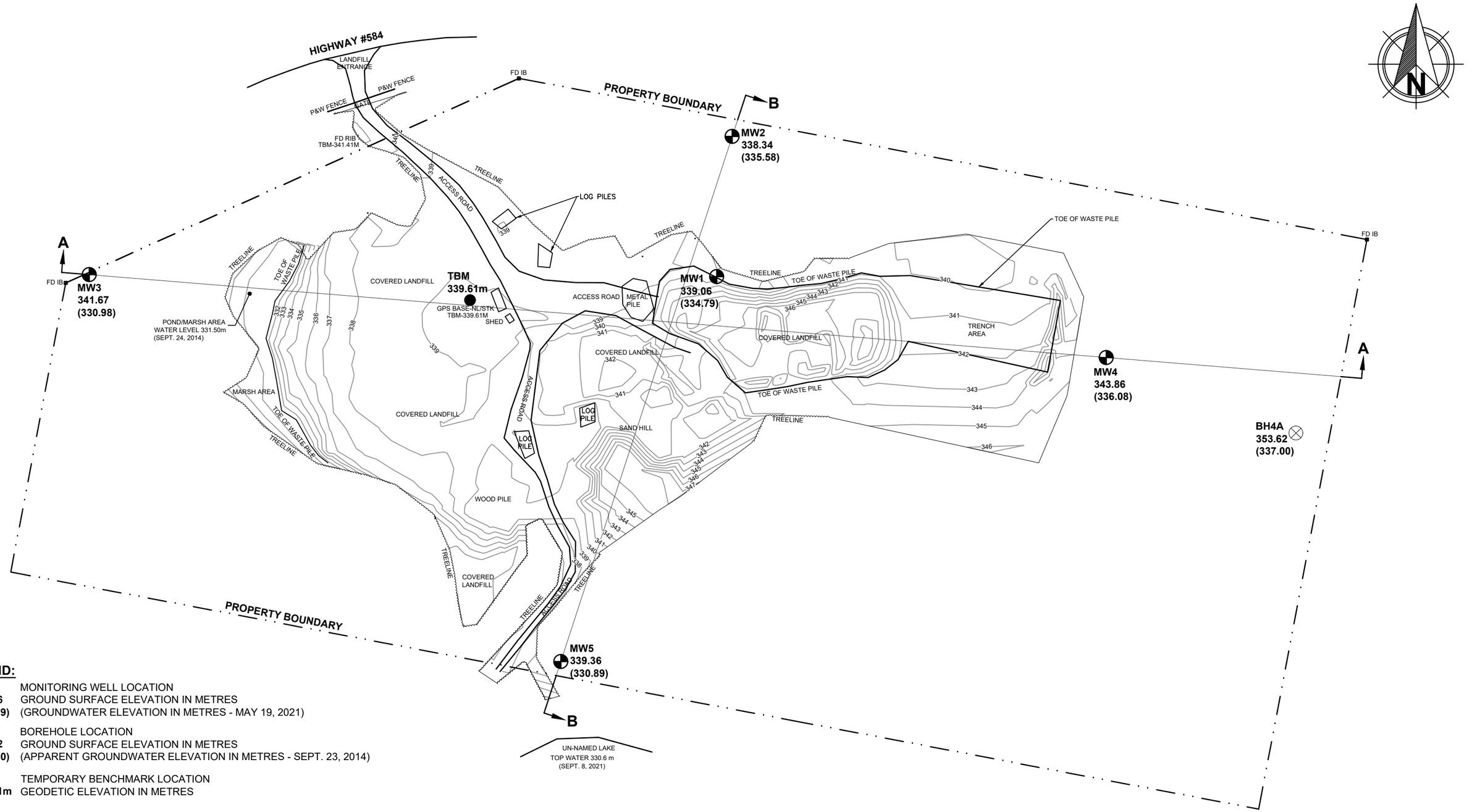
exp. Thunder Bay, Ontario

FIGURE 2

SITE & SURROUNDING FEATURES

2019, 2020 and 2021 Monitoring Report
Nakina Landfill, Nakina, Ontario
Municipality of Greenstone

PROJECT NO.:	THB-00011119-JE
SCALE:	1:15,000
DRAWN BY:	SW
CHECKED BY:	AM
DATE:	April 30, 2022



LEGEND:

MW1 **339.06** **(334.79)**	MONITORING WELL LOCATION GROUND SURFACE ELEVATION IN METRES (GROUNDWATER ELEVATION IN METRES - MAY 19, 2021)
BH4A **353.62** **(337.00)**	BOREHOLE LOCATION GROUND SURFACE ELEVATION IN METRES (APPARENT GROUNDWATER ELEVATION IN METRES - SEPT. 23, 2014)
TBM **339.61m**	TEMPORARY BENCHMARK LOCATION GEODETIC ELEVATION IN METRES

NOTES:

1. REFERENCE: TOPOGRAPHIC SURVEY PLAN BY DELTA SURVEY INC. (SEPTEMBER 8, 2021).
2. GROUND SURFACE AND TOP OF PIPE ELEVATIONS OF MONITORING WELLS AND TOP OF WATER LEVELS AT UN-NAMED LAKE AND THE POND/MARSH WERE SURVEYED BY DELTA SURVEY ON SEPT. 8, 2021.
3. TEMPORARY BENCHMARK: STAKE IN GROUND LOCATED BEHIND LANDFILL SHACK.

20 0 20 40
IN METRES

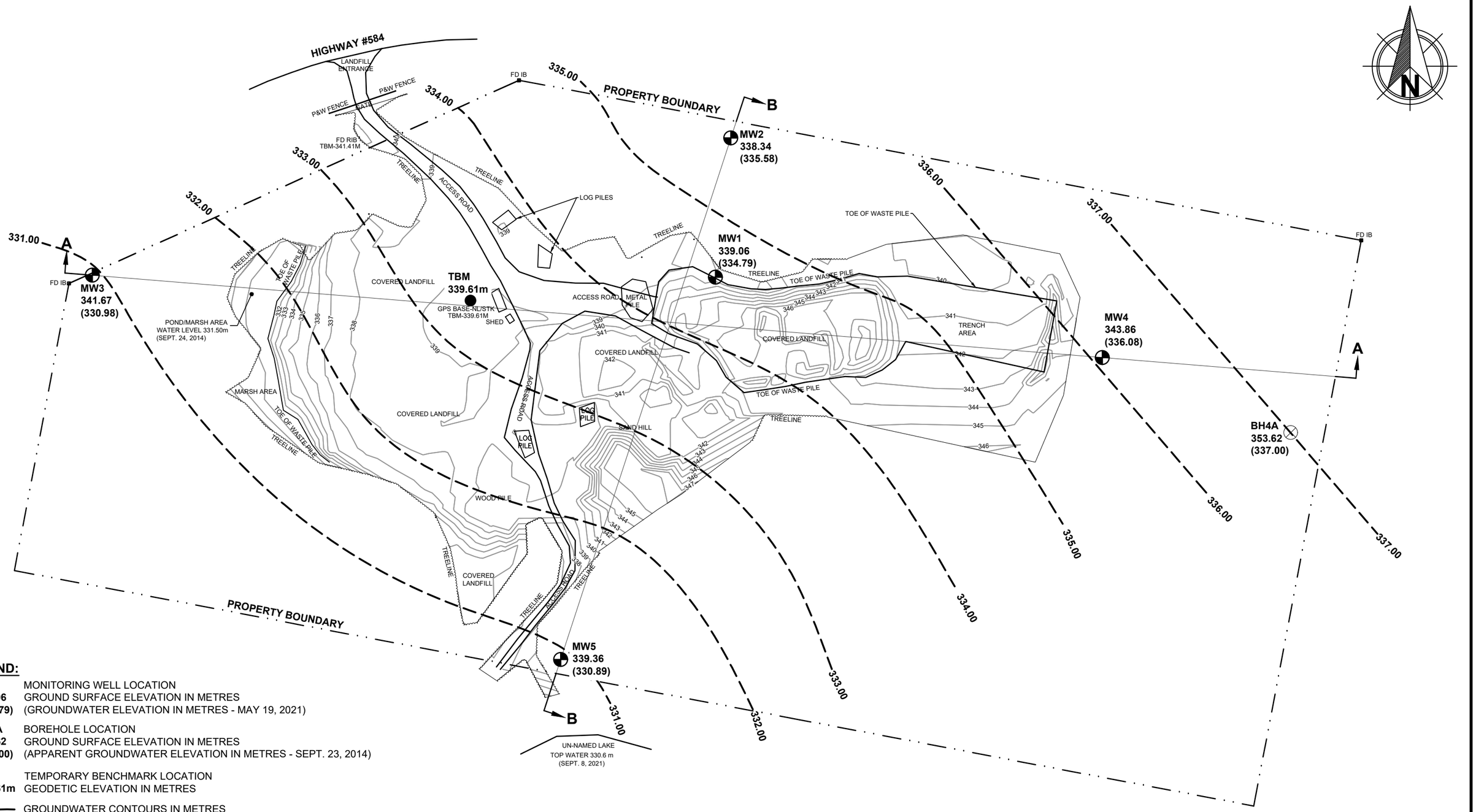
exp. Thunder Bay, Ontario

FIGURE 3

MONITORING WELL LOCATION PLAN

2019, 2020 and 2021 Monitoring Report
Nakina Landfill, Nakina, Ontario
Municipality of Greenstone

PROJECT NO.:	THB-00011119-JE
SCALE:	1:2,000
DRAWN BY:	SW/KP
CHECKED BY:	AM
DATE:	April 30, 2022



LEGEND:

MW1 **339.06** **(334.79)**	MONITORING WELL LOCATION GROUND SURFACE ELEVATION IN METRES (GROUNDWATER ELEVATION IN METRES - MAY 19, 2021)
BH4A **353.62** **(337.00)**	BOREHOLE LOCATION GROUND SURFACE ELEVATION IN METRES (APPARENT GROUNDWATER ELEVATION IN METRES - SEPT. 23, 2014)
TBM **339.61m**	TEMPORARY BENCHMARK LOCATION GEODETIC ELEVATION IN METRES
— — —	GROUNDWATER CONTOURS IN METRES

NOTES:

1. REFERENCE: TOPOGRAPHIC SURVEY PLAN BY DELTA SURVEY INC. (SEPTEMBER 8, 2021).
2. GROUND SURFACE AND TOP OF PIPE ELEVATIONS OF MONITORING WELLS AND TOP OF WATER LEVELS AT UN-NAMED LAKE AND THE POND/MARSH WERE SURVEYED BY DELTA SURVEY ON SEPT. 8, 2021.
3. TEMPORARY BENCHMARK: STAKE IN GROUND LOCATED BEHIND LANDFILL SHACK.

20 0 20 40
IN METRES

exp. Thunder Bay, Ontario

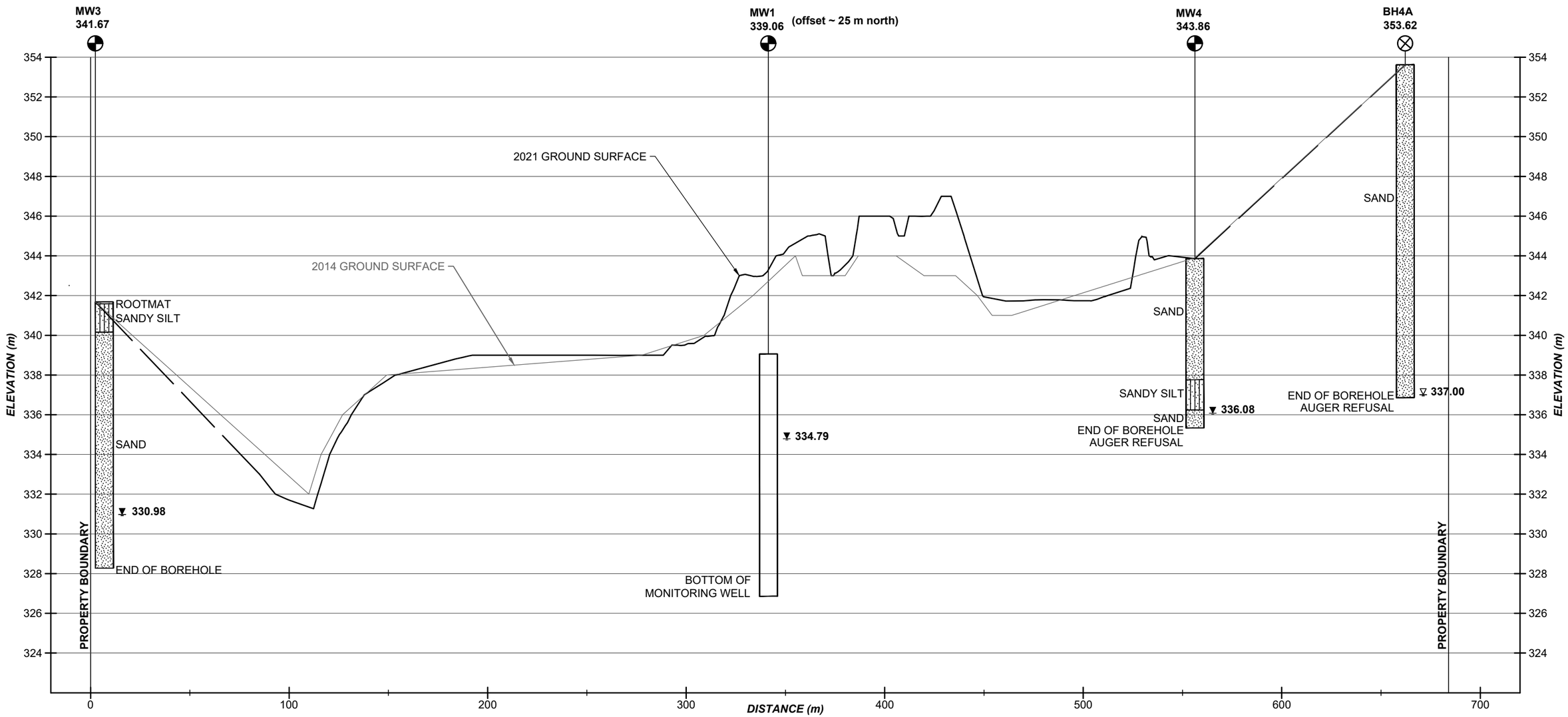
FIGURE 4

GROUNDWATER CONTOUR PLAN

2019, 2020 and 2021 Monitoring Report
Nakina Landfill, Nakina, Ontario
Municipality of Greenstone

PROJECT NO.:	THB-00011119-JE
SCALE:	1:2,000
DRAWN BY:	SW/KP
CHECKED BY:	AM
DATE:	April 30, 2022

WEST **EAST**



SECTION A-A

NOTES:

1. REFERENCE: TOPOGRAPHIC SURVEY PLAN BY DELTA SURVEY INC. (SEPTEMBER 8, 2021).
2. REFER TO FIGURE 3 FOR SECTION LINE LOCATION.
2. GROUND SURFACE AND TOP OF PIPE ELEVATIONS OF MONITORING WELLS AND TOP OF WATER LEVELS AT UN-NAMED LAKE AND THE POND/MARSH WERE SURVEYED BY DELTA SURVEY ON SEPT. 8, 2021.
3. TEMPORARY BENCHMARK: STAKE IN GROUND LOCATED BEHIND LANDFILL SHACK.
4. NO BOREHOLE LOG AVAILABLE FOR MW1.
5. ALL UNITS IN METRES.

LEGEND:

MW1 **339.06**	MONITORING WELL LOCATION GROUND SURFACE ELEVATION IN METRES
BH4A **353.62**	BOREHOLE LOCATION GROUND SURFACE ELEVATION IN METRES
334.79	MEASURED GROUNDWATER ELEVATION IN METRES (MAY 19, 2021)
337.00	APPARENT GROUNDWATER ELEVATION IN METRES (SEPTEMBER 23, 2014)

exp. Thunder Bay, Ontario

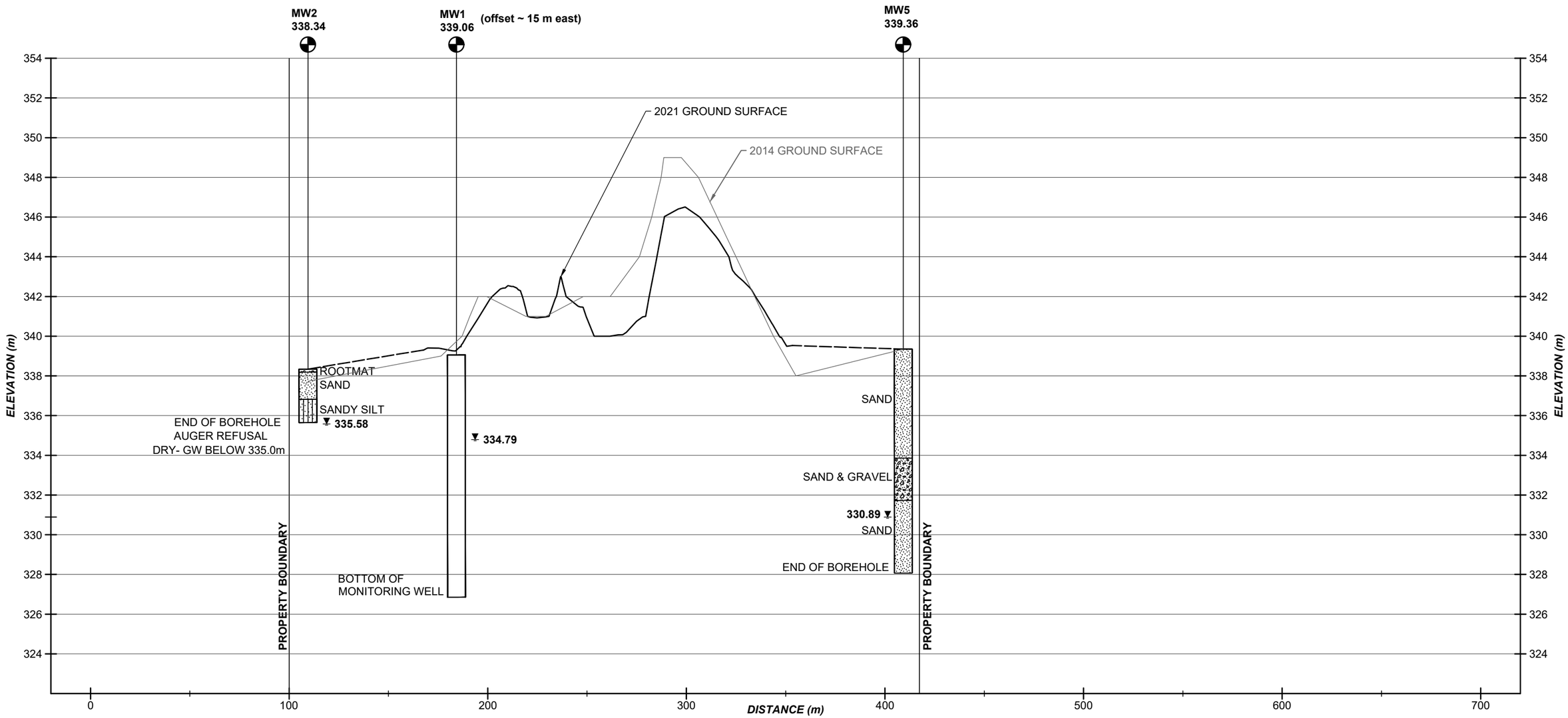
FIGURE 5A

STRATIGRAPHIC PROFILE A-A

2019, 2020 and 2021 Monitoring Report
Nakina Landfill, Nakina, Ontario
Municipality of Greenstone

PROJECT NO.:	THB-00011119-JE
SCALE:	1:2,000H / 1:200V
DRAWN BY:	SW/KP
CHECKED BY:	AM
DATE:	April 30, 2022

NORTH **SOUTH**



SECTION B-B

NOTES:

1. REFERENCE: TOPOGRAPHIC SURVEY PLAN BY DELTA SURVEY INC. (SEPTEMBER 8, 2021).
2. REFER TO FIGURE 3 FOR SECTION LINE LOCATION.
2. GROUND SURFACE AND TOP OF PIPE ELEVATIONS OF MONITORING WELLS AND TOP OF WATER LEVELS AT UN-NAMED LAKE AND THE POND/MARSH WERE SURVEYED BY DELTA SURVEY ON SEPT. 8, 2021.
3. TEMPORARY BENCHMARK: STAKE IN GROUND LOCATED BEHIND LANDFILL SHACK.
4. NO BOREHOLE LOG AVAILABLE FOR MW1.
5. ALL UNITS IN METRES.

LEGEND:

MW1 **339.06**	MONITORING WELL LOCATION GROUND SURFACE ELEVATION IN METRES
334.79	MEASURED GROUNDWATER ELEVATION IN METRES (MAY 19, 2021)

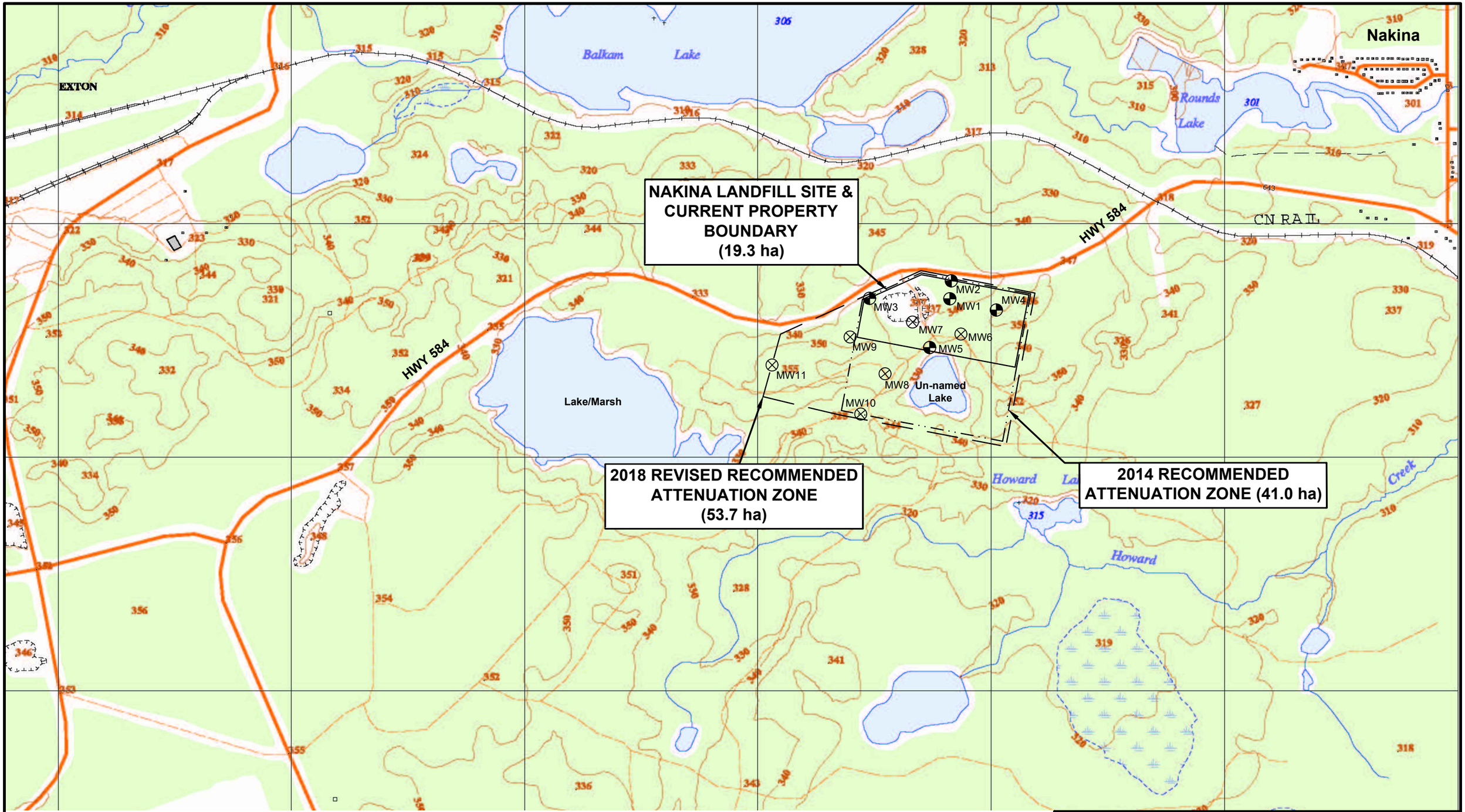
exp. Thunder Bay, Ontario

FIGURE 5B

STRATIGRAPHIC PROFILE B-B

2019, 2020 and 2021 Monitoring Report
Nakina Landfill, Nakina, Ontario
Municipality of Greenstone

PROJECT NO.:	THB-00011119-JE
SCALE:	1:2,000H / 1:200V
DRAWN BY:	SW/KP
CHECKED BY:	AM
DATE:	April 30, 2022



LEGEND:

- MW1 MONITORING WELL LOCATION
- MW6 PROPOSED MONITORING WELL LOCATIONS

NOTES:

1) REFERENCE: MINISTRY OF NATURAL RESOURCES ONTARIO BASE MAP NO. 20 16 5100 55500. NORTH AMERICAN DATUM 1983.

150 0 150 300
IN METRES

N

exp. Thunder Bay, Ontario

FIGURE 6

RECOMMENDED ATTENTION ZONE EXPANSION

2019, 2020 and 2021 Monitoring Report
Nakina Landfill, Nakina, Ontario
Municipality of Greenstone

PROJECT NO.:	THB-00011119-JE
SCALE:	1:15,000
DRAWN BY:	SW
CHECKED BY:	AM
DATE:	April 30, 2022

HIGHWAY #584

LANDFILL ENTRANCE

P&W FENCE

GATE

FD IB

PROPERTY BOUNDARY

FD RIB
TBM-341.41M

MW2

TREELINE

ACCESS ROAD

WASTE FOOTPRINT (5 ha)
(INCLUDES ADDITIONAL 1.2 ha FOOTPRINT)

MW1

TRENCHES (17)
TOTAL VOLUME = 16,320 m³
(6 m x 40 m x 4 m DEEP)

FD IB

MW3

TOE OF WASTE PILE

COVERED LANDFILL

LOG PILES

ACCESS ROAD

METAL PILE

NEW GARBAGE TRENCHES

GPS BASE-NL/STK
TBM-339.61M

SHED

POND/MARSH AREA
WATER LEVEL 331.50m
(SEPT. 24, 2014)

MARSH AREA

MW4

LOG PILE

SAND HILL

WOOD PILE

EXCAVATED AREA
FOR COVER MATERIAL

MW5

LEGEND:

- PIT/TRENCH FILLED BY 2031
- TRENCH TO BE FILLED BEFORE 2031
- MW1 MONITORING WELL LOCATION

NOTES:

1. REFERENCE: TOPOGRAPHIC SURVEY PLAN BY DELTA SURVEY INC. (SEPTEMBER 2021)
2. REFERENCE TO CURRENT WASTE FOOTPRINT: TOPOGRAPHIC SURVEY PLAN BY DELTA SURVEY INC. (JUNE 26, 2014), BASE SURVEY PLAN PRODUCED BY J. D. BARNES LIMITED, DATED MARCH 14, 2011 AND EXP FIELD SKETCH MAY 3, 2011.
3. THE TRENCHES ARE TO BE EXCAVATED 4 m BELOW GROUND SURFACE.
4. THE TRENCH BASES ARE TO BE LOCATED 4 m APART TO ALLOW FOR 1H:1V SIDE SLOPES.
5. VOLUME INCREASE OF WASTE AND COVER MATERIAL:
   2014 - 2019 = 4,471 m³
   2019 - 2021 = 3,800 m³

15 0 15 30
IN METRES

exp. Thunder Bay, Ontario

FIGURE 7

CONCEPTUAL SITE PLAN - YEAR 2031

2019, 2020 and 2021 Monitoring Report
Nakina Landfill, Nakina, ON
Municipality of Greenstone

PROJECT NO.:	THB-00011119-JE
SCALE:	1:1,500
DRAWN BY:	SW
CHECKED BY:	AM
DATE:	April 30, 2022

APPENDIX C –

Borehole Logs and Grain Size Curves

exp Thunder Bay Branch

BOREHOLE LOG

MW2

Sheet 1 of 1

PROJECT **Initial Hydrogeological Evaluation - Nakina Landfill Site, Nakina, ON** PROJECT NO. **THB-00011119-CE**

CLIENT **Municipality of Greenstone** DATUM **Geodetic**

DRILL TYPE/METHOD **CME 850 Tracked / HSA** DATES: Boring **Sept. 22, 2014** Water Level

DEPTH (m)	ELEVATION (m) 337.73	STRATA DESCRIPTION	STRATA PLOT	WELL LOG	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) or (%)	SAMPLES N VALUE (blows) or RQD (%)	OTHER TESTS	SHEAR STRENGTH / Atterberg Limits and Moisture
0	337.58	**ROOTMAT**								
		SAND - loose, brown, damp, trace gravel, occasional cobbles, fine grained			AS	S1				
1	336.21									
		SANDY SILT- loose, brown, moist to wet, trace gravel			SS	S2	300	9		
2	335.04									
3		**End of Borehole**- refusal to auger								
		- no groundwater encountered								
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										

SHEAR STRENGTH
S Field Vane Test (#=Sensitivity)
Penetrometer Torvane
40 80 kPa
Atterberg Limits and Moisture
W_P W W_L
SPT N Value Dynamic Cone
20 40 60 80

NOTES

1) For definition of symbols & terms used on logs, see sheets prior to logs.

2) 50 mm PVC monitoring well installed upon completion, screened from about 1.2 m to 2.7 m below ground surface.

3) Top of pipe elevation is 338.48 m.

4) GPS coordinates in UTM NAD 83 16 U 517815 E 558746 N.

SAMPLE LEGEND
AS Auger Sample SS Split Spoon ST Shelby Tube
Rock Core (eg. BQ, NQ, etc.) VN Vane Sample

OTHER TESTS
G Specific Gravity C Consolidation
H Hydrometer CD Consolidated Drained Triaxial
S Sieve Analysis CU Consolidated Undrained Triaxial
γ Unit Weight UU Unconsolidated Undrained Triaxial
P Field Permeability UC Unconfined Compression
K Lab Permeability DS Direct Shear

WATER LEVELS
Apparent Measured Artesian (see Notes)

exp Thunder Bay Branch

BOREHOLE LOG

MW3

Sheet 1 of 1

PROJECT **Initial Hydrogeological Evaluation - Nakina Landfill Site, Nakina, ON** PROJECT NO. **THB-00011119-CE**

CLIENT **Municipality of Greenstone** DATUM **Geodetic**

DRILL TYPE/METHOD **CME 850 Tracked / HSA** DATES: Boring **Sept. 23, 2014** Water Level **Sept. 25/14**

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WELL LOG	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) or (%)	SAMPLES N VALUE (blows) or RQD (%)	OTHER TESTS	SHEAR STRENGTH / Atterberg Limits and Moisture
0	341.68									S Field Vane Test (#=Sensitivity); Penetrometer; Torvane; 40 80 kPa; W_P W W_L; SPT N Value; Dynamic Cone; 20 40 60 80
	341.58	**ROOTMAT**								
1		**SANDY SILT**- loose, brown, damp, some gravel, occasional cobbles			AS	S1				
	340.16									
2		**SAND** - loose, brown, damp, trace gravel, trace silt, fine grained			SS	S2	300	5		●
3										
4										
5		- becoming damp to moist at about 4.6 m depth			SS	S3	250	8		●
6										
7										
8		- becoming compact at about 7.6 m depth			SS	S4	250	16		●
9										
10										
11		- becoming dense, wet at about 10.7 m depth			SS	S5	460	33	S	●
12		- about 460 mm of blowup at about 12.2 m depth - becoming compact at about 12.2 m depth			SS	S6	410	17		●
13	328.27									
		End of Borehole								
14										

NOTES

1) For definition of symbols & terms used on logs, see sheets prior to logs.

2) 50 mm PVC monitoring well installed upon completion, screened from about 8.1 m to 12.6 m below ground surface.

3) Top of pipe elevation is 342.40 m.

4) GPS coordinates in UTM NAD83 16 U 517466 E 5558671 N.

SAMPLE LEGEND

AS Auger Sample; SS Split Spoon; ST Shelby Tube; Rock Core (eg. BQ, NQ, etc.); VN Vane Sample

OTHER TESTS

G Specific Gravity	C Consolidation
H Hydrometer	CD Consolidated Drained Triaxial
S Sieve Analysis	CU Consolidated Undrained Triaxial
γ Unit Weight	UU Unconsolidated Undrained Triaxial
P Field Permeability	UC Unconfined Compression
K Lab Permeability	DS Direct Shear

WATER LEVELS

Apparent; Measured; Artesian (see Notes)

exp Thunder Bay Branch

BOREHOLE LOG

MW4

Sheet 1 of 1

PROJECT **Initial Hydrogeological Evaluation - Nakina Landfill Site, Nakina, ON** PROJECT NO. **THB-00011119-CE**

CLIENT **Municipality of Greenstone** DATUM **Geodetic**

DRILL TYPE/METHOD **CME 850 Tracked / HSA** DATES: Boring **Sept. 23, 2014** Water Level **Sept. 24/14**

DEPTH (m)	ELEVATION (m) 343.91	STRATA DESCRIPTION	STRATA PLOT	WELL LOG	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) or (%)	SAMPLES N VALUE (blows) or RQD (%)	OTHER TESTS	SHEAR STRENGTH / Atterberg Limits and Moisture
0		**SAND** - compact, brown, damp, trace gravel, fine grained			AS	S1				
1										
2					SS	S2	360	16		
3					SS	S3	380	16		
4										
5										
6	337.81									
		SANDY SILT - compact, brown, wet			SS	S4	410	14		
7	336.29									
8		**SAND** - compact, brown, wet, some gravel, some silt, coarse grained			SS	S5	280	22		
	335.38									
9		**End of Borehole** - refusal to auger								
10										
11										
12										
13										
14										

SHEAR STRENGTH
S Field Vane Test (#=Sensitivity)
Penetrometer Torvane
40 80 kPa

Atterberg Limits and Moisture
W_P W W_L
SPT N Value Dynamic Cone
20 40 60 80

NOTES

1) For definition of symbols & terms used on logs, see sheets prior to logs.

2) 50 mm PVC monitoring well installed upon completion, screened from 4.0 m to 8.5 m below ground surface.

3) Top of pipe elevation is 344.64 m.

2) GPS coordinates in UTM NAD83 16 U 518018 E 5558626 N.

SAMPLE LEGEND
AS Auger Sample SS Split Spoon ST Shelby Tube
Rock Core (eg. BQ, NQ, etc.) VN Vane Sample

OTHER TESTS
G Specific Gravity C Consolidation
H Hydrometer CD Consolidated Drained Triaxial
S Sieve Analysis CU Consolidated Undrained Triaxial
γ Unit Weight UU Unconsolidated Undrained Triaxial
P Field Permeability UC Unconfined Compression
K Lab Permeability DS Direct Shear

WATER LEVELS
Apparent Measured Artesian (see Notes)

exp. Thunder Bay Branch

BOREHOLE LOG

MW5

Sheet 1 of 1

PROJECT **Initial Hydrogeological Evaluation - Nakina Landfill Site, Nakina, ON** PROJECT NO. **THB-00011119-CE**

CLIENT **Municipality of Greenstone** DATUM **Geodetic**

DRILL TYPE/METHOD **CME 850 Tracked / HSA** DATES: Boring **Sept. 22, 2014** Water Level **Sept. 24/14**

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WELL LOG	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) or (%)	SAMPLES N VALUE (blows) or RQD (%)	OTHER TESTS
0	339.35	**SAND** - compact, brown, moist, trace gravel, occasional cobbles, trace roots in upper 0.6 m, fine grained			AS	S1			
1									
2		-becoming damp at about 1.5 m depth			SS	S2	360	11	
3					SS	S3	380	8	
4									
5	333.86				SS	S4	300	11	
6		**SAND & GRAVEL**- compact, brown, damp			SS	S5	150	23	
7	331.73								
8		**SAND** - compact, brown, moist, trace gravel			SS	S6	360	25	
9									
10		- becoming wet, some gravel, trace silt, coarse grained at about 9.1 m depth			SS	S7	360	26	S
11	328.07	- becoming loose to very loose at about 10.7 m depth			SS	S8	410	4	
12		**End of Borehole**							
13									
14									

SHEAR STRENGTH

S Field Vane Test (#=Sensitivity)

Penetrometer Torvane

40 80 kPa

Atterberg Limits and Moisture

W_P W W_L

SPT N Value × Dynamic Cone

20 40 60 80

NOTES

1) For definition of symbols & terms used on logs, see sheets prior to logs.

2) 50 mm PVC monitoring well installed upon completion, screened from about 7.5 m to 10.5 m below ground surface.

3) Top of pipe elevation is 340.09 m.

4) GPS coordinates in UTM NAD83 16 U 517722 E 5558461 N.

SAMPLE LEGEND

AS Auger Sample SS Split Spoon ST Shelby Tube

Rock Core (eg. BQ, NQ, etc.) VN Vane Sample

OTHER TESTS

G Specific Gravity	C Consolidation
H Hydrometer	CD Consolidated Drained Triaxial
S Sieve Analysis	CU Consolidated Undrained Triaxial
γ Unit Weight	UU Unconsolidated Undrained Triaxial
P Field Permeability	UC Unconfined Compression
K Lab Permeability	DS Direct Shear

WATER LEVELS

Apparent Measured Artesian (see Notes)

exp. Thunder Bay Branch

BOREHOLE LOG

BH4A

Sheet 1 of 2

PROJECT **Initial Hydrogeological Evaluation - Nakina Landfill Site, Nakina, ON** PROJECT NO. **THB-00011119-CE**

CLIENT **Municipality of Greenstone** DATUM **Geodetic**

DRILL TYPE/METHOD **CME 850 Tracked / HSA** DATES: Boring **Sept. 22, 2014** Water Level **Sept. 23/14**

DEPTH (m)	ELEVATION (m) 353.62	STRATA DESCRIPTION	STRATA PLOT	WELL LOG	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) or (%)	SAMPLES N VALUE (blows) or RQD (%)	OTHER TESTS
0		**SAND** - loose, brown, moist, trace gravel, some silt, some roots in about upper 1.5 m			AS	S1			
1					AS	S2			
2		- becoming damp, fine grained at about 1.5 m depth			SS	S3	150	6	
3		- becoming compact, trace silt at about 3.1 m depth			SS	S4	410	14	
4									
5					SS	S5	430	18	
6									
7					SS	S6	410	16	
8					SS	S7	460	17	
9									
10					SS	S8	430	15	
11					SS	S9	460	22	
12									
13									
14		- becoming dense at about 13.7 m depth							

SHEAR STRENGTH
S Field Vane Test (#=Sensitivity)
Penetrometer Torvane
40 80 kPa
Atterberg Limits and Moisture
W_P W W_L
SPT N Value Dynamic Cone
20 40 60 80

Continued Next Page

NOTES

1) For definition of symbols & terms used on logs, see sheets prior to logs.

2) GPS coordinates in UTM NAD83 16 U 518121 E 5558585 N.

SAMPLE LEGEND
AS Auger Sample SS Split Spoon ST Shelby Tube
Rock Core (eg. BQ, NQ, etc.) VN Vane Sample

OTHER TESTS
G Specific Gravity C Consolidation
H Hydrometer CD Consolidated Drained Triaxial
S Sieve Analysis CU Consolidated Undrained Triaxial
γ Unit Weight UU Unconsolidated Undrained Triaxial
P Field Permeability UC Unconfined Compression
K Lab Permeability DS Direct Shear

WATER LEVELS
Apparent Measured Artesian (see Notes)

exp. Thunder Bay Branch

BOREHOLE LOG

BH4A

PROJECT **Initial Hydrogeological Evaluation - Nakina Landfill Site, Nakina, ON** PROJECT NO. **THB-00011119-CE**

CLIENT **Municipality of Greenstone** DATUM **Geodetic**

DRILL TYPE/METHOD **CME 850 Tracked / HSA** DATES: Boring **Sept. 22, 2014** Water Level **Sept. 23/14**

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WELL LOG	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) or (%)	SAMPLES N VALUE (blows) or RQD (%)	OTHER TESTS	SHEAR STRENGTH / Atterberg Limits and Moisture
14		**SAND** continued		▽	SS	S10	480	31		
15										
16	336.86									
17		**End of Borehole**- refusal to auger								
18										
19										
20										
21										
22										
23										
24										
25										
26										
27										
28										

SHEAR STRENGTH
✤ S Field Vane Test (#=Sensitivity)
▲ Penetrometer ■ Torvane
40 80 kPa

Atterberg Limits and Moisture
W_P W W_L
● SPT N Value × Dynamic Cone
20 40 60 80

NOTES

1) For definition of symbols & terms used on logs, see sheets prior to logs.

2) GPS coordinates in UTM NAD83 16 U 518121 E 5558585 N.

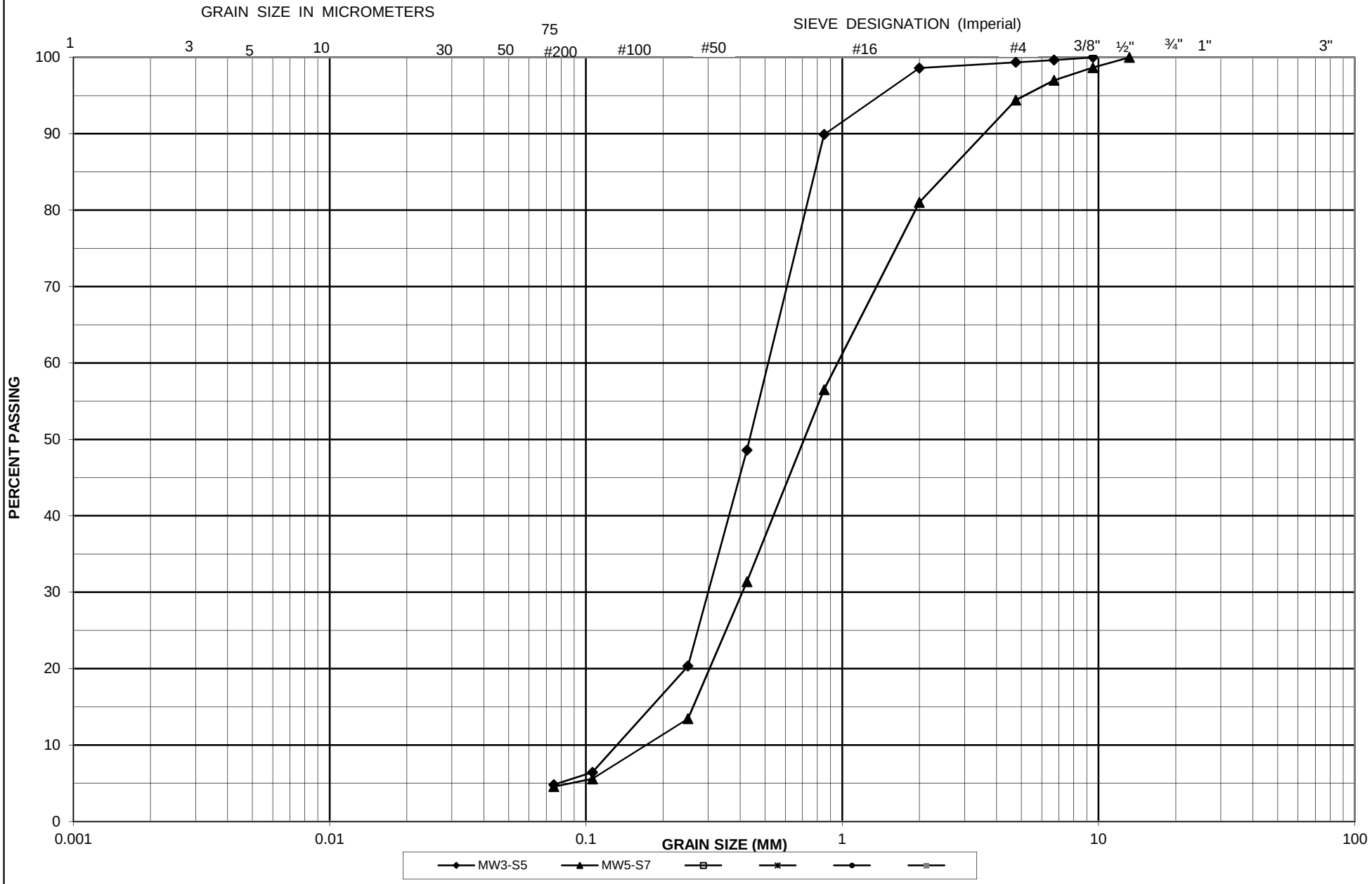
SAMPLE LEGEND
☒ AS Auger Sample ▨ SS Split Spoon ■ ST Shelby Tube
▯ Rock Core (eg. BQ, NQ, etc.) ▯ VN Vane Sample

OTHER TESTS
G Specific Gravity
H Hydrometer
S Sieve Analysis
γ Unit Weight
P Field Permeability
K Lab Permeability
C Consolidation
CD Consolidated Drained Triaxial
CU Consolidated Undrained Triaxial
UU Unconsolidated Undrained Triaxial
UC Unconfined Compression
DS Direct Shear

WATER LEVELS
▽ Apparent ▼ Measured ▲ Artesian (see Notes)

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY AND SILT	SAND			GRAVEL	
	Fine	Medium	Coarse	Fine	Coarse



exp.

GRAIN SIZE DISTRIBUTION

Initial Hydrogeological Evaluation - Nakina Landfill Site, Nakina, ON

FIGURE No. 4

Ref. No. THB-0001119-CE (500)

DATE December 16, 2014

APPENDIX D –

Summary Tables

LIST OF TABLES

Table 1: Groundwater Elevation Data

Monitoring Well No.	Ground Surface Elevation[2]	Top of Pipe Elevation[2]	Ground Surface Elevation[3]	Top of Pipe Elevation[3]	Ground Surface Elevation[4]	Top of Pipe Elevation[4]	Depth to Groundwater and Elevation																			
							Sep. 27, 2014		Nov. 11, 2016		May 17, 2017		Sep. 27, 2017		May 16, 2018		Oct. 15, 2018		May 8, 2019		Oct. 28, 2019		May 27, 2020		Oct. 6, 2020		May 19, 2021		Sept. 23, 2021	
MW1	338.93	339.86	339.1	339.89	339.06	339.86	5.18[5]	334.68	5.97	333.89	5.55	334.31	5.48	334.38	5.49	334.37	5.28	334.58	5.62	334.27	5.47	334.42	5.69	334.20	5.45	334.44	5.07	334.79	5.47	334.39
MW2	337.73	338.48	337.82	338.55	338.34	338.56	Dry	--[6]	Dry	--[6]	Dry	--[6]	Dry	--[6]	2.94	335.54	Dry	--[6]	Dry	--[6]	Dry	--[6]	Dry	--[6]	Dry	--[6]	2.98	335.58	Dry	--[6]
MW3	341.68	342.40	341.70	342.41	341.67	342.40	11.26	331.14	11.71	330.69	11.42	330.98	11.39	331.01	11.41	330.99	11.29	331.11	11.36	331.05	11.42	330.99	11.60	330.81	11.57	330.84	11.42	330.98	11.53	330.87
MW4	343.91	344.64	343.94	344.68	343.86	344.63	8.52	336.12	8.98	335.66	8.89	335.75	8.90	335.74	8.76	335.88	8.58	336.06	8.89	335.79	8.65	336.03	8.71	335.97	8.57	336.11	8.55	336.08	8.62	336.01
MW5	339.35	340.09	339.45	340.17	339.36	340.09	8.99	331.10	9.45	330.64	9.23	330.86	9.17	330.92	9.15	330.94	9.00	331.09	9.08	331.09	9.12	331.05	9.33	330.84	9.32	330.85	9.20	330.89	9.27	330.82

Notes:
1) All units in meters.
2) Ground surface and top of pipe elevations were surveyed by EXP on September 24, 2014; all elevations are geodetic. The reference elevations were the top of pipe at MW1 and a stake in the ground behind the landfill shack, which served as a temporary benchmark.
The elevations of MW1 and the ground stake were provided by Delta Survey Inc. The temporary benchmark had an elevation of 339.61 m.
3) Ground surface and top of pipe elevations were surveyed by Delta Survey Inc. on November 10, 2019; all elevations are geodetic. The reference elevation was the stake in the ground behind the landfill shack, which served as a temporary benchmark.
The elevation of the ground stake were provided by Delta Survey Inc. on November 10, 2019.
4) Ground surface and top of pipe elevations were surveyed by Delta Survey Inc. on September 8, 2021; all elevations are geodetic.
5) All depths are relative to top of pipe.
6) -- denotes no groundwater elevation due to dry well.

Table 2: Groundwater Data

MW1

Parameter	ODWS[2]	Background[3]	B-7 Criteria[4]	Sep-14	Sep-14 (Blind Dup.)	Nov-16	Nov-16 (Blind Dup.)	May-17	May-17 (Blind Dup.)	Sep-17	Sep-17 (Blind Dup.)	May-18	May-18 (Blind Dup.)	Oct-18	Oct-18 (Blind Dup.)	May-19	Oct-19	May-20	Oct-20	May-21	Sep-21
General																					
pH	6.5 to 8.5	8.14	--	7.18	7.18	7.32	7.28	7.18	7.37	7.19	7.2	7.16	7.13	7.27	7.17	7.43	7.22	7.46	7.36	7.76	7.7
Field pH	--	7.85	--	--	--	6.79	--	6.78	--	7	--	7.29	7.29	7.41	--	6.79	8.2	7.85	6.56	6.64	7.14
Conductivity (uS/cm)	--	350	--	1,600	1,600	1,700	1,700	1,100	1,100	1,400	1,400	1,000	1,000	1,200	1,200	1,200	1,100	1,100	1,000	990	860
Field Conductivity (uS/cm)	--	315.8	--	--	--	1,573	--	1,048	--	1,237	--	884	884	1,140	--	1,000	584	746	1,034	441	671
Field Temperature (˚C)	--	9.14	--	--	--	8.2	--	4	--	8.8	--	6.3	6.3	2.1	--	7.8	2.9	2.2	7.6	11.9	13.8
Total Dissolved Solids	500	196	348	**1,180**	**1,190**	**1,010**	**1,100**	**624**	**644**	**875**	**855**	**550**	**560**	**695**	**650**	**750**	**610**	**590**	**645**	490	495
Total Suspended Solids	--	--	--	1,100	1,200	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Organics																					
Dissolved Organic Carbon (DOC)	5	2.63	3.8	**40**	**37**	**32**	**32**	**5.7**	**5.7**	**14**	**14**	**5.8**	**5.8**	**11**	**10**	**10**	**6.5**	**6.8**	**5.2**	4.5	4
Total Chemical Oxygen Demand (COD)	--	14.55	--	240	240	710	750	100	110	69	63	38	44	110	130	42	36	94	30	28	18
Phenols	--	--	--	0.034	0.026	0.0064	0.0054	<0.001	<0.001	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	0.0011	<0.001	0.001	<0.001	0.001	<0.0010
Total Kjeldahl Nitrogen (TKN)	--	0.27	--	13	11	8	8.5	1.2	1.3	1.1	1.2	0.88	0.86	2.2	2.1	1.3	1	2.7	0.63	0.63	0.38
Ammonia-N	--	0.07	--	0.35	0.36	1	1.1	0.26	0.26	0.27	0.27	0.24	0.25	0.51	0.52	0.16	0.29	0.46	0.31	0.11	<0.050
Organic Nitrogen	0.15	0.21	0.21*	**12.65**	**10.64**	**7**	**7.4**	**0.94**	**1.04**	**0.83**	**0.93**	**0.64**	**0.61**	**1.69**	**1.58**	**1.14**	**0.71**	**2.24**	**0.32**	**0.52**	**0.375**
Cations (mg/L)																					
Calcium	--	60.4	--	270	280	300	290	220	220	280	280	200	200	240	240	250	220	220	230	210	180
Magnesium	--	9.06	--	30	31	28	28	13	13	19	19	13	13	17	16	15	13	13	12	13	11
Potassium	--	1.12	--	4.3	4.3	7.3	7.2	2.8	2.8	4.2	4.2	2.8	2.8	4.4	4.2	2.7	3	2.9	2.8	2.2	2.3
Sodium	200	2.28	101	39	41	65	64	2.3	2.3	19	19	2.7	2.7	9	8.6	5	3.9	2	2.1	3.6	4
Anions (mg/L)																					
Chloride	250	1.2	126	34	27	34	34	3.1	2	15	15	2	1.8	15	9.7	4.3	5.7	7.4	3.7	2.8	5.7
Nitrate	10	0.08	2.56	<0.1	<0.1	<0.1	<0.1	0.59	0.58	<0.1	<0.1	2.95	3.18	0.28	0.22	5.71	<0.01	2.95	<0.10	1.01	1.18
Nitrite	1	0.005	0.25	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.048	0.011	0.06	0.16	<0.01	<0.010	<0.010	<0.010
Total Phosphorus	--	0.64	--	1.7	1.8	14	16	2.1	2.2	0.35	0.35	1.6	1.9	2.6	2.4	0.45	0.33	0.041	0.25	0.28	0.16
Sulphate	500	1.6	251	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1.0
Alkalinity as $CaCO_3$	30-500	187	343	**880**	**850**	**1,000**	**1,000**	**630**	**630**	**810**	**810**	**570**	**580**	**690**	**680**	**620**	**600**	**600**	**620**	**550**	500
Ion Balance	--	--	--	2.2	1.8	0.85	2.16	1.94	1.83	0.29	0.48	2.95	2.95	2.95	2.95	4.21	--	0.78	1.01	1.63	0.98
Metals (mg/L) - Dissolved																					
Arsenic	0.025	0.0005	0.0066	0.0096	0.0097	0.0041	0.004	<0.001	<0.001	0.0017	0.0013	0.0011	0.001	0.0017	0.0016	0.0041	0.005	0.0014	<0.001	<0.001	<0.001
Barium	1	0.0118	0.25	0.07	0.069	0.13	0.13	0.065	0.066	0.09	0.092	0.056	0.054	0.08	0.077	0.059	0.057	0.055	0.058	0.049	0.042
Boron	5	0.0086	1.25	0.14	0.14	0.52	0.51	0.025	0.023	0.11	0.11	0.048	0.046	0.067	0.065	0.065	0.065	0.038	0.047	0.054	0.04
Cadmium	0.005	0.00005	0.00129	<0.0001	<0.0001	0.00019	0.00014	<0.0001	<0.0001	0.00013	0.00012	0.0001	0.0001	<0.0001	<0.0001	<0.0001	0.00012	<0.0001	0.000099	<0.00009	<0.00009
Chromium	0.05	0.0025	0.0144	<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	<0.0005	<0.005	<0.005	<0.005	<0.005
Copper	1	0.002	0.5	0.0092	0.0099	0.013	0.012	0.005	0.0049	0.0086	0.008	0.006	0.0051	0.012	0.0037	0.006	0.0027	0.0071	0.0062	0.0066	0.0033
Iron	0.3	0.05	0.175	**4**	**4**	**9.3**	**9.2**	**0.84**	**0.82**	**2.6**	**2.6**	**0.51**	**0.5**	**2.5**	**2.4**	**4.5**	**7.3**	**1.3**	<0.1	<0.1	<0.1
Lead	0.01	0.0003	0.0027	<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
Manganese	0.05	0.0017	0.026	**7.1**	**7.1**	**6.1**	**6.1**	**1.9**	**1.9**	**5.3**	**5.3**	**2.1**	**2.1**	**4.1**	**4**	**1.6**	**2.8**	**1.2**	**1.2**	**0.25**	**0.43**
Mercury	0.001	0.0001	0.00029	**0.0037**	**0.0031**	<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	<0.00010
Zinc	5	0.0005	2.5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
VOCs (mg/L)																					
Benzene	0.005	0.0001	0.00129	0.00055	0.0005	0.0024	0.0024	<0.0001	<0.0001	0.00065	0.0007	<0.0001	<0.0001	<0.0005	0.00016	<0.00025	<0.00025	<0.001	<0.0001	<0.0001	<0.0001
1,4-Dichlorobenzene	0.005	0.0001	0.00133	<0.001	<0.001	<0.001	<0.001	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.001	<0.00020	<0.00050	<0.00050	<0.002	<0.0002	<0.0002	<0.0002
Dichloromethane	0.05	0.0003	0.0127	<0.0025	<0.0025	<0.0025	<0.0025	<0.0005	<0.0005	<0.0013	<0.0005	<0.0005	<0.0005	<0.0025	<0.00050	<0.0013	<0.0013	<0.005	<0.0005	<0.0005	<0.0005
Toluene	0.024	0.0001	0.0121	0.0032	0.0031	<0.001	0.001	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.001	<0.00020	<0.00050	<0.00050	<0.002	<0.0002	<0.0002	<0.0002
Vinyl Chloride	0.002	0.0001	0.00058	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.001	<0.00020	<0.00050	<0.00050	<0.002	<0.0002	<0.0002	<0.0002

Notes:

1. Concentrations are presented in mg/L (ppm).
2. ODWS: MECP Ontario Drinking Water Standards, from *Techical Support Document for Ontaio Drinking Water Standard, Ojectives and Guidelines* , June 2003. Exceedances are indicated in **bold**.
3. Background = Based on mean results (most recent three years) from upgradient well MW4.
4. MECP Guideline B-7, Incorporation of Reasonable Use Concept into MECP Groundwater Managemnet Actinities (1994). Underlining indicates exceedance.

Asterisk (*) indicates that background exceeds ODWS; therefore B-7 criterion = background.

Table 2: Groundwater Data

MW2

Parameter	ODWS[2]	Background[3]	B-7 Criteria[4]	Sep-14	Nov-16	May-17	Sep-17	May-18	Oct-18	May-19	Oct-19	May-20	Oct-20	May-21	Sep-21
General															
pH	6.5 to 8.5	8.14	--	No	No	No	No	7.94	No	No	No	No	No	8.23	No
Field pH	--	7.85	--	Groundwater	Groundwater	Groundwater	Groundwater	7.7	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	7.51	Groundwater
Conductivity (uS/cm)	--	350	--	Encountered	Encountered	Encountered	Encountered	240	Encountered	Encountered	Encountered	Encountered	Encountered	330	Encountered
Field Conductivity (uS/cm)	--	315.8	--	--	--	--	--	293	--	--	--	--	--	189	--
Field Temperature (˚C)	--	9.14	--	--	--	--	--	3.8	--	--	--	--	--	9.1	--
Total Dissolved Solids	500	196	348	--	--	--	--	130	--	--	--	--	--	145	--
Total Suspended Solids	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Organics															
Dissolved Organic Carbon (DOC)	5	2.63	3.8	--	--	--	--	**5.9**	--	--	--	--	--	3.2	--
Total Chemical Oxygen Demand (COD)	--	14.55	--	--	--	--	--	15	--	--	--	--	--	15	--
Phenols	--	--	--	--	--	--	--	<0.0010	--	--	--	--	--	<0.0010	--
Total Kjeldahl Nitrogen (TKN)	--	0.27	--	--	--	--	--	<0.10	--	--	--	--	--	0.52	--
Ammonia-N	--	0.07	--	--	--	--	--	0.091	--	--	--	--	--	0.11	--
Organic Nitrogen	0.15	0.21	0.21*	--	--	--	--	<0.05	--	--	--	--	--	**0.41**	--
Cations (mg/L)															
Calcium	--	60.4	--	--	--	--	--	38	--	--	--	--	--	53	--
Magnesium	--	9.06	--	--	--	--	--	6.2	--	--	--	--	--	9.3	--
Potassium	--	1.12	--	--	--	--	--	0.33	--	--	--	--	--	0.54	--
Sodium	200	2.28	101	--	--	--	--	1.3	--	--	--	--	--	2.7	--
Anions (mg/L)															
Chloride	250	1.2	126	--	--	--	--	1.3	--	--	--	--	--	3.1	--
Nitrate	10	0.08	2.56	--	--	--	--	<0.10	--	--	--	--	--	<0.10	--
Nitrite	1	0.005	0.25	--	--	--	--	<0.010	--	--	--	--	--	<0.010	--
Total Phosphorus	--	0.64	--	--	--	--	--	1.1	--	--	--	--	--	1.2	--
Sulphate	500	1.6	251	--	--	--	--	<1.0	--	--	--	--	--	<1.0	--
Alkalinity as $CaCO_3$	30-500	187	343	--	--	--	--	130	--	--	--	--	--	170	--
Ion Balance	--	--	--	--	--	--	--	NC	--	--	--	--	--	1.18	--
Metals (mg/L) - Dissolved															
Arsenic	0.025	0.0005	0.0066	--	--	--	--	<0.001	--	--	--	--	--	<0.001	--
Barium	1	0.0118	0.25	--	--	--	--	0.0043	--	--	--	--	--	0.0082	--
Boron	5	0.0086	1.25	--	--	--	--	<0.01	--	--	--	--	--	<0.01	--
Cadmium	0.005	0.00005	0.00129	--	--	--	--	<0.0001	--	--	--	--	--	<0.00009	--
Chromium	0.05	0.0025	0.0144	--	--	--	--	<0.005	--	--	--	--	--	<0.005	--
Copper	1	0.002	0.5	--	--	--	--	0.0015	--	--	--	--	--	0.0026	--
Iron	0.3	0.05	0.175	--	--	--	--	<0.1	--	--	--	--	--	<0.1	--
Lead	0.01	0.0003	0.0027	--	--	--	--	<0.0005	--	--	--	--	--	<0.0005	--
Manganese	0.05	0.0017	0.026	--	--	--	--	<0.002	--	--	--	--	--	<0.002	--
Mercury	0.001	0.0001	0.00029	--	--	--	--	<0.0001	--	--	--	--	--	<0.00010	--
Zinc	5	0.0005	2.5	--	--	--	--	<0.005	--	--	--	--	--	<0.005	--
VOCs (mg/L)															
Benzene	0.005	0.0001	0.00129	--	--	--	--	<0.0001	--	--	--	--	--	<0.0001	--
1,4-Dichlorobenzene	0.005	0.0001	0.00133	--	--	--	--	<0.0002	--	--	--	--	--	<0.0002	--
Dichloromethane	0.05	0.0003	0.0127	--	--	--	--	<0.0005	--	--	--	--	--	<0.0005	--
Toluene	0.024	0.0001	0.0121	--	--	--	--	<0.0002	--	--	--	--	--	<0.0002	--
Vinyl Chloride	0.002	0.0001	0.00058	--	--	--	--	<0.0002	--	--	--	--	--	<0.0002	--

Notes:

1. Concentrations are presented in mg/L (ppm).
2. ODWS: MECP Ontario Drinking Water Standards, from *Techical Support Document for Ontaio Drinking Water Standard, Ojectives and Guidelines* , June 2003. Exceedances are indicated in **bold**.
3. Background = Based on mean results (most recent three years) from upgradient well MW4.
4. MECP Guideline B-7, Incorporation of Reasonable Use Concept into MECP Groundwater Managemnet Actinities (1994). Underlining indicates exceedance.

Asterisk (*) indicates that background exceeds ODWS; therefore B-7 criterion = background.

Table 2: Groundwater Data															
MW3															
Parameter	ODWS[2]	Background[3]	B-7 Criteria[4]	Sep-14	Nov-16	May-17	Sep-17	May-18	Oct-18	May-19	Oct-19	May-20	Oct-20	May-21	Sep-21
General															
pH	6.5 to 8.5	8.14	--	7.8	7.93	7.87	7.91	7.92	7.83	7.91	7.85	7.97	7.75	8.01	7.98
Field pH	--	7.85	--	--	7.32	7.45	7.26	7.29	8.23	7.43	6.73	7.55	7.17	7.32	7.49
Conductivity (uS/cm)	--	350	--	2,100	1,900	2,300	2,100	1,800	1,900	2,000	2,300	2,000	2,300	2,500	2,300
Field Conductivity (uS/cm)	--	315.8	--	--	1,838	1,935	1,704	1,475	1,650	1,648	936	1,345	2,154	789	2,333
Field Temperature (˚C)	--	9.14	--	--	6.5	4	5.5	4.8	2.4	6.2	3.6	7.6	5.9	7.6	8.4
Total Dissolved Solids	500	196	348	**1,190**	**1,160**	**1,150**	**1,040**	**920**	**1,030**	**1,170**	**1,150**	**1,020**	**1,270**	**1,410**	**1,280**
Total Suspended Solids	--	--	--	1,800	--	--	--	--	--	--	--	--	--	--	--
Organics															
Dissolved Organic Carbon (DOC)	5	2.63	3.8	2.3	2.5	2	2.1	1.8	2.1	2.1	2.1	2	2.2	2.2	1.7
Total Chemical Oxygen Demand (COD)	--	14.55	--	<4	14	9.2	8	6.6	8.3	5.4	6.8	18	11	8.4	8.4
Phenols	--	--	--	<0.001	<0.001	<0.001	<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen (TKN)	--	0.27	--	1.1	0.29	0.62	0.26	<0.10	0.19	0.17	0.31	0.24	0.21	0.13	0.18
Ammonia-N	--	0.07	--	<0.05	<0.05	<0.05	<0.05	0.05	0.062	<0.050	0.053	<0.050	0.19	<0.050	<0.050
Organic Nitrogen	0.15	0.21	0.21*	**1.075**	**0.265**	**0.595**	**0.235**	<0.05	0.128	0.145	**0.257**	**0.235**	0.02	0.125	**0.175**
Cations (mg/L)															
Calcium	--	60.4	--	120	140	120	110	110	140	120	160	130	170	160	140
Magnesium	--	9.06	--	15	17	14	13	13	17	15	20	16	19	20	17
Potassium	--	1.12	--	2.4	2.3	2.4	2.2	2	2.1	2.1	2.2	2.1	2.3	2.5	2.5
Sodium	200	2.28	101	**270**	**250**	**330**	**270**	**230**	**180**	**280**	**250**	**240**	**270**	**350**	**330**
Anions (mg/L)															
Chloride	250	1.2	126	**450**	**420**	**460**	**430**	**370**	**430**	**470**	**540**	**450**	**530**	**640**	**570**
Nitrate	10	0.08	2.56	1.11	0.85	1.4	0.9	0.52	0.53	0.53	0.6	0.41	0.56	0.69	0.52
Nitrite	1	0.005	0.25	<0.01	<0.01	<0.01	<0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.017
Total Phosphorus	--	0.64	--	0.26	1.1	0.3	0.27	0.21	0.18	0.21	0.075	0.077	0.072	0.092	0.12
Sulphate	500	1.6	251	14	13	15	13	9.8	9.2	11	13	12	13	16	14
Alkalinity as $CaCO_3$	30-500	187	343	290	290	310	300	290	260	250	270	290	290	290	280
Ion Balance	--	--	--	3.7	3.98	4.2	0.21	0.44	NC	2.58	0.94	1.47	0.98	0.91	1.98
Metals (mg/L) - Dissolved															
Arsenic	0.025	0.0005	0.0066	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Barium	1	0.0118	0.25	0.051	0.054	0.053	0.046	0.042	0.05	0.047	0.058	0.047	0.061	0.064	0.059
Boron	5	0.0086	1.25	<0.01	0.011	<0.01	<0.01	<0.01	0.012	0.017	0.013	<0.01	0.014	0.014	<0.01
Cadmium	0.005	0.00005	0.00129	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.00010	<0.0001	<0.00009	<0.00009	<0.00009
Chromium	0.05	0.0025	0.0144	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Copper	1	0.002	0.5	0.0015	0.0015	0.0014	0.0014	0.0065	0.0019	0.0016	0.0013	0.0013	0.0022	0.0043	0.0021
Iron	0.3	0.05	0.175	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lead	0.01	0.0003	0.0027	<0.0005	<0.0005	<0.0005	<0.0005	0.001	<0.0005	<0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Manganese	0.05	0.0017	0.026	0.031	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0022	0.0022	<0.002
Mercury	0.001	0.0001	0.00029	0.00012	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010
Zinc	5	0.0005	2.5	<0.005	<0.005	<0.005	<0.005	0.017	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
VOCs (mg/L)															
Benzene	0.005	0.0001	0.00129	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
1,4-Dichlorobenzene	0.005	0.0001	0.00133	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Dichloromethane	0.05	0.0003	0.0127	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Toluene	0.024	0.0001	0.0121	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Vinyl Chloride	0.002	0.0001	0.00058	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Notes:

1. Concentrations are presented in mg/L (ppm).
2. ODWS: MECP Ontario Drinking Water Standards, from *Techical Support Document for Ontaio Drinking Water Standard, Ojectives and Guidelines* , June 2003. Exceedances are indicated in **bold**.
3. Background = Based on mean results (most recent three years) from upgradient well MW4.
4. MECP Guideline B-7, Incorporation of Reasonable Use Concept into MECP Groundwater Managemnet Actinities (1994). Underlining indicates exceedance.

Asterisk (*) indicates that background exceeds ODWS; therefore B-7 criterion = background.

Table 2: Groundwater Data

MW4

Parameter	ODWS[2]	Background[3]	B-7 Criteria[4]	Sep-14	Nov-16	May-17	17-Sep	May-18[5]	Oct-18[5]	May-19	Oct-19	May-20[5]	Oct-20	May-21	Sep-21
General							Insufficient Water	Insufficient Water		Insufficient Water					Insufficient Water
pH	6.5 to 8.5	8.14	--	7.88	8.2	8.11	--	8.15	8.07	8.18	8.03	8.12	8.08	8.26	8.17
Field pH	--	7.85	--	--	7.86	7.51	7.6	--	--	7.9	8.27	--	7.63	7.54	7.91
Conductivity (uS/cm)	--	350	--	470	350	390	--	380	350	350	340	360	350	350	350
Field Conductivity (uS/cm)	--	315.8	--	--	634	387	368	--	--	343	292	--	362	202	380
Field Temperature (˚C)	--	9.14	--	--	6.1	2.6	7.3	--	--	6.1	4.4	--	8.1	14.4	12.7
Total Dissolved Solids	500	196	348	328	249	232	**--**	**--**	165	235	190	230	190	140	190
Total Suspended Solids	--	--	--	34,000	--	--	--	--	--	--	--	--	--	--	-
Organics															
Dissolved Organic Carbon (DOC)	5	2.63	3.8	**7.1**	**--**	2.9	**--**	**--**	2.5	2.6	2.5	2.2	2.6	2.9	3
Total Chemical Oxygen Demand (COD)	--	14.55	--	47	70	12	--	--	7	--	8.2	21	11	18	--
Phenols	--	--	--	0.0011	<0.001	<0.001	--	--	<0.001	--	<0.0010	<0.0010	<0.0010	0.002	--
Total Kjeldahl Nitrogen (TKN)	--	0.27	--	<2	0.41	0.57	--	--	0.48	--	0.24	0.29	0.32	0.23	--
Ammonia-N	--	0.07	--	0.1	<0.05	0.052	--	--	0.18	--	<0.050	<0.050	0.15	0.077	--
Organic Nitrogen	0.15	0.21	0.21*	**--**	**0.385**	**0.518**	**--**	**--**	**0.30**	--	**0.24**	**0.29**	**0.17**	0.15	--
Cations (mg/L)															
Calcium	--	60.4	--	68	58	60	59	--	60	--	59	59	58	61	65
Magnesium	--	9.06	--	12	8.6	9	9	--	8.9	--	8.7	8.7	8.2	9.7	10
Potassium	--	1.12	--	4.2	4.3	6.3	21	--	1.2	--	1.1	1.6	1.1	0.92	0.88
Sodium	200	2.28	101	4.5	1.7	1.8	1.9	--	2.4	--	2.5	2.5	2.3	1.7	2.4
Anions (mg/L)															
Chloride	250	1.2	126	8	3.7	<1	--	1.4	1	1.2	1.3	1.3	1.6	<1.0	1.3
Nitrate	10	0.08	2.56	0.11	<0.1	<0.1	--	0.18	0.29	<0.1	<0.1	<0.10	<0.10	0.11	0.16
Nitrite	1	0.005	0.25	<0.01	<0.01	<0.01	--	<0.01	<0.01	<0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Total Phosphorus	--	0.64	--	3.5	1.3	0.75	--	--	5.7	--	0.7	0.47	0.97	0.43	--
Sulphate	500	1.6	251	43	3.3	1.4	--	4	1.1	3.4	2.8	1.9	<1.0	<1.0	<1.0
Alkalinity as $CaCO_3$	30-500	187	343	180	190	200	**--**	200	190	180	180	190	190	190	190
Ion Balance	--	--	--	3.3	2.15	0.46	--	--	0.44	--	1.11	0.92	0.75	1.99	3.19
Metals (mg/L) - Dissolved															
Arsenic	0.025	0.0005	0.0066	<0.001	<0.001	<0.001	<0.001	--	<0.001	--	<0.001	<0.001	<0.001	<0.001	<0.001
Barium	1	0.0118	0.25	0.023	0.029	0.038	0.019	--	0.014	--	0.012	0.013	0.012	0.012	0.01
Boron	5	0.0086	1.25	0.027	<0.01	<0.01	<0.001	--	<0.01	--	<0.01	0.015	<0.01	0.013	<0.01
Cadmium	0.005	0.00005	0.00129	<0.0001	<0.0001	<0.0001	<0.0001	--	<0.0001	--	<0.0001	<0.0001	<0.00009	<0.00009	<0.00009
Chromium	0.05	0.0025	0.0144	<0.005	<0.005	<0.005	<0.005	--	<0.005	--	<0.005	<0.005	<0.005	<0.005	<0.005
Copper	1	0.002	0.5	0.0038	0.0028	0.0018	0.0028	--	0.002	--	0.0012	0.0029	0.0024	0.001	0.0026
Iron	0.3	0.05	0.175	<0.1	<0.1	<0.1	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1
Lead	0.01	0.0003	0.0027	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005	--	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Manganese	0.05	0.0017	0.026	**0.58**	<0.002	0.0023	0.0021	**--**	<0.002	--	<0.002	<0.002	<0.002	<0.002	0.0043
Mercury	0.001	0.0001	0.00029	0.00028	<0.0001	<0.0001	<0.0001	--	<0.0001	--	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010
Zinc	5	0.0005	2.5	0.0067	0.0055	<0.005	<0.005	--	<0.005	--	<0.005	<0.005	<0.005	<0.005	<0.005
VOCs (mg/L)															
Benzene	0.005	0.0001	0.00129	0.00029	<0.0001	<0.0001	--	--	<0.0001	--	<0.0001	<0.0001	<0.0001	<0.0001	--
1,4-Dichlorobenzene	0.005	0.0001	0.00133	<0.0002	<0.0002	<0.0002	--	--	<0.0002	--	<0.0002	<0.0002	<0.0002	<0.0002	--
Dichloromethane	0.05	0.0003	0.0127	<0.0005	<0.0005	<0.0005	--	--	<0.0005	--	<0.0005	<0.0005	<0.0005	<0.0005	--
Toluene	0.024	0.0001	0.0121	0.00041	<0.0002	<0.0002	--	--	<0.0002	--	<0.0002	<0.0002	<0.0002	<0.0002	--
Vinyl Chloride	0.002	0.0001	0.00058	<0.0002	<0.0002	<0.0002	--	--	<0.0002	--	<0.0002	<0.0002	<0.0002	<0.0002	--

Notes:

1. Concentrations are presented in mg/L (ppm).
2. ODWS: MECP Ontario Drinking Water Standards, from *Techical Support Document for Ontaio Drinking Water Standard, Ojectives and Guidelines* , June 2003. Exceedances are indicated in **bold**.
3. Background = Based on mean results (most recent three years) from upgradient well MW4.
4. MECP Guideline B-7, Incorporation of Reasonable Use Concept into MECP Groundwater Managemnet Actinities (1994). Underlining indicates exceedance.
Asterisk (*) indicates that background exceeds ODWS; therefore B-7 criterion = background.
5. Field parameters were not measured due to insufficient water.

Table 2: Groundwater Data

MW5

Parameter	ODWS[2]	APV[3]	Background[4]	B-7 Criteria[5]	Sep-14	Nov-16	May-17	Sep-17	May-18	Oct-18[6]	May-19	May-19 (Blind Dup.)	Oct-19	Oct-19 (Blind Dup.)	May-20	May-20 (Blind Dup.)	Oct-20	Oct-20 (Blind Dup.)	May-21	May-21 (Blind Dup.)	Sep-21	Sep-21 (Blind Dup.)
General																						
pH	6.5 to 8.5	--	8.14	--	7.2	7.57	7.25	7.28	7.19	7.16	7.25	7.29	7.19	7.09	7.27	7.51	7.3	7.3	7.55	7.33	7.35	7.67
Field pH	--	--	7.85	--	--	6.95	6.81	6.83	6.82	--	6.96	--	7.2	--	6.48	6.48	6.48	6.48	6.63	--	6.72	--
Conductivity (uS/cm)	--	--	350	--	1,600	1,600	1,700	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,500	1,500	1,700	1,700	1,500	1,400
Field Conductivity (uS/cm)	--	--	315.8	--	--	1,477	1,535	1,376	1,297	--	1,301	--	752	--	1,016	1,016	1,522	1,522	602	--	1,610	--
Field Temperature (˚C)	--	--	9.14	--	--	7.8	6.6	8.5	5.8	--	5.9	--	4.2	--	7.5	7.5	6.4	6.4	11.1	--	11.2	--
Total Dissolved Solids	500	--	196	348	**986**	**1,070**	**1,070**	**1,030**	**910**	**905**	**1,040**	**1,030**	**990**	**935**	**930**	**910**	**995**	**965**	**810**	**960**	**920**	**950**
Total Suspended Solids	--	--	--	--	2,100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Organics																						
Dissolved Organic Carbon (DOC)	5	--	2.63	3.8	**11**	**12**	**12**	**12**	**11**	**11**	**12**	**12**	**12**	**12**	**12**	**12**	**13**	**13**	**13**	**13**	**12**	**13**
Total Chemical Oxygen Demand (COD)	--	--	14.55	--	20	27	40	35	31	39	34	34	35	31	40	47	33	36	41	40	34	38
Phenols	--	0.961	--	--	<0.001	<0.001	<0.001	<0.001	0.0013	<0.0010	<0.0010	0.001	0.001	<0.0010	<0.0010	0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen (TKN)	--	--	0.27	--	2	0.54	0.98	0.56	0.39	0.59	0.49	0.58	0.67	0.61	0.8	0.59	0.73	0.78	0.73	0.79	0.91	0.9
Ammonia-N	--	--	0.07	--	0.055	<0.05	<0.05	<0.05	0.059	0.071	<0.05	<0.05	<0.050	0.06	<0.050	0.15	0.15	0.16	0.095	0.15	0.052	0.07
Organic Nitrogen	0.15	--	0.21	0.21*	**1.945**	**0.515**	**0.955**	**0.535**	**0.331**	**0.519**	**0.465**	**0.555**	**0.665**	**0.55**	**0.795**	**0.44**	**0.58**	**0.62**	**0.64**	**0.64**	**0.86**	**0.83**
Cations (mg/L)																						
Calcium	--	--	60.4	--	250	270	270	260	250	240	260	280	260	260	260	250	280	280	260	270	270	270
Magnesium	--	--	9.06	--	46	44	45	43	42	42	44	48	46	46	44	45	42	43	48	47	45	45
Potassium	--	--	1.12	--	2.9	2.8	2.8	2.8	2.9	2.9	2.9	2.9	2.8	2.8	2.9	3	2.9	2.9	3.1	3.1	3	3
Sodium	200	180	2.28	101	47	42	49	50	53	53	59	63	54	54	57	56	48	48	65	66	56	56
Anions (mg/L)																						
Chloride	250	180	1.2	126	66	40	60	56	66	62	72	68	50	57	59	49	43	42	65	64	45	46
Nitrate	10	--	0.08	2.56	<0.1	0.24	<0.1	0.15	0.14	0.11	<0.1	<0.1	0.11	0.11	<0.1	<0.1	0.4	0.41	<0.1	<0.10	0.22	0.24
Nitrite	1	--	0.005	0.25	<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	<0.01	<0.010	<0.010	<0.010
Total Phosphorus	--	--	0.64	--	1.6	0.56	0.45	0.24	0.26	0.18	0.21	0.2	0.09	0.098	0.074	0.055	0.11	0.13	0.13	0.14	0.35	0.28
Sulphate	500	--	1.6	251	17	160	85	95	42	39	27	28	70	68	48	48	130	130	39	38	81	84
Alkalinity as $CaCO_3$	30-500	--	187	343	**790**	**730**	**820**	**780**	**840**	**790**	**830**	**830**	**780**	**780**	**820**	**820**	**780**	**770**	**850**	**840**	**780**	**740**
Ion Balance	--	--	--	--	2.1	0.31	1.32	1.63	3.24	3.24	0.16	3.61	2.01	1.63	0.64	0.19	0.07	1.14	0.83	2.41	2.56	5.19
Metals (mg/L) - Dissolved																						
Arsenic	0.025	0.15	0.0005	0.0066	<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
Barium	1	2.3	0.0118	0.25	0.082	0.081	0.08	0.079	0.075	0.083	0.08	0.083	0.079	0.079	0.079	0.08	0.083	0.087	0.084	0.089	0.083	0.088
Boron	5	3.55	0.0086	1.25	0.32	0.61	0.58	0.61	0.49	0.47	0.43	0.45	0.66	0.67	0.52	0.54	0.94	0.96	0.51	0.51	0.79	0.75
Cadmium	0.005	0.00021	0.00005	0.00129	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009
Chromium	0.05	0.064	0.0025	0.0144	<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
Copper	1	0.0069	0.002	0.5	0.012	0.011	0.014	0.013	0.014	0.015	0.018	0.018	0.015	0.015	0.019	0.019	0.017	0.017	0.02	0.02	0.02	0.02
Iron	0.3	--	0.05	0.175	<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	<0.1	<0.1
Lead	0.01	0.002	0.0003	0.0027	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Manganese	0.05	--	0.0017	0.026	**2.3**	**1.5**	**1.8**	**1.3**	**1.4**	**1.4**	**1.8**	**1.8**	**1.8**	**1.8**	**2.1**	**2.1**	**1.8**	**1.8**	**2.3**	**2.3**	**2**	**2.1**
Mercury	0.001	0.00077	0.0001	0.00029	0.0006	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Zinc	5	0.089	0.0005	2.5	0.0068	<0.005	<0.005	<0.005	0.0053	<0.005	<0.005	<0.005	<0.005	<0.005	0.0052	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
VOCs (mg/L)																						
Benzene	0.005	0.46	0.0001	0.00129	0.0012	0.00078	0.0012	0.00098	0.0012	0.0012	0.0016	0.0016	0.001	0.0012	0.0011	0.0012	0.00086	0.00086	0.00089	0.0009	0.001	0.0012
1,4-Dichlorobenzene	0.005	0.763	0.0001	0.00133	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
Dichloromethane	0.05	--	0.0003	0.0127	<0.0005	<0.0013	<0.0005	<0.0013	<0.0005	<0.0013	<0.0013	<0.025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0005	<0.0005	<0.0013	<0.0013	<0.0013	<0.0013
Toluene	0.024	1.4	0.0001	0.0121	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
Vinyl Chloride	0.002	35.6	0.0001	0.00058	0.0013	0.0017	**0.0035**	**0.0041**	**0.0046**	**0.0041**	**0.0053**	**0.0052**	**0.0044**	**0.0048**	**0.0036**	**0.0039**	**0.003**	**0.0031**	**0.0031**	**0.0031**	**0.003**	**0.0038**

Notes:

1. Concentrations are presented in mg/L (ppm).
2. ODWS: MECP Ontario Drinking Water Standards, from *Techical Support Document for Ontaio Drinking Water Standard, Objectives and Guidelines* , June 2003. Exceedances are indicated in **bold**.
3. APV: Aquatic Protection Values, from Table 3.1 of *Rationale for the Development of Soil and Groundwater Standards for Use at Contaminated Sites in Ontario* (MECP, April 2011).
Exceedances for APV are indicated by a dark border.
4. Background = Based on mean results (most recent three years) from upgradient well MW4.
5. MECP Guideline B-7, Incorporation of Reasonable Use Concept into MECP Groundwater Managemnet Actinities (1994). Underlining indicates exceedance.
Asterisk (*) indicates that background exceeds ODWS; therefore B-7 criterion = background.
6. Field parameters were not recorded due to Hanna instrument malfunctioning.

Table 3: Surface Water Data												
SW1												
Parameter	PWQO[2]	Nov-16	May-17	Sep-17	May-18	Oct-18[3]	May-19	Oct-19	May-20	Oct-20	May-21	Sep-21
General												
pH	6.5 to 8.5	7.81	7.84	7.94	7.9	7.67	7.26	7.97	8.08	7.75	8.2	8.26
Field pH	--	8.22	7.88	8.28	7.41	--	9.28	7.76	8.21	8.14	8.25	8.47
Conductivity (uS/cm)	--	220	180	180	210	--	30	210	230	200	190	210
Field Conductivity (uS/cm)	--	244	189	191	240	210	35	168	207	189	134	232
Field Temperature (˚C)	--	8.1	7.7	12.8	10.4	--	4.1	4.2	11.1	10.6	19.7	17.3
Total Dissolved Solids	--	212	90	160	100	85	10	125	210	170	80	130
Total Suspended Solids	--	20	2	3	5	48	2	1	4	4	3	2
Organics												
Total Biochemical Oxygen Demand (BOD)		<2	<2	<2	2	<2	<2	<2	<2	<2	<2	<2
Total Chemical Oxygen Demand (COD)	--	46	26	30	22	76	7.3	26	31	40	32	43
Phenols	0.001	<0.001	<0.001	<0.001	<0.0010	**0.0013**	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen (TKN)	--	0.75	0.65	0.66	0.63	0.64	0.23	0.6	0.79	0.82	0.7	0.7
Ammonia-N	--	0.096	0.17	0.72	0.31	0.099	<0.050	0.065	0.24	0.21	0.15	0.11
Organic Nitrogen	--	0.654	0.48	<0.05	0.32	0.541	0.205	--	--	--	--	--
Anions (mg/L)												
Chloride	--	3.4	2.7	3.1	2.6	3.6	<1.0	3.7	3.1	3.6	1.8	3.3
Nitrate	--	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrite	--	<0.01	<0.01	<0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Total Phosphorus	--	0.044	0.008	0.006	0.013	0.19	0.022	0.008	0.015	0.014	0.011	0.017
Sulphate	--	7.7	5.2	6.1	5	6.6	<1.0	8.4	7.6	7.1	6.1	7.9
Alkalinity as $CaCO_3$	--	100	86	83	100	100	13	97	110	90	89	100
Metals (mg/L) - Dissolved												
Arsenic	0.1 (0.005)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Barium	--	0.011	0.0072	0.0092	0.0084	0.016	0.002	0.0096	0.0072	0.0087	0.0068	0.0012
Boron	0.2	0.033	0.026	0.033	0.026	0.036	<0.001	0.036	0.034	0.035	0.035	0.005
Cadmium	0.0002 (0.0001)	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	0.00011	<0.0001	<0.0001	<0.00009	<0.00009	<0.00009
Chromium	0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Copper	0.005	<0.001	<0.001	<0.001	<0.001	0.0014	<0.001	<0.001	<0.001	0.0011	<0.0009	<0.0009
Iron	0.3	0.24	<0.1	<0.1	<0.1	**0.78**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lead	0.01 (0.003)	0.0009	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Mercury	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Zinc	0.03 (0.02)	<0.005	<0.005	<0.005	<0.005	0.007	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Notes:

1. Concentrations are presented in mg/L (ppm).
2. PWQO: MECP Provincial Water Quality Objectives, 1994 (updated 1999). Interim PWQO criteria are bracketed.
   Exceedances are indicated in **bold**.
3. Field parameters were not recorded due to Hanna instrument malfunctioning.

Table 4: Calculation of Alert Criteria

Groundwater Impact

Parameter	Source Concentration (MW1)	Background Concentration (MW4)	B-7 Criteria	MW3 Tigger Levels	MW3 Maximum 2021 Concentration	MW5 Tigger Levels	MW5 Maximum 2021 Concentration
Total Dissolved Solids	493	165	348	349	**1,410 (>source, >B-7)+**	431	**960 (>source, >B-7)**
Dissolved Organic Carbon (DOC)	4.25	3.0	3.80	3.8	2.2	4.1	**13 (>source, >B-7)**
Organic Nitrogen	0.45	0.15	0.21	0.21	0.175	0.35	**0.86 (>source, >B-7)**
Sodium	3.80	2.1	101	n/a	350 (>source, >B-7)+	n/a	66 (>source)
Chloride	4.3	0.90	126	n/a	640 (>source, >B-7)+	n/a	65 (>source)
Nitrate	1.10	0.14	2.56	n/a	0.69	n/a	0.24
Nitrite	0.005	0.005	0.250	n/a	0.017	n/a	<0.01
Sulphate	0.5	0.5	251	n/a	16 (>source)	n/a	84 (>source)
Alkalinity as CaCO3	525	190	343	344.1	290	447	**850 (>source, >B-7)**
Arsenic	0.0005	0.0005	0.0066	n/a	<0.001	n/a	<0.001
Barium	0.046	0.011	0.25	n/a	0.064 (>source)	n/a	0.089 (>source)
Boron	0.047	0.009	1.25	n/a	0.014	n/a	0.79 (>source)
Cadmium	0.000045	0.000045	0.00129	n/a	<0.00009	n/a	<0.00009
Chromium	0.0025	0.0025	0.0144	n/a	<0.005	n/a	<0.005
Copper	0.0050	0.0018	0.50	n/a	0.0043	n/a	0.02 (>source)
Iron	0.05	0.05	0.175	n/a	<0.1	n/a	<0.1
Lead	0.00025	0.00025	0.0027	n/a	<0.0005	n/a	<0.0005
Manganese	0.34	0.0027	0.026	0.028	0.0022	0.21	**2.3 (>source, >B-7)**
Mercury	0.00005	0.00005	0.00029	n/a	<0.0001	n/a	<0.0001
Zinc	0.0025	0.0025	2.50	n/a	<0.005	n/a	<0.005
Benzene	0.00005	0.00005	0.00129	n/a	<0.0001	n/a	0.0012 (>source)
1,4-Dichlorobenzene	0.0001	0.0001	0.00133	n/a	<0.0002	n/a	<0.0005
Dichloromethane	0.00025	0.00025	0.0127	n/a	<0.0005	n/a	<0.0013
Toluene	0.0001	0.0001	0.0121	n/a	<0.0002	n/a	<0.0005
Vinyl Chloride	0.0001	0.0001	0.00058	n/a	<0.0002	n/a	0.0038 (>source, >B-7)
Distance from "source well" MW1 to trigger well MW3 (m)				340			
Distance from "source well" MW1 to 2018 recommended west attenuation zone boundary (m)				342			
Distance from "source well" MW1 to trigger well MW5 (m)						250	
Distance from "source well" MW1 to 2018 recommended south attenuation zone boundary (m)						585	

Notes:

1. Source and background concentrations are the arithmetic means of 2021 results for the respective wells.
2. Non-detectable background concentrations have been assumed to be one-half of the detection limit.
3. Where background exceeds the ODWS, the B-7 criterion defaults to background (i.e., no further deterioration of groundwater quality is acceptable).
4. Where the source concentration is lower than or equal to the B-7 criterion, a trigger level is not applicable (n/a).
5. Concentrations exceeding tigger values are in **bold**.
6. Value exceeds source concentration and additional source implicated is indicated by a +.
7. All concentrations expressed in milligrams per litre (mg/L).

Appendix E –

Laboratory Reports of Analysis

Maxxam
A Bureau Veritas Group Company

Your Project #: THB-00011119-HE
Site#: Nakina Landfill
Your C.O.C. #: 715266-01-01

Attention: Kristof Karpiuk

exp Services Inc
Thunder Bay Branch
1142 Roland St
Thunder Bay, ON
CANADA P7B 5M4

Report Date: 2019/05/22
Report #: R5721031
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B9C5103
Received: 2019/05/09, 14:08

Sample Matrix: Water
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Alkalinity	6	N/A	2019/05/14	CAM SOP-00448	SM 23 2320 B m
Biochemical Oxygen Demand (BOD)	1	2019/05/17	2019/05/22	CAM SOP-00427	SM 23 5210B m
Chloride by Automated Colourimetry	6	N/A	2019/05/15	CAM SOP-00463	SM 4500-Cl E m
Chemical Oxygen Demand	4	N/A	2019/05/14	CAM SOP-00416	SM 23 5220 D m
Chemical Oxygen Demand	1	N/A	2019/05/17	CAM SOP-00416	SM 23 5220 D m
Conductivity	6	N/A	2019/05/14	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	5	N/A	2019/05/14	CAM SOP-00446	SM 23 5310 B m
Mercury in Water by CVAA	5	2019/05/15	2019/05/15	CAM SOP-00453	EPA 7470A m
Dissolved Metals by ICPMS	2	N/A	2019/05/13	CAM SOP-00447	EPA 6020B m
Dissolved Metals by ICPMS	2	N/A	2019/05/14	CAM SOP-00447	EPA 6020B m
Total Metals Analysis by ICPMS	1	N/A	2019/05/14	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	4	N/A	2019/05/15		
Total Ammonia-N	5	N/A	2019/05/14	CAM SOP-00441	EPA GS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (2)	6	N/A	2019/05/14	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	6	2019/05/13	2019/05/14	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	5	N/A	2019/05/13	CAM SOP-00444	OMOE E3179 m
Sulphate by Automated Colourimetry	6	N/A	2019/05/15	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids	5	2019/05/11	2019/05/13	CAM SOP-00428	SM 23 2540C m
Total Dissolved Solids	1	2019/05/13	2019/05/14	CAM SOP-00428	SM 23 2540C m
Total Kjeldahl Nitrogen in Water	4	2019/05/13	2019/05/14	CAM SOP-00938	OMOE E3516 m
Total Kjeldahl Nitrogen in Water	1	2019/05/13	2019/05/15	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	1	2019/05/13	2019/05/14	CAM SOP-00407	SM 23 4500 P B H m
Total Phosphorus (Colourimetric)	4	2019/05/14	2019/05/14	CAM SOP-00407	SM 23 4500 P B H m
Low Level Total Suspended Solids	1	2019/05/11	2019/05/13	CAM SOP-00428	SM 23 2540D m
Volatile Organic Compounds in Water	4	N/A	2019/05/15	CAM SOP-00226	EPA 8260C m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All

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Your Project #: THB-00011119-HE
Site#: Nakina Landfill
Your C.O.C. #: 715266-01-01

Attention: Kristof Karpiuk

exp Services Inc
Thunder Bay Branch
1142 Roland St
Thunder Bay, ON
CANADA P7B 5M4

Report Date: 2019/05/22
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CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B9C5103
Received: 2019/05/09, 14:08

data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Michelle Brescacin, Project Manager Assistant
Email: MBrescacin@maxxam.ca
Phone# (807)344-4220

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B9C5103
Report Date: 2019/05/22

exp Services Inc
Client Project #: THB-00011119-HE
Sampler Initials: EF

LANDFILL STANDARDS SCH 5 - GW COMP. LIST (WATER)

Maxxam ID		JRH111			JRH111			JRH112		
Sampling Date		2019/05/08 14:53			2019/05/08 14:53			2019/05/08 16:10		
COC Number		715266-01-01			715266-01-01			715266-01-01		
	UNITS	**MW1**	**RDL**	**QC Batch**	**MW1 Lab-Dup**	**RDL**	**QC Batch**	**MW3**	**RDL**	**QC Batch**
Inorganics										
Total Ammonia-N	mg/L	0.16	0.050	6118915	0.12	0.050	6118915	<0.050	0.050	6118915
Total Chemical Oxygen Demand (COD)	mg/L	42	4.0	6118622				5.4	4.0	6118622
Conductivity	umho/cm	1200	1.0	6119153				2000	1.0	6119153
Total Dissolved Solids	mg/L	750	10	6117337				1170	10	6117337
Total Kjeldahl Nitrogen (TKN)	mg/L	1.3	0.20	6118610				0.17	0.10	6118610
Dissolved Organic Carbon	mg/L	10	0.50	6118252				2.1	0.50	6118252
pH	pH	7.43		6119156				7.91		6119156
Phenols-4AAP	mg/L	0.0011	0.0010	6118008				<0.0010	0.0010	6117999
Total Phosphorus	mg/L	0.45	0.020	6119924				0.21	0.020	6119924
Dissolved Sulphate (SO4)	mg/L	<1.0	1.0	6119184				11	1.0	6119184
Alkalinity (Total as CaCO3)	mg/L	620	1.0	6119150				250	1.0	6119150
Dissolved Chloride (Cl-)	mg/L	4.3	1.0	6119179				470	5.0	6119179
Nitrite (N)	mg/L	0.060	0.010	6119226				<0.010	0.010	6119226
Nitrate (N)	mg/L	5.71	0.10	6119226				0.53	0.10	6119226
Metals										
Mercury (Hg)	mg/L	0.0001	0.0001	6122227				<0.0001	0.0001	6122227
Dissolved Arsenic (As)	ug/L	4.1	1.0	6118805				<1.0	1.0	6118805
Dissolved Barium (Ba)	ug/L	59	2.0	6118805				47	2.0	6118805
Dissolved Boron (B)	ug/L	65	10	6118805				17	10	6118805
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	6118805				<0.10	0.10	6118805
Dissolved Calcium (Ca)	ug/L	250000	200	6118805				120000	200	6118805
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	6118805				<5.0	5.0	6118805
Dissolved Copper (Cu)	ug/L	6.0	1.0	6118805				1.6	1.0	6118805
Dissolved Iron (Fe)	ug/L	4500	100	6118805				<100	100	6118805
Dissolved Lead (Pb)	ug/L	<0.50	0.50	6118805				<0.50	0.50	6118805
Dissolved Magnesium (Mg)	ug/L	15000	50	6118805				15000	50	6118805
Dissolved Manganese (Mn)	ug/L	1600	2.0	6118805				<2.0	2.0	6118805
Dissolved Potassium (K)	ug/L	2700	200	6118805				2100	200	6118805
Dissolved Sodium (Na)	ug/L	5000	100	6118805				280000	100	6118805
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	6118805				<5.0	5.0	6118805
Volatile Organics										
Benzene	ug/L	<0.25	0.25	6117861				<0.10	0.10	6117861
1,4-Dichlorobenzene	ug/L	<0.50	0.50	6117861				<0.20	0.20	6117861
Methylene Chloride(Dichloromethane)	ug/L	<1.3	1.3	6117861				<0.50	0.50	6117861

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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Maxxam Job #: B9C5103
Report Date: 2019/05/22

exp Services Inc
Client Project #: THB-00011119-HE
Sampler Initials: EF

LANDFILL STANDARDS SCH 5 - GW COMP. LIST (WATER)

Maxxam ID		JRH111			JRH111			JRH112		
Sampling Date		2019/05/08 14:53			2019/05/08 14:53			2019/05/08 16:10		
COC Number		715266-01-01			715266-01-01			715266-01-01		
	UNITS	**MW1**	**RDL**	**QC Batch**	**MW1 Lab-Dup**	**RDL**	**QC Batch**	**MW3**	**RDL**	**QC Batch**
Toluene	ug/L	<0.50	0.50	6117861				<0.20	0.20	6117861
Vinyl Chloride	ug/L	<0.50	0.50	6117861				<0.20	0.20	6117861
Surrogate Recovery (%)										
4-Bromofluorobenzene	%	97		6117861				97		6117861
D4-1,2-Dichloroethane	%	98		6117861				99		6117861
D8-Toluene	%	92		6117861				91		6117861

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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Maxxam Job #: B9C5103
Report Date: 2019/05/22

exp Services Inc
Client Project #: THB-00011119-HE
Sampler Initials: EF

LANDFILL STANDARDS SCH 5 - GW COMP. LIST (WATER)

Maxxam ID		JRH113			JRH114			JRH115		
Sampling Date		2019/05/08 14:05			2019/05/08 16:48			2019/05/08 17:30		
COC Number		715266-01-01			715266-01-01			715266-01-01		
	UNITS	**MW4**	**RDL**	**QC Batch**	**MW5**	**RDL**	**QC Batch**	**MW6**	**RDL**	**QC Batch**
Inorganics										
Total Ammonia-N	mg/L				<0.050	0.050	6118915	<0.050	0.050	6118915
Total Chemical Oxygen Demand (COD)	mg/L				43	4.0	6118622	34	4.0	6118622
Conductivity	umho/cm	350	1.0	6119153	1600	1.0	6119153	1600	1.0	6119153
Total Dissolved Solids	mg/L	235	10	6117337	1040	10	6117337	1030	10	6117337
Total Kjeldahl Nitrogen (TKN)	mg/L				0.49	0.10	6118610	0.58	0.10	6118610
Dissolved Organic Carbon	mg/L	2.6	0.50	6118252	12	0.50	6118252	12	0.50	6118252
pH	pH	8.18		6119156	7.25		6119156	7.29		6119156
Phenols-4AAP	mg/L				<0.0010	0.0010	6117999	0.0010	0.0010	6118008
Total Phosphorus	mg/L				0.21	0.020	6119924	0.20	0.020	6119924
Dissolved Sulphate (SO4)	mg/L	3.4	1.0	6119184	27	1.0	6119184	28	1.0	6119184
Alkalinity (Total as CaCO3)	mg/L	180	1.0	6119150	830	1.0	6119150	830	1.0	6119150
Dissolved Chloride (Cl-)	mg/L	1.2	1.0	6119179	72	1.0	6119179	68	1.0	6119179
Nitrite (N)	mg/L	<0.010	0.010	6119226	<0.010	0.010	6119226	<0.010	0.010	6119226
Nitrate (N)	mg/L	<0.10	0.10	6119226	<0.10	0.10	6119226	<0.10	0.10	6119226
Metals										
Mercury (Hg)	mg/L				<0.0001	0.0001	6122260	<0.0001	0.0001	6122260
Dissolved Arsenic (As)	ug/L				<1.0	1.0	6118805	<1.0	1.0	6118805
Dissolved Barium (Ba)	ug/L				80	2.0	6118805	83	2.0	6118805
Dissolved Boron (B)	ug/L				430	10	6118805	450	10	6118805
Dissolved Cadmium (Cd)	ug/L				<0.10	0.10	6118805	<0.10	0.10	6118805
Dissolved Calcium (Ca)	ug/L				260000	200	6118805	280000	200	6118805
Dissolved Chromium (Cr)	ug/L				<5.0	5.0	6118805	<5.0	5.0	6118805
Dissolved Copper (Cu)	ug/L				18	1.0	6118805	18	1.0	6118805
Dissolved Iron (Fe)	ug/L				<100	100	6118805	<100	100	6118805
Dissolved Lead (Pb)	ug/L				<0.50	0.50	6118805	<0.50	0.50	6118805
Dissolved Magnesium (Mg)	ug/L				44000	50	6118805	48000	50	6118805
Dissolved Manganese (Mn)	ug/L				1800	2.0	6118805	1800	2.0	6118805
Dissolved Potassium (K)	ug/L				2900	200	6118805	2900	200	6118805
Dissolved Sodium (Na)	ug/L				59000	100	6118805	63000	100	6118805
Dissolved Zinc (Zn)	ug/L				<5.0	5.0	6118805	<5.0	5.0	6118805
Volatile Organics										
Benzene	ug/L				1.6	0.25	6117861	1.6	0.50	6117861
1,4-Dichlorobenzene	ug/L				<0.50	0.50	6117861	<1.0	1.0	6117861
Methylene Chloride(Dichloromethane)	ug/L				<1.3	1.3	6117861	<2.5	2.5	6117861
Toluene	ug/L				<0.50	0.50	6117861	<1.0	1.0	6117861

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B9C5103
Report Date: 2019/05/22

exp Services Inc
Client Project #: THB-00011119-HE
Sampler Initials: EF

LANDFILL STANDARDS SCH 5 - GW COMP. LIST (WATER)

Maxxam ID		JRH113			JRH114			JRH115		
Sampling Date		2019/05/08 14:05			2019/05/08 16:48			2019/05/08 17:30		
COC Number		715266-01-01			715266-01-01			715266-01-01		
	UNITS	**MW4**	**RDL**	**QC Batch**	**MW5**	**RDL**	**QC Batch**	**MW6**	**RDL**	**QC Batch**
Vinyl Chloride	ug/L				5.3	0.50	6117861	5.2	1.0	6117861
Surrogate Recovery (%)										
4-Bromofluorobenzene	%				98		6117861	99		6117861
D4-1,2-Dichloroethane	%				99		6117861	94		6117861
D8-Toluene	%				93		6117861	96		6117861

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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exp Services Inc
Client Project #: THB-00011119-HE
Sampler Initials: EF

LANDFILL STANDARDS SCH 5 - SW COMP. LIST (WATER)

Maxxam ID		JRH116			JRH116		
Sampling Date		2019/05/08 18:10			2019/05/08 18:10		
COC Number		715266-01-01			715266-01-01		
	UNITS	**SW1**	**RDL**	**QC Batch**	**SW1 Lab-Dup**	**RDL**	**QC Batch**
Inorganics							
Total Ammonia-N	mg/L	<0.050	0.050	6118915			
Total BOD	mg/L	<2	2	6128491			
Total Chemical Oxygen Demand (COD)	mg/L	7.3	4.0	6125702			
Conductivity	umho/cm	30	1.0	6119153			
Total Dissolved Solids	mg/L	10	10	6119345	15	10	6119345
Total Kjeldahl Nitrogen (TKN)	mg/L	0.23	0.10	6118610			
pH	pH	7.26		6119156			
Phenols-4AAP	mg/L	<0.0010	0.0010	6118002			
Total Phosphorus	mg/L	0.022	0.004	6118802	0.020	0.004	6118802
Total Suspended Solids	mg/L	2	1	6117316			
Dissolved Sulphate (SO4)	mg/L	<1.0	1.0	6119184			
Alkalinity (Total as CaCO3)	mg/L	13	1.0	6119150			
Dissolved Chloride (Cl-)	mg/L	<1.0	1.0	6119179			
Nitrite (N)	mg/L	<0.010	0.010	6119226			
Nitrate (N)	mg/L	<0.10	0.10	6119226			
Metals							
Mercury (Hg)	mg/L	<0.0001	0.0001	6122227			
Total Arsenic (As)	ug/L	<1.0	1.0	6118977			
Total Barium (Ba)	ug/L	2.0	2.0	6118977			
Total Boron (B)	ug/L	<10	10	6118977			
Total Cadmium (Cd)	ug/L	0.11	0.10	6118977			
Total Chromium (Cr)	ug/L	<5.0	5.0	6118977			
Total Copper (Cu)	ug/L	<1.0	1.0	6118977			
Total Iron (Fe)	ug/L	<100	100	6118977			
Total Lead (Pb)	ug/L	<0.50	0.50	6118977			
Total Zinc (Zn)	ug/L	<5.0	5.0	6118977			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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Maxxam Job #: B9C5103
Report Date: 2019/05/22

exp Services Inc
Client Project #: THB-00011119-HE
Sampler Initials: EF

RESULTS OF ANALYSES OF WATER

Maxxam ID		JRH111	JRH112	JRH114	JRH115	
Sampling Date		2019/05/08 14:53	2019/05/08 16:10	2019/05/08 16:48	2019/05/08 17:30	
COC Number		715266-01-01	715266-01-01	715266-01-01	715266-01-01	
	UNITS	**MW1**	**MW3**	**MW5**	**MW6**	**QC Batch**
Calculated Parameters						
Ion Balance (% Difference)	%	4.21	2.58	0.160	3.61	6115262

QC Batch = Quality Control Batch

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B9C5103
Report Date: 2019/05/22

exp Services Inc
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Sampler Initials: EF

TEST SUMMARY

Maxxam ID: JRH111
Sample ID: MW1
Matrix: Water

Collected: 2019/05/08
Shipped:
Received: 2019/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	6119150	N/A	2019/05/14	Surinder Rai
Chloride by Automated Colourimetry	KONE	6119179	N/A	2019/05/15	Deonarine Ramnarine
Chemical Oxygen Demand	SPEC	6118622	N/A	2019/05/14	Viorica Rotaru
Conductivity	AT	6119153	N/A	2019/05/14	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	6118252	N/A	2019/05/14	Mandeep Kaur
Mercury in Water by CVAA	CV/AA	6122227	2019/05/15	2019/05/15	Ron Morrison
Dissolved Metals by ICPMS	ICP/MS	6118805	N/A	2019/05/14	Nan Raykha
Ion Balance (% Difference)	CALC	6115262	N/A	2019/05/15	Automated Statchk
Total Ammonia-N	LACH/NH4	6118915	N/A	2019/05/14	Chandra Nandlal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	6119226	N/A	2019/05/14	Chandra Nandlal
pH	AT	6119156	2019/05/13	2019/05/14	Surinder Rai
Phenols (4AAP)	TECH/PHEN	6118008	N/A	2019/05/13	Bramdeo Motiram
Sulphate by Automated Colourimetry	KONE	6119184	N/A	2019/05/15	Alina Dobreanu
Total Dissolved Solids	BAL	6117337	2019/05/11	2019/05/13	Nilam Borole
Total Kjeldahl Nitrogen in Water	SKAL	6118610	2019/05/13	2019/05/15	Rajni Tyagi
Total Phosphorus (Colourimetric)	LACH/P	6119924	2019/05/14	2019/05/14	Louise Harding
Volatile Organic Compounds in Water	P&T/MS	6117861	N/A	2019/05/15	Dina Wang

Maxxam ID: JRH111 Dup
Sample ID: MW1
Matrix: Water

Collected: 2019/05/08
Shipped:
Received: 2019/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Ammonia-N	LACH/NH4	6118915	N/A	2019/05/14	Chandra Nandlal

Maxxam ID: JRH112
Sample ID: MW3
Matrix: Water

Collected: 2019/05/08
Shipped:
Received: 2019/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	6119150	N/A	2019/05/14	Surinder Rai
Chloride by Automated Colourimetry	KONE	6119179	N/A	2019/05/15	Deonarine Ramnarine
Chemical Oxygen Demand	SPEC	6118622	N/A	2019/05/14	Viorica Rotaru
Conductivity	AT	6119153	N/A	2019/05/14	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	6118252	N/A	2019/05/14	Mandeep Kaur
Mercury in Water by CVAA	CV/AA	6122227	2019/05/15	2019/05/15	Ron Morrison
Dissolved Metals by ICPMS	ICP/MS	6118805	N/A	2019/05/13	Nan Raykha
Ion Balance (% Difference)	CALC	6115262	N/A	2019/05/15	Automated Statchk
Total Ammonia-N	LACH/NH4	6118915	N/A	2019/05/14	Chandra Nandlal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	6119226	N/A	2019/05/14	Chandra Nandlal
pH	AT	6119156	2019/05/13	2019/05/14	Surinder Rai
Phenols (4AAP)	TECH/PHEN	6117999	N/A	2019/05/13	Bramdeo Motiram
Sulphate by Automated Colourimetry	KONE	6119184	N/A	2019/05/15	Alina Dobreanu
Total Dissolved Solids	BAL	6117337	2019/05/11	2019/05/13	Nilam Borole
Total Kjeldahl Nitrogen in Water	SKAL	6118610	2019/05/13	2019/05/14	Rajni Tyagi
Total Phosphorus (Colourimetric)	LACH/P	6119924	2019/05/14	2019/05/14	Louise Harding

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Maxxam Job #: B9C5103
Report Date: 2019/05/22

exp Services Inc
Client Project #: THB-00011119-HE
Sampler Initials: EF

TEST SUMMARY

Maxxam ID: JRH112
Sample ID: MW3
Matrix: Water

Collected: 2019/05/08
Shipped:
Received: 2019/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Volatile Organic Compounds in Water	P&T/MS	6117861	N/A	2019/05/15	Dina Wang

Maxxam ID: JRH113
Sample ID: MW4
Matrix: Water

Collected: 2019/05/08
Shipped:
Received: 2019/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	6119150	N/A	2019/05/14	Surinder Rai
Chloride by Automated Colourimetry	KONE	6119179	N/A	2019/05/15	Deonarine Ramnarine
Conductivity	AT	6119153	N/A	2019/05/14	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	6118252	N/A	2019/05/14	Mandeep Kaur
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	6119226	N/A	2019/05/14	Chandra Nandlal
pH	AT	6119156	2019/05/13	2019/05/14	Surinder Rai
Sulphate by Automated Colourimetry	KONE	6119184	N/A	2019/05/15	Alina Dobreanu
Total Dissolved Solids	BAL	6117337	2019/05/11	2019/05/13	Nilam Borole

Maxxam ID: JRH114
Sample ID: MW5
Matrix: Water

Collected: 2019/05/08
Shipped:
Received: 2019/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	6119150	N/A	2019/05/14	Surinder Rai
Chloride by Automated Colourimetry	KONE	6119179	N/A	2019/05/15	Deonarine Ramnarine
Chemical Oxygen Demand	SPEC	6118622	N/A	2019/05/14	Viorica Rotaru
Conductivity	AT	6119153	N/A	2019/05/14	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	6118252	N/A	2019/05/14	Mandeep Kaur
Mercury in Water by CVAA	CV/AA	6122260	2019/05/15	2019/05/15	Ron Morrison
Dissolved Metals by ICPMS	ICP/MS	6118805	N/A	2019/05/14	Nan Raykha
Ion Balance (% Difference)	CALC	6115262	N/A	2019/05/15	Automated Statchk
Total Ammonia-N	LACH/NH4	6118915	N/A	2019/05/14	Chandra Nandlal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	6119226	N/A	2019/05/14	Chandra Nandlal
pH	AT	6119156	2019/05/13	2019/05/14	Surinder Rai
Phenols (4AAP)	TECH/PHEN	6117999	N/A	2019/05/13	Bramdeo Motiram
Sulphate by Automated Colourimetry	KONE	6119184	N/A	2019/05/15	Alina Dobreanu
Total Dissolved Solids	BAL	6117337	2019/05/11	2019/05/13	Nilam Borole
Total Kjeldahl Nitrogen in Water	SKAL	6118610	2019/05/13	2019/05/14	Rajni Tyagi
Total Phosphorus (Colourimetric)	LACH/P	6119924	2019/05/14	2019/05/14	Louise Harding
Volatile Organic Compounds in Water	P&T/MS	6117861	N/A	2019/05/15	Dina Wang

Maxxam ID: JRH115
Sample ID: MW6
Matrix: Water

Collected: 2019/05/08
Shipped:
Received: 2019/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	6119150	N/A	2019/05/14	Surinder Rai
Chloride by Automated Colourimetry	KONE	6119179	N/A	2019/05/15	Deonarine Ramnarine

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Maxxam Job #: B9C5103
Report Date: 2019/05/22

exp Services Inc
Client Project #: THB-00011119-HE
Sampler Initials: EF

TEST SUMMARY

Maxxam ID: JRH115
Sample ID: MW6
Matrix: Water

Collected: 2019/05/08
Shipped:
Received: 2019/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chemical Oxygen Demand	SPEC	6118622	N/A	2019/05/14	Viorica Rotaru
Conductivity	AT	6119153	N/A	2019/05/14	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	6118252	N/A	2019/05/14	Mandeep Kaur
Mercury in Water by CVAA	CV/AA	6122260	2019/05/15	2019/05/15	Ron Morrison
Dissolved Metals by ICPMS	ICP/MS	6118805	N/A	2019/05/13	Nan Raykha
Ion Balance (% Difference)	CALC	6115262	N/A	2019/05/15	Automated Statchk
Total Ammonia-N	LACH/NH4	6118915	N/A	2019/05/14	Chandra Nandlal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	6119226	N/A	2019/05/14	Chandra Nandlal
pH	AT	6119156	2019/05/13	2019/05/14	Surinder Rai
Phenols (4AAP)	TECH/PHEN	6118008	N/A	2019/05/13	Bramdeo Motiram
Sulphate by Automated Colourimetry	KONE	6119184	N/A	2019/05/15	Alina Dobreanu
Total Dissolved Solids	BAL	6117337	2019/05/11	2019/05/13	Nilam Borole
Total Kjeldahl Nitrogen in Water	SKAL	6118610	2019/05/13	2019/05/14	Rajni Tyagi
Total Phosphorus (Colourimetric)	LACH/P	6119924	2019/05/14	2019/05/14	Louise Harding
Volatile Organic Compounds in Water	P&T/MS	6117861	N/A	2019/05/15	Dina Wang

Maxxam ID: JRH116
Sample ID: SW1
Matrix: Water

Collected: 2019/05/08
Shipped:
Received: 2019/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	6119150	N/A	2019/05/14	Surinder Rai
Biochemical Oxygen Demand (BOD)	DO	6128491	2019/05/17	2019/05/22	Althea Gonzalez
Chloride by Automated Colourimetry	KONE	6119179	N/A	2019/05/15	Deonarine Ramnarine
Chemical Oxygen Demand	SPEC	6125702	N/A	2019/05/17	Viorica Rotaru
Conductivity	AT	6119153	N/A	2019/05/14	Surinder Rai
Mercury in Water by CVAA	CV/AA	6122227	2019/05/15	2019/05/15	Ron Morrison
Total Metals Analysis by ICPMS	ICP/MS	6118977	N/A	2019/05/14	Arefa Dabhad
Total Ammonia-N	LACH/NH4	6118915	N/A	2019/05/14	Chandra Nandlal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	6119226	N/A	2019/05/14	Chandra Nandlal
pH	AT	6119156	2019/05/13	2019/05/14	Surinder Rai
Phenols (4AAP)	TECH/PHEN	6118002	N/A	2019/05/13	Bramdeo Motiram
Sulphate by Automated Colourimetry	KONE	6119184	N/A	2019/05/15	Alina Dobreanu
Total Dissolved Solids	BAL	6119345	2019/05/13	2019/05/14	Nilam Borole
Total Kjeldahl Nitrogen in Water	SKAL	6118610	2019/05/13	2019/05/14	Rajni Tyagi
Total Phosphorus (Colourimetric)	LACH/P	6118802	2019/05/13	2019/05/14	Louise Harding
Low Level Total Suspended Solids	BAL	6117316	2019/05/11	2019/05/13	Mandeep Kaur

Maxxam ID: JRH116 Dup
Sample ID: SW1
Matrix: Water

Collected: 2019/05/08
Shipped:
Received: 2019/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Dissolved Solids	BAL	6119345	2019/05/13	2019/05/14	Nilam Borole
Total Phosphorus (Colourimetric)	LACH/P	6118802	2019/05/13	2019/05/14	Louise Harding

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Maxxam Job #: B9C5103
Report Date: 2019/05/22

exp Services Inc
Client Project #: THB-00011119-HE
Sampler Initials: EF

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	1.0°C

VOC Water Analysis: Due to foaming, most of the samples required dilution. The detection limits were adjusted accordingly.

Sample JRH116 [SW1] : Biochemical Oxygen Demand (BOD) Analysis: Re-analysis was performed past sample holding time. This may increase the variability associated with these results.

Results relate only to the items tested.

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Maxxam Job #: B9C5103
Report Date: 2019/05/22

QUALITY ASSURANCE REPORT

exp Services Inc
Client Project #: THB-00011119-HE
Sampler Initials: EF

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
6117861	4-Bromofluorobenzene	2019/05/14	103	70 - 130	103	70 - 130	96	%				
6117861	D4-1,2-Dichloroethane	2019/05/14	91	70 - 130	90	70 - 130	91	%				
6117861	D8-Toluene	2019/05/14	97	70 - 130	97	70 - 130	94	%				
6117316	Total Suspended Solids	2019/05/13					<1	mg/L	11	25	98	85 - 115
6117337	Total Dissolved Solids	2019/05/13					<10	mg/L	3.8	25	100	90 - 110
6117861	1,4-Dichlorobenzene	2019/05/14	101	70 - 130	106	70 - 130	<0.20	ug/L				
6117861	Benzene	2019/05/15	98	70 - 130	102	70 - 130	<0.10	ug/L	NC	30		
6117861	Methylene Chloride(Dichloromethane)	2019/05/15	93	70 - 130	98	70 - 130	<0.50	ug/L	NC	30		
6117861	Toluene	2019/05/14	93	70 - 130	95	70 - 130	<0.20	ug/L				
6117861	Vinyl Chloride	2019/05/15	79	70 - 130	88	70 - 130	<0.20	ug/L	NC	30		
6117999	Phenols-4AAP	2019/05/13	96	80 - 120	96	80 - 120	<0.0010	mg/L	NC	20		
6118002	Phenols-4AAP	2019/05/13	94	80 - 120	97	80 - 120	<0.0010	mg/L	3.8	20		
6118008	Phenols-4AAP	2019/05/14	94	80 - 120	96	80 - 120	<0.0010	mg/L	NC (1)	20		
6118252	Dissolved Organic Carbon	2019/05/14	91	80 - 120	94	80 - 120	<0.50	mg/L	1.3	20		
6118610	Total Kjeldahl Nitrogen (TKN)	2019/05/14	93	80 - 120	101	80 - 120	<0.10	mg/L	20	20	101	80 - 120
6118622	Total Chemical Oxygen Demand (COD)	2019/05/14	100	80 - 120	100	80 - 120	<4.0	mg/L	NC	20		
6118802	Total Phosphorus	2019/05/14	112	80 - 120	108	80 - 120	<0.004	mg/L	8.5	20	101	80 - 120
6118805	Dissolved Arsenic (As)	2019/05/14	110	80 - 120	100	80 - 120	<1.0	ug/L	0.62	20		
6118805	Dissolved Barium (Ba)	2019/05/14	110	80 - 120	100	80 - 120	<2.0	ug/L	3.5	20		
6118805	Dissolved Boron (B)	2019/05/14	96	80 - 120	99	80 - 120	<10	ug/L	2.3	20		
6118805	Dissolved Cadmium (Cd)	2019/05/14	108	80 - 120	100	80 - 120	<0.10	ug/L	NC	20		
6118805	Dissolved Calcium (Ca)	2019/05/14	NC	80 - 120	104	80 - 120	<200	ug/L	3.4	20		
6118805	Dissolved Chromium (Cr)	2019/05/14	109	80 - 120	97	80 - 120	<5.0	ug/L	NC	20		
6118805	Dissolved Copper (Cu)	2019/05/14	92	80 - 120	99	80 - 120	<1.0	ug/L	NC	20		
6118805	Dissolved Iron (Fe)	2019/05/14	109	80 - 120	100	80 - 120	<100	ug/L	NC	20		
6118805	Dissolved Lead (Pb)	2019/05/14	104	80 - 120	100	80 - 120	<0.50	ug/L	NC	20		
6118805	Dissolved Magnesium (Mg)	2019/05/14	116	80 - 120	101	80 - 120	<50	ug/L	0.91	20		
6118805	Dissolved Manganese (Mn)	2019/05/14	110	80 - 120	101	80 - 120	<2.0	ug/L	NC	20		
6118805	Dissolved Potassium (K)	2019/05/14	NC	80 - 120	99	80 - 120	<200	ug/L	0.94	20		
6118805	Dissolved Sodium (Na)	2019/05/14	NC	80 - 120	100	80 - 120	<100	ug/L	1.3	20		
6118805	Dissolved Zinc (Zn)	2019/05/14	106	80 - 120	98	80 - 120	<5.0	ug/L	NC	20		
6118915	Total Ammonia-N	2019/05/14	93	75 - 125	97	80 - 120	<0.050	mg/L	NC	20		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
6118977	Total Arsenic (As)	2019/05/14	102	80 - 120	100	80 - 120	<1.0	ug/L				
6118977	Total Barium (Ba)	2019/05/14	97	80 - 120	96	80 - 120	<2.0	ug/L				
6118977	Total Boron (B)	2019/05/14	91	80 - 120	92	80 - 120	<10	ug/L				
6118977	Total Cadmium (Cd)	2019/05/14	100	80 - 120	100	80 - 120	<0.10	ug/L				
6118977	Total Chromium (Cr)	2019/05/14	97	80 - 120	97	80 - 120	<5.0	ug/L				
6118977	Total Copper (Cu)	2019/05/14	102	80 - 120	99	80 - 120	<1.0	ug/L				
6118977	Total Iron (Fe)	2019/05/14	101	80 - 120	99	80 - 120	<100	ug/L				
6118977	Total Lead (Pb)	2019/05/14	95	80 - 120	96	80 - 120	<0.50	ug/L				
6118977	Total Zinc (Zn)	2019/05/14	101	80 - 120	100	80 - 120	<5.0	ug/L	3.9	20		
6119150	Alkalinity (Total as CaCO3)	2019/05/14			95	85 - 115	<1.0	mg/L	2.6	20		
6119153	Conductivity	2019/05/14			101	85 - 115	<1.0	umho/cm	0.14	25		
6119156	pH	2019/05/14			102	98 - 103			0.76	N/A		
6119179	Dissolved Chloride (Cl-)	2019/05/15	105	80 - 120	104	80 - 120	<1.0	mg/L	0.13	20		
6119184	Dissolved Sulphate (SO4)	2019/05/15	111	75 - 125	102	80 - 120	<1.0	mg/L	NC	20		
6119226	Nitrate (N)	2019/05/14	104	80 - 120	104	80 - 120	<0.10	mg/L	0.60	20		
6119226	Nitrite (N)	2019/05/14	108	80 - 120	105	80 - 120	<0.010	mg/L	NC	20		
6119345	Total Dissolved Solids	2019/05/14					<10	mg/L	NC	25	95	90 - 110
6119924	Total Phosphorus	2019/05/14	NC	80 - 120	100	80 - 120	<0.020	mg/L	1.3	20	101	80 - 120
6122227	Mercury (Hg)	2019/05/15	102	75 - 125	96	80 - 120	<0.0001	mg/L	NC	20		
6122260	Mercury (Hg)	2019/05/15	109	75 - 125	104	80 - 120	<0.0001	mg/L	NC	20		
6125702	Total Chemical Oxygen Demand (COD)	2019/05/17	92	80 - 120	97	80 - 120	<4.0	mg/L	4.9	20		

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Maxxam Job #: B9C5103
Report Date: 2019/05/22

QUALITY ASSURANCE REPORT(CONT'D)

exp Services Inc
Client Project #: THB-00011119-HE
Sampler Initials: EF

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
6128491	Total BOD	2019/05/22					<2	mg/L	NC	30	93	80 - 120

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

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

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Detection Limit was raised due to matrix interferences.

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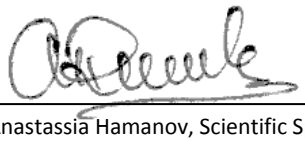
Maxxam Job #: B9C5103
Report Date: 2019/05/22

exp Services Inc
Client Project #: THB-00011119-HE
Sampler Initials: EF

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Anastassia Hamanov, Scientific Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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BOD

Maxxam

CHAIN OF CUSTODY RECORD

Page 1 of 1

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#17501 exp Service		Kristof Karpiuk & Alikas Mitsopoulos	Quotation #:	B90555	Maxxam Job #:	Bottle Order #: 715266
Attention:	accounts payable		Alikas.Mitsopoulos@exp.com	P.O. #:		COC #: C#715266-01-01	Project Manager: Michelle Brescacin
Address:	1142 Roland St, Thunder Bay ON P7B 5M4			Project:	THB-00011119-HE		
Tel:	(807) 623-9495 Fax: (807) 623-8070	Tel: / Fax:		Project Name:			
Email:	thunderbay@exp.com; Karen.Burke@exp.com;AP@ex	Email:	Kristof.Karpiuk@exp.com	Site #:	Nakina Landfill		
				Sampled By:	Elwin Farkas		

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011): ☐ Table 1 ☐ Res/Park ☐ Medium/Fine ☐ Table 2 ☐ Ind/Comm ☐ Coarse ☐ Table 3 ☐ Agri/Other ☐ For RSC ☐ Table

Other Regulations: ☐ CCME ☐ Sanitary Sewer Bylaw ☐ Reg 558 ☐ Storm Sewer Bylaw ☐ MISA Municipality ☒ PWQO ☒ Other ODWS

Special Instructions:

Include Criteria on Certificate of Analysis (Y/N)?

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required: Please provide advance notice for rush projects

Regular (Standard) TAT: ☒ (will be applied if Rush TAT is not specified): Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission) Date Required: Time Required: Rush Confirmation Number: (call lab for #)

#	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	Landfill Standards Sch 5 - GW Comp. List	Landfill Standard Sch 5 - SW Comp. List	# of Bottles	Comments
1		MW 1	May 8th 2019	2:53 PM	GW	✓	X			
2		MW 3	May 8th 2019	4:10 PM	GW	✓	X			
3		MW 4	May 8th 2019	2:05 Pm	GW	No	X			Slow Recovery, Sample bottle only one! sound unfiltered
4		MW 5	May 8th 2019	4:49 Pm	GW	✓	X			
5		MW 6	May 8th 2019	5:30 Pm	GW	✓	X			
6		~~—~~	~~—~~	~~—~~	~~GW~~		~~X~~			
7		SW 1	May 8th 2019	6:10 PM	SW	only Mercury		X		Mercury Hg only field filtered bottle in SW
8										
9										
10										

09-May-19 14:08
Michelle Brescacin
B9C5103
KVG ENV-1415

RECEIVED TBay

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Laboratory Use Only
Kristof Karpiuk	19/05/09	14:09	MBrescacin Michelle Brescacin	2019/05/09	14:08		Time Sensitive; Temperature (°C) on Recei 2/0/1; Custody Seal Present Yes / Intact No N/A
			[illegible signature]	2019/05/10	1401		

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO MAXXAM'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.MAXXAM.CA/TERMS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT HTTP://MAXXAM.CA/WP-CONTENT/UPLOADS/ONTARIO-COC.PDF.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

White: Maxxam Yellow: Client

-1|0|1

Maxxam Analytics International Corporation o/a Maxxam Analytics

Your Project #: THB-00011119-HE
Site#: Nakina Landfill
Your C.O.C. #: 741910-01-01

Attention: Ahileas Mitsopoulos

exp Services Inc
Thunder Bay Branch
1142 Roland St
Thunder Bay, ON
CANADA P7B 5M4

Report Date: 2019/11/08
Report #: R5957478
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9U7640
Received: 2019/10/31, 11:40

Sample Matrix: Water
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Alkalinity	6	N/A	2019/11/02	CAM SOP-00448	SM 23 2320 B m
Biochemical Oxygen Demand (BOD)	1	2019/11/01	2019/11/06	CAM SOP-00427	SM 23 5210B m
Chloride by Automated Colourimetry	6	N/A	2019/11/05	CAM SOP-00463	SM 23 4500-Cl E m
Chemical Oxygen Demand	6	N/A	2019/11/05	CAM SOP-00416	SM 23 5220 D m
Conductivity	6	N/A	2019/11/02	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	5	N/A	2019/11/03	CAM SOP-00446	SM 23 5310 B m
Mercury in Water by CVAA	5	2019/11/04	2019/11/06	CAM SOP-00453	EPA 7470A m
Mercury in Water by CVAA	1	2019/11/05	2019/11/05	CAM SOP-00453	EPA 7470A m
Lab Filtered Metals by ICPMS	1	2019/11/02	2019/11/04	CAM SOP-00447	EPA 6020B m
Dissolved Metals by ICPMS	4	N/A	2019/11/05	CAM SOP-00447	EPA 6020B m
Total Metals Analysis by ICPMS	1	N/A	2019/11/06	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	3	N/A	2019/11/06		
Ion Balance (% Difference)	2	N/A	2019/11/07		
Total Ammonia-N	4	N/A	2019/11/05	CAM SOP-00441	USGS I-2522-90 m
Total Ammonia-N	2	N/A	2019/11/06	CAM SOP-00441	USGS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (2)	6	N/A	2019/11/07	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	6	2019/11/01	2019/11/02	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	3	N/A	2019/11/04	CAM SOP-00444	OMOE E3179 m
Phenols (4AAP)	3	N/A	2019/11/05	CAM SOP-00444	OMOE E3179 m
Sulphate by Automated Colourimetry	6	N/A	2019/11/05	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids	5	2019/11/02	2019/11/05	CAM SOP-00428	SM 23 2540C m
Total Dissolved Solids	1	2019/11/04	2019/11/05	CAM SOP-00428	SM 23 2540C m
Total Kjeldahl Nitrogen in Water	6	2019/11/04	2019/11/07	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	1	2019/11/04	2019/11/04	CAM SOP-00407	SM 23 4500 P B H m
Total Phosphorus (Colourimetric)	5	2019/11/05	2019/11/05	CAM SOP-00407	SM 23 4500 P B H m
Low Level Total Suspended Solids	1	2019/11/04	2019/11/05	CAM SOP-00428	SM 23 2540D m
Volatile Organic Compounds in Water	5	N/A	2019/11/06	CAM SOP-00226	EPA 8260C m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used

Your Project #: THB-00011119-HE
Site#: Nakina Landfill
Your C.O.C. #: 741910-01-01

Attention: Ahileas Mitsopoulos

exp Services Inc
Thunder Bay Branch
1142 Roland St
Thunder Bay, ON
CANADA P7B 5M4

Report Date: 2019/11/08
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CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9U7640
Received: 2019/10/31, 11:40

by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Michelle Huth, Project Manager Assistant
Email: Michelle.Huth@bvlabs.com
Phone# (807)344-4220

==========

This report has been generated and distributed using a secure automated process.
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BV Labs Job #: B9U7640
Report Date: 2019/11/08

exp Services Inc
Client Project #: THB-00011119-HE
Sampler Initials: CP

LANDFILL STANDARDS SCH 5 - GW COMP. LIST (WATER)

BV Labs ID		LES295			LES296			LES296		
Sampling Date		2019/10/28 11:30			2019/10/28 13:10			2019/10/28 13:10		
COC Number		741910-01-01			741910-01-01			741910-01-01		
	UNITS	**MW1**	**RDL**	**QC Batch**	**MW3**	**RDL**	**QC Batch**	**MW3 Lab-Dup**	**RDL**	**QC Batch**
Inorganics										
Total Ammonia-N	mg/L	0.29	0.050	6423037	0.053	0.050	6423037	<0.050	0.050	6423037
Total Chemical Oxygen Demand (COD)	mg/L	36	4.0	6422725	6.8	4.0	6422725			
Conductivity	umho/cm	1100	1.0	6420641	2300	1.0	6420727			
Total Dissolved Solids	mg/L	610	10	6421977	1150	10	6421977			
Total Kjeldahl Nitrogen (TKN)	mg/L	1.0	0.10	6422749	0.31	0.10	6422749			
Dissolved Organic Carbon	mg/L	6.5	0.50	6421519	2.1	0.50	6421519			
pH	pH	7.22		6420646	7.85		6420728			
Phenols-4AAP	mg/L	<0.0010	0.0010	6422303	<0.0010	0.0010	6422307			
Total Phosphorus	mg/L	0.33	0.020	6424961	0.075	0.020	6424961			
Dissolved Sulphate (SO4)	mg/L	<1.0	1.0	6420773	13	1.0	6420773			
Alkalinity (Total as CaCO3)	mg/L	600	1.0	6420639	270	1.0	6420722			
Dissolved Chloride (Cl-)	mg/L	5.7	1.0	6420769	540	6.0	6420769			
Nitrite (N)	mg/L	<0.010	0.010	6420662	<0.010	0.010	6420662			
Nitrate (N)	mg/L	0.16	0.10	6420662	0.60	0.10	6420662			
Metals										
Mercury (Hg)	mg/L	<0.0001	0.0001	6424887	<0.0001	0.0001	6422981			
Dissolved Arsenic (As)	ug/L	5.0	1.0	6421818	<1.0	1.0	6421818			
Dissolved Barium (Ba)	ug/L	57	2.0	6421818	58	2.0	6421818			
Dissolved Boron (B)	ug/L	65	10	6421818	13	10	6421818			
Dissolved Cadmium (Cd)	ug/L	0.12	0.10	6421818	<0.10	0.10	6421818			
Dissolved Calcium (Ca)	ug/L	220000	200	6421818	160000	200	6421818			
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	6421818	<5.0	5.0	6421818			
Dissolved Copper (Cu)	ug/L	2.7	1.0	6421818	1.3	1.0	6421818			
Dissolved Iron (Fe)	ug/L	7300	100	6421818	<100	100	6421818			
Dissolved Lead (Pb)	ug/L	<0.50	0.50	6421818	<0.50	0.50	6421818			
Dissolved Magnesium (Mg)	ug/L	13000	50	6421818	20000	50	6421818			
Dissolved Manganese (Mn)	ug/L	2800	2.0	6421818	<2.0	2.0	6421818			
Dissolved Potassium (K)	ug/L	3000	200	6421818	2200	200	6421818			
Dissolved Sodium (Na)	ug/L	3900	100	6421818	250000	100	6421818			
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	6421818	<5.0	5.0	6421818			
Volatile Organics										
Benzene	ug/L	<0.25	0.25	6422495	<0.10	0.10	6422495	<0.10	0.10	6422495
1,4-Dichlorobenzene	ug/L	<0.50	0.50	6422495	<0.20	0.20	6422495	<0.20	0.20	6422495
Methylene Chloride(Dichloromethane)	ug/L	<1.3	1.3	6422495	<0.50	0.50	6422495	<0.50	0.50	6422495

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

BV Labs Job #: B9U7640
Report Date: 2019/11/08

exp Services Inc
Client Project #: THB-00011119-HE
Sampler Initials: CP

LANDFILL STANDARDS SCH 5 - GW COMP. LIST (WATER)

BV Labs ID		LES295			LES296			LES296		
Sampling Date		2019/10/28 11:30			2019/10/28 13:10			2019/10/28 13:10		
COC Number		741910-01-01			741910-01-01			741910-01-01		
	UNITS	**MW1**	**RDL**	**QC Batch**	**MW3**	**RDL**	**QC Batch**	**MW3 Lab-Dup**	**RDL**	**QC Batch**
Toluene	ug/L	<0.50	0.50	6422495	<0.20	0.20	6422495	<0.20	0.20	6422495
Vinyl Chloride	ug/L	<0.50	0.50	6422495	<0.20	0.20	6422495	<0.20	0.20	6422495
Surrogate Recovery (%)										
4-Bromofluorobenzene	%	103		6422495	102		6422495	102		6422495
D4-1,2-Dichloroethane	%	112		6422495	111		6422495	110		6422495
D8-Toluene	%	96		6422495	96		6422495	97		6422495

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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BV Labs Job #: B9U7640
Report Date: 2019/11/08

exp Services Inc
Client Project #: THB-00011119-HE
Sampler Initials: CP

LANDFILL STANDARDS SCH 5 - GW COMP. LIST (WATER)

BV Labs ID		LES298	LES299			LES299		
Sampling Date		2019/10/28 12:15	2019/10/28 10:00			2019/10/28 10:00		
COC Number		741910-01-01	741910-01-01			741910-01-01		
	UNITS	**MW5**	**MW6**	**RDL**	**QC Batch**	**MW6 Lab-Dup**	**RDL**	**QC Batch**
Inorganics								
Total Ammonia-N	mg/L	<0.050	0.060	0.050	6423375			
Total Chemical Oxygen Demand (COD)	mg/L	35	31	4.0	6422725			
Conductivity	umho/cm	1600	1600	1.0	6420641	1600	1.0	6420641
Total Dissolved Solids	mg/L	990	935	10	6421977			
Total Kjeldahl Nitrogen (TKN)	mg/L	0.67	0.61	0.10	6422749			
Dissolved Organic Carbon	mg/L	12	12	0.50	6421519			
pH	pH	7.19	7.09		6420646	7.11		6420646
Phenols-4AAP	mg/L	0.0010	<0.0010	0.0010	6422307			
Total Phosphorus	mg/L	0.090	0.098	0.040	6424961			
Dissolved Sulphate (SO4)	mg/L	70	68	1.0	6421067			
Alkalinity (Total as CaCO3)	mg/L	780	780	1.0	6420639	770	1.0	6420639
Dissolved Chloride (Cl-)	mg/L	50	57	1.0	6421059			
Nitrite (N)	mg/L	<0.010	<0.010	0.010	6420674			
Nitrate (N)	mg/L	0.11	0.11	0.10	6420674			
Metals								
Mercury (Hg)	mg/L	<0.0001	<0.0001	0.0001	6422981			
Dissolved Arsenic (As)	ug/L	<1.0	<1.0	1.0	6421818			
Dissolved Barium (Ba)	ug/L	79	79	2.0	6421818			
Dissolved Boron (B)	ug/L	660	670	10	6421818			
Dissolved Cadmium (Cd)	ug/L	<0.10	<0.10	0.10	6421818			
Dissolved Calcium (Ca)	ug/L	260000	260000	200	6421818			
Dissolved Chromium (Cr)	ug/L	<5.0	<5.0	5.0	6421818			
Dissolved Copper (Cu)	ug/L	15	15	1.0	6421818			
Dissolved Iron (Fe)	ug/L	<100	<100	100	6421818			
Dissolved Lead (Pb)	ug/L	<0.50	<0.50	0.50	6421818			
Dissolved Magnesium (Mg)	ug/L	46000	46000	50	6421818			
Dissolved Manganese (Mn)	ug/L	1800	1800	2.0	6421818			
Dissolved Potassium (K)	ug/L	2800	2800	200	6421818			
Dissolved Sodium (Na)	ug/L	54000	54000	100	6421818			
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	5.0	6421818			
Volatile Organics								
Benzene	ug/L	1.0	1.2	0.50	6422495			
1,4-Dichlorobenzene	ug/L	<1.0	<1.0	1.0	6422495			
Methylene Chloride(Dichloromethane)	ug/L	<2.5	<2.5	2.5	6422495			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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BV Labs Job #: B9U7640
Report Date: 2019/11/08

exp Services Inc
Client Project #: THB-00011119-HE
Sampler Initials: CP

LANDFILL STANDARDS SCH 5 - GW COMP. LIST (WATER)

BV Labs ID		LES298	LES299			LES299		
Sampling Date		2019/10/28 12:15	2019/10/28 10:00			2019/10/28 10:00		
COC Number		741910-01-01	741910-01-01			741910-01-01		
	UNITS	**MW5**	**MW6**	**RDL**	**QC Batch**	**MW6 Lab-Dup**	**RDL**	**QC Batch**
Toluene	ug/L	<1.0	<1.0	1.0	6422495			
Vinyl Chloride	ug/L	4.4	4.8	1.0	6422495			
Surrogate Recovery (%)								
4-Bromofluorobenzene	%	101	102		6422495			
D4-1,2-Dichloroethane	%	109	109		6422495			
D8-Toluene	%	98	98		6422495			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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LANDFILL SCH 5 - GW COMP. (LAB FILTERED)

BV Labs ID		LES297		
Sampling Date		2019/10/28 10:45		
COC Number		741910-01-01		
	UNITS	**MW4**	**RDL**	**QC Batch**
Inorganics				
Total Ammonia-N	mg/L	<0.050	0.050	6423037
Total Chemical Oxygen Demand (COD)	mg/L	8.2	4.0	6422725
Conductivity	umho/cm	340	1.0	6420641
Total Dissolved Solids	mg/L	190	10	6421901
Total Kjeldahl Nitrogen (TKN)	mg/L	0.24	0.10	6422749
Dissolved Organic Carbon	mg/L	2.5	0.50	6421519
pH	pH	8.03		6420646
Phenols-4AAP	mg/L	<0.0010	0.0010	6422307
Total Phosphorus	mg/L	0.70	0.040	6424961
Dissolved Sulphate (SO4)	mg/L	2.8	1.0	6421067
Alkalinity (Total as CaCO3)	mg/L	180	1.0	6420639
Dissolved Chloride (Cl-)	mg/L	1.3	1.0	6421059
Nitrite (N)	mg/L	<0.010	0.010	6420674
Nitrate (N)	mg/L	<0.10	0.10	6420674
Metals				
Dissolved Arsenic (As)	ug/L	<1.0	1.0	6418578
Dissolved Barium (Ba)	ug/L	12	2.0	6418578
Dissolved Boron (B)	ug/L	<10	10	6418578
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	6418578
Dissolved Calcium (Ca)	ug/L	59000	200	6418578
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	6418578
Dissolved Copper (Cu)	ug/L	1.2	1.0	6418578
Dissolved Iron (Fe)	ug/L	<100	100	6418578
Dissolved Lead (Pb)	ug/L	<0.50	0.50	6418578
Dissolved Magnesium (Mg)	ug/L	8700	50	6418578
Dissolved Manganese (Mn)	ug/L	<2.0	2.0	6418578
Dissolved Potassium (K)	ug/L	1100	200	6418578
Dissolved Sodium (Na)	ug/L	2500	100	6418578
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	6418578
Mercury (Hg)	mg/L	<0.0001	0.0001	6422981
Volatile Organics				
Benzene	ug/L	<0.10	0.10	6422495
1,4-Dichlorobenzene	ug/L	<0.20	0.20	6422495
Methylene Chloride(Dichloromethane)	ug/L	<0.50	0.50	6422495
Toluene	ug/L	<0.20	0.20	6422495

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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LANDFILL SCH 5 - GW COMP. (LAB FILTERED)

BV Labs ID		LES297		
Sampling Date		2019/10/28 10:45		
COC Number		741910-01-01		
	UNITS	**MW4**	**RDL**	**QC Batch**
Vinyl Chloride	ug/L	<0.20	0.20	6422495
Surrogate Recovery (%)				
4-Bromofluorobenzene	%	104		6422495
D4-1,2-Dichloroethane	%	111		6422495
D8-Toluene	%	98		6422495

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

LANDFILL STANDARDS SCH 5 - SW COMP. LIST (WATER)

BV Labs ID		LES300			LES300		
Sampling Date		2019/10/28 12:00			2019/10/28 12:00		
COC Number		741910-01-01			741910-01-01		
	UNITS	**SW1**	**RDL**	**QC Batch**	**SW1 Lab-Dup**	**RDL**	**QC Batch**
Inorganics							
Total Ammonia-N	mg/L	0.065	0.050	6423037			
Total BOD	mg/L	<2	2	6419461			
Total Chemical Oxygen Demand (COD)	mg/L	26	4.0	6422725	24	4.0	6422725
Conductivity	umho/cm	210	1.0	6420641			
Total Dissolved Solids	mg/L	125	10	6420520			
Total Kjeldahl Nitrogen (TKN)	mg/L	0.60	0.10	6422749			
pH	pH	7.97		6420646			
Phenols-4AAP	mg/L	<0.0010	0.0010	6422307			
Total Phosphorus	mg/L	0.008	0.004	6422637			
Total Suspended Solids	mg/L	1	1	6422683			
Dissolved Sulphate (SO4)	mg/L	8.4	1.0	6420773			
Alkalinity (Total as CaCO3)	mg/L	97	1.0	6420639			
Dissolved Chloride (Cl-)	mg/L	3.7	1.0	6420769			
Nitrite (N)	mg/L	<0.010	0.010	6420662			
Nitrate (N)	mg/L	<0.10	0.10	6420662			
Metals							
Mercury (Hg)	mg/L	<0.0001	0.0001	6422981			
Total Arsenic (As)	ug/L	<1.0	1.0	6424640			
Total Barium (Ba)	ug/L	9.6	2.0	6424640			
Total Boron (B)	ug/L	36	10	6424640			
Total Cadmium (Cd)	ug/L	<0.10	0.10	6424640			
Total Chromium (Cr)	ug/L	<5.0	5.0	6424640			
Total Copper (Cu)	ug/L	<1.0	1.0	6424640			
Total Iron (Fe)	ug/L	<100	100	6424640			
Total Lead (Pb)	ug/L	<0.50	0.50	6424640			
Total Zinc (Zn)	ug/L	<5.0	5.0	6424640			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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BV Labs Job #: B9U7640
Report Date: 2019/11/08

exp Services Inc
Client Project #: THB-00011119-HE
Sampler Initials: CP

RESULTS OF ANALYSES OF WATER

BV Labs ID		LES295	LES296	LES297	LES298	LES299	
Sampling Date		2019/10/28 11:30	2019/10/28 13:10	2019/10/28 10:45	2019/10/28 12:15	2019/10/28 10:00	
COC Number		741910-01-01	741910-01-01	741910-01-01	741910-01-01	741910-01-01	
	UNITS	**MW1**	**MW3**	**MW4**	**MW5**	**MW6**	**QC Batch**
Calculated Parameters							
Ion Balance (% Difference)	%	2.58	0.940	1.11	2.01	1.63	6419734
QC Batch = Quality Control Batch							

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TEST SUMMARY

BV Labs ID: LES295
Sample ID: MW1
Matrix: Water

Collected: 2019/10/28
Shipped:
Received: 2019/10/31

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	6420639	N/A	2019/11/02	Yogesh Patel
Chloride by Automated Colourimetry	KONE	6420769	N/A	2019/11/05	Deonarine Ramnarine
Chemical Oxygen Demand	SPEC	6422725	N/A	2019/11/05	Viorica Rotaru
Conductivity	AT	6420641	N/A	2019/11/02	Yogesh Patel
Dissolved Organic Carbon (DOC)	TOCV/NDIR	6421519	N/A	2019/11/03	Nimarta Singh
Mercury in Water by CVAA	CV/AA	6424887	2019/11/05	2019/11/05	Medhat Nasr
Dissolved Metals by ICPMS	ICP/MS	6421818	N/A	2019/11/05	Prempal Bhatti
Ion Balance (% Difference)	CALC	6419734	N/A	2019/11/07	Automated Statchk
Total Ammonia-N	LACH/NH4	6423037	N/A	2019/11/05	Mazin Wakai
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	6420662	N/A	2019/11/07	Chandra Nandlal
pH	AT	6420646	2019/11/01	2019/11/02	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	6422303	N/A	2019/11/05	Bramdeo Motiram
Sulphate by Automated Colourimetry	KONE	6420773	N/A	2019/11/05	Deonarine Ramnarine
Total Dissolved Solids	BAL	6421977	2019/11/02	2019/11/05	Shivani Desai
Total Kjeldahl Nitrogen in Water	SKAL	6422749	2019/11/04	2019/11/07	Rajni Tyagi
Total Phosphorus (Colourimetric)	LACH/P	6424961	2019/11/05	2019/11/05	Shivani Shivani
Volatile Organic Compounds in Water	P&T/MS	6422495	N/A	2019/11/06	Ancheol Jeong

BV Labs ID: LES296
Sample ID: MW3
Matrix: Water

Collected: 2019/10/28
Shipped:
Received: 2019/10/31

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	6420722	N/A	2019/11/02	Yogesh Patel
Chloride by Automated Colourimetry	KONE	6420769	N/A	2019/11/05	Deonarine Ramnarine
Chemical Oxygen Demand	SPEC	6422725	N/A	2019/11/05	Viorica Rotaru
Conductivity	AT	6420727	N/A	2019/11/02	Yogesh Patel
Dissolved Organic Carbon (DOC)	TOCV/NDIR	6421519	N/A	2019/11/03	Nimarta Singh
Mercury in Water by CVAA	CV/AA	6422981	2019/11/04	2019/11/06	Medhat Nasr
Dissolved Metals by ICPMS	ICP/MS	6421818	N/A	2019/11/05	Prempal Bhatti
Ion Balance (% Difference)	CALC	6419734	N/A	2019/11/07	Automated Statchk
Total Ammonia-N	LACH/NH4	6423037	N/A	2019/11/05	Mazin Wakai
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	6420662	N/A	2019/11/07	Chandra Nandlal
pH	AT	6420728	2019/11/01	2019/11/02	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	6422307	N/A	2019/11/05	Bramdeo Motiram
Sulphate by Automated Colourimetry	KONE	6420773	N/A	2019/11/05	Deonarine Ramnarine
Total Dissolved Solids	BAL	6421977	2019/11/02	2019/11/05	Shivani Desai
Total Kjeldahl Nitrogen in Water	SKAL	6422749	2019/11/04	2019/11/07	Rajni Tyagi
Total Phosphorus (Colourimetric)	LACH/P	6424961	2019/11/05	2019/11/05	Shivani Shivani
Volatile Organic Compounds in Water	P&T/MS	6422495	N/A	2019/11/06	Ancheol Jeong

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TEST SUMMARY

BV Labs ID: LES296 Dup
Sample ID: MW3
Matrix: Water

Collected: 2019/10/28
Shipped:
Received: 2019/10/31

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Ammonia-N	LACH/NH4	6423037	N/A	2019/11/05	Mazin Wakai
Volatile Organic Compounds in Water	P&T/MS	6422495	N/A	2019/11/06	Ancheol Jeong

BV Labs ID: LES297
Sample ID: MW4
Matrix: Water

Collected: 2019/10/28
Shipped:
Received: 2019/10/31

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	6420639	N/A	2019/11/02	Yogesh Patel
Chloride by Automated Colourimetry	KONE	6421059	N/A	2019/11/05	Deonarine Ramnarine
Chemical Oxygen Demand	SPEC	6422725	N/A	2019/11/05	Viorica Rotaru
Conductivity	AT	6420641	N/A	2019/11/02	Yogesh Patel
Dissolved Organic Carbon (DOC)	TOCV/NDIR	6421519	N/A	2019/11/03	Nimarta Singh
Mercury in Water by CVAA	CV/AA	6422981	2019/11/04	2019/11/06	Medhat Nasr
Lab Filtered Metals by ICPMS	ICP/MS	6418578	2019/11/02	2019/11/04	Arefa Dabhad
Ion Balance (% Difference)	CALC	6419734	N/A	2019/11/06	Automated Statchk
Total Ammonia-N	LACH/NH4	6423037	N/A	2019/11/05	Mazin Wakai
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	6420674	N/A	2019/11/07	Chandra Nandlal
pH	AT	6420646	2019/11/01	2019/11/02	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	6422307	N/A	2019/11/05	Bramdeo Motiram
Sulphate by Automated Colourimetry	KONE	6421067	N/A	2019/11/05	Deonarine Ramnarine
Total Dissolved Solids	BAL	6421901	2019/11/02	2019/11/05	Xinyue (Sarah) Hou
Total Kjeldahl Nitrogen in Water	SKAL	6422749	2019/11/04	2019/11/07	Rajni Tyagi
Total Phosphorus (Colourimetric)	LACH/P	6424961	2019/11/05	2019/11/05	Shivani Shivani
Volatile Organic Compounds in Water	P&T/MS	6422495	N/A	2019/11/06	Ancheol Jeong

BV Labs ID: LES298
Sample ID: MW5
Matrix: Water

Collected: 2019/10/28
Shipped:
Received: 2019/10/31

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	6420639	N/A	2019/11/02	Yogesh Patel
Chloride by Automated Colourimetry	KONE	6421059	N/A	2019/11/05	Deonarine Ramnarine
Chemical Oxygen Demand	SPEC	6422725	N/A	2019/11/05	Viorica Rotaru
Conductivity	AT	6420641	N/A	2019/11/02	Yogesh Patel
Dissolved Organic Carbon (DOC)	TOCV/NDIR	6421519	N/A	2019/11/03	Nimarta Singh
Mercury in Water by CVAA	CV/AA	6422981	2019/11/04	2019/11/06	Medhat Nasr
Dissolved Metals by ICPMS	ICP/MS	6421818	N/A	2019/11/05	Prempal Bhatti
Ion Balance (% Difference)	CALC	6419734	N/A	2019/11/06	Automated Statchk
Total Ammonia-N	LACH/NH4	6423375	N/A	2019/11/06	Mazin Wakai
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	6420674	N/A	2019/11/07	Chandra Nandlal
pH	AT	6420646	2019/11/01	2019/11/02	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	6422307	N/A	2019/11/04	Bramdeo Motiram
Sulphate by Automated Colourimetry	KONE	6421067	N/A	2019/11/05	Deonarine Ramnarine
Total Dissolved Solids	BAL	6421977	2019/11/02	2019/11/05	Shivani Desai

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TEST SUMMARY

BV Labs ID: LES298
Sample ID: MW5
Matrix: Water

Collected: 2019/10/28
Shipped:
Received: 2019/10/31

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Kjeldahl Nitrogen in Water	SKAL	6422749	2019/11/04	2019/11/07	Rajni Tyagi
Total Phosphorus (Colourimetric)	LACH/P	6424961	2019/11/05	2019/11/05	Shivani Shivani
Volatile Organic Compounds in Water	P&T/MS	6422495	N/A	2019/11/06	Ancheol Jeong

BV Labs ID: LES299
Sample ID: MW6
Matrix: Water

Collected: 2019/10/28
Shipped:
Received: 2019/10/31

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	6420639	N/A	2019/11/02	Yogesh Patel
Chloride by Automated Colourimetry	KONE	6421059	N/A	2019/11/05	Deonarine Ramnarine
Chemical Oxygen Demand	SPEC	6422725	N/A	2019/11/05	Viorica Rotaru
Conductivity	AT	6420641	N/A	2019/11/02	Yogesh Patel
Dissolved Organic Carbon (DOC)	TOCV/NDIR	6421519	N/A	2019/11/03	Nimarta Singh
Mercury in Water by CVAA	CV/AA	6422981	2019/11/04	2019/11/06	Medhat Nasr
Dissolved Metals by ICPMS	ICP/MS	6421818	N/A	2019/11/05	Prempal Bhatti
Ion Balance (% Difference)	CALC	6419734	N/A	2019/11/06	Automated Statchk
Total Ammonia-N	LACH/NH4	6423375	N/A	2019/11/06	Mazin Wakai
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	6420674	N/A	2019/11/07	Chandra Nandlal
pH	AT	6420646	2019/11/01	2019/11/02	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	6422307	N/A	2019/11/04	Bramdeo Motiram
Sulphate by Automated Colourimetry	KONE	6421067	N/A	2019/11/05	Deonarine Ramnarine
Total Dissolved Solids	BAL	6421977	2019/11/02	2019/11/05	Shivani Desai
Total Kjeldahl Nitrogen in Water	SKAL	6422749	2019/11/04	2019/11/07	Rajni Tyagi
Total Phosphorus (Colourimetric)	LACH/P	6424961	2019/11/05	2019/11/05	Shivani Shivani
Volatile Organic Compounds in Water	P&T/MS	6422495	N/A	2019/11/06	Ancheol Jeong

BV Labs ID: LES299 Dup
Sample ID: MW6
Matrix: Water

Collected: 2019/10/28
Shipped:
Received: 2019/10/31

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	6420639	N/A	2019/11/02	Yogesh Patel
Conductivity	AT	6420641	N/A	2019/11/02	Yogesh Patel
pH	AT	6420646	2019/11/01	2019/11/02	Yogesh Patel

BV Labs ID: LES300
Sample ID: SW1
Matrix: Water

Collected: 2019/10/28
Shipped:
Received: 2019/10/31

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	6420639	N/A	2019/11/02	Yogesh Patel
Biochemical Oxygen Demand (BOD)	DO	6419461	2019/11/01	2019/11/06	Navjot Kaur Gill
Chloride by Automated Colourimetry	KONE	6420769	N/A	2019/11/05	Deonarine Ramnarine
Chemical Oxygen Demand	SPEC	6422725	N/A	2019/11/05	Viorica Rotaru

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BV Labs Job #: B9U7640
Report Date: 2019/11/08

exp Services Inc
Client Project #: THB-00011119-HE
Sampler Initials: CP

TEST SUMMARY

BV Labs ID: LES300
Sample ID: SW1
Matrix: Water

Collected: 2019/10/28
Shipped:
Received: 2019/10/31

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Conductivity	AT	6420641	N/A	2019/11/02	Yogesh Patel
Mercury in Water by CVAA	CV/AA	6422981	2019/11/04	2019/11/06	Medhat Nasr
Total Metals Analysis by ICPMS	ICP/MS	6424640	N/A	2019/11/06	Prempal Bhatti
Total Ammonia-N	LACH/NH4	6423037	N/A	2019/11/05	Mazin Wakai
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	6420662	N/A	2019/11/07	Chandra Nandlal
pH	AT	6420646	2019/11/01	2019/11/02	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	6422307	N/A	2019/11/04	Bramdeo Motiram
Sulphate by Automated Colourimetry	KONE	6420773	N/A	2019/11/05	Deonarine Ramnarine
Total Dissolved Solids	BAL	6420520	2019/11/04	2019/11/05	Xinyue (Sarah) Hou
Total Kjeldahl Nitrogen in Water	SKAL	6422749	2019/11/04	2019/11/07	Rajni Tyagi
Total Phosphorus (Colourimetric)	LACH/P	6422637	2019/11/04	2019/11/04	Shivani Shivani
Low Level Total Suspended Solids	BAL	6422683	2019/11/04	2019/11/05	Massarat Jan

BV Labs ID: LES300 Dup
Sample ID: SW1
Matrix: Water

Collected: 2019/10/28
Shipped:
Received: 2019/10/31

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chemical Oxygen Demand	SPEC	6422725	N/A	2019/11/05	Viorica Rotaru

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	-2.0°C
Package 2	-1.0°C
Package 3	0.0°C
Package 4	0.3°C
Package 5	-1.0°C
Package 6	-3.3°C
Package 7	-3.0°C
Package 8	-3.7°C
Package 9	-5.7°C
Package 10	-2.0°C

Sample LES295 [MW1] : VOC Water Analysis: Due to foaming, sample required dilution. The detection limits were adjusted accordingly.

Sample LES298 [MW5] : VOC Water Analysis: Due to foaming, sample required dilution. The detection limits were adjusted accordingly.

Sample LES299 [MW6] : VOC Water Analysis: Due to foaming, sample required dilution. The detection limits were adjusted accordingly.

Results relate only to the items tested.

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BV Labs Job #: B9U7640
Report Date: 2019/11/08

QUALITY ASSURANCE REPORT

exp Services Inc
Client Project #: THB-00011119-HE
Sampler Initials: CP

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
6422495	4-Bromofluorobenzene	2019/11/06	105	70 - 130	103	70 - 130	101	%				
6422495	D4-1,2-Dichloroethane	2019/11/06	106	70 - 130	106	70 - 130	106	%				
6422495	D8-Toluene	2019/11/06	98	70 - 130	98	70 - 130	97	%				
6418578	Dissolved Arsenic (As)	2019/11/04	100	80 - 120	101	80 - 120	<1.0	ug/L	NC	20		
6418578	Dissolved Barium (Ba)	2019/11/04	99	80 - 120	99	80 - 120	<2.0	ug/L	3.5	20		
6418578	Dissolved Boron (B)	2019/11/04	102	80 - 120	102	80 - 120	<10	ug/L	3.4	20		
6418578	Dissolved Cadmium (Cd)	2019/11/04	99	80 - 120	97	80 - 120	<0.10	ug/L	NC	20		
6418578	Dissolved Calcium (Ca)	2019/11/04	NC	80 - 120	102	80 - 120	<200	ug/L	0.88	20		
6418578	Dissolved Chromium (Cr)	2019/11/04	94	80 - 120	95	80 - 120	<5.0	ug/L	NC	20		
6418578	Dissolved Copper (Cu)	2019/11/04	101	80 - 120	100	80 - 120	<1.0	ug/L	0.58	20		
6418578	Dissolved Iron (Fe)	2019/11/04	98	80 - 120	98	80 - 120	<100	ug/L	NC	20		
6418578	Dissolved Lead (Pb)	2019/11/04	96	80 - 120	95	80 - 120	<0.50	ug/L	0.24	20		
6418578	Dissolved Magnesium (Mg)	2019/11/04	100	80 - 120	103	80 - 120	<50	ug/L	2.1	20		
6418578	Dissolved Manganese (Mn)	2019/11/04	98	80 - 120	98	80 - 120	<2.0	ug/L	NC	20		
6418578	Dissolved Potassium (K)	2019/11/04	104	80 - 120	106	80 - 120	<200	ug/L	1.8	20		
6418578	Dissolved Sodium (Na)	2019/11/04	99	80 - 120	102	80 - 120	<100	ug/L	1.2	20		
6418578	Dissolved Zinc (Zn)	2019/11/04	99	80 - 120	100	80 - 120	<5.0	ug/L	1.1	20		
6419461	Total BOD	2019/11/06					<2	mg/L	NC	30	101	80 - 120
6420520	Total Dissolved Solids	2019/11/05					<10	mg/L	1.4	25	98	90 - 110
6420639	Alkalinity (Total as CaCO3)	2019/11/02			95	85 - 115	<1.0	mg/L	0.35	20		
6420641	Conductivity	2019/11/02			100	85 - 115	<1.0	umho/cm	0.32	25		
6420646	pH	2019/11/02			102	98 - 103			0.26	N/A		
6420662	Nitrate (N)	2019/11/07	101	80 - 120	102	80 - 120	<0.10	mg/L	NC	20		
6420662	Nitrite (N)	2019/11/07	106	80 - 120	104	80 - 120	<0.010	mg/L	NC	20		
6420674	Nitrate (N)	2019/11/07	99	80 - 120	100	80 - 120	<0.10	mg/L	NC	20		
6420674	Nitrite (N)	2019/11/07	104	80 - 120	103	80 - 120	<0.010	mg/L	NC	20		
6420722	Alkalinity (Total as CaCO3)	2019/11/02			96	85 - 115	<1.0	mg/L	0.28	20		
6420727	Conductivity	2019/11/02			100	85 - 115	<1.0	umho/cm	0.38	25		
6420728	pH	2019/11/02			102	98 - 103			0.31	N/A		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
6420769	Dissolved Chloride (Cl-)	2019/11/05	120	80 - 120	102	80 - 120	<1.0	mg/L	5.9	20		
6420773	Dissolved Sulphate (SO4)	2019/11/05	84	75 - 125	106	80 - 120	<1.0	mg/L	NC	20		
6421059	Dissolved Chloride (Cl-)	2019/11/05	NC	80 - 120	102	80 - 120	<1.0	mg/L	1.0	20		
6421067	Dissolved Sulphate (SO4)	2019/11/05	NC	75 - 125	104	80 - 120	<1.0	mg/L	2.0	20		
6421519	Dissolved Organic Carbon	2019/11/02	95	80 - 120	96	80 - 120	<0.50	mg/L	13	20		
6421818	Dissolved Arsenic (As)	2019/11/05	98	80 - 120	99	80 - 120	<1.0	ug/L	2.1	20		
6421818	Dissolved Barium (Ba)	2019/11/05	97	80 - 120	94	80 - 120	<2.0	ug/L				
6421818	Dissolved Boron (B)	2019/11/05	94	80 - 120	93	80 - 120	<10	ug/L				
6421818	Dissolved Cadmium (Cd)	2019/11/05	98	80 - 120	98	80 - 120	<0.10	ug/L				
6421818	Dissolved Calcium (Ca)	2019/11/05	NC	80 - 120	101	80 - 120	<200	ug/L				
6421818	Dissolved Chromium (Cr)	2019/11/05	98	80 - 120	99	80 - 120	<5.0	ug/L				
6421818	Dissolved Copper (Cu)	2019/11/05	102	80 - 120	101	80 - 120	<1.0	ug/L				
6421818	Dissolved Iron (Fe)	2019/11/05	98	80 - 120	100	80 - 120	<100	ug/L				
6421818	Dissolved Lead (Pb)	2019/11/05	96	80 - 120	96	80 - 120	<0.50	ug/L				
6421818	Dissolved Magnesium (Mg)	2019/11/05	97	80 - 120	100	80 - 120	<50	ug/L				
6421818	Dissolved Manganese (Mn)	2019/11/05	94	80 - 120	96	80 - 120	<2.0	ug/L				
6421818	Dissolved Potassium (K)	2019/11/05	99	80 - 120	100	80 - 120	<200	ug/L				
6421818	Dissolved Sodium (Na)	2019/11/05	96	80 - 120	104	80 - 120	100, RDL=100	ug/L				
6421818	Dissolved Zinc (Zn)	2019/11/05	97	80 - 120	98	80 - 120	<5.0	ug/L				
6421901	Total Dissolved Solids	2019/11/05					<10	mg/L	2.7	25	102	90 - 110
6421977	Total Dissolved Solids	2019/11/05					<10	mg/L	8.9	25	98	90 - 110
6422303	Phenols-4AAP	2019/11/05	101	80 - 120	100	80 - 120	<0.0010	mg/L	NC	20		
6422307	Phenols-4AAP	2019/11/04	97	80 - 120	97	80 - 120	<0.0010	mg/L	8.7	20		
6422495	1,4-Dichlorobenzene	2019/11/06	94	70 - 130	95	70 - 130	<0.20	ug/L	NC	30		
6422495	Benzene	2019/11/06	95	70 - 130	93	70 - 130	<0.10	ug/L	NC	30		
6422495	Methylene Chloride(Dichloromethane)	2019/11/06	95	70 - 130	95	70 - 130	<0.50	ug/L	NC	30		
6422495	Toluene	2019/11/06	93	70 - 130	92	70 - 130	<0.20	ug/L	NC	30		
6422495	Vinyl Chloride	2019/11/06	91	70 - 130	89	70 - 130	<0.20	ug/L	NC	30		
6422637	Total Phosphorus	2019/11/04	86	80 - 120	90	80 - 120	<0.004	mg/L	NC	20	88	80 - 120
6422683	Total Suspended Solids	2019/11/05					<1	mg/L	NC	25	100	85 - 115
6422725	Total Chemical Oxygen Demand (COD)	2019/11/05	94	80 - 120	104	80 - 120	<4.0	mg/L	8.2	20		

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
6422749	Total Kjeldahl Nitrogen (TKN)	2019/11/07	102	80 - 120	102	80 - 120	<0.10	mg/L	4.5	20	101	80 - 120
6422981	Mercury (Hg)	2019/11/06	90	75 - 125	94	80 - 120	<0.0001	mg/L	NC	20		
6423037	Total Ammonia-N	2019/11/05	102	75 - 125	101	80 - 120	<0.050	mg/L	6.2	20		
6423375	Total Ammonia-N	2019/11/06	96	75 - 125	102	80 - 120	<0.050	mg/L	NC	20		
6424640	Total Arsenic (As)	2019/11/06	99	80 - 120	98	80 - 120	<1.0	ug/L				
6424640	Total Barium (Ba)	2019/11/06	99	80 - 120	96	80 - 120	<2.0	ug/L				
6424640	Total Boron (B)	2019/11/06	89	80 - 120	87	80 - 120	<10	ug/L				
6424640	Total Cadmium (Cd)	2019/11/06	97	80 - 120	95	80 - 120	<0.10	ug/L	NC	20		
6424640	Total Chromium (Cr)	2019/11/06	96	80 - 120	97	80 - 120	<5.0	ug/L	7.7	20		
6424640	Total Copper (Cu)	2019/11/06	109	80 - 120	102	80 - 120	<1.0	ug/L	16	20		
6424640	Total Iron (Fe)	2019/11/06	98	80 - 120	98	80 - 120	<100	ug/L	7.3	20		
6424640	Total Lead (Pb)	2019/11/06	96	80 - 120	95	80 - 120	<0.50	ug/L	4.8	20		
6424640	Total Zinc (Zn)	2019/11/06	98	80 - 120	99	80 - 120	<5.0	ug/L	4.1	20		
6424887	Mercury (Hg)	2019/11/05	94	75 - 125	91	80 - 120	<0.0001	mg/L	NC	20		
6424961	Total Phosphorus	2019/11/06	93	80 - 120	96	80 - 120	<0.020	mg/L	NC	20	95	80 - 120

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

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

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

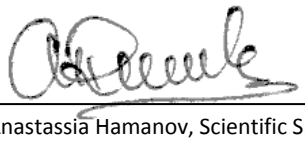
NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Anastassia Hamanov, Scientific Specialist

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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BOD/HT

BUREAU VERITAS

Bu… 67… 817-5700 Toll-free 800-563-6266 Fax (905) 817-5777 www.bvlabs.com

31-Oct-19 11:40
Michelle Huth
B9U7640
FJE ENV-680

Page 1 of 1

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:	
Company Name:	#17501 exp Services Inc	Company Name:	EXP Services Inc.	Quotation #:	B90555
Attention:	accounts payable	Attention:	Ahileas Mitsopoulos	P.O. #:	
Address:	1142 Roland St	Address:	please c/c connor.porter@exp.com	Project:	THB-00011119-HE
	Thunder Bay ON P7B 5M4		Kristof.Karpiuk@exp.com	Project Name:	
Tel:	(807) 623-9495 Fax: (807) 623-8070	Tel:	Fax:	Site #:	Nakina Landfill
Email:	thunderbay@exp.com; Karen.Burke@exp.com;AP@ex	Email:	ahileas.mitsopoulos@exp.com, Kristof.Karpiuk@exp.co	Sampled By:	Conner Porter + Kristof Karpiuk

Lab Use Only:
Bottle Order #: 741910
COC #: C#741910-01-01
Project Manager: Michelle Huth

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BV LABS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)
- [ ] Table 1 [ ] Res/Park [ ] Medium/Fine
- [ ] Table 2 [ ] Ind/Comm [ ] Coarse
- [ ] Table 3 [ ] Agri/Other [ ] For RSC
- [ ] Table ___

Other Regulations
- [ ] CCME [ ] Sanitary Sewer Bylaw
- [ ] Reg 558 [ ] Storm Sewer Bylaw
- [ ] MISA Municipality ______
- [x] PWQO
- [x] Other ODWS

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ______

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: [x]
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ______ Time Required: ______ [ ]
Rush Confirmation Number: ______ *(call lab for #)*

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): (Metals) / (Hg) / Cr VI	Landfill Standards Sch 5 - GW Comp. List	Landfill Standard Sch 5 - SW Comp List	# of Bottles	Comments
1		MW 1	10/28/19	11:30am	GW	X	X		11	
2		MW 3	10/28/19	1:10pm	GW	X	X		11	
3		MW 4 *	10/28/19	10:45am	GW		X		11	Mercury + Metals must be Lab Filtered
4		MW 5	10/28/19	12:15pm	GW	X	X		11	
5		MW 6	10/28/19	10:00am	GW		X		11	
6					GW		X			
7		SW 1	10/28/19	12:00pm	SW	X		X	8	~~Dissolved metals~~ mercury only Field filtered
8										
9										
10	*MW 4 was not field filtered due to insufficient water + slow recovery (dissolved metals + dissolved mercury)									

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Conner Porter CONNOR PORTER	19/10/31	11:40	MHuth Michelle Huth	2019/10/31	11:40	
			[illegible]	2019/11/01	11:45	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Receipt	Custody Seal	Yes	No
	No ACTR	Present		✓
		Intact		N/A

RECEIVED TBay

1, 0, 1
0, 0, 0

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

White: BV Labs Yellow: Client

Your Project #: THB-00011119-IE
Site#: Nakina Landfill
Your C.O.C. #: 770952-01-01

Attention: Ahileas Mitsopoulos

exp Services Inc
Thunder Bay Branch
1142 Roland St
Thunder Bay, ON
CANADA P7B 5M4

Report Date: 2020/05/26
Report #: R6186731
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0B9178
Received: 2020/05/14, 15:05

Sample Matrix: Ground Water
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	1	N/A	2020/05/20	CAM SOP-00448	SM 23 2320 B m
Alkalinity	3	N/A	2020/05/21	CAM SOP-00448	SM 23 2320 B m
Alkalinity	1	N/A	2020/05/22	CAM SOP-00448	SM 23 2320 B m
Chloride by Automated Colourimetry	3	N/A	2020/05/20	CAM SOP-00463	SM 23 4500-Cl E m
Chloride by Automated Colourimetry	2	N/A	2020/05/21	CAM SOP-00463	SM 23 4500-Cl E m
Chemical Oxygen Demand	5	N/A	2020/05/25	CAM SOP-00416	SM 23 5220 D m
Conductivity	1	N/A	2020/05/20	CAM SOP-00414	SM 23 2510 m
Conductivity	3	N/A	2020/05/21	CAM SOP-00414	SM 23 2510 m
Conductivity	1	N/A	2020/05/22	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	5	N/A	2020/05/21	CAM SOP-00446	SM 23 5310 B m
Mercury in Water by CVAA	4	2020/05/21	2020/05/21	CAM SOP-00453	EPA 7470A m
Mercury in Water by CVAA	1	2020/05/22	2020/05/22	CAM SOP-00453	EPA 7470A m
Dissolved Metals by ICPMS	1	N/A	2020/05/21	CAM SOP-00447	EPA 6020B m
Dissolved Metals by ICPMS	4	N/A	2020/05/22	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	1	N/A	2020/05/22		
Ion Balance (% Difference)	4	N/A	2020/05/25		
Total Ammonia-N	1	N/A	2020/05/21	CAM SOP-00441	USGS I-2522-90 m
Total Ammonia-N	4	N/A	2020/05/25	CAM SOP-00441	USGS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (2)	1	N/A	2020/05/20	CAM SOP-00440	SM 23 4500-NO3I/NO2B
Nitrate (NO3) and Nitrite (NO2) in Water (2)	4	N/A	2020/05/21	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	1	2020/05/19	2020/05/20	CAM SOP-00413	SM 4500H+ B m
pH	3	2020/05/19	2020/05/21	CAM SOP-00413	SM 4500H+ B m
pH	1	2020/05/21	2020/05/22	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	5	N/A	2020/05/20	CAM SOP-00444	OMOE E3179 m
Sulphate by Automated Colourimetry	3	N/A	2020/05/20	CAM SOP-00464	EPA 375.4 m
Sulphate by Automated Colourimetry	2	N/A	2020/05/21	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids	4	2020/05/20	2020/05/21	CAM SOP-00428	SM 23 2540C m
Total Dissolved Solids	1	2020/05/21	2020/05/22	CAM SOP-00428	SM 23 2540C m
Total Kjeldahl Nitrogen in Water	4	2020/05/22	2020/05/22	CAM SOP-00938	OMOE E3516 m
Total Kjeldahl Nitrogen in Water	1	2020/05/22	2020/05/25	CAM SOP-00938	OMOE E3516 m

Your Project #: THB-00011119-IE
Site#: Nakina Landfill
Your C.O.C. #: 770952-01-01

Attention: Ahileas Mitsopoulos

exp Services Inc
Thunder Bay Branch
1142 Roland St
Thunder Bay, ON
CANADA P7B 5M4

Report Date: 2020/05/26
Report #: R6186731
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0B9178
Received: 2020/05/14, 15:05

Sample Matrix: Ground Water
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Total Phosphorus (Colourimetric)	5	2020/05/25	2020/05/26	CAM SOP-00407	SM 23 4500 P B H m
Volatile Organic Compounds in Water	5	N/A	2020/05/20	CAM SOP-00226	EPA 8260C m

Sample Matrix: Surface Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	1	N/A	2020/05/21	CAM SOP-00448	SM 23 2320 B m
Biochemical Oxygen Demand (BOD)	1	2020/05/19	2020/05/24	CAM SOP-00427	SM 23 5210B m
Chloride by Automated Colourimetry	1	N/A	2020/05/22	CAM SOP-00463	SM 23 4500-Cl E m
Chemical Oxygen Demand	1	N/A	2020/05/25	CAM SOP-00416	SM 23 5220 D m
Conductivity	1	N/A	2020/05/21	CAM SOP-00414	SM 23 2510 m
Mercury in Water by CVAA	1	2020/05/20	2020/05/20	CAM SOP-00453	EPA 7470A m
Total Metals Analysis by ICPMS	1	N/A	2020/05/23	CAM SOP-00447	EPA 6020B m
Total Ammonia-N	1	N/A	2020/05/25	CAM SOP-00441	USGS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (2)	1	N/A	2020/05/22	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	1	2020/05/20	2020/05/21	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	1	N/A	2020/05/20	CAM SOP-00444	OMOE E3179 m
Sulphate by Automated Colourimetry	1	N/A	2020/05/22	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids	1	2020/05/21	2020/05/22	CAM SOP-00428	SM 23 2540C m
Total Kjeldahl Nitrogen in Water	1	2020/05/22	2020/05/22	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	1	2020/05/25	2020/05/25	CAM SOP-00407	SM 23 4500 P B H m
Low Level Total Suspended Solids	1	2020/05/21	2020/05/22	CAM SOP-00428	SM 23 2540D m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been

Your Project #: THB-00011119-IE
Site#: Nakina Landfill
Your C.O.C. #: 770952-01-01

Attention: Ahileas Mitsopoulos

exp Services Inc
Thunder Bay Branch
1142 Roland St
Thunder Bay, ON
CANADA P7B 5M4

Report Date: 2020/05/26
Report #: R6186731
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0B9178
Received: 2020/05/14, 15:05

accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Julie Clement, Technical Account Manager
Email: Julie.CLEMENT@bvlabs.com
Phone# (613)868-6079

==========

This report has been generated and distributed using a secure automated process.
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LANDFILL STANDARDS SCH 5 - GW COMP. LIST (GROUND WATER)

BV Labs ID		MQI728			MQI729		
Sampling Date		2020/05/13 15:45			2020/05/13 13:15		
COC Number		770952-01-01			770952-01-01		
	UNITS	**MW1**	**RDL**	**QC Batch**	**MW3**	**RDL**	**QC Batch**
Inorganics							
Total Ammonia-N	mg/L	0.46	0.050	6746375	<0.050	0.050	6746375
Total Chemical Oxygen Demand (COD)	mg/L	94	4.0	6738454	18	4.0	6738454
Conductivity	umho/cm	1100	1.0	6730817	2000	1.0	6730625
Total Dissolved Solids	mg/L	590	10	6732144	1020	10	6732144
Total Kjeldahl Nitrogen (TKN)	mg/L	2.7	0.50	6738282	0.24	0.10	6738282
Dissolved Organic Carbon	mg/L	6.8	0.40	6734379	2.0	0.40	6734379
pH	pH	7.46		6730819	7.97		6730626
Phenols-4AAP	mg/L	0.0010	0.0010	6729834	<0.0010	0.0010	6729828
Total Phosphorus	mg/L	0.041	0.020	6746148	0.077	0.020	6746148
Dissolved Sulphate (SO4)	mg/L	<1.0	1.0	6730006	12	1.0	6730006
Alkalinity (Total as CaCO3)	mg/L	600	1.0	6730814	290	1.0	6730624
Dissolved Chloride (Cl-)	mg/L	7.4	1.0	6730002	450	5.0	6730002
Nitrite (N)	mg/L	<0.010	0.010	6730602	<0.010	0.010	6730602
Nitrate (N)	mg/L	2.95	0.10	6730602	0.41	0.10	6730602
Metals							
Mercury (Hg)	mg/L	<0.00010	0.00010	6737389	<0.00010	0.00010	6734079
Dissolved Arsenic (As)	ug/L	1.4	1.0	6730422	<1.0	1.0	6731725
Dissolved Barium (Ba)	ug/L	55	2.0	6730422	47	2.0	6731725
Dissolved Boron (B)	ug/L	38	10	6730422	<10	10	6731725
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	6730422	<0.10	0.10	6731725
Dissolved Calcium (Ca)	ug/L	220000	200	6730422	130000	200	6731725
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	6730422	<5.0	5.0	6731725
Dissolved Copper (Cu)	ug/L	7.1	1.0	6730422	1.3	1.0	6731725
Dissolved Iron (Fe)	ug/L	1300	100	6730422	<100	100	6731725
Dissolved Lead (Pb)	ug/L	<0.50	0.50	6730422	<0.50	0.50	6731725
Dissolved Magnesium (Mg)	ug/L	13000	50	6730422	16000	50	6731725
Dissolved Manganese (Mn)	ug/L	1200	2.0	6730422	<2.0	2.0	6731725
Dissolved Potassium (K)	ug/L	2900	200	6730422	2100	200	6731725
Dissolved Sodium (Na)	ug/L	2000	100	6730422	240000	100	6731725
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	6730422	<5.0	5.0	6731725
Volatile Organics							
Benzene	ug/L	<1.0	1.0	6728887	<0.10	0.10	6728887
1,4-Dichlorobenzene	ug/L	<2.0	2.0	6728887	<0.20	0.20	6728887
Methylene Chloride(Dichloromethane)	ug/L	<5.0	5.0	6728887	<0.50	0.50	6728887
Toluene	ug/L	<2.0	2.0	6728887	<0.20	0.20	6728887

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

BV Labs Job #: C0B9178
Report Date: 2020/05/26

exp Services Inc
Client Project #: THB-00011119-IE
Sampler Initials: EF

LANDFILL STANDARDS SCH 5 - GW COMP. LIST (GROUND WATER)

BV Labs ID		MQI728			MQI729		
Sampling Date		2020/05/13 15:45			2020/05/13 13:15		
COC Number		770952-01-01			770952-01-01		
	UNITS	**MW1**	**RDL**	**QC Batch**	**MW3**	**RDL**	**QC Batch**
Vinyl Chloride	ug/L	<2.0	2.0	6728887	<0.20	0.20	6728887
Surrogate Recovery (%)							
4-Bromofluorobenzene	%	101		6728887	101		6728887
D4-1,2-Dichloroethane	%	95		6728887	97		6728887
D8-Toluene	%	91		6728887	94		6728887

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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LANDFILL STANDARDS SCH 5 - GW COMP. LIST (GROUND WATER)

BV Labs ID		MQI730			MQI730		
Sampling Date		2020/05/13 11:45			2020/05/13 11:45		
COC Number		770952-01-01			770952-01-01		
	UNITS	**MW4**	**RDL**	**QC Batch**	**MW4 Lab-Dup**	**RDL**	**QC Batch**
Inorganics							
Total Ammonia-N	mg/L	<0.050	0.050	6746375			
Total Chemical Oxygen Demand (COD)	mg/L	21	4.0	6738454			
Conductivity	umho/cm	360	1.0	6730845			
Total Dissolved Solids	mg/L	230	10	6731252			
Total Kjeldahl Nitrogen (TKN)	mg/L	0.29	0.10	6738282			
Dissolved Organic Carbon	mg/L	2.2	0.40	6734379	2.2	0.40	6734379
pH	pH	8.12		6730847			
Phenols-4AAP	mg/L	<0.0010	0.0010	6729828			
Total Phosphorus	mg/L	0.47	0.020	6746148			
Dissolved Sulphate (SO4)	mg/L	1.9	1.0	6730860			
Alkalinity (Total as CaCO3)	mg/L	190	1.0	6730827			
Dissolved Chloride (Cl-)	mg/L	1.3	1.0	6730855			
Nitrite (N)	mg/L	<0.010	0.010	6733858			
Nitrate (N)	mg/L	<0.10	0.10	6733858			
Metals							
Mercury (Hg)	mg/L	<0.00010	0.00010	6734079			
Dissolved Arsenic (As)	ug/L	<1.0	1.0	6730422			
Dissolved Barium (Ba)	ug/L	13	2.0	6730422			
Dissolved Boron (B)	ug/L	15	10	6730422			
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	6730422			
Dissolved Calcium (Ca)	ug/L	59000	200	6730422			
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	6730422			
Dissolved Copper (Cu)	ug/L	2.9	1.0	6730422			
Dissolved Iron (Fe)	ug/L	<100	100	6730422			
Dissolved Lead (Pb)	ug/L	<0.50	0.50	6730422			
Dissolved Magnesium (Mg)	ug/L	8700	50	6730422			
Dissolved Manganese (Mn)	ug/L	<2.0	2.0	6730422			
Dissolved Potassium (K)	ug/L	1600	200	6730422			
Dissolved Sodium (Na)	ug/L	2500	100	6730422			
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	6730422			
Volatile Organics							
Benzene	ug/L	<0.10	0.10	6728887			
1,4-Dichlorobenzene	ug/L	<0.20	0.20	6728887			
Methylene Chloride(Dichloromethane)	ug/L	<0.50	0.50	6728887			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

LANDFILL STANDARDS SCH 5 - GW COMP. LIST (GROUND WATER)

BV Labs ID		MQI730			MQI730		
Sampling Date		2020/05/13 11:45			2020/05/13 11:45		
COC Number		770952-01-01			770952-01-01		
	UNITS	**MW4**	**RDL**	**QC Batch**	**MW4 Lab-Dup**	**RDL**	**QC Batch**
Toluene	ug/L	<0.20	0.20	6728887			
Vinyl Chloride	ug/L	<0.20	0.20	6728887			
Surrogate Recovery (%)							
4-Bromofluorobenzene	%	100		6728887			
D4-1,2-Dichloroethane	%	95		6728887			
D8-Toluene	%	92		6728887			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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LANDFILL STANDARDS SCH 5 - GW COMP. LIST (GROUND WATER)

BV Labs ID		MQI731			MQI731		
Sampling Date		2020/05/13 16:50			2020/05/13 16:50		
COC Number		770952-01-01			770952-01-01		
	UNITS	**MW5**	**RDL**	**QC Batch**	**MW5 Lab-Dup**	**RDL**	**QC Batch**
Inorganics							
Total Ammonia-N	mg/L	<0.050	0.050	6734818			
Total Chemical Oxygen Demand (COD)	mg/L	40	4.0	6738454			
Conductivity	umho/cm	1600	1.0	6733842	1600	1.0	6733842
Total Dissolved Solids	mg/L	930	10	6732141			
Total Kjeldahl Nitrogen (TKN)	mg/L	0.80	0.10	6738282			
Dissolved Organic Carbon	mg/L	12	0.40	6734379			
pH	pH	7.27		6733843	7.29		6733843
Phenols-4AAP	mg/L	<0.0010	0.0010	6729828			
Total Phosphorus	mg/L	0.074	0.020	6746148			
Dissolved Sulphate (SO4)	mg/L	48	1.0	6730860			
Alkalinity (Total as CaCO3)	mg/L	820	1.0	6733839	820	1.0	6733839
Dissolved Chloride (Cl-)	mg/L	59	1.0	6730855			
Nitrite (N)	mg/L	<0.010	0.010	6730863			
Nitrate (N)	mg/L	<0.10	0.10	6730863			
Metals							
Mercury (Hg)	mg/L	<0.00010	0.00010	6734079			
Dissolved Arsenic (As)	ug/L	<1.0	1.0	6730422			
Dissolved Barium (Ba)	ug/L	79	2.0	6730422			
Dissolved Boron (B)	ug/L	520	10	6730422			
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	6730422			
Dissolved Calcium (Ca)	ug/L	260000	200	6730422			
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	6730422			
Dissolved Copper (Cu)	ug/L	19	1.0	6730422			
Dissolved Iron (Fe)	ug/L	<100	100	6730422			
Dissolved Lead (Pb)	ug/L	<0.50	0.50	6730422			
Dissolved Magnesium (Mg)	ug/L	44000	50	6730422			
Dissolved Manganese (Mn)	ug/L	2100	2.0	6730422			
Dissolved Potassium (K)	ug/L	2900	200	6730422			
Dissolved Sodium (Na)	ug/L	57000	100	6730422			
Dissolved Zinc (Zn)	ug/L	5.2	5.0	6730422			
Volatile Organics							
Benzene	ug/L	1.1	0.50	6728887			
1,4-Dichlorobenzene	ug/L	<1.0	1.0	6728887			
Methylene Chloride(Dichloromethane)	ug/L	<2.5	2.5	6728887			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

BV Labs Job #: C0B9178
Report Date: 2020/05/26

exp Services Inc
Client Project #: THB-00011119-IE
Sampler Initials: EF

LANDFILL STANDARDS SCH 5 - GW COMP. LIST (GROUND WATER)

BV Labs ID		MQI731			MQI731		
Sampling Date		2020/05/13 16:50			2020/05/13 16:50		
COC Number		770952-01-01			770952-01-01		
	UNITS	**MW5**	**RDL**	**QC Batch**	**MW5 Lab-Dup**	**RDL**	**QC Batch**
Toluene	ug/L	<1.0	1.0	6728887			
Vinyl Chloride	ug/L	3.6	1.0	6728887			
Surrogate Recovery (%)							
4-Bromofluorobenzene	%	100		6728887			
D4-1,2-Dichloroethane	%	97		6728887			
D8-Toluene	%	92		6728887			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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LANDFILL STANDARDS SCH 5 - GW COMP. LIST (GROUND WATER)

BV Labs ID		MQI732		
Sampling Date		2020/05/13 14:30		
COC Number		770952-01-01		
	UNITS	**MW6**	**RDL**	**QC Batch**
Inorganics				
Total Ammonia-N	mg/L	0.15	0.050	6746375
Total Chemical Oxygen Demand (COD)	mg/L	47	4.0	6738454
Conductivity	umho/cm	1600	1.0	6730625
Total Dissolved Solids	mg/L	910	10	6732141
Total Kjeldahl Nitrogen (TKN)	mg/L	0.59	0.10	6738282
Dissolved Organic Carbon	mg/L	12	0.40	6734379
pH	pH	7.51		6730626
Phenols-4AAP	mg/L	0.0010	0.0010	6729828
Total Phosphorus	mg/L	0.055	0.020	6746148
Dissolved Sulphate (SO4)	mg/L	48	1.0	6730006
Alkalinity (Total as CaCO3)	mg/L	820	1.0	6730624
Dissolved Chloride (Cl-)	mg/L	49	1.0	6730002
Nitrite (N)	mg/L	<0.010	0.010	6730602
Nitrate (N)	mg/L	<0.10	0.10	6730602
Metals				
Mercury (Hg)	mg/L	<0.00010	0.00010	6734079
Dissolved Arsenic (As)	ug/L	<1.0	1.0	6730422
Dissolved Barium (Ba)	ug/L	80	2.0	6730422
Dissolved Boron (B)	ug/L	540	10	6730422
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	6730422
Dissolved Calcium (Ca)	ug/L	250000	200	6730422
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	6730422
Dissolved Copper (Cu)	ug/L	19	1.0	6730422
Dissolved Iron (Fe)	ug/L	<100	100	6730422
Dissolved Lead (Pb)	ug/L	<0.50	0.50	6730422
Dissolved Magnesium (Mg)	ug/L	45000	50	6730422
Dissolved Manganese (Mn)	ug/L	2100	2.0	6730422
Dissolved Potassium (K)	ug/L	3000	200	6730422
Dissolved Sodium (Na)	ug/L	56000	100	6730422
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	6730422
Volatile Organics				
Benzene	ug/L	1.2	0.50	6728887
1,4-Dichlorobenzene	ug/L	<1.0	1.0	6728887
Methylene Chloride(Dichloromethane)	ug/L	<2.5	2.5	6728887
Toluene	ug/L	<1.0	1.0	6728887

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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LANDFILL STANDARDS SCH 5 - GW COMP. LIST (GROUND WATER)

BV Labs ID		MQI732		
Sampling Date		2020/05/13 14:30		
COC Number		770952-01-01		
	UNITS	**MW6**	**RDL**	**QC Batch**
Vinyl Chloride	ug/L	3.9	1.0	6728887
Surrogate Recovery (%)				
4-Bromofluorobenzene	%	98		6728887
D4-1,2-Dichloroethane	%	95		6728887
D8-Toluene	%	93		6728887

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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LANDFILL STANDARDS SCH 5 - SW COMP. LIST (SURFACE WATER)

BV Labs ID		MQJ493			MQJ493		
Sampling Date		2020/05/13 16:15			2020/05/13 16:15		
COC Number		770952-01-01			770952-01-01		
	UNITS	**SW1**	**RDL**	**QC Batch**	**SW1 Lab-Dup**	**RDL**	**QC Batch**
Inorganics							
Total Ammonia-N	mg/L	0.24	0.050	6746375			
Total BOD	mg/L	<2	2	6730191			
Total Chemical Oxygen Demand (COD)	mg/L	31	4.0	6738454	35	4.0	6738454
Conductivity	umho/cm	230	1.0	6732609			
Total Dissolved Solids	mg/L	210	10	6734791			
Total Kjeldahl Nitrogen (TKN)	mg/L	0.79	0.10	6738282			
pH	pH	8.08		6732612			
Phenols-4AAP	mg/L	<0.0010	0.0010	6732033			
Total Phosphorus	mg/L	0.015	0.004	6745697	0.013	0.004	6745697
Total Suspended Solids	mg/L	4	1	6734353			
Dissolved Sulphate (SO4)	mg/L	7.6	1.0	6736845			
Alkalinity (Total as CaCO3)	mg/L	110	1.0	6732608			
Dissolved Chloride (Cl-)	mg/L	3.1	1.0	6736842			
Nitrite (N)	mg/L	<0.010	0.010	6733857			
Nitrate (N)	mg/L	<0.10	0.10	6733857			
Metals							
Mercury (Hg)	mg/L	<0.00010	0.00010	6731929			
Total Arsenic (As)	ug/L	<1.0	1.0	6737543			
Total Barium (Ba)	ug/L	7.2	2.0	6737543			
Total Boron (B)	ug/L	34	10	6737543			
Total Cadmium (Cd)	ug/L	<0.10	0.10	6737543			
Total Chromium (Cr)	ug/L	<5.0	5.0	6737543			
Total Copper (Cu)	ug/L	<1.0	1.0	6737543			
Total Iron (Fe)	ug/L	<100	100	6737543			
Total Lead (Pb)	ug/L	<0.50	0.50	6737543			
Total Zinc (Zn)	ug/L	<5.0	5.0	6737543			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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BV Labs Job #: C0B9178
Report Date: 2020/05/26

exp Services Inc
Client Project #: THB-00011119-IE
Sampler Initials: EF

RESULTS OF ANALYSES OF GROUND WATER

BV Labs ID		MQI728	MQI729	MQI730	MQI731	MQI732	
Sampling Date		2020/05/13 15:45	2020/05/13 13:15	2020/05/13 11:45	2020/05/13 16:50	2020/05/13 14:30	
COC Number		770952-01-01	770952-01-01	770952-01-01	770952-01-01	770952-01-01	
	UNITS	**MW1**	**MW3**	**MW4**	**MW5**	**MW6**	**QC Batch**
Calculated Parameters							
Ion Balance (% Difference)	%	0.780	1.47	0.920	0.640	0.190	6727485
QC Batch = Quality Control Batch							

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TEST SUMMARY

BV Labs ID: MQI728
Sample ID: MW1
Matrix: Ground Water

Collected: 2020/05/13
Shipped:
Received: 2020/05/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	6730814	N/A	2020/05/20	Surinder Rai
Chloride by Automated Colourimetry	KONE	6730002	N/A	2020/05/20	Deonarine Ramnarine
Chemical Oxygen Demand	SPEC	6738454	N/A	2020/05/25	Viorica Rotaru
Conductivity	AT	6730817	N/A	2020/05/20	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	6734379	N/A	2020/05/21	Nimarta Singh
Mercury in Water by CVAA	CV/AA	6737389	2020/05/22	2020/05/22	Meghaben Patel
Dissolved Metals by ICPMS	ICP/MS	6730422	N/A	2020/05/22	Nan Raykha
Ion Balance (% Difference)	CALC	6727485	N/A	2020/05/25	Automated Statchk
Total Ammonia-N	LACH/NH4	6746375	N/A	2020/05/25	Amanpreet Sappal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	6730602	N/A	2020/05/21	Chandra Nandlal
pH	AT	6730819	2020/05/19	2020/05/20	Surinder Rai
Phenols (4AAP)	TECH/PHEN	6729834	N/A	2020/05/20	Bramdeo Motiram
Sulphate by Automated Colourimetry	KONE	6730006	N/A	2020/05/20	Deonarine Ramnarine
Total Dissolved Solids	BAL	6732144	2020/05/20	2020/05/21	Jingwei (Alvin) Shi
Total Kjeldahl Nitrogen in Water	SKAL	6738282	2020/05/22	2020/05/25	Rajni Tyagi
Total Phosphorus (Colourimetric)	LACH/P	6746148	2020/05/25	2020/05/26	Shivani Shivani
Volatile Organic Compounds in Water	P&T/MS	6728887	N/A	2020/05/20	Gladys Guerrero

BV Labs ID: MQI729
Sample ID: MW3
Matrix: Ground Water

Collected: 2020/05/13
Shipped:
Received: 2020/05/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	6730624	N/A	2020/05/21	Surinder Rai
Chloride by Automated Colourimetry	KONE	6730002	N/A	2020/05/20	Deonarine Ramnarine
Chemical Oxygen Demand	SPEC	6738454	N/A	2020/05/25	Viorica Rotaru
Conductivity	AT	6730625	N/A	2020/05/21	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	6734379	N/A	2020/05/21	Nimarta Singh
Mercury in Water by CVAA	CV/AA	6734079	2020/05/21	2020/05/21	Meghaben Patel
Dissolved Metals by ICPMS	ICP/MS	6731725	N/A	2020/05/21	Nan Raykha
Ion Balance (% Difference)	CALC	6727485	N/A	2020/05/22	Automated Statchk
Total Ammonia-N	LACH/NH4	6746375	N/A	2020/05/25	Amanpreet Sappal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	6730602	N/A	2020/05/21	Chandra Nandlal
pH	AT	6730626	2020/05/19	2020/05/21	Surinder Rai
Phenols (4AAP)	TECH/PHEN	6729828	N/A	2020/05/20	Bramdeo Motiram
Sulphate by Automated Colourimetry	KONE	6730006	N/A	2020/05/20	Deonarine Ramnarine
Total Dissolved Solids	BAL	6732144	2020/05/20	2020/05/21	Jingwei (Alvin) Shi
Total Kjeldahl Nitrogen in Water	SKAL	6738282	2020/05/22	2020/05/22	Rajni Tyagi
Total Phosphorus (Colourimetric)	LACH/P	6746148	2020/05/25	2020/05/26	Shivani Shivani
Volatile Organic Compounds in Water	P&T/MS	6728887	N/A	2020/05/20	Gladys Guerrero

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TEST SUMMARY

BV Labs ID: MQI730
Sample ID: MW4
Matrix: Ground Water

Collected: 2020/05/13
Shipped:
Received: 2020/05/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	6730827	N/A	2020/05/21	Surinder Rai
Chloride by Automated Colourimetry	KONE	6730855	N/A	2020/05/21	Deonarine Ramnarine
Chemical Oxygen Demand	SPEC	6738454	N/A	2020/05/25	Viorica Rotaru
Conductivity	AT	6730845	N/A	2020/05/21	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	6734379	N/A	2020/05/21	Nimarta Singh
Mercury in Water by CVAA	CV/AA	6734079	2020/05/21	2020/05/21	Meghaben Patel
Dissolved Metals by ICPMS	ICP/MS	6730422	N/A	2020/05/22	Nan Raykha
Ion Balance (% Difference)	CALC	6727485	N/A	2020/05/25	Automated Statchk
Total Ammonia-N	LACH/NH4	6746375	N/A	2020/05/25	Amanpreet Sappal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	6733858	N/A	2020/05/21	Chandra Nandlal
pH	AT	6730847	2020/05/19	2020/05/21	Surinder Rai
Phenols (4AAP)	TECH/PHEN	6729828	N/A	2020/05/20	Bramdeo Motiram
Sulphate by Automated Colourimetry	KONE	6730860	N/A	2020/05/21	Deonarine Ramnarine
Total Dissolved Solids	BAL	6731252	2020/05/21	2020/05/22	Shivani Desai
Total Kjeldahl Nitrogen in Water	SKAL	6738282	2020/05/22	2020/05/22	Rajni Tyagi
Total Phosphorus (Colourimetric)	LACH/P	6746148	2020/05/25	2020/05/26	Shivani Shivani
Volatile Organic Compounds in Water	P&T/MS	6728887	N/A	2020/05/20	Gladys Guerrero

BV Labs ID: MQI730 Dup
Sample ID: MW4
Matrix: Ground Water

Collected: 2020/05/13
Shipped:
Received: 2020/05/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Organic Carbon (DOC)	TOCV/NDIR	6734379	N/A	2020/05/21	Nimarta Singh

BV Labs ID: MQI731
Sample ID: MW5
Matrix: Ground Water

Collected: 2020/05/13
Shipped:
Received: 2020/05/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	6733839	N/A	2020/05/22	Surinder Rai
Chloride by Automated Colourimetry	KONE	6730855	N/A	2020/05/21	Deonarine Ramnarine
Chemical Oxygen Demand	SPEC	6738454	N/A	2020/05/25	Viorica Rotaru
Conductivity	AT	6733842	N/A	2020/05/22	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	6734379	N/A	2020/05/21	Nimarta Singh
Mercury in Water by CVAA	CV/AA	6734079	2020/05/21	2020/05/21	Meghaben Patel
Dissolved Metals by ICPMS	ICP/MS	6730422	N/A	2020/05/22	Nan Raykha
Ion Balance (% Difference)	CALC	6727485	N/A	2020/05/25	Automated Statchk
Total Ammonia-N	LACH/NH4	6734818	N/A	2020/05/21	Amanpreet Sappal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	6730863	N/A	2020/05/20	Chandra Nandlal
pH	AT	6733843	2020/05/21	2020/05/22	Surinder Rai
Phenols (4AAP)	TECH/PHEN	6729828	N/A	2020/05/20	Bramdeo Motiram
Sulphate by Automated Colourimetry	KONE	6730860	N/A	2020/05/21	Deonarine Ramnarine
Total Dissolved Solids	BAL	6732141	2020/05/20	2020/05/21	Jingwei (Alvin) Shi
Total Kjeldahl Nitrogen in Water	SKAL	6738282	2020/05/22	2020/05/22	Rajni Tyagi

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TEST SUMMARY

BV Labs ID: MQI731 **Collected:** 2020/05/13
Sample ID: MW5 **Shipped:**
Matrix: Ground Water **Received:** 2020/05/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Phosphorus (Colourimetric)	LACH/P	6746148	2020/05/25	2020/05/26	Shivani Shivani
Volatile Organic Compounds in Water	P&T/MS	6728887	N/A	2020/05/20	Gladys Guerrero

BV Labs ID: MQI731 Dup **Collected:** 2020/05/13
Sample ID: MW5 **Shipped:**
Matrix: Ground Water **Received:** 2020/05/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	6733839	N/A	2020/05/22	Surinder Rai
Conductivity	AT	6733842	N/A	2020/05/22	Surinder Rai
pH	AT	6733843	2020/05/21	2020/05/22	Surinder Rai

BV Labs ID: MQI732 **Collected:** 2020/05/13
Sample ID: MW6 **Shipped:**
Matrix: Ground Water **Received:** 2020/05/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	6730624	N/A	2020/05/21	Surinder Rai
Chloride by Automated Colourimetry	KONE	6730002	N/A	2020/05/20	Deonarine Ramnarine
Chemical Oxygen Demand	SPEC	6738454	N/A	2020/05/25	Viorica Rotaru
Conductivity	AT	6730625	N/A	2020/05/21	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	6734379	N/A	2020/05/21	Nimarta Singh
Mercury in Water by CVAA	CV/AA	6734079	2020/05/21	2020/05/21	Meghaben Patel
Dissolved Metals by ICPMS	ICP/MS	6730422	N/A	2020/05/22	Nan Raykha
Ion Balance (% Difference)	CALC	6727485	N/A	2020/05/25	Automated Statchk
Total Ammonia-N	LACH/NH4	6746375	N/A	2020/05/25	Amanpreet Sappal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	6730602	N/A	2020/05/21	Chandra Nandlal
pH	AT	6730626	2020/05/19	2020/05/21	Surinder Rai
Phenols (4AAP)	TECH/PHEN	6729828	N/A	2020/05/20	Bramdeo Motiram
Sulphate by Automated Colourimetry	KONE	6730006	N/A	2020/05/20	Deonarine Ramnarine
Total Dissolved Solids	BAL	6732141	2020/05/20	2020/05/21	Jingwei (Alvin) Shi
Total Kjeldahl Nitrogen in Water	SKAL	6738282	2020/05/22	2020/05/22	Rajni Tyagi
Total Phosphorus (Colourimetric)	LACH/P	6746148	2020/05/25	2020/05/26	Shivani Shivani
Volatile Organic Compounds in Water	P&T/MS	6728887	N/A	2020/05/20	Gladys Guerrero

BV Labs ID: MQJ493 **Collected:** 2020/05/13
Sample ID: SW1 **Shipped:**
Matrix: Surface Water **Received:** 2020/05/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	6732608	N/A	2020/05/21	Surinder Rai
Biochemical Oxygen Demand (BOD)	DO	6730191	2020/05/19	2020/05/24	Navjot Kaur Gill
Chloride by Automated Colourimetry	KONE	6736842	N/A	2020/05/22	Deonarine Ramnarine
Chemical Oxygen Demand	SPEC	6738454	N/A	2020/05/25	Viorica Rotaru
Conductivity	AT	6732609	N/A	2020/05/21	Surinder Rai

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BV Labs Job #: C0B9178
Report Date: 2020/05/26

exp Services Inc
Client Project #: THB-00011119-IE
Sampler Initials: EF

TEST SUMMARY

BV Labs ID: MQJ493
Sample ID: SW1
Matrix: Surface Water

Collected: 2020/05/13
Shipped:
Received: 2020/05/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury in Water by CVAA	CV/AA	6731929	2020/05/20	2020/05/20	Meghaben Patel
Total Metals Analysis by ICPMS	ICP/MS	6737543	N/A	2020/05/23	Arefa Dabhad
Total Ammonia-N	LACH/NH4	6746375	N/A	2020/05/25	Amanpreet Sappal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	6733857	N/A	2020/05/22	Chandra Nandlal
pH	AT	6732612	2020/05/20	2020/05/21	Surinder Rai
Phenols (4AAP)	TECH/PHEN	6732033	N/A	2020/05/20	Bramdeo Motiram
Sulphate by Automated Colourimetry	KONE	6736845	N/A	2020/05/22	Deonarine Ramnarine
Total Dissolved Solids	BAL	6734791	2020/05/21	2020/05/22	Jingwei (Alvin) Shi
Total Kjeldahl Nitrogen in Water	SKAL	6738282	2020/05/22	2020/05/22	Rajni Tyagi
Total Phosphorus (Colourimetric)	LACH/P	6745697	2020/05/25	2020/05/25	Shivani Shivani
Low Level Total Suspended Solids	BAL	6734353	2020/05/21	2020/05/22	Jingwei (Alvin) Shi

BV Labs ID: MQJ493 Dup
Sample ID: SW1
Matrix: Surface Water

Collected: 2020/05/13
Shipped:
Received: 2020/05/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chemical Oxygen Demand	SPEC	6738454	N/A	2020/05/25	Viorica Rotaru
Total Phosphorus (Colourimetric)	LACH/P	6745697	2020/05/25	2020/05/25	Shivani Shivani

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	3.7°C

VOC Water Analysis: Due to foaming,some of samples required dilution. The detection limits were adjusted accordingly.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
6728887	4-Bromofluorobenzene	2020/05/19	107	70 - 130	106	70 - 130	100	%				
6728887	D4-1,2-Dichloroethane	2020/05/19	90	70 - 130	90	70 - 130	94	%				
6728887	D8-Toluene	2020/05/19	96	70 - 130	97	70 - 130	94	%				
6728887	1,4-Dichlorobenzene	2020/05/20	95	70 - 130	100	70 - 130	<0.20	ug/L	NC	30		
6728887	Benzene	2020/05/20	99	70 - 130	97	70 - 130	<0.10	ug/L	NC	30		
6728887	Methylene Chloride(Dichloromethane)	2020/05/20	91	70 - 130	89	70 - 130	<0.50	ug/L	NC	30		
6728887	Toluene	2020/05/20	95	70 - 130	94	70 - 130	<0.20	ug/L	NC	30		
6728887	Vinyl Chloride	2020/05/20	85	70 - 130	85	70 - 130	<0.20	ug/L	NC	30		
6729828	Phenols-4AAP	2020/05/20	92	80 - 120	98	80 - 120	<0.0010	mg/L	NC	20		
6729834	Phenols-4AAP	2020/05/20	95	80 - 120	97	80 - 120	<0.0010	mg/L	NC	20		
6730002	Dissolved Chloride (Cl-)	2020/05/20	108	80 - 120	104	80 - 120	<1.0	mg/L	0.48	20		
6730006	Dissolved Sulphate (SO4)	2020/05/20	NC	75 - 125	102	80 - 120	<1.0	mg/L	1.1	20		
6730191	Total BOD	2020/05/24					<2	mg/L	NC	30	107	80 - 120
6730422	Dissolved Arsenic (As)	2020/05/22	109	80 - 120	100	80 - 120	<1.0	ug/L	NC	20		
6730422	Dissolved Barium (Ba)	2020/05/22	109	80 - 120	97	80 - 120	<2.0	ug/L	4.1	20		
6730422	Dissolved Boron (B)	2020/05/22	104	80 - 120	97	80 - 120	<10	ug/L	3.7	20		
6730422	Dissolved Cadmium (Cd)	2020/05/22	110	80 - 120	100	80 - 120	<0.10	ug/L	NC	20		
6730422	Dissolved Calcium (Ca)	2020/05/22	NC	80 - 120	101	80 - 120	<200	ug/L	0.54	20		
6730422	Dissolved Chromium (Cr)	2020/05/22	109	80 - 120	98	80 - 120	<5.0	ug/L	NC	20		
6730422	Dissolved Copper (Cu)	2020/05/22	111	80 - 120	101	80 - 120	<1.0	ug/L	1.5	20		
6730422	Dissolved Iron (Fe)	2020/05/22	104	80 - 120	98	80 - 120	<100	ug/L	NC	20		
6730422	Dissolved Lead (Pb)	2020/05/22	108	80 - 120	98	80 - 120	<0.50	ug/L	NC	20		
6730422	Dissolved Magnesium (Mg)	2020/05/22	106	80 - 120	98	80 - 120	<50	ug/L	0.11	20		
6730422	Dissolved Manganese (Mn)	2020/05/22	108	80 - 120	98	80 - 120	<2.0	ug/L	NC	20		
6730422	Dissolved Potassium (K)	2020/05/22	113	80 - 120	103	80 - 120	<200	ug/L	0.33	20		
6730422	Dissolved Sodium (Na)	2020/05/22	109	80 - 120	98	80 - 120	<100	ug/L	0.36	20		
6730422	Dissolved Zinc (Zn)	2020/05/22	106	80 - 120	97	80 - 120	<5.0	ug/L	NC	20		
6730602	Nitrate (N)	2020/05/21	109	80 - 120	102	80 - 120	<0.10	mg/L	NC	20		
6730602	Nitrite (N)	2020/05/21	113	80 - 120	107	80 - 120	<0.010	mg/L	NC	20		
6730624	Alkalinity (Total as CaCO3)	2020/05/21			96	85 - 115	<1.0	mg/L	0.27	20		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
6730625	Conductivity	2020/05/21			101	85 - 115	<1.0	umho/cm	0.33	25		
6730626	pH	2020/05/21			101	98 - 103			0.30	N/A		
6730814	Alkalinity (Total as CaCO3)	2020/05/20			96	85 - 115	<1.0	mg/L	0.77	20		
6730817	Conductivity	2020/05/20			101	85 - 115	<1.0	umho/cm	0.47	25		
6730819	pH	2020/05/20			102	98 - 103			0.025	N/A		
6730827	Alkalinity (Total as CaCO3)	2020/05/21			95	85 - 115	<1.0	mg/L	1.7	20		
6730845	Conductivity	2020/05/21			102	85 - 115	<1.0	umho/cm	0.69	25		
6730847	pH	2020/05/21			101	98 - 103			0.38	N/A		
6730855	Dissolved Chloride (Cl-)	2020/05/21	116	80 - 120	100	80 - 120	<1.0	mg/L	3.0	20		
6730860	Dissolved Sulphate (SO4)	2020/05/21	NC	75 - 125	100	80 - 120	<1.0	mg/L	0.078	20		
6730863	Nitrate (N)	2020/05/20	NC	80 - 120	102	80 - 120	<0.10	mg/L	0.87	20		
6730863	Nitrite (N)	2020/05/20	106	80 - 120	107	80 - 120	<0.010	mg/L	2.3	20		
6731252	Total Dissolved Solids	2020/05/22					<10	mg/L	5.0	25	98	90 - 110
6731725	Dissolved Arsenic (As)	2020/05/21	107	80 - 120	98	80 - 120	<1.0	ug/L				
6731725	Dissolved Barium (Ba)	2020/05/21	105	80 - 120	95	80 - 120	<2.0	ug/L				
6731725	Dissolved Boron (B)	2020/05/21	101	80 - 120	94	80 - 120	<10	ug/L				
6731725	Dissolved Cadmium (Cd)	2020/05/21	107	80 - 120	98	80 - 120	<0.10	ug/L				
6731725	Dissolved Calcium (Ca)	2020/05/21	NC	80 - 120	100	80 - 120	<200	ug/L				
6731725	Dissolved Chromium (Cr)	2020/05/21	102	80 - 120	93	80 - 120	<5.0	ug/L				
6731725	Dissolved Copper (Cu)	2020/05/21	105	80 - 120	95	80 - 120	<1.0	ug/L				
6731725	Dissolved Iron (Fe)	2020/05/21	107	80 - 120	97	80 - 120	<100	ug/L	1.4	20		
6731725	Dissolved Lead (Pb)	2020/05/21	102	80 - 120	95	80 - 120	<0.50	ug/L				
6731725	Dissolved Magnesium (Mg)	2020/05/21	NC	80 - 120	99	80 - 120	<50	ug/L				
6731725	Dissolved Manganese (Mn)	2020/05/21	NC	80 - 120	95	80 - 120	<2.0	ug/L	3.8	20		
6731725	Dissolved Potassium (K)	2020/05/21	110	80 - 120	100	80 - 120	<200	ug/L				
6731725	Dissolved Sodium (Na)	2020/05/21	NC	80 - 120	96	80 - 120	<100	ug/L				
6731725	Dissolved Zinc (Zn)	2020/05/21	102	80 - 120	96	80 - 120	<5.0	ug/L				
6731929	Mercury (Hg)	2020/05/20	100	75 - 125	95	80 - 120	<0.00010	mg/L	NC	20		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
6732033	Phenols-4AAP	2020/05/20	93	80 - 120	96	80 - 120	<0.0010	mg/L	NC	20		
6732141	Total Dissolved Solids	2020/05/21					<10	mg/L	3.0	25	102	90 - 110
6732144	Total Dissolved Solids	2020/05/21					<10	mg/L	0.60	25	100	90 - 110
6732608	Alkalinity (Total as CaCO3)	2020/05/21			96	85 - 115	<1.0	mg/L	0.52	20		
6732609	Conductivity	2020/05/21			101	85 - 115	<1.0	umho/cm	0	25		
6732612	pH	2020/05/21			101	98 - 103			0.025	N/A		
6733839	Alkalinity (Total as CaCO3)	2020/05/22			98	85 - 115	<1.0	mg/L	0.30	20		
6733842	Conductivity	2020/05/22			101	85 - 115	<1.0	umho/cm	0.43	25		
6733843	pH	2020/05/22			101	98 - 103			0.36	N/A		
6733857	Nitrate (N)	2020/05/22	101	80 - 120	102	80 - 120	<0.10	mg/L	0.28	20		
6733857	Nitrite (N)	2020/05/22	107	80 - 120	108	80 - 120	<0.010	mg/L	NC	20		
6733858	Nitrate (N)	2020/05/21	104	80 - 120	104	80 - 120	<0.10	mg/L	NC	20		
6733858	Nitrite (N)	2020/05/21	106	80 - 120	108	80 - 120	<0.010	mg/L				
6734079	Mercury (Hg)	2020/05/21	93	75 - 125	92	80 - 120	<0.00010	mg/L	NC	20		
6734353	Total Suspended Solids	2020/05/22					<1	mg/L	NC	25	101	85 - 115
6734379	Dissolved Organic Carbon	2020/05/21	94	80 - 120	95	80 - 120	<0.40	mg/L	0.96	20		
6734791	Total Dissolved Solids	2020/05/22					<10	mg/L	5.6	25	97	90 - 110
6734818	Total Ammonia-N	2020/05/21	99	75 - 125	100	80 - 120	<0.050	mg/L	NC	20		
6736842	Dissolved Chloride (Cl-)	2020/05/22	NC	80 - 120	104	80 - 120	<1.0	mg/L	1.3	20		
6736845	Dissolved Sulphate (SO4)	2020/05/22	110	75 - 125	100	80 - 120	<1.0	mg/L	NC	20		
6737389	Mercury (Hg)	2020/05/22	92	75 - 125	96	80 - 120	<0.00010	mg/L	NC	20		
6737543	Total Arsenic (As)	2020/05/23	99	80 - 120	97	80 - 120	<1.0	ug/L	3.2	20		
6737543	Total Barium (Ba)	2020/05/23	NC	80 - 120	97	80 - 120	<2.0	ug/L				
6737543	Total Boron (B)	2020/05/23	NC	80 - 120	81	80 - 120	<10	ug/L				
6737543	Total Cadmium (Cd)	2020/05/23	100	80 - 120	96	80 - 120	<0.10	ug/L	NC	20		
6737543	Total Chromium (Cr)	2020/05/23	95	80 - 120	93	80 - 120	<5.0	ug/L	NC	20		
6737543	Total Copper (Cu)	2020/05/23	97	80 - 120	97	80 - 120	<1.0	ug/L	6.9	20		
6737543	Total Iron (Fe)	2020/05/23	91	80 - 120	92	80 - 120	<100	ug/L				
6737543	Total Lead (Pb)	2020/05/23	85	80 - 120	96	80 - 120	<0.50	ug/L	NC	20		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
6737543	Total Zinc (Zn)	2020/05/23	88	80 - 120	97	80 - 120	<5.0	ug/L	NC	20		
6738282	Total Kjeldahl Nitrogen (TKN)	2020/05/25	104	80 - 120	106	80 - 120	<0.10	mg/L	2.8	20	110	80 - 120
6738454	Total Chemical Oxygen Demand (COD)	2020/05/25	106	80 - 120	104	80 - 120	<4.0	mg/L	10	20		
6745697	Total Phosphorus	2020/05/25	97	80 - 120	93	80 - 120	<0.004	mg/L	12	20	88	N/A
6746148	Total Phosphorus	2020/05/26	95	80 - 120	97	80 - 120	<0.020	mg/L	14	20	96	80 - 120
6746375	Total Ammonia-N	2020/05/25	96	75 - 125	99	80 - 120	<0.050	mg/L	8.1	20		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

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

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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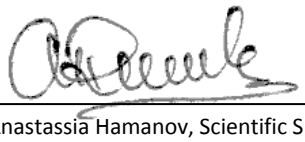
VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Anastassia Hamanov, Scientific Specialist

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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14-May-20 15:05
Julie Clement
C0B9178
MAF ENV-1112

Page 1 of 2

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:	
Company Name:	#17501 exp Services Inc	Company Name:		Quotation #:	B90555
Attention:	accounts payable	Attention:	Ahileas Mitsopoulos, Mike Soramaki	P.O. #:	
Address:	1142 Roland St Thunder Bay ON P7B 5M4	Address:		Project:	THB-00011119-IE
				Project Name:	
Tel:	(807) 623-9495 Fax: (807) 623-8070	Tel:	Fax:	Site #:	Nakina Landfill
Email:	thunderbay@exp.com; Karen.Burke@exp.com;AP@ex	Email:	ahileas.mitsopoulos@exp.com, ~~connor.porter@exp.com~~	Sampled By:	EF

Bottle Order #: 770952
COC #: C#770952-01-01
Project Manager: Julie Clement

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BV LABS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011): ☐ Table 1 ☐ Res/Park ☐ Medium/Fine ☐ Table 2 ☐ Ind/Comm ☐ Coarse ☐ Table 3 ☐ Agri/Other ☐ For RSC ☐ Table ___

Other Regulations: ☐ CCME ☐ Sanitary Sewer Bylaw ☐ Reg 558 ☐ Storm Sewer Bylaw ☐ MISA Municipality ___ ☐ PWQO ☒ Other ODWS

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ___

ANALYSIS REQUESTED (PLEASE BE SPECIFIC): Field Filtered (please circle): Metals / Hg / Cr VI; Landfill Standards Sch 5 - GW Comp. List

Turnaround Time (TAT) Required: Please provide advance notice for rush projects

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___
Rush Confirmation Number: ___ (call lab for #)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered	Landfill Standards Sch 5 - GW Comp. List	# of Bottles	Comments
1		MW 1	May 13, 2020	3:45PM	GW		X	11	
2		~~MW 2~~	~~May 2020~~		~~GW~~		~~X~~		DRY - Not sampled
3		MW 3	May 13, 2020	1:15 PM	GW		X	11	
4		MW 4	May 13, 2020	11:45AM	GW		X	11	
5		MW 5	May 13 2020	4:50 PM	GW		X	11	
6		MW 6	May 13 2020	2:30PM	GW		X	11	
7									
8									
9									
10									

RECEIVED T Bay

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
[signature] Michael Soramaki	20/05/14	1:00 PM	[signature] James Klappeich	2020/05/14	15:05	
			[signature] Ashish Dukhan	20/05/15	07:03	

Laboratory Use Only: Time Sensitive; Temperature (°C) on Recei 4/4/3; Custody Seal Present Yes ☐ No ✓; Intact N/A

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS. Ashish Dukhan

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

White: BV Labs Yellow: Client
REFER TO ACTR

Bureau Veritas Laboratories
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel (905) 817-5700 Toll-free 800-563-6266 Fax (905) 817-5777 www.bvlabs.com

CHAIN OF CUSTODY RECORD

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#17501 exp Services Inc	Company Name:		Quotation #:	B90555	BV Labs Job #:	Bottle Order #:
Attention:	accounts payable	Attention:	Ahileas Mitsopoulos, Mike Soramaki	P.O. #:		(0B 9178 MA	770955
Address:	1142 Roland St Thunder Bay ON P7B 5M4	Address:		Project:	THB-00011119-HE	COC #:	Project Manager:
Tel:	(807) 623-9495 Fax: (807) 623-8070	Tel:	Fax:	Project Name:		C#770955-01-01	Julie Clement
Email:	thunderbay@exp.com; Karen.Burke@exp.com;AP@ex	Email:	ahileas.mitsopoulos@exp.com, ~~connor.porter@exp.com~~	Site #:	Nakina Landfill		
				Sampled By:	EF		

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BV LABS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)	Other Regulations	Special Instructions
☐ Table 1 ☐ Res/Park ☐ Medium/Fine ☐ Table 2 ☐ Ind/Comm ☐ Coarse ☐ Table 3 ☐ Agri/Other ☐ For RSC ☐ Table ___	☐ CCME ☐ Sanitary Sewer Bylaw ☐ Reg 558 ☐ Storm Sewer Bylaw ☐ MISA Municipality ___ ☒ PWQO ☐ Other ___	

Include Criteria on Certificate of Analysis (Y/N)? ___

Field Filtered (please circle): Metals / Hg / Cr VI

ANALYSIS REQUESTED (PLEASE BE SPECIFIC):

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Landfill Standard Sch 5 - SW Comp List	# of Bottles	Comments
1		SW1	May 13 2020	4:25 PM	SW	X	8	
2								
3								
4								
5								
6								
7								
8								
9								
10								

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note. Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___ ☐
Rush Confirmation Number: ___ *(call lab for #)*

RECEIVED Thunder Bay

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Michael Soramaki	20/05/14	1:00 PM	James Wapenaar See Page 1	2020/05/14 2020/05/15	15:05 08:03	

Laboratory Use Only				
Time Sensitive	Temperature (°C) on Recei	Custody Seal	Yes	No
		Present		✓
		Intact		N/A

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.
* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.
** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

White: BV Labs Yellow: Client

Bureau Veritas Canada (2019) Inc.

Your Project #: THB-00011119-IE
Site Location: NAKINA LANDFILL, ON
Your C.O.C. #: n/a

Attention: Ahileas Mitsopoulos

exp Services Inc
Thunder Bay Branch
1142 Roland St
Thunder Bay, ON
CANADA P7B 5M4

Report Date: 2020/10/15
Report #: R6371408
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0Q6555
Received: 2020/10/08, 13:08

Sample Matrix: Water
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	1	N/A	2020/10/11	CAM SOP-00448	SM 23 2320 B m
Alkalinity	5	N/A	2020/10/14	CAM SOP-00448	SM 23 2320 B m
Biochemical Oxygen Demand (BOD)	1	2020/10/10	2020/10/15	CAM SOP-00427	SM 23 5210B m
Chloride by Automated Colourimetry	5	N/A	2020/10/14	CAM SOP-00463	SM 23 4500-Cl E m
Chloride by Automated Colourimetry	1	N/A	2020/10/15	CAM SOP-00463	SM 23 4500-Cl E m
Chemical Oxygen Demand	6	N/A	2020/10/14	CAM SOP-00416	SM 23 5220 D m
Conductivity	1	N/A	2020/10/11	CAM SOP-00414	SM 23 2510 m
Conductivity	5	N/A	2020/10/15	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	5	N/A	2020/10/14	CAM SOP-00446	SM 23 5310 B m
Mercury in Water by CVAA	6	2020/10/14	2020/10/14	CAM SOP-00453	EPA 7470A m
Dissolved Metals by ICPMS	5	N/A	2020/10/14	CAM SOP-00447	EPA 6020B m
Total Metals Analysis by ICPMS	1	N/A	2020/10/15	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	5	N/A	2020/10/15		
Total Ammonia-N	6	N/A	2020/10/14	CAM SOP-00441	USGS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (2)	5	N/A	2020/10/14	CAM SOP-00440	SM 23 4500-NO3I/NO2B
Nitrate (NO3) and Nitrite (NO2) in Water (2)	1	N/A	2020/10/15	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	1	2020/10/10	2020/10/11	CAM SOP-00413	SM 4500H+ B m
pH	5	2020/10/13	2020/10/14	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	2	N/A	2020/10/13	CAM SOP-00444	OMOE E3179 m
Phenols (4AAP)	4	N/A	2020/10/14	CAM SOP-00444	OMOE E3179 m
Sulphate by Automated Colourimetry	5	N/A	2020/10/14	CAM SOP-00464	EPA 375.4 m
Sulphate by Automated Colourimetry	1	N/A	2020/10/15	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids	6	2020/10/13	2020/10/14	CAM SOP-00428	SM 23 2540C m
Total Kjeldahl Nitrogen in Water	1	2020/10/13	2020/10/13	CAM SOP-00938	OMOE E3516 m
Total Kjeldahl Nitrogen in Water	5	2020/10/13	2020/10/15	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	1	2020/10/14	2020/10/14	CAM SOP-00407	SM 23 4500 P B H m
Total Phosphorus (Colourimetric)	5	2020/10/13	2020/10/14	CAM SOP-00407	SM 23 4500 P B H m
Low Level Total Suspended Solids	1	2020/10/13	2020/10/14	CAM SOP-00428	SM 23 2540D m
Volatile Organic Compounds in Water	5	N/A	2020/10/13	CAM SOP-00226	EPA 8260C m

Your Project #: THB-00011119-IE
Site Location: NAKINA LANDFILL, ON
Your C.O.C. #: n/a

Attention: Ahileas Mitsopoulos

exp Services Inc
Thunder Bay Branch
1142 Roland St
Thunder Bay, ON
CANADA P7B 5M4

Report Date: 2020/10/15
Report #: R6371408
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0Q6555
Received: 2020/10/08, 13:08
Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Julie Clement, Technical Account Manager
Email: Julie.CLEMENT@bvlabs.com
Phone# (613)868-6079

==========

This report has been generated and distributed using a secure automated process.
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BV Labs Job #: C0Q6555
Report Date: 2020/10/15

exp Services Inc
Client Project #: THB-00011119-IE
Site Location: NAKINA LANDFILL, ON

LANDFILL STANDARDS SCH 5 - GW COMP. LIST (WATER)

BV Labs ID		NWA692			NWA692			NWA693		
Sampling Date		2020/10/06 14:55			2020/10/06 14:55			2020/10/06 16:55		
COC Number		n/a			n/a			n/a		
	UNITS	**MW1**	**RDL**	**QC Batch**	**MW1 Lab-Dup**	**RDL**	**QC Batch**	**MW3**	**RDL**	**QC Batch**
Inorganics										
Total Ammonia-N	mg/L	0.31	0.050	6997308				0.19	0.050	6997308
Total Chemical Oxygen Demand (COD)	mg/L	30	4.0	6996642				11	4.0	6996642
Conductivity	umho/cm	1000	1.0	6997776				2300	1.0	6997776
Total Dissolved Solids	mg/L	645	10	6997889				1270	10	6997889
Total Kjeldahl Nitrogen (TKN)	mg/L	0.63	0.10	6997006				0.21	0.10	6997006
Dissolved Organic Carbon	mg/L	5.2	0.40	6997115	5.1	0.40	6997115	2.2	0.40	6997115
pH	pH	7.36		6997789				7.75		6997789
Phenols-4AAP	mg/L	<0.0010	0.0010	6998389				<0.0010	0.0010	6998389
Total Phosphorus	mg/L	0.25	0.020	6996951				0.072	0.020	6996951
Dissolved Sulphate (SO4)	mg/L	<1.0	1.0	6997678				13	1.0	6997678
Alkalinity (Total as CaCO3)	mg/L	620	1.0	6997762				290	1.0	6997762
Dissolved Chloride (Cl-)	mg/L	3.7	1.0	6997644				530	5.0	6997644
Nitrite (N)	mg/L	<0.010	0.010	6995468				<0.010	0.010	6995468
Nitrate (N)	mg/L	<0.10	0.10	6995468				0.56	0.10	6995468
Metals										
Mercury (Hg)	mg/L	<0.00010	0.00010	6998697				<0.00010	0.00010	6998697
Dissolved Arsenic (As)	ug/L	<1.0	1.0	6997525				<1.0	1.0	6997525
Dissolved Barium (Ba)	ug/L	58	2.0	6997525				61	2.0	6997525
Dissolved Boron (B)	ug/L	47	10	6997525				14	10	6997525
Dissolved Cadmium (Cd)	ug/L	0.099	0.090	6997525				<0.090	0.090	6997525
Dissolved Calcium (Ca)	ug/L	230000	200	6997525				170000	200	6997525
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	6997525				<5.0	5.0	6997525
Dissolved Copper (Cu)	ug/L	6.2	0.90	6997525				2.2	0.90	6997525
Dissolved Iron (Fe)	ug/L	<100	100	6997525				<100	100	6997525
Dissolved Lead (Pb)	ug/L	<0.50	0.50	6997525				<0.50	0.50	6997525
Dissolved Magnesium (Mg)	ug/L	12000	50	6997525				19000	50	6997525
Dissolved Manganese (Mn)	ug/L	1200	2.0	6997525				2.2	2.0	6997525
Dissolved Potassium (K)	ug/L	2800	200	6997525				2300	200	6997525
Dissolved Sodium (Na)	ug/L	2100	100	6997525				270000	100	6997525
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	6997525				<5.0	5.0	6997525
Volatile Organics										
Benzene	ug/L	<0.10	0.10	6995525				<0.10	0.10	6995525
1,4-Dichlorobenzene	ug/L	<0.20	0.20	6995525				<0.20	0.20	6995525
Methylene Chloride(Dichloromethane)	ug/L	<0.50	0.50	6995525				<0.50	0.50	6995525

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

BV Labs Job #: C0Q6555
Report Date: 2020/10/15

exp Services Inc
Client Project #: THB-00011119-IE
Site Location: NAKINA LANDFILL, ON

LANDFILL STANDARDS SCH 5 - GW COMP. LIST (WATER)

BV Labs ID		NWA692			NWA692			NWA693		
Sampling Date		2020/10/06 14:55			2020/10/06 14:55			2020/10/06 16:55		
COC Number		n/a			n/a			n/a		
	UNITS	**MW1**	**RDL**	**QC Batch**	**MW1 Lab-Dup**	**RDL**	**QC Batch**	**MW3**	**RDL**	**QC Batch**
Toluene	ug/L	<0.20	0.20	6995525				<0.20	0.20	6995525
Vinyl Chloride	ug/L	<0.20	0.20	6995525				<0.20	0.20	6995525
Surrogate Recovery (%)										
4-Bromofluorobenzene	%	101		6995525				101		6995525
D4-1,2-Dichloroethane	%	105		6995525				105		6995525
D8-Toluene	%	92		6995525				90		6995525

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

LANDFILL STANDARDS SCH 5 - GW COMP. LIST (WATER)

BV Labs ID		NWA694			NWA695		
Sampling Date		2020/10/06 14:30			2020/10/06 15:40		
COC Number		n/a			n/a		
	UNITS	**MW4**	**RDL**	**QC Batch**	**MW5**	**RDL**	**QC Batch**
Inorganics							
Total Ammonia-N	mg/L	0.15	0.050	6997308	0.15	0.050	6997308
Total Chemical Oxygen Demand (COD)	mg/L	11	4.0	6996642	33	4.0	6996642
Conductivity	umho/cm	350	1.0	6995450	1500	1.0	6997776
Total Dissolved Solids	mg/L	190	10	6996517	995	10	6997889
Total Kjeldahl Nitrogen (TKN)	mg/L	0.32	0.10	6997006	0.73	0.10	6997006
Dissolved Organic Carbon	mg/L	2.6	0.40	6997115	13	0.40	6997115
pH	pH	8.08		6995451	7.30		6997789
Phenols-4AAP	mg/L	<0.0010	0.0010	6998387	<0.0010	0.0010	6996433
Total Phosphorus	mg/L	0.97	0.10	6996951	0.11	0.020	6996951
Dissolved Sulphate (SO4)	mg/L	<1.0	1.0	6995467	130	1.0	6997678
Alkalinity (Total as CaCO3)	mg/L	190	1.0	6995449	780	1.0	6997762
Dissolved Chloride (Cl-)	mg/L	1.6	1.0	6995466	43	1.0	6997644
Nitrite (N)	mg/L	<0.010	0.010	6995435	<0.010	0.010	6995468
Nitrate (N)	mg/L	<0.10	0.10	6995435	0.40	0.10	6995468
Metals							
Mercury (Hg)	mg/L	<0.00010	0.00010	6998697	<0.00010	0.00010	6998697
Dissolved Arsenic (As)	ug/L	<1.0	1.0	6997525	<1.0	1.0	6997525
Dissolved Barium (Ba)	ug/L	12	2.0	6997525	83	2.0	6997525
Dissolved Boron (B)	ug/L	<10	10	6997525	940	10	6997525
Dissolved Cadmium (Cd)	ug/L	<0.090	0.090	6997525	<0.090	0.090	6997525
Dissolved Calcium (Ca)	ug/L	58000	200	6997525	280000	200	6997525
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	6997525	<5.0	5.0	6997525
Dissolved Copper (Cu)	ug/L	2.4	0.90	6997525	17	0.90	6997525
Dissolved Iron (Fe)	ug/L	<100	100	6997525	<100	100	6997525
Dissolved Lead (Pb)	ug/L	<0.50	0.50	6997525	<0.50	0.50	6997525
Dissolved Magnesium (Mg)	ug/L	8200	50	6997525	42000	50	6997525
Dissolved Manganese (Mn)	ug/L	<2.0	2.0	6997525	1800	2.0	6997525
Dissolved Potassium (K)	ug/L	1100	200	6997525	2900	200	6997525
Dissolved Sodium (Na)	ug/L	2300	100	6997525	48000	100	6997525
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	6997525	<5.0	5.0	6997525
Volatile Organics							
Benzene	ug/L	<0.10	0.10	6995525	0.86	0.10	6995525
1,4-Dichlorobenzene	ug/L	<0.20	0.20	6995525	<0.20	0.20	6995525
Methylene Chloride(Dichloromethane)	ug/L	<0.50	0.50	6995525	<0.50	0.50	6995525

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

LANDFILL STANDARDS SCH 5 - GW COMP. LIST (WATER)

BV Labs ID		NWA694			NWA695		
Sampling Date		2020/10/06 14:30			2020/10/06 15:40		
COC Number		n/a			n/a		
	UNITS	**MW4**	**RDL**	**QC Batch**	**MW5**	**RDL**	**QC Batch**
Toluene	ug/L	<0.20	0.20	6995525	<0.20	0.20	6995525
Vinyl Chloride	ug/L	<0.20	0.20	6995525	3.0	0.20	6995525
Surrogate Recovery (%)							
4-Bromofluorobenzene	%	102		6995525	101		6995525
D4-1,2-Dichloroethane	%	106		6995525	105		6995525
D8-Toluene	%	92		6995525	92		6995525

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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LANDFILL STANDARDS SCH 5 - GW COMP. LIST (WATER)

BV Labs ID		NWA696		
Sampling Date		2020/10/06 16:00		
COC Number		n/a		
	UNITS	**MW6**	**RDL**	**QC Batch**
Inorganics				
Total Ammonia-N	mg/L	0.16	0.050	6997308
Total Chemical Oxygen Demand (COD)	mg/L	36	4.0	6996642
Conductivity	umho/cm	1500	1.0	6997776
Total Dissolved Solids	mg/L	965	10	6997889
Total Kjeldahl Nitrogen (TKN)	mg/L	0.78	0.10	6997006
Dissolved Organic Carbon	mg/L	13	0.40	6996983
pH	pH	7.30		6997789
Phenols-4AAP	mg/L	<0.0010	0.0010	6998387
Total Phosphorus	mg/L	0.13	0.10	6996951
Dissolved Sulphate (SO4)	mg/L	130	1.0	6997678
Alkalinity (Total as CaCO3)	mg/L	770	1.0	6997762
Dissolved Chloride (Cl-)	mg/L	42	1.0	6997644
Nitrite (N)	mg/L	<0.010	0.010	6995468
Nitrate (N)	mg/L	0.41	0.10	6995468
Metals				
Mercury (Hg)	mg/L	<0.00010	0.00010	6998697
Dissolved Arsenic (As)	ug/L	<1.0	1.0	6997525
Dissolved Barium (Ba)	ug/L	87	2.0	6997525
Dissolved Boron (B)	ug/L	960	10	6997525
Dissolved Cadmium (Cd)	ug/L	<0.090	0.090	6997525
Dissolved Calcium (Ca)	ug/L	280000	200	6997525
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	6997525
Dissolved Copper (Cu)	ug/L	17	0.90	6997525
Dissolved Iron (Fe)	ug/L	<100	100	6997525
Dissolved Lead (Pb)	ug/L	<0.50	0.50	6997525
Dissolved Magnesium (Mg)	ug/L	43000	50	6997525
Dissolved Manganese (Mn)	ug/L	1800	2.0	6997525
Dissolved Potassium (K)	ug/L	2900	200	6997525
Dissolved Sodium (Na)	ug/L	48000	100	6997525
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	6997525
Volatile Organics				
Benzene	ug/L	0.86	0.10	6995525
1,4-Dichlorobenzene	ug/L	<0.20	0.20	6995525
Methylene Chloride(Dichloromethane)	ug/L	<0.50	0.50	6995525

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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LANDFILL STANDARDS SCH 5 - GW COMP. LIST (WATER)

BV Labs ID		NWA696		
Sampling Date		2020/10/06 16:00		
COC Number		n/a		
	UNITS	**MW6**	**RDL**	**QC Batch**
Toluene	ug/L	<0.20	0.20	6995525
Vinyl Chloride	ug/L	3.1	0.20	6995525
Surrogate Recovery (%)				
4-Bromofluorobenzene	%	103		6995525
D4-1,2-Dichloroethane	%	104		6995525
D8-Toluene	%	93		6995525

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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LANDFILL STANDARDS SCH 5 - SW COMP. LIST (WATER)

BV Labs ID		NWA697		
Sampling Date		2020/10/07 08:20		
COC Number		n/a		
	UNITS	**SW1**	**RDL**	**QC Batch**
Inorganics				
Total Ammonia-N	mg/L	0.21	0.050	6997308
Total BOD	mg/L	<2	2	6994661
Total Chemical Oxygen Demand (COD)	mg/L	40	4.0	6996642
Conductivity	umho/cm	200	1.0	6997776
Total Dissolved Solids	mg/L	170	10	6997889
Total Kjeldahl Nitrogen (TKN)	mg/L	0.82	0.10	6996640
pH	pH	7.75		6997789
Phenols-4AAP	mg/L	<0.0010	0.0010	6996433
Total Phosphorus	mg/L	0.014	0.004	6998893
Total Suspended Solids	mg/L	4	1	6996572
Dissolved Sulphate (SO4)	mg/L	7.1	1.0	6997678
Alkalinity (Total as CaCO3)	mg/L	90	1.0	6997762
Dissolved Chloride (Cl-)	mg/L	3.6	1.0	6997644
Nitrite (N)	mg/L	<0.010	0.010	6995468
Nitrate (N)	mg/L	<0.10	0.10	6995468
Metals				
Mercury (Hg)	mg/L	<0.00010	0.00010	6998697
Total Arsenic (As)	ug/L	<1.0	1.0	6997365
Total Barium (Ba)	ug/L	8.7	2.0	6997365
Total Boron (B)	ug/L	35	10	6997365
Total Cadmium (Cd)	ug/L	<0.090	0.090	6997365
Total Chromium (Cr)	ug/L	<5.0	5.0	6997365
Total Copper (Cu)	ug/L	1.1	0.90	6997365
Total Iron (Fe)	ug/L	<100	100	6997365
Total Lead (Pb)	ug/L	<0.50	0.50	6997365
Total Zinc (Zn)	ug/L	<5.0	5.0	6997365

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

BV Labs Job #: C0Q6555
Report Date: 2020/10/15

exp Services Inc
Client Project #: THB-00011119-IE
Site Location: NAKINA LANDFILL, ON

RESULTS OF ANALYSES OF WATER

BV Labs ID		NWA692	NWA693	NWA694	NWA695	NWA696	
Sampling Date		2020/10/06 14:55	2020/10/06 16:55	2020/10/06 14:30	2020/10/06 15:40	2020/10/06 16:00	
COC Number		n/a	n/a	n/a	n/a	n/a	
	UNITS	**MW1**	**MW3**	**MW4**	**MW5**	**MW6**	**QC Batch**
Calculated Parameters							
Ion Balance (% Difference)	%	1.01	0.980	0.750	0.0700	1.14	6995080
QC Batch = Quality Control Batch							

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BV Labs Job #: C0Q6555
Report Date: 2020/10/15

exp Services Inc
Client Project #: THB-00011119-IE
Site Location: NAKINA LANDFILL, ON

TEST SUMMARY

BV Labs ID: NWA692
Sample ID: MW1
Matrix: Water

Collected: 2020/10/06
Shipped:
Received: 2020/10/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	6997762	N/A	2020/10/14	Surinder Rai
Chloride by Automated Colourimetry	KONE	6997644	N/A	2020/10/14	Alina Dobreanu
Chemical Oxygen Demand	SPEC	6996642	N/A	2020/10/14	Nimarta Singh
Conductivity	AT	6997776	N/A	2020/10/15	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	6997115	N/A	2020/10/14	Nimarta Singh
Mercury in Water by CVAA	CV/AA	6998697	2020/10/14	2020/10/14	Meghaben Patel
Dissolved Metals by ICPMS	ICP/MS	6997525	N/A	2020/10/14	Azita Fazaeli
Ion Balance (% Difference)	CALC	6995080	N/A	2020/10/15	Automated Statchk
Total Ammonia-N	LACH/NH4	6997308	N/A	2020/10/14	Amanpreet Sappal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	6995468	N/A	2020/10/14	Chandra Nandlal
pH	AT	6997789	2020/10/13	2020/10/14	Surinder Rai
Phenols (4AAP)	TECH/PHEN	6998389	N/A	2020/10/14	Bramdeo Motiram
Sulphate by Automated Colourimetry	KONE	6997678	N/A	2020/10/14	Deonarine Ramnarine
Total Dissolved Solids	BAL	6997889	2020/10/13	2020/10/14	Shivani Desai
Total Kjeldahl Nitrogen in Water	SKAL	6997006	2020/10/13	2020/10/15	Rajni Tyagi
Total Phosphorus (Colourimetric)	LACH/P	6996951	2020/10/13	2020/10/14	Shivani Shivani
Volatile Organic Compounds in Water	P&T/MS	6995525	N/A	2020/10/13	Adriana Zurita

BV Labs ID: NWA692 Dup
Sample ID: MW1
Matrix: Water

Collected: 2020/10/06
Shipped:
Received: 2020/10/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Organic Carbon (DOC)	TOCV/NDIR	6997115	N/A	2020/10/14	Nimarta Singh

BV Labs ID: NWA693
Sample ID: MW3
Matrix: Water

Collected: 2020/10/06
Shipped:
Received: 2020/10/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	6997762	N/A	2020/10/14	Surinder Rai
Chloride by Automated Colourimetry	KONE	6997644	N/A	2020/10/14	Alina Dobreanu
Chemical Oxygen Demand	SPEC	6996642	N/A	2020/10/14	Nimarta Singh
Conductivity	AT	6997776	N/A	2020/10/15	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	6997115	N/A	2020/10/14	Nimarta Singh
Mercury in Water by CVAA	CV/AA	6998697	2020/10/14	2020/10/14	Meghaben Patel
Dissolved Metals by ICPMS	ICP/MS	6997525	N/A	2020/10/14	Azita Fazaeli
Ion Balance (% Difference)	CALC	6995080	N/A	2020/10/15	Automated Statchk
Total Ammonia-N	LACH/NH4	6997308	N/A	2020/10/14	Amanpreet Sappal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	6995468	N/A	2020/10/14	Chandra Nandlal
pH	AT	6997789	2020/10/13	2020/10/14	Surinder Rai
Phenols (4AAP)	TECH/PHEN	6998389	N/A	2020/10/14	Bramdeo Motiram
Sulphate by Automated Colourimetry	KONE	6997678	N/A	2020/10/14	Deonarine Ramnarine
Total Dissolved Solids	BAL	6997889	2020/10/13	2020/10/14	Shivani Desai
Total Kjeldahl Nitrogen in Water	SKAL	6997006	2020/10/13	2020/10/15	Rajni Tyagi

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TEST SUMMARY

BV Labs ID: NWA693
Sample ID: MW3
Matrix: Water

Collected: 2020/10/06
Shipped:
Received: 2020/10/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Phosphorus (Colourimetric)	LACH/P	6996951	2020/10/13	2020/10/14	Shivani Shivani
Volatile Organic Compounds in Water	P&T/MS	6995525	N/A	2020/10/13	Adriana Zurita

BV Labs ID: NWA694
Sample ID: MW4
Matrix: Water

Collected: 2020/10/06
Shipped:
Received: 2020/10/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	6995449	N/A	2020/10/11	Yogesh Patel
Chloride by Automated Colourimetry	KONE	6995466	N/A	2020/10/15	Alina Dobreanu
Chemical Oxygen Demand	SPEC	6996642	N/A	2020/10/14	Nimarta Singh
Conductivity	AT	6995450	N/A	2020/10/11	Yogesh Patel
Dissolved Organic Carbon (DOC)	TOCV/NDIR	6997115	N/A	2020/10/14	Nimarta Singh
Mercury in Water by CVAA	CV/AA	6998697	2020/10/14	2020/10/14	Meghaben Patel
Dissolved Metals by ICPMS	ICP/MS	6997525	N/A	2020/10/14	Azita Fazaeli
Ion Balance (% Difference)	CALC	6995080	N/A	2020/10/15	Automated Statchk
Total Ammonia-N	LACH/NH4	6997308	N/A	2020/10/14	Amanpreet Sappal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	6995435	N/A	2020/10/15	Chandra Nandlal
pH	AT	6995451	2020/10/10	2020/10/11	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	6998387	N/A	2020/10/14	Bramdeo Motiram
Sulphate by Automated Colourimetry	KONE	6995467	N/A	2020/10/15	Alina Dobreanu
Total Dissolved Solids	BAL	6996517	2020/10/13	2020/10/14	Massarat Jan
Total Kjeldahl Nitrogen in Water	SKAL	6997006	2020/10/13	2020/10/15	Rajni Tyagi
Total Phosphorus (Colourimetric)	LACH/P	6996951	2020/10/13	2020/10/14	Shivani Shivani
Volatile Organic Compounds in Water	P&T/MS	6995525	N/A	2020/10/13	Adriana Zurita

BV Labs ID: NWA695
Sample ID: MW5
Matrix: Water

Collected: 2020/10/06
Shipped:
Received: 2020/10/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	6997762	N/A	2020/10/14	Surinder Rai
Chloride by Automated Colourimetry	KONE	6997644	N/A	2020/10/14	Alina Dobreanu
Chemical Oxygen Demand	SPEC	6996642	N/A	2020/10/14	Nimarta Singh
Conductivity	AT	6997776	N/A	2020/10/15	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	6997115	N/A	2020/10/14	Nimarta Singh
Mercury in Water by CVAA	CV/AA	6998697	2020/10/14	2020/10/14	Meghaben Patel
Dissolved Metals by ICPMS	ICP/MS	6997525	N/A	2020/10/14	Azita Fazaeli
Ion Balance (% Difference)	CALC	6995080	N/A	2020/10/15	Automated Statchk
Total Ammonia-N	LACH/NH4	6997308	N/A	2020/10/14	Amanpreet Sappal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	6995468	N/A	2020/10/14	Chandra Nandlal
pH	AT	6997789	2020/10/13	2020/10/14	Surinder Rai
Phenols (4AAP)	TECH/PHEN	6996433	N/A	2020/10/13	Bramdeo Motiram
Sulphate by Automated Colourimetry	KONE	6997678	N/A	2020/10/14	Deonarine Ramnarine
Total Dissolved Solids	BAL	6997889	2020/10/13	2020/10/14	Shivani Desai

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TEST SUMMARY

BV Labs ID: NWA695
Sample ID: MW5
Matrix: Water

Collected: 2020/10/06
Shipped:
Received: 2020/10/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Kjeldahl Nitrogen in Water	SKAL	6997006	2020/10/13	2020/10/15	Rajni Tyagi
Total Phosphorus (Colourimetric)	LACH/P	6996951	2020/10/13	2020/10/14	Shivani Shivani
Volatile Organic Compounds in Water	P&T/MS	6995525	N/A	2020/10/13	Adriana Zurita

BV Labs ID: NWA696
Sample ID: MW6
Matrix: Water

Collected: 2020/10/06
Shipped:
Received: 2020/10/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	6997762	N/A	2020/10/14	Surinder Rai
Chloride by Automated Colourimetry	KONE	6997644	N/A	2020/10/14	Alina Dobreanu
Chemical Oxygen Demand	SPEC	6996642	N/A	2020/10/14	Nimarta Singh
Conductivity	AT	6997776	N/A	2020/10/15	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	6996983	N/A	2020/10/14	Nimarta Singh
Mercury in Water by CVAA	CV/AA	6998697	2020/10/14	2020/10/14	Meghaben Patel
Dissolved Metals by ICPMS	ICP/MS	6997525	N/A	2020/10/14	Azita Fazaeli
Ion Balance (% Difference)	CALC	6995080	N/A	2020/10/15	Automated Statchk
Total Ammonia-N	LACH/NH4	6997308	N/A	2020/10/14	Amanpreet Sappal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	6995468	N/A	2020/10/14	Chandra Nandlal
pH	AT	6997789	2020/10/13	2020/10/14	Surinder Rai
Phenols (4AAP)	TECH/PHEN	6998387	N/A	2020/10/14	Bramdeo Motiram
Sulphate by Automated Colourimetry	KONE	6997678	N/A	2020/10/14	Deonarine Ramnarine
Total Dissolved Solids	BAL	6997889	2020/10/13	2020/10/14	Shivani Desai
Total Kjeldahl Nitrogen in Water	SKAL	6997006	2020/10/13	2020/10/15	Rajni Tyagi
Total Phosphorus (Colourimetric)	LACH/P	6996951	2020/10/13	2020/10/14	Shivani Shivani
Volatile Organic Compounds in Water	P&T/MS	6995525	N/A	2020/10/13	Adriana Zurita

BV Labs ID: NWA697
Sample ID: SW1
Matrix: Water

Collected: 2020/10/07
Shipped:
Received: 2020/10/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	6997762	N/A	2020/10/14	Surinder Rai
Biochemical Oxygen Demand (BOD)	DO	6994661	2020/10/10	2020/10/15	Navjot Kaur Gill
Chloride by Automated Colourimetry	KONE	6997644	N/A	2020/10/14	Alina Dobreanu
Chemical Oxygen Demand	SPEC	6996642	N/A	2020/10/14	Nimarta Singh
Conductivity	AT	6997776	N/A	2020/10/15	Surinder Rai
Mercury in Water by CVAA	CV/AA	6998697	2020/10/14	2020/10/14	Meghaben Patel
Total Metals Analysis by ICPMS	ICP/MS	6997365	N/A	2020/10/15	Arefa Dabhad
Total Ammonia-N	LACH/NH4	6997308	N/A	2020/10/14	Amanpreet Sappal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	6995468	N/A	2020/10/14	Chandra Nandlal
pH	AT	6997789	2020/10/13	2020/10/14	Surinder Rai
Phenols (4AAP)	TECH/PHEN	6996433	N/A	2020/10/13	Bramdeo Motiram
Sulphate by Automated Colourimetry	KONE	6997678	N/A	2020/10/14	Deonarine Ramnarine
Total Dissolved Solids	BAL	6997889	2020/10/13	2020/10/14	Shivani Desai

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BV Labs Job #: C0Q6555
Report Date: 2020/10/15

exp Services Inc
Client Project #: THB-00011119-IE
Site Location: NAKINA LANDFILL, ON

TEST SUMMARY

BV Labs ID: NWA697
Sample ID: SW1
Matrix: Water

Collected: 2020/10/07
Shipped:
Received: 2020/10/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Kjeldahl Nitrogen in Water	SKAL	6996640	2020/10/13	2020/10/13	Rajni Tyagi
Total Phosphorus (Colourimetric)	LACH/P	6998893	2020/10/14	2020/10/14	Shivani Shivani
Low Level Total Suspended Solids	BAL	6996572	2020/10/13	2020/10/14	Massarat Jan

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	8.7°C

Results relate only to the items tested.

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BV Labs Job #: C0Q6555
Report Date: 2020/10/15

QUALITY ASSURANCE REPORT

exp Services Inc
Client Project #: THB-00011119-IE
Site Location: NAKINA LANDFILL, ON

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
6995525	4-Bromofluorobenzene	2020/10/13	102	70 - 130	102	70 - 130	98	%				
6995525	D4-1,2-Dichloroethane	2020/10/13	92	70 - 130	99	70 - 130	93	%				
6995525	D8-Toluene	2020/10/13	97	70 - 130	96	70 - 130	96	%				
6994661	Total BOD	2020/10/15					<2	mg/L	0	30	101	80 - 120
6995435	Nitrate (N)	2020/10/15	103	80 - 120	104	80 - 120	<0.10	mg/L	NC	20		
6995435	Nitrite (N)	2020/10/15	107	80 - 120	108	80 - 120	<0.010	mg/L	NC	20		
6995449	Alkalinity (Total as CaCO3)	2020/10/11			97	85 - 115	<1.0	mg/L	1.1	20		
6995450	Conductivity	2020/10/11			102	85 - 115	<1.0	umho/cm	0.072	25		
6995451	pH	2020/10/11			101	98 - 103			0.92	N/A		
6995466	Dissolved Chloride (Cl-)	2020/10/15	NC	80 - 120	102	80 - 120	<1.0	mg/L	2.8	20		
6995467	Dissolved Sulphate (SO4)	2020/10/15	12 (1)	75 - 125	102	80 - 120	<1.0	mg/L	NC	20		
6995468	Nitrate (N)	2020/10/14	91	80 - 120	95	80 - 120	<0.10	mg/L	NC	20		
6995468	Nitrite (N)	2020/10/14	105	80 - 120	107	80 - 120	<0.010	mg/L	NC	20		
6995525	1,4-Dichlorobenzene	2020/10/13	110	70 - 130	108	70 - 130	<0.20	ug/L	NC	30		
6995525	Benzene	2020/10/13	101	70 - 130	100	70 - 130	<0.10	ug/L	NC	30		
6995525	Methylene Chloride(Dichloromethane)	2020/10/13	105	70 - 130	108	70 - 130	<0.50	ug/L	NC	30		
6995525	Toluene	2020/10/13	98	70 - 130	93	70 - 130	<0.20	ug/L	2.7	30		
6995525	Vinyl Chloride	2020/10/13	113	70 - 130	104	70 - 130	<0.20	ug/L				
6996433	Phenols-4AAP	2020/10/13	103	80 - 120	100	80 - 120	<0.0010	mg/L	NC	20		
6996517	Total Dissolved Solids	2020/10/14					<10	mg/L	1.0	25	100	90 - 110
6996572	Total Suspended Solids	2020/10/14					<1	mg/L	13	25	95	85 - 115
6996640	Total Kjeldahl Nitrogen (TKN)	2020/10/13	108	80 - 120	100	80 - 120	<0.10	mg/L	NC	20	96	80 - 120
6996642	Total Chemical Oxygen Demand (COD)	2020/10/14	95	80 - 120	97	80 - 120	<4.0	mg/L	NC	20		
6996951	Total Phosphorus	2020/10/14	100	80 - 120	100	80 - 120	<0.020	mg/L	0.15	20	97	80 - 120
6996983	Dissolved Organic Carbon	2020/10/14	93	80 - 120	97	80 - 120	<0.40	mg/L	0.98	20		
6997006	Total Kjeldahl Nitrogen (TKN)	2020/10/15	NC	80 - 120	95	80 - 120	<0.10	mg/L	9.8	20	93	80 - 120
6997115	Dissolved Organic Carbon	2020/10/14	93	80 - 120	97	80 - 120	<0.40	mg/L	0.72	20		
6997308	Total Ammonia-N	2020/10/14	104	75 - 125	101	80 - 120	<0.050	mg/L	3.2	20		
6997365	Total Arsenic (As)	2020/10/14	101	80 - 120	98	80 - 120	<1.0	ug/L				
6997365	Total Barium (Ba)	2020/10/14	100	80 - 120	94	80 - 120	<2.0	ug/L				

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
6997365	Total Boron (B)	2020/10/14	75 (1)	80 - 120	89	80 - 120	<10	ug/L				
6997365	Total Cadmium (Cd)	2020/10/14	99	80 - 120	98	80 - 120	<0.090	ug/L	2.1	20		
6997365	Total Chromium (Cr)	2020/10/14	93	80 - 120	90	80 - 120	<5.0	ug/L	NC	20		
6997365	Total Copper (Cu)	2020/10/14	102	80 - 120	99	80 - 120	<0.90	ug/L	12	20		
6997365	Total Iron (Fe)	2020/10/14	100	80 - 120	97	80 - 120	<100	ug/L	9.4	20		
6997365	Total Lead (Pb)	2020/10/14	93	80 - 120	92	80 - 120	<0.50	ug/L	3.9	20		
6997365	Total Zinc (Zn)	2020/10/14	99	80 - 120	97	80 - 120	<5.0	ug/L	2.5	20		
6997525	Dissolved Arsenic (As)	2020/10/14	97	80 - 120	97	80 - 120	<1.0	ug/L	NC	20		
6997525	Dissolved Barium (Ba)	2020/10/14	97	80 - 120	100	80 - 120	<2.0	ug/L	3.7	20		
6997525	Dissolved Boron (B)	2020/10/14	94	80 - 120	97	80 - 120	<10	ug/L	3.6	20		
6997525	Dissolved Cadmium (Cd)	2020/10/14	96	80 - 120	99	80 - 120	<0.090	ug/L	NC	20		
6997525	Dissolved Calcium (Ca)	2020/10/14	NC	80 - 120	100	80 - 120	<200	ug/L				
6997525	Dissolved Chromium (Cr)	2020/10/14	96	80 - 120	97	80 - 120	<5.0	ug/L	NC	20		
6997525	Dissolved Copper (Cu)	2020/10/14	99	80 - 120	102	80 - 120	<0.90	ug/L	3.9	20		
6997525	Dissolved Iron (Fe)	2020/10/14	95	80 - 120	95	80 - 120	<100	ug/L				
6997525	Dissolved Lead (Pb)	2020/10/14	90	80 - 120	95	80 - 120	<0.50	ug/L	NC	20		
6997525	Dissolved Magnesium (Mg)	2020/10/14	NC	80 - 120	96	80 - 120	<50	ug/L				
6997525	Dissolved Manganese (Mn)	2020/10/14	96	80 - 120	96	80 - 120	<2.0	ug/L				
6997525	Dissolved Potassium (K)	2020/10/14	98	80 - 120	97	80 - 120	<200	ug/L				
6997525	Dissolved Sodium (Na)	2020/10/14	NC	80 - 120	97	80 - 120	<100	ug/L	2.5	20		
6997525	Dissolved Zinc (Zn)	2020/10/14	91	80 - 120	97	80 - 120	<5.0	ug/L	15	20		
6997644	Dissolved Chloride (Cl-)	2020/10/14	NC	80 - 120	105	80 - 120	<1.0	mg/L	1.7	20		
6997678	Dissolved Sulphate (SO4)	2020/10/14	NC	75 - 125	106	80 - 120	<1.0	mg/L	1.5	20		
6997762	Alkalinity (Total as CaCO3)	2020/10/14			95	85 - 115	<1.0	mg/L	0.87	20		
6997776	Conductivity	2020/10/15			101	85 - 115	<1.0	umho/cm	0.34	25		
6997789	pH	2020/10/14			101	98 - 103			0.30	N/A		
6997889	Total Dissolved Solids	2020/10/14					<10	mg/L	6.7	25	102	90 - 110
6998387	Phenols-4AAP	2020/10/14	102	80 - 120	98	80 - 120	<0.0010	mg/L	NC	20		
6998389	Phenols-4AAP	2020/10/14	102	80 - 120	99	80 - 120	<0.0010	mg/L	NC	20		
6998697	Mercury (Hg)	2020/10/14	94	75 - 125	97	80 - 120	<0.00010	mg/L	NC	20		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
6998893	Total Phosphorus	2020/10/14	95	80 - 120	88	80 - 120	<0.004	mg/L	3.8	20	85	80 - 120

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

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

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

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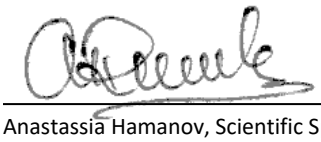
VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Anastassia Hamanov, Scientific Specialist

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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BUREAU VERITAS

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Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/6

CHAIN OF CUSTODY RECORD

Page 1 of 1

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: # 17501 EXP Services Inc	Company Name:	Quotation #: B90555	[X] Regular TAT (5-7 days) Most analyses
Contact Name: Ahileas Mitsopoulos	Contact Name: Ahileas Mitsopoulos, Sharif Nawyaz	P.O. #/ AFE#:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 1142 Roland St	Address:	Project #: THB-00011119-IE	Rush TAT (Surcharges will be applied)
Thunder Bay, ON, P7B 5M4		Site Location:	[ ] 1 Day [ ] 2 Days [ ] 3-4 Days
Phone: (807) 623-9495 Fax: (807) 623-8070	Phone: Fax:	Site #: Nakina Landfill	
Email:	Email: Ahileas.Mitsopoulos@exp.com	Site Location Province: ON	Date Required:
MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BUREAU VERITAS LABORATORIES' DRINKING WATER CHAIN OF CUSTODY		Sampled By: Elwin Farkas	Rush Confirmation #:

Regulation 153	Other Regulations
[ ] Table 1 [ ] Res/Park [*] Med/ Fine	[ ] CCME [ ] Sanitary Sewer Bylaw
[ ] Table 2 [ ] Ind/Comm [ ] Coarse	[ ] MISA [ ] Storm Sewer Bylaw
[ ] Table 3 [ ] Agri/ Other	[X] PWQO Region
[ ] Table ____	[X] Other (Specify) ODWS
FOR RSC (PLEASE CIRCLE) Y / N	[ ] REG 558 (MIN. 3 DAY TAT REQUIRED)
	[ ] REG 406 Table ____

Include Criteria on Certificate of Analysis: Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	Field Filtered (Please Circle Metals/Hg/Cr VI)	Landfill Standard Sch 5 - GW Comp. List	Landfill Standard Sch 5 - SW Comp. List											HOLD- DO NOT ANALYZE
1	MW1	10/6/2020	14:55	GW		X												12
2	MW3	10/6/2020	16:55	GW		X												12
3	MW4	10/6/2020	14:30	GW		X												10
4	MW5	10/6/2020	15:40	GW		X												12
5	MW6	10/6/2020	16:00	GW		X												12
6																		
7	SW1	10/7/2020	8:20	SW			X											10
8																		
9																		
10																		

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)
Sharif Nawyaz	10/8/2020	11:00	James Klapperich	2020/10/08	13:08
				2020/10/09	09:35

LABORATORY USE ONLY

CUSTODY SEAL Y / N		COOLER TEMPERATURES
Present	Intact	
N	N/A	10/9/7
N	N/A	8/8/8
		01/1/1 01/01

COOLING MEDIA PRESENT: (Y) / N

COMMENTS

Limited sample 10/10/08

Rec'd In Thunder Bay

09-Oct-20 11:26
Antonella Brasil
C0Q6557

URE ENV-1224

Your Project #: THB-00011119-JE
Site#: Nakina Landfill
Site Location: NAKINA LANDFILL
Your C.O.C. #: 825017-01-01, C#825018-01-01

Attention: Ahileas Mitsopoulos

exp Services Inc
Thunder Bay Branch
1142 Roland St
Thunder Bay, ON
CANADA P7B 5M4

Report Date: 2021/05/28
Report #: R6652867
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1D8248
Received: 2021/05/20, 14:30

Sample Matrix: Water
Samples Received: 7

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	1	N/A	2021/05/26	CAM SOP-00448	SM 23 2320 B m
Alkalinity	6	N/A	2021/05/27	CAM SOP-00448	SM 23 2320 B m
Biochemical Oxygen Demand (BOD)	1	2021/05/22	2021/05/27	CAM SOP-00427	SM 23 5210B m
Chloride by Automated Colourimetry	7	N/A	2021/05/26	CAM SOP-00463	SM 23 4500-Cl E m
Chemical Oxygen Demand	7	N/A	2021/05/26	CAM SOP-00416	SM 23 5220 D m
Conductivity	1	N/A	2021/05/26	CAM SOP-00414	SM 23 2510 m
Conductivity	6	N/A	2021/05/27	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	1	N/A	2021/05/26	CAM SOP-00446	SM 23 5310 B m
Dissolved Organic Carbon (DOC) (1)	5	N/A	2021/05/27	CAM SOP-00446	SM 23 5310 B m
Mercury in Water by CVAA	2	2021/05/25	2021/05/26	CAM SOP-00453	EPA 7470A m
Mercury in Water by CVAA	5	2021/05/26	2021/05/28	CAM SOP-00453	EPA 7470A m
Dissolved Metals by ICPMS	6	N/A	2021/05/26	CAM SOP-00447	EPA 6020B m
Total Metals Analysis by ICPMS	1	N/A	2021/05/27	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	6	N/A	2021/05/27		
Total Ammonia-N	7	N/A	2021/05/27	CAM SOP-00441	USGS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (2)	4	N/A	2021/05/26	CAM SOP-00440	SM 23 4500-NO3I/NO2B
Nitrate (NO3) and Nitrite (NO2) in Water (2)	3	N/A	2021/05/27	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	1	2021/05/25	2021/05/26	CAM SOP-00413	SM 4500H+ B m
pH	6	2021/05/25	2021/05/27	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	5	N/A	2021/05/25	CAM SOP-00444	OMOE E3179 m
Phenols (4AAP)	2	N/A	2021/05/26	CAM SOP-00444	OMOE E3179 m
Sulphate by Automated Colourimetry	7	N/A	2021/05/26	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids	5	2021/05/25	2021/05/26	CAM SOP-00428	SM 23 2540C m
Total Dissolved Solids	2	2021/05/26	2021/05/27	CAM SOP-00428	SM 23 2540C m
Total Kjeldahl Nitrogen in Water	7	2021/05/25	2021/05/25	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	1	2021/05/25	2021/05/26	CAM SOP-00407	SM 23 4500 P B H m
Total Phosphorus (Colourimetric)	2	2021/05/26	2021/05/26	CAM SOP-00407	SM 23 4500 P B H m
Total Phosphorus (Colourimetric)	4	2021/05/26	2021/05/27	CAM SOP-00407	SM 23 4500 P B H m
Low Level Total Suspended Solids	1	2021/05/25	2021/05/26	CAM SOP-00428	SM 23 2540D m
Volatile Organic Compounds in Water	4	N/A	2021/05/25	CAM SOP-00226	EPA 8260C m

Your Project #: THB-00011119-JE
Site#: Nakina Landfill
Site Location: NAKINA LANDFILL
Your C.O.C. #: 825017-01-01, C#825018-01-01

Attention: Ahileas Mitsopoulos

exp Services Inc
Thunder Bay Branch
1142 Roland St
Thunder Bay, ON
CANADA P7B 5M4

Report Date: 2021/05/28
Report #: R6652867
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1D8248
Received: 2021/05/20, 14:30

Sample Matrix: Water
Samples Received: 7

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Volatile Organic Compounds in Water	2	N/A	2021/05/26	CAM SOP-00226	EPA 8260C m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Your Project #: THB-00011119-JE
Site#: Nakina Landfill
Site Location: NAKINA LANDFILL
Your C.O.C. #: 825017-01-01, C#825018-01-01

Attention: Ahileas Mitsopoulos

exp Services Inc
Thunder Bay Branch
1142 Roland St
Thunder Bay, ON
CANADA P7B 5M4

Report Date: 2021/05/28
Report #: R6652867
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1D8248
Received: 2021/05/20, 14:30

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Michelle Huth, Project Manager Assistant
Email: michelle.brescacin@bureauveritas.com
Phone# (807)344-4220

==========

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BV Labs Job #: C1D8248
Report Date: 2021/05/28

exp Services Inc
Client Project #: THB-00011119-JE
Site Location: NAKINA LANDFILL
Sampler Initials: EF

LANDFILL STANDARDS SCH 5 - GW COMP. LIST (WATER)

BV Labs ID		PQC576			PQC576		
Sampling Date		2021/05/19 15:30			2021/05/19 15:30		
COC Number		825017-01-01			825017-01-01		
	UNITS	**MW1**	**RDL**	**QC Batch**	**MW1 Lab-Dup**	**RDL**	**QC Batch**
Inorganics							
Total Ammonia-N	mg/L	0.11	0.050	7369232			
Total Chemical Oxygen Demand (COD)	mg/L	28	4.0	7369557			
Conductivity	umho/cm	990	1.0	7369846			
Total Dissolved Solids	mg/L	490	10	7372880			
Total Kjeldahl Nitrogen (TKN)	mg/L	0.63	0.10	7369282			
Dissolved Organic Carbon	mg/L	4.5	0.40	7371762			
pH	pH	7.76		7369851			
Phenols-4AAP	mg/L	0.0010	0.0010	7369143			
Total Phosphorus	mg/L	0.28	0.020	7371717			
Dissolved Sulphate (SO4)	mg/L	<1.0	1.0	7369538			
Alkalinity (Total as CaCO3)	mg/L	550	1.0	7369834			
Dissolved Chloride (Cl-)	mg/L	2.8	1.0	7369546			
Nitrite (N)	mg/L	<0.010	0.010	7369818			
Nitrate (N)	mg/L	1.01	0.10	7369818			
Metals							
Mercury (Hg)	mg/L	<0.00010	0.00010	7371337			
Dissolved Arsenic (As)	ug/L	<1.0	1.0	7369850			
Dissolved Barium (Ba)	ug/L	49	2.0	7369850			
Dissolved Boron (B)	ug/L	54	10	7369850			
Dissolved Cadmium (Cd)	ug/L	<0.090	0.090	7369850			
Dissolved Calcium (Ca)	ug/L	210000	200	7369850			
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	7369850			
Dissolved Copper (Cu)	ug/L	6.6	0.90	7369850			
Dissolved Iron (Fe)	ug/L	<100	100	7369850			
Dissolved Lead (Pb)	ug/L	<0.50	0.50	7369850			
Dissolved Magnesium (Mg)	ug/L	13000	50	7369850			
Dissolved Manganese (Mn)	ug/L	250	2.0	7369850			
Dissolved Potassium (K)	ug/L	2200	200	7369850			
Dissolved Sodium (Na)	ug/L	3600	100	7369850			
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	7369850			
Volatile Organics							
Benzene	ug/L	<0.10	0.10	7365318	<0.10	0.10	7365318
1,4-Dichlorobenzene	ug/L	<0.20	0.20	7365318	<0.20	0.20	7365318

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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BV Labs Job #: C1D8248
Report Date: 2021/05/28

exp Services Inc
Client Project #: THB-00011119-JE
Site Location: NAKINA LANDFILL
Sampler Initials: EF

LANDFILL STANDARDS SCH 5 - GW COMP. LIST (WATER)

BV Labs ID		PQC576			PQC576		
Sampling Date		2021/05/19 15:30			2021/05/19 15:30		
COC Number		825017-01-01			825017-01-01		
	UNITS	**MW1**	**RDL**	**QC Batch**	**MW1 Lab-Dup**	**RDL**	**QC Batch**
Methylene Chloride(Dichloromethane)	ug/L	<0.50	0.50	7365318	<0.50	0.50	7365318
Toluene	ug/L	<0.20	0.20	7365318	<0.20	0.20	7365318
Vinyl Chloride	ug/L	<0.20	0.20	7365318	<0.20	0.20	7365318
Surrogate Recovery (%)							
4-Bromofluorobenzene	%	101		7365318	103		7365318
D4-1,2-Dichloroethane	%	95		7365318	96		7365318
D8-Toluene	%	98		7365318	99		7365318

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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BV Labs Job #: C1D8248
Report Date: 2021/05/28

exp Services Inc
Client Project #: THB-00011119-JE
Site Location: NAKINA LANDFILL
Sampler Initials: EF

LANDFILL STANDARDS SCH 5 - GW COMP. LIST (WATER)

BV Labs ID		PQC577			PQC577		
Sampling Date		2021/05/19 16:40			2021/05/19 16:40		
COC Number		825017-01-01			825017-01-01		
	UNITS	**MW2**	**RDL**	**QC Batch**	**MW2 Lab-Dup**	**RDL**	**QC Batch**
Inorganics							
Total Ammonia-N	mg/L	0.11	0.050	7369539			
Total Chemical Oxygen Demand (COD)	mg/L	15	4.0	7369557			
Conductivity	umho/cm	330	1.0	7369846			
Total Dissolved Solids	mg/L	145	10	7367666			
Total Kjeldahl Nitrogen (TKN)	mg/L	0.52	0.10	7369282			
Dissolved Organic Carbon	mg/L	3.2	0.40	7372408			
pH	pH	8.23		7369851			
Phenols-4AAP	mg/L	<0.0010	0.0010	7369253			
Total Phosphorus	mg/L	1.2	0.10	7371717			
Dissolved Sulphate (SO4)	mg/L	<1.0	1.0	7370328	<1.0	1.0	7370328
Alkalinity (Total as CaCO3)	mg/L	170	1.0	7369834			
Dissolved Chloride (Cl-)	mg/L	3.1	1.0	7370322	3.6	1.0	7370322
Nitrite (N)	mg/L	<0.010	0.010	7369818			
Nitrate (N)	mg/L	<0.10	0.10	7369818			
Metals							
Mercury (Hg)	mg/L	<0.00010	0.00010	7369482	<0.00010	0.00010	7369482
Dissolved Arsenic (As)	ug/L	<1.0	1.0	7369850	<1.0	1.0	7369850
Dissolved Barium (Ba)	ug/L	8.2	2.0	7369850	8.2	2.0	7369850
Dissolved Boron (B)	ug/L	<10	10	7369850	<10	10	7369850
Dissolved Cadmium (Cd)	ug/L	<0.090	0.090	7369850	<0.090	0.090	7369850
Dissolved Calcium (Ca)	ug/L	53000	200	7369850	53000	200	7369850
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	7369850	<5.0	5.0	7369850
Dissolved Copper (Cu)	ug/L	2.6	0.90	7369850	2.5	0.90	7369850
Dissolved Iron (Fe)	ug/L	<100	100	7369850	<100	100	7369850
Dissolved Lead (Pb)	ug/L	<0.50	0.50	7369850	<0.50	0.50	7369850
Dissolved Magnesium (Mg)	ug/L	9300	50	7369850	9500	50	7369850
Dissolved Manganese (Mn)	ug/L	<2.0	2.0	7369850	<2.0	2.0	7369850
Dissolved Potassium (K)	ug/L	540	200	7369850	550	200	7369850
Dissolved Sodium (Na)	ug/L	2700	100	7369850	2700	100	7369850
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	7369850	<5.0	5.0	7369850
Volatile Organics							
Benzene	ug/L	<0.10	0.10	7365318			
1,4-Dichlorobenzene	ug/L	<0.20	0.20	7365318			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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LANDFILL STANDARDS SCH 5 - GW COMP. LIST (WATER)

BV Labs ID		PQC577			PQC577		
Sampling Date		2021/05/19 16:40			2021/05/19 16:40		
COC Number		825017-01-01			825017-01-01		
	UNITS	**MW2**	**RDL**	**QC Batch**	**MW2 Lab-Dup**	**RDL**	**QC Batch**
Methylene Chloride(Dichloromethane)	ug/L	<0.50	0.50	7365318			
Toluene	ug/L	<0.20	0.20	7365318			
Vinyl Chloride	ug/L	<0.20	0.20	7365318			
Surrogate Recovery (%)							
4-Bromofluorobenzene	%	101		7365318			
D4-1,2-Dichloroethane	%	96		7365318			
D8-Toluene	%	98		7365318			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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BV Labs Job #: C1D8248
Report Date: 2021/05/28

exp Services Inc
Client Project #: THB-00011119-JE
Site Location: NAKINA LANDFILL
Sampler Initials: EF

LANDFILL STANDARDS SCH 5 - GW COMP. LIST (WATER)

BV Labs ID		PQC578			PQC579		
Sampling Date		2021/05/19 13:45			2021/05/19 16:55		
COC Number		825017-01-01			825017-01-01		
	UNITS	**MW3**	**RDL**	**QC Batch**	**MW4**	**RDL**	**QC Batch**
Inorganics							
Total Ammonia-N	mg/L	<0.050	0.050	7369539	0.077	0.050	7369232
Total Chemical Oxygen Demand (COD)	mg/L	8.4	4.0	7369557	18	4.0	7369557
Conductivity	umho/cm	2500	1.0	7369846	350	1.0	7369846
Total Dissolved Solids	mg/L	1410	10	7367666	140	10	7367666
Total Kjeldahl Nitrogen (TKN)	mg/L	0.13	0.10	7369288	0.23	0.10	7369282
Dissolved Organic Carbon	mg/L	2.2	0.40	7372408	2.9	0.40	7372408
pH	pH	8.01		7369851	8.26		7369851
Phenols-4AAP	mg/L	<0.0010	0.0010	7369253	0.0020	0.0010	7369143
Total Phosphorus	mg/L	0.092	0.020	7370835	0.43	0.10	7370835
Dissolved Sulphate (SO4)	mg/L	16	1.0	7369538	<1.0	1.0	7369538
Alkalinity (Total as CaCO3)	mg/L	290	1.0	7369834	190	1.0	7369834
Dissolved Chloride (Cl-)	mg/L	640	7.0	7369546	<1.0	1.0	7369546
Nitrite (N)	mg/L	<0.010	0.010	7369794	<0.010	0.010	7369818
Nitrate (N)	mg/L	0.69	0.10	7369794	0.11	0.10	7369818
Metals							
Mercury (Hg)	mg/L	<0.00010	0.00010	7371337	<0.00010	0.00010	7371337
Dissolved Arsenic (As)	ug/L	<1.0	1.0	7369850	<1.0	1.0	7369850
Dissolved Barium (Ba)	ug/L	64	2.0	7369850	12	2.0	7369850
Dissolved Boron (B)	ug/L	14	10	7369850	13	10	7369850
Dissolved Cadmium (Cd)	ug/L	<0.090	0.090	7369850	<0.090	0.090	7369850
Dissolved Calcium (Ca)	ug/L	160000	200	7369850	61000	200	7369850
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	7369850	<5.0	5.0	7369850
Dissolved Copper (Cu)	ug/L	4.3	0.90	7369850	1.0	0.90	7369850
Dissolved Iron (Fe)	ug/L	<100	100	7369850	<100	100	7369850
Dissolved Lead (Pb)	ug/L	<0.50	0.50	7369850	<0.50	0.50	7369850
Dissolved Magnesium (Mg)	ug/L	20000	50	7369850	9700	50	7369850
Dissolved Manganese (Mn)	ug/L	2.2	2.0	7369850	<2.0	2.0	7369850
Dissolved Potassium (K)	ug/L	2500	200	7369850	920	200	7369850
Dissolved Sodium (Na)	ug/L	350000	100	7369850	1700	100	7369850
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	7369850	<5.0	5.0	7369850
Volatile Organics							
Benzene	ug/L	<0.10	0.10	7365318	<0.10	0.10	7365318
1,4-Dichlorobenzene	ug/L	<0.20	0.20	7365318	<0.20	0.20	7365318

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: C1D8248
Report Date: 2021/05/28

exp Services Inc
Client Project #: THB-00011119-JE
Site Location: NAKINA LANDFILL
Sampler Initials: EF

LANDFILL STANDARDS SCH 5 - GW COMP. LIST (WATER)

BV Labs ID		PQC578			PQC579		
Sampling Date		2021/05/19 13:45			2021/05/19 16:55		
COC Number		825017-01-01			825017-01-01		
	UNITS	**MW3**	**RDL**	**QC Batch**	**MW4**	**RDL**	**QC Batch**
Methylene Chloride(Dichloromethane)	ug/L	<0.50	0.50	7365318	<0.50	0.50	7365318
Toluene	ug/L	<0.20	0.20	7365318	<0.20	0.20	7365318
Vinyl Chloride	ug/L	<0.20	0.20	7365318	<0.20	0.20	7365318
Surrogate Recovery (%)							
4-Bromofluorobenzene	%	101		7365318	103		7365318
D4-1,2-Dichloroethane	%	95		7365318	96		7365318
D8-Toluene	%	97		7365318	98		7365318

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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LANDFILL STANDARDS SCH 5 - GW COMP. LIST (WATER)

BV Labs ID		PQC580			PQC581		
Sampling Date		2021/05/19 16:15			2021/05/19 13:10		
COC Number		825017-01-01			825017-01-01		
	UNITS	**MW5**	**RDL**	**QC Batch**	**MW6**	**RDL**	**QC Batch**
Inorganics							
Total Ammonia-N	mg/L	0.095	0.050	7369539	0.15	0.050	7369539
Total Chemical Oxygen Demand (COD)	mg/L	41	4.0	7369557	40	4.0	7369557
Conductivity	umho/cm	1700	1.0	7369846	1700	1.0	7369866
Total Dissolved Solids	mg/L	810	10	7367666	960	10	7367666
Total Kjeldahl Nitrogen (TKN)	mg/L	0.73	0.10	7369600	0.79	0.10	7369282
Dissolved Organic Carbon	mg/L	13	0.40	7372408	13	0.40	7372408
pH	pH	7.55		7369851	7.33		7369873
Phenols-4AAP	mg/L	<0.0010	0.0010	7369143	<0.0010	0.0010	7369143
Total Phosphorus	mg/L	0.13	0.040	7371717	0.14	0.020	7371280
Dissolved Sulphate (SO4)	mg/L	39	1.0	7369538	38	1.0	7369538
Alkalinity (Total as CaCO3)	mg/L	850	1.0	7369834	840	1.0	7369871
Dissolved Chloride (Cl-)	mg/L	65	1.0	7369546	64	1.0	7369546
Nitrite (N)	mg/L	<0.010	0.010	7369794	<0.010	0.010	7369794
Nitrate (N)	mg/L	<0.10	0.10	7369794	<0.10	0.10	7369794
Metals							
Mercury (Hg)	mg/L	<0.00010	0.00010	7371349	<0.00010	0.00010	7369482
Dissolved Arsenic (As)	ug/L	<1.0	1.0	7369850	<1.0	1.0	7369850
Dissolved Barium (Ba)	ug/L	84	2.0	7369850	89	2.0	7369850
Dissolved Boron (B)	ug/L	510	10	7369850	510	10	7369850
Dissolved Cadmium (Cd)	ug/L	<0.090	0.090	7369850	<0.090	0.090	7369850
Dissolved Calcium (Ca)	ug/L	260000	200	7369850	270000	200	7369850
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	7369850	<5.0	5.0	7369850
Dissolved Copper (Cu)	ug/L	20	0.90	7369850	20	0.90	7369850
Dissolved Iron (Fe)	ug/L	<100	100	7369850	<100	100	7369850
Dissolved Lead (Pb)	ug/L	<0.50	0.50	7369850	<0.50	0.50	7369850
Dissolved Magnesium (Mg)	ug/L	48000	50	7369850	47000	50	7369850
Dissolved Manganese (Mn)	ug/L	2300	2.0	7369850	2300	2.0	7369850
Dissolved Potassium (K)	ug/L	3100	200	7369850	3100	200	7369850
Dissolved Sodium (Na)	ug/L	65000	100	7369850	66000	100	7369850
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	7369850	<5.0	5.0	7369850
Volatile Organics							
Benzene	ug/L	0.89	0.25	7365318	0.90	0.25	7365318
1,4-Dichlorobenzene	ug/L	<0.50	0.50	7365318	<0.50	0.50	7365318

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

LANDFILL STANDARDS SCH 5 - GW COMP. LIST (WATER)

BV Labs ID		PQC580			PQC581		
Sampling Date		2021/05/19 16:15			2021/05/19 13:10		
COC Number		825017-01-01			825017-01-01		
	UNITS	**MW5**	**RDL**	**QC Batch**	**MW6**	**RDL**	**QC Batch**
Methylene Chloride(Dichloromethane)	ug/L	<1.3	1.3	7365318	<1.3	1.3	7365318
Toluene	ug/L	<0.50	0.50	7365318	<0.50	0.50	7365318
Vinyl Chloride	ug/L	3.1	0.50	7365318	3.1	0.50	7365318
Surrogate Recovery (%)							
4-Bromofluorobenzene	%	101		7365318	100		7365318
D4-1,2-Dichloroethane	%	90		7365318	90		7365318
D8-Toluene	%	100		7365318	101		7365318

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

BV Labs ID		PQC581		
Sampling Date		2021/05/19 13:10		
COC Number		825017-01-01		
	UNITS	**MW6 Lab-Dup**	**RDL**	**QC Batch**
Inorganics				
Conductivity	umho/cm	1700	1.0	7369866
pH	pH	7.40		7369873
Alkalinity (Total as CaCO3)	mg/L	850	1.0	7369871

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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Report Date: 2021/05/28

exp Services Inc
Client Project #: THB-00011119-JE
Site Location: NAKINA LANDFILL
Sampler Initials: EF

LANDFILL STANDARDS SCH 5 - SW COMP. LIST (WATER)

BV Labs ID		PQC623			PQC623		
Sampling Date		2021/05/19 14:30			2021/05/19 14:30		
COC Number		C#825018-01-01			C#825018-01-01		
	UNITS	**SW1**	**RDL**	**QC Batch**	**SW1 Lab-Dup**	**RDL**	**QC Batch**
Inorganics							
Total Ammonia-N	mg/L	0.15	0.050	7369539			
Total BOD	mg/L	<2	2	7367405	<2	2	7367405
Total Chemical Oxygen Demand (COD)	mg/L	32	4.0	7369557			
Conductivity	umho/cm	190	1.0	7369852			
Total Dissolved Solids	mg/L	80	10	7372880			
Total Kjeldahl Nitrogen (TKN)	mg/L	0.70	0.10	7369282			
pH	pH	8.20		7369858			
Phenols-4AAP	mg/L	<0.0010	0.0010	7369253			
Total Phosphorus	mg/L	0.011	0.004	7369536			
Total Suspended Solids	mg/L	3	1	7367787			
Dissolved Sulphate (SO4)	mg/L	6.1	1.0	7369538			
Alkalinity (Total as CaCO3)	mg/L	89	1.0	7369863			
Dissolved Chloride (Cl-)	mg/L	1.8	1.0	7369546			
Nitrite (N)	mg/L	<0.010	0.010	7369818			
Nitrate (N)	mg/L	<0.10	0.10	7369818			
Metals							
Mercury (Hg)	mg/L	<0.00010	0.00010	7371349			
Total Arsenic (As)	ug/L	<1.0	1.0	7373388			
Total Barium (Ba)	ug/L	6.8	2.0	7373388			
Total Boron (B)	ug/L	35	10	7373388			
Total Cadmium (Cd)	ug/L	<0.090	0.090	7373388			
Total Chromium (Cr)	ug/L	<5.0	5.0	7373388			
Total Copper (Cu)	ug/L	<0.90	0.90	7373388			
Total Iron (Fe)	ug/L	<100	100	7373388			
Total Lead (Pb)	ug/L	<0.50	0.50	7373388			
Total Zinc (Zn)	ug/L	<5.0	5.0	7373388			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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BV Labs Job #: C1D8248
Report Date: 2021/05/28

exp Services Inc
Client Project #: THB-00011119-JE
Site Location: NAKINA LANDFILL
Sampler Initials: EF

RESULTS OF ANALYSES OF WATER

BV Labs ID		PQC576	PQC577	PQC578	PQC579	PQC580	PQC581	
Sampling Date		2021/05/19 15:30	2021/05/19 16:40	2021/05/19 13:45	2021/05/19 16:55	2021/05/19 16:15	2021/05/19 13:10	
COC Number		825017-01-01	825017-01-01	825017-01-01	825017-01-01	825017-01-01	825017-01-01	
	UNITS	**MW1**	**MW2**	**MW3**	**MW4**	**MW5**	**MW6**	**QC Batch**
Calculated Parameters								
Ion Balance (% Difference)	%	1.63	1.18	0.910	1.99	0.830	2.41	7365778
QC Batch = Quality Control Batch								

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TEST SUMMARY

BV Labs ID: PQC576
Sample ID: MW1
Matrix: Water

Collected: 2021/05/19
Shipped:
Received: 2021/05/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7369834	N/A	2021/05/27	Surinder Rai
Chloride by Automated Colourimetry	KONE	7369546	N/A	2021/05/26	Alina Dobreanu
Chemical Oxygen Demand	SPEC	7369557	N/A	2021/05/26	Nimarta Singh
Conductivity	AT	7369846	N/A	2021/05/27	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7371762	N/A	2021/05/26	Nimarta Singh
Mercury in Water by CVAA	CV/AA	7371337	2021/05/26	2021/05/28	Medhat Nasr
Dissolved Metals by ICPMS	ICP/MS	7369850	N/A	2021/05/26	Prempal Bhatti
Ion Balance (% Difference)	CALC	7365778	N/A	2021/05/27	Automated Statchk
Total Ammonia-N	LACH/NH4	7369232	N/A	2021/05/27	Amanpreet Sappal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	7369818	N/A	2021/05/26	Chandra Nandlal
pH	AT	7369851	2021/05/25	2021/05/27	Surinder Rai
Phenols (4AAP)	TECH/PHEN	7369143	N/A	2021/05/25	Deonarine Ramnarine
Sulphate by Automated Colourimetry	KONE	7369538	N/A	2021/05/26	Avneet Kour Sudan
Total Dissolved Solids	BAL	7372880	2021/05/26	2021/05/27	Shivani Desai
Total Kjeldahl Nitrogen in Water	SKAL	7369282	2021/05/25	2021/05/25	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	7371717	2021/05/26	2021/05/27	Shivani Shivani
Volatile Organic Compounds in Water	P&T/MS	7365318	N/A	2021/05/25	Gladys Guerrero

BV Labs ID: PQC576 Dup
Sample ID: MW1
Matrix: Water

Collected: 2021/05/19
Shipped:
Received: 2021/05/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Volatile Organic Compounds in Water	P&T/MS	7365318	N/A	2021/05/25	Gladys Guerrero

BV Labs ID: PQC577
Sample ID: MW2
Matrix: Water

Collected: 2021/05/19
Shipped:
Received: 2021/05/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7369834	N/A	2021/05/27	Surinder Rai
Chloride by Automated Colourimetry	KONE	7370322	N/A	2021/05/26	Alina Dobreanu
Chemical Oxygen Demand	SPEC	7369557	N/A	2021/05/26	Nimarta Singh
Conductivity	AT	7369846	N/A	2021/05/27	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7372408	N/A	2021/05/27	Nimarta Singh
Mercury in Water by CVAA	CV/AA	7369482	2021/05/25	2021/05/26	Meghaben Patel
Dissolved Metals by ICPMS	ICP/MS	7369850	N/A	2021/05/26	Prempal Bhatti
Ion Balance (% Difference)	CALC	7365778	N/A	2021/05/27	Automated Statchk
Total Ammonia-N	LACH/NH4	7369539	N/A	2021/05/27	Amanpreet Sappal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	7369818	N/A	2021/05/26	Chandra Nandlal
pH	AT	7369851	2021/05/25	2021/05/27	Surinder Rai
Phenols (4AAP)	TECH/PHEN	7369253	N/A	2021/05/25	Deonarine Ramnarine
Sulphate by Automated Colourimetry	KONE	7370328	N/A	2021/05/26	Avneet Kour Sudan
Total Dissolved Solids	BAL	7367666	2021/05/25	2021/05/26	Sandeep Kaur

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BV Labs Job #: C1D8248
Report Date: 2021/05/28

exp Services Inc
Client Project #: THB-00011119-JE
Site Location: NAKINA LANDFILL
Sampler Initials: EF

TEST SUMMARY

BV Labs ID: PQC577
Sample ID: MW2
Matrix: Water

Collected: 2021/05/19
Shipped:
Received: 2021/05/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Kjeldahl Nitrogen in Water	SKAL	7369282	2021/05/25	2021/05/25	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	7371717	2021/05/26	2021/05/27	Shivani Shivani
Volatile Organic Compounds in Water	P&T/MS	7365318	N/A	2021/05/25	Gladys Guerrero

BV Labs ID: PQC577 Dup
Sample ID: MW2
Matrix: Water

Collected: 2021/05/19
Shipped:
Received: 2021/05/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	KONE	7370322	N/A	2021/05/26	Alina Dobreanu
Mercury in Water by CVAA	CV/AA	7369482	2021/05/25	2021/05/26	Meghaben Patel
Dissolved Metals by ICPMS	ICP/MS	7369850	N/A	2021/05/26	Prempal Bhatti
Sulphate by Automated Colourimetry	KONE	7370328	N/A	2021/05/26	Avneet Kour Sudan

BV Labs ID: PQC578
Sample ID: MW3
Matrix: Water

Collected: 2021/05/19
Shipped:
Received: 2021/05/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7369834	N/A	2021/05/27	Surinder Rai
Chloride by Automated Colourimetry	KONE	7369546	N/A	2021/05/26	Alina Dobreanu
Chemical Oxygen Demand	SPEC	7369557	N/A	2021/05/26	Nimarta Singh
Conductivity	AT	7369846	N/A	2021/05/27	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7372408	N/A	2021/05/27	Nimarta Singh
Mercury in Water by CVAA	CV/AA	7371337	2021/05/26	2021/05/28	Medhat Nasr
Dissolved Metals by ICPMS	ICP/MS	7369850	N/A	2021/05/26	Prempal Bhatti
Ion Balance (% Difference)	CALC	7365778	N/A	2021/05/27	Automated Statchk
Total Ammonia-N	LACH/NH4	7369539	N/A	2021/05/27	Amanpreet Sappal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	7369794	N/A	2021/05/27	Chandra Nandlal
pH	AT	7369851	2021/05/25	2021/05/27	Surinder Rai
Phenols (4AAP)	TECH/PHEN	7369253	N/A	2021/05/25	Deonarine Ramnarine
Sulphate by Automated Colourimetry	KONE	7369538	N/A	2021/05/26	Avneet Kour Sudan
Total Dissolved Solids	BAL	7367666	2021/05/25	2021/05/26	Sandeep Kaur
Total Kjeldahl Nitrogen in Water	SKAL	7369288	2021/05/25	2021/05/25	Rajni Tyagi
Total Phosphorus (Colourimetric)	LACH/P	7370835	2021/05/26	2021/05/26	Shivani Shivani
Volatile Organic Compounds in Water	P&T/MS	7365318	N/A	2021/05/25	Gladys Guerrero

BV Labs ID: PQC579
Sample ID: MW4
Matrix: Water

Collected: 2021/05/19
Shipped:
Received: 2021/05/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7369834	N/A	2021/05/27	Surinder Rai
Chloride by Automated Colourimetry	KONE	7369546	N/A	2021/05/26	Alina Dobreanu

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BV Labs Job #: C1D8248
Report Date: 2021/05/28

exp Services Inc
Client Project #: THB-00011119-JE
Site Location: NAKINA LANDFILL
Sampler Initials: EF

TEST SUMMARY

BV Labs ID: PQC579
Sample ID: MW4
Matrix: Water

Collected: 2021/05/19
Shipped:
Received: 2021/05/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chemical Oxygen Demand	SPEC	7369557	N/A	2021/05/26	Nimarta Singh
Conductivity	AT	7369846	N/A	2021/05/27	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7372408	N/A	2021/05/27	Nimarta Singh
Mercury in Water by CVAA	CV/AA	7371337	2021/05/26	2021/05/28	Medhat Nasr
Dissolved Metals by ICPMS	ICP/MS	7369850	N/A	2021/05/26	Prempal Bhatti
Ion Balance (% Difference)	CALC	7365778	N/A	2021/05/27	Automated Statchk
Total Ammonia-N	LACH/NH4	7369232	N/A	2021/05/27	Amanpreet Sappal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	7369818	N/A	2021/05/26	Chandra Nandlal
pH	AT	7369851	2021/05/25	2021/05/27	Surinder Rai
Phenols (4AAP)	TECH/PHEN	7369143	N/A	2021/05/25	Deonarine Ramnarine
Sulphate by Automated Colourimetry	KONE	7369538	N/A	2021/05/26	Avneet Kour Sudan
Total Dissolved Solids	BAL	7367666	2021/05/25	2021/05/26	Sandeep Kaur
Total Kjeldahl Nitrogen in Water	SKAL	7369282	2021/05/25	2021/05/25	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	7370835	2021/05/26	2021/05/26	Shivani Shivani
Volatile Organic Compounds in Water	P&T/MS	7365318	N/A	2021/05/25	Gladys Guerrero

BV Labs ID: PQC580
Sample ID: MW5
Matrix: Water

Collected: 2021/05/19
Shipped:
Received: 2021/05/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7369834	N/A	2021/05/27	Surinder Rai
Chloride by Automated Colourimetry	KONE	7369546	N/A	2021/05/26	Alina Dobreanu
Chemical Oxygen Demand	SPEC	7369557	N/A	2021/05/26	Nimarta Singh
Conductivity	AT	7369846	N/A	2021/05/27	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7372408	N/A	2021/05/27	Nimarta Singh
Mercury in Water by CVAA	CV/AA	7371349	2021/05/26	2021/05/28	Medhat Nasr
Dissolved Metals by ICPMS	ICP/MS	7369850	N/A	2021/05/26	Prempal Bhatti
Ion Balance (% Difference)	CALC	7365778	N/A	2021/05/27	Automated Statchk
Total Ammonia-N	LACH/NH4	7369539	N/A	2021/05/27	Amanpreet Sappal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	7369794	N/A	2021/05/27	Chandra Nandlal
pH	AT	7369851	2021/05/25	2021/05/27	Surinder Rai
Phenols (4AAP)	TECH/PHEN	7369143	N/A	2021/05/26	Deonarine Ramnarine
Sulphate by Automated Colourimetry	KONE	7369538	N/A	2021/05/26	Avneet Kour Sudan
Total Dissolved Solids	BAL	7367666	2021/05/25	2021/05/26	Sandeep Kaur
Total Kjeldahl Nitrogen in Water	SKAL	7369600	2021/05/25	2021/05/25	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	7371717	2021/05/26	2021/05/27	Shivani Shivani
Volatile Organic Compounds in Water	P&T/MS	7365318	N/A	2021/05/26	Gladys Guerrero

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exp Services Inc
Client Project #: THB-00011119-JE
Site Location: NAKINA LANDFILL
Sampler Initials: EF

TEST SUMMARY

BV Labs ID: PQC581
Sample ID: MW6
Matrix: Water

Collected: 2021/05/19
Shipped:
Received: 2021/05/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7369871	N/A	2021/05/26	Surinder Rai
Chloride by Automated Colourimetry	KONE	7369546	N/A	2021/05/26	Alina Dobreanu
Chemical Oxygen Demand	SPEC	7369557	N/A	2021/05/26	Nimarta Singh
Conductivity	AT	7369866	N/A	2021/05/26	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7372408	N/A	2021/05/27	Nimarta Singh
Mercury in Water by CVAA	CV/AA	7369482	2021/05/25	2021/05/26	Meghaben Patel
Dissolved Metals by ICPMS	ICP/MS	7369850	N/A	2021/05/26	Prempal Bhatti
Ion Balance (% Difference)	CALC	7365778	N/A	2021/05/27	Automated Statchk
Total Ammonia-N	LACH/NH4	7369539	N/A	2021/05/27	Amanpreet Sappal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	7369794	N/A	2021/05/27	Chandra Nandlal
pH	AT	7369873	2021/05/25	2021/05/26	Surinder Rai
Phenols (4AAP)	TECH/PHEN	7369143	N/A	2021/05/26	Deonarine Ramnarine
Sulphate by Automated Colourimetry	KONE	7369538	N/A	2021/05/26	Avneet Kour Sudan
Total Dissolved Solids	BAL	7367666	2021/05/25	2021/05/26	Sandeep Kaur
Total Kjeldahl Nitrogen in Water	SKAL	7369282	2021/05/25	2021/05/25	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	7371280	2021/05/26	2021/05/27	Shivani Shivani
Volatile Organic Compounds in Water	P&T/MS	7365318	N/A	2021/05/26	Gladys Guerrero

BV Labs ID: PQC581 Dup
Sample ID: MW6
Matrix: Water

Collected: 2021/05/19
Shipped:
Received: 2021/05/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7369871	N/A	2021/05/26	Surinder Rai
Conductivity	AT	7369866	N/A	2021/05/26	Surinder Rai
pH	AT	7369873	2021/05/25	2021/05/26	Surinder Rai

BV Labs ID: PQC623
Sample ID: SW1
Matrix: Water

Collected: 2021/05/19
Shipped:
Received: 2021/05/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7369863	N/A	2021/05/27	Surinder Rai
Biochemical Oxygen Demand (BOD)	DO	7367405	2021/05/22	2021/05/27	Nusrat Naz
Chloride by Automated Colourimetry	KONE	7369546	N/A	2021/05/26	Alina Dobreanu
Chemical Oxygen Demand	SPEC	7369557	N/A	2021/05/26	Nimarta Singh
Conductivity	AT	7369852	N/A	2021/05/27	Surinder Rai
Mercury in Water by CVAA	CV/AA	7371349	2021/05/26	2021/05/28	Medhat Nasr
Total Metals Analysis by ICPMS	ICP/MS	7373388	N/A	2021/05/27	Prempal Bhatti
Total Ammonia-N	LACH/NH4	7369539	N/A	2021/05/27	Amanpreet Sappal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	7369818	N/A	2021/05/26	Chandra Nandlal
pH	AT	7369858	2021/05/25	2021/05/27	Surinder Rai
Phenols (4AAP)	TECH/PHEN	7369253	N/A	2021/05/25	Deonarine Ramnarine
Sulphate by Automated Colourimetry	KONE	7369538	N/A	2021/05/26	Avneet Kour Sudan

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BV Labs Job #: C1D8248
Report Date: 2021/05/28

exp Services Inc
Client Project #: THB-00011119-JE
Site Location: NAKINA LANDFILL
Sampler Initials: EF

TEST SUMMARY

BV Labs ID: PQC623
Sample ID: SW1
Matrix: Water

Collected: 2021/05/19
Shipped:
Received: 2021/05/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Dissolved Solids	BAL	7372880	2021/05/26	2021/05/27	Shivani Desai
Total Kjeldahl Nitrogen in Water	SKAL	7369282	2021/05/25	2021/05/25	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	7369536	2021/05/25	2021/05/26	Shivani Shivani
Low Level Total Suspended Solids	BAL	7367787	2021/05/25	2021/05/26	Shaneil Hall

BV Labs ID: PQC623 Dup
Sample ID: SW1
Matrix: Water

Collected: 2021/05/19
Shipped:
Received: 2021/05/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Biochemical Oxygen Demand (BOD)	DO	7367405	2021/05/22	2021/05/27	Nusrat Naz

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	7.0°C
Package 2	7.0°C

Sample PQC580 [MW5] : VOC Water Analysis: Due to foaming, sample required dilution. The detection limits were adjusted accordingly.

Sample PQC581 [MW6] : VOC Water Analysis: Due to foaming, sample required dilution. The detection limits were adjusted accordingly.

Results relate only to the items tested.

BV Labs Job #: C1D8248
Report Date: 2021/05/28

QUALITY ASSURANCE REPORT

exp Services Inc
Client Project #: THB-00011119-JE
Site Location: NAKINA LANDFILL
Sampler Initials: EF

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7365318	4-Bromofluorobenzene	2021/05/25	105	70 - 130	104	70 - 130	100	%				
7365318	D4-1,2-Dichloroethane	2021/05/25	93	70 - 130	90	70 - 130	89	%				
7365318	D8-Toluene	2021/05/25	100	70 - 130	101	70 - 130	101	%				
7365318	1,4-Dichlorobenzene	2021/05/25	112	70 - 130	106	70 - 130	<0.20	ug/L	NC	30		
7365318	Benzene	2021/05/25	93	70 - 130	91	70 - 130	<0.10	ug/L	NC	30		
7365318	Methylene Chloride(Dichloromethane)	2021/05/25	98	70 - 130	96	70 - 130	<0.50	ug/L	NC	30		
7365318	Toluene	2021/05/25	94	70 - 130	92	70 - 130	<0.20	ug/L	NC	30		
7365318	Vinyl Chloride	2021/05/25	90	70 - 130	87	70 - 130	<0.20	ug/L	NC	30		
7367405	Total BOD	2021/05/27					<2	mg/L	NC	30	99	80 - 120
7367666	Total Dissolved Solids	2021/05/26					<10	mg/L	4.2	25	102	90 - 110
7367787	Total Suspended Solids	2021/05/26					<1	mg/L	12	25	95	85 - 115
7369143	Phenols-4AAP	2021/05/25	104	80 - 120	102	80 - 120	<0.0010	mg/L	NC	20		
7369232	Total Ammonia-N	2021/05/27	91	75 - 125	100	80 - 120	<0.050	mg/L	0.68	20		
7369253	Phenols-4AAP	2021/05/25	101	80 - 120	102	80 - 120	<0.0010	mg/L	NC	20		
7369282	Total Kjeldahl Nitrogen (TKN)	2021/05/25	NC	80 - 120	101	80 - 120	<0.10	mg/L	1.5	20	97	80 - 120
7369288	Total Kjeldahl Nitrogen (TKN)	2021/05/25	106	80 - 120	98	80 - 120	<0.10	mg/L	10	20	96	80 - 120
7369482	Mercury (Hg)	2021/05/26	97	75 - 125	96	80 - 120	<0.00010	mg/L	NC	20		
7369536	Total Phosphorus	2021/05/26	111	80 - 120	94	80 - 120	<0.004	mg/L	0.22	20	96	80 - 120
7369538	Dissolved Sulphate (SO4)	2021/05/26	NC	75 - 125	103	80 - 120	<1.0	mg/L	5.9	20		
7369539	Total Ammonia-N	2021/05/27	100	75 - 125	100	80 - 120	<0.050	mg/L	NC	20		
7369546	Dissolved Chloride (Cl-)	2021/05/26	NC	80 - 120	100	80 - 120	<1.0	mg/L	0.61	20		
7369557	Total Chemical Oxygen Demand (COD)	2021/05/26	96	80 - 120	103	80 - 120	<4.0	mg/L	0	20		
7369600	Total Kjeldahl Nitrogen (TKN)	2021/05/25	110	80 - 120	101	80 - 120	<0.10	mg/L	0	20	99	80 - 120
7369794	Nitrate (N)	2021/05/27	109	80 - 120	104	80 - 120	<0.10	mg/L	NC	20		
7369794	Nitrite (N)	2021/05/27	112	80 - 120	107	80 - 120	<0.010	mg/L	NC	20		
7369818	Nitrate (N)	2021/05/26	113	80 - 120	105	80 - 120	<0.10	mg/L	1.8	20		
7369818	Nitrite (N)	2021/05/26	100	80 - 120	107	80 - 120	<0.010	mg/L	NC	20		
7369834	Alkalinity (Total as CaCO3)	2021/05/27			94	85 - 115	<1.0	mg/L	1.2	20		
7369846	Conductivity	2021/05/27			101	85 - 115	<1.0	umho/cm	0.59	25		
7369850	Dissolved Arsenic (As)	2021/05/26	105	80 - 120	103	80 - 120	<1.0	ug/L	NC	20		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7369850	Dissolved Barium (Ba)	2021/05/26	103	80 - 120	101	80 - 120	<2.0	ug/L	0.061	20		
7369850	Dissolved Boron (B)	2021/05/26	104	80 - 120	100	80 - 120	<10	ug/L	NC	20		
7369850	Dissolved Cadmium (Cd)	2021/05/26	104	80 - 120	102	80 - 120	<0.090	ug/L	NC	20		
7369850	Dissolved Calcium (Ca)	2021/05/26	NC	80 - 120	100	80 - 120	<200	ug/L	0.79	20		
7369850	Dissolved Chromium (Cr)	2021/05/26	102	80 - 120	99	80 - 120	<5.0	ug/L	NC	20		
7369850	Dissolved Copper (Cu)	2021/05/26	105	80 - 120	102	80 - 120	<0.90	ug/L	4.4	20		
7369850	Dissolved Iron (Fe)	2021/05/26	104	80 - 120	101	80 - 120	<100	ug/L	NC	20		
7369850	Dissolved Lead (Pb)	2021/05/26	106	80 - 120	104	80 - 120	<0.50	ug/L	NC	20		
7369850	Dissolved Magnesium (Mg)	2021/05/26	107	80 - 120	103	80 - 120	<50	ug/L	2.8	20		
7369850	Dissolved Manganese (Mn)	2021/05/26	103	80 - 120	101	80 - 120	<2.0	ug/L	NC	20		
7369850	Dissolved Potassium (K)	2021/05/26	106	80 - 120	102	80 - 120	<200	ug/L	1.6	20		
7369850	Dissolved Sodium (Na)	2021/05/26	107	80 - 120	105	80 - 120	<100	ug/L	0.48	20		
7369850	Dissolved Zinc (Zn)	2021/05/26	103	80 - 120	100	80 - 120	<5.0	ug/L	NC	20		
7369851	pH	2021/05/27			102	98 - 103			0.85	N/A		
7369852	Conductivity	2021/05/27			102	85 - 115	<1.0	umho/cm	0	25		
7369858	pH	2021/05/27			102	98 - 103			0.23	N/A		
7369863	Alkalinity (Total as CaCO3)	2021/05/27			95	85 - 115	<1.0	mg/L	0.54	20		
7369866	Conductivity	2021/05/26			100	85 - 115	<1.0	umho/cm	0.61	25		
7369871	Alkalinity (Total as CaCO3)	2021/05/26			99	85 - 115	<1.0	mg/L	0.54	20		
7369873	pH	2021/05/26			102	98 - 103			0.87	N/A		
7370322	Dissolved Chloride (Cl-)	2021/05/26	117	80 - 120	102	80 - 120	<1.0	mg/L	13	20		
7370328	Dissolved Sulphate (SO4)	2021/05/26	117	75 - 125	104	80 - 120	<1.0	mg/L	NC	20		
7370835	Total Phosphorus	2021/05/26	103	80 - 120	99	80 - 120	<0.020	mg/L	3.2	20	101	80 - 120
7371280	Total Phosphorus	2021/05/27	100	80 - 120	98	80 - 120	<0.020	mg/L	0	20	99	80 - 120
7371337	Mercury (Hg)	2021/05/28	95	75 - 125	100	80 - 120	<0.00010	mg/L	NC	20		
7371349	Mercury (Hg)	2021/05/28	94	75 - 125	97	80 - 120	<0.00010	mg/L	NC	20		
7371717	Total Phosphorus	2021/05/27	103	80 - 120	100	80 - 120	<0.020	mg/L	0.60	20	99	80 - 120
7371762	Dissolved Organic Carbon	2021/05/26	91	80 - 120	95	80 - 120	<0.40	mg/L	1.5	20		
7372408	Dissolved Organic Carbon	2021/05/27	98	80 - 120	96	80 - 120	<0.40	mg/L	2.7	20		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7372880	Total Dissolved Solids	2021/05/27					<10	mg/L	1.0	25	95	90 - 110
7373388	Total Arsenic (As)	2021/05/27	100	80 - 120	99	80 - 120	<1.0	ug/L	NC	20		
7373388	Total Barium (Ba)	2021/05/27	99	80 - 120	98	80 - 120	<2.0	ug/L	2.8	20		
7373388	Total Boron (B)	2021/05/27	94	80 - 120	90	80 - 120	<10	ug/L	0.89	20		
7373388	Total Cadmium (Cd)	2021/05/27	101	80 - 120	100	80 - 120	<0.090	ug/L	NC	20		
7373388	Total Chromium (Cr)	2021/05/27	92	80 - 120	93	80 - 120	<5.0	ug/L	NC	20		
7373388	Total Copper (Cu)	2021/05/27	103	80 - 120	100	80 - 120	<0.90	ug/L	0.89	20		
7373388	Total Iron (Fe)	2021/05/27	95	80 - 120	97	80 - 120	<100	ug/L	2.5	20		
7373388	Total Lead (Pb)	2021/05/27	98	80 - 120	100	80 - 120	<0.50	ug/L	0.28	20		
7373388	Total Zinc (Zn)	2021/05/27	97	80 - 120	101	80 - 120	<5.0	ug/L	1.4	20		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

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

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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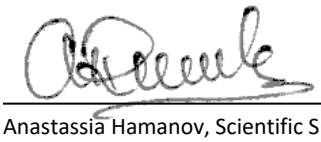
BV Labs Job #: C1D8248
Report Date: 2021/05/28

exp Services Inc
Client Project #: THB-00011119-JE
Site Location: NAKINA LANDFILL
Sampler Initials: EF

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:



Anastassia Hamanov, Scientific Specialist

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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20-May-21 14:30
Michelle Huth
C1D8248

ATM ENV-1110

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Only:
Company Name:	#17501 exp Services Inc	Company Name:		Quotation #:	B90555	Bottle Order #:
Attention:	accounts payable	Attention:	Ahileas Mitsopoulos	P.O. #:		825017
Address:	1142 Roland St Thunder Bay ON P7B 5M4	Address:		Project:	THB-00011119-JE	COC #: C#825017-01-01
Tel:	(807) 623-9495 Fax: (807) 623-8070	Tel:	Fax:	Project Name:		Project Manager:
Email:	thunderbay@exp.com; Karen.Burke@exp.com;AP@ex	Email:	ahileas.mitsopoulos@exp.com	Site #:	Nakina Landfill	Michelle Huth
				Sampled By:	EF	

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BV LABS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)
- ☐ Table 1 ☐ Res/Park ☐ Medium/Fine
- ☐ Table 2 ☐ Ind/Comm ☐ Coarse
- ☐ Table 3 ☐ Agri/Other ☐ For RSC
- ☐ Table ___

Other Regulations
- ☐ CCME ☐ Sanitary Sewer Bylaw
- ☐ Reg 558 ☐ Storm Sewer Bylaw
- ☐ MISA Municipality ___
- ☐ PWQO ☐ Reg 406 Table ___
- ☒ Other ODWS

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ___

Field Filtered (please circle): (Metals / Hg / Cr VI)

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___ ☐
Rush Confirmation Number: ___ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Landfill Standards Sch 5 - GW Comp. List	# of Bottles	Comments
1		MW1	May 19 2021	3:30PM	GW	X	11	
2		MW2	May 19 2021	4:40PM	GW	X	11	
3		MW3	May 19 2021	1:45PM	GW	X	11	
4		MW4	May 19 2021	4:55PM	GW	X	11	
5		MW5	May 19 2021	4:15PM	GW	X	11	
6		MW6	May 19 2021	1:10PM	GW	X	11	
7								
8								
9								
10								

Rec'd In Thunder Bay

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Sabrina Wyldt	21/05/20	1:00PM	MHuth, Michelle Huth	2021/05/20	14:30	
			[illegible]	2021/05/21	12:20	

Laboratory Use Only
Time Sensitive ☐ Temperature (°C) on Recei 7/6/8 6/5/10
Custody Seal Present ☐ Yes ☐ No ☐ Intact ☐ N/A

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

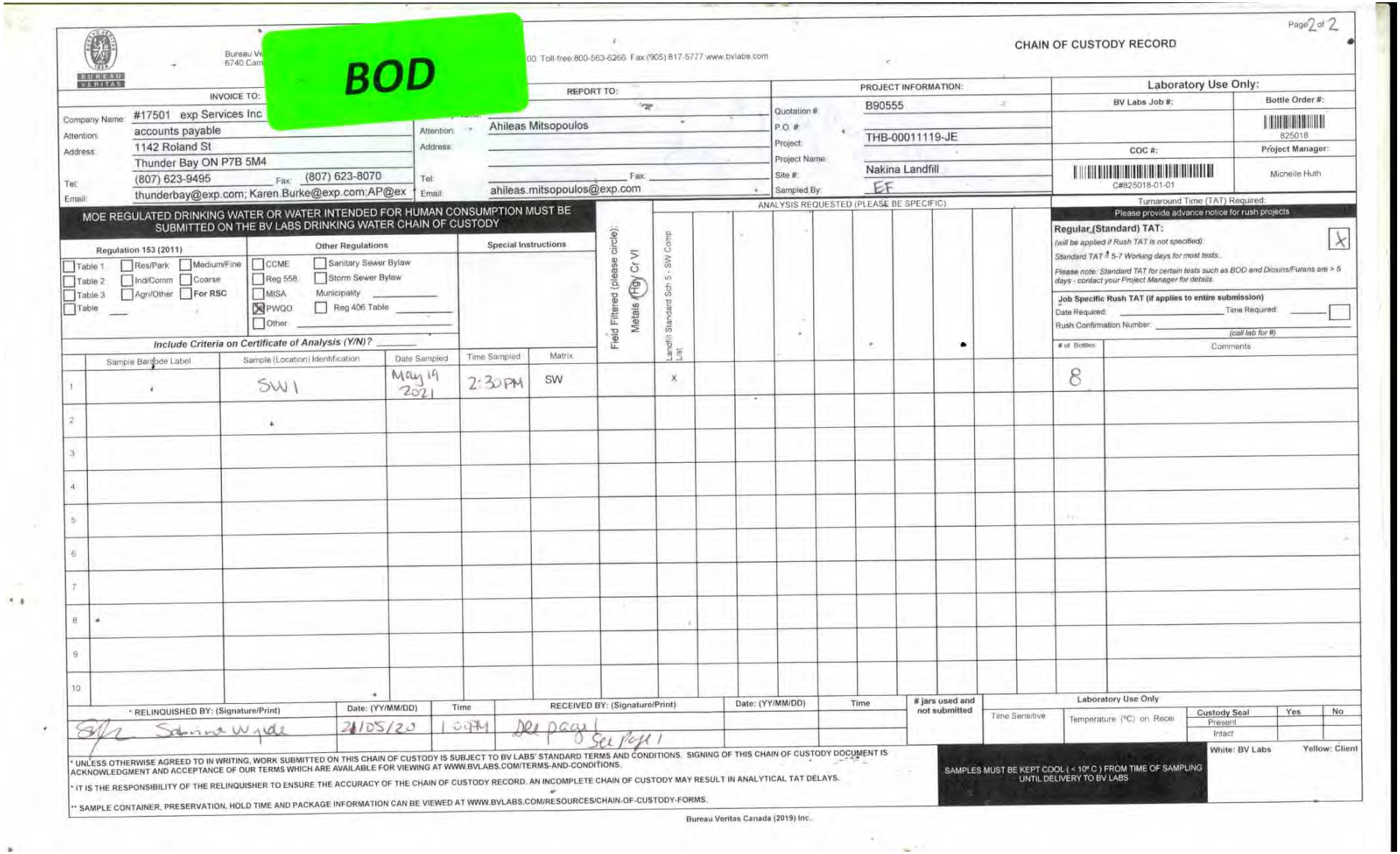
** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

White: BV Labs Yellow: Client

1/0/5 7/0/0

Bureau Veritas Canada (2019) Inc.



BOD

Page 2 of 2

BUREAU VERITAS

Bureau Ve
6740 Cam

00 Toll-free 800-563-6266 Fax (905) 817-5777 www.bvlabs.com

CHAIN OF CUSTODY RECORD

INVOICE TO:

Company Name: #17501 exp Services Inc
Attention: accounts payable
Address: 1142 Roland St
Thunder Bay ON P7B 5M4
Tel: (807) 623-9495 Fax: (807) 623-8070
Email: thunderbay@exp.com; Karen.Burke@exp.com;AP@ex

REPORT TO:

Attention: Ahileas Mitsopoulos
Address:
Tel: Fax:
Email: ahileas.mitsopoulos@exp.com

PROJECT INFORMATION:

Quotation #: B90555
P.O. #:
Project: THB-00011119-JE
Project Name:
Site #: Nakina Landfill
Sampled By: EF

Laboratory Use Only:

BV Labs Job #:
Bottle Order #: 825018
COC #: C#825018-01-01
Project Manager: Michelle Huth

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BV LABS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)

- [ ] Table 1 [ ] Res/Park [ ] Medium/Fine
- [ ] Table 2 [ ] Ind/Comm [ ] Coarse
- [ ] Table 3 [ ] Agr/Other [ ] For RSC
- [ ] Table ___

Other Regulations

- [ ] CCME [ ] Sanitary Sewer Bylaw
- [ ] Reg 558 [ ] Storm Sewer Bylaw
- [ ] MISA Municipality ___
- [x] PWQO [ ] Reg 406 Table ___
- [ ] Other ___

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ___

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Field Filtered (please circle): Metals / Hg / Cr VI

Landfill Standard Sch 5 - SW Comp List

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: [X]
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___ [ ]
Rush Confirmation Number: ___ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered	Landfill Std Sch 5 - SW Comp List	# of Bottles	Comments
1		SW1	May 19 2021	2:30 PM	SW		X	8	
2									
3									
4									
5									
6									
7									
8									
9									
10									

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Sabrina Wylde	21/05/20	1:04PM	See page 1			

Laboratory Use Only

Time Sensitive	Temperature (°C) on Recei	Custody Seal	Yes	No
		Present		
		Intact		

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

White: BV Labs Yellow: Client

Bureau Veritas Canada (2019) Inc.

Your Project #: THB-00011119-JE
Site#: Nakina Landfill
Your C.O.C. #: 844779-01-01

Attention: Kole Pitkanen

exp Services Inc
Thunder Bay Branch
1142 Roland St
Thunder Bay, ON
CANADA P7B 5M4

Report Date: 2021/10/05
Report #: R6840802
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1R9799
Received: 2021/09/27, 11:50

Sample Matrix: Water
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	4	N/A	2021/10/01	CAM SOP-00448	SM 23 2320 B m
Alkalinity	2	N/A	2021/09/30	CAM SOP-00448	SM 23 2320 B m
Biochemical Oxygen Demand (BOD)	1	2021/09/28	2021/10/03	CAM SOP-00427	SM 23 5210B m
Chloride by Automated Colourimetry	6	N/A	2021/09/30	CAM SOP-00463	SM 23 4500-Cl E m
Chemical Oxygen Demand	5	N/A	2021/09/30	CAM SOP-00416	SM 23 5220 D m
Conductivity	4	N/A	2021/10/01	CAM SOP-00414	SM 23 2510 m
Conductivity	2	N/A	2021/09/30	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	5	N/A	2021/09/30	CAM SOP-00446	SM 23 5310 B m
Mercury in Water by CVAA	6	2021/09/29	2021/09/29	CAM SOP-00453	EPA 7470A m
Dissolved Metals by ICPMS	5	N/A	2021/09/30	CAM SOP-00447	EPA 6020B m
Total Metals Analysis by ICPMS	1	N/A	2021/10/05	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	4	N/A	2021/10/01		
Ion Balance (% Difference)	1	N/A	2021/09/30		
Total Ammonia-N	5	N/A	2021/09/30	CAM SOP-00441	USGS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (2)	1	N/A	2021/09/29	CAM SOP-00440	SM 23 4500-NO3I/NO2B
Nitrate (NO3) and Nitrite (NO2) in Water (2)	5	N/A	2021/09/30	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	4	2021/09/29	2021/10/01	CAM SOP-00413	SM 4500H+ B m
pH	2	2021/09/29	2021/09/30	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	5	N/A	2021/09/29	CAM SOP-00444	OMOE E3179 m
Sulphate by Automated Colourimetry	6	N/A	2021/09/30	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids	6	2021/09/29	2021/09/30	CAM SOP-00428	SM 23 2540C m
Total Kjeldahl Nitrogen in Water	1	2021/09/29	2021/09/30	CAM SOP-00938	OMOE E3516 m
Total Kjeldahl Nitrogen in Water	1	2021/09/30	2021/10/04	CAM SOP-00938	OMOE E3516 m
Total Kjeldahl Nitrogen in Water	3	2021/09/30	2021/09/30	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	1	2021/09/29	2021/09/30	CAM SOP-00407	SM 23 4500 P B H m
Total Phosphorus (Colourimetric)	4	2021/09/30	2021/09/30	CAM SOP-00407	SM 23 4500 P B H m
Low Level Total Suspended Solids	1	2021/09/29	2021/09/30	CAM SOP-00428	SM 23 2540D m
Volatile Organic Compounds in Water	4	N/A	2021/10/01	CAM SOP-00226	EPA 8260C m

Remarks:

Your Project #: THB-00011119-JE
Site#: Nakina Landfill
Your C.O.C. #: 844779-01-01

Attention: Kole Pitkanen

exp Services Inc
Thunder Bay Branch
1142 Roland St
Thunder Bay, ON
CANADA P7B 5M4

Report Date: 2021/10/05
Report #: R6840802
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1R9799
Received: 2021/09/27, 11:50

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Michelle Huth, Project Manager Assistant
Email: michelle.brescacin@bureauveritas.com
Phone# (807)344-4220

==========

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BV Labs Job #: C1R9799
Report Date: 2021/10/05

exp Services Inc
Client Project #: THB-00011119-JE
Sampler Initials: KP

LANDFILL STANDARDS SCH 5 - GW COMP. LIST (WATER)

BV Labs ID					QTU228			QTU228		
Sampling Date					2021/09/23 08:20			2021/09/23 08:20		
COC Number					844779-01-01			844779-01-01		
	UNITS	**MAC**	**A/O**	**Criteria**	**MW1**	**RDL**	**QC Batch**	**MW1 Lab-Dup**	**RDL**	**QC Batch**
Inorganics										
Total Ammonia-N	mg/L	-	-	-	<0.050	0.050	7608770			
Total Chemical Oxygen Demand (COD)	mg/L	-	-	-	18	4.0	7610140	17	4.0	7610140
Conductivity	umho/cm	-	-	-	860	1.0	7608963			
Total Dissolved Solids	mg/L	-	500	-	495	10	7608363			
Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	-	0.38	0.10	7610133			
Dissolved Organic Carbon	mg/L	-	5	-	4.0	0.40	7610154			
pH	pH	-	6.5:8.5	6.5:8.5	7.70		7608969			
Phenols-4AAP	mg/L	-	-	0.001	<0.0010	0.0010	7607192			
Total Phosphorus	mg/L	-	-	0.01	0.16	0.020	7610053			
Dissolved Sulphate (SO4)	mg/L	-	500	-	<1.0	1.0	7609217			
Alkalinity (Total as CaCO3)	mg/L	-	30:500	-	500	1.0	7608955			
Dissolved Chloride (Cl-)	mg/L	-	250	-	5.7	1.0	7609208			
Nitrite (N)	mg/L	1	-	-	<0.010	0.010	7608991			
Nitrate (N)	mg/L	10	-	-	1.18	0.10	7608991			
Metals										
Mercury (Hg)	mg/L	0.001	-	0.0002	<0.00010	0.00010	7607772			
Dissolved Arsenic (As)	ug/L	10	-	100	<1.0	1.0	7609859			
Dissolved Barium (Ba)	ug/L	1000	-	-	42	2.0	7609859			
Dissolved Boron (B)	ug/L	5000	-	200	40	10	7609859			
Dissolved Cadmium (Cd)	ug/L	5	-	0.2	<0.090	0.090	7609859			
Dissolved Calcium (Ca)	ug/L	-	-	-	180000	200	7609859			
Dissolved Chromium (Cr)	ug/L	50	-	-	<5.0	5.0	7609859			
Dissolved Copper (Cu)	ug/L	-	1000	5	3.3	0.90	7609859			
Dissolved Iron (Fe)	ug/L	-	300	300	<100	100	7609859			
Dissolved Lead (Pb)	ug/L	10	-	5	<0.50	0.50	7609859			
Dissolved Magnesium (Mg)	ug/L	-	-	-	11000	50	7609859			
Dissolved Manganese (Mn)	ug/L	-	50	-	430	2.0	7609859			
Dissolved Potassium (K)	ug/L	-	-	-	2300	200	7609859			
Dissolved Sodium (Na)	ug/L	-	200000	-	4000	100	7609859			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
MAC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

BV Labs Job #: C1R9799
Report Date: 2021/10/05

exp Services Inc
Client Project #: THB-00011119-JE
Sampler Initials: KP

LANDFILL STANDARDS SCH 5 - GW COMP. LIST (WATER)

BV Labs ID					QTU228			QTU228		
Sampling Date					2021/09/23 08:20			2021/09/23 08:20		
COC Number					844779-01-01			844779-01-01		
	UNITS	**MAC**	**A/O**	**Criteria**	**MW1**	**RDL**	**QC Batch**	**MW1 Lab-Dup**	**RDL**	**QC Batch**
Dissolved Zinc (Zn)	ug/L	-	5000	30	<5.0	5.0	7609859			
Volatile Organics										
Benzene	ug/L	1	-	100	<0.10	0.10	7607230			
1,4-Dichlorobenzene	ug/L	5	1	4	<0.20	0.20	7607230			
Methylene Chloride(Dichloromethane)	ug/L	50	-	100	<0.50	0.50	7607230			
Toluene	ug/L	60	24	0.8	<0.20	0.20	7607230			
Vinyl Chloride	ug/L	1	-	600	<0.20	0.20	7607230			
Surrogate Recovery (%)										
4-Bromofluorobenzene	%	-	-	-	98		7607230			
D4-1,2-Dichloroethane	%	-	-	-	103		7607230			
D8-Toluene	%	-	-	-	99		7607230			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
MAC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)
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LANDFILL STANDARDS SCH 5 - GW COMP. LIST (WATER)

BV Labs ID					QTU229			QTU229		
Sampling Date					2021/09/23 11:55			2021/09/23 11:55		
COC Number					844779-01-01			844779-01-01		
	UNITS	**MAC**	**A/O**	**Criteria**	**MW3**	**RDL**	**QC Batch**	**MW3 Lab-Dup**	**RDL**	**QC Batch**
Inorganics										
Total Ammonia-N	mg/L	-	-	-	<0.050	0.050	7608770			
Total Chemical Oxygen Demand (COD)	mg/L	-	-	-	8.4	4.0	7610140			
Conductivity	umho/cm	-	-	-	2300	1.0	7608963			
Total Dissolved Solids	mg/L	-	500	-	1280	10	7608363			
Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	-	0.18	0.10	7610133	0.24	0.10	7610133
Dissolved Organic Carbon	mg/L	-	5	-	1.7	0.40	7610154			
pH	pH	-	6.5:8.5	6.5:8.5	7.98		7608969			
Phenols-4AAP	mg/L	-	-	0.001	<0.0010	0.0010	7607192			
Total Phosphorus	mg/L	-	-	0.01	0.12	0.020	7610053			
Dissolved Sulphate (SO4)	mg/L	-	500	-	14	1.0	7609217			
Alkalinity (Total as CaCO3)	mg/L	-	30:500	-	280	1.0	7608955			
Dissolved Chloride (Cl-)	mg/L	-	250	-	570	5.0	7609208			
Nitrite (N)	mg/L	1	-	-	0.017	0.010	7608991			
Nitrate (N)	mg/L	10	-	-	0.52	0.10	7608991			
Metals										
Mercury (Hg)	mg/L	0.001	-	0.0002	<0.00010	0.00010	7607551			
Dissolved Arsenic (As)	ug/L	10	-	100	<1.0	1.0	7609859			
Dissolved Barium (Ba)	ug/L	1000	-	-	59	2.0	7609859			
Dissolved Boron (B)	ug/L	5000	-	200	<10	10	7609859			
Dissolved Cadmium (Cd)	ug/L	5	-	0.2	<0.090	0.090	7609859			
Dissolved Calcium (Ca)	ug/L	-	-	-	140000	200	7609859			
Dissolved Chromium (Cr)	ug/L	50	-	-	<5.0	5.0	7609859			
Dissolved Copper (Cu)	ug/L	-	1000	5	2.1	0.90	7609859			
Dissolved Iron (Fe)	ug/L	-	300	300	<100	100	7609859			
Dissolved Lead (Pb)	ug/L	10	-	5	<0.50	0.50	7609859			
Dissolved Magnesium (Mg)	ug/L	-	-	-	17000	50	7609859			
Dissolved Manganese (Mn)	ug/L	-	50	-	<2.0	2.0	7609859			
Dissolved Potassium (K)	ug/L	-	-	-	2500	200	7609859			
Dissolved Sodium (Na)	ug/L	-	200000	-	330000	100	7609859			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
MAC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

LANDFILL STANDARDS SCH 5 - GW COMP. LIST (WATER)

BV Labs ID					QTU229			QTU229		
Sampling Date					2021/09/23 11:55			2021/09/23 11:55		
COC Number					844779-01-01			844779-01-01		
	UNITS	**MAC**	**A/O**	**Criteria**	**MW3**	**RDL**	**QC Batch**	**MW3 Lab-Dup**	**RDL**	**QC Batch**
Dissolved Zinc (Zn)	ug/L	-	5000	30	<5.0	5.0	7609859			
Volatile Organics										
Benzene	ug/L	1	-	100	<0.10	0.10	7607230			
1,4-Dichlorobenzene	ug/L	5	1	4	<0.20	0.20	7607230			
Methylene Chloride(Dichloromethane)	ug/L	50	-	100	<0.50	0.50	7607230			
Toluene	ug/L	60	24	0.8	<0.20	0.20	7607230			
Vinyl Chloride	ug/L	1	-	600	<0.20	0.20	7607230			
Surrogate Recovery (%)										
4-Bromofluorobenzene	%	-	-	-	97		7607230			
D4-1,2-Dichloroethane	%	-	-	-	101		7607230			
D8-Toluene	%	-	-	-	101		7607230			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
MAC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

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LANDFILL STANDARDS SCH 5 - GW COMP. LIST (WATER)

BV Labs ID					QTU230			QTU231		
Sampling Date					2021/09/23 13:55			2021/09/23 16:15		
COC Number					844779-01-01			844779-01-01		
	UNITS	**MAC**	**A/O**	**Criteria**	**MW4**	**RDL**	**QC Batch**	**MW5**	**RDL**	**QC Batch**
Inorganics										
Total Ammonia-N	mg/L	-	-	-				0.052	0.050	7608770
Total Chemical Oxygen Demand (COD)	mg/L	-	-	-				34	4.0	7610140
Conductivity	umho/cm	-	-	-	350	1.0	7608457	1500	1.0	7608963
Total Dissolved Solids	mg/L	-	500	-	190	10	7608867	920	10	7608363
Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	-				0.91	0.10	7610133
Dissolved Organic Carbon	mg/L	-	5	-	3.0	0.40	7609302	12	0.40	7610154
pH	pH	-	6.5:8.5	6.5:8.5	8.17		7608477	7.35		7608969
Phenols-4AAP	mg/L	-	-	0.001				<0.0010	0.0010	7607192
Total Phosphorus	mg/L	-	-	0.01				0.35	0.10	7610053
Dissolved Sulphate (SO4)	mg/L	-	500	-	<1.0	1.0	7608703	81	1.0	7609217
Alkalinity (Total as CaCO3)	mg/L	-	30:500	-	190	1.0	7608438	780	1.0	7608955
Dissolved Chloride (Cl-)	mg/L	-	250	-	1.3	1.0	7608695	45	1.0	7609208
Nitrite (N)	mg/L	1	-	-	<0.010	0.010	7608261	<0.010	0.010	7608991
Nitrate (N)	mg/L	10	-	-	0.16	0.10	7608261	0.22	0.10	7608991
Metals										
Mercury (Hg)	mg/L	0.001	-	0.0002	<0.00010	0.00010	7607772	<0.00010	0.00010	7607551
Dissolved Arsenic (As)	ug/L	10	-	100	<1.0	1.0	7609859	<1.0	1.0	7609859
Dissolved Barium (Ba)	ug/L	1000	-	-	10	2.0	7609859	83	2.0	7609859
Dissolved Boron (B)	ug/L	5000	-	200	<10	10	7609859	790	10	7609859
Dissolved Cadmium (Cd)	ug/L	5	-	0.2	<0.090	0.090	7609859	<0.090	0.090	7609859
Dissolved Calcium (Ca)	ug/L	-	-	-	65000	200	7609859	270000	200	7609859
Dissolved Chromium (Cr)	ug/L	50	-	-	<5.0	5.0	7609859	<5.0	5.0	7609859
Dissolved Copper (Cu)	ug/L	-	1000	5	2.6	0.90	7609859	20	0.90	7609859
Dissolved Iron (Fe)	ug/L	-	300	300	<100	100	7609859	<100	100	7609859
Dissolved Lead (Pb)	ug/L	10	-	5	<0.50	0.50	7609859	<0.50	0.50	7609859
Dissolved Magnesium (Mg)	ug/L	-	-	-	10000	50	7609859	45000	50	7609859
Dissolved Manganese (Mn)	ug/L	-	50	-	4.3	2.0	7609859	2000	2.0	7609859
Dissolved Potassium (K)	ug/L	-	-	-	880	200	7609859	3000	200	7609859
Dissolved Sodium (Na)	ug/L	-	200000	-	2400	100	7609859	56000	100	7609859
Dissolved Zinc (Zn)	ug/L	-	5000	30	<5.0	5.0	7609859	<5.0	5.0	7609859

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

MAC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)

Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

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BV Labs Job #: C1R9799
Report Date: 2021/10/05

exp Services Inc
Client Project #: THB-00011119-JE
Sampler Initials: KP

LANDFILL STANDARDS SCH 5 - GW COMP. LIST (WATER)

BV Labs ID					QTU230			QTU231		
Sampling Date					2021/09/23 13:55			2021/09/23 16:15		
COC Number					844779-01-01			844779-01-01		
	UNITS	**MAC**	**A/O**	**Criteria**	**MW4**	**RDL**	**QC Batch**	**MW5**	**RDL**	**QC Batch**
Volatile Organics										
Benzene	ug/L	1	-	100				1.0	0.25	7607230
1,4-Dichlorobenzene	ug/L	5	1	4				<0.50	0.50	7607230
Methylene Chloride(Dichloromethane)	ug/L	50	-	100				<1.3	1.3	7607230
Toluene	ug/L	60	24	0.8				<0.50	0.50	7607230
Vinyl Chloride	ug/L	1	-	600				3.0	0.50	7607230
Surrogate Recovery (%)										
4-Bromofluorobenzene	%	-	-	-				98		7607230
D4-1,2-Dichloroethane	%	-	-	-				100		7607230
D8-Toluene	%	-	-	-				100		7607230

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
MAC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)
Criteria: Ontario Provincial Water Quality Objectives
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LANDFILL STANDARDS SCH 5 - GW COMP. LIST (WATER)

BV Labs ID					QTU232		
Sampling Date					2021/09/23 18:30		
COC Number					844779-01-01		
	UNITS	**MAC**	**A/O**	**Criteria**	**MW6**	**RDL**	**QC Batch**
Inorganics							
Total Ammonia-N	mg/L	-	-	-	0.070	0.050	7608770
Total Chemical Oxygen Demand (COD)	mg/L	-	-	-	38	4.0	7610140
Conductivity	umho/cm	-	-	-	1400	1.0	7607497
Total Dissolved Solids	mg/L	-	500	-	950	10	7608867
Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	-	0.90	0.10	7610133
Dissolved Organic Carbon	mg/L	-	5	-	13	0.40	7609302
pH	pH	-	6.5:8.5	6.5:8.5	7.67		7607507
Phenols-4AAP	mg/L	-	-	0.001	<0.0010	0.0010	7607192
Total Phosphorus	mg/L	-	-	0.01	0.28	0.10	7610053
Dissolved Sulphate (SO4)	mg/L	-	500	-	84	1.0	7607904
Alkalinity (Total as CaCO3)	mg/L	-	30:500	-	740	1.0	7607494
Dissolved Chloride (Cl-)	mg/L	-	250	-	46	1.0	7607870
Nitrite (N)	mg/L	1	-	-	<0.010	0.010	7607390
Nitrate (N)	mg/L	10	-	-	0.24	0.10	7607390
Metals							
Mercury (Hg)	mg/L	0.001	-	0.0002	<0.00010	0.00010	7607551
Dissolved Arsenic (As)	ug/L	10	-	100	<1.0	1.0	7609859
Dissolved Barium (Ba)	ug/L	1000	-	-	88	2.0	7609859
Dissolved Boron (B)	ug/L	5000	-	200	750	10	7609859
Dissolved Cadmium (Cd)	ug/L	5	-	0.2	<0.090	0.090	7609859
Dissolved Calcium (Ca)	ug/L	-	-	-	270000	200	7609859
Dissolved Chromium (Cr)	ug/L	50	-	-	<5.0	5.0	7609859
Dissolved Copper (Cu)	ug/L	-	1000	5	20	0.90	7609859
Dissolved Iron (Fe)	ug/L	-	300	300	<100	100	7609859
Dissolved Lead (Pb)	ug/L	10	-	5	<0.50	0.50	7609859
Dissolved Magnesium (Mg)	ug/L	-	-	-	45000	50	7609859
Dissolved Manganese (Mn)	ug/L	-	50	-	2100	2.0	7609859
Dissolved Potassium (K)	ug/L	-	-	-	3000	200	7609859
Dissolved Sodium (Na)	ug/L	-	200000	-	56000	100	7609859
Dissolved Zinc (Zn)	ug/L	-	5000	30	<5.0	5.0	7609859

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

MAC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)

Criteria: Ontario Provincial Water Quality Objectives
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LANDFILL STANDARDS SCH 5 - GW COMP. LIST (WATER)

BV Labs ID					QTU232		
Sampling Date					2021/09/23 18:30		
COC Number					844779-01-01		
	UNITS	**MAC**	**A/O**	**Criteria**	**MW6**	**RDL**	**QC Batch**
Volatile Organics							
Benzene	ug/L	1	-	100	1.2	0.25	7607230
1,4-Dichlorobenzene	ug/L	5	1	4	<0.50	0.50	7607230
Methylene Chloride(Dichloromethane)	ug/L	50	-	100	<1.3	1.3	7607230
Toluene	ug/L	60	24	0.8	<0.50	0.50	7607230
Vinyl Chloride	ug/L	1	-	600	3.8	0.50	7607230
Surrogate Recovery (%)							
4-Bromofluorobenzene	%	-	-	-	97		7607230
D4-1,2-Dichloroethane	%	-	-	-	100		7607230
D8-Toluene	%	-	-	-	100		7607230

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
MAC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

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BV Labs Job #: C1R9799
Report Date: 2021/10/05

exp Services Inc
Client Project #: THB-00011119-JE
Sampler Initials: KP

LANDFILL STANDARDS SCH 5 - SW COMP. LIST (WATER)

BV Labs ID					QTU233			QTU233		
Sampling Date					2021/09/23 16:55			2021/09/23 16:55		
COC Number					844779-01-01			844779-01-01		
	UNITS	**MAC**	**A/O**	**Criteria**	**SW1**	**RDL**	**QC Batch**	**SW1 Lab-Dup**	**RDL**	**QC Batch**
Inorganics										
Total Ammonia-N	mg/L	-	-	-	0.11	0.050	7608770			
Total BOD	mg/L	-	-	-	<2	2	7605874			
Total Chemical Oxygen Demand (COD)	mg/L	-	-	-	43	4.0	7608283			
Conductivity	umho/cm	-	-	-	210	1.0	7608457			
Total Dissolved Solids	mg/L	-	500	-	130	10	7608363			
Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	-	0.70	0.10	7607869			
pH	pH	-	6.5:8.5	6.5:8.5	8.26		7608477			
Phenols-4AAP	mg/L	-	-	0.001	<0.0010	0.0010	7607160			
Total Phosphorus	mg/L	-	-	0.01	0.017	0.004	7608054			
Total Suspended Solids	mg/L	-	-	-	2	1	7607745			
Dissolved Sulphate (SO4)	mg/L	-	500	-	7.9	1.0	7608703	7.9	1.0	7608703
Alkalinity (Total as CaCO3)	mg/L	-	30:500	-	100	1.0	7608438			
Dissolved Chloride (Cl-)	mg/L	-	250	-	3.3	1.0	7608695	3.5	1.0	7608695
Nitrite (N)	mg/L	1	-	-	<0.010	0.010	7608261			
Nitrate (N)	mg/L	10	-	-	<0.10	0.10	7608261			
Metals										
Mercury (Hg)	mg/L	0.001	-	0.0002	<0.00010	0.00010	7607551			
Total Arsenic (As)	ug/L	10	-	100	<1.0	1.0	7610425	<1.0	1.0	7610425
Total Barium (Ba)	ug/L	1000	-	-	12	2.0	7610425	12	2.0	7610425
Total Boron (B)	ug/L	5000	-	200	50	10	7610425	51	10	7610425
Total Cadmium (Cd)	ug/L	5	-	0.2	<0.090	0.090	7610425	<0.090	0.090	7610425
Total Chromium (Cr)	ug/L	50	-	-	<5.0	5.0	7610425	<5.0	5.0	7610425
Total Copper (Cu)	ug/L	-	1000	5	<0.90	0.90	7610425	<0.90	0.90	7610425
Total Iron (Fe)	ug/L	-	300	300	<100	100	7610425	<100	100	7610425
Total Lead (Pb)	ug/L	10	-	5	<0.50	0.50	7610425	<0.50	0.50	7610425
Total Zinc (Zn)	ug/L	-	5000	30	<5.0	5.0	7610425	<5.0	5.0	7610425

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
MAC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)
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BV Labs Job #: C1R9799
Report Date: 2021/10/05

exp Services Inc
Client Project #: THB-00011119-JE
Sampler Initials: KP

RESULTS OF ANALYSES OF WATER

BV Labs ID		QTU228	QTU229	QTU230	QTU231	QTU232	
Sampling Date		2021/09/23 08:20	2021/09/23 11:55	2021/09/23 13:55	2021/09/23 16:15	2021/09/23 18:30	
COC Number		844779-01-01	844779-01-01	844779-01-01	844779-01-01	844779-01-01	
	UNITS	**MW1**	**MW3**	**MW4**	**MW5**	**MW6**	**QC Batch**
Calculated Parameters							
Ion Balance (% Difference)	%	0.980	1.98	3.19	2.56	5.19	7604461
QC Batch = Quality Control Batch							

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TEST SUMMARY

BV Labs ID: QTU228
Sample ID: MW1
Matrix: Water

Collected: 2021/09/23
Shipped:
Received: 2021/09/27

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7608955	N/A	2021/10/01	Surinder Rai
Chloride by Automated Colourimetry	KONE	7609208	N/A	2021/09/30	Avneet Kour Sudan
Chemical Oxygen Demand	SPEC	7610140	N/A	2021/09/30	Nimarta Singh
Conductivity	AT	7608963	N/A	2021/10/01	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7610154	N/A	2021/09/30	Julianna Castiglione
Mercury in Water by CVAA	CV/AA	7607772	2021/09/29	2021/09/29	Gagandeep Rai
Dissolved Metals by ICPMS	ICP/MS	7609859	N/A	2021/09/30	Nan Raykha
Ion Balance (% Difference)	CALC	7604461	N/A	2021/10/01	Automated Statchk
Total Ammonia-N	LACH/NH4	7608770	N/A	2021/09/30	Viorica Rotaru
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	7608991	N/A	2021/09/30	Chandra Nandlal
pH	AT	7608969	2021/09/29	2021/10/01	Surinder Rai
Phenols (4AAP)	TECH/PHEN	7607192	N/A	2021/09/29	Deonarine Ramnarine
Sulphate by Automated Colourimetry	KONE	7609217	N/A	2021/09/30	Avneet Kour Sudan
Total Dissolved Solids	BAL	7608363	2021/09/29	2021/09/30	Shaneil Hall
Total Kjeldahl Nitrogen in Water	SKAL	7610133	2021/09/30	2021/09/30	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	7610053	2021/09/30	2021/09/30	Shivani Shivani
Volatile Organic Compounds in Water	P&T/MS	7607230	N/A	2021/10/01	Gladys Guerrero

BV Labs ID: QTU228 Dup
Sample ID: MW1
Matrix: Water

Collected: 2021/09/23
Shipped:
Received: 2021/09/27

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chemical Oxygen Demand	SPEC	7610140	N/A	2021/09/30	Nimarta Singh

BV Labs ID: QTU229
Sample ID: MW3
Matrix: Water

Collected: 2021/09/23
Shipped:
Received: 2021/09/27

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7608955	N/A	2021/10/01	Surinder Rai
Chloride by Automated Colourimetry	KONE	7609208	N/A	2021/09/30	Avneet Kour Sudan
Chemical Oxygen Demand	SPEC	7610140	N/A	2021/09/30	Nimarta Singh
Conductivity	AT	7608963	N/A	2021/10/01	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7610154	N/A	2021/09/30	Julianna Castiglione
Mercury in Water by CVAA	CV/AA	7607551	2021/09/29	2021/09/29	Gagandeep Rai
Dissolved Metals by ICPMS	ICP/MS	7609859	N/A	2021/09/30	Nan Raykha
Ion Balance (% Difference)	CALC	7604461	N/A	2021/10/01	Automated Statchk
Total Ammonia-N	LACH/NH4	7608770	N/A	2021/09/30	Viorica Rotaru
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	7608991	N/A	2021/09/30	Chandra Nandlal
pH	AT	7608969	2021/09/29	2021/10/01	Surinder Rai
Phenols (4AAP)	TECH/PHEN	7607192	N/A	2021/09/29	Deonarine Ramnarine
Sulphate by Automated Colourimetry	KONE	7609217	N/A	2021/09/30	Avneet Kour Sudan
Total Dissolved Solids	BAL	7608363	2021/09/29	2021/09/30	Shaneil Hall
Total Kjeldahl Nitrogen in Water	SKAL	7610133	2021/09/30	2021/09/30	Massarat Jan

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TEST SUMMARY

BV Labs ID: QTU229 **Collected:** 2021/09/23
Sample ID: MW3 **Shipped:**
Matrix: Water **Received:** 2021/09/27

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Phosphorus (Colourimetric)	LACH/P	7610053	2021/09/30	2021/09/30	Shivani Shivani
Volatile Organic Compounds in Water	P&T/MS	7607230	N/A	2021/10/01	Gladys Guerrero

BV Labs ID: QTU229 Dup **Collected:** 2021/09/23
Sample ID: MW3 **Shipped:**
Matrix: Water **Received:** 2021/09/27

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Kjeldahl Nitrogen in Water	SKAL	7610133	2021/09/30	2021/09/30	Massarat Jan

BV Labs ID: QTU230 **Collected:** 2021/09/23
Sample ID: MW4 **Shipped:**
Matrix: Water **Received:** 2021/09/27

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7608438	N/A	2021/10/01	Surinder Rai
Chloride by Automated Colourimetry	KONE	7608695	N/A	2021/09/30	Alina Dobreanu
Conductivity	AT	7608457	N/A	2021/10/01	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7609302	N/A	2021/09/30	Julianna Castiglione
Mercury in Water by CVAA	CV/AA	7607772	2021/09/29	2021/09/29	Gagandeep Rai
Dissolved Metals by ICPMS	ICP/MS	7609859	N/A	2021/09/30	Nan Raykha
Ion Balance (% Difference)	CALC	7604461	N/A	2021/10/01	Automated Statchk
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	7608261	N/A	2021/09/30	Chandra Nandlal
pH	AT	7608477	2021/09/29	2021/10/01	Surinder Rai
Sulphate by Automated Colourimetry	KONE	7608703	N/A	2021/09/30	Alina Dobreanu
Total Dissolved Solids	BAL	7608867	2021/09/29	2021/09/30	Shaneil Hall

BV Labs ID: QTU231 **Collected:** 2021/09/23
Sample ID: MW5 **Shipped:**
Matrix: Water **Received:** 2021/09/27

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7608955	N/A	2021/10/01	Surinder Rai
Chloride by Automated Colourimetry	KONE	7609208	N/A	2021/09/30	Avneet Kour Sudan
Chemical Oxygen Demand	SPEC	7610140	N/A	2021/09/30	Nimarta Singh
Conductivity	AT	7608963	N/A	2021/10/01	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7610154	N/A	2021/09/30	Julianna Castiglione
Mercury in Water by CVAA	CV/AA	7607551	2021/09/29	2021/09/29	Gagandeep Rai
Dissolved Metals by ICPMS	ICP/MS	7609859	N/A	2021/09/30	Nan Raykha
Ion Balance (% Difference)	CALC	7604461	N/A	2021/10/01	Automated Statchk
Total Ammonia-N	LACH/NH4	7608770	N/A	2021/09/30	Viorica Rotaru
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	7608991	N/A	2021/09/30	Chandra Nandlal
pH	AT	7608969	2021/09/29	2021/10/01	Surinder Rai
Phenols (4AAP)	TECH/PHEN	7607192	N/A	2021/09/29	Deonarine Ramnarine
Sulphate by Automated Colourimetry	KONE	7609217	N/A	2021/09/30	Avneet Kour Sudan

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TEST SUMMARY

BV Labs ID: QTU231
Sample ID: MW5
Matrix: Water

Collected: 2021/09/23
Shipped:
Received: 2021/09/27

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Dissolved Solids	BAL	7608363	2021/09/29	2021/09/30	Shaneil Hall
Total Kjeldahl Nitrogen in Water	SKAL	7610133	2021/09/30	2021/10/04	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	7610053	2021/09/30	2021/09/30	Shivani Shivani
Volatile Organic Compounds in Water	P&T/MS	7607230	N/A	2021/10/01	Gladys Guerrero

BV Labs ID: QTU232
Sample ID: MW6
Matrix: Water

Collected: 2021/09/23
Shipped:
Received: 2021/09/27

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7607494	N/A	2021/09/30	Surinder Rai
Chloride by Automated Colourimetry	KONE	7607870	N/A	2021/09/30	Alina Dobreanu
Chemical Oxygen Demand	SPEC	7610140	N/A	2021/09/30	Nimarta Singh
Conductivity	AT	7607497	N/A	2021/09/30	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7609302	N/A	2021/09/30	Julianna Castiglione
Mercury in Water by CVAA	CV/AA	7607551	2021/09/29	2021/09/29	Gagandeep Rai
Dissolved Metals by ICPMS	ICP/MS	7609859	N/A	2021/09/30	Nan Raykha
Ion Balance (% Difference)	CALC	7604461	N/A	2021/09/30	Automated Statchk
Total Ammonia-N	LACH/NH4	7608770	N/A	2021/09/30	Viorica Rotaru
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	7607390	N/A	2021/09/29	Chandra Nandlal
pH	AT	7607507	2021/09/29	2021/09/30	Surinder Rai
Phenols (4AAP)	TECH/PHEN	7607192	N/A	2021/09/29	Deonarine Ramnarine
Sulphate by Automated Colourimetry	KONE	7607904	N/A	2021/09/30	Alina Dobreanu
Total Dissolved Solids	BAL	7608867	2021/09/29	2021/09/30	Shaneil Hall
Total Kjeldahl Nitrogen in Water	SKAL	7610133	2021/09/30	2021/09/30	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	7610053	2021/09/30	2021/09/30	Shivani Shivani
Volatile Organic Compounds in Water	P&T/MS	7607230	N/A	2021/10/01	Gladys Guerrero

BV Labs ID: QTU233
Sample ID: SW1
Matrix: Water

Collected: 2021/09/23
Shipped:
Received: 2021/09/27

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7608438	N/A	2021/09/30	Surinder Rai
Biochemical Oxygen Demand (BOD)	DO	7605874	2021/09/28	2021/10/03	Frank Zhang
Chloride by Automated Colourimetry	KONE	7608695	N/A	2021/09/30	Alina Dobreanu
Chemical Oxygen Demand	SPEC	7608283	N/A	2021/09/30	Nimarta Singh
Conductivity	AT	7608457	N/A	2021/09/30	Surinder Rai
Mercury in Water by CVAA	CV/AA	7607551	2021/09/29	2021/09/29	Gagandeep Rai
Total Metals Analysis by ICPMS	ICP/MS	7610425	N/A	2021/10/05	Nan Raykha
Total Ammonia-N	LACH/NH4	7608770	N/A	2021/09/30	Viorica Rotaru
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	7608261	N/A	2021/09/30	Chandra Nandlal
pH	AT	7608477	2021/09/29	2021/09/30	Surinder Rai
Phenols (4AAP)	TECH/PHEN	7607160	N/A	2021/09/29	Deonarine Ramnarine
Sulphate by Automated Colourimetry	KONE	7608703	N/A	2021/09/30	Alina Dobreanu

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BV Labs Job #: C1R9799
Report Date: 2021/10/05

exp Services Inc
Client Project #: THB-00011119-JE
Sampler Initials: KP

TEST SUMMARY

BV Labs ID: QTU233
Sample ID: SW1
Matrix: Water

Collected: 2021/09/23
Shipped:
Received: 2021/09/27

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Dissolved Solids	BAL	7608363	2021/09/29	2021/09/30	Shaneil Hall
Total Kjeldahl Nitrogen in Water	SKAL	7607869	2021/09/29	2021/09/30	Rajni Tyagi
Total Phosphorus (Colourimetric)	LACH/P	7608054	2021/09/29	2021/09/30	Shivani Shivani
Low Level Total Suspended Solids	BAL	7607745	2021/09/29	2021/09/30	Shaneil Hall

BV Labs ID: QTU233 Dup
Sample ID: SW1
Matrix: Water

Collected: 2021/09/23
Shipped:
Received: 2021/09/27

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	KONE	7608695	N/A	2021/09/30	Alina Dobreanu
Total Metals Analysis by ICPMS	ICP/MS	7610425	N/A	2021/10/05	Nan Raykha
Sulphate by Automated Colourimetry	KONE	7608703	N/A	2021/09/30	Alina Dobreanu

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	7.0°C
Package 2	8.3°C

BOD Analysis: Sample analyzed past hold time. Notification sent to client and analysis performed.

Sample QTU231 [MW5] : VOC Water Analysis: Due to foaming, sample required dilution. The detection limits were adjusted accordingly.

Sample QTU232 [MW6] : VOC Water Analysis: Due to foaming, sample required dilution. The detection limits were adjusted accordingly.

Results relate only to the items tested.

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BV Labs Job #: C1R9799
Report Date: 2021/10/05

QUALITY ASSURANCE REPORT

exp Services Inc
Client Project #: THB-00011119-JE
Sampler Initials: KP

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7607230	4-Bromofluorobenzene	2021/10/01	100	70 - 130	101	70 - 130	97	%				
7607230	D4-1,2-Dichloroethane	2021/10/01	101	70 - 130	100	70 - 130	101	%				
7607230	D8-Toluene	2021/10/01	100	70 - 130	100	70 - 130	99	%				
7605874	Total BOD	2021/10/03					<2	mg/L	3.7	30	99	80 - 120
7607160	Phenols-4AAP	2021/09/29	93	80 - 120	95	80 - 120	<0.0010	mg/L	NC	20		
7607192	Phenols-4AAP	2021/09/29	96	80 - 120	95	80 - 120	<0.0010	mg/L	NC	20		
7607230	1,4-Dichlorobenzene	2021/10/01	97	70 - 130	94	70 - 130	<0.20	ug/L	NC	30		
7607230	Benzene	2021/10/01	92	70 - 130	87	70 - 130	<0.10	ug/L	NC	30		
7607230	Methylene Chloride(Dichloromethane)	2021/10/01	98	70 - 130	93	70 - 130	<0.50	ug/L	NC	30		
7607230	Toluene	2021/10/01	94	70 - 130	88	70 - 130	<0.20	ug/L	NC	30		
7607230	Vinyl Chloride	2021/10/01	93	70 - 130	89	70 - 130	<0.20	ug/L	NC	30		
7607390	Nitrate (N)	2021/09/29	100	80 - 120	107	80 - 120	<0.10	mg/L	0.39	20		
7607390	Nitrite (N)	2021/09/29	105	80 - 120	110	80 - 120	<0.010	mg/L	0.43	20		
7607494	Alkalinity (Total as CaCO3)	2021/09/30			97	85 - 115	<1.0	mg/L	1.2	20		
7607497	Conductivity	2021/09/30			101	85 - 115	<1.0	umho/cm	1.8	25		
7607507	pH	2021/09/30			101	98 - 103			0.39	N/A		
7607551	Mercury (Hg)	2021/09/29	97	75 - 125	96	80 - 120	<0.00010	mg/L	NC	20		
7607745	Total Suspended Solids	2021/09/30					<1	mg/L	12	25	97	85 - 115
7607772	Mercury (Hg)	2021/09/29	89	75 - 125	94	80 - 120	<0.00010	mg/L	NC	20		
7607869	Total Kjeldahl Nitrogen (TKN)	2021/09/30	NC	80 - 120	101	80 - 120	<0.10	mg/L	3.1 (1)	20	103	80 - 120
7607870	Dissolved Chloride (Cl-)	2021/09/30	NC	80 - 120	103	80 - 120	<1.0	mg/L	1.0	20		
7607904	Dissolved Sulphate (SO4)	2021/09/30	NC	75 - 125	101	80 - 120	<1.0	mg/L	8.2	20		
7608054	Total Phosphorus	2021/09/30	92	80 - 120	89	80 - 120	<0.004	mg/L	NC	20	81	80 - 120
7608261	Nitrate (N)	2021/09/30	102	80 - 120	93	80 - 120	<0.10	mg/L	13	20		
7608261	Nitrite (N)	2021/09/30	106	80 - 120	104	80 - 120	<0.010	mg/L	NC	20		
7608283	Total Chemical Oxygen Demand (COD)	2021/09/30	NC	80 - 120	98	80 - 120	<4.0	mg/L	1.3	20		
7608363	Total Dissolved Solids	2021/09/30					<10	mg/L	1.6	25	97	90 - 110
7608438	Alkalinity (Total as CaCO3)	2021/09/30			96	85 - 115	<1.0	mg/L	0.87	20		
7608457	Conductivity	2021/09/30			103	85 - 115	<1.0	umho/cm	0.86	25		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7608477	pH	2021/09/30			102	98 - 103			0.22	N/A		
7608695	Dissolved Chloride (Cl-)	2021/09/30	109	80 - 120	100	80 - 120	<1.0	mg/L	3.5	20		
7608703	Dissolved Sulphate (SO4)	2021/09/30	113	75 - 125	101	80 - 120	<1.0	mg/L	0.17	20		
7608770	Total Ammonia-N	2021/09/30	100	75 - 125	97	80 - 120	<0.050	mg/L	15	20		
7608867	Total Dissolved Solids	2021/09/30					<10	mg/L	21	25	98	90 - 110
7608955	Alkalinity (Total as CaCO3)	2021/10/01			99	85 - 115	<1.0	mg/L	1.6	20		
7608963	Conductivity	2021/10/01			101	85 - 115	<1.0	umho/cm	0.093	25		
7608969	pH	2021/10/01			102	98 - 103			1.2	N/A		
7608991	Nitrate (N)	2021/09/30	99	80 - 120	98	80 - 120	<0.10	mg/L	0.044	20		
7608991	Nitrite (N)	2021/09/30	105	80 - 120	105	80 - 120	<0.010	mg/L	2.5	20		
7609208	Dissolved Chloride (Cl-)	2021/09/30	NC	80 - 120	106	80 - 120	<1.0	mg/L	0.67	20		
7609217	Dissolved Sulphate (SO4)	2021/09/30	107	75 - 125	99	80 - 120	<1.0	mg/L	0.46	20		
7609302	Dissolved Organic Carbon	2021/09/30	97	80 - 120	96	80 - 120	<0.40	mg/L	0.40	20		
7609859	Dissolved Arsenic (As)	2021/09/30	103	80 - 120	102	80 - 120	<1.0	ug/L	NC	20		
7609859	Dissolved Barium (Ba)	2021/09/30	102	80 - 120	102	80 - 120	<2.0	ug/L	0.31	20		
7609859	Dissolved Boron (B)	2021/09/30	106	80 - 120	99	80 - 120	<10	ug/L	0.59	20		
7609859	Dissolved Cadmium (Cd)	2021/09/30	104	80 - 120	104	80 - 120	<0.090	ug/L	NC	20		
7609859	Dissolved Calcium (Ca)	2021/09/30	NC	80 - 120	101	80 - 120	<200	ug/L	1.5	20		
7609859	Dissolved Chromium (Cr)	2021/09/30	98	80 - 120	98	80 - 120	<5.0	ug/L	NC	20		
7609859	Dissolved Copper (Cu)	2021/09/30	105	80 - 120	103	80 - 120	<0.90	ug/L	NC	20		
7609859	Dissolved Iron (Fe)	2021/09/30	99	80 - 120	99	80 - 120	<100	ug/L	NC	20		
7609859	Dissolved Lead (Pb)	2021/09/30	95	80 - 120	99	80 - 120	<0.50	ug/L	NC	20		
7609859	Dissolved Magnesium (Mg)	2021/09/30	100	80 - 120	100	80 - 120	<50	ug/L	1.6	20		
7609859	Dissolved Manganese (Mn)	2021/09/30	99	80 - 120	100	80 - 120	<2.0	ug/L	0.92	20		
7609859	Dissolved Potassium (K)	2021/09/30	104	80 - 120	102	80 - 120	<200	ug/L	0.19	20		
7609859	Dissolved Sodium (Na)	2021/09/30	NC	80 - 120	98	80 - 120	<100	ug/L	2.0	20		
7609859	Dissolved Zinc (Zn)	2021/09/30	100	80 - 120	100	80 - 120	<5.0	ug/L	NC	20		
7610053	Total Phosphorus	2021/09/30	95	80 - 120	97	80 - 120	<0.020	mg/L	0.67	20	97	80 - 120
7610133	Total Kjeldahl Nitrogen (TKN)	2021/09/30	98	80 - 120	92	80 - 120	<0.10	mg/L	NC	20	87	80 - 120
7610140	Total Chemical Oxygen Demand (COD)	2021/09/30	92	80 - 120	103	80 - 120	<4.0	mg/L	8.1	20		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7610154	Dissolved Organic Carbon	2021/09/30	85	80 - 120	94	80 - 120	<0.40	mg/L	1.2	20		
7610425	Total Arsenic (As)	2021/10/05	106	80 - 120	103	80 - 120	<1.0	ug/L	NC	20		
7610425	Total Barium (Ba)	2021/10/05	103	80 - 120	105	80 - 120	<2.0	ug/L	0.52	20		
7610425	Total Boron (B)	2021/10/05	103	80 - 120	105	80 - 120	<10	ug/L	3.0	20		
7610425	Total Cadmium (Cd)	2021/10/05	105	80 - 120	103	80 - 120	<0.090	ug/L	NC	20		
7610425	Total Chromium (Cr)	2021/10/05	103	80 - 120	100	80 - 120	<5.0	ug/L	NC	20		
7610425	Total Copper (Cu)	2021/10/05	109	80 - 120	107	80 - 120	<0.90	ug/L	NC	20		
7610425	Total Iron (Fe)	2021/10/05	104	80 - 120	101	80 - 120	<100	ug/L	NC	20		
7610425	Total Lead (Pb)	2021/10/05	99	80 - 120	102	80 - 120	<0.50	ug/L	NC	20		
7610425	Total Zinc (Zn)	2021/10/05	107	80 - 120	105	80 - 120	<5.0	ug/L	NC	20		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

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

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) TKN < NH4: Both values fall within acceptable RPD limits for duplicates and are likely equivalent.

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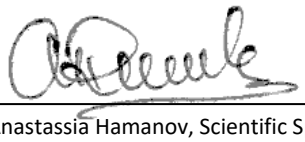
BV Labs Job #: C1R9799
Report Date: 2021/10/05

exp Services Inc
Client Project #: THB-00011119-JE
Sampler Initials: KP

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:



Anastassia Hamanov, Scientific Specialist

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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BOD

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27-Sep-21 11:50
Michelle Huth
C1R9799
J L ENV-1132

Page 1 of 2

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:	
Company Name:	#17501 exp Services Inc	Company Name:		Quotation #:	B90555
Attention:	Accounts Payable	Attention:	Kole Pitkanen	P.O. #:	
Address:	1142 Roland St, Thunder Bay ON P7B 5M4	Address:		Project:	THB-00011119-JE
Tel:	(807) 623-9495 Fax: (807) 623-8070	Tel:	Fax:	Project Name:	Nakina Landfill
Email:	AP@exp.com	Email:	Kole.Pitkanen@exp.com, [handwritten email]	Site #: / Sampled By:	KP + SW

Bottle Order #: 844779
COC #: C#844779-01-01
Project Manager: Michelle Huth

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BV LABS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011): Table 1, Table 2, Table 3, Table ___; Res/Park, Ind/Comm, Agri/Other; Medium/Fine, Coarse, For RSC

Other Regulations: CCME, Reg 558, MISA, PWQO, [X] Other ODWS; Sanitary Sewer Bylaw, Storm Sewer Bylaw, Municipality ______, Reg 406 Table ______

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ______

ANALYSIS REQUESTED (PLEASE BE SPECIFIC): Field Filtered (please circle): Metals / Hg / Cr VI; Landfill Standards Sch 5 - GW Comp. List

Turnaround Time (TAT) Required: Please provide advance notice for rush projects

Regular (Standard) TAT: [X]
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ______ Time Required: ______
Rush Confirmation Number: ______ (call lab for #)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Landfill Standards Sch 5 - GW Comp. List	# of Bottles	Comments
1		MW1	Sept.23, 2021	3:20pm	GW	X	11	
2		~~MW2~~			~~GW~~	~~X~~	~~11~~	Dry
3		MW3	Sept.23, 2021	11:55am	GW	X	11	
4		MW4	Sept.23, 2021	1:55pm	GW	X	3	Insufficient Water
5		MW5	Sept.23, 2021	4:15pm	GW	X	11	
6		MW6	Sept.23, 2021	6:30pm	GW	X	11	
7								
8								
9								
10								

Rec'd In Thunder Bay

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
[signature] / Sabrina Wylde	21/09/27	10:30am	MHuth Michelle Huth	2021/09/27	11:50	
			[signature] / MUSKAN	2021/09/28	08:55	

Laboratory Use Only: Time Sensitive; Temperature (°C) on Recei: 7/8/6, 8/8/9; Custody Seal Present / Intact: Yes / No — N/A

White: BV Labs Yellow: Client

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

4/6/2

BOD

BOD

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CHAIN OF CUSTODY RECORD

Page 2 of 2

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name	#17501 exp Services Inc	Company Name		Quotation #	B90555	BV Labs Job #:	Bottle Order #: 844780
Attention	Accounts Payable	Attention	Kole Pitkanen	P.O. #		COC #: C#844780-01-01	Project Manager: Michelle Huth
Address	1142 Roland St, Thunder Bay ON P7B 5M4	Address		Project	THB-00011119-JE		
Tel	(807) 623-9495 Fax (807) 623-8070	Tel	Fax	Project Name	Nakina Landfill		
Email	AP@exp.com	Email	Kole.Pitkanen@exp.com, ahlers.mdsoprte@exp...	Site # / Sampled By	SW + KP		

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BV LABS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011): ☐ Table 1 ☐ Res/Park ☐ Medium/Fine ☐ Table 2 ☐ Ind/Comm ☐ Coarse ☐ Table 3 ☐ Agri/Other ☐ For RSC ☐ Table ___

Other Regulations: ☐ CCME ☐ Sanitary Sewer Bylaw ☐ Reg 558 ☐ Storm Sewer Bylaw ☐ MISA Municipality ___ ☒ PWQO ☐ Reg 406 Table ___ ☐ Other ___

Special Instructions:

Include Criteria on Certificate of Analysis (Y/N)? ___

ANALYSIS REQUESTED (PLEASE BE SPECIFIC): Field Filtered (please circle): Metals / Hg / Cr VI; Landfill Standard Sch 5 - SW Comp. List

Turnaround Time (TAT) Required: Please provide advance notice for rush projects

Regular (Standard) TAT: ☒ (will be applied if Rush TAT is not specified): Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission) Date Required: ___ Time Required: ___ Rush Confirmation Number: ___ (call lab for #)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered	Landfill Standard Sch 5 - SW Comp. List	# of Bottles	Comments
1		SW1	Sept. 23, 2021	4:55pm	SW		X	8	
2									
3									
4									
5									
6									
7									
8									
9									
10									

Rec'd In Thunder Bay

RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
/ Sabrina Wylde	21/09/27	10:30am	M Huth Michelle Huth	2021/09/27	11:50	
			Muskan / MUSKAN	2021/09/28	08:55	

Laboratory Use Only: Time Sensitive; Temperature (°C) on Receipt: 8/8/9 7/8/6; Custody Seal Present / Intact: Yes / No: N/A

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

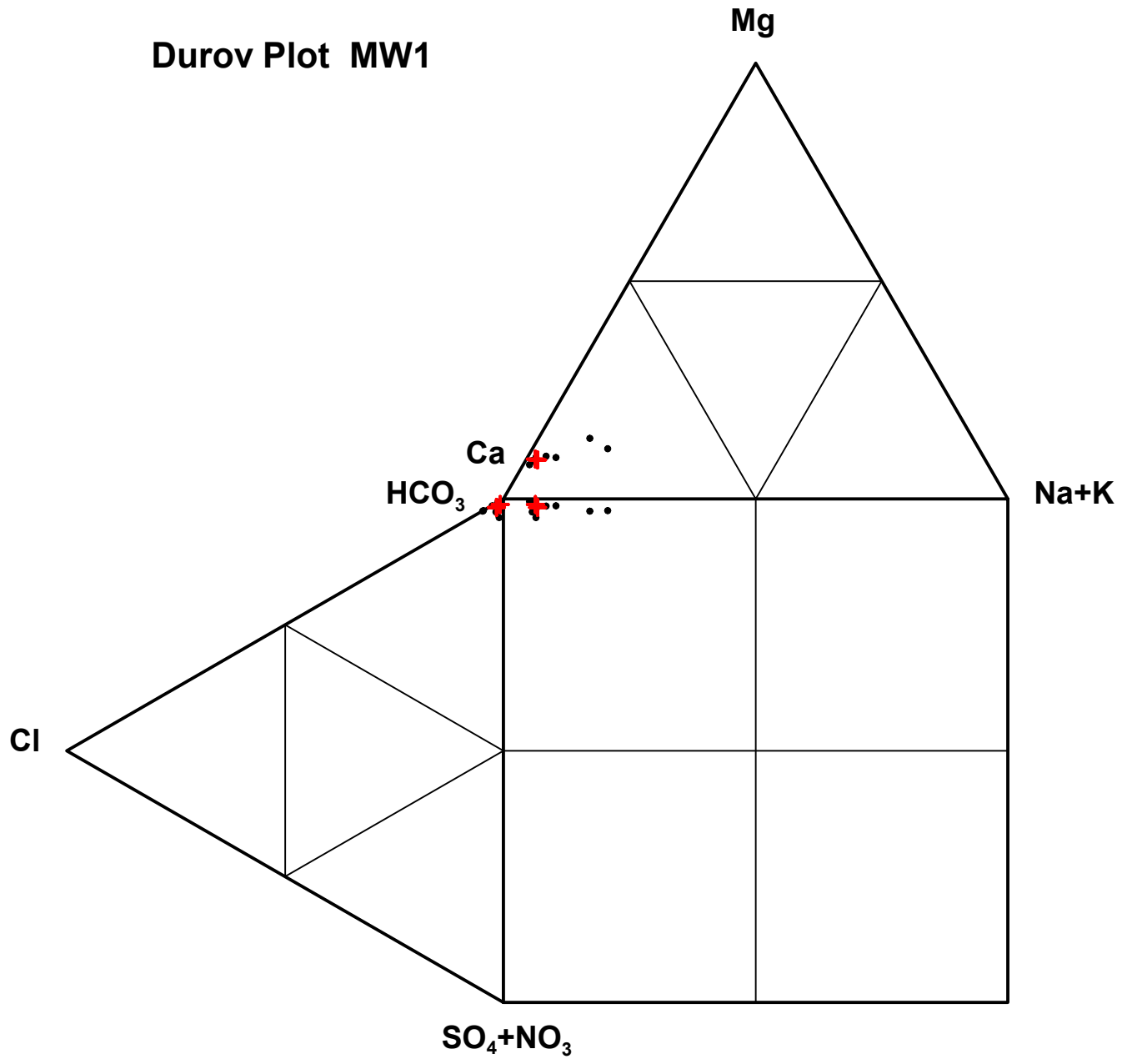
White: BV Labs Yellow: Client

4/6/2

Appendix F –

Durov Plots

Durov Plot MW1



Legend
- Historical Data Point
- 2021 Data

Drawing to be read in conjunction with accompanying report.

exp.

Thunder Bay, Ontario

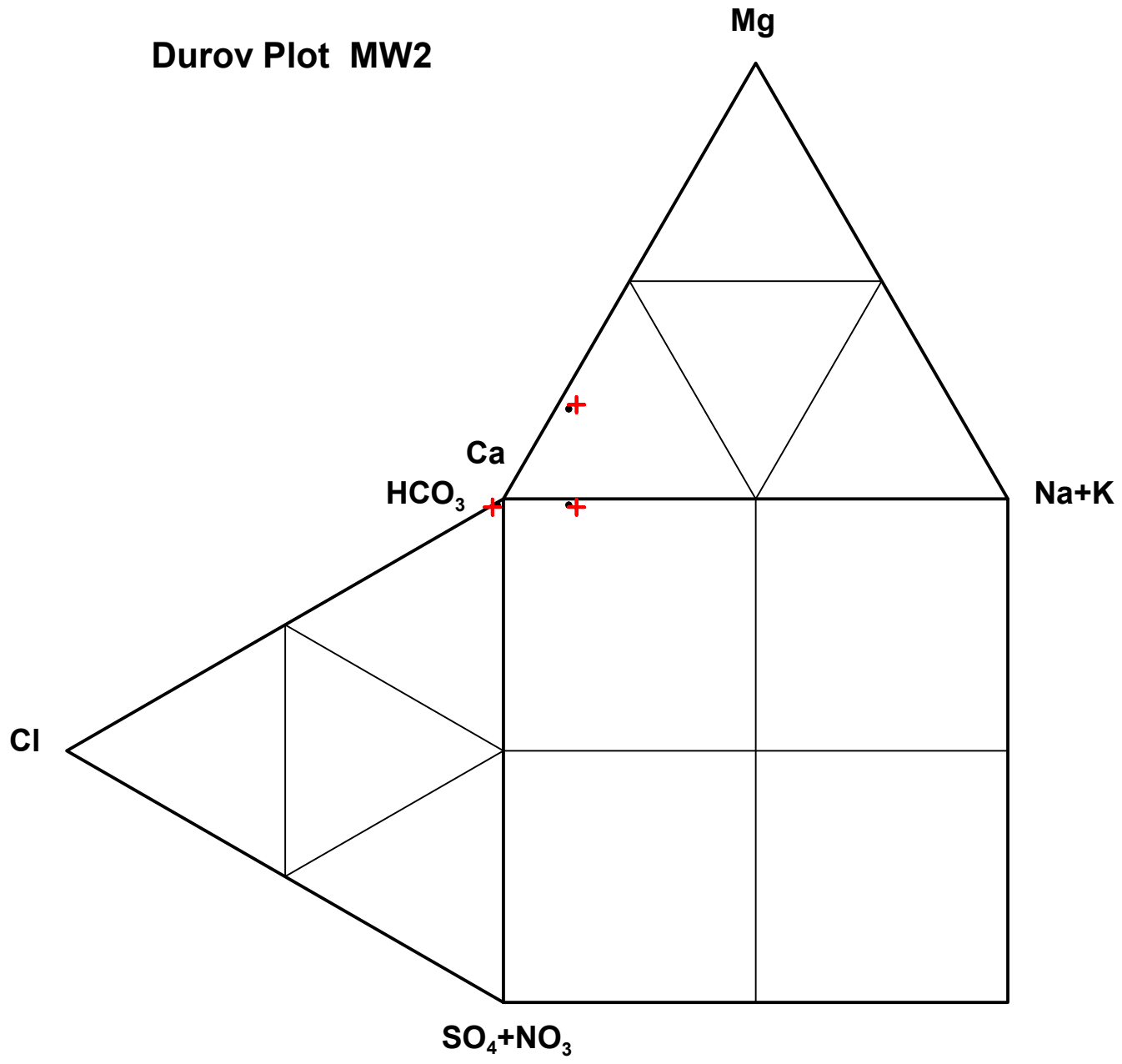
Figure F-1

Monitoring Well MW1

2019, 2020 & 2021 Monitoring Report
Nakina Landfill
Municipality of Greenstone

REF. NO.:	THB-00011119-JE
SCALE:	N/A
DRAWN BY:	SW
CHECKED BY:	AM
DATE:	April 30, 2022

Durov Plot MW2



Legend
- • Historical Data Point
- + 2021 Data

Drawing to be read in conjunction with accompanying report.

exp. Thunder Bay, Ontario

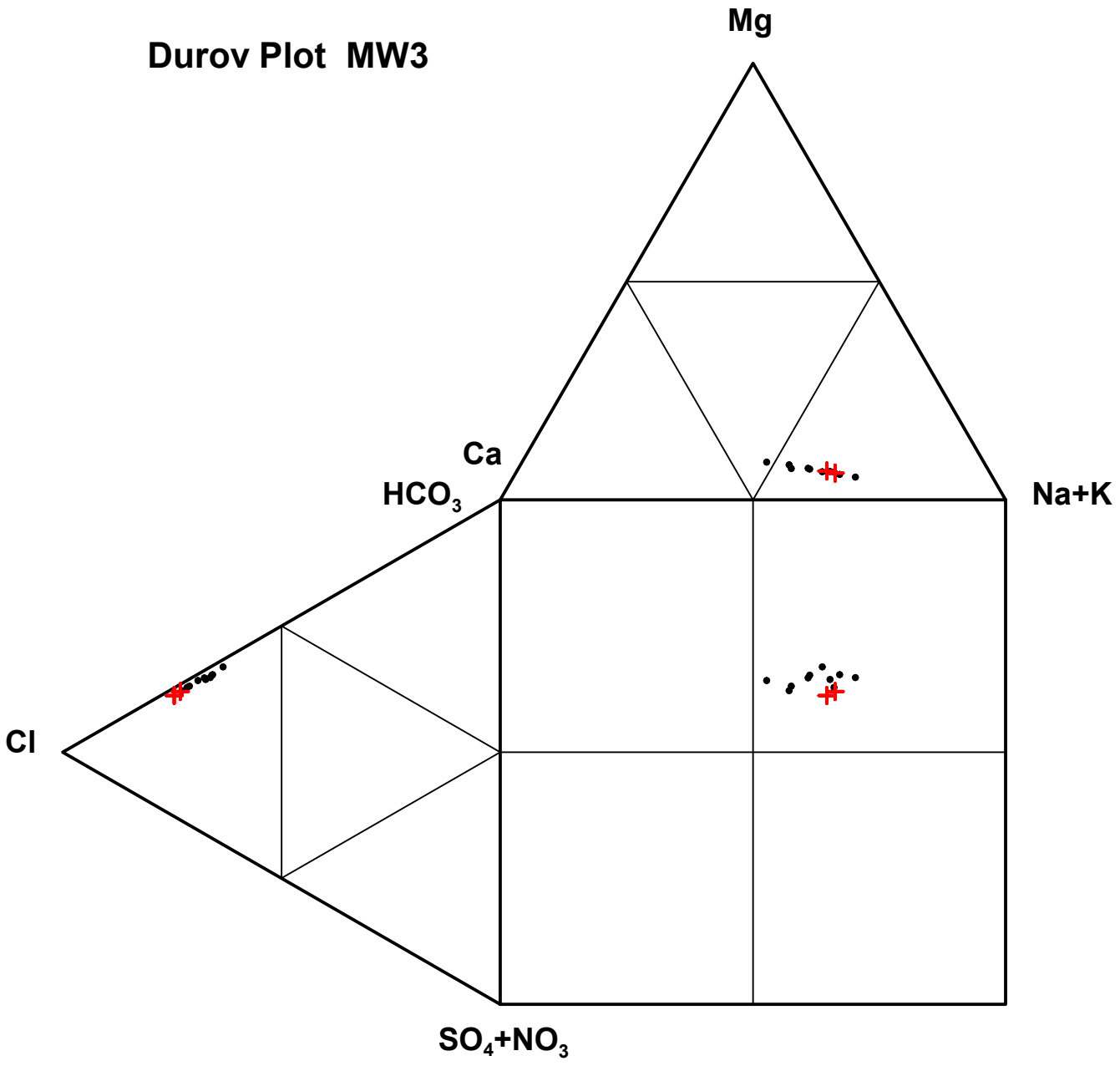
Figure F-2

Monitoring Well MW2

2019, 2020 & 2021 Monitoring Report
Nakina Landfill
Municipality of Greenstone

REF. NO.:	THB-00011119-JE
SCALE:	N/A
DRAWN BY:	SW
CHECKED BY:	AM
DATE:	April 30, 2022

Durov Plot MW3



Legend
- Historical Data Point
- 2021 Data

Drawing to be read in conjunction with accompanying report.

exp.

Thunder Bay, Ontario

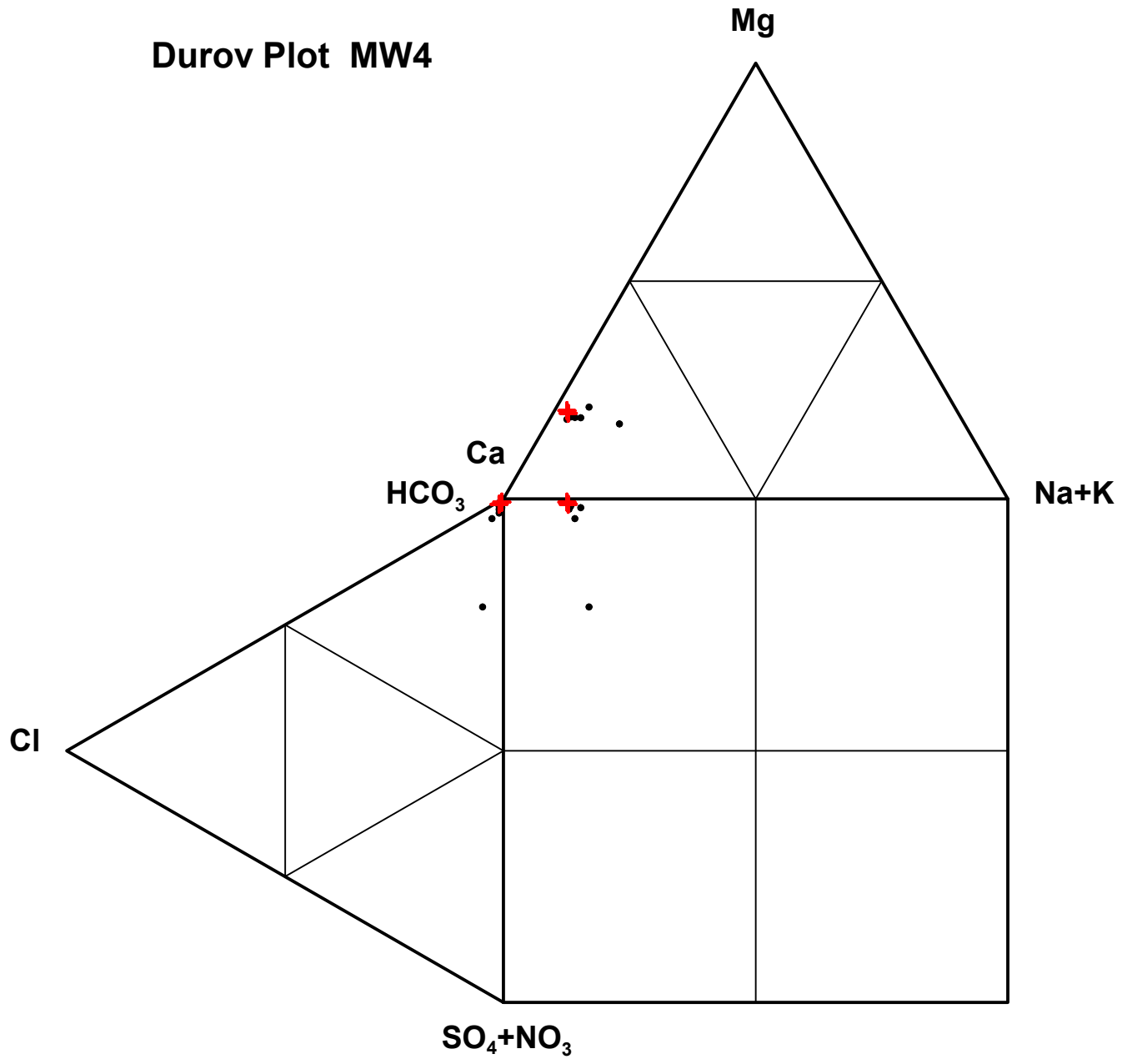
Figure F-3

Monitoring Well MW3

2019, 2020 & 2021 Monitoring Report
Nakina Landfill
Municipality of Greenstone

REF. NO.:	THB-00011119-JE
SCALE:	N/A
DRAWN BY:	SW
CHECKED BY:	AM
DATE:	April 30, 2022

Durov Plot MW4



Legend
- Historical Data Point
- 2021 Data

Drawing to be read in conjunction with accompanying report.

exp.

Thunder Bay, Ontario

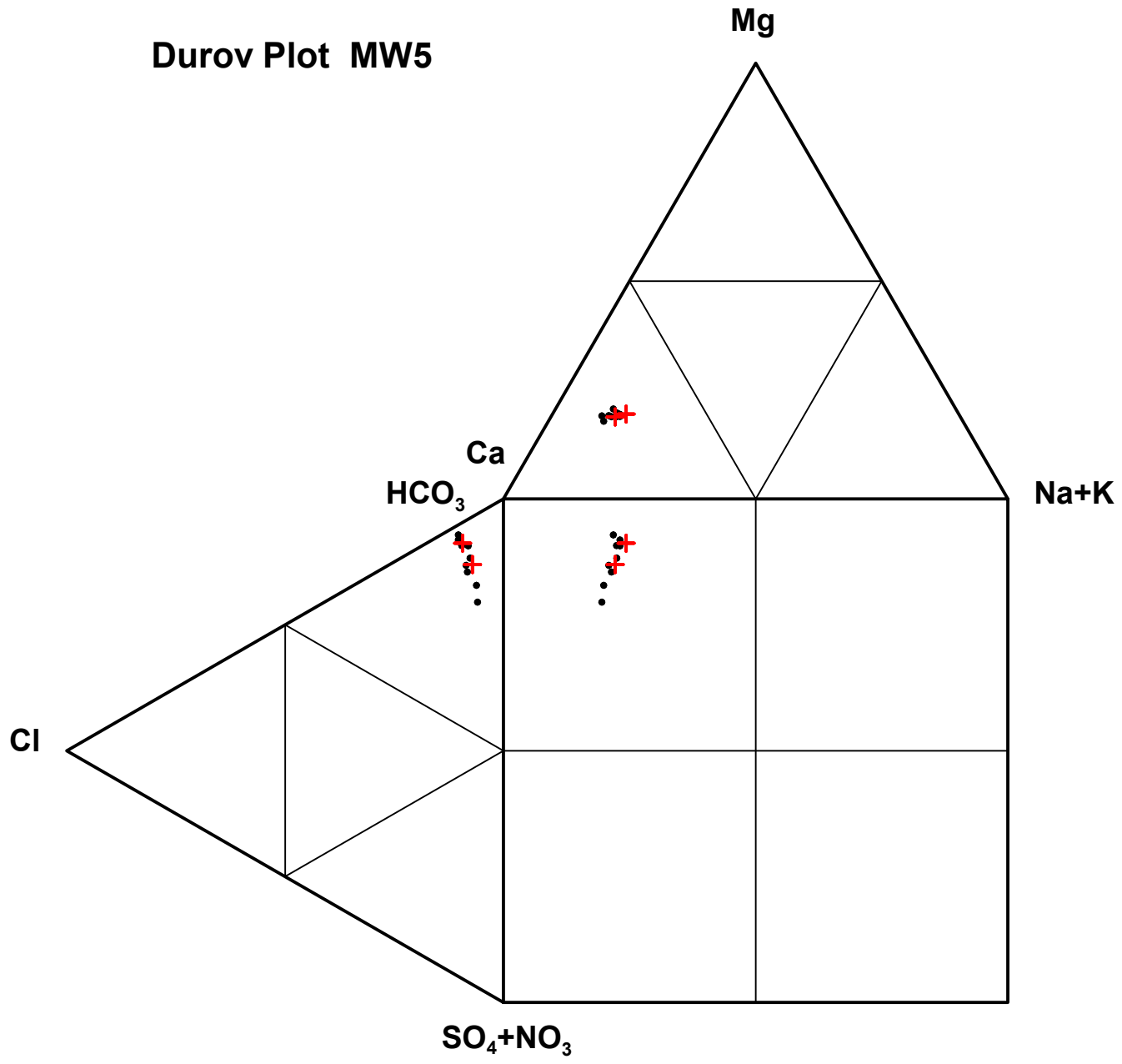
Figure F-4

Monitoring Well MW4

2019, 2020 & 2021 Monitoring Report
Nakina Landfill
Municipality of Greenstone

REF. NO.:	THB-00011119-JE
SCALE:	N/A
DRAWN BY:	SW
CHECKED BY:	AM
DATE:	April 30, 2022

Durov Plot MW5



Legend
- Historical Data Point
- 2021 Data

Drawing to be read in conjunction with accompanying report.

exp.

Thunder Bay, Ontario

Figure F-5

Monitoring Well MW5

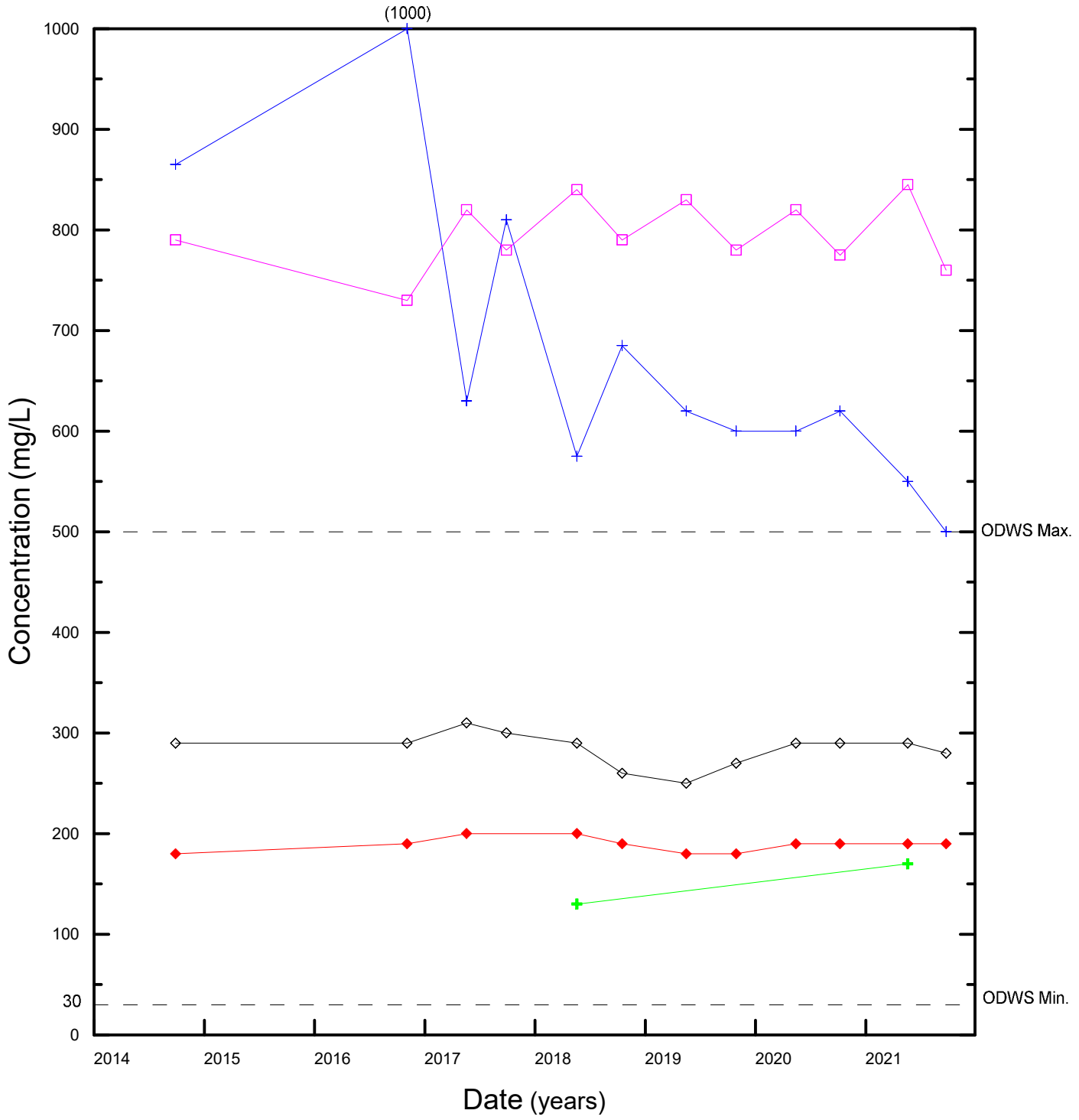
2019, 2020 & 2021 Monitoring Report
Nakina Landfill
Municipality of Greenstone

REF. NO.:	THB-00011119-JE
SCALE:	N/A
DRAWN BY:	SW
CHECKED BY:	AM
DATE:	April 30, 2022

Appendix G –

Time Series Graphs

Alkalinity



Legend
- MW1
- MW2
- MW3
- MW4
- MW5

Notes 1) ODWS: Ontario Drinking Water Standard rev 2001.
2) MW2 does not have enough data due to well being consistantly dry.
3) Drawing to be read in conjunction with accompanying report.

exp.

Thunder Bay, Ontario

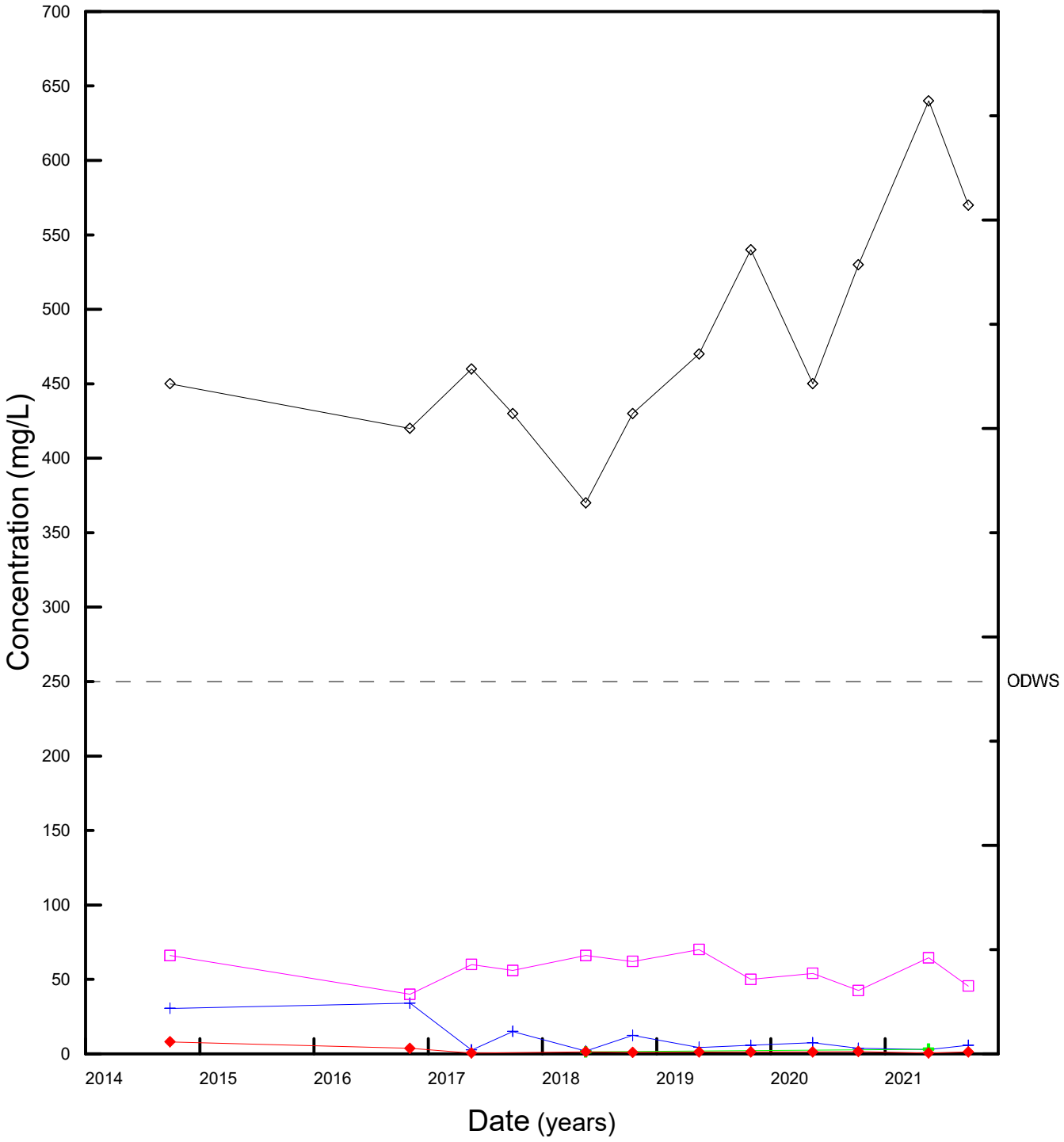
Figure G-1

Alkalinity

2019, 2020, 2021 Monitoring Report
Nakina Landfill
Municipality of Greenstone

REF. NO.:	THB-00011119-JE
SCALE:	N/A
DRAWN BY:	SW
CHECKED BY:	AM
DATE:	April 30, 2022

Chloride



Legend
- MW1
- MW2
- MW3
- MW4
- MW5

Notes 1) ODWS: Ontario Drinking Water Standard rev 2001.
2) MW2 does not have enough data due to well being consistantly dry.
3) Drawing to be read in conjunction with accompanying report.

exp.

Thunder Bay, Ontario

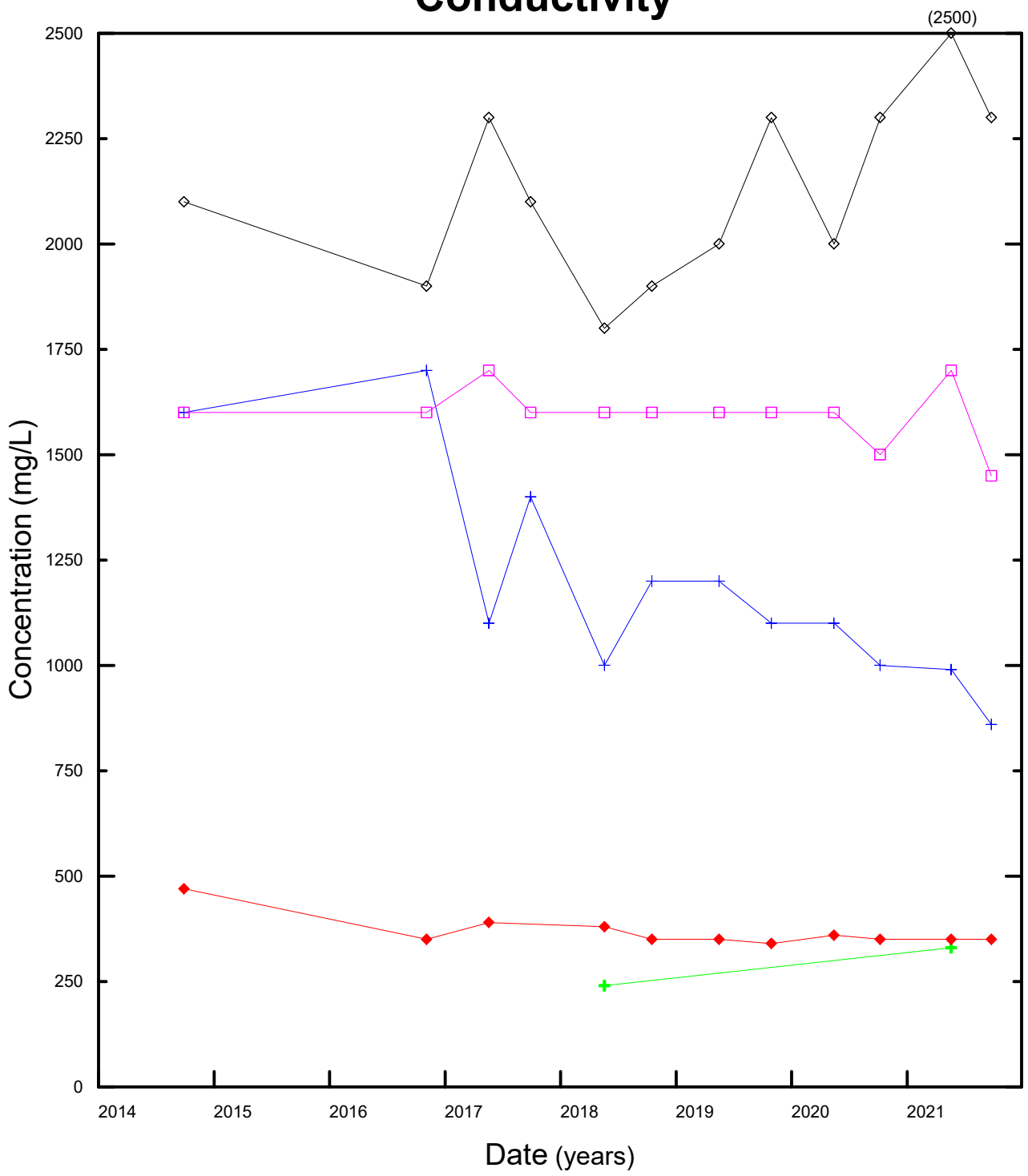
Figure G-2

Chloride

2019, 2020, 2021 Monitoring Report
Nakina Landfill
Municipality of Greenstone

REF. NO.:	THB-00011119-JE
SCALE:	N/A
DRAWN BY:	SW
CHECKED BY:	AM
DATE:	April 30, 2022

Conductivity



Legend
- MW1
- MW2
- MW3
- MW4
- MW5

Notes 1) ODWS: Ontario Drinking Water Standard rev 2001.
2) MW2 does not have enough data due to well being consistantly dry.
3) Drawing to be read in conjunction with accompanying report.

exp.

Thunder Bay, Ontario

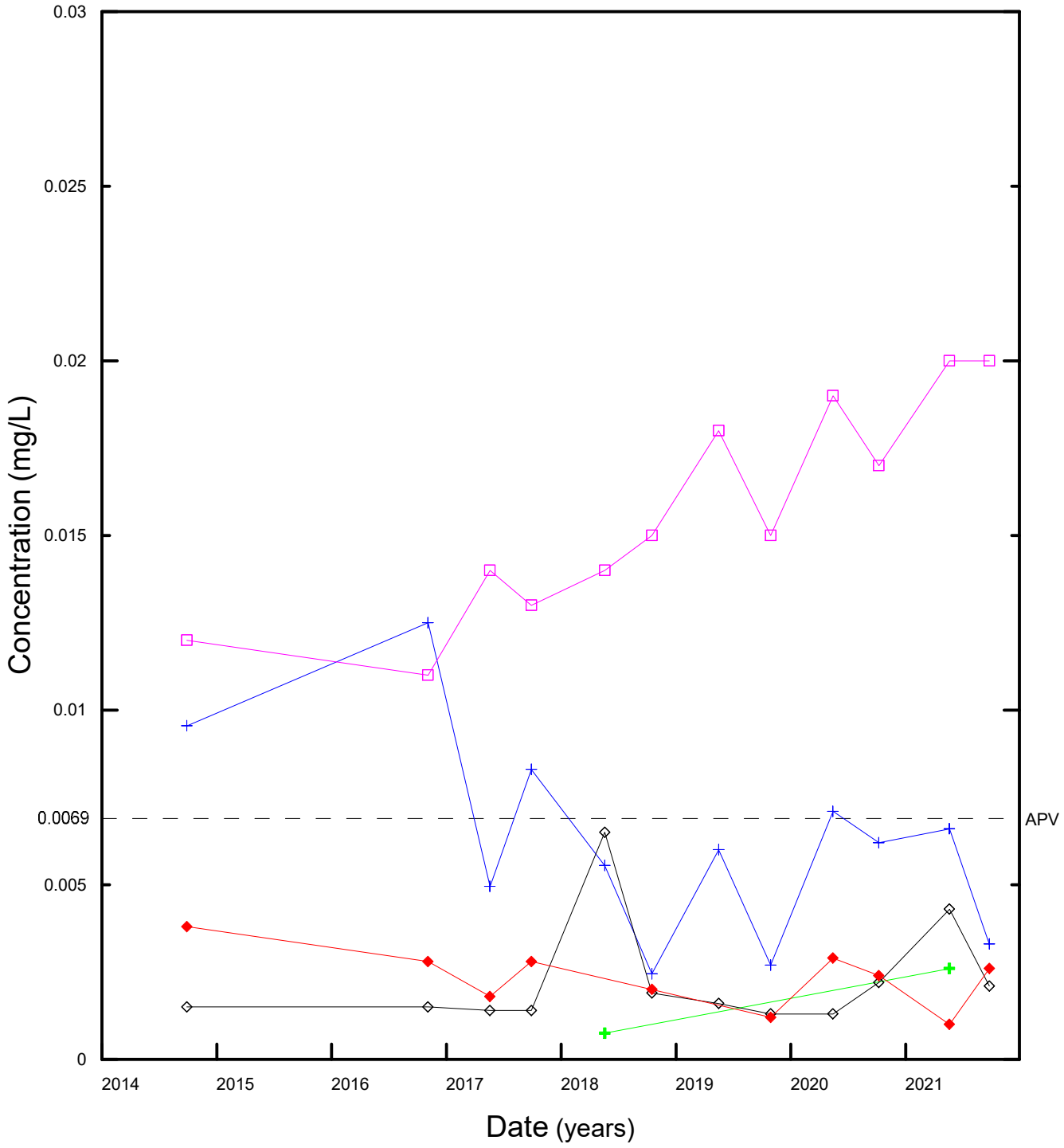
Figure G-3

Conductivity

2019, 2020, 2021 Monitoring Report
Nakina Landfill
Municipality of Greenstone

REF. NO.:	THB-00011119-JE
SCALE:	N/A
DRAWN BY:	SW
CHECKED BY:	AM
DATE:	April 30, 2022

Copper



Legend
- MW1
- MW2
- MW3
- MW4
- MW5

Notes 1) APV: Aquatic Protection Values (MECP, April 2011)
2) MW2 does not have enough data due to well being consistantly dry.
3) Drawing to be read in conjunction with accompanying report.

exp.

Thunder Bay, Ontario

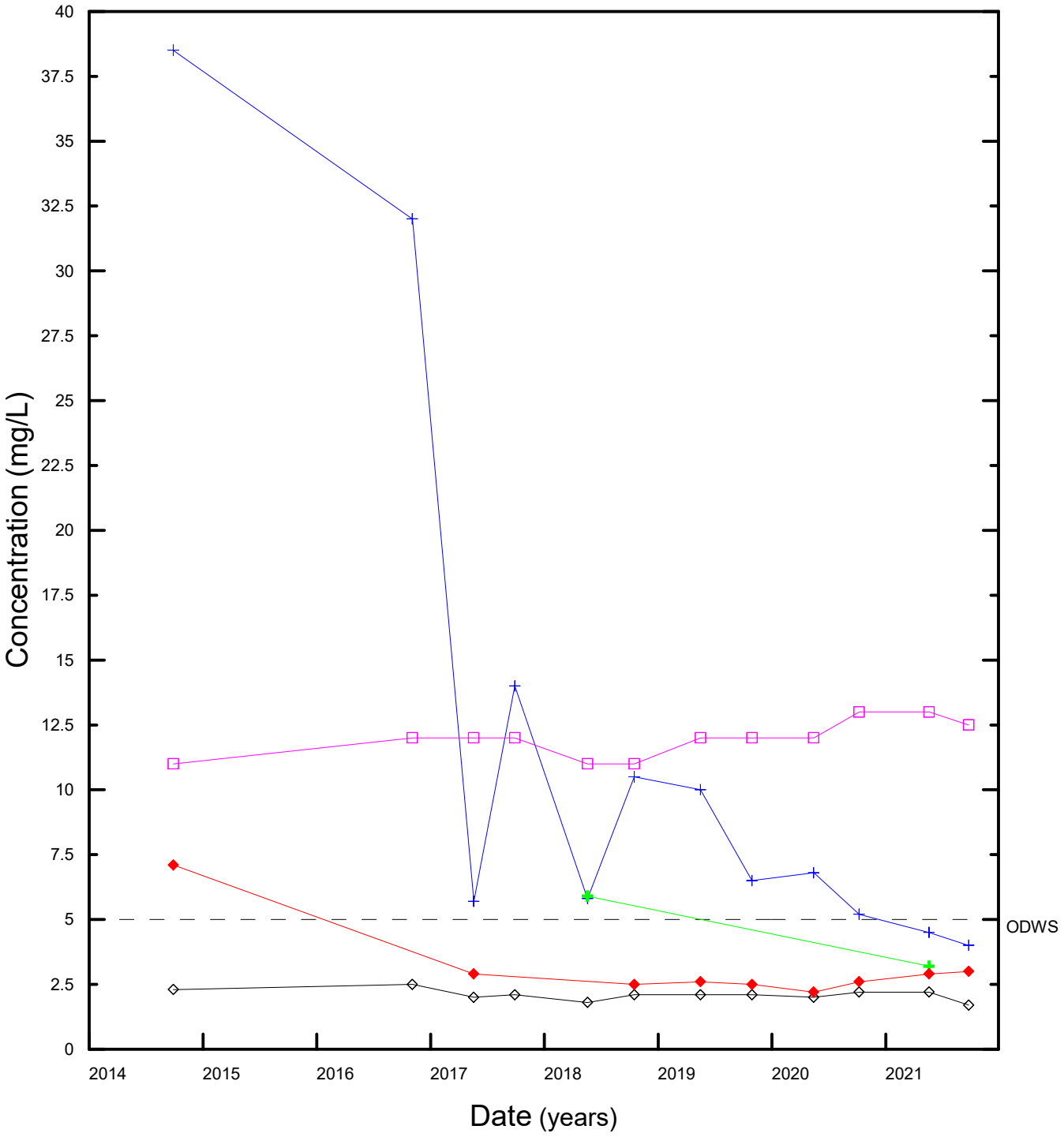
Figure G-4

Copper

2019, 2020, 2021 Monitoring Report
Nakina Landfill
Municipality of Greenstone

REF. NO.:	THB-00011119-JE
SCALE:	N/A
DRAWN BY:	SW
CHECKED BY:	AM
DATE:	April 30, 2022

DOC



Legend
- MW1
- MW2
- MW3
- MW4
- MW5

Notes 1) ODWS: Ontario Drinking Water Standard rev 2001.
2) MW2 does not have enough data due to well being consistantly dry.
3) Drawing to be read in conjunction with accompanying report.

exp.

Thunder Bay, Ontario

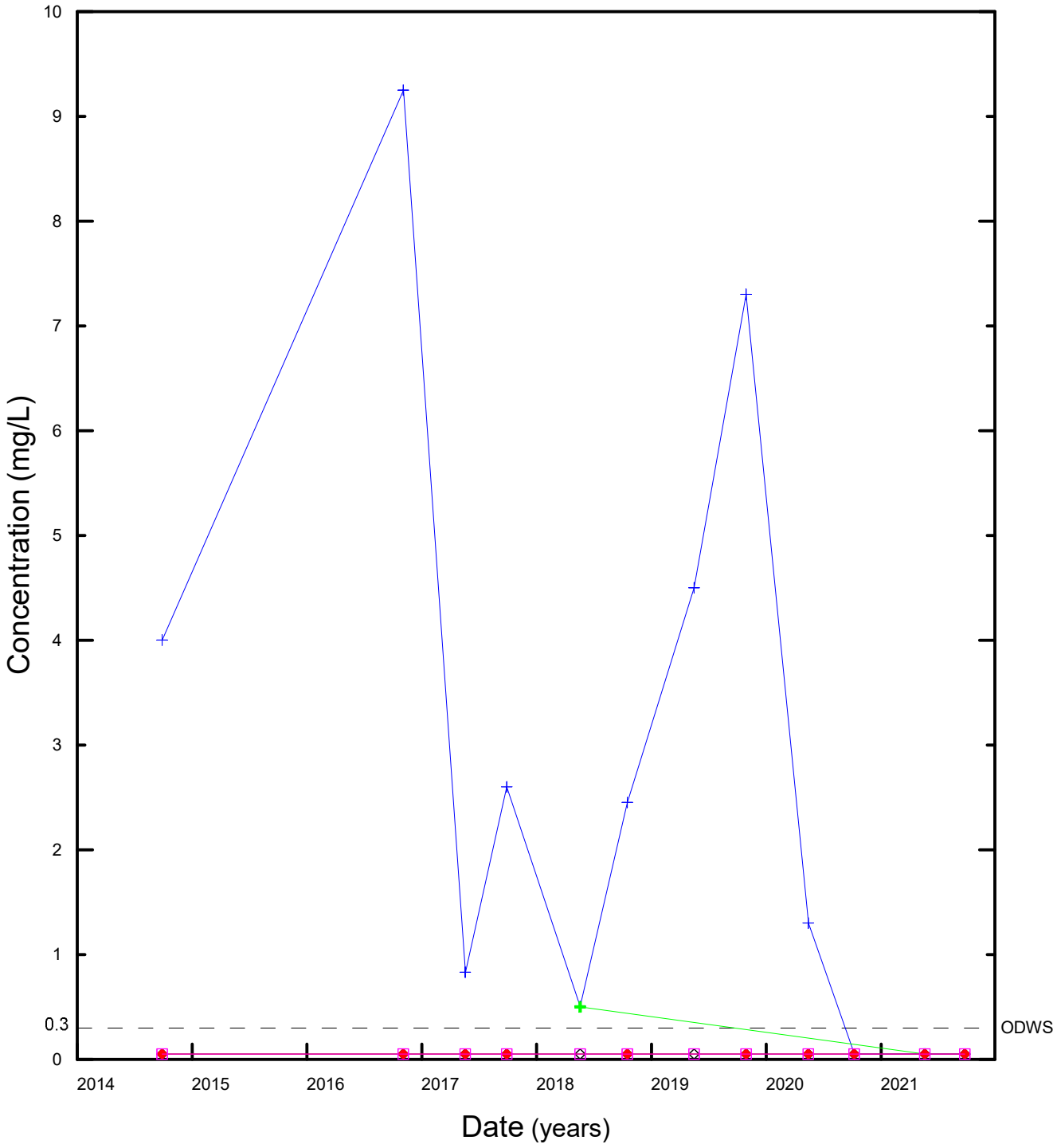
Figure G-5

DOC

2019, 2020, 2021 Monitoring Report
Nakina Landfill
Municipality of Greenstone

REF. NO.:	THB-00011119-JE
SCALE:	N/A
DRAWN BY:	SW
CHECKED BY:	AM
DATE:	April 30, 2022

Iron



Legend
- MW1
- MW2
- MW3
- MW4
- MW5

Notes 1) ODWS: Ontario Drinking Water Standard rev 2001.
2) MW2 does not have enough data due to well being consistantly dry.
3) Drawing to be read in conjunction with accompanying report.

exp.

Thunder Bay, Ontario

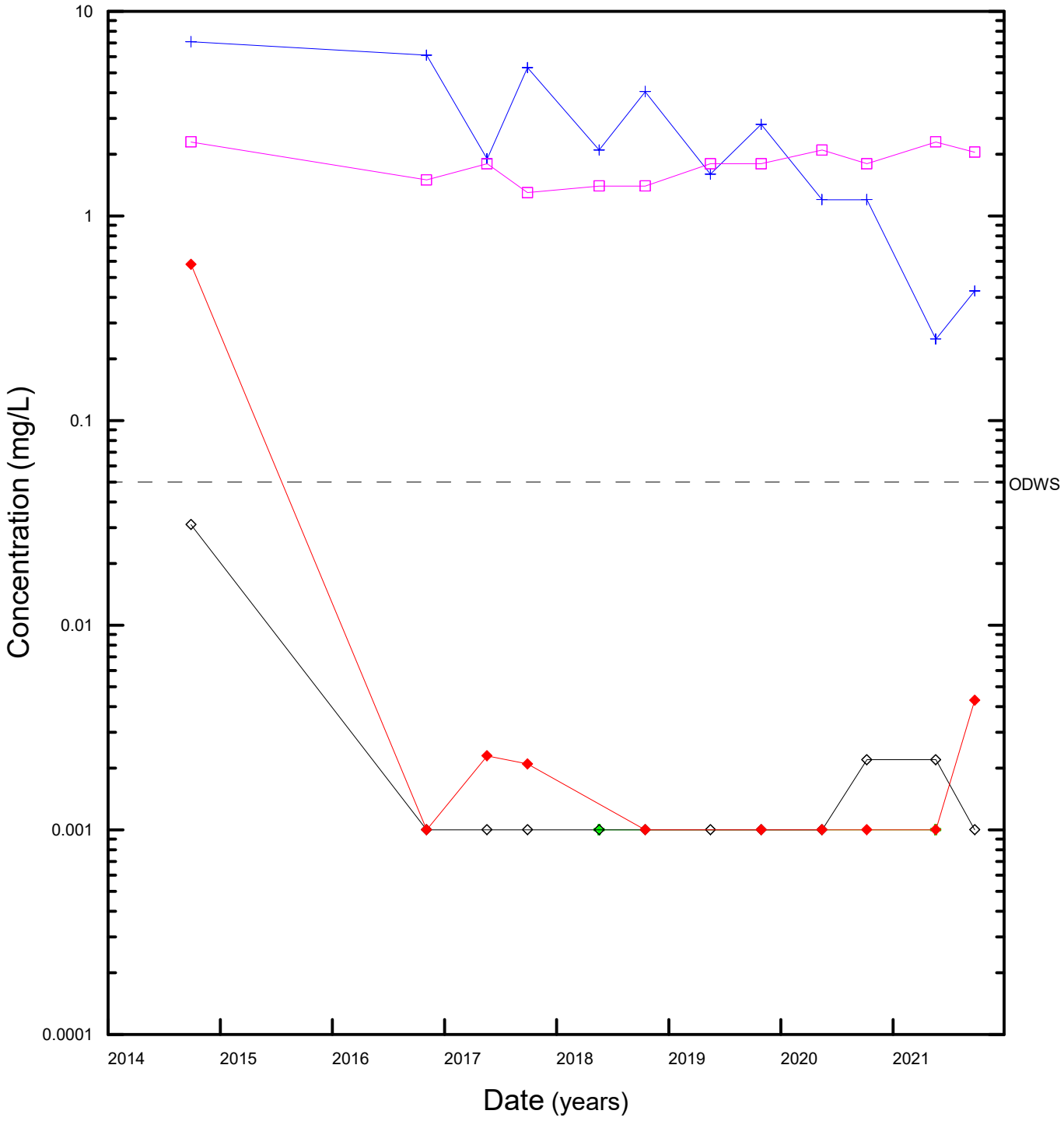
Figure G-6

Iron

2019, 2020, 2021 Monitoring Report
Nakina Landfill
Municipality of Greenstone

REF. NO.:	THB-00011119-JE
SCALE:	N/A
DRAWN BY:	SW
CHECKED BY:	AM
DATE:	April 30, 2022

Manganese



Legend
- MW1
- MW2
- MW3
- MW4
- MW5

Notes 1) ODWS: Ontario Drinking Water Standard rev 2001.
2) MW2 does not have enough data due to well being consistantly dry.
3) Drawing to be read in conjunction with accompanying report.

exp.

Thunder Bay, Ontario

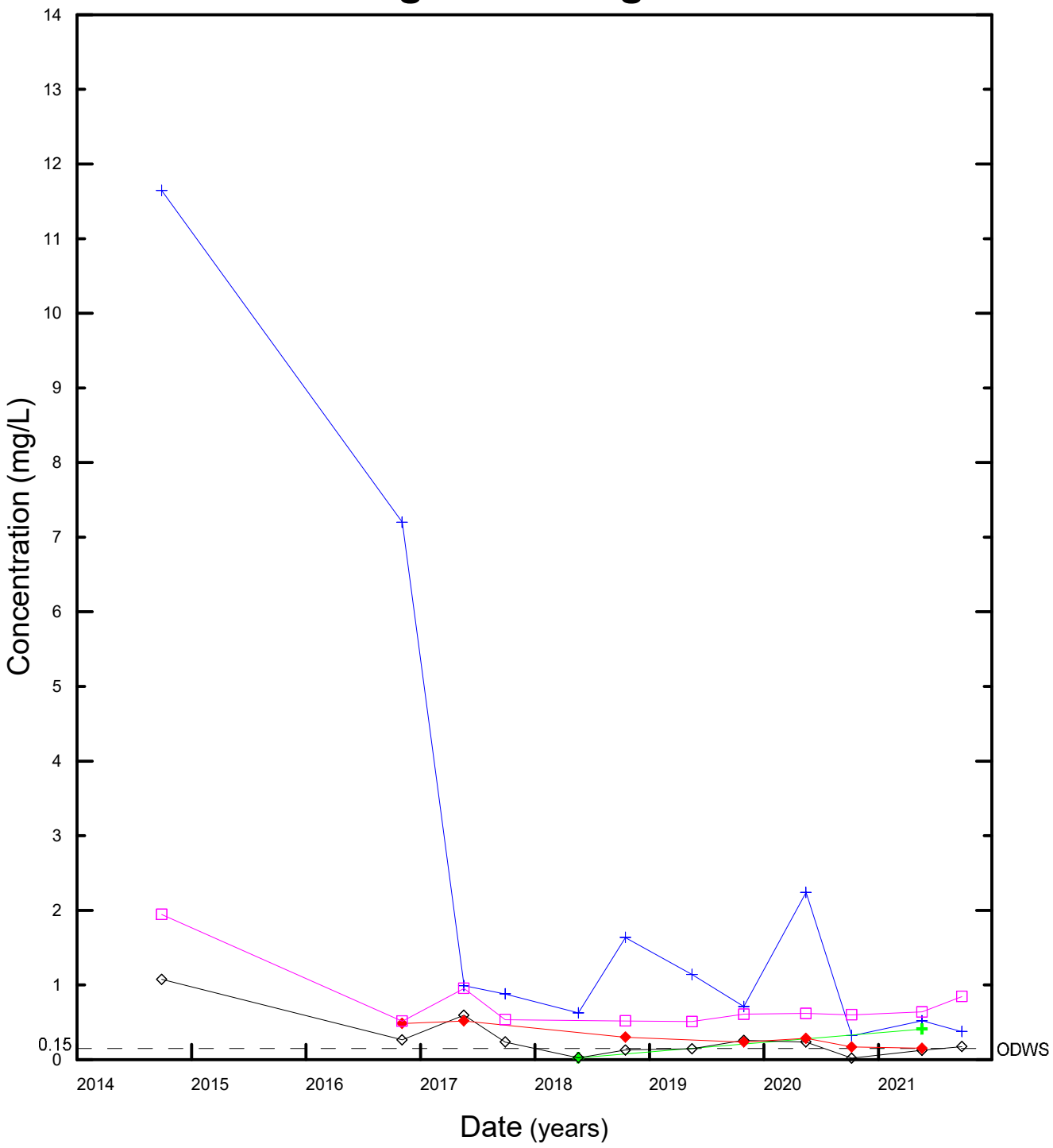
Figure G-7

Manganese

2019, 2020, 2021 Monitoring Report
Nakina Landfill
Municipality of Greenstone

REF. NO.:	THB-00011119-JE
SCALE:	N/A
DRAWN BY:	SW
CHECKED BY:	AM
DATE:	April 30, 2022

Organic Nitrogen



Legend
- MW1
- MW2
- MW3
- MW4
- MW5

Notes: 1) ODWS: Ontario Drinking Water Standard rev 2001.
2) MW2 does not have enough data due to well being consistantly dry.
3) Drawing to be read in conjunction with accompanying report.

exp.

Thunder Bay, Ontario

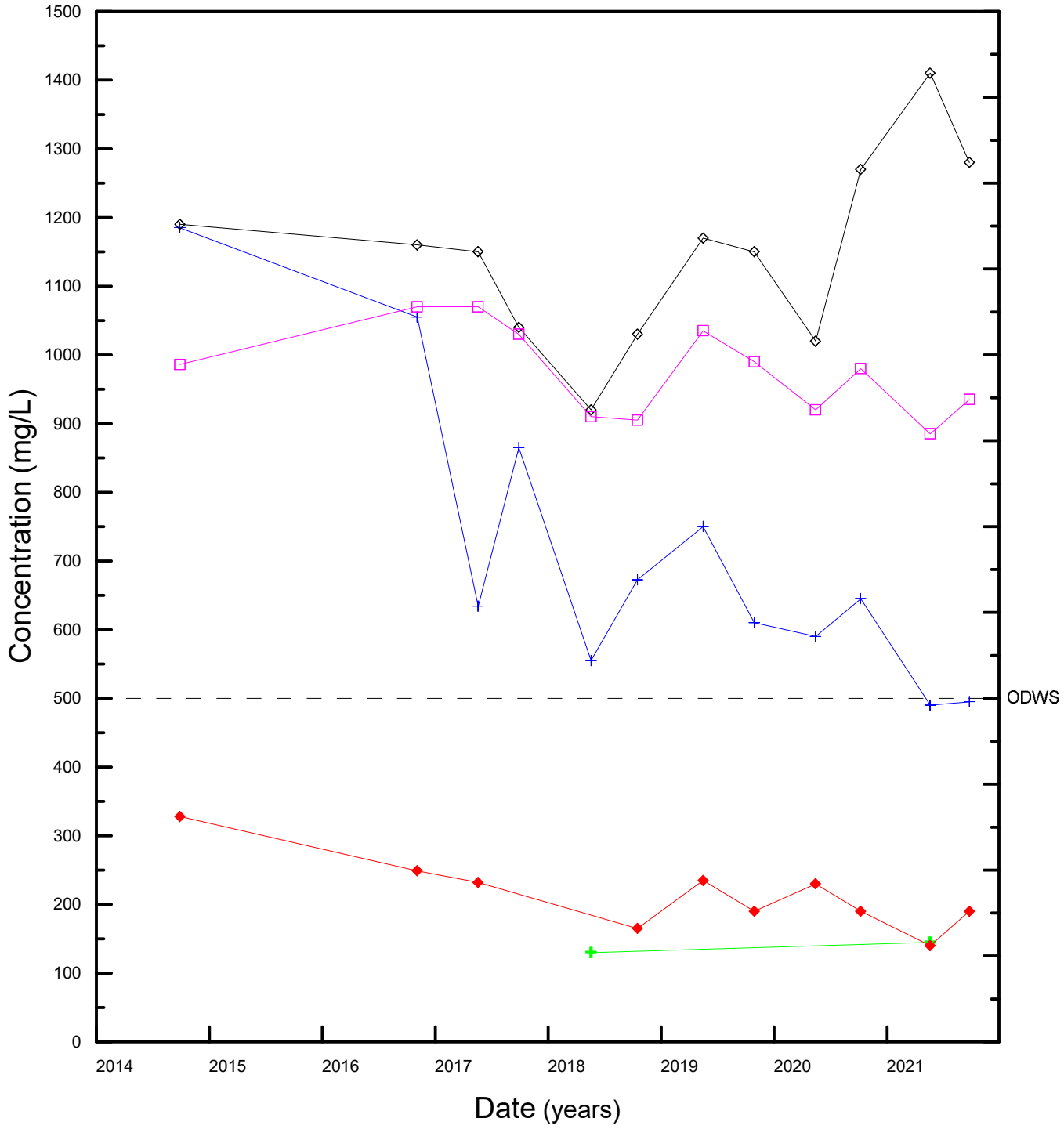
Figure G-8

Organic Nitrogen

2019, 2020, 2021 Monitoring Report
Nakina Landfill
Municipality of Greenstone

REF. NO.:	THB-00011119-JE
SCALE:	N/A
DRAWN BY:	SW
CHECKED BY:	AM
DATE:	April 30, 2022

TDS



Legend
- MW1
- MW2
- MW3
- MW4
- MW5

Notes 1) ODWS: Ontario Drinking Water Standard rev 2001.
2) MW2 does not have enough data due to well being consistantly dry.
3) Drawing to be read in conjunction with accompanying report.

exp.

Thunder Bay, Ontario

Figure G-9

TDS

2019, 2020, 2021 Monitoring Report
Nakina Landfill
Municipality of Greenstone

REF. NO.:	THB-00011119-JE
SCALE:	N/A
DRAWN BY:	SW
CHECKED BY:	AM
DATE:	April 30, 2022