Application for Amendment to Certificate of Approval South Easthope Landfill Site

Revised Design & Operations Plan

Prepared for:
Township of Perth East

Prepared by:
Azimuth Environmental
Consulting, Inc.

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AEC 22-003

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Ministry of the Environment, Conservation and Parks
Environmental Assessment and Approvals Branch
Certificate of Approval Review Section – Waste
2 St. Clair Ave West, 12^{th} Floor,
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Attention: Mohsen Keyvani
Manager, Waste Approvals

Re: **Amendment Application to Certificate of Approval A150901 – Perth EAst Landfill Site - Revised Design & Operations Plan**

Dear Mohsen:

This document represents a revised Design and Operations Plan (D & O) for the South Easthope Landfill Site that is being submitted as part of the application to revise the current Environmental Compliance Approval (ECA) (A150901). This application is being submitted to facilitate an increase in the approved waste volume from 235,000 m^3 to 335,000 m^3 (100,000 m^3 increase). Beyond the proposed alterations to the waste footprint and revisions to the leachate collection system and small expansion of the existing leachate treatment system, the overall operations at the Site are not proposed to be changed significantly, so much of the existing D & O (Azimuth, 2007) remains unchanged. It is noted that a separate ECA amendment application is also being submitted with respect to the leachate treatment system as it is authorized under a separate waste water ECA, although the details of which will be discussed within this document as well.

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Please contact us for any further information or questions you may have during the review process.

Yours truly,

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

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Attach:

cc: Wes Kuepfer, Township of Perth East
Jeff Mills, MECP (London District Office)

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1.0 INTRODUCTION & BACKGROUND

The Corporation of the Township of Perth East is responsible for the operation and maintenance of the South Easthope Landfill Site (Site) in accordance with the Provisional Certificate of Approval (CoA) No.: A 150902 (now referred to as Environmental Compliance Approval [ECA]), issued by the Ministry of the Environment, Conservation & Parks (MECP) November 14, 1988 with the last amendment occurring September 2018. An Ontario Water Resources Act Certificate of Approval (Sewage) Number 3-0762-88-906 for the Site Leachate Treatment System (LTS) was issued August 4, 2004 and last amended February 10, 2020. The Site is registered to accept domestic, commercial and industrial solid non-hazardous waste. The Site has been operated within the framework of the 2007 Design and Operations Plan since its acceptance. Site operations have been upgraded and standardized by the Township over the last several years so that this document formalizes the operational practices that are already in place. For reference purposes the current and previous ECA's for the site is provided in Appendix C.

The landfill site opened in June of 1989 with the site selection and design intended on serving the waste management needs of the four municipalities over a forty-year period. On January 1, 1998, these four municipalities and the Township of Ellice amalgamated into the Township of Perth East. The Township of Perth East assumed responsibilities for the Site as of January 1, 1998.

The purpose of this report is to present the revised Design and Operations Plan (D&O) to facilitate an increase in the approved waste volume from 235,000 m^3 to 335,000 m^3 (100,000 m^3 increase). As the undertaking is identified to have predictable environmental impacts which could be readily mitigated, and Environmental Screening Process (ESP) was completed in accordance with Section 18, Part III, of O. Reg. 101/07 in parallel to this application. Overall, Site operations will continue as they have historically with the same service area, but with an increased capacity to address future use by the Township over the next 15-20 years.

2.0 SITE SETTING

The surface topography is generally flat. The land slopes gently from west to east towards the Wilhelm Drain, which flows southwards into the Thames River. The shallow overburden soils consist of low permeability clay silt till approximately 9 m thick with occasional discontinuous sandy zones. A dense silt and fine-grained sand till, greater than 13 meters in thickness, can be found below the upper clay till.

The Site is located within the Stratford Till Plain. Chapman and Putnam (1984) describe the soils as fairly uniform, brown calcareous silty clay. Some of the silt and clay is calcareous rock flour from the underlying limestone bedrock. According to local well records, the limestone contact is located approximately 40 to 60 m below the ground surface. Figure 3 is a regional cross sectional diagram of the underlying stratigraphy which references local well logs as well as Site boreholes. More localized cross-sections have also been included in this report that illustrate subsurface conditions at the Site including the waste mound, LTS discharge trench and leachate ponds (Figures 7 & 8).

The wastes and cover materials are more permeable than the underlying clay silt till. Precipitation falling on the landfill will tend to infiltrate through the cover material, flow vertically down to the top of the clay till, and then laterally to the surface. Leachate is captured and transferred into one temporary pond with leachate transferred from the active cell into the permanent Leachate Treatment System (LTS) pond or temporary pond if capacity does not allow through temporary pumps. Trench surrounding the active waste area are utilized for capture of leachate when the active area was above grade; however, during initial cell development which includes excavation below existing grad or within perimeter berms, leachate is retained within the cell and transferred via pumps to the leachate pond as required. Leachate is allowed to evaporate within the storage ponds, with the remainder treated and discharged to an in-ground pressure trench. Clean surface drainage from areas outside the active waste area and from the closed cells flows through a series of drainage swales to the on-site storm water pond. This ponds discharge through a controlled overflow to a channel that flows easterly to the Wilhelm Drain.

A small amount of precipitation will infiltrate into the clay till and migrate downwards to the water table. The infiltration rate is estimated at less than 5 cm per year, based on the hydraulic conductivity of the upper clay unit. Within the waste area, this amount of infiltration will also occur, creating leachate-impacted ground water. The water table fluctuates seasonally; however consistent ground water flow patterns towards the southeast and the Wilhelm drain have been observed for the period of record. There is some deviations to this noted along the western property boundary with a localized depression (OW5) in the water table; however, given the remaining consistency in ground water elevations / contours across the Site, this is viewed as an isolated condition to this monitoring well.

Due to the low permeability clay silt tills in the overburden, the Site has very low flow rates of approximately 0.5 to 5.0 m per year. Observed lateral gradients are less than 0.02. As such, the amount of ground water from the landfill discharging into the Wilhelm Drain is negligible when compared with other sources (i.e., overland runoff and ground water discharge from the remainder of the watershed).

2.1 Site Water Quality

Annual water quality monitoring has been ongoing since 1996. The scope of the monitoring program has included ground and surface water monitoring from both up and downgradient locations, as well as from the leachate treatment system that was installed in 2005. The details associated with this monitoring program, including sampling and a summary of the monitoring results can be found in 2022 annual monitoring report (Appendix D). A brief summary of the results is presented below.

The current monitoring program involves the collection of ground water samples from nine (9) monitoring wells, three (3) private wells, three (3) surface water locations and two (2) leachate samples (influent and effluent). The monitoring network expanded from 6 to 9 monitoring wells in 2020, which OW7, OW8 and OW9 were installed south of the waste mound in April 2020. These wells were installed to address the new LTS pressure trench location (Figure 4) south of the leachate pond. OW7 represents a new downradient location, OW8 represents a new background location from the trench along the western property boundary and OW9 was installed immediately adjacent to the trench to assess water quality and water table mounding as per the requirements of the amended ECA. These locations also are situated surrounding the proposed waste footprint expansion area such that the current monitoring network is appropriate for monitoring of the Site in its expanded configuration. For reference, the monitoring well records have been included in Appendix C.

The surface water monitoring stations provide data on the Wilhelm Drain that could be influenced by leachate and storm run-off from the landfill site. Two surface water stations exist along the Wilhelm Drain (SW-1 and SW-2). Surface water station SW-1 is situated upstream of the landfill area in order to represent the natural stream water quality. Surface water station SW-2 is located downstream of the confluence where storm water from the landfill retention pond discharges into the stream. As well, surface water station SW-3 monitors the storm water discharging from the retention pond located in the eastern portion of the landfill property.

Leachate samples are collected from the leachate storage pond adjacent to the LTS which represent influent LTS samples, while effluent samples are collected from the outlet of the LTS prior to discharge into the subsurface pressure trench south of the leachate pond.

To date the ground and surface water monitoring locations are noticeably lacking the classic parameters indicative of a leachate signature, with the exception of SW-3 (stormwater management pond), which has shown leachate influence on occasion in the past when surface runoff from the waste area breached into the stormwater drainage system. These occurrences were typically associated with spring time inundation of surface runoff at the Site; however, were never noted to have created a measurable influence in the downstream surface water in Wilhelm drain.

Some concern was expressed by the MECP that the water quality along the western property boundary was resulting in off-site impacts via the LTS pressure trench which was located adjacent to the property boundary. Azimuth contended that the parameter elevations were more likely the result of road salt or adjacent agricultural influences. Regardless, the pressure trench was relocated further southeast away from the property boundary to reduce the potential for these off-site impacts.

Agricultural influence has been observed in some monitoring wells including upgradient location OW3 (background) with elevated and variable nitrate concentrations, which is not unexpected with the surrounding agricultural land uses. Beyond these external sources, downgradient ground water quality has remained relatively uninfluenced by leachate despite the Site being in operation for the past 30+ years. This is not surprising given the low permeability glacial till soils present beneath the Site which provide adequate attenuation such that there is no measurable downgradient plume within 50 m of the waste mound (*i.e.* OW2).

Samples have historically been collected from the three residences (Yantzi, Wagler and Steinmann) during all sampling events. Please note that the Wagler property is now owned by the Schlotzhauer family, however, the reference in this report has been retained as “Wagler” because the previous ECA and site design documentation made specific reference to that property owner. It is also noted that the Steinmann well was removed from the monitoring program in 2020 as the well targeted for sampling had been removed / decommissioned. The well water chemistry at each well has remained consistent over time and does not show any impacts due to landfill leachate. Impacts are not expected since the Wagler well is in a different watershed and the Yantzi well is upgradient of the landfill. In general, the water quality is moderately hard and has low levels of parameters that are typically indicative of contamination (e.g. chloride, TKN, ammonia, DOC, conductivity, etc). Each of the wells has on occasion had elevated levels of iron, although this is likely due to the inclusion of particulate matter in some of the samples. These samples have historically been collected out of courtesy to the surrounding residents as they participate in the Landfill Committee.

3.0 SITE DESIGN

3.1 Site Description

The South Easthope Landfill Site is located in Lot 26, Concession 5, Line 29 in the Township of Perth East (see Figure 1). The Township of Perth East operates the 5 ha approved waste area within the 29.6 ha site.

The Site is located within an Agricultural Zone (A), with an A-39 designation in the Townships Official Plan which states the land may be used for public uses by the Township as a municipal landfill site, recycling depot, and accessory uses.

3.2 Site Grading

The fill area has a current established height of 5 to 9 m above the surrounding ground elevation. It should be noted that the waste has been emplaced below this point in excavated waste cells to a depth of approximately 3-4 m below ground surface, giving the total waste thickness of 8-13 m. With the proposed expanded waste footprint area, the waste heights above current grade will increase in certain areas with the maintenance of the current waste mound peak of 366 masl and lower surrounding ground elevations further south. It is noted that the waste depths below grade in the proposed waste area will be limited to 2 mbgs to ensure wastes are not emplaced below the water table. The side slopes of the waste pile in areas no longer active and have and will be covered with interim cover material are approximately 3:1 to 4:1. All non-active slope faces will be graded to maintain surface drainage and minimize the amount of pooled water in the waste area. The slopes will be maintained so that the potential for erosion is kept to a minimum and any areas of active erosion will be restored and protective measures implemented.

3.3 Site Life

The landfill will continue to only serve Township of Perth East residents. Total population is 12,595 as per the Government of Canada 2021 Census data. Total number of households is 4,266, of which are 795 agricultural properties. The Census data indicated a 2.6% growth in population between 2016 and 2021.

Total station surveys have been completed annually for the past 19 years at the Site, with the most recent completed in October 2022. Cut and fill calculations completed annually over this period indicate a historical range of 6,000 to 10,000 m^3, which includes waste and interim cover material. As the Site has been the primary disposal Site for all Township waste since 2016 when the Ellice Landfill Site waste closed, which servicing the northern portion of the Township, there has been an annual average waste acceptance volume of ~6,000 m^3 at the Site. A general maintenance in annual waste volumes has been achieved since 2016 despite serving an increased service population (entire Township) owing to improved operations at the Site including implementation of a waste transfer area at the Site entrance and installation of weigh scales to provide better waste screening and diversion. As well, utilization of a waste compactor has likely increased waste density and therefore reduced annual waste volumes. Similarly, efficiencies have been achieved with respect to interim cover material usage relative to incoming waste volumes (*i.e.,* higher waste to cover material ration).

Variance is observed year to year with the survey data as it incorporates berm and cell capping material, as well as excavations for new cells which can skew the volumes year to year. Weigh scales were installed at the Site in 2020; however, only a single year of data has been collected thus far.

Given the variability in annual waste volumes, lack of measurable increase over time in annual waste volumes and small population growth rate (2.9%), the 5 year average annual volume of 6,000 m^3 is utilized for lifespan estimates at the Site.

As of 2022, the Site has a waste volume of ~192,000 m^3, with a remaining waste volume of 43,000 m^3. Given an average ~6,000 m^3 per year acceptance rate and the current total remaining waste volume, the current lifespan of the landfill is approximately 7 years, which falls in line with the original 40 year lifespan of the Site when filling began in 1989. With the proposed 100,000 m^3 expansion from 235,000 m^3 to 335,000 m^3, an additional 15 years of capacity could be gained, assuming annual waste volumes remain consistent with the recent annual average, including a potential modest increase relating to population growth (2.9%). It is surmised that any potential increase owing to population growth of the expansion period would likely be balanced with increased waste diversion efforts over a similar period.

3.4 Final Grade Plan

The final grading plan for the Site was selected with regard to the following criteria:

- provide for a total capacity of 335,000 m^3 at 3:1 slopes in all areas where waste is landfilled;
- provide positive drainage from the Site to minimize surface water infiltration through the cover soils;
- minimize soil erosion and long term maintenance requirements for the cover soils; and
- arrange the contours to be compatible with the surrounding topography and to promote natural re-vegetation subsequent to closure of the Site.

On this basis, the conceptual final grade plan design is as shown in Figure 6. The final contours shown in this figure are based on the waste volume that would permit a 100,000 m^3 expansion of the Site, with the footprint established to fit with the currently fenced in area of the Site without the need for removal of any natural vegetation. The final proposed footprint based on the proposed contours and existing waste area is 4.3 ha.

3.5 Leachate Generation & Dilution Potential

Leachate quality is controlled by the availability of soluble contaminants in the waste pile, the residence time of infiltrating water in the waste, and the physical conditions (i.e., temperature, redox potential, and pH) of the solution. Compared to the background waters, leachate that is produced from recently landfilled waste at the Site has elevated concentrations (10x or more) of calcium, magnesium, manganese, sodium, potassium, iron, chloride, sulphate, alkalinity, ammonia, conductivity, total dissolved solids and dissolved organic carbon. Aluminum, boron, barium, cobalt, nickel, strontium, titanium, vanadium and phosphorus species are also enriched but to a lesser degree. The best available estimate of leachate quality is the analytical data from the leachate pond, which collects leachate from the active waste cell areas of the Site. The leachate signature over the period of records has been relatively stable which is expected given the general Site operations and waste acceptance rates have been maintained over the lifespan of the Site. Leachate quality at the Site will change over time as a result of continued leaching of the waste pile, which removes soluble compounds such that the leachate generated at the Site beyond the active areas as represented by the leachate samples is likely being depleted over time.

Beyond the measured leachate quality at the Site it is important to look at the leachate generation rate and volume from the Site in its current state as well as in the future with an increased waste footprint. A water budget was prepared using the Thornthwaite and Mather (1957) method based on long-term average climatic data from Environment Canada for the Stratford and Glen Allan weather stations, which provide climate data that is representative of conditions at the Site. All numbers were calculated using historic data for from 1970 to 2015. The average precipitation is 1,016 mm/year, and evapotranspiration is 521 mm/year. The water surplus is 495 mm/year, which represents the amount of water available annually to infiltrate into the ground water or run off as surface water. Approximately 30% of the available water surplus infiltrates into the waste, resulting in the generation of approximately 6,000 m^3 of leachate each year with the fully expanded waste footprint. It is noted that this volume does not include leachate runoff volume from the active areas that is directed into the leachate ponds for treatment in the LTS.

The current waste area is approximately 2.5 ha, with a proposed final footprint of 4.3 ha. There is ~70 ha of contributing watershed (including the landfill) upgradient of the Wilhelm Drain along the eastern property boundary and 1,500 ha for that of the entire upstream watershed for the Wilhelm Drain which provides dilution potential to this feature. Based on the current waste footprint, a dilution potential of at least 25 is expected for the Site receiving area for the Wilhelm Drain and 600 for the entire upstream watershed. With the proposed increase in footprint to 4.3 ha as part of the proposed expansion, the minimum dilution potential will be approximately 16 or 350 (CAZ) at closure.

Assuming that 30% of the available water surplus infiltrates into the waste and surrounding watershed (granular overburden materials), approximately 6.4 million litres of leachate are produced per year in the current configuration, while 3.7 million litres will be produced under the final footprint upon closure of the Site. By comparison, 346 million litres of water pass through the Site watershed in a typical year.

After over 30 years of landfill operations, no observable leachate influence has been observed in the downgradient monitoring wells such that the between the above noted dilution potential and limited permeability of the underlying glacial till soils, the Site has adequate natural attenuation capacity for the landfill in its current and expanded configuration.

3.6 Leachate Collection and Treatment

In October 2004, a new leachate treatment system (LTS) was installed at the west end of the Site. This newly added facility has been operated in accordance to Certificate of Approval number 0032-5XBJJH, issued August 4, 2004 and most recently revised in 2020 (6224-B5KK74) to facilitate the movement of the pressure discharge trench from the western property boundary to the field immediately south of the leachate storage pond (Figure 4). The LTS consists of a permanent leachate pond, a Waterloo Biofilter system and pressure trench. A second temporary pond is utilized to collect leachate at the waste face and transfer leachate to the treatment system. Historically, the temporary pond was moved as each new waste cell comes on line; however, has been in the same location immediately south of the LTS for the past ten years. The LTS was a proactive step taken by the Township to reduce leachate volumes and to minimize potential risks associated with escape to the ground water or surface water regimes. A Waterloo Biofilter system is utiilized to reduce organic contaminants in the leachate and to discharge treated effluent in a controlled fashion on-site. This also allows more effective use of the leachate collection ponds and protects them against overflow during wet times of year. Over the past 5-10 years, treatment volumes have increased such that they exceed the design flow rates for the system. The system has been able to accommodate these flows, but it has increased the frequency for cleaning and maintenance of the system to ensure optimal efficiency. As part of the proposed landfill expansion, the Township is also submitting an application to amend the current LTS ECA to increase the capacity. The treatment is broken down into three main areas, which are discussed below with both the current and proposed revised details for the expanded system.

(1) Solids Removal and Balancing

Primary solids removal will occur in the leachate ponds. This stage will allow solids separation and some of the BOD will be removed through passive aeration. From this point, the leachate pond is linked to the dosing chamber by a gravity flow pipe.

(2) Biofilter Treatment

There is a single pump chamber (1,000 L active capacity) located beside the leachate holding pond. The leachate is dosed into the Waterloo Biofilter from the pump chamber. Currently, the Biofilter consists of a 2.5 m diameter, 2.5 m high polyethylene tank that is filled with proprietary foam media. This unit is housed in a small building. Leachate is intermittently sprayed across the upper surface of the foam cubes and allowed to trickle down. Aerobic degradation occurs through this process on the outer surface of each cube of the foam media and anaerobic degradation occurs within the foam cores. After completion of this process, approximately 50% of the treated effluent is returned through the system again, and the remainder can be discharged. By recirculating treated effluent, it increases the denitrification rate by providing a mix of nitrogen and carbon oxidation-reduction sources. This results in a more complete organic digestion and lower nitrogen concentrations in the effluent. Under the expanded LTS configuration, a second Biolfilter tank will be added to the system.

(3) Discharge

Treated effluent is discharged to the ground through a pressure trench system. A pressure trench is practical for clayey silt soils, which is the case for this specific location. The pressure trench is 100 m long and complies with the requirements of the Ontario Building Code. Therefore, the trench design is over-sized by 50% and is capable of disposing of 7,500 L/day. With the increase in the Biofilter tank, a second trench alignment is proposed to be installed at the Site parallel to the existing trench.

3.6.1 Surface Water Management

The surface water flow patterns at the site are well understood given that the site has been in operation since 1989. The majority of surface runoff follows the natural topography, which slopes to the southeast. A channel with culverts is in place along the west and north side of the fill area to allow clean runoff to be directed north, east and then south towards the Site stormwater management pond. The location of the stormwater pond is situated in the low point of the Site such that it is the ultimate receptor for surface runoff within the current and proposed waste area, before reaching the Wilhelm Drain approximately 100 m east of the pond outlet.

Runoff at the Site can be quite substantial, especially during periods of heavy precipitation due to the low permeability of the native clay soils. As noted previously surface runoff within the active waste areas is handled and treated via the Site leachate storage ponds and LTS system, which has helped to mitigate surface water impacts to the stormwater pond and ultimately the Wilhelm Drain.

With the proposed expanded waste footprint, the stormwater system will be expanded with similar perimeter ditching to collect clean surface runoff from the non-active sections of the expansion area with direction into the existing stormwater management pond, which is facilitated by the local grades in the expansion area. As such, there is no plan to expand or alter the surface water monitoring program at the Site.

Given this has only occurred once during the fifteen years of site operations as a result of an abnormal storm event, it represents an incremental risk. Overland flow would still be directed this way but due to the better segregation of leachate from stormwater, this potential will be minimized. In summary given the native clay soils, and relatively small fill area, changes are not proposed to the current surface water management system.

3.7 Landfill Performance Monitoring Program

The performance monitoring program recommended for this Site needs to be responsive to the findings of the monitoring program. In that regard it will be adaptive to the changing conditions should they occur. Adaptive management is by definition the linking of new data to actions and measures in order to achieve the overall project goals. In essence, new information affects subsequent decisions. This is the concept behind the proposed "Adaptive Management Plan" for performance monitoring. The initial Performance Monitoring / Adaptive Management Plan (AMP) has been formulated from the 20+ years of monitoring data that has been collected by Azimuth and summarized in previous annual monitoring reports. The most current monitoring report has been included in Appendix C for reference. The proposed monitoring program will utilize the existing monitoring program as outlined in that document and update to fit with the proposed expanded waste footprint area in the expanded landfill configuration.

The overall goal and objective of the AMP is to detect and prevent any adverse impact(s) from occurring at any significant receptor. This is accomplished principally through two strategic decision making processes. If the Site condition reacts as predicted then the AMP is used to monitor the response(s) along critical pathways and intervene when appropriate to protect a receptor. Deviation from the predicted response also triggers reaction depending upon the magnitude so that the receptor remains protected.

It is proposed that this will be accomplished through the completion and submission of an annual monitoring report to the MECP, where any potential amendments to the program can be discussed and proposed within this document for review by MECP technical support staff.

3.7.1 Ground Water Monitoring:

The performance monitoring of ground water that is currently recommended will include nine (9) monitoring wells located both down and side gradient to the landfill area. These monitoring locations will be sampled in spring and fall, as has been done since monitoring at the Site began, while an additional sample is collected from OW9 in conjunction with the summer LTS samples as noted below. The parameters to be analyzed include the major and minor inorganics. The positioning of the current monitoring well network is such that it surrounds both the existing and proposed expanded landfill configuration with downgradient locations at OW-2 and OW-7. As no downgradient ground water impacts have been observed at the Site since operations began, and the proposed landfill expansion will not represent an increase in waste acceptance rate at the Site, a single line downgradient monitoring wells are surmised to be sufficient to assess potential downgradient leachate impacts and ground water compliance at the dowgradient property (i.e. Reasonable Use) moving forward. Given the slow movement of any leachate plume at the Site, additional monitoring wells further downgradient of the existing locations could be installed as required in the future if ground water quality at OW-2 or OW-7 begin to shown leachate influence over time.

The landfill currently does not generate a significant dissolved organic plume based on the historical leachate quality at the Site. Trace detection of volatile organic compounds has occurred and would be expected for any landfill Site; however, future changes in the dissolved organic plume are unlikely given current consumer trends and products. VOC analyses at the LTS is and will continue to take place as per the requirements within the LTS ECA such that the presence of VOC parameters in the leachate can be tracked over time.

3.7.2 Surface Water Monitoring

The performance monitoring of surface water that is currently recommended will include one upstream (SW-1) location along Wilhelm Drain and two downstream surface water sampling stations SW-2 (Wilhelm Drain) and SW-3 (stormwater management pond) similar to what has been completed for the past 30 years. The sampling focuses on a comparison of the surface water quality between up and downstream locations within the

Wilhelm Drain to assess potential for leachate influence. The water quality from SW-2 will ensure that all Site runoff from the Site is being segregated from the active waste cell areas before entering the Wilhelm Drain. These monitoring locations will be sampled at the same time as the ground water monitoring in the spring and fall with the parameters to be analyzed including a suite of major and minor inorganics.

3.7.3 Leachate Monitoring

The performance monitoring of leachate at the Site will be completed through sample collection at the leachate storage pond and LTS outlet to track both raw leachate quality at the Site as well as the efficiency of the LTS. This program will continue as has been done historically and originally outlined in the LTS ECA with spring, summer and fall samples from both the raw leachate and LTS effluent for a suite of major and minor inorganics and volatile organic compounds annually.

In addition to the above mentioned analytical parameters field measurements of pH, conductivity and temperature will be conducted at all surface water, ground water and leachate monitoring locations, while dissolved oxygen will be measured at all surface water locations.

The monitoring program presented in Table 1 below reflects the recommendations in the Hydrogeological Investigation Report.

Table 1: Monitoring Program

Monitoring Station	Frequency	Parameters
Ground Water OW2, OW3, OW4A, OW4B, OW5, OW6, OW7, OW8 & OW9	2 times per year (spring & fall)	major and minor inorganics, BOD, COD and phenols
OW9	Summer	
Surface Water & Leachate SW-1, SW-2, SW-3, LTS pond, & LTS outflow	2 times per year (spring & fall)	major and minor inorganics, BOD, COD phenols and TSS
LTS pond & LTS outflow	summer	major and minor inorganics, BOD, COD phenols, TSS & VOC’s (LTS Pond only)

In addition to the annual surface and ground water monitoring program there is also included the collection of hydraulic (water level) measurements in the ground water monitoring wells semi-annually (spring and fall).

The major and minor inorganics analyzed will include, unless sampling requirements are changes with the agreement of the MECP:

pH	Alkalinity
Bicarbonate	Carbonate
Hardness (as Calcium Carbonate)	Total Phosphorus
Electrical Conductivity	Fluoride
Chloride	Nitrate
Nitrite	Sulfate
Calcium	Magnesium
Sodium	Potassium
Bromide	Dissolved Organic Carbon (DOC)
Ammonia Nitrogen	Un-ionized Ammonia* (SW only)
Total Dissolved Solids (TDS)	Orthophosphate
Colour	Turbidity
Aluminum	Arsenic
Barium	Boron
Tin	Iron
Lead	Manganese
Zinc	Nickel
Total Kjeldahl Nitrogen (TKN)	Strontium

3.8 Trigger Mechanism

The purpose of the proposed trigger mechanism is to be a predictive tool used to evaluate the environmental impact and environmental risk of the landfill site. The trigger mechanism is intended to evaluate when the site is not performing as predicted and to identify the potential for significant impacts before they occur, and to trigger further investigations to confirm if the potential impact requires proactive mitigation, or can also lead to modification of the trigger mechanism to reflect the changing understanding of physical conditions at the site.

The trigger mechanism is intended to evaluate routine, ongoing monitoring and assumes that leachate impacts are related to the slow migration of leachate over time, which is the basis of the landfill's design. It is assumed that catastrophic impacts are related to significant point-in-time events, such as a slope failure, unauthorized waste acceptance, etc., and would be identified by Township staff, and remedied / monitored accordingly.

Thus, the trigger mechanism affords time to evaluate actual impacts and plan appropriate mitigation. The following trigger program follows what has been implemented at the Site since 2007 with minor revisions to reflect the expanded monitoring well network since then and the proposed expanded landfill operations.

3.8.1 Trigger Locations

For the purposes of this trigger level assessment, downgradient surface water station SW3 and Monitoring Wells OW2, OW4-B, and OW7 will serve as the compliance trigger level monitoring locations. These locations fall in the most likely path of any possible migrating leachate plume from the current and proposed expanded waste footprint, and are also located well within the inside the property boundary (~90-200 m) so that the point of compliance criteria is met.

3.8.2 Trigger Parameters

Trigger parameters are chosen by comparing surface and ground water quality data with that of the leachate quality data. The following concepts were considered when selecting the suite of trigger parameters:

- Trigger parameters are those typically found at low concentrations in background (unimpacted) surface and ground water and in elevated concentrations in leachate;
- Ideally, the difference in the PWQO/ODWQS value for the selected trigger parameter and the background concentrations in the media should be sufficient enough to enable the determination of non-compliance with confidence by identifying a sustained increase in concentrations which is not simply due to the inherent and / or seasonal fluctuation in the data;
- The suitability of the parameter to serve as an indicator parameter is also considered (i.e., its mobility, persistence, and presence or absence of PWQO's or ODWQS's). The reader is referred to the Ministry's February 1994 document that describes attenuation mechanisms (MOEE, 1994). Adequacy of available data and the degree of fluctuation in analytical results were considered in selecting the trigger parameters.

Based on this criteria boron and iron have been selected as parameters for ground water as they both have a compliance criteria for ODWQS (iron = 0.3 mg/L & boron 5 mg/L) and show notable elevations in the leachate quality. Boron is also noted to have high mobility and minimal reactivity in the natural environment such that they would most likely be the first detected downgradient of the fill area if a migrating leachate plume were to exist. Although iron concentrations can be elevated naturally, concentrations are this Site have shown to be consistently at low concentrations, while can become elevated associated with the anoxic conditions associated with a leachate plume such that it will allow for detection of leachate influence in the ground water. Historically, chloride has been utilized as a ground water trigger parameter at this Site. However, with elevated concentrations being observed at a few upgradient locations over the past several years (OW3, OW5 & OW6) owing to alternative sources including road salt application in the entrance and waste transfer area, it will become more difficult to differentiate between leachate and non-leachate sources in the downgradient monitors.

Surface water parameters selected include BOD, unionized ammonia, and boron. With the exception of boron, these parameters have been included historically in the LTS ECA as trigger parameters such that they will be maintained for consistency, while boron has been added for the same reasons it is included as a ground water trigger parameter. It is noted that boron has been selected to replace chloride, which is proposed to be removed given an alternative source is present within road salt application at the Site, which could create difficulty in refining the source for a potential trigger exceedance.

3.8.3 Tier I – Routine Monitoring

As mentioned previously, OW2, OW4-B, OW7 & SW3 are suggested to represent the key receptor trigger locations. Background concentrations have been established based on the average concentrations at OW8 for ground water and SW1 for surface water.

<u>Ground Water Criteria</u>
The Reasonable Use Concept was used to calculate trigger concentrations for the ground water parameters. RUP values were calculated using the following equation:

$C_m = C_b + x_*(C_r - C_b)$

where,

- C_m – Maximum allowable concentration or parameter at boundary
- C_b – Background concentration (average concentration at BH-13)
- C_r – ODWQS for parameter in question
- x – Constant value (0.5 for aesthetic and 0.25 for health related parameters)

For example, the RUC criteria for chloride in ground water is 129 mg/L, based on [background + 0.5*(ODWQS-background)] or [7.6 mg/L +0.5*(250 mg/L-7.6 mg/L)].

As the downgradient monitoring wells are located between 90 and 200 m from the downgradient property boundaries, the RUP value is appropriate as any exceedances to this would be able to be addressed prior to the Site becoming out of compliance with RUP at the property boundaries. This is further supported by the fact that ground water flow is very slow owing to the low permeability soils (1.0 to 10 m/year, Azimuth, 2022) such that the separation distance represents a travel time of approximately 9 to 200 years. As such any non-compliance issues will have an adequate time window to allow for mitigation measures to be developed and implemented prior to any RUP non-compliance.

Table 2: Ground Water Trigger Parameters and Concentrations

Trigger Parameters	Background Concentration (OW8)* (mg/L)	Leachate Concentration (LTS Pond)* (mg/L)	ODWQS Value (mg/L)	Constant Value (Aesthetic / Health Related Parameter)	Trigger Concentration (mg/L)
Iron	0.01	0.7	0.3	0.5	0.15
Boron	0.03	3.1	5	0.25	1.3

* - five year average concentration

For a trigger to be exceeded and Tier II monitoring initiated, exceedances for a single parameter on three consecutive events needs to occur. The rationale for this is to remove the potential for more significant climatic / seasonal variation or anomalous values creating a trigger exceedance.

Along with these parameters, the analytical database for the ground water monitors is to be examined for increasing trends for other notable leachate indicator parameters such as TKN, DOC, sodium, alkalinity and calcium. If routine monitoring indicates that these parameters are increasing along with the trigger exceedances, then Tier II monitoring is commenced.

Surface Water Criteria

As discussed previously, PWQO and CWQG were reviewed and utilized to formulate the trigger concentrations for surface water boron trigger, while the BOD and unionized ammonia trigger concentrations were based on the previously established values in the LTS ECA. Given the interim nature of the PWQO criteria for boron, MECP Standards Branch has indicated that given the limited toxicology dataset that was utilized during development of the criteria that the Canadian Water Quality Guidelines (CWQG) for the Protection of Aquatic Life (CCME, 2003) value would be more appropriate to use as it utilized a more robust toxicological dataset and was developed by the MECP. As such, the CWQG value for boron for long term exposure is 1.5 mg/L. For added conservancy, the trigger value has been established at 50% the CWQG value for boron.

Table 3: Surface Water Trigger Parameters

Parameter	PWQO[1] / CWQG[2] (mg/L)	Background Concentration (SW1)* (mg/L)	Leachate Concentration (LTS Pond)* (mg/L)	Trigger Concentration (mg/L)
BOD	N/A	<5	102	10.0 mg/L
Unionized Ammonia	0.02[1]	0.002	15**	0.1 mg/L
Boron	1.5[2] (Long-term exposure in fresh water)	0.02	3.1	0.75 mg/L

* - five year average concentration
* - total ammonia

Similar to the ground water triggers, for a trigger to be exceeded and Tier II monitoring initiated, exceedances for a single parameter on two consecutive events needs to occur. Only two consecutive parameter exceedances are established for surface water compared to three with ground water as the surface water migration pathway is noted to be faster than that of ground water and the surface water parameters are less likely to be naturally or seasonally influenced as those in the ground water (*i.e.* iron). As well, the analytical database for the surface water (SW-2 and SW-3) is to be examined for increasing trends for other notable leachate indicator parameters such as TKN, DOC, sodium, alkalinity and calcium. If routine monitoring indicates that these parameters are increasing along with the trigger exceedances, then Tier II monitoring is commenced.

3.8.4 Tier II – Confirmatory Monitoring

The trigger mechanism is designed such that two consecutive exceedances of a given trigger parameter, at a given location, represents an action level.

Surface and ground water monitoring data from each monitoring event will be reviewed upon receipt for the laboratory to determine if any triggers are exceeded. If the concentrations of the trigger parameter exceed the trigger levels during two (surface water) or three (ground water) consecutive sampling events, a confirmatory monitoring program will be implemented.

The confirmatory monitoring program will comprise of collecting samples from the monitoring location(s) in question on two separate occasions over the following two-month period, assuming weather conditions permit (*i.e.* non frozen conditions for surface water). It is recommended that the samples being analyzed for the trigger parameters be collected in duplicate to allow evaluation of the results to determine if the results are representative, accurate, and precise.

The nature of the exceedance(s) and impact in general will be assessed to determine the associated level of concern and the degree of urgency for corrective actions. This review would include an evaluation of the feasibility and effectiveness of the various contingency options. Should the review determine that remedial action is triggered due to parameter exceedances are derived from the on-site operations, a Contingency Plan would be developed based on the specific leachate trends and include possible solutions such as the following:

- Reduction or cessation of waste acceptance of specific materials
- Increased / improved landfill cap / interim cover (i.e. increased thickness or lower permeability material / barrier)
- Establishment of a smaller active area
- Increased monitoring frequency
- Other engineering options (*i.e.* enhancement of perimeter leachate collection network / treatment)

Prior to implementation, the appropriate contingency measure(s) shall be discussed with and approved by the MECP within an appropriate amount of time based on potential ECA application and review times. Since the landfill is located in an area that where there are no proximal downgradient users and the local target aquifer for water supply is within the deeper bedrock unit which is hydraulically separated from the upper aquifer unit which would be most influenced by leachate at the Site, there are no perceived risks to any downgradient ground water users. Similarly, the upper aquifer unit would likely discharge into the Wilhelm Drain at the eastern property boundary such that off-site leachate impacts are not expected given this hydraulic barrier.

Detailed plans, specifications and descriptions for the design, operation and maintenance of the contingency measures shall be prepared and submitted by the Owner to the District Manager for approval.

3.8.5 Tier III – Compliance Monitoring

Tier III compliance monitoring is intended to assess the effectiveness of the implemented contingency measures. The Tier III compliance-monitoring program would be developed along with the Contingency Plan to specifically target locations, parameters, concentrations, and monitoring frequencies that reflect the issue. After compliance is confirmed the surface or ground water quality monitoring would revert to the Tier I monitoring program described in Section 3.7.

3.8.6 Future Trigger Mechanism Modifications

The Owner shall ensure that the Director via an amendment to the ECA shall approve any proposed changes to the site-specific trigger levels for leachate impacts to the surface or ground water, in advance.

4.0 LANDFILL OPERATION PLAN

4.1 Landfill Hours

Landfill hours of operation in 2023 are 9:00 am to 4:00 pm Tuesday through Thursday and 9:00 am to 1:00 pm on Saturdays, which are similar to what they have been for the past several years. Hours are posted on signs at the entry road. The Township reserves the right to modify hours of operation as required. A Site attendant is on Site during all operating hours such that all incoming wastes are screened such that proper diversion of recyclables occurs and no unauthorized wastes are deposited at the Site. When the Site is closed there is a gate at entrance, which locks the Site from road access.

4.2 Landfill Sequencing

The sequencing of landfilling operations has been based on utilizing the area method of landfilling both below and above existing ground surface within defined waste cells as has been completed since the Site began operations in 1989. A new portion of the waste footprint begins with subsurface excavation of the waste cell between 2 and 4 m below grade. During cell excavations, observations are undertaken of the pit to ensure the cells do not encroach water table or any sand seams which could more readily convey leachate impacted ground water. To date, neither of these conditions have been observed in any waste cells at the Site. More limited target depths (2 mbgs) for the proposed expansion area are being established as the water table depths further south and east are noted to be more shallow given the topographic decline in that direction. These sub surface cells have been excavated sequentially as the filling has shifted north to south over the Sites lifepan. Once the below grade cells have been filled the cells have either shifted south or vertically upward in a series of lifts once a sufficient base has been established and access routes are developed for access to the active waste areas. Each subsequent lift is approximately 3-4 meters in height and is based on the height of the perimeter berms utilized to delineate the active cells areas. The Site has currently filled all subsurface waste cells within the currently approved waste footprint and is currently in the second lift of the final row of cells at the southern limits of the approved waste area.

The above noted method will be carried forward with the proposed expansion area for the Site. As landfilling operations move from cell to cell, drainage swales and temporary leachate collection ponds should be adjusted or re-established to accommodate the expanding fill area.

The final contours (Figure 6) provide the proposed waste footprint expansion, however, the specific sequencing may be adjusted over time to reflect revisions to Site access routes, temporary leachate ponds and location of waste diversion areas (i.e. leaf / yard waste, clean wood, etc.), which has occurred in inactive portions of the waste mound. For a small site such as the South Easthope landfill, these operational flexibilities are important to maintain ease of service over the entire operating lifespan.

With proposed waste mound, leachate flow and overland flow from the active waste area can continue to be directed to the west to reach the leachate collection pond via temporary pumping methods as is currently done from the active cells toe drain collection ditches.

Control of clean surface runoff and leachate are of primary concern during regrading of the existing cells. A soil berm will be placed and compacted along the periphery of the active waste cells to prevent runoff of leachate to the perimeter ditching. Existing interim cover is to be removed and the surface of old waste exposed so that new waste forms a hydraulic contact with the lower waste. Temporary leachate collection ponds will be constructed along the southern edge of the active cells and leachate will be pumped from the temporary ponds to the permanent pond beside the leachate collection system.

4.3 Cover Soils

4.3.1 Routine Cover

As per the current operations and direction under the existing ECA, cover material is added to the working area on a weekly basis, or as needed. This will continue with the expanded waste configuration with the newly placed refuse being covered to minimize blowing litter and debris, to minimize odours and to control vermin. Cover soil will be obtained primarily from the excavation of the landfill footprint area or wood chips generated from clean wood diversion. These materials have been utilized historically at the Site and have been of sufficient quantity to provide adequate coverage during operations.

4.3.2 Interim Cover

During development of the landfill, areas which are not considered part of the active disposal area but are scheduled to receive additional lifts of refuse at some point in the future will be temporarily completed with interim cover soils to help promote surface water runoff and to limit the exposure of refuse at the Site. Interim cover will consist of a 0.3 m thick layer of soil that will be obtained from on-site borrow areas or stockpiles. Interim cover will be placed on disposal areas, which will remain inactive for more than six months, after which landfilling will resume until final contours are reached. Interim cover removal, prior to landfilling, will be preformed to promote a hydraulic connection between refuse lifts. In areas where final contours have been reached prior to the scheduled application of final cover, interim cover will be placed and maintained preparatory to constructing final cover in these areas. There interim cover will then form part of the final cover. The material which has been used at the Site historically has been fine grained material typically consisting of silt and clay such that it is adequate material for both interim and final cover where necessary as the Site progresses and cells are closed at final closure grades.

4.3.3 Final Cover

The final contours were chosen to match existing site contours, and provide a maximum slop of 4:1. Slopes on the top of the waste pile are maintained at more than 5% (20:1) to promote runoff of clean water and prevent ponding and infiltration of precipitation. Upon completion of landfilling operations within each cell, a final cover shall be placed over the entire surface area of the cell, and will consist of a compacted 600 mm thick low-permeable cap and a 100 mm thick layer of topsoil.

The low-permeable cover material with a hydraulic conductivity in the order of 10^{-6} cm/sec will be secured from either on or off-Site sources, which as noted above, has been utilized for interim cover since operations began. The final cover material shall minimize surface water infiltration and consequently leachate production. Approximately 26,000 m^3 of final cover material will be required to close the landfill within the expanded limits of refuse.

The topsoil can be obtained from an on-Site stockpile (if available at that time) or an offsite source. The topsoil shall be seeded to quickly establish a root mat and minimize short-term slop erosion. A typical grass seed mixture which is used at landfills and which is proposed at this site is as follows:

55 percent – Creeping Red Fescue
27 percent – Canada Bluegrass
15 percent – Perennial Ryegrass
3 percent – White Clover

Natural re-vegetation will be allowed to occur once the protective grass cover has been developed over the landfill cap.

The final cover will be added to all areas once they have been filled and capped such that a progressive approach is taken to close the landfill site.

4.4 Tipping Fees

The following table summarizes the fees. The Township reserves the right to alter tipping fees as deemed necessary.

Table 4: Tipping Fees

Item	Cost
Landfill Tipping Fees* – Waste	$ 86.50/tonne ($10 minimum charge)
Tires (no rims)	No charge
Electronic Waste	No charge
Scrap Metal	No charge
Clean Wood	No charge
Recyclables	No charge
Yard Waste / Clean Wood	No charge
Impacted Soil	$173/tonne
Asbestos	$173/tonne

* - includes standard waste, appliances & wood waste

4.5 Recycling Operations

The Township promotes recycling through blue box program (glass, paper, cardboard and metal cans) and dropoff programs (for larger items / material), including tires, metal, electronic waste, yard waste and clean wood. This recycling program, at a minimum, complies with the provincial requirements for Waste Diversion Ontario (WDO) program. The Township continues to consider alternate recycling programs and may implement these additional programs to promote waste diversion.

4.6 Composting

The Township may undertake a small composting program to address yard wastes. The program would rely on municipal residents to deliver compostible yard wastes to the Site, where they would be composted in a dedicated location. The designated area would be located such that runoff from the composting area would be directed into the leachate collection pond.

4.7 Burning of Materials

In accordance with O. Reg. 232/98, burning of small amounts of clean wood and brush may only be undertaken at some small remote sites if specified in the ECA. There has been no allowance in the current ECA for this site that would allow for any burning of waste to take place. Given this and the fact that the clean wood waste is utilized for daily cover material once ground, there is no intention of undertaking any burning at the Site in the future.

4.8 Dust and Noise Control

With the relatively small size of the Site and its isolated location within an agricultural setting, dust and noise have never been an identified problem, nor have any complaints be received in the past. If complaints should arise in the future, proper measures should be taken to alleviate these issues. Measures could include providing maintenance to Site equipment to reduce noise or wetting of roadways to reduce the amount of dust created by heavy vehicle traffic.

4.9 Equipment and Buildings

The site is equipped with a small building for staff located at the gate of the Site along with a bulldozer used for compaction and movement of refuse and cover material. There is no on site well so a portable outhouse services the building. The site building is to continue to be kept in an orderly fashion and regular maintenance will be conducted on the bulldozer and landfill compactor vehicle to ensure it is operational during all business hours. This equipment is dedicated to the Site such that they are available during operational hours to ensure all incoming wastes are properly emplaced, compacted and covered to minimize nuiassance issues such as wind blown wastes, vector / vermin and odour.

4.10 Maintenance

Regular maintenance will be carried out at the Site to maintain the facilities in a useable manner. During the operating life, the landfill slopes under interim cover will be inspected, as a minimum, on a weekly basis by landfill operation staff. Areas subjected to soil erosion will be repaired on an as required basis using material obtained from on-Site stockpiles.

Should erosion of soils from the interim cover persist, the cover soils will be vegetated to establish a root mat to minimize erosion. Otherwise, natural vegetation will be allowed to re-establish on all interim covers.

The boundary fences will control blowing paper and debris. Debris will be cleaned up and disposed on Site as required.

In the event of a leachate seep or breakout is identified, the following steps will be taken as soon as possible: the affected area will be isolated to prevent migration of leachate along the surface; the area of the seep will be excavated to the underlying refuse materials to provide a hydraulic connection; the excavation will then be backfilled with suitable, low-permeability material to seal off the surface. Following the repair, the location will be closely monitored to confirm that the repair was successful.

Both long-term and short-term maintenance of the surface water management system will be provided. This will include:

- maintenance and cleaning of the perimeter swales, culverts and leachate ponds as required; and
- remediation of landfill areas damaged by erosion.

All on-site roads will be maintained in a passable condition. Should washouts occur, the road will be rebuilt as soon as possible thereafter in a manner comparable to the original design.

Fencing of the Site will be maintained and repaired as required throughout the Site life to control access.

Maintenance of all mechanical equipment will be conducted on a regular basis, or as required.

Also, the site attendant shall ensure that all incoming wastes are inspected and deposited in the correct location so that all wastes can easily be compacted and covered on a regular basis. The current configuration of the Site facilitates this through the weigh scale at the Site entrance and waste transfer area which provides additional screening of incoming wastes by Site staff prior to deposition in the waste cells. In addition, records should be kept of all incoming wastes including volumes (ie. number of truck loads), weight and waste types.

4.11 Animal / Vector Control

Potential vermin and vectors are primarily restricted to rodents (e.g. mice, voles, rats), reptiles (e.g. snakes), small mammals (e.g. raccoons), insects (e.g. mosquitoes) and birds (e.g. crows, gulls, geese). These species are typically found throughout Perth County. Larger mammals such as deer and bear are not common.

At the present time, there has not been a reported problem with vermin nor vector. American crows were an issue in the past – population numbers have declined with the reduction in the recirculation of leachate and more effective interim cover applications. Thus, past intervention steps have proven effective.

This plan represents a proactive step in preparing for an occurrence. The Site is reasonably isolated and located within an agricultural setting, so any problem would be contained within a small geographic area. This allows flexibility in addressing any problems. The action plan represents tasks that the Township already completes as part of their standard operating procedures for both sites. Therefore, this plan is a formality to identify their approach to the MECP and provides a written procedure that the Township could provide to members of the public who are concerned regarding outbreaks.

Vector and vermin are drawn to a landfill because it represents a readily available food source and/or shelter. The key to minimizing vector / vermin problems lies in a proactive approach to cover the refuse, minimizing food opportunities. Secondly, operating staff is readily cognizant of vermin issues and watch for signs that they are present in increasing numbers. Thirdly, actions are taken to remove food / shelter opportunities and undesirable populations are monitored. Lastly, if populations continue to expand, extermination activities are undertaken.

The vermin / vector plan consists of the following activities:

1) The Site and Site buildings are inspected on a regular basis as part of normal site operations. Inspection for animal sign (e.g. digging, scat, nests, prints, calls). Notes on the daily inspection will be made in the operations logs,
2) Site staff note the presence of any animals during standard site operations,
3) Litter from the perimeter fences is collected and returned to the working area twice per year or whenever the amount of debris is moderate,
4) Interim cover is maintained to minimize any open refuse,
5) The size of the working area is minimized to reduce waste exposure during operating hours,
6) Recyclables and recovered material are segregated and removed from the Site as soon as complete transfer loads are available. This minimizes the amount of cover available to animals. Materials with standing water are drained or overturned to minimize opportunities for water supply and breeding potential (e.g. mosquitoes for West Nile virus),
7) Grassed areas around the Site are not cut since this reduces loafing potential for gulls. Longer grass could obscure views of approaching predators so that gulls do not feel safe, minimizing their residence time at the property. At selected times of year, long grass can encourage proliferation of insects (e.g. grasshoppers) that are a food source and can encourage the presence of wildlife, however, this shorter duration event is considered to be less important, and to date has not posed a significant concern such that a change has been warranted,
8) If wildlife are evident and populations are increasing above historical levels, the site operator will undertake action to eliminate the attracting mechanism,

9) If rodents or mammals are the issue, the Township will call a local commercial extermination / pest control company to undertake a removal program. The pest control company will set traps as necessary,

10) If the vector are avian, the control program must also consider controls available under the Migratory Bird Act. If a migratory bird (e.g. gulls, geese) are involved, the Township is limited to disturbance of nesting sites before laying of eggs). To this time, nesting of migratory birds has never been observed on the property. Other disturbance techniques for adult birds could be used (propane bangers, shotgun blanks, taped distress calls, injured bird or predator decoys). However, the use of disturbance techniques is unlikely to be required since the landfills are small and have not had any historical problems with gulls or geese, and

11) Vector and vermin control activities will be noted in the annual monitoring report. This will provide a mechanism to ensure that control measures are directly reported to the MECP as well as provide public notification since the annual report is reviewed by the Public Liaison Committee and is made available to the public by the Township.

The Site has a readily available supply of water, from on-site leachate control ponds and stormwater control ponds. Therefore, this component cannot be readily addressed through engineering controls. However, given the historical operations at the Site, there is no reasonable need to address vermin / vector mitigation at these water sources given they have never been observed to have created any issues in the past.

4.12 Site Closure

Final elevations and contours for the landfill area were designed to allow drainage of storm runoff along swales towards the southeast, which is the natural direction runoff would migrate. The proposed closure activities include placement of final cap and establishment of grass vegetation, which will be done progressively as cells are closed.

In addition to regular operating inspections, the landfill cover will be inspected two times per year (spring and fall) for the first five years after closure and then annually for the next five years after closure to assess the condition of the cap in terms of erosion, slope stability, and vegetative stress. Any necessary repairs would be completed in a timely fashion using suitable procedures and materials.

In accordance with MECP Regulation 232/98, a Final Closure Plan will be prepared for the Site at least two years before the expected date of closure or by the time the Site has been 90 % filled. This report should include the following items:

1. A plan showing site appearance after closure;
2. A description of the proposed end use of the Site;
3. Descriptions of the procedures for closure of the site, including:
    1. advance notification of the public of the landfill closure;
    2. posting of a sign at the site entrance indicating the landfill is closed and identifying any alternative waste disposal arrangement;
    3. completion, inspection and maintenance of the final cover and landscaping;
    4. site security;
    5. removal of unnecessary structures, buildings and facilities; and
    6. final construction of any control, treatment, disposal and monitoring facilities for leachate, groundwater, surface water and landfill gas;
4. Descriptions of the procedures for post-closure care of the Site, including:
    1. operation, inspection and maintenance of the control, treatment, disposal and monitoring facilities for leachate, groundwater, surface water and landfill gas;
    2. record keeping and reporting; and
    3. complaint contact and response procedures;
5. An assessment of the adequacy of and need to implement the contingency plans for leachate and methane gas;
6. An updated estimate of the contaminating life span, based on the results of the monitoring to date; and
7. An update of the cost estimate for financial assurance and the amount which has been provided to the Director, in the case of a privately-owned site.
8.

4.13 Public Liaison Committee

A landfill Public Liaison committee is already in place and has been meeting on an annual basis with additional meetings being held as required. The committee is made up of four local homeowners as well as Township staff. The Township's consultants attend meetings and provide information as requested by the Township. The mandate of this committee includes:

1. Provision of review and comments on the draft Annual Operating Reports for the Site;
2. The Committee shall meet at least once every year or as required by either the Committee or the Township;

3. The Committee shall have the opportunity to comment on any proposed amendments to the ECA for the landfill site.

4.14 Emergency and Complaint Response

In the event of an emergency situation at the Site the attendant has easy access to emergency services (fire department, ambulance and police) via telephone or radio. In the event of an environmental emergency, the MECP as well as Azimuth Environmental (or current township consultant) should be contacted immediately such that any environmental impacts could be minimized.

If for any reason a complaint is received that is attributable to the operations of the landfill, the manager of public works should be contacted such that proper action could be taken to rectify the issue. The Township has a defined complaints process to handle complaints from all municipal activities in a unified manner. The steps followed include defining the nature of the problem by interviewing the complainant and observing the issue firsthand (if required), evaluating alternatives and safety issues, selecting a preferred alternative, discussing the preferred alternative with the complainant and undertaking the selected remedial action.

4.15 Routine Monitoring Report

The Routine Monitoring Report is prepared every year. Topics that should be addressed in the monitoring report include:

- changes in the waste footprint,
- remaining capacity,
- summary of site operations during the monitoring period,
- summary of cell inspections,
- surface water quality,
- ground water quality
- leachate quality,
- private well water quality,
- performance of the LTS, including period of operation, volumes and water quality monitoring
- waste and diversion material quantities,
- an assessment of the landfill and LTS on the natural environment, including stormwater,
- an evaluation of performance based on the trigger mechanism,
- potential changes to the monitoring program (which must be implemented through an amendment to either of the ECA’s)

5.0 CONCLUSIONS

The South Easthope Landfill is a small site that currently accepts relatively small quantities (~6,750 m^3 annually) of municipal waste, large items and C&D wastes. The Site has been in operation since 1989 with no significant complaints from the public or impacts to the local ground or surface water which is tracked through the seasonal monitoring program that has been in place since the Site opened. It is proposed that the Site continue to be operated as a natural attenuation site with its new, increased capacity within the current property boundaries which will provide adequate attentuative capacity. Assuming the Site use is continued with the similar waste stream and annual volumes as has historically been accepted, the proposed 100,000 m^3 increase in waste capacity (335,000 m^3 total capacity), the Site could provide approximately 15 years of additional capacity for Township residents in addition to the remaining 7 years within its current configuration. This proposed capacity increase fits within the Township's waste management planning window of 15-20 years.

6.0 REFERENCES

Azimuth Environmental, OWRA Section 53 application for a Certificate of Approval to Operate a Leachate Treatment System. Submitted to MOE Approvals Branch, August 25, 2003

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Azimuth Environmental, ECA Amendment Application – South Easthope Landfill Site Leachate Treatment System (ECA 0032-5ZBJJH), Township of Perth East, September 2017.

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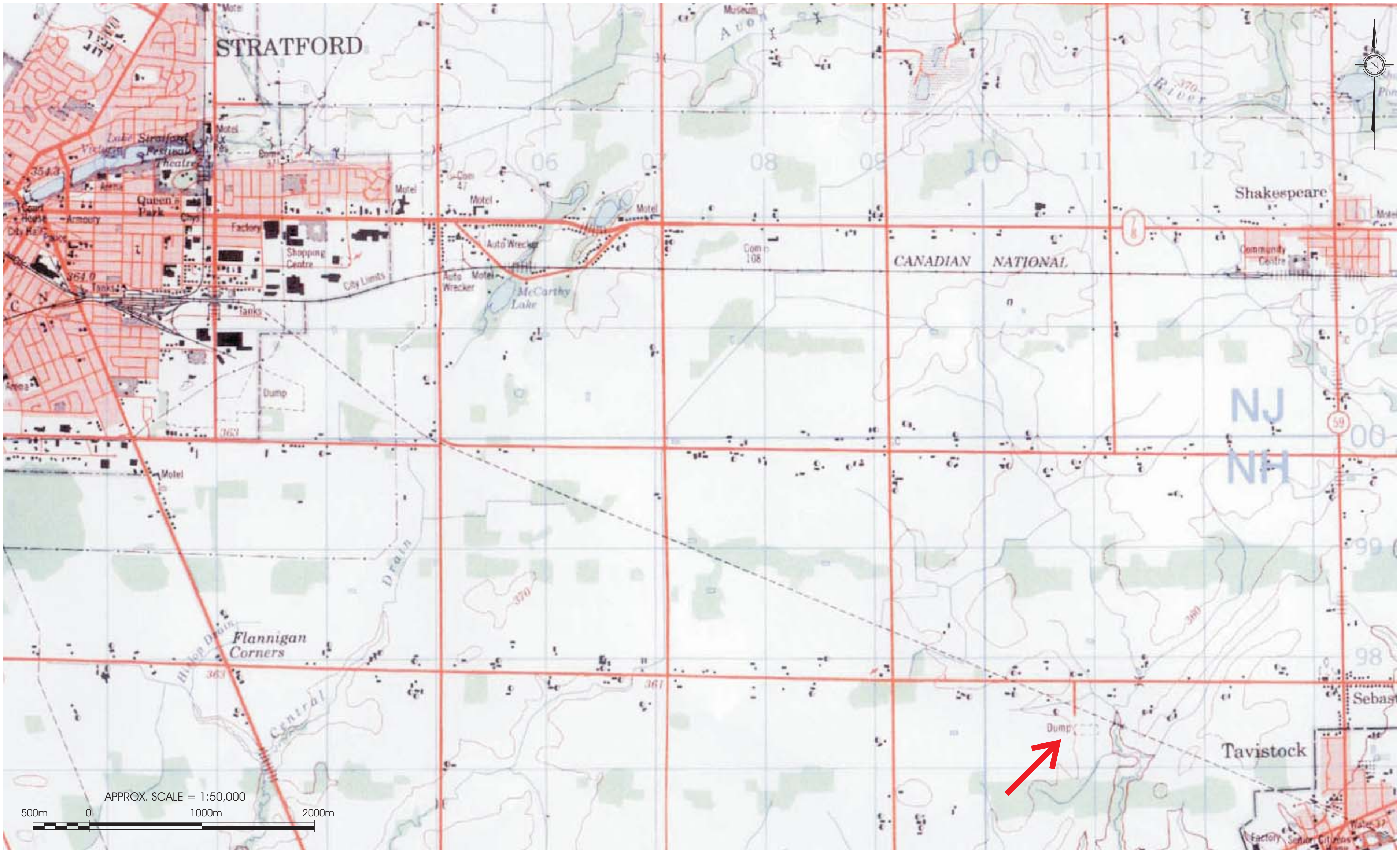
APPENDICES

Appendix A: **Figures**
Appendix B: **Current Environmental Compliance Approvals (ECA’s)**
Appendix C: **ECA Application Form**
Appendix D: **2022 Annual Monitoring Report**

APPENDIX A

Figures



Legend:

Landfill Location

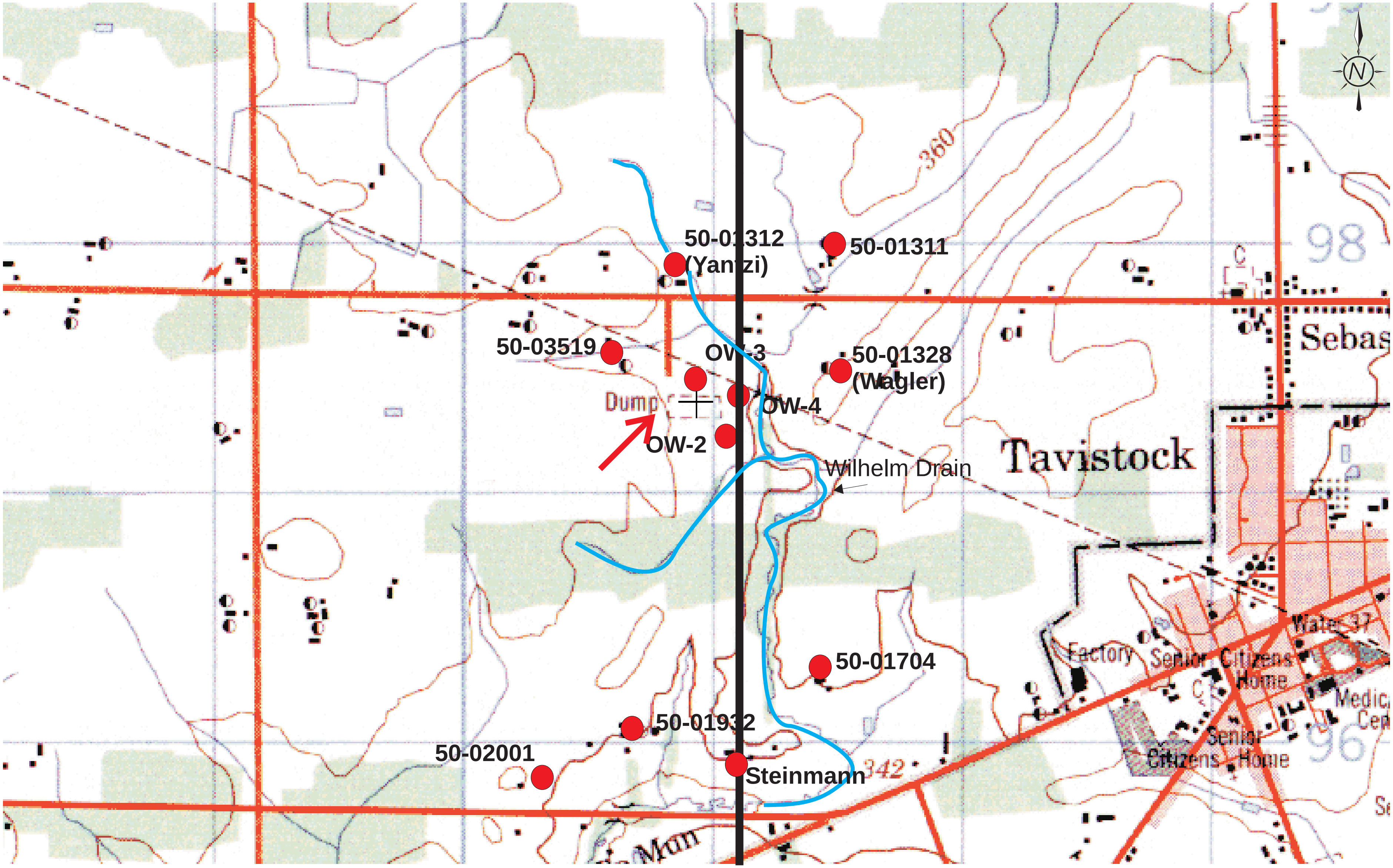
AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Site Location

Date Issued:	February 2023
Created By:	CMR.
Project No.	22-003
File Name:	Figure-1.cdr

South Easthope Landfill

Figure No. 1



Regional Cross Section Location Map

FIGURE 2

AEC 22-003

0m 500m 1000m

250m 750m

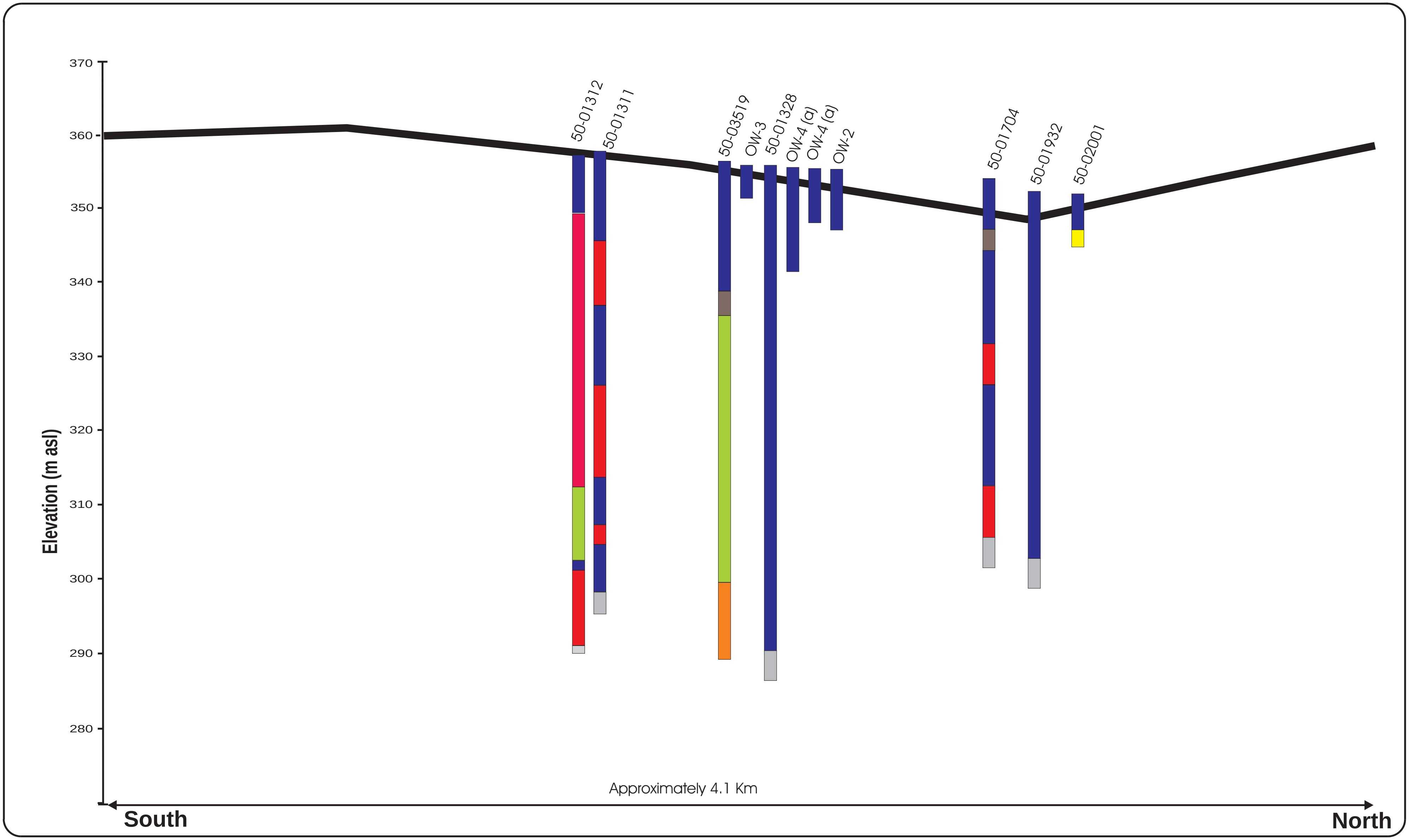
Scale = 1: 25,000

Summary Notes:

Cross-Section Line

Well Locations

Landfill Location



Legend:

Clay	Sand and Gravel
Sand	Clay and Gravel
Gravel	Shale
Hardpan	Limestone

Static Water Level

Horizontal Distance Not to Scale

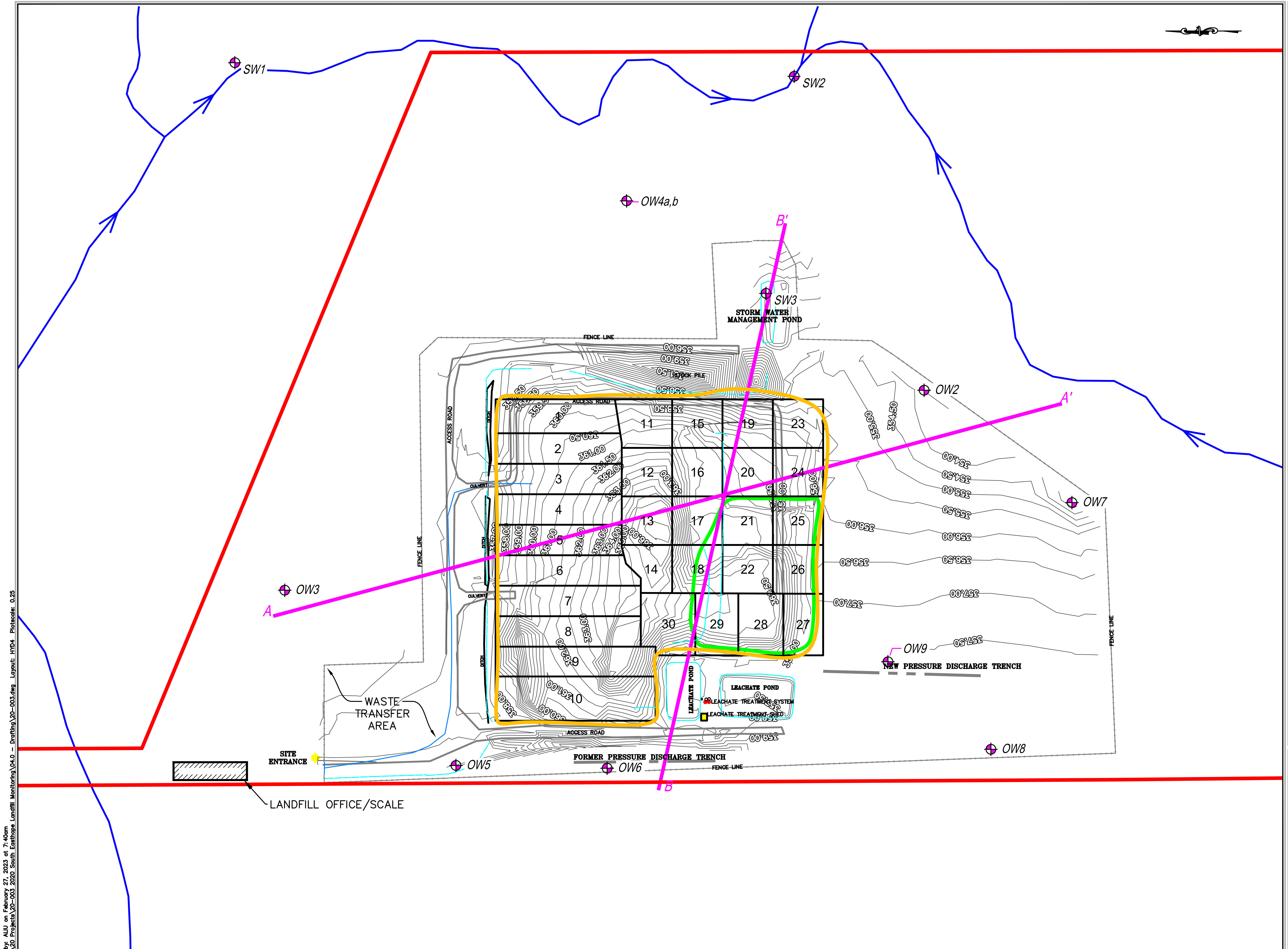
AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Regional Geologic Cross-Section

Date Issued:	February 2023
Created By:	C.M.R.
Project No.	22-003
File Name:	Figure 3 - Cross-Sections.CDR

South Easthope Landfill

Figure No. 3



LEGEND:

Surface water locations shown on Figure 5.

Topographic base from 2003 + Waste Surface Updated in 2016 Elevations are based on Blue Plan Engineering Survey.

- *Waste footprint (2021)*
- *Active Waste Area*
- *Cross Section Locations*
- *Fence Line*
- *Monitoring Wells*

30m 0 60m

HORIZONTAL SCALE 1: 2,000

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

2022 Site Survey

South Easthope Landfill
Perth East

DATE ISSUED:	February 2023	Figure No.
CREATED BY:	JLM	4
PROJECT NO.:	22-003	
REFERENCE:		

DAYSTAMP: Q:\20 Projects\20-003 2020 South Easthope Landfill Monitoring\04.0 - Drafting\20-003.dwg

LEGEND:

Surface water locations shown on Figure 5.

Topographic base from 2003 + Waste Surface Updated in 2016 Elevations are based on Blue Plan Engineering Survey.

- *Property Boundary*
- *Waste footprint (2022)*
- *Active Waste Area*
- *Fence Line*
- *Monitoring Wells*

50m 0 100m

HORIZONTAL SCALE 1: 3,000

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Landfill Property

South Easthope Landfill
Perth East

DATE ISSUED:	February 2023	Figure No.
CREATED BY:	JLM	5
PROJECT NO.:	22-003	
REFERENCE:		

DAYSTAMP: Q:\20 Projects\20-003 2020 South Easthope Landfill Monitoring\04.0 - Drafting\20-003.dwg

Plotted by: ALIU on February 27, 2023 at 7:41am Layout: HY05 Plotscale: 0.25
File: Q:\20 Projects\20-003 2020 South Easthope Landfill Monitoring\04.0 - Drafting\20-003.dwg

Plotted by: AJU on February 27, 2023 at 10:01am
File: Q:\22 Projects\22-003 2022 South Easthope Landfill Monitoring\04.0 - Drafting\22-003 Site Layout.dwg Layout: D06 Plotscale: 1

AZIMUTH ENVIRONMENTAL CONSULTING, INC.
ENVIRONMENTAL ASSESSMENTS & APPROVALS

LEGEND:

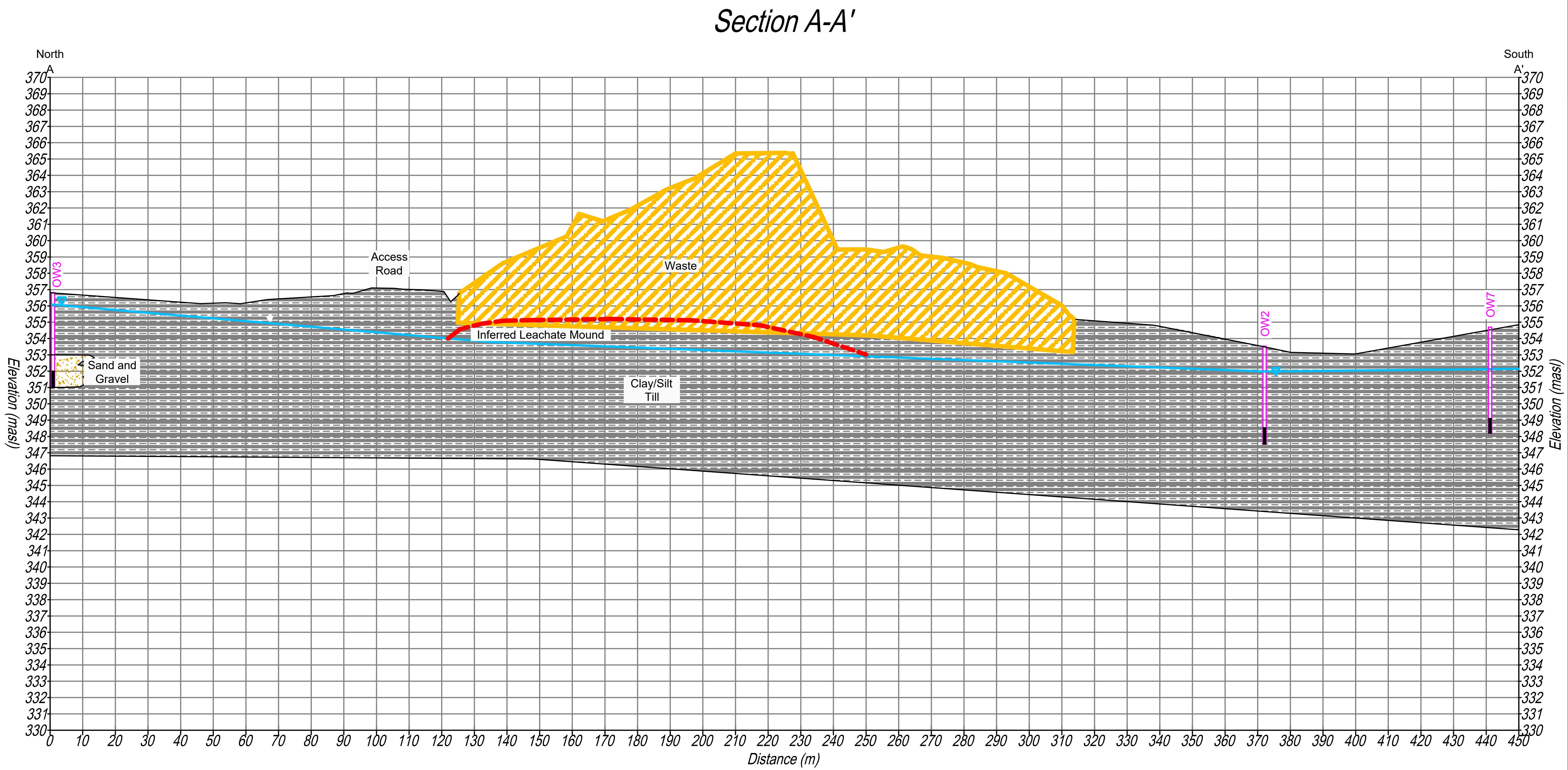
(red dash-dot line)	APPROX. PROPERTY BOUNDARY
—100.00—	PREGRADE SURFACE CONTOURS
—100.00— (red)	PROPOSED LANDFILL EXPANSION CONTOURS
(blue line)	WATERCOURSE
(symbol)	MONITORING WELL LOCATION
(symbol)	SURFACE WATER MONITORING LOCATION

SOUTH EASTHOPE LANDFILL
PERTH EAST, ON

EXPANSION DESIGN

DATE ISSUED:	FEBRUARY 2023
CREATED BY:	A.L.
PROJECT NO.:	22-003
REFERENCE:	---

Figure No.
6



LEGEND:

Ground Water Elevations (April, 2022)

5x Vertical Exaggeration
Not to Scale

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Cross Section A-A'

South Easthope Landfill
Perth East

DATE ISSUED:	February 2023	Figure No.
CREATED BY:	JLM	7
PROJECT NO.:	22-003	
REFERENCE:		

DAYSTAMP: Q:\20 Projects\20-003 2020 South Easthope Landfill Monitoring\04.0 - Drafting\20-003.dwg

Plotted by: AUU on February 27, 2023 at 10:01am Layout: D07 Plotscale: 0.25
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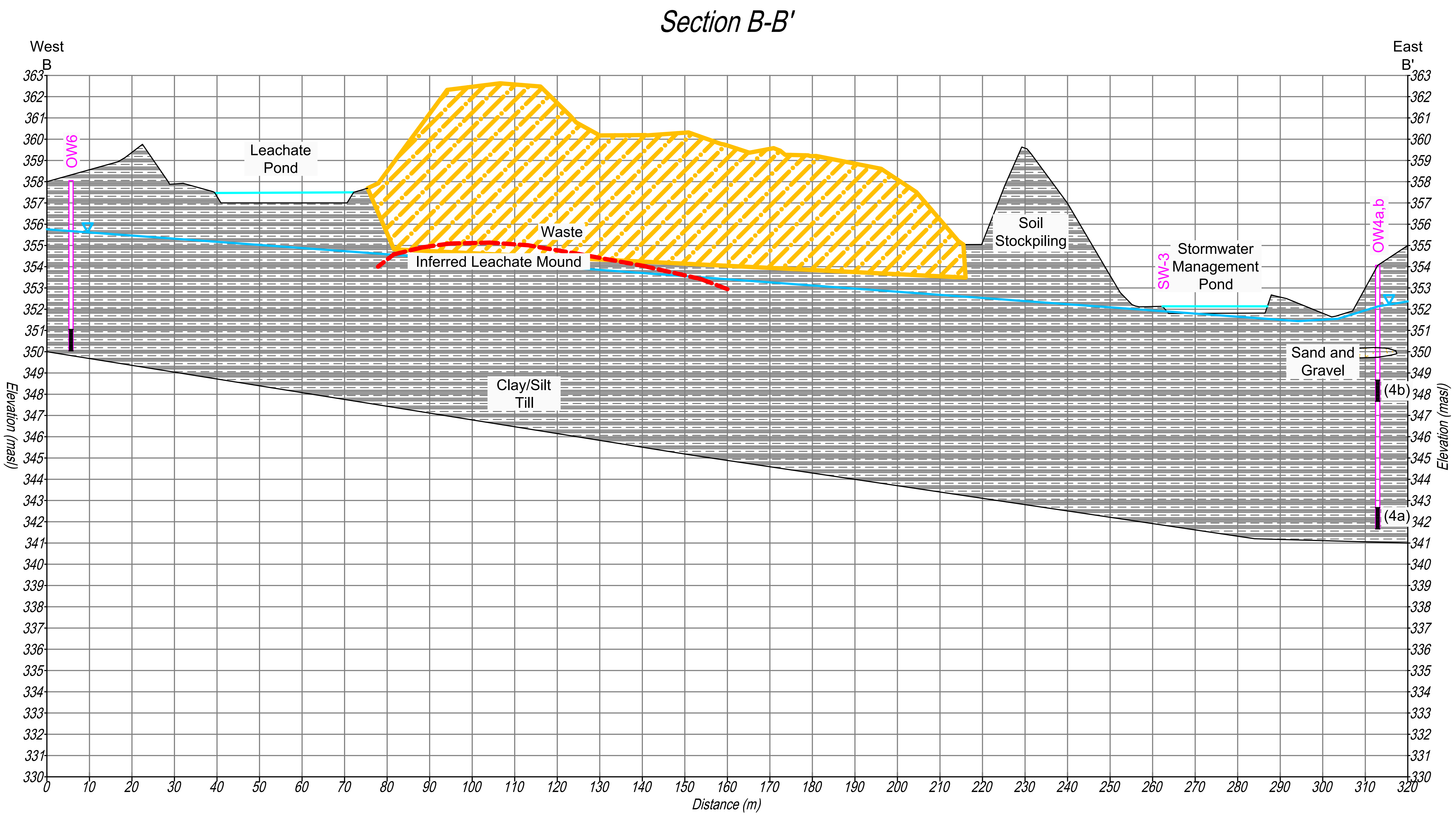

LEGEND:

Ground Water Elevations (April, 2022)

5x Vertical Exaggeration
Not to Scale

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Cross Section B-B'

South Easthope Landfill
Perth East

DATE ISSUED:	February 2023	Figure No.
CREATED BY:	JLM	8
PROJECT NO.:	22-003	
REFERENCE:		

DAYSTAMP: Q:\20 Projects\20-003 2020 South Easthope Landfill Monitoring\04.0 - Drafting\20-003.dwg

Plotted by: AJJ on February 27, 2023 at 10:01am Layout: D08 Plotscale: 0.25
File: Q:\20 Projects\20-003 2020 South Easthope Landfill Monitoring\04.0 - Drafting\20-003.dwg

APPENDIX B

Current Environmental Compliance Approvals (ECA's)

CONTENT COPY OF ORIGINAL

Ontario

Ministry of the Environment

Ministère de l'Environnement

AMENDED PROVISIONAL CERTIFICATE OF APPROVAL
WASTE DISPOSAL SITE
NUMBER A150902
Issue Date: May 24, 2007

The Corporation of the Township of Perth East
PO Box 455, 25 Mill Street East
Milverton, Ontario
N0K 1M0

Site Location: South Easthope Landfill
Lot 26, Concession 5
Perth East Township, County of Perth

You have applied in accordance with Section 27 of the Environmental Protection Act for approval of:

For the use and operation of a 5.0 hectare landfilling site within a total site area of 29.6 hectares, being known as the South Easthope Landfill

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

a) "*Regulation 347*" means Ontario Regulation 347 R.R.O. 1990

b) "*Owner*" means the Corporation of the Township of Perth East;

c) "*Reasonable Use Guideline*" means the Ministry Guideline B-7 entitled "Incorporation of the Reasonable Use Concept into MOE Groundwater Management Activities, dated April 1994, as amended

d) "*Director*" means Director, Section 39, Environmental Protection act, R.S.0. 1990, C.E-19 as amended;

e) "*District Manager*" means the District Manager in the London District Office, Southwestern Region, Ontario Ministry of the Environment;

f) "*Certificate*" means this Provisional Certificate of Approval including all Notices of Amendment;

g) "*Ministry*" means the Ontario Ministry of the Environment;

h) "*Point of Compliance*" means the boundary at which MOE Guideline B-7 shall be evaluated;

i) "*CAZ*" means the Contaminated Attenuation Zone;

j) "*EPA*" means the Environmental Protection Act, R.S.O. 1990, C.E-19 as amended; and

k) "*OWRA*" mean the Ontario Water Resource Act, R.S.O 1990, Chapter O.40

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

TERMS AND CONDITIONS

I. GENERAL

Compliance

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

conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

2. Any person authorized to carry out work on or operate any aspect of the *Site/System* shall comply with the conditions of this *Certificate*.

In Accordance

3. Except as otherwise provided for in this *Certificate*, the *Site* shall be designed, developed, built, operated and maintained in accordance with the application for this *Certificate*, dated November 21, 2006, and the supporting documentation listed in Schedule A.

Interpretation

4. Where there is a conflict between a provision of any document, including the application, referred to in this *Certificate*, and the conditions of this *Certificate,* the conditions in this *Certificate* shall take precedence.

5. Where there is a conflict between the application and a provision in any documents listed in Schedule "A", the application shall take precedence, unless it is clear that the purpose of the document was to amend the application and that the *Ministry* approved the amendment.

6. Where there is a conflict between any two documents listed in Schedule "A", other than the application, the document bearing the most recent date shall take precedence.

7. The conditions of this *Certificate* are severable. If any condition of this *Certificate*, or the application of any condition of this *Certificate* to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this *Certificate* shall not be affected thereby.

Other Legal Obligations

8. The issuance of, and compliance with, this *Certificate* does not:

a. relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement; or

b. limit in any way the authority of the *Ministry* to require certain steps be taken or to require the *Owner* and *Operator* to furnish any further information related to compliance with this *Certificate*;

Adverse Effect

9. The Owner and Operator shall take steps to minimize and ameliorate any adverse effect on the natural environment or impairment of water quality resulting from the ***Site*** , including such accelerated or additional monitoring as may be necessary to determine the nature and extent of the effect or impairment.

10. Despite an Owner, Operator or any other person fulfilling any obligations imposed by this *Certificate* the person remains responsible for any contravention of any other condition of this *Certificate* or any applicable statute, regulation, or other legal requirement resulting from any act or omission that caused the adverse effect to the natural environment or impairment of water quality.

Change of Owner

11. The *Owner* shall notify the *Director*, in writing, and forward a copy of the notification to the *District Manager*, within 30 days of the occurrence of any changes in the following information:

i. the ownership of the *Site*;
ii. the Operator of the *Site*;
iii. the address of the *Owner* or *Operator*;
iv. the partners, where the *Owner* or *Operator* is or at any time becomes a partnership and a copy

of the most recent declaration filed under the *Business Names Act*, R. S. O. 1990, c. B.17, shall be included in the notification;

12. No portion of this *Site* shall be transferred or encumbered prior to or after closing of the *Site* unless the *Director* is notified in advance and sufficient financial assurance is deposited with the *Ministry* to ensure that these conditions will be carried out. In the event of any change in *Ownership* of the works, other than change to a successor municipality, the *Owner* shall notify the successor of and provide the successor with a copy of this *Certificate*, and the Owner shall provide a copy of the notification to the *District Manager* and the *Director.*

Certificate of Registration

13. Pursuant to Section 197 of the *EPA*, no person having an interest in the *Site* shall deal in any way with the *Site* without first giving a copy of this *Certificate* to each person acquiring an interest in the *Site* as a result of the dealing.

14. Two copies of a completed Certificate of Prohibition, containing a registerable description of the *Site*, shall be submitted to the Director for the Directors signature within 60 calendar days of the date of this *Certificate* for any landfilled owned lands that are not yet registered on title to the landfill.

15. The Certificate of Prohibition shall be registered in the appropriate land registry office on title to the *Site* by the *Owner* within 10 calendar days of receiving the Certificate of Prohibition signed by the *Director,* and a duplicate registered copy shall be submitted to the *Director*.

Inspections

16. No person shall hinder or obstruct a *Provincial Officer* from carrying out any and all inspections authorized by the *OWRA*, the *EPA*, or the *PA*, of any place to which this *Certificate* relates, and without limiting the foregoing:

a. to enter upon the premises where the approved works are located, or the location where the records required by the conditions of this *Certificate* are kept;
b. to have access to, inspect, and copy any records required to be kept by the conditions of this *Certificate*;
c. to inspect the *Site,* related equipment and appurtenances;
d. to inspect the practices, procedures, or operations required by the conditions of this *Certificate*; and
e. to sample and monitor for the purposes of assessing compliance with the terms and conditions of this *Certificate* or the *EPA*, the *OWRA* or the *PA*.

Information and Records Retention

17. Any information requested, by the *Ministry*, concerning the *Site* and its operation under this *Certificate*, including but not limited to any records required to be kept by this *Certificate* shall be provided to the Ministry, upon request, in a timely manner. Records shall be retained for two (2) years except for as otherwise authorized in writing by the Director.

18. The receipt of any information by the *Ministry* or the failure of the *Ministry* to prosecute any person or to require any person to take any action, under this *Certificate* or under any statute, regulation or other legal requirement, in relation to the information, shall not be construed as:

a. an approval, waiver, or justification by the *Ministry* of any act or omission of any person that contravenes any term or condition of this *Certificate* or any statute, regulation or other legal requirement; or

b. acceptance by the *Ministry* of the informations completeness or accuracy.

II. Design, Operations and Maintenance

19. (1) Approval is hereby granted to design and operation in accordance with Item 1 through 10 in Schedule "A".

(2) The maximum capacity for the site is 272,000 cubic meters including final cover.

20. Any changes to the Site Design and Operation Manual shall be submitted to the *Director* for acceptance prior to their implementation.

21. A sign shall be posted in a prominent location at the *Site* entrance clearly stating the *Owne*r's name, Operator's name, Provisional Certificate of Approval Number, the hours of operation and contact telephone number to call with complaints or in the event of an emergency.

22. No burning or incineration of any materials shall be permitted at the *Site*.

23. Cover shall be placed over the entire working face with a minimum thickness of 150 mm of soil cover or an approved thickness of alternative cover material on a weekly basis.

24. Intermediate Cover shall be placed in areas where landfilling has been temporarily discontinued for six (6) months or more. A minimum thickness of 300 mm of soil cover or an approved thickness of alternative cover material shall be placed.

25. Clean wood chips may be used as weekly cover material (150 mm thickness)

26. The *Owner* shall undertake litter pick-up around the property in the early spring and late fall, including the fenceline and any surface water bodies on the property. The owner shall also undertake regularly scheduled litter pick-ups around the site between the months of May and September or as required after blustery days.

27. The Vector/Vermin control plan be undertaken by the *Owner* in accordance with the Vector/Vermin Control Plan set out in Schedule "B".

III. Record Keeping

28. The *Owner* shall establish and maintain a written record of daily operations at the *Site*. This record must be in a form of a log or a dedicated electronic file and it shall include as a minimum the following information:

a) date of record;
b) hours of operation;
c) an approximation of the type, amount and source of waste received;
d) an estimate on the amount of recyclable materials (depending on item - i.e. number of containers, number of tires, appliances, batteries) removed from the site by the licensed hauler retained by the owner;

29. The *Owner* shall establish and maintain a written record of all environmental emergency situations at the *Site*. This record shall be in the form of a log or a dedicated electronic file and it shall include, as a minimum, the following information:

a) type of the emergency situation and the resulting environmental impact;
b) actions taken to address the impact; and
c) actions taken to prevent the re-occurrence of a similar emergency situation in the future.

30. The *Owner* shall establish and maintain a written record of complaints received about the *Site*. The records shall be kept at the municipal office. This record shall be in the form of a log or a dedicated electronic file and it shall include, as a minimum, the following information:

a) date and time of any complaints received at the Site and their nature;
b) name, address and telephone number of the complainant;

c) nature of the complaint;
d) date and description of any remedial actions taken to address the received complaints; and
e) actions taken to prevent the re-occurrence of a similar incident, in the future.

31. The *Owner* shall establish and maintain a written record of the site inspections. This record shall be in the form of a log or a dedicated electronic file and it shall include, as a minimum, the following information:

a) date and time of inspection;
b) name, title and signature of trained personnel conducting the inspection; and
c) a listing of all equipment, fencing, signs, etc. inspected and any deficiencies observed; and
d) recommendations for remedial action and the completion date of such action.

32. The *Owner* shall establish and maintain a written record of all occurrences of unapproved waste landfilled at the *Site*. This record shall be in a form of a log or a dedicated electronic file and it shall include, as a minimum, the following information:

a) waste generator (if known);
b) type of unapproved waste;
c) an approximation on the amount of unapproved waste;
d) nature of unapproved waste;
e) steps taken to remove waste material; and
f) actions taken by the Owner to prevent recurrence.

33. The *Owner* shall retain at the Municipal Office for a minimum of two (2) years from the date of their creation, or longer if requested in writing by the *District Manager*, all records and information relating to or resulting from the activities approved under this Certificate, and shall make all records and information available at all times for inspection by a Provincial Officer. A copy of the Design, Operations and Maintenance Plan shall be kept at the Site.

IV. Environmental Monitoring and Trigger Mechanisms

34. (1) Groundwater and surface water monitoring shall be undertaken by the *Owner* in accordance with the environmental monitoring program set out in Schedule "C".

(2) The *Owner* may make request to changes to the monitoring program to the *District Manager* in accordance with the recommendations of the annual report as described in Condition 41 (2).

(3) Within fourteen (14) days of receiving the written correspondence from the District Office confirming that the District Office is in agreement with the proposed changes to the environmental monitoring program identified in Condition 34(2), the Owner shall forward a letter identifying the proposed changes and a copy of the correspondences from the District Manager and all other correspondences and responses related to Condition 34(2) and 41(2), to the *Director* requesting the *Certificate* be amended to approve the proposed changes to the environmental monitoring plan.

(4) In the event any other changes to the environmental monitoring program are proposed outside of the recommendation of the annual report, the *Owner* shall follow current ministry procedures for seeking approval for amending the Certificate of Approval.

35. The groundwater trigger mechanism plan and contingency plan is approved in accordance with Items 8 and 9 in Schedule "A".

36. In the event of a confirmed exceedance of a site-specific trigger level relating to leachate mounding or groundwater or surface water impacts due to leachate at the site's point of compliance, the Owner shall immediately notify the District Manager, and an investigation into the cause and the need for implementation of remedial or contingency actions shall be

carried out by the Owner in accordance with the approved trigger mechanisms and associated contingency plans.

37. If monitoring results, investigative activities and/or trigger mechanisms indicate the need to implement contingency measures, the Owner shall ensure that the following steps are taken:

a.) The *Owner* shall notify the *District Manager*, in writing of the need to implement contingency measures, no later than 30 days after confirmation of the exceedances;
b.) Detailed plans, specifications and descriptions for the design, operation and maintenance of the contingency measures shall be prepared and submitted by the *Owner* to the *Director* for approval; and
c.) The contingency measures shall be implemented by the *Owner* upon approval by the *Director*.

38. The *Owner* shall ensure that any proposed changes to the site-specific trigger levels for leachate impacts to the surface water or groundwater, shall be approved in advance by the *Director* via an amendment to this *Certificate*.

V. Leachate Treatment System

39. The *Owner* shall provide to the *District Office* in writing no later than seven (7) days after implementation, any changes in the design, operation and maintenance plan relating to the LTS.

40. The owner shall submit to the *District Manager* in writing, no later than thirty (30) days prior to implementation, any plans to implement upgrades to the LTS.

VI. Annual Report

41. (1) By no later than **June 30, 2007**, and by every other June 30 thereafter, the proponent shall submit, to the MOE *District Manager,* an annual report. The report shall be prepared by an qualified professional engineer, hydrogeologist and/or surface water specialist. The report shall contain, but is not limited to, the following information:

a) a summary of type and quantity of incoming waste accepted during the reporting period;

b) a summary of total amount of waste received at the site, remaining capacity and remaining life expectancy of the site;
c) a summary of the site's operation procedure and compliance as per the Design and Operation Plan;
d) a summary of recycling operations;
e) a section of text describing the landfill's hydrogeologic setting;
f) a location map illustrating the site relative to nearby existing groundwater and surface water features, based on known information;
g) a site plan(s) illustrating the approved landfill footprint and currently filled area;
h) a water table contour map;
i) stratigraphic cross-sections which clearly illustrate the subsurface distribution of geological materials;
j) the report shall document sampling protocols, and describe any problems encountered during the sampling runs which may have impacted the reliability of analytical results;
k) all data shall be interpreted by the author(s) and shall be presented in a form that is easy to follow. All analytical results for all parameters must be presented in tabular form. All analytical results for the critical contaminants must be presented graphically on time-series graphs, and must be compared to the trigger levels in accordance with the environmental contingency plan that was established in the reasonable use assessment. Trends of ground water quality must be presented graphically on Piper or Durov plots and interpreted.
l) the report shall identify the "Reasonable Use" (Guideline B-7) of the ground water

that is to be impacted. The report should also identify expected and worst-case impacts;
m) the report shall include the calculation of major ion balances for the groundwater sample analytical results. The % difference between the sums (expressed as milliequivalents per litre) of major cations and major anions shall be calculated. The % difference is defined as:

3 cation - 3 anion
% difference = 100 x _______
3 cation + 3 anion

If the analytical result of a ground water sample has an anion-cation balance % difference of greater than ±10%, the Owner must take action to determine the cause of the imbalance, and ensure that it is addressed in future groundwater sampling and analyses;
n) the report shall include a comparison of the results of surface water sampling to the PWQOs or Interim PWQOs described in Water Management, MOEE, July 1994, as amended from time to time;
o) discussion of the Site's Contaminated Attenuation Zone (CAZ);
p) QA/QC protocol shall be described; and
q) the report shall include conclusions and recommendations of the author(s), especially as they concern future sampling parameters, frequency and protocol.
r) a discussion on the effects of the LTS to the groundwater system and the landfill.
s) copies of the boreholes logs for the site.

(2) In the event the *Owner* recommends any changes to the environmental monitoring plan in the Annual Report, the *Owner* shall provide a cover letter with the submission of the annual report that clearly indicates the report contains proposed changes to the environmental monitoring plan and request the District Office review the proposed changes. The cover letter shall be addressed to the *District Manager*.

VI. Closure Plan

42. At least 2 years prior to the anticipated date of closure of this *Site*, the *Owner* shall submit to the *Director* for approval, with copies to the *District Manager*, a detailed site closure plan pertaining to the termination of landfilling operations at this *Site*, post-closure inspection, maintenance and monitoring, and end use, based on the Landfill Closure Section of the Design and Operations Report. The plan shall include the following:

a. a plan showing the *Site* appearance after closure;
b. a description of the proposed end use of the *Site*;
c. a descriptions of the procedures for closure of the *Site,* including:

i. advance notification to the public of the landfill closure;
ii. posting of a sign at the Site entrance indicating the landfill is closed and identifying any alternative waste disposal arrangements;
iii. completion, inspection and maintenance of the final cover and landscaping;
iv. site security;
v. removal of unnecessary landfill-related structures, buildings and facilities;
vi. final construction of any control, treatment, disposal and monitoring facilities for leachate, groundwater, surface water and landfill gas; and
vii. a schedule indicating the time-period for implementing sub-conditions i) to vi) above.

d. descriptions of the procedures for post-closure care of the Site, including:

i. operation, inspection and maintenance of the control, treatment, disposal and monitoring facilities for leachate, groundwater, surface water and landfill gas;
ii. record keeping and reporting; and
iii. complaint contact and response procedures;

e. an assessment of the adequacy of and need to implement the contingency plans for leachate and methane gas; and
f. an updated estimate of the contaminating life span of the *Site*, based on the results of the monitoring programs to date.

43. The *Site* shall be closed in accordance with the closure plan as approved by the *Director.*

Schedule "A"

1. Letter dated November 29, 2004 to Mr. Glenn Schwendinger, Township of Perth East from Mr. Mike Jones, Azimuth Environmental Consulting providing a Vector/Vermin Plan for the South Easthope and Ellice Landfills.

2. Report entitled *"Trigger Mechanism and Contingency Plan and the Design and Operations Plan for the South Easthope Landfill"* prepared for the Corporation of the Township of Perth East by Azimuth Environmental Consulting Inc. dated February 2005.

3. Letter dated May 5, 2005 addressed to Mr. Glenn Schwendinger, Corporation of the Township of Perth East from Mr. Dale I. Gable, Ministry of the Environment providing comments and requesting additional information on the submitted Design and Operations Plan.

4. Letter dated June 7, 2005 addressed to Mr. Dale Gable, Ministry of the Environment from Mr. Mike Jones, Azimuth Environmental Consulting Inc. providing a response to May 5, 2005 letter.

5. Letter dated September 14, 2005 addressed to Mr. Glenn Schwendinger, Corporation of the Township of Perth East from Mr. Dale I. Gable, Ministry of the Environment providing additional comments and requesting additional information on the submitted Design and Operations Plan.

6. Letter with supporting documentation dated December 1, 2005 addressed to Mr. Dale Gable, Ministry of the Environment from Mr. Mike Jones, Azimuth Environmental Limited Inc. providing a response to September 14, 2005 letter. The supporting documentation included the following:

i. Figure No. 2 - Site Location prepared by Azimuth Environmental Consultants Inc. (Project No. 02-055);
ii. Figure No. 2 - Site Layout prepared by Azimuth Environmental Consultants Inc. (Project No. 02-055) dated February 2005;
iii. Figure No. 3 - Final Contours prepared by Azimuth Environmental Consultants Inc. (Project No. 02-055) dated February 2005;
iv. Figure No. 4 - Waste Cell Phasing prepared by Azimuth Environmental Consultants Inc. (Project No. 02-055) dated February 2005;
v Figure No. 5 - Site Configuration prepared by Azimuth Environmental Consultants Inc. (Project No. 02-055) dated February 2005.

7. Letter dated December 11, 2006 addressed to Mr. Bud Markham, Township of Perth East from Mr. Dale Gable, Ministry of the Environment requesting additional information on the updated information

8. Updated report dated February 2007 entitled "*Trigger Mechanisms and Contingency Plan and the Design and Operations Plan for the South Easthope Landfill*" prepared for the Township of Perth East by Azimuth Environmental Consultants Inc.

9. Letter dated February 26, 2007 addressed to Mr. Dale Gable, Ministry of the Environment from Mr. Mike Jones, Azimuth Environmental Consultants Inc. providing a response to comments on the pressure trench, trigger mechanisms and borehole logs.

10. Email from Mr. Mike Jones, Azimuth Environmental Inc. addressed to Mr. Dale Gable, Ministry of the Environment

providing a copy of the existing borehole logs for the site.

Schedule "B"

This Schedule forms part of the Certificate of Approval No. A151001. It describes the Vector/Vermin Control Plan referred to in Condition 27.

1. The site and site buildings shall be inspected on a regular basis as part of the normal site operations. Inspection for animal signs shall be noted on daily operations and shall be logged in the operation logs.

2. Site staff shall note the presence of any animals during standard site operations.

3. Litter collected from around the site as required by Condition 9 shall be placed in the working face.

4. Cover material as required under Condition 6 and 7 shall be placed and maintained to minimize any open refuse.

5. Ensure that the active landfilling face is minimized

6. Recyclables and recovered materials shall be segregated and removed from the site as soon as complete transfer loads are available or before the end of the year, whichever occurs first. This shall minimize the amount of cover available to animals. Materials with standing water are drained or overturned to minimize opportunities for water supply and breeding potential.

7. Grassed areas around the site are not cut since this reduces the loafing potential for gulls. Longer grass could obscure views of approaching predators so that gulls do not feel safe minimizing their residence time at the property. At selected times of the year, long grass can encourage proliferation of insects that are a food source and can encourage the presence of wildlife, however, this shorter duration event is considered to be less important and to date not pose a significant concern such that a change is warranted.

8. If wildlife is evident and populations are increasing above nuissance levels, the site operator shall undertake action to eliminate the attracting mechanism.

9. If rodents or mammals are the issue, the owner shall call a commercial extermination/pest control company to undertake a control program. The pest control company will set up traps and kill significant vermin to return the population to its non-nuissance levels.

10. If vectors are avian, the control program, must also consider controls available under the Migratory Bird Act. If a migratory bird is involved, the owner is limited to disturbance of nesting sites before hatching of young. Other disturbances techniques for adult birds could be used.

11. Activities shall be discussed in the annual monitoring program.

Schedule "C"

This Schedule forms part of the Certificate of Approval No. A151001. It describes the groundwater and surface water monitoring program referred to in Condition 34.

C.1. Groundwater

C.1.1 Groundwater Monitoring Program Objectives

The overall goal of the groundwater monitoring program is to detect and assess effects of the landfill on local water resources. The following objectives have been identified to achieve this goal:

a) to monitor groundwater quality in the groundwater system;
b) to identify and characterize movement of leachate related contaminants in the systems;
c) to evaluate the effectiveness of the attenuation zone; and

d) to determine the need for implementation of contingency plans.

C.1.2 Monitoring Plan

The groundwater monitoring plan shall be carried out by the Owner to address the stated objectives and will include:

C.1.2.1 Landfill Monitoring Frequency

The groundwater monitoring program shall be conducted twice per year during the spring and fall.

C.1.2.2 Groundwater Monitor Sampling Locations

Table C-1 identifies the groundwater monitors sampling locations. If a monitoring well is dry or damaged then that well does not have to be sampled that sampling event. Static water levels shall be collected in all the groundwater monitors prior to purging and sampling:

Table C-1: Groundwater Sampling Location

OW-2	OW-3	OW-4A
OW-4B		

C.1.2.3 Analytical Parameters

The parameters which shall be measured in the field, along with the chemical and physical laboratory analyses which shall be collected on the groundwater samples from the groundwater monitors, shall include the following:

Table C-2: Analytical Parameters

pH (field)	Alkalinity	Nickel
pH (lab)		Selenium
Temperature(field)		Strontium
Conductivity (field)	Fluoride	Biochemical Oxygen Demand
Conductivity (lab)	Sulphate	Titanium
Bicarbonate	Magnesium	Zinc
Hardness as(Calcium Carbonate)	Potassium	Phenols
Chloride	Mercury	Total Phosphorus
Nitrite	Total Organic Carbon	Iron
Nitrate	Orthophosphate	Manganese
Calcium	Sodium	Phosphorus
Bromide		VOC(s)
Ammonia Nitrogen	Arsenic	
Total Dissolved Solids	Boron	
Colour	Chromium	
Aluminium	Copper	
Barium	Lead	
Cadmium		

C.1.2.4 Groundwater Monitor Inspections

Any groundwater monitoring well found to be damaged, not functioning or otherwise improperly maintained, shall within a reasonable time be properly repaired or replaced. The District Manager shall be notified prior to any well being replaced.

C.1.2.5 Groundwater Monitoring Protocols

Standard and/or generally accepted groundwater sampling (including well development, sample collection, storage and transport) and analytical protocols shall be adhered to during all groundwater monitoring sessions. Groundwater elevation measurements shall be of the static groundwater elevation within the groundwater monitoring well measured prior to well development.

C.1.2.6 Method Detection Limits

All laboratory analyses on groundwater samples shall be performed by an accredited analytical laboratory and the detection limits (MDLs) for the specific analyses should commensurate with the standards established in the current Ontario Drinking Water Quality Objectives.

C.2. Surface Water

C.2.1 Surface Water Monitoring Program Objectives

The primary goal of the Surface Water Monitoring Program is to monitor for any landfill-related impairment of surface water above Provincial Water Quality Objectives (PWQOs). Where the concentration of a specific parameter already exceeds the PWQO in background surface waters, the aim is to allow no further deterioration of surface water quality.

C.2.2 Monitoring Plan

The surface water monitoring plan shall be carried out by the Owner to address the stated objectives and will include:

C.2.2.1 Landfill Monitoring Frequency

The surface water monitoring program shall be conducted twice per year during the spring and late summer/early fall.

C.2.2.2 Surface Water Sampling Locations

Table C-3: Surface Water Sampling Locations

SW 1	SW 2	SW 3
Leachate Ponds		

C.2.2.3 Analytical Parameters

The parameters which shall be measured in the field, along with the chemical and physical laboratory analyses which shall be collected on the surface water samples, shall include the following:

Table C-4: Surface Water Analytical Parameters

pH (field)	Alkalinity	Nickel
pH (lab)	Fluoride	Selenium
Temperature(field)	Sulphate	Strontium
Conductivity (field)	Magnesium	Biochemical Oxygen Demand
Conductivity (lab)	Potassium	Titanium
Bicarbonate	Reactive Silica	Zinc
Hardness as(Calcium Carbonate)	Total Organic Carbon	Phenols
Chloride	Orthophosphate	Total Phosphorus
Nitrite	Sodium	Iron
Nitrate	Turbidity	Manganese
Calcium	Arsenic	Molybdenum
Bromide	Boron	Phosphorus
Ammonia Nitrogen	Chromium	VOC(s)
Total Dissolved Solids	Copper	
Colour	Lead	
Aluminium	Mercury	
Barium	Total Suspended Solids	
Cadmium		

C.2.2.4 Surface Water Monitoring Protocols

Standard and/or generally accepted surface water sampling (sample collection, storage and transport) and analytical protocols shall be adhered to during all surface water sampling sessions.

C.2.2.5 Method Detection Limits

All laboratory analyses on surface water samples shall be performed by an accredited analytical laboratory and the detection limits (MDLs) for the specific analyses should commensurate with the standards established in the current Provincial Water Quality Objectives.

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

1. The reason for Condition Nos. (1), (2), (3), (4), (5), (6), (7), (8), (9), (10), (11), (12), (16), (17), and (18) is to clarify the legal rights and responsibilities of the Owner.

2. The reason for Condition Nos. (13), (14) and (15) are included, pursuant to subsection 197(1) of the EPA, to provide that any persons having an interest in the Site are aware that the land has been approved and used for the purposes of waste disposal.

3. The reasons for Condition Nos. (19), (20), (21), (22), (23), (24), (25) and (26) are to ensure the landfill is operated in accordance with Ministry standards, and to ensure the long-term protection of the health and safety of the public and the environment.

4. The reason for Condition No. (27) is to incorporate the submitted Vector/Vermin Plan into the Certificate.

5. The reasons for Condition Nos. (28), (29), (30), (31), (32), (33) and (34) is to ensure the monitoring and reporting are completed in accordance with Ministry standards, and to ensure the long-term protection of the health and safety of the public and the environment.

6. The reasons for Condition Nos. (35), (36), (37) and (38) is to ensure the owner has a plan with an organized set of *procedures for identifying and responding to potential issues relating to groundwater and surface water contamination near or at the site's compliance point.*

7. The reason for Condition Nos. (39) and (40) are added to ensure that Owner informs the Ministry on plans for any proposed changes to the leachate treatment system.

8. The reasons for Condition No. (41) are to ensure the Owner submits an annual summary report to the Ministry so that the landfilling operation can be evaluated to ensure compliance with the Ministry's requirements on annual operations and monitoring. This is to ensure the long-term protection of the health and safety of the public and the environment.

9. The reason for Condition Nos. (42) and (43) is to ensure the Owner has an established approved plan for the closure and post-closure maintenance of the landfill site. This is to ensure the long-term health and safety of the public and the environment.

This Provisional Certificate of Approval revokes and replaces Certificate(s) of Approval No. A150902 issued on November 14, 1988

In accordance with Section 139 of the Environmental Protection Act, R.S.O. 1990, Chapter E-19, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

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

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary* Environmental Review Tribunal 2300 Yonge St., Suite 1700 P.O. Box 2382 Toronto, Ontario M4P 1E4	AND	The Director Section 39, *Environmental Protection Act* Ministry ofthe Environment 2 St. Clair Avenue West, Floor 12A Toronto, Ontario M4V 1L5

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

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

DATED AT TORONTO this 24th day of May, 2007

Tesfaye Gebrezghi, P.Eng.
Director
Section 39, *Environmental Protection Act*

DG/
c: District Manager, MOE London - District

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Ontario

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

AMENDMENT TO ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER A150902
Notice No. 1
Issue Date: September 25, 2018

The Corporation of the Township of Perth East
25 Mill Street East
Post Office Box, No. 455
Milverton, Ontario
N0K 1M0

Site Location: South Easthope Landfill
Lot 26, Concession 5
Perth East Township, County of Perth

You are hereby notified that I have amended Approval No. A150902 issued on May 24, 2007 for the use and operation of a 5.0 hectare landfilling site within a total site area of 29.6 hectares, being known as the South Easthope Landfill , as follows:

I. The following Conditions are hereby added:

Transfer Station

Conditions 44-53 apply to the operation of the *Transfer Station* only.

Operations

44. The Transfer Station shall be designed, developed, built, operated, maintained, and the management and disposal of all waste shall be carried out, in accordance with the *EPA* , *Regulation 347* , and except as otherwise provided by this Approval, with the application for this *Approval* , dated **March 13, 2018** , and the supporting documentation listed in Items 11 an 12 of Schedule "A". At no time shall the discharge of a contaminant that causes or is likely to cause an adverse effect be permitted.

Waste Types

45. Only solid non-hazardous household domestic waste shall be accepted at the *Transfer Station* .

Waste Limits

46. No more than 300 tonnes of waste per day shall be accepted at the *Transfer Station* .

47. No more than 250 tonnes waste shall be stored or be present at the *Transfer Station* at any time. If for any reason waste cannot be transferred from the Transfer Station, the *Transfer Station* shall cease accepting waste.

Signage

48. A sign shall be posted and maintained at the *Transfer Station* in a manner that is clear and legible, and shall include the following information:

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

Incoming / Outgoing Waste

49. All incoming and outgoing wastes shall be inspected by trained personnel prior to being received, transferred and/or shipped to ensure wastes are being managed and disposed of in accordance with the *EPA* and *Reg. 347.*

Site Security

50. The Transfer Station shall be operated and maintained in a secure manner, such that unauthorized persons cannot enter the *Transfer Station* .

Closure Plan

51. The *Owner* shall submit to the *District Manager* written notification of the decision to cease activities at the *Site* . The notification and closure schedule shall be submitted either not later than four (4) months prior to the planned permanent closure of the *Site* or forthwith in the situation of an unplanned permanent closure of the *Site* or indefinite cessation of *Site* activities.

52. Within 10 days after closure of the Transfer Station, the Owner shall notify the Director, in writing, that the Transfer Statio *n* is closed and that the approved Closure Plan has been implemented.

Log Book

53. A log shall be maintained on-site, either electronically or in written format, and shall include the following information as a minimum:
a. the date;
b. quantity and source of waste received;
c. quantity of waste at the Transfer Station at the end of the operating week;
d. quantities and destination of each type of waste shipped from the Transfer Station;
e. a record of inspections required by this Approval;
f. a record of any spills or process upsets at the site, the nature of the spill or process upset and the action taken for the clean up or correction of the spill, the time and date of the spill or process upset, and for spills, the time that the Ministry and other persons were notified of the spill in fulfilment of the reporting requirements in the EPA .
g. a record of any waste refusals which shall include; amounts, reasons for refusal and actions taken; and
h. the signature of the Trained Personnel conducting the inspection and completing the report.

II. The following Items are hereby added to Schedule "A":

11. Application for a Provisional Certificate of Approval for a Waste Disposal Site dated March 13, 2018 and signed by Glenn Schwendinger, CAO, Township of Perth East,

including all supporting documentation.
12. Email dated July 16 2018 from Jennette Walker, GM BluePlan Engineering Ltd., to Alan Tan, Senior Waste Engineer, Environmental Approvals Branch of MECP.

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

1. The reason for Conditions 44 is to ensure that the Transfer Station is operated in a manner which does not result in a nuisance or a hazard to the health and safety of the environment or people.
2. The reasons for Conditions 45, 46 and 47 are to specify the types of waste that may be accepted at the Transfer Station, the amounts of waste that may be stored and processed at the Transfer Station, and the maximum rate at which the Transfer Station may receive waste.
4. The reason for Conditions 48 is to ensure that users of the Transfer Station are fully aware of important information and restrictions related to Transfer Station operations and access under this Environmental Compliance Approval.
5. The reason for Conditions 49 is to ensure that all wastes are properly classified to ensure that they are managed, processed and disposed in accordance with O. Reg. 347, R.R.O. 1990 and in a manner that protects the health and safety of people and the public.
6. The reason for Condition 50 is to ensure the controlled access and integrity of the Transfer Station by preventing unauthorized access when the Transfer Station is closed and no site attendant is on duty.
7. The reasons for Condition 51 and 52 are to ensure that the Transfer Station is closed in accordance with Ministry standards and to protect the health and safety of the public and the environment.
8. The reason for Condition 53 is to provide for the proper assessment of effectiveness and efficiency of site design and operation, their effect or relationship to any nuisance or environmental impacts, and the occurrence of any public complaints or concerns. Record keeping is necessary to determine compliance with this Environmental Compliance Approval, the EPA and its regulations.

This Notice shall constitute part of the approval issued under Approval No. A150902 dated May 24, 2007.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;

b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary***** Environmental Review Tribunal 655 Bay Street, Suite 1500 Toronto, Ontario M5G 1E5	AND	The Director appointed for the purposes of Part II.1 of the Environmental Protection Act Ministry of the Environment, Conservation and Parks 135 St. Clair Avenue West, 1st Floor Toronto, Ontario M4V 1P5

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

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 25th day of September, 2018

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

AT/
c: District Manager, MECP London - District
Jennette Walker, GM BluePlan Engineering Limited

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

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER 6224-B5KK74
Issue Date: February 13, 2020

The Corporation of the Township of Perth East
25 Mill Street East
Post Office Box, No. 455
Milverton, Ontario
N0K 1M0

Site Location: South Easthope Landfill
Lot 26, Concession 5
Township of Perth East, County of Perth

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act , R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

construction of a leachate storage pond and a subsurface leachate disposal system at the South Easthope Landfill Site, located at the above site location and consisting of the following Works:

Proposed Works

construction of a leachate storage pond and a disposal system (located approximately 40 m east of the western upgradient property boundary) to complement the existing leachate management system comprising of the following:

• one (1) leachate storage pond to receive leachate overflow from the waste cells and,
• approximately 100 m long, 30 cm deep x 30 cm wide shallow buried pressure trench system to dispose treated leachate into the ground,

including all piping and pumping equipment, associated controls and appurtenances, all in accordance with the documents listed in Schedule 'A'.

Existing Works

existing stormwater management facilities and establishment of leachate collection, treatment and disposal system to service the South Easthope Landfill Site, located at the above site location and consisting of the following Works:

Stormwater Management Facilities

The stormwater collection, treatment and disposal facilities constitute of the following:

• approximately 600 m of ditches and swales to collect stormwater from the landfill site;
• two (2) stormwater ponds (Pond 1 and Pond 2) connected in series having approximate volumes of 400 m^3 and 320 m^3 , respectively and approximate areas of 270 m^2 and 220 m^2, respectively;
• approximately 25 m of vegetated riprap channel to the property boundary; and
• approximately 300 m of swale receiving stormwater from the vegetated riprap channel and discharging to the Wilhelm Drain.

Leachate Collection & Treatment System

The leachate collection, treatment and disposal system consists of the following:

• three (3) temporary storage ponds adjacent to the waste area to collect leachate from the waste cells, each measuring 40 m x 20 m x 2.5 m deep;
• one (1) 40 m x 20 m x 2.5 m deep proposed permanent holding pond having a volume of greater than 400 m^3 and an area of approximately 300 m^2 for secondary solids removal and balancing leachate received from the temporary ponds;
• one (1) pumping chamber of 1,000 L capacity for dosing the Waterloo Biofilter System reactor equipped with a dosing pump capable of pumping 1.1 L/s at 5 m TDH;
• one (1) 2.5 m diameter x 2.5 m high Waterloo Biofilter System bioreactor filled with foam media rated to handle flowrate up to 5 m^3/day;
• one (1) pumping chamber of 1,000 L capacity for recirculation and discharge to the pressure trench equipped with a discharge pump rated to pump 2.3 L/s at 5 m TDH;
• approximately 100 m long, 30 cm deep x 30 cm wide shallow buried pressure trench constructed fed from the center and having at least one inspection port for each 30 m of lateral; and
• all associated controls and appurtenances necessary for the operation of the Works.
all in accordance with the Application for Approval of Municipal and Private Sewage Works submitted by the Township of Perth East dated August 25, 2003 along with a design letter brief (modified on April 16, 2004), drawings and supporting data.

For the purpose of this environmental compliance approval, the following definitions apply:

"Approval" means this environmental compliance approval and any schedules attached to it, and the application;

"BOD5" (also known as $TBOD_5$) means five day biochemical oxygen demand measured in an unfiltered sample and includes carbonaceous and nitrogenous oxygen demand;

"CBOD5" means five day carbonaceous (nitrification inhibited) biochemical oxygen demand measured in an unfiltered sample.
"Director" means a person appointed by the Minister pursuant to section 5 of the EPA for the purposes of Part II.1 of the EPA;

"District Manager" means the District Manager of the appropriate local district office of the Ministry where the Works is geographically located;

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

"Ministry" means the ministry of the government of Ontario responsible for the EPA and OWRA and includes all officials, employees or other persons acting on its behalf;

"Owner" means The Corporation of the Township of Perth East and its successors and assignees.

"Overflow" means any discharge from the Works that does not undergo any treatment or only receives partial treatment before it is discharged to the environment.
"OWRA" means the Ontario Water Resources Act , R.S.O. 1990, c. O.40, as amended.
"Partial Treatment" means any treatment that does not include the full train of unit processes described and approved in the Approval.
"Peak Flow Rate" means the maximum rate of sewage flow for which the plant or process unit was designed.
"Existing Works" means those portions of the sewage works previously constructed and approved under an Approval.
"Proposed Works" means the sewage works described in the Owner's application, this Approval, and to the extent approved by this Approval.
"Substantial Completion" has the same meaning as "substantial performance" in the Construction Lien Act;
"Works" means the sewage works described in the Owner’s application and this Approval and includes both Existing Works and Proposed Works.

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

TERMS AND CONDITIONS

1. GENERAL PROVISIONS
(1) The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.
(2) Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this Approval.
(3) Where there is a conflict between a provision of any submitted document referred to in this Approval and the Conditions of this Approval, the Conditions in this Approval shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.
(4) Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.
(5) The requirements of this Approval are severable. If any requirement of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this Approval shall not be affected thereby.
2. EXPIRY OF APPROVAL

This Approval will cease to apply to those parts of the Proposed Works which have not been constructed within five (5) years of the date of this Approval.

3. CHANGE OF OWNER

(1) The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within 30 days of the change occurring:

(a) change of Owner;
(b) change of address of the Owner;
(c) change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act , R.S.O. 1990, c.B17 shall be included in the notification to the District Manager;
(d) change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act , R.S.O. 1990, c. C39 shall be included in the notification to the District Manager.

(2) In the event of any change in ownership of the Works, other than a change to a successor municipality, the Owner shall notify in writing the succeeding owner of the existence of this Approval, and a copy of such notice shall be forwarded to the District Manager and the Director.

4. OVERFLOW

(1) Any Overflow of untreated leachate from any portion of the Works is prohibited, except where:

(a) it is necessary to avoid loss of life, personal injury, danger to public health or severe property damage;
(b) the District Manager agrees that it is necessary for the purpose of carrying out essential maintenance and the District Manager has given prior written acknowledgment of the Overflow; or
(c) the District Manager has given prior written acknowledgment of the Overflow.

(2) The Owner shall maintain a logbook of all Overflow events which shall include, at a minimum, the time, location, duration, quantity of Overflow, the authority for Overflow pursuant to subsection (1), and the reasons for the occurrence.

5. MONITORING AND RECORDING

(1) The Owner shall, upon commencement of operation of the Works, carry out the following monitoring program:

(a) Leachate Monitoring

(i) influent leachate samples shall be collected in April, July and October each year from the existing temporary (leachate) storage ponds prior to the leachate entering the permanent holding pond and shall be analyzed for the following parameters:

pH	chlorides
alkalinity	sulphates
conductivity	calcium
total suspended solids	barium
chemical oxygen demand (COD)	boron
5-day biochemical oxygen demand (BOD5)	sodium
total Kjeldahl nitrogen (TKN)	iron
total ammonia nitrogen	magnesium
nitrates	

(ii) effluent leachate samples shall be collected in April, July and October each year from the pumping chamber discharging to the pressure trench and shall be analyzed for the parameters listed in columns 2 and 3 of Table 1. The samples collected in April and October shall be analyzed for the indicator parameters listed in column 3 of Table 1 while the sample collected in July shall be analyzed for the comprehensive parameters listed in column 2 of Table 1.

(b) Groundwater Monitoring

(i) groundwater samples shall be collected in April, July and October each year from a groundwater monitoring well installed upgradient of the pressure trench at the West property line (adjacent to the trench) and shall be analyzed for the parameters listed in columns 4 or 5 of Table 1. The samples collected in April and October shall be analyzed for the indicator parameters listed in column 5 of Table 1 while the sample collected during July shall be analyzed for the comprehensive parameters listed in column 4 of Table 1.

(c) Surface Water Monitoring

(i) surface water samples shall be collected twice each year in Spring and Autumn at the outlet of Pond 2 and shall be analyzed for the parameters listed in column 4 of Table 1.

Table 1

Parameter (Column 1)	**Leachate Monitoring**		**Ground and Surface Water Monitoring**	
	Comprehensive Parameter (Column 2)	**Indicator Parameter** (Column 3)	**Comprehensive Parameter** (Column 4)	**Indicator Parameter** (Column 5)
General				
Alkalinity	x	x	x	x[2]
BOD5	x	x	x[1]	
COD	x	x	x[1]	
DOC	x	x	x[2]	x[2]
Phenol	x		x	
Sulphate	x	x	x	x[2]
Total Dissolved Solids	x	x	x	x[2]
Suspended Solids	x	x	x[1]	

Table 1...continued

Parameter (Column 1)	**Leachate Monitoring**		**Ground and Surface Water Monito**	
	Comprehensive Parameter (Column 2)	**Indicator Parameter** (Column 3)	**Comprehensive Parameter** (Column 4)	**Indicator Pa** (Column

General - Nutrients				
Ammonia	x	x	x	x^2
Nitrate	x	x	x	x^2
Nitrite	x		x	
TKN	x		x	
Total Phosphorus	x		x	
General - Major Ions				
Chloride	x	x	x	x^2
Calcium	x	x	x^2	x^2
Iron	x	x	x	x^2
Magnesium	x	x	x^2	x^2
Manganese	x		x^2	
Potassium	x		x^2	
Sodium	x	x	x^2	x^2
Trace Metals				
Arsenic	x		x	
Barium	x	x	x	x^2
Boron	x	x	x	x^2

Cadmium	x		x	
Chromium	x		x	
Copper	x		x	
Lead	x		x	
Mercury	x		x	
Zinc	x		x	
Volatiles				
Benzene	x		x[2]	
1,4 Dichlorobenzene	x		x[2]	
Dichloromethane	x		x[2]	
Toluene	x		x[2]	
Vinyl Chloride	x		x[2]	
Field Test				
Temperature			x[1]	
Conductivity	x	x	x	x[2]

Dissolved Oxygen			x^1	
pH	x	x	x	x^2

Note: x^1 only for surface water and x^2 only for groundwater

(2) The Owner shall retain for a minimum of three (3) years from the date of their creation, all records and information related to or resulting from the monitoring activities required by this Approval.

6. OPERATION AND MAINTENANCE

(1) The Owner shall review and assess monitoring results from the surface water sampling point outlined in Section 5 "Surface Water Monitoring" of this Approval against the following trigger points in Table 2:

Table 2

Trigger Concentrations for Surface Water Monitoring	
Parameter	**Trigger Concentration** (milligrams per litre)
CBOD5	>10.0
Ammonia (un-ionized)*	>0.1
Chlorides	>250

* Note: Ammonia (un-ionized) concentration shall be calculated from the monitoring results of ammonia, pH, and field temperature.

(2) In the event that a monitoring result for any of the trigger parameters listed in Table 2 exceeds the corresponding trigger concentration, the Owner shall notify the District Manager within seven (7) days of the receipt of the analytical results.

(3) The Owner shall exercise due diligence in ensuring that, at all times, the Works and

the related equipment and appurtenances used to achieve compliance with this Approval are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate operator staffing and training, including training in all procedures and requirements of this Approval, the Act and regulations, process controls and alarms.
(4) The Owner shall prepare an operations manual within six (6) months of Substantial Completion of the Proposed Works, that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the Works;
(b) inspection programs, including frequency of inspection, for the Works and the methods or tests employed to detect when maintenance is necessary;
(c) repair and maintenance programs, including the frequency of repair and maintenance for the Works;
(d) procedures for the inspection and calibration of monitoring equipment;
(e) a spill prevention control and countermeasures plan, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the District Manager; and
(f) procedures for receiving, responding and recording public complaints, including recording any follow up actions taken.

(5) The Owner shall maintain the operations manual current and retain a copy at the location of the Works or operational office of the Owner for the operational life of the Works. Upon request, the Owner shall make the manual available to Ministry staff.
(6) The Owner shall provide for the overall operation of the Works with an operator who holds a licence that is applicable to that type of facility and that is of the same class as or higher than the class of the facility in accordance with Ontario Regulation 129/04.
(7) The Owner shall undertake an inspection of the condition of the stormwater management ponds and ditches, at least once a year, and undertake any necessary cleaning and maintenance to prevent the excessive build-up of sediment and/or decaying vegetation.
(8) The Owner shall undertake regular visual inspection of the trench bed and the field immediately adjacent to the trench bed for breakout and seepage, at least twice a year, and undertake any necessary mitigation measure to prevent future breakouts or seepages.
(9) The Owner shall develop a Contingency Plan to manage leachate at the site in the event leachate breakouts are observed after the construction and operation of the

pressure trench.
(10) The Owner shall maintain a logbook to record the results of the stormwater management pond and the trench bed plus field inspections, and any cleaning and maintenance operations undertaken and shall keep the logbook at the site or operational office of the Owner for inspection by the Ministry.
(11) An additional groundwater monitoring well shall be installed immediately adjacent to the proposed pressure trench on the downstream side to evaluate downstream groundwater mounding.

7. REPORTING

(1) One week prior to the start up of the operation of the Proposed Works, the Owner shall notify the District Manager (in writing) of the pending start up date.
(2) In addition to the obligations under Part X of the Environmental Protection Act, the Owner shall, within 10 working days of the occurrence of any reportable spill as defined in Ontario Regulation 675/98, loss of any product, by-product, intermediate product, oil, solvent, waste material or any other polluting substance into the environment, submit a full written report of the occurrence to the District Manager describing the cause and discovery of the spill or loss, clean-up and recovery measures taken, preventative measures to be taken and schedule of implementation.
(3) The Owner shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to Ministry staff.
(4) The Owner shall prepare and submit to the District Manager, a performance report, on an annual basis, within ninety (90) days following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the Works and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a description of any operating problems encountered and corrective actions
taken;
(b) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the Works;
(c) a summary of all stormwater and leachate monitoring results undertaken in the reporting period and the total volume of leachate disposed off site;
(d) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;
(e) any other information the District Manager requires from time to time.

Schedule 'A'

1. Application for Environmental Compliance Approval submitted and signed by Mr.W. Wilson, Public Works Manager,The Corporation of the Township of Perth East dated September 20, 2017 and submitted in a bound report entitled "ECA Amendment Application, South Easthope Landfill Site, Leachate Treatment System (ECA 0032-5ZBJJH)" prepared by Azimuth Environmental Consulting, Inc.

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

1. Condition 1 is imposed to ensure that the Works are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The condition also advises the Owners their responsibility to notify any person they authorized to carry out work pursuant to this Approval the existence of this Approval.
2. Condition 2 is included to ensure that, when the Works are constructed, the Works will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.
3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to the approved works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the Works in compliance with it.
4. Condition 4 is included to indicate Overflow of untreated leachate to the natural environment is prohibited, save in certain limited circumstances where the failure to Overflow could result in greater injury to the public interest than the Overflow itself where an Overflow will not violate the approved leachate requirements, or where Overflow can be limited or otherwise mitigated by handling it in accordance with an approved contingency plan. The notification and documentation requirements allow the Ministry to take action in an informed manner and will ensure the Owner is aware of extent and frequency of Overflow events.
5. Conditions 5 is included to enable the Owner to evaluate and demonstrate the performance of the Works, on a continual basis, so that the Works are properly operated and maintained at a level which is consistent with the design objectives specified in the Approval and that the Works does not cause any impairment to the receiving watercourse.
6. Conditions 6 is included to require that the Works be properly operated, maintained, funded, staffed and equipped such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the owner and made available to the Ministry. Such a manual is an integral part of the operation of

the Works. Its compilation and use should assist the Owner in staff training, in proper plant operation and in identifying and planning for contingencies during possible abnormal conditions. The manual will also act as a benchmark for Ministry staff when reviewing the Owner's operation of the work.
7. Condition 7 is included to provide a performance record for future references, to ensure that the Ministry is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this Approval, so that the Ministry can work with the Owner in resolving any problems in a timely manner.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 0032-5ZBJJH issued on August 4, 2004.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

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

AND

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

M4V 1P5

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

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 13th day of February, 2020

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

HV/
c: District Manager, DWECD, MECP London - District
Mike Jones, Azimuth Environmental Consulting

APPENDIX C

Environmental Compliance Approval Application Form

APPENDIX D

2022 Annual Monitoring Report

2022 Landfill Monitoring Report
South Easthope Landfill

Township of Perth East

Prepared for:
Township of Perth East

Prepared by:
Azimuth Environmental
Consulting, Inc.

March 2023

AEC 22-003

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Environmental Assessments & Approvals

March 24, 2023 AEC 22-003

Township of Perth East
P.O. Box 455
25 Mill Street East
Milverton, ON N0K 1M0

Attention: Mr. Wes Keupfer, Public Works Manager

Re: **2022 South Easthope Landfill Report**

Dear Wes:

Azimuth Environmental Consulting, Inc. (Azimuth) is pleased to present the annual monitoring report for the South Easthope Landfill. The monitoring program provides ongoing performance evaluation as part of the compliance requirements for the Certificates of Approval (No. A 150901 and No. 6224-B5KK74) for both the landfill operations and leachate treatment system.

As observed in previous years the landfill continues to have minimal impact to the surrounding environment. Leachate impacts are not discerned in the downgradient ground water or surface water and the leachate treatment system continues to be effective, albeit has measurable influence along the western property boundary. With the use of the new infiltration trench, this influence should gradually lessen with time.

Yours truly,

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

PROFESSIONAL GEOSCIENTIST
COLIN ROSS
PRACTISING MEMBER
2055
ONTARIO

PROFESSIONAL GEOSCIENTIST
MICHAEL G. JONES
PRACTISING MEMBER
0595
ONTARIO

Colin Ross, B.Sc., P.Geo.
Senior Hydrogeologist

Mike Jones, M.Sc., P.Geo.
President

Attach:

cc: Jeff Mills – Senior Environmental Officer, MECP

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1.0 INTRODUCTION & BACKGROUND

The Corporation of the Township of Perth East owns and is responsible for the operation and maintenance of the South Easthope Landfill (Site) in accordance with the Provisional Environmental Compliance Approval (ECA) No. A 150902, issued by the Ministry of the Environment, Conservation & Parks (MECP) September 5, 2007 (formally No. A 150901, issued October 2004). An Ontario Water Resources Act (OWRA) Certificate of Approval (Sewage) Number 0032-5ZBJJH issued by the MECP on August 4, 2004 and recently revised (6224-B5KK74) in 2020, provides conditions for the facilities at the Site, including storm water management. The Site is registered to accept domestic, commercial and industrial solid non-hazardous waste.

The following information is provided as a summary of previous investigations to allow the reader to review this report in context. For more complete information, the reader should review the original documentation (see Section 5 - References). It is also noted that this report is being utilized as a reference document for the submission on an ECA amendment application to facilitate the expansion of the landfill Site.

1.1 Location

The South Easthope Landfill Site is located in Lot 26, Concession 5 Line 29 in the Township of Perth East (see Figure 1). The Township of Perth East operates the 5 ha landfill area within the 29.6 ha Site, with the remainder of the property acting as a Contaminant Attenuation Zone (CAZ) (Figure 5).

1.2 Site Setting

The surface topography is generally flat. The land slopes gently from west to east towards the Wilhelm Drain, which flows southwards into the Thames River. The shallow overburden soils consist of low permeability clay silt till approximately 9 m thick with occasional discontinuous sandy zones. A dense silt and fine-grained sand till, greater than 13 meters in thickness, can be found below the upper clay till.

The wastes and cover materials are more permeable than the underlying clay silt till. Precipitation falling on the landfill will tend to infiltrate through the cover material, flow vertically down to the top of the clay till, and then laterally to the surface. Leachate is captured and transferred into one temporary pond with leachate transferred from the active cell or perimeter trench into the permanent Leachate Treatment System (LTS) pond or temporary pond if capacity does not allow through temporary pumps. Leachate is allowed to evaporate within the storage ponds, with the remainder treated and discharged to an in-ground pressure trench. Clean surface drainage from areas outside the active waste area and from the closed cells flows through a series of drainage swales to the on-site storm water pond. This ponds discharge through a controlled overflow to a channel that flows easterly to the Wilhelm Drain.

A small amount of precipitation will infiltrate into the clay till and migrate downwards to the water table. The infiltration rate is estimated at less than 5 cm per year, based on the hydraulic conductivity of the upper clay unit. Within the waste area, this amount of infiltration will also occur, creating leachate-impacted ground water. The water table fluctuates seasonally. The amount of ground water from the landfill discharging into the stream is negligible when compared with other sources (i.e., overland runoff and ground water discharge from the remainder of the watershed).

The Site is located within the Stratford Till Plain. Chapman and Putnam (1984) describe the soils as fairly uniform, brown calcareous silty clay. Some of the silt and clay is calcareous rock flour from the underlying limestone bedrock. According to local well records, the limestone contact is located approximately 40 to 60 m below the ground surface. Figure 3 is a regional cross sectional diagram of the underlying stratigraphy which references local well logs as well as Site boreholes. More localized cross-sections have also been included in this report that illustrate subsurface conditions at the Site including the waste mound, LTS discharge trench and leachate ponds (Figures 8 & 9)

1.3 Site Design & Operations

The Landfill Site was developed in cooperation with the former Townships of North Easthope, South Easthope, Mornington, and the village of Milverton. The landfill Site opened in June of 1989 with the site selection and design intended on serving the waste management needs of the four municipalities over a forty-year period. On January 1, 1998 these four municipalities and the Township of Ellice amalgamated into the Township of Perth East. The Township of Perth East assumed responsibilities for the Site as of January 1, 1998.

The total waste capacity for this Site is 235,000 m^3 (excluding final cover) or approximately 112,000 tonnes to 139,000 tonnes, with a total volume of 272,000 m^3 between the bottom and final contours (M.K. Ince and Associates, 2001). Note that the cell configuration was modified as part of the revised Design and Operations report (Azimuth, Dec 2005, updated in Feb 2007). This resulted in effectively doubling the waste thickness and reducing the footprint to maintain the approved volume.

Since truck scales have not historically used at this Site, waste values were estimated by the Site operator and confirmed annually by total station survey. Prior to 2004, waste volumes were estimated since Site surveys were not completed on a regular basis. Since 2004, a survey has been completed each year. Weigh scales were added to the Site in 2020 and 2022 represents the second year where daily tonnage accepted at the Site were recorded. The monthly values are summarized in Appendix I.

An annual total station survey was completed for the 2022 monitoring program (see Figure 4). Cut and fill calculations were conducted and indicate that the total volume (waste plus cover material) for October 20, 2021 to October 18, 2022 was 6,500 m^3 (or approximately 540 m^3/month). This volume includes waste and cover materials. The volume appears to represent a potential underestimate of annual volumes given the annual tonnage accepted at the Site of 4,723 tonnes (Appendix I). Based on an assumed waste density of 0.75 tonnes/m^3 of waste, the theoretical volume of waste received would be 6,300 m^3, which correlates to the cut and volume for the Site.

The total landfill volume (waste, daily cover and interim cover) is estimated from the annual survey volumes as ~192,000 m^3, which yields a remaining capacity of 43,000 m^3. Table 1 (below) provides a summary of Site activities throughout its operational lifespan.

Given a 6,000 m^3 to 10,000 m^3 per year acceptance rate and the current total remaining waste volume (43,000 m^3), the current lifespan of the landfill is approximately 4 to 7 years, which falls in line with the original 40 year lifespan of the Site when filling began in 1989.

The Township continues to segregate recyclables, including metal and tires so that these materials are removed from the waste stream. Materials are stockpiled at the Site or stored in lugger boxes until a suitable volume is available and then the materials are hauled away for re-use. In 2022, records were kept for all received diversion materials which included 4.7 tonnes of electronic waste, 7,551 tires and 18.5 tonnes of metal.

Table 1: Summary of Site Operations

Date	Cells Filled	Volume Consumed (m^3) (approximate)	Cumulative Volume Consumed (m^3)	Remaining Waste Capacity (m^3)
1989/1990	1	6,420	6,420	229,080
1990/1991	2	3,520	9,940	225,560
1991/1992	2	3,610	13,550	221,950
1992/1993	2 & 3	3,640	17,190	218,310
1993/1994	3	5,700	22,900	212,600
1994/1995	3	6,100	29,000	206,500
1995/1996	3 & 4	4,200	33,200	202,300
1996/1997	4	4,400	37,600	197,900
1997/1998	4	4,200	41,800	193,700
1998/1999	4	4,500	46,300	189,200
1999/2000	4	3,400	49,700	185,800
2000/2001	4 & 5	3,200	52,900	182,600
2001/2002	5	5,100	58,000	177,500
2002/2003	5 & 6	6,300	64,300	171,200
2003/2004	6 & 7	7,100	71,400	164,100
2004/2005	7 & 8	1,400	72,800	162,700
2005/2006	9, 10 & 11	1,000	73,800	161,700
2006/2007	12 & 13	2,900	76,700	158,800
2007/2008	13 & 14	4,333	81,033	154,467
2008/2009	14	6,270	87,303	148,197
2009/2010	14 & 15	2,100	89,403	146,097
2010/2011	16	1,850	91,253	144,247
2011/2012	16	2,375	93,628	141,872
2012/2013	14/18	4,680	98,308	137,192
2013/2014	14/18	1,024	99,332	136,168
2014/2015	29/30	4,900	104,232	131,268
2015/2016	29/30/9/10	5,040	109,272	126,228
2016/2017	27/28/9/10	7,200	116,472	119,028
2017/2018	21-22, 24-26	12,000	128,472	107,028
2018/2019	15-16, 19-21, 23-25	6,500	134,972	100,528
2019/2020*	21-22, 25-29	5,300	162,100	72,900
2020/2021	21-22, 25-29	6,920	164,800	70,200
2021/2022*	21-22, 25-29	6,500	192,000	43,000

Note:
(1) Table taken from 2000/2001 annual report (prepared by others).
(2) 2001/2002 data copied not measured.
(3) Daily cover was used during the first year of operation.
(4) Daily cover was not used 1991 to 2001; minor intermediate/intermediate cover used.
(5) Values shown are approximate and exclude final cover.
(6) Cells modified in 2005 and 2007 to change configuration to thicker waste and smaller footprint.
(7) 2015/2016 & 2016/2017 volumes prorated given 2016 survey was completed in August instead of October
(8) Consumed and remaining capacity volumes are based on annual survey volumes and differ from total cut and fill calculations for entire waste mound
* - cumulative total adjusted based on revised reference elevation data.

1.3.1 LTS operations in 2022

The leachate treatment system operated in 2022 for a pumping period of 201 hours, in which time 1,099,086 L of leachate were treated. The 2022 daily average flow was calculated to be 4,300 L/day, which falls within the maximum design loading of 5,000 L/day of the system. Although daily records are not collected, the routine inspections completed approximately monthly provide information on the operation of the LTS (i.e. hours). System efficiency has shown to decline on occasion; however, this is more related to the foam media becoming saturated causing the system to go into an anoxic state. Routine maintenance of the media is completed when this is observed which re-introduces the intended aerobic state of the system such that the system operates as designed.

2.0 SUMMARY OF 2022 MONITORING PROGRAMS

The 2022 monitoring program for the South Easthope Landfill was undertaken by Azimuth in adherence with the monitoring programs outlined in both the LTS and landfill ECA's (Appendix E). Site visits were conducted by Azimuth on April 6th, July 26th and October 18th.

The monitoring program involves the collection of ground water samples from nine monitoring wells, three private wells, three surface water locations and two leachate samples (influent and effluent).

Prior to sampling at ground water monitors, water levels were measured. Ground water samples were then collected following purging of at least three borehole volumes of water from each monitor using dedicated check valve pumps and tubing or until the monitor was dry, with samples collected after at least one hour of recovery. Ground water samples for metals and DOC analysis were also field-filtered using disposable 0.45 μm filters.

The surface water monitoring stations provide data on the Wilhelm Drain that could be influenced by leachate and storm run-off from the landfill site. Surface water samples were collected at a depth about equal to half of the stream's total depth, where access and water depth permitted and were not filtered. Two surface water stations exist along the Wilhelm Drain (SW-1 and SW-2). Surface water station SW-1 is situated upstream of the landfill area in order to represent the natural stream water quality. Surface water station SW-2 is located downstream of the confluence where storm water from the landfill retention pond discharges into the stream. As well, surface water station SW-3 monitors the storm water discharging from the retention pond located in the eastern portion of the landfill property.

Caduceon Laboratories of Barrie (CALA-accredited) completed the analytical work in 2022, in addition to providing all of the sample bottles pre-filled with the appropriate preservatives. Following field collection, all samples were maintained in coolers with ice and were delivered to the laboratory within 48 hours of sample collection. The analytical results were provided by the laboratory via email. The geochemical data are summarized in the appendices. The location of each monitoring station is detailed on Figures 4-7.

2.1 2022 QA/QC Samples

As part of the routine sampling program for the Township landfills, duplicate samples were collected and analyzed for quality assurance purposes. In 2022, three QA/QC sample were collected out of 35 samples. The laboratory was not advised of the sample duplication prior to analysis of these samples. Results are provided in Appendix B and were found to be generally within acceptable limits, beyond a few parameters that are more likely related to variance in sediment between samples as evidenced by the presence and variance within the total suspended solids (TSS) and turbidity from the LTS and LTS pond QA/QC locations. Overall, the results are within the historical ranges, such that the minor variance noted is not interpreted to represent laboratory error.

As required in the ECA, the data analysis is to include major ion balances (% difference). As in previous years, all sample data collected in 2022 with the exception of one sample indicated low % differences (<10%). The exception was the October results from OW7, which had a % difference of 13.2. Given the remaining surface and ground water samples for 2022, including the April OW7 sample had values below 5%, it is uncertain as to the source of the elevation. Given the historically low values across the Site, this variance is not seen as a concern, but will be monitored in 2022. Overall, the results would indicate the current analytical package used for sampling at the Site is adequate.

2.2 Ground Water & Leachate

2.2.1 Ground Water & Leachate Flow

Water level measurements were obtained prior to any disturbance of the static piezometric surface using an electronic water level meter (accuracy of +/- 0.2 cm). The water level data collected by Azimuth during sampling in 2022 was generally consistent with the historical data set, while the additional monitors constructed further refined and confirmed ground water flow patterns at the Site.

Contouring of the ground water level data demonstrates the direction and rate of the shallow ground water flow in the vicinity of the waste (Figures 6 & 7). The water levels show that flow is towards the Wilhelm Drain to the southeast. The ground water elevations are also provided in Table C-3.

Due to the low permeability clay silt tills in the overburden, the Site has very low flow rates of approximately 0.5 to 5.0 m per year. Observed lateral gradients are less than 0.02.

Slight anomalies with respect to water table conditions at the Site continue at OW5 and OW6 in 2022. There is an apparent ground water mound in the vicinity of the pressure trench adjacent to OW6. This trench was taken off-line in the summer of 2020 when the new trench was constructed south of the leachate storage pond to reduce the potential for off-site impacts associated with the mounding adjacent to the western property boundary. As noted in the ground water elevation data at this location since, the ground water elevations generally fall in line with the historical data and seasonal fluctuations observed at other locations. As such, it is uncertain as to whether the ground water elevations in this area were influenced by the former operation of the LTS trench. It is possible that these elevated water levels could be the result of the granular materials associated with the trench such that it promoted localized infiltration of surface runoff. The low ground water elevation at OW5 relative to the remaining network (~1 to 2 m) continues in 2022 and the source of this anomaly is not readily known, although is assumed to reflect a localized condition at that location.

Although no monitoring well is present within the waste mound, there likely is some ground water / leachate mound given the waste mound is approximately 10 m above surrounding grade. However, given that only a small section of the mound has been exposed in the active areas over the years, the amount of infiltration is likely limited, which would limit the degree of mounding. This is also supported by the fact that there are no visible leachate seeps observed along the largest slopes of the waste mound. Finally, the closest proximity wells to the waste mound (OW5 & OW6) have not shown obvious leachate impacts, aside from elevated calcium and chloride, which could be related to the application of road salt and dust suppressants on the Site roadways as OW5 is immediately adjacent to the entrance laneway and OW6 is adjacent to a ditch that receives runoff from the area of OW5.

2.2.2 Background Ground Water Quality

The background ground water quality is characterized by relatively low concentrations of most parameters. Natural waters dissolve low quantities of elements through reaction with the soil minerals. Monitor OW3 is located upgradient of the landfill area and is used to determine the background conditions at the Site. The 2022 analytical data is generally consistent with historical data; however elevated nitrate, calcium, hardness, chloride and to a lesser degree alkalinity concentrations have been noted to be elevated since 2009, although more stable over the past few years with the exception of chloride which showed an increase in concentrations in 2022 (~15 to 35 mg/L). The increase in chloride is surmised to be associated with road salt laden runoff from a portion of the new waste diversion area approximately 50 m southwest of OW3. This area was recently graded and paved such that road salt laden surface runoff is directed to a low lying area in proximity to OW3, which is likely contributing to elevations similar to what has been seen historically at OW5 and OW6.

Given the landfill is located within an agricultural setting, OW3 is located upgradient from the waste and the fact no other leachate indicator parameters are elevated, it is likely these trends are associated with fertilizer application to the adjacent agricultural fields. Another or alternative source for the calcium and chloride may be the addition of calcium chloride to the Site roadways for dust suppressant. The graphs provided in Appendix F demonstrate the change in observed concentrations of typical leachate indicator parameters at OW3 over time. It is noted that although no ground water monitoring well is located within the waste mound, there is an expectation that radial ground water / leachate flow originating from the waste mound has developed over the past 8 to 10 years with the increase in waste mound height to approximately 10 m above existing grade. However, given the distance (100 m) from the waste mound and the fact that more significant increasing trends have not been observed at OW2 or OW4b (downgradient and closer), radial flow from the waste mound is not affecting the water quality at OW3 and thus it remains a representative background location. This is the result of the localized nature of any radial flow.

In order to quantify the effect of the potential leachate mound, ground water flow calculations were completed based on a hydraulic conductivity range for the Site (3.0×10^{-6} to 3.8×10^{-7} m/sec) from the 2000/2001 monitoring report (MK Ince, 2001), a porosity of 20% and a hydraulic gradient of 0.035. The hydraulic gradient (0.022) assumed a leachate mound height of 50% of the vertical difference between the water table at OW5 and top of waste mound (360 masl) and a seasonally high ground water elevation of 356 masl at OW3. The horizontal distance of 180 m was based on the centre of the mound and OW3.

The resulting ground water velocity range of 1.0 to 10 m/year, which equates to a travel time range of 10 to 100 years based on the separation distance of 100 m. Given these travel times and the fact the waste mound had only began to be elevated more than a few metres above grade in 2009, the leading edge of any plume mound would have not been expected to be observed at OW3 until 2019 at the earliest, which the elevated concentrations noted began in 2009. This further confirms an alternative source unrelated to the waste mound. It also indicates that this monitoring well provides adequate characterization of water quality and potential leachate influence within the current property boundary to the north as this location is approximately 40 m south of the northern property boundary.

In addition to OW3, OW5 and OW6 are also located upgradient of the landfill. These two monitoring wells were installed in proximity to the LTS pressure discharge trench to monitor mounding and water quality. These locations have been noted to have rising trends for chloride, calcium, hardness and alkalinity (OW5 only and more stable now) similar to that at OW3. However, there is no nitrate presence such that it is possibly sourced to the treated effluent derived from the LTS pressure trench. Despite this, radial flow would be expected to be more dominant at OW6 than OW5 if that was the case, whereas the trends at both locations are very similar in magnitude. It is also noted that the chloride trend is more dominant than the other parameters suggesting a potential variance in sources. As discussed previously, the OW5 and OW6 could be influenced by runoff from Site roadways given OW5 is immediately adjacent to entrance area, while the area of OW6 would receive runoff from this area as well through adjacent ditching that collects runoff. It is known that both road salt (NaCl) and dust suppressant ($CaCl_2$) are added to the roadways, which could account for all or at least part of these elevations. Given the trends at OW6 have become more stable since the LTS was moved, the trend has stabilized at that location suggesting that it was likely at least partially was sourced to the LTS, while the October 2022 value was more elevated than the historical dataset suggesting a similar LTS influence at this location is not likely present. Given how muted and seasonally influenced these trends are at these locations, they will continue to be evaluated as additional data is collected.

In 2020, a new background monitoring location (OW8) was added along with new monitoring wells targeting the location of the revised LTS pressure trench (OW9) and downgradient of the trench (OW7). OW8 was located along the western property boundary approximately 180 m south of OW6 such that it provides additional background water quality reference. The data indicates a more dilute water quality relative to OW3, 5 & 6; however, it is far removed from the active area of the Site so would not be influenced by road runoff and the associated calcium, chloride and sodium sources. The lack of nitrate concentrations would indicate variance in influence within the area. This variability within the background water quality owing to the alternative sources noted above is important to differentiate from leachate impacts such that utilizing both locations may be beneficial.

2.2.3 Leachate Quality

Leachate quality is controlled by the availability of soluble contaminants in the waste pile, the residence time of infiltrating water in the waste, and the physical conditions (i.e., temperature, redox potential, and pH) of the solution. Compared to the background waters, leachate that is produced from recently landfilled waste could have elevated concentrations of calcium, magnesium, manganese, sodium, potassium, iron, chloride, sulfate, alkalinity, ammonia, total kjeldahl nitrogen (TKN), phenols, conductivity, total dissolved solids, boron, dissolved organic carbon and chemical oxygen demand.

Leachate quality is only shown by leachate pond sampling which the results appearing to be generally consistent with previous years as is illustrated by the graphs provided in Appendix F.

2.2.4 Downgradient Ground Water Quality

Leachate does not appear to be impacting the Site downgradient of the landfill. The quality of ground water downgradient of the landfill is similar to that found in the background monitors, although some variance has been observed over the years due to alternative sources, such as agricultural fertilizers, road salt and dust suppressant. Ground water parameters analyzed generally meet the criteria of the ODWQS with the exception of hardness, which is noted to generally be within the historical range of OW3, although more elevated at OW5 and OW6. Total Dissolved Solids (TDS) also routinely exceeds the ODWQS (500 mg/L) at OW5 and OW6, but not by a significant amount and as discussed previously is likely attributable to alternative sources (i.e. road salt, dust suppressant, and / or fertilizers) which has increased the overall mineralization of the water. The elevated hardness is consistent with the widespread distribution of carbonate minerals in the overburden and bedrock. Nitrate has been found to exceed ODWQS at OW4b where elevated but variable concentrations have been noted throughout much of the period of record, while concentrations have only began to become exceeded since 2016 with concentrations ranging between 5.89 and 15.6 mg/L. Given the lack of leachate elevated and consistent indicator parameter concentrations and similarly elevated nitrate concentrations observed over the same period at the upgradient monitoring location (OW3), the source is believed to be agricultural from adjacent farm fields to the northwest. Similarly, elevated nitrate concentrations have been observed in the new downgradient location OW7 (~7 - 20 mg/L), but not at OW8 and OW9, while low level and variable at OW2, which are also located in the agricultural field immediately south of the waste footprint. Beyond the elevated nitrate, a slightly higher concentrations of hardness, calcium and chloride are present at OW7 which may indicate some minor leachate influence is observed at that location although it is not a defined leachate signature given the parameters are also observed in some upgradient locations. Table 2 below summarizes the average major ion chemistry values over the past five years for the entire ground water monitoring network. This table is a representation of relative ground water quality at the Site to provide context with respect to the compliance evaluation in subsequent sections of the report and summarized in the data tables provided in Appendix B. As can be seen, concentrations between both up and downgradient monitoring locations are very similar although some parameters do show some variance for reasons noted above. The downgradient water quality indicates measureable but negligible increases for most common and mobile leachate indicator parameters such as ammonia, boron and chloride.

Table 2: Average Ground Water Concentrations of Leachate Indicator Parameters

Parameter	OW3	OW8	OW5	OW6	Pond	OW9	OW7	OW2	OW4a (Shallow)	OW4b (Shallow)
	(Background)				(Leachate)	(Downgradient With Distance From Mound)				
Calcium	97	69	144	131	54	39	109	33	54	120
Magnesium	25	34	46	56	71	26	21	21	26	26
Sodium	7	10	15	23	297	15	3	14	11	9
Boron	0.01	0.02	0.01	0.05	3	0.05	0.01	0.03	0.02	0.02
Iron	0.01	0.03	0.02	0.01	1	0.01	0.01	0.02	0.02	0.04
Chloride	21	7	138	191	376	4	25	3	7	28
Alkalinity	232	271	321	293	672	282	287	184	220	302
Sulphate	33	51	45	61	30	24	5	17	31	29
DOC	3	2	2	2	104	1	2	2	1	2
Ammonia	0.03	0.0	0.02	0.02	15	0.0	0.01	0.1	0.04	0.03
Nitrate	15	0.1	0.1	0.1	1	0.2	11	0.3	0.2	11
Hardness	345	313	548	558	429	204	357	168	243	405

Notes: (1) Averages taken from 2018-2022.
(2) Data in mg/L

The graphs provided in Appendix F demonstrate the observed concentrations of leachate parameters at all downgradient monitoring locations over time with plots based on both location and specific leachate indicator parameters. As in the past, the downgradient locations do not show obvious or elevated leachate impacts, although some trends and variance has been observed over time. OW4b has indicated an increase in chloride (from <5 mg/L in the late 1990's to ~30mg/L in 2016), but is more recently stable and nitrate concentrations increased in 2011 (from <1 mg/L to ~10 mg/L) but have also been more stable since 2016. Although chloride is a notable leachate indicator parameter, the relation to the nitrate would indicate an agricultural source derived from the fields to the north of the Site as the concentrations are not significant. This is also supported by a similar but larger magnitude nitrate trend at OW3 (background) as well as a more muted chloride trend at that location. As all other leachate indicator parameters have not shown any comparable upward trending at OW4b, it is unlikely sourced to the landfill; however, these trends will continue to be monitored over time. It is also noted that these trends are not observed at OW4a, although a much more muted increasing trend for chloride has been observed since 2009.

The other downgradient monitoring well is OW2, which is located southeast of the waste mound. This location has not shown similar trends with respect to calcium, chloride, nitrate, hardness, or alkalinity as other locations; however pH, calcium, ammonia have shown some degree of variance over the period of record. As no leachate indicator parameter has shown a defined trend or consistent elevated concentration over time, it is interpreted that this location is not being influenced by leachate or it is at a very minimal scale.

The one parameter of note at this location is arsenic, which although consistent trace detections have been present for most of the period of record, has not shown any upward trends. This coupled with the lack of other consistent leachate indicator parameter elevations would suggest it is derived from an alternative natural source. It is also noted that similar consistent trace detections are also observed in the leachate, but a more significant source would be required to create a concentration gradient if the leachate were to represent the source for the arsenic concentrations at OW2, and it would be represented in other parameters as well. It is possible that the arsenic could be sourced to natural soil mineralogy or to historical localized pesticide applications on the adjacent field. Elevated arsenic concentrations can be sourced to lead arsenate, which was widely used in Canada until as late as the 1960’s. Given the lack of an upward trend, this parameter is not seen as a concern; however, will be monitored during future events.

2.2.5 Leachate Treatment System Water Quality

The effectiveness of the Leachate Treatment System (LTS) has been evaluated since its construction with the collection of samples at the influent pond as well as the outflow to the pressure trench with samples collected since 2004. This type of treatment system is geared primarily to the reduction of the organic and particulate components of the impacted water, which includes BOD, nitrogen species and TSS. The effectiveness of this system has shown some variation over the past number of years which is attributable to an increase in system flows. As a result, cleaning and replacement of the foam media has been undertaken by the Township, which has proven effective. The most recent cleaning was completed in September 2020, following a measured decline in system effectiveness. The subsequent October 2020 results did not indicate optimal treatment conditions; however, all results collected in 2021 and 2022 indicated the nitrification-denitrification processes have been re-established and the system is again functioning as designed. During 2021 there were large scale decreases in the BOD, TSS and ammonia concentrations from those observed in the leachate pond. An associated increase in nitrate concentrations from the LTS was been observed in 2022 reflecting complete nitrification (Table 3, Appendix B). Further denitrification is expected upon discharge to ground via the pressure trench system.

Additional modifications, particularly increased recirculation could improve the treatment efficiency during dry periods of the year. During wetter periods, the recirculation is limited such that the system prevents the buildup of leachate and collected runoff from the waste areas. Overall, the hydraulic load through the system should not be further increased to avoid compaction and fouling of the foam; however, as evidenced from the maintenance conducted in 2015 and 2020, which included washing of the foam media, these issues are easily addressed and the monitoring frequency allows for tracking of the system and thus timely maintenance can be completed as required.

Overall, the leachate concentrations appear to be generally consistent with previous years as is illustrated by the graphs provided in Appendix F for the LTS and Leachate Pond. The data suggest that the treatment is being limited to organic decomposition and nitrification, with a minimal amount of denitrification occurring with the LTS. Overall, the treatment system is effective for its intended purpose. In addition, the effluent is fully directed to the shallow ground water regime whereas originally the leachate would have remained at surface and could potentially have been carried with surface runoff.

Table 3: Water chemistry averages for the LTS inflow (Pond) and LTS outflow (LTS).

	Pond			LTS		
	Max	**Ave**	**Min**	**Max**	**Ave**	**Min**
Chloride	693	**411**	150	747	**448**	242
Iron	5	**1**	0.004	2.1	**0.3**	0.00
Nitrate	4.7	**0.59**	0.05	181	**34**	0.13
Total Kjeldhal Nitrogen	196	**53**	0.57	197	**20**	2.6
Ammonia	148	**30**	0.40	78	**8**	0.04
Conductivity	4980	**2428**	301	4440	**2686**	1530
Biological Oxygen Demand	555	**80**	<5	79	**10**	<5
Total Suspended Solids	866	**96**	<5	47	**12**	<5

* - Data period 2004-2022

2.2.6 Private Wells

Samples were collected from two residences (Wagler& Yantzi) during 2022 in April and October. It is noted that the Schlotzhauer family has owned the Wagler property for many years; however, the reference in this report has been retained as "Wagler" because the previous CoA and Site design documentation made specific reference to that property owner. The well water chemistry at each well has remained consistent over time with a few minor exceptions and does not show any impacts due to landfill leachate. Overall, impacts are not expected in these wells since the Wagler well is in a different watershed. In general, the water quality is moderately hard and has low levels of parameters that are typically indicative of contamination (e.g. chloride, ammonia, DOC, conductivity, etc). Each of the wells has on occasion had elevated levels of iron, although this is likely due to the inclusion of particulate matter in some of the samples.

The Township appreciated and thanks these members of the community for their voluntary participation in the monitoring program and on the Landfill Committee.

2.3 Surface Water

2.3.1 Surface Water Flow

Shallow ground water from the landfill area discharges into the Wilhelm Drain. This stream flows southward about 2.5 km past the landfill area into the Thames River. SW-1 is located upstream of the landfill area on the Wilhelm Drain. This sample point provides background conditions of the stream in order to represent the natural stream water quality. SW-2 is located downstream of the inlet where storm water from the landfill retention pond discharges into the stream. The storm water discharging from the retention pond is monitored as SW-3 (Figure 5).

2.3.2 Surface Water Quality

Surface water quality data collected in 2022 was compared to background quality data obtained at SW-1, and the Provincial Water Quality Objectives (PWQO, 1994). In general, surface water quality is good and meets the PWQO with the exception of total phosphorus, iron, aluminum, copper, phenols, zinc and boron, with only phosphorus exceeding in the downstream Wilhelm Drain location (SW-2). Upstream (SW-1) indicated more elevated concentrations of phosphorus indicating the source is not landfill related, while additional exceedances for iron, zinc and phenols indicate the surface water quality is impaired by upstream sources. The remaining exceedances (copper and boron) were limited to the storm water management pond SW-3. The boron exceedance at SW-3 is most likely sourced to runoff derived from the non-active landfill area, and is noted to show some minor leachate influence.

Caution should be exercised when evaluating boron compliance with PWQO. Given the interim nature of the PWQO criteria for boron, MECP Standards Branch has indicated that given the limited toxicology dataset that was utilized during development of the criteria that the Canadian Water Quality Guidelines (CWQG) for the Protection of Aquatic Life (CCME, 2003) value would be more appropriate to use as it utilized a more robust toxicological dataset and was developed by the MECP. As such, the CWQG value for boron for long term exposure is 1.5 mg/L, which is met for both 2022 monitoring events at SW-3 (0.631 & 0.545 mg/L), as well as all historical results for SW-3 such that boron concentrations observed are not considered an impairment to the water quality at SW-3 or via discharge into the Wilhelm drain. Finally, it is noted that despite these elevations, there was no meaningful influence of boron or any other elevated or exceeded parameters 2022 on the Wilhelm Drain. This was evidenced as the concentration at SW-2, which is immediately downstream of where the SWMP outlets into the drain indicated very similar concentrations to the upstream location SW-1, while outflow from the SWMP was only noted during the Spring monitoring event.

Overall, leachate is not impacting the surface water in the Wilhelm Drain and has not shown to be for the period of record. The graphs provided in Appendix F show time-trend analysis of selected dissolved parameters at surface water locations since 1996. The concentration of calcium, ammonia, nitrate and chloride are typically higher in the surface water than in the ground water. These concentrations are likely due to road de-icing, fertilizer application on the surrounding agricultural lands, and are not due to the landfill. As noted above, dilute leachate influence is observed at SW-3; however, concentrations for more defined leachate indicator parameters such as ammonia have declined over the past several years indicating that Site grading and leachate management practices within the active waste area by the Township have had a measureable influence in the Site surface water. The other item of note is there has been a slightly elevated chloride concentration since 2017, which as noted for a number of ground water monitors is likely sourced to road salt or dust suppressant use at the Site as SW-3 is the receiver for the bulk of surface runoff at the Site. This source is further supported by the fact the leachate (*i.e.* ammonia) influence has declined over the same timeframe.

The following table summarizes the average major ion chemistry values over the past five years for the surface water monitoring network relative to the leachate signature at the leachate pond. As can be seen, concentrations between both up and downstream monitoring locations are very similar although iron and total organic carbon do indicate a slightly elevated concentration in the downstream location. However, it is noted that these parameters are influenced by sediment entrainment within the acidified bottles in which these parameters are collected. Sediment loads within the Wilhelm drain are noted to be elevated during some monitoring events with total suspended solids concentrations ranging between 6 and 80 mg/L in both the up and downstream locations for this 5 year average period such that bias in the results owing to sediment entrainment is likely present.

Table 4: Average Surface Water Concentrations of Leachate Indicator Parameters

Parameter	SW1 (Upstream)	Pond (Leachate)	SW3 (Storm Pond)	SW2 (Downstream)
Calcium	95	54	96	92
Magnesium	20	71	23	20
Sodium	25	297	59	27
Boron	0.02	3	0.4	0.02
Iron	0.4	1	0.5	0.5
Chloride	52	376	114	55
Alkalinity	249	672	254	247
Sulfate	17	30	67	17
Total Organic Carbon	7	104	22	8
Ammonia	0.5	15	1	0.6
Nitrate	10	0.6	1	9
Hardness	320	429	340	314

2.3.3 Organic Sampling Results

Historically, volatile organic compounds (VOC) sampling was required for ground (OW2, 3, 4A, 4B) and surface water monitoring locations (SW-1, 2, 3, leachate pond). Based on limited, low level and sporadic detections historically at the Site, the MECP agreed that VOC's could be removed from the program, with the exception of OW4b until it can be confirmed that the detections observed in October 2016 are not representative of ground water quality at the Site.

No VOC's were detected in any of the 2019, 2020 or 2021 results, while trace detections for toluene and xylenes were observed in 2018 and 2022. It is possible these previous detections may represent a discrete source related to a spill or leak from ATV use in the surrounding forest. Over the years, a number of trails and tracks have been observed suggesting this area is utilized by local residents. Despite the occasional trace detection, it is recommended that no further VOC sampling is required at the Site.

2.3.4 Perfluorinated Chemicals (PFC) Sampling Results

MECP review comments relating to the 2020 annual monitoring report proposed utilizing emerging contaminant parameters being perfluorinated chemicals (PFC) for the purposes of refining the understanding of potential leachate influence along the western property boundary at OW5 and OW6. As noted above, it is Azimuth's contention that the elevated concentrations at OW5 are the result of road salt, dust suppressant and agricultural influences, while similar influences are also expecting to be influencing OW6. OW6 is located immediately adjacent to the former LTS discharge trench such that leachate influence is likely present; however, it is surmised that the leachate influence is muted related to the other sources noted above.

Given the more significant costs associated with laboratory analysis of these parameters, it was recommended by MECP staff to establish a targeted single event monitoring program, which included the locations of concern, as well as background (OW8) and leachate reference (LTS Pond) locations, while a trip blank was also included.

Due to potential contamination issues during sampling, field staff minimized avoided wearing waterproof clothing, using waterproof paper and other materials such as bugspray, sunscreen, markers, prior to sample collection which are known to have materials containing PFCs. The samples were collected during the October monitoring event along with analysis for the routine parameter set.

The results, which are provided in Appendix B; indicate the highest detected concentrations of PFCs occurred at LTS Pond, which is expected given it represents the leachate reference for the Site. A trace detection for Perfluoroctane sulfonate (FOSA) was observed in the trip blank (0.0081 μg/L); however, it was not detected in any other location. No other detections in the trip blank were documented. This detection is likely sourced to the sensitivity of analysis and omnipresent nature of these chemicals; however, the lack of other detections and the fact that the parameter was not observed in the leachate sample would suggest that the quality of lab data is sufficient for this assessment.

For the LTS pond sample, a number of parameters had detections with a total PFC concentration of 1.192 μg/L. This value is considered within the lower range of that published from other municipal landfill site sampling programs based on a perusal of available research literature (ex., Gallen *et al.*, 2017; Li *et al.*, 2012). Detections were also noted in OW6, with a total PFC concentration of 0.222 μg/L, while OW5 and OW8 did not have a single detection. The results would indicate that there is an order of magnitude reduction in concentrations from leachate to the ground water adjacent to the former LTS discharge trench. Although discharge into this trench was stopped and redirected into the new trench area in 2020 (Figure 5), the presence of remnant concentrations are not surprising given the low permeable nature of the soils and the fact this was the primary leachate discharge point for 17 years. With a lack of detection for any PFC parameter at OW5, it would indicate that leachate influence is not being observed at this location and that the elevated chloride, calcium, hardness and alkalinity are most likely attributable to alternative sources as noted previously in the report. This would also support the similar alternative sources for the elevations at OW6 given its close proximity and similar low lying area which can receive surface runoff from the Site roadways. However, it is likely that a component of the source is leachate related and can be tracked with continued water quality sampling from this location following the removal of treated leachate effluent discharge in this area.

Although no specific provincial guidelines are in place for PFCs, the MECP has indicated that a total concentration of 0.07 µg/L for drinking water for both PFOA and PFOS is what is referenced by the USEPA for use with drinking water compliance (USEPA, 2017). In fact, the 0.07 µg/L value is actually related to a drinking water health advisory issued by the USEPA. Above this level, the USEPA recommends drinking water systems take steps to assess contamination, inform consumers and limit exposure. The USEPA (2017) technical fact sheet goes on to state that based on their research the calculated PFOA drinking water concentration of 0.5 µg/L would correspond to a one-in-a-million increased risk of cancer, which typically correlates to the established drinking water limit. However, the USEPA states that a maximum drinking water limit has not yet been issued.

Alternative criteria have also been proposed in the Canadian Water Quality Guidelines for PFOA (0.6 µg/L) and PFOS (0.2 µg/L) which is comparable to the USEPA's value (i.e., 0.5 µg/L). In comparison of the data collected to these criteria, there are exceedances of the USEPA action level in the leachate and OW6 for the total PFCs (1.192 & 0.222 µg/L), while the total PFOA and PFOS concentrations for both locations (<0.155 ηg/L) were below the MECP criteria of 0.6 & 0.2 µg/L.

Overall, the results support the Site interpretation that leachate influence along the western property boundary is limited to the area of historic LTS discharge trench and that alternative sources are causing the elevated chloride, calcium, hardness and alkalinity concentrations at OW5 and at least a partial source at OW6. As such, no additional PFC sampling is recommended for the Site.

2.3.5 Graphical Analysis

An alternate evaluation technique (to identify unique waters) is to compare the major ion chemistry of different waters or waters that have been mixed with two or more sources. A comparison was done of the ratios of major ion constituents for the 2022 data. The assessment of ratios and plotting on Piper diagrams will show the consistency of the geochemical signatures and trends that demonstrate mixing or chemical reactions over time.

The results for the 2022 evaluation (Appendix D) indicate the geochemical "signatures" of both the ground and surface water monitors are relatively similar, while a distinct leachate signature is visible for the LTS and leachate pond samples. The signatures remain similar to what has been seen historically at the Site. OW5, OW6, and SW-3 have shown a sodium and chloride influence that pushes the signature towards the leachate signature. Despite this similarity to the leachate signature for sodium and chloride, this influence is interpreted to potentially represent alternative sources (i.e. road salt, dust suppressant, or fertilizers) as discussed previously in the report for OW5 & OW6, while SW-3 targets the SWMP which receives surface runoff from the Site roadways such that road salt influence is expected.

The remaining results plot similarly to previous years indicating a different water quality for the surface and ground water at the Site versus the leachate signature observed from the leachate pond and LTS. The newest monitoring well locations which include upgradient (OW8) and downgradient locations (OW7 & OW9) had signatures that plotted closely to the other monitoring wells not influenced by chloride, illustrating a background water quality signature.

2.3.6 Dilution Potential

A water budget was prepared using the Thornthwaite and Mather (1957) method based on long-term average climatic data from Environment Canada for the Stratford and Glen Allan weather stations, which provide climate data that is representative of conditions at the Site. All numbers were calculated using historic data for from 1970 to 2015. The average precipitation is 1,016 mm/year, and evapotranspiration is 521 mm/year. The water surplus is 495 mm/year, which represents the amount of water available annually to infiltrate into the ground water or run off as surface water. Approximately 30% of the available water surplus infiltrates into the waste, resulting in the generation of approximately 4,000 m^3 of leachate each year. In previous years we had assumed a 50% infiltration value, however, given the native clay material used for capping and the fact that as the Site expands there is an increased area of capped waste, it was determined that 30% was a more reflective value for the current state of the Site. It is noted that this volume does not include leachate runoff volume from the active area that is directed into the leachate ponds for treatment in the LTS.

Based on the observed ground water and surface water quality and the natural environment surrounding the landfill, there is no meaningful impact to surface waters in the area.

2.3.7 Reasonable Use Concept

Calculations with respect to MECP's Reasonable Use Concept (RUC) B–7 were performed using the 2022 monitoring program results at OW3 as the reference background location for the Site. Although other background locations have been established, this location appears to be influenced by alternative sources (i.e. agriculture, road salt, dust suppressant), which makes it an appropriate reference location for establishment of potential impairment of water quality resulting from leachate rather than alternative background sources.

The MECP's Reasonable Use Concept states that, in accordance with the appropriate criteria for particular uses, a change in quality of the ground water on an adjacent property will be accepted only as follows:

"The quality cannot be degraded by an amount in excess of 50% of the difference between background and the Ontario Drinking Water Standards for non-health related parameters and in excess of 25% of the difference between background and the ODWS for health related parameters. Background is considered to be the quality of the ground water prior to any man made contamination.", MECP Procedure B-7-1, (MECP, 1994a)

The maximum concentration of a particular contaminant that is considered acceptable in the ground water beneath an adjacent property is calculated in accordance with the following relationship:

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

where:

C_m = maximum concentration accepted
C_b = background concentration
C_r = Maximum concentration permitted in accordance with the Ontario Drinking Water Quality Standards
x = a constant that reduces the contamination to a level that is considered by the Ministry to have a negligible effect on water use. (i.e. 0.5 for non-health related parameters & 0.25 for health related parameters).

In 2022, the RUC values were calculated using the values of the background concentration (C_b) which are average concentrations at OW3 over the past five years. The maximum allowable concentration (C_m) of any particular parameter was calculated using the background concentration of that parameter from a monitor upgradient of the

Site, the designated ODWQS value for that parameter, and a constant that reflects whether the parameter is health or aesthetic-related as defined by the ODWQS. Where background concentrations were less than the laboratory method detection limit, the method detection limit was used as the background value. The calculated C_m values for the Site were set as the RUC values.

As this assessment is based on compliance at the downgradient property boundaries, OW4a, OW4b, OW2 and OW7 were used as these locations are the furthest east and southeast locations at the Site, while OW6 is also considered as it is immediately adjacent to both the former LTS discharge trench and the western, albeit upgradient property boundary. In previous years, OW5 was also included based on MECP comments; however, the discussion presented in Section 2.3.4 would indicate that this location is not leachate influenced such that its historic interpretation as a background location is valid and it does not represent a downgradient location.

Specific exceedances for RUC are illustrated in the summary chemistry tables (Appendix B), including chloride, hardness, manganese, nitrate and TDS. The TDS and chloride elevations have previously been discussed as likely being attributable to non-landfill sources (i.e. road salt, dust suppressant, fertilizers) given elevated concentrations are also observed in the background location OW3. Similarly, the exceedances are considered to represent variable natural concentrations as they are earth elements which have shown to exceed ODWQS historically at OW3. Similar to the rationale for OW5, the exceedances at OW6 have been shown to be at least partially sourced to alternative sources, albeit the previous PFC sampling would indicate a component is leachate derived. With the relocation of the LTS discharge trench further east in 2020, the data over the next several years will help to refine the leachate influence; however, over the last two years, concentrations have stabilized but not declined, which would further support the elevated concentrations as being at least partially alternatively sourced. With the low permeability of the soils, it is likely that it may take a number of years for concentrations to show a response to the trench relocation; however these results will be tracked in the upcoming monitoring years to assess any trending with respect to RUC parameters.

The manganese exceedance at OW7 is not considered to be sourced to the landfill given a lack of other elevated leachate indicator parameters at that location, as well similar exceedances were noted at OW8, which is upgradient of the waste, which would indicate a natural source and variance for manganese is present in the area.

2.3.8 Trigger Mechanism Monitoring

As discussed in the Trigger Mechanism Plan completed by Azimuth in 2005, chloride was established as the trigger parameter. Chloride has a high mobility and it represents a leachate parameter that would most likely be the first detected downgradient of the fill area if a migrating leachate plume were to exist. The trigger concentration was determined through the RUC in ground water to be 123 mg/L based on 0.5*(ODWS – background) or (250-4)*0.5. In 2022 and all previous years, no downgradient monitoring location (OW2, OW4a, OW4b, OW7 and SW-2) has had a concentration greater than the trigger limit of 123 mg/L and have all been relatively stable (Appendix F). It is noted that this criteria has been exceeded at the updgradient boundary due to alternative sources as well as localized radial flow from the LTS discharge trench; however, these exceedances are localized and not representative of a main leachate migration pathway.

In addition to the Trigger Mechanism Plan, there are also trigger limits established in the LTS sewage works Certificate of Approval (0032-5ZBJJH) for surface water quality at SW-3, which are outlined below.

Table 5: LTS ECA Surface Water Trigger Concentrations (SW-3)

Parameter	Trigger Concentration	2022 Maximum Concentration
$CBOD_5$	10.0 mg/L	<3 mg/L
Unionized Ammonia	0.1 mg/L	0.018 mg/L
Chloride	250 mg/L	182 mg/L

As noted in the table, all 2022 downgradient concentrations are within the trigger limits. The Township continues work to better segregate surface runoff at the Site, which has shown to have improved the overall water quality at SW-3 over the past several years.

2.4 Vector / Vermin

During all three Site visits in 2022, no vector / vermin issues were documented at the Site. The only wildlife that are routinely observed at the Site are Canada geese, and seagulls, of which have never been noted to be in excess levels and are routinely more present in the agricultural fields that surround the Site. It is also noted that there were no complaints received from neighbours relating to vector / vermin associated with the landfill. As such, historical programs for control of vector / vermin have never been employed and given the observations in 2022, no mitigation measures are proposed for 2023.

2.5 Landfill Hours of Operation

Landfill hours of operation remain the same as in 2022. Hours of operation are 9:00 am to 4:00 pm Tuesday through Thursday and 9:00 am to 1:00 pm on Saturdays. Hours are posted on signs at the entry road.

2.6 Tipping Fees

Tipping fees for 2022 have been revised slightly than what they have been historically. The following table summarizes the fees.

Table 6: Tipping Fees

Item	Cost
Landfill Tipping Fees* – Waste	$ 86.50/tonne ($10 minimum charge)
Tires (no rims)	No charge
Electronic Waste	No charge
Scrap Metal	No charge
Clean Wood	No charge
Recyclables	No charge
Yard Waste / Clean Wood	No charge
Impacted Soil	$173/tonne
Asbestos	$173/tonne

* - includes standard waste, appliances & wood waste,

2.7 Landfill Advisory Committee

The Committee had a meeting on November 29th, 2022. No specific operational issues or complaints pertaining to environmental monitoring were raised during this meeting beyond some comments relating to odours being noted on occasion. The municipality has been employing a smaller waste footprint to aid in reducing the odour issues at the Site. Beyond this, it was noted by many of the members that the Site operations have been improved with the implementation of the transfer area. Odour conditions will be monitored by staff to attempt to further reduce these issues. It is also noted that the Committee was presented with the conceptual landfill expansion plan and did not express any concern with the plan or process.

2.8 Landfill Operations

The main change to the Site over the past two years has been the implantation of the waste scales and waste transfer area near the entrance of the Site. This was implemented to allow for better management and segregation of incoming wastes at the Site through isolation of materials within bins which will be transported and deposited into the Site waste cells as permitted storage volumes require. Over time, the waste scales will help to better track waste quantities over time to assist with the long term planning of the Site and waste management operations for the Township.

3.0 CONCLUSIONS

The Perth East Township South Easthope Landfill Site is in compliance with its current Amended Provisional Certificates of Approval (No. A 150902 and No. 6224-B5KK74), with the exception of the RUC exceedance of chloride at the western property boundary; however, with the recent PFC sampling completed in 2021, it is apparent that the source of these exceedances are primarily alternatively sourced to agricultural fertilizers, road salt and / or dust suppressant. Leachate influence is likely present at OW6, but the relative concentrations between OW5 and OW6 and overall scale of concentrations would indicate they are still primarily alternatively sourced. With the relocation of the LTS discharge trench in 2020, the concentrations at OW6 will be monitored over the next few years to assess potential trends; however the initial lack of defined decline would support primarily alternative sources.

With the exception of the localized mounding and potential off-site ground water influence, the LTS has provided control for the leachate such that the Site has the ability to manage leachate generated from within the active waste cells and any potential seepage along the toe of the waste mound. Leachate impacts are not discerned or are quite minimal in the downgradient ground water, while surface water impacts have been limited to the SWMP historically, although have noted to have improved over the past couple of years owing to drainage and waste cell confinement grading completed by the Township. Concentrations from the SWMP can be elevated during the fall owing to limited water levels in the pond as much of the water is evaporated. However, during these periods, no water is able to discharge from the pond, which would mitigate any impacts to the Wilhelm Drain.

It is concluded that the landfill is having only a minimal impact on the surrounding environment. The landfill has been operating for more than 30 years, and the ground water/surface water have shown only minor impacts close to the waste mound / LTS discharge trench.

4.0 RECOMMENDATIONS

4.1 Leachate Monitoring:

Influent leachate monitoring will be sampled at the leachate storage pond as has been done in previous years for similar parameters as historic sampling parameters (Appendix B).

Effluent leachate samples will also be collected from the outlet pipe discharging to the pressure trench and will also be conducted in April, July and October. Parameters will include the same parameter list as that completed in 2022 (Appendix B).

4.2 Ground Water Monitoring:

The 2023 ground water monitoring program will maintain the current monitoring locations (nine monitoring wells and three private wells) (Figures 4, 5 & 6). All wells will be sampled in the spring and fall only, with the exception of OW9, which will also be sampled in July as part of the LTS ECA. The parameters to be analyzed at these monitoring wells are the same as 2021. Since 2018, VOC's have been removed from the monitoring program, with the exception of MW4b as per direction from the MECP. This location has continued to be sampled but has shown no detections over the past two years. As such it is recommended that this location be removed from the monitoring program for VOC analysis.

4.3 Surface Water Monitoring:

The 2023 surface water monitoring program will maintain the three historic monitoring locations as well as the LTS pond. The parameters will be similar to those analyzed for in 2022. Similar to the ground water monitoring, VOC sampling of the surface water has been eliminated due to the lack of detections historically.

In addition to the above mentioned analytical parameters field measurements of pH, conductivity, redox potential and temperature will be conducted at all surface water, ground water and leachate monitoring locations, while dissolved oxygen will be collected at all surface water locations.

Table 7: Proposed Monitoring Program

Monitoring Station	Frequency	Parameters
Ground Water OW2, OW3, OW4A, OW4B, OW5, OW6, OW7, OW8 & OW9	2 times per year (April, October)	major and minor inorganics, BOD and phenols
OW9	July	comprehensive
Surface Water & Leachate		
SW-1, SW-2, SW-3, LTS pond, & LTS outflow	2 times per year (April, October)	major and minor inorganics, BOD, phenols and TSS
LTS pond & LTS outflow	July	comprehensive

The Monitoring Report is to be prepared every year. Topics that should be addressed in the monitoring report include:

- changes in the waste footprint,
- remaining capacity,
- summary of Site operations during the monitoring period,
- summary of cell inspections,
- surface water quality,
- ground water quality
- leachate quality,
- private well water quality,
- performance of the LTS, including period of operation, volumes and water quality monitoring
- waste quantity,
- an assessment of the landfill and LTS on the natural environment, including storm water,
- an evaluation of performance based on the trigger mechanism, and
- potential changes to the monitoring program (which must be implemented through an amendment to either of the Environmental Compliance Approval)

5.0 REFERENCES

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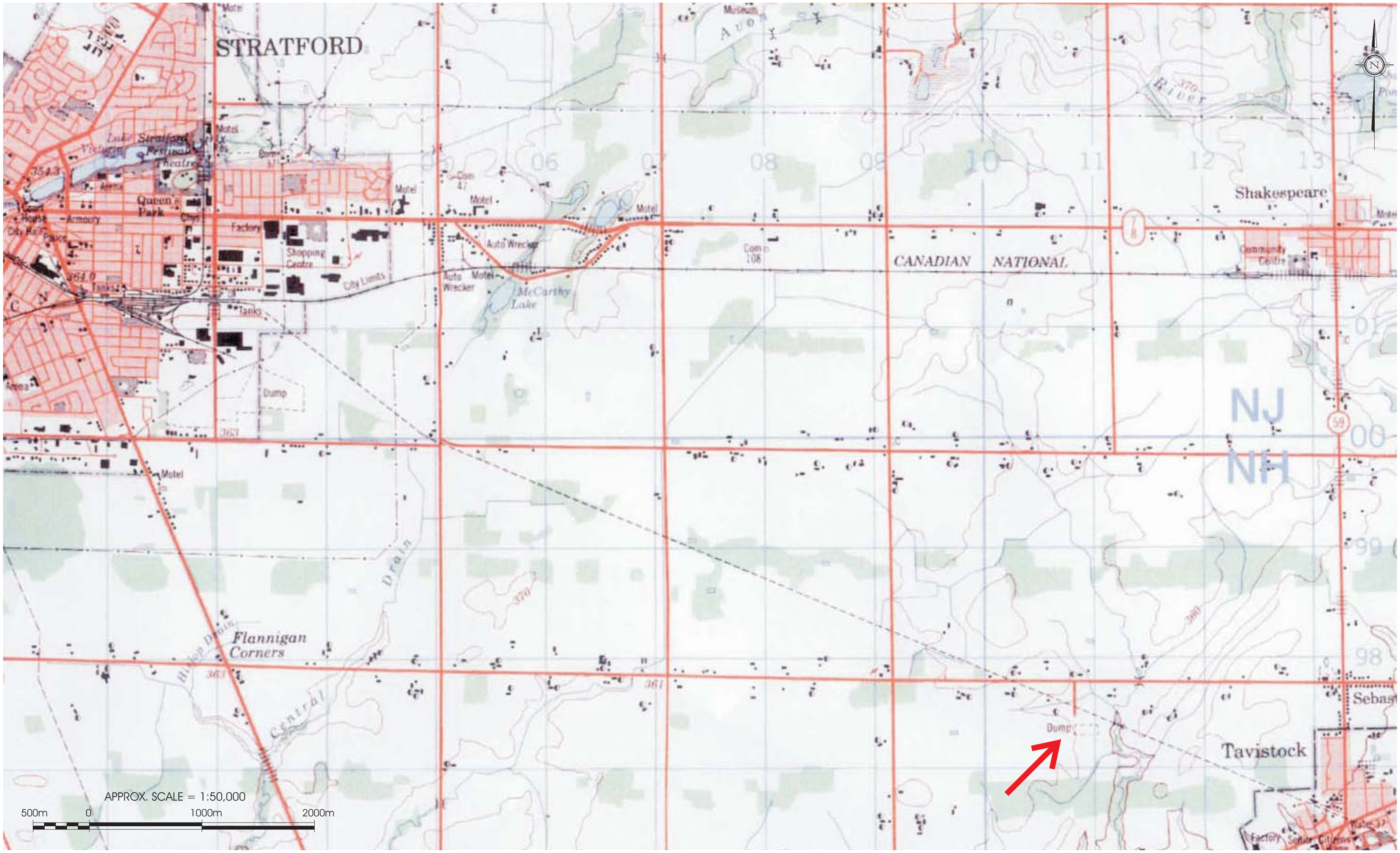
APPENDICES

Appendix A: Figures
Appendix B: Results of Chemical Analysis
Appendix C: Well Details & Logs
Appendix D: Piper Diagrams
Appendix E: Certificate of Approval & MECP Correspondences
Appendix F: Temporal Chemistry Graphs
Appendix G: Surface Water Photographs
Appendix H: MECP Landfill Reporting Submission Forms
Appendix I: Monthly Waste Tonnage

APPENDIX A

Figures



Legend:

Landfill Location

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Site Location

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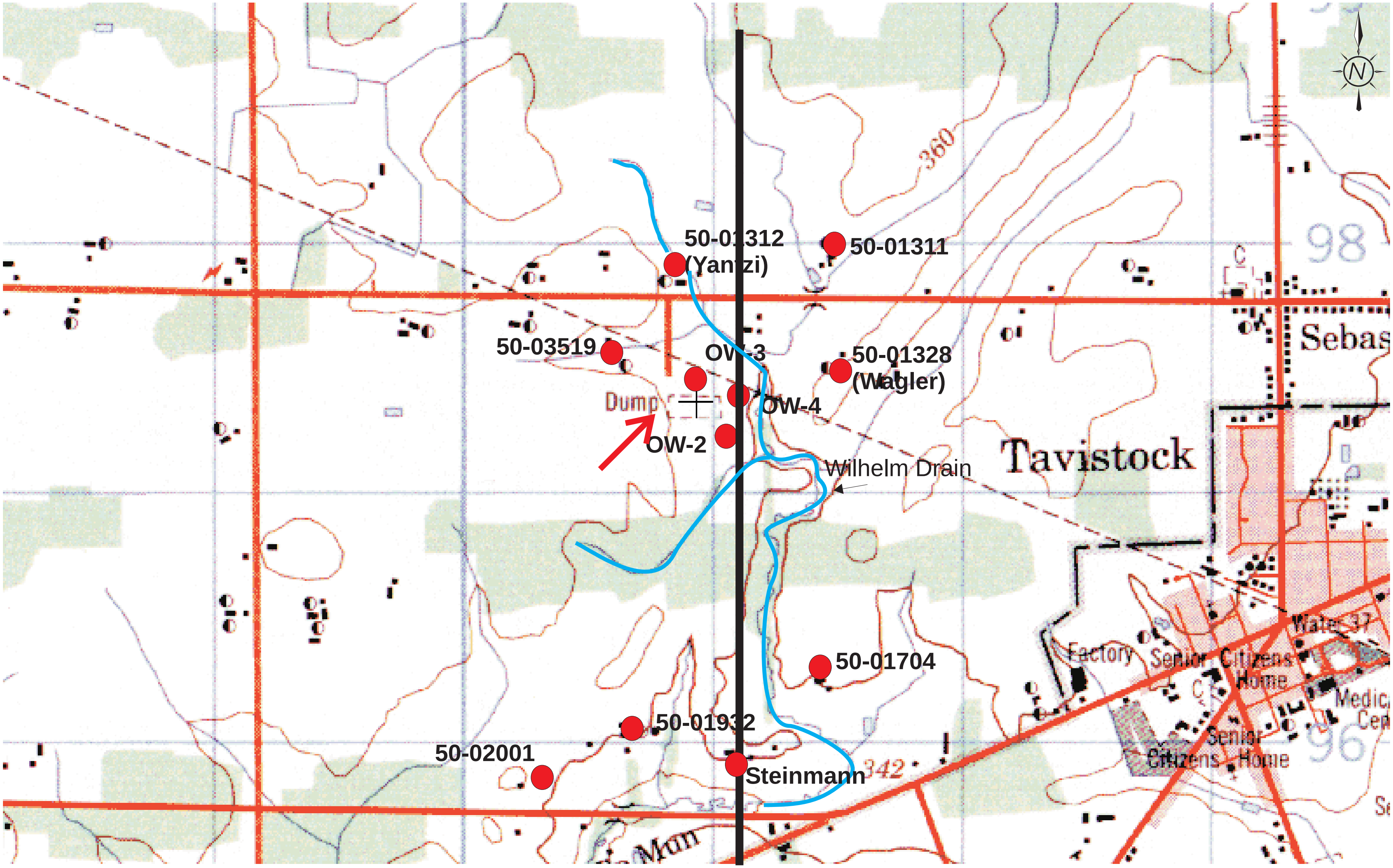
Created By:	CMR.		
Project No.	22-003		
File Name:	Figure-1.cdr		



Regional Cross Section Location Map

FIGURE 2

AEC 22-003

0m 500m 1000m

250m 750m

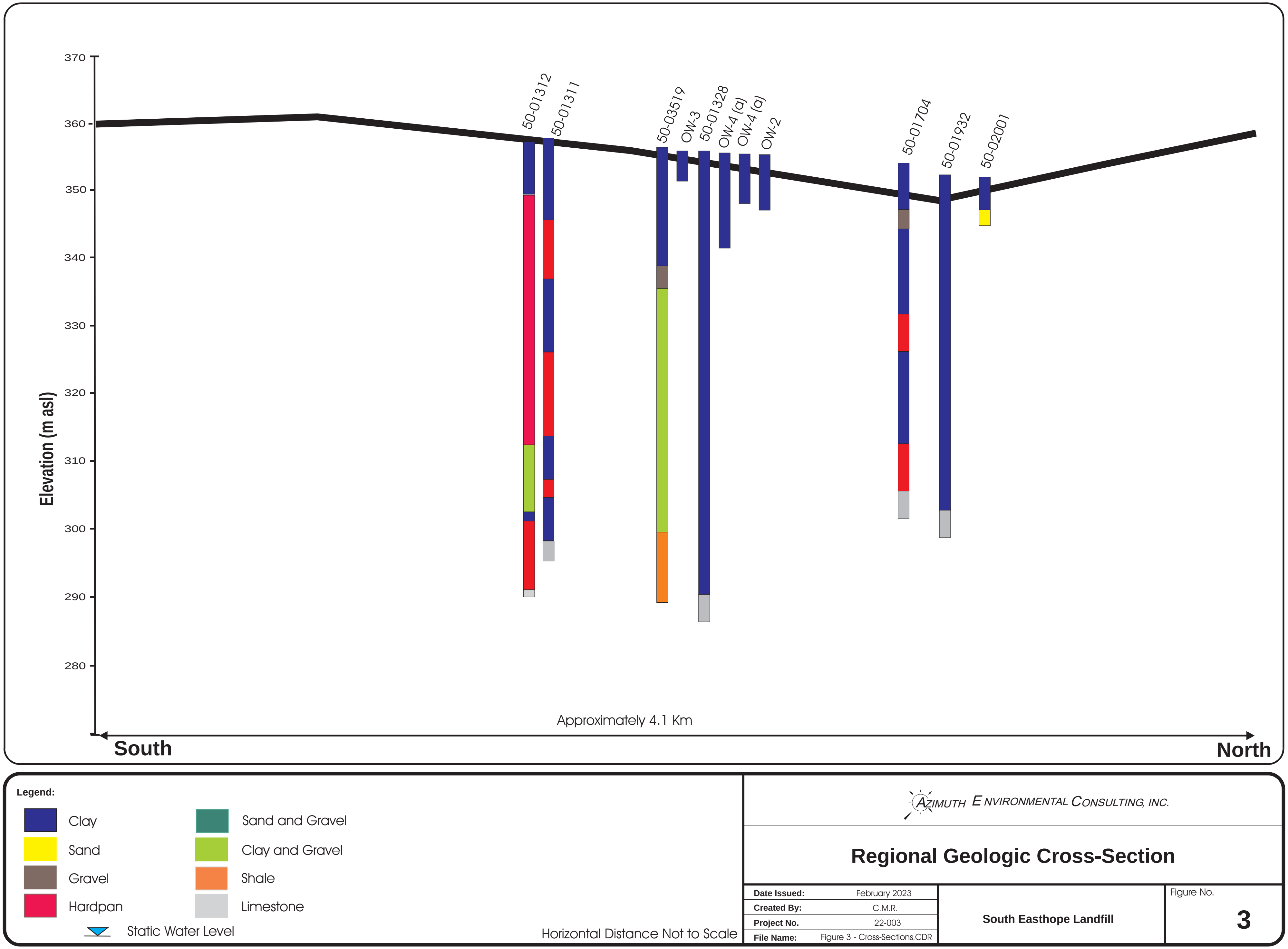
Scale = 1: 25,000

Summary Notes:

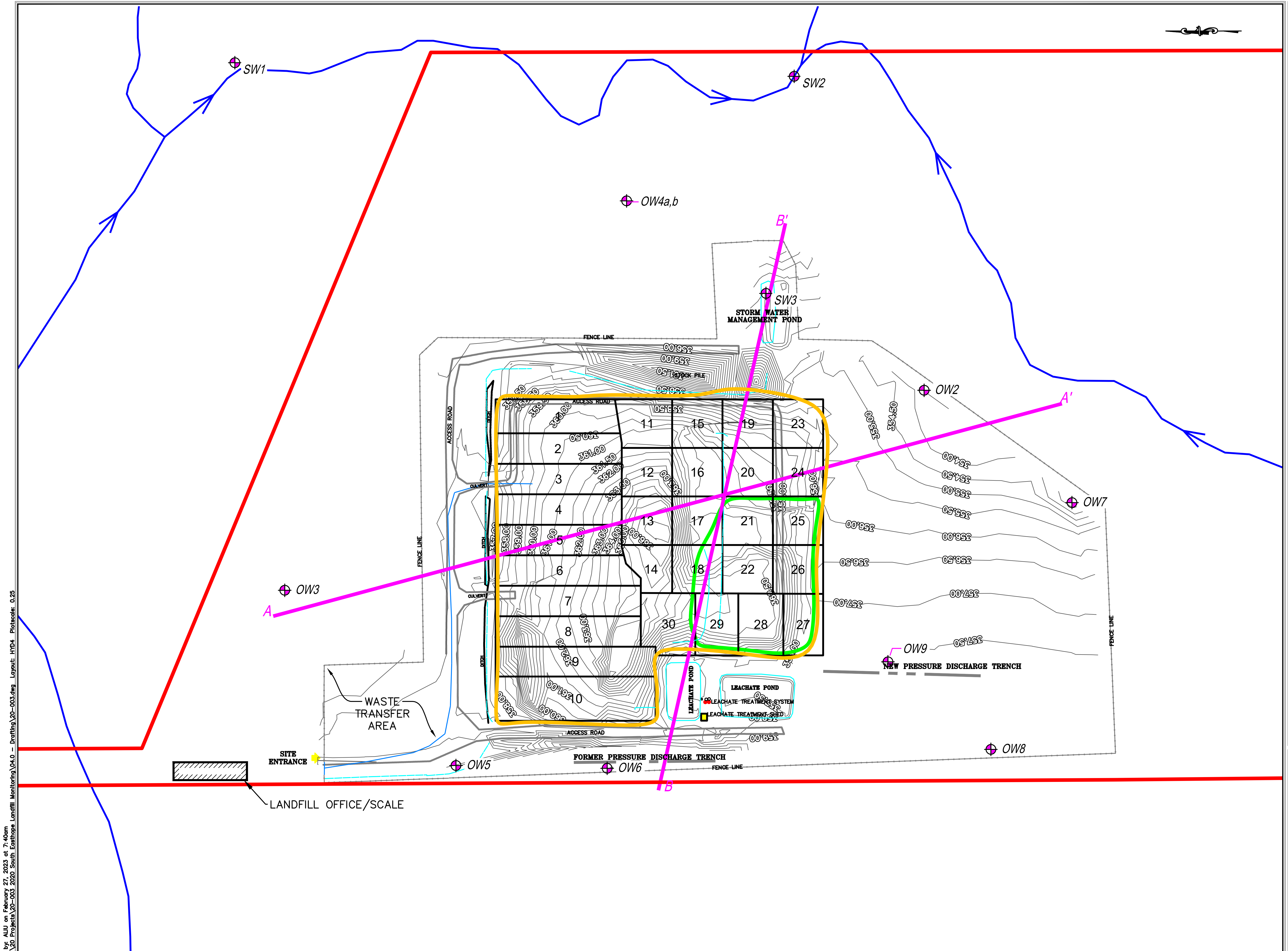
Cross-Section Line

Well Locations

Landfill Location



370
360
350
340
330
320
310
300
290
280
Elevation (m asl)
50-01312
50-01311
50-03519
OW-3
50-01328
OW-4 (a)
OW-4 (a)
OW-2
50-01704
50-01932
50-02001
Approximately 4.1 Km
South
North
Legend:
Clay
Sand
Gravel
Hardpan
Sand and Gravel
Clay and Gravel
Shale
Limestone
Static Water Level
Horizontal Distance Not to Scale
AZIMUTH ENVIRONMENTAL CONSULTING, INC.
Regional Geologic Cross-Section
Date Issued: February 2023
Created By: C.M.R.
Project No. 22-003
File Name: Figure 3 - Cross-Sections.CDR
South Easthope Landfill
Figure No.
3



LEGEND:

Surface water locations shown on Figure 5.

Topographic base from 2003 + Waste Surface Updated in 2016 Elevations are based on Blue Plan Engineering Survey.

- *Waste footprint (2021)*
- *Active Waste Area*
- *Cross Section Locations*
- *Fence Line*
- *Monitoring Wells*

30m 0 60m

HORIZONTAL SCALE 1:2,000

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

2022 Site Survey

South Easthope Landfill
Perth East

DATE ISSUED:	February 2023	Figure No.
CREATED BY:	JLM	4
PROJECT NO.:	22-003	
REFERENCE:		

DAYSTAMP: Q:\20 Projects\20-003 2020 South Easthope Landfill Monitoring\04.0 - Drafting\20-003.dwg

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LEGEND:

Surface water locations shown on Figure 5.

Topographic base from 2003 + Waste Surface Updated in 2016 Elevations are based on Blue Plan Engineering Survey.

Property Boundary

Waste footprint (2022)

Active Waste Area

Fence Line

Monitoring Wells

50m 0 100m

HORIZONTAL SCALE 1: 3,000

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Landfill Property

South Easthope Landfill
Perth East

DATE ISSUED:	February 2023	Figure No.
CREATED BY:	JLM	5
PROJECT NO.:	22-003	
REFERENCE:		

DAYSTAMP: Q:\20 Projects\20-003 2020 South Easthope Landfill Monitoring\04.0 - Drafting\20-003.dwg

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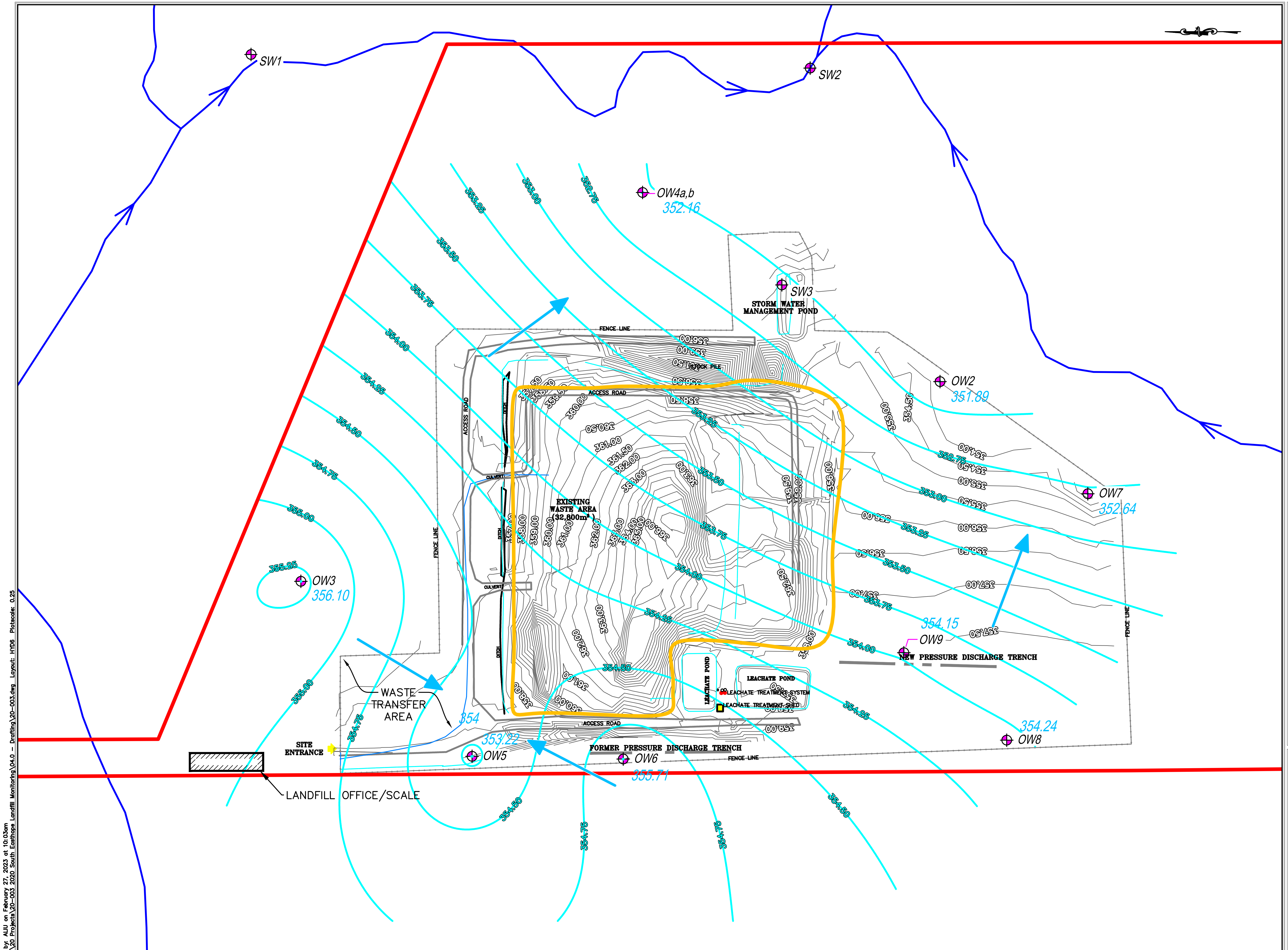

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LEGEND:

Ground Water elevations are based on April, 2021 data.

Waste footprint (2022)
Ground Water Contours
Inferred Ground Water Flow Direction
Monitoring Wells

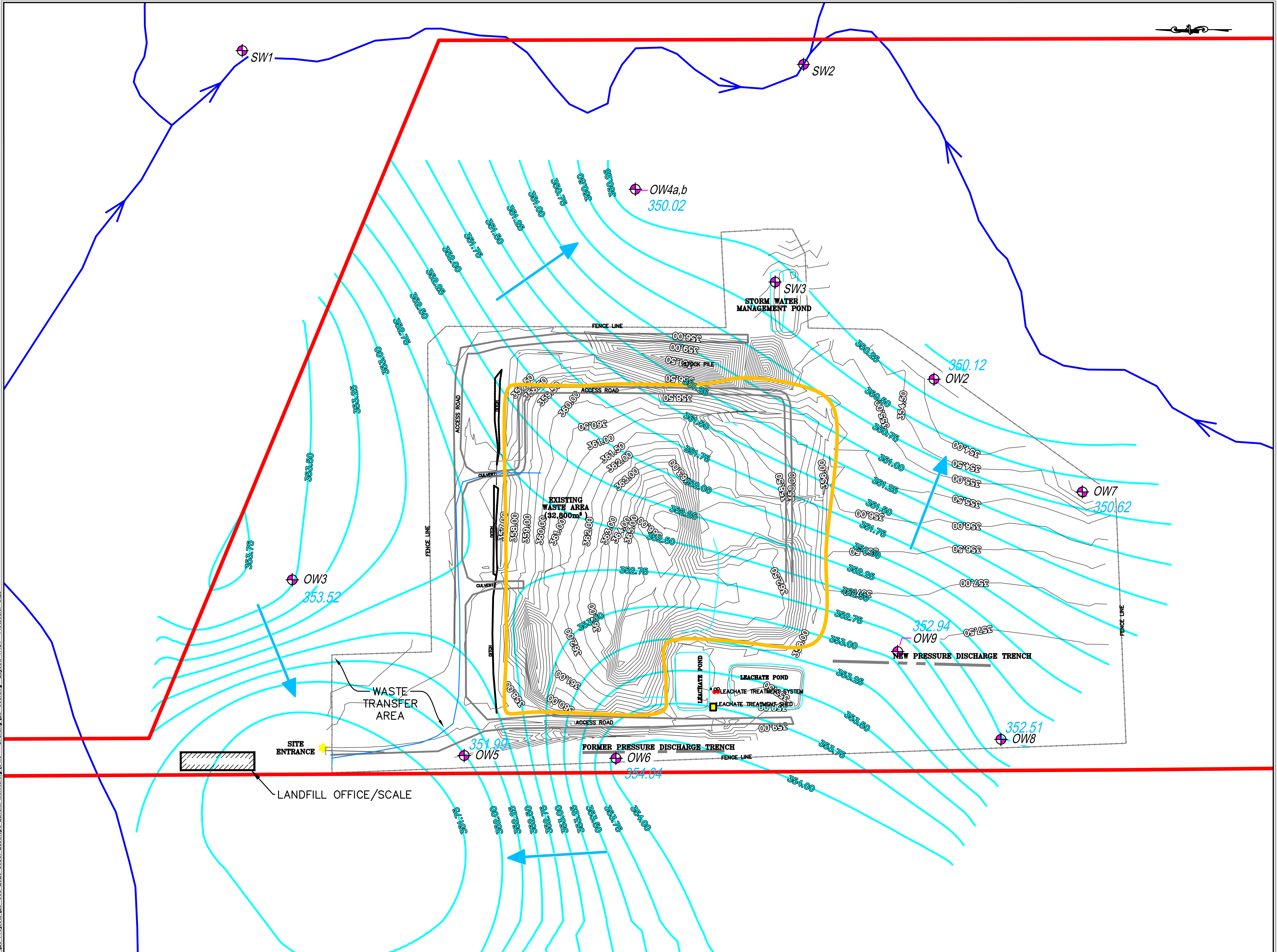
30m 0 60m
HORIZONTAL SCALE 1:2,000

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Ground Water Flow
April 2022

South Easthope Landfill
Perth East

DATE ISSUED:	February 2023	Figure No.
CREATED BY:	JLM	6
PROJECT NO.:	22-003	
REFERENCE:		



LEGEND:

Ground Water elevations are based on October, 2020 data.

- *Waste footprint (2022)*
- *Ground Water Contours*
- *Inferred Ground Water Flow Direction*
- *Monitoring Wells*
- *Proposed Monitoring Wells*

30m 0 60m

HORIZONTAL SCALE 1:2,000

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Ground Water Flow
October 2022

South Easthope Landfill
Perth East

DATE ISSUED:	February 2023	Figure No.
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PROJECT NO.:	21-003	
REFERENCE:		

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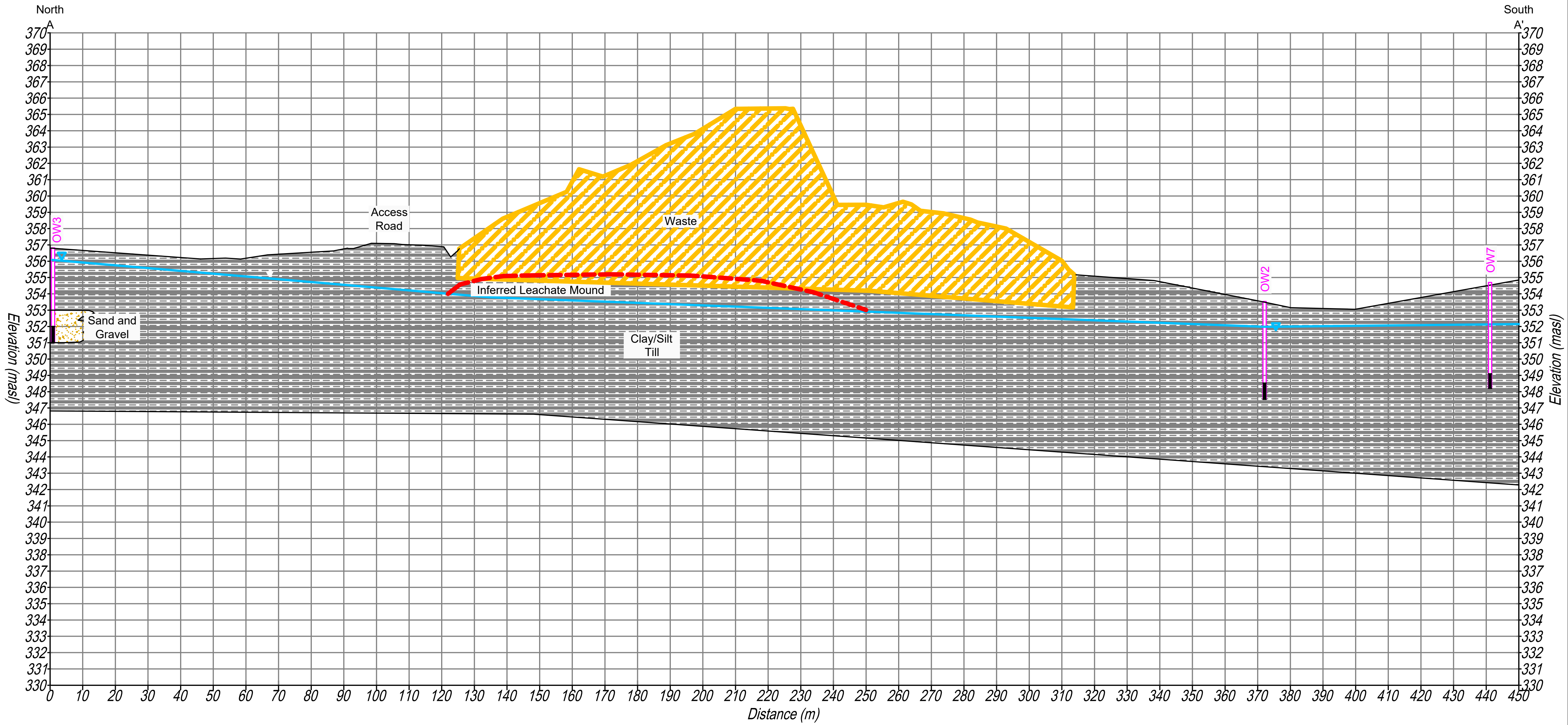
Section A-A'



LEGEND:

Ground Water Elevations (April, 2022)

5x Vertical Exaggeration
Not to Scale

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Cross Section A-A'

South Easthope Landfill
Perth East

DATE ISSUED:	February 2023	Figure No.
CREATED BY:	JLM	8
PROJECT NO.:	22-003	
REFERENCE:		

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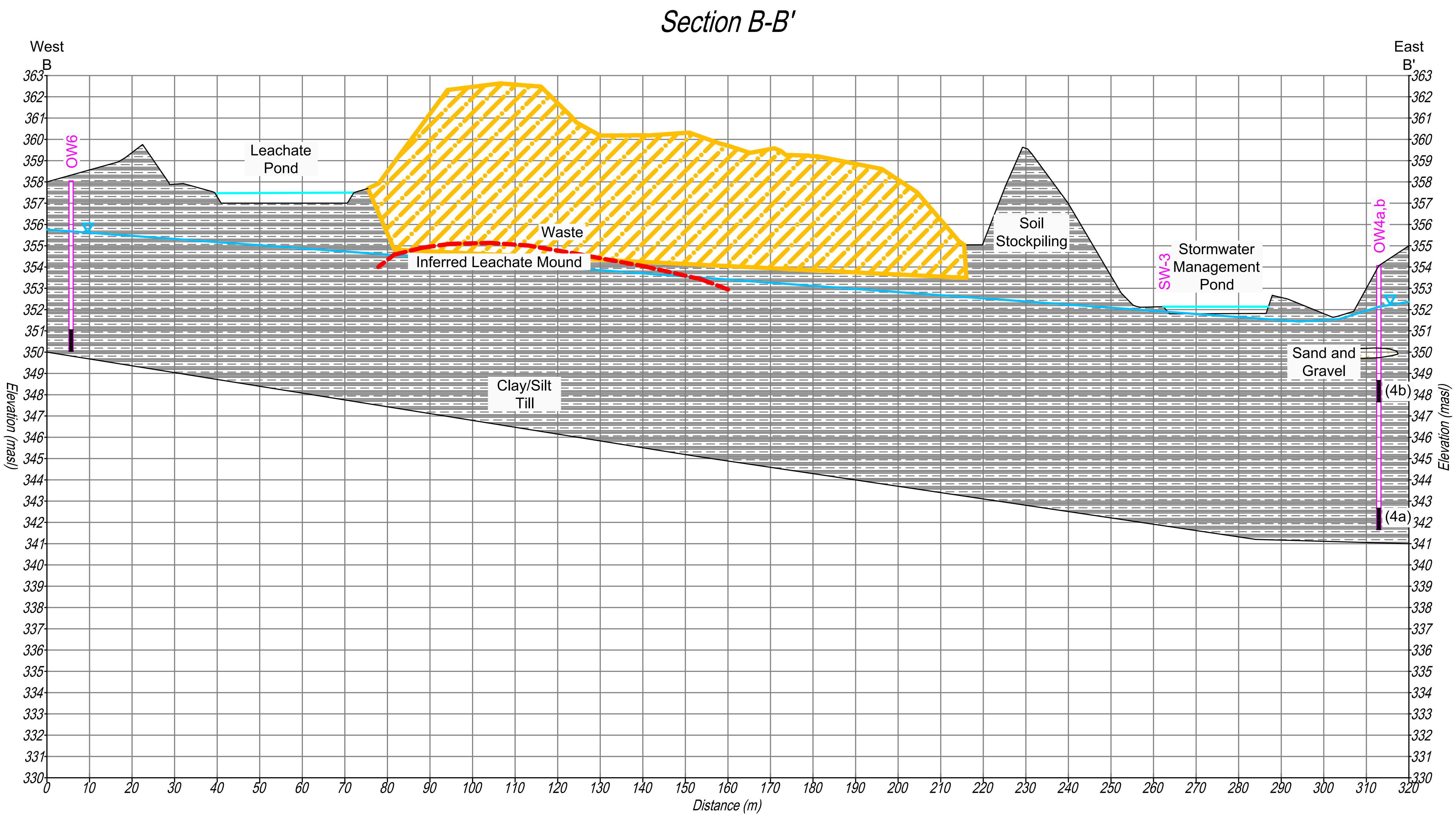

LEGEND:

Ground Water Elevations (April, 2022)

5x Vertical Exaggeration
Not to Scale

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Cross Section B-B'

South Easthope Landfill
Perth East

DATE ISSUED:	February 2023	Figure No.
CREATED BY:	JLM	9
PROJECT NO.:	22-003	
REFERENCE:		

DAYSTAMP: Q:\20 Projects\20-003 2020 South Easthope Landfill Monitoring\04.0 - Drafting\20-003.dwg

APPENDIX B

Results of Chemical Analysis

Results of Chemical Analyses

South Easthope Landfill			Ontario Drinking Water Standards		Reasonable Use Criteria (RUC)	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87
						Sampled on: 23-Apr-96	Sampled on: 14-Nov-96	Sampled on: 17-Apr-97	Sampled on: 26-Nov-97	Sampled on: 28-Apr-98	Sampled on: 26-Nov-98	Sampled on: 20-Apr-99	Sampled on: 23-Nov-99	Sampled on: 20-Apr-00	Sampled on: 20-Nov-00	Sampled on: 30-Apr-01	Sampled on: 25-Apr-02	Sampled on: 26-Nov-02	Sampled on: 22-May-03	Sampled on: 05-Dec-03	Sampled on: 05-Jun-04	Sampled on: 05-Oct-04
						Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC
Parameter	**Symbol**	**Units**	**Objective**	**Type**		Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT
Saturation pH			-		-												7.51	7.57	7.63	7.28	7.98	7.43
pH			6.5-8.5	OG	-	**8.8**	7.72	**9.1**	7.62	7.93	8.36	8.3	7.76	8.02	7.6	8.5	8.2	8.33	8.16	8.14	**9.68**	8.14
Langelier Saturation Index			-		-												0.69			0.86	1.7	0.71
T - Alkalinity		mg/L	30-500	OG	369	128	220	117	200	136	207	205	189	224	217	171	212	225	176	200	83	170
Bicarbonate	HCO_3^-	mg/L	-		-												259	274	176	200	39	170
Carbonate	CO_3^{-2}	mg/L	-		-												<5	<5	<5	<5	<5	<5
Hydroxide		mg/L	-		-												<5	<5	<5	<5	<5	<5
Electrical Conductivity		µS/cm	-		-	289	560	254	383	417	423	443	470	520	500	350	464	382	348	404	208	364
Fluoride	F^-	mg/L	2.4	**MAC	0.7												0.4	0.5	0.34	0.38	0.28	0.38
Chloride	Cl^-	mg/L	250	AO	134	<1.0	<1.0	<1.0	<1.0	0.39	<1.0	3.3	22.6	5	6.6	4.3	3.6	1.6	2.13	2.14	3.83	2.52
Nitrate	NO_3-N	mg/L	10	†MAC	14.5	<0.05	0.16	0.27	0.01	<0.05	0.24	<0.05	0.57	0.43	0.72	0.29	1.2	**42.6**	<0.05	0.17	0.12	0.27
Nitrite	NO_2-N	mg/L	1	†MAC	0.31	<0.05											<0.3	<0.3	<0.05	<0.05	<0.05	<0.05
Bromide	Br^-	mg/L	-		-												<0.1	<0.1	<0.05	<0.05	<0.05	<0.05
Sulfate	SO_4^{-2}	mg/L	500	AO	267	19.2	1.5	10	<1.0	65	12.1	18.4	17.8	34.3	24.4	24.1	37	12.3	15	16.6	15.1	18.8
Calcium	Ca	mg/L	-		-	19.5	40.2	16.3	35	24	39.3	34	41.6	38.1	38	33.3	43.2	40.5	10.3	36.5	7.25	27.4
Magnesium	Mg	mg/L	-		-	17.8	24.1	16	24.5	23	22.9	24	24.6	24.1	23.8	22.4	24.9	25.7	15.7	21.1	13.5	19.2
Sodium	Na	mg/L	200	*AO	104	10.1	10.1	11.9	8.4	19	9.9	17.9	9.6	25.7	28.1	16.7	16.9	17	13	14.2	14.9	18.4
Potassium	K	mg/L	-		-	0.4	4.1	<0.1	<0.1	<0.1	1.5	2.8	1.3	2.2	2.4	2	0.7	1.5	2.4	1.8	2.78	2.09
Ammonia Nitrogen	NH_3-N	mg/L	-		-	<0.05	<0.05	0.14	<0.05	<0.05	<0.05	0.2	<0.05	<0.05	0.12	<0.05	0.11	<0.05	<0.05	0.09	<0.05	<0.05
Orthophosphate	PO_4^{-3}	mg/L	-		-												<0.15	<0.15	<0.15	<0.05	<0.05	<0.05
Total Phosphorus		mg/L	-		-															<0.05	<0.05	<0.05
Reactive Silica		mg/L	-		-												18	18.9	15.7	17.6	10.1	15.7
Dissolved Organic Carbon	DOC	mg/L	5	AO	4.1	0.8	1.8	0.6	0.5	0.5	0.9	1.1	1.7	0.2	2.5	3.2	<1	3	2	<1	1	<1
Colour		Colour Units	5	AO	-												5	5	5	5	<5	<5
Turbidity		NTU	5	AO	-												<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Aluminum	Al	mg/L	0.1	OG	0.07												0.01	<0.002	0.005	**0.229**	0.011	0.009
Arsenic	As	mg/L	0.025	IMAC	0.007												0.005	<0.005	0.005	***0.008***	0.004	0.006
Barium	Ba	mg/L	1	MAC	0.29												0.105	0.087	0.051	0.097	0.032	0.092
Boron	B	mg/L	5	IMAC	1.3												0.02	0.03	0.03	0.03	0.03	0.029
Cadmium	Cd	mg/L	0.005	MAC	0.001												0.001	***0.003***	<0.001	<0.002	<0.002	<0.002
Chromium	Cr	mg/L	0.05	MAC	0.014												<0.002	***0.017***	<0.002	<0.003	<0.003	<0.003
Copper	Cu	mg/L	1	AO	0.50												<0.002	0.013	0.002	0.002	0.003	<0.002
Iron	Fe	mg/L	0.3	AO	0.16	<0.02	**2.04**	<0.02	<0.02	<0.02	<0.02	**0.34**	<0.02	<0.02	***0.2***	**0.99**	0.031	0.029	0.034	***0.221***	0.025	0.138
Lead	Pb	mg/L	0.01	MAC	0.003												<0.01	<0.01	<0.01	<0.002	<0.002	<0.002
Manganese	Mn	mg/L	0.05	AO	0.03												0.012	0.005	0.002	***0.039***	0.007	0.016
Mercury		mg/L	0.001	MAC	0.0003												<0.0001	<0.0001	<0.0001	<0.00005	<0.00005	<0.00005
Molybdenum	Mo	mg/L	-		-												0.003	<0.003	<0.003	0.004	0.003	0.004
Nickel	Ni	mg/L	-		-												<0.002	<0.003	<0.003	<0.003	<0.003	<0.003
Selenium	Se	mg/L	0.01	MAC	0.004												<0.005	<0.005	<0.005	<0.004	<0.004	<0.004
Silver	Ag	mg/L	-		-												0.002	0.001	<0.001	<0.002	<0.002	<0.002
Strontium	Sr		-		-												0.591	0.57	0.378	0.584	0.268	0.604
Thallium	Tl	mg/L	-		-												<0.02	<0.06	<0.06	<0.06	<0.06	<0.06
Tin	Sn	mg/L	-		-												<0.007	<0.009	<0.009	<0.009	<0.010	<0.009
Titanium	Ti	mg/L	-		-												<0.001	0.008	**0.009**	**0.001**	<0.001	<0.001
Uranium	U	mg/L	0.02	MAC	0.006												<0.05	<0.05	<0.05	**0.001**	<0.001	0.001
Vanadium	V	mg/L	-		-												<0.001	0.002	<0.001	**0.001**	<0.001	<0.001
Zinc	Zn	µmhos/cm	5	AO	2.5												0.016	0.033	**0.013**	**0.545**	**0.009**	0.007
Total Dissolved Solids	TDS	mg/L	500	AO	429	162	232	142	209	234	230	240	240	280	280	240	255	234	**198**	226	114	206
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	223	**123**	**201**	**107**	**189**	**156**	**194**	**185**	**206**	**196**	**194**	**177**	**210**	**206**	**90.4**	**178**	73.8	**147**
% Difference			-		-								2.67	2.6	0.82	2.91	1.98	0.82	14.9	6.5	7.4	7.4
Biological Oxygen Demand	BOD	mg/L	-		-																	
Total Kjeldahl Nitrogen	TKN	mg/L	-		-	0.9	3.84	2.06	2.2	0.6	2.1	2.6	1.4	1.3	1.1	2.6	0.16	<0.05				
Chemical Oxygen Demand	COD	mg/L	-		-																	
Phenols		mg/L	-		-	<2	<2	<2	<2	<2	<1	<1	<1	<1	<1	20			<0.002	<0.002	0.051	NR
Field Conductivity		µS/cm	-		-																	
Field pH			-		-																	
Field Temperature		oC	-		-																	

Bold / Highlighting indicates ODWQS exceedance
Bold / Italics indicates RUC exceedance

* When the sodium concentration exceeds 20 mg/L, it should be considered in sodium-restricted diets.
**When the fluoride concentration exceeds 2.4 mg/L, it should be reported to the local medical officer of health.
† Where nitrate and nitrite are present, their total should not exceed 10 mg/L.
‡ Water is considered unsafe if Total Coliform are detected in consecutive samples.

MAC - Maximum Acceptable Concentration
IMAC - Interim Maximum Acceptable Concentration
AO - Aesthetic Objective
OG - Operational Guideline
ND - Not Detected

Results of Chemical Analyses

South Easthope Landfill			Ontario Drinking Water Standards		Reasonable Use Criteria (RUC)	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87
						Sampled on: 19-May-05 Sampled by: AEC Analyzed by: AGAT	Sampled on: 03-Oct-05 Sampled by: AEC Analyzed by: AGAT	Sampled on: 24-May-06 Sampled by: AEC Analyzed by: AGAT	Sampled on: 25-Oct-06 Sampled by: AEC Analyzed by: AGAT	Sampled on: 26-Apr-07 Sampled by: AEC Analyzed by: AGAT	Sampled on: 24-Oct-07 Sampled by: AEC Analyzed by: AGAT	Sampled on: 08-Apr-08 Sampled by: AEC Analyzed by: AGAT	Sampled on: 30-Oct-08 Sampled by: AEC Analyzed by: AGAT	Sampled on: 15-Apr-09 Sampled by: AEC Analyzed by: AGAT	Sampled on: 27-Oct-09 Sampled by: AEC Analyzed by: AGAT	Sampled on: 09-Apr-10 Sampled by: AEC Analyzed by: AGAT	Sampled on: 20-Oct-10 Sampled by: AEC Analyzed by: AGAT	Sampled on: 14-Apr-11 Sampled by: AEC Analyzed by: AGAT	Sampled on: 19-Oct-11 Sampled by: AEC Analyzed by: AGAT	Sampled on: 04-Apr-12 Sampled by: AEC Analyzed by: AGAT	Sampled on: 24-Oct-12 Sampled by: AEC Analyzed by: AGAT	Sampled on: 10-Apr-13 Sampled by: AEC Analyzed by: AGAT
Parameter	**Symbol**	**Units**	**Objective**	**Type**																		
Saturation pH			-		-	8.18	7.2	7.49	7.22	7.47	7.28	7.16	7.96	8.03	7.77	7.38	7.84	8.12	7.26	7.8	7.52	7.13
pH			6.5-8.5	OG	-	8.39	8.49	**8.51**	8.21	**8.85**	8.11	8.49	**11.2**	**10.4**	8.44	**8.63**	**9.21**	**9.52**	**8.51**	**9.33**	8.34	8.1
Langelier Saturation Index			-		-	0.21	1.29	1.02	0.99	1.38	0.83	1.33	3.24	2.37	0.67	1.25	1.37	1.4	1.25	1.53	0.82	0.97
T - Alkalinity		mg/L	30-500	OG	369	100	203	156	208	159	194	217	93	90	123	181	103	75	195	110	157	220
Bicarbonate	HCO_3^-	mg/L	-		-	122	190	144	208	131	194	203	<5	<5	119	160	73	<5	184	66	153	220
Carbonate	CO_3^{-2}	mg/L	-		-	<5	13	12	<10	28	<10	14	51	90	<5	20	30	39	11	44	<5	<5
Hydroxide		mg/L	-		-	<5	<5	<10	<10	<10	<10	<5	43	<5	<5	<5	<5	<5	<5	<5	<5	<5
Electrical Conductivity		µS/cm	-		-	333	407	311	401	332	405	438	345	252	263	329	218	227	334	255	299	478
Fluoride	F^-	mg/L	2.4	**MAC	0.7	0.34	0.42	0.34	0.44	0.3	0.39	0.36	<0.05	0.19	0.24	0.13	0.14	0.15	0.16	0.21	0.09	0.26
Chloride	Cl^-	mg/L	250	AO	134	2.75	2.35	3	1.33	4.12	3.1	1.07	7.97	3.47	2.23	1.22	3.75	4.21	2.1	3.86	3.55	2.14
Nitrate	NO_3-N	mg/L	10	†MAC	14.5	0.36	0.28	0.13	<0.05	0.1	0.93	<0.05	0.06	<0.05	0.12	<0.05	0.45	0.09	0.88	0.09	<0.05	0.08
Nitrite	NO_2-N	mg/L	1	†MAC	0.31	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.07	<0.05	0.11	<0.05	0.27	<0.05	<0.05	<0.05	0.07	<0.05
Bromide	Br^-	mg/L	-		-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sulfate	SO_4^{-2}	mg/L	500	AO	267	13.9	14.7	11.8	9.04	16.8	15.1	29.8	25.9	27.7	20.6	12.9	14.3	26.6	17.8	19.6	14.7	35
Calcium	Ca	mg/L	-		-	27.5	38	25.7	39.8	26.1	40.4	46.5	28.4	7.45	16.9	29.8	10.4	5.25	33.3	15.1	20.9	46.5
Magnesium	Mg	mg/L	-		-	21.4	21	18.6	23.4	19.4	20.1	24.2	1.94	10.2	12.6	22.7	13.8	11.3	26.1	14.3	19	27.6
Sodium	Na	mg/L	200	*AO	104	13.5	14.7	10.2	10.7	16.4	12.1	14.7	23.2	22.9	21.3	12.8	15.1	23.5	14.5	20.3	13	17.6
Potassium	K	mg/L	-		-	1.95	1.9	2.13	1.53	2.11	2.38	1.61	4.65	3.36	4.27	2.78	4.06	3.12	2.78	3.41	3.66	2.66
Ammonia Nitrogen	NH_3-N	mg/L	-		-	0.13	0.44	0.17	0.8	0.11	0.25	<0.05	2.42	0.1	<0.02	0.16	0.28	0.19	0.52	0.27	3.45	0.2
Orthophosphate	PO_4^{-3}	mg/L	-		-	<0.15	<0.05	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.16	<0.10	<0.10	<0.10
Total Phosphorus		mg/L	-		-	<0.05	<0.05	1.14	0.06	0.03	<0.05	<0.05	0.04	0.03	0.05	0.04	0.03	<0.02	0.52	0.03	0.07	0.03
Reactive Silica		mg/L	-		-	16.2	17.8	14.2	16.6	15.6	15.3	16.5	6.97	12.1	16	15.9	16.2	12.8	16.4	14	11.2	18.5
Dissolved Organic Carbon	DOC	mg/L	5	AO	4.1	**15**	2	1.4	1.4	1.6	3.6	1.9	**15.9**	2.7	2.5	1.4	1.5	2	2.2	1.7	**5.4**	1.2
Colour		Colour Units	5	AO	-	5	<5	<5	<5	<5	<5	<5	**7**	<5	<5	<5	**12**	<5	<5	<5	**30**	<5
Turbidity		NTU	5	AO	-	**15**	<0.5	4.8	1.5	<0.5	<0.5	**13**	<0.5	<0.5	<0.5	<0.5	<0.5	**27.1**	0.8	<0.5	1.2	<0.5
Aluminum	Al	mg/L	0.1	OG	0.07	0.01	0.005	0.008	0.012	0.029	<0.004	0.006	<0.004	0.01	0.018	0.006	0.011	0.008	0.009	0.01	0.013	0.008
Arsenic	As	mg/L	0.025	IMAC	0.007	0.007	***0.01***	0.004	***0.012***	0.007	0.004	0.007	<0.003	<0.003	***0.012***	***0.011***	<0.003	0.005	***0.009***	0.006	0.005	***0.008***
Barium	Ba	mg/L	1	MAC	0.29	0.081	0.114	0.042	0.094	0.044	0.146	0.1	0.144	0.036	0.134	0.156	0.269	0.106	0.161	0.054	0.114	0.106
Boron	B	mg/L	5	IMAC	1.3	0.027	0.025	0.024	0.026	0.02	0.023	0.029	0.027	0.018	0.015	0.021	0.019	0.017	0.025	0.018	0.022	0.029
Cadmium	Cd	mg/L	0.005	MAC	0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	Cr	mg/L	0.05	MAC	0.014	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Copper	Cu	mg/L	1	AO	0.50	0.011	<0.002	0.004	<0.003	<0.003	<0.003	0.013	0.01	<0.003	<0.003	<0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Iron	Fe	mg/L	0.3	AO	0.16	0.129	***0.161***	0.024	**0.53**	0.012	<0.005	<0.005	<0.010	<0.010	<0.010	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead	Pb	mg/L	0.01	MAC	0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	Mn	mg/L	0.05	AO	0.03	0.009	***0.041***	<0.002	***0.028***	<0.002	0.002	0.013	<0.002	<0.002	0.002	0.005	<0.002	<0.002	0.007	<0.002	0.005	0.013
Mercury		mg/L	0.001	MAC	0.0003	<0.0001	<0.0001	<0.0001	**0.004**	<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
Molybdenum	Mo	mg/L	-		-	0.0003	0.003	0.002	<0.0001	0.006	0.004	<0.002	0.005	0.005	0.004	0.002	0.003	0.003	0.003	0.005	0.002	0.003
Nickel	Ni	mg/L	-		-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Selenium	Se	mg/L	0.01	MAC	0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Silver	Ag	mg/L	-		-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Strontium	Sr		-		-	0.536	0.564	0.314	0.465	0.349	0.986	0.58	0.365	0.151	0.658	0.719	1.19	0.527	0.776	0.332	0.728	0.653
Thallium	Tl	mg/L	-		-	<0.06	<0.06	<0.006	<0.006	<0.006	<0.006	<0.006	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Tin	Sn	mg/L	-		-	<0.009	<0.009	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Titanium	Ti	mg/L	-		-	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Uranium	U	mg/L	0.02	MAC	0.006	<0.001	0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	V	mg/L	-		-	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Zinc	Zn	µmhos/cm	5	AO	2.5	0.011	0.004	0.01	0.041	0.01	0.126	0.005	0.006	<0.005	<0.005	0.006	<0.005	<0.005	<0.005	0.021	0.011	<0.005
Total Dissolved Solids	TDS	mg/L	500	AO	429	205	118	186	212	188	210	236	168	138	176	318	118	100	270	174	214	244
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	223	**205**	**182**	**141**	**196**	**145**	**184**	**216**	79	61	94	**168**	83	60	**191**	97	**130**	**230**
% Difference			-		-	23	2.7	3.27	10	1.4	0.9	<0.1	4.5	3.7	1.1	0.8	1.8	2.6	1.6	3.2	4.3	2.1
Biological Oxygen Demand	BOD	mg/L	-		-		<5					<5	<5	<5	<5	<5	<2	<2	<2	<5	14	<2
Total Kjeldahl Nitrogen	TKN	mg/L	-		-		0.67	0.24	1.08	<0.10	0.48	0.17	5.41		2.32	0.36	0.51	0.65	0.59	0.6	4.39	0.22
Chemical Oxygen Demand	COD	mg/L	-		-											13	<5	<5	6	18	31	<5
Phenols		mg/L	-		-	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	0.032	<0.002	0.002	<0.001	<0.001	0.002	<0.001	0.003	<0.001	<0.001
Field Conductivity		µS/cm	-		-			360	500	420	450	580	1140	300	333	328	400	374	300	1800	520	340
Field pH			-		-			8.51	8.3	8.54	8.55	8.23	12.04	10.38	10.14	11.54	8.97	12.92	9.1	12.06	8.65	8.4
Field Temperature		oC	-		-			11.2	8.8	8.1	9.4	10.3	9.6	8.2	10.6	2.7	11.5	7.6	10.1	8.9	10.6	6.6

Bold / Highlighting indicates ODWQS exceedance
Bold / Italics indicates RUC exceedance

* When the sodium concentration exceeds 20 mg/L, it should be considered in sodium-restricted diets.
**When the fluoride concentration exceeds 2.4 mg/L, it should be reported to the local medical officer of health.
† Where nitrate and nitrite are present, their total should not exceed 10 mg/L.
‡ Water is considered unsafe if Total Coliform are detected in consecutive samples.

MAC - Maximum Acceptable Concentration
IMAC - Interim Maximum Acceptable Concentration
AO - Aesthetic Objective
OG - Operational Guideline
ND - Not Detected

Results of Chemical Analyses

South Easthope Landfill			Ontario Drinking Water Standards		Reasonable Use Criteria (RUC)	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87	OW2-87
						Sampled on: 29-Oct-13	Sampled on: 16-Apr-14	Sampled on: 28-Oct-14	Sampled on: 16-Apr-15	Sampled on: 27-Oct-15	Sampled on: 12-Apr-16	Sampled on: 20-Oct-16	Sampled on: 19-Apr-17	Sampled on: 31-Oct-17	Sampled on: 19-Apr-18	Sampled on: 23-Oct-18	Sampled on: 16-Apr-19	Sampled on: 22-Oct-19	Sampled on: 20-Apr-20	Sampled on: 26-Oct-20	Sampled on: 13-Apr-21	Sampled on: 20-Oct-21
						Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC
Parameter	Symbol	Units	Objective	Type		Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon
Saturation pH			-		-	7.19	7.25	7.21	7.22	7.34	7.21	7.15	7.24	7.19	7.38	7.26	7.76	7.55	7.6	7.65	7.81	7.7
pH			6.5-8.5	OG	-	8.35	8.23	8.27	8.25	8	8.08	8.24	8.37	7.94	8.11	7.98	8.2	8.04	8.03	8.06	8.21	8.4
Langelier Saturation Index			-		-	1.16	0.98	1.06	1.03	0.66	0.87	1.09	1.13	0.75	0.73	0.72	0.445	0.489	0.426	0.409	0.396	0.695
T - Alkalinity		mg/L	30-500	OG	369	217	206	211	215	175	221	247	212	225	179	189	176	204	186	171	172	153
Bicarbonate	HCO_3^-	mg/L	-		-	214	206	211	215	175	221	247	204	225	179	189	176	204	186	171	172	150
Carbonate	CO_3^{-2}	mg/L	-		-	<5	<5	<5	<5	<5	<5	<5	8	<5	<5	<5	< 5	< 5	< 5	< 5	< 5	< 5
Hydroxide		mg/L	-		-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	< 5	< 5	< 5	< 5	< 5	< 5
Electrical Conductivity		µS/cm	-		-	421	452	435	433	368	417	458	421	355	309	442	383	422	407	378	368	334
Fluoride	F^-	mg/L	2.4	**MAC	0.7	0.36	0.3	0.26	0.25	0.35	<0.10	0.26	0.3	0.31	0.3	0.32	0.4	0.3	< 0.1	0.3	0.3	0.2
Chloride	Cl^-	mg/L	250	AO	134	1.98	1.98	1.67	2.35	1.73	2.31	4.07	2.27	2.59	3.25	2.06	3.1	2.2	3.2	2.8	5	6.3
Nitrate	NO_3-N	mg/L	10	†MAC	14.5	<0.05	0.06	<0.05	<0.10	0.13	<0.10	0.11	0.11	<0.05	0.2	<0.05	0.15	0.16	0.24	0.19	0.21	1.36
Nitrite	NO_2-N	mg/L	1	†MAC	0.31	<0.05	<0.05	<0.05	<0.10	<0.05	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	< 0.05	0.09	< 0.05	< 0.05	< 0.05	0.22
Bromide	Br^-	mg/L	-		-	<0.05	<0.05	<0.05	<0.10	<0.05	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Sulfate	SO_4^{-2}	mg/L	500	AO	267	21.6	21.6	18.8	20.4	13.7	19.8	8.97	20.3	13.5	18.2	17.2	18	15	17	15	20	16
Calcium	Ca	mg/L	-		-	40.4	36.2	38.8	38.9	33.4	38	31.5	37	39.2	29.2	41.7	26.4	37.4	36.3	34.5	23.6	33.3
Magnesium	Mg	mg/L	-		-	23.8	22.7	24.4	22.1	22.3	23	28	22.2	23.7	20.4	22.1	20.8	23	23.8	20.4	22.3	16.6
Sodium	Na	mg/L	200	*AO	104	15.9	16.6	15.3	16.7	12.8	14.6	13.6	15.6	14	13.2	13.5	14.4	14.8	13.8	13.2	12.3	13.1
Potassium	K	mg/L	-		-	1.91	1.78	1.58	1.78	1.97	1.84	4.02	1.96	2.59	2.52	1.47	1.8	2.6	1.9	2.3	3.8	3.8
Ammonia Nitrogen	NH_3-N	mg/L	-		-	0.2	0.08	0.13	0.04	0.12	<0.02	1.89	0.07	0.48	<0.02	0.09	0.13	0.38	0.06	0.17	0.05	0.1
Orthophosphate	PO_4^{-3}	mg/L	-		-	<0.10	<0.10	<0.10	<0.20	0.12	<0.20	<0.10	<0.10	<0.10	0.15	<0.10	0.19	0.341	0.008	0.007	0.019	0.021
Total Phosphorus		mg/L	-		-	0.04	0.02	0.04	0.01	0.16	0.02	0.14	0.03	0.09	0.04	0.03	0.2	0.36	0.14	0.58	0.15	0.26
Reactive Silica		mg/L	-		-	17.1	16.2	19.1	16.1	17.1	16.9	1.14	16.3	18.8	17.3	17.8	14.6	17.4	16.5	14.7	15.9	12.8
Dissolved Organic Carbon	DOC	mg/L	5	AO	4.1	1.7	0.8	3	**7.5**	3.5	2.7	3.4	0.7	1.2	0.9	2.2	1.1	1.6	1.5	1.3	2.2	2
Colour		Colour Units	5	AO	-	<5	<5	<5	<5	<5	<5	5	<5	<5	<5	<5	< 2	< 2	< 2	2	2	2
Turbidity		NTU	5	AO	-	<0.5	4.4	<0.5	<0.5	<0.5	0.6	0.7	<0.5	1.3	<0.5	<0.5	**239**	**119**	**72.2**	**226**	**106**	**71.6**
Aluminum	Al	mg/L	0.1	OG	0.07	<0.004	<0.004	<0.004	<0.004	0.004	<0.004	0.004	<0.004	0.006	<0.004	0.03	0.02	0.04	0.03	< 0.01	< 0.01	< 0.01
Arsenic	As	mg/L	0.025	IMAC	0.007	***0.009***	***0.008***	0.007	0.007	0.007	***0.008***	***0.01***	***0.008***	***0.014***	***0.008***	***0.008***	0.0058	***0.009***	0.0072	***0.0096***	0.0067	0.0047
Barium	Ba	mg/L	1	MAC	0.29	0.1	0.097	0.098	0.054	0.122	0.089	0.134	0.093	0.104	0.096	0.108	0.055	0.103	0.087	0.105	0.088	0.123
Boron	B	mg/L	5	IMAC	1.3	0.021	0.025	0.021	0.023	0.018	0.024	0.03	0.028	0.028	0.025	0.029	0.022	0.028	0.027	0.03	0.04	0.023
Cadmium	Cd	mg/L	0.005	MAC	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015
Chromium	Cr	mg/L	0.05	MAC	0.014	<0.003	0.004	<0.003	<0.003	<0.003	<0.003	0.004	<0.003	<0.003	<0.003	<0.003	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Copper	Cu	mg/L	1	AO	0.50	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0004	0.0002	0.0015	0.0021	0.0006	0.0027
Iron	Fe	mg/L	0.3	AO	0.16	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.08	<0.01	0.03	< 0.005	0.137	< 0.005	< 0.005	< 0.005	< 0.005
Lead	Pb	mg/L	0.01	MAC	0.003	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	0.00002	< 0.00002	0.00003	0.00007	0.00003	0.00004
Manganese	Mn	mg/L	0.05	AO	0.03	0.01	0.01	0.005	0.01	0.006	0.011	***0.033***	0.01	0.018	0.015	0.013	< 0.001	0.015	0.006	0.011	< 0.001	< 0.001
Mercury		mg/L	0.001	MAC	0.0003	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Molybdenum	Mo	mg/L	-		-	0.003	0.004	0.003	0.003	<0.002	0.003	<0.002	0.003	0.003	0.003	0.003	0.0022	0.0023	0.0021	0.0014	0.0014	0.0019
Nickel	Ni	mg/L	-		-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Selenium	Se	mg/L	0.01	MAC	0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	**0.012**	<0.004	<0.004	<0.004	<0.004	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Silver	Ag	mg/L	-		-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Strontium	Sr		-		-	0.572	0.558	0.607	0.408	0.727	0.52	0.693	0.556	0.609	0.6	0.547	0.462	0.674	0.559	0.687	0.599	0.723
Thallium	Tl	mg/L	-		-	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Tin	Sn	mg/L	-		-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Titanium	Ti	mg/L	-		-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Uranium	U	mg/L	0.02	MAC	0.006	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.00087	0.00074	0.0007	0.00027	0.00039	0.00015
Vanadium	V	mg/L	-		-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0002	0.0001	0.0001	0.0002	0.0001	0.0003
Zinc	Zn	µmhos/cm	5	AO	2.5	<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
Total Dissolved Solids	TDS	mg/L	500	AO	429	238	186	226	206	196	220	232	154	218	200	238	190	218	208	192	190	181
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	223	**199**	**184**	**197**	**188**	**175**	**190**	**194**	**184**	**195**	**157**	**195**	**151**	**188**	**189**	**170**	**151**	**151**
% Difference			-		-	1.5	2.2	0.2	2.9	3.16	4.59	5.66	3.79	2.73	3.95	3.6	3.79	0.29	2.92	2.4	4.82	0.158
Biological Oxygen Demand	BOD	mg/L	-		-	<2	<2	<5	<5	<5	<5	<5	<5	<5	<5	<5	< 3	4	< 3	< 3	< 3	3
Total Kjeldahl Nitrogen	TKN	mg/L	-		-	0.34	0.18	0.46	0.11	0.4	0.26	2.05	<0.10	0.66	0.12	0.32	0.2	0.7	0.2	0.8	0.2	0.3
Chemical Oxygen Demand	COD	mg/L	-		-	<5	<5	14	<5	10	22	<5	<5	<5	<5	<5	< 5	18	< 5	13	7	< 5
Phenols		mg/L	-		-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.002	< 0.002	< 0.002	< 0.001	< 0.002	< 0.002
Field Conductivity		µS/cm	-		-	300	400	350	291	234	470	470	530	440	445	350	406	383	320	360	450	274
Field pH			-		-	9.55	8.8	9.22	10.34	11.06	7.13	8.34	8.5	8.68	8.04	8.8	7.96	8.06	7.43	8.25	8.16	8.49
Field Temperature		oC	-		-	9.3	4.8	13	6.3	11.1	6.5	11.7	11.4	8.3	5.5	11.8	10.1	12.5	5.6	10.1	11	15.5

Bold / Highlighting indicates ODWQS exceedance
Bold / Italics indicates RUC exceedance

* When the sodium concentration exceeds 20 mg/L, it should be considered in sodium-restricted diets.
**When the fluoride concentration exceeds 2.4 mg/L, it should be reported to the local medical officer of health.
† Where nitrate and nitrite are present, their total should not exceed 10 mg/L.
‡ Water is considered unsafe if Total Coliform are detected in consecutive samples.

MAC - Maximum Acceptable Concentration
IMAC - Interim Maximum Acceptable Concentration
AO - Aesthetic Objective
OG - Operational Guideline
ND - Not Detected

Results of Chemical Analyses

South Easthope Landfill			Ontario Drinking Water Standards		Reasonable Use Criteria (RUC)	OW2-87	OW2-87
						Sampled on: 06-Apr-22 Sampled by: AEC Analyzed by: Caduceon	Sampled on: 18-Oct-22 Sampled by: AEC Analyzed by: Caduceon
Parameter	Symbol	Units	Objective	Type			
Saturation pH			-		-	7.5	7.69
pH			6.5-8.5	OG	-	8.24	8.04
Langelier Saturation Index			-		-	0.739	0.354
T - Alkalinity		mg/L	30-500	OG	369	207	206
Bicarbonate	HCO_3^-	mg/L	-		-	207	206
Carbonate	CO_3^{-2}	mg/L	-		-	< 5	< 5
Hydroxide		mg/L	-		-	< 5	< 5
Electrical Conductivity		µS/cm	-		-	419	399
Fluoride	F^-	mg/L	2.4	**MAC	0.7	0.3	0.3
Chloride	Cl^-	mg/L	250	AO	134	3.2	1.9
Nitrate	NO_3-N	mg/L	10	†MAC	14.5	0.09	< 0.05
Nitrite	NO_2-N	mg/L	1	†MAC	0.31	< 0.05	< 0.05
Bromide	Br^-	mg/L	-		-	< 0.4	< 0.4
Sulfate	SO_4^{-2}	mg/L	500	AO	267	17	15
Calcium	Ca	mg/L	-		-	41.4	27
Magnesium	Mg	mg/L	-		-	24.6	16.8
Sodium	Na	mg/L	200	*AO	104	13.3	15.4
Potassium	K	mg/L	-		-	1.6	3.2
Ammonia Nitrogen	NH_3-N	mg/L	-		-	0.06	0.07
Orthophosphate	PO_4^{-3}	mg/L	-		-	0.015	0.004
Total Phosphorus		mg/L	-		-	0.35	0.33
Reactive Silica		mg/L	-		-	16.2	11.9
Dissolved Organic Carbon	DOC	mg/L	5	AO	4.1	1.5	1.6
Colour		Colour Units	5	AO	-	< 2	< 2
Turbidity		NTU	5	AO	-	**145**	**136**
Aluminum	Al	mg/L	0.1	OG	0.07	0.03	< 0.01
Arsenic	As	mg/L	0.025	IMAC	0.007	0.0059	0.0038
Barium	Ba	mg/L	1	MAC	0.29	0.106	0.117
Boron	B	mg/L	5	IMAC	1.3	0.026	0.029
Cadmium	Cd	mg/L	0.005	MAC	0.001	< 0.000015	< 0.000010
Chromium	Cr	mg/L	0.05	MAC	0.014	0.001	< 0.001
Copper	Cu	mg/L	1	AO	0.50	0.001	0.0009
Iron	Fe	mg/L	0.3	AO	0.16	< 0.005	< 0.005
Lead	Pb	mg/L	0.01	MAC	0.003	0.00003	0.00003
Manganese	Mn	mg/L	0.05	AO	0.03	0.007	0.001
Mercury		mg/L	0.001	MAC	0.0003	< 0.00002	< 0.00002
Molybdenum	Mo	mg/L	-		-	0.0024	0.0023
Nickel	Ni	mg/L	-		-	< 0.01	< 0.01
Selenium	Se	mg/L	0.01	MAC	0.004	< 0.001	< 0.001
Silver	Ag	mg/L	-		-	< 0.0001	< 0.0001
Strontium	Sr		-		-	0.625	0.692
Thallium	Tl	mg/L	-		-	< 0.00005	< 0.00005
Tin	Sn	mg/L	-		-	< 0.05	< 0.05
Titanium	Ti	mg/L	-		-	< 0.005	< 0.005
Uranium	U	mg/L	0.02	MAC	0.006	0.00061	0.00046
Vanadium	V	mg/L	-		-	0.0002	0.0003
Zinc	Zn	µmhos/cm	5	AO	2.5	< 0.005	< 0.005
Total Dissolved Solids	TDS	mg/L	500	AO	429	225	205
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	223	**205**	**124**
% Difference			-		-	1.29	13.2
Biological Oxygen Demand	BOD	mg/L	-		-	< 3	< 3
Total Kjeldahl Nitrogen	TKN	mg/L	-		-	0.3	0.4
Chemical Oxygen Demand	COD	mg/L	-		-	11	12
Phenols		mg/L	-		-	< 0.001	< 0.001
Field Conductivity		µS/cm	-		-		525
Field pH			-		-		7.37
Field Temperature		oC	-		-		10.7

Bold / Highlighting indicates ODWQS exceedance
Bold / Italics indicates RUC exceedance

Results of Chemical Analyses

South Easthope Landfill			Ontario Drinking Water Standards		OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87
					Sampled on: 23-Apr-96	Sampled on: 14-Nov-96	Sampled on: 17-Apr-97	Sampled on: 26-Nov-97	Sampled on: 28-Apr-98	Sampled on: 26-Nov-98	Sampled on: 20-Apr-99	Sampled on: 23-Nov-99	Sampled on: 20-Apr-00	Sampled on: 20-Nov-00	Sampled on: 30-Apr-01	Sampled on: 25-Apr-02	Sampled on: 26-Nov-02	Sampled on: 22-May-03	Sampled on: 05-Dec-03	Sampled on: 05-Jun-04	Sampled on: 05-Oct-04	Sampled on: 19-May-05
					Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC
					Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT
Parameter	**Symbol**	**Units**	**Objective**	**Type**																		
Saturation pH			-													7.85	7.49	6.94	6.96	6.95	7.33	7.55
pH			6.5-8.5	OG	7.3	7.57	**8.7**	7.47	7.6	8.02	8.4	7.7	7.59	7.6	8.3	8.5	8.17	7.46	7.94	7.62	7.91	8.04
Langelier Saturation Index			-													0.65			0.98	0.67	0.58	0.49
T - Alkalinity		mg/L	30-500	OG	221	282	265	260	148	303	241	254	270	250	90	175	223	306	282	280	180	225
Bicarbonate	HCO_3^-	mg/L	-													183	272	306	282	280	180	275
Carbonate	CO_3^{-2}	mg/L	-													15	<5	<5	<5	<5	<5	<5
Hydroxide		mg/L	-													<5	<5	<5	<5	<5	<5	<5
Electrical Conductivity		µS/cm	-		561	704	618	545	442	628	584	630	700	640	380	403	424	587	592	568	405	543
Fluoride	F^-	mg/L	2.4	**MAC												<0.1	0.1	0.07	0.08	0.08	0.08	0.07
Chloride	Cl^-	mg/L	250	AO	<1.0	<1.0	<0.05	<1.0	0.55	<1.0	<1.0	12.7	5.3	7.2	6.8	3.3	1.9	1.84	2.42	1.92	1.5	2.64
Nitrate	NO_3-N	mg/L	10	†MAC	<0.05	0.09	0.19	0.05	<0.05	<0.05	<0.05	<0.05	0.4	0.74	0.33	1.4	0.5	0.07	0.16	0.14	0.15	0.46
Nitrite	NO_2-N	mg/L	1	†MAC	<0.05											<0.3	<0.3	<0.05	<0.05	<0.05	<0.05	<0.05
Bromide	Br^-	mg/L	-													<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05
Sulfate	SO_4^{-2}	mg/L	500	AO	63.2	43.2	49.8	12.8	68	30.2	42.5	42	52.7	47.5	86.5	40	38.6	33.3	34.8	37.4	34.8	37.5
Calcium	Ca	mg/L	-		48.1	67.6	60.5	58.8	26.3	70.5	55.2	50	76.6	73.2	20.3	28.8	49.8	59.8	71.7	73.7	43.6	56.1
Magnesium	Mg	mg/L	-		25.8	25.9	24.5	24.9	23	21.5	27.5	25.8	26.3	27.9	22.6	23.7	18.8	27.7	22.5	26.0	16.2	21.8
Sodium	Na	mg/L	200	*AO	19.9	23	24.9	17.8	21	13.8	16.4	20.8	26.7	26.9	20.9	18.9	26.5	17.8	11.7	15.3	17.6	13.8
Potassium	K	mg/L	-		2	5.6	<0.1	<0.1	<0.1	8.2	8.8	21.9	2.1	2.5	4.5	1.7	3.1	1.61	1.3	1.36	2.91	1.2
Ammonia Nitrogen	NH_3-N	mg/L	-		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.2	0.08	<0.05	<0.05	0.09	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	1.2
Orthophosphate	PO_4^{-3}	mg/L	-													<0.15	<0.15	<0.15	<0.05	<1	<0.05	<0.15
Total Phosphorus		mg/L	-																<0.05	<0.05	<0.05	<0.05
Reactive Silica		mg/L	-													14.7	14.5	16.4	15.3	15.5	10	14.6
Dissolved Organic Carbon	DOC	mg/L	5	AO	0.3	2.2	0.5	0.6	0.5	0.8	1.4	0.7	0.6	5	4	<1	2	2	<1	<1	<1	<1
Colour		Colour Unit	5	AO												5	5	5	5	<5	<5	5
Turbidity		NTU	5	AO												<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1
Aluminum	Al	mg/L	0.1	OG												0.009	<0.002	0.008	**0.152**	0.019	0.027	0.005
Arsenic	As	mg/L	0.025	IMAC												<0.005	<0.005	<0.005	<0.003	<0.003	<0.003	<0.003
Barium	Ba	mg/L	1	MAC												0.055	0.056	0.060	0.067	0.008	0.057	0.052
Boron	B	mg/L	5	IMAC												0.03	0.05	0.01	0.01	0.01	0.013	0.052
Cadmium	Cd	mg/L	0.005	MAC												<0.001	0.004	<0.001	<0.002	<0.002	<0.002	<0.002
Chromium	Cr	mg/L	0.05	MAC												<0.002	0.013	<0.002	<0.003	<0.003	0.003	<0.003
Copper	Cu	mg/L	1	AO												<0.002	0.017	0.003	<0.002	0.003	<0.002	0.004
Iron	Fe	mg/L	0.3	AO	<0.02	**3.69**	<0.02	<0.02	<0.02	<0.02	**0.53**	<0.02	<0.02	<0.02	0.1	0.014	0.03	0.178	0.269	0.027	**0.324**	**0.356**
Lead	Pb	mg/L	0.01	MAC												<0.01	<0.01	<0.01	<0.002	<0.002	<0.002	<0.002
Manganese	Mn	mg/L	0.05	AO												0.001	0.017	0.005	**0.061**	0.005	**0.058**	0.003
Mercury		mg/L	0.001	MAC												<0.0001	<0.0001	<0.0001	<0.00005	<0.00005	<0.00005	<0.0001
Molybdenum	Mo	mg/L	-													0.003	<0.003	<0.003	0.002	<0.002	<0.002	<0.003
Nickel	Ni	mg/L	-													<0.002	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Selenium	Se	mg/L	0.01	MAC												<0.005	<0.005	<0.005	<0.004	<0.004	<0.004	<0.004
Silver	Ag	mg/L	-													0.003	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002
Strontium	Sr		-													0.184	0.206	0.205	0.230	0.015	0.197	0.168
Thallium	Tl	mg/L	-													<0.02	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Tin	Sn	mg/L	-													<0.007	<0.009	<0.009	<0.009	<0.010	<0.009	<0.009
Titanium	Ti	mg/L	-													<0.001	0.008	0.060	0.001	0.001	<0.001	0.001
Uranium	U	mg/L	0.02	MAC												<0.05	<0.05	<0.05	0.001	<0.001	<0.001	<0.001
Vanadium	V	mg/L	-													<0.001	0.001	<0.001	0.001	0.001	0.001	<0.001
Zinc	Zn	µmhos/cm	5	AO												0.017	0.04	0.036	0.278	0.007	<0.004	0.009
Total Dissolved Solids	TDS	mg/L	500	AO	307	351	334	305	249	343	312	340	370	330	240	222	273	356	286	338	210	355
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	**228**	**277**	**253**	**251**	**162**	**266**	**253**	**233**	**301**	**299**	**145**	**169**	**201**	**263**	**272**	**291**	**176**	**229**
% Difference			-									1.74	4.1	7.17	1.65	2.3	0.56	2.6	4.8	9.1	7.7	1.42
Biological Oxygen Demand	BOD	mg/L	-																			
Total Kjeldahl Nitrogen	TKN	mg/L	-		0.4	4.32	6.51	5.9	0.5	2.1	3.6	2.3	2.4	2.5	2.5	0.34	0.017					
Chemical Oxygen Demand	COD	mg/L	-																			
Phenols		mg/L	-		<2	<2	<2	<2	<2	<1	<1	<1	<1	<1	20			<0.002	<0.002	<0.002	<0.002	<0.002
Field Conductivity		µS/cm	-																			
Field pH			-																			
Field Temperature		oC	-																			

Bold / Highlighting indicates ODWQS exceedance

* When the sodium concentration exceeds 20 mg/L, it should be considered in sodium-restricted diets.
**When the fluoride concentration exceeds 2.4 mg/L, it should be reported to the local medical officer of health.
† Where nitrate and nitrite are present, their total should not exceed 10 mg/L.
‡ Water is considered unsafe if Total Coliform are detected in consecutive samples.

MAC - Maximum Acceptable Concentration
IMAC - Interim Maximum Acceptable Concentration
AO - Aesthetic Objective
OG - Operational Guideline
ND - Not Detected

Results of Chemical Analyses

South Easthope Landfill			Ontario Drinking Water Standards		OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87
					Sampled on: 03-Oct-05	Sampled on: 24-May-06	Sampled on: 14-Jul-06	Sampled on: 25-Oct-06	Sampled on: 26-Apr-07	Sampled on: 24-Oct-07	Sampled on: 08-Apr-08	Sampled on: 30-Oct-08	Sampled on: 15-Apr-09	Sampled on: 27-Oct-09	Sampled on: 09-Apr-10	Sampled on: 20-Oct-10	Sampled on: 14-Apr-11	Sampled on: 19-Oct-11	Sampled on: 04-Apr-12	Sampled on: 24-Oct-12	Sampled on: 10-Apr-13	Sampled on: 29-Oct-13
					Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC
Parameter	**Symbol**	**Units**	**Objective**	**Type**	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT
Saturation pH			-		7.8	6.95	6.91	6.97	7.11	7.04	6.93	6.95	7.02	7.01	7.05	7.06	7.07	7.02	7.03	7.1	7.06	7.01
pH			6.5-8.5	OG	**8.59**	7.97	7.86	8.07	**8.51**	8.07	8.12	8.3	8.15	8.22	8.09	8.1	8.17	8.23	8.11	8.23	8	8.09
Langelier Saturation Index			-		0.79	1.02	0.95	1.1	1.4	1.03	1.19	1.35	1.13	1.21	1.04	1.04	1.1	1.21	1.08	1.13	0.94	1.08
T - Alkalinity		mg/L	30-500	OG	101	275	287	275	244	248	278	278	253	244	239	234	242	238	231	208	214	229
Bicarbonate	HCO_3^-	mg/L	-		91	275	287	275	226	248	228	276	253	244	239	234	242	238	231	208	214	229
Carbonate	CO_3^{-2}	mg/L	-		10	<10	<10	<10	19	<10	215	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Hydroxide		mg/L	-		<5	<10	<10	<10	<10	<10	13	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Electrical Conductivity		µS/cm	-		267	564	585	566	507	497	551	580	537	514	466	498	545	455	545	492	572	598
Fluoride	F^-	mg/L	2.4	**MAC	0.06	0.07	0.09	0.09	<0.05	0.08	<0.05	<0.05	<0.05	0.07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.10
Chloride	Cl^-	mg/L	250	AO	2.63	3.01	2.91	3.21	2.72	3.63	2.82	5.04	4.31	3.69	4.52	9.6	16.3	15.9	12.4	11.5	11.3	9.52
Nitrate	NO_3-N	mg/L	10	†MAC	0.29	0.19	0.23	0.26	0.12	0.32	0.26	0.43	0.52	0.78	1.41	0.73	0.53	2.4	4.02	6.26	9.18	**14.7**
Nitrite	NO_2-N	mg/L	1	†MAC	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.23	<0.10	<0.10
Bromide	Br^-	mg/L	-		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.10
Sulfate	SO_4^{-2}	mg/L	500	AO	34.8	36.1	36.6	34.5	28.9	26.4	33.4	33	33.7	32.8	33.6	28.7	30.2	34.5	37.4	40.4	37.2	37.4
Calcium	Ca	mg/L	-		16.9	73.5	82.8	75.5	48.8	67.8	78.4	78.1	66.7	78.7	72.6	72	73.3	82.6	84.2	80.5	86	90.7
Magnesium	Mg	mg/L	-		12	23	25	22.8	22.7	18.8	21.7	23.4	21.2	23.1	17.8	17.7	18	20.5	20.7	18.1	18.8	19.3
Sodium	Na	mg/L	200	*AO	16.9	12	13.4	12.1	22.4	8.29	9.67	10.6	13.6	10.1	6.63	5.2	7.14	6.56	8.85	4.8	5.09	6.14
Potassium	K	mg/L	-		3.81	1.85	2.17	1.51	13.9	3.92	2.46	3.12	8.24	2.7	3.22	2.24	5.06	1.92	7.63	2.53	1.85	1.18
Ammonia Nitrogen	NH_3-N	mg/L	-		<0.05	<0.05	0.3	0.08	0.19	0.33	<0.05	0.14	<0.05	<0.02	<0.02	<0.02	<0.02	0.15	<0.02	0.08	<0.02	<0.02
Orthophosphate	PO_4^{-3}	mg/L	-		<0.05	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
Total Phosphorus		mg/L	-		<0.05	<0.05	<0.05	<0.05	0.03	<0.05	<0.05	0.04	0.05	0.95	0.08	0.03	<0.02	0.11	<0.02	<0.02	0.02	<0.02
Reactive Silica		mg/L	-		8.17	13	14.5	15.2	14.4	11.6	12.9	13.9	11.5	13.3	10.3	7.05	9.66	10.4	9.86	8.85	9.54	9.43
Dissolved Organic Carbon	DOC	mg/L	5	AO	2	0.8	1.4	1	1.5	1.3	1.7	3.6	1.4	3	1.1	4.1	1.9	1.5	1.5	1.8	1.4	1.7
Colour		Colour Unit	5	AO	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Turbidity		NTU	5	AO	<0.5	**5.8**	**10**	<0.5	<0.5	1.7	3.6	0.6	<0.5	2.3	<0.5	**35.3**	<0.5	1	<0.5	**795**	**756**	<0.5
Aluminum	Al	mg/L	0.1	OG	0.008	0.007	0.011	0.011	0.027	0.03	<0.004	<0.004	<0.004	<0.004	<0.004	0.022	0.008	0.009	<0.004	0.011	0.02	<0.004
Arsenic	As	mg/L	0.025	IMAC	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Barium	Ba	mg/L	1	MAC	0.06	0.055	0.05	0.062	0.061	0.049	0.067	0.053	0.045	0.053	0.042	0.044	0.047	0.047	0.05	0.039	0.045	0.048
Boron	B	mg/L	5	IMAC	<0.010	<0.010	<0.01	0.01	<0.010	0.014	0.011	0.018	0.012	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.017
Cadmium	Cd	mg/L	0.005	MAC	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	Cr	mg/L	0.05	MAC	<0.003	<0.003	0.047	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.015	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Copper	Cu	mg/L	1	AO	0.002	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Iron	Fe	mg/L	0.3	AO	0.047	0.208	0.159	0.153	0.048	<0.005	<0.005	0.028	<0.010	<0.010	<0.01	0.02	<0.01	<0.01	<0.01	0.07	<0.01	<0.01
Lead	Pb	mg/L	0.01	MAC	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	Mn	mg/L	0.05	AO	0.003	0.008	0.023	0.009	<0.002	**0.129**	0.004	**0.059**	0.006	**0.18**	0.004	**0.051**	0.004	0.021	0.004	0.026	0.01	0.003
Mercury		mg/L	0.001	MAC	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	Mo	mg/L	-		0.002	<0.002	<0.002	<0.002	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Nickel	Ni	mg/L	-		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.007	<0.003	<0.003
Selenium	Se	mg/L	0.01	MAC	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Silver	Ag	mg/L	-		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Strontium	Sr		-		0.241	0.157	0.163	0.186	0.172	0.149	0.175	0.157	0.128	0.156	0.136	0.141	0.156	0.159	0.149	0.142	0.148	0.154
Thallium	Tl	mg/L	-		<0.06	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Tin	Sn	mg/L	-		<0.009	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Titanium	Ti	mg/L	-		<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Uranium	U	mg/L	0.02	MAC	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	V	mg/L	-		<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Zinc	Zn	µmhos/cm	5	AO	0.004	0.004	0.005	0.006	0.009	0.142	0.007	0.01	<0.005	0.006	<0.005	<0.005	<0.005	0.005	<0.005	0.007	<0.005	<0.005
Total Dissolved Solids	TDS	mg/L	500	AO	92	292	396	314	280	290	298	302	300	320	280	290	304	326	338	378	302	340
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	92	**278**	**310**	**282**	**215**	**247**	**285**	**291**	**254**	**292**	**255**	**253**	**257**	**291**	**295**	**276**	**292**	**306**
% Difference			-		0.8	7.26	10.4	7.7	5.8	2	1.4	0.4	0.4	5.1	2.2	2.4	3.3	0.5	3.6	<0.1	0.7	2
Biological Oxygen Demand	BOD	mg/L	-		<5		<5				9	<5	<5	<5	<5	<2	<2	<2	<5	<2	<2	<2
Total Kjeldahl Nitrogen	TKN	mg/L	-		0.08	0.27	0.24	0.31	<0.10	0.34	0.13	0.96		0.13	<0.10	0.36	0.47	<0.10	0.22	<0.10	<0.10	<0.10
Chemical Oxygen Demand	COD	mg/L	-												9	8	10	7	<5	20	<5	<5
Phenols		mg/L	-		<0.002	<0.001	<0.001	<0.001	<0.001	0.002	<0.002	<0.001		0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Field Conductivity		µS/cm	-			500	580	700	600	650	600	583	500	538	467	600	580	800	600	620	560	510
Field pH			-			7.82	7.67	8.5	8.3	8.05	8.79	7.62	8.02	8.4	8	8.07	8.23	7.57	8.36	8.08	6.93	8.12
Field Temperature		oC	-			13.2	14.1	7.8	7.1	9.7	7.1	8.7	8.1	9.8	3.4	9.7	7	10.2	7.7	10.5	4.8	8.2

Bold / Highlighting indicates ODWQS exceedance

* When the sodium concentration exceeds 20 mg/L, it should be considered in sodium-restricted diets.
**When the fluoride concentration exceeds 2.4 mg/L, it should be reported to the local medical officer of health.
† Where nitrate and nitrite are present, their total should not exceed 10 mg/L.
‡ Water is considered unsafe if Total Coliform are detected in consecutive samples.

MAC - Maximum Acceptable Concentration
IMAC - Interim Maximum Acceptable Concentration
AO - Aesthetic Objective
OG - Operational Guideline
ND - Not Detected

Results of Chemical Analyses

South Easthope Landfill			Ontario Drinking Water Standards		OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87	OW3-87
					Sampled on: 16-Apr-14	Sampled on: 28-Oct-14	Sampled on: 16-Apr-15	Sampled on: 27-Oct-15	Sampled on: 12-Apr-16	Sampled on: 20-Oct-16	Sampled on: 19-Apr-17	Sampled on: 31-Oct-17	Sampled on: 19-Apr-18	Sampled on: 23-Oct-18	Sampled on: 16-Apr-19	Sampled on: 22-Oct-19	Sampled on: 20-Apr-20	Sampled on: 26-Oct-20	Sampled on: 13-Apr-21	Sampled on: 20-Oct-21	Sampled on: 06-Apr-22	Sampled on: 18-Oct-22
					Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC
Parameter	Symbol	Units	Objective	Type	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon
Saturation pH			-		6.99	6.88	6.88	6.87	6.93	6.91	6.93	6.87	6.96	6.97	7.12	7.1	7.11	7.14	7.05	7.06	7.19	7.09
pH			6.5-8.5	OG	8.06	8.1	8.12	8.17	8.09	8.08	8.2	7.85	8.01	8.02	7.98	7.9	7.87	7.95	7.97	8.01	7.99	7.77
Langelier Saturation Index			-		1.07	1.22	1.24	1.3	1.16	1.17	1.27	0.98	1.05	1.05	0.863	0.805	0.762	0.81	0.919	0.948	0.804	0.684
T - Alkalinity		mg/L	30-500	OG	242	259	274	277	257	282	242	287	236	230	232	256	235	202	242	215	243	229
Bicarbonate	HCO_3^-	mg/L	-		242	259	274	277	257	282	242	287	236	230	232	256	235	202	242	215	243	229
Carbonate	CO_3^{-2}	mg/L	-		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Hydroxide		mg/L	-		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Electrical Conductivity		µS/cm	-		680	738	727	652	681	657	734	573	608	696	670	646	662	648	680	626	694	714
Fluoride	F^-	mg/L	2.4	**MAC	<0.10	<0.10	<0.25	<0.10	<0.25	<0.10	<0.10	<0.05	<0.25	<0.05	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chloride	Cl^-	mg/L	250	AO	7.98	8.96	9.39	5.9	14.3	7.87	18.4	7.99	14	9.27	10.9	9.5	13.4	16.7	35.4	38.3	25.5	33.6
Nitrate	NO_3-N	mg/L	10	†MAC	**13.8**	**22.7**	**13.7**	9.31	**22.1**	**14.2**	**24.1**	**13.9**	**28**	**16**	**18.5**	9.37	**13.2**	**19.1**	9.87	7.73	**13**	**19.4**
Nitrite	NO_2-N	mg/L	1	†MAC	<0.10	<0.10	<0.25	<0.10	<0.25	<0.10	<0.10	<0.05	<0.25	<0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Bromide	Br^-	mg/L	-		<0.10	<0.10	<0.25	<0.10	<0.25	<0.10	<0.10	<0.05	<0.25	<0.05	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Sulfate	SO_4^{-2}	mg/L	500	AO	38	35.8	36.1	33.3	37.8	36.8	38.1	37.1	34.9	34.5	33	32	35	31	33	32	34	31
Calcium	Ca	mg/L	-		85.8	106	98	97.2	93.1	86.9	103	90.8	98.1	94.8	91.4	86.9	91.9	99.1	104	114	95.5	99.2
Magnesium	Mg	mg/L	-		21.6	24.6	24.5	27.7	24.1	24.9	23.8	27.4	22.6	24.1	24.2	28	26.2	25.3	22.4	25.1	25.5	22.4
Sodium	Na	mg/L	200	*AO	8.29	7.45	8	10.8	7.83	10.1	6.55	9.59	7.08	7.92	6.8	9.2	7.6	7	6.3	6.9	7.3	6.5
Potassium	K	mg/L	-		2.24	1.11	1.63	1.42	1.99	1.91	1.69	1.78	5.05	1.28	1.3	1.2	1.1	1.1	0.9	0.8	1.1	0.8
Ammonia Nitrogen	NH_3-N	mg/L	-		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	0.04	0.11	0.03	0.05	0.02	0.02	0.01	0.02	< 0.01
Orthophosphate	PO_4^{-3}	mg/L	-		<0.20	<0.20	<0.50	<0.20	<0.50	<0.20	<0.20	<0.10	<0.50	<0.10	1.56	0.089	0.052	< 0.002	0.022	0.019	0.007	0.003
Total Phosphorus		mg/L	-		0.03	0.04	<0.01	1.14	0.03	0.8	0.01	0.05	0.02	0.08	1.81	0.09	0.25	0.3	0.16	0.32	0.61	0.6
Reactive Silica		mg/L	-		10.1	10.4	10.1	13.7	9.83	12.3	9.55	12.8	9.16	12.4	8.95	12.7	11.6	10.2	8.73	9.39	10.2	8.6
Dissolved Organic Carbon	DOC	mg/L	5	AO	1.3	1.1	**8.6**	1	1.2	4.4	1.1	1.2	1.1	**7.9**	1.9	1.6	2	1.1	2.9	**10.4**	2	0.6
Colour		Colour Unit	5	AO	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Turbidity		NTU	5	AO	2.7	<0.5	<0.5	<0.5	1.5	**20700**	0.7	<0.5	0.8	<0.5	**771**	**206**	**162**	**439**	**294**	**238**	**498**	**853**
Aluminum	Al	mg/L	0.1	OG	<0.004	<0.004	<0.004	0.008	<0.004	0.053	0.096	0.004	0.01	0.013	0.05	0.07	0.05	0.02	0.03	0.08	0.06	0.03
Arsenic	As	mg/L	0.025	IMAC	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.0002	0.0002	0.0001	0.0002	0.0001	0.0001	0.0001	0.0002
Barium	Ba	mg/L	1	MAC	0.05	0.053	0.051	0.057	0.053	0.061	0.056	0.061	0.054	0.061	0.044	0.062	0.057	0.058	0.042	0.05	0.049	0.043
Boron	B	mg/L	5	IMAC	<0.010	<0.010	<0.010	<0.010	<0.010	0.01	0.013	0.014	<0.010	0.03	0.008	0.008	0.009	0.011	0.009	0.01	0.009	0.009
Cadmium	Cd	mg/L	0.005	MAC	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000010
Chromium	Cr	mg/L	0.05	MAC	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Copper	Cu	mg/L	1	AO	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0008	0.0005	0.0014	0.0018	0.0007	0.001	0.0014	0.0008
Iron	Fe	mg/L	0.3	AO	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	0.009	0.049	< 0.005	< 0.005	< 0.005	0.008	0.01	< 0.005
Lead	Pb	mg/L	0.01	MAC	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	0.00003	0.00008	0.00003	0.00005	< 0.00002	< 0.00002	0.00014	0.00002
Manganese	Mn	mg/L	0.05	AO	0.005	0.013	0.002	0.007	<0.002	0.033	0.003	0.004	<0.002	0.018	0.002	0.022	0.001	0.001	< 0.001	0.003	0.001	0.002
Mercury		mg/L	0.001	MAC	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Molybdenum	Mo	mg/L	-		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0005	0.0008	0.0007	0.0005	0.0003	0.0004	0.0005	0.0005
Nickel	Ni	mg/L	-		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Selenium	Se	mg/L	0.01	MAC	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.001	< 0.001
Silver	Ag	mg/L	-		<0.0001	<0.0001	<0.0001	<0.0005	<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
Strontium	Sr		-		0.174	0.196	0.164	0.189	0.173	0.208	0.185	0.188	0.172	0.167	0.172	0.203	0.172	0.194	0.172	0.182	0.187	0.168
Thallium	Tl	mg/L	-		<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Tin	Sn	mg/L	-		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Titanium	Ti	mg/L	-		0.002	<0.002	<0.002	<0.002	<0.002	0.003	<0.002	<0.002	<0.002	<0.002	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Uranium	U	mg/L	0.02	MAC	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.00096	0.00132	0.00092	0.00074	0.00046	0.00051	0.00088	0.00093
Vanadium	V	mg/L	-		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0002	0.0003	0.0002	0.0002	0.0002	0.0001	0.0002	0.0002
Zinc	Zn	µmhos/cm	5	AO	<0.005	<0.005	<0.005	<0.005	<0.005	0.007	<0.005	<0.005	0.005	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.005	< 0.005	< 0.005
Total Dissolved Solids	TDS	mg/L	500	AO	370	396	414	372	406	402	410	406	438	396	307	320	316	301	347	347	335	331
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	**303**	**366**	**346**	**357**	**332**	**320**	**355**	**340**	**338**	**336**	**328**	**332**	**337**	**352**	**353**	**388**	**344**	**340**
% Difference			-		2.7	0.8	1.2	3.89	5.94	5.29	2.91	3.19	4.3	2.7	0.44	2.58	2.6	6.1	0.907	9.95	0.0299	3.16
Biological Oxygen Demand	BOD	mg/L	-		<2	<5	<5	<5	<5	10	<5	<5	<5	<5	3	< 3	< 3	< 3	< 3	< 3	< 3	< 3
Total Kjeldahl Nitrogen	TKN	mg/L	-		<0.10	<0.10	<0.10	<0.10	<0.10	0.29	<0.10	0.24	<0.10	0.65	1.3	0.2	0.4	0.3	0.3	0.3	0.5	0.5
Chemical Oxygen Demand	COD	mg/L	-		<5	7	<5	<5	7	<5	<5	<5	<5	<5	32	< 5	< 5	23	< 5	< 5	5	30
Phenols		mg/L	-		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.002	< 0.002	< 0.002	< 0.001	< 0.002	< 0.002	< 0.001	< 0.001
Field Conductivity		µS/cm	-		678	680	674	494	930	727	600	740	745	728	571	353	634	520	720	733		528
Field pH			-		8.6	7.91	8.12	7.99	7.72	7.92	8.14	8.24	8.01	6.5	8.02	8.15	7.45	7.48	7.65	7.78		7.93
Field Temperature		oC	-		2.4	12	6.3	9.4	4.3	9.9	9.9	7.6	5.5	9.8	8.7	10.7	5.4	8	8.5	11.2		7.9

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**When the fluoride concentration exceeds 2.4 mg/L, it should be reported to the local medical officer of health.
† Where nitrate and nitrite are present, their total should not exceed 10 mg/L.
‡ Water is considered unsafe if Total Coliform are detected in consecutive samples.

MAC - Maximum Acceptable Concentration
IMAC - Interim Maximum Acceptable Concentration
AO - Aesthetic Objective
OG - Operational Guideline
ND - Not Detected

Results of Chemical Analyses

South Easthope Landfill			Ontario Drinking Water Standards		Reasonable Use Criteria (RUC)	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87
						Sampled on: 23-Apr-96	Sampled on: 14-Nov-96	Sampled on: 17-Apr-97	Sampled on: 26-Nov-97	Sampled on: 28-Apr-98	Sampled on: 26-Nov-98	Sampled on: 20-Apr-99	Sampled on: 23-Nov-99	Sampled on: 20-Apr-00	Sampled on: 20-Nov-00	Sampled on: 30-Apr-01	Sampled on: 25-Apr-02	Sampled on: 26-Nov-02	Sampled on: 22-May-03	Sampled on: 05-Dec-03	Sampled on: 05-Jun-04	Sampled on: 05-Oct-04
						Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC
Parameter	Symbol	Units	Objective	Type		Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT
Saturation pH			-		-												7.5	7.47	7.2	7.2	7.18	7.18
pH			6.5-8.5	OG	-	7.6	7.62	8.2	7.5	7.9	8.31	7.9	7.76	7.4	7.7	8.3	8.4	8.23	7.65	8.13	7.89	7.82
Langelier Saturation Index			-		-												0.9			0.93	0.71	0.64
T - Alkalinity		mg/L	30-500	OG	369	201	241	224	252	150	252	199	203	238	202	199	219	238	216	214	210	214
Bicarbonate	HCO_3^-	mg/L	-		-												259	290	216	214	210	214
Carbonate	CO_3^{-2}	mg/L	-		-												<5	<5	<5	<5	<5	<5
Hydroxide		mg/L	-		-												<5	<5	<5	<5	<5	<5
Electrical Conductivity		µS/cm	-		-	473	677	514	520	450	532	509	640	560	520	500	465	403	441	799	447	447
Fluoride	F^-	mg/L	2.4	**MAC	0.7												0.4	0.4	0.34	0.34	0.35	0.36
Chloride	Cl^-	mg/L	250	AO	134	<1.0	<1.0	2.4	<1.0	0.4	<1.0	5.3	43.4	7.3	6.2	3.2	3.2	2.2	1.87	1.8	1.68	1.32
Nitrate	NO_3-N	mg/L	10	†MAC	14.5	<0.05	0.13	0.23	<0.05	<0.05	<0.05	0.03	0.6	0.41	0.77	0.25	1.2	7.2	0.06	0.10	0.12	0.09
Nitrite	NO_2-N	mg/L	1	†MAC	0.31	<0.05											<0.3	<0.3	<0.05	<0.05	<0.05	<0.05
Bromide	Br^-	mg/L	-		-												<0.1	<0.1	<0.05	<0.05	<0.05	<0.05
Sulfate	SO_4^{-2}	mg/L	500	AO	267	38.4	28.6	33.1	10.9	67.8	31.1	38.4	40.4	38.1	30.9	41.2	39	30.1	28.7	33.1	30.9	26.3
Calcium	Ca	mg/L	-		-	39.5	48.3	43.4	56	29	47.6	45.8	57.3	42.8	45.1	45.4	45.6	48.1	40.1	42.1	45.8	44.5
Magnesium	Mg	mg/L	-		-	21.2	24.4	23.6	24	22.6	22.5	25.7	26	22.8	23.4	24.2	24.3	27.4	24.9	22.8	24	23.6
Sodium	Na	mg/L	200	*AO	104	22	23.6	24.6	18	22	20	17	19.3	33.3	29.5	19.9	21.6	22	15.7	14.9	15.3	14.9
Potassium	K	mg/L	-		-	1.6	4.2	<0.1	<0.1	<0.1	1.9	2.5	3	2.3	2.6	2.8	1.3	2.4	2.68	2.3	2.53	2.17
Ammonia Nitrogen	NH_3-N	mg/L	-		-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Orthophosphate	PO_4^{-3}	mg/L	-		-												<0.15	<0.15	<0.15	<0.05	<0.05	<0.05
Total Phosphorus		mg/L	-		-															<0.05		
Reactive Silica		mg/L	-		-												18.2	16.5	18.0	17.4	16	19.4
Dissolved Organic Carbon	DOC	mg/L	5	AO	4.1	0.6	1.9	0.7	0.6	0.5	0.7	1.1	0.8	1	4	**9.3**	<1	2	1	<1	<1	<1
Colour		Colour Units	5	AO	-												5	**10**	5	5	<5	<5
Turbidity		NTU	5	AO	-												<0.5	1.6	<0.5	0.5	<0.5	<0.5
Aluminum	Al	mg/L	0.1	OG	0.07												0.014	<0.002	0.002	0.004	0.014	0.034
Arsenic	As	mg/L	0.025	IMAC	0.007												<0.005	<0.005	<0.005	<0.003	<0.003	<0.003
Barium	Ba	mg/L	1	MAC	0.29												0.048	0.046	0.035	0.045	0.042	0.042
Boron	B	mg/L	5	IMAC	1.3												0.01	0.03	0.02	0.02	0.02	0.024
Cadmium	Cd	mg/L	0.005	MAC	0.001												<0.001	0.004	<0.001	<0.002	<0.002	<0.002
Chromium	Cr	mg/L	0.05	MAC	0.014												<0.002	0.018	<0.002	<0.003	<0.003	0.003
Copper	Cu	mg/L	1	AO	0.50												0.02	0.011	0.002	<0.002	0.004	<0.002
Iron	Fe	mg/L	0.3	AO	0.16	<0.02	**1.62**	<0.02	<0.02	<0.02	<0.02	**0.51**	**1.83**	<0.02	<0.02	**2.01**	0.096	0.091	0.111	0.139	0.126	**0.63**
Lead	Pb	mg/L	0.01	MAC	0.003												<0.01	<0.01	<0.01	<0.002	<0.002	<0.002
Manganese	Mn	mg/L	0.05	AO	0.03												0.02	0.015	0.002	0.010	0.008	0.02
Mercury		mg/L	0.001	MAC	0.0003												<0.0001	<0.0001	<0.0001	<0.00005	<0.00005	<0.00005
Molybdenum	Mo	mg/L	-		-												0.006	<0.003	<0.003	0.002	0.002	0.003
Nickel	Ni	mg/L	-		-												0.005	<0.003	<0.003	<0.003	<0.003	<0.003
Selenium	Se	mg/L	0.01	MAC	0.004												<0.005	<0.005	<0.005	<0.004	<0.004	<0.004
Silver	Ag	mg/L	-		-												0.003	<0.001	<0.001	<0.002	<0.002	<0.002
Strontium	Sr		-		-												0.407	0.292	0.260	0.352	0.317	0.406
Thallium	Tl	mg/L	-		-												<0.02	<0.06	<0.06	<0.06	<0.06	<0.06
Tin	Sn	mg/L	-		-												<0.007	<0.009	<0.009	<0.009	0.03	<0.009
Titanium	Ti	mg/L	-		-												<0.001	0.008	0.040	0.001	0.001	<0.001
Uranium	U	mg/L	0.02	MAC	0.006												<0.05	<0.05	<0.05	<0.001	<0.001	<0.001
Vanadium	V	mg/L	-		-												0.001	0.001	<0.001	<0.001	<0.001	<0.001
Zinc	Zn	µmhos/cm	5	AO	2.5												0.032	0.043	0.009	0.028	0.021	0.04
Total Dissolved Solids	TDS	mg/L	500	AO	429	261	293	279	290	251	291	270	330	310	270	290	268	275	248	156	284	244
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	223	**187**	**222**	**207**	**240**	**167**	**213**	**222**	**251**	**202**	**210**	**215**	**213**	**232**	**203**	**200**	**213**	**208**
% Difference			-		-								1.85	2.08	6.12	2.84	0.57	1.79	6.5	4.8	9.1	8.4
Biological Oxygen Demand	BOD	mg/L	-		-																	
Total Kjeldahl Nitrogen	TKN	mg/L	-		-	0.4	4.23	9.32	4.2	0.5	2	3.2	2.9	3.5	1.3	2.6	0.19	<0.05				
Chemical Oxygen Demand	COD	mg/L	-		-																	
Phenols		mg/L	-		-	<2	<2	<2	<2	<2	<1	<1	<1	<1	<1	20			<0.002	<0.002	<0.002	<0.002
Field Conductivity		µS/cm	-		-																	
Field pH			-		-																	
Field Temperature		oC	-		-																	

Bold / Highlighting indicates ODWQS exceedance
Bold / Italics indicates RUC exceedance

* When the sodium concentration exceeds 20 mg/L, it should be considered in sodium-restricted diets.
**When the fluoride concentration exceeds 2.4 mg/L, it should be reported to the local medical officer of health.
† Where nitrate and nitrite are present, their total should not exceed 10 mg/L.
‡ Water is considered unsafe if Total Coliform are detected in consecutive samples.

MAC - Maximum Acceptable Concentration
IMAC - Interim Maximum Acceptable Concentration
AO - Aesthetic Objective
OG - Operational Guideline
ND - Not Detected

Results of Chemical Analyses

South Easthope Landfill			Ontario Drinking Water Standards		Reasonable Use Criteria (RUC)	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87
						Sampled on: 19-May-05 Sampled by: AEC Analyzed by: AGAT	Sampled on: 03-Oct-05 Sampled by: AEC Analyzed by: AGAT	Sampled on: 24-May-06 Sampled by: AEC Analyzed by: AGAT	Sampled on: 25-Oct-06 Sampled by: AEC Analyzed by: AGAT	Sampled on: 26-Apr-07 Sampled by: AEC Analyzed by: AGAT	Sampled on: 24-Oct-07 Sampled by: AEC Analyzed by: AGAT	Sampled on: 08-Apr-08 Sampled by: AEC Analyzed by: AGAT	Sampled on: 30-Oct-08 Sampled by: AEC Analyzed by: AGAT	Sampled on: 15-Apr-09 Sampled by: AEC Analyzed by: AGAT	Sampled on: 27-Oct-09 Sampled by: AEC Analyzed by: AGAT	Sampled on: 09-Apr-10 Sampled by: AEC Analyzed by: AGAT	Sampled on: 20-Oct-10 Sampled by: AEC Analyzed by: AGAT	Sampled on: 14-Apr-11 Sampled by: AEC Analyzed by: AGAT	Sampled on: 19-Oct-11 Sampled by: AEC Analyzed by: AGAT	Sampled on: 04-Apr-12 Sampled by: AEC Analyzed by: AGAT	Sampled on: 24-Oct-12 Sampled by: AEC Analyzed by: AGAT	Sampled on: 10-Apr-13 Sampled by: AEC Analyzed by: AGAT
Parameter	Symbol	Units	Objective	Type																		
Saturation pH			-		-	7.66	7.11	7.17	7.18	7.16	7.2	7.13	7.14	7.12	7.08	7.13	7.15	7.11	7.14	7.16	7.14	7.1
pH			6.5-8.5	OG	-	8.16	8.31	8.15	8.19	8.35	8.23	8.46	8.32	8.2	8.39	8.2	8.1	8.26	8.27	8.33	8.35	8.05
Langelier Saturation Index			-		-	0.5		0.98	1.01	1.19	1.03	1.33	1.18	1.08	1.31	1.07	0.95	1.15	1.13	1.17	1.21	0.95
T - Alkalinity		mg/L	30-500	OG	369	250	218	214	214	219	214	228	221	234	228	221	216	228	217	219	228	221
Bicarbonate	HCO_3^-	mg/L	-		-	305	212	214	214	208	214	228	218	234	222	221	216	228	217	215	222	221
Carbonate	CO_3^{-2}	mg/L	-		-	<5	6	<10	<10	11	<10	<5	<5	<5	6	<5	<5	<5	<5	<5	7	<5
Hydroxide		mg/L	-		-	<5	<5	<10	<10	<10	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Electrical Conductivity		μS/cm	-		-	442	448	454	450	455	448	460	468	458	468	428	457	462	377	445	410	477
Fluoride	F^-	mg/L	2.4	**MAC	0.7	0.29	0.38	0.32	0.35	<0.05	0.39	0.28	0.16	0.33	0.25	0.32	0.31	0.3	<0.05	0.32	0.29	0.25
Chloride	Cl^-	mg/L	250	AO	134	2.25	2.32	2.21	2.31	2.64	1.99	1.65	2.7	2.48	1.72	1.82	1.9	2.17	3.19	2.49	2.54	3.08
Nitrate	NO_3-N	mg/L	10	†MAC	14.5	0.35	0.73	0.16	0.13	0.2	0.08	0.1	<0.05	0.22	<0.05	<0.05	<0.05	<0.05	<0.05	0.09	<0.05	<0.05
Nitrite	NO_2-N	mg/L	1	†MAC	0.31	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Bromide	Br^-	mg/L	-		-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sulfate	SO_4^{-2}	mg/L	500	AO	267	29.6	30.4	31.2	32.3	28.8	26.3	32.5	29.6	35.5	30.1	29.5	36.7	29.8	33	30.3	28.3	30
Calcium	Ca	mg/L	-		-	37.6	46.1	47	46.3	46.8	43.7	48	47.8	48.5	53.6	49	49.4	49.8	49.4	49.7	46.2	54.4
Magnesium	Mg	mg/L	-		-	22.1	22.5	23.3	23	23.6	22.4	24.4	24.9	23.8	27.8	25.3	24.1	25.3	24.7	24.9	24.6	26.3
Sodium	Na	mg/L	200	*AO	104	13.7	14.6	13.8	14.8	14.6	15.2	13.4	14	14.2	14.5	13.8	13.1	13.4	13.4	14.1	12.4	14
Potassium	K	mg/L	-		-	2.16	2.25	2.48	2.27	2.33	1.81	2.12	2.05	1.81	1.91	2.08	1.87	1.92	2.4	2.51	1.97	2.54
Ammonia Nitrogen	NH_3-N	mg/L	-		-	0.08	<0.05	0.38	0.09	<0.05	0.1	<0.05	0.3	<0.05	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	0.05	0.03
Orthophosphate	PO_4^{-3}	mg/L	-		-	<0.15	<0.05	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Total Phosphorus		mg/L	-		-		0.11	0.08	<0.05	0.04	<0.05	<0.05	0.04	0.91	<0.02	0.04	<0.02	<0.02	3.65	0.02	<0.02	0.02
Reactive Silica		mg/L	-		-	16.5	15.5	15.3	16.1	12.7	14.1	15.6	15	12.4	14.9	14.3	14	14	15.5	15.7	13.9	16.6
Dissolved Organic Carbon	DOC	mg/L	5	AO	4.1	<1	2	4	1	1.4	1.1	1.1	2.7	1.9	1.3	1	2.7	1.9	1.2	0.7	1.1	0.7
Colour		Colour Units	5	AO	-	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Turbidity		NTU	5	AO	-	<0.5	**5.2**	3	2.6	**8.6**	<0.5	4.7	<0.5	**80**	0.7	1.2	1.7	**147**	1.2	0.5	<0.5	<0.5
Aluminum	Al	mg/L	0.1	OG	0.07	<0.004	**0.21**	**0.147**	0.012	0.027	0.02	<0.004	<0.004	0.005	0.016	0.009	0.01	0.007	0.011	0.006	0.009	0.006
Arsenic	As	mg/L	0.025	IMAC	0.007	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Barium	Ba	mg/L	1	MAC	0.29	0.031	0.049	0.047	0.044	0.045	0.041	0.05	0.046	0.058	0.048	0.049	0.053	0.045	0.056	0.054	0.041	0.055
Boron	B	mg/L	5	IMAC	1.3	0.018	0.023	0.022	0.02	0.023	0.072	0.024	0.024	0.024	0.016	0.018	0.022	0.019	0.021	0.019	0.021	0.024
Cadmium	Cd	mg/L	0.005	MAC	0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	Cr	mg/L	0.05	MAC	0.014	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Copper	Cu	mg/L	1	AO	0.50	<0.002	<0.002	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Iron	Fe	mg/L	0.3	AO	0.16	**0.5**	**0.369**	**0.333**	0.104	0.086	<0.005	<0.005	<0.010	0.095	0.161	<0.01	**0.8**	0.01	***0.22***	0.09	<0.01	<0.01
Lead	Pb	mg/L	0.01	MAC	0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	Mn	mg/L	0.05	AO	0.03	0.013	0.02	**0.088**	0.024	0.019	0.022	0.011	**0.102**	0.022	0.039	0.028	0.035	0.015	0.013	0.015	0.015	***0.046***
Mercury		mg/L	0.001	MAC	0.0003	<0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	Mo	mg/L	-		-	<0.002	0.003	0.003	0.002	0.002	0.003	0.002	0.002	0.003	0.002	0.002	0.003	0.002	0.002	0.002	0.002	0.002
Nickel	Ni	mg/L	-		-	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.005	<0.003
Selenium	Se	mg/L	0.01	MAC	0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Silver	Ag	mg/L	-		-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Strontium	Sr		-		-	0.285	<0.002	0.43	0.376	0.42	0.501	0.431	0.404	0.42	0.485	0.418	0.415	0.479	0.4	0.41	0.407	0.392
Thallium	Tl	mg/L	-		-	<0.06	<0.06	<0.006	<0.006	<0.006	<0.006	<0.006	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Tin	Sn	mg/L	-		-	<0.009	<0.009	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Titanium	Ti	mg/L	-		-	<0.009	0.033	0.008	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Uranium	U	mg/L	0.02	MAC	0.006	<0.001	0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	V	mg/L	-		-	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Zinc	Zn	μmhos/cm	5	AO	2.5	0.012	0.009	0.013	0.007	0.013	0.075	<0.004	0.01	<0.005	<0.005	0.02	<0.005	<0.005	0.008	<0.005	<0.005	<0.005
Total Dissolved Solids	TDS	mg/L	500	AO	429	380	148	252	246	256	252	240	252	268	276	248	254	264	254	306	262	244
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	223	**285**	**208**	**213**	**210**	**214**	**201**	**220**	**222**	**219**	**248**	**227**	**223**	**229**	**225**	**227**	**217**	**244**
% Difference			-		-	13.5	4.8	6.47	7	5.4	1.6	2.5	<0.1	4.4	3.6	0.7	0.9	0.6	0.2	1	3.2	3.8
Biological Oxygen Demand	BOD	mg/L	-		-		<5					<5	<5	<5	<5	<5	<2	<2	<2	<5	<2	5
Total Kjeldahl Nitrogen	TKN	mg/L	-		-		0.22	0.42	0.23	<0.10	0.31	<0.10	0.26		<0.10	<0.10	0.27	0.54	<0.10	<0.10	<0.10	<0.10
Chemical Oxygen Demand	COD	mg/L	-		-											11	5	10	20	<5	18	<5
Phenols		mg/L	-		-	<0.002	<0.002	<0.001	<0.001	0.003	<0.001	<0.002	<0.001	<0.002	<0.001	0.001	0.005	<0.001	0.003	0.002	<0.001	0.002
Field Conductivity		μS/cm	-		-			660	600	520	540		471		493	458	500	480	500	500	560	420
Field pH			-		-			7.69	8.21	8.4	8.53		9.31		8.83	8.08	8.32	8.65	8.1	9.8	8.4	7.97
Field Temperature		oC	-		-			8.5	8.8	7.5	8.2		8.4		10.6	3.4	10.5	7.3	9.8	8.2	10.1	6

Bold / Highlighting indicates ODWQS exceedance
Bold / Italics indicates RUC exceedance

* When the sodium concentration exceeds 20 mg/L, it should be considered in sodium-restricted diets.
**When the fluoride concentration exceeds 2.4 mg/L, it should be reported to the local medical officer of health.
† Where nitrate and nitrite are present, their total should not exceed 10 mg/L.
‡ Water is considered unsafe if Total Coliform are detected in consecutive samples.

MAC - Maximum Acceptable Concentration
IMAC - Interim Maximum Acceptable Concentration
AO - Aesthetic Objective
OG - Operational Guideline
ND - Not Detected

Results of Chemical Analyses

South Easthope Landfill			Ontario Drinking Water Standards		Reasonable Use Criteria (RUC)	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87	OW4a-87
						Sampled on: 29-Oct-13 Sampled by: AEC Analyzed by: AGAT	Sampled on: 16-Apr-14 Sampled by: AEC Analyzed by: AGAT	Sampled on: 28-Oct-14 Sampled by: AEC Analyzed by: AGAT	Sampled on: 16-Apr-15 Sampled by: AEC Analyzed by: AGAT	Sampled on: 27-Oct-15 Sampled by: AEC Analyzed by: AGAT	Sampled on: 12-Apr-16 Sampled by: AEC Analyzed by: AGAT	Sampled on: 20-Oct-16 Sampled by: AEC Analyzed by: AGAT	Sampled on: 19-Apr-17 Sampled by: AEC Analyzed by: AGAT	Sampled on: 31-Oct-17 Sampled by: AEC Analyzed by: AGAT	Sampled on: 19-Apr-18 Sampled by: AEC Analyzed by: AGAT	Sampled on: 23-Oct-18 Sampled by: AEC Analyzed by: AGAT	Sampled on: 16-Apr-19 Sampled by: AEC Analyzed by: Caduceon	Sampled on: 22-Oct-19 Sampled by: AEC Analyzed by: Caduceon	Sampled on: 20-Apr-20 Sampled by: AEC Analyzed by: Caduceon	Sampled on: 26-Oct-20 Sampled by: AEC Analyzed by: Caduceon	Sampled on: 13-Apr-21 Sampled by: AEC Analyzed by: Caduceon	Sampled on: 20-Oct-21 Sampled by: AEC Analyzed by: Caduceon
Parameter	**Symbol**	**Units**	**Objective**	**Type**																		
Saturation pH			-		-	7.13	7.19	7.13	7.14	7.14	7.15	7.12	7.11	7.09	7.09	7.15	7.39	7.39	7.39	7.46	7.38	7.3
pH			6.5-8.5	OG	-	8.21	8.2	8.23	8.08	8.21	8.08	8.11	8.2	7.93	7.98	8.01	8.13	8.04	7.94	7.95	8.07	8.3
Langelier Saturation Index			-		-	1.08	1.01	1.1	0.94	1.07	0.93	0.99	1.09	0.84	0.89	0.86	0.737	0.645	0.552	0.489	0.694	0.999
T - Alkalinity		mg/L	30-500	OG	369	227	216	223	223	208	230	235	234	236	244	205	213	219	207	208	218	235
Bicarbonate	HCO_3^-	mg/L	-		-	227	216	223	223	208	230	235	234	236	244	205	213	219	207	208	218	235
Carbonate	CO_3^{-2}	mg/L	-		-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	< 5	< 5	< 5	< 5	< 5	< 5
Hydroxide		mg/L	-		-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	< 5	< 5	< 5	< 5	< 5	< 5
Electrical Conductivity		µS/cm	-		-	456	480	484	495	462	465	472	480	403	413	501	489	473	487	489	479	485
Fluoride	F^-	mg/L	2.4	**MAC	0.7	0.27	0.28	0.22	0.24	0.25	<0.10	0.28	0.25	0.17	0.25	0.26	0.3	0.3	< 0.1	0.2	0.2	< 0.1
Chloride	Cl^-	mg/L	250	AO	134	2.75	3.59	2.82	3.17	2.85	4.41	3.26	4.21	3.93	4.95	4.78	5.2	4.8	6.5	6.1	8.3	5.7
Nitrate	NO_3-N	mg/L	10	†MAC	14.5	<0.05	0.12	<0.05	<0.10	<0.10	0.34	0.05	0.1	<0.05	0.26	0.06	0.06	0.09	0.23	0.25	0.21	< 0.05
Nitrite	NO_2-N	mg/L	1	†MAC	0.31	<0.05	<0.10	<0.05	<0.10	<0.10	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Bromide	Br^-	mg/L	-		-	<0.05	<0.10	<0.05	<0.10	<0.10	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Sulfate	SO_4^{-2}	mg/L	500	AO	267	29.3	30.8	28.8	28.5	28.2	32.9	31.2	30.8	32	29.8	30.6	30	25	31	34	34	31
Calcium	Ca	mg/L	-		-	49.1	45.2	50.3	49.6	52.4	47.2	49.7	49.6	52.1	51.9	53.3	51.5	49.8	53.4	59.2	52.1	59.1
Magnesium	Mg	mg/L	-		-	23.3	21.6	24.3	23.5	25.1	21.8	22.8	24.1	25.2	23.8	23.9	24.8	26.6	25.8	28.3	25.4	30.4
Sodium	Na	mg/L	200	*AO	104	12.2	12.9	12.5	11.9	12.9	13.1	11.7	11.8	11.3	11.4	11	11.1	11.6	11.6	11.8	11.7	11.4
Potassium	K	mg/L	-		-	1.76	2.88	1.88	2.06	3.04	3.03	2.09	2.45	2.52	2.53	2.14	2.9	1.9	2.8	2.9	3.1	1.8
Ammonia Nitrogen	NH_3-N	mg/L	-		-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.06	0.06	0.08	0.08	0.01	0.03
Orthophosphate	PO_4^{-3}	mg/L	-		-	<0.10	<0.20	<0.10	<0.20	<0.20	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10	0.07	0.105	0.039	< 0.002	0.016	0.019
Total Phosphorus		mg/L	-		-	<0.02	0.03	0.06	0.01	0.2	0.03	0.04	0.02	0.06	<0.02	0.02	0.09	0.14	0.05	1.22	0.14	0.1
Reactive Silica		mg/L	-		-	14.5	16.5	14.7	15.1	16.2	16.6	15	16.3	16.1	16.8	14.7	15.2	14.4	17.5	17.5	18.2	15.9
Dissolved Organic Carbon	DOC	mg/L	5	AO	4.1	0.8	0.8	3.3	**7.3**	0.8	**5.2**	1.4	0.8	0.8	0.6	1.4	1.5	1.1	0.9	0.8	2.2	1.6
Colour		Colour Units	5	AO	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	< 2	< 2	< 2	< 2	< 2	< 2
Turbidity		NTU	5	AO	-	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	2	<0.5	**21.4**	**145**	0.6	**336**	**121**	**163**	**3970**	**912**	**245**
Aluminum	Al	mg/L	0.1	OG	0.07	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	0.056	0.011	0.026	<0.004	0.011	0.04	0.04	0.02	0.04	0.01	0.04
Arsenic	As	mg/L	0.025	IMAC	0.007	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.0013	0.0008	0.0015	0.0015	0.0018	0.0013
Barium	Ba	mg/L	1	MAC	0.29	0.044	0.053	0.057	0.048	0.053	0.048	0.051	0.056	0.049	0.055	0.056	0.048	0.048	0.053	0.062	0.057	0.06
Boron	B	mg/L	5	IMAC	1.3	0.018	0.021	0.017	0.021	<0.010	0.019	0.022	0.022	0.02	0.02	0.023	0.016	0.02	0.019	0.019	0.018	0.023
Cadmium	Cd	mg/L	0.005	MAC	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015	0.000033
Chromium	Cr	mg/L	0.05	MAC	0.014	<0.003	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Copper	Cu	mg/L	1	AO	0.50	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0005	0.0002	0.0016	0.0021	0.0006	0.0008
Iron	Fe	mg/L	0.3	AO	0.16	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	***0.27***	0.06	<0.01	<0.01	< 0.005	0.095	< 0.005	0.035	< 0.005	0.047
Lead	Pb	mg/L	0.01	MAC	0.003	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	0.00003	< 0.00002	0.00004	0.00012	0.00004	0.00012
Manganese	Mn	mg/L	0.05	AO	0.03	0.024	0.005	0.004	0.011	0.002	0.008	0.008	***0.036***	0.019	0.002	0.008	< 0.001	***0.03***	< 0.001	0.004	< 0.001	0.027
Mercury		mg/L	0.001	MAC	0.0003	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Molybdenum	Mo	mg/L	-		-	0.002	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.001	0.0016	0.0011	0.0007	0.0008	0.0011
Nickel	Ni	mg/L	-		-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Selenium	Se	mg/L	0.01	MAC	0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Silver	Ag	mg/L	-		-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Strontium	Sr		-		-	0.436	0.425	0.44	0.376	0.356	0.359	0.433	0.443	0.412	0.377	0.453	0.301	0.51	0.342	0.405	0.345	0.644
Thallium	Tl	mg/L	-		-	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Tin	Sn	mg/L	-		-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Titanium	Ti	mg/L	-		-	<0.002	0.003	<0.002	<0.002	<0.002	<0.002	0.004	<0.002	<0.002	<0.002	<0.002	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Uranium	U	mg/L	0.02	MAC	0.006	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.00028	0.00043	0.00027	0.00025	0.00022	0.00031
Vanadium	V	mg/L	-		-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	< 0.0001	0.0001	< 0.0001	0.0002	< 0.0001	0.0002
Zinc	Zn	µmhos/cm	5	AO	2.5	<0.005	<0.005	0.007	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.006
Total Dissolved Solids	TDS	mg/L	500	AO	429	240	246	232	260	240	264	268	256	272	272	258	253	252	255	268	266	280
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	223	**219**	**202**	**226**	**221**	**234**	**208**	**218**	**223**	**234**	**228**	**232**	**231**	**234**	**240**	**265**	**235**	**273**
% Difference			-		-	3	4.3	0.5	1.8	4.68	6.25	5.24	4.09	2.6	5.25	2.66	1.32	1.71	3.79	7.26	0.468	4.37
Biological Oxygen Demand	BOD	mg/L	-		-	<2	<2	<5	<5	<5	<5	<5	<5	<5	<5	<5	< 3	< 3	< 3	5	6	< 3
Total Kjeldahl Nitrogen	TKN	mg/L	-		-	<0.10	<0.10	0.4	<0.10	<0.10	0.57	<0.10	<0.10	<0.10	<0.10	0.24	0.2	0.3	0.2	1.2	0.3	0.3
Chemical Oxygen Demand	COD	mg/L	-		-	<5	<5	17	<5	<5	27	<5	<5	<5	<5	<5	5	< 5	< 5	75	< 5	5
Phenols		mg/L	-		-	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.002	< 0.002	< 0.002	< 0.001	< 0.002	< 0.002
Field Conductivity		µS/cm	-		-	410	438	600	486	441	630	494	420	740	580	538	411	478	452	420	570	601
Field pH			-		-	8.96	8.32	7.87	8.16	8.74	7.68	7.94	8.27	8.24	8.04	7.6	8.02	7.78	7.62	7.5	7.76	8.05
Field Temperature		oC	-		-	8.5	6.3	10.5	7.7	10.1	6.1	10.2	11.2	7.6	5.9	8.4	10.1	9.8	4.2	8.4	11.1	11.5

Bold / Highlighting indicates ODWQS exceedance
Bold / Italics indicates RUC exceedance

* When the sodium concentration exceeds 20 mg/L, it should be considered in sodium-restricted diets.
**When the fluoride concentration exceeds 2.4 mg/L, it should be reported to the local medical officer of health.
† Where nitrate and nitrite are present, their total should not exceed 10 mg/L.
‡ Water is considered unsafe if Total Coliform are detected in consecutive samples.

MAC - Maximum Acceptable Concentration
IMAC - Interim Maximum Acceptable Concentration
AO - Aesthetic Objective
OG - Operational Guideline
ND - Not Detected

Results of Chemical Analyses

South Easthope Landfill			Ontario Drinking Water Standards		Reasonable Use Criteria (RUC)	OW4a-87	OW4a-87
						Sampled on: 06-Apr-22 Sampled by: AEC Analyzed by: Caduceon	Sampled on: 18-Oct-22 Sampled by: AEC Analyzed by: Caduceon
Parameter	**Symbol**	**Units**	**Objective**	**Type**			
Saturation pH			-		-	7.34	7.35
pH			6.5-8.5	OG	-	8.1	7.93
Langelier Saturation Index			-		-	0.755	0.581
T - Alkalinity		mg/L	30-500	OG	369	225	225
Bicarbonate	HCO_3^-	mg/L	-		-	225	225
Carbonate	CO_3^{-2}	mg/L	-		-	< 5	< 5
Hydroxide		mg/L	-		-	< 5	< 5
Electrical Conductivity		µS/cm	-		-	510	502
Fluoride	F^-	mg/L	2.4	**MAC	0.7	0.2	0.2
Chloride	Cl^-	mg/L	250	AO	134	10.2	12.3
Nitrate	NO_3-N	mg/L	10	†MAC	14.5	0.19	0.21
Nitrite	NO_2-N	mg/L	1	†MAC	0.31	< 0.05	< 0.05
Bromide	Br^-	mg/L	-		-	< 0.4	< 0.4
Sulfate	SO_4^{-2}	mg/L	500	AO	267	32	34
Calcium	Ca	mg/L	-		-	55.7	55.2
Magnesium	Mg	mg/L	-		-	26.9	25.8
Sodium	Na	mg/L	200	*AO	104	12.3	10.9
Potassium	K	mg/L	-		-	3.2	2.9
Ammonia Nitrogen	NH_3-N	mg/L	-		-	< 0.01	0.02
Orthophosphate	PO_4^{-3}	mg/L	-		-	0.003	< 0.002
Total Phosphorus		mg/L	-		-	0.47	0.1
Reactive Silica		mg/L	-		-	18.3	16.7
Dissolved Organic Carbon	DOC	mg/L	5	AO	4.1	1.7	0.8
Colour		Colour Units	5	AO	-	< 2	< 2
Turbidity		NTU	5	AO	-	**745**	**95.4**
Aluminum	Al	mg/L	0.1	OG	0.07	0.04	< 0.01
Arsenic	As	mg/L	0.025	IMAC	0.007	0.0014	0.0014
Barium	Ba	mg/L	1	MAC	0.29	0.062	0.063
Boron	B	mg/L	5	IMAC	1.3	0.018	0.016
Cadmium	Cd	mg/L	0.005	MAC	0.001	< 0.000015	< 0.000010
Chromium	Cr	mg/L	0.05	MAC	0.014	< 0.001	< 0.001
Copper	Cu	mg/L	1	AO	0.50	0.0009	0.0006
Iron	Fe	mg/L	0.3	AO	0.16	0.011	< 0.005
Lead	Pb	mg/L	0.01	MAC	0.003	0.00006	0.00004
Manganese	Mn	mg/L	0.05	AO	0.03	0.004	< 0.001
Mercury		mg/L	0.001	MAC	0.0003	< 0.00002	< 0.00002
Molybdenum	Mo	mg/L	-		-	0.0009	0.0009
Nickel	Ni	mg/L	-		-	< 0.01	< 0.01
Selenium	Se	mg/L	0.01	MAC	0.004	< 0.001	< 0.001
Silver	Ag	mg/L	-		-	< 0.0001	< 0.0001
Strontium	Sr		-		-	0.37	0.298
Thallium	Tl	mg/L	-		-	< 0.00005	< 0.00005
Tin	Sn	mg/L	-		-	< 0.05	< 0.05
Titanium	Ti	mg/L	-		-	< 0.005	< 0.005
Uranium	U	mg/L	0.02	MAC	0.006	0.00028	0.00023
Vanadium	V	mg/L	-		-	0.0001	< 0.0001
Zinc	Zn	µmhos/cm	5	AO	2.5	< 0.005	< 0.005
Total Dissolved Solids	TDS	mg/L	500	AO	429	275	276
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	223	**250**	**244**
% Difference			-		-	1.32	1.23
Biological Oxygen Demand	BOD	mg/L	-		-	< 3	< 3
Total Kjeldahl Nitrogen	TKN	mg/L	-		-	0.4	0.3
Chemical Oxygen Demand	COD	mg/L	-		-	5	6
Phenols		mg/L	-		-	< 0.001	< 0.001
Field Conductivity		µS/cm	-		-		497
Field pH			-		-		7.86
Field Temperature		oC	-		-		8.9

Bold / Highlighting indicates ODWQS exceedance

Bold / Italics indicates RUC exceedance

Results of Chemical Analyses

South Easthope Landfill Parameter	Symbol	Units	Ontario Drinking Water Standards Objective	Type	Reasonable Use Criteria (RUC)	OW4b-87 Sampled on: 23-Apr-96 Sampled by: Analyzed by:	OW4b-87 Sampled on: 14-Nov-96 Sampled by: Analyzed by:	OW4b-87 Sampled on: 17-Apr-97 Sampled by: Analyzed by:	OW4b-87 Sampled on: 26-Nov-97 Sampled by: Analyzed by:	OW4b-87 Sampled on: 28-Apr-98 Sampled by: Analyzed by:	OW4b-87 Sampled on: 20-Apr-99 Sampled by: Analyzed by:	OW4b-87 Sampled on: 20-Apr-00 Sampled by: Analyzed by:	OW4b-87 Sampled on: 01-Nov-00 Sampled by: Analyzed by:	OW4b-87 Sampled on: 30-Apr-01 Sampled by: Analyzed by:	OW4b-87 Sampled on: 25-Apr-02 Sampled by: AEC Analyzed by: AGAT	OW4b-87 Sampled on: 26-Nov-02 Sampled by: AEC Analyzed by: AGAT	OW4b-87 Sampled on: 22-May-03 Sampled by: AEC Analyzed by: AGAT	OW4b-87 Sampled on: 05-Dec-03 Sampled by: AEC Analyzed by: AGAT	OW4b-87 Sampled on: 05-Jun-04 Sampled by: AEC Analyzed by: AGAT	OW4b-87 Sampled on: 05-Oct-04 Sampled by: AEC Analyzed by: AGAT	OW4b-87 Sampled on: 19-May-05 Sampled by: AEC Analyzed by: AGAT	OW4b-87 Sampled on: 24-May-06 Sampled by: AEC Analyzed by: AGAT
Saturation pH			-		-										6.99	7.13	6.88	6.81	6.76	6.83	7.33	6.86
pH			6.5-8.5	OG	-	7.2	7.54	7.6	7.5	7.5	7.8	7.4	7.6	8.5	8.2	7.81	7.44	7.84	7.23	7.57	7.95	7.79
Langelier Saturation Index			-		-										1.21			1.03	0.47	0.74	0.62	0.93
T - Alkalinity		mg/L	30-500	OG	369	240	289	323	260	216	267	281	230	230	275	268	308	322	344	320	225	299
Bicarbonate	HCO_3^-	mg/L	-		-										336	327	308	322	344	320	275	299
Carbonate	CO_3^{-2}	mg/L	-		-										<5	<5	<5	<5	<5	<5	<5	<10
Hydroxide		mg/L	-		-										<5	<5	<5	<5	<5	<5	<5	<10
Electrical Conductivity		µS/cm	-		-	640	701	692	534	586	639	700	580	550	576	400	595	640	652	619	615	617
Fluoride	F^-	mg/L	2.4	**MAC	0.7										0.1	0.1	0.05	0.07	0.07	<0.05	0.05	0.06
Chloride	Cl^-	mg/L	250	AO	134	<1.0	<1.0	<1.0	<1.0	0.5	2.4	8.4	8	4.2	6.1	5	4.15	5.15	3.74	3.77	5.96	8.1
Nitrate	NO_3-N	mg/L	10	†MAC	14.5	<0.05	0.1	0.17	<0.05	<0.05	<0.05	0.36	0.78	0.16	1.7	0.6	1.09	0.51	0.45	0.22	4.13	1.57
Nitrite	NO_2-N	mg/L	1	†MAC	0.31	<0.05									<0.3	<0.3	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Bromide	Br^-	mg/L	-		-										<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sulfate	SO_4^{-2}	mg/L	500	AO	267	78	31.1	34.1	11.5	73	47.2	48.6	49.7	44.8	24	29.3	22.9	33.4	11.1	21.8	24.1	28.4
Calcium	Ca	mg/L	-		-	74.9	78.7	89	61.8	64	80.5	81.6	80.2	73	87.6	94	88.7	97.9	115	101	93.5	103
Magnesium	Mg	mg/L	-		-	23.4	25.8	26.5	24.8	25	25.7	23.1	24	24.3	20.3	20.2	19.3	20.3	19	19.7	22.2	17.7
Sodium	Na	mg/L	200	*AO	104	8.8	8	8.8	14.1	8	5	19.9	15.6	11	3.2	4.5	3.63	3.9	2.97	3.54	3.89	3.52
Potassium	K	mg/L	-		-	2.3	5.2	<0.1	<0.1	<0.1	2.6	3.2	2.2	1.9	<0.6	1.1	0.785	1.2	0.58	1.03	0.96	0.79
Ammonia Nitrogen	NH_3-N	mg/L	-		-	<0.05	<0.05	<0.05	<0.05	<0.05	0.19	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.19	<0.05	0.73
Orthophosphate	PO_4^{-3}	mg/L	-		-										<0.15	<0.15	<0.15	<0.05	<0.05	<0.05	<0.15	<0.10
Total Phosphorus		mg/L	-		-													<0.05				<0.05
Reactive Silica		mg/L	-		-										8.49	11.8	10.1	12.3	8.71	11.7	10.6	8.09
Dissolved Organic Carbon	DOC	mg/L	5	AO	4.1	0.9	**7**	0.8	0.6	0.5	1	0.5	**8.3**	**8.8**	1	5	2	<1	<1	2	<1	3.4
Colour		Colour Unit	5	AO	-										5	5	5	5	<5	<5	5	<5
Turbidity		NTU	5	AO	-										0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.6
Aluminum	Al	mg/L	0.1	OG	0.07										0.004	0.022	0.007	0.022	**0.783**	0.01	<0.004	0.004
Arsenic	As	mg/L	0.025	IMAC	0.007										<0.005	<0.005	<0.005	<0.003	<0.003	<0.003	<0.003	<0.003
Barium	Ba	mg/L	1	MAC	0.29										0.029	0.033	0.024	0.036	0.041	0.031	0.031	0.024
Boron	B	mg/L	5	IMAC	1.3										<0.01	0.02	0.01	0.01	0.02	0.012	0.018	<0.010
Cadmium	Cd	mg/L	0.005	MAC	0.001										<0.001	***0.004***	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002
Chromium	Cr	mg/L	0.05	MAC	0.014										<0.002	***0.017***	<0.002	<0.003	0.004	0.004	<0.003	<0.003
Copper	Cu	mg/L	1	AO	0.50										0.007	0.021	0.003	<0.002	0.006	<0.002	<0.002	<0.003
Iron	Fe	mg/L	0.3	AO	0.16	<0.02	**1.89**	<0.02	<0.02	<0.02	**0.39**	<0.02	<0.02	***0.25***	0.006	0.06	***0.267***	***0.218***	**0.635**	**0.507**	**0.5**	***0.281***
Lead	Pb	mg/L	0.01	MAC	0.003										<0.01	<0.01	<0.01	<0.002	<0.002	<0.002	<0.002	<0.002
Manganese	Mn	mg/L	0.05	AO	0.03										0.002	***0.044***	0.003	***0.037***	**0.072**	**0.102**	0.013	0.002
Mercury		mg/L	0.001	MAC	0.0003										<0.0001	<0.0001	<0.0001	<0.00005	<0.00005	<0.00005	<0.0001	<0.0001
Molybdenum	Mo	mg/L	-		-										0.002	<0.003	<0.003	<0.002	<0.002	<0.002	<0.002	<0.002
Nickel	Ni	mg/L	-		-										<0.002	<0.003	<0.003	<0.003	<0.003	<0.003	0.004	<0.003
Selenium	Se	mg/L	0.01	MAC	0.004										<0.005	<0.005	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004
Silver	Ag	mg/L	-		-										0.002	0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002
Strontium	Sr		-		-										0.147	0.142	0.136	0.178	0.209	0.176	0.159	0.136
Thallium	Tl	mg/L	-		-										<0.02	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.006
Tin	Sn	mg/L	-		-										<0.007	<0.009	<0.009	<0.009	0.055	<0.009	<0.009	<0.001
Titanium	Ti	mg/L	-		-										<0.001	0.008	0.09	0.001	0.003	<0.001	<0.001	<0.002
Uranium	U	mg/L	0.02	MAC	0.006										<0.05	<0.05	<0.05	0.001	<0.001	<0.001	<0.001	<0.002
Vanadium	V	mg/L	-		-										<0.001	0.002	<0.001	<0.001	0.002	0.002	<0.001	<0.002
Zinc	Zn	µmhos/cm	5	AO	2.5										0.023	0.145	0.029	0.025	1.06	<0.004	<0.004	0.006
Total Dissolved Solids	TDS	mg/L	500	AO	429	348	338	368	298	319	337	370	290	320	308	315	340	***474***	376	348	380	344
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	223	**285**	**304**	**333**	**258**	**264**	**308**	**300**	**301**	**283**	**302**	**317**	**301**	**328**	**366**	**334**	**324**	**330**
% Difference			-		-							0.36	6.58	4.4	0.24	3.62	4.5	4.9	10.9	8.3	12.1	8.36
Biological Oxygen Demand	BOD	mg/L	-		-																	
Total Kjeldahl Nitrogen	TKN	mg/L	-		-	0.6	8.92	12.03	4.4	0.5	3.2	2.9	3.4	3	0.18	<0.05						0.79
Chemical Oxygen Demand	COD	mg/L	-		-																	
Phenols		mg/L	-		-	<2	<2	<2	<2	<2	<1	<1	<1	40			<0.002	<0.002	<0.002	<0.002	<0.002	<0.001
Field Conductivity		µS/cm	-		-																	490
Field pH			-		-																	8.12
Field Temperature		oC	-		-																	10.2

Bold / Highlighting indicates ODWQS exceedance
Bold / Italics indicates RUC exceedance

* When the sodium concentration exceeds 20 mg/L, it should be considered in sodium-restricted diets.
**When the fluoride concentration exceeds 2.4 mg/L, it should be reported to the local medical officer of health.
† Where nitrate and nitrite are present, their total should not exceed 10 mg/L.
‡ Water is considered unsafe if Total Coliform are detected in consecutive samples.

MAC - Maximum Acceptable Concentration
IMAC - Interim Maximum Acceptable Concentration
AO - Aesthetic Objective
OG - Operational Guideline
ND - Not Detected

Results of Chemical Analyses

South Easthope Landfill			Ontario Drinking Water Standards		Reasonable Use Criteria (RUC)	OW4b-87	OW4b-87	OW4b-87	OW4b-87	OW4b-87	OW4b-87	OW4b-87	OW4b-87	OW4b-87	OW4b-87	OW4b-87	OW4b-87	OW4b-87	OW4b-87	OW4b-87	OW4b-87	OW4b-87
						Sampled on: 25-Oct-06 Sampled by: AEC Analyzed by: AGAT	Sampled on: 26-Apr-07 Sampled by: AEC Analyzed by: AGAT	Sampled on: 24-Oct-07 Sampled by: AEC Analyzed by: AGAT	Sampled on: 08-Apr-08 Sampled by: AEC Analyzed by: AGAT	Sampled on: 30-Oct-08 Sampled by: AEC Analyzed by: AGAT	Sampled on: 15-Apr-09 Sampled by: AEC Analyzed by: AGAT	Sampled on: 27-Oct-09 Sampled by: AEC Analyzed by: AGAT	Sampled on: 09-Apr-10 Sampled by: AEC Analyzed by: AGAT	Sampled on: 20-Oct-10 Sampled by: AEC Analyzed by: AGAT	Sampled on: 14-Apr-11 Sampled by: AEC Analyzed by: AGAT	Sampled on: 19-Oct-11 Sampled by: AEC Analyzed by: AGAT	Sampled on: 04-Apr-12 Sampled by: AEC Analyzed by: AGAT	Sampled on: 24-Oct-12 Sampled by: AEC Analyzed by: AGAT	Sampled on: 10-Apr-13 Sampled by: AEC Analyzed by: AGAT	Sampled on: 29-Oct-13 Sampled by: AEC Analyzed by: AGAT	Sampled on: 16-Apr-14 Sampled by: AEC Analyzed by: AGAT	Sampled on: 28-Oct-14 Sampled by: AEC Analyzed by: AGAT
Parameter	Symbol	Units	Objective	Type																		
Saturation pH			-		-	6.7	6.84		6.91	6.88	7.05	6.86	6.84	6.88	6.85	6.87	6.82		6.79	6.7	6.73	6.69
pH			6.5-8.5	OG	-	7.93	8.05		8.07	8.07	7.99	8.34	7.97	7.96	8	8.2	8.02		8.04	7.99	7.98	8.08
Langelier Saturation Index			-		-	1.23	1.21		1.16	1.19	0.94	1.48	1.13	1.08	1.15	1.33	1.2		1.25	1.29	1.25	1.39
T - Alkalinity		mg/L	30-500	OG	369	***377***	305		290	298	226	297	302	289	291	295	317		305	362	343	353
Bicarbonate	HCO_3^-	mg/L	-		-	377	305		290	298	226	292	302	289	291	295	317		305	362	343	353
Carbonate	CO_3^{-2}	mg/L	-		-	<10	<10		<5	<5	<5	6	<5	<5	<5	<5	<5		<5	<5	<5	<5
Hydroxide		mg/L	-		-	<10	<10		<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	<5	<5	<5
Electrical Conductivity		µS/cm	-		-	701	610		585	607	625	595	596	622	625	490	658		685	771	804	831
Fluoride	F^-	mg/L	2.4	**MAC	0.7	0.07	0.07		<0.05	<0.05	<0.05	<0.05	<0.05	0.07	<0.05	<0.05	<0.05		<0.10	<0.25	<0.10	<0.10
Chloride	Cl^-	mg/L	250	AO	134	7.03	6.95		6.71	5.3	7.01	4.24	8.26	4.66	13.4	6.42	12.3		16.9	19.9	21.6	28.2
Nitrate	NO_3-N	mg/L	10	†MAC	14.5	0.51	0.62		0.71	0.55	0.79	0.5	1.08	1.32	0.8	0.12	2.26		2.85	4.64	4.22	6
Nitrite	NO_2-N	mg/L	1	†MAC	0.31	<0.05	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.10	<0.25	<0.10	<0.10
Bromide	Br^-	mg/L	-		-	<0.05	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.10	<0.25	<0.10	<0.10
Sulfate	SO_4^{-2}	mg/L	500	AO	267	26.9	25.7		39.5	33	28	29.5	31.3	54.9	30.2	37.7	27.8		29.4	25.2	20	26.2
Calcium	Ca	mg/L	-		-	119	104		91	94	79	99.4	102	97.1	106	99.3	104		113	125	121	132
Magnesium	Mg	mg/L	-		-	20.3	20.5		20.1	21	21.6	22.1	21.6	21.4	20.6	20.9	21.9		24.2	21.2	23	22.7
Sodium	Na	mg/L	200	*AO	104	4.86	3.96		4.89	5.36	5.32	5.35	4.94	4.78	4.74	5.22	4.99		5.61	6.19	5.61	6.3
Potassium	K	mg/L	-		-	0.91	0.94		1.32	2.03	1.64	1.58	1.36	1.44	0.98	0.89	0.91		1.16	0.86	0.75	0.76
Ammonia Nitrogen	NH_3-N	mg/L	-		-	0.11	<0.05		0.11	0.24	0.29	<0.02	<0.02	<0.02	<0.02	0.03	<0.02		0.02	<0.02	<0.02	<0.02
Orthophosphate	PO_4^{-3}	mg/L	-		-	<0.10	<0.10		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		<0.20	<0.50	<0.20	<0.20
Total Phosphorus		mg/L	-		-	<0.05	<0.02		0.05	0.04	0.05	0.02	0.04	0.42	<0.02	<0.02	<0.02		0.02	<0.02	0.02	0.03
Reactive Silica		mg/L	-		-	10.5	13.8		11.4	11.9	11.3	11.9	11.2	16	9.5	10.3	12.9		12.9	10.6	10.4	10.9
Dissolved Organic Carbon	DOC	mg/L	5	AO	4.1	1.9	1.9		**9.1**	**11.7**	1	1.7	1	2.3	2.2	1.6	3.2		1.6	2.4	1.4	1.3
Colour		Colour Unit	5	AO	-	<5	<5		<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	<5	<5	<5
Turbidity		NTU	5	AO	-	<0.5	**11**		**20**	**5.4**	**18.7**	<0.5	**6.5**	**8.8**	**114**	**9240**	<0.5		<0.5	**27.3**	0.9	1
Aluminum	Al	mg/L	0.1	OG	0.07	0.015	<0.004		<0.004	0.004	0.006	0.015	0.007	0.028	0.01	0.009	0.005		0.004	<0.004	<0.004	0.004
Arsenic	As	mg/L	0.025	IMAC	0.007	<0.003	<0.003		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003		<0.003	<0.003	<0.003	<0.003
Barium	Ba	mg/L	1	MAC	0.29	0.034	0.03		0.031	0.036	0.038	0.028	0.03	0.032	0.033	0.031	0.034		0.034	0.035	0.033	0.037
Boron	B	mg/L	5	IMAC	1.3	<0.010	<0.010	Dry	<0.010	0.012	0.01	<0.010	<0.010	0.011	<0.010	<0.010	<0.010	Dry	<0.010	<0.010	<0.010	0.012
Cadmium	Cd	mg/L	0.005	MAC	0.001	<0.002	<0.002		<0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		<0.0001	<0.0001	<0.0001	<0.0001
Chromium	Cr	mg/L	0.05	MAC	0.014	<0.003	<0.003		<0.003	<0.003	<0.003	0.003	<0.003	<0.003	<0.003	<0.003	<0.003		<0.003	<0.003	<0.003	<0.003
Copper	Cu	mg/L	1	AO	0.50	<0.003	<0.003		<0.003	0.005	<0.003	<0.003	0.002	<0.002	<0.002	<0.002	<0.002		<0.002	<0.002	<0.002	<0.002
Iron	Fe	mg/L	0.3	AO	0.16	***0.299***	***0.233***		<0.005	***0.258***	<0.010	<0.010	<0.01	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
Lead	Pb	mg/L	0.01	MAC	0.003	<0.002	<0.002		<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001	<0.001	<0.001	<0.002
Manganese	Mn	mg/L	0.05	AO	0.03	**0.056**	**0.069**		0.02	**0.248**	0.005	0.006	0.005	**0.117**	0.004	***0.034***	0.007		<0.002	<0.002	<0.002	0.009
Mercury		mg/L	0.001	MAC	0.0003	<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
Molybdenum	Mo	mg/L	-		-	<0.002	<0.002		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002		<0.002	<0.002	<0.002	<0.002
Nickel	Ni	mg/L	-		-	<0.003	<0.003		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003		<0.003	<0.003	<0.003	<0.003
Selenium	Se	mg/L	0.01	MAC	0.004	<0.004	<0.004		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004		<0.004	<0.004	<0.004	<0.004
Silver	Ag	mg/L	-		-	<0.002	<0.002		<0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		<0.0001	<0.0001	<0.0001	<0.0001
Strontium	Sr		-		-	0.167	0.17		0.168	0.151	0.135	0.143	0.154	0.14	0.163	0.15	0.176		0.169	0.174	0.175	0.206
Thallium	Tl	mg/L	-		-	<0.006	<0.006		<0.006	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003		<0.0003	<0.0003	<0.0003	<0.0003
Tin	Sn	mg/L	-		-	<0.002	<0.002		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002		<0.002	<0.002	<0.002	<0.002
Titanium	Ti	mg/L	-		-	<0.002	<0.002		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002		<0.002	<0.002	<0.002	<0.002
Uranium	U	mg/L	0.02	MAC	0.006	<0.002	<0.002		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002		<0.002	<0.002	<0.002	<0.002
Vanadium	V	mg/L	-		-	<0.002	<0.002		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002		<0.002	<0.002	<0.002	<0.002
Zinc	Zn	µmhos/cm	5	AO	2.5	0.005	0.007		0.005	0.03	0.006	<0.005	0.025	0.006	0.005	0.008	0.006		<0.005	<0.005	<0.005	<0.005
Total Dissolved Solids	TDS	mg/L	500	AO	429	394	386		344	338	364	356	364	378	372	352	378		374	***434***	396	***444***
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	223	**381**	**344**		**310**	**321**	**286**	**339**	**344**	**331**	**350**	**334**	**350**		**382**	**399**	**397**	**423**
% Difference			-		-	6.1	10.1		3.1	0.8	5.8	2.5	0.8	2.1	2.4	0.4	1.3		3.4	2.2	<0.1	0.4
Biological Oxygen Demand	BOD	mg/L	-		-				<5	<5	<5	<5	<5	<2	<2	<2	<5		<2	<2	<2	<5
Total Kjeldahl Nitrogen	TKN	mg/L	-		-	0.51	<0.10		2.26	1.48		<0.10	<0.10	1.27	0.9	0.12	0.49		<0.10	0.3	<0.10	<0.10
Chemical Oxygen Demand	COD	mg/L	-		-								12	<5	6	<5	11		<5	5	<5	8
Phenols		mg/L	-		-	<0.001	<0.001		<0.002	0.002	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001	<0.001	<0.001	<0.001
Field Conductivity		µS/cm	-		-	900	710		690	590	600	585	611	600	668	600	800		440	650	675	720
Field pH			-		-	8.09	8.1		7.82	7.52	7.58	8.27	7.58	8.02	8.07	7.74	8.82		7.07	8.07	8.8	7.55
Field Temperature		oC	-		-	8.6	6.8		8.1	8.1	8.2	9.6	3.4	10.1	6.1	10.1	6.5		9.7	9.3	4.2	12

Bold / Highlighting indicates ODWQS exceedance
Bold / Italics indicates RUC exceedance

* When the sodium concentration exceeds 20 mg/L, it should be considered in sodium-restricted diets.
**When the fluoride concentration exceeds 2.4 mg/L, it should be reported to the local medical officer of health.
† Where nitrate and nitrite are present, their total should not exceed 10 mg/L.
‡ Water is considered unsafe if Total Coliform are detected in consecutive samples.

MAC - Maximum Acceptable Concentration
IMAC - Interim Maximum Acceptable Concentration
AO - Aesthetic Objective
OG - Operational Guideline
ND - Not Detected

Results of Chemical Analyses

South Easthope Landfill			Ontario Drinking Water Standards		Reasonable Use Criteria (RUC)	OW4b-87	OW4b-87	OW4b-87	OW4b-87	OW4b-87	OW4b-87	OW4b-87	OW4b-87	OW4b-87	OW4b-87	OW4b-87	OW4b-87	OW4b-87	OW4b-87	OW4b-87	OW4b-87
						Sampled on: 16-Apr-15	Sampled on: 27-Oct-15	Sampled on: 12-Apr-16	Sampled on: 20-Oct-16	Sampled on: 19-Apr-17	Sampled on: 31-Oct-17	Sampled on: 19-Apr-18	Sampled on: 23-Oct-18	Sampled on: 16-Apr-19	Sampled on: 22-Oct-19	Sampled on: 20-Apr-20	Sampled on: 26-Oct-20	Sampled on: 13-Apr-21	Sampled on: 20-Oct-21	Sampled on: 06-Apr-22	Sampled on: 18-Oct-22
						Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC
Parameter	Symbol	Units	Objective	Type		Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon
Saturation pH			-		-	6.79	6.95	6.77	6.85	6.76	6.8	6.74	6.78	6.9	6.88	6.87	6.92	6.89	7.05	6.83	6.91
pH			6.5-8.5	OG	-	8.09	7.76	8.09	8.05	8.12	7.9	7.91	7.96	7.86	7.78	7.81	7.82	7.89	7.98	7.95	7.84
Langelier Saturation Index			-		-	1.3	0.81	1.32	1.2	1.36	1.1	1.17	1.18	0.96	0.898	0.936	0.9	1	0.933	1.12	0.931
T - Alkalinity		mg/L	30-500	OG	369	313	254	310	289	335	311	335	280	302	305	298	272	299	257	352	319
Bicarbonate	HCO_3^-	mg/L	-		-	313	254	310	289	335	311	335	280	302	305	298	272	299	257	352	319
Carbonate	CO_3^{-2}	mg/L	-		-	<5	<5	<5	<5	<5	<5	<5	<5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Hydroxide		mg/L	-		-	<5	<5	<5	<5	<5	<5	<5	<5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Electrical Conductivity		µS/cm	-		-	752	620	668	705	745	631	672	850	771	798	777	759	764	664	822	766
Fluoride	F^-	mg/L	2.4	**MAC	0.7	<0.25	<0.10	<0.25	<0.10	<0.10	<0.25	<0.25	<0.05	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chloride	Cl^-	mg/L	250	AO	134	22.8	23.4	33.1	27.9	25.4	33	25.2	29.5	23.4	27.1	26.1	29.9	27.9	32.7	28.5	29.3
Nitrate	NO_3-N	mg/L	10	†MAC	14.5	5.39	5.95	8.94	**10.6**	5.89	8.95	**12.2**	**15.6**	9	**10.7**	**10.4**	**12.3**	**10.9**	*7.63*	5.79	**11.4**
Nitrite	NO_2-N	mg/L	1	†MAC	0.31	<0.25	<0.10	<0.25	<0.10	<0.10	<0.25	<0.25	<0.05	0.06	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Bromide	Br^-	mg/L	-		-	<0.25	<0.10	<0.25	<0.10	<0.10	<0.25	<0.25	<0.05	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Sulfate	SO_4^{-2}	mg/L	500	AO	267	29.1	24.8	25.8	33.6	35	30.4	28.4	27.7	29	27	29	30	29	26	29	31
Calcium	Ca	mg/L	-		-	113	88.4	117	104	109	109	118	132	118	122	127	125	123	98.9	123	110
Magnesium	Mg	mg/L	-		-	22.2	23.4	25.6	22.4	24.7	24.4	23.1	23.4	24.5	25.8	25.6	29.4	26.7	25.3	26.5	26.4
Sodium	Na	mg/L	200	*AO	104	5.09	5.7	6.3	7.15	6.55	7.05	7.67	9.43	7.9	8.1	8.2	7.4	7.8	12.3	11.8	8.3
Potassium	K	mg/L	-		-	0.96	1.02	0.61	1.71	1.16	1.04	1.33	0.7	0.4	0.6	0.5	0.8	0.7	0.9	0.4	0.7
Ammonia Nitrogen	NH_3-N	mg/L	-		-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.13	0.07	0.04	0.02	0.01	0.01	< 0.01	< 0.01
Orthophosphate	PO_4^{-3}	mg/L	-		-	<0.50	<0.20	<0.50	<0.20	<0.20	<0.50	<0.50	<0.10	0.09	2.2	0.07	< 0.002	0.022	0.017	< 0.002	0.002
Total Phosphorus		mg/L	-		-	<0.01	0.02	0.05	0.26	0.01	0.03	0.13	<0.02	2.67	5.22	5.61	13.7	9.46	7.01	6.1	17.9
Reactive Silica		mg/L	-		-	9.71	10.7	9.68	11.3	10.8	11.6	9.98	10.9	7.92	10.9	9.67	11.7	11.6	11.8	10.1	10.7
Dissolved Organic Carbon	DOC	mg/L	5	AO	4.1	**8.9**	2.2	1.3	3.3	1.1	1.2	1.5	1.9	2.5	1.6	2.8	1.3	3.4	2.2	2.2	1.1
Colour		Colour Unit	5	AO	-	<5	<5	<5	<5	<5	<5	<5	<5	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Turbidity		NTU	5	AO	-	<0.5	**9320**	0.7	**5820**	2.6	**602**	**6660**	**3080**	**8920**	**11700**	**4960**	**16200**	**10600**	**7990**	**14900**	**18500**
Aluminum	Al	mg/L	0.1	OG	0.07	<0.004	0.011	<0.004	***0.072***	0.032	<0.004	0.014	0.005	0.07	***0.08***	0.07	**0.2**	**0.11**	0.03	***0.08***	0.03
Arsenic	As	mg/L	0.025	IMAC	0.007	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.0001	< 0.0001	0.0001	0.0003	0.0002	0.0001	0.0001	0.0001
Barium	Ba	mg/L	1	MAC	0.29	0.03	0.029	0.028	0.038	0.036	0.028	0.031	0.037	0.025	0.032	0.028	0.031	0.03	0.032	0.031	0.03
Boron	B	mg/L	5	IMAC	1.3	<0.010	<0.010	<0.010	0.014	0.01	0.011	0.014	0.024	0.016	0.016	0.014	0.014	0.013	0.034	0.026	0.018
Cadmium	Cd	mg/L	0.005	MAC	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000010
Chromium	Cr	mg/L	0.05	MAC	0.014	<0.003	<0.003	0.003	<0.003	<0.003	<0.003	<0.003	<0.003	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Copper	Cu	mg/L	1	AO	0.50	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0007	0.0006	0.0022	0.004	0.0013	0.0013	0.0011	0.001
Iron	Fe	mg/L	0.3	AO	0.16	<0.01	<0.01	<0.01	0.04	<0.01	<0.01	<0.01	<0.01	< 0.005	< 0.005	< 0.005	***0.239***	0.138	< 0.005	< 0.005	< 0.005
Lead	Pb	mg/L	0.01	MAC	0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	0.00003	< 0.00002	0.00006	0.00063	0.00026	0.00005	0.00003	0.00004
Manganese	Mn	mg/L	0.05	AO	0.03	0.003	0.003	<0.002	0.014	0.005	<0.002	0.002	0.007	0.001	0.002	0.001	***0.038***	0.014	< 0.001	0.001	0.014
Mercury		mg/L	0.001	MAC	0.0003	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Molybdenum	Mo	mg/L	-		-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	< 0.0001	0.0002	0.0002	< 0.0001	0.0002	0.0002	0.0001	0.0002
Nickel	Ni	mg/L	-		-	<0.003	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Selenium	Se	mg/L	0.01	MAC	0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Silver	Ag	mg/L	-		-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Strontium	Sr		-		-	0.157	0.177	0.164	0.177	0.172	0.157	0.194	0.18	0.175	0.196	0.172	0.194	0.183	0.176	0.191	0.172
Thallium	Tl	mg/L	-		-	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Tin	Sn	mg/L	-		-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Titanium	Ti	mg/L	-		-	<0.002	<0.002	<0.002	0.003	<0.002	<0.002	<0.002	<0.002	< 0.005	< 0.005	< 0.005	0.006	< 0.005	< 0.005	< 0.005	< 0.005
Uranium	U	mg/L	0.02	MAC	0.006	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.00047	0.00082	0.00045	0.00044	0.00038	0.00045	0.00045	0.00053
Vanadium	V	mg/L	-		-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0001	0.0002	0.0001	0.0006	0.0004	0.0002	0.0002	0.0002
Zinc	Zn	µmhos/cm	5	AO	2.5	<0.005	0.006	<0.005	0.007	<0.005	<0.005	<0.005	<0.005	< 0.005	< 0.005	< 0.005	0.018	< 0.005	< 0.005	< 0.005	< 0.005
Total Dissolved Solids	TDS	mg/L	500	AO	429	406	412	416	***434***	***432***	412	***466***	***492***	385	394	395	386	394	351	***430***	397
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	223	**374**	**317**	**398**	**352**	**374**	**373**	**390**	**426**	**396**	**411**	**423**	**434**	**416**	**351**	**416**	**382**
% Difference			-		-	1.1	0.521	0.431	4.11	4.75	3.95	4.18	4.82	1.96	2.26	4.63	7.48	3.16	2.78	0.0421	3.95
Biological Oxygen Demand	BOD	mg/L	-		-	<5	<5	<5	<5	<5	<5	<5	<5	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3
Total Kjeldahl Nitrogen	TKN	mg/L	-		-	<0.10	0.2	0.13	0.34	<0.10	0.12	<0.10	0.28	0.9	1.2	1.4	4.3	3	2.1	2.3	11.8
Chemical Oxygen Demand	COD	mg/L	-		-	<5	9	10	<5	<5	<5	<5	<5	400	104	23	47	138	108	117	440
Phenols		mg/L	-		-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.002	< 0.002	< 0.002	< 0.001	< 0.002	< 0.002	< 0.001	< 0.001
Field Conductivity		µS/cm	-		-	694	599	980	778	860	740	785	886	634	804	710	620	750	835		606
Field pH			-		-	7.63	8.47	8.05	7.72	8.19	8.15	7.94	7.31	8.02	7.8	7.1	7.27	7.56	7.52		7.69
Field Temperature		oC	-		-	6.4	10.1	6	10.2	10.5	7.7	5.6	9.7	8.7	10.9	4.3	8.7	9.2	12.5		9.4

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* When the sodium concentration exceeds 20 mg/L, it should be considered in sodium-restricted diets.
**When the fluoride concentration exceeds 2.4 mg/L, it should be reported to the local medical officer of health.
† Where nitrate and nitrite are present, their total should not exceed 10 mg/L.
‡ Water is considered unsafe if Total Coliform are detected in consecutive samples.

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AO - Aesthetic Objective
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ND - Not Detected

Results of Chemical Analyses

South Eastshope Landfill			Ontario Drinking Water Standards		Reasonable Use Criteria (RUC)	OW-5	OW-5	OW-5	OW-5	OW-5	OW-5	OW-5	OW-5	OW-5	OW-5	OW-5	OW-5	OW-5	OW-5	OW-5	OW-5	OW-5
						Sampled on: 26-Apr-07	Sampled on: 24-Oct-07	Sampled on: 08-Apr-08	Sampled on: 30-Oct-08	Sampled on: 15-Apr-09	Sampled on: 27-Oct-09	Sampled on: 09-Apr-10	Sampled on: 20-Oct-10	Sampled on: 14-Apr-11	Sampled on: 19-Oct-11	Sampled on: 04-Apr-12	Sampled on: 24-Oct-12	Sampled on: 10-Apr-13	Sampled on: 29-Oct-13	Sampled on: 16-Apr-14	Sampled on: 28-Oct-14	Sampled on: 16-Apr-15
						Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC
Parameter	Symbol	Units	Objective	Type		Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT
Saturation pH			-		-	6.72	6.94	6.91	6.92	6.9	6.84	6.88	6.84	6.84	6.85	6.82	6.79	6.74	6.8	6.76	6.77	6.75
pH			6.5-8.5	OG	-	8.03	7.96	8.4	8.2	8.01	8.25	8.07	8.13	8.05	8.25	7.94	8.31	7.94	8.06	7.99	8.16	8.11
Langelier Saturation Index			-		-	1.31	1.02	1.49	1.28	1.11	1.41	1.19	1.29	1.21	1.4	1.12	1.52	1.2	1.26	1.23	1.39	1.36
T - Alkalinity		mg/L	30-500	OG	373	280	248	245	251	256	267	258	272	268	271	271	276	281	282	297	288	293
Bicarbonate	HCO_3^-	mg/L	-		-	280	248	234	251	256	267	258	272	268	271	271	270	281	282	297	288	293
Carbonate	CO_3^{-2}	mg/L	-		-	<10	<10	12	<5	<5	<5	<5	<5	<5	<5	<5	6	<5	<5	<5	<5	<5
Hydroxide		mg/L	-		-	<10	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Electrical Conductivity		µS/cm	-		-	1010	740	696	778	778	763	759	792	858	725	865	800	955	931	1040	996	1040
Fluoride	F^-	mg/L	2.4	**MAC	0.7	0.1	0.15	0.08	<0.05	0.07	<0.05	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	<0.25	<0.25	<0.25	<0.25	<0.25
Chloride	Cl^-	mg/L	250	AO	131	44.8	50	55.8	83.6	81.8	81.2	93.1	95.4	111	106	113	111	126	123	131	128	***142***
Nitrate	NO_3-N	mg/L	10	†MAC	15.9	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.25	<0.25	<0.25	<0.25	<0.25
Nitrite	NO_2-N	mg/L	1	†MAC	0.33	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.25	<0.25	<0.25	<0.25	<0.25
Bromide	Br^-	mg/L	-		-	0.23	0.22	0.23	0.27	0.23	0.19	0.24	<0.05	<0.05	0.31	<0.05	0.3	0.37	0.44	0.44	<0.25	0.65
Sulfate	SO_4^{-2}	mg/L	500	AO	268	214	82.4	52.4	48.8	38.5	31.8	34.9	30.2	33.9	32.9	30.8	37.2	33.5	28.3	30.7	28.1	32.7
Calcium	Ca	mg/L	-		-	142	95.3	98.4	99.4	104	106	107	110	114	107	116	112	126	119	121	124	127
Magnesium	Mg	mg/L	-		-	42.2	30.3	27.7	29.9	29.3	31.8	31.3	32.4	33.1	32.8	35.1	34.6	37.2	33.5	35.9	37.2	37.5
Sodium	Na	mg/L	200	*AO	104	9.35	7.94	9.24	11.6	10.7	9.9	10.6	10.5	11.2	9.8	11.4	8.33	12.2	10.5	11.8	10.8	11.9
Potassium	K	mg/L	-		-	4.98	3.54	1.98	2.41	1.74	2.05	1.81	1.82	1.78	1.66	1.84	1.79	1.87	1.65	1.71	1.78	1.71
Ammonia Nitrogen	NH_3-N	mg/L	-		-	0.18	0.19	<0.05	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	0.06	<0.02	<0.02	<0.02	<0.02	<0.02
Orthophosphate	PO_4^{-3}	mg/L	-		-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.50	<0.50	<0.50	<0.50	<0.50
Total Phosphorus		mg/L	-		-	0.03	<0.05	<0.05	0.03	0.03	0.02	0.04	<0.02	<0.02	1.22	0.02	<0.02	0.02	<0.02	0.03	0.04	<0.01
Reactive Silica		mg/L	-		-	12.8	15.7	18.4	16.9	16.8	18.6	17.2	17.9	17.2	18.8	19.3	19.9	19.7	19.7	17.8	16.3	18.7
Dissolved Organic Carbon	DOC	mg/L	5	AO	3.7	**7.4**	3.5	1.5	2.8	2.1	1.8	1	3.1	2	1.3	1.9	1.2	1.2	2	1.3	3.1	**11.2**
Colour		Colour Unit	5	AO	-	<5	**20**	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Turbidity		NTU	5	AO	-	5	4	**12**	2.2	<0.5	1.6	<0.5	2.3	<0.5	**1110**	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	<0.5
Aluminum	Al	mg/L	0.1	OG	0.07	0.007	***0.075***	<0.004	<0.004	<0.004	0.016	0.054	0.017	0.013	0.011	<0.004	0.024	0.004	<0.004	0.006	<0.004	<0.004
Arsenic	As	mg/L	0.025	IMAC	0.008	<0.003	0.006	<0.003	0.003	<0.003	<0.003	<0.003	0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Barium	Ba	mg/L	1	MAC	0.29	0.035	0.039	0.062	0.075	0.109	0.114	0.126	0.123	0.135	0.146	0.14	0.137	0.165	0.162	0.171	0.166	0.165
Boron	B	mg/L	5	IMAC	1.3	0.049	0.028	0.012	0.01	0.025	<0.010	<0.010	0.012	<0.010	0.012	0.01	0.012	0.013	<0.010	0.013	<0.010	0.012
Cadmium	Cd	mg/L	0.005	MAC	0.001	<0.002	<0.002	<0.002	<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
Chromium	Cr	mg/L	0.05	MAC	0.014	<0.003	<0.003	<0.003	0.003	0.004	0.003	<0.003	0.004	<0.003	<0.003	<0.003	0.007	<0.003	<0.003	0.004	<0.003	<0.003
Copper	Cu	mg/L	1	AO	0.50	<0.003	<0.003	0.01	<0.003	<0.003	<0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Iron	Fe	mg/L	0.3	AO	0.16	**4.19**	**2.07**	<0.005	***0.17***	<0.010	<0.010	<0.01	***0.27***	0.04	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead	Pb	mg/L	0.01	MAC	0.003	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002
Manganese	Mn	mg/L	0.05	AO	0.03	**0.283**	**0.088**	**0.052**	**0.059**	0.026	**0.067**	***0.03***	**0.063**	0.022	**0.061**	0.021	0.023	0.013	***0.05***	0.013	***0.05***	0.011
Mercury		mg/L	0.001	MAC	0.0003	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	Mo	mg/L	-		-	0.033	0.019	0.004	0.005	0.003	0.003	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Nickel	Ni	mg/L	-		-	0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.004	<0.003	0.011	<0.003	<0.003	<0.003	<0.003	<0.003
Selenium	Se	mg/L	0.01	MAC	0.005	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Silver	Ag	mg/L	-		-	<0.002	<0.002	<0.002	<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
Strontium	Sr		-		-	0.318	0.261	0.2	0.213	0.211	0.224	0.238	0.233	0.262	0.258	0.266	0.255	0.27	0.267	0.269	0.286	0.272
Thallium	Tl	mg/L	-		-	<0.006	<0.006	<0.006	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Tin	Sn	mg/L	-		-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Titanium	Ti	mg/L	-		-	0.003	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.003	0.002	<0.002
Uranium	U	mg/L	0.02	MAC	0.006	0.006	0.004	<0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	V	mg/L	-		-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Zinc	Zn	µmhos/cm	5	AO	2.5	0.11	0.231	<0.004	0.01	<0.005	<0.005	0.162	<0.005	0.014	0.009	0.006	0.076	<0.005	<0.005	<0.005	<0.005	<0.005
Total Dissolved Solids	TDS	mg/L	500	AO	435	**620**	**532**	432	**538**	**524**	***484***	**508**	**536**	**542**	**546**	**564**	320	360	**506**	**532**	**586**	**610**
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	219	**528**	**363**	**360**	**371**	**380**	**396**	**396**	**408**	**421**	**402**	**434**	**422**	**468**	**435**	**450**	**463**	**472**
% Difference			-		-	3.7	2.5	0.5	2.5	0.7	0.6	0.6	0.6	1.4	3.3	0.2	3.2	0.3	2.7	3.7	1	2.7
Biological Oxygen Demand	BOD	mg/L	-		-			6			<5	<5	<2	<2	<2	<5	<2	<2	<2	<2	<5	<5
Total Kjeldahl Nitrogen	TKN	mg/L	-		-	<0.10	0.35	0.1	0.61		<0.10	<0.10	0.29	0.33	<0.10	0.32	<0.10	<0.10	0.2	<0.10	0.26	<0.10
Chemical Oxygen Demand	COD	mg/L	-		-							8	8	9	7	10	18	5	6	<5	17	<5
Phenols		mg/L	-		-	0.003	0.002	<0.002	0.002		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Field Conductivity		µS/cm	-		-	980	820	850	758	800	779	805	900	885	500	1000	1030	890	790	807	1050	1030
Field pH			-		-	8.03	7.99	7.97	7.6	7.91	8.19	7.59	7.92	8.23	7.98	8.28	7.82	7.02	8.29	8.47	7.7	8
Field Temperature		oC	-		-	8.6	8.9	8.8	9.1	8.3	10.5	4.9	10.6	8.4	9.1	8.2	11.1	4.5	9.6	5.2	12	10.3

Bold / Highlighting indicates ODWQS exceedance

* When the sodium concentration exceeds 20 mg/L, it should be considered in sodium-restricted diets.
**When the fluoride concentration exceeds 2.4 mg/L, it should be reported to the local medical officer of health.
† Where nitrate and nitrite are present, their total should not exceed 10 mg/L.
‡ Water is considered unsafe if Total Coliform are detected in consecutive samples.

MAC - Maximum Acceptable Concentration
IMAC - Interim Maximum Acceptable Concentration
AO - Aesthetic Objective
OG - Operational Guideline
ND - Not Detected

Results of Chemical Analyses

South Easthope Landfill			Ontario Drinking Water Standards		Reasonable Use Criteria (RUC)	OW-5	OW-5	OW-5	OW-5	OW-5	OW-5	OW-5	OW-5	OW-5	OW-5	OW-5	OW-5	OW-5	OW-5	OW-5
						Sampled on: 27-Oct-15	Sampled on: 12-Apr-16	Sampled on: 20-Oct-16	Sampled on: 19-Apr-17	Sampled on: 31-Oct-17	Sampled on: 19-Apr-18	Sampled on: 23-Oct-18	Sampled on: 16-Apr-19	Sampled on: 22-Oct-19	Sampled on: 20-Apr-20	Sampled on: 26-Oct-20	Sampled on: 13-Apr-21	Sampled on: 20-Oct-21	Sampled on: 06-Apr-22	Sampled on: 18-Oct-22
						Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC
Parameter	**Symbol**	**Units**	**Objective**	**Type**		Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon
Saturation pH			-		-	6.72	6.73	6.69	6.68	6.68	6.65	6.71	6.84	6.85	6.81	6.8	6.8	6.82	6.76	6.76
pH			6.5-8.5	OG	-	8.14	8.03	8.09	8.07	7.94	7.92	8.05	7.84	7.79	7.76	7.69	7.82	8	7.92	7.71
Langelier Saturation Index			-		-	1.42	1.3	1.4	1.39	1.26	1.27	1.34	1	0.937	0.95	0.89	1.02	1.18	1.16	0.95
T - Alkalinity		mg/L	30-500	OG	373	302	301	337	326	329	343	293	320	313	315	310	333	281	354	351
Bicarbonate	HCO_3^-	mg/L	-		-	302	601	337	326	329	343	293	320	313	315	310	333	281	354	351
Carbonate	CO_3^{-2}	mg/L	-		-	<5	<5	<5	<5	<5	<5	<5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Hydroxide		mg/L	-		-	<5	<5	<5	<5	<5	<5	<5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Electrical Conductivity		µS/cm	-		-	999	967	991	1070	882	900	1090	1090	1050	1090	1080	1110	1020	1160	1150
Fluoride	F^-	mg/L	2.4	**MAC	0.7	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chloride	Cl^-	mg/L	250	AO	131	127	***144***	***132***	***146***	***137***	***138***	131	***133***	125	***142***	***134***	***141***	***143***	***140***	***157***
Nitrate	NO_3-N	mg/L	10	†MAC	15.9	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	< 0.05	< 0.05	0.06	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nitrite	NO_2-N	mg/L	1	†MAC	0.33	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	0.25	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.11	< 0.05	< 0.05
Bromide	Br^-	mg/L	-		-	0.37	<0.25	<0.25	<0.25	<0.25	<0.25	0.55	1	0.6	0.9	0.6	< 0.4	1	1	1.1
Sulfate	SO_4^{-2}	mg/L	500	AO	268	29.3	37	33.5	37.4	38.1	39	39.5	42	36	46	46	52	50	49	52
Calcium	Ca	mg/L	-		-	130	123	126	132	130	133	140	135	133	146	152	143	159	147	147
Magnesium	Mg	mg/L	-		-	39.6	41	36.8	40.4	41.1	41	40	44.3	45	46.8	49.2	47	50.1	49.9	47.6
Sodium	Na	mg/L	200	*AO	104	11.9	12.8	10.7	13.6	12.9	13.5	13.2	13.2	14.7	15	14.5	15.4	16.8	16.8	15.5
Potassium	K	mg/L	-		-	1.93	1.87	1.72	1.75	1.84	1.68	1.71	1.6	1.9	1.8	2	1.9	2	1.9	1.9
Ammonia Nitrogen	NH_3-N	mg/L	-		-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.08	0.04	0.02	< 0.01	0.01	< 0.01	< 0.01	< 0.01
Orthophosphate	PO_4^{-3}	mg/L	-		-	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.82	0.893	0.042	< 0.002	0.02	0.018	0.002	< 0.002
Total Phosphorus		mg/L	-		-	0.16	0.03	0.04	0.03	0.02	<0.02	0.02	0.84	1.05	0.19	1.07	0.79	0.8	1.41	0.26
Reactive Silica		mg/L	-		-	19.9	19.9	20.6	19.3	19.6	20.5	21.3	16.7	20.2	19.7	20.4	20.6	21.1	20.2	19.1
Dissolved Organic Carbon	DOC	mg/L	5	AO	3.7	1.2	3.4	2	1.5	1.4	1.2	2.2	1.8	1.7	2	0.7	3	2.3	1.8	< 0.2
Colour		Colour Unit	5	AO	-	<5	<5	<5	**6**	<5	<5	<5	< 2	< 2	< 2	2	< 2	< 2	< 2	< 2
Turbidity		NTU	5	AO	-	0.6	<0.5	1.2	4.7	0.7	2.2	0.8	**306**	**445**	**168**	**2690**	**765**	**984**	**662**	**153**
Aluminum	Al	mg/L	0.1	OG	0.07	0.005	<0.004	0.033	0.038	<0.004	<0.004	0.005	***0.08***	***0.08***	***0.08***	0.05	0.04	**0.11**	***0.09***	0.04
Arsenic	As	mg/L	0.025	IMAC	0.008	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.0009	0.0007	0.0007	0.0009	0.0008	0.0008	0.0007	0.0007
Barium	Ba	mg/L	1	MAC	0.29	0.174	0.168	0.179	0.189	0.178	0.18	0.198	0.179	0.196	0.197	0.222	0.211	0.23	0.211	0.219
Boron	B	mg/L	5	IMAC	1.3	<0.010	0.011	0.013	0.013	0.012	0.014	0.016	0.013	0.012	0.013	0.015	0.015	0.013	0.013	0.013
Cadmium	Cd	mg/L	0.005	MAC	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	< 0.000015	< 0.000015	0.000026	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000012
Chromium	Cr	mg/L	0.05	MAC	0.014	<0.003	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Copper	Cu	mg/L	1	AO	0.50	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0007	0.0006	0.0015	0.0015	0.0054	0.001	0.0014	0.0006
Iron	Fe	mg/L	0.3	AO	0.16	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	0.007	< 0.005	< 0.005	< 0.005	< 0.005	0.132	0.018	< 0.005
Lead	Pb	mg/L	0.01	MAC	0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	0.0001	< 0.00004	0.00005	0.00018	0.00004	0.00013	0.00005	< 0.00004
Manganese	Mn	mg/L	0.05	AO	0.03	***0.046***	0.006	***0.033***	0.01	**0.055**	0.003	***0.04***	0.007	***0.03***	0.006	***0.034***	0.006	***0.035***	0.007	***0.039***
Mercury		mg/L	0.001	MAC	0.0003	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Molybdenum	Mo	mg/L	-		-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0006	0.0007	0.0007	0.0006	0.0007	0.0006	0.0005	0.0006
Nickel	Ni	mg/L	-		-	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Selenium	Se	mg/L	0.01	MAC	0.005	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	0.002	0.002	0.001	0.001	0.002	0.002	0.003	0.002
Silver	Ag	mg/L	-		-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	< 0.0001	0.0008	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Strontium	Sr		-		-	0.293	0.277	0.297	0.306	0.285	0.311	0.293	0.305	0.339	0.308	0.344	0.336	0.359	0.355	0.333
Thallium	Tl	mg/L	-		-	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Tin	Sn	mg/L	-		-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Titanium	Ti	mg/L	-		-	<0.002	<0.002	<0.002	0.003	<0.002	<0.002	<0.002	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Uranium	U	mg/L	0.02	MAC	0.006	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.00087	0.00089	0.00087	0.00082	0.00086	0.00076	0.00088	0.00081
Vanadium	V	mg/L	-		-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0003	0.0003	0.0002	0.0003	0.0002	0.0005	0.0002	0.0002
Zinc	Zn	µmhos/cm	5	AO	2.5	<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
Total Dissolved Solids	TDS	mg/L	500	AO	435	**646**	**550**	**662**	**674**	**576**	**698**	**638**	**561**	**544**	**586**	**583**	**600**	**590**	**617**	**632**
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	219	**488**	**476**	**466**	**496**	**494**	**501**	**514**	**520**	**517**	**557**	**582**	**550**	**603**	**573**	**563**
% Difference			-		-	0.391	3.52	6.36	3.96	3.5	4.16	2.44	0.0585	2.27	2.51	5.98	0.0581	9.13	0.749	2.32
Biological Oxygen Demand	BOD	mg/L	-		-	<5	<5	<5	<5	<5	<5	<5	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3
Total Kjeldahl Nitrogen	TKN	mg/L	-		-	<0.10	0.25	<0.10	<0.10	<0.10	<0.10	0.14	0.4	0.3	0.2	0.4	0.3	0.3	0.5	0.2
Chemical Oxygen Demand	COD	mg/L	-		-	<5	29	<5	<5	<5	<5	<5	< 5	59	5	39	< 5	5	15	14
Phenols		mg/L	-		-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.002	< 0.002	< 0.002	< 0.001	< 0.002	< 0.002	< 0.001	< 0.001
Field Conductivity		µS/cm	-		-	912	1230	1048	1090	1040	1100	1072	877	961	1122	820	1040	1148		429
Field pH			-		-	7.77	7.81	7.85	8.06	8.17	7.95	6.8	7.95	7.71	8.54	7.05	7.61	7.42		730
Field Temperature		oC	-		-	10.3	5.1	10.7	11.8	8.7	6.7	11.2	10.1	12.4	7.8	9.5	10.1	13.9		9.7

Bold / Highlighting indicates ODWQS exceedance

* When the sodium concentration exceeds 20 mg/L, it should be considered in sodium-restricted diets.
**When the fluoride concentration exceeds 2.4 mg/L, it should be reported to the local medical officer of health.
† Where nitrate and nitrite are present, their total should not exceed 10 mg/L.
‡ Water is considered unsafe if Total Coliform are detected in consecutive samples.

MAC - Maximum Acceptable Concentration
IMAC - Interim Maximum Acceptable Concentration
AO - Aesthetic Objective
OG - Operational Guideline
ND - Not Detected

Results of Chemical Analyses

South Easthope Landfill			Ontario Drinking Water Standards		Reasonable Use Criteria (RUC)	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6
						Sampled on: 31-Jul-07	Sampled on: 24-Oct-07	Sampled on: 08-Apr-08	Sampled on: 03-Jul-08	Sampled on: 30-Oct-08	Sampled on: 15-Apr-09	Sampled on: 14-Jul-09	Sampled on: 27-Oct-09	Sampled on: 09-Apr-10	Sampled on: 29-Jul-10	Sampled on: 20-Oct-10	Sampled on: 14-Apr-11	Sampled on: 04-Jul-11	Sampled on: 19-Oct-11	Sampled on: 04-Apr-12	Sampled on: 19-Jul-12	Sampled on: 24-Oct-12
						Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC
Parameter	Symbo	Units	Objective	Type		Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT
Saturation pH			-		-	6	6.85	6.9	6.93	6.9	6.91	6.9	6.84	6.85	6.86	6.84	6.83	6.87	6.85	6.82	6.84	6.87
pH			6.5-8.5	OG	-	7.57	7.89	8.45	7.87	8.21	8.04	8	8.33	8.05	7.85	8.11	8.16	7.91	8.29	8.15	8.18	8.29
Langelier Saturation Index			-		-	1.57	1.04	1.55	0.94	1.31	1.13	1.1	1.49	1.2	0.99	1.27	1.33	1.04	1.44	1.33	1.34	1.42
T - Alkalinity		mg/L	30-500	OG	369	***968***	282	275	281	274	274	273	284	290	278	279	287	280	279	280	280	275
Bicarbonate	HCO_3^-	mg/L	-		-	968	282	256	281	274	274	273	280	290	278	279	287	280	279	280	280	272
Carbonate	CO_3^{-2}	mg/L	-		-	<5	<10	19	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Hydroxide		mg/L	-		-	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Electrical Conductivity		µS/cm	-		-	2430	784	653	654	684	664	679	716	683	650	726	773	744	654	807	743	676
Fluoride	F^-	mg/L	2.4	**MAC	0.7	0.14	0.19	0.17	0.16	0.16	0.16	0.07	0.18	0.13	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chloride	Cl^-	mg/L	250	AO	134	**269**	13.1	16.2	16.1	23	25.1	23.5	32.6	40.4	39.6	45.4	58.8	52.9	53.2	68.9	69.6	48.1
Nitrate	NO_3-N	mg/L	10	†MAC	14.5	0.98	<0.05	0.07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrite	NO_2-N	mg/L	1	†MAC	0.31	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Bromide	Br^-	mg/L	-		-	2.57	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.11	<0.05	<0.05	<0.05	<0.05	0.29	<0.05	<0.05	<0.05
Sulfate	SO_4^{-2}	mg/L	500	AO	267	3.31	155	71.7	59	66.5	55.9	54	59.9	61.2	60.7	62.4	61.3	63.6	67	58.9	64.5	66.3
Calcium	Ca	mg/L	-		-	184	96.2	80.7	71.4	80.6	79.2	79.4	89	85	86.7	90.7	90.9	89.1	88.2	102	95.1	85.2
Magnesium	Mg	mg/L	-		-	85.6	36.8	31.4	29.8	32.1	31.6	32.1	35.9	34.4	35.4	36.1	36.5	36.5	36	40.8	39.6	35.6
Sodium	Na	mg/L	200	*AO	104	***180***	14	13.8	12.1	15.3	14.2	13.2	16.7	16	15.3	17	17.7	16.3	16	20	17.1	13.4
Potassium	K	mg/L	-		-	10.8	5.53	3.24	2.48	2.7	2.18	2.2	2.55	2.23	2.2	2.26	2.11	2.11	2.1	2.35	2.22	2.1
Ammonia Nitrogen	NH_3-N	mg/L	-		-	14.6	0.23	<0.05	0.08	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.27	0.04	<0.02	0.06	0.09
Orthophosphate	PO_4^{-3}	mg/L	-		-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Total Phosphorus		mg/L	-		-	0.06	<0.05	<0.05	0.09	0.12	0.03	0.19	0.02	0.05	<0.02	<0.02	<0.02	<0.02	0.11	0.02	0.17	<0.02
Reactive Silica		mg/L	-		-	23.4	17.2	15.5	20.2	16.9	15.7	15.3	15.9	15.8	14.3	16.4	15.9	14.8	16.2	16.6	15.1	16.5
Dissolved Organic Carbon	DOC	mg/L	5	AO	4.1	**27.4**	**6.3**	2.7	2	3.2	1.6	1.6	0.6	1.2	2.5	3.3	2	3.4	1.3	1.3	2.4	1.4
Colour		Colour Unit	5	AO	-	**8**	**15**	**10**	5	7	<5	<5	<5	<5	**17**	<5	<5	<5	<5	5	<5	<5
Turbidity		NTU	5	AO	-	2.8	**10**	**12**	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.1	<0.5	<0.5	1.2	<0.5	3.6	<0.5
Aluminum	Al	mg/L	0.1	OG	0.07	<0.004	0.05	0.033	<0.004	<0.004	0.005	0.056	<0.004	<0.004	0.016	0.013	0.009	***0.076***	0.008	0.065	**0.474**	0.009
Arsenic	As	mg/L	0.025	IMAC	0.007	0.007	***0.008***	<0.003	0.006	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.003	<0.003
Barium	Ba	mg/L	1	MAC	0.29	***0.486***	0.03	0.073	0.084	0.085	0.094	0.111	0.1	0.103	0.108	0.104	0.109	0.127	0.12	0.117	0.169	0.11
Boron	B	mg/L	5	IMAC	1.3	***1.85***	0.135	0.023	0.024	0.017	0.025	0.022	0.018	0.022	0.028	0.029	0.026	0.025	0.031	0.03	0.043	0.026
Cadmium	Cd	mg/L	0.005	MAC	0.001	<0.002	<0.002	<0.002	<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
Chromium	Cr	mg/L	0.05	MAC	0.014	0.009	0.007	<0.003	<0.003	<0.003	<0.003	<0.003	0.003	<0.003	0.009	0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.006
Copper	Cu	mg/L	1	AO	0.50	<0.003	<0.003	0.01	<0.003	<0.003	<0.003	<0.003	<0.003	<0.002	<0.002	<0.002	<0.002	0.029	<0.002	<0.002	0.002	<0.002
Iron	Fe	mg/L	0.3	AO	0.16	**11.4**	**4.28**	<0.005	0.08	<0.010	<0.010	<0.010	<0.010	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**0.92**	<0.01
Lead	Pb	mg/L	0.01	MAC	0.003	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	0.002	<0.001
Manganese	Mn	mg/L	0.05	AO	0.03	**0.493**	**0.144**	**0.056**	**0.064**	***0.038***	***0.048***	***0.041***	***0.034***	0.02	***0.032***	0.022	0.011	0.012	0.022	0.011	**0.119**	***0.029***
Mercury		mg/L	0.001	MAC	0.0003	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	Mo	mg/L	-		-	<0.002	0.031	0.01	0.007	0.005	0.004	0.003	0.003	0.003	0.002	0.002	0.002	0.002	0.002	0.002	<0.002	0.002
Nickel	Ni	mg/L	-		-	0.016	0.007	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.009
Selenium	Se	mg/L	0.01	MAC	0.004	***0.01***	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Silver	Ag	mg/L	-		-	<0.002	<0.002	<0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	<0.0001
Strontium	Sr		-		-	0.744	0.351	0.326	0.349	0.306	0.403	0.314	0.341	0.362	0.374	0.355	0.392	0.398	0.379	0.425	0.437	0.352
Thallium	Tl	mg/L	-		-	<0.006	<0.006	<0.006	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Tin	Sn	mg/L	-		-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.002
Titanium	Ti	mg/L	-		-	<0.002	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.015	0.003
Uranium	U	mg/L	0.02	MAC	0.006	<0.002	0.005	<0.002	0.003	0.003	0.003	0.003	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	<0.002
Vanadium	V	mg/L	-		-	0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	<0.002
Zinc	Zn	µmhos/cm	5	AO	2.5	0.033	0.131	0.004	0.005	0.008	<0.005	0.08	<0.005	0.006	0.037	<0.005	<0.005	0.018	<0.005	0.142	0.005	<0.005
Total Dissolved Solids	TDS	mg/L	500	AO	429	**1390**	**540**	396	***430***	400	408	***434***	***440***	420	***456***	***458***	***466***	**520**	***478***	**506**	**506**	***496***
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	223	**812**	**392**	**331**	**301**	**333**	**328**	**330**	**370**	**354**	**362**	**375**	**377**	**373**	**368**	**423**	**401**	**359**
% Difference			-		-	2.9	3.6	1.1	5	0.8	0.9	0.1	2	2.5	0.1	0.8	1.8	1.1	2.2	3.3	0.6	2.6
Biological Oxygen Demand	BOD	mg/L	-		-	12		<5			<5		<5	<5	<5	<2	<2	15	<2	<5	<2	<2
Total Kjeldahl Nitrogen	TKN	mg/L	-		-	15.5	0.46	0.48	0.27	0.5		0.39	<0.10	<0.10	0.46	0.2	0.61	0.29	<0.10	0.13	2.78	0.14
Chemical Oxygen Demand	COD	mg/L	-		-									11	7.89	6	12	12	6	<5	<5	20
Phenols		mg/L	-		-		0.004	<0.002	<0.001	0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.004
Field Conductivity		µS/cm	-		-		910	810	550	656	700	500	708	724	673	800	766	841	800	1000	1010	940
Field pH			-		-		8	8.14	7.62	7.57	8.13	7.89	8.3	7.69	8.55	7.86	8.13	8.19	7.81	8.51	7.77	8.24
Field Temperature		oC	-		-		10.2	9.5	12.1	8.6	7.8	10.7	10.6	6.6	12.8	11	9.3	10.4	10.4	7.9	13	11.1

Bold / Highlighting indicates ODWQS exceedance
Bold / Italics indicates RUC exceedance

* When the sodium concentration exceeds 20 mg/L, it should be considered in sodium-restricted diets.
**When the fluoride concentration exceeds 2.4 mg/L, it should be reported to the local medical officer of health.
† Where nitrate and nitrite are present, their total should not exceed 10 mg/L.
‡ Water is considered unsafe if Total Coliform are detected in consecutive samples.

MAC - Maximum Acceptable Concentration
IMAC - Interim Maximum Acceptable Concentration
AO - Aesthetic Objective
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ND - Not Detected

Results of Chemical Analyses

South Easthope Landfill			Ontario Drinking Water Standards		Reasonable Use Criteria (RUC)	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6
						Sampled on: 10-Apr-13	Sampled on: 09-Jul-13	Sampled on: 29-Oct-13	Sampled on: 16-Apr-14	Sampled on: 03-Jul-14	Sampled on: 28-Oct-14	Sampled on: 16-Apr-15	Sampled on: 08-Jul-15	Sampled on: 27-Oct-15	Sampled on: 12-Apr-16	Sampled on: 27-Jul-16	Sampled on: 20-Oct-16	Sampled on: 19-Apr-17	Sampled on: 26-Jul-17	Sampled on: 31-Oct-17
						Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC
Parameter	Symbol	Units	Objective	Type		Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT
Saturation pH			-		-	6.78	6.83	6.8	6.8	6.84	6.78	6.82	6.81	6.79	6.77	6.8	6.76	6.76	6.79	6.74
pH			6.5-8.5	OG	-	8.06	7.9	8.05	8.02	8.28	8.16	8.16	7.86	8.15	8.05	7.95	8.08	8.06	8.17	7.94
Langelier Saturation Index			-		-	1.28	1.07	1.25	1.22	1.44	1.38	1.34	1.05	1.36	1.28	1.15	1.32	1.3	1.38	1.2
T - Alkalinity		mg/L	30-500	OG	369	273	276	281	277	266	293	270	271	274	293	277	287	282	283	287
Bicarbonate	HCO_3^-	mg/L	-		-	273	276	281	277	266	293	270	271	274	293	277	287	282	283	287
Carbonate	CO_3^{-2}	mg/L	-		-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Hydroxide		mg/L	-		-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Electrical Conductivity		µS/cm	-		-	902	886	875	992	955	961	993	931	987	988	1040	1030	1090	1080	903
Fluoride	F^-	mg/L	2.4	**MAC	0.7	<0.25	<0.25	<0.25	<0.25	<0.10	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Chloride	Cl^-	mg/L	250	AO	134	89.5	88.8	91	106	104	102	123	114	115	***135***	***138***	***147***	***163***	***158***	***156***
Nitrate	NO_3-N	mg/L	10	†MAC	14.5	<0.25	<0.25	<0.25	<0.25	<0.10	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Nitrite	NO_2-N	mg/L	1	†MAC	0.31	<0.25	<0.25	<0.25	<0.25	<0.10	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Bromide	Br^-	mg/L	-		-	<0.25	<0.25	0.5	0.48	0.46	<0.25	0.48	<0.25	0.55	<0.25	<0.25	0.7	<0.25	0.9	<0.25
Sulfate	SO_4^{-2}	mg/L	500	AO	267	69.7	64.1	59.6	59.4	61.4	62.6	60.2	65.4	51	57.7	58.6	63.5	56.7	57.4	63
Calcium	Ca	mg/L	-		-	107	101	99.3	99.6	97.5	106	105	107	111	105	108	114	114	106	116
Magnesium	Mg	mg/L	-		-	42.6	40.8	38	40.3	43.2	41.7	42.1	43.8	45	46	43	43.8	47.5	44.6	49.4
Sodium	Na	mg/L	200	*AO	104	18	16.1	16.6	18	17.5	18.6	19.4	18	19.3	17.5	18.4	20.7	21.7	18.5	20.6
Potassium	K	mg/L	-		-	2.27	2.33	2.09	2.06	2.19	2.09	2.08	2.12	2.36	2.15	2.27	2.15	2.18	1.99	2.35
Ammonia Nitrogen	NH_3-N	mg/L	-		-	<0.02	0.06	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Orthophosphate	PO_4^{-3}	mg/L	-		-	<0.50	<0.50	<0.50	<0.50	<0.20	<0.50	2.04	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Total Phosphorus		mg/L	-		-	0.02	<0.02	0.03	0.03	0.03	0.04	0.01	0.02	0.06	0.02	0.02	0.02	0.02	<0.01	0.02
Reactive Silica		mg/L	-		-	16.5	15.8	15.3	15.2	13.5	<0.05	14.6	15.9	16.1	16.2	15.7	16.2	15.2	15.4	15.6
Dissolved Organic Carbon	DOC	mg/L	5	AO	4.1	1.8	1.7	1.5	2.4	1.9	1.6	**10.1**	3.9	1.7	**5.1**	2.3	2.4	1.9	2.3	2
Colour		Colour Unit	5	AO	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Turbidity		NTU	5	AO	-	<0.5	**20.6**	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	0.5	<0.5	2	<0.5	<0.5	1.7
Aluminum	Al	mg/L	0.1	OG	0.07	0.006	0.007	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	0.004	0.023	0.018	0.034	0.007	0.014
Arsenic	As	mg/L	0.025	IMAC	0.007	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Barium	Ba	mg/L	1	MAC	0.29	0.144	***0.355***	0.146	0.137	0.118	0.156	0.142	0.134	0.155	0.143	0.15	0.166	0.169	0.155	0.169
Boron	B	mg/L	5	IMAC	1.3	0.033	0.126	0.028	0.027	0.044	0.03	0.036	0.029	0.025	0.034	0.078	0.042	0.044	0.082	0.042
Cadmium	Cd	mg/L	0.005	MAC	0.001	<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
Chromium	Cr	mg/L	0.05	MAC	0.014	<0.003	0.011	<0.003	0.005	0.003	<0.003	<0.003	<0.003	<0.003	0.005	0.004	0.004	<0.003	0.006	<0.003
Copper	Cu	mg/L	1	AO	0.50	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Iron	Fe	mg/L	0.3	AO	0.16	<0.01	<0.010	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead	Pb	mg/L	0.01	MAC	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Manganese	Mn	mg/L	0.05	AO	0.03	0.002	<0.002	0.003	<0.002	<0.002	0.003	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	<0.002	<0.002	<0.002
Mercury		mg/L	0.001	MAC	0.0003	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	Mo	mg/L	-		-	0.002	0.004	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.002
Nickel	Ni	mg/L	-		-	<0.003	< 0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Selenium	Se	mg/L	0.01	MAC	0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Silver	Ag	mg/L	-		-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Strontium	Sr		-		-	0.421	1.03	0.418	0.388	0.386	0.454	0.404	0.427	0.462	0.42	0.422	0.458	0.466	0.422	0.451
Thallium	Tl	mg/L	-		-	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	0.0004	<0.0003	<0.0003	0.0003	<0.0003
Tin	Sn	mg/L	-		-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Titanium	Ti	mg/L	-		-	<0.002	0.005	<0.002	0.003	<0.002	0.004	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	<0.002	<0.002
Uranium	U	mg/L	0.02	MAC	0.006	0.002	0.005	0.002	<0.002	<0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	V	mg/L	-		-	<0.002	0.005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Zinc	Zn	µmhos/cm	5	AO	2.5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	<0.005	0.017	<0.005	<0.005	<0.005	<0.005
Total Dissolved Solids	TDS	mg/L	500	AO	429	***482***	**558**	***482***	***492***	**570**	**546**	**586**	**558**	**570**	**520**	**640**	**614**	**666**	**628**	**570**
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	223	**443**	**420**	**404**	**415**	**421**	**436**	**436**	**448**	**462**	**452**	**447**	**465**	**480**	**448**	**493**
% Difference			-		-	1.3	1.1	3.1	3.4	1.6	2.3	2.7	1.11	1.77	4.99	4.26	4.49	3.75	7.1	2.91
Biological Oxygen Demand	BOD	mg/L	-		-	<2	<2	<2	<2	<2	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Total Kjeldahl Nitrogen	TKN	mg/L	-		-	<0.10	0.28	0.18	0.17	0.11	0.12	0.3	0.4	<0.10	0.52	0.41	0.1	0.1	<0.10	0.18
Chemical Oxygen Demand	COD	mg/L	-		-	<5	11	<5	6	8	5	7	15	<5	28	10	<5	<5	<5	<5
Phenols		mg/L	-		-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Field Conductivity		µS/cm	-		-	840	720	950	807	690	1000	903	842	893	1270	934	1045	1130	1100	1050
Field pH			-		-	8.09	7.82	8.68	8.47	7.75	8.48	8.17	7.92	7.83	7.9	7.73	7.85	8.38	8.39	8.8
Field Temperature		oC	-		-	6	14.2	9.6	5.2	13.1	14	10.3	11.9	10.1	4.3	13.9	12.8	10.9	12.8	8.9

Bold / Highlighting indicates ODWQS exceedance
Bold / Italics indicates RUC exceedance

* When the sodium concentration exceeds 20 mg/L, it should be considered in sodium-restricted diets.
**When the fluoride concentration exceeds 2.4 mg/L, it should be reported to the local medical officer of health.
† Where nitrate and nitrite are present, their total should not exceed 10 mg/L.
‡ Water is considered unsafe if Total Coliform are detected in consecutive samples.

MAC - Maximum Acceptable Concentration
IMAC - Interim Maximum Acceptable Concentration
AO - Aesthetic Objective
OG - Operational Guideline
ND - Not Detected

Results of Chemical Analyses

South Easthope Landfill			Ontario Drinking Water Standards		Reasonable Use Criteria (RUC)	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-7	OW-7	OW-7	OW-7
						Sampled on: 19-Apr-18	Sampled on: 04-Jul-18	Sampled on: 23-Oct-18	Sampled on: 16-Apr-19	Sampled on: 09-Jul-19	Sampled on: 22-Oct-19	Sampled on: 20-Apr-20	Sampled on: 09-Jul-20	Sampled on: 26-Oct-20	Sampled on: 13-Apr-21	Sampled on: 20-Oct-21	Sampled on: 06-Apr-22	Sampled on: 18-Oct-22	Sampled on: 20-Apr-20	Sampled on: 26-Oct-20	Sampled on: 13-Apr-21	Sampled on: 20-Oct-21
						Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC
Parameter	Symbol	Units	Objective	Type		Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon
Saturation pH			-		-	6.72	6.84	6.79	6.94	6.94	6.96	6.93	6.9	6.92	6.92	6.91	6.87	6.97	6.96	7	7	7.02
pH			6.5-8.5	OG	-	7.87	7.65	8.02	7.92	7.89	7.82	7.79	7.83	7.72	7.86	8.01	7.93	7.7	7.84	7.84	7.9	8.01
Langelier Saturation Index			-		-	1.15	0.81	1.23	0.979	0.95	0.856	0.864	0.935	0.796	0.944	1.1	1.06	0.73	0.88	0.844	0.905	0.992
T - Alkalinity		mg/L	30-500	OG	369	293	228	250	277	260	264	257	263	255	274	251	292	286	289	257	254	230
Bicarbonate	HCO_3^-	mg/L	-		-	293	228	250	277	260	264	257	263	255	274	251	292	286	289	257	254	230
Carbonate	CO_3^{-2}	mg/L	-		-	<5	<5	<5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Hydroxide		mg/L	-		-	<5	<5	<5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Electrical Conductivity		µS/cm	-		-	943	1110	1170	1170	1180	1160	1210	1220	1180	1230	1160	1280	1250	667	592	700	661
Fluoride	F^-	mg/L	2.4	**MAC	0.7	<0.25	<0.25	0.14	< 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
Chloride	Cl^-	mg/L	250	AO	134	***176***	***175***	***175***	***183***	***190***	***180***	***207***	***195***	***194***	***208***	***200***	***191***	***213***	16.4	10.3	15.7	27.5
Nitrate	NO_3-N	mg/L	10	†MAC	14.5	<0.25	<0.25	0.08	< 0.05	0.11	< 0.05	0.09	0.14	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	5.97	6.98	**21.2**	**19.5**
Nitrite	NO_2-N	mg/L	1	†MAC	0.31	<0.25	<0.25	<0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Bromide	Br^-	mg/L	-		-	1.18	<0.25	0.59	1.3	1.1	0.9	1.3	1.2	0.9	< 0.4	1.2	1.2	1.3	< 0.4	< 0.4	< 0.4	< 0.4
Sulfate	SO_4^{-2}	mg/L	500	AO	267	56.8	66.1	59	59	58	53	61	61	62	66	62	64	65	9	5	4	4
Calcium	Ca	mg/L	-		-	120	114	123	123	131	122	137	144	139	131	144	136	134	105	109	110	116
Magnesium	Mg	mg/L	-		-	49.1	49.1	47.7	55	55.9	54.5	59.7	62.6	60.8	58.2	60.6	61.3	58.3	21.1	20.3	21.4	21.9
Sodium	Na	mg/L	200	*AO	104	21.7	19.3	20.4	22.2	21.1	23	24.3	23.9	23.7	25.9	26.1	28	22.3	3.7	2.6	2.8	3.8
Potassium	K	mg/L	-		-	2.15	2.05	2.16	2.1	2.1	2.4	2.3	2.5	2.6	2.3	2.5	2.4	2.3	1.2	0.5	0.4	0.6
Ammonia Nitrogen	NH_3-N	mg/L	-		-	<0.02	<0.02	<0.02	0.06	0.05	0.02	0.02	0.02	< 0.01	0.01	0.01	< 0.01	< 0.01	0.03	< 0.01	0.01	0.01
Orthophosphate	PO_4^{-3}	mg/L	-		-	<0.50	<0.50	<0.50	0.06	0.024	0.018	0.022	0.013	< 0.002	0.007	0.007	< 0.002	< 0.002	0.031	< 0.002	0.025	0.017
Total Phosphorus		mg/L	-		-	0.02	<0.02	<0.02	0.08	0.03	0.03	0.03	0.03	0.02	0.05	0.04	0.03	0.03	15.1	0.5	15.5	10.1
Reactive Silica		mg/L	-		-	15.7	19.9	16.6	13	14.2	15.7	15.5	16.3	16	16.1	16.3	15.7	15	8.99	9.2	8.32	9.1
Dissolved Organic Carbon	DOC	mg/L	5	AO	4.1	2	3	2.5	1.8	2.4	1.8	2	1.7	0.8	2.9	2	1.8	< 0.2	0.9	1.2	2.7	1.8
Colour		Colour Unit	5	AO	-	<5	<5	<5	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Turbidity		NTU	5	AO	-	**27**	<0.5	<0.5	**44.4**	**24.8**	**10.8**	**34.6**	**28.7**	**13.7**	**28.6**	**6**	**7.1**	**20.5**	**16900**	**9510**	**13300**	**6390**
Aluminum	Al	mg/L	0.1	OG	0.07	0.012	<0.004	0.005	0.07	0.07	***0.08***	0.07	0.05	0.05	0.03	***0.08***	***0.08***	0.04	0.06	0.04	0.03	0.04
Arsenic	As	mg/L	0.025	IMAC	0.007	<0.003	<0.003	<0.003	0.0006	0.0007	0.0005	0.0005	0.0005	0.0007	0.0005	0.0006	0.0005	0.0006	0.0003	0.0003	0.0001	0.0001
Barium	Ba	mg/L	1	MAC	0.29	0.172	0.146	0.192	0.169	0.188	0.185	0.194	0.208	0.209	0.198	0.216	0.201	0.202	0.038	0.025	0.021	0.027
Boron	B	mg/L	5	IMAC	1.3	0.045	0.037	0.048	0.045	0.039	0.048	0.051	0.049	0.054	0.06	0.062	0.064	0.056	0.012	0.011	0.008	0.005
Cadmium	Cd	mg/L	0.005	MAC	0.001	<0.0001	<0.0001	<0.0001	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000012	0.000015	< 0.000015	< 0.000015	< 0.000015
Chromium	Cr	mg/L	0.05	MAC	0.014	<0.003	0.006	<0.003	< 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
Copper	Cu	mg/L	1	AO	0.50	<0.002	<0.002	<0.002	0.0006	0.0006	0.0004	0.0015	0.0003	0.0015	0.0013	0.0007	0.0009	0.0006	0.002	0.0023	0.0006	0.0041
Iron	Fe	mg/L	0.3	AO	0.16	<0.01	<0.01	<0.01	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Lead	Pb	mg/L	0.01	MAC	0.003	<0.001	<0.001	<0.001	0.00004	0.00002	< 0.00004	0.00003	< 0.00004	0.00009	0.00005	< 0.00004	0.00004	< 0.00004	0.00005	0.00007	< 0.00002	0.00011
Manganese	Mn	mg/L	0.05	AO	0.03	0.002	<0.002	<0.002	< 0.001	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.003	0.001	0.011	0.026	0.001	< 0.001	< 0.001
Mercury		mg/L	0.001	MAC	0.0003	<0.0001	<0.0001	<0.0001	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Molybdenum	Mo	mg/L	-		-	<0.002	<0.002	<0.002	0.0009	0.0011	0.0011	0.0011	0.001	0.0011	0.001	0.001	0.001	0.0009	0.0008	< 0.0001	< 0.0001	< 0.0001
Nickel	Ni	mg/L	-		-	<0.003	<0.003	<0.003	< 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
Selenium	Se	mg/L	0.01	MAC	0.004	<0.004	<0.004	<0.004	0.004	0.003	0.003	0.003	0.002	0.002	0.002	0.003	0.003	0.003	< 0.001	< 0.001	< 0.001	< 0.001
Silver	Ag	mg/L	-		-	<0.0001	<0.0001	<0.0001	< 0.0001	< 0.0001	0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Strontium	Sr		-		-	0.504	0.395	0.474	0.511	0.505	0.543	0.525	0.564	0.559	0.538	0.57	0.577	0.527	0.165	0.148	0.152	0.16
Thallium	Tl	mg/L	-		-	<0.0003	<0.0003	<0.0003	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Tin	Sn	mg/L	-		-	<0.002	<0.002	<0.002	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Titanium	Ti	mg/L	-		-	0.002	<0.002	<0.002	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Uranium	U	mg/L	0.02	MAC	0.006	<0.002	<0.002	0.002	0.00176	0.00151	0.00177	0.00169	0.00149	0.00154	0.00159	0.0015	0.00176	0.00168	0.00018	0.00014	0.00013	0.00017
Vanadium	V	mg/L	-		-	<0.002	<0.002	<0.002	0.0003	0.0003	0.0003	0.0003	0.0003	0.0004	0.0003	0.0003	0.0003	0.0003	0.0002	0.0003	0.0002	0.0002
Zinc	Zn	µmhos/cm	5	AO	2.5	<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
Total Dissolved Solids	TDS	mg/L	500	AO	429	**696**	**688**	**732**	**610**	**614**	**594**	**646**	**646**	**634**	**656**	**646**	**658**	**666**	330	301	308	312
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	223	**502**	**487**	**504**	**534**	**557**	**529**	**588**	**616**	**597**	**568**	**609**	**592**	**574**	**349**	**355**	**363**	**379**
% Difference			-		-	4.27	1.19	0.791	1.01	1.42	0.687	2.42	5.47	4.74	0.746	5.62	2.17	2.25	2.34	9	1.75	6.14
Biological Oxygen Demand	BOD	mg/L	-		-	<5	<5	<5	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3
Total Kjeldahl Nitrogen	TKN	mg/L	-		-	0.18	<0.10	0.3	0.3	0.3	0.2	0.3	0.4	0.4	0.3	0.3	0.3	0.3	3	0.2	3	2.4
Chemical Oxygen Demand	COD	mg/L	-		-	<5	<5	<5	8	6	< 5	< 5	< 5	< 5	6	5	< 5	< 5	380	420	194	104
Phenols		mg/L	-		-	<0.001	<0.001	<0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.001	< 0.002	< 0.002	< 0.001	< 0.001	< 0.002	< 0.001	< 0.002	< 0.002
Field Conductivity		µS/cm	-		-	1130	1040	1190	891	1213	1103	1052	1160	880	1100	1260		925	680	490	656	781
Field pH			-		-	8.12	7.11	6.8	8.01	8.02	7.62	7.04	7.55	6.9	7.46	7.47		7.55	8.74	7.2	7.61	7.57
Field Temperature		oC	-		-	6.9	12.8	9.9	9	12.1	10.8	4.4	16	9.3	10.1	13.3		8.2	5.9	10.3	8.7	15.4

Bold / Highlighting indicates ODWQS exceedance

Bold / Italics indicates RUC exceedance

* When the sodium concentration exceeds 20 mg/L, it should be considered in sodium-restricted diets.

**When the fluoride concentration exceeds 2.4 mg/L, it should be reported to the local medical officer of health.

† Where nitrate and nitrite are present, their total should not exceed 10 mg/L.

‡ Water is considered unsafe if Total Coliform are detected in consecutive samples.

Results of Chemical Analyses

South Easthope Landfill			Ontario Drinking Water Standards		Reasonable Use Criteria (RUC)	OW-7	OW-7	OW-8	OW-8	OW-8	OW-8	OW-8	OW-8	OW-9	OW-9	OW-9	OW-9	OW-9	OW-9	OW-9	OW-9
						Sampled on: 06-Apr-22	**Sampled on:** 18-Oct-22	**Sampled on:** 09-Jul-20	**Sampled on:** 26-Oct-20	**Sampled on:** 13-Apr-21	**Sampled on:** 20-Oct-21	**Sampled on:** 06-Apr-22	**Sampled on:** 18-Oct-22	**Sampled on:** 09-Jul-20	**Sampled on:** 26-Oct-20	**Sampled on:** 13-Apr-21	**Sampled on:** 12-Jul-21	**Sampled on:** 20-Oct-21	**Sampled on:** 06-Apr-22	**Sampled on:** 26-Jul-22	**Sampled on:** 18-Oct-22
						Sampled by: AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC
Parameter	**Symbo**	**Units**	**Objective**	**Type**		**Analyzed by:** Caduceon	**Analyzed by:** Caduceon	**Analyzed by:** Caduceon	**Analyzed by:** Caduceon	**Analyzed by:** Caduceon	**Analyzed by:** Caduceon	**Analyzed by:** Caduceon	**Analyzed by:** Caduceon	**Analyzed by:** Caduceon	**Analyzed by:** Caduceon	**Analyzed by:** Caduceon	**Analyzed by:** Caduceon	**Analyzed by:** Caduceon	**Analyzed by:** Caduceon	**Analyzed by:** Caduceon	**Analyzed by:** Caduceon
Saturation pH			-		-	6.99	6.99	7.24	7.25	7.19	7.17	7.22	7.23	7.56	7.6	7.58	7.53	7.51	7.56	7.52	7.56
pH			6.5-8.5	OG	-	7.95	7.8	8.02	7.98	8.01	8.2	8.07	7.95	8.08	8.1	8.05	8.09	8.33	8.09	8.08	7.94
Langelier Saturation Index			-		-	0.963	0.809	0.783	0.73	0.815	1.03	0.847	0.72	0.519	0.502	0.47	0.565	0.817	0.526	0.564	0.378
T - Alkalinity		mg/L	30-500	OG	369	275	271	238	231	252	244	260	252	182	180	191	201	203	201	206	200
Bicarbonate	HCO_3^-	mg/L	-		-	275	271	238	231	252	244	260	252	182	180	191	201	201	201	206	200
Carbonate	CO_3^{-2}	mg/L	-		-	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Hydroxide		mg/L	-		-	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Electrical Conductivity		µS/cm	-		-	673	683	574	547	606	551	561	546	418	397	412	422	401	416	420	417
Fluoride	F^-	mg/L	2.4	**MAC	0.7	< 0.1	< 0.1	0.2	0.2	0.1	< 0.1	0.2	0.2	0.4	0.6	0.5	0.4	< 0.1	0.2	0.5	***0.7***
Chloride	Cl^-	mg/L	250	AO	134	33.2	47.5	8.8	7.1	7.2	7.1	6.8	7	4.6	3.1	3.8	4.5	3.1	3.7	3.6	3.4
Nitrate	NO_3-N	mg/L	10	†MAC	14.5	7.47	6.14	0.15	0.06	< 0.05	0.07	< 0.05	0.05	0.47	0.07	0.19	0.27	< 0.05	0.13	0.16	< 0.05
Nitrite	NO_2-N	mg/L	1	†MAC	0.31	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Bromide	Br^-	mg/L	-		-	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Sulfate	SO_4^{-2}	mg/L	500	AO	267	3	4	47	43	71	58	41	46	23	19	25	28	20	28	26	26
Calcium	Ca	mg/L	-		-	104	107	67.5	67.4	71.9	78.3	63.8	64.6	41	37.8	37.3	40.2	41	36.8	40.1	37.1
Magnesium	Mg	mg/L	-		-	20.8	20.1	35	34.8	35.4	36.2	32.3	31.6	25.5	25.7	25.8	26.6	27	25.9	26.1	25
Sodium	Na	mg/L	200	*AO	104	3.2	3.7	13.1	9.4	9.4	11.1	9.5	8.6	17.8	14.2	13.9	14.2	14.8	15	15.6	13.8
Potassium	K	mg/L	-		-	0.3	0.3	5	3.2	3.1	3.1	1.9	1.8	5.6	3.7	2.8	2.6	2.6	2.2	2.1	2
Ammonia Nitrogen	NH_3-N	mg/L	-		-	< 0.01	< 0.01	0.16	< 0.01	0.02	0.02	< 0.01	< 0.01	0.17	< 0.01	0.02	0.03	0.02	< 0.01	0.12	< 0.01
Orthophosphate	PO_4^{-3}	mg/L	-		-	0.005	< 0.002	0.229	< 0.002	0.026	0.019	0.006	0.004	0.264	< 0.002	0.034	0.041	0.023	0.014	0.162	0.01
Total Phosphorus		mg/L	-		-	7.69	4.94	0.58	4.17	0.36	0.96	0.28	0.46	0.95	0.67	0.28	0.35	0.17	0.31	2.06	0.27
Reactive Silica		mg/L	-		-	7.96	8.08	12.7	14.4	14.6	14.7	17.4	15.8	9.28	10	10.9	11.4	11.9	11.4	11.3	11.2
Dissolved Organic Carbon	DOC	mg/L	5	AO	4.1	2.3	0.5	2.3	1	2.3	1.5	1.9	0.9	2.2	0.9	2.4	1.8	1.2	1.3	1	0.8
Colour		Colour Unit	5	AO	-	< 2	< 2	< 2	< 2	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Turbidity		NTU	5	AO	-	**5810**	**9680**	**1030**	**3000**	**483**	**742**	**849**	**638**	**1220**	**17.2**	**773**	**860**	**124**	**561**	**773**	**1750**
Aluminum	Al	mg/L	0.1	OG	0.07	0.07	0.03	0.02	0.03	0.01	0.06	***0.08***	0.02	0.02	0.02	< 0.01	***0.08***	0.03	0.03	0.05	0.03
Arsenic	As	mg/L	0.025	IMAC	0.007	< 0.0001	0.0001	0.0044	0.0052	0.004	0.0033	0.0072	0.0059	0.0014	0.0024	0.0012	0.0012	0.0015	0.0012	0.0014	0.0014
Barium	Ba	mg/L	1	MAC	0.29	0.022	0.023	0.121	0.116	0.112	0.105	0.105	0.105	0.129	0.104	0.097	0.098	0.103	0.088	0.102	0.091
Boron	B	mg/L	5	IMAC	1.3	0.009	0.012	0.032	0.026	0.023	0.023	0.017	0.018	0.054	0.053	0.048	0.047	0.05	0.044	0.04	0.045
Cadmium	Cd	mg/L	0.005	MAC	0.001	< 0.000015	< 0.000010	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000010	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015	0.000016	< 0.000010
Chromium	Cr	mg/L	0.05	MAC	0.014	< 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
Copper	Cu	mg/L	1	AO	0.50	0.0012	0.0007	0.0003	0.0016	0.0005	0.0009	0.0011	0.0003	0.0008	0.0004	0.0022	0.0007	0.0007	0.0009	0.0007	0.0024
Iron	Fe	mg/L	0.3	AO	0.16	< 0.005	< 0.005	< 0.005	0.006	< 0.005	0.02	0.139	< 0.005	< 0.005	< 0.005	< 0.005	0.048	< 0.005	0.007	0.009	0.01
Lead	Pb	mg/L	0.01	MAC	0.003	0.00003	0.00003	< 0.00002	0.00008	< 0.00002	0.00003	0.00025	0.00002	< 0.00002	0.00003	< 0.00002	0.00006	< 0.00002	0.00003	0.00002	0.00014
Manganese	Mn	mg/L	0.05	AO	0.03	< 0.001	< 0.001	***0.049***	**0.061**	0.022	***0.029***	***0.035***	***0.029***	0.016	0.026	0.005	0.006	0.006	0.001	0.002	0.002
Mercury		mg/L	0.001	MAC	0.0003	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Molybdenum	Mo	mg/L	-		-	< 0.0001	0.0001	0.0045	0.0023	0.0027	0.0023	0.0018	0.0018	0.0071	0.0042	0.0045	0.0043	0.0049	0.005	0.0054	0.0046
Nickel	Ni	mg/L	-		-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Selenium	Se	mg/L	0.01	MAC	0.004	< 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
Silver	Ag	mg/L	-		-	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Strontium	Sr		-		-	0.148	0.144	0.315	0.323	0.275	0.292	0.289	0.272	0.826	0.903	0.966	0.992	1.02	0.995	1.02	0.966
Thallium	Tl	mg/L	-		-	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Tin	Sn	mg/L	-		-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Titanium	Ti	mg/L	-		-	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Uranium	U	mg/L	0.02	MAC	0.006	0.00017	0.0002	0.00155	0.00127	0.00264	0.00228	0.00176	0.00191	0.00082	0.00092	0.00133	0.00173	0.00159	0.00194	0.00166	0.00193
Vanadium	V	mg/L	-		-	0.0002	0.0002	0.0008	0.0007	0.0008	0.0009	0.0006	0.0005	0.0011	0.0016	0.0016	0.0017	0.0021	0.0015	0.0016	0.0016
Zinc	Zn	µmhos/cm	5	AO	2.5	< 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
Total Dissolved Solids	TDS	mg/L	500	AO	429	330	345	319	304	350	340	311	311	227	213	223	237	231	232	237	228
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	223	**345**	**350**	**313**	**312**	**325**	**345**	**292**	**291**	**207**	**200**	**199**	**210**	**213**	**198**	**208**	**196**
% Difference			-		-	0.13	0.866	7.5	7.97	1.91	8.56	0.56	0.237	8.25	6.56	2.13	1.16	4.37	0.481	1.05	1.06
Biological Oxygen Demand	BOD	mg/L	-		-	< 3	< 3	4	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3
Total Kjeldahl Nitrogen	TKN	mg/L	-		-	2.1	0.2	0.6	1.3	0.2	0.5	0.3	0.3	0.5	0.4	0.2	12.6	0.2	0.2	1.7	0.2
Chemical Oxygen Demand	COD	mg/L	-		-	88	254	< 5	125	< 5	< 5	< 5	17	7	< 5	< 5	< 5	< 5	< 5	58	25
Phenols		mg/L	-		-	< 0.001	< 0.001	< 0.002	< 0.001	< 0.002	< 0.002	< 0.001	< 0.001	< 0.002	< 0.001	< 0.002	< 0.002	< 0.002	< 0.001	< 0.001	< 0.001
Field Conductivity		µS/cm	-		-	650	325	570	460	610	636		462	520	370	450	380	463		320	335
Field pH			-		-	7.92	7.61	7.76	7.61	7.64	7.79		7.95	7.74	8.26	7.71	8.05	8.09		8.06	7.98
Field Temperature		oC	-		-	6.66	9.1	19.1	8.4	10.7	14.1		9	18.2	8.4	13.2	11.4	14.6		17.9	12.5

Bold / Highlighting indicates ODWQS exceedance

Bold / Italics indicates RUC exceedance

Results of Chemical Analyses

South Easthope Landfill			Ontario Drinking Water Standards		Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well
					Sampled on: 23-Apr-96	Sampled on: 14-Nov-96	Sampled on: 17-Apr-97	Sampled on: 26-Nov-97	Sampled on: 28-Apr-98	Sampled on: 26-Nov-98	Sampled on: 20-Apr-99	Sampled on: 23-Nov-99	Sampled on: 20-Apr-00	Sampled on: 29-Nov-00	Sampled on: 30-Apr-01	Sampled on: 25-Apr-02	Sampled on: 26-Nov-02	Sampled on: 22-May-03	Sampled on: 05-Dec-03
					Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC
Parameter	**Symbol**	**Units**	**Objectiv**	**Type**	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT
Saturation pH			-													7.45	7.62	7.3	7.31
pH			6.5-8.5	OG	7.5	7.79	**8.6**	7.57	7.7	7.2	7.8	7.83	7.4	7.3	8.4	8.4	8.15	7.81	8.13
Langelier Saturation Index			-													0.95			0.82
T - Alkalinity		mg/L	30-500	OG	218	220	225	229	168	235	195	207	228	201	180	238	225	226	217
Bicarbonate	HCO_3^-	mg/L	-													274	274	226	217
Carbonate	CO_3^{-2}	mg/L	-													8	<5	<5	<5
Hydroxide		mg/L	-													<5	<5	<5	<5
Electrical Conductivity		µS/cm	-		421	429	436	425	441	442	409	430	460	420	370	399	397	396	406
Fluoride	F^-	mg/L	2.4	**MAC												1	0.9	0.79	0.9
Chloride	Cl^-	mg/L	250	AO	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2	11.9	6.1	6.1	3.9	2.6	6.9	1.08	0.98
Nitrate	NO_3-N	mg/L	10	†MAC	<0.05	0.11	0.27	<0.05	<0.05	<0.05	0.05	0.38	0.32	0.11	0.23	1.3	2.1	<0.05	<0.05
Nitrite	NO_2-N	mg/L	1	†MAC	<0.05											<0.3	<0.3	<0.05	<0.05
Bromide	Br^-	mg/L	-													<0.1	<0.1	<0.05	<0.05
Sulfate	SO_4^{-2}	mg/L	500	AO	5.6	<1.0	2.7	<1.0	54.8	5.6	7	5.3	2.1	8.4	2.4	2.7	2.8	<0.10	<0.10
Calcium	Ca	mg/L	-		39	38.2	39.8	43	34	38	40	37	36	30.4	30.6	41.5	36.3	33.6	35.6
Magnesium	Mg	mg/L	-		15.9	16	16.8	16	15.9	15.9	17	16	16.4	15.1	15.5	17.9	17.2	15.9	15.7
Sodium	Na	mg/L	200	*AO	24.4	25.2	28.6	22	26	28	21.1	24.5	34.1	31.5	25.7	27.7	33.6	27.1	26.1
Potassium	K	mg/L	-		0.9	4.2	<0.1	<0.1	<0.1	1.7	1.3	0.5	1.1	1	0.7	<0.6	0.9	8.65	0.9
Ammonia Nitrogen	NH_3-N	mg/L	-		<0.05	0.78	0.72	0.93	<0.05	<0.05	0.73	0.79	0.56	0.42	0.45	0.71	0.87	0.35	0.69
Orthophosphate	PO_4^{-3}	mg/L	-													<0.15	<0.15	<0.15	0.25
Total Phosphorus		mg/L	-																
Reactive Silica		mg/L	-													14	13.8	14.3	14
Dissolved Organic Carbon	DOC	mg/L	5	AO	0.5	0.5	0.5	0.5	<0.5	0.6	0.6	0.7	0.9	0.1	0.1	2	2	2	<1
Colour		Colour Unit	5	AO												**15**	**20**	**10**	**30**
Turbidity		NTU	5	AO												1	<0.5	<0.5	0.008
Aluminum	Al	mg/L	0.1	OG												<0.002	<0.002	0.007	0.008
Arsenic	As	mg/L	0.025	IMAC												<0.005	<0.005	<0.005	<0.003
Barium	Ba	mg/L	1	MAC												0.152	0.142	0.130	0.146
Boron	B	mg/L	5	IMAC												0.07	0.18	0.09	0.09
Cadmium	Cd	mg/L	0.005	MAC												0.001	0.005	<0.001	<0.002
Chromium	Cr	mg/L	0.05	MAC												<0.002	0.012	<0.002	<0.003
Copper	Cu	mg/L	1	AO												0.172	0.035	0.023	<0.002
Iron	Fe	mg/L	0.3	AO	<0.02	0.06	<0.02	<0.02	<0.02	<0.02	**0.66**	0.03	0.03	**0.43**	0.11	**0.861**		**0.9**	**1.05**
Lead	Pb	mg/L	0.01	MAC												<0.01	<0.01	<0.01	<0.002
Manganese	Mn	mg/L	0.05	AO												0.016	0.018	0.016	0.02
Molybdenum	Mo	mg/L	-													0.002	<0.003	<0.003	0.002
Nickel	Ni	mg/L	-													<0.002	<0.003	<0.003	<0.003
Selenium	Se	mg/L	0.01	MAC												<0.005	<0.005	<0.005	0.004
Silver	Ag	mg/L	-													<0.001	<0.001	<0.001	<0.002
Strontium	Sr		-													1.19	0.9	0.913	1.06
Thallium	Tl	mg/L	-													<0.02	<0.06	<0.06	<0.06
Tin	Sn	mg/L	-													<0.007	<0.009	<0.009	<0.009
Titanium	Ti	mg/L	-													<0.001	0.008	0.028	<0.001
Uranium	U	mg/L	0.02	MAC												<0.05	<0.05	<0.05	<0.001
Vanadium	V	mg/L	-													<0.001	<0.001	<0.001	<0.001
Zinc	Zn	µmhos/cm	5	AO												0.016	0.173	0.014	<0.004
Total Dissolved Solids	TDS	mg/L	500	AO	234	227	239	235	249	247	219	230	250	230	210	237	235	234	182
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	**164**	**162**	**169**	**174**	**151**	**161**	**171**	**159**	**160**	**139**	**141**	**177**	**161**	**139**	**154**
% Difference			-								3.25	0.42		2.07	2.94	2.26	1.26	5.5	8.1
Total Coliform Bacteria		per 100 mL	0	‡MAC														0	<1
Escherichia coli Bacteria		per 100 mL	0	MAC															<1
Field Conductivity		µS/cm	-																
Field pH			-																
Field Temperature		oC	-																

Bold / Highlighting indicates ODWQS exceedance

* When the sodium concentration exceeds 20 mg/L, it should be considered in sodium restricted diets
**When the fluoride concentration exceeds 2.4 mg/L, it should be reported to the local medical officer of health.
† Where nitrate and nitrite are present, their total should not exceed 10 mg/L.
‡ Water is considered unsafe if Total Coliform are detected in consecutive samples.

MAC - Maximum Acceptable Concentration
IMAC - Interim Maximum Acceptable Concentration
AO - Aesthetic Objective
OG - Operational Guideline

ND - Not Detected

Results of Chemical Analyses

South Easthope Landfill			Ontario Drinking Water Standards		Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well
					Sampled on: 05-Jun-04	Sampled on: 05-Oct-04	Sampled on: 19-May-05	Sampled on: 03-Oct-05	Sampled on: 24-May-06	Sampled on: 25-Oct-06	Sampled on: 26-Apr-07	Sampled on: 24-Oct-07	Sampled on: 08-Apr-08	Sampled on: 30-Oct-08	Sampled on: 15-Apr-09	Sampled on: 27-Oct-09	Sampled on: 09-Apr-10	Sampled on: 20-Oct-10	Sampled on: 14-Apr-11
					Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC
Parameter	**Symbol**	**Units**	**Objectiv**	**Type**	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT
Saturation pH			-		7.28	7.29	8.15	7.26	7.3	7.3	7.29	7.31	7.3	7.29	7.26	7.25	7.27	7.28	7.26
pH			6.5-8.5	OG	7.88	7.94	8.27	8.41	7.99	8.06	8.47	8.15	8.35	8.27	8.28	8.43	8.35	8.16	8.19
Langelier Saturation Index			-		0.6	0.65	0.12	1.15	0.69	0.76	1.18	0.84	1.05	0.98	1.02	1.18	1.08	0.88	0.93
T - Alkalinity		mg/L	30-500	OG	218	218	150	215	216	220	222	219	220	218	222	234	222	218	226
Bicarbonate	HCO_3^-	mg/L	-		218	218	183	205	216	220	205	219	210	218	222	226	215	218	226
Carbonate	CO_3^{-2}	mg/L	-		<5	<5	<5	10	<10	<10	17	<10	10	<5	<5	8	6	<5	<5
Hydroxide		mg/L	-		<5	<5	<5	<5	<10	<10	<10	<10	<5	<5	<5	<5	<5	<5	<5
Electrical Conductivity		µS/cm	-		401	396	404	392	400	398	399	400	400	407	404	397	396	383	410
Fluoride	F^-	mg/L	2.4	**MAC	0.94	0.87	0.85	0.93	0.88	0.88	0.81	0.86	0.83	0.87	0.92	0.65	0.92	0.83	0.79
Chloride	Cl^-	mg/L	250	AO	0.68	1.25	1.26	1.15	0.82	1.01	0.97	0.76	0.67	1.43	0.68	0.82	0.8	0.96	1.07
Nitrate	NO_3-N	mg/L	10	†MAC	<0.05	<0.05	0.43	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrite	NO_2-N	mg/L	1	†MAC	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Bromide	Br^-	mg/L	-		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sulfate	SO_4^{-2}	mg/L	500	AO	0.26	<0.10	0.17	<0.10	<0.10	2.42	<0.10	<0.10	<0.10	0.2	<0.10	0.13	0.76	0.2	1.01
Calcium	Ca	mg/L	-		37.6	37.1	20.4	36.2	37.6	36.3	37	35.8	36.6	37.5	40	38.9	38.6	38.7	38.9
Magnesium	Mg	mg/L	-		16.5	16	8.68	14.8	15.7	15.5	15.8	15.2	15.1	16.2	16.6	16.2	16.3	16.4	16.4
Sodium	Na	mg/L	200	*AO	26.8	27.5	15.1	26.3	27	27	27.1	27.9	25.7	28.2	27.9	28.8	28.1	27.9	27.1
Potassium	K	mg/L	-		1.07	0.92	0.56	0.88	0.94	0.93	0.96	0.97	1.13	1.02	0.9	0.98	0.92	1.02	1.01
Ammonia Nitrogen	NH_3-N	mg/L	-		0.86	0.45	0.97	0.61	0.9	0.87	1.04	0.84	0.81	0.66	0.97	0.42	0.71	0.5	0.68
Orthophosphate	PO_4^{-3}	mg/L	-		0.18	0.12	<0.15	<0.05	<0.10	<0.10	<0.10	<0.10	<0.10	0.15	<0.10	0.12	<0.10	<0.10	<0.10
Total Phosphorus		mg/L	-		0.2	0.23	0.22	0.25	0.25	0.25	0.27	0.27	0.27	0.25	0.26	0.08	0.18	0.29	0.26
Reactive Silica		mg/L	-		NR	12.5	13.5	13.4	11.9	13.9	13.2	12.9	13.7	14	13.2	14.6	13.6	12.8	13.1
Dissolved Organic Carbon	DOC	mg/L	5	AO		2	<1	2	1.6	1.4	1.7	1.6	1.7	1.7	1.8	1.8	1.9	1.9	1.8
Colour		Colour Unit	5	AO	**8**	<5	5	<5	**25**	<5	<5	<5	5	**7**	<5	**8**	**35**	<5	**15**
Turbidity		NTU	5	AO	2.9	<0.5	1	<0.5	1.8	0.9	1.8	0.7	2.7	1.5	2.8	1.3	**5.1**	<0.5	0.6
Aluminum	Al	mg/L	0.1	OG	0.010	0.006	<0.004	0.006	<0.004	0.013	<0.004	0.011	<0.004	<0.004	<0.004	0.015	0.014	0.009	0.011
Arsenic	As	mg/L	0.025	IMAC	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Barium	Ba	mg/L	1	MAC	0.422	0.151	0.078	0.161	0.161	0.152	0.155	0.152	0.163	0.158	0.158	0.18	0.169	0.155	0.156
Boron	B	mg/L	5	IMAC	0.13	0.085	0.05	0.079	0.084	0.094	0.085	0.092	0.099	0.073	0.096	0.092	0.105	0.089	0.085
Cadmium	Cd	mg/L	0.005	MAC	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0001	<0.002	<0.001	<0.002	<0.002	<0.002
Chromium	Cr	mg/L	0.05	MAC	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Copper	Cu	mg/L	1	AO	0.003	0.014	0.009	0.025	0.009	0.005	0.019	0.003	0.003	0.014	<0.003	0.03	0.052	0.073	0.074
Iron	Fe	mg/L	0.3	AO	**0.927**	**1.19**	0.228	**0.987**	**1.18**	**1.21**	**1.16**	**0.889**	**1.07**	**0.914**	**1.12**	**1.06**	**1.31**	**1.04**	**0.913**
Lead	Pb	mg/L	0.01	MAC	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	0.001	<0.002	0.007	<0.002	<0.002	<0.002
Manganese	Mn	mg/L	0.05	AO	0.022	0.019	0.009	0.017	0.017	0.018	0.017	0.019	0.021	0.017	0.019	0.017	0.024	0.019	0.017
Molybdenum	Mo	mg/L	-		<0.002	<0.002	<0.002	0.002	<0.002	<0.002	<0.002	<0.002	0.002	0.002	<0.002	0.002	<0.002	<0.002	<0.002
Nickel	Ni	mg/L	-		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.01	<0.003	<0.003
Selenium	Se	mg/L	0.01	MAC	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Silver	Ag	mg/L	-		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0001	<0.002	<0.002	<0.002	<0.002	<0.002
Strontium	Sr		-		1.68	1.09	0.557	1	1.05	1.02	1.01	0.998	1.07	1.06	1.03	1.04	1.07	1.05	1.01
Thallium	Tl	mg/L	-		<0.06	<0.06	<0.06	<0.06	<0.006	<0.006	<0.006	<0.006	<0.006	<0.0003	<0.006	<0.003	<0.006	<0.006	<0.006
Tin	Sn	mg/L	-		<0.010	<0.009	<0.009	<0.009	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Titanium	Ti	mg/L	-		<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Uranium	U	mg/L	0.02	MAC	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	V	mg/L	-		<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Zinc	Zn	µmhos/cm	5	AO	0.006	0.005	<0.004	0.015	0.006	0.013	0.013	0.037	0.012	0.048	<0.005	0.051	0.469	0.048	0.116
Total Dissolved Solids	TDS	mg/L	500	AO	224	206	250	120	210	214	230	212	214	206	216	154	192	214	214
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	**162**	**158**	**250**	**151**	**158**	**154**	**157**	**152**	**154**	**160**	**168**	**164**	**164**	**164**	**165**
% Difference			-		10.3	9.4	12.5	5.2	10.1	7.6	5.1	0.8	1.7	1.1	2.3	1.7	0.4	1.3	0.8
Total Coliform Bacteria		per 100 mL	0	‡MAC	<1		<1		<1	<1	<1	<1	<1	<1	<1	<1	NA	<1	NA
Escherichia coli Bacteria		per 100 mL	0	MAC	<1		<1		<1	<1	<1	<1	<1	<1	<1	<1	NA	<1	NA
Field Conductivity		µS/cm	-						380	500	467	440	420	419	500	415	408	400	402
Field pH			-						7.77	8.54	8.25	8.26	8.34	7.96	8.13	8.58	7.89	8.34	8.44
Field Temperature		oC	-						12.2	7.7	9.8	9.8	12.3	9.6	8.9	10.7	7.4	9.9	10.5

Bold / Highlighting indicates ODWQS exceedance

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**When the fluoride concentration exceeds 2.4 mg/L, it should be reported to the local medical officer of health.

† Where nitrate and nitrite are present, their total should not exceed 10 mg/L.

‡ Water is considered unsafe if Total Coliform are detected in consecutive samples.

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IMAC - Interim Maximum Acceptable Concentration
AO - Aesthetic Objective
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ND - Not Detected

Results of Chemical Analyses

South Eastehope Landfill			Ontario Drinking Water Standards		Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well
					Sampled on: 19-Oct-11	Sampled on: 04-Apr-12	Sampled on: 24-Oct-12	Sampled on: 10-Apr-13	Sampled on: 29-Oct-13	Sampled on: 16-Apr-14	Sampled on: 28-Oct-14	Sampled on: 16-Apr-15	Sampled on: 27-Oct-15	Sampled on: 12-Apr-16	Sampled on: 20-Oct-16	Sampled on: 19-Apr-17	Sampled on: 31-Oct-17	Sampled on: 19-Apr-18	Sampled on: 23-Oct-18
					Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC
Parameter	**Symbol**	**Units**	**Objectiv**	**Type**	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT
Saturation pH			-		7.27		9.6	7.25	7.29	7.27	7.3	7.29	7.29	7.29	7.16				
pH			6.5-8.5	OG	8.18		8.27	8.03	8.39	8.24	7.98	8.32	8.08	8.23	7.29				
Langelier Saturation Index			-		0.91		-1.33	0.78	1.1	0.97	0.68	1.03	0.79	0.94	0.13				
T - Alkalinity		mg/L	30-500	OG	231		225	222	223	229	212	219	221	228	260				
Bicarbonate	HCO_3^-	mg/L	-		231		225	222	217	229	212	217	221	228	260				
Carbonate	CO_3^{-2}	mg/L	-		<5		<5	<5	7	<5	<5	<5	<5	<5	<5				
Hydroxide		mg/L	-		<5		<5	<5	<5	<5	<5	<5	<5	<5	<5				
Electrical Conductivity		µS/cm	-		341		393	416	404	443	421	423	404	396	407				
Fluoride	F^-	mg/L	2.4	**MAC	0.89		0.73	0.87	0.94	0.85	0.84	0.73	0.84	0.83	0.87				
Chloride	Cl^-	mg/L	250	AO	1.22		1.08	1.23	1.21	1.21	1.01	1.25	1.38	1.12	1.04				
Nitrate	NO_3-N	mg/L	10	†MAC	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				
Nitrite	NO_2-N	mg/L	1	†MAC	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				
Bromide	Br^-	mg/L	-		<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				
Sulfate	SO_4^{-2}	mg/L	500	AO	0.22		<0.10	0.62	0.18	0.15	<0.10	<0.10	<0.10	<0.10	<0.10				
Calcium	Ca	mg/L	-		37.3		0.17	41	37	36.5	37	37.5	37.2	35.9	42.4				
Magnesium	Mg	mg/L	-		15.9		0.08	17	15.3	16.2	16.3	15.8	15.7	15.5	18.2				
Sodium	Na	mg/L	200	*AO	27		108	29.5	27.5	27.3	26.4	25.8	28.4	29.4	28.5				
Potassium	K	mg/L	-		0.87		0.93	1.02	0.92	1.03	0.82	0.96	0.94	0.88	1.04				
Ammonia Nitrogen	NH_3-N	mg/L	-		0.38		0.7	0.93	0.76	0.76	0.74	0.2	0.79	0.73	0.78				
Orthophosphate	PO_4^{-3}	mg/L	-		0.12		<0.10	<0.10	<0.10	<0.10	0.51	0.33	0.17	0.15	0.13				
Total Phosphorus		mg/L	-		0.29		0.05	0.21	0.26	0.24	0.22	0.05	0.25	0.26	0.26				
Reactive Silica		mg/L	-		13		13.7	13.9	13.1	13.2	13.2	12.5	13	12.9	13				
Dissolved Organic Carbon	DOC	mg/L	5	AO	1.9		1.4	1.7	1.7	3	1.9	2.2	1.8	1.7	2.2				
Colour		Colour Unit	5	AO	**8**		**6**	**50**	**52**	**65**	**54**	**46**	<5	**7**	**52**				
Turbidity		NTU	5	AO	2.6		<0.5	3.9	3.4	3.9	3.9	3.7	3.4	3.5	3.6				
Aluminum	Al	mg/L	0.1	OG	<0.004	Outside Tap Not On and No One Home	0.011	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004				
Arsenic	As	mg/L	0.025	IMAC	<0.003		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	Tap not on	Tap not on	Tap not on	Tap not on
Barium	Ba	mg/L	1	MAC	0.169		<0.002	0.145	0.155	0.173	0.154	0.048	0.15	0.159	0.137				
Boron	B	mg/L	5	IMAC	0.095		0.086	0.078	0.089	0.082	0.08	0.102	0.077	0.071	0.089				
Cadmium	Cd	mg/L	0.005	MAC	<0.002		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002				
Chromium	Cr	mg/L	0.05	MAC	<0.003		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003				
Copper	Cu	mg/L	1	AO	0.059		0.005	0.03	0.021	0.011	0.007	0.014	0.004	0.003	<0.003				
Iron	Fe	mg/L	0.3	AO	**1.55**		0.01	**0.825**	**0.95**	**0.994**	**0.944**	**0.76**	**1.08**	**0.994**	**0.875**				
Lead	Pb	mg/L	0.01	MAC	<0.002		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002				
Manganese	Mn	mg/L	0.05	AO	0.02		<0.002	0.015	0.018	0.019	0.018	0.007	0.018	0.017	0.017				
Molybdenum	Mo	mg/L	-		<0.002		<0.002	<0.002	<0.002	<0.002	<0.002	0.012	<0.002	<0.002	<0.002				
Nickel	Ni	mg/L	-		<0.003		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003				
Selenium	Se	mg/L	0.01	MAC	<0.004		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004				
Silver	Ag	mg/L	-		<0.002		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002				
Strontium	Sr		-		1.12		<0.005	0.918	1.09	0.971	1.09	0.594	1.07	0.985	1.01				
Thallium	Tl	mg/L	-		<0.006		<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006				
Tin	Sn	mg/L	-		<0.002		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002				
Titanium	Ti	mg/L	-		<0.002		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002				
Uranium	U	mg/L	0.02	MAC	<0.002		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002				
Vanadium	V	mg/L	-		<0.002		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002				
Zinc	Zn	µmhos/cm	5	AO	0.057		0.005	0.107	0.085	0.036	0.029	0.014	<0.005	0.007	0.007				
Total Dissolved Solids	TDS	mg/L	500	AO	218		224	208	224	254	220	218	230	200	216				
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	**159**		**0.8**	**172**	**155**	**158**	**160**	**159**	**158**	**153**	**181**				
% Difference			-		3.5		1.8	3	1.9	2.7	1.1	1.4	0.457	2.4	3.35				
Total Coliform Bacteria		per 100 mL	0	‡MAC	**4**		NA	<1	<1	<1	<1	<1	<1	<1	<1				
Escherichia coli Bacteria		per 100 mL	0	MAC	<1		NA	<1	<1	<1	<1	<1	<1	<1	<1				
Field Conductivity		µS/cm	-		400		520	330	350	374	410	415	383	600	439				
Field pH			-		7.84		8.46	7.61	8.7	8.69	8.21	8.04	8.46	8.34	8.38				
Field Temperature		oC	-		11		13.3	9.3	11.3	10.3	14.1	9.6	11	7.3	11.3				

Bold / Highlighting indicates ODWQS exceedance

* When the sodium concentration exceeds 20 mg/L, it should be considered in sodium restricted diets
**When the fluoride concentration exceeds 2.4 mg/L, it should be reported to the local medical officer of health.
† Where nitrate and nitrite are present, their total should not exceed 10 mg/L.
‡ Water is considered unsafe if Total Coliform are detected in consecutive samples.

MAC - Maximum Acceptable Concentration
IMAC - Interim Maximum Acceptable Concentration
AO - Aesthetic Objective
OG - Operational Guideline
ND - Not Detected

Results of Chemical Analyses

South Easthope Landfill			Ontario Drinking Water Standards		Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well	Yantzi Well
					Sampled on: 16-Apr-19	Sampled on: 22-Oct-19	Sampled on: 20-Apr-20	Sampled on: 26-Oct-20	Sampled on: 13-Apr-21	Sampled on: 20-Oct-21	Sampled on: 06-Apr-22	Sampled on: 18-Oct-22
					Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC
Parameter	**Symbol**	**Units**	**Objectiv**	**Type**	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon
Saturation pH			-		7.55	7.56				7.47		7.52
pH			6.5-8.5	OG	8.2	8.08				8.38	7.65	8.01
Langelier Saturation Index			-		0.647	0.524				0.912		0.487
T - Alkalinity		mg/L	30-500	OG	208	203				224	213	213
Bicarbonate	HCO_3^-	mg/L	-		208	203				220	213	213
Carbonate	CO_3^{-2}	mg/L	-		< 5	< 5				< 5	< 5	< 5
Hydroxide		mg/L	-		< 5	< 5				< 5	< 5	< 5
Electrical Conductivity		µS/cm	-		405	388				398	400	386
Fluoride	F^-	mg/L	2.4	**MAC	0.7	0.9				0.3	0.9	0.9
Chloride	Cl^-	mg/L	250	AO	1.4	1.1				1.8	1.3	1.2
Nitrate	NO_3-N	mg/L	10	†MAC	< 0.1	< 0.1				< 0.05	< 0.1	< 0.1
Nitrite	NO_2-N	mg/L	1	†MAC	< 0.1	0.1				< 0.05	< 0.1	< 0.1
Bromide	Br^-	mg/L	-		< 0.4	< 0.4				< 0.4	< 0.4	< 0.4
Sulfate	SO_4^{-2}	mg/L	500	AO	< 1	< 1				< 1	< 1	< 1
Calcium	Ca	mg/L	-		36.4	37.2				41.1	39.4	38.1
Magnesium	Mg	mg/L	-		16.5	17				18.2	17.3	16.3
Sodium	Na	mg/L	200	*AO	26.5	27.7				28.2	27.4	24.8
Potassium	K	mg/L	-		0.8	0.9				1.1	0.8	0.8
Ammonia Nitrogen	NH_3-N	mg/L	-		0.84	0.8				0.76	0.93	0.84
Orthophosphate	PO_4^{-3}	mg/L	-		0.8	0.228				0.103	0.164	0.153
Total Phosphorus		mg/L	-		0.26	0.23				0.2	0.24	0.21
Reactive Silica		mg/L	-		10.9	13.2				12.4	12.7	11.6
Dissolved Organic Carbon	DOC	mg/L	5	AO	2.2	2.2				2.3	2.6	1.6
Colour		Colour Unit	5	AO	5	**6**				5	5	**8**
Turbidity		NTU	5	AO	4.7	3.2				3.5	3.4	3.4
Aluminum	Al	mg/L	0.1	OG	0.03	0.03				0.03	0.03	< 0.01
Arsenic	As	mg/L	0.025	IMAC	0.0007	0.00052		Did Not Sample Due to Covid		0.0001	0.0005	0.0005
Barium	Ba	mg/L	1	MAC	0.139	0.153				0.523	0.196	0.16
Boron	B	mg/L	5	IMAC	0.087	0.085				0.087	0.085	0.079
Cadmium	Cd	mg/L	0.005	MAC	< 0.000015	< 0.000015				< 0.000015	< 0.000015	< 0.000010
Chromium	Cr	mg/L	0.05	MAC	< 0.001	< 0.001				< 0.001	< 0.001	< 0.001
Copper	Cu	mg/L	1	AO	< 0.002	< 0.002				0.0021	0.031	0.032
Iron	Fe	mg/L	0.3	AO	**0.612**	**0.801**				**0.758**	**0.838**	**0.77**
Lead	Pb	mg/L	0.01	MAC	0.00004	0.00005				0.00002	0.00092	0.00065
Manganese	Mn	mg/L	0.05	AO	0.017	0.017				0.016	0.018	0.018
Molybdenum	Mo	mg/L	-		< 0.01	< 0.01				0.0017	< 0.01	< 0.01
Nickel	Ni	mg/L	-		< 0.01	< 0.01				< 0.01	< 0.01	< 0.01
Selenium	Se	mg/L	0.01	MAC	< 0.001	< 0.0002				< 0.001	< 0.001	< 0.001
Silver	Ag	mg/L	-		< 0.0001	< 0.00002				< 0.0001	< 0.0001	< 0.0001
Strontium	Sr		-		1.08	1.19				2.04	1.17	1.1
Thallium	Tl	mg/L	-		< 0.00005	< 0.000004				< 0.00005	< 0.00005	< 0.00005
Tin	Sn	mg/L	-		< 0.05	< 0.05				< 0.05	< 0.05	< 0.05
Titanium	Ti	mg/L	-		< 0.005	< 0.005				< 0.005	< 0.005	< 0.005
Uranium	U	mg/L	0.02	MAC	< 0.00005	< 0.000004				< 0.00005	< 0.00005	< 0.00005
Vanadium	V	mg/L	-		< 0.0001	< 0.00007				< 0.0001	< 0.0001	< 0.0001
Zinc	Zn	µmhos/cm	5	AO	0.009	< 0.005				0.061	0.049	0.009
Total Dissolved Solids	TDS	mg/L	500	AO	209	209				227	216	211
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	**159**	**163**				**178**	**170**	**162**
% Difference			-		2.27	5.07				3.68	3.44	0.433
Total Coliform Bacteria		per 100 mL	0	‡MAC	<1	<1					0	0
Escherichia coli Bacteria		per 100 mL	0	MAC	<1	<1					0	0
Field Conductivity		µS/cm	-		350	405				470		311
Field pH			-		8.13	7.94				7.83		7.9
Field Temperature		oC	-		10.9	10.4				12.1		9.5

Bold / Highlighting indicates ODWQS exceedance

* When the sodium concentration exceeds 20 mg/L, it should be considered in sodium restricted diets

**When the fluoride concentration exceeds 2.4 mg/L, it should be reported to the local medical officer of health.

† Where nitrate and nitrite are present, their total should not exceed 10 mg/L.

‡ Water is considered unsafe if Total Coliform are detected in consecutive samples.

Results of Chemical Analyses

South Easthope Landfill			Ontario Drinking Water Standards		Wagler Well	Wagler Well	Wagler Well	Wagler Well	Wagler Well	Wagler Well	Wagler Well	Wagler Well	Wagler Well	Wagler Well	Wagler Well	Wagler Well	Wagler Well	Wagler Well	Wagler Well	Wagler Well
					Sampled on: 30-Apr-01	Sampled on: 25-Apr-02	Sampled on: 26-Nov-02	Sampled on: 22-May-03	Sampled on: 05-Dec-03	Sampled on: 05-Jun-04	Sampled on: 05-Oct-04	Sampled on: 19-May-05	Sampled on: 03-Oct-05	Sampled on: 24-May-06	Sampled on: 25-Oct-06	Sampled on: 26-Apr-07	Sampled on: 24-Oct-07	Sampled on: 08-Apr-08	Sampled on: 30-Oct-08	Sampled on: 15-Apr-09
					Sampled by:	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC
Parameter	Symbol	Units	Objective	Type	Analyzed by:	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT
Saturation pH			-			7.41	7.53	7.21	7.19	7.2	7.21	7.7	9.63	7.2	7.17	7.19	7.22	7.19	7.18	7.18
pH			6.5-8.5	OG	**8.7**	8.4	8.29	7.82	8.07	7.8	7.95	8.06	8.46	8.21	8.14	8.41	8.19	8.34	8.3	8.04
Langelier Saturation Index			-			0.99			1.3	0.6	0.74	1.09	1.17	1.01	0.97	1.22	0.97	1.15	1.12	0.86
T - Alkalinity		mg/L	30-500	OG	180	250	238	230	224	220	222	200	224	226	234	230	224	219	230	237
Bicarbonate	HCO_3^-	mg/L	-			244	290	230	224	220	222	244	214	226	234	218	224	209	228	237
Carbonate	CO_3^{-2}	mg/L	-			30	<5	<5	<5	<5	<5	<5	11	<10	<10	12	<10	10	<5	<5
Hydroxide		mg/L	-			<5	<5	<5	<5	<5	<5	<5	<5	<10	<10	<10	<10	<5	<5	<5
Electrical Conductivity		µS/cm	-		320	430	418	422	426	421	420	429	425	425	420	422	420	418	427	425
Fluoride	F^-	mg/L	2.4	**MAC		0.9	0.9	0.75	0.85	0.86	0.83	0.8	0.86	0.84	0.83	0.82	0.82	0.8	0.77	0.87
Chloride	Cl^-	mg/L	250	AO	3.6	1.8	1.1	0.95	0.82	0.54	0.74	1.09	0.9	0.59	0.79	0.74	0.52	0.44	1.02	0.44
Nitrate	NO_3-N	mg/L	10	†MAC	0.25	0.7	<0.4	<0.05	0.06	<0.05	<0.05	<0.08	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05
Nitrite	NO_2-N	mg/L	1	†MAC		<0.3	<0.3	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Bromide	Br^-	mg/L	-			<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sulfate	SO_4^{-2}	mg/L	500	AO	18.3	7.5	6.2	5.23	6.45	5.68	5.6	5.98	5.87	5.97	6.02	5.62	5.84	5.94	6.43	5.75
Calcium	Ca	mg/L	-		35.4	48.3	42	38.7	43.5	43.5	42.3	43.1	0.11	42.6	44.4	43.3	41.3	46.3	44	45.5
Magnesium	Mg	mg/L	-		19.8	23	22	20.8	20.6	20.5	20	21.7	0.08	19.5	20.7	20	19	20.4	20.8	21
Sodium	Na	mg/L	200	*AO	19.1	18.9	23.5	18.5	18.6	18.5	18.3	19.3	104	18.3	19	18.2	18.5	19.4	19	19
Potassium	K	mg/L	-		0.8	<0.6	1	0.934	1	0.99	0.99	0.93	0.31	0.96	1.01	1.03	1.05	1.12	1.06	1.13
Ammonia Nitrogen	NH_3-N	mg/L	-		0.14	0.36	2.4	0.09	0.44	0.44	0.3	<0.15	0.11	0.4	0.42	0.47	0.37	0.23	0.26	<0.05
Orthophosphate	PO_4^{-3}	mg/L	-			<0.15	<0.15	<0.15	0.05	0.05	<0.05	<0.15	<0.05	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Total Phosphorus		mg/L	-						0.05	0.05	<0.05	<0.05	<0.05	0.05	0.05	0.04	0.06	0.08	0.06	<0.05
Reactive Silica		mg/L	-			15.3	15.2	15.8	15.7	15.6	15.2	14.9	14.6	13.1	15.2	9.52	14.1	14.9	14.8	13.7
Dissolved Organic Carbon	DOC	mg/L	5	AO	0.1	**7**	4	<1	<1	<1		<1	2	1	1	1.2	1.1	1.2	1.1	1.3
Colour		Colour Unit	5	AO		**10**	**30**	**30**	**30**	**10**	**7.5**	**30**	<5	**25**	<5	<5	<5	5	**7**	**7.5**
Turbidity		NTU	5	AO		4.3	3.7	4.1	2.6	3.9	2.1	**6.2**	<0.5	3.3	1	2	1	2.6	1.4	0.7
Aluminum	Al	mg/L	0.1	OG		<0.002	0.01	0.002	0.011	0.010	0.011	<0.004	0.005	<0.004	0.015	<0.004	0.087	<0.004	<0.004	<0.004
Arsenic	As	mg/L	0.025	IMAC		<0.005	<0.005	<0.005	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Barium	Ba	mg/L	1	MAC		0.094	0.09	0.083	0.096	0.085	0.088	0.081	0.001	0.098	0.077	0.099	0.085	0.098	0.095	0.089
Boron	B	mg/L	5	IMAC		0.06	0.2	0.055	0.06	0.08	0.059	0.058	0.058	0.053	0.06	0.055	0.059	0.067	0.047	0.058
Cadmium	Cd	mg/L	0.005	MAC		0.002	0.004	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0001	<0.002
Chromium	Cr	mg/L	0.05	MAC		<0.002	0.015	<0.002	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Copper	Cu	mg/L	1	AO		0.002	0.013	0.007	0.028	<0.002	<0.002	0.013	0.022	<0.003	0.004	<0.003	0.006	<0.003	0.004	0.006
Iron	Fe	mg/L	0.3	AO	**0.51**	**0.842**	0.07	0.925	**1.02**	1.10	**1.09**	0.298	0.057	**1.05**	**0.908**	**0.947**	**0.803**	**0.883**	**0.865**	<0.010
Lead	Pb	mg/L	0.01	MAC		<0.01	<0.01	<0.01	<0.002	<0.002	<0.002	**0.031**	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.002
Manganese	Mn	mg/L	0.05	AO		0.032	0.029	0.029	0.033	0.039	0.033	0.031	<0.002	0.029	0.03	0.031	0.043	0.035	0.03	0.031
Molybdenum	Mo	mg/L	-			0.002	<0.003	<0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.004	0.004	0.003	0.003
Nickel	Ni	mg/L	-			<0.002	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Selenium	Se	mg/L	0.01	MAC		<0.005	<0.005	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Silver	Ag	mg/L	-			<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0001	<0.002
Strontium	Sr		-			1.32	1.27	1.12	1.32	1.25	1.3	<0.06	0.007	1.27	1.23	1.3	1.27	1.31	1.3	1.24
Thallium	Tl	mg/L	-			<0.02	<0.06	<0.06	<0.06	<0.06	<0.06	<0.009	<0.06	<0.006	<0.006	<0.006	<0.006	<0.006	<0.0003	<0.006
Tin	Sn	mg/L	-			<0.007	<0.009	<0.009	<0.009	0.042	<0.009	<0.001	<0.009	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Titanium	Ti	mg/L	-			<0.001	0.008	0.031	0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Uranium	U	mg/L	0.02	MAC		<0.05	<0.05	<0.05	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	V	mg/L	-			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Zinc	Zn	µmhos/cm	5	AO		0.019	0.036	0.024	0.288	<0.004	<0.004	0.021	0.004	<0.004	0.041	<0.004	0.31	0.005	0.037	0.006
Total Dissolved Solids	TDS	mg/L	500	AO	225	251	239	212	186	234	216	250	138	228	226	226	230	220	218	302
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	**171**	**215**	**195**	**182**	**193**	**193**	**188**	**196**	<5	**187**	**196**	**190**	**181**	**200**	**196**	**200**
% Difference			-			1.34	0.1	6.3	9.9	10.9	9.2	6.67	5.5	7.5	8.7	5.7	1.5	3.8	0.1	0.3
Total Coliform Bacteria		per 100 mL	0	‡MAC				0	<1	<1		<1		<1	<1	<1	<1	<1	**12**	<1
Escherichia coli Bacteria		per 100 mL	0	MAC					<1	<1		<1		<1	<1	<1	<1	<1	**4**	<1
Field Conductivity		µS/cm	-											800	1300	820	1130	780	441	500
Field pH			-											7.76	7.85	7.81	7.65	7.87	8.03	7.86
Field Temperature		oC	-											11.8	6.6	7.9	11.1	9.6	9.4	8.1

Bold / Highlighting indicates ODWQS exceedance

* When the sodium concentration exceeds 20 mg/L, it should be considered in sodium restricted diets
**When the fluoride concentration exceeds 2.4 mg/L, it should be reported to the local medical officer of health.
† Where nitrate and nitrite are present, their total should not exceed 10 mg/L.
‡ Water is considered unsafe if Total Coliform are detected in consecutive samples.

MAC - Maximum Acceptable Concentration
IMAC - Interim Maximum Acceptable Concentration
AO - Aesthetic Objective
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ND - Not Detected

Results of Chemical Analyses

South Easthope Landfill			Ontario Drinking Water Standards		Wagler Well	Wagler Well	Wagler Well	Wagler Well	Wagler Well	Wagler Well	Wagler Well	Wagler Well	Wagler Well	Wagler Well	Wagler Well	Wagler Well	Wagler Well
					Sampled on: 27-Oct-09	Sampled on: 09-Apr-10	Sampled on: 20-Oct-10	Sampled on: 14-Apr-11	Sampled on: 19-Oct-11	Sampled on: 04-Apr-12	Sampled on: 24-Oct-12	Sampled on: 10-Apr-13	Sampled on: 29-Oct-13	Sampled on: 16-Apr-14	Sampled on: 28-Oct-14	Sampled on: 16-Apr-15	Sampled on: 27-Oct-15
					Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC
Parameter	**Symbol**	**Units**	**Objective**	**Type**	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT
Saturation pH			-		7.17	7.17	7.18	7.2	7.18	7.21	7.18	7.17	7.19	7.18	7.23	7.2	7.17
pH			6.5-8.5	OG	8.46	8.24	8.14	8.07	8.22	8.08	8.1	8.03	8.34	8.26	8.04	8.28	7.98
Langelier Saturation Index			-		1.29	1.07	0.96	0.87	1.04	0.87	0.92	0.86	1.15	1.08	0.81	1.08	0.81
T - Alkalinity		mg/L	30-500	OG	226	236	226	223	231	227	228	224	230	230	222	227	237
Bicarbonate	HCO_3^-	mg/L	-		215	236	226	223	231	227	228	224	227	230	222	227	237
Carbonate	CO_3^{-2}	mg/L	-		11	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Hydroxide		mg/L	-		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Electrical Conductivity		µS/cm	-		414	417	403	431	358	422	387	433	427	469	444	455	428
Fluoride	F^-	mg/L	2.4	**MAC	1	0.85	0.8	0.76	0.77	0.76	0.67	0.83	0.92	0.82	0.84	0.65	0.69
Chloride	Cl^-	mg/L	250	AO	1.19	0.55	0.49	0.85	0.97	0.72	0.96	1.01	0.92	0.94	0.75	1.04	1.02
Nitrate	NO_3-N	mg/L	10	†MAC	0.27	0.2	<0.05	<0.05	<0.05	0.37	0.2	0.4	0.41	0.36	<0.05	0.34	1.05
Nitrite	NO_2-N	mg/L	1	†MAC	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Bromide	Br^-	mg/L	-		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sulfate	SO_4^{-2}	mg/L	500	AO	5.93	6.25	5.96	5.96	6.19	6.02	6.02	6.1	6.19	6.17	6.54	6	10.1
Calcium	Ca	mg/L	-		45.8	43.9	44.9	43.1	44.2	42	44.3	46.8	43.9	43.7	39.7	44	43.9
Magnesium	Mg	mg/L	-		21	20.3	20.8	20.1	20.5	19.5	21	21.1	19.3	20.8	19.8	19.2	20
Sodium	Na	mg/L	200	*AO	19.1	18.7	18.4	16.6	18.2	17.9	18.3	19.5	18.4	18.6	18.5	17.3	19
Potassium	K	mg/L	-		1.09	0.9	0.99	1.03	0.92	0.91	1.1	1.08	1	1.08	0.9	0.99	0.99
Ammonia Nitrogen	NH_3-N	mg/L	-		0.06	<0.02	0.16	0.27	0.23	<0.02	0.06	<0.02	<0.02	<0.02	0.34	<0.02	0.2
Orthophosphate	PO_4^{-3}	mg/L	-		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.12	<0.10
Total Phosphorus		mg/L	-		<0.05	<0.05	<0.05	0.02	<0.05	<0.05	<0.02	0.02	0.02	0.02	0.04	0.04	0.02
Reactive Silica		mg/L	-		15.1	14.3	13.8	14.4	14.3	14.8	14.6	15.4	14.2	14.1	14.2	14.3	14.1
Dissolved Organic Carbon	DOC	mg/L	5	AO	1.3	1.2	1.2	1.2	1.6	1	1.2	1.2	1.1	1.4	1.3	2.5	1.2
Colour		Colour Unit	5	AO	<5	5	<5	<5	**15**	<5	**9**	<5	**7**	**10**	**27**	<5	<5
Turbidity		NTU	5	AO	<0.5	0.6	<0.5	<0.5	3.5	<0.5	1.5	0.7	0.6	<0.5	1.7	<0.5	<0.5
Aluminum	Al	mg/L	0.1	OG	0.016	<0.004	0.007	0.009	<0.004	<0.004	0.009	<0.004	<0.004	<0.004	<0.004	0.009	<0.004
Arsenic	As	mg/L	0.025	IMAC	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Barium	Ba	mg/L	1	MAC	0.101	0.088	0.09	0.088	0.107	0.082	0.088	0.08	0.093	0.092	0.093	0.028	0.083
Boron	B	mg/L	5	IMAC	0.062	0.066	0.058	0.057	0.065	0.047	0.061	0.051	0.062	0.059	0.053	0.021	0.048
Cadmium	Cd	mg/L	0.005	MAC	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Chromium	Cr	mg/L	0.05	MAC	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Copper	Cu	mg/L	1	AO	0.005	0.005	<0.003	0.014	<0.003	0.011	<0.003	0.025	0.006	0.013	0.008	<0.003	<0.003
Iron	Fe	mg/L	0.3	AO	<0.010	0.043	0.032	0.017	**0.662**	0.012	0.013	0.016	0.03	0.096	**0.713**	**0.553**	<0.010
Lead	Pb	mg/L	0.01	MAC	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Manganese	Mn	mg/L	0.05	AO	0.028	0.034	0.034	0.028	0.037	0.028	0.027	0.02	0.022	0.023	**0.098**	0.013	0.042
Molybdenum	Mo	mg/L	-		0.004	0.004	0.003	0.003	0.004	0.003	0.003	0.003	0.003	0.003	0.003	<0.002	0.003
Nickel	Ni	mg/L	-		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Selenium	Se	mg/L	0.01	MAC	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Silver	Ag	mg/L	-		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Strontium	Sr		-		1.26	1.35	1.29	1.21	1.42	1.19	1.25	1.17	1.36	1.21	1.3	0.307	1.28
Thallium	Tl	mg/L	-		<0.003	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Tin	Sn	mg/L	-		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Titanium	Ti	mg/L	-		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Uranium	U	mg/L	0.02	MAC	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	V	mg/L	-		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Zinc	Zn	µmhos/cm	5	AO	0.008	<0.005	<0.005	<0.005	<0.005	<0.005	0.063	<0.005	0.007	<0.005	<0.005	0.258	<0.005
Total Dissolved Solids	TDS	mg/L	500	AO	206	214	222	210	228	250	228	214	240	264	226	222	218
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	**201**	**193**	**198**	**190**	**195**	**185**	**197**	**204**	**189**	**195**	**181**	**189**	**192**
% Difference			-		1.3	2.4	0.9	0.8	1	2.7	<0.1	2.5	2.4	1	2	2.2	3.99
Total Coliform Bacteria		per 100 mL	0	‡MAC	<1	NA	<1	NA	**1**	<1	NA	<1	<1	<1	<1	<1	<1
Escherichia coli Bacteria		per 100 mL	0	MAC	<1	NA	<1	NA	<1	<1	NA	<1	<1	<1	<1	<1	<1
Field Conductivity		µS/cm	-		432	431	400	424	400	500	440	540	350	390	391	430	401
Field pH			-		8.72	7.54	8.14	8.34	7.45	8.38	8.09	6.87	8.54	8.04	8.5	8.14	8.38
Field Temperature		oC	-		11.3	6.9	10.5	9.5	10.6	10.1	13	6	10.9	11	8.2	8.2	10.1

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Results of Chemical Analyses

South Easthope Landfill			Ontario Drinking Water Standards		Wagler Well	Wagler Well	Wagler Well	Wagler Well	Wagler Well	Wagler Well	Wagler Well	Wagler Well	Wagler Well	Wagler Well	Wagler Well	Wagler Well	Wagler Well	Wagler Well
					Sampled on: 12-Apr-16	Sampled on: 20-Oct-16	Sampled on: 19-Apr-17	Sampled on: 31-Oct-17	Sampled on: 19-Apr-18	Sampled on: 23-Oct-18	Sampled on: 16-Apr-19	Sampled on: 22-Oct-19	Sampled on: 20-Apr-20	Sampled on: 26-Oct-20	Sampled on: 13-Apr-21	Sampled on: 20-Oct-21	Sampled on: 06-Apr-22	Sampled on: 18-Oct-22
					Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC
Parameter	**Symbol**	**Units**	**Objective**	**Type**	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon
Saturation pH			-		7.17	7.1	7.2	7.18		7.25	7.47	7.47				7.38		9.48
pH			6.5-8.5	OG	8.02	7.91	8.43	8.01	8.01	7.9	8.17	8.08				8.44	8	8.07
Langelier Saturation Index			-		0.85	0.81	1.23	0.83		0.65	0.697	0.61				1.06		-1.41
T - Alkalinity		mg/L	30-500	OG	240	253	229	235	237	201	213	209				234	217	225
Bicarbonate	HCO_3^-	mg/L	-		240	253	216	235		201	213	209				224	217	225
Carbonate	CO_3^{-2}	mg/L	-		<5	<5	12	<5			< 5	< 5				10	< 5	< 5
Hydroxide		mg/L	-		<5	<5	<5	<5		<5	< 5	< 5				< 5	< 5	< 5
Electrical Conductivity		µS/cm	-		427	434	432	364	427	446	426	419				416	437	428
Fluoride	F^-	mg/L	2.4	**MAC	0.76	0.85	0.86	0.79	0.8	0.78	0.7	0.9				0.2	0.9	0.8
Chloride	Cl^-	mg/L	250	AO	0.83	0.89	0.8	1.02	0.77	0.79	0.6	0.9				1.6	1	1
Nitrate	NO_3-N	mg/L	10	†MAC	0.12	0.46	0.35	0.32	0.36	0.35	0.5	0.6				< 0.05	< 0.1	< 0.1
Nitrite	NO_2-N	mg/L	1	†MAC	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	< 0.1	0.1				< 0.05	< 0.1	< 0.1
Bromide	Br^-	mg/L	-		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	< 0.4	< 0.4				< 0.4	< 0.4	< 0.4
Sulfate	SO_4^{-2}	mg/L	500	AO	6.24	6.16	6.91	6.03	8.88	6.26	8	6				7	7	6
Calcium	Ca	mg/L	-		42.9	48.4	41.4	43.9	42	44	42.7	43.8				48.3	0.03	0.39
Magnesium	Mg	mg/L	-		19.8	22.3	19.7	19.9	20	19.2	21	21.9				22.4	< 0.02	0.04
Sodium	Na	mg/L	200	*AO	19.3	18.6	18.2	18.6	18.1	17.2	17.8	20				20.1	116	108
Potassium	K	mg/L	-		0.99	1.08	0.97	0.92	0.95	0.9	0.9	1				1	< 0.1	< 0.1
Ammonia Nitrogen	NH_3-N	mg/L	-		0.21	<0.02	0.02	<0.02	0.24	<0.02	0.11	0.05				0.37	0.02	< 0.01
Orthophosphate	PO_4^{-3}	mg/L	-		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.04	0.027				0.027	0.038	0.029
Total Phosphorus		mg/L	-		0.03	0.03	<0.05	0.04	0.02	<0.02	0.02	0.03				0.05	0.04	0.03
Reactive Silica		mg/L	-		14.1	14.1	14	13.7	9.75	14.2	11.9	14.3				14.1	13.8	12.8
Dissolved Organic Carbon	DOC	mg/L	5	AO	1	1.6	1.4	1.3	1	1.1	1.9	4				1.9	1.9	0.9
Colour		Colour Unit	5	AO	<5	**8**	**14**	**20**	**6**	<5	2	3				4	3	6
Turbidity		NTU	5	AO	0.8	1	2.1	3.2	1.1	0.6	0.7	0.3				3.3	0.2	0.3
Aluminum	Al	mg/L	0.1	OG	<0.004	<0.004	<0.004	<0.004	<0.004	0.006	0.03	0.03				0.03	< 0.01	< 0.01
Arsenic	As	mg/L	0.025	IMAC	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.0003	0.00034				0.0008	0.0007	0.0006
Barium	Ba	mg/L	1	MAC	0.089	0.089	0.092	0.09	0.084	0.091	0.08	0.089		Did Not Sample Due to Covid		0.1	< 0.001	< 0.001
Boron	B	mg/L	5	IMAC	0.053	0.059	0.06	0.052	0.06	0.063	0.056	0.058				0.06	0.059	0.056
Cadmium	Cd	mg/L	0.005	MAC	<0.002	<0.002	<0.001	<0.002	<0.001	<0.001	< 0.000015	< 0.000015				< 0.000015	< 0.000015	< 0.000010
Chromium	Cr	mg/L	0.05	MAC	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	< 0.001	< 0.001				0.016	< 0.001	< 0.001
Copper	Cu	mg/L	1	AO	0.005	0.012	0.038	0.021	0.027	0.011	0.04	0.016				0.0002	< 0.002	< 0.002
Iron	Fe	mg/L	0.3	AO	0.047	0.076	0.254	0.295	0.02	<0.010	0.067	0.026				**0.678**	0.022	0.029
Lead	Pb	mg/L	0.01	MAC	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	0.00197	0.00048				< 0.00002	< 0.00002	0.00003
Manganese	Mn	mg/L	0.05	AO	0.034	0.023	0.01	0.014	0.013	0.009	0.014	0.022				0.043	< 0.001	< 0.001
Molybdenum	Mo	mg/L	-		0.003	0.003	0.003	0.003	0.003	0.003	< 0.01	< 0.01				0.0028	< 0.01	< 0.01
Nickel	Ni	mg/L	-		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	< 0.01	< 0.01				< 0.01	< 0.01	< 0.01
Selenium	Se	mg/L	0.01	MAC	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	< 0.001	< 0.0002				< 0.001	< 0.001	< 0.001
Silver	Ag	mg/L	-		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	< 0.0001	< 0.00002				< 0.0001	< 0.0001	< 0.0001
Strontium	Sr		-		1.19	1.31	1.27	1.15	1.35	1.53	1.33	1.46				1.43	0.001	0.003
Thallium	Tl	mg/L	-		<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	< 0.00005	< 0.000004				< 0.00005	< 0.00005	< 0.00005
Tin	Sn	mg/L	-		<0.002	<0.002	<0.002	<0.002		<0.002	< 0.05	< 0.05				< 0.05	< 0.05	< 0.05
Titanium	Ti	mg/L	-		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	< 0.005	< 0.005				< 0.005	< 0.005	< 0.005
Uranium	U	mg/L	0.02	MAC	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.00007	0.000064				0.0001	0.00007	0.00007
Vanadium	V	mg/L	-		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	< 0.0001	< 0.00007				< 0.0001	< 0.0001	< 0.0001
Zinc	Zn	µmhos/cm	5	AO	<0.005	0.007	0.017	<0.005	0.008	0.02	0.011	0.005				< 0.005	< 0.005	< 0.005
Total Dissolved Solids	TDS	mg/L	500	AO	200	238	218	226	418	222	223	223				242	255	252
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	**189**	**213**	**185**	**192**	**187**	**189**	**193**	**200**				**213**	**< 1**	**1**
% Difference			-		3.67	1.99	3.37	2.72			1.46	4.96				3.42	5.26	0.133
Total Coliform Bacteria		per 100 mL	0	‡MAC	<1	<1	<1	<1	<1	<1	<1	**3**					**2**	**3**
Escherichia coli Bacteria		per 100 mL	0	MAC	<1	<1	<1	<1	<1	<1	<1	<1					0	0
Field Conductivity		µS/cm	-		600	453	560	420	450	475	357	423				426		335
Field pH			-		8.31	8.15	8.49	8.03	7.56	7.87	8.03	7.95				7.78		8.07
Field Temperature		oC	-		8	10.9	11.2	9.2	7.9	9.6	8.6	10.8				11.2		12.5

Bold / Highlighting indicates ODWQS exceedance

* When the sodium concentration exceeds 20 mg/L, it should be considered in sodium restricted diets
**When the fluoride concentration exceeds 2.4 mg/L, it should be reported to the local medical officer of health.
† Where nitrate and nitrite are present, their total should not exceed 10 mg/L.
‡ Water is considered unsafe if Total Coliform are detected in consecutive samples.

MAC - Maximum Acceptable Concentration
IMAC - Interim Maximum Acceptable Concentration
AO - Aesthetic Objective
OG - Operational Guideline

ND - Not Detected

Results of Chemical Analyses

South Easthope Landfill			Ontario Drinking Water Standards		Steinman Well	Steinman Well	Steinman Well	Steinman Well	Steinman Well	Steinman Well	Steinman Well	Steinman Well	Steinman Well	Steinman Well	Steinman Well	Steinman Well	Steinman Well	Steinman Well	Steinman Well	Steinman Well
					Sampled on: 30-Apr-01	Sampled on: 25-Apr-02	Sampled on: 22-May-03	Sampled on: 05-Dec-03	Sampled on: 05-Jun-04	Sampled on: 05-Oct-04	Sampled on: 19-May-05	Sampled on: 03-Oct-05	Sampled on: 24-May-06	Sampled on: 25-Oct-06	Sampled on: 26-Apr-07	Sampled on: 24-Oct-07	Sampled on: 08-Apr-08	Sampled on: 15-Apr-09	Sampled on: 27-Oct-09	Sampled on: 09-Apr-10
					Sampled by:	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC
Parameter	**Symbol**	**Units**	**Objective**	**Type**	Analyzed by:	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT
Saturation pH			-			6.98	7.13	6.63	6.74	6.68	7.11	6.58	6.68	6.52	6.61	6.51	6.85	6.92	6.64	6.62
pH			6.5-8.5	OG	**9**	8.4	7.3	7.93	7.42	7.25	8.2	8.21	8.11	7.78	8.14	7.78	8.05	7.97	8.18	8.12
Langelier Saturation Index			-			1.42		1.3	0.68	0.57	1.09	1.63	1.43	1.26	1.53	1.27	1.2	1.05	1.54	1.5
T - Alkalinity		mg/L	30-500	OG	271	319	426	400	342	380	300	414	380	479	421	492	307	286	389	407
Bicarbonate	HCO_3^-	mg/L	-			381	426	400	342	380	366	414	380	479	421	492	307	286	389	407
Carbonate	CO_3^{-2}	mg/L	-			<5	<5	<5	<5	<5	<5	<5	<10	<10	<10	<10	<5	<5	<5	<5
Hydroxide		mg/L	-			<5	<5	<5	<5	<5	<5	<5	<10	<10	<10	<10	<5	<5	<5	<5
Electrical Conductivity		µS/cm	-		720	702	840	855	205	789	722	830	769	899	805	941	623	571	776	771
Fluoride	F^-	mg/L	2.4	**MAC		0.1	0.08	0.09	0.08	0.1	0.08	0.07	0.09	0.08	0.09	0.07	0.07	0.09	<0.05	0.08
Chloride	Cl^-	mg/L	250	AO	19.3	15	10.5	14.7	0.91	14.5	10.3	14.2	13.6	13.9	9.09	12.2	9.13	4.98	6.59	6.78
Nitrate	NO_3-N	mg/L	10	†MAC	3.96	**23**	7.42	9.88	<0.05	3.49	5.9	4.67	2.26	0.77	2.33	6.58	3.58	1.14	3.61	2.62
Nitrite	NO_2-N	mg/L	1	†MAC		<0.3	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Bromide	Br^-	mg/L	-			<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sulfate	SO_4^{-2}	mg/L	500	AO	38.7	31	32.5	31.7	1.13	23.7	16.7	23.5	27.6	19.2	19.9	23.6	20	12.1	29.7	17.2
Calcium	Ca	mg/L	-		95.2	110	128	133	38.8	128	118	135	125	143	134	150	104	96	136	136
Magnesium	Mg	mg/L	-		19.3	17.6	25	22.4	5.37	19.9	18.1	22.4	20.5	24.7	21.6	28.6	17.8	15	21.2	21.1
Sodium	Na	mg/L	200	*AO	8.8	6	8.42	6.4	0.82	5.64	4.55	6.23	5.9	5.7	5.6	6.12	4.69	3.71	4.56	4.56
Potassium	K	mg/L	-		10.3	10.1	12.7	13	0.75	12.1	10.6	13.2	10.2	12.2	10.3	14.2	9.09	8.05	11.9	10.3
Ammonia Nitrogen	NH_3-N	mg/L	-		<0.05	<0.05	<0.05	<0.05	0.08	<0.05	<0.06	<0.05	0.06	0.87	0.06	0.1	<0.05	<0.05	<0.05	<0.02
Orthophosphate	PO_4^{-3}	mg/L	-			<0.15	<0.15	<0.05	<0.05	<0.05	<0.15	<0.05	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Total Phosphorus		mg/L	-					<0.05	0.07	<0.05	<0.05	0.06	0.06	<0.05	0.04	<0.05	<0.05	<0.05	<0.05	<0.05
Reactive Silica		mg/L	-			11.7	14.2	13.6	2.39	12.8	11.2	13.3	9.44	12.4	9.57	15.5	10.6	10.3	13.9	17.2
Dissolved Organic Carbon	DOC	mg/L	5	AO	0.2	3	3	<1	<1	3	<1	3	2.8	2.3	3.2	3	2.6	2.6	2.3	3.4
Colour		Colour Unit	5	AO		**10**	5	5	**250**	<5	5	<5	<5	<5	<5	<5	5	**7.5**	<5	**15**
Turbidity		NTU	5	AO		4.8	2.4	1.7	5.9	<0.5	3.9	0.9	<0.5	0.8	1.9	<0.5	0.9	1.9	1.1	4.3
Aluminum	Al	mg/L	0.1	OG		0.009	0.006	0.007	0.264	0.047	0.004	0.008	0.009	0.012	0.035	0.018	0.009	0.062	0.005	0.017
Arsenic	As	mg/L	0.025	IMAC		<0.005	<0.005	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Barium	Ba	mg/L	1	MAC		0.024	0.031	0.035	0.019	0.029	0.024	0.036	0.026	0.033	0.028	0.035	0.025	0.019	0.033	0.025
Boron	B	mg/L	5	IMAC		0.02	0.019	0.02	0.10	0.024	0.021	0.022	0.017	0.018	0.018	0.029	0.022	0.015	0.019	0.021
Cadmium	Cd	mg/L	0.005	MAC		0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.004	<0.002	<0.002	<0.002	<0.002	<0.001	<0.002
Chromium	Cr	mg/L	0.05	MAC		<0.002	<0.002	0.003	<0.003	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	0.004	<0.003	<0.003	0.004	<0.003
Copper	Cu	mg/L	1	AO		<0.002	0.004	0.002	0.003	<0.002	0.003	0.002	<0.003	0.034	<0.003	<0.003	<0.003	<0.003	<0.002	<0.003
Iron	Fe	mg/L	0.3	AO	0.18	**0.793**	**1.54**	**0.547**	**1.94**	**0.788**	**0.736**	**0.677**	**0.576**	**1.26**	**0.432**	**1.19**	0.272	0.184	**0.547**	**0.806**
Lead	Pb	mg/L	0.01	MAC		<0.01	<0.01	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Manganese	Mn	mg/L	0.05	AO		0.003	0.005	0.008	**0.244**	0.008	0.002	0.004	0.004	0.038	0.008	0.021	0.008	0.005	0.021	0.038
Mercury		mg/L	0.001	MAC		<0.0001	<0.0001	<0.00005	<0.00005	<0.00005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	Mo	mg/L	-			<0.001	<0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.002
Nickel	Ni	mg/L	-			<0.002	<0.003	<0.002	<0.003	<0.003	0.005	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.003
Selenium	Se	mg/L	0.01	MAC		<0.005	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Silver	Ag	mg/L	-			0.002	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Strontium	Sr		-			0.224	0.259	0.297	0.079	0.271	0.212	0.27	0.236	0.288	0.28	0.322	0.211	0.178	0.234	0.245
Thallium	Tl	mg/L	-			<0.02	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.003	<0.006
Tin	Sn	mg/L	-			<0.007	<0.009	<0.009	0.030	<0.009	<0.009	<0.009	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Titanium	Ti	mg/L	-			<0.001	0.113	0.001	0.004	0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	0.003	<0.002	<0.002
Uranium	U	mg/L	0.02	MAC		<0.05	<0.05	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	V	mg/L	-			<0.001	<0.001	0.001	0.002	0.002	0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Zinc	Zn	µmhos/cm	5	AO		0.196	0.220	0.866	0.185	0.197	0.149	0.004	0.441	3.2	0.63	1.08	0.332	0.285	0.527	0.95
Total Dissolved Solids	TDS	mg/L	500	AO	375	404	**570**	494	456	450	460	254	436	488	480	**580**	352	338	438	448
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	**318**	**347**	**135**	**424**	**382**	**402**	**369**	**430**	**398**	**459**	**424**	**492**	**333**	**301**	**427**	**426**
% Difference			-		0.21	1.45	6.3	7.7	16.2	8.9	7.65	8.6	7.96	6.2	7.4	3.1	0.2	1.6	1.1	0.6
Total Coliform Bacteria		per 100 mL	0	‡MAC			**154**	**1020**			**78**		**6000**	**271**	**6**	**1100**	**71**	**TNTC**	**TNTC**	NA
Escherichia coli Bacteria		per 100 mL	0	MAC				2			<1		**4000**	**31**	**1**	<1	<1	**1**	**73**	NA
Field Conductivity		µS/cm	-										440	500	490	480	500	600	783	748
Field pH			-										7.41	8.36	8.33	8.21	7.87	7.84	7.84	7.34
Field Redox Potential		mV	-											-260				176	-12	-53
Field Temperature		oC	-										13.4	6.8	9.3	10.3	9.6	7.2	11.3	4.4

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IMAC - Interim Maximum Acceptable Concentration
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Results of Chemical Analyses

South Easthope Landfill			Ontario Drinking Water Standards		Steinman Well	Steinman Well	Steinman Well	Steinman Well	Steinman Well	Steinman Well	Steinman Well	Steinman Well	Steinman Well	Steinman Well	Steinman Well	Steinman Well	Steinman Well
					Sampled on: 20-Oct-10 **Sampled by:** AEC **Analyzed by:** AGAT	**Sampled on:** 14-Apr-11 **Sampled by:** AEC **Analyzed by:** AGAT	**Sampled on:** 19-Oct-11 **Sampled by:** AEC **Analyzed by:** AGAT	**Sampled on:** 04-Apr-12 **Sampled by:** AEC **Analyzed by:** AGAT	**Sampled on:** 24-Oct-12 **Sampled by:** AEC **Analyzed by:** AGAT	**Sampled on:** 10-Apr-13 **Sampled by:** AEC **Analyzed by:** AGAT	**Sampled on:** 29-Oct-13 **Sampled by:** AEC **Analyzed by:** AGAT	**Sampled on:** 16-Apr-14 **Sampled by:** AEC **Analyzed by:** AGAT	**Sampled on:** 28-Oct-14 **Sampled by:** AEC **Analyzed by:** AGAT	**Sampled on:** 16-Apr-15 **Sampled by:** AEC **Analyzed by:** AGAT	**Sampled on:** 27-Oct-15 **Sampled by:** AEC **Analyzed by:** AGAT	**Sampled on:** 12-Apr-16 **Sampled by:** AEC **Analyzed by:** AGAT	**Sampled on:** 20-Oct-16 **Sampled by:** AEC **Analyzed by:** AGAT
Parameter	**Symbol**	**Units**	**Objective**	**Type**													
Saturation pH			-		6.59	6.61	6.57	6.59	6.56	6.75	6.59	6.56	6.64	6.59	6.62	6.87	6.58
pH			6.5-8.5	OG	8.07	8.04	7.89	7.89	8.27	7.99	8.03	8.23	7.51	8.26	8	8.13	7.72
Langelier Saturation Index			-		1.48	1.43	1.32	1.3	1.71	1.24	1.44	1.67	0.87	1.67	1.38	1.26	1.14
T - Alkalinity		mg/L	30-500	OG	435	403	450	442	428	335	442	454	403	441	405	317	427
Bicarbonate	HCO_3^-	mg/L	-		435	403	450	442	428	335	442	454	403	441	405	317	427
Carbonate	CO_3^{-2}	mg/L	-		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Hydroxide		mg/L	-		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Electrical Conductivity		µS/cm	-		824	801	758	860	784	723	865	891	848	913	809	603	797
Fluoride	F^-	mg/L	2.4	**MAC	<0.05	0.06	<0.05	<0.05	<0.05	0.08	0.07	0.1	0.1	<0.05	<0.10	0.07	<0.05
Chloride	Cl^-	mg/L	250	AO	6.9	7.06	9.2	7.26	8.25	7.85	8	4.8	5.5	7.99	5.11	4.27	5.1
Nitrate	NO_3-N	mg/L	10	†MAC	6.04	4.23	5.31	4.86	8.7	6.87	3.35	2.53	3.09	3.4	5.58	3.09	6.8
Nitrite	NO_2-N	mg/L	1	†MAC	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05	<0.05
Bromide	Br^-	mg/L	-		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05	<0.05
Sulfate	SO_4^{-2}	mg/L	500	AO	17	17.1	22.8	21.2	30.6	20.2	20.5	12	17.5	26	21.2	12.1	22.8
Calcium	Ca	mg/L	-		142	137	147	142	141	121	146	137	131	146	139	98.4	142
Magnesium	Mg	mg/L	-		25.4	23	24.7	22.9	28.4	20.8	22.2	22.7	20.8	22.1	20.8	14.4	23
Sodium	Na	mg/L	200	*AO	4.58	4.29	4.52	4.67	5.99	4.92	5.37	4.72	4.14	4.42	4.74	3.91	4.57
Potassium	K	mg/L	-		13	10.7	13.2	10.7	15	11.6	12.9	10.9	11.6	11.6	13.9	9.28	13.7
Ammonia Nitrogen	NH_3-N	mg/L	-		<0.02	<0.02	0.26	<0.02	0.06	0.03	<0.02	<0.02	<0.02	0.77	<0.02	<0.02	<0.02
Orthophosphate	PO_4^{-3}	mg/L	-		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.17	<0.20	<0.10	<0.10
Total Phosphorus		mg/L	-		0.06	0.03	0.05	<0.05	0.02	0.03	0.05	0.05	0.04	0.26	0.04	0.05	0.06
Reactive Silica		mg/L	-		14.5	11.4	12.9	12	17.7	11.5	13.1	12.8	13.4	12.8	14.2	10.9	1.43
Dissolved Organic Carbon	DOC	mg/L	5	AO	2.4	2.1	2.8	2.7	1.6	2.3	3.2	3	2.5	1.7	2.2	2.6	2.6
Colour		Colour Unit	5	AO	<5	5	5	<5	**7**	**11**	**11**	**9**	**16**	**13**	<5	**7**	**17**
Turbidity		NTU	5	AO	1	1.6	3.7	0.5	1.9	1.2	2.3	1.6	**5.3**	3.4	**108**	3.1	**6.1**
Aluminum	Al	mg/L	0.1	OG	0.011	0.01	0.004	<0.004	0.02	0.012	0.007	<0.004	0.004	<0.004	0.032	0.024	0.007
Arsenic	As	mg/L	0.025	IMAC	<0.003	<0.003	<0.003	<0.003	0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Barium	Ba	mg/L	1	MAC	0.034	0.027	0.033	0.031	0.04	0.025	0.036	0.027	0.029	0.139	0.031	0.022	0.031
Boron	B	mg/L	5	IMAC	0.022	0.016	0.028	0.015	0.026	0.012	0.025	0.018	0.021	0.075	0.027	0.017	0.033
Cadmium	Cd	mg/L	0.005	MAC	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Chromium	Cr	mg/L	0.05	MAC	<0.003	<0.003	0.003	<0.003	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Copper	Cu	mg/L	1	AO	<0.003	0.016	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.004	<0.003	<0.003	<0.003
Iron	Fe	mg/L	0.3	AO	**0.341**	**0.569**	**0.336**	0.224	0.03	0.146	**0.407**	0.224	0.3	**1.02**	**0.376**	**0.303**	**0.746**
Lead	Pb	mg/L	0.01	MAC	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Manganese	Mn	mg/L	0.05	AO	0.01	0.003	0.005	0.003	0.003	<0.002	**0.057**	0.025	0.027	0.018	0.005	0.006	0.003
Mercury		mg/L	0.001	MAC		<0.0001	<0.0001		<0.0001		<0.0001	<0.0001		<0.0001		<0.0001	
Molybdenum	Mo	mg/L	-		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Nickel	Ni	mg/L	-		0.004	<0.003	0.004	<0.003	0.01	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Selenium	Se	mg/L	0.01	MAC	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Silver	Ag	mg/L	-		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Strontium	Sr		-		0.301	0.257	0.285	0.283	0.296	0.213	0.31	0.284	0.301	1.05	0.288	0.199	0.275
Thallium	Tl	mg/L	-		<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Tin	Sn	mg/L	-		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Titanium	Ti	mg/L	-		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Uranium	U	mg/L	0.02	MAC	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	V	mg/L	-		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Zinc	Zn	µmhos/cm	5	AO	0.739	0.47	0.851	0.354	0.171	0.089	0.992	0.387	0.217	0.009	0.162	0.292	0.198
Total Dissolved Solids	TDS	mg/L	500	AO	**502**	448	**508**	**556**	488	404	**508**	492	462	**516**	454	334	472
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	**459**	**437**	**469**	**449**	**469**	**388**	**456**	**436**	**413**	**456**	**433**	**305**	**449**
% Difference			-		0.2	1.5	0.9	2	0.1	2.7	0.3	2.4	0.4	0.9	0.724	3.19	0.572
Total Coliform Bacteria		per 100 mL	0	‡MAC	**TNTC**	NA	**TNTC**	**TNTC**	NA	**TNTC**	**TNTC**	**50**	**TNTC**	**TNTC**	**TNTC**	**TNTC**	**TNTC**
Escherichia coli Bacteria		per 100 mL	0	MAC	**14**	NA	**TNTC**	**10**	NA	**40**	**TNTC**	ND	**TNTC**	**TNTC**	**TNTC**	**TNTC**	**TNTC**
Field Conductivity		µS/cm	-		900	824	900	1000	1100	320	700	737	790	890	734	660	811
Field pH			-		7.43	7.79	7.9	8.24	7.61	7.25	8.24	8.03	7.86	7.45	7.8	7.6	7.4
Field Redox Potential		mV	-		15	40	19	14	168	15	77	-70		79	58	50	129
Field Temperature		oC	-		13.2	8.5	10.5	10.3	11.6	8.1	11.6	6.2	13.5	10.2	9.8	6.4	12

Bold / Highlighting indicates ODWQS exceedance

* When the sodium concentration exceeds 20 mg/L, it should be considered in sodium restricted diets
**When the fluoride concentration exceeds 2.4 mg/L, it should be reported to the local medical officer of health.
† Where nitrate and nitrite are present, their total should not exceed 10 mg/L.
‡ Water is considered unsafe if Total Coliform are detected in consecutive samples.

MAC - Maximum Acceptable Concentration
IMAC - Interim Maximum Acceptable Concentration
AO - Aesthetic Objective
OG - Operational Guideline
ND - Not Detected

Results of Chemical Analyses

South Easthope Landfill			Ontario Drinking Water Standards		Steinman Well	Steinman Well	Steinman Well	Steinman Well	Steinman Well	Steinman Well	Steinman Well	Steinman Well	Steinman Well	Steinman Well
					Sampled on: 19-Apr-17	Sampled on: 31-Oct-17	Sampled on: 19-Apr-18	Sampled on: 23-Oct-18	Sampled on: 16-Apr-19	Sampled on: 22-Oct-19	Sampled on: 20-Apr-20	Sampled on: 26-Oct-20	Sampled on: 13-Apr-21	Sampled on: 20-Oct-21
					Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC
Parameter	**Symbol**	**Units**	**Objective**	**Type**	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon
Saturation pH			-		6.66	6.57	6.64		7.02	6.78				
pH			6.5-8.5	OG	8.31	7.91	7.94	8	7.96	7.81				
Langelier Saturation Index			-		1.65	1.34	1.3		0.943	1.03				
T - Alkalinity		mg/L	30-500	OG	392	429	375	324	294	371				
Bicarbonate	HCO_3^-	mg/L	-		384	429	375		294	371				
Carbonate	CO_3^{-2}	mg/L	-		9	<5			< 5	< 5				
Hydroxide		mg/L	-		<5	<5	<5		< 5	< 5				
Electrical Conductivity		µS/cm	-		795	726	863	622	621	768				
Fluoride	F^-	mg/L	2.4	**MAC	<0.05	<0.05	<0.25	0.07	0.3	< 0.1				
Chloride	Cl^-	mg/L	250	AO	6.7	5.39	3.93	5.28	6	4.2				
Nitrate	NO_3-N	mg/L	10	†MAC	6.96	8.02	5.25	3.23	4	4.5				
Nitrite	NO_2-N	mg/L	1	†MAC	<0.05	<0.05	<0.25	<0.05	< 0.1	< 0.1				
Bromide	Br^-	mg/L	-		<0.05	<0.05	<0.25	<0.05	< 0.4	< 0.4				
Sulfate	SO_4^{-2}	mg/L	500	AO	18	19	17.5	14.7	18	12				
Calcium	Ca	mg/L	-		127	144	144	102	92.7	130				
Magnesium	Mg	mg/L	-		20.5	22.4	21.2	14.8	16	21.9				
Sodium	Na	mg/L	200	*AO	4.66	5.06	4.49	4.16	4.2	4.9				
Potassium	K	mg/L	-		11.1	12.5	12.3	9.31	9.8	12.5				
Ammonia Nitrogen	NH_3-N	mg/L	-		<0.02	<0.02	<0.02	<0.02	0.12	0.02				
Orthophosphate	PO_4^{-3}	mg/L	-		<0.10	<0.10	<0.50	<0.10	0.26	0.054				
Total Phosphorus		mg/L	-		0.05	0.05	0.041	0.08	0.11	0.05				
Reactive Silica		mg/L	-		11.7	13	16.5	9.69	8.6	13.2				
Dissolved Organic Carbon	DOC	mg/L	5	AO	3.1	2.6	2.3	2.9	**5.1**	1.7				
Colour		Colour Unit	5	AO	**13**	**8**	**11**	**14**	**9**	3				
Turbidity		NTU	5	AO	2.7	1.5	2.9	1.5	**23.6**	4.5				
Aluminum	Al	mg/L	0.1	OG	0.019	<0.004	<0.004	0.01	0.05	0.08				
Arsenic	As	mg/L	0.025	IMAC	<0.003	<0.003	<0.003	<0.003	0.001	0.0013				
Barium	Ba	mg/L	1	MAC	0.028	0.034	0.027	0.019	0.016	0.033				
Boron	B	mg/L	5	IMAC	0.025	0.033	0.039	0.024	0.029	0.032		Did Not Sample Due to Covid		Well Removed
Cadmium	Cd	mg/L	0.005	MAC	<0.001	<0.002	<0.001	<0.001	0.000083	0.000399				
Chromium	Cr	mg/L	0.05	MAC	<0.003	<0.003	<0.003	<0.003	< 0.001	< 0.001				
Copper	Cu	mg/L	1	AO	<0.003	<0.003	<0.003	<0.003	< 0.002	< 0.002				
Iron	Fe	mg/L	0.3	AO	0.2	0.173	0.28	0.064	0.195	**0.92**				
Lead	Pb	mg/L	0.01	MAC	<0.002	<0.002	<0.001	<0.001	0.00006	0.00025				
Manganese	Mn	mg/L	0.05	AO	0.004	0.004	0.003	0.002	0.041	0.035				
Mercury		mg/L	0.001	MAC		<0.0001		<0.0001						
Molybdenum	Mo	mg/L	-		<0.002	<0.002	<0.002	<0.002	0.04	< 0.01				
Nickel	Ni	mg/L	-		<0.003	<0.003	<0.003	<0.003	< 0.01	< 0.01				
Selenium	Se	mg/L	0.01	MAC	<0.004	<0.004	<0.004	<0.004	< 0.001	0.0005				
Silver	Ag	mg/L	-		<0.002	<0.002	<0.002	<0.002	< 0.0001	< 0.00002				
Strontium	Sr		-		0.264	0.289	0.288	0.224	0.202	0.303				
Thallium	Tl	mg/L	-		<0.006	<0.006	<0.006	<0.006	< 0.00005	< 0.000004				
Tin	Sn	mg/L	-		<0.002	<0.002	<0.002		< 0.05	< 0.05				
Titanium	Ti	mg/L	-		<0.002	<0.002	<0.002	<0.002	< 0.005	< 0.005				
Uranium	U	mg/L	0.02	MAC	<0.002	<0.002	<0.002	<0.002	0.00025	0.000524				
Vanadium	V	mg/L	-		<0.002	<0.002	<0.002	<0.002	0.0002	0.00073				
Zinc	Zn	µmhos/cm	5	AO	0.176	0.563	0.468	0.167	0.166	0.967				
Total Dissolved Solids	TDS	mg/L	500	AO	434	466	480	**566**	342	429				
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	**402**	**452**	**447**	**316**	**298**	**415**				
% Difference			-		2.2	0.646			2.49	4.47				
Total Coliform Bacteria		per 100 mL	0	‡MAC	**TNTC**	**TNTC**	**TNTC**	**TNTC**	0	**TNTC**				
Escherichia coli Bacteria		per 100 mL	0	MAC	**TNTC**	**TNTC**	**TNTC**	**TNTC**	**12**	**TNTC**				
Field Conductivity		µS/cm	-		750	920	675	900	531	769				
Field pH			-		8.21	7.81	8.18	7.51	8.03	7.78				
Field Redox Potential		mV	-		200	165	72	1.81	96					
Field Temperature		oC	-		11.2	9.8	5.7	9.4	9.1	12.9				

Bold / Highlighting indicates ODWQS exceedance

* When the sodium concentration exceeds 20 mg/L, it should be considered in sodium restricted diets

**When the fluoride concentration exceeds 2.4 mg/L, it should be reported to the local medical officer of health.

† Where nitrate and nitrite are present, their total should not exceed 10 mg/L.

‡ Water is considered unsafe if Total Coliform are detected in consecutive samples.

MAC - Maximum Acceptable Concentration
IMAC - Interim Maximum Acceptable Concentration
AO - Aesthetic Objective
OG - Operational Guideline

ND - Not Detected

Results of Chemical Analyses

South Easthope Landfill			Provincial Water Quality Objectives	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1
				Sampled on: 23-Apr-96	Sampled on: 14-Nov-96	Sampled on: 17-Apr-97	Sampled on: 26-Nov-97	Sampled on: 16-Apr-98	Sampled on: 28-Apr-98	Sampled on: 26-Nov-98	Sampled on: 20-Apr-99	Sampled on: 23-Nov-99	Sampled on: 20-Apr-00	Sampled on: 01-Nov-00	Sampled on: 30-Apr-01	Sampled on: 23-May-01	Sampled on: 25-Apr-02	Sampled on: 26-Nov-02	Sampled on: 22-May-03	Sampled on: 05-Dec-03	Sampled on: 05-Jun-04
				Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC
Parameter	**Symbol**	**Units**		Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT
Saturation pH			-														7.18	7.14	7.04	6.91	6.95
pH			6.5-8.5	7.3	8.12	8.8	7.51	8.4	8.4	7.5	8.7	7.88	7.95	7.1	8.3	9.3	8.4	8.3	8.34	8.14	8
Langelier Saturation Index			-														1.22			1.23	1.05
T - Alkalinity		mg/L	-	187	289	239	289	249	162	210	165	175	161	296	190	159	238	262	240	274	258
Bicarbonate	HCO_3^-	mg/L	-														274	320	240	274	258
Carbonate	CO_3^{-2}	mg/L	-														8	<5	<5	<5	<5
Hydroxide		mg/L	-														<5	<5	<5	<5	<5
Electrical Conductivity		µS/cm	-	529	877	653	748	746	623	955	585	740	650	900	660	730	652	756	645	677	668
Fluoride	F^-	mg/L	-														0.2	0.2	0.12	0.12	0.13
Chloride	Cl^-	mg/L	-	19.8	28.6	40.3	37.9	38.2	38.7	16.4	42.5	69.1	44.9	60.4	43.2	51.6	42	60.4	40.4	33.7	36.7
Nitrate	NO_3-N	mg/L	-	<0.05	1.35	1.33	5.39	5.02	2.8	<0.05	2.74	2.51	10.24	3.17	6.26	23.78	29	44	10.3	8.92	6.88
Nitrite	NO_2-N	mg/L	-	<0.05													<0.3	1	<0.05	<0.05	0.07
Bromide	Br^-	mg/L	-														<0.1	<0.1	<0.05	<0.05	<0.05
Sulfate	SO_4^{-2}	mg/L	-	41.9	27.9	20.6	<1.0	28.7	65.1	206	29	44.3	28.5	22	29.8	26.6	26	28.6	17.7	21.8	17.6
Calcium	Ca	mg/L	-	71.7	103.1	81.2	105	97	65	109.6	72.3	72.1	72.6	101.1	76	78.4	81.3	99.7	82.6	94.1	93.8
Magnesium	Mg	mg/L	-	13.6	22.1	18.1	22.2	19.7	19.6	26.7	15.9	16.6	17.3	26.2	19.9	20.1	19	24	20.7	19.4	20.3
Sodium	Na	mg/L	-	5.4	8.1	15.1	11.2	20.2	16	4.9	13.6	36.5	21.2	32.5	17.4	15.6	22.3	31.5	17.9	10.3	20
Potassium	K	mg/L	-	1.7	5.1	<0.1	<0.1	<0.1	<0.1	8	3.3	11.6	4.1	12	2.6	2.9	1.8	5	2.66	2.4	3.63
Ammonia Nitrogen	NH_3-N	mg/L	-	<0.05	<0.05	<0.05	0.09	0.72	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.16	<0.05	<0.05	<0.05	<0.05
Orthophosphate	PO_4^{-3}	mg/L	-														<0.15	0.58	<0.15	0.09	0.15
Total Phosphorus		mg/L	0.03														**0.06**	**0.23**		**0.11**	
Reactive Silica		mg/L	-														1.19	6.23	3.52	7.85	1.25
Total Organic Carbon	TOC	mg/L	-	0.4	0.7	0.5	0.5	0.5	0.5	0.6	0.6	2.6	2.6	0.7	1.2	0.6	4	4	4	<1	2
Colour		Colour Units	-														10	20	20	5	25
Turbidity		NTU	-														1.4	3.4	1.1	1.9	4.2
Aluminum	Al	mg/L	0.075														0.063	0.027	0.047	**0.109**	0.118
Arsenic	As	mg/L	0.1														<0.005	<0.005	<0.005	<0.003	<0.003
Barium	Ba	mg/L	-														0.028	0.03	0.023	0.028	0.031
Boron	B	mg/L	0.2														0.01	0.08	0.02	0.01	0.02
Cadmium	Cd	mg/L	0.0002														<0.001	**0.004**	<0.001	<0.002	<0.002
Chromium	Cr	mg/L	0.1														<0.002	0.018	<0.002	<0.003	<0.003
Copper	Cu	mg/L	0.005														<0.002	**0.021**	0.003	<0.002	0.005
Iron	Fe	mg/L	0.3	<0.02	0.08	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	0.09	0.085	0.07	**0.311**	0.264	0.376
Lead	Pb	mg/L	0.025														<0.01	<0.01	<0.01	<0.002	<0.002
Manganese	Mn	mg/L	-														0.022	0.005	0.011	0.008	0.033
Mercury		mg/L	0.0002														<0.0001	<0.0001	<0.0001	<0.00005	<0.00005
Molybdenum	Mo	mg/L	0.01														0.003	<0.003	<0.003	<0.002	<0.002
Nickel	Ni	mg/L	0.025														<0.002	<0.003	<0.003	<0.003	<0.003
Selenium	Se	mg/L	0.1														<0.005	<0.005	<0.005	<0.004	<0.004
Silver	Ag	mg/L	0.0001														**0.001**	**0.001**	<0.001	<0.002	<0.002
Strontium	Sr		-														0.194	0.23	0.183	0.218	0.209
Thallium	Tl	mg/L	-														<0.02	<0.06	<0.06	<0.06	<0.06
Tin	Sn	mg/L	-														<0.007	<0.009	0.009	<0.009	0.043
Titanium	Ti	mg/L	-														0.001	0.009	0.085	0.005	0.005
Uranium	U	mg/L	0.005														<0.05	<0.05	<0.05	0.001	<0.001
Vanadium	V	mg/L	0.007														<0.001	0.002	<0.001	0.001	0.002
Zinc	Zn	µmhos/cm	0.02														**0.051**	**0.082**	0.016	<0.004	0.011
Total Dissolved Solids	TDS	mg/L	-	281	376	326	367	368	310	510	284	360	300	440	320	1	364	450	510	340	414
Hardness (as Calcium Carbonate)		mg/L	-	236	350	278	355	325	244	385	247	249	254	362	273	280	281	347	291	315	318
% Difference			-									2.51	2.47	3.82	1.67	0.92	2.42	1.01	8.6	5.9	12
Biological Oxygen Demand	BOD	mg/L	-																		
Total Kjeldahl Nitrogen	TKN	mg/L	-	0.40	0.14	0.54	2.10	0.91	0.60	1.40	1.40	4.40	5.20	0.90	0.80	2.50	0.51				
Chemical Oxygen Demand	COD	mg/L	-																		
Phenols		mg/L	0.001	<2	<2	<2	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1	<0.002		<0.002	<0.002	
Total Suspended Solids	TSS	mg/L	-																		
Un-ionized Ammonia		mg/L	0.02	<0.003	<0.001	<0.007	0.0008	0.0462	<0.003	<0.004	<0.006	<0.001	<0.001	<0.002	<0.002	<0.015	0.0103	<0.002	<0.003	<0.002	<0.001
Field Conductivity		µS/cm	-																		
Field pH			-																		
Field Dissolved Oxygen		mg/L	-																		
Field Temperature		oC	-																		

Bold / Highlighting indicates PWQO exceedance

Results of Chemical Analyses

South Easthope Landfill			Provincial Water Quality Objectives	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1
				Sampled on: 19-May-05	Sampled on: 03-Oct-05	Sampled on: 24-May-06	Sampled on: 25-Oct-06	Sampled on: 26-Apr-07	Sampled on: 24-Oct-07	Sampled on: 08-Apr-08	Sampled on: 30-Oct-08	Sampled on: 15-Apr-09	Sampled on: 27-Oct-09	Sampled on: 09-Apr-10	Sampled on: 20-Oct-10	Sampled on: 14-Apr-11	Sampled on: 19-Oct-11	Sampled on: 04-Apr-12	Sampled on: 24-Oct-12	Sampled on: 10-Apr-13	Sampled on: 29-Oct-13
				Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC
Parameter	**Symbol**	**Units**		Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT
Saturation pH			-	7.6	6.9	7.16	6.92	7.04	7.48	7.47	6.82	6.95	6.81	7.14	6.85	7.06	6.84	6.96	7.06	7.57	6.82
pH			6.5-8.5	8.5	8.41	8.41	8.1	8.63	7.95	8.36	8.45	8.41	8.48	8.09	8.48	8.39	8.39	8.4	8.35	7.73	8.35
Langelier Saturation Index			-	0.9		1.33	1.18	1.59	0.47	0.89	1.63	1.46	1.67	0.95	1.63	1.33	1.55	1.44	1.29	0.16	1.53
T - Alkalinity		mg/L	-	150	270	192	286	240	130	133	303	254	305	198	291	221	304	261	228	116	321
Bicarbonate	HCO_3^-	mg/L	-	174	257	166	286	213	130	128	386	243	286	198	272	213	293	247	221	116	313
Carbonate	CO_3^{-2}	mg/L	-	<5	13	26	<10	27	<10	6	17	12	18	<5	19	8	11	14	8	<5	7
Hydroxide		mg/L	-	<5	<5	<10	<10	<10	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Electrical Conductivity		µS/cm	-	640	750	605	610	584	523	366	754	634	722	552	753	607	654	675	653	357	692
Fluoride	F^-	mg/L	-	0.1	0.11	0.12	0.12	<0.05	0.14	0.08	<0.05	0.1	0.08	0.07	<0.25	<0.05	<0.05	<0.05	<0.05	0.07	<0.25
Chloride	Cl^-	mg/L	-	49.5	58.1	41.2	17.4	33.9	60.5	15.5	43.8	31	38.6	31.3	55.7	41.2	38.6	47.8	45	15.2	20.9
Nitrate	NO_3-N	mg/L	-	20.1	6.35	11.3	5.37	3.06	1.28	4.89	6.16	7.09	3.86	12.6	7.08	7.7	10.4	3.36	16.7	8.24	6.34
Nitrite	NO_2-N	mg/L	-	0.42	0.16	0.05	<0.05	<0.05	0.07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.25	<0.05	<0.05	<0.05	<0.05	<0.05	<0.25
Bromide	Br^-	mg/L	-	<0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.05	<0.05	<0.05	<0.05	<0.05	<0.25	<0.05	<0.05	<0.05	<0.05	<0.05	<0.25
Sulfate	SO_4^{-2}	mg/L	-	18.9	25.6	21	14	17.4	29.9	11	23.2	16.6	20.8	14.6	26.1	18.8	21.6	19.5	20.8	7.15	12.4
Calcium	Ca	mg/L	-	76.1	95.7	71	92.5	77.9	53.3	53.1	109	94.8	107	80.4	103	81.1	105	85.1	89.2	49.1	104
Magnesium	Mg	mg/L	-	19.6	19	20.2	17.6	19.6	12.2	9.78	22.6	19.4	24.1	15.5	23	19.4	20.9	21.9	17.3	8.71	19.1
Sodium	Na	mg/L	-	21.1	29.8	18.6	8.86	16.8	22.6	7.33	19.6	14.5	19.8	13.7	23.8	17.3	19.9	26.1	24.8	8.79	11.7
Potassium	K	mg/L	-	3.42	7.79	2.21	2.86	3.04	14.1	2.67	4.49	2.12	4.29	3.98	4.82	2.68	4.71	3.01	9.1	3.98	2.45
Ammonia Nitrogen	NH_3-N	mg/L	-	0.1	<0.05	0.07	0.1	0.56	0.27	0.1	<0.05	<0.05	<0.02	<0.02	<0.02	0.02	0.22	<0.02	0.13	0.3	0.08
Orthophosphate	PO_4^{-3}	mg/L	-	0.22	<0.05	<0.10	<0.10	<0.10	0.15	<0.10	<0.10	<0.10	<0.10	<0.10	<0.50	<0.10	<0.10	<0.10	<0.10	0.12	<0.50
Total Phosphorus		mg/L	0.03	**0.13**	**0.2**	**0.06**	**0.14**	**0.11**	**0.22**	**0.15**	**0.12**	**0.06**	**0.13**	**0.29**	**0.1**	**0.05**	**0.19**	**0.09**	**0.21**	**0.91**	**0.08**
Reactive Silica		mg/L	-	1.22	7.6	0.31	9.38	9.49	2.94	5.15	6.13	4.06	7.28	8.09	3.07	2.5	9.19	1.15	9.02	6.11	8.5
Total Organic Carbon	TOC	mg/L	-	3	7	3.7	5.5	6.6	13.4	4.7	4.3	3.3	3.9	9.3	4.9	3.7	5.2	4.4	7.6	9.2	3.6
Colour		Colour Units	-	20	5	<5	10	<5	20	25	16	<5	8	38	15	13	18	17	51	41	14
Turbidity		NTU	-	4.4	2	1.4	4.7	4.5	6.3	8.9	2.2	2.7	5.4	21	3.7	2.9	26.3	2	22.9	260	6.7
Aluminum	Al	mg/L	0.075	0.006	**0.151**	0.057	**0.293**	**0.414**	**0.354**	**0.459**	**0.098**	**0.119**	**0.215**	0.012	0.004	<0.004	**0.25**	**0.268**	0.009	**1.81**	0.007
Arsenic	As	mg/L	0.1	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.004	<0.003	<0.003	<0.003
Barium	Ba	mg/L	-	0.025	0.042	0.025	0.028	0.028	0.043	0.02	0.032	0.028	0.034	0.037	0.037	0.026	0.045	0.032	0.041	0.054	0.036
Boron	B	mg/L	0.2	0.016	0.029	0.027	0.015	0.106	0.041	0.045	0.058	0.01	0.012	0.017	0.02	0.011	0.02	0.014	0.02	0.012	0.012
Cadmium	Cd	mg/L	0.0002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.004	<0.0001	0.0001	<0.0001
Chromium	Cr	mg/L	0.1	0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.004	<0.003	0.003	<0.003	<0.003	<0.003	<0.003	<0.004	0.006	<0.003	<0.003
Copper	Cu	mg/L	0.005	0.002	0.002	<0.003	<0.003	<0.003	0.004	<0.003	<0.003	<0.003	<0.003	0.004	<0.002	<0.002	0.003	<0.004	0.004	**0.006**	<0.002
Iron	Fe	mg/L	0.3	**0.552**	**0.379**	0.298	**0.445**	**0.565**	**0.436**	0.174	<0.010	0.063	0.188	**0.57**	0.07	0.08	0.25	0.189	**0.46**	**0.788**	0.069
Lead	Pb	mg/L	0.025	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.004	<0.001	0.004	<0.001
Manganese	Mn	mg/L	-	0.026	0.018	0.02	0.016	0.064	0.099	0.01	0.011	0.019	0.031	0.023	0.012	0.016	0.04	0.049	0.012	0.09	0.015
Mercury		mg/L	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	Mo	mg/L	0.01	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.004	<0.002	<0.002	<0.002
Nickel	Ni	mg/L	0.025	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.004	0.009	<0.003	<0.003
Selenium	Se	mg/L	0.1	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Silver	Ag	mg/L	0.0001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.004	<0.0001	<0.0001	<0.0001
Strontium	Sr		-	0.198	0.232	0.201	0.173	0.202	0.186	0.098	0.231	0.194	0.243	0.17	0.271	0.192	0.254	0.248	0.226	0.089	0.222
Thallium	Tl	mg/L	-	<0.06	<0.06	<0.006	<0.006	<0.006	<0.006	<0.006	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.004	<0.0003	<0.0003	<0.0003
Tin	Sn	mg/L	-	<0.009	<0.009	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.004	<0.002	<0.002	<0.002
Titanium	Ti	mg/L	-	<0.001	0.007	0.002	0.009	0.015	0.014	0.014	0.004	0.005	0.006	0.033	0.008	0.006	0.006	0.007	0.034	0.012	0.006
Uranium	U	mg/L	0.005	0.001	0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.004	<0.002	<0.002	<0.002
Vanadium	V	mg/L	0.007	0.002	0.002	<0.002	<0.002	0.002	0.002	<0.002	0.002	<0.002	0.002	0.002	<0.002	<0.002	<0.002	<0.004	0.004	0.004	<0.002
Zinc	Zn	µmhos/cm	0.02	<0.004	**0.025**	0.008	0.005	0.014	**0.288**	0.008	0.014	0.005	0.008	0.011	0.016	0.009	0.014	**0.149**	0.011	0.018	<0.005
Total Dissolved Solids	TDS	mg/L	-	470	230	376	346	342	326	226	464	392	432	372	352	364	490	446	512	246	382
Hardness (as Calcium Carbonate)		mg/L	-	270	317	260	303	275	183	173	365	317	366	265	482	282	348	303	294	158	338
% Difference			-	12.6	6.1	6.09	8	3.4	<0.1	2.3	0.3	1.5	2.4	0.5	1.5	0.4	2.4	0.3	1.8	2.6	2.5
Biological Oxygen Demand	BOD	mg/L	-		<5					5	<5	<5	<5	<5	<5	<2	<2	<5	<2	<2	<2
Total Kjeldahl Nitrogen	TKN	mg/L	-		0.76	0.59	1.08	0.51	1.60	0.67	0.9500		0.56	0.69	0.28	0.55	0.91	0.65	<0.10	0.86	0.57
Chemical Oxygen Demand	COD	mg/L	-											33	<5	6	16	12	43	43	8
Phenols		mg/L	0.001	<0.002	<0.002	0.001	<0.001	**0.002**	**0.006**	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Suspended Solids	TSS	mg/L	-			10	16	26	47	<10	<10	20	28	19	<10	<10	28	27	13	230	<10
Un-ionized Ammonia		mg/L	0.02	0.0079	<0.003	0.0046	0.0019	0.0394	0.0051	0.0042	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0008	0.0100	<0.0002	0.0066	0.0019	0.0030
Field Conductivity		µS/cm	-			710	800	650	660	380	750	700	724	589	900	627	800	800	900	276	580
Field pH			-			8.24	8.13	8.56	8.64	8.58	8.34	8.48	8.83	7.71	8.55	8.9	7.9	8.42	8.32	7.06	8.5
Field Dissolved Oxygen		mg/L	-							10.4	11.5	13.32		10	11.5	15.5	1.9	5.67	6.33	8.92	7.92
Field Temperature		oC	-				7.9	9.4	12	10.3	5.5	4.2	10.1	5.3	8.8	9.1	10.5	10.1	13.3	4.5	9

Bold / Highlighting indicates PWQO exceedance

Results of Chemical Analyses

South Easthope Landfill			Provincial Water Quality Objectives	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1
				Sampled on: 16-Apr-14	Sampled on: 28-Oct-14	Sampled on: 16-Apr-15	Sampled on: 27-Oct-15	Sampled on: 12-Apr-16	Sampled on: 20-Oct-16	Sampled on: 19-Apr-17	Sampled on: 31-Oct-17	Sampled on: 19-Apr-18	Sampled on: 23-Oct-18	Sampled on: 16-Apr-19	Sampled on: 22-Oct-19	Sampled on: 20-Apr-20	Sampled on: 26-Oct-20	Sampled on: 13-Apr-21	Sampled on: 20-Oct-21	Sampled on: 06-Apr-22	Sampled on: 18-Oct-22
				Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC
Parameter	**Symbol**	**Units**		Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon
Saturation pH			-	6.96	6.76	6.87	7.05	7.26	6.95	7.03	6.91	7.2	6.84	7.03	7.17	7.13	7.01	7.21	6.88	7.01	7.19
pH			6.5-8.5	8.18	8.39	8.3	8.17	7.96	8.11	8.22	8.07	7.83	8.15	8.16	7.87	8.19	8.26	8.13	8.29	8.29	7.74
Langelier Saturation Index			-	1.22	1.63	1.43	1.12	0.7	1.16	1.19	1.16	0.63	1.31	1.13	0.704	1.06	1.25	0.925	1.41	1.28	0.549
T - Alkalinity		mg/L	-	262	346	294	224	185	292	236	289	194	284	254	216	232	297	199	292	273	247
Bicarbonate	HCO_3^-	mg/L	-	262	332	293	224	185	292	236	289	194	284	254	216	232	297	199	292	273	247
Carbonate	CO_3^{-2}	mg/L	-	<5	14	<5	<5	<5	<5	<5	<5	<5	<5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Hydroxide		mg/L	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Electrical Conductivity		µS/cm	-	737	796	756	832	454	665	698	667	476	831	733	663	652	957	699	869	769	744
Fluoride	F^-	mg/L	-	<0.10	<0.10	<0.25	<0.25	<0.10	<0.10	<0.10	<0.25	0.09	<0.10	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chloride	Cl^-	mg/L	-	51.1	32.8	42.4	89.2	18.7	42.7	54.1	68.2	29.9	45.7	37.8	36.2	42.7	99.1	57.8	46.7	57.6	81.9
Nitrate	NO_3-N	mg/L	-	5.81	4.21	7.01	4.75	8.15	<0.10	10.1	3.54	12.8	8.49	10.7	10.1	6.11	0.84	15.2	17.7	10.9	< 0.05
Nitrite	NO_2-N	mg/L	-	<0.10	<0.10	<0.25	<0.25	<0.10	<0.10	<0.10	<0.25	<0.05	<0.10	< 0.05	0.07	< 0.05	0.15	0.1	0.15	< 0.05	< 0.05
Bromide	Br^-	mg/L	-	<0.10	<0.10	<0.25	<0.25	<0.10	<0.10	<0.10	<0.25	<0.05	<0.10	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Sulfate	SO_4^{-2}	mg/L	-	10.9	15.2	13.4	23	8.73	7.56	16	16.2	9.47	18.1	12	14	15	31	17	18	16	17
Calcium	Ca	mg/L	-	91.7	110	99.4	85.2	61.8	80.7	83.4	91.3	72.4	108	105	88.1	87.6	95.9	87.4	132	102	75.5
Magnesium	Mg	mg/L	-	17.5	22.6	19.7	18.9	11.7	18.4	18.2	19.8	13.9	23.1	21.2	19.6	22.2	21.7	16.6	24.8	22	18.3
Sodium	Na	mg/L	-	24.3	17.2	20.7	45.6	11	22.9	24.6	33.5	13.3	23.8	20.2	17.9	21.3	45.6	26.9	23	24.6	39.7
Potassium	K	mg/L	-	2.86	2.89	2.6	27.6	2.24	9.92	2.99	16.2	2.77	6.06	2.3	12.1	2.6	33.3	3.8	3.8	2.7	18.4
Ammonia Nitrogen	NH_3-N	mg/L	-	0.17	0.07	0.05	0.24	0.13	<0.02	0.03	0.22	0.06	0.2	0.09	0.21	0.04	4.24	0.1	0.05	0.05	0.38
Orthophosphate	PO_4^{-3}	mg/L	-	<0.20	<0.20	2.06	<0.50	<0.20	<0.20	<0.20	<0.50	<0.10	<0.20	0.05	0.344	0.042	0.548	0.094	0.071	0.041	0.297
Total Phosphorus		mg/L	0.03	**0.14**	**0.14**	**0.07**	**0.54**	**0.2**	**0.37**	**0.06**	**0.31**	**0.12**	**0.11**	**0.08**	**0.54**	**0.06**	**0.59**	**0.16**	**0.13**	**0.08**	**0.83**
Reactive Silica		mg/L	-	6.82	16.6	6.44	9.57	5.59	8.23	2.55	9.08	5.64	7.06	5.89	9.14	2.7	11.8	6.33	8.32	4.87	6.03
Total Organic Carbon	TOC	mg/L	-	4.7	3.3	9.8	18.8	5.6	17.4	4.5	9.1	5.2	5.6	4.3	14.4	4.4	11.9	8.3	5.2	3.6	17.5
Colour		Colour Units	-	18	16	13	117	31	45	17	49	21	8	10	70	8	118	34	11	10	55
Turbidity		NTU	-	10.6	12.7	3.7	69.7	35.2	11.2	7.6	32.9	23.6	18.6	5	51.7	9.2	39	12.8	14.3	4.1	14.4
Aluminum	Al	mg/L	0.075	0.005	<0.004	<0.004	0.018	<0.006	<0.004	<0.004	0.01	0.009	0.008	**0.21**	0.07	0.05	0.05	0.03	0.07	0.06	0.02
Arsenic	As	mg/L	0.1	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.0002	0.0009	0.0004	0.0017	0.0004	0.0004	0.0003	0.0027
Barium	Ba	mg/L	-	0.031	0.038	0.029	0.059	0.023	0.051	0.031	0.048	0.027	0.044	0.034	0.054	0.029	0.071	0.034	0.048	0.033	0.052
Boron	B	mg/L	0.2	0.013	0.016	0.012	0.024	<0.010	0.044	0.015	0.054	0.013	0.023	0.012	0.033	0.014	0.04	0.008	0.022	0.007	0.036
Cadmium	Cd	mg/L	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.000021	0.000073	< 0.000015	0.000055	0.000027	0.000022	0.000015	0.000034
Chromium	Cr	mg/L	0.1	0.005	<0.003	<0.003	<0.003	0.005	<0.003	<0.003	<0.003	<0.003	<0.003	< 0.001	0.002	< 0.001	0.001	0.001	< 0.001	< 0.001	< 0.001
Copper	Cu	mg/L	0.005	0.002	<0.002	<0.002	**0.007**	0.002	<0.002	<0.002	0.004	0.003	0.003	0.0015	**0.0106**	0.0015	0.005	0.0027	0.0021	0.0014	0.0031
Iron	Fe	mg/L	0.3	0.179	0.165	0.083	**1.03**	0.167	**1.15**	0.087	**0.529**	0.175	0.112	0.212	**1.2**	0.219	**1.01**	**0.357**	**0.357**	0.167	**0.874**
Lead	Pb	mg/L	0.025	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	0.00017	0.00143	0.00014	0.00078	0.00034	0.00029	0.00012	0.00041
Manganese	Mn	mg/L	-	0.029	0.04	0.031	0.047	0.014	1.71	0.023	0.073	0.016	0.036	0.027	0.079	0.032	0.191	0.022	0.03	0.033	1.77
Mercury		mg/L	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Molybdenum	Mo	mg/L	0.01	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0002	0.0008	0.0004	0.0018	0.0004	0.0003	0.0002	0.0016
Nickel	Ni	mg/L	0.025	<0.003	<0.003	<0.003	0.005	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Selenium	Se	mg/L	0.1	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Silver	Ag	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Strontium	Sr		-	0.193	0.26	0.193	0.27	0.113	0.329	0.207	0.243	0.154	0.278	0.216	0.232	0.212	0.382	0.189	0.257	0.215	0.287
Thallium	Tl	mg/L	-	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Tin	Sn	mg/L	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Titanium	Ti	mg/L	-	0.013	0.007	0.004	0.056	0.011	<0.002	0.006	0.017	0.009	0.007	0.005	0.028	< 0.005	0.014	0.009	0.007	< 0.005	< 0.005
Uranium	U	mg/L	0.005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.00075	0.00106	0.0009	0.00113	0.0007	0.00091	0.00082	0.00073
Vanadium	V	mg/L	0.007	0.003	<0.002	<0.002	0.005	<0.002	<0.002	<0.002	0.002	<0.002	<0.002	0.0006	0.0033	0.0008	0.0025	0.001	0.0012	0.0006	0.0014
Zinc	Zn	µmhos/cm	0.02	0.006	<0.005	<0.005	**0.024**	<0.005	<0.005	<0.005	0.01	0.006	<0.005	0.016	**0.022**	< 0.005	0.017	0.015	0.007	**0.021**	< 0.005
Total Dissolved Solids	TDS	mg/L	-	398	432	404	470	274	378	390	454	340	466	351	316	332	511	331	428	388	403
Hardness (as Calcium Carbonate)		mg/L	-	301	368	329	291	202	277	283	310	238	365	333	301	315	335	287	431	344	265
% Difference			-	1.1	1.7	2	4.29	4.15	2.92	3.48	1.34	3.79	3.31	5.19	5.1	4.34	1.7	0.562	5.83	0.931	0.0885
Biological Oxygen Demand	BOD	mg/L	-	<2	<5	<5	7	<5	5	<5	<5	<5	<5	< 3	11	< 3	6	< 3	< 3	< 3	7
Total Kjeldahl Nitrogen	TKN	mg/L	-	0.25	0.46	0.57	2.57	1.06	0.90	0.65	1.47	<0.1	1.63	0.80	3.30	0.50	5.80	1.20	0.90	0.80	3.60
Chemical Oxygen Demand	COD	mg/L	-	10	12	6	63	21	42	9	28	7	9	11	81	11	57	17	14	7	89
Phenols		mg/L	0.001	<0.001	<0.001	<0.001	**0.002**	<0.001	**0.013**	<0.001	<0.001	<0.001	<0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.001	**0.007**
Total Suspended Solids	TSS	mg/L	-	<10	13	<10	38	25	10	<10	22	16	<10	6	80	6	18	8	14	7	12
Un-ionized Ammonia		mg/L	0.02	0.0031	0.0037	0.0012	0.0058	0.0012	<0.0002	0.0010	0.0024	0.0038	0.0011	0.0007	0.0016	0.0008	0.0083	0.0013	0.0018	0.0008	0.0040
Field Conductivity		µS/cm	-	631	650	733	721	550	702	810	650	620	765	622	655	615	710	700	920	790	576
Field pH			-	8.16	8.19	8.23	8.16	7.97	7.74	8.2	7.92	8.82	7.56	7.85	7.55	8	7.06	7.85	8.21	8.15	7.88
Field Dissolved Oxygen		mg/L	-	6.24	4.75	7.21	4.17	11.48	1.9	11.97	9.5	13.33	9.62	19.82	5.49		5.7	10.76	9.2	4.85	1.44
Field Temperature		oC	-	4.8	12.5	4.9	8.7	2.8	12.8	11.6	5.8	2.5	7.9	3.4	11.6	11.6	8.9	9.8	12.4	4.2	6.5

Bold / Highlighting indicates PWQO exceedance

Results of Chemical Analyses

South Easthope Landfill			Provincial Water Quality Objectives	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2
				Sampled on: 23-Apr-96	**Sampled on:** 14-Nov-96	**Sampled on:** 17-Apr-97	**Sampled on:** 26-Nov-97	**Sampled on:** 17-Apr-98	**Sampled on:** 28-Apr-98	**Sampled on:** 26-Nov-98	**Sampled on:** 20-Apr-99	**Sampled on:** 23-Nov-99	**Sampled on:** 20-Apr-00	**Sampled on:** 22-Apr-00	**Sampled on:** 01-Nov-00	**Sampled on:** 30-Apr-01	**Sampled on:** 23-May-01	**Sampled on:** 25-Apr-02	**Sampled on:** 26-Nov-02	**Sampled on:** 22-May-03	**Sampled on:** 05-Dec-03
				Sampled by:	**Sampled by:**	**Sampled by:**	**Sampled by:**	**Sampled by:**	**Sampled by:**	**Sampled by:**	**Sampled by:**	**Sampled by:**	**Sampled by:**	**Sampled by:**	**Sampled by:**	**Sampled by:**	**Sampled by:**	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC
Parameter	**Symbol**	**Units**		**Analyzed by:**	**Analyzed by:**	**Analyzed by:**	**Analyzed by:**	**Analyzed by:**	**Analyzed by:**	**Analyzed by:**	**Analyzed by:**	**Analyzed by:**	**Analyzed by:**	**Analyzed by:**	**Analyzed by:**	**Analyzed by:**	**Analyzed by:**	**Analyzed by:** AGAT	**Analyzed by:** AGAT	**Analyzed by:** AGAT	**Analyzed by:** AGAT
Saturation pH			-															7.32	7.08	7.06	6.93
pH			6.5-8.5	7.5	7.99	8.6	7.62	7.5	8.3	7.8	8.4	8	8.03	7.83	8	8.8	9.4	8.4	8.37	8.22	8.21
Langelier Saturation Index			-															1.08			1.28
T - Alkalinity		mg/L	-	202	307	235	291	251	210	276	185	210	179	157	280	178	148	206	288	424	266
Bicarbonate	HCO_3^-	mg/L	-															244	351	242	266
Carbonate	CO_3^{-2}	mg/L	-															<5	<5	<5	<5
Hydroxide		mg/L	-															<5	<5	<5	<5
Electrical Conductivity		µS/cm	-	531	890	631	740	740	661	709	607	860	550	680	810	640	723	575	727	626	665
Fluoride	F^-	mg/L	-															0.2	0.2	0.11	0.11
Chloride	Cl^-	mg/L	-	20	26	35	32	27	22	20	37	40	22	33	30	42	50	24	53.7	37	29.6
Nitrate	NO_3-N	mg/L	-	<0.05	1.41	1.5	6.07	12.11	2.81	2.37	2.34	4.56	1.85	19.78	6.96	9.3	25.32	27	42.6	8.90	11.0
Nitrite	NO_2-N	mg/L	-	<0.05														<0.3	1.1	<0.05	<0.05
Bromide	Br^-	mg/L	-															<0.1	0.1	<0.05	<0.05
Sulfate	SO_4^{-2}	mg/L	-	27.7	20	21.6	<1.0	27	65.9	46.2	31	96.6	41	29.1	29.6	30.7	26.3	20	33.2	17.6	21.6
Calcium	Ca	mg/L	-	76.2	105.5	81	107	95.9	74	83.2	76.8	100.6	71.1	85.3	98.1	69.8	78.1	76.5	105	74.5	95.5
Magnesium	Mg	mg/L	-	14.3	22.7	17.3	22	19.2	21.4	26.5	16.8	27.5	11.5	16.8	26.7	19.8	20.1	18.7	25.8	18.4	19.3
Sodium	Na	mg/L	-	5	7.8	12.9	9	14.5	14.5	5.7	11.9	20	14.9	16.3	22.7	15.7	15	14.3	24	14.6	9.3
Potassium	K	mg/L	-	0.6	5.1	<0.1	<0.1	<0.1	<0.1	1.8	3.2	3.8	2.5	2.6	7.1	2.6	3.1	1.6	6.2	2.58	2.3
Ammonia Nitrogen	NH_3-N	mg/L	-	<0.05	<0.05	0.06	<0.05	0.73	<0.05	<0.05	0.09	<0.05	<0.05	0.17	0.05	0.05	0.05	0.05	0.05	<0.05	<0.05
Orthophosphate	PO_4^{-3}	mg/L	-															<0.05	0.34	<0.15	0.06
Total Phosphorus		mg/L	0.03															<0.05	**0.17**		**0.08**
Reactive Silica		mg/L	-															1.02	6.37	2.00	8.06
Total Organic Carbon	TOC	mg/L	-	0.7	0.6	0.5	0.5	0.6	0.5	0.6	0.6	2.9	2.4	0.5	0.2	0.9	0.6	4	5	4	<1
Colour		Colour Units	-															10	30	20	5
Turbidity		NTU	-															1.3	5.4	1.4	1.7
Aluminum	Al	mg/L	0.075															0.055	**0.08**	0.045	**0.108**
Arsenic	As	mg/L	0.1															<0.005	<0.005	<0.005	<0.003
Barium	Ba	mg/L	-															0.027	0.038	0.026	0.029
Boron	B	mg/L	0.2															0.01	0.02	0.031	0.01
Cadmium	Cd	mg/L	0.0002															<0.001	0.004	<0.001	<0.002
Chromium	Cr	mg/L	0.1															<0.002	0.019	<0.002	<0.003
Copper	Cu	mg/L	0.005															**0.057**	**0.013**	0.004	<0.002
Iron	Fe	mg/L	0.3	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	**0.31**	<0.02	<0.02	0.06	<0.02	<0.02	0.08	0.065	0.293	**0.324**	0.281
Lead	Pb	mg/L	0.025															<0.01	<0.01	<0.01	<0.002
Manganese	Mn	mg/L	-															0.014	0.026	0.012	0.011
Mercury		mg/L	0.0002															<0.0001	<0.0001	<0.0001	<0.00005
Molybdenum	Mo	mg/L	0.01															0.003	<0.003	<0.003	<0.002
Nickel	Ni	mg/L	0.025															<0.002	<0.003	<0.003	<0.003
Selenium	Se	mg/L	0.1															<0.005	<0.005	<0.005	<0.004
Silver	Ag	mg/L	0.0001															**0.001**	**0.001**	<0.001	<0.002
Strontium	Sr		-															0.166	0.219	0.173	0.206
Thallium	Tl	mg/L	-															<0.02	<0.06	<0.06	<0.06
Tin	Sn	mg/L	-															<0.007	<0.009	<0.009	<0.009
Titanium	Ti	mg/L	-															0.001	0.01	0.077	0.005
Uranium	U	mg/L	0.005															<0.05	<0.05	<0.05	0.001
Vanadium	V	mg/L	0.007															<0.001	0.002	<0.001	0.001
Zinc	Zn	µmhos/cm	0.02															**0.021**	**0.059**	**0.636**	0.005
Total Dissolved Solids	TDS	mg/L	-	277	381	317	363	356	334	366	295	420	280	310	390	300	1	305	463	388	374
Hardness (as Calcium Carbonate)		mg/L	-	250	359	275	359	320	274	318	262	366	225	283	356	257	279	268	368	262	318
% Difference			-									3.9	0.4	3	4.7	1.3	0.9	4.24	0.69	3.6	7.7
Biological Oxygen Demand	BOD	mg/L	-																		
Total Kjeldahl Nitrogen	TKN	mg/L	-	0.30	0.09	0.69	2.40	0.93	0.60	1.50	0.60	6.20	7.30	0.60	0.70	0.60	3.10	<0.05			
Chemical Oxygen Demand	COD	mg/L	-																		
Phenols		mg/L	0.001	<2	<2	<2	<2	<2	<2	<1	<1	<1	<1	<1	<1	80	<1	<0.002		<0.002	<0.002
Total Suspended Solids	TSS	mg/L	-																		
Un-ionized Ammonia		mg/L	0.02	<0.004	<0.001	0.0059	<0.006	0.0062	<0.002	<0.008	0.0058	<0.001	<0.001	0.0031	0.0013	0.0073	<0.02	<0.003	0.0030	<0.002	<0.002
Field Conductivity		µS/cm	-																		
Field pH			-																		
Field Dissolved Oxygen		mg/L	-																		
Field Temperature		oC	-																		

Bold / Highlighting indicates PWQO exceedance

Results of Chemical Analyses

South Eastlope Landfill			Provincial Water Quality Objectives	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2
				Sampled on: 05-Jun-04	Sampled on: 01-Oct-04	Sampled on: 19-May-05	Sampled on: 24-May-06	Sampled on: 25-Oct-06	Sampled on: 26-Apr-07	Sampled on: 24-Oct-07	Sampled on: 08-Apr-08	Sampled on: 30-Oct-08	Sampled on: 15-Apr-09	Sampled on: 27-Oct-09	Sampled on: 09-Apr-10	Sampled on: 20-Oct-10	Sampled on: 14-Apr-11	Sampled on: 19-Oct-11	Sampled on: 04-Apr-12	Sampled on: 24-Oct-12	Sampled on: 10-Apr-13
				Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC
Parameter	Symbol	Units		Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT
Saturation pH			-	7.01	7.01	7.47	7.13	6.93	7.02	7.47	7.49	6.82	6.97	6.79	7.15	6.85	7	6.86	7.02	7.09	7.6
pH			6.5-8.5	8.18	8.01	8.4	8.43	8.19	8.65	7.97	8.43	8.39	8.42	8.46	8.12	8.39	8.34	8.42	8.36	8.29	7.68
Langelier Saturation Index			-	1.17	1		1.3	1.26	1.63	0.5	0.94	1.57	1.45	1.67	0.97	1.54	1.34	1.56	1.34	1.2	0.08
T - Alkalinity		mg/L	-	238	236	200	198	287	246	133	133	307	253	314	196	285	248	292	244	225	111
Bicarbonate	HCO_3^-	mg/L	-	238	236	241	187	287	214	133	125	297	242	294	196	273	242	279	237	223	111
Carbonate	CO_3^{-2}	mg/L	-	<5	<5	<5	11	<10	32	<10	8	11	12	20	<5	11	6	13	7	<5	<5
Hydroxide		mg/L	-	<5	<5	<5	<10	<10	<10	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Electrical Conductivity		μS/cm	-	608	592	605	592	600	589	508	346	747	599	725	535	705	638	639	629	636	340
Fluoride	F^-	mg/L	-	0.11	0.09	0.09	0.09	0.11	0.08	0.09	0.07	<0.05	0.08	0.08	0.08	<0.25	<0.05	<0.05	<0.05	<0.05	0.07
Chloride	Cl^-	mg/L	-	28.2	18.4	38.5	31.1	16.6	25.9	45.1	12.3	38.5	24.7	33.4	26.8	40.5	36.6	33	39	44	14.9
Nitrate	NO_3-N	mg/L	-	6.25	5.38	19.3	10.7	5.49	4.22	0.08	4.5	6.19	6.48	4.58	12.2	7.62	8.39	10.4	3.71	15.9	7.33
Nitrite	NO_2-N	mg/L	-	<0.05	<0.05	0.42	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.25	<0.05	<0.05	<0.05	<0.05	<0.05
Bromide	Br^-	mg/L	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.22	<0.05	<0.05	0.62	<0.05	<0.05	<0.25	<0.05	<0.05	<0.05	<0.05	<0.05
Sulfate	SO_4^{-2}	mg/L	-	16.6	37.8	20.4	20.8	14	18.9	48	11.1	23.1	16	19.8	14.4	25.3	19.4	22.9	18	20.1	7.12
Calcium	Ca	mg/L	-	85.4	76.7	77.1	75.9	91.3	79.5	52.6	51.1	107	91.3	110	78.6	105	85.5	104	80.6	85.9	47.4
Magnesium	Mg	mg/L	-	20.1	26	20.2	19.9	17.3	20	13	9.37	22.2	19	23.8	15.2	23.2	18.7	20.6	20.6	16.6	8.29
Sodium	Na	mg/L	-	15.4	6.33	16.4	13.9	8.37	12.5	19.2	6.01	17.3	12.2	17.5	12.3	19	13.4	16.8	21.8	23.8	8.81
Potassium	K	mg/L	-	3.13	2.83	3.2	1.96	2.97	3.07	4.66	2.36	4.33	1.99	3.87	3.99	4.26	2.45	4.11	3.15	9.6	4.13
Ammonia Nitrogen	NH_3-N	mg/L	-	<0.05	<0.02	0.07	0.07	0.11	1.08	2.87	<0.05	<0.05	<0.05	<0.02	<0.02	<0.02	0.03	0.14	<0.02	0.12	0.36
Orthophosphate	PO_4^{-3}	mg/L	-	<0.05	<0.05	<0.15	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.50	<0.10	<0.10	<0.10	<0.10	0.12
Total Phosphorus		mg/L	0.03	<0.05	0.01	**0.06**	**0.05**	**0.16**	**0.05**	**0.14**	**0.11**	**0.12**	**0.04**	0.02	**0.31**	**0.09**	**0.04**	**0.13**	**0.06**	**0.26**	**0.87**
Reactive Silica		mg/L	-	1.65	4.59	1.55	1.03	9.48	9.48	1.19	5.18	5.97	3.64	6.1	8.13	4.07	2.36	9.76	0.61	8.69	6.03
Total Organic Carbon	TOC	mg/L	-	<1	2	2	3	4.6	4.7	14.5	4.7	4.7	3	3.5	10.1	4.3	2.9	4.7	4.3	8.2	4.6
Colour		Colour Units	-	10	7.5	20	<5	7	<5	5	25	13	<5	9	46	16	10	17	16	55	37
Turbidity		NTU	-	2.5	0.5	3	0.6	5.2	2.3	25	8.4	2.5	2	3.2	20	1.7	1.8	6.4	1.9	28.8	298
Aluminum	Al	mg/L	0.075	**0.086**	**0.133**	0.004	0.017	**0.296**	**0.198**	**0.813**	<0.004	**0.103**	**0.091**	**0.145**	0.012	<0.004	<0.004	**0.133**	**0.141**	0.01	**2.22**
Arsenic	As	mg/L	0.1	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.004	<0.003	<0.003
Barium	Ba	mg/L	-	0.028	0.019	0.027	0.025	0.028	0.028	0.059	0.018	0.034	0.028	0.036	0.032	0.037	0.029	0.042	0.03	0.037	0.066
Boron	B	mg/L	0.2	0.02	0.015	0.017	**0.222**	0.015	0.06	0.084	0.014	0.14	0.012	0.014	0.017	0.019	0.011	0.019	0.017	0.02	0.019
Cadmium	Cd	mg/L	0.0002	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	0.0001	<0.004	<0.0001	0.0002
Chromium	Cr	mg/L	0.1	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.004	<0.003	0.003	<0.003	<0.003	<0.003	<0.003	<0.004	0.007	<0.003
Copper	Cu	mg/L	0.005	0.004	<0.002	0.003	<0.003	<0.003	<0.003	0.004	**0.009**	<0.003	<0.003	<0.003	0.004	<0.002	0.002	0.002	<0.004	0.004	**0.008**
Iron	Fe	mg/L	0.3	**0.327**	**0.441**	**0.591**	0.266	**0.431**	**0.33**	**1.5**	<0.005	<0.010	0.025	0.111	**0.55**	0.02	0.05	0.09	0.12	**0.5**	**0.985**
Lead	Pb	mg/L	0.025	<0.002	<0.001	<0.002	<0.002	<0.002	<0.002	0.004	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.004	<0.001	0.005
Manganese	Mn	mg/L	-	0.028	0.036	<0.002	0.002	0.012	0.018	0.238	0.003	0.009	0.012	0.024	0.028	0.013	0.015	0.015	0.027	0.013	0.132
Mercury		mg/L	0.0002	<0.00005	<0.00005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	Mo	mg/L	0.01	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.004	<0.002	<0.002
Nickel	Ni	mg/L	0.025	<0.003	<0.003	0.004	<0.003	<0.003	<0.003	0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.004	0.008	<0.003
Selenium	Se	mg/L	0.1	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Silver	Ag	mg/L	0.0001	<0.002	<0.0001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.004	<0.0001	<0.0001
Strontium	Sr		-	0.179	0.171	0.183	0.174	0.165	0.19	0.155	0.087	0.221	0.173	0.233	0.165	0.224	0.197	0.234	0.217	0.193	0.09
Thallium	Tl	mg/L	-	<0.06	<0.0003	<0.06	<0.006	<0.006	<0.006	<0.006	<0.006	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.004	<0.0003	<0.0003
Tin	Sn	mg/L	-	0.04	<0.009	<0.009	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.004	<0.002	<0.002
Titanium	Ti	mg/L	-	0.003	<0.001	<0.001	<0.002	0.016	0.006	0.018	<0.002	0.005	0.003	0.005	0.035	0.002	0.003	0.005	0.005	0.039	0.011
Uranium	U	mg/L	0.005	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.004	<0.002	<0.002
Vanadium	V	mg/L	0.007	0.001	0.002	0.001	<0.002	<0.002	<0.002	0.003	<0.002	0.002	<0.002	<0.002	0.002	<0.002	<0.002	<0.002	<0.004	0.004	0.005
Zinc	Zn	μmhos/cm	0.02	0.01	**0.026**	<0.004	<0.004	0.016	0.005	0.012	<0.004	0.006	<0.005	0.005	0.012	<0.005	0.01	<0.005	<0.004	0.008	**0.023**
Total Dissolved Solids	TDS	mg/L	-	370	334	425	362	344	324	328	188	480	346	436	366	358	380	444	406	552	236
Hardness (as Calcium Carbonate)		mg/L	-	296	298	275	272	299	281	185	166	359	306	373	259	456	291	345	286	283	152
% Difference			-	9.2	9	4.3	10.5	7.3	2.5	0.8	1.2	0.7	1.1	2.1	0.3	1.1	4	1.6	1	2.5	3.6
Biological Oxygen Demand	BOD	mg/L	-							6	<5	<5	<5	<5	<5	<5	<2	<2	<5	<2	<2
Total Kjeldahl Nitrogen	TKN	mg/L	-				0.27	0.78	1.14	3.95	0.51	1.27		<0.10	1.48	0.42	0.38	0.67	0.98	1.17	1.02
Chemical Oxygen Demand	COD	mg/L	-							26.7	13	14		<5	36	<5	<5	13	10	43	46
Phenols		mg/L	0.001	<0.002	<0.002	<0.002	0.001	<0.001	<0.001	0.006	<0.002	0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Suspended Solids	TSS	mg/L	-				<5	<12	<12	6.0000	<10	<10	<10	10	23	<10	<10	<10	<10	16	324
Un-ionized Ammonia		mg/L	0.02	<0.002	<0.001	0.0045	0.0048	0.0045	**0.0758**	**0.0512**	<0.0005	<0.0005	<0.0005	<0.0005	< 0.0005	< 0.0005	0.0009	0.0063	<0.0002	0.0044	0.0021
Field Conductivity		μS/cm	-				570	700	660	620	370	719	600	740	589	900	688	700	900	800	260
Field pH			-				8.32	8.09	8.63	8.57	8.21	7.43	8.5	8.76	7.99	8.32	8.8	8.05	8.48	8.23	7.23
Field Dissolved Oxygen		mg/L	-							4.66	11.32	10.3	14.18	6.66	11.14	9.74	15.72	8.35	6.1	6.12	8.86
Field Temperature		oC	-				16.8	8.9	8.8	10.6	9.6	2	5.5	8.8	3.3	9.3	6.5	9.5	9.2	10.6	4.6

Bold / Highlighting indicates PWQO exceedance

Results of Chemical Analyses

South Easthope Landfill			Provincial Water Quality Objectives	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2
				Sampled on: 29-Oct-13	**Sampled on:** 16-Apr-14	**Sampled on:** 28-Oct-14	**Sampled on:** 16-Apr-15	**Sampled on:** 27-Oct-15	**Sampled on:** 12-Apr-16	**Sampled on:** 20-Oct-16	**Sampled on:** 19-Apr-17	**Sampled on:** 31-Oct-17	**Sampled on:** 19-Apr-18	**Sampled on:** 23-Oct-18	**Sampled on:** 16-Apr-19	**Sampled on:** 22-Oct-19	**Sampled on:** 20-Apr-20	**Sampled on:** 26-Oct-20	**Sampled on:** 13-Apr-21	**Sampled on:** 20-Oct-21	**Sampled on:** 06-Apr-22
				Sampled by: AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC
Parameter	**Symbol**	**Units**		**Analyzed by:** AGAT	**Analyzed by:** AGAT	**Analyzed by:** AGAT	**Analyzed by:** AGAT	**Analyzed by:** AGAT	**Analyzed by:** AGAT	**Analyzed by:** AGAT	**Analyzed by:** AGAT	**Analyzed by:** AGAT	**Analyzed by:** AGAT	**Analyzed by:** AGAT	**Analyzed by:** Caduceon	**Analyzed by:** Caduceon	**Analyzed by:** Caduceon	**Analyzed by:** Caduceon	**Analyzed by:** Caduceon	**Analyzed by:** Caduceon	**Analyzed by:** Caduceon
Saturation pH			-	6.85	6.98	6.75	6.89	7.11	7.22	6.91	7.03	6.88	7.2	6.84	7.04	7.16	7.11	7.05	7.2	6.9	7.04
pH			6.5-8.5	8.34	8.21	8.44	8.34	8.08	8.03	8.05	8.27	8.05	7.92	8.12	8.19	7.88	8.31	8.22	8.15	8.29	8.22
Langelier Saturation Index			-	1.49	1.23	1.69	1.45	0.97	0.81	1.14	1.24	1.17	0.72	1.28	1.15	0.721	1.2	1.17	0.954	1.39	1.18
T - Alkalinity		mg/L	-	313	253	344	284	213	194	318	237	309	196	289	257	221	243	289	198	291	271
Bicarbonate	HCO_3^-	mg/L	-	308	253	324	279	213	194	318	237	309	196	289	257	221	240	289	198	291	271
Carbonate	CO_3^{-2}	mg/L	-	<5	<5	20	5	<5	<5	<5	<5	<5	<5	<5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Hydroxide		mg/L	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Electrical Conductivity		µS/cm	-	676	739	789	758	737	467	683	698	671	479	832	723	666	656	949	701	863	768
Fluoride	F^-	mg/L	-	<0.10	0.1	<0.10	<0.25	<0.25	<0.10	<0.10	<0.10	<0.25	0.08	<0.10	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chloride	Cl^-	mg/L	-	19.9	50.9	32.2	40.3	68.1	19.2	40.8	52.2	70.1	30.3	46	35.9	37.2	42	101	58.1	46.7	58.5
Nitrate	NO_3-N	mg/L	-	6.78	5.92	3.86	6.7	3.54	8.24	<0.10	9.68	3.43	12.9	8.39	10.6	9.65	6.03	0.28	15.2	17.5	10.7
Nitrite	NO_2-N	mg/L	-	<0.10	<0.05	<0.10	<0.25	<0.25	<0.10	<0.10	<0.10	<0.25	<0.05	<0.10	< 0.05	0.07	< 0.05	0.13	0.1	0.16	< 0.05
Bromide	Br^-	mg/L	-	<0.10	<0.05	<0.10	<0.25	<0.25	<0.10	<0.10	<0.10	<0.25	<0.05	<0.10	< 0.4	< 0.4	< 0.4	< 0.4	0.5	< 0.4	< 0.4
Sulfate	SO_4^{-2}	mg/L	-	12.1	11	14.7	12.8	25.6	9.26	0.87	15.7	18.5	9.97	18.3	12	14	16	30	17	19	16
Calcium	Ca	mg/L	-	100	91.3	112	98.8	76.8	63.8	81	84	91.6	71.2	108	101	87.4	90.2	89.5	85.9	126	95.9
Magnesium	Mg	mg/L	-	18.3	17.4	22.6	19.8	17.3	12	18.5	18.6	19.6	13.7	22.8	20.6	19.9	22.4	20.6	16.7	24.2	20.8
Sodium	Na	mg/L	-	11.3	24.2	17.6	20.8	37.9	11.3	20.3	25.2	33.4	13.2	23.8	18.5	18.8	21.1	50.6	27.1	23	23.4
Potassium	K	mg/L	-	2.35	2.88	2.83	2.61	25.7	2.23	13.4	3.09	17	2.69	6.19	2.2	11.6	2.6	43.2	3.5	3.8	2.5
Ammonia Nitrogen	NH_3-N	mg/L	-	0.07	0.21	0.05	0.07	0.16	0.19	<0.02	0.02	0.37	0.09	0.2	0.11	0.2	0.04	5.18	0.09	0.05	0.06
Orthophosphate	PO_4^{-3}	mg/L	-	<0.20	<0.10	<0.20	2.01	<0.50	<0.20	<0.20	<0.10	<0.50	<0.10	<0.20	0.06	0.337	0.043	0.676	0.092	0.073	0.039
Total Phosphorus		mg/L	0.03	**0.09**	**0.15**	**0.25**	**0.08**	**0.46**	**0.2**	**0.72**	**0.06**	**0.32**	**0.13**	**0.11**	**0.08**	**0.53**	**0.06**	**1**	**0.15**	**0.1**	**0.07**
Reactive Silica		mg/L	-	8.63	6.87	16.7	6.21	8.48	5.49	5.65	2.55	9.06	5.64	7.18	5.67	10.1	2.7	11	6.27	8.42	4.52
Total Organic Carbon	TOC	mg/L	-	3.7	5.1	3.3	11.6	16.1	5.3	56.8	4.7	9.8	5.6	6	4.4	14	4.5	12.4	8.8	10.5	3.9
Colour		Colour Units	-	14	18	14	12	96	29	129	17	53	23	10	9	83	8	131	32	13	10
Turbidity		NTU	-	7.6	10.4	9.8	4.3	75.7	32	50.3	4.8	27	23.6	7.8	4.8	53.1	5.9	31.7	11.4	10.5	3.2
Aluminum	Al	mg/L	0.075	0.006	0.005	0.004	<0.004	0.014	<0.006	<0.004	0.009	0.008	0.007	0.01	**0.18**	0.07	0.05	0.06	0.04	0.07	0.06
Arsenic	As	mg/L	0.1	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.011	<0.003	<0.003	<0.003	<0.003	0.0003	0.0008	0.0004	0.0023	0.0004	< 0.0005	0.0003
Barium	Ba	mg/L	-	0.034	0.031	0.038	0.03	0.048	0.027	0.074	0.031	0.048	0.032	0.047	0.032	0.053	0.03	0.068	0.033	0.045	0.031
Boron	B	mg/L	0.2	0.014	0.014	0.017	0.014	<0.010	<0.010	0.045	0.022	0.06	0.018	0.026	0.013	0.034	0.016	0.041	0.01	0.029	0.008
Cadmium	Cd	mg/L	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.000017	0.000084	< 0.000015	0.000045	0.000028	< 0.000070	< 0.000015
Chromium	Cr	mg/L	0.1	<0.003	0.005	<0.003	<0.003	<0.003	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	< 0.001	0.004	< 0.001	0.001	0.001	0.001	< 0.001
Copper	Cu	mg/L	0.005	<0.002	<0.002	<0.002	<0.002	0.005	0.003	<0.002	**0.009**	0.004	0.003	0.004	0.0014	**0.0097**	0.0014	**0.0062**	0.003	0.0017	0.0014
Iron	Fe	mg/L	0.3	0.081	0.158	0.166	0.091	**0.6**	**0.634**	**3.05**	0.055	**0.419**	0.231	0.097	0.181	**1.71**	0.198	**1.28**	0.279	0.243	0.148
Lead	Pb	mg/L	0.025	<0.001	<0.001	<0.002	<0.002	0.003	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	0.00013	0.0013	0.00013	0.00099	0.00029	0.0002	0.00012
Manganese	Mn	mg/L	-	0.019	0.028	0.044	0.033	0.066	0.018	5.59	0.019	0.099	0.024	0.028	0.024	0.078	0.032	0.293	0.017	0.026	0.028
Mercury		mg/L	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Molybdenum	Mo	mg/L	0.01	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0002	0.0007	0.0002	0.0018	0.0004	< 0.0005	0.0002
Nickel	Ni	mg/L	0.025	<0.003	<0.003	<0.003	<0.003	0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Selenium	Se	mg/L	0.1	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.005	< 0.001
Silver	Ag	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Strontium	Sr		-	0.204	0.19	0.275	0.198	0.174	0.117	0.256	0.212	0.248	0.146	0.27	0.211	0.232	0.217	0.288	0.189	0.253	0.202
Thallium	Tl	mg/L	-	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.0003	< 0.00005
Tin	Sn	mg/L	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Titanium	Ti	mg/L	-	0.005	0.012	0.007	0.004	0.008	0.035	0.017	0.004	0.018	0.011	0.005	< 0.005	0.039	< 0.005	0.015	0.008	< 0.005	< 0.005
Uranium	U	mg/L	0.005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.00075	0.001	0.00085	0.00103	0.0008	0.0011	0.00078
Vanadium	V	mg/L	0.007	<0.002	0.002	<0.002	<0.002	0.002	0.003	<0.002	<0.002	0.002	<0.002	<0.002	0.0005	0.0031	0.0007	0.0028	0.0011	0.0015	0.0006
Zinc	Zn	µmhos/cm	0.02	<0.005	<0.005	<0.005	<0.005	0.015	0.006	0.007	0.009	0.008	0.009	0.006	0.012	**0.021**	< 0.005	0.016	0.017	0.018	0.017
Total Dissolved Solids	TDS	mg/L	-	376	432	438	396	422	270	406	386	460	368	462	345	321	340	516	333	417	380
Hardness (as Calcium Carbonate)		mg/L	-	325	300	373	328	263	209	278	286	309	234	364	334	300	323	323	283	415	325
% Difference			-	3.4	0.1	0.5	0.2	4.18	4.7	5.15	2.34	4.07	5.12	2.53	3.11	4.11	3.92	3.39	1.19	3.46	3.67
Biological Oxygen Demand	BOD	mg/L	-	<2	<2	<5	<5	7	<5	21	<5	<5	<5	<5	< 3	11	< 3	8	< 3	< 3	< 3
Total Kjeldahl Nitrogen	TKN	mg/L	-	0.57	0.42	0.44	<0.10	2.13	0.67	2.50	0.55	1.80	0.71	1.81	0.70	3.10	0.50	9.20	1.10	0.80	0.70
Chemical Oxygen Demand	COD	mg/L	-	5	9	14	<5	49	20	134	13	34	8	12	< 5	77	12	108	18	8	13
Phenols		mg/L	0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	0.035	<0.001	<0.001	<0.001	<0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.001
Total Suspended Solids	TSS	mg/L	-	<10	<10	12	<10	37	20	47	<10	36	18	<10	6	68	5	20	11	10	5
Un-ionized Ammonia		mg/L	0.02	0.0023	0.0042	0.0028	0.0018	0.0025	0.0021	<0.0002	0.0007	0.0063	0.0038	0.0008	0.0011	0.0016	0.0008	0.0157	0.0015	0.0016	0.0010
Field Conductivity		µS/cm	-	610	6.3	850	732	686	510	711	830	640	630	780	607	659	607	750	700	892	794
Field pH			-	7.65	8	8.16	8.3	8.63	7.97	7.89	8.25	8.11	8.63	7.4	7.95	7.59	7.99	7.32	7.96	8.16	8.15
Field Dissolved Oxygen		mg/L	-	8.4	6.11	5.3	7.65	7.96	11.58	2.1	13.6	10.8	13.07	12.82	16.92	5.49		4.28	10.7	8.93	4.76
Field Temperature		oC	-	7.9	5	12	4.8	5.9	3.1	13	11.4	6	2.6	7.6	3.6	11.8	11.9	6.9	9.8	12.3	4.3

Bold / Highlighting indicates PWQO exceedance

Results of Chemical Analyses

South Easthope Landfill			Provincial Water Quality Objectives	SW-2 Sampled on: 18-Oct-22 Sampled by: AEC Analyzed by: Caduceon
Parameter	**Symbol**	**Units**		
Saturation pH			-	7.29
pH			6.5-8.5	7.9
Langelier Saturation Index			-	0.609
T - Alkalinity		mg/L	-	215
Bicarbonate	HCO_3^-	mg/L	-	215
Carbonate	CO_3^{-2}	mg/L	-	< 5
Hydroxide		mg/L	-	< 5
Electrical Conductivity		µS/cm	-	741
Fluoride	F^-	mg/L	-	< 0.1
Chloride	Cl^-	mg/L	-	95.4
Nitrate	NO_3-N	mg/L	-	< 0.05
Nitrite	NO_2-N	mg/L	-	< 0.05
Bromide	Br^-	mg/L	-	< 0.4
Sulfate	SO_4^{-2}	mg/L	-	22
Calcium	Ca	mg/L	-	69
Magnesium	Mg	mg/L	-	17.3
Sodium	Na	mg/L	-	48.3
Potassium	K	mg/L	-	20.1
Ammonia Nitrogen	NH_3-N	mg/L	-	0.05
Orthophosphate	PO_4^{-3}	mg/L	-	0.203
Total Phosphorus		mg/L	0.03	**0.4**
Reactive Silica		mg/L	-	4.02
Total Organic Carbon	TOC	mg/L	-	12.9
Colour		Colour Units	-	54
Turbidity		NTU	-	6.6
Aluminum	Al	mg/L	0.075	0.01
Arsenic	As	mg/L	0.1	0.0017
Barium	Ba	mg/L	-	0.041
Boron	B	mg/L	0.2	0.038
Cadmium	Cd	mg/L	0.0002	0.000025
Chromium	Cr	mg/L	0.1	< 0.001
Copper	Cu	mg/L	0.005	0.0026
Iron	Fe	mg/L	0.3	0.295
Lead	Pb	mg/L	0.025	0.00023
Manganese	Mn	mg/L	-	0.301
Mercury		mg/L	0.0002	< 0.00002
Molybdenum	Mo	mg/L	0.01	0.0012
Nickel	Ni	mg/L	0.025	< 0.01
Selenium	Se	mg/L	0.1	< 0.001
Silver	Ag	mg/L	0.0001	< 0.0001
Strontium	Sr		-	0.224
Thallium	Tl	mg/L	-	< 0.00005
Tin	Sn	mg/L	-	< 0.05
Titanium	Ti	mg/L	-	< 0.005
Uranium	U	mg/L	0.005	0.00067
Vanadium	V	mg/L	0.007	0.0011
Zinc	Zn	µmhos/cm	0.02	< 0.005
Total Dissolved Solids	TDS	mg/L	-	401
Hardness (as Calcium Carbonate)		mg/L	-	236
% Difference			-	0.518
Biological Oxygen Demand	BOD	mg/L	-	4
Total Kjeldahl Nitrogen	TKN	mg/L	-	1.90
Chemical Oxygen Demand	COD	mg/L	-	50
Phenols		mg/L	0.001	< 0.001
Total Suspended Solids	TSS	mg/L	-	8
Un-ionized Ammonia		mg/L	0.02	0.0006
Field Conductivity		µS/cm	-	574
Field pH			-	7.91
Field Dissolved Oxygen		mg/L	-	4.12
Field Temperature		oC	-	6.2

Bold / Highlighting indicates PWQO exceedance

Results of Chemical Analyses

South Easthope Landfill			Provincial Water Quality Objectives	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3
				Sampled on: 23-Apr-96	Sampled on: 14-Nov-96	Sampled on: 17-Apr-97	Sampled on: 26-Nov-97	Sampled on: 16-Apr-98	Sampled on: 28-Apr-98	Sampled on: 20-Apr-99	Sampled on: 27-May-99	Sampled on: 23-Nov-99	Sampled on: 20-Apr-00	Sampled on: 22-Apr-00	Sampled on: 01-Nov-00	Sampled on: 30-Apr-01	Sampled on: 23-May-01	Sampled on: 25-Apr-02	Sampled on: 26-Nov-02	Sampled on: 22-May-03	Sampled on: 05-Dec-03
				Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by:	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC
				Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by:	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT
Parameter	**Symbol**	**Units**																			
Saturation pH			-															7.28	7.26	7.1	6.88
pH			6.5-8.5	7.5	7.44	8	7.52	7.5	8.1	8.4	7.76	8.36	7.97	7.53	7.7	8.4	9.8	8.3	8.18	7.94	8.05
Langelier Saturation Index			-															1.02			1.17
T - Alkalinity		mg/L	-	174	221	221	153	240	125	314	394	79	172	117	171	183	134	200	229	209	268
Bicarbonate	HCO_3^-	mg/L	-															236	280	209	268
Carbonate	CO_3^{-2}	mg/L	-															<5	<5	<5	<5
Hydroxide		mg/L	-															<5	<5	<5	<5
Electrical Conductivity		µS/cm	-	548	880	651	942	702	583	806	1145	570	680	570	690	620	487	549	844	668	450
Fluoride	F^-	mg/L	-															0.1	0.1	0.08	0.07
Chloride	Cl^-	mg/L	-	36.1	50.8	41.4	99.9	24.3	42.8	37.7	98.3	48.2	44.7	34.5	56.4	32.7	39.6	26	103	40.9	26.3
Nitrate	NO_3-N	mg/L	-	<0.05	1.67	1.35	4.31	9.23	1.3	<0.05	0.24	3.59	10.72	9.05	2.69	0.66	1.26	19	0.5	4.28	8.76
Nitrite	NO_2-N	mg/L	-	<0.05														<0.3	2.4	<0.05	<0.05
Bromide	Br^-	mg/L	-															<0.1	0.1	0.06	<0.05
Sulfate	SO_4^{-2}	mg/L	-	37.5	52.7	34	91.8	39	74	19	37.6	90.6	39.1	51.6	56.4	40.1	38.4	32	98.6	66.9	72.5
Calcium	Ca	mg/L	-	60.9	93.4	78.9	101	85.9	58	113.5	98.6	53.6	73.7	64.8	72	71.9	74.1	73.5	87.6	73.9	104
Magnesium	Mg	mg/L	-	13.9	18.9	17.2	24	18.2	17.6	21.2	28.5	8.78	19	12.8	15.6	14.7	15.9	15.8	27.2	20.1	23.3
Sodium	Na	mg/L	-	14	16	15.9	34	16.6	18	13.6	47.9	24.1	20.6	17.7	22.6	15.7	15.1	17.7	61.2	19.3	19.1
Potassium	K	mg/L	-	7.7	3.3	<0.1	<0.1	<0.1	<0.1	5.5	26.1	5	3.3	3.8	8.2	2.5	2.7	2.3	16.3	3.98	4.9
Ammonia Nitrogen	NH_3-N	mg/L	-	<0.05	0.4	1.42	0.38	0.66	<0.05	1.24	4.64	0.26	<0.05	0.45	0.28	<0.05	<0.05	0.11	5.93	0.10	1.20
Orthophosphate	PO_4^{-3}	mg/L	-															<0.15	<0.15	<0.15	<0.05
Total Phosphorus		mg/L	0.03															<0.05	**0.17**		<0.05
Reactive Silica		mg/L	-															1.11	6.31	1.57	6.65
Total Organic Carbon	TOC	mg/L	-	0.5	1.9	0.5	0.5	0.9	0.5	0.9	59.3	0.7	2.3	0.5	0.3	1.1	0.5	4	20	7	<1
Colour		Colour Units	-															10	70	20	5
Turbidity		NTU	-															6.8	26	6.8	1.6
Aluminum	Al	mg/L	0.075															**0.146**	**0.157**	**0.126**	**0.067**
Arsenic	As	mg/L	0.1															<0.005	<0.005	<0.005	<0.003
Barium	Ba	mg/L	-															0.031	0.075	0.036	0.044
Boron	B	mg/L	0.2															0.08	**0.39**	0.147	0.11
Cadmium	Cd	mg/L	0.0002															<0.001	**0.004**	<0.001	<0.002
Chromium	Cr	mg/L	0.1															<0.002	0.022	<0.002	<0.003
Copper	Cu	mg/L	0.005															**0.026**	**0.018**	0.004	<0.002
Iron	Fe	mg/L	0.3	<0.02	**3.69**	<0.02	<0.02	<0.02	<0.02	**0.67**	0.04	<0.02	<0.02	0.22	**0.43**	<0.02	0.06	0.143	0.226	**0.370**	0.262
Lead	Pb	mg/L	0.025															0.01	<0.01	<0.01	<0.002
Manganese	Mn	mg/L	-															0.027	0.25	0.028	0.013
Mercury		mg/L	0.0002															<0.0001	<0.0001	<0.0001	<0.00005
Molybdenum	Mo	mg/L	0.01															0.004	<0.003	<0.003	<0.002
Nickel	Ni	mg/L	0.025															0.006	<0.003	<0.003	<0.003
Selenium	Se	mg/L	0.1															<0.005	<0.005	<0.005	<0.004
Silver	Ag	mg/L	0.0001															**0.002**	<0.001	<0.001	<0.002
Strontium	Sr		-															0.139	0.217	0.159	0.210
Thallium	Tl	mg/L	-															<0.02	<0.06	<0.06	<0.06
Tin	Sn	mg/L	-															<0.007	<0.009	<0.009	<0.009
Titanium	Ti	mg/L	-															0.003	0.012	0.085	0.004
Uranium	U	mg/L	0.005															<0.05	<0.05	<0.05	0.001
Vanadium	V	mg/L	0.007															<0.001	0.002	<0.001	<0.001
Zinc	Zn	µmhos/cm	0.02															0.019	**0.054**	0.012	0.004
Total Dissolved Solids	TDS	mg/L	-	288	384	327	456	349	293	410	585	290	320	270	340	300	1	306	538	464	474
Hardness (as Calcium Carbonate)		mg/L	-	210	312	269	353	291	218	372	365	171	263	215	245	241	184	248	330	267	356
% Difference			-									4.81	0.34	1.75	2.06	0.97	0.94	1.93	0.2	2	9.1
Biological Oxygen Demand	BOD	mg/L	-																		
Total Kjeldahl Nitrogen	TKN	mg/L	-	0.8	2.9	0.5	2.0	3.9	0.5	4.3	23.4	1.6	4.8	0.9	1.0	1.8	2.4	0.4			
Chemical Oxygen Demand	COD	mg/L	-																		
Phenols		mg/L	0.001	<2	<2	<2	<2	<2	<2	<1	<1	<1	<1	<1	<1	100	<1	<0.002		<0.002	<0.002
Total Suspened Solids	TSS	mg/L	-																		
Un-ionized Ammonia		mg/L	0.02	<0.0004	0.0030	**0.0377**	0.0034	0.0056	<0.002	**0.0796**	**0.0718**	0.0153	<0.001	0.0041	0.0038	<0.003	<0.03	0.0057	**0.2353**	0.0023	**0.0357**
Field Conductivity		µS/cm	-																		
Field pH			-																		
Field Dissolved Oxygen		mg/L	-																		
Field Temperature		oC	-																		

Bold / Highlighting indicates PWQO exceedance

Results of Chemical Analyses

South Easthope Landfill			Provincial Water Quality Objectives	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3
				Sampled on: 05-Jun-04 Sampled by: AEC Analyzed by: AGAT	Sampled on: 19-May-05 Sampled by: AEC Analyzed by: AGAT	Sampled on: 03-Oct-05 Sampled by: AEC Analyzed by: AGAT	Sampled on: 24-May-06 Sampled by: AEC Analyzed by: AGAT	Sampled on: 25-Oct-06 Sampled by: AEC Analyzed by: AGAT	Sampled on: 26-Apr-07 Sampled by: AEC Analyzed by: AGAT	Sampled on: 24-Oct-07 Sampled by: AEC Analyzed by: AGAT	Sampled on: 08-Apr-08 Sampled by: AEC Analyzed by: AGAT	Sampled on: 30-Oct-08 Sampled by: AEC Analyzed by: AGAT	Sampled on: 15-Apr-09 Sampled by: AEC Analyzed by: AGAT	Sampled on: 27-Oct-09 Sampled by: AEC Analyzed by: AGAT	Sampled on: 09-Apr-10 Sampled by: AEC Analyzed by: AGAT	Sampled on: 20-Oct-10 Sampled by: AEC Analyzed by: AGAT	Sampled on: 14-Apr-11 Sampled by: AEC Analyzed by: AGAT	Sampled on: 19-Oct-11 Sampled by: AEC Analyzed by: AGAT	Sampled on: 04-Apr-12 Sampled by: AEC Analyzed by: AGAT	Sampled on: 24-Oct-12 Sampled by: AEC Analyzed by: AGAT	Sampled on: 10-Apr-13 Sampled by: AEC Analyzed by: AGAT
Parameter	Symbol	Units																			
Saturation pH			-	7.08	7.76	7.78	7.24	6.97	7.12	7.01	7.44	7.62	7.07	6.91	7.03	6.96	6.82	6.87	6.82	7.64	6.83
pH			6.5-8.5	8.03	8.15	8.25	8.2	8.17	8.35	8.15	8.32	8.22	8.17	8.31	8.04	8.26	8.24	8.25	8.29	8.2	8.1
Langelier Saturation Index			-	0.95	0.39	0.47	0.86	1.2	1.23	1.14	0.88	0.6	1.1	1.4	1.01	1.3	1.42	1.38	1.47	0.56	1.27
T - Alkalinity		mg/L	-	224	125	89	182	259	213	237	144	109	223	280	237	236	327	296	315	117	335
Bicarbonate	HCO_3^-	mg/L	-	224	152	89	182	259	204	237	139	109	223	277	237	236	327	296	314	117	335
Carbonate	CO_3^{-2}	mg/L	-	<5	<5	<5	<10	<10	<10	<10	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Hydroxide		mg/L	-	<5	<5	<5	<10	<10	<10	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Electrical Conductivity		µS/cm	-	543	555	266	499	660	562	576	406	424	612	848	638	706	933	730	899	453	1030
Fluoride	F^-	mg/L	-	0.09	0.07	0.1	0.08	0.08	0.05	0.08	0.05	<0.05	<0.05	0.08	<0.05	<0.25	<0.05	<0.05	<0.05	<0.05	<0.25
Chloride	Cl^-	mg/L	-	20.8	34	12.6	33.2	38.5	35.8	16.9	25.5	47.1	40.6	76.9	43.3	59	92.5	59.3	85.7	57.9	90.3
Nitrate	NO_3-N	mg/L	-	2.36	7.07	<0.05	0.08	3.5	1.73	4.51	1.39	<0.05	2.15	0.96	5.14	7.54	2.75	2.12	2.22	0.84	5.59
Nitrite	NO_2-N	mg/L	-	0.07	<0.05	<0.05	<0.05	<0.05	<0.05	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	<0.25	<0.05	<0.05	<0.05	<0.05	<0.25
Bromide	Br^-	mg/L	-	<0.05	<0.05	<0.05	<0.05	0.05	0.07	<0.05	0.11	<0.05	0.22	<0.05	0.15	0.39	1.62	0.3	1.08	0.4	<0.25
Sulfate	SO_4^{-2}	mg/L	-	30.7	33.5	24	27.7	30.8	25.9	35.8	20.7	33.2	26	47	33.3	37.8	31.5	62.5	30.7	34.6	37.2
Calcium	Ca	mg/L	-	79.8	62.4	32.3	60.7	90.4	73.9	79.5	51.4	42.4	82	91.2	85.4	100	102	107	101	33.1	97.8
Magnesium	Mg	mg/L	-	16.2	17.2	7.31	15.5	17.5	18.2	23.7	10.3	10.5	17.9	22.1	17.5	20.2	25.9	20.8	28.3	14	24.8
Sodium	Na	mg/L	-	12	15	6.4	16.1	17.6	15.6	5.45	16.5	23.9	17.9	35.6	19.5	16.8	47	30.3	47.8	30.9	57.4
Potassium	K	mg/L	-	3.58	3.36	3.21	3.37	3.43	3.23	2.84	5.35	5.07	3.3	14.7	5.86	5.46	10.2	8.24	8	7.52	13.3
Ammonia Nitrogen	NH_3-N	mg/L	-	0.16	0.1	0.61	0.1	0.59	0.23	0.07	0.69	<0.05	0.12	11.9	3.35	1.26	5.72	3.33	1.67	0.14	14
Orthophosphate	PO_4^{-3}	mg/L	-	<0.05	<0.15	<0.05	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.50	<0.10	<0.10	<0.10	<0.10	<0.50
Total Phosphorus		mg/L	0.03	<0.05	**0.05**	**0.09**	**0.05**	<0.05	0.03	<0.05	**0.05**	**0.12**	0.03	**0.07**	**0.16**	**0.05**	**0.1**	**0.05**	**0.05**	**0.2**	**0.05**
Reactive Silica		mg/L	-	4.71	<0.05	0.09	1.17	7.59	0.74	5.82	4.44	0.08	<0.05	8.34	7.69	5.95	4.28	9.53	0.09	1.85	6.07
Total Organic Carbon	TOC	mg/L	-	<1	4	6	6	4.5	4.3	3.4	5.1	12.3	6.4	250	15.9	10	15.7	20.1	11.9	16	14.3
Colour		Colour Units	-	8	35	<5	<5	5	<5	<5	20	13	10	26	30	21	28	42	18	35	30
Turbidity		NTU	-	4.8	25.5	5.9	12	2.7	2.1	0.8	7.9	45	3.2	8.8	10	6.4	4	16.1	3.8	52	10.2
Aluminum	Al	mg/L	0.075	**0.137**	<0.004	**0.853**	**0.481**	**0.178**	**0.167**	**0.115**	**0.417**	**1.49**	**0.147**	**0.499**	<0.004	0.007	<0.004	**0.247**	**0.159**	0.016	**0.178**
Arsenic	As	mg/L	0.1	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.004	<0.003	<0.003
Barium	Ba	mg/L	-	0.033	0.026	0.03	0.031	0.037	0.029	0.032	0.026	0.055	0.033	0.066	0.042	0.044	0.042	0.064	0.051	0.047	0.066
Boron	B	mg/L	0.2	0.1	0.085	0.051	0.103	0.081	0.094	0.027	0.174	0.095	0.082	0.134	0.092	0.066	**0.295**	0.174	**0.31**	0.194	**0.535**
Cadmium	Cd	mg/L	0.0002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	<0.004	<0.0001	0.0001
Chromium	Cr	mg/L	0.1	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.003	<0.003	0.005	0.004	0.003	<0.003	<0.003	<0.004	<0.003	<0.003
Copper	Cu	mg/L	0.005	0.003	<0.002	0.002	<0.003	<0.003	<0.003	<0.003	0.003	0.004	<0.003	<0.003	0.005	0.003	0.005	**0.006**	<0.004	0.004	**0.006**
Iron	Fe	mg/L	0.3	**0.344**	**0.517**	**0.742**	**0.645**	**0.428**	**0.338**	0.144	0.265	**0.955**	0.095	**0.454**	**0.5**	0.14	0.2	0.23	0.209	**0.701**	0.118
Lead	Pb	mg/L	0.025	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.004	0.003	<0.001
Manganese	Mn	mg/L	-	0.178	<0.002	0.089	0.086	0.064	0.075	0.025	0.037	0.041	0.027	0.146	0.126	0.044	0.095	0.159	0.076	0.211	0.035
Mercury		mg/L	0.0002	<0.00005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	Mo	mg/L	0.01	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.004	<0.002	<0.002
Nickel	Ni	mg/L	0.025	<0.003	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.004	0.004	<0.003	0.004	0.006	0.004	0.005	0.004
Selenium	Se	mg/L	0.1	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Silver	Ag	mg/L	0.0001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.004	<0.0001	<0.0001
Strontium	Sr		-	0.149	0.145	0.086	0.133	0.167	0.157	0.159	0.093	0.12	0.144	0.249	0.174	0.188	0.204	0.242	0.256	0.117	0.257
Thallium	Tl	mg/L	-	<0.06	<0.06	<0.06	<0.006	<0.006	<0.006	<0.006	<0.006	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.004	<0.0003	<0.0003
Tin	Sn	mg/L	-	0.049	<0.009	<0.009	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.004	<0.002	<0.002
Titanium	Ti	mg/L	-	0.004	0.001	0.039	0.02	0.006	0.005	0.005	0.014	0.052	0.004	0.017	0.02	0.007	0.005	0.013	0.006	0.014	0.011
Uranium	U	mg/L	0.005	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.004	<0.002	<0.002
Vanadium	V	mg/L	0.007	0.001	<0.001	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.004	<0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.004	0.004	<0.002
Zinc	Zn	µmhos/cm	0.02	0.01	<0.004	0.02	0.015	0.02	0.005	<0.005	**0.023**	0.006	<0.005	0.005	**0.022**	0.007	<0.005	0.01	<0.004	0.006	0.008
Total Dissolved Solids	TDS	mg/L	-	362	395	80	280	368	332	364	236	258	356	498	392	333	522	516	552	358	538
Hardness (as Calcium Carbonate)		mg/L	-	266	226	111	216	298	259	296	171	149	278	319	285	478	361	353	369	140	346
% Difference			-	9.2	10.5	5.2	6.2	6.3	8.6	0.5	2.2	0.6	1.1	1.8	0.6	0.6	0.3	1.3	1.3	4.6	1.6
Biological Oxygen Demand	BOD	mg/L	-			<5		<5	<5		<5	5	<5	<5	9	<5	<2	9	<5	14	<2
Total Kjeldahl Nitrogen	TKN	mg/L	-			0.7	0.7	1.4	0.3	0.4	1.1	<0.10	0.85	12.9	5.86	2.17	11.8	5.79	3.32	1.42	14.5
Chemical Oxygen Demand	COD	mg/L	-						12.7		12		21		53	16	44	53	34	59	47
Phenols		mg/L	0.001	<0.002	<0.002	<0.002	0.001	<0.001	<0.001	**0.004**	<0.002	<0.001	<0.001	**0.005**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	**0.002**
Total Suspened Solids	TSS	mg/L	-				19	12	<12	38	15	<10	69	41	<10	11	<10	10	11	63	<10
Un-ionized Ammonia		mg/L	0.02	0.0045	0.0037	**0.0282**	0.0039	**0.0201**	0.0094	0.0065	**0.0627**	<0.0005	0.0024	**0.824**	**0.052**	**0.051**	**0.560**	**0.053**	**0.087**	0.003	**0.028**
Field Conductivity		µS/cm	-				490	800	630	650	750	412	600	843	788	800	975	800	1100	480	660
Field pH			-				8.14	8.35	8.32	8.63	8.64	8.45	8.1	8.63	8.06	8.37	8.77	7.95	8.58	8.14	7.1
Field Dissolved Oxygen		mg/L	-								8.69	10.29	13.13		5.95	8.97	10.6	3.66	9.16	6.11	9.53
Field Temperature		oC	-				16	7.9	11.2	13.3	12.7	1.4	8.5	9.2	6.3	9.6	9.9	9.65	6.9	9.6	8.2

Bold / Highlighting indicates PWQO exceedance

Results of Chemical Analyses

South Easthope Landfill			Provincial Water Quality Objectives	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3
				Sampled on: 29-Oct-13	**Sampled on:** 16-Apr-14	**Sampled on:** 28-Oct-14	**Sampled on:** 16-Apr-15	**Sampled on:** 27-Oct-15	**Sampled on:** 12-Apr-16	**Sampled on:** 20-Oct-16	**Sampled on:** 19-Apr-17	**Sampled on:** 26-Jul-17	**Sampled on:** 31-Oct-17	**Sampled on:** 19-Apr-18	**Sampled on:** 11-May-18	**Sampled on:** 23-Oct-18	**Sampled on:** 16-Apr-19	**Sampled on:** 22-Oct-19	**Sampled on:** 20-Apr-20	**Sampled on:** 26-Oct-20	**Sampled on:** 13-Apr-21	**Sampled on:** 20-Oct-21
				Sampled by: AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC	**Sampled by:** AEC
Parameter	**Symbol**	**Units**		**Analyzed by:** AGAT	**Analyzed by:** AGAT	**Analyzed by:** AGAT	**Analyzed by:** AGAT	**Analyzed by:** AGAT	**Analyzed by:** AGAT	**Analyzed by:** AGAT	**Analyzed by:** AGAT	**Analyzed by:** AGAT	**Analyzed by:** AGAT	**Analyzed by:** AGAT	**Analyzed by:** AGAT	**Analyzed by:** AGAT	**Analyzed by:** Caduceon	**Analyzed by:** Caduceon	**Analyzed by:** Caduceon	**Analyzed by:** Caduceon	**Analyzed by:** Caduceon	**Analyzed by:** Caduceon
Saturation pH			-	6.76	6.91	6.83	6.82	7.23	6.89	7.34	6.86	7.39	7.29	6.85	6.75	7.45	6.86	7.55	6.87	7.21	6.89	6.81
pH			6.5-8.5	8.16	8.12	8.37	8.24	8.11	8.21	8.01	8.18	8.26	7.98	7.97	7.95	7.76	8.2	7.96	8.14	8.26	8.16	8.3
Langelier Saturation Index			-	1.4	1.21	1.54	1.42	0.88	1.32	0.67	1.32	0.87	0.69	1.12	1.2	0.31	1.34	0.41	1.27	1.05	1.27	1.49
T - Alkalinity		mg/L	-	356	295	316	323	195	332	183	295	141	167	321	366	124	351	131	325	151	316	354
Bicarbonate	HCO_3^-	mg/L	-	356	295	306	323	195	332	183	295	141	167	321	366	124	351	131	325	151	316	351
Carbonate	CO_3^{-2}	mg/L	-	<5	<5	10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	< 5	< 5	< 5	< 5	< 5	< 5
Hydroxide		mg/L	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	< 5	< 5	< 5	< 5	< 5	< 5
Electrical Conductivity		µS/cm	-	953	912	881	958	683	865	555	1190	815	569	861	1180	590	976	700	1080	1200	1170	1040
Fluoride	F^-	mg/L	-	<0.25	<0.25	<0.10	<0.25	<0.25	<0.25	0.09	<0.25	<0.25	<0.05	0.99	<0.25	0.07	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chloride	Cl^-	mg/L	-	69.2	62.5	62.4	63.6	75.8	58.6	49.9	175	112	63.4	79.5	121	55.2	77.8	102	128	198	153	105
Nitrate	NO_3-N	mg/L	-	4.43	2.51	4.67	4.21	<0.25	4.61	<0.05	8.16	<0.25	0.24	<0.25	<0.25	<0.05	0.38	0.39	1.41	1.16	1.59	0.35
Nitrite	NO_2-N	mg/L	-	<0.25	<0.25	<0.10	<0.25	<0.25	<0.25	<0.05	<0.25	<0.25	<0.05	3.12	<0.25	0.46	0.06	< 0.05	< 0.05	< 0.05	0.13	0.1
Bromide	Br^-	mg/L	-	<0.25	0.39	0.25	0.41	0.56	<0.25	0.22	<0.25	<0.25	<0.05	<0.25	<0.25	0.16	0.6	< 0.4	0.5	0.5	0.9	< 0.4
Sulfate	SO_4^{-2}	mg/L	-	46.9	36.5	31.4	38.2	20	41.8	36.2	48.8	96.3	87.8	78.4	74	61.8	32	45	48	147	55	34
Calcium	Ca	mg/L	-	112	87.4	107	106	52.5	77.9	46.4	99.6	54.1	60.3	100	107	63.8	114	59.5	124	125	121	125
Magnesium	Mg	mg/L	-	23.5	20.4	22.9	23.1	21.8	20.4	15.6	27.8	18	18	22.4	26	12.1	27.3	15.7	31.5	23	27.8	28.7
Sodium	Na	mg/L	-	40.4	43.5	33.6	40.9	50.6	45.6	33.4	87.7	61.9	41.3	57.8	72.7	26.7	48.4	47.3	59.5	70.8	76	62
Potassium	K	mg/L	-	7.94	10.8	7.84	7.36	11.1	8.99	10.4	9.52	11.7	10.5	15.4	17.8	7.4	10.3	20.9	12.1	22.7	12.6	17.1
Ammonia Nitrogen	NH_3-N	mg/L	-	4.82	6.82	0.82	5.4	0.86	14.2	0.97	4.36	0.06	0.58	4.12	3.82	<0.02	2.73	0.31	0.12	0.06	0.22	0.16
Orthophosphate	PO_4^{-3}	mg/L	-	<0.50	<0.50	<0.20	<0.50	<0.50	<0.5	<0.10	<0.50	<0.50	<0.10	<0.50	<0.50	<0.10	0.01	0.035	0.033	0.05	0.018	0.012
Total Phosphorus		mg/L	0.03	**0.04**	**0.09**	**0.21**	**0.05**	**0.18**	**0.06**	**0.22**	**0.04**	**0.11**	**0.12**	**0.2**	**0.26**	0.03	**0.06**	**0.13**	**0.11**	**0.13**	**0.05**	**0.06**
Reactive Silica		mg/L	-	6.83	5.61	29.1	3.53	3.06	5.87	1.01	0.77	4.45	2.31	5.79	8.52	0.9	2.4	5.2	2.57	5.03	3.81	7.02
Total Organic Carbon	TOC	mg/L	-	10.1	15.3	7.8	21.2	31.4	14.6	22.4	20.6	22.6	17.1	60.2	28.7	9.7	14.7	20	12.7	11.8	20.3	26.5
Colour		Colour Units	-	21	32	21	24	23	34	29	32	30	18	32	69	10	22	44	30	92	55	71
Turbidity		NTU	-	12.6	17.3	22.4	12.5	54.4	24.8	104	6.2	40.2	33.1	61.1	26.6	13.3	3.1	19.8	69.8	39.5	11.5	11.8
Aluminum	Al	mg/L	0.075	0.006	<0.004	<0.004	<0.004	0.007	<0.006	0.009	<0.004	0.009	0.007	0.005	0.008	0.031	**0.09**	0.05	0.07	0.06	**0.48**	**0.09**
Arsenic	As	mg/L	0.1	<0.003	<0.003	<0.003	<0.003	0.004	<0.003	<0.003	<0.003	0.003	<0.003	<0.006	0.003	<0.003	0.004	0.0038	0.0034	0.0033	0.0026	0.0037
Barium	Ba	mg/L	-	0.061	0.048	0.058	0.057	0.046	0.043	0.071	0.073	0.06	0.041	0.068	0.069	0.045	0.048	0.052	0.061	0.074	0.078	0.086
Boron	B	mg/L	0.2	**0.309**	**0.384**	**0.238**	**0.316**	**0.455**	**0.326**	**0.375**	**0.661**	**0.663**	**0.645**	**0.356**	**0.693**	**0.231**	**0.274**	**0.239**	**0.289**	**0.222**	**0.437**	**0.443**
Cadmium	Cd	mg/L	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	0.000027	0.000026	0.00004	0.000041	0.000045	0.00003
Chromium	Cr	mg/L	0.1	<0.003	<0.003	<0.003	<0.003	<0.003	0.006	<0.003	<0.003	0.004	<0.003	<0.006	0.005	<0.003	< 0.001	0.002	0.002	0.003	0.002	0.003
Copper	Cu	mg/L	0.005	0.003	0.004	0.003	0.005	<0.002	**0.007**	0.003	**0.006**	0.003	0.002	**0.006**	0.004	0.003	0.0025	**0.0064**	**0.0057**	**0.0154**	**0.0081**	**0.007**
Iron	Fe	mg/L	0.3	0.15	0.256	0.182	0.142	**0.887**	0.258	**0.795**	0.062	**0.633**	**0.905**	**0.698**	**0.395**	0.208	0.197	**0.35**	**1.1**	**0.892**	0.283	**0.414**
Lead	Pb	mg/L	0.025	<0.001	<0.001	<0.002	<0.002	0.003	<0.002	0.003	<0.002	<0.002	<0.002	0.002	0.001	<0.001	0.00021	0.00081	0.00165	0.00298	0.00055	0.00034
Manganese	Mn	mg/L	-	0.083	0.078	0.03	0.069	0.317	0.065	0.254	0.022	0.317	0.171	0.517	0.824	0.018	0.107	0.094	0.191	0.107	0.115	0.065
Mercury		mg/L	0.0002	<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	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Molybdenum	Mo	mg/L	0.01	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.004	<0.002	<0.002	0.0008	0.0013	0.0008	0.0014	0.0014	0.0013
Nickel	Ni	mg/L	0.025	<0.003	0.003	<0.003	<0.003	0.005	0.004	<0.003	0.005	0.008	<0.003	<0.006	0.009	<0.003	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Selenium	Se	mg/L	0.1	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.008	<0.004	<0.004	< 0.001	< 0.001	< 0.001	< 0.001	0.001	0.001
Silver	Ag	mg/L	0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	**0.0003**	<0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Strontium	Sr		-	0.276	0.219	0.27	0.227	0.198	0.208	0.192	0.266	0.212	0.201	0.271	0.347	0.213	0.301	0.219	0.304	0.414	0.369	0.359
Thallium	Tl	mg/L	-	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	0.0003	<0.0003	<0.0006	<0.0003	<0.0003	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Tin	Sn	mg/L	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.004	<0.002	<0.002	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Titanium	Ti	mg/L	-	0.005	0.009	0.01	0.008	0.009	0.016	0.024	0.01	0.017	0.012	0.023	0.007	0.015	< 0.005	0.005	0.02	0.025	0.008	0.011
Uranium	U	mg/L	0.005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.004	<0.002	<0.002	0.00118	0.00073	0.00116	0.00118	0.00152	0.00122
Vanadium	V	mg/L	0.007	<0.002	<0.002	<0.002	<0.002	0.003	<0.002	<0.002	<0.002	0.003	<0.002	<0.004	0.003	<0.002	0.0004	0.0013	0.0013	0.0014	0.0009	0.0013
Zinc	Zn	µmhos/cm	0.02	0.006	0.013	<0.005	<0.005	0.006	0.01	0.009	<0.005	<0.005	0.008	**0.044**	0.016	<0.005	0.008	0.009	0.009	0.016	0.014	**0.021**
Total Dissolved Solids	TDS	mg/L	-	516	433	502	522	370	446	338	648	484	382	584	698	342	524	374	599	679	642	601
Hardness (as Calcium Carbonate)		mg/L	-	376	302	361	360	221	279	180	363	209	225	342	374	209	400	213	463	421	417	444
% Difference			-	2.6	0.5	0.7	1	3.75	3.82	3.92	3.36	5.33	2.78	2.58	3.82	1.58	2.97	4.83	2.48	0.369	1.52	7.35
Biological Oxygen Demand	BOD	mg/L	-	<2	3	<5	<5	8	<5	8	<5	7	<5	60	37	<5	4	4	3	3	< 3	< 3
Total Kjeldahl Nitrogen	TKN	mg/L	-	6.69	9.07	1.49	6.9	3.29	14.4	3.62	6.6	2.2	2.38	6.54	8.18	0.85	4.6	2.7	2	2.7	2.2	2.3
Chemical Oxygen Demand	COD	mg/L	-	20	32	23	28	98	43	56	56	79	41	149	120	13	54	75	60	75	70	70
Phenols		mg/L	0.001	<0.001	<0.001	<0.001	<0.001	0.001	**0.003**	<0.001	<0.001	<0.001	<0.001	**0.015**	**0.010**	0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Total Suspened Solids	TSS	mg/L	-	<10	16	14	17	59	17	77	<10	40	24	120	34	<10	3	22	30	22	8	7
Un-ionized Ammonia		mg/L	0.02	**0.099**	**0.093**	0.018	**0.095**	0.012	**0.039**	0.014	**0.099**	0.006	0.016	**0.075**	**0.092**	<0.0002	0.016	0.010	0.002	0.003	0.006	0.004
Field Conductivity		µS/cm	-	820	763	960	900	617	910	557	1220	725	640	1010		625	800	697	982	930	1100	1080
Field pH			-	8.16	8.18	8.1	8.02	8.02	7.42	7.77	8.06	8.25	8.37	8.25		8.28	7.68	8.22	7.97	8.48	8.01	8.08
Field Dissolved Oxygen		mg/L	-	6.92	4.25	6.9	6.44	5.54	9.8	2.6	9.52	2.1	11.93	10.5		11.34	12.48	5.85		6.25	3.64	7.25
Field Temperature		oC	-	6.9	1.2	9.8	9	5.5	2.8	13.8	11.1	26.2	4.5	2.9	15.2	7.3	4.9	11.5	11.8	8.7	14.4	13.1

Bold / Highlighting indicates PWQO exceedance

Results of Chemical Analyses

South Easthope Landfill			Provincial Water Quality Objectives	SW-3	SW-3
				Sampled on: 06-Apr-22	Sampled on: 18-Oct-22
				Sampled by: AEC	Sampled by: AEC
				Analyzed by: Caduceon	Analyzed by: Caduceon
Parameter	**Symbol**	**Units**			
Saturation pH			-	6.69	7.51
pH			6.5-8.5	8.16	7.65
Langelier Saturation Index			-	1.47	0.145
T - Alkalinity		mg/L	-	441	99
Bicarbonate	HCO_3^-	mg/L	-	441	99
Carbonate	CO_3^{-2}	mg/L	-	< 5	< 5
Hydroxide		mg/L	-	< 5	< 5
Electrical Conductivity		µS/cm	-	1270	1120
Fluoride	F^-	mg/L	-	< 0.1	< 0.1
Chloride	Cl^-	mg/L	-	143	182
Nitrate	NO_3-N	mg/L	-	2.19	< 0.05
Nitrite	NO_2-N	mg/L	-	< 0.05	0.07
Bromide	Br^-	mg/L	-	< 0.4	< 0.4
Sulfate	SO_4^{-2}	mg/L	-	46	189
Calcium	Ca	mg/L	-	140	93.9
Magnesium	Mg	mg/L	-	35.3	25.2
Sodium	Na	mg/L	-	73.9	86.9
Potassium	K	mg/L	-	9.3	13.1
Ammonia Nitrogen	NH_3-N	mg/L	-	0.92	0.08
Orthophosphate	PO_4^{-3}	mg/L	-	0.004	0.012
Total Phosphorus		mg/L	0.03	**0.06**	**0.07**
Reactive Silica		mg/L	-	2.47	2
Total Organic Carbon	TOC	mg/L	-	9.8	3.8
Colour		Colour Units	-	20	28
Turbidity		NTU	-	4.3	31.1
Aluminum	Al	mg/L	0.075	**0.08**	**0.53**
Arsenic	As	mg/L	0.1	0.0012	0.0014
Barium	Ba	mg/L	-	0.068	0.063
Boron	B	mg/L	0.2	**0.631**	**0.545**
Cadmium	Cd	mg/L	0.0002	0.000063	0.000029
Chromium	Cr	mg/L	0.1	< 0.001	< 0.001
Copper	Cu	mg/L	0.005	0.0037	**0.0089**
Iron	Fe	mg/L	0.3	0.134	**1.03**
Lead	Pb	mg/L	0.025	0.00022	0.00122
Manganese	Mn	mg/L	-	0.204	0.031
Mercury		mg/L	0.0002	< 0.00002	< 0.00002
Molybdenum	Mo	mg/L	0.01	0.0005	0.0017
Nickel	Ni	mg/L	0.025	< 0.01	< 0.01
Selenium	Se	mg/L	0.1	0.001	0.001
Silver	Ag	mg/L	0.0001	< 0.0001	< 0.0001
Strontium	Sr		-	0.354	0.3
Thallium	Tl	mg/L	-	< 0.00005	< 0.00005
Tin	Sn	mg/L	-	< 0.05	< 0.05
Titanium	Ti	mg/L	-	< 0.005	0.025
Uranium	U	mg/L	0.005	0.00134	0.00103
Vanadium	V	mg/L	0.007	0.0004	0.0011
Zinc	Zn	µmhos/cm	0.02	0.013	< 0.005
Total Dissolved Solids	TDS	mg/L	-	713	651
Hardness (as Calcium Carbonate)		mg/L	-	495	343
% Difference			-	1.9	0.532
Biological Oxygen Demand	BOD	mg/L	-	< 3	< 3
Total Kjeldahl Nitrogen	TKN	mg/L	-	2.8	1.6
Chemical Oxygen Demand	COD	mg/L	-	60	49
Phenols		mg/L	0.001	< 0.001	< 0.001
Total Suspened Solids	TSS	mg/L	-	8	18
Un-ionized Ammonia		mg/L	0.02	0.018	0.002
Field Conductivity		µS/cm	-	1210	861
Field pH			-	8.05	8.16
Field Dissolved Oxygen		mg/L	-	5.61	8.52
Field Temperature		oC	-	9.6	8.1

Bold / Highlighting indicates PWQO exceedance

Table 1 - Results of Chemical Analyses
Shading indicates parameter criterion exceeded

South Easthope Landfill			Ontario Drinking Water Quality Standards		LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond
					Sampled on: 05-Jun-04	Sampled on: 01-Oct-04	Sampled on: 14-Oct-04	Sampled on: 19-May-05	Sampled on: 03-Oct-05	Sampled on: 24-May-06	Sampled on: 14-Jul-06	Sampled on: 25-Oct-06	Sampled on: 26-Apr-07	Sampled on: 24-Oct-07	Sampled on: 08-Apr-08	Sampled on: 03-Jul-08	Sampled on: 30-Oct-08	Sampled on: 15-Apr-09	Sampled on: 14-Jul-09	Sampled on: 27-Oct-09	Sampled on: 09-Apr-10	Sampled on: 29-Jul-10
					Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC
Parameter	**Symbol**	**Units**	**Objective**	**Type**	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT
Saturation pH			-		6.43	6.37	6.35	7.47	6.35	6.51	6.34	6.68	6.42	6.28	6.64	6.64	6.68	6.6	6.28	5.76	6.51	6.64
pH			6.5-8.5	OG	8.23	**8.51**	**8.56**	**8.58**	8.49	**8.51**	8	**8.73**	8.27	**8.55**	8.17	**8.9**	8.44	7.97	7.96	8.07	8.09	8.49
Langelier Saturation Index			-		1.8	2.14	2.21	1.11	2.14	2	1.66	2.05	1.85	2.27	1.53	2.26	1.76	1.37	1.68	2.31	1.58	1.85
T - Alkalinity		mg/L	30-500	OG	**646**	**698**	**702**	**550**	**739**	**601**	**683**	494	**594**	**734**	455	451	392	453	**718**	**1540**	**639**	**508**
Bicarbonate	HCO_3^-	mg/L	-		646	638	630	641	690	545	683	401	594	734	455	333	373	453	718	1540	639	478
Carbonate	CO_3^{-2}	mg/L	-		<5	60	72	<5	49	55	<10	93	<10	<10	<5	118	19	<5	<5	<5	<5	30
Hydroxide		mg/L	-		<5	<5	<5	<5	<5	<10	<10	<10	<10	<10	<5	<5	<5	<5	<5	<5	<5	<5
Electrical Conductivity		µS/cm	-		2690	301	3040	2450	3240	2540	2890	2070	2290	3460	1850	2540	2280	1830	3080	4980	2170	2220
Fluoride	F^-	mg/L	2.4	**MAC	0.07	0.08	0..09	0.05	0.06	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.25	<0.50	<0.05	<0.25
Chloride	Cl^-	mg/L	250	AO	**453**	**519**	**519**	**451**	**614**	**426**	**450**	**356**	**314**	**643**	238	**385**	**405**	**258**	**530**	**693**	**363**	**501**
Nitrate	NO_3-N	mg/L	10	†MAC	0.1	0.19	<0.05	1.27	0.2	<0.05	0.12	0.05	0.07	0.13	<0.05	<0.05	<0.05	0.05	<0.25	<0.50	0.37	<0.25
Nitrite	NO_2-N	mg/L	1	†MAC	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**2.11**	<0.05	<0.05	<0.25	<0.50	<0.05	<0.25
Bromide	Br^-	mg/L	-		1.04	0.99	1.01	1.45	1.44	0.71	1.24	0.86	0.97	3.37	1.18	<0.05	1.52	2.3	4.71	5.22	2.97	5.12
Sulfate	SO_4^{-2}	mg/L	500	AO	43.5	58.3	67.4	89.1	93.3	62.4	170	59.3	159	246	156	244	211	125	122	35.4	34.6	43.7
Calcium	Ca	mg/L	-		43.4	39.9	42.3	31.9	42.2	42.1	72.4	33.4	100	28.7	84.1	22.8	34.7	96.3	75.9	165	64.2	41.6
Magnesium	Mg	mg/L	-		83.8	93.6	98.3	77.7	91.8	73	86.1	60.5	62.3	120	46.8	83.8	81	47.6	96.1	120	54.7	62.7
Sodium	Na	mg/L	200	*AO	**349**	**386**	**402**	**330**	**424**	**306**	**311**	**260**	**236**	**450**	181	**302**	**275**	159	**410**	**507**	**237**	**308**
Potassium	K	mg/L	-		125	152	158	154	190	136	142	114	99.2	173	80	139	118	52.9	130	191	91.3	110
Ammonia Nitrogen	NH_3-N	mg/L	-		8.83	4.96	7.7	17.8	11.3	2.03	14.8	2.45	22.6	0.4	33.2	3.6	3.68	18.3	24.6	106	50.2	33.7
Orthophosphate	PO_4^{-3}	mg/L	-		0.12	<0.05	<0.05	<0.15	0.05	<0.10	0.2	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.50	<1.00	<0.10	<0.50
Total Phosphorus		mg/L	-		0.23	0.1	0.13	0.33	0.45	0.32	0.75	0.11	0.35	0.3	2.43	0.68	0.94	0.79	3.35	2.16	1.39	0.45
Reactive Silica		mg/L	-		11.6	9.52	11.1	9.79	15.8	9.42	16.5	7.62	9.49	18.2	11.1	15.8	11.6	7.99	19.8	23.5	11.2	6.48
Total Organic Carbon	TOC	mg/L	5	AO	**77**	-	**91**	**71**	**109**	**67**	**133**	**61.8**	**101**	**113**	**72.6**	**130**	**81.6**	**74.5**	**279**	**375**	**133**	**121**
Colour		Colour Units	5	AO	**100**	**85**	**70**	**140**	**55**	**175**	**175**	**25**	**20**	**125**	**90**	**125**	**65**	**52**	**225**	**512**	**154**	**202**
Turbidity		NTU	5	AO	**38**	3.8	**5.4**	**60.9**	8	**10**	**15**	**9.2**	**22**	**18**	**50**	**34**	**45**	**31**	**294**	**277**	**52**	**21**
Aluminum	Al	mg/L	0.1	OG	**0.749**	**0.194**	**0.237**	0.054	0.059	**0.155**	**0.197**	0.062	**0.327**	0.041	**0.214**	**0.148**	0.029	**0.19**	**1.04**	**0.281**	0.037	**0.105**
Arsenic	As	mg/L	0.025	IMAC	0.021	0.015	0.014	0.012	**0.043**	0.024	**0.043**	0.012	0.008	0.013	0.006	0.009	0.008	0.013	0.008	0.014	0.005	0.009
Barium	Ba	mg/L	1	MAC	0.089	0.065	0.085	0.055	0.07	0.052	0.064	0.067	0.096	0.029	0.056	0.02	0.023	0.243	0.085	0.125	0.059	0.06
Boron	B	mg/L	5	IMAC	3.97	**5.08**	4.38	4.49	**5.88**	4.69	3.72	3.8	3	**5.01**	3.68	4.69	4.35	4.87	3.2	3.62	2.42	3.72
Cadmium	Cd	mg/L	0.005	MAC	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0001	<0.0001	0.0002	0.0006	<0.0001	<0.0001	<0.0001
Chromium	Cr	mg/L	0.05	MAC	0.01	0.013	0.01	0.03	0.015	0.011	0.023	0.005	0.041	0.022	<0.003	0.031	0.012	0.026	0.024	**0.058**	0.013	0.014
Copper	Cu	mg/L	1	AO	0.006	0.008	0.004	0.007	0.002	0.003	0.003	<0.003	<0.003	0.024	0.026	0.006	<0.003	0.008	0.006	0.007	0.006	0.005
Iron	Fe	mg/L	0.3	AO	**0.693**	**0.437**	**0.398**	0.193	0.229	**0.418**	**0.521**	0.195	**1.96**	0.161	**3.31**	**1.16**	0.285	**5.15**	**3.15**	**2.35**	**2.11**	**0.96**
Lead	Pb	mg/L	0.01	MAC	<0.002	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	0.002	0.005	0.001	<0.001	0.002	0.004	0.003	0.001	<0.001
Manganese	Mn	mg/L	0.05	AO	**0.183**	**0.178**	**0.069**	0.008	**0.141**	**0.101**	**0.064**	**0.13**	**0.541**	**0.128**	**1.06**	**0.206**	**0.134**	**2.84**	**0.541**	**0.866**	**0.479**	**0.204**
Mercury		mg/L	0.001	MAC	<0.00005	<0.00005	<0.00005	<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
Molybdenum	Mo	mg/L	-		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Nickel	Ni	mg/L	-		0.022	0.022	0.024	0.022	0.021	0.02	0.021	0.011	0.013	0.016	0.015	0.021	0.012	0.026	0.023	0.024	0.015	0.017
Selenium	Se	mg/L	0.01	MAC	0.005	<0.004	0.006	0.006	0.006	<0.004	0.004	<0.004	<0.004	0.009	<0.004	0.008	0.005	0.004	<0.004	**0.015**	<0.004	<0.004
Silver	Ag	mg/L	-		<0.002	<0.0001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Strontium	Sr		-		0.273	0.306	0.372	0.299	0.342	0.303	0.649	0.311	0.568	0.281	0.359	0.201	0.14	0.812	0.486	0.786	0.338	0.336
Thallium	Tl	mg/L	-		<0.06	0.0004	<0.06	<0.06	<0.06	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.0003	<0.0003	<0.0003	<0.0003	0.0009	<0.0003	<0.0003
Tin	Sn	mg/L	-		0.04	<0.009	<0.009	<0.009	<0.009	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Titanium	Ti	mg/L	-		0.01	0.007	<0.001	0.003	0.007	0.011	0.021	0.003	0.014	0.007	0.016	0.014	0.005	0.015	0.014	0.018	0.017	0.008
Uranium	U	mg/L	0.02	MAC	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	V	mg/L	-		0.011	0.014	0.011	0.005	0.012	0.008	0.013	0.006	0.008	0.01	<0.002	0.012	0.005	0.01	0.011	0.019	0.007	0.009
Zinc	Zn	mg/L	5		0.73	0.085	0.015	0.013	0.008	0.014	0.006	<0.004	0.099	0.063	0.555	0.117	0.007	0.239	0.143	0.1	0.046	0.028
Total Dissolved Solids	TDS	mg/L	500	AO	**1690**	**1780**	**1870**	**1600**	**1080**	**1430**	**1890**	**1180**	**1390**	**2260**	**1150**	**1660**	**1420**	**1170**	**1930**	**2680**	**1200**	**1520**
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	**453**	**485**	**510**	**399**	**479**	**406**	**535**	**333**	**506**	**566**	**403**	**402**	**420**	**436**	**585**	**906**	**386**	**362**
% Difference			-		7.1	4			0.6	1.81	2.6	0.2	5.6	3.6	3.2	0.3	<0.1	1.8	4.1	1.4	0.3	1.2
Biological Oxygen Demand	BOD	mg/L	-						18	29	54	7	29	20	47	30	24	52	305	555	<5	<5
Total Kjeldahl Nitrogen	TKN	mg/L	-						31.3	24.8	30.4	10.5	28.7	0.57	31.3	22.3	18.9	24.6	115	182	84	11.9
Chemical Oxygen Demand	COD	mg/L	-							85.5	284	119	238	223	391	28	295	287	922	1150	323	169
Phenols		mg/L	-		0.026	0.031		0.019	<0.002	0.006		0.001	0.056	0.05	0.045	0.014	0.005	0.016			0.005	0.002
Total Suspended Solids	TSS	mg/L	-							28	17	26	NA	47	74	183	16	114	866	304	120	14
Field Conductivity	-		-							**>1990**	2936	2700	**>1990**	**>1990**	**>1990**	**>1990**	1069		3200	>4000	2463	2395
Field pH	-		-							8.68	8.41	8.58	7.84	9.33	7.85	9.38	8.65		8.49	8.45	8.18	8.44
Field Temperature	-		-							15.3	32.2	6.2	8.6	12.4	18.3	22.1	5.5		22.7	8.5	6.8	31.2

Bold / Highlighting indicates ODWQS exceedanc

* When the sodium concentration exceeds 20 mg/L, it should be considered in sodium restricted diets
**When the fluoride concentration exceeds 2.4 mg/L, it should be reported to the local medical officer of health.
† Where nitrate and nitrite are present, their total should not
‡ Water is considered unsafe if Total Coliform are detected in

MAC - Maximum Acceptable Concentration
IMAC - Interim Maximum Acceptable Concentration
AO - Aesthetic Objective
OG - Operational Guideline
ND - Not Detected

Table 1 - Results of Chemical Analyses
Shading indicates parameter criterion exceeded

South Easthope Landfill			Ontario Drinking Water Quality Standards		LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond
					Sampled on: 20-Oct-10	Sampled on: 14-Apr-11	Sampled on: 04-Jul-11	Sampled on: 19-Oct-11	Sampled on: 04-Apr-12	Sampled on: 19-Jul-12	Sampled on: 24-Oct-12	Sampled on: 10-Apr-13	Sampled on: 09-Jul-13	Sampled on: 29-Oct-13	Sampled on: 16-Apr-14	Sampled on: 03-Jul-14	Sampled on: 28-Oct-14	Sampled on: 16-Apr-15	Sampled on: 08-Jul-15	Sampled on: 27-Oct-15	Sampled on: 12-Apr-16	Sampled on: 27-Jul-16
					Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC
Parameter	**Symbol**	**Units**	**Objective**	**Type**	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT
Saturation pH			-		6.61	6.57	6.74	6.79	6.57	6.58	6.71	7.49	7.1	6.54	6.65	6.46	5.97	6.99	6.4	5.71	6.46	6.27
pH			6.5-8.5	OG	8.16	8.34	7.99	8.26	8.15	8.26	8.4	8.01	8.15	8.29	7.8	8.34	8.06	8.31	8.22	8.09	8.31	8.34
Langelier Saturation Index			-		1.55	1.77	1.25	1.47	1.58	1.68	1.69	0.52	1.05	1.75	1.15	1.88	2.09	1.32	1.82	2.38	1.85	2.07
T - Alkalinity		mg/L	30-500	OG	**552**	**819**	**515**	436	**730**	**579**	408	141	231	**572**	498	**588**	**1170**	335	**642**	**1380**	**684**	**825**
Bicarbonate	HCO_3^-	mg/L	-		552	804	515	436	730	579	390	141	231	572	498	574	1170	333	642	1380	679	807
Carbonate	CO_3^{-2}	mg/L	-		<5	15	<5	<5	<5	<5	17	<5	<5	<5	<5	14	<5	<5	<5	<5	5	18
Hydroxide		mg/L	-		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Electrical Conductivity		µS/cm	-		2470	2790	2550	1800	2640	2400	2010	872	1660	2310	1920	2550	3740	1420	2340	3870	2120	3410
Fluoride	F^-	mg/L	2.4	**MAC	<0.05	<0.05	<0.10	<0.05	<0.05	<0.10	<0.05	<0.25	<0.25	<1.0	<0.10	<1.0	<1.0	<0.25	<1.0	<1.0	<0.5	<1.0
Chloride	Cl^-	mg/L	250	AO	**485**	**376**	**528**	**441**	**421**	**521**	**446**	150	**323**	**391**	206	**364**	**437**	196	**362**	**421**	**296**	**615**
Nitrate	NO_3-N	mg/L	10	†MAC	<0.05	<0.05	<0.10	0.25	<0.05	<0.10	0.94	4.14	4.65	<1.0	<0.10	<1.0	<1.0	<0.25	<1.0	<1.0	<0.5	<1.0
Nitrite	NO_2-N	mg/L	1	†MAC	<0.05	<0.05	<0.10	<0.05	<0.05	<0.10	<0.05	<0.25	**3.08**	<1.0	<0.10	<1.0	<1.0	<0.25	<1.0	<1.0	<0.5	<1.0
Bromide	Br^-	mg/L	-		4.37	5.61	7.52	6.16	6.38	7.56	8.54	1.92	4.32	5.77	1.98	2.8	2.9	1.52	<1.0	1.8	<0.5	2.4
Sulfate	SO_4^{-2}	mg/L	500	AO	51.4	29.5	18.6	22	33.8	44.7	102	38.7	84.6	76.9	98.3	163	91.5	47	110	92.8	39	128
Calcium	Ca	mg/L	-		49.3	45.3	32.8	44.5	50.3	52.3	59.3	35.2	41	81	92	97.7	182	44	92.9	293	71.5	39.2
Magnesium	Mg	mg/L	-		56.2	36.3	48.2	44.3	40.9	56.5	56.4	19	41.5	49	30.9	53.4	64.9	30.7	64.5	95.2	55.5	101
Sodium	Na	mg/L	200	*AO	**279**	**228**	**327**	**259**	**265**	**296**	**284**	90.3	182	**217**	148	**239**	**311**	141	**272**	**379**	**251**	**464**
Potassium	K	mg/L	-		94.5	84.9	123	81.6	87.9	87.2	89.6	23.3	51.2	64.7	46.6	82.9	105	47.5	92.1	139	81.9	161
Ammonia Nitrogen	NH_3-N	mg/L	-		44.7	148	37.1	37.4	132	56.1	13.9	5.6	2.57	31.6	33.3	38.1	73	17	25	55.6	30.4	15.8
Orthophosphate	PO_4^{-3}	mg/L	-		<0.10	<0.10	<0.20	1.01	<0.10	<0.20	<0.10	<0.50	<0.50	<2.0	<0.20	<2.0	<2.0	<0.50	<2.0	<2.0	<1.0	<1.0
Total Phosphorus		mg/L	-		0.95	1.2	2.17	0.53	0.74	0.45	0.61	0.11	0.24	0.41	0.8	1.3	3	0.33	0.7	2.09	0.69	5.1
Reactive Silica		mg/L	-		6.24	5.78	11.8	5.57	9.41	10.6	7.54	3.17	4.19	8.74	6.23	10.7	3.77	7.42	14.5	23.9	14.7	17
Total Organic Carbon	TOC	mg/L	5	AO	**132**	**98.8**	**163**	**99.4**	**117**	**135**	**47.6**	**22.7**	**68.6**	**76.6**	**111**	**115**	**256**	**50.1**	**97**	**143**	**78.2**	**188**
Colour		Colour Units	5	AO	**224**	**366**	**638**	**290**	**533**	**461**	**262**	**41**	**114**	**237**	**129**	**262**	**342**	**85**	**263**	**331**	**176**	**416**
Turbidity		NTU	5	AO	**44.1**	**26.3**	**57.8**	**25.4**	**46**	**44.9**	**46.7**	**20.4**	**9.1**	**21.9**	**77.3**	**318**	**667**	**13**	**57**	**126**	**32.8**	**196**
Aluminum	Al	mg/L	0.1	OG	0.052	0.021	**0.95**	0.042	0.079	0.07	0.017	**0.16**	0.014	0.025	0.02	0.041	0.04	0.014	0.033	0.038	<0.006	0.016
Arsenic	As	mg/L	0.025	IMAC	0.006	0.003	0.007	0.004	0.005	0.01	0.007	<0.003	<0.003	0.008	0.005	0.007	0.011	0.005	<0.006	0.019	0.014	0.022
Barium	Ba	mg/L	1	MAC	0.058	0.06	0.068	0.067	0.079	0.097	0.059	0.036	0.055	0.129	0.079	0.085	0.135	0.037	0.013	0.171	0.051	0.047
Boron	B	mg/L	5	IMAC	3.44	3.19	4.69	3.41	3.22	3.15	2.87	0.948	2.55	2.79	1.65	3.2	4.29	1.94	0.091	4.68	2.74	**5.04**
Cadmium	Cd	mg/L	0.005	MAC	<0.0001	<0.0001	<0.0001	<0.0001	<0.004	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	**3.36**	<0.0001	<0.0001	<0.0001
Chromium	Cr	mg/L	0.05	MAC	0.03	0.024	0.033	0.016	0.027	0.02	0.018	<0.003	0.009	0.009	0.014	0.021	0.019	0.005	<0.0001	0.02	0.024	0.026
Copper	Cu	mg/L	1	AO	0.006	0.014	0.006	0.003	0.012	0.005	0.003	0.003	<0.002	0.003	0.004	0.002	0.005	0.003	0.008	0.003	<0.002	0.007
Iron	Fe	mg/L	0.3	AO	**0.95**	**3.33**	**1.95**	**0.37**	**1.99**	**0.6**	**0.845**	0.195	0.221	**0.363**	**0.687**	**0.505**	**0.917**	0.195	0.004	**0.568**	0.159	**2.8**
Lead	Pb	mg/L	0.01	MAC	<0.001	0.002	0.002	<0.001	<0.004	<0.001	<0.001	<0.001	<0.001	0.003	0.001	0.001	<0.002	<0.002	**0.574**	<0.002	<0.002	0.002
Manganese	Mn	mg/L	0.05	AO	**0.25**	**0.353**	**0.352**	**0.212**	**0.321**	**0.371**	**0.376**	**0.183**	0.048	**0.736**	**1.12**	**0.483**	**1.03**	**0.099**	<0.002	**0.973**	**0.184**	**0.364**
Mercury		mg/L	0.001	MAC	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	**0.299**	<0.0001	<0.0001	<0.0001
Molybdenum	Mo	mg/L	-		<0.002	<0.002	<0.002	<0.002	<0.004	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Nickel	Ni	mg/L	-		0.019	0.022	0.031	0.023	0.033	0.039	0.035	0.008	<0.003	0.017	0.01	0.024	0.019	0.009	0.016	0.026	0.01	0.025
Selenium	Se	mg/L	0.01	MAC	0.008	<0.004	0.006	<0.004	**0.011**	**0.027**	0.007	<0.004	<0.004	<0.004	**0.011**	**0.044**	**0.345**	<0.004	<0.004	**0.044**	0.01	**0.012**
Silver	Ag	mg/L	-		<0.0001	<0.0001	<0.0001	0.0002	<0.004	0.0003	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Strontium	Sr		-		0.306	0.251	0.289	0.282	0.287	0.343	0.326	0.128	0.315	0.662	0.338	0.541	1.07	0.295	0.681	1.21	0.482	0.223
Thallium	Tl	mg/L	-		<0.0003	<0.0003	<0.0003	<0.0003	<0.004	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Tin	Sn	mg/L	-		<0.002	<0.002	<0.002	<0.002	<0.004	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Titanium	Ti	mg/L	-		0.006	0.017	0.036	0.004	0.012	0.007	0.012	0.004	0.013	0.008	0.014	0.012	0.066	0.005	0.015	0.016	0.01	0.104
Uranium	U	mg/L	0.02	MAC	<0.002	<0.002	<0.002	<0.002	<0.004	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	V	mg/L	-		0.006	0.006	0.014	0.005	0.014	0.007	0.012	0.003	0.004	0.004	0.004	0.006	0.011	0.003	0.008	0.013	0.009	0.018
Zinc	Zn	mg/L	5		0.036	0.078	0.018	0.011	0.066	0.026	0.012	<0.005	<0.005	0.015	0.063	0.033	0.043	<0.005	0.049	0.027	0.005	0.055
Total Dissolved Solids	TDS	mg/L	500	AO	**1420**	**1160**	**1670**	**1200**	**1320**	**1540**	**1370**	464	**974**	**1320**	**944**	**1570**	**1990**	**738**	**1490**	**2180**	**1140**	**2260**
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	**355**	**263**	**280**	**294**	**294**	**363**	**380**	**166**	**273**	**404**	**357**	**464**	**722**	**236**	**498**	**1120**	**407**	**514**
% Difference					1.9	0.5	<0.1	0.6	3.4	1.6	1.6	0.5	3.8	5.8	1.9	1.9	2.4	0.3	1.09	5.75	1	1.18
Biological Oxygen Demand	BOD	mg/L	-		36	38	58	21	43	109	42	4	10	19	75	68	412	21	42	62	46	99
Total Kjeldahl Nitrogen	TKN	mg/L	-		60.5	196	57.5	56.2	167	106	38.9	8.35	11.2	38.8	42.8	52	92.5	23.8	39.7	72	37	68.5
Chemical Oxygen Demand	COD	mg/L	-		301	464	452	257	282	376	384	66	173	264	267	367	648	149	288	457	262	541
Phenols		mg/L	-		0.003	0.005	0.003	0.001	0.003	0.002	0.004	0.002	0.003	0.019	0.073	0.145	0.193	0.002	0.009	0.146	0.013	0.003
Total Suspended Solids	TSS	mg/L	-			58	120	17	134	142	16	20	20	28	46	47	68	28	49	54	42	326
Field Conductivity	-		-		3000	2883	3005	2500	3400	3310	2900	660	970	1900	1610	2300	3400	2900	2100	3487	2700	2914
Field pH	-		-		8.5	8.75	8.02	7.94	8.7	7.95	8.66	7.43	7.92	8.3	8.09	8.29	7.36	8.07	8.38	7.93	7.81	8.19
Field Temperature	-		-		12.6	11.9	30.6	9.9	7.2	23.5	10.2	7.8	27.3	7.2	2.7	25.2	11.9	10.2	22.1	6.3	2.1	28.3

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* When the sodium concentration exceeds 20 mg/L, it should be considered in sodium restricted diets
**When the fluoride concentration exceeds 2.4 mg/L, it should be reported to the local medical officer of health.
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OG - Operational Guideline
ND - Not Detected

Table 1 - Results of Chemical Analyses
Shading indicates parameter criterion exceeded

South Easthope Landfill			Ontario Drinking Water Quality Standards		LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond	LTS Pond
					Sampled on: 20-Oct-16	Sampled on: 19-Apr-17	Sampled on: 26-Jul-17	Sampled on: 31-Oct-17	Sampled on: 19-Apr-18	Sampled on: 04-Jul-18	Sampled on: 23-Oct-18	Sampled on: 16-Apr-19	Sampled on: 09-Jul-19	Sampled on: 22-Oct-19	Sampled on: 20-Apr-20	Sampled on: 09-Jul-20	Sampled on: 26-Oct-20	Sampled on: 13-Apr-21	Sampled on: 12-Jul-21	Sampled on: 20-Oct-21	Sampled on: 06-Apr-22	Sampled on: 26-Jul-22
					Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC
Parameter	**Symbol**	**Units**	**Objective**	**Type**	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon
Saturation pH			-		6.59	6.96	6.82	6.01	6.49	6.1	6.24	7.24	7.22	6.87	7.27	6.99	7	7.6	7.16	7.33	7.22	7.33
pH			6.5-8.5	OG	8.46	8.42	8.36	8.08	7.82	7.55	8.12	8.24	7.54	8.44	8.29	8.33	**8.73**	**9.56**	**8.64**	**8.55**	8.29	**8.54**
Langelier Saturation Index			-		1.87	1.46	1.54	2.07	1.33	1.45	1.88	1	0.317	1.57	1.02	1.34	1.73	1.96	1.48	1.22	1.07	1.21
T - Alkalinity		mg/L	30-500	OG	**570**	332	427	**1050**	**601**	**1000**	**882**	376	463	**791**	351	**803**	**1020**	**594**	**823**	**568**	351	**558**
Bicarbonate	HCO_3^-	mg/L	-		544	311	412	1050	601	1000	882	376	463	748	351	789	875	276	721	524	351	508
Carbonate	CO_3^{-2}	mg/L	-		27	21	14	<5	<5	<5	<5	< 5	< 5	43	< 5	14	150	317	102	43	< 5	49
Hydroxide		mg/L	-		<5	<5	<5	<5	<5	<5	<5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Electrical Conductivity		µS/cm	-		2430	1480	1630	2780	1520	3850	3400	1260	1750	2760	1250	2890	3820	2420	3060	2360	1140	2240
Fluoride	F^-	mg/L	2.4	**MAC	<1.0	<0.25	<0.25	<1.0	**2.97**	<2.5	<1.0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1	< 1	< 1	< 0.1	< 0.1	0.1
Chloride	Cl^-	mg/L	250	AO	**402**	242	246	**436**	202	**592**	**482**	166	**264**	**377**	175	**423**	**667**	**412**	**529**	**424**	150	**387**
Nitrate	NO_3-N	mg/L	10	†MAC	<1.0	<0.25	<0.25	<1.0	<0.25	<2.5	<1.0	0.06	< 0.05	< 0.05	0.27	0.09	0.83	1.68	< 0.5	< 0.05	0.75	0.08
Nitrite	NO_2-N	mg/L	1	†MAC	<1.0	<0.25	<0.25	<1.0	<0.25	<2.5	<1.0	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.5	**1.21**	< 0.5	< 0.05	< 0.05	< 0.05
Bromide	Br^-	mg/L	-		<1.0	<0.25	1.14	<1.0	0.83	<2.5	<1.0	0.7	0.7	< 4	0.6	1.4	< 4	5.9	< 4	1	0.5	< 0.4
Sulfate	SO_4^{-2}	mg/L	500	AO	112	71.7	44.1	24	31.7	10	29	10	17	31	20	30	52	39	28	17	35	9
Calcium	Ca	mg/L	-		22.5	35.2	46.2	164	111	62.7	52.2	46.6	41.1	55.2	46.2	43.5	32.5	16.2	27.6	26.9	51.3	27.3
Magnesium	Mg	mg/L	-		72.7	42.2	40.4	79.6	37.1	116	93.7	36.4	53.5	82.6	37.6	93.8	119	68.7	96.7	73.9	34.5	61.4
Sodium	Na	mg/L	200	*AO	**310**	170	167	**329**	142	**466**	**382**	131	**210**	**347**	124	**362**	**500**	**339**	**453**	**332**	127	**321**
Potassium	K	mg/L	-		106	50.2	49.5	110	52.2	197	153	53.3	84	144	44.9	154	220	131	179	132	42.8	111
Ammonia Nitrogen	NH_3-N	mg/L	-		6.06	5.67	13.4	2.09	28.6	26.9	35.2	9.31	15.7	31.8	10.1	29.5	16	0.27	1.34	2.39	1.57	0.93
Orthophosphate	PO_4^{-3}	mg/L	-		<2.0	<0.50	<0.50	<2.0	<0.50	<5.0	<2.0	0.06	0.192	1.07	0.007	0.079	0.182	0.069	0.056	0.036	0.017	0.024
Total Phosphorus		mg/L	-		0.81	0.26	0.21	1.55	1.08	5.47	0.98	0.22	1.46	0.87	0.1	0.44	0.8	0.4	0.33	0.17	0.09	0.21
Reactive Silica		mg/L	-		12.1	5.82	5.25	13.2	9.57	15.3	21	8.58	7.81	14	6.42	10.1	12	7.38	9.63	7.45	5.5	6.27
Total Organic Carbon	TOC	mg/L	5	AO	**137**	**39.7**	**38.6**	**366**	**150**	**351**	**117**	**17.4**	**60.8**	**83.3**	**14.6**	**154**	**66.1**	**73.3**	**17.4**	**15.6**	**8.5**	**14.1**
Colour		Colour Units	5	AO	**130**	**58**	**81**	**279**	**103**	**134**	**179**	**40**	**110**	**203**	**40**	**162**	**219**	**136**	**203**	**47**	**16**	**43**
Turbidity		NTU	5	AO	**67.7**	**12.1**	5	**98.4**	**83.6**	**311**	**41.9**	**22.3**	**19.8**	**18.9**	**11**	**45.7**	**43.3**	**64.8**	**18.4**	**14.5**	**17.2**	**14.5**
Aluminum	Al	mg/L	0.1	OG	<0.004	0.028	0.011	0.04	0.021	0.031	0.015	**0.43**	0.01	0.05	0.03	0.03	0.02	**0.13**	**0.16**	**0.14**	**0.33**	**0.42**
Arsenic	As	mg/L	0.025	IMAC	0.015	0.005	0.006	0.009	<0.006	0.014	0.014	0.0046	0.0096	0.0143	0.0041	0.0161	0.0138	0.0086	0.0098	0.0049	0.0011	0.0084
Barium	Ba	mg/L	1	MAC	0.013	0.034	0.063	0.127	0.082	0.098	0.095	0.071	0.119	0.145	0.064	0.091	0.091	0.043	0.093	0.057	0.074	0.077
Boron	B	mg/L	5	IMAC	4.21	2.09	1.98	3.43	1.51	4.75	3.8	1.29	2.07	3.68	1.18	3.62	**5.35**	3.58	4.85	3.69	1.21	3.31
Cadmium	Cd	mg/L	0.005	MAC	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	0.0002	<0.0001	0.000043	0.000023	< 0.000070	< 0.000015	< 0.000070	< 0.000070	< 0.000070	< 0.000070	< 0.000070	< 0.000070	< 0.000070
Chromium	Cr	mg/L	0.05	MAC	0.005	<0.003	0.01	0.013	0.011	0.035	0.013	0.001	0.009	0.011	0.003	0.01	0.01	0.006	0.004	0.003	0.002	0.002
Copper	Cu	mg/L	1	AO	<0.002	0.004	<0.002	0.003	0.006	0.009	<0.002	0.0025	0.0048	0.0025	0.0011	0.0014	0.0033	0.0078	0.0027	0.0015	0.003	0.0022
Iron	Fe	mg/L	0.3	AO	0.163	0.033	**0.491**	**0.44**	**1.43**	**2.46**	**0.841**	**0.61**	**0.977**	**0.493**	**0.392**	**0.568**	**0.599**	**0.781**	**0.306**	**0.404**	**0.638**	**0.763**
Lead	Pb	mg/L	0.01	MAC	<0.002	<0.002	<0.002	<0.002	<0.002	0.005	0.002	0.00056	0.00078	0.0008	0.00021	0.0005	0.0006	0.00087	0.0004	0.0002	0.0004	0.0011
Manganese	Mn	mg/L	0.05	AO	**0.251**	**0.077**	**0.452**	**0.815**	**1.17**	**1.23**	**0.554**	**0.26**	**0.365**	**0.379**	**0.213**	**0.139**	**0.166**	**0.073**	**0.058**	**0.057**	**0.267**	**0.159**
Mercury		mg/L	0.001	MAC	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Molybdenum	Mo	mg/L	-		<0.002	<0.002	<0.002	<0.002	<0.004	<0.002	<0.002	0.0003	0.0004	< 0.0005	0.0004	< 0.0005	0.0011	0.0012	0.001	0.0006	< 0.0005	0.0009
Nickel	Ni	mg/L	-		0.014	0.009	0.011	0.013	0.008	0.03	0.014	< 0.01	0.01	0.02	< 0.01	0.01	0.03	0.02	0.02	< 0.01	0.01	< 0.01
Selenium	Se	mg/L	0.01	MAC	0.007	<0.004	0.005	0.007	<0.008	0.008	<0.004	0.001	0.002	< 0.005	0.001	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Silver	Ag	mg/L	-		<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<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
Strontium	Sr		-		0.089	0.219	0.261	0.74	0.432	0.537	0.195	0.147	0.224	0.33	0.185	0.387	0.171	0.099	0.172	0.12	0.197	0.135
Thallium	Tl	mg/L	-		<0.0003	<0.0003	<0.0003	<0.0003	<0.0006	<0.0003	<0.0003	< 0.00005	< 0.00005	< 0.0003	< 0.00005	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003
Tin	Sn	mg/L	-		<0.002	<0.002	<0.002	<0.002	<0.004	<0.002	<0.002	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Titanium	Ti	mg/L	-		0.005	<0.002	0.009	0.007	0.015	0.031	0.018	0.011	0.01	0.012	< 0.005	0.008	0.014	0.019	0.005	0.005	0.01	0.014
Uranium	U	mg/L	0.02	MAC	<0.002	<0.002	<0.002	<0.002	<0.004	<0.002	<0.002	0.00027	0.00025	0.0004	0.0004	0.0003	0.0006	0.00085	0.0005	0.0004	0.0006	0.0005
Vanadium	V	mg/L	-		0.003	<0.002	0.003	0.007	<0.004	0.012	0.007	0.0022	0.0038	0.0066	0.0015	0.0048	0.0095	0.0163	0.006	0.0035	0.0011	0.0042
Zinc	Zn	mg/L	5		0.005	<0.005	<0.005	0.042	0.093	0.154	0.011	0.011	0.053	0.012	0.005	< 0.005	0.008	0.018	0.03	0.018	0.021	< 0.005
Total Dissolved Solids	TDS	mg/L	500	AO	**1480**	**816**	**838**	**1980**	**1020**	**2610**	**1880**	**681**	**969**	**1587**	**672**	**1652**	**2227**	**1412**	**1809**	**1350**	**654**	**1254**
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	**356**	**262**	**282**	**737**	**430**	**634**	**516**	**254**	**286**	**477**	**285**	**494**	**615**	**323**	**466**	**371**	**282**	**321**
% Difference			-		2.8	2.25	4.1	2.75	1.07	3.85	2.28	2.69	5.16	7.92	1.18	6.59	0.625	4.14	2.72	3.6	0.602	2.36
Biological Oxygen Demand	BOD	mg/L	-		40	8	<5	430	184	656	40	11	112	26	5	10	20	15	10	5	< 3	4
Total Kjeldahl Nitrogen	TKN	mg/L	-		23.8	11.6	16.5	71	31.8	86.5	40.5	15.5	42.1	516	14.5	52.1	34.6	12.4	16	13.2	4.3	10.6
Chemical Oxygen Demand	COD	mg/L	-		296	119	110	717	361	1390	278	78	489	345	93	300	397	247	256	159	67	133
Phenols		mg/L	-		<0.001	<0.001	0.002	0.086	0.088	0.04	0.02	< 0.002	0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.001	< 0.001
Total Suspended Solids	TSS	mg/L	-		26	18	<10	90	44	805	38	42	260	84	6	30	35	100	25	16	20	20
Field Conductivity	-		-		2500	1430	1445	2400	1790	3450	3200	1012	1780	2606	1300	2360	2370	2110	2400	2386	1200	1778
Field pH	-		-		7.63	8.74	8.48	7.71	8	8.25	7.43	7.79	8.36	8.16	8.1	7.41	8.58	8.9	8.35	8.57	8.21	8.67
Field Temperature	-		-		14.8	13	20.1	8.4	2.9	30.4	10.4	9.3	31.1	13.1	12.7	29.3	8.9	16.2	24.2	15.6	8.9	27.3

Bold / Highlighting indicates ODWQS exceedanc

* When the sodium concentration exceeds 20 mg/L, it should be considered in sodium restricted diets
**When the fluoride concentration exceeds 2.4 mg/L, it should be reported to the local medical officer of health.
† Where nitrate and nitrite are present, their total should not
‡ Water is considered unsafe if Total Coliform are detected in

MAC - Maximum Acceptable Concentration
IMAC - Interim Maximum Acceptable Concentration
AO - Aesthetic Objective
OG - Operational Guideline
ND - Not Detected

Table 1 - Results of Chemical Analyses
Shading indicates parameter criterion exceeded

South Easthope Landfill			Ontario Drinking Water Quality Standards		LTS Pond	LTS Pond
					DUP	
					Sampled on: 26-Jul-22	Sampled on: 18-Oct-22
					Sampled by: AEC	Sampled by: AEC
					Analyzed by:	Analyzed by:
Parameter	**Symbol**	**Units**	**Objective**	**Type**	Caduceon	Caduceon
Saturation pH			-		7.3	7.37
pH			6.5-8.5	OG	**8.55**	8.37
Langelier Saturation Index			-		1.25	1
T - Alkalinity		mg/L	30-500	OG	**555**	448
Bicarbonate	HCO_3^-	mg/L	-		507	436
Carbonate	CO_3^{-2}	mg/L	-		49	12
Hydroxide		mg/L	-		< 5	< 5
Electrical Conductivity		µS/cm	-		2220	1930
Fluoride	F^-	mg/L	2.4	**MAC	0.1	< 1
Chloride	Cl^-	mg/L	250	AO	**383**	**328**
Nitrate	NO_3-N	mg/L	10	†MAC	0.09	< 0.5
Nitrite	NO_2-N	mg/L	1	†MAC	< 0.05	< 0.5
Bromide	Br^-	mg/L	-		< 0.4	< 4
Sulfate	SO_4^{-2}	mg/L	500	AO	9	25
Calcium	Ca	mg/L	-		29.3	31.3
Magnesium	Mg	mg/L	-		64.8	50.6
Sodium	Na	mg/L	200	*AO	**338**	**268**
Potassium	K	mg/L	-		117	88.5
Ammonia Nitrogen	NH_3-N	mg/L	-		0.94	2.2
Orthophosphate	PO_4^{-3}	mg/L	-		0.025	0.033
Total Phosphorus		mg/L	-		0.25	0.11
Reactive Silica		mg/L	-		6.6	4.46
Total Organic Carbon	TOC	mg/L	5	AO	**13.4**	**7.3**
Colour		Colour Units	5	AO	**42**	**31**
Turbidity		NTU	5	AO	**13.3**	**16.5**
Aluminum	Al	mg/L	0.1	OG	**0.39**	**0.29**
Arsenic	As	mg/L	0.025	IMAC	0.0078	0.0047
Barium	Ba	mg/L	1	MAC	0.082	0.096
Boron	B	mg/L	5	IMAC	3.47	2.86
Cadmium	Cd	mg/L	0.005	MAC	0.000078	< 0.000028
Chromium	Cr	mg/L	0.05	MAC	0.004	0.002
Copper	Cu	mg/L	1	AO	0.0019	0.0016
Iron	Fe	mg/L	0.3	AO	**0.797**	**0.559**
Lead	Pb	mg/L	0.01	MAC	0.0011	0.00052
Manganese	Mn	mg/L	0.05	AO	**0.157**	**0.13**
Mercury		mg/L	0.001	MAC	< 0.00002	< 0.00002
Molybdenum	Mo	mg/L	-		0.0011	0.0013
Nickel	Ni	mg/L	-		< 0.01	< 0.01
Selenium	Se	mg/L	0.01	MAC	< 0.005	0.003
Silver	Ag	mg/L	-		< 0.0001	< 0.0001
Strontium	Sr		-		0.147	0.141
Thallium	Tl	mg/L	-		< 0.0003	< 0.0001
Tin	Sn	mg/L	-		< 0.05	< 0.05
Titanium	Ti	mg/L	-		0.016	0.01
Uranium	U	mg/L	0.02	MAC	0.0005	0.00083
Vanadium	V	mg/L	-		0.004	0.0025
Zinc	Zn	mg/L	5		0.033	< 0.005
Total Dissolved Solids	TDS	mg/L	500	AO	**1277**	**1064**
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	**339**	**282**
% Difference			-		5.27	2.93
Biological Oxygen Demand	BOD	mg/L	-		5	< 3
Total Kjeldahl Nitrogen	TKN	mg/L	-		11	9.4
Chemical Oxygen Demand	COD	mg/L	-		131	121
Phenols		mg/L	-		< 0.001	< 0.001
Total Suspended Solids	TSS	mg/L	-		11	3
Field Conductivity	-		-		1778	1458
Field pH	-		-		8.67	8.3
Field Temperature	-		-		27.3	10.9

Bold / Highlighting indicates ODWQS exceedanc

Table 1 - Results of Chemical Analyses
Shading indicates parameter criterion exceeded

South Easthope Landfill			Ontario Drinking Water Quality Standards		LTS Outflow Sampled on: 03-Oct-05 Sampled by: AEC Analyzed by: AGAT	LTS Outflow Sampled on: 24-May-06 Sampled by: AEC Analyzed by: AGAT	LTS Outflow Sampled on: 14-Jul-06 Sampled by: AEC Analyzed by: AGAT	LTS Outflow Sampled on: 25-Oct-06 Sampled by: AEC Analyzed by: AGAT	LTS Outflow Sampled on: 26-Apr-07 Sampled by: AEC Analyzed by: AGAT	LTS Outflow Sampled on: 31-Jul-07 Sampled by: AEC Analyzed by: AGAT	LTS Outflow Sampled on: 24-Oct-07 Sampled by: AEC Analyzed by: AGAT	LTS Outflow Sampled on: 08-Apr-08 Sampled by: AEC Analyzed by: AGAT	LTS Outflow Sampled on: 03-Jul-08 Sampled by: AEC Analyzed by: AGAT	LTS Outflow Sampled on: 30-Oct-08 Sampled by: AEC Analyzed by: AGAT	LTS Outflow Sampled on: 15-Apr-09 Sampled by: AEC Analyzed by: AGAT	LTS Outflow Sampled on: 14-Jul-09 Sampled by: AEC Analyzed by: AGAT	LTS Outflow Sampled on: 27-Oct-09 Sampled by: AEC Analyzed by: AGAT	LTS Outflow Sampled on: 09-Apr-10 Sampled by: AEC Analyzed by: AGAT	LTS Outflow Sampled on: 29-Jul-10 Sampled by: AEC Analyzed by: AGAT	LTS Outflow Sampled on: 20-Oct-10 Sampled by: AEC Analyzed by: AGAT	LTS Outflow Sampled on: 14-Apr-11 Sampled by: AEC Analyzed by: AGAT	LTS Outflow Sampled on: 04-Jul-11 Sampled by: AEC Analyzed by: AGAT	LTS Outflow Sampled on: 19-Oct-11 Sampled by: AEC Analyzed by: AGAT
Parameter	**Symbol**	**Units**	**Objective**	**Type**																			
Saturation pH			-		6.42	6.67	6.63	6.73	6.97	6.18	6.29	6.14	6.33	6.72	6.71	5.93	5.95	5.9	7.02	7.03	7.56	8.01	7.21
pH			6.5-8.5	OG	8.43	8.26	8.19	8.39	8.49	8.1	8.48	8.33	7.82	8.23	8.06	8.04	8.1	7.92	7.75	8.04	7.08	6.59	8.17
Langelier Saturation Index			-		2.01	1.59	1.56	1.66	1.52	1.92	2.19	2.19	1.49	1.51	1.35	2.11	2.15	2.02	0.73	1.01	-0.48	-1.42	0.96
T - Alkalinity		mg/L	30-500	OG	**616**	471	484	449	328	**703**	**652**	**765**	**587**	366	346	**883**	**979**	**1140**	198	204	46	**25**	178
Bicarbonate	HCO_3^-	mg/L	-		854	471	484	431	305	703	652	748	587	366	346	883	979	1140	198	204	46	25	178
Carbonate	CO_3^{-2}	mg/L	-		32	<10	<10	18	22	<5	<10	17	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Hydroxide		mg/L	-		<5	<10	<10	<10	<10	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Electrical Conductivity		µS/cm	-		3120	2400	2440	2080	1530	3420	3540	3110	2930	2270	1730	3570	4440	4310	2210	2240	2990	2440	1740
Fluoride	F^-	mg/L	2.4	**MAC	0.06	<0.05	0.07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	1.14	<0.50	<0.50	<0.25	<0.25	<0.05	<0.05	<0.10	<0.05
Chloride	Cl^-	mg/L	250	AO	**604**	**440**	**423**	**352**	**284**	**529**	**617**	**433**	**392**	**426**	**270**	**458**	**678**	**747**	**520**	**484**	**512**	**499**	**421**
Nitrate	NO_3-N	mg/L	10	†MAC	**20**	**14**	**12.3**	3.95	4.39	**14.4**	**18.4**	9.16	**22.3**	7.15	**15.8**	**35.3**	**64.4**	**56.8**	**58.9**	**50**	**181**	**118**	**41.5**
Nitrite	NO_2-N	mg/L	1	†MAC	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.13	**1.78**	<0.05	<0.05	<0.50	**1.37**	<0.25	<0.25	<0.05	<0.05	<0.10	<0.05
Bromide	Br^-	mg/L	-		1.4	<0.05	0.82	0.82	0.68	2.6	3.3	2.2	<0.05	<0.05	1.85	4.06	4.92	5.32	5.35	4.72	11	6.52	6.06
Sulfate	SO_4^{-2}	mg/L	500	AO	94.6	59.8	73.2	59	61.8	307	262	341	270	199	129	189	71.6	46.1	51.5	58.8	40	19.6	25.9
Calcium	Ca	mg/L	-		46.3	31.7	40.5	32.9	26.9	94	42.3	156	112	34.4	98.9	261	163	156	51.9	49.2	97.4	50.1	39.1
Magnesium	Mg	mg/L	-		90.6	68.2	68.9	59.3	46	123	125	88.5	86.2	79.7	48.9	97.8	121	118	61.2	58.4	57.7	45.2	43
Sodium	Na	mg/L	200	*AO	**416**	**286**	**302**	**253**	182	**555**	**483**	**340**	**301**	**274**	162	**356**	**508**	**522**	**319**	**280**	**299**	**306**	**251**
Potassium	K	mg/L	-		199	130	132	111	79	228	186	146	141	116	54.2	129	193	212	119	94.5	111	115	79.1
Ammonia Nitrogen	NH_3-N	mg/L	-		0.21	0.15	0.2	0.45	1.82	0.62	0.13	31	0.9	0.09	0.06	0.53	52.2	78.3	0.13	0.11	17.3	6.49	0.12
Orthophosphate	PO_4^{-3}	mg/L	-		0.24	<0.10	1.09	<0.10	<0.10	<0.10	0.96	<0.10	<0.10	<0.10	<0.10	<1.00	<1.00	<0.50	<0.50	<0.10	<0.10	<0.20	0.85
Total Phosphorus		mg/L	-		0.47	0.6	0.4	0.08	0.15	0.56	0.99	0.31	1.69	0.56	0.35	0.49	2.18	2.86	1.81	1.4	1.97	1.62	0.61
Reactive Silica		mg/L	-		15.6	8.84	9.9	7.85	13.6	17.2	17.6	16.6	17	10	8.1	20.4	26.5	26.8	9.9	7.67	11.6	13.5	6.17
Total Organic Carbon	TOC	mg/L	5	AO	**77**	**42.9**	**51.9**	**43.3**	**30**	**64.7**	**57.2**	**78.5**	**46**	**44.2**	**21.8**	**48.7**	**146**	**143**	**75**	**63.6**	**83.1**	**126**	**70.3**
Colour		Colour Units	5	AO	**60**	**70**	**125**	**20**	<5	**15**	**175**	**130**	5	**55**	**37**	**150**	**436**	**360**	**286**	**174**	**260**	**379**	**316**
Turbidity		NTU	5	AO	2.3	0.9	1.6	2.3	1.1	3.3	0.9	3.4	1.1	**7.8**	<0.5	0.5	**21.1**	**17**	2.4	1.1	1	2.9	3
Aluminum	Al	mg/L	0.1	OG	0.016	0.016	0.024	0.031	0.024	0.031	0.014	0.031	0.019	0.005	0.008	0.056	0.047	0.021	0.032	0.021	0.019	**0.182**	0.024
Arsenic	As	mg/L	0.025	IMAC	**0.042**	0.018	**0.031**	0.01	0.006	0.015	0.02	0.008	0.012	0.006	0.005	0.01	0.014	0.01	0.009	0.005	0.005	0.006	0.004
Barium	Ba	mg/L	1	MAC	0.061	0.05	0.044	0.048	0.044	0.062	0.037	0.07	0.039	0.013	0.03	0.053	0.035	0.083	0.029	0.017	0.11	0.172	0.016
Boron	B	mg/L	5	IMAC	**5.71**	4.4	3.92	3.75	2.31	**5.2**	**5.72**	3.5	4.4	3.61	1.89	3.88	3.36	**5.15**	3.63	3.61	4.3	4.26	3.3
Cadmium	Cd	mg/L	0.005	MAC	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	<0.0001	<0.0001	0.0011	0.0002	<0.0001
Chromium	Cr	mg/L	0.05	MAC	0.014	0.008	0.011	0.005	0.005	0.019	0.026	0.023	0.026	0.013	0.007	**0.06**	0.046	0.029	0.014	0.021	0.021	0.034	0.016
Copper	Cu	mg/L	1	AO	0.003	0.003	0.003	<0.003	<0.003	0.003	0.005	0.012	0.007	<0.003	<0.003	0.007	0.007	0.011	0.021	0.012	0.027	0.024	0.007
Iron	Fe	mg/L	0.3	AO	0.135	0.135	0.109	<0.003	0.086	<0.005	0.027	0.039	0.04	<0.010	<0.010	0.018	**0.556**	**1.72**	**0.47**	0.06	0.19	**0.75**	**0.32**
Lead	Pb	mg/L	0.01	MAC	<0.002	<0.002	<0.002	**0.117**	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	Mn	mg/L	0.05	AO	0.007	0.015	0.016	<0.002	0.01	**0.054**	0.017	**1.15**	**0.14**	0.013	**0.066**	**0.149**	**2.27**	**2.52**	**0.268**	**0.07**	**3.8**	**3.26**	**0.085**
Mercury		mg/L	0.001	MAC	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	Mo	mg/L	-		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Nickel	Ni	mg/L	-		0.024	0.019	0.015	0.011	0.009	0.016	0.018	0.029	0.018	0.012	0.008	0.017	0.026	0.031	0.02	0.019	0.032	0.035	0.024
Selenium	Se	mg/L	0.01	MAC	0.006	<0.004	<0.004	<0.004	<0.004	0.008	**0.017**	0.01	**0.011**	0.005	<0.004	0.005	0.01	<0.004	<0.004	0.009	<0.004	0.007	<0.004
Silver	Ag	mg/L	-		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Strontium	Sr		-		0.349	0.279	0.326	0.303	0.263	0.722	0.378	0.655	0.586	0.138	0.317	0.824	0.723	0.75	0.284	0.309	0.733	0.362	0.215
Thallium	Tl	mg/L	-		<0.06	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.0003	<0.0003	<0.0003	0.0007	0.0004	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Tin	Sn	mg/L	-		<0.009	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Titanium	Ti	mg/L	-		0.004	0.003	0.003	0.003	<0.002	0.007	0.005	0.009	0.007	0.004	0.003	0.004	0.007	0.014	0.003	0.003	0.004	0.005	0.003
Uranium	U	mg/L	0.02	MAC	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	V	mg/L	-		<0.001	0.005	0.011	0.005	0.004	0.026	0.012	0.004	0.011	0.004	0.003	0.006	0.013	0.016	0.01	0.005	0.003	0.008	0.004
Zinc	Zn	mg/L	5		0.004	0.006	0.006	0.027	<0.004	0.086	0.033	0.277	0.082	0.032	0.03	0.122	0.131	0.172	0.202	0.085	1.11	0.394	0.032
Total Dissolved Solids	TDS	mg/L	500	AO	**936**	**1470**	**1510**	**1150**	**880**	**2150**	**2290**	**2030**	**1940**	**1340**	**1060**	**2400**	**2510**	**2690**	**1730**	**1510**	**2000**	**1980**	**1290**
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	**489**	**360**	**385**	**326**	**257**	**741**	**620**	**754**	**635**	**414**	**448**	**1050**	**905**	**875**	**382**	**363**	**481**	**311**	**275**
% Difference			-		4.6	2.97	5.7	3.8	0.6	13.5	1.2	0.7	1.2	1.8	2.7	3.7	4.2	2.3	1.3	1.5	4.4	1.1	1.4
Biological Oxygen Demand	BOD	mg/L	-		<5	<5	<5	<5	<5	<5	<5	24	7	9	<5	<5	79	60	<5	<2	<2	21	<2
Total Kjeldahl Nitrogen	TKN	mg/L	-		9.4	5.85	5.37	6.63	3.21	7.96	6.3	37.1	6.47	6.16		7.83	75.3	197	11.9	7.93	23.2	18.9	12.7
Chemical Oxygen Demand	COD	mg/L	-			83.3	106	91.7	72.1	165		179	83	168	56	145	382	465	169	154	706	289	172
Phenols		mg/L	-		<0.002	0.003	0.008	0.001	0.013	0.021	0.025	0.006	0.009	0.01		0.006	0.031	0.021	0.002	<0.001	0.007	0.004	0.001
Total Suspended Solids	TSS	mg/L	-			<5	18	<12	NA	<10	< 10	11	11	10	<10	<10	47		14		<10	<10	<10
Field Conductivity	-		-			>1990	2478	2800	1770	>1990	>1990	>1900	>1990	1064	1900	3800	>4000	>3999	2439	2800	3070	2990	2100
Field pH	-					7.96	7.94	8.24	8.14	7.07	8.86	7.87	7.47	7.83	7.96	7.66	8.26	7.61	7.36	8	7.22	7.32	7.79
Field Temperature	-					15.3	23.2	6.6	10.4	22.1	13.4	9.4	19.4	5.8	7.96	21.2	9.7	8.1	25	11.4	9.2	22	10.9

Bold / Highlighting indicates ODWQS exceedanc

* When the sodium concentration exceeds 20 mg/L, it should be considered in sodium restricted diets
**When the fluoride concentration exceeds 2.4 mg/L, it should be reported to the local medical
† Where nitrate and nitrite are present, their total
‡ Water is considered unsafe if Total Coliform are

MAC - Maximum Acceptable Concentration
IMAC - Interim Maximum Acceptable Concentration
AO - Aesthetic Objective
OG - Operational Guideline
ND - Not Detected

Table 1 - Results of Chemical Analyses
Shading indicates parameter criterion exceeded

South Easthope Landfill			Ontario Drinking Water Quality Standards		LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow
					Sampled on: 04-Apr-12	Sampled on: 19-Jul-12	Sampled on: 24-Oct-12	Sampled on: 10-Apr-13	Sampled on: 09-Jul-13	Sampled on: 29-Oct-13	Sampled on: 16-Apr-14	Sampled on: 03-Jul-14	Sampled on: 28-Oct-14	Sampled on: 16-Apr-15	Sampled on: 08-Jul-15	Sampled on: 27-Oct-15	Sampled on: 12-Apr-16	Sampled on: 27-Jul-16	Sampled on: 20-Oct-16	Sampled on: 19-Apr-17	Sampled on: 26-Jul-17
					Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC
Parameter	**Symbol**	**Units**	**Objective**	**Type**	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT
Saturation pH			-		7.62	7.19	6.94	6.93	6.83	6.75	6.1	6.55	6.13	6.11	6.13	6.02	6.04	6.06	6.5	6.9	6.94
pH			6.5-8.5	OG	6.82	8.14	**8.55**	7.96	8.02	8.24	8.04	8.35	8.31	8.37	8.16	8.25	8.45	8.08	8.25	8.15	8.4
Langelier Saturation Index			-		-0.8	0.95	1.61	1.03	1.19	1.49	1.94	1.8	2.18	2.26	2.03	2.23	2.41	2.02	1.75	1.25	1.46
T - Alkalinity		mg/L	30-500	OG	59	177	263	242	290	356	**886**	417	**802**	**825**	**819**	**793**	**874**	**866**	**559**	320	332
Bicarbonate	HCO_3^-	mg/L	-		59	177	240	242	290	356	886	404	789	795	819	793	804	866	559	320	315
Carbonate	CO_3^{-2}	mg/L	-		<5	<5	23	<5	<5	<5	<5	12	13	30	<5	<5	70	<5	<5	<5	16
Hydroxide		mg/L	-		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Electrical Conductivity		µS/cm	-		2360	2050	2010	2060	1940	2150	3600	2690	3320	3080	2670	3460	3280	3410	2540	1550	1550
Fluoride	F^-	mg/L	2.4	**MAC	<0.05	<0.10	<0.05	<0.5	<0.25	<0.5	<0.25	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.25	<0.25
Chloride	Cl^-	mg/L	250	AO	**405**	**505**	**491**	**388**	**344**	**379**	**403**	**360**	**448**	**443**	**359**	**415**	**445**	**541**	**425**	249	242
Nitrate	NO_3-N	mg/L	10	†MAC	**101**	**52.9**	**25.5**	**36.5**	**25.4**	**32.4**	**12.1**	**36.7**	**10.7**	**10.8**	<1.0	**59.8**	**78.2**	**25.3**	**14.6**	**11.6**	**14.1**
Nitrite	NO_2-N	mg/L	1	†MAC	<0.05	<0.10	<0.05	<0.5	<0.25	<0.5	<0.25	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.25	<0.25
Bromide	Br^-	mg/L	-		6.2	8.18	7.09	4.59	4.2	5.09	3.78	2.7	3	2.6	<1.0	1.6	<1.0	2.8	<1.0	<0.25	1
Sulfate	SO_4^{-2}	mg/L	500	AO	256	38.4	54.2	94.5	88.2	79.2	220	188	231	121	127	217	78.7	135	122	74.5	47
Calcium	Ca	mg/L	-		58.4	42.3	56.1	75.1	82.5	79.9	182	124	179	188	178	228	190	154	46.9	52.7	46.9
Magnesium	Mg	mg/L	-		43	45.3	50.9	47.6	48.2	48.1	62.4	54.8	69.1	65.5	66.8	94.5	86.4	101	80.6	43.7	38.8
Sodium	Na	mg/L	200	*AO	**271**	**286**	**308**	**225**	**202**	**213**	**295**	**247**	**324**	**310**	**270**	**362**	**377**	**434**	**330**	170	159
Potassium	K	mg/L	-		93.3	88.8	90.9	59.2	57.2	63.5	93.4	84	110	106	94	132	120	152	112	51	47.1
Ammonia Nitrogen	NH_3-N	mg/L	-		20	0.12	0.26	0.18	0.25	0.12	45	4.4	13.8	5.66	20.2	0.34	0.2	0.2	0.04	0.05	0.07
Orthophosphate	PO_4^{-3}	mg/L	-		3.26	<0.20	<0.10	<1.0	<0.50	<1.0	<0.50	<2.0	<2.0	8.6	7.8	<2.0	<2.0	<1.0	<2.0	<0.50	<0.50
Total Phosphorus		mg/L	-		1.2	0.93	0.91	0.33	0.45	0.3	0.44	1.76	4	1.33	5.48	0.38	2.14	1.58	0.81	0.49	0.64
Reactive Silica		mg/L	-		9.33	10.2	9.67	8.64	5.96	8.54	13.4	12.4	20.3	17.9	18.1	18.6	24.2	21.3	12.2	7.34	6.54
Total Organic Carbon	TOC	mg/L	5	AO	**99.6**	**97.9**	**33.4**	**55.8**	**50.2**	**54.2**	**91.2**	**60.9**	**73.1**	**94.8**	**47.4**	**71.8**	**72.5**	**68.2**	**51.2**	**21.3**	**22.9**
Colour		Colour Units	5	AO	**221**	**488**	**403**	**130**	**153**	**179**	**238**	**196**	**185**	**205**	**209**	**233**	**278**	**235**	**124**	**63**	**80**
Turbidity		NTU	5	AO	**15.2**	1.5	1.7	1.6	<0.5	0.5	**5.6**	2.4	3.6	1.5	**17.9**	4	3	1.3	1	0.6	0.8
Aluminum	Al	mg/L	0.1	OG	0.05	**0.149**	0.047	0.012	0.01	0.012	0.023	0.024	0.012	0.014	0.011	0.018	<0.006	0.013	<0.004	0.005	0.012
Arsenic	As	mg/L	0.025	IMAC	0.005	0.007	0.006	0.003	<0.003	<0.003	0.008	0.009	0.016	0.01	0.024	0.006	0.023	0.015	0.008	0.007	0.006
Barium	Ba	mg/L	1	MAC	0.087	0.022	0.018	0.026	0.037	0.057	0.12	0.085	0.129	0.1	0.31	0.123	0.098	0.078	0.056	0.04	0.048
Boron	B	mg/L	5	IMAC	2.98	3.18	3.12	2.08	2.32	2.84	3.34	3.11	3.58	4.33	3.3	4.74	4.06	4.44	3.76	2.04	1.9
Cadmium	Cd	mg/L	0.005	MAC	<0.004	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	Cr	mg/L	0.05	MAC	0.024	0.022	0.019	0.009	0.014	0.008	0.021	0.019	0.014	0.015	0.01	0.013	0.031	0.024	<0.003	<0.003	0.012
Copper	Cu	mg/L	1	AO	0.015	0.01	0.017	0.005	<0.002	0.002	0.004	0.005	0.003	0.004	<0.002	0.009	0.005	0.006	0.004	0.003	0.003
Iron	Fe	mg/L	0.3	AO	**0.914**	0.28	0.104	0.07	0.087	0.026	**0.322**	0.13	**0.37**	0.227	**2.07**	0.215	0.105	0.039	<0.010	<0.010	<0.010
Lead	Pb	mg/L	0.01	MAC	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Manganese	Mn	mg/L	0.05	AO	**0.947**	**0.11**	0.018	**0.054**	0.037	0.013	**2.78**	**0.52**	**1.26**	**0.716**	**3.87**	**0.581**	**0.375**	**0.06**	0.006	0.007	0.003
Mercury		mg/L	0.001	MAC	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	Mo	mg/L	-		<0.004	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Nickel	Ni	mg/L	-		0.035	0.039	0.037	0.022	<0.003	0.015	0.019	0.023	0.016	0.015	0.016	0.026	0.013	0.018	0.012	0.009	0.012
Selenium	Se	mg/L	0.01	MAC	**0.011**	<0.004	0.005	<0.004	0.005	<0.004	0.006	<0.004	<0.004	<0.004	<0.004	0.009	0.008	0.007	0.004	<0.004	<0.004
Silver	Ag	mg/L	-		<0.004	0.0002	<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
Strontium	Sr		-		0.357	0.242	0.225	0.382	0.375	0.649	0.718	0.578	0.919	0.882	0.906	1.09	1.06	0.566	0.165	0.247	0.235
Thallium	Tl	mg/L	-		<0.004	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Tin	Sn	mg/L	-		<0.004	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Titanium	Ti	mg/L	-		0.008	0.004	0.006	0.004	0.005	0.003	0.019	0.006	0.017	0.006	0.011	0.01	0.008	0.004	0.003	<0.002	<0.002
Uranium	U	mg/L	0.02	MAC	<0.004	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	V	mg/L	-		0.008	0.004	0.014	0.002	0.005	<0.002	0.004	0.007	0.009	0.007	0.012	0.006	0.01	0.009	<0.002	<0.002	0.004
Zinc	Zn	mg/L	5		0.145	0.123	0.034	0.021	0.07	0.019	0.028	0.024	0.012	0.01	0.009	0.05	0.016	0.02	0.013	0.009	0.006
Total Dissolved Solids	TDS	mg/L	500	AO	**1400**	**1620**	**1450**	**1200**	**1260**	**1330**	**1870**	**1630**	**1980**	**1710**	**1580**	**2150**	**2080**	**2100**	**1500**	**846**	**856**
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	**323**	**292**	**350**	**384**	**404**	**398**	**711**	**535**	**732**	**739**	**720**	**958**	**830**	**800**	**449**	**312**	**277**
% Difference			-		6.6	4.2	1.4	3.5	2.2	7.2	2.8	2.3	2.6	1.5	1.37	2.59	1.64	2.04	1.1	2.89	6.2
Biological Oxygen Demand	BOD	mg/L	-		13	<2	<2	<2	<2	<2	7	7	21	17	14	<5	<5	<5	<5	<5	<5
Total Kjeldahl Nitrogen	TKN	mg/L	-		34.8	24.7	13.4	8.12	5.94	6.79	61.5	12.3	20.4	13.3	26.4	8.78	6.27	8.18	5.63	2.67	2.55
Chemical Oxygen Demand	COD	mg/L	-		253	263	288	156	117	135	198	142	212	149	180	179	187	158	110	54	68
Phenols		mg/L	-		0.003	<0.001	<0.001	0.004	0.003	0.003	0.008	0.003	0.009	0.002	0.015	0.008	0.01	<0.001	<0.001	<0.001	<0.001
Total Suspended Solids	TSS	mg/L	-		16	20	<10	<10	<10	<10	<10	<10	<10	<10	11	<10	<10	<10	<10	<10	<10
Field Conductivity	-		-		2800	2880	2900	1780	1420	1720	2743	1920	2900	2900	2221	3098	3600	2865	2500	1450	1378
Field pH	-				8.4	7.26	8.76	6.76	7.92	8.3	8.4	7.74	7.83	8.07	7.85	8.2	7.59	7.81	7.63	8.33	8.5
Field Temperature	-				6.7	22	11.8	7.4	24.2	8.9	5.9	24.1	12.8	10.2	20.1	9.5	3.5	23.3	14.8	12.5	23.2

Bold / Highlighting indicates ODWQS exceedanc

* When the sodium concentration exceeds 20 mg/L, it should be considered in sodium restricted diets
**When the fluoride concentration exceeds 2.4 mg/L, it should be reported to the local medical officer of health.
† Where nitrate and nitrite are present, their total should not
‡ Water is considered unsafe if Total Coliform are detected in

MAC - Maximum Acceptable Concentration
IMAC - Interim Maximum Acceptable Concentration
AO - Aesthetic Objective
OG - Operational Guideline
ND - Not Detected

Table 1 - Results of Chemical Analyses
Shading indicates parameter criterion exceeded

South Easthope Landfill			Ontario Drinking Water Quality Standards		LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow
																			DUP			DUP
					Sampled on: 31-Oct-17	Sampled on: 19-Apr-18	Sampled on: 04-Jul-18	Sampled on: 23-Oct-18	Sampled on: 16-Apr-19	Sampled on: 09-Jul-19	Sampled on: 22-Oct-19	Sampled on: 20-Apr-20	Sampled on: 09-Jul-20	Sampled on: 26-Oct-20	Sampled on: 13-Apr-21	Sampled on: 12-Jul-21	Sampled on: 20-Oct-21	Sampled on: 06-Apr-22	Sampled on: 06-Apr-22	Sampled on: 26-Jul-22	Sampled on: 18-Oct-22	Sampled on: 18-Oct-22
					Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC	Sampled by: AEC
Parameter	**Symbol**	**Units**	**Objective**	**Type**	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: AGAT	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon	Analyzed by: Caduceon
Saturation pH			-		6	6.4	5.74	6.33	7.3	7.12	6.96	7.2	6.77	7.03	7.33	7.2	7.37	7.25	7.23	7.32	7.37	7.37
pH			6.5-8.5	OG	8.31	7.91	7.48	8.27	8.1	8.01	8.11	8.05	7.94	**8.76**	**8.67**	**8.71**	**8.51**	8.33	8.35	8.5	8.42	8.37
Langelier Saturation Index			-		2.31	1.51	1.74	1.94	0.804	0.889	1.15	0.845	1.17	1.73	1.34	1.51	1.14	1.08	1.12	1.18	1.05	0.996
T - Alkalinity		mg/L	30-500	OG	**982**	**676**	**1470**	**696**	350	436	**628**	360	**664**	**1030**	**675**	**807**	**551**	358	358	**545**	449	448
Bicarbonate	HCO_3^-	mg/L	-		956	676	1470	696	350	436	628	360	664	871	584	686	513	354	353	509	427	435
Carbonate	CO_3^{-2}	mg/L	-		26	<5	<5	<5	< 5	< 5	< 5	< 5	< 5	164	90	121	37	< 5	5	36	23	13
Hydroxide		mg/L	-		<5	<5	<5	<5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Electrical Conductivity		µS/cm	-		2820	1660	4460	3250	1410	1770	2750	1260	2810	3830	2740	3060	2340	1210	1210	2230	1940	1940
Fluoride	F^-	mg/L	2.4	**MAC	<1.0	<0.25	<2.5	<1.0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1	< 1	< 1	< 0.1	< 0.1	< 0.1	< 0.1	< 1	< 1
Chloride	Cl^-	mg/L	250	AO	**518**	220	**542**	**488**	191	**251**	**387**	169	**377**	**667**	**456**	**533**	**424**	167	165	**364**	**325**	**317**
Nitrate	NO_3-N	mg/L	10	†MAC	9	<0.25	<2.5	**39.9**	**11.9**	**16.6**	**25.4**	0.45	0.07	2.66	7.17	4.38	3.98	3.28	2.95	2.03	1.68	1.61
Nitrite	NO_2-N	mg/L	1	†MAC	<1.0	<0.25	<2.5	<1.0	0.13	< 0.05	0.36	0.07	< 0.05	< 0.5	0.74	< 0.5	0.18	< 0.05	< 0.05	< 0.05	< 0.5	< 0.5
Bromide	Br^-	mg/L	-		<1.0	1.03	<2.5	<1.0	0.8	0.6	< 4	0.6	1.1	< 4	5.7	< 4	1	0.5	0.5	< 0.4	< 4	< 4
Sulfate	SO_4^{-2}	mg/L	500	AO	106	31.1	31.4	13.9	11	20	34	18	19	54	38	29	17	34	34	10	21	21
Calcium	Ca	mg/L	-		167	119	218	58.1	43.9	55.3	58.2	52.7	84.7	30.2	24.8	25.7	25.4	47.8	49.8	28.4	31.2	30.7
Magnesium	Mg	mg/L	-		93.6	40.5	106	93.9	42.2	52	86.4	37.7	85.5	118	82.6	94.4	68.9	35.1	36	66.8	51.5	50.5
Sodium	Na	mg/L	200	*AO	**383**	159	**417**	**381**	147	**201**	**362**	127	**333**	**493**	**385**	**444**	**309**	132	137	**349**	**272**	**267**
Potassium	K	mg/L	-		132	58.7	177	152	61.9	79.8	150	46	137	218	149	175	123	44.5	45.9	121	89.6	87.9
Ammonia Nitrogen	NH_3-N	mg/L	-		0.27	32.6	79.9	0.8	1.13	1.07	0.94	5.3	7.38	13.6	0.1	0.1	0.05	0.03	0.03	0.08	0.04	0.05
Orthophosphate	PO_4^{-3}	mg/L	-		<2.0	<0.50	<5.0	<2.0	0.3	0.573	0.247	0.514	0.35	0.164	0.09	0.035	0.024	0.017	0.016	0.059	0.123	0.12
Total Phosphorus		mg/L	-		0.73	1.58	5.55	1.17	0.38	0.61	0.3	0.77	0.54	0.81	0.35	0.35	0.15	0.18	0.17	0.12	0.18	0.18
Reactive Silica		mg/L	-		13.7	10	10.1	20.3	8.82	7.92	14.1	6.78	14.7	11.2	8.2	8.99	6.63	3.72	3.72	5.71	4.7	4.59
Total Organic Carbon	TOC	mg/L	5	AO	**52.8**	**146**	**368**	**72.7**	**13.8**	**25.8**	**48**	**12.9**	**108**	**66**	**72.4**	**16.2**	**20.4**	**7.7**	**8.1**	**11.5**	4.9	4.9
Colour		Colour Units	5	AO	**181**	**121**	**148**	**164**	**68**	**89**	**200**	**46**	**181**	**236**	**147**	**208**	**47**	**16**	**16**	**35**	**31**	**30**
Turbidity		NTU	5	AO	0.9	**85.1**	**91.4**	4.7	1.8	3.4	1	4.6	3.1	**24.7**	**11.6**	**6.2**	**5.4**	3.7	3.2	1.4	2.6	2.8
Aluminum	Al	mg/L	0.1	OG	0.016	0.024	0.043	0.017	0.03	0.04	0.05	0.03	0.04	0.02	< 0.01	0.05	0.02	0.04	0.04	0.03	0.05	0.02
Arsenic	As	mg/L	0.025	IMAC	0.01	0.006	0.012	0.009	0.0051	0.0052	0.006	0.0068	0.0093	0.0137	0.0085	0.0097	0.0046	0.0011	0.001	0.0065	0.0054	0.006
Barium	Ba	mg/L	1	MAC	0.105	0.108	0.143	0.043	0.038	0.059	0.104	0.121	0.173	0.081	0.066	0.083	0.053	0.063	0.065	0.071	0.084	0.083
Boron	B	mg/L	5	IMAC	3.56	1.69	4.32	3.95	1.51	1.99	3.85	1.21	3.23	**5.32**	4.04	4.78	3.44	1.27	1.3	3.6	2.87	2.82
Cadmium	Cd	mg/L	0.005	MAC	<0.0001	<0.0001	<0.0001	<0.0001	0.000022	0.00003	< 0.000070	< 0.000015	< 0.000070	< 0.000070	< 0.000070	< 0.000070	< 0.000070	< 0.000070	< 0.000070	< 0.000070	< 0.000028	< 0.000028
Chromium	Cr	mg/L	0.05	MAC	0.011	0.013	0.043	0.012	0.003	0.005	0.011	0.003	0.014	0.009	0.006	0.003	0.003	0.001	0.002	0.002	0.002	0.001
Copper	Cu	mg/L	1	AO	0.003	0.004	0.006	0.008	0.0027	0.0043	0.0048	0.0005	0.0066	0.0033	0.0055	0.0026	0.0012	0.0014	0.0012	0.0014	0.004	0.0041
Iron	Fe	mg/L	0.3	AO	0.019	**1.7**	**1.07**	0.14	**0.326**	0.093	0.099	**1.86**	**1.57**	0.221	0.216	0.082	0.125	0.087	0.107	0.082	0.079	0.072
Lead	Pb	mg/L	0.01	MAC	<0.002	0.001	0.003	<0.001	0.00012	0.00008	0.0001	0.00022	0.0003	0.0003	0.00031	0.0004	0.0001	< 0.0001	< 0.0001	0.0002	0.0001	0.00011
Manganese	Mn	mg/L	0.05	AO	0.031	**1.44**	**1.79**	**0.066**	**0.239**	**0.076**	0.041	**0.608**	**0.65**	**0.138**	0.045	0.023	0.019	0.012	0.014	0.025	**0.052**	**0.051**
Mercury		mg/L	0.001	MAC	<0.0001	<0.0001	<0.0001	<0.0001	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Molybdenum	Mo	mg/L	-		<0.002	<0.002	<0.002	<0.002	0.0003	0.0005	< 0.0005	0.0005	0.0008	0.0014	0.0012	0.0009	0.0007	0.0005	< 0.0005	0.001	0.0012	0.0013
Nickel	Ni	mg/L	-		0.013	0.009	0.027	0.016	0.01	0.01	0.02	< 0.01	0.01	0.03	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Selenium	Se	mg/L	0.01	MAC	<0.004	<0.008	**0.051**	0.004	0.001	0.002	< 0.005	< 0.001	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.003	0.003
Silver	Ag	mg/L	-		<0.0001	<0.0001	<0.0001	<0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Strontium	Sr		-		0.782	0.462	1.01	0.204	0.161	0.234	0.335	0.195	0.479	0.167	0.145	0.164	0.112	0.186	0.192	0.144	0.14	0.138
Thallium	Tl	mg/L	-		<0.0003	<0.0003	<0.0003	<0.0003	< 0.00005	< 0.00005	< 0.0003	< 0.00005	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0001	< 0.0001
Tin	Sn	mg/L	-		<0.002	<0.002	<0.002	<0.002	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Titanium	Ti	mg/L	-		0.003	0.016	0.029	0.006	< 0.005	< 0.005	< 0.005	< 0.005	0.007	< 0.005	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Uranium	U	mg/L	0.02	MAC	<0.002	<0.002	<0.002	<0.002	0.00015	0.00035	0.0004	0.00022	0.0005	0.0006	0.00078	0.0004	0.0004	0.0006	0.0006	0.0004	0.0007	0.00072
Vanadium	V	mg/L	-		0.005	0.005	0.011	0.006	0.0034	0.0054	0.0051	0.0032	0.01	0.0092	0.008	0.006	0.0029	< 0.0005	< 0.0005	0.0026	0.0018	0.0019
Zinc	Zn	mg/L	5		0.015	0.07	0.107	0.039	0.03	0.046	0.047	< 0.005	0.047	0.007	0.015	< 0.005	0.018	< 0.005	0.013	< 0.005	< 0.005	< 0.005
Total Dissolved Solids	TDS	mg/L	500	AO	**2000**	**1060**	**3020**	**1950**	**709**	**922**	**1467**	**676**	**1468**	**2218**	**1564**	**1785**	**1298**	**675**	**683**	**1266**	**1059**	**1043**
Hardness (as Calcium Carbonate)		mg/L	80 - 100	OG	**802**	**464**	**981**	**532**	**286**	**362**	**501**	**308**	**563**	**610**	**401**	**452**	**347**	**289**	**285**	**346**	**279**	**284**
% Difference			-		1.41	0.893	2.8	0.462	0.991	1.45	6.74	2.19	11.6	1.98	3.15	1.19	0.211	2.52	0.599	7.92	3.13	2.88
Biological Oxygen Demand	BOD	mg/L	-		<5	176	686	9	7	< 3	4	16	20	22	5	< 3	< 3	3	< 3	< 3	< 3	< 3
Total Kjeldahl Nitrogen	TKN	mg/L	-		6.56	37.6	107	12.6	4.5	4.8	7.7	9.2	17.9	40.2	14	12.4	8.9	3.3	3.2	6	4.3	4.3
Chemical Oxygen Demand	COD	mg/L	-		84	349	1310	156	25	79	169	66	178	391	240	202	127	59	67	88	81	82
Phenols		mg/L	-		0.001	0.09	0.268	0.011	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Total Suspended Solids	TSS	mg/L	-		<10	40	117	<10	4	6	3	6	14	40	13	11	6	10	14	3	< 3	< 3
Field Conductivity	-		-		2800	1785	>4000	2950	1162	1908	2592	1120	2560	2250	2310	2800	2413	1240	1240	1820	1461	1461
Field pH	-				7.71	7.97	7.38	7.63	7.68	6.33	7.68	6.72	7.3	8.55	8.96	8.45	8.45	8.35	8.35	8.56	8.33	8.33
Field Temperature	-				8.4	3.9	21.1	9.5	10.1	24.3	12.2	5.6	24.7	8.6	14.5	22.1	14.1	9.2	9.2	25.2	8.7	8.7

Bold / Highlighting indicates ODWQS exceedanc

* When the sodium concentration exceeds 20 mg/L, it should be considered in sodium restricted diets
**When the fluoride concentration exceeds 2.4 mg/L, it should be reported to the local medical officer of health.
† Where nitrate and nitrite are present, their total should not
‡ Water is considered unsafe if Total Coliform are detected in

MAC - Maximum Acceptable Concentration
IMAC - Interim Maximum Acceptable Concentration
AO - Aesthetic Objective
OG - Operational Guideline
ND - Not Detected

Results of VOC Analyses

South Easthope Landfill		Provincial Water Quality Objectives (1994)	Ontario Drinking Water Quality Guidelines and Standards (2003)		OW-2	OW-2	OW-2	OW-2	OW-2	OW-2	OW-2	OW-2	OW-2	OW-2	OW-2
Parameter	**Unit**	**Objective**	**Objective**	**Type**	**08-Apr-08**	**30-Oct-08**	**15-Apr-09**	**27-Oct-09**	**09-Apr-10**	**20-Oct-10**	**14-Apr-11**	**19-Oct-11**	**04-Apr-12**	**24-Oct-12**	**10-Apr-13**
Chloromethane	µg/L	700			<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Vinyl Chloride	µg/L	600	1	MAC	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17
Bromomethane	µg/L	0.9			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Trichlorofluoromethane	µg/L				<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Acetone	µg/L				<0.50	<0.50	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1 Dichloroethene	µg/L	40	14	MAC	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Methylene Chloride	µg/L	100			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
trans- 1,2-dichloroethylene	µg/L	0.2			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Methyl tert-butyl ether	µg/L	200			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1-Dichloroethane	µg/L	200			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Methyl Ethyl Ketone	µg/L	400			<0.90	<0.90	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis- 1,2-Dichloroethylene	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroform	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2 - Dichloroethane	µg/L	100	5	IMAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,1-Trichloroethane	µg/L	10			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Carbon Tetrachloride	µg/L		2	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Benzene	µg/L	100	1	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2-Dichloropropane	µg/L	0.7			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Trichloroethylene	µg/L	20	5	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bromodichloromethane	µg/L	200			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
cis-1,3-Dichloropropene	ug/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Methyl Isobutyl Ketone	µg/L				<0.30	<0.30	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,1,2-Trichloroethane	µg/L	800			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	0.8	24	AO	<0.20	**0.23**	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	**0.56**	<0.20	<0.20
2-Hexanone	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Dibromochloromethane	µg/L				<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylene Dibromide	µg/L	5			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.10	<0.10	<0.10
Tetrachloroethene	µg/L	50	30	MAC	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,1,2-Tetrachloroethane	µg/L	20			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Chlorobenzene	µg/L	15	80		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylbenzene	µg/L	8	2.4	AO	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	**0.12**	<0.10	<0.10
m & p-Xylene	µg/L	30			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	**0.43**	<0.20	<0.20
Bromoform	µg/L	60			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Styrene	µg/L	4			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	µg/L	70			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	40			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,3-Dichlorobenzene	µg/L	2.5			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	4	5	MAC	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	µg/L	2.5	200	MAC	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2,4-Trichlorobenzene	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,3-Dichloropropene (Cis + Tra	µg/L							<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Xylenes (Total)	µg/L		300	AO	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	**0.43**	<0.20	<0.20

Bold indiates detection

Bold, underlined and highlighted indicates Exceedance

Results of VOC Analyses

South Easthope Landfill		Provincial Water Quality Objectives (1994)	Ontario Drinking Water Quality Guidelines and Standards (2003)		OW-2	OW-2	OW-2	OW-2	OW-2	OW-2	OW-2	OW-2	OW-3	OW-3	OW-3
Parameter	**Unit**	**Objective**	**Objective**	**Type**	**29-Oct-13**	**16-Apr-14**	**28-Oct-14**	**16-Apr-15**	**28-Oct-15**	**12-Apr-16**	**20-Oct-16**	**19-Apr-17**	**08-Apr-08**	**30-Oct-08**	**15-Apr-09**
Chloromethane	µg/L	700			<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Vinyl Chloride	µg/L	600	1	MAC	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17
Bromomethane	µg/L	0.9			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Trichlorofluoromethane	µg/L				<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Acetone	µg/L				<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.50	<0.50	<1.0
1,1 Dichloroethene	µg/L	40	14	MAC	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Methylene Chloride	µg/L	100			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
trans- 1,2-dichloroethylene	µg/L	0.2			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Methyl tert-butyl ether	µg/L	200			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1-Dichloroethane	µg/L	200			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Methyl Ethyl Ketone	µg/L	400			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.90	<0.90	<1.0
cis- 1,2-Dichloroethylene	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroform	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2 - Dichloroethane	µg/L	100	5	IMAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,1-Trichloroethane	µg/L	10			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Carbon Tetrachloride	µg/L		2	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Benzene	µg/L	100	1	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2-Dichloropropane	µg/L	0.7			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Trichloroethylene	µg/L	20	5	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bromodichloromethane	µg/L	200			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
cis-1,3-Dichloropropene	ug/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Methyl Isobutyl Ketone	µg/L				<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.8**	<1.0	<0.30	<0.30	<1.0
trans-1,3-Dichloropropene	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,1,2-Trichloroethane	µg/L	800			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	0.8	24	AO	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
2-Hexanone	µg/L				<0.30	<0.30	<0.30	<0.30	<1.0	<1.0	<1.0	<1.0	<0.30	<0.30	<0.30
Dibromochloromethane	µg/L				<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylene Dibromide	µg/L	5			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20
Tetrachloroethene	µg/L	50	30	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.10	<0.20	<0.20
1,1,1,2-Tetrachloroethane	µg/L	20			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Chlorobenzene	µg/L	15	80		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylbenzene	µg/L	8	2.4	AO	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
m & p-Xylene	µg/L	30			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bromoform	µg/L	60			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Styrene	µg/L	4			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	µg/L	70			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	40			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,3-Dichlorobenzene	µg/L	2.5			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	4	5	MAC	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	µg/L	2.5	200	MAC	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2,4-Trichlorobenzene	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,3-Dichloropropene (Cis + Tra	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30			
Xylenes (Total)	µg/L		300	AO	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Bold indiates detection

Bold, underlined and highlighted indicates Exceedance

Results of VOC Analyses

South Easthope Landfill		Provincial Water Quality Objectives (1994)	Ontario Drinking Water Quality Guidelines and Standards (2003)		OW-3	OW-3	OW-3	OW-3	OW-3	OW-3	OW-3	OW-3	OW-3	OW-3	OW-3
Parameter	**Unit**	**Objective**	**Objective**	**Type**	**27-Oct-09**	**09-Apr-10**	**20-Oct-10**	**14-Apr-11**	**19-Oct-11**	**04-Apr-12**	**24-Oct-12**	**10-Apr-13**	**29-Oct-13**	**16-Apr-14**	**28-Oct-14**
Chloromethane	µg/L	700			<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Vinyl Chloride	µg/L	600	1	MAC	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17
Bromomethane	µg/L	0.9			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Trichlorofluoromethane	µg/L				<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Acetone	µg/L				<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**83**	<1.0
1,1 Dichloroethene	µg/L	40	14	MAC	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Methylene Chloride	µg/L	100			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
trans- 1,2-dichloroethylene	µg/L	0.2			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Methyl tert-butyl ether	µg/L	200			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1-Dichloroethane	µg/L	200			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Methyl Ethyl Ketone	µg/L	400			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis- 1,2-Dichloroethylene	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroform	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2 - Dichloroethane	µg/L	100	5	IMAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,1-Trichloroethane	µg/L	10			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Carbon Tetrachloride	µg/L		2	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Benzene	µg/L	100	1	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2-Dichloropropane	µg/L	0.7			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Trichloroethylene	µg/L	20	5	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bromodichloromethane	µg/L	200			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
cis-1,3-Dichloropropene	ug/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Methyl Isobutyl Ketone	µg/L				<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,1,2-Trichloroethane	µg/L	800			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	0.8	24	AO	<0.20	<0.20	<0.20	<0.20	<0.20	**0.55**	<0.20	<0.20	<0.20	<0.20	<0.20
2-Hexanone	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Dibromochloromethane	µg/L				<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylene Dibromide	µg/L	5			<0.20	<0.20	<0.20	<0.20	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Tetrachloroethene	µg/L	50	30	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,1,2-Tetrachloroethane	µg/L	20			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Chlorobenzene	µg/L	15	80		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylbenzene	µg/L	8	2.4	AO	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
m & p-Xylene	µg/L	30			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bromoform	µg/L	60			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Styrene	µg/L	4			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	µg/L	70			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	40			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,3-Dichlorobenzene	µg/L	2.5			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	4	5	MAC	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	µg/L	2.5	200	MAC	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2,4-Trichlorobenzene	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,3-Dichloropropene (Cis + Tra	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Xylenes (Total)	µg/L		300	AO	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Bold indiates detection

Bold, underlined and highlighted indicates Exceedance

Results of VOC Analyses

South Easthope Landfill		Provincial Water Quality Objectives (1994)	Ontario Drinking Water Quality Guidelines and Standards (2003)		OW-3	OW-3	OW-3	OW-3	OW-3	OW-3	OW-4A	OW-4A	OW-4A	OW-4A	OW-4A
Parameter	**Unit**	**Objective**	**Objective**	**Type**	**16-Apr-15**	**28-Oct-15**	**12-Apr-16**	**20-Oct-16**	**19-Apr-17**	**31-Oct-17**	**08-Apr-08**	**30-Oct-08**	**15-Apr-09**	**27-Oct-09**	**09-Apr-10**
Chloromethane	µg/L	700			<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Vinyl Chloride	µg/L	600	1	MAC	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17
Bromomethane	µg/L	0.9			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Trichlorofluoromethane	µg/L				<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Acetone	µg/L				<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.50	<0.50	<1.0	<1.0	<1.0
1,1 Dichloroethene	µg/L	40	14	MAC	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Methylene Chloride	µg/L	100			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
trans- 1,2-dichloroethylene	µg/L	0.2			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Methyl tert-butyl ether	µg/L	200			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1-Dichloroethane	µg/L	200			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Methyl Ethyl Ketone	µg/L	400			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.90	<0.90	<1.0	<1.0	<1.0
cis- 1,2-Dichloroethylene	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroform	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2 - Dichloroethane	µg/L	100	5	IMAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,1-Trichloroethane	µg/L	10			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Carbon Tetrachloride	µg/L		2	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Benzene	µg/L	100	1	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2-Dichloropropane	µg/L	0.7			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Trichloroethylene	µg/L	20	5	MAC	<0.20	<0.20	<0.20	<0.20	**0.29**	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bromodichloromethane	µg/L	200			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
cis-1,3-Dichloropropene	ug/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Methyl Isobutyl Ketone	µg/L				<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.30	<0.30	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,1,2-Trichloroethane	µg/L	800			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	0.8	24	AO	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
2-Hexanone	µg/L				<0.30	<1.0	<1.0	<1.0	<1.0	<1.0	<0.30	<0.30	<0.30	<0.30	<0.30
Dibromochloromethane	µg/L				<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylene Dibromide	µg/L	5			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20
Tetrachloroethene	µg/L	50	30	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.10	<0.20	<0.20	<0.20	<0.20
1,1,1,2-Tetrachloroethane	µg/L	20			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Chlorobenzene	µg/L	15	80		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylbenzene	µg/L	8	2.4	AO	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
m & p-Xylene	µg/L	30			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bromoform	µg/L	60			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Styrene	µg/L	4			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	µg/L	70			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	40			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,3-Dichlorobenzene	µg/L	2.5			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	4	5	MAC	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	µg/L	2.5	200	MAC	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2,4-Trichlorobenzene	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,3-Dichloropropene (Cis + Tra	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30				<0.30	<0.30
Xylenes (Total)	µg/L		300	AO	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Bold indiates detection

Bold, underlined and highlighted indicates Exceedance

Results of VOC Analyses

South Easthope Landfill		Provincial Water Quality Objectives (1994)	Ontario Drinking Water Quality Guidelines and Standards (2003)		OW-4A	OW-4A	OW-4A	OW-4A	OW-4A	OW-4A	OW-4A	OW-4A	OW-4A	OW-4A	OW-4A
Parameter	**Unit**	**Objective**	**Objective**	**Type**	**20-Oct-10**	**14-Apr-11**	**19-Oct-11**	**04-Apr-12**	**24-Oct-12**	**10-Apr-13**	**29-Oct-13**	**16-Apr-14**	**28-Oct-14**	**16-Apr-15**	**28-Oct-15**
Chloromethane	µg/L	700			<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Vinyl Chloride	µg/L	600	1	MAC	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17
Bromomethane	µg/L	0.9			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Trichlorofluoromethane	µg/L				<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Acetone	µg/L				<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**74**	<1.0	<1.0	<1.0
1,1 Dichloroethene	µg/L	40	14	MAC	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Methylene Chloride	µg/L	100			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
trans- 1,2-dichloroethylene	µg/L	0.2			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Methyl tert-butyl ether	µg/L	200			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1-Dichloroethane	µg/L	200			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Methyl Ethyl Ketone	µg/L	400			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis- 1,2-Dichloroethylene	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroform	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2 - Dichloroethane	µg/L	100	5	IMAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,1-Trichloroethane	µg/L	10			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Carbon Tetrachloride	µg/L		2	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Benzene	µg/L	100	1	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2-Dichloropropane	µg/L	0.7			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Trichloroethylene	µg/L	20	5	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bromodichloromethane	µg/L	200			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
cis-1,3-Dichloropropene	ug/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Methyl Isobutyl Ketone	µg/L				<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,1,2-Trichloroethane	µg/L	800			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	0.8	24	AO	<0.20	<0.20	**0.24**	**0.48**	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
2-Hexanone	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<1.0
Dibromochloromethane	µg/L				<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylene Dibromide	µg/L	5			<0.20	<0.20	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Tetrachloroethene	µg/L	50	30	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,1,2-Tetrachloroethane	µg/L	20			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Chlorobenzene	µg/L	15	80		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylbenzene	µg/L	8	2.4	AO	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
m & p-Xylene	µg/L	30			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bromoform	µg/L	60			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Styrene	µg/L	4			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	µg/L	70			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	40			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,3-Dichlorobenzene	µg/L	2.5			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	4	5	MAC	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	µg/L	2.5	200	MAC	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2,4-Trichlorobenzene	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,3-Dichloropropene (Cis + Tra	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Xylenes (Total)	µg/L		300	AO	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Bold indiates detection

Bold, underlined and highlighted indicates Exceedance

Results of VOC Analyses

South Easthope Landfill		Provincial Water Quality Objectives (1994)	Ontario Drinking Water Quality Guidelines and Standards (2003)		OW-4A	OW-4A	OW-4A	OW-4b	OW-4b	OW-4b	OW-4b	OW-4b	OW-4b	OW-4b	OW-4b
Parameter	**Unit**	**Objective**	**Objective**	**Type**	**12-Apr-16**	**20-Oct-16**	**19-Apr-17**	**08-Apr-08**	**30-Oct-08**	**15-Apr-09**	**27-Oct-09**	**09-Apr-10**	**20-Oct-10**	**14-Apr-11**	**19-Oct-11**
Chloromethane	µg/L	700			<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Vinyl Chloride	µg/L	600	1	MAC	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17
Bromomethane	µg/L	0.9			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Trichlorofluoromethane	µg/L				<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Acetone	µg/L				<1.0	<1.0	<1.0	<0.50	<0.50	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1 Dichloroethene	µg/L	40	14	MAC	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Methylene Chloride	µg/L	100			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
trans- 1,2-dichloroethylene	µg/L	0.2			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Methyl tert-butyl ether	µg/L	200			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1-Dichloroethane	µg/L	200			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Methyl Ethyl Ketone	µg/L	400			<1.0	<1.0	<1.0	<0.90	<0.90	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis- 1,2-Dichloroethylene	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroform	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2 - Dichloroethane	µg/L	100	5	IMAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,1-Trichloroethane	µg/L	10			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Carbon Tetrachloride	µg/L		2	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Benzene	µg/L	100	1	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2-Dichloropropane	µg/L	0.7			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Trichloroethylene	µg/L	20	5	MAC	<0.20	**0.64**	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bromodichloromethane	µg/L	200			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
cis-1,3-Dichloropropene	ug/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Methyl Isobutyl Ketone	µg/L				<1.0	<1.0	<1.0	<0.30	<0.30	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,1,2-Trichloroethane	µg/L	800			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	0.8	24	AO	<0.20	**0.2**	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
2-Hexanone	µg/L				<1.0	<1.0	<1.0	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Dibromochloromethane	µg/L				<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylene Dibromide	µg/L	5			<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Tetrachloroethene	µg/L	50	30	MAC	<0.20	<0.20	<0.20	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,1,2-Tetrachloroethane	µg/L	20			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Chlorobenzene	µg/L	15	80		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylbenzene	µg/L	8	2.4	AO	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
m & p-Xylene	µg/L	30			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bromoform	µg/L	60			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Styrene	µg/L	4			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	µg/L	70			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	40			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,3-Dichlorobenzene	µg/L	2.5			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	4	5	MAC	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	µg/L	2.5	200	MAC	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2,4-Trichlorobenzene	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,3-Dichloropropene (Cis + Tra	µg/L				<0.30	<0.30	<0.30				<0.30	<0.30	<0.30	<0.30	<0.30
Xylenes (Total)	µg/L		300	AO	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Bold indiates detection

Bold, underlined and highlighted indicates Exceedance

Results of VOC Analyses

South Easthope Landfill		Provincial Water Quality Objectives (1994)	Ontario Drinking Water Quality Guidelines and Standards (2003)		OW-4b	OW-4b	OW-4b	OW-4b	OW-4b	OW-4b	OW-4b	OW-4b	OW-4b	OW-4b	OW-4b
Parameter	**Unit**	**Objective**	**Objective**	**Type**	**04-Apr-12**	**24-Oct-12**	**10-Apr-13**	**29-Oct-13**	**16-Apr-14**	**28-Oct-14**	**16-Apr-15**	**28-Oct-15**	**12-Apr-16**	**20-Oct-16**	**19-Apr-17**
Chloromethane	µg/L	700			<0.40		<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Vinyl Chloride	µg/L	600	1	MAC	<0.17		<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17
Bromomethane	µg/L	0.9			<0.20		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	µg/L				<0.20		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Trichlorofluoromethane	µg/L				<0.40		<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Acetone	µg/L				<1.0		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1 Dichloroethene	µg/L	40	14	MAC	<0.30		<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Methylene Chloride	µg/L	100			<0.30		<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
trans- 1,2-dichloroethylene	µg/L	0.2			<0.20		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Methyl tert-butyl ether	µg/L	200			<0.20		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1-Dichloroethane	µg/L	200			<0.30		<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Methyl Ethyl Ketone	µg/L	400			<1.0		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis- 1,2-Dichloroethylene	µg/L				<0.20		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroform	µg/L				<0.20		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2 - Dichloroethane	µg/L	100	5	IMAC	<0.20		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,1-Trichloroethane	µg/L	10			<0.30		<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Carbon Tetrachloride	µg/L		2	MAC	<0.20		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Benzene	µg/L	100	1	MAC	<0.20		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2-Dichloropropane	µg/L	0.7			<0.20		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Trichloroethylene	µg/L	20	5	MAC	<0.20		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bromodichloromethane	µg/L	200			<0.20		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
cis-1,3-Dichloropropene	ug/L				<0.20		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Methyl Isobutyl Ketone	µg/L				<1.0	Dry	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene	µg/L				<0.30		<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,1,2-Trichloroethane	µg/L	800			<0.20		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	0.8	24	AO	<0.20		<0.20	<0.20	**0.29**	**0.34**	<0.20	**0.32**	<0.20	**0.36**	**0.32**
2-Hexanone	µg/L				<0.30		<0.30	<0.30	<0.30	<0.30	<0.30	<1.0	<1.0	<1.0	<1.0
Dibromochloromethane	µg/L				<0.10		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylene Dibromide	µg/L	5			<0.10		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Tetrachloroethene	µg/L	50	30	MAC	<0.20		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,1,2-Tetrachloroethane	µg/L	20			<0.10		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Chlorobenzene	µg/L	15	80		<0.10		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylbenzene	µg/L	8	2.4	AO	<0.10		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
m & p-Xylene	µg/L	30			<0.20		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	**0.2**	<0.20
Bromoform	µg/L	60			<0.10		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Styrene	µg/L	4			<0.10		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	µg/L	70			<0.10		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	40			<0.10		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,3-Dichlorobenzene	µg/L	2.5			<0.10		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	4	5	MAC	<0.10		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	µg/L	2.5	200	MAC	<0.10		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2,4-Trichlorobenzene	µg/L				<0.30		<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,3-Dichloropropene (Cis + Tra	µg/L				<0.30		<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Xylenes (Total)	µg/L		300	AO	<0.20		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	**0.2**	<0.20

Bold indiates detection

Bold, underlined and highlighted indicates Exceedance

Results of VOC Analyses

South Easthope Landfill		Provincial Water Quality Objectives (1994)	Ontario Drinking Water Quality Guidelines and Standards (2003)		OW-4b	OW-4b	OW-4b	OW-4b	OW-4b	OW-4b	OW-4b	OW-4b	OW-4b	OW-4b	OW-4b
Parameter	**Unit**	**Objective**	**Objective**	**Type**	**31-Oct-17**	**19-Apr-18**	**23-Oct-18**	**16-Apr-19**	**22-Oct-19**	**20-Apr-20**	**26-Oct-20**	**13-Apr-21**	**20-Oct-21**	**06-Apr-22**	**18-Oct-22**
Chloromethane	µg/L	700			<0.40	<0.40									
Vinyl Chloride	µg/L	600	1	MAC	<0.17	<0.17	<0.17	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Bromomethane	µg/L	0.9			<0.20	<0.20	<0.20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chloroethane	µg/L				<0.20	<0.20									
Trichlorofluoromethane	µg/L				<0.40	<0.40	<0.40	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Acetone	µg/L				<1.0	<1.0	<1.0	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30
1,1 Dichloroethene	µg/L	40	14	MAC	<0.30	<0.30	<0.30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Methylene Chloride	µg/L	100			<0.30	<0.30	<0.30	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
trans- 1,2-dichloroethylene	µg/L	0.2			<0.20	<0.20	<0.20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Methyl tert-butyl ether	µg/L	200			<0.20	<0.20	<0.20	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
1,1-Dichloroethane	µg/L	200			<0.30	<0.30	<0.30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Methyl Ethyl Ketone	µg/L	400			<1.0	<1.0	<1.0	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
cis- 1,2-Dichloroethylene	µg/L				<0.20	<0.20	<0.20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chloroform	µg/L				<0.20	<0.20	<0.20	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,2 - Dichloroethane	µg/L	100	5	IMAC	<0.20	<0.20	<0.20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1,1-Trichloroethane	µg/L	10			<0.30	<0.30	<0.30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Carbon Tetrachloride	µg/L		2	MAC	<0.20	<0.20	<0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Benzene	µg/L	100	1	MAC	<0.20	<0.20	<0.20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,2-Dichloropropane	µg/L	0.7			<0.20	<0.20	<0.20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene	µg/L	20	5	MAC	<0.20	<0.20	<0.20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bromodichloromethane	µg/L	200			<0.20	<0.20	<0.20	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
cis-1,3-Dichloropropene	ug/L				<0.20	<0.20	<0.20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Methyl Isobutyl Ketone	µg/L				<1.0	<1.0	<1.0	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
trans-1,3-Dichloropropene	µg/L				<0.30	<0.30	<0.30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1,2-Trichloroethane	µg/L	800			<0.20	<0.20	<0.20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Toluene	µg/L	0.8	24	AO	<0.20	<0.20	**0.78**	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	**0.5**	< 0.5
2-Hexanone	µg/L				<1.0	<1.0									
Dibromochloromethane	µg/L				<0.10	<0.10	<0.10	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Ethylene Dibromide	µg/L	5			<0.10	<0.10	<0.10	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Tetrachloroethene	µg/L	50	30	MAC	<0.20	<0.20	<0.20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1,1,2-Tetrachloroethane	µg/L	20			<0.10	<0.10	<0.10	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chlorobenzene	µg/L	15	80		<0.10	<0.10	<0.10	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Ethylbenzene	µg/L	8	2.4	AO	<0.10	<0.10	<0.10	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
m & p-Xylene	µg/L	30			<0.20	<0.20	**0.25**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	µg/L	60			<0.10	<0.10	<0.10	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Styrene	µg/L	4			<0.10	<0.10	<0.10	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1,2,2-Tetrachloroethane	µg/L	70			<0.10	<0.10	<0.10	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
o-Xylene	µg/L	40			<0.10	<0.10	<0.10	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,3-Dichlorobenzene	µg/L	2.5			<0.10	<0.10	<0.10	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,4-Dichlorobenzene	µg/L	4	5	MAC	<0.10	<0.10	<0.10	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,2-Dichlorobenzene	µg/L	2.5	200	MAC	<0.10	<0.10	<0.10	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,2,4-Trichlorobenzene	µg/L				<0.30	<0.30									
1,3-Dichloropropene (Cis + Tra	µg/L				<0.30	<0.30									
Xylenes (Total)	µg/L		300	AO	<0.20	<0.20	**0.25**	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1

Bold indiates detection

Bold, underlined and highlighted indicates Exceedance

Results of VOC Analyses

South Easthope Landfill		Provincial Water Quality Objectives (1994)	Ontario Drinking Water Quality Guidelines and Standards (2003)		OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6	OW-6
Parameter	**Unit**	**Objective**	**Objective**	**Type**	**30-Jul-07**	**08-Apr-08**	**03-Jul-08**	**30-Oct-08**	**14-Jul-09**	**26-Jul-10**	**04-Jul-11**	**04-Apr-12**	**19-Jul-12**	**10-Apr-13**	**09-Jul-13**
Chloromethane	µg/L	700			<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Vinyl Chloride	µg/L	600	1	MAC	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17
Bromomethane	µg/L	0.9			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Trichlorofluoromethane	µg/L				<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Acetone	µg/L				<0.50	<0.50	<0.50	<0.50	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1 Dichloroethene	µg/L	40	14	MAC	<0.20	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Methylene Chloride	µg/L	100			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
trans- 1,2-dichloroethylene	µg/L	0.2			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Methyl tert-butyl ether	µg/L	200			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1-Dichloroethane	µg/L	200			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Methyl Ethyl Ketone	µg/L	400			<0.90	<0.90	<0.90	<0.90	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis- 1,2-Dichloroethylene	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroform	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2 - Dichloroethane	µg/L	100	5	IMAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,1-Trichloroethane	µg/L	10			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Carbon Tetrachloride	µg/L		2	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Benzene	µg/L	100	1	MAC	**0.33**	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2-Dichloropropane	µg/L	0.7			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Trichloroethylene	µg/L	20	5	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bromodichloromethane	µg/L	200			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
cis-1,3-Dichloropropene	ug/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Methyl Isobutyl Ketone	µg/L				<0.30	<0.30	<0.30	<0.30	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,1,2-Trichloroethane	µg/L	800			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	0.8	24	AO	<0.20	<0.20	**0.61**	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
2-Hexanone	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Dibromochloromethane	µg/L				<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylene Dibromide	µg/L	5			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.10	<0.10	<0.10	<0.10
Tetrachloroethene	µg/L	50	30	MAC	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,1,2-Tetrachloroethane	µg/L	20			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Chlorobenzene	µg/L	15	80		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylbenzene	µg/L	8	2.4	AO	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
m & p-Xylene	µg/L	30			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bromoform	µg/L	60			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Styrene	µg/L	4			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	µg/L	70			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	40			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,3-Dichlorobenzene	µg/L	2.5			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	4	5	MAC	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	µg/L	2.5	200	MAC	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2,4-Trichlorobenzene	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,3-Dichloropropene (Cis + Tra	µg/L									<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Xylenes (Total)	µg/L		300	AO	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Bold indiates detection

Bold, underlined and highlighted indicates Exceedance

Results of VOC Analyses

South Easthope Landfill		Provincial Water Quality Objectives (1994)	Ontario Drinking Water Quality Guidelines and Standards (2003)		OW-6	OW-6	OW-6	OW-6	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1
Parameter	**Unit**	**Objective**	**Objective**	**Type**	**03-Jul-14**	**08-Jul-15**	**27-Jul-16**	**26-Jul-17**	**08-Apr-08**	**30-Oct-08**	**15-Apr-09**	**27-Oct-09**	**09-Apr-10**	**20-Oct-10**	**14-Apr-11**
Chloromethane	µg/L	700			<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Vinyl Chloride	µg/L	600	1	MAC	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17
Bromomethane	µg/L	0.9			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Trichlorofluoromethane	µg/L				<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Acetone	µg/L				<1.0	<1.0	<1.0	<1.0	<0.50	<0.50	<1.0	<1.0	<1.0	<1.0	<1.0
1,1 Dichloroethene	µg/L	40	14	MAC	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Methylene Chloride	µg/L	100			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
trans- 1,2-dichloroethylene	µg/L	0.2			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Methyl tert-butyl ether	µg/L	200			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1-Dichloroethane	µg/L	200			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Methyl Ethyl Ketone	µg/L	400			<1.0	<1.0	<1.0	<1.0	<0.90	<0.90	<1.0	<1.0	<1.0	<1.0	<1.0
cis- 1,2-Dichloroethylene	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroform	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2 - Dichloroethane	µg/L	100	5	IMAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,1-Trichloroethane	µg/L	10			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Carbon Tetrachloride	µg/L		2	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Benzene	µg/L	100	1	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2-Dichloropropane	µg/L	0.7			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Trichloroethylene	µg/L	20	5	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bromodichloromethane	µg/L	200			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
cis-1,3-Dichloropropene	ug/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Methyl Isobutyl Ketone	µg/L				<1.0	<1.0	<1.0	<1.0	<0.30	<0.30	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,1,2-Trichloroethane	µg/L	800			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	0.8	24	AO	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
2-Hexanone	µg/L				<0.30	<0.30	<1.0	<1.0	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Dibromochloromethane	µg/L				<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylene Dibromide	µg/L	5			<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Tetrachloroethene	µg/L	50	30	MAC	<0.20	<0.20	<0.20	<0.20	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,1,2-Tetrachloroethane	µg/L	20			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Chlorobenzene	µg/L	15	80		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylbenzene	µg/L	8	2.4	AO	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
m & p-Xylene	µg/L	30			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bromoform	µg/L	60			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Styrene	µg/L	4			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	µg/L	70			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	40			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,3-Dichlorobenzene	µg/L	2.5			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	4	5	MAC	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	µg/L	2.5	200	MAC	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2,4-Trichlorobenzene	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,3-Dichloropropene (Cis + Tra	µg/L				<0.30	<0.30	<0.30	<0.30				<0.30	<0.30	<0.30	<0.30
Xylenes (Total)	µg/L		300	AO	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Bold indiates detection

Bold, underlined and highlighted indicates Exceedance

Results of VOC Analyses

South Easthope Landfill		Provincial Water Quality Objectives (1994)	Ontario Drinking Water Quality Guidelines and Standards (2003)		SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1
Parameter	**Unit**	**Objective**	**Objective**	**Type**	**19-Oct-11**	**04-Apr-12**	**24-Oct-12**	**10-Apr-13**	**29-Oct-13**	**16-Apr-14**	**28-Oct-14**	**16-Apr-15**	**28-Oct-15**	**12-Apr-16**	**20-Oct-16**
Chloromethane	µg/L	700			<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.80	<0.40	<0.40
Vinyl Chloride	µg/L	600	1	MAC	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.34	<0.17	<0.17
Bromomethane	µg/L	0.9			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20
Chloroethane	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20
Trichlorofluoromethane	µg/L				<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.80	<0.40	<0.40
Acetone	µg/L				<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**37**
1,1 Dichloroethene	µg/L	40	14	MAC	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.60	<0.30	<0.30
Methylene Chloride	µg/L	100			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.60	<0.30	<0.30
trans- 1,2-dichloroethylene	µg/L	0.2			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20
Methyl tert-butyl ether	µg/L	200			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20
1,1-Dichloroethane	µg/L	200			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.60	<0.30	<0.30
Methyl Ethyl Ketone	µg/L	400			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**5.7**
cis- 1,2-Dichloroethylene	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20
Chloroform	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20
1,2 - Dichloroethane	µg/L	100	5	IMAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20
1,1,1-Trichloroethane	µg/L	10			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.60	<0.30	<0.30
Carbon Tetrachloride	µg/L		2	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20
Benzene	µg/L	100	1	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20
1,2-Dichloropropane	µg/L	0.7			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20
Trichloroethylene	µg/L	20	5	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20
Bromodichloromethane	µg/L	200			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20
cis-1,3-Dichloropropene	ug/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20
Methyl Isobutyl Ketone	µg/L				<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0
trans-1,3-Dichloropropene	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.60	<0.30	<0.30
1,1,2-Trichloroethane	µg/L	800			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20
Toluene	µg/L	0.8	24	AO	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	**0.54**
2-Hexanone	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<2.0	<1.0	<1.0
Dibromochloromethane	µg/L				<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10
Ethylene Dibromide	µg/L	5			<0.20	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10
Tetrachloroethene	µg/L	50	30	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20
1,1,1,2-Tetrachloroethane	µg/L	20			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10
Chlorobenzene	µg/L	15	80		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10
Ethylbenzene	µg/L	8	2.4	AO	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	**0.2**
m & p-Xylene	µg/L	30			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20
Bromoform	µg/L	60			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10
Styrene	µg/L	4			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	**1.4**
1,1,2,2-Tetrachloroethane	µg/L	70			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10
o-Xylene	µg/L	40			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10
1,3-Dichlorobenzene	µg/L	2.5			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	4	5	MAC	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10
1,2-Dichlorobenzene	µg/L	2.5	200	MAC	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10
1,2,4-Trichlorobenzene	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.60	<0.30	<0.30
1,3-Dichloropropene (Cis + Tra	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.60	<0.30	<0.30
Xylenes (Total)	µg/L		300	AO	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20

Bold indiates detection

Bold, underlined and highlighted indicates Exceedance

Results of VOC Analyses

South Easthope Landfill		Provincial Water Quality Objectives (1994)	Ontario Drinking Water Quality Guidelines and Standards (2003)		SW-1	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2
Parameter	**Unit**	**Objective**	**Objective**	**Type**	**19-Apr-17**	**08-Apr-08**	**30-Oct-08**	**15-Apr-09**	**27-Oct-09**	**09-Apr-10**	**20-Oct-10**	**14-Apr-11**	**19-Oct-11**	**04-Apr-12**	**24-Oct-12**
Chloromethane	µg/L	700			<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Vinyl Chloride	µg/L	600	1	MAC	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17
Bromomethane	µg/L	0.9			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Trichlorofluoromethane	µg/L				<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Acetone	µg/L				<1.0	<0.50	<0.50	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1 Dichloroethene	µg/L	40	14	MAC	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Methylene Chloride	µg/L	100			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
trans- 1,2-dichloroethylene	µg/L	0.2			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Methyl tert-butyl ether	µg/L	200			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1-Dichloroethane	µg/L	200			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Methyl Ethyl Ketone	µg/L	400			<1.0	<0.90	<0.90	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis- 1,2-Dichloroethylene	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroform	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2 - Dichloroethane	µg/L	100	5	IMAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,1-Trichloroethane	µg/L	10			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Carbon Tetrachloride	µg/L		2	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Benzene	µg/L	100	1	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2-Dichloropropane	µg/L	0.7			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Trichloroethylene	µg/L	20	5	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bromodichloromethane	µg/L	200			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
cis-1,3-Dichloropropene	ug/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Methyl Isobutyl Ketone	µg/L				<1.0	<0.30	<0.30	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,1,2-Trichloroethane	µg/L	800			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	0.8	24	AO	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
2-Hexanone	µg/L				<1.0	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Dibromochloromethane	µg/L				<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylene Dibromide	µg/L	5			<0.10	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.10	<0.10
Tetrachloroethene	µg/L	50	30	MAC	<0.20	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,1,2-Tetrachloroethane	µg/L	20			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Chlorobenzene	µg/L	15	80		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylbenzene	µg/L	8	2.4	AO	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
m & p-Xylene	µg/L	30			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bromoform	µg/L	60			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Styrene	µg/L	4			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	µg/L	70			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	40			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,3-Dichlorobenzene	µg/L	2.5			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	4	5	MAC	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	µg/L	2.5	200	MAC	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2,4-Trichlorobenzene	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,3-Dichloropropene (Cis + Tra	µg/L				<0.30				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Xylenes (Total)	µg/L		300	AO	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Bold indiates detection

Bold, underlined and highlighted indicates Exceedance

Results of VOC Analyses

South Easthope Landfill		Provincial Water Quality Objectives (1994)	Ontario Drinking Water Quality Guidelines and Standards (2003)		SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-3	SW-3
Parameter	**Unit**	**Objective**	**Objective**	**Type**	**10-Apr-13**	**29-Oct-13**	**16-Apr-14**	**28-Oct-14**	**16-Apr-15**	**28-Oct-15**	**12-Apr-16**	**20-Oct-16**	**19-Apr-17**	**08-Apr-08**	**30-Oct-08**
Chloromethane	µg/L	700			<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.80	<0.40	<0.40	<0.40
Vinyl Chloride	µg/L	600	1	MAC	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.34	<0.17	<0.17	<0.17
Bromomethane	µg/L	0.9			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20
Chloroethane	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20
Trichlorofluoromethane	µg/L				<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.80	<0.40	<0.40	<0.40
Acetone	µg/L				<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**44**	<1.0	<0.50	<0.50
1,1 Dichloroethene	µg/L	40	14	MAC	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.60	<0.30	<0.30	<0.30
Methylene Chloride	µg/L	100			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.60	<0.30	<0.30	<0.30
trans- 1,2-dichloroethylene	µg/L	0.2			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20
Methyl tert-butyl ether	µg/L	200			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20
1,1-Dichloroethane	µg/L	200			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.60	<0.30	<0.30	<0.30
Methyl Ethyl Ketone	µg/L	400			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<0.90	<0.90
cis- 1,2-Dichloroethylene	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20
Chloroform	µg/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20
1,2 - Dichloroethane	µg/L	100	5	IMAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20
1,1,1-Trichloroethane	µg/L	10			<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.60	<0.30	<0.30	<0.30
Carbon Tetrachloride	µg/L		2	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20
Benzene	µg/L	100	1	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20
1,2-Dichloropropane	µg/L	0.7			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20
Trichloroethylene	µg/L	20	5	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20
Bromodichloromethane	µg/L	200			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20
cis-1,3-Dichloropropene	ug/L				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20
Methyl Isobutyl Ketone	µg/L				<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<0.30	<0.30
trans-1,3-Dichloropropene	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.60	<0.30	<0.30	<0.30
1,1,2-Trichloroethane	µg/L	800			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20
Toluene	µg/L	0.8	24	AO	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20
2-Hexanone	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<1.0	<1.0	<2.0	<1.0	<0.30	<0.30
Dibromochloromethane	µg/L				<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10
Ethylene Dibromide	µg/L	5			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.20	<0.20
Tetrachloroethene	µg/L	50	30	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.10	<0.20
1,1,1,2-Tetrachloroethane	µg/L	20			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10
Chlorobenzene	µg/L	15	80		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10
Ethylbenzene	µg/L	8	2.4	AO	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10
m & p-Xylene	µg/L	30			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20
Bromoform	µg/L	60			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10
Styrene	µg/L	4			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	**0.47**	<0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	µg/L	70			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10
o-Xylene	µg/L	40			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10
1,3-Dichlorobenzene	µg/L	2.5			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	4	5	MAC	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	µg/L	2.5	200	MAC	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10
1,2,4-Trichlorobenzene	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.60	<0.30	<0.30	<0.30
1,3-Dichloropropene (Cis + Tra	µg/L				<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.60	<0.30		
Xylenes (Total)	µg/L		300	AO	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20

Bold indiates detection

Bold, underlined and highlighted indicates Exceedance

Results of VOC Analyses

South Easthope Landfill		Provincial Water Quality Objectives (1994)	Ontario Drinking Water Quality Guidelines and Standards (2003)		SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3
Parameter	**Unit**	**Objective**	**Objective**	**Type**	**15-Apr-09**	**27-Oct-09**	**09-Apr-10**	**20-Oct-10**	**14-Apr-11**	**19-Oct-11**	**04-Apr-12**	**24-Oct-12**	**10-Apr-13**	**29-Oct-13**	**16-Apr-14**
Chloromethane	µg/L	700			<0.40	<0.80	<0.40	<0.40	<0.80	<0.80	<0.40	<0.40	<0.40	<0.80	<0.40
Vinyl Chloride	µg/L	600	1	MAC	<0.17	<0.34	<0.17	<0.17	<0.34	<0.34	<0.17	<0.17	<0.17	<0.34	<0.17
Bromomethane	µg/L	0.9			<0.20	<0.40	<0.20	<0.20	<0.40	<0.40	<0.20	<0.20	<0.20	<0.40	<0.20
Chloroethane	µg/L				<0.20	<0.40	<0.20	<0.20	<0.40	<0.40	<0.20	<0.20	<0.20	<0.40	<0.20
Trichlorofluoromethane	µg/L				<0.40	<0.80	<0.40	<0.40	<0.80	<0.80	<0.40	<0.40	<0.40	<0.80	<0.40
Acetone	µg/L				<1.0	<2.0	<1.0	<1.0	<2.0	<2.0	<1.0	<1.0	<1.0	<2.0	<1.0
1,1 Dichloroethene	µg/L	40	14	MAC	<0.30	<0.60	<0.30	<0.30	<0.60	<0.60	<0.30	<0.30	<0.30	<0.60	<0.30
Methylene Chloride	µg/L	100			<0.30	<0.60	<0.30	<0.30	<0.60	<0.60	<0.30	<0.30	<0.30	<0.60	<0.30
trans- 1,2-dichloroethylene	µg/L	0.2			<0.20	<0.40	<0.20	<0.20	<0.40	<0.40	<0.20	<0.20	<0.20	<0.40	<0.20
Methyl tert-butyl ether	µg/L	200			<0.20	<0.40	<0.20	<0.20	<0.40	<0.40	<0.20	<0.20	<0.20	<0.40	<0.20
1,1-Dichloroethane	µg/L	200			<0.30	<0.60	<0.30	<0.30	<0.60	<0.60	<0.30	<0.30	<0.30	<0.60	<0.30
Methyl Ethyl Ketone	µg/L	400			<1.0	<2.0	<1.0	<1.0	<2.0	<2.0	<1.0	<1.0	<1.0	<2.0	<1.0
cis- 1,2-Dichloroethylene	µg/L				<0.20	<0.40	<0.20	<0.20	<0.40	<0.40	<0.20	<0.20	<0.20	<0.40	<0.20
Chloroform	µg/L				<0.20	<0.40	<0.20	<0.20	<0.40	<0.40	<0.20	<0.20	<0.20	<0.40	<0.20
1,2 - Dichloroethane	µg/L	100	5	IMAC	<0.20	<0.40	<0.20	<0.20	<0.40	<0.40	<0.20	<0.20	<0.20	<0.40	<0.20
1,1,1-Trichloroethane	µg/L	10			<0.30	<0.60	<0.30	<0.30	<0.60	<0.60	<0.30	<0.30	<0.30	<0.60	<0.30
Carbon Tetrachloride	µg/L		2	MAC	<0.20	<0.40	<0.20	<0.20	<0.40	<0.40	<0.20	<0.20	<0.20	<0.40	<0.20
Benzene	µg/L	100	1	MAC	<0.20	<0.40	<0.20	<0.20	<0.40	<0.40	<0.20	<0.20	<0.20	<0.40	<0.20
1,2-Dichloropropane	µg/L	0.7			<0.20	<0.40	<0.20	<0.20	<0.40	<0.40	<0.20	<0.20	<0.20	<0.40	<0.20
Trichloroethylene	µg/L	20	5	MAC	<0.20	<0.40	<0.20	<0.20	<0.40	<0.40	<0.20	<0.20	<0.20	<0.40	<0.20
Bromodichloromethane	µg/L	200			<0.20	<0.40	<0.20	<0.20	<0.40	<0.40	<0.20	<0.20	<0.20	<0.40	<0.20
cis-1,3-Dichloropropene	ug/L				<0.20	<0.40	<0.20	<0.20	<0.40	<0.40	<0.20	<0.20	<0.20	<0.40	<0.20
Methyl Isobutyl Ketone	µg/L				<1.0	<2.0	<1.0	<1.0	<2.0	<2.0	<1.0	<1.0	<1.0	<2.0	<1.0
trans-1,3-Dichloropropene	µg/L				<0.30	<0.60	<0.30	<0.30	<0.60	<0.60	<0.30	<0.30	<0.30	<0.60	<0.30
1,1,2-Trichloroethane	µg/L	800			<0.20	<0.40	<0.20	<0.20	<0.40	<0.40	<0.20	<0.20	<0.20	<0.40	<0.20
Toluene	µg/L	0.8	24	AO	<0.20	<0.40	<0.20	<0.20	<0.40	<0.40	<0.20	<0.20	<0.20	<0.40	<0.20
2-Hexanone	µg/L				<0.30	<0.60	<0.30	<0.30	<0.60	<0.60	<0.30	<0.30	<0.30	<0.60	<0.30
Dibromochloromethane	µg/L				<0.10	<0.20	<0.10	<0.10	<0.20	<0.20	<0.10	<0.10	<0.10	<0.20	<0.10
Ethylene Dibromide	µg/L	5			<0.20	<0.40	<0.20	<0.20	<0.40	<0.40	<0.10	<0.10	<0.10	<0.20	<0.10
Tetrachloroethene	µg/L	50	30	MAC	<0.20	<0.40	<0.20	<0.20	<0.40	<0.40	<0.20	<0.20	<0.20	<0.40	<0.20
1,1,1,2-Tetrachloroethane	µg/L	20			<0.10	<0.20	<0.10	<0.10	<0.20	<0.20	<0.10	<0.10	<0.10	<0.20	<0.10
Chlorobenzene	µg/L	15	80		<0.10	<0.20	<0.10	<0.10	<0.20	<0.20	<0.10	<0.10	<0.10	<0.20	<0.10
Ethylbenzene	µg/L	8	2.4	AO	<0.10	<0.20	<0.10	<0.10	<0.20	<0.20	<0.10	<0.10	<0.10	<0.20	<0.10
m & p-Xylene	µg/L	30			<0.20	<0.40	<0.20	<0.20	<0.40	<0.40	<0.20	<0.20	<0.20	<0.40	<0.20
Bromoform	µg/L	60			<0.10	<0.20	<0.10	<0.10	<0.20	<0.20	<0.10	<0.10	<0.10	<0.20	<0.10
Styrene	µg/L	4			<0.10	<0.20	<0.10	<0.10	<0.20	<0.20	<0.10	<0.10	<0.10	<0.20	<0.10
1,1,2,2-Tetrachloroethane	µg/L	70			<0.10	<0.20	<0.10	<0.10	<0.20	<0.20	<0.10	<0.10	<0.10	<0.20	<0.10
o-Xylene	µg/L	40			<0.10	<0.20	<0.10	<0.10	<0.20	<0.20	<0.10	<0.10	<0.10	<0.20	<0.10
1,3-Dichlorobenzene	µg/L	2.5			<0.10	<0.20	<0.10	<0.10	<0.20	<0.20	<0.10	<0.10	<0.10	<0.20	<0.10
1,4-Dichlorobenzene	µg/L	4	5	MAC	<0.10	<0.20	<0.10	<0.10	<0.20	<0.20	<0.10	<0.10	<0.10	<0.20	<0.10
1,2-Dichlorobenzene	µg/L	2.5	200	MAC	<0.10	<0.20	<0.10	<0.10	<0.20	<0.20	<0.10	<0.10	<0.10	<0.20	<0.10
1,2,4-Trichlorobenzene	µg/L				<0.30	<0.60	<0.30	<0.30	<0.60	<0.60	<0.30	<0.30	<0.30	<0.60	<0.30
1,3-Dichloropropene (Cis + Tra	µg/L					<0.60	<0.30	<0.30	<0.60	<0.60	<0.30	<0.30	<0.30	<0.60	<0.30
Xylenes (Total)	µg/L		300	AO	<0.20	<0.40	<0.20	<0.20	<0.40	<0.40	<0.20	<0.20	<0.20	<0.40	<0.20

Bold indiates detection

Bold, underlined and highlighted indicates Exceedance

Results of VOC Analyses

South Easthope Landfill		Provincial Water Quality Objectives (1994)	Ontario Drinking Water Quality Guidelines and Standards (2003)		SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow
Parameter	**Unit**	**Objective**	**Objective**	**Type**	**28-Oct-14**	**16-Apr-15**	**28-Oct-15**	**12-Apr-16**	**20-Oct-16**	**19-Apr-17**	**14-Jul-06**	**30-Jul-07**	**03-Jul-08**	**14-Jul-09**	**26-Jul-10**
Chloromethane	µg/L	700			<1.60	<0.40	<0.80	<0.40	<0.40	<0.40	<0.4	<0.80	<0.80	<0.80	<4.00
Vinyl Chloride	µg/L	600	1	MAC	<0.68	<0.17	<0.34	<0.17	<0.17	<0.17	<0.17	<0.34	<0.34	<0.34	<1.70
Bromomethane	µg/L	0.9			<0.80	<0.20	<0.40	<0.20	<0.20	<0.20	<0.2	<0.40	<0.40	<0.40	<2.00
Chloroethane	µg/L				<0.80	<0.20	<0.40	<0.20	<0.20	<0.20	<0.2	<0.40	<0.40	<0.40	<2.00
Trichlorofluoromethane	µg/L				<1.60	<0.40	<0.80	<0.40	<0.40	<0.40	<0.4	<0.80	<0.80	<0.80	<4.00
Acetone	µg/L				<4.0	<1.0	<2.0	<1.0	<1.0	<1.0	<0.5	<1.00	<1.00	<2.0	<10.0
1,1 Dichloroethene	µg/L	40	14	MAC	<1.20	<0.30	<0.60	<0.30	<0.30	<0.30	<0.2	<0.40	<0.60	<0.60	<3.00
Methylene Chloride	µg/L	100			<1.20	<0.30	<0.60	<0.30	<0.30	<0.30	<0.3	<0.60	<0.60	<0.60	<3.00
trans- 1,2-dichloroethylene	µg/L	0.2			<0.80	<0.20	<0.40	<0.20	<0.20	<0.20	<0.2	<0.40	<0.40	<0.40	<2.00
Methyl tert-butyl ether	µg/L	200			<0.80	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<0.40	<0.40	<0.40	<2.00
1,1-Dichloroethane	µg/L	200			<1.20	<0.30	<0.60	<0.30	<0.30	<0.30	<0.30	<0.60	<0.60	<0.60	<3.00
Methyl Ethyl Ketone	µg/L	400			<4.0	<1.0	<2.0	<1.0	<1.0	<1.0	<0.90	<1.80	<1.80	<2.0	<10.0
cis- 1,2-Dichloroethylene	µg/L				<0.80	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<0.40	<0.40	<0.40	<2.00
Chloroform	µg/L				<0.80	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<0.40	<0.40	<0.40	<2.00
1,2 - Dichloroethane	µg/L	100	5	IMAC	<0.80	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<0.40	<0.40	<0.40	<2.00
1,1,1-Trichloroethane	µg/L	10			<1.20	<0.30	<0.60	<0.30	<0.30	<0.30	<0.30	<0.60	<0.60	<0.60	<3.00
Carbon Tetrachloride	µg/L		2	MAC	<0.80	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<0.40	<0.40	<0.40	<2.00
Benzene	µg/L	100	1	MAC	<0.80	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<0.40	<0.40	<0.40	<2.00
1,2-Dichloropropane	µg/L	0.7			<0.80	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<0.40	<0.40	<0.40	<2.00
Trichloroethylene	µg/L	20	5	MAC	<0.80	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<0.40	<0.40	<0.40	<2.00
Bromodichloromethane	µg/L	200			<0.80	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<0.40	<0.40	<0.40	<2.00
cis-1,3-Dichloropropene	ug/L				<0.80	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<0.40	<0.40	<0.40	<2.00
Methyl Isobutyl Ketone	µg/L				<4.0	<1.0	<2.0	<1.0	<1.0	<1.0	<0.30	<0.60	<0.60	<2.0	<10.0
trans-1,3-Dichloropropene	µg/L				<1.20	<0.30	<0.60	<0.30	<0.30	<0.30	<0.30	<0.60	<0.60	<0.60	<3.00
1,1,2-Trichloroethane	µg/L	800			<0.80	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<0.40	<0.40	<0.40	<2.00
Toluene	µg/L	0.8	24	AO	<0.80	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<0.40	**0.71**	<0.40	<2.00
2-Hexanone	µg/L				<1.20	<0.30	<2.0	<1.0	<1.0	<1.0	<0.30	<0.60	<0.60	<0.60	<3.00
Dibromochloromethane	µg/L				<0.40	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<1.00
Ethylene Dibromide	µg/L	5			<0.40	<0.10	<0.20	<0.10	<0.10	<0.10	<0.20	<0.40	<0.40	<0.40	<2.00
Tetrachloroethene	µg/L	50	30	MAC	<0.80	<0.20	<0.40	<0.20	<0.20	<0.20	<0.10	<0.20	<0.20	<0.40	<2.00
1,1,1,2-Tetrachloroethane	µg/L	20			<0.40	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<1.00
Chlorobenzene	µg/L	15	80		<0.40	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<1.00
Ethylbenzene	µg/L	8	2.4	AO	<0.40	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<1.00
m & p-Xylene	µg/L	30			<0.80	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<0.40	**1**	<0.40	<2.00
Bromoform	µg/L	60			<0.40	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<1.00
Styrene	µg/L	4			<0.40	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<1.00
1,1,2,2-Tetrachloroethane	µg/L	70			<0.40	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<1.00
o-Xylene	µg/L	40			<0.40	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<1.00
1,3-Dichlorobenzene	µg/L	2.5			<0.40	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<1.00
1,4-Dichlorobenzene	µg/L	4	5	MAC	<0.40	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<1.00
1,2-Dichlorobenzene	µg/L	2.5	200	MAC	<0.40	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<1.00
1,2,4-Trichlorobenzene	µg/L				<1.20	<0.30	<0.60	<0.30	<0.30	<0.30	<0.30	<0.60	<0.60	<0.60	<3.00
1,3-Dichloropropene (Cis + Tra	µg/L				<1.20	<0.30	<0.60	<0.30	<0.30	<0.30					<3.00
Xylenes (Total)	µg/L		300	AO	<0.80	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<0.40	**1**	<0.40	<2.00

Bold indiates detection

Bold, underlined and highlighted indicates Exceedance

Results of VOC Analyses

South Easthope Landfill		Provincial Water Quality Objectives (1994)	Ontario Drinking Water Quality Guidelines and Standards (2003)		LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	LTS Outflow	Pond	Pond	Pond
Parameter	**Unit**	**Objective**	**Objective**	**Type**	**04-Jul-11**	**04-Apr-12**	**19-Jul-12**	**09-Jul-13**	**03-Jul-14**	**08-Jul-15**	**27-Jul-16**	**26-Jul-17**	**15-Apr-09**	**27-Oct-09**	**09-Apr-10**
Chloromethane	µg/L	700			<4.00	<0.40	<1.60	<1.60	<1.60	<1.60	<0.40	<0.80	<0.40	<3.20	<4.00
Vinyl Chloride	µg/L	600	1	MAC	<1.70	<0.17	<0.68	<0.68	<0.68	<0.68	<0.17	<0.34	<0.17	<1.36	<1.70
Bromomethane	µg/L	0.9			<2.00	<0.20	<0.80	<0.80	<0.80	<0.80	<0.20	<0.40	<0.20	<1.60	<2.00
Chloroethane	µg/L				<2.00	<0.20	<0.80	<0.80	<0.80	<0.80	<0.20	<0.40	<0.20	<1.60	<2.00
Trichlorofluoromethane	µg/L				<4.00	<0.40	<1.60	<1.60	<1.60	<1.60	<0.40	<0.80	<0.40	<3.20	<4.00
Acetone	µg/L				<10.0	<1.0	<4.0	<4.0	<4.0	<4.0	<1.0	<2.0	<1.0	**290**	<10.0
1,1 Dichloroethene	µg/L	40	14	MAC	<3.00	<0.30	<1.20	<1.20	<1.20	<1.20	<0.30	<0.60	<0.30	<2.40	<3.00
Methylene Chloride	µg/L	100			<3.00	<0.30	<1.20	<1.20	<1.20	<1.20	<0.30	<0.60	<0.30	<2.40	<3.00
trans- 1,2-dichloroethylene	µg/L	0.2			<2.00	<0.20	<0.80	<0.80	<0.80	<0.80	<0.20	<0.40	<0.20	<1.60	<2.00
Methyl tert-butyl ether	µg/L	200			<2.00	<0.20	<0.80	<0.80	<0.80	<0.80	<0.20	<0.40	<0.20	<1.60	<2.00
1,1-Dichloroethane	µg/L	200			<3.00	<0.30	<1.20	<1.20	<1.20	<1.20	<0.30	<0.60	<0.30	<2.40	<3.00
Methyl Ethyl Ketone	µg/L	400			<10.0	<1.0	<4.0	<4.0	<4.0	<4.0	<1.0	<2.0	<1.0	**<u>140</u>**	<10.0
cis- 1,2-Dichloroethylene	µg/L				<2.00	<0.20	<0.80	<0.80	<0.80	<0.80	<0.20	<0.40	<0.20	<1.60	<2.00
Chloroform	µg/L				<2.00	<0.20	<0.80	<0.80	<0.80	<0.80	<0.20	<0.40	<0.20	<1.60	<2.00
1,2 - Dichloroethane	µg/L	100	5	IMAC	<2.00	<0.20	<0.80	<0.80	<0.80	<0.80	<0.20	<0.40	<0.20	<1.60	<2.00
1,1,1-Trichloroethane	µg/L	10			<3.00	<0.30	<1.20	<1.20	<1.20	<1.20	<0.30	<0.60	<0.30	<2.40	<3.00
Carbon Tetrachloride	µg/L		2	MAC	<2.00	<0.20	<0.80	<0.80	<0.80	<0.80	<0.20	<0.40	<0.20	<1.60	<2.00
Benzene	µg/L	100	1	MAC	<2.00	<0.20	<0.80	<0.80	<0.80	<0.80	<0.20	<0.40	<0.20	<1.60	<2.00
1,2-Dichloropropane	µg/L	0.7			<2.00	<0.20	<0.80	<0.80	<0.80	<0.80	<0.20	<0.40	<0.20	<1.60	<2.00
Trichloroethylene	µg/L	20	5	MAC	<2.00	<0.20	<0.80	<0.80	<0.80	<0.80	<0.20	<0.40	<0.20	<1.60	<2.00
Bromodichloromethane	µg/L	200			<2.00	<0.20	<0.80	<0.80	<0.80	<0.80	<0.20	<0.40	<0.20	<1.60	<2.00
cis-1,3-Dichloropropene	ug/L				<2.00	<0.20	<0.80	<0.80	<0.80	<0.80	<0.20	<0.40	<0.20	<1.60	<2.00
Methyl Isobutyl Ketone	µg/L				<10.0	<1.0	<4.0	<4.0	<4.0	<4.0	<1.0	<2.0	<1.0	<8.0	<10.0
trans-1,3-Dichloropropene	µg/L				<3.00	<0.30	<1.20	<1.20	<1.20	<1.20	<0.30	<0.60	<0.30	<2.40	<3.00
1,1,2-Trichloroethane	µg/L	800			<2.00	<0.20	<0.80	<0.80	<0.80	<0.80	<0.20	<0.40	<0.20	<1.60	<2.00
Toluene	µg/L	0.8	24	AO	<2.00	<0.20	<0.80	<0.80	<0.80	<0.80	<0.20	<0.40	<0.20	**<u>25</u>**	<2.00
2-Hexanone	µg/L				<3.00	<0.30	<1.20	<1.20	<1.20	<1.20	<1.0	<2.0	<0.30	<2.40	<3.00
Dibromochloromethane	µg/L				<1.00	<0.10	<0.40	<0.40	<0.40	<0.40	<0.10	<0.20	<0.10	<0.80	<1.00
Ethylene Dibromide	µg/L	5			<2.00	<0.10	<0.40	<0.40	<0.40	<0.40	<0.10	<0.20	<0.20	<1.60	<2.00
Tetrachloroethene	µg/L	50	30	MAC	<2.00	<0.20	<0.80	<0.80	<0.80	<0.80	<0.20	<0.40	<0.20	<1.60	<2.00
1,1,1,2-Tetrachloroethane	µg/L	20			<1.00	<0.10	<0.40	<0.40	<0.40	<0.40	<0.10	<0.20	<0.10	<0.80	<1.00
Chlorobenzene	µg/L	15	80		<1.00	<0.10	<0.40	<0.40	<0.40	<0.40	<0.10	<0.20	<0.10	<0.80	<1.00
Ethylbenzene	µg/L	8	2.4	AO	<1.00	<0.10	<0.40	<0.40	<0.40	<0.40	<0.10	<0.20	<0.10	<0.80	<1.00
m & p-Xylene	µg/L	30			<2.00	<0.20	<0.80	<0.80	<0.80	<0.80	<0.20	<0.40	<0.20	<1.60	<2.00
Bromoform	µg/L	60			<1.00	<0.10	<0.40	<0.40	<0.40	<0.40	<0.10	<0.20	<0.10	<0.80	<1.00
Styrene	µg/L	4			<1.00	<0.10	<0.40	<0.40	<0.40	<0.40	<0.10	<0.20	<0.10	<0.80	<1.00
1,1,2,2-Tetrachloroethane	µg/L	70			<1.00	<0.10	<0.40	<0.40	<0.40	<0.40	<0.10	<0.20	<0.10	<0.80	<1.00
o-Xylene	µg/L	40			<1.00	<0.10	<0.40	<0.40	<0.40	<0.40	<0.10	<0.20	<0.10	<0.80	<1.00
1,3-Dichlorobenzene	µg/L	2.5			<1.00	<0.10	<0.40	<0.40	<0.40	<0.40	<0.10	<0.20	<0.10	<0.80	<1.00
1,4-Dichlorobenzene	µg/L	4	5	MAC	<1.00	<0.10	<0.40	<0.40	<0.40	<0.40	<0.10	<0.20	<0.10	<0.80	<1.00
1,2-Dichlorobenzene	µg/L	2.5	200	MAC	<1.00	<0.10	<0.40	<0.40	<0.40	<0.40	<0.10	<0.20	<0.10	<0.80	<1.00
1,2,4-Trichlorobenzene	µg/L				<3.00	<0.30	<1.20	<1.20	<1.20	<1.20	<0.30	<0.60	<0.30	<2.40	<3.00
1,3-Dichloropropene (Cis + Tra	µg/L				<3.00	<0.30	<1.20	<1.20	<1.20	<1.20	<0.30	<0.60		<2.40	<3.00
Xylenes (Total)	µg/L		300	AO	<2.00	<0.20	<0.80	<0.80	<0.80	<0.80	<0.20	<0.40	<0.20	<1.60	<2.00

Bold indiates detection

<u>Bold, underlined and highlighted indicates Exceedance</u>

Results of VOC Analyses

South Easthope Landfill		Provincial Water Quality Objectives (1994)	Ontario Drinking Water Quality Guidelines and Standards (2003)		Pond	Pond	Pond	Pond	Pond	Pond	Pond	Pond	Pond	Pond	Pond
Parameter	**Unit**	**Objective**	**Objective**	**Type**	**19-Oct-10**	**14-Apr-11**	**19-Oct-11**	**04-Apr-12**	**24-Oct-12**	**10-Apr-13**	**29-Oct-13**	**16-Apr-14**	**28-Oct-14**	**16-Apr-15**	**28-Oct-15**
Chloromethane	µg/L	700			<4.00	<4.00	<0.80	<0.40	<0.80	<0.40	<4.00	<1.60	<4.00	<1.60	<4.00
Vinyl Chloride	µg/L	600	1	MAC	<1.70	<1.70	<0.34	<0.17	<0.34	<0.17	<1.70	<0.68	<1.70	<0.68	<1.70
Bromomethane	µg/L	0.9			<2.00	<2.00	<0.40	<0.20	<0.40	<0.20	<2.00	<0.80	<2.00	<0.80	<2.00
Chloroethane	µg/L				<2.00	<2.00	<0.40	<0.20	<0.40	<0.20	<2.00	<0.80	<2.00	<0.80	<2.00
Trichlorofluoromethane	µg/L				<4.00	<4.00	<0.80	<0.40	<0.80	<0.40	<4.00	**9.7**	<4.00	<1.60	<4.00
Acetone	µg/L				<10.0	<10.0	<2.0	<1.0	<2.0	<1.0	<10.0	<4.0	<10.0	<4.0	<10.0
1,1 Dichloroethene	µg/L	40	14	MAC	<3.00	<3.00	<0.60	<0.30	<0.60	<0.30	<3.00	<1.20	<3.00	<1.20	<3.00
Methylene Chloride	µg/L	100			<3.00	<3.00	<0.60	<0.30	<0.60	<0.30	<3.00	<1.20	<3.00	<1.20	<3.00
trans- 1,2-dichloroethylene	µg/L	0.2			<2.00	<2.00	<0.40	<0.20	<0.40	<0.20	<2.00	<0.80	<2.00	<0.80	<2.00
Methyl tert-butyl ether	µg/L	200			<2.00	<2.00	<0.40	<0.20	<0.40	<0.20	<2.00	<0.80	<2.00	<0.80	<2.00
1,1-Dichloroethane	µg/L	200			<3.00	<3.00	<0.60	<0.30	<0.60	<0.30	<3.00	<1.20	<3.00	<1.20	<3.00
Methyl Ethyl Ketone	µg/L	400			<10.0	<10.0	<2.0	<1.0	<2.0	<1.0	<10.0	<4.0	<10.0	<4.0	<10.0
cis- 1,2-Dichloroethylene	µg/L				<2.00	<2.00	<0.40	<0.20	<0.40	<0.20	<2.00	<0.80	<2.00	<0.80	<2.00
Chloroform	µg/L				**4**	<2.00	<0.40	<0.20	<0.40	<0.20	<2.00	<0.80	<2.00	<0.80	<2.00
1,2 - Dichloroethane	µg/L	100	5	IMAC	<2.00	<2.00	<0.40	<0.20	<0.40	<0.20	<2.00	<0.80	<2.00	<0.80	<2.00
1,1,1-Trichloroethane	µg/L	10			<3.00	<3.00	<0.60	<0.30	<0.60	<0.30	<3.00	<1.20	<3.00	<1.20	<3.00
Carbon Tetrachloride	µg/L		2	MAC	<2.00	<2.00	<0.40	<0.20	<0.40	<0.20	<2.00	<0.80	<2.00	<0.80	<2.00
Benzene	µg/L	100	1	MAC	<2.00	<2.00	<0.40	<0.20	<0.40	<0.20	<2.00	<0.80	<2.00	<0.80	<2.00
1,2-Dichloropropane	µg/L	0.7			<2.00	<2.00	<0.40	<0.20	<0.40	<0.20	<2.00	<0.80	<2.00	<0.80	<2.00
Trichloroethylene	µg/L	20	5	MAC	<2.00	<2.00	<0.40	<0.20	<0.40	<0.20	<2.00	<0.80	<2.00	<0.80	<2.00
Bromodichloromethane	µg/L	200			<2.00	<2.00	<0.40	<0.20	<0.40	<0.20	<2.00	<0.80	<2.00	<0.80	<2.00
cis-1,3-Dichloropropene	ug/L				<2.00	<2.00	<0.40	<0.20	<0.40	<0.20	<2.00	<0.80	<2.00	<0.80	<2.00
Methyl Isobutyl Ketone	µg/L				<10.0	<10.0	<2.0	<1.0	<2.0	<1.0	<10.0	<4.0	<10.0	<4.0	<10.0
trans-1,3-Dichloropropene	µg/L				<3.00	<3.00	<0.60	<0.30	<0.60	<0.30	<3.00	<1.20	<3.00	<1.20	<3.00
1,1,2-Trichloroethane	µg/L	800			<2.00	<2.00	<0.40	<0.20	<0.40	<0.20	<2.00	<0.80	<2.00	<0.80	<2.00
Toluene	µg/L	0.8	24	AO	**8.8**	<2.00	<0.40	<0.20	<0.40	<0.20	<2.00	**5.2**	**9.7**	<0.80	**4.6**
2-Hexanone	µg/L				<3.00	<3.00	<0.60	<0.30	<0.60	<0.30	<3.00	<1.20	<3.00	<1.20	<10.0
Dibromochloromethane	µg/L				<1.00	<1.00	<0.20	<0.10	<0.20	<0.10	<1.00	<0.40	<1.00	<0.40	<1.00
Ethylene Dibromide	µg/L	5			<2.00	<2.00	<0.40	<0.10	<0.20	<0.10	<1.00	<0.40	<1.00	<0.40	<1.00
Tetrachloroethene	µg/L	50	30	MAC	<2.00	<2.00	<0.40	<0.20	<0.40	<0.20	<2.00	<0.80	<2.00	<0.80	<2.00
1,1,1,2-Tetrachloroethane	µg/L	20			<1.00	<1.00	<0.20	<0.10	<0.20	<0.10	<1.00	<0.40	<1.00	<0.40	<1.00
Chlorobenzene	µg/L	15	80		<1.00	<1.00	<0.20	<0.10	<0.20	<0.10	<1.00	<0.40	<1.00	<0.40	<1.00
Ethylbenzene	µg/L	8	2.4	AO	<1.00	<1.00	<0.20	<0.10	<0.20	<0.10	<1.00	**0.43**	**1.2**	<0.40	<1.00
m & p-Xylene	µg/L	30			<2.00	<2.00	<0.40	<0.20	<0.40	<0.20	<2.00	**1.3**	**2.2**	<0.80	<2.00
Bromoform	µg/L	60			<1.00	<1.00	<0.20	<0.10	<0.20	<0.10	<1.00	<0.40	<1.00	<0.40	<1.00
Styrene	µg/L	4			<1.00	<1.00	<0.20	<0.10	<0.20	<0.10	<1.00	<0.40	<1.00	<0.40	<1.00
1,1,2,2-Tetrachloroethane	µg/L	70			<1.00	<1.00	<0.20	<0.10	<0.20	<0.10	<1.00	<0.40	<1.00	<0.40	<1.00
o-Xylene	µg/L	40			<1.00	<1.00	<0.20	<0.10	<0.20	<0.10	<1.00	<0.40	**1**	<0.40	<1.00
1,3-Dichlorobenzene	µg/L	2.5			<1.00	<1.00	<0.20	<0.10	<0.20	<0.10	<1.00	<0.40	<1.00	<0.40	<1.00
1,4-Dichlorobenzene	µg/L	4	5	MAC	<1.00	<1.00	<0.20	<0.10	<0.20	<0.10	<1.00	<0.40	<1.00	<0.40	<1.00
1,2-Dichlorobenzene	µg/L	2.5	200	MAC	<1.00	<1.00	<0.20	<0.10	<0.20	<0.10	<1.00	<0.40	<1.00	<0.40	<1.00
1,2,4-Trichlorobenzene	µg/L				<3.00	<3.00	<0.60	<0.30	<0.60	<0.30	<3.00	<1.20	<3.00	<1.20	<3.00
1,3-Dichloropropene (Cis + Tra	µg/L				<3.00	<3.00	<0.60	<0.30	<0.60	<0.30	<3.00	<1.20	<3.00	<1.20	<3.00
Xylenes (Total)	µg/L		300	AO	<2.00	<2.00	<0.40	<0.20	<0.40	<0.20	<2.00	**1.3**	**3.2**	<0.80	<2.00

Bold indiates detection

Bold, underlined and highlighted indicates Exceedance

Results of VOC Analyses

South Easthope Landfill		Provincial Water Quality Objectives (1994)	Ontario Drinking Water Quality Guidelines and Standards (2003)		Pond	Pond	Pond
Parameter	Unit	Objective	Objective	Type	12-Apr-16	20-Oct-16	19-Apr-17
Chloromethane	µg/L	700			<1.60	<0.80	<0.40
Vinyl Chloride	µg/L	600	1	MAC	<0.68	<0.34	<0.17
Bromomethane	µg/L	0.9			<0.80	<0.40	<0.20
Chloroethane	µg/L				<0.80	<0.40	<0.20
Trichlorofluoromethane	µg/L				<1.60	<0.80	<0.40
Acetone	µg/L				<4.0	<2.0	<1.0
1,1 Dichloroethene	µg/L	40	14	MAC	<1.20	<0.60	<0.30
Methylene Chloride	µg/L	100			<1.20	<0.60	<0.30
trans- 1,2-dichloroethylene	µg/L	0.2			<0.80	<0.40	<0.20
Methyl tert-butyl ether	µg/L	200			<0.80	<0.40	<0.20
1,1-Dichloroethane	µg/L	200			<1.20	<0.60	<0.30
Methyl Ethyl Ketone	µg/L	400			<4.0	<2.0	<1.0
cis- 1,2-Dichloroethylene	µg/L				<0.80	<0.40	<0.20
Chloroform	µg/L				<0.80	<0.40	<0.20
1,2 - Dichloroethane	µg/L	100	5	IMAC	<0.80	<0.40	<0.20
1,1,1-Trichloroethane	µg/L	10			<1.20	<0.60	<0.30
Carbon Tetrachloride	µg/L		2	MAC	<0.80	<0.40	<0.20
Benzene	µg/L	100	1	MAC	<0.80	<0.40	<0.20
1,2-Dichloropropane	µg/L	0.7			<0.80	<0.40	<0.20
Trichloroethylene	µg/L	20	5	MAC	<0.80	<0.40	<0.20
Bromodichloromethane	µg/L	200			<0.80	<0.40	<0.20
cis-1,3-Dichloropropene	ug/L				<0.80	<0.40	<0.20
Methyl Isobutyl Ketone	µg/L				<4.0	<2.0	<1.0
trans-1,3-Dichloropropene	µg/L				<1.20	<0.60	<0.30
1,1,2-Trichloroethane	µg/L	800			<0.80	<0.40	<0.20
Toluene	µg/L	0.8	24	AO	<0.80	<0.40	<0.20
2-Hexanone	µg/L				<4.0	<2.0	<1.0
Dibromochloromethane	µg/L				<0.40	<0.20	<0.10
Ethylene Dibromide	µg/L	5			<0.40	<0.20	<0.10
Tetrachloroethene	µg/L	50	30	MAC	<0.80	<0.40	<0.20
1,1,1,2-Tetrachloroethane	µg/L	20			<0.40	<0.20	<0.10
Chlorobenzene	µg/L	15	80		<0.40	<0.20	<0.10
Ethylbenzene	µg/L	8	2.4	AO	<0.40	<0.20	<0.10
m & p-Xylene	µg/L	30			<0.80	<0.40	<0.20
Bromoform	µg/L	60			<0.40	<0.20	<0.10
Styrene	µg/L	4			<0.40	<0.20	<0.10
1,1,2,2-Tetrachloroethane	µg/L	70			<0.40	<0.20	<0.10
o-Xylene	µg/L	40			<0.40	<0.20	<0.10
1,3-Dichlorobenzene	µg/L	2.5			<0.40	<0.20	<0.10
1,4-Dichlorobenzene	µg/L	4	5	MAC	<0.40	<0.20	<0.10
1,2-Dichlorobenzene	µg/L	2.5	200	MAC	<0.40	<0.20	<0.10
1,2,4-Trichlorobenzene	µg/L				<1.20	<0.60	<0.30
1,3-Dichloropropene (Cis + Tra	µg/L				<1.20	<0.60	<0.30
Xylenes (Total)	µg/L		300	AO	<0.80	<0.40	<0.20

Bold indiates detection

Bold, underlined and highlighted indicates Exceedance

APPENDIX C

Well Details & Logs

Table C-1: Monitoring Well Details

Monitor	Ground Elevation (m)	TOC Elevation (m)	Stickup (m)	Total Depth (mbgs)	Screen Length (m)	Bottom Elevation (masl)	Screened Interval (mbgs)		Screened Interval (masl)		Geologic Unit Targeted
							Top	Bottom	Top	Bottom	
OW2	353.41	354.16	0.75	6.10	0.91	347.31	5.19	6.10	348.22	347.31	Silt Clay Till
OW3	356.88	357.46	0.58	5.90	0.91	350.98	4.99	5.90	351.89	350.98	Silt Clay Till
OW4a	354.22	354.82	0.60	12.80	0.91	341.42	11.89	12.80	342.33	341.42	Silt Clay Till
OW4b	354.20	354.84	0.64	6.10	0.91	348.10	5.19	6.10	349.01	348.10	Silt Clay Till
OW5	356.39	357.29	0.90	7.52	3.00	348.87	6.61	7.52	349.78	348.87	Silt Clay Till
OW6	358.04	358.84	0.80	7.60	3.00	350.44	6.69	7.60	351.35	350.44	Silt Clay Till
OW7	354.74	355.54	0.80	6.02	1.50	348.72	5.11	6.02	349.63	348.72	Silt Clay Till
OW8	357.80	358.74	0.94	7.52	3.00	350.28	6.61	7.52	351.19	350.28	Silt Clay Till
OW9	356.90	357.76	0.86	7.63	3.00	349.27	6.72	7.63	350.18	349.27	Silt Clay Till

Table C-2: Ground Water Levels

Monitor	Water Level (mbtoc)																			
	01-Oct-04	01-Jun-05	01-Oct-05	25-Oct-06	26-Apr-07	24-Oct-07	08-Apr-08	30-Oct-08	14-Apr-09	27-Oct-09	10-Apr-10	20-Oct-10	14-Apr-11	19-Oct-11	04-Apr-12	24-Oct-12	10-Apr-13	29-Oct-13	16-Apr-14	28-Oct-14
OW2	4.00	3.05	4.19	2.26	2.67	5.50	2.26	3.88	2.45	3.25	2.38	3.13	2.45	3.20	2.72	5.27	2.05	2.35	2.26	2.85
OW3	3.65	2.15	3.79	1.40	1.83	4.80	1.30	3.75	1.40	3.04	1.48	3.30	1.50	3.71	1.73	4.76	1.25	1.40	1.37	2.02
OW4a	6.05	5.23	6.38	4.88	4.98	5.50	4.78	6.05	4.85	5.75	4.95	5.79	4.85	5.90	4.95	6.80	4.74	4.80	4.69	5.15
OW4b	5.10	3.50	5.36	2.68	3.15	Dry	2.85	5.10	2.97	4.60	2.95	4.69	2.98	4.85	3.49	5.95	2.75	2.75	2.87	3.60
OW5					4.19	6.60	4.28	5.50	4.10	4.88	4.25	4.82	4.08	5.05	4.15	6.14	4.01	4.04	4.00	4.20
OW6						4.85	4.21	5.37	4.35	4.67	4.15	4.45	3.78	4.48	3.70	6.08	3.48	3.40	3.28	3.55

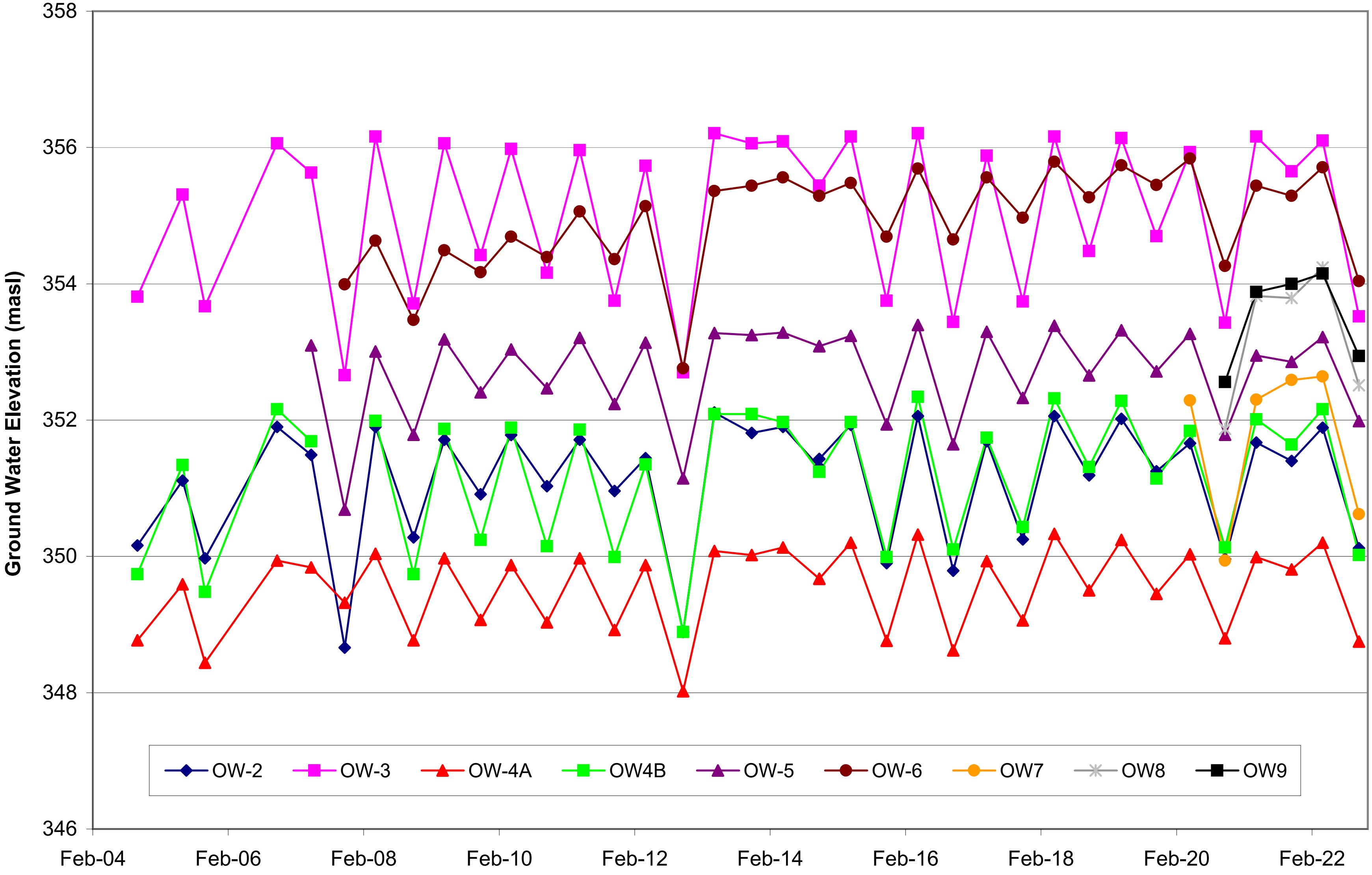
Monitor	Water Level (mbtoc)															
	16-Apr-15	27-Oct-15	12-Apr-16	20-Oct-16	19-Apr-17	31-Oct-17	19-Apr-18	23-Oct-18	16-Apr-19	22-Oct-19	20-Apr-20	26-Oct-20	13-Apr-21	20-Oct-21	06-Apr-22	18-Oct-22
OW2	2.23	4.26	2.10	4.37	2.47	3.91	2.10	2.97	2.14	2.91	2.50	4.20	2.49	2.76	2.27	4.04
OW3	1.30	3.71	1.25	4.02	1.58	3.72	1.30	2.98	1.32	2.76	1.53	4.03	1.30	1.81	1.36	3.94
OW4a	4.62	6.06	4.50	6.20	4.89	5.76	4.49	5.32	4.58	5.37	4.79	6.02	4.83	5.01	4.62	6.07
OW4b	2.87	4.85	2.50	4.74	3.10	4.41	2.52	3.53	2.56	3.70	3.00	4.71	2.83	3.20	2.68	4.82
OW5	4.05	5.35	3.89	5.64	3.99	4.96	3.90	4.63	3.97	4.57	4.02	5.50	4.34	4.43	4.07	5.30
OW6	3.36	4.15	3.15	4.19	3.28	3.87	3.05	3.57	3.10	3.39	3.00	4.58	3.40	3.55	3.13	4.80
OW7											3.25	5.60	3.24	2.95	2.90	4.92
OW8												6.87	4.92	4.95	4.50	6.23
OW9												5.20	3.88	3.76	3.61	4.82

Table C-3: Ground Water Elevations

Monitor	Ground Water Elevation (masl)																			
	01-Oct-04	01-Jun-05	01-Oct-05	25-Oct-06	26-Apr-07	24-Oct-07	08-Apr-08	30-Oct-08	14-Apr-09	27-Oct-09	10-Apr-10	20-Oct-10	14-Apr-11	19-Oct-11	04-Apr-12	24-Oct-12	10-Apr-13	29-Oct-13	16-Apr-14	28-Oct-14
OW2	350.16	351.11	349.97	351.90	351.49	348.66	351.90	350.28	351.71	350.91	351.78	351.03	351.71	350.96	351.44	348.89	352.11	351.81	351.90	351.31
OW3	353.81	355.31	353.67	356.06	355.63	352.66	356.16	353.71	356.06	354.42	355.98	354.16	355.96	353.75	355.73	352.70	356.21	356.06	356.09	355.44
OW4a	348.77	349.59	348.44	349.94	349.84	349.32	350.04	348.77	349.97	349.07	349.87	349.03	349.97	348.92	349.87	348.02	350.08	350.02	350.13	349.67
OW4b	349.74	351.34	349.48	352.16	351.69		351.99	349.74	351.87	350.24	351.89	350.15	351.86	349.99	351.35	348.89	352.09	352.09	351.97	351.24
OW5					353.10	350.69	353.01	351.79	353.19	352.41	353.04	352.47	353.21	352.24	353.14	351.15	353.28	353.25	353.29	353.09
OW6						353.99	354.63	353.47	354.49	354.17	354.69	354.39	355.06	354.36	355.14	352.76	355.36	355.44	355.56	355.29

Monitor	Ground Water Elevation (masl)															
	16-Apr-15	27-Oct-15	12-Apr-16	20-Oct-16	19-Apr-17	31-Oct-17	19-Apr-18	23-Oct-18	16-Apr-19	22-Oct-19	20-Apr-20	26-Oct-20	13-Apr-21	20-Oct-21	06-Apr-22	18-Oct-22
OW2	351.93	349.90	352.06	349.79	351.69	350.25	352.06	351.19	352.02	351.25	351.66	349.96	351.67	351.40	351.89	350.12
OW3	356.16	353.75	356.21	353.44	355.88	353.74	356.16	354.48	356.14	354.70	355.93	353.43	356.16	355.65	356.10	353.52
OW4a	350.20	348.76	350.32	348.62	349.93	349.06	350.33	349.50	350.24	349.45	350.03	348.80	349.99	349.81	350.20	348.75
OW4b	351.97	349.99	352.34	350.10	351.74	350.43	352.32	351.31	352.28	351.14	351.84	350.13	352.01	351.64	352.16	350.02
OW5	353.24	351.94	353.40	351.65	353.30	352.33	353.39	352.66	353.32	352.72	353.27	351.79	352.95	352.86	353.22	351.99
OW6	355.48	354.69	355.69	354.65	355.56	354.97	355.79	355.27	355.74	355.45	355.84	354.26	355.44	355.29	355.71	354.04
OW7											352.29	349.94	352.30	352.59	352.64	350.62
OW8												351.87	353.82	353.79	354.24	352.51
OW9												352.56	353.88	354.00	354.15	352.94

Figure C-1

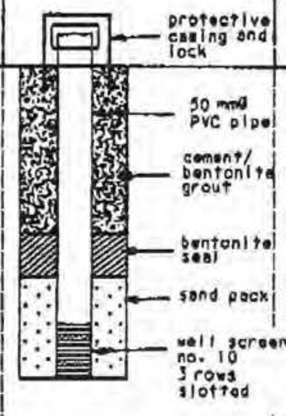


358
356
354
352
350
348
346
Ground Water Elevation (masl)
Feb-04
Feb-06
Feb-08
Feb-10
Feb-12
Feb-14
Feb-16
Feb-18
Feb-20
Feb-22
OW-2
OW-3
OW-4A
OW4B
OW-5
OW-6
OW7
OW8
OW9

STRATIGRAPHIC AND INSTRUMENTATION LOG

(OVERBURDEN)

PROJECT NAME:	HYDROGEOLOGIC INVESTIGATION	HOLE DESIGNATION:	OW2-87
PROJECT NO.:	1925	DATE COMPLETED:	MARCH 13, 1987
CLIENT:	FOUR MUNICIPALITIES	DRILLING METHOD:	95 mm I.D. H.S.A.
LOCATION:	AS PER PLAN	CRA SUPERVISOR:	P. HAYES



DEPTH m BG	STRATIGRAPHY DESCRIPTION & REMARKS	ELEVATION m AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE
		354.25				
0		353.58				
	ML - (TILL) silt: little clay, little gravel, massive, compact, mottled, brown, moist			SS 1	X	23
2	- little gravel			SS 2	X	42
	- some clay	350.53		SS 3	X	30
4	CL (TILL) clay: some gravel, soft, massive, low plastic, brown, moist			SS 4	X	16
		349.16		SS 5	X	16
	ML (TILL) silt: some very fine sand, little gravel, compact, massive, light brown, moist			SS 6	X	29
6		347.48		SS 7	X	25
8	End of Boring 6.1 m b.g.s.					
10			Screen Details: Set screen to 6.1 m (Elev. 347.48) Length - .91 m Diameter - 50 mm			
12						
14						
16						
18						
20						
22						
24						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

GRAIN SIZE ANALYSIS WATER FOUND STATIC WATER LEVEL

STRATIGRAPHIC AND INSTRUMENTATION LOG

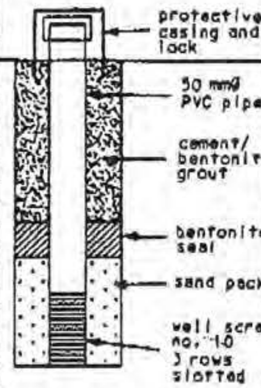
(OVERBURDEN)

PROJECT NAME: HYDROGEOLOGIC INVESTIGATION
PROJECT NO.: 1925
CLIENT: FOUR MUNICIPALITIES
LOCATION: AS PER PLAN

HOLE DESIGNATION: OW3-87
DATE COMPLETED: MARCH 13, 1987
DRILLING METHOD: 95 mm I.D. H.S.A.
CRA SUPERVISOR: P. HAYES

DEPTH m BG	STRATIGRAPHY DESCRIPTION & REMARKS	ELEVATION m AMSL	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE
		357.41			
0		356.65			
	CL - (TILL) clay: little gravel, massive, low plastic, light brown, moist		SS 1	⊠	10
2		354.36	SS 2	⊠	6
	ML - (TILL) silt: some gravel, little clay, dense, moist	353.60	SS 3	⊠	38
			SS 4	⊠	34
4	SM (TILL) very fine sand: some silt, some clay, brown, moist - little clay	352.69	SS 5	⊠	67
	SW - medium to fine gravel sand: compact, well sorted, light brown, saturated - some gravel		SS 6	⊠	36
6		350.86	SS 7	⊠	54
		350.71			
	SM - (TILL) very fine sand: some silt, massive, dense, light gray brown, moist				
8	End of boring 5.9 m b.g.s.				
10					
12					
14					
16					
18					
20					
22					
24					

MONITOR INSTALLATION



Screen Details:

Set screen to 5.48 m
(Elev. 350.97)
Length - .91 m
Diameter - 50 mm

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

GRAIN SIZE ANALYSIS   WATER FOUND   STATIC WATER LEVEL

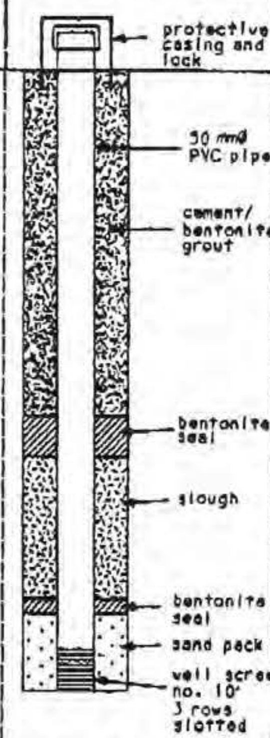
STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: HYDROGEOLOGIC INVESTIGATION
PROJECT NO.: 1925
CLIENT: FOUR MUNICIPALITIES
LOCATION: AS PER PLAN

HOLE DESIGNATION: OW4A-87
DATE COMPLETED: MARCH 12, 1987
DRILLING METHOD: 95 mm I.D. H.S.A.
CRA SUPERVISOR: P. HAYES

DEPTH m BG	STRATIGRAPHY DESCRIPTION & REMARKS	ELEVATION m AMSL	SAMPLE NUMBER	SAMPLE "N" VALUE
		354.82		
0		354.24		
2	ML - (TILL) silt: some very fine sand, compact, massive, low plastic, brown, moist		SS 2	8
			SS 3	37
			SS 4	57
		350.73	SS 5	46
4	SP - Sand medium grained: trace silt, poorly graded, moist	350.59	SS 6	71
	ML - (TILL) Silt: some very fine sand, some gravel, dense, massive, light brown, moist		SS 7	41
6			SS 8	53
			SS 9	37
	- hard		SS 10	100+
8	- little clay		SS 11	100+
		345.86		
	ML - (TILL) silt: very dense, massive, brown, moist	345.10	SS 12	100+
10	SM - (TILL) very fine sand: some silt, very dense, massive, light brown, moist		SS 13	100+
		343.57	SS 14	100+
	ML - (TILL) silt: very dense, massive, light brown, moist	342.81	SS 15	78
12	ML - (TILL) silt: some very fine sand, very dense, massive, moist - little gravel		SS 16	100+
		341.44	SS 17	100+
14	End of Boring 12.80 m b.g.s.			
16				
18				
20				
22				
24				

MONITOR INSTALLATION



Screen Details:
Set screen to 12.19 m
(Elev. 342.05)
Length - .91 m
Diameter - 50 mm

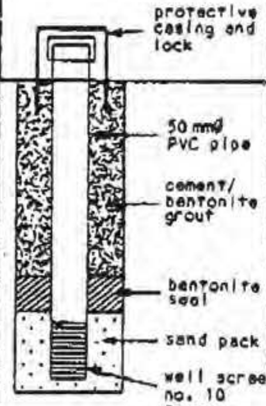
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

GRAIN SIZE ANALYSIS WATER FOUND STATIC WATER LEVEL

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: HYDROGEOLOGIC INVESTIGATION
PROJECT NO.: 1925
CLIENT: FOUR MUNICIPALITIES
LOCATION: AS PER PLAN

HOLE DESIGNATION: OW4B-87
DATE COMPLETED: MARCH 12, 1987
DRILLING METHOD: 95 mm I.D. H.S.A.
CRA SUPERVISOR: P. HAYES



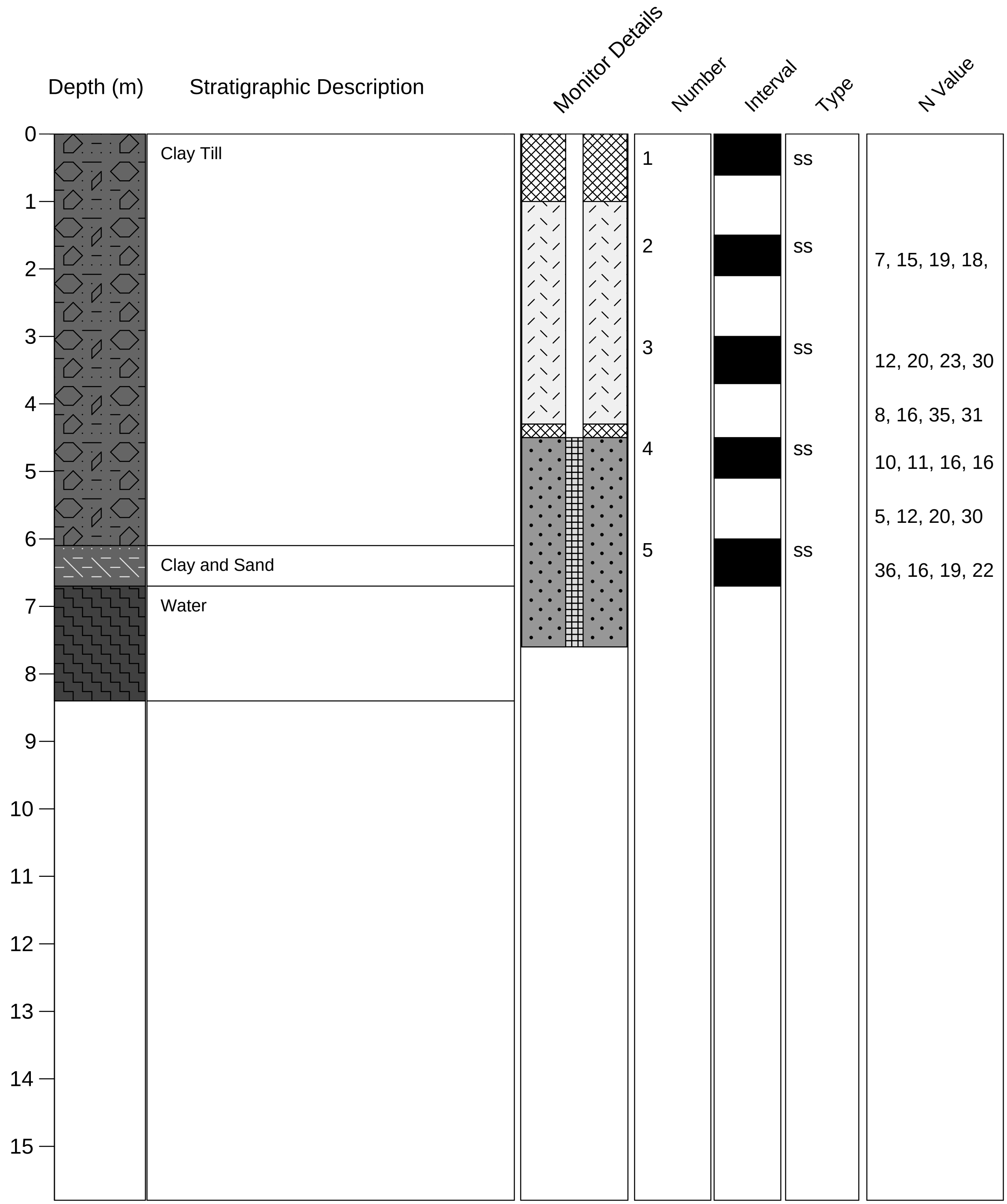
DEPTH m BG	STRATIGRAPHY DESCRIPTION & REMARKS	ELEVATION m AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE
		354.84	protective casing and lock			
0		354.07				
2	For stratigraphic detail see OW4A-87		50 mmØ PVC pipe; cement/ bentonite grout			
4			bentonite seal			
6			sand pack; well screen no. 10 3 rows slotted	SS 1	⊠	64
	End of boring 6.1 m b.g.s.	347.97				
8						
10			Screen Details: Set screen to 5.79 m (Elev. 348.28) Length - .91 m Diameter - 50 mm			
12						
14						
16						
18						
20						
22						
24						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

GRAIN SIZE ANALYSIS   WATER FOUND   STATIC WATER LEVEL

Borehole: BH-5

Location: South Easthope Landfill	**Project No:** 02-055
	Drilled by: Lantec Drilling Services
Client: Twp. of Perth East	**UTMs:** Easting: 0510827 Northing: 4797398



Logged by: Azimuth Environmental
Adrian Forsyth

Date: March 2007

Borehole: 6

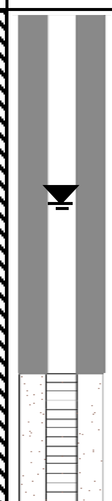
Project No: 02-055	**Location:** South Easthope Landfill
Logged By: Colin Ross	**Drilled by:** Lantech Drilling Services
Date: July 2007	**UTMs:**
Client: Twp. of Perth East	

Depth (m)	Stratigraphic Description	Monitor Details	Number	Interval	Type	N Value
0	Topsoil					
1	Sandy Silt: Brown, trace clay, stiff, dry, some small stones throughout					
2			1		ss	3, 6, 10, 12
3	3.0m- Gray, slightly moist, becoming more dense		2		ss	8, 9, 15, 16
4						
5			3		ss	7, 12, 18, 26
6			4		ss	10, 12, 16, 32
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

Azimuth Environmental Consulting, Inc.
Environmental Assessments & Approvals

Project: South Easthope Landfill Site	**Project Number:** 20-003	**Client:** Twp of Perth East	**Borehole ID:** OW7
Project Location: 2439 Line 29, Township of Perth East		**Drilling Contractor:** Orbit Garant	**Drilling Method:** Hollow Stem Auger Drill Rig
Logged By: Colin Ross	**Date:** 20-Apr-2020	**Stickup (m):** 0.8	**Well Depth (mbgs):** 6.02
UTM: (NAD 83, Zone 17T)	**Ground Elevation (masl):** 354.2	**Water Level (mbgs):** 2.45	**Well Diameter (mm)** 51
Easting: 510966 **Northing:** 4797061	**Well Screen Type:** 10-Slot PVC, schedule 40	**Riser Pipe Type:** schedule 40 PVC	**Well Screen Length (m):** 1.5

Depth Below Ground Surface (mbgs)	Sample Type	Sample Number	Sample Recovery (%)	Lithology	Monitoring Well Construction	Lithology Description
						Soil Group Name: grain size,color, density/consistency, moisture, stratification, other descriptors **Rock Description:** modifier, color, hardness/degree of concentration, bedding and joint characteristics, solutions, void conditions.
	GS	1		▨		**Silty Clay Till:** Brown, dry (wet at 3m) , clayey silt with some stones, poorly sorted (tilled near surface) soft, firm to dense with depth.
2	SS	2		▨		Fine sand seam (~0.3m) @ 4m bgs; Medium to fine sand seam (~0.3m) @ 5.5m bgs
	SS	3		▨		
4	SS	4		▨		
6	SS	5		▨		
8						
10						
12						



▼ **Ground Water Level Upon Well Completion (mbgs)**

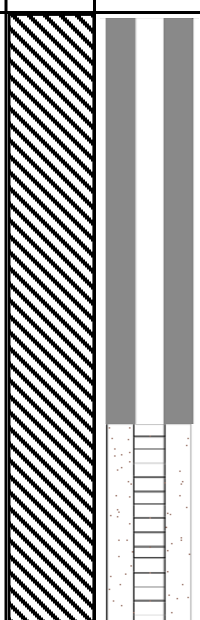
Seal (grout / hole plug) **Silica Sand Pack** **Well Screen**

Azimuth Environmental Consulting, Inc.
Environmental Assessments & Approvals

Project:	Project Number:	Client:	Borehole ID:
South Easthope Landfill Site	20-003	Twp of Perth East	OW8
Project Location:		**Drilling Contractor:**	**Drilling Method:**
2439 Line 29, Township of Perth East		Orbit Garant	Hollow Stem Auger Drill Rig
Logged By:	**Date:**	**Stickup (m):**	**Well Depth (mbgs):**
Colin Ross	20-Apr-2020	0.94	7.52
UTM: (NAD 83, Zone 17T)	**Ground Elevation (masl):** 357.8	**Water Level (mbgs):** dry upon completion	**Well Diameter (mm)** 51
Easting: 510821 / **Northing:** 4797119	**Well Screen Type:** 10-Slot PVC, schedule 40	**Riser Pipe Type:** schedule 40 PVC	**Well Screen Length (m):** 3.0

Depth Below Ground Surface (mbgs)	Sample Type	Sample Number	Sample Recovery (%)
	GS	1	
2	SS	2	
	SS	3	
4	SS	4	
6			
	SS	5	
8			
10			
12			

Lithology / Monitoring Well Construction:



Lithology Description

Soil Group Name: grain size,color, density/consistency, moisture, stratification, other descriptors

Rock Description: modifier, color, hardness/degree of concentration, bedding and joint characteristics, solutions, void conditions.

Silty Clay Till: Brown, dry to moist, clayey silt with some stones, poorly sorted (tilled near surface) soft, firm to dense with depth.

Becomes gray at 3m

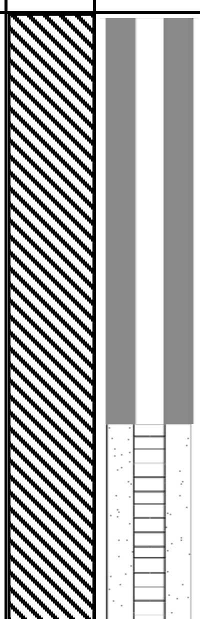
Ground Water Level Upon Well Completion (mbgs)

Seal (grout / hole plug) **Silica Sand Pack** **Well Screen**

AZIMUTH ENVIRONMENTAL CONSULTING, INC.
Environmental Assessments & Approvals

Project:	Project Number:	Client:	Borehole ID:
South Easthope Landfill Site	20-003	Twp of Perth East	OW9
Project Location:		**Drilling Contractor:**	**Drilling Method:**
2439 Line 29, Township of Perth East		Orbit Garant	Hollow Stem Auger Drill Rig
Logged By:	**Date:**	**Stickup (m):**	**Well Depth (mbgs):**
Colin Ross	20-Apr-2020	0.86	7.63
UTM: (NAD 83, Zone 17T)	**Ground Elevation (masl):** 359.9	**Water Level (mbgs):** dry upon completion	**Well Diameter (mm)** 51
Easting: 510863	**Well Screen Type:**	**Riser Pipe Type:**	**Well Screen Length (m):**
Northing: 4797158	10-Slot PVC, schedule 40	schedule 40 PVC	3.0

Depth Below Ground Surface (mbgs)	Sample Type	Sample Number	Sample Recovery (%)	Lithology	Monitoring Well Construction	Lithology Description
						Soil Group Name: grain size,color, density/consistency, moisture, stratification, other descriptors **Rock Description:** modifier, color, hardness/degree of concentration, bedding and joint characteristics, solutions, void conditions.
	GS	1				**Silty Clay Till:** Brown, dry to moist, clayey silt with some stones, poorly sorted (tilled near surface) soft, firm to dense with depth.
2	SS	2				Becomes gray at 3m
	SS	3				
4	SS	4				
6						
	SS	5				
8						
10						
12						



Ground Water Level Upon Well Completion (mbgs)

Seal (grout / hole plug)

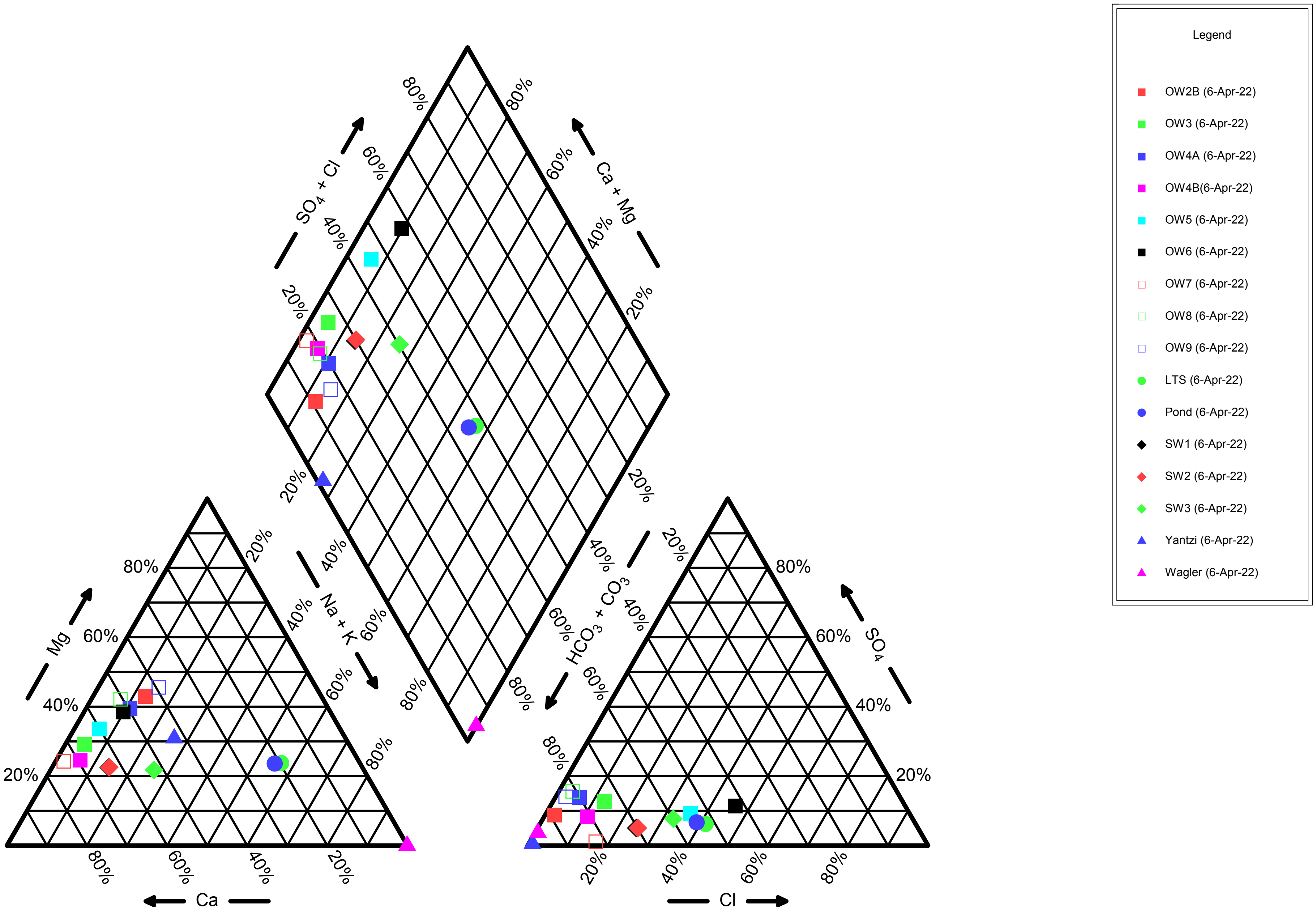
Silica Sand Pack

Well Screen

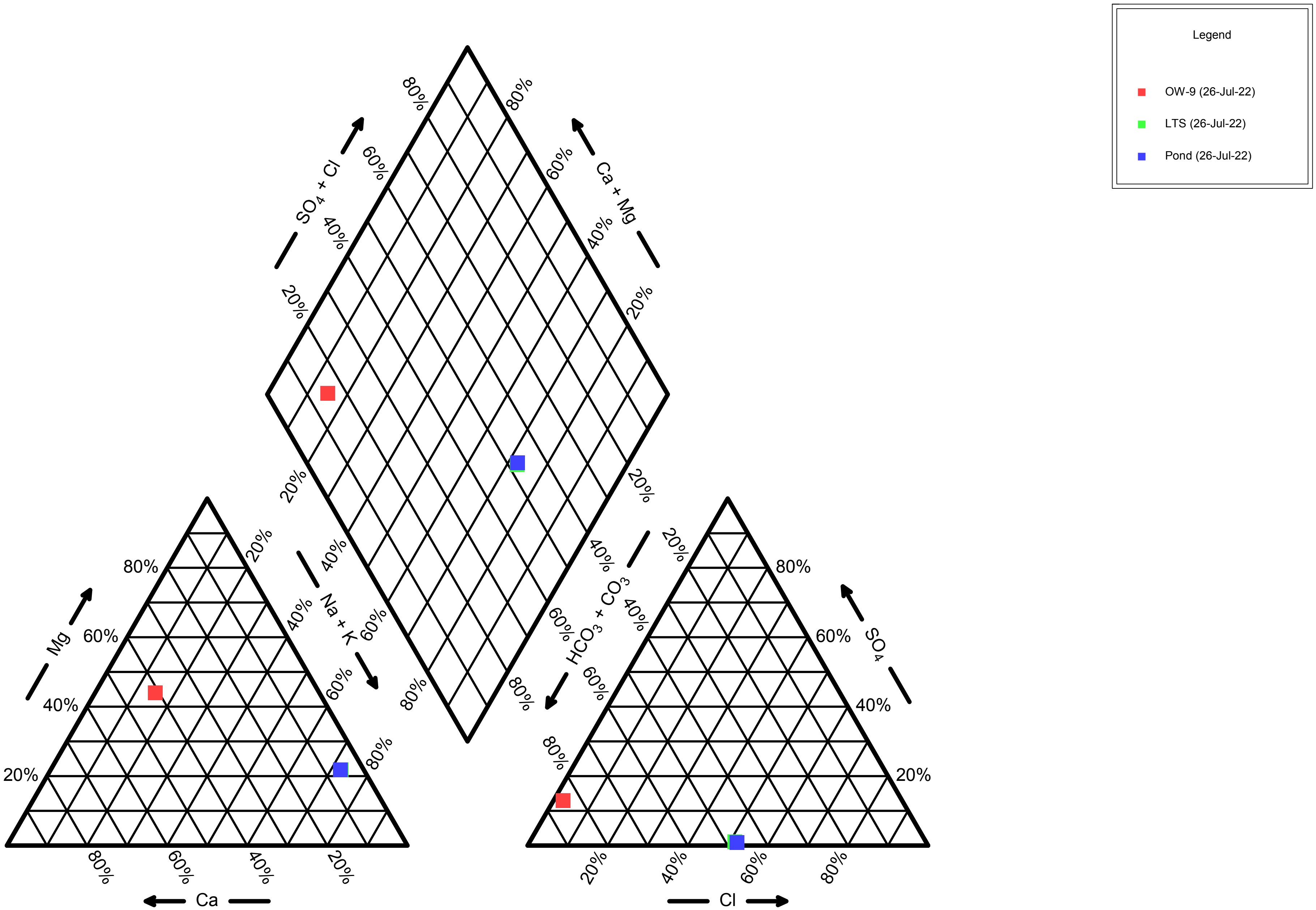
APPENDIX D

Piper Diagrams

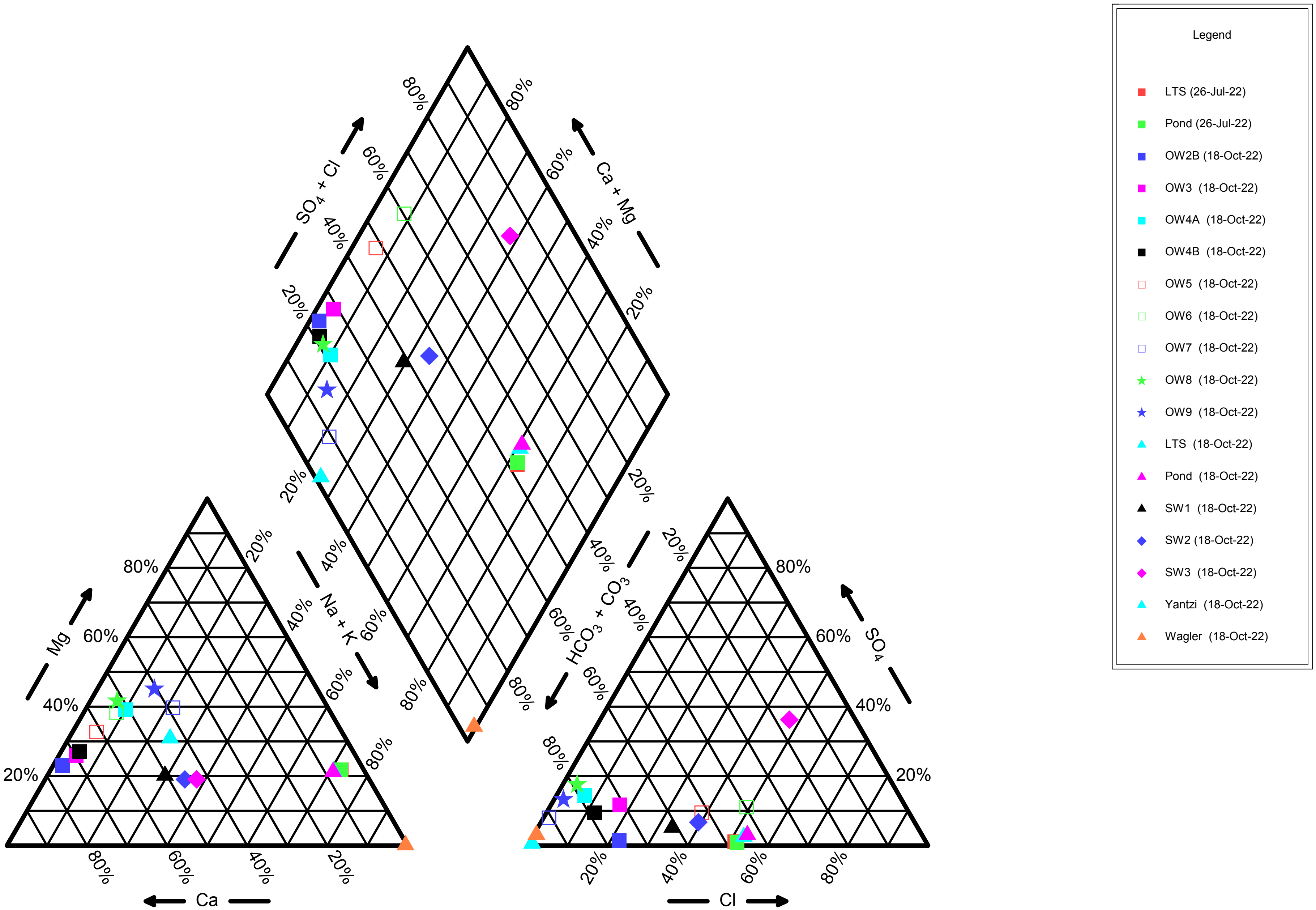
Piper Diagram - April 2022



Piper Diagram - July 2022



Piper Diagram - October 2022



APPENDIX E

Certificate of Approval & MECP Correspondence

L75
C of A

02-055

Ministry of the Environment
Ministère de l'Environnement

Ontario

AMENDED CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS
NUMBER 0032-5ZBJJH

The Corporation of the Township of Perth East
PO Box 455
Milverton, Ontario
N0K 1M0

Site Location: South Easthope Landfill
Lot 26, Concession 5
Perth East Township, County of Perth

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

existing stormwater management facilities and establishment of leachate collection, treatment and disposal system to service the South Easthope Landfill Site, located at the above site location and consisting of the following *Works*:

STORMWATER MANAGEMENT

The stromwater collection, treatment and disposal facilities constitute of the following *Previous Works*:

- approximately 600 m of ditches and swales to collect stormwater from the landfill site;
- two (2) stormwater ponds (Pond 1 and Pond 2) connected in series having approximate volumes of 400 m^3 and 320 m^3, respectively and approximate areas of 270 m^2 and 220 m^2, respectively;
- approximately 25 m of vegetated riprap channel to the property boundary; and
- approximately 300 m of swale receiving stormwater from the vegetated riprap channel and discharging to the Wilhelm Drain.

LEACHATE COLLECTION AND DISPOSAL

The leachate collection, treatment and disposal system consists of the following:

- three (3) existing temporary storage ponds adjacent to the waste area to collect leachate from the waste cells, each measuring 40 m x 20 m x 2.5 m deep;

- one (1) 40 m x 20 m x 2.5 m deep proposed permanent holding pond having a volume of greater than 400 m^3 and an area of approximately 300 m^2 for secondary solids removal and balancing leachate received from the temporary ponds;

- one (1) pumping chamber of 1,000 L capacity for dosing the Waterloo Biofilter System reactor equipped with a dosing pump capable of pumping 1.1 L/s at 5 m TDH;

- one (1) 2.5 m diameter x 2.5 m high Waterloo Biofilter System bioreactor filled with foam media rated to handle flowrate up to 5 m^3/day;

- one (1) pumping chamber of 1,000 L capacity for recirculation and discharge to the pressure trench equipped with a discharge pump rated to pump 2.3 L/s at 5 m TDH;

- approximately 100 m long, 30 cm deep x 30 cm wide shallow buried pressure trench constructed fed from the center and having at least one inspection port for each 30 m of lateral; and

- all associated controls and appurtenances necessary for the operation of the *Works*.

all in accordance with the Application for Approval of Municipal and Private Sewage Works submitted by the Township of Perth East dated August 25, 2003 along with a design letter brief (modified on April 16, 2004), drawings and supporting data.

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

"*Act*" means the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended;

"*Certificate*" means this entire certificate of approval document, issued in accordance with Section 53 of the *Act*, and includes any schedules;

"*Director*" means any *Ministry* employee appointed by the Minister pursuant to section 5 of the *Act*;

"*District Manager*" means the *District Manager* of the London District Office of the Ministry;

"*Ministry*" means the Ontario Ministry of the Environment;

"*Owner*" means The Corporation of the Township of Perth East and includes its successors and assignees;

"*Previous Works*" means those portions of the sewage works previously constructed and approved under a certificate of approval;

"Proposed Works" means the sewage works described in the *Owner*'s application, this *Certificate* and in the supporting documentation referred to herein, to the extent approved by this *Certificate*;

"*Regional Director*" means the Regional Director of the Southwestern Region of the Ministry;

"Substantial Completion" has the same meaning as *"substantial performance"* in the Construction Lien Act; and

"*Works*" means the sewage works described in the *Owner*'s application, this *Certificate* and in the supporting documentation referred to herein, to the extent approved by this *Certificate* and includes both *Previous Works* and *Proposed Works*.

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

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

(1) The *Owner* shall ensure that any person authorized to carry out work on or operate any aspect of the *Works* is notified of this *Certificate* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

(2) Except as otherwise provided by these Conditions, the *Owner* shall design, build, install, operate and maintain the *Works* in accordance with the description given in this *Certificate*, the application for approval of the *Works* and the submitted supporting documents and plans and specifications as listed in this *Certificate*.

(3) Where there is a conflict between a provision of any submitted document referred to in this *Certificate* and the Conditions of this *Certificate*, the Conditions in this *Certificate* shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

(4) Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

(5) The requirements of this *Certificate* are severable. If any requirement of this *Certificate*, or the application of any requirement of this *Certificate* to any circumstance, is held invalid or unenforceable, the application of such

requirement to other circumstances and the remainder of this *Certificate* shall not be affected thereby.

2. EXPIRY OF APPROVAL

The approval issued by this *Certificate* will cease to apply to those parts of the *Works* which have not been constructed within five (5) years of the date of this *Certificate.*

3. CHANGE OF OWNER

(1) The *Owner* shall notify the *District Manager* and the *Director*, in writing, of any of the following changes within 30 days of the change occurring:

(a) change of *Owner*;

(b) change of address of the *Owner*;

(c) change of partners where the *Owner* is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c.B17 shall be included in the notification to the *District Manager*;

(d) change of name of the corporation where the *Owner* is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C 39 shall be included in the notification to the *District Manager*;

(2) In the event of any change in ownership of the *Works*, other than a change to a successor municipality, the *Owner* shall notify in writing the succeeding owner of the existence of this *Certificate*, and a copy of such notice shall be forwarded to the *District Manager* and the *Director*.

4. UPON THE SUBSTANTIAL COMPLETION OF THE WORKS

Within one year of the Substantial Completion of the *Proposed Works*, a set of as-built drawings showing the *Works* "as constructed" shall be prepared. These drawings shall be kept up to date through revisions undertaken from time to time and a copy shall be retained at the *Works* or at operational office of the *Owner* for the operational life of the *Works*.

5. MONITORING AND RECORDING

(1) The *Owner* shall, upon commencement of operation of the *Works*, carry out the following monitoring program:

(a) Leachate Monitoring

Pond.

(i) influent leachate samples shall be collected in April, July and October each year from the existing temporary (leachate) storage ponds prior to the leachate entering the permanent holding pond and shall be analyzed for the following parameters:

pH	chlorides
alkalinity	sulphates
conductivity	calcium
total suspended solids	barium
chemical oxygen demand (COD)	boron
5-day biochemical oxygen demand (BOD_5)	sodium
total Kjeldahl nitrogen (TKN)	iron
total ammonia nitrogen	magnesium
nitrates	

LTS.

(ii) effluent leachate samples shall be collected in April, July and October each year from the pumping chamber discharging to the pressure trench and shall be analyzed for the parameters listed in columns 2 and 3 of Table 1. The samples collected in April and October shall be analyzed for the indicator parameters listed in column 3 of Table 1 while the sample collected in July shall be analyzed for the comprehensive parameters listed in column 2 of Table 1.

(b) Groundwater Monitoring

OW6.

(i) Groundwater samples shall be collected in April, July and October each year from a groundwater monitoring well installed upgradient of the pressure trench at the West property line (adjacent to the trench) and shall be analyzed for the parameters listed in columns 4 or 5 of Table 1. The samples collected in April and October shall be analyzed for the indicator parameters listed in column 5 of Table 1 while the sample collected during July shall be analyzed for the comprehensive parameters listed in column 4 of Table 1.

(c) Surface Water Monitoring

SW 3

(i) Surface water samples shall be collected twice each year in Spring and

Autumn at the outlet of Pond 2 and shall be analyzed for the parameters listed in column 4 of Table 1.

Table 1.

Parameter (Column 1)	Leachate Monitoring		Ground and Surface Water Monitoring	
	Comprehensive Parameter (Column 2)	**Indicator Parameter** (Column 3)	**Comprehensive Parameter** (Column 4)	**Indicator Parameter** (Column 5)
General				
Alkalinity	X	X	X	X[2]
BOD_5	X	X	X[1]	
COD	X	X	X[1]	
DOC	X	X	X[2]	X[2]
Phenol	X		X	
Sulphate	X	X	X	X[2]
Total Dissolved Solids	X	X	X	X[2]
Suspended Solids	X	X	X[1]	
General - Nutrients				
Ammonia	X	X	X	X[2]
Nitrate	X	X	X	X[2]
Nitrite	X		X	
TKN	X		X	
Total Phosphorus	X		X	
General - Major Ions				
Chloride	X	X	X	X[2]
Calcium	X	X	X[2]	X[2]
Iron	X	X	X	X[2]
Magnesium	X	X	X[2]	X[2]
Manganese	X		X[2]	
Potassium	X		X[2]	
Sodium	X	X	X[2]	X[2]
Trace Metals				
Arsenic	X		X	
Barium	X	X	X	X[2]
Boron	X	X	X	X[2]
Cadmium	X		X	
Chromium	X		X	

Copper	X		X	
Lead	X		X	
Mercury	X		X	
Zinc	X		X	
Volatiles				
Benzene	X		X[2]	
1,4 Dichlorobenzene	X		X[2]	
Dichloromethane	X		X[2]	
Toluene	X		X[2]	
Vinyl Chloride	X		X[2]	
Field Test				
Temperature			X[1]	
Conductivity	X	X	X	X[2]
Dissolved Oxygen			X[1]	
pH	X	X	X	X[2]

[1]Only for surface water and [2]only for groundwater.

(2) The *Owner* shall retain for a minimum of three (3) years from the date of their creation, all records and information related to or resulting from the monitoring activities required by this *Certificate*.

6. OPERATION AND MAINTENANCE

(1) The Owner shall review and assess monitoring results from the surface water sampling point outlined in Section 5 "Surface Water Monitoring" of this *Certificate* against the following trigger points in Table 2:

Table 2.

Trigger Concentrations for Surface Water Monitoring	
Parameter	**Trigger Concentration** (milligrams per litre)
$CBOD_5$	>10.0
Ammonia (un-ionized)*	>0.1
Chlorides	>250

* Note: Ammonia (un-ionized) concentration shall be calculated from the monitoring results of ammonia, pH, and field temperature.

(2) In the event that a monitoring result for any of the trigger parameters listed in Table 2 exceeds the corresponding trigger concentration, the *Owner* shall notify the *District Manager* within seven (7) days of the receipt of the analytical results.

(3) The *Owner* shall exercise due diligence in ensuring that, at all times, the *Works* and the related equipment and appurtenances used to achieve compliance with this *Certificate* are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate operator staffing and training, including training in all procedures and requirements of this *Certificate*, the Act and regulations, process controls and alarms.

(4) The *Owner* shall prepare an operations manual within six (6) months of Substantial Completion of the *Proposed Works*, that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the *Works*;

(b) inspection programs, including frequency of inspection, for the *Works* and the methods or tests employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the *Works*;

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a spill prevention control and countermeasures plan, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the *District Manager*; and

(f) procedures for receiving, responding and recording public complaints, including recording any follow up actions taken.

(5) The *Owner* shall maintain the operations manual current and retain a copy at the location of the *Works* or operational office of the *Owner* for the operational life of the *Works*. Upon request, the *Owner* shall make the manual available to *Ministry* staff.

(6) The *Owner* shall provide for the overall operation of the *Works* with an operator who holds a licence that is applicable to that type of facility and that is of the same class as or higher than the class of the facility in accordance with Ontario Regulation 435/93.

(7) The *Owner* shall undertake an inspection of the condition of the stormwater management ponds and ditches, at least once a year, and undertake any necessary cleaning and maintenance to prevent the excessive build-up of sediment and/or decaying vegetation.

(8) The *Owner* shall undertake visual inspection of the trench bed and the field immediately adjacent to the trench bed for outbreak and seepage, at least twice a year, and undertake any necessary maintenance to prevent the outbreak or seepage.

(9) The *Owner* shall maintain a logbook to record the results of the stormwater management pond and the trench bed plus field inspections, and any cleaning and maintenance operations undertaken and shall keep the logbook at the site or operational office of the *Owner* for inspection by the *Ministry*.

7. REPORTING

(1) One week prior to the start up of the operation of the *Proposed Works*, the *Owner* shall notify the *District Manager* (in writing) of the pending start up date.

(2) In addition to the obligations under Part X of the Environmental Protection Act, the *Owner* shall, within 10 working days of the occurrence of any reportable spill as defined in Ontario Regulation 675/98, loss of any product, by-product, intermediate product, oil, solvent, waste material or any other polluting substance into the environment, submit a full written report of the occurrence to the *District Manager* describing the cause and discovery of the spill or loss, clean-up and recovery measures taken, preventative measures to be taken and schedule of implementation.

(3) The *Owner* shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to *Ministry* staff.

(4) The *Owner* shall prepare and submit to the *District Manager*, a performance report, on an annual basis, within ninety (90) days following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the *Works* and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a description of any operating problems encountered and corrective actions taken;

(b) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the *Works*;

(c) a summary of all stormwater and leachate monitoring results undertaken in the reporting period and the total volume of leachate disposed off site;

(d) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;

(e) any other information the *District Manager* requires from time to time.

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

1. Condition 1 is imposed to ensure that the *Works* are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the *Certificate* and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The condition also advises the *Owner's* their responsibility to notify any person they authorized to carry out work pursuant to this *Certificate* the existence of this *Certificate*.

2. Condition 2 is included to ensure that, when the *Works* are constructed, the *Works* will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the *Ministry* records are kept accurate and current with respect to the approved works and to ensure that subsequent owners of the *Works* are made aware of the *Certificate* and continue to operate the *Works* in compliance with it.

4. Condition 4 is included to ensure that the *Works* are constructed in accordance with the approval and that record drawings of the *Works* "as constructed" are maintained for future references.

5. Condition 5 is included to enable the *Owner* to evaluate and demonstrate the performance of the *Works*, on a continual basis, so that the *Works* are properly operated and maintained at a level which is consistent with the design objectives specified in the *Certificate* and that the *Works* does not cause any impairment to the groundwater and receiving watercourse.

6. Condition 6 is included to require that the *Works* be properly operated, maintained, funded, staffed and equipped such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the owner and made available to the *Ministry*. Such a manual is an integral part of the operation of the *Works*. Its compilation and use should assist the *Owner* in staff training, in proper plant operation and in identifying and planning for contingencies during possible abnormal conditions. The manual will also act as a benchmark for *Ministry* staff when reviewing the *Owner*'s operation of the *Works*.

7. Condition 7 is included to provide a performance record for future references, to ensure that the *Ministry* is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this *Certificate,* so that the *Ministry* can work with the *Owner* in resolving any problems in a timely manner.

This Certificate of Approval revokes and replaces Certificate(s) of Approval No. 3-0762-88-906 issued on

Iarch 14, 1990

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary* Environmental Review Tribunal 2300 Yonge St., 12th Floor P.O. Box 2382 Toronto, Ontario M4P 1E4	AND	The Director Section 53, *Ontario Water Resources Act* Ministry of the Environment 2 St. Clair Avenue West, Floor 12A Toronto, Ontario M4V 1L5

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

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 4th day of August, 2004

THIS CERTIFICATE WAS MAILED
ON Aug. 5, 2004
9C
(Signed)

Mohamed Dhalla, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

ZB/

- District Manager, MOE London - District
  Mike Jones, Azimuth Environmental Consulting, Inc.

02-055
Landfill

Ministry of the Environment
Ministère de l'Environnement
Ontario

AMENDED PROVISIONAL CERTIFICATE OF APPROVAL
WASTE DISPOSAL SITE
NUMBER A150902
Issue Date: May 24, 2007

The Corporation of the Township of Perth East
PO Box 455, 25 Mill Street East
Milverton, Ontario
N0K 1M0

Site Location: South Easthope Landfill
Lot 26, Concession 5
Perth East Township, County of Perth

You have applied in accordance with Section 27 of the Environmental Protection Act for approval of:

For the use and operation of a 5.0 hectare landfilling site within a total site area of 29.6 hectares, being known as the South Easthope Landfill

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

a) "*Regulation 347* " means Ontario Regulation 347 R.R.O. 1990

b) "*Owner* " means the Corporation of the Township of Perth East;

c) "*Reasonable Use Guideline* " means the Ministry Guideline B-7 entitled "Incorporation of the Reasonable Use Concept into MOE Groundwater Management Activities, dated April 1994, as amended

d) "*Director* " means Director, Section 39, Environmental Protection act, R.S.0. 1990, C.E-19 as amended;

e) "*District Manager* " means the District Manager in the London District Office, Southwestern Region, Ontario Ministry of the Environment;

f) "*Certificate* " means this Provisional Certificate of Approval including all Notices of Amendment;

g) "*Ministry* " means the Ontario Ministry of the Environment;

h) "*Point of Compliance* " means the boundary at which MOE Guideline B-7 shall be evaluated;

i) "*CAZ* " means the Contaminated Attenuation Zone;

j) "*EPA* " means the Environmental Protection Act, R.S.O. 1990, C.E-19 as amended; and

k) "*OWRA* " mean the Ontario Water Resource Act, R.S.O 1990, Chapter O.40

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

TERMS AND CONDITIONS

I. GENERAL

Compliance

1. The *Owner* and Operator shall ensure compliance with all the conditions of this Certificate and shall ensure that any person authorized to carry out work on or operate any aspect of the *Site/System* is notified of this *Certificate* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

2. Any person authorized to carry out work on or operate any aspect of the *Site/System* shall comply with the conditions of this *Certificate* .

In Accordance

3. Except as otherwise provided for in this *Certificate* , the *Site* shall be designed, developed, built, operated and maintained in accordance with the application for this *Certificate* , dated November 21, 2006, and the supporting documentation listed in Schedule A.

Interpretation

4. Where there is a conflict between a provision of any document, including the application, referred to in this *Certificate* , and the conditions of this *Certificate,* the conditions in this *Certificate* shall take precedence.

5. Where there is a conflict between the application and a provision in any documents listed in Schedule "A", the application shall take precedence, unless it is clear that the purpose of the document was to amend the application and that the *Ministry* approved the amendment.

6. Where there is a conflict between any two documents listed in Schedule "A", other than the application, the document bearing the most recent date shall take precedence.

7. The conditions of this *Certificate* are severable. If any condition of this *Certificate* , or the application of any condition of this *Certificate* to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder

of this *Certificate* shall not be affected thereby.

Other Legal Obligations

8. The issuance of, and compliance with, this *Certificate* does not:

   a. relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement; or

   b. limit in any way the authority of the *Ministry* to require certain steps be taken or to require the *Owner* and *Operator* to furnish any further information related to compliance with this *Certificate* ;

Adverse Effect

9. The Owner and Operator shall take steps to minimize and ameliorate any adverse effect on the natural environment or impairment of water quality resulting from the ***Site*** , including such accelerated or additional monitoring as may be necessary to determine the nature and extent of the effect or impairment.

10. Despite an Owner, Operator or any other person fulfilling any obligations imposed by this *Certificate* the person remains responsible for any contravention of any other condition of this *Certificate* or any applicable statute, regulation, or other legal requirement resulting from any act or omission that caused the adverse effect to the natural environment or impairment of water quality.

Change of Owner

11. The *Owner* shall notify the *Director* , in writing, and forward a copy of the notification to the *District Manager* , within 30 days of the occurrence of any changes in the following information:

    i. the ownership of the *Site* ;
    ii. the Operator of the *Site* ;
    iii. the address of the *Owner* or *Operator* ;
    iv. the partners, where the *Owner* or *Operator* is or at any time becomes a partnership and a copy of the most recent declaration filed under the *Business Names Act* , R. S. O. 1990, c. B.17, shall be included in the notification;

12. No portion of this *Site* shall be transferred or encumbered prior to or after closing of the *Site* unless the *Director* is notified in advance and sufficient financial assurance is deposited with the *Ministry* to ensure that these conditions will be carried out. In the event of any change in *Ownership* of the works, other than change to a successor municipality, the *Owner* shall notify the successor of and provide the successor with a

copy of this *Certificate* , and the Owner shall provide a copy of the notification to the *District Manager* and the *Director.*

Certificate of Registration

13. Pursuant to Section 197 of the *EPA* , no person having an interest in the *Site* shall deal in any way with the *Site* without first giving a copy of this *Certificate* to each person acquiring an interest in the *Site* as a result of the dealing.

14. Two copies of a completed Certificate of Prohibition, containing a registerable description of the *Site* , shall be submitted to the Director for the Directors signature within 60 calendar days of the date of this *Certificate* for any landfilled owned lands that are not yet registered on title to the landfill.

15. The Certificate of Prohibition shall be registered in the appropriate land registry office on title to the *Site* by the *Owner* within 10 calendar days of receiving the Certificate of Prohibition signed by the *Director,* and a duplicate registered copy shall be submitted to the *Director* .

Inspections

16. No person shall hinder or obstruct a *Provincial Officer* from carrying out any and all inspections authorized by the *OWRA* , the *EPA* , or the *PA* , of any place to which this *Certificate* relates, and without limiting the foregoing:

    a. to enter upon the premises where the approved works are located, or the location where the records required by the conditions of this *Certificate* are kept;
    b. to have access to, inspect, and copy any records required to be kept by the conditions of this *Certificate* ;
    c. to inspect the *Site,* related equipment and appurtenances;
    d. to inspect the practices, procedures, or operations required by the conditions of this *Certificate* ; and
    e. to sample and monitor for the purposes of assessing compliance with the terms and conditions of this *Certificate* or the *EPA* , the *OWRA* or the *PA* .

Information and Records Retention

17. Any information requested, by the *Ministry* , concerning the *Site* and its operation under this *Certificate* , including but not limited to any records required to be kept by this *Certificate* shall be provided to the Ministry, upon request, in a timely manner. Records shall be retained for two (2) years except for as otherwise authorized in writing by the Director.

18. The receipt of any information by the *Ministry* or the failure of the *Ministry* to prosecute any person or to require any person to take any action, under this *Certificate* or under any statute, regulation or other legal requirement, in relation to the information, shall not be construed as:

a. an approval, waiver, or justification by the *Ministry* of any act or omission of any person that contravenes any term or condition of this *Certificate* or any statute, regulation or other legal requirement; or

b. acceptance by the *Ministry* of the informations completeness or accuracy.

II. Design, Operations and Maintenance

19. (1) Approval is hereby granted to design and operation in accordance with Item 1 through 10 in Schedule "A".

(2) The maximum capacity for the site is 272,000 cubic meters including final cover.

20. Any changes to the Site Design and Operation Manual shall be submitted to the *Director* for acceptance prior to their implementation.

21. A sign shall be posted in a prominent location at the *Site* entrance clearly stating the *Owne* r's name, Operator's name, Provisional Certificate of Approval Number, the hours of operation and contact telephone number to call with complaints or in the event of an emergency.

22. No burning or incineration of any materials shall be permitted at the *Site* .

23. Cover shall be placed over the entire working face with a minimum thickness of 150 mm of soil cover or an approved thickness of alternative cover material on a weekly basis.

24. Intermediate Cover shall be placed in areas where landfilling has been temporarily discontinued for six (6) months or more. A minimum thickness of 300 mm of soil cover or an approved thickness of alternative cover material shall be placed.

25. Clean wood chips may be used as weekly cover material (150 mm thickness)

26. The *Owner* shall undertake litter pick-up around the property in the early spring and late fall, including the fenceline and any surface water bodies on the property. The owner shall also undertake regularly scheduled litter pick-ups around the site between the months of May and September or as required after blustery days.

27. The Vector/Vermin control plan be undertaken by the *Owner* in accordance with the Vector/Vermin Control Plan set out in Schedule "B".

III. Record Keeping

28. The *Owner* shall establish and maintain a written record of daily operations at the *Site* . This record must be in a form of a log or a dedicated electronic file and it shall include as a minimum the following information:

    a) date of record;
    b) hours of operation;
    c) an approximation of the type, amount and source of waste received;
    d) an estimate on the amount of recyclable materials (depending on item - i.e. number of containers, number of tires, appliances, batteries) removed from the site by the licensed hauler retained by the owner;

29. The *Owner* shall establish and maintain a written record of all environmental emergency situations at the *Site* . This record shall be in the form of a log or a dedicated electronic file and it shall include, as a minimum, the following information:

    a) type of the emergency situation and the resulting environmental impact;
    b) actions taken to address the impact; and
    c) actions taken to prevent the re-occurrence of a similar emergency situation in the future.

30. The *Owner* shall establish and maintain a written record of complaints received about the *Site* . The records shall be kept at the municipal office. This record shall be in the form of a log or a dedicated electronic file and it shall include, as a minimum, the following information:

    a) date and time of any complaints received at the Site and their nature;
    b) name, address and telephone number of the complainant;
    c) nature of the complaint;
    d) date and description of any remedial actions taken to address the received complaints; and
    e) actions taken to prevent the re-occurrence of a similar incident, in the future.

31. The *Owner* shall establish and maintain a written record of the site inspections. This record shall be in the form of a log or a dedicated electronic file and it shall include, as a minimum, the following information:

    a) date and time of inspection;
    b) name, title and signature of trained personnel conducting the inspection; and
    c) a listing of all equipment, fencing, signs, etc. inspected and any deficiencies observed; and

d) recommendations for remedial action and the completion date of such action.

32. The *Owner* shall establish and maintain a written record of all occurrences of unapproved waste landfilled at the *Site* . This record shall be in a form of a log or a dedicated electronic file and it shall include, as a minimum, the following information:

a) waste generator (if known);
b) type of unapproved waste;
c) an approximation on the amount of unapproved waste;
d) nature of unapproved waste;
e) steps taken to remove waste material; and
f) actions taken by the Owner to prevent recurrence.

33. The *Owner* shall retain at the Municipal Office for a minimum of two (2) years from the date of their creation, or longer if requested in writing by the *District Manager* , all records and information relating to or resulting from the activities approved under this Certificate, and shall make all records and information available at all times for inspection by a Provincial Officer. A copy of the Design, Operations and Maintenance Plan shall be kept at the Site.

IV. Environmental Monitoring and Trigger Mechanisms

34. (1) Groundwater and surface water monitoring shall be undertaken by the *Owner* in accordance with the environmental monitoring program set out in Schedule "C".

(2) The *Owner* may make request to changes to the monitoring program to the *District Manager* in accordance with the recommendations of the annual report as described in Condition 41 (2).

(3) Within fourteen (14) days of receiving the written correspondence from the District Office confirming that the District Office is in agreement with the proposed changes to the environmental monitoring program identified in Condition 34(2), the Owner shall forward a letter identifying the proposed changes and a copy of the correspondences from the District Manager and all other correspondences and responses related to Condition 34(2) and 41(2), to the *Director* requesting the *Certificate* be amended to approve the proposed changes to the environmental monitoring plan.

(4) In the event any other changes to the environmental monitoring program are proposed outside of the recommendation of the annual report, the *Owner* shall follow current ministry procedures for seeking approval for amending the Certificate of Approval.

35. The groundwater trigger mechanism plan and contingency plan is approved in accordance with Items 8 and 9 in Schedule "A".

36. In the event of a confirmed exceedance of a site-specific trigger level relating to leachate mounding or groundwater or surface water impacts due to leachate at the site's point of compliance, the Owner shall immediately notify the District Manager, and an investigation into the cause and the need for implementation of remedial or contingency actions shall be carried out by the Owner in accordance with the approved trigger mechanisms and associated contingency plans.

37. If monitoring results, investigative activities and/or trigger mechanisms indicate the need to implement contingency measures, the Owner shall ensure that the following steps are taken:

a.) The *Owner* shall notify the *District Manager* , in writing of the need to implement contingency measures, no later than 30 days after confirmation of the exceedances;
b.) Detailed plans, specifications and descriptions for the design, operation and maintenance of the contingency measures shall be prepared and submitted by the *Owner* to the *Director* for approval; and
c.) The contingency measures shall be implemented by the *Owner* upon approval by the *Director* .

38. The *Owner* shall ensure that any proposed changes to the site-specific trigger levels for leachate impacts to the surface water or groundwater, shall be approved in advance by the *Director* via an amendment to this *Certificate.*

V. Leachate Treatment System

39. The *Owner* shall provide to the *District Office* in writing no later than seven (7) days after implementation, any changes in the design, operation and maintenance plan relating to the LTS.

40. The owner shall submit to the *District Manager* in writing, no later than thirty (30) days prior to implementation, any plans to implement upgrades to the LTS.

VI. Annual Report

41. (1) By no later than **June 30, 2007**, and by every other June 30 thereafter, the proponent shall submit, to the MOE *District Manager,* an annual report. The report shall be prepared by an qualified professional engineer, hydrogeologist and/or surface water specialist. The report shall contain, but is not limited to, the following information:

a) a summary of type and quantity of incoming waste accepted during the reporting period;

b) a summary of total amount of waste received at the site, remaining capacity and remaining life expectancy of the site;

c) a summary of the site's operation procedure and compliance as per the Design and Operation Plan;

d) a summary of recycling operations;

e) a section of text describing the landfill's hydrogeologic setting;

f) a location map illustrating the site relative to nearby existing groundwater and surface water features, based on known information;

g) a site plan(s) illustrating the approved landfill footprint and currently filled area;

h) a water table contour map;

i) stratigraphic cross-sections which clearly illustrate the subsurface distribution of geological materials;

j) the report shall document sampling protocols, and describe any problems encountered during the sampling runs which may have impacted the reliability of analytical results;

k) all data shall be interpreted by the author(s) and shall be presented in a form that is easy to follow. All analytical results for all parameters must be presented in tabular form. All analytical results for the critical contaminants must be presented graphically on time-series graphs, and must be compared to the trigger levels in accordance with the environmental contingency plan that was established in the reasonable use assessment. Trends of ground water quality must be presented graphically on Piper or Durov plots and interpreted.

l) the report shall identify the "Reasonable Use" (Guideline B-7) of the ground water that is to be impacted. The report should also identify expected and worst-case impacts;

m) the report shall include the calculation of major ion balances for the groundwater sample analytical results. The % difference between the sums (expressed as milliequivalents per litre) of major cations and major anions shall be calculated. The % difference is defined as:

$$\% \text{ difference} = 100 \text{ x } \frac{\sum \text{cation} - \sum \text{anion}}{\sum \text{cation} + \sum \text{anion}}$$

If the analytical result of a ground water sample has an anion-cation balance % difference of greater than ±10%, the Owner must take action to determine the cause of the imbalance, and ensure that it is addressed in future groundwater sampling and analyses;

n) the report shall include a comparison of the results of surface water sampling to the PWQOs or Interim PWQOs described in Water Management, MOEE, July 1994, as amended from time to time;

o) discussion of the Site's Contaminated Attenuation Zone (CAZ);

p) QA/QC protocol shall be described; and

q) the report shall include conclusions and recommendations of the author(s), especially as they concern future sampling parameters, frequency and protocol.

r) a discussion on the effects of the LTS to the groundwater system and the landfill.

s) copies of the boreholes logs for the site.

(2) In the event the *Owner* recommends any changes to the environmental monitoring plan in the Annual Report, the *Owner* shall provide a cover letter with the submission of the annual report that clearly indicates the report contains proposed changes to the environmental monitoring plan and request the District Office review the proposed changes. The cover letter shall be addressed to the *District Manager* .

VI. Closure Plan

42. At least 2 years prior to the anticipated date of closure of this *Site* , the *Owner* shall submit to the *Director* for approval, with copies to the *District Manager* , a detailed site closure plan pertaining to the termination of landfilling operations at this *Site* , post-closure inspection, maintenance and monitoring, and end use, based on the Landfill Closure Section of the Design and Operations Report. The plan shall include the following:

a. a plan showing the *Site* appearance after closure;

b. a description of the proposed end use of the *Site* ;

c. a descriptions of the procedures for closure of the *Site,* including:

i. advance notification to the public of the landfill closure;

ii. posting of a sign at the Site entrance indicating the landfill is closed and identifying any alternative waste disposal arrangements;

iii. completion, inspection and maintenance of the final cover and landscaping;

iv. site security;

v. removal of unnecessary landfill-related structures, buildings and facilities;

vi. final construction of any control, treatment, disposal and monitoring facilities for leachate, groundwater, surface water and landfill gas; and

vii. a schedule indicating the time-period for implementing sub-conditions i) to vi) above.

d. descriptions of the procedures for post-closure care of the Site, including:

   i. operation, inspection and maintenance of the control, treatment, disposal and monitoring facilities for leachate, groundwater, surface water and landfill gas;
   ii. record keeping and reporting; and
   iii. complaint contact and response procedures;

e. an assessment of the adequacy of and need to implement the contingency plans for leachate and methane gas; and
f. an updated estimate of the contaminating life span of the *Site* , based on the results of the monitoring programs to date.

43. The *Site* shall be closed in accordance with the closure plan as approved by the *Director.*

Schedule "A"

1. Letter dated November 29, 2004 to Mr. Glenn Schwendinger, Township of Perth East from Mr. Mike Jones, Azimuth Environmental Consulting providing a Vector/Vermin Plan for the South Easthope and Ellice Landfills.

2. Report entitled *"Trigger Mechanism and Contingency Plan and the Design and Operations Plan for the South Easthope Landfill"* prepared for the Corporation of the Township of Perth East by Azimuth Environmental Consulting Inc. dated February 2005.

3. Letter dated May 5, 2005 addressed to Mr. Glenn Schwendinger, Corporation of the Township of Perth East from Mr. Dale I. Gable, Ministry of the Environment providing comments and requesting additional information on the submitted Design and Operations Plan.

4. Letter dated June 7, 2005 addressed to Mr. Dale Gable, Ministry of the Environment from Mr. Mike Jones, Azimuth Environmental Consulting Inc. providing a response to May 5, 2005 letter.

5. Letter dated September 14, 2005 addressed to Mr. Glenn Schwendinger, Corporation of the Township of Perth East from Mr. Dale I. Gable, Ministry of the Environment providing additional comments and requesting additional information on the submitted Design and Operations Plan.

6. Letter with supporting documentation dated December 1, 2005 addressed to Mr. Dale Gable, Ministry of the Environment from Mr. Mike Jones, Azimuth Environmental Limited Inc. providing a response to September 14, 2005 letter. The supporting documentation included the following:

    i. Figure No. 2 - Site Location prepared by Azimuth Environmental Consultants Inc. (Project No. 02-055);
    ii. Figure No. 2 - Site Layout prepared by Azimuth Environmental Consultants Inc. (Project No. 02-055) dated February 2005;
    iii. Figure No. 3 - Final Contours prepared by Azimuth Environmental Consultants Inc. (Project No. 02-055) dated February 2005;
    iv. Figure No. 4 - Waste Cell Phasing prepared by Azimuth Environmental Consultants Inc. (Project No. 02-055) dated February 2005;
    v Figure No. 5 - Site Configuration prepared by Azimuth Environmental Consultants Inc. (Project No. 02-055) dated February 2005.

7. Letter dated December 11, 2006 addressed to Mr. Bud Markham, Township of Perth East from Mr. Dale Gable, Ministry of the Environment requesting additional information on the updated information

8. Updated report dated February 2007 entitled "*Trigger Mechanisms and Contingency Plan and the Design and Operations Plan for the South Easthope Landfill* " prepared for the Township of Perth East by Azimuth Environmental Consultants Inc.

9. Letter dated February 26, 2007 addressed to Mr. Dale Gable, Ministry of the Environment from Mr. Mike Jones, Azimuth Environmental Consultants Inc. providing a response to comments on the pressure trench, trigger mechanisms and borehole logs.

10. Email from Mr. Mike Jones, Azimuth Environmental Inc. addressed to Mr. Dale Gable, Ministry of the Environment providing a copy of the existing borehole logs for the site.

Schedule "B"

This Schedule forms part of the Certificate of Approval No. A151001. It describes the Vector/Vermin Control Plan referred to in Condition 27.

1. The site and site buildings shall be inspected on a regular basis as part of the normal site operations. Inspection for animal signs shall be noted on daily operations and shall be logged in the operation logs.

2. Site staff shall note the presence of any animals during standard site operations.

3. Litter collected from around the site as required by Condition 9 shall be placed in the working face.

4. Cover material as required under Condition 6 and 7 shall be placed and maintained to minimize any open refuse.

5. Ensure that the active landfilling face is minimized

6. Recyclables and recovered materials shall be segregated and removed from the site as soon as complete transfer loads are available or before the end of the year, whichever occurs first. This shall minimize the amount of cover available to animals. Materials with standing water are drained or overturned to minimize opportunities for water supply and breeding potential.

7. Grassed areas around the site are not cut since this reduces the loafing potential for gulls. Longer grass could obscure views of approaching predators so that gulls do not feel safe minimizing their residence time at the property. At selected times of the year, long grass can encourage proliferation of insects that are a food source and can encourage the presence of wildlife, however, this shorter duration event is considered to be less important and to date not pose a significant concern such that a change is warranted.

8. If wildlife is evident and populations are increasing above nuissance levels, the site operator shall undertake action to eliminate the attracting mechanism.

9. If rodents or mammals are the issue, the owner shall call a commercial extermination/pest control company to undertake a control program. The pest control company will set up traps and kill significant vermin to return the population to its non-nuissance levels.

10. If vectors are avian, the control program, must also consider controls available under the Migratory Bird Act. If a migratory bird is involved, the owner is limited to disturbance of nesting sites before hatching of young. Other disturbances techniques for adult birds could be used.

11. Activities shall be discussed in the annual monitoring program.

Schedule "C"

This Schedule forms part of the Certificate of Approval No. A151001. It describes the groundwater and surface water monitoring program referred to in Condition 34.

C.1. Groundwater

C.1.1 Groundwater Monitoring Program Objectives

The overall goal of the groundwater monitoring program is to detect and assess effects of the landfill on local water resources. The following objectives have been identified to achieve this goal:

a) to monitor groundwater quality in the groundwater system;
b) to identify and characterize movement of leachate related contaminants in the systems;
c) to evaluate the effectiveness of the attenuation zone; and
d) to determine the need for implementation of contingency plans.

C.1.2 Monitoring Plan

The groundwater monitoring plan shall be carried out by the Owner to address the stated objectives and will include:

C.1.2.1 Landfill Monitoring Frequency

The groundwater monitoring program shall be conducted twice per year during the spring and fall.

C.1.2.2 Groundwater Monitor Sampling Locations

Table C-1 identifies the groundwater monitors sampling locations. If a monitoring well is dry or damaged then that well does not have to be sampled that sampling event. Static water levels shall be collected in all the groundwater monitors prior to purging and sampling:

Table C-1: Groundwater Sampling Location

OW-2	OW-3	OW-4A
OW-4B		

C.1.2.3 Analytical Parameters

The parameters which shall be measured in the field, along with the chemical and physical laboratory analyses which shall be collected on the groundwater samples from the groundwater monitors, shall include the following:

Table C-2: Analytical Parameters

pH (field)	Alkalinity	Nickel
pH (lab)		Selenium
Temperature(field)		Strontium
Conductivity (field)	Fluoride	Biochemical Oxygen Demand
Conductivity (lab)	Sulphate	Titanium
Bicarbonate	Magnesium	Zinc
Hardness as(Calcium Carbonate)	Potassium	Phenols
Chloride	Mercury	Total Phosphorus
Nitrite	Total Organic Carbon	Iron
Nitrate	Orthophosphate	Manganese
Calcium	Sodium	Phosphorus
Bromide		VOC(s)
Ammonia Nitrogen	Arsenic	
Total Dissolved Solids	Boron	
Colour	Chromium	
Aluminium	Copper	
Barium	Lead	
Cadmium		

C.1.2.4 Groundwater Monitor Inspections

Any groundwater monitoring well found to be damaged, not functioning or otherwise improperly maintained, shall within a reasonable time be properly repaired or replaced. The District Manager shall be notified prior to any well being replaced.

C.1.2.5 Groundwater Monitoring Protocols

Standard and/or generally accepted groundwater sampling (including well development, sample collection, storage and transport) and analytical protocols shall be adhered to during all groundwater monitoring sessions. Groundwater elevation measurements shall be of the static groundwater elevation within the groundwater monitoring well measured prior to well development.

C.1.2.6 Method Detection Limits

All laboratory analyses on groundwater samples shall be performed by an accredited analytical laboratory and the detection limits (MDLs) for the specific analyses should commensurate with the standards established in the current Ontario Drinking Water Quality Objectives.

C.2. Surface Water

C.2.1 Surface Water Monitoring Program Objectives

The primary goal of the Surface Water Monitoring Program is to monitor for any landfill-related impairment of surface water above Provincial Water Quality Objectives (PWQOs). Where the concentration of a specific parameter already exceeds the PWQO in background surface waters, the aim is to allow no further deterioration of surface water quality.

C.2.2 Monitoring Plan

The surface water monitoring plan shall be carried out by the Owner to address the stated objectives and will include:

C.2.2.1 Landfill Monitoring Frequency

The surface water monitoring program shall be conducted twice per year during the spring and late summer/early fall.

C.2.2.2 Surface Water Sampling Locations

Table C-3: Surface Water Sampling Locations

SW 1	SW 2	SW 3
Leachate Ponds		

C.2.2.3 Analytical Parameters

The parameters which shall be measured in the field, along with the chemical and physical laboratory analyses which shall be collected on the surface water samples, shall include the following:

Table C-4: Surface Water Analytical Parameters

pH (field)	Alkalinity	Nickel
pH (lab)	Fluoride	Selenium
Temperature(field)	Sulphate	Strontium
Conductivity (field)	Magnesium	Biochemical Oxygen Demand
Conductivity (lab)	Potassium	Titanium
Bicarbonate	Reactive Silica	Zinc
Hardness as(Calcium Carbonate)	Total Organic Carbon	Phenols
Chloride	Orthophosphate	Total Phosphorus
Nitrite	Sodium	Iron
Nitrate	Turbidity	Manganese
Calcium	Arsenic	Molybdenum

Bromide	Boron	Phosphorus
Ammonia Nitrogen	Chromium	VOC(s) (*)
Total Dissolved Solids	Copper	
Colour	Lead	
Aluminium	Mercury	
Barium	Total Suspended Solids (*)	
Cadmium		

C.2.2.4 Surface Water Monitoring Protocols

Standard and/or generally accepted surface water sampling (sample collection, storage and transport) and analytical protocols shall be adhered to during all surface water sampling sessions.

C.2.2.5 Method Detection Limits

All laboratory analyses on surface water samples shall be performed by an accredited analytical laboratory and the detection limits (MDLs) for the specific analyses should commensurate with the standards established in the current Provincial Water Quality Objectives.

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

1. *The reason for Condition Nos. (1), (2), (3), (4), (5), (6), (7), (8), (9), (10), (11), (12), (16), (17), and (18) is to clarify the legal rights and responsibilities of the Owner.*

2. *The reason for Condition Nos. (13), (14) and (15) are included, pursuant to subsection 197(1) of the EPA, to provide that any persons having an interest in the Site are aware that the land has been approved and used for the purposes of waste disposal.*

3. *The reasons for Condition Nos. (19), (20), (21), (22), (23), (24), (25) and (26) are to ensure the landfill is operated in accordance with Ministry standards, and to ensure the long-term protection of the health and safety of the public and the environment.*

4. *The reason for Condition No. (27) is to incorporate the submitted Vector/Vermin Plan into the Certificate.*

5. *The reasons for Condition Nos. (28), (29), (30), (31), (32), (33) and (34) is to ensure the monitoring and reporting are completed in accordance with Ministry standards, and to ensure the long-term protection of the health and safety of the public and the environment.*

6. *The reasons for Condition Nos. (35), (36), (37) and (38) is to ensure the owner has a plan with an organized set of procedures for identifying and responding to potential issues relating to groundwater and surface water contamination near or at the site's compliance point.*

7. *The reason for Condition Nos. (39) and (40) are added to ensure that Owner informs the Ministry on plans for any proposed changes to the leachate treatment system.*

8. *The reasons for Condition No. (41) are to ensure the Owner submits an annual summary report to the Ministry so that the landfilling operation can be evaluated to ensure compliance with the Ministry's requirements on annual operations and monitoring. This is to ensure the long-term protection of the health and safety of the public and the environment.*

9. *The reason for Condition Nos. (42) and (43) is to ensure the Owner has an established approved plan for the closure and post-closure maintenance of the landfill site. This is to ensure the long-term health and safety of the public and the environment.*

This Provisional Certificate of Approval revokes and replaces Certificate(s) of Approval No. A150902 issued on November 14, 1988

In accordance with Section 139 of the Environmental Protection Act, R.S.O. 1990, Chapter E-19, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

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

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary* Environmental Review Tribunal 2300 Yonge St., Suite 1700 P.O. Box 2382 Toronto, Ontario M4P 1E4	AND	The Director Section 39, *Environmental Protection Act* Ministry of the Environment 2 St. Clair Avenue West, Floor 12A Toronto, Ontario M4V 1L5

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

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

DATED AT TORONTO this 24th day of May, 2007

THIS CERTIFICATE WAS MAILED
ON June 5, 2007
9C
(Signed)

Tes Gebrezghi

Tesfaye Gebrezghi, P.Eng.
Director
Section 39, *Environmental Protection Act*

DG/
c: District Manager, MOE London - District
Mike Jones, Azimuth Environmental Consulting Inc.

Ontario

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

AMENDMENT TO ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER A150902
Notice No. 1
Issue Date: September 25, 2018

RECEIVED
OCT 05 2018

The Corporation of the Township of Perth East
25 Mill Street East
Post Office Box, No. 455
Milverton, Ontario
N0K 1M0

Site Location: South Easthope Landfill
Lot 26, Concession 5
Perth East Township, County of Perth

You are hereby notified that I have amended Approval No. A150902 issued on May 24, 2007 for the use and operation of a 5.0 hectare landfilling site within a total site area of 29.6 hectares, being known as the South Easthope Landfill , as follows:

I. The following Conditions are hereby added:

Transfer Station

Conditions 44-53 apply to the operation of the *Transfer Station* only.

Operations

44. The Transfer Station shall be designed, developed, built, operated, maintained, and the management and disposal of all waste shall be carried out, in accordance with the *EPA* , *Regulation 347* , and except as otherwise provided by this Approval, with the application for this *Approval* , dated **March 13, 2018**, and the supporting documentation listed in Items 11 an 12 of Schedule "A". At no time shall the discharge of a contaminant that causes or is likely to cause an adverse effect be permitted.

Waste Types

45. Only solid non-hazardous household domestic waste shall be accepted at the *Transfer Station* .

Waste Limits

46. No more than 300 tonnes of waste per day shall be accepted at the *Transfer Station* .

47. No more than 250 tonnes waste shall be stored or be present at the *Transfer Station* at any time. If for any reason waste cannot be transferred from the Transfer Station, the *Transfer Station* shall cease accepting waste.

Signage

48. A sign shall be posted and maintained at the *Transfer Station* in a manner that is clear and legible, and shall include the following information:

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

Incoming / Outgoing Waste

49. All incoming and outgoing wastes shall be inspected by trained personnel prior to being received, transferred and/or shipped to ensure wastes are being managed and disposed of in accordance with the *EPA* and *Reg. 347.*

Site Security

50. The Transfer Station shall be operated and maintained in a secure manner, such that unauthorized persons cannot enter the *Transfer Station* .

Closure Plan

51. The *Owner* shall submit to the *District Manager* written notification of the decision to cease activities at the *Site* . The notification and closure schedule shall be submitted either not later than four (4) months prior to the planned permanent closure of the *Site* or forthwith in the situation of an unplanned permanent closure of the *Site* or indefinite cessation of *Site* activities.

52. Within 10 days after closure of the Transfer Station, the Owner shall notify the Director, in writing, that the Transfer Statio*n* is closed and that the approved Closure Plan has been implemented.

Log Book

53. A log shall be maintained on-site, either electronically or in written format, and shall include the following information as a minimum:

7. The reasons for Condition 51 and 52 are to ensure that the Transfer Station is closed in accordance with Ministry standards and to protect the health and safety of the public and the environment.

8. The reason for Condition 53 is to provide for the proper assessment of effectiveness and efficiency of site design and operation, their effect or relationship to any nuisance or environmental impacts, and the occurrence of any public complaints or concerns. Record keeping is necessary to determine compliance with this Environmental Compliance Approval, the EPA and its regulations.

This Notice shall constitute part of the approval issued under Approval No. A150902 dated May 24, 2007.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary* Environmental Review Tribunal 655 Bay Street, Suite 1500 Toronto, Ontario M5G 1E5	AND	The Director appointed for the purposes of Part II.1 of the Environmental Protection Act Ministry of the Environment, Conservation and Parks 135 St. Clair Avenue West, 1st Floor Toronto, Ontario M4V 1P5

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

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 25th day of September, 2018

a. the date;
b. quantity and source of waste received;
c. quantity of waste at the Transfer Station at the end of the operating week;
d. quantities and destination of each type of waste shipped from the Transfer Station;
e. a record of inspections required by this Approval;
f. a record of any spills or process upsets at the site, the nature of the spill or process upset and the action taken for the clean up or correction of the spill, the time and date of the spill or process upset, and for spills, the time that the Ministry and other persons were notified of the spill in fulfilment of the reporting requirements in the EPA .
g. a record of any waste refusals which shall include; amounts, reasons for refusal and actions taken; and
h. the signature of the Trained Personnel conducting the inspection and completing the report.

II. The following Items are hereby added to Schedule "A":

11. Application for a Provisional Certificate of Approval for a Waste Disposal Site dated March 13, 2018 and signed by Glenn Schwendinger, CAO, Township of Perth East, including all supporting documentation.

12. Email dated July 16 2018 from Jennette Walker, GM BluePlan Engineering Ltd., to Alan Tan, Senior Waste Engineer, Environmental Approvals Branch of MECP.

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

1. The reason for Conditions 44 is to ensure that the Transfer Station is operated in a manner which does not result in a nuisance or a hazard to the health and safety of the environment or people.

2. The reasons for Conditions 45, 46 and 47 are to specify the types of waste that may be accepted at the Transfer Station, the amounts of waste that may be stored and processed at the Transfer Station, and the maximum rate at which the Transfer Station may receive waste.

4. The reason for Conditions 48 is to ensure that users of the Transfer Station are fully aware of important information and restrictions related to Transfer Station operations and access under this Environmental Compliance Approval.

5. The reason for Conditions 49 is to ensure that all wastes are properly classified to ensure that they are managed, processed and disposed in accordance with O. Reg. 347, R.R.O. 1990 and in a manner that protects the health and safety of people and the public.

6. The reason for Condition 50 is to ensure the controlled access and integrity of the Transfer Station by preventing unauthorized access when the Transfer Station is closed and no site attendant is on duty.

THIS NOTICE WAS MAILED

ON OCT - 1 2018

(Signed)

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

AT/

c: District Manager, MECP London - District
Jennette Walker, GM BluePlan Engineering Limited

Ontario

Ministry of the Environment
Ministère de l'Environnement

Solid Non-Hazardous Waste Disposal Site Inspection Report

Client:	The Corporation of the Township of Perth East Mailing Address: Post Office Box, 455, Milverton, Ontario, Canada, N0K 1M0 Physical Address: 25 Mill St E, Perth East, Township, County of Perth, Ontario, Canada, N0K 1M0 Telephone: (519)595-2800, FAX: (519)595-2801, email: township@pertheast.on.ca Client #: 7633-4DRHE7, Client Type: Municipal Government, NAICS: 913910		
Inspection Site Address:	South Easthope Landfill Address: Lot: 26, Concession: 5, Perth East, Township, County of Perth District Office: London - District GeoReference: Map Datum: NAD83, Zone: 17, Accuracy Estimate: 1-10 metres eg. Good Quality GPS, Method: GPS, UTM Easting: 510906, UTM Northing: 4797389, ,		
Contact Name:	Wes Kuepfer	**Title:**	Public Works and Parks Manager
Contact Telephone:	(519) 595-2800 **ext**234	**Contact Fax:**	
Last Inspection Date:	2010/10/19		
Inspection Start Date:	2011/09/30	**Inspection Finish Date:**	2011/09/30
Region:	Southwestern		

1.0 INTRODUCTION

A Solid Non-hazardous Waste Disposal Site Inspection was conducted at The South Easthope Landfill (hereafter referred to as "the landfill"), located in the Township of Perth East as part of the Ministry of the Environment (Ministry) 2011/2012 inspection program. The Corporation of the Township of Perth East (Township) operates the South Easthope landfill. During the inspection, the Ministry met with Wes Keupfer, Public Works and Park Manager, Bill Wilson, Operations Co-ordinator for the Public Works and Parks Department and Ron , attendant at the landfill; all are employees of the Township.

The site inspection was conducted on September 30, 2011. The inspection included a review of historical information contained in the Ministry files, a review of the landfill's operating data, a detailed assessment of compliance with the terms and conditions of the current Certificate of Approval, and a tour of the facilities. The inspection was conducted to determine compliance with the requirements of the Environmental Protection Act (EPA), O.Reg. 232/98 (Landfilling Sites), Regulation 347 (Waste), Certificate of Approval, and other MOE policies and guidelines.

The landfill was originally approved for operation in 1976 (Certificate of Approval A 150901). It receives residential, industrial, and commercial wastes from the Township of Perth East. The Certificate was amended October 13, 2004, November 15, 2004 and March 21, 2005 to include definitions, design and operations data and vector/vermin control plans. All notices and amendments were consolidated into one Certificate issued May 24, 2007.

2.0 INSPECTION OBSERVATIONS

Certificate of Approval Number(s):
Number A150902 issued May 24, 2007.

2.1 FINANCIAL ASSURANCE:

Specifics:
The Corporation of the Township of Perth East does not require financial assurance for this facility as per O.Reg. 232/98 s.17 (9) (owned by municipality).

2.2 APPROVED AREA OF THE SITE:

Specifics:
The Site has 5 ha of approved waste area within the 29.6 ha property owned by the Township. The footprint is clearly identifiable with no wastes being deposited outside of the footprint.

2.3 APPROVED CAPACITY:

Specifics:
The total waste capacity for this site is 235000 m^3. In the 2010 Annual Report, the Township indicates that the remaining waste capacity of the Site is 167900 m^3 as of October 27, 2010 when the last annual total station survey was completed.

2.4 ACCESS CONTROL:

Specifics:
Access is regulated by section 11 (2) of O. Reg 347 and is controlled through two lockable gates and fencing. One gate is located at the roadway and the other is located by the lone building at the landfill. An attendant is present whenever the landfill is open to receive waste.

2.5 COVER MATERIAL:

Specifics:
The CoA stipulates weekly cover and records show the Township satisfies this requirement by covering with soil during the summer and clean chipped wood in the winter. Cover is applied on Thursdays.

No litter problem was observed during the inspection; litter pick-up is scheduled twice annually but is also done as needed by the attendant.

No vector/vermin issue observed; there were no sea gulls present during the inspection. Township representatives state there has been no need to implement the Vector/Vermin Control Plan required in Condition 27 of the CoA. (Actual plan is present in Schedule B of the CoA) as there are no issues at this site with either. Township cites the presence of a nesting pair of hawks as a possible reason for lack of vector/vermin issue.

2.6 WASTE BURNING:

Specifics:
The CoA for the Landfill stipulates in condition 22:

"No burning or incineration of any materials shall be permitted at the Site."

There is no evidence of any intentional burning on site. There was also no reoccurrence of the fires that occurred in the Summer of 2010; these fires were noted in the last inspection report.

2.7 GROUNDWATER/SURFACEWATER IMPACT:

Specifics:
No observations made of leachate springs, leachate ponding, or trenches below water table. Overall the site seemed in good order with appropriate grading. No impacts on SW or GW were observed.

The tech support surface water specialist's analysis of the 2010 Annual Report filed by the Township for this Landfill indicated no concerns other than the location of sampling upstream (u/s) and downstream (d/s) in the nearby creek. SW1 u/s of the landfill is at a location previous to another tributary joining the creek while SW2 d/s of the landfill occurs after a split in the creek. In both instances the Surface Water Specialist's recommendation is to sample after the creeks have joined (SW1) and before they diverge (SW2). Please see attachment for more details.

2.8 LEACHATE CONTROL SYSTEM:

Specifics:
The leachate produced at the landfill is collected in an open ditch along the edge of the operating face. From the ditch leachate is pumped to the holding ponds. The leachate is held in the first holding pond where the sediment is allowed to precipitate. The leachate is then directed to the second holding pond. The leachate is then pumped to a Waterloo Biofilter System (bioreactor) which discharges to a shallow buried pressure trench. The ponds were observed to have plenty of free board despite the wet conditions.

The leachate treatment system Certificate of Approval was issued in accordance with Section 53 of the *Ontario Water Resources Act* .

2.9 METHANE GAS CONTROL SYSTEM:

Specifics:
No methane gas control system is utilized at this facility.

2.10 OTHER WASTES:

Specifics:
Waste streams other than the domestic waste which is landfilled include:

- tire recycling - the Landfill is part of the Ontario Tire Stewardship
- e-waste is collected and recycled
- bale wrap is kept and sold to a company that reuses it (the Township has found another company to take the bale wrap they collect after they were informed that the previous company will no longer be picking up this waste)
- scrap metal is collected in a tote and sent for recycling
- car batteries are accepted and sold for their metal contents (not as part of the scrap metal recycling)

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

The following requirement is taken from the last Inspection Report:

"The Municipality shall establish and maintain a written record of all environmental emergency situations at the landfill. A copy of the report detailing the events surrounding the fires this summer shall be submitted to the undersigned by November 30, 2010."

The Township complied with this requirement but did not have the document on hand during the inspection.

No incident reports were found in conjunction with this site since the last inspection performed by Officer Slivar.

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 ?
No

Specifics:

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

Specifics:
Some documentation required by the CoA was either not available at the site during the inspection, did not exist or was lacking information required in the CoA.

5.0 ACTION(S) REQUIRED

The Township shall:

1. Amend the log of daily operations kept at the site to include all information required by condition 28 of the CoA and submit a copy to the undersigned.

2. Submit to the undersigned a copy of the written record of environmental emergency situations that satisfies the requirements of condition 29 in the CoA.

3. Submit to the undersigned a copy of the written record of complaints received at the site that satisfies the requirements of condition 30 of the CoA.

4. Amend the written record of site inspections conducted at the site to include all information required by condition 31 of the CoA and submit a copy to the undersigned.

5. Create a template for a written record of of all occurences of unapproved waste landfilled at the site that meets the requirements of condition 32 of the CoA and submit a copy to the undersigned.

6. Submit all of the above referenced documentation to the undersigned by November 30, 2011.

6.0 OTHER INSPECTION FINDINGS

7.0 INCIDENT REPORT

Applicable
1076-8MJMHJ

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:

Name:	**Mark S Smith**
District Office:	**London District Office**
Date:	**2011/10/11**
Signature	

REVIEWED BY:
District Supervisor:

Name:	**Angela Whiteley**
District Office:	**London District Office**
Date:	**2011/11/09**
Signature:	

File Storage Number: SI

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"

Technical Reviewer Details

2010 LANDFILL MONITORING REPORT
SOUTH EASTHOPE LANDFILL, TOWNSHIP of PERTH EAST

Prepared By: Azimuth Environmental Consulting, Inc.
March, 2011

I have reviewed the above report with respect to a surface water assessment and provide the following comments:

The report concludes that the landfill is not having any surface water impacts. I have reviewed the surface water results for 2010, the historical results and the trend through time graphs provided. The report's conclusion of no impacts to surface waters can not be properly assessed at this time due to the questionable location of both the upstream (SW1) and downstream (SW2) stations and whether these two monitoring stations are properly located to assess landfill impacts. This same issue was highlighted by this Surface Water reviewer with regards to the 2008 monitoring report. The response from the Surface Water reviewer also provided a map, interpreting the location of the current surface water monitoring sites, as well as suggested locations for an amended monitoring program. This air photo map is provided along with this cover letter. As far as I know, the Municipality has not responded to the MOE surface water comments provided concerning the 2008 report.

Once again, I was not able to find the location of SW1 (upstream location) on any maps provided in the report. However, on Figure 5, the legend text describes SW1 as located at the crossing of concession road 4. Therefore, I have also shown where I understand SW1 to be located on the accompanying airphoto. I have also provided what I believe to be a preferred upstream location which is located downstream of three tributaries of Wilheim Drain south of the concession road 4. In this way, this upstream surface water location will capture the true background water chemistry prior to flowing along side of the landfill.

As for the suggested location of SW2, it needs to be located between the discharge point of the stormwater pond to Wilhelm Drain and the next tributary downstream entering Wilhelm Drain. The current location of SW2 is too far downstream of the landfill and there are two additional tributaries that enter Wilhelm Drain between its location and the landfill, that can potentially influence and cloud the interpretation of downstream water chemistry.

Action Items:

A number of recommendations were provided pertaining to the 2008 monitoring report that are reiterated again, this time as action items:

1/ The CofAs the landfill is operating under need to be attached as appendices to all future reports.

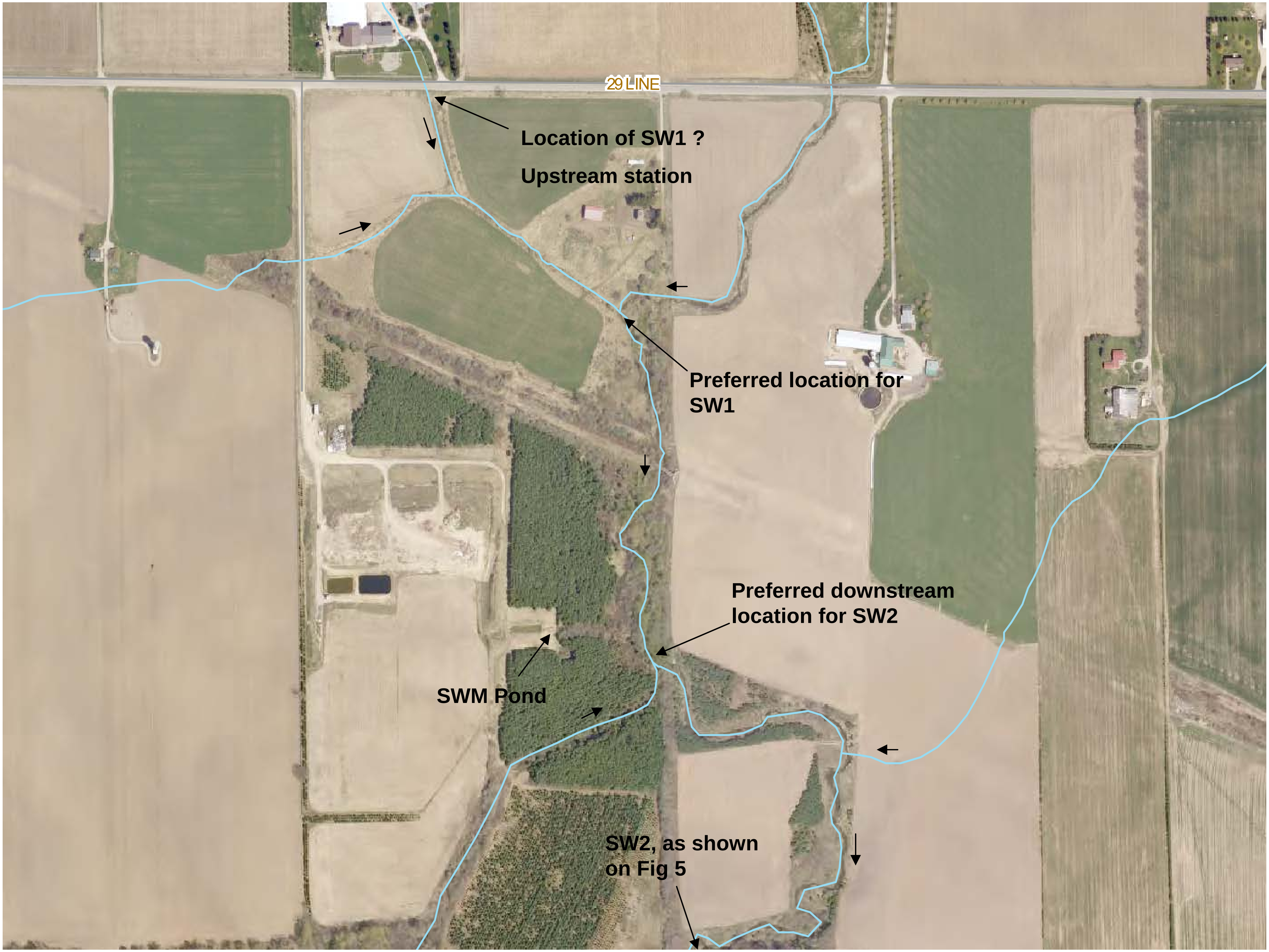
2/ This landfill was last inspected by MOE on May 31, 2007. In future, monitoring reports should reference any MOE inspection and/or complaint(s), whether they occurred or not. Any inspection report should be appended to the monitoring report and how required actions were addressed. In the same fashion, all complaints need to be documented and how they were addressed.

3/ There is a need to discuss the locations of the surface water monitoring stations on Wilhelm Drain and to reach a consensus on relocation of SW1 and SW2 and/or establish additional stations.

4/ Please provide the MDLs on the summary table for surface water results. It appears that the MDLs for silver and cadmium are above the PWQOs.

5/ The report makes a recommendation to remove VOC analysis from the surface water monitoring program. This needs to be delayed at this time pending the relocation of SW2 to better assess landfill influences on surface waters.

Jack Colonnello
July 7, 2011


29 LINE
Location of SW1 ?
Upstream station
Preferred location for SW1
Preferred downstream location for SW2
SWM Pond
SW2, as shown on Fig 5

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

Solid Non-Hazardous Waste Disposal Site Inspection Report

Client:	The Corporation of the Township of Perth East Mailing Address: Post Office Box, 455, Milverton, Ontario, Canada, N0K 1M0 Physical Address: 25 Mill St E, Perth East, Township, County of Perth, Ontario, Canada, N0K 1M0 Telephone: (519)595-2800, Extension: 234, FAX: (519)595-2801, email: wkuepfer@pertheast.ca Client #: 7633-4DRHE7, Client Type: Municipal Government, NAICS: 913910		
Inspection Site Address:	South Easthope Landfill Address: Lot: 26, Concession: 5, Geographic Township: SOUTH EASTHOPE, Perth East, Township, County of Perth District Office: London - District GeoReference: Map Datum: NAD83, Zone: 17, Accuracy Estimate: 1-10 metres eg. Good Quality GPS, Method: GPS, UTM Easting: 510906, UTM Northing: 4797389, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 43.3281, Longitude: -80.8642 Site #: 9770-5MLRYB		
Contact Name:	Wes Kuepfer	**Title:**	Manager, Public Works
Contact Telephone:	(519)595-2800 **ext**234	**Contact Fax:**	
Last Inspection Date:	2011/09/30		
Inspection Start Date:	2016/11/09	**Inspection Finish Date:**	2016/11/09
Region:	Southwestern		

1.0 INTRODUCTION

The Township of Perth East operates a solid non-hazardous waste landfill site at Concession 5, Lot 26 in the Township of Perth East. This site is known as the South Easthope Landfill.

The landfill site serves the Township of Perth East, population approximately 12,000, and receives residential, commercial and industrial waste from the township.

The South Easthope Landfill is open to the public on Tuesday, Wednesday and Thursday from 9:00am to 4:00pm, and Saturday 9:00 am to 1:00 pm.

Curbside garbage and blue-box pick-up is provided under contract by Bluewater Recycling. The township uses a bag tag system for curbside waste collection. Waste collected in the township by Bluewater Recycling is disposed of at the South Easthope Landfill.

An inspection was conducted at the site on November 9, 2016. The inspection was undertaken to determine compliance with the Environmental Protection Act (EPA), Regulation 347 (O. Reg. 347), Environmental Compliance Approval (ECA) A150902 issued May 24, 2007, and other relevant ministry legislation, policies and guidelines.

During the site visit, Wes Kuepfer, Manager, Public Works, Bill Wilson, Operations Coordinator and Heather, the landfill attendant, were interviewed. The landfill was open at the time of the inspection.

Several digital photographs were taken during the inspection to support the inspection findings .

INSPECTION NOTE: Changes to the EPA effective October 2011 have resulted in Certificates of Approval (CofA) now being referred to as Environmental Compliance Approvals (ECA). The electronic template for this inspection report form has not been updated to reflect this change , however, the text entered in the report reflects this change in terminology .

2.0 INSPECTION OBSERVATIONS

Certificate of Approval Number(s):
A150902

2.1 FINANCIAL ASSURANCE:

Specifics:
Financial assurance is not required for this municipally operated site .

2.2 APPROVED AREA OF THE SITE:

Specifics:
The approved landfill area is 5.0 hectares within a 29.6 hectare site.

The landfill area has been flagged using markers stakes . No landfilling has occurred outside the landfill area .

2.3 APPROVED CAPACITY:

Specifics:
Condition 19 of ECA A150902 lists the maximum capacity for the landfill site as 272,000 cubic meters.

A consultant working on behalf of the Township estimated the remaining landfill capacity of the South Easthope Landfill as 131,268 cubic metres as of October 2015. The estimate was calculated based on annual fill rates . This estimate was obtained from the Township of Perth East - Long-Term Waste management Plan (August 2016).

2.4 ACCESS CONTROL:

Specifics:
Access to the landfill site is prescribed by the standards found at O . Reg. 347, S. 11(2) and the ECA conditions.

Access to the site is restricted through the use of a lockable gate and a chain -link fence. As well, the site is well screened through the planting of trees.

An attendant is present whenever the landfill is open to receive waste .

Two signs are located at the entranceway to the site providing owner 's name, ECA number, operating hours, and contact information. See Section 6, below, for a recommendation.

2.5 COVER MATERIAL:

Specifics:
Wes Kuepfer indicated that cover material is applied weekly . This is in accordance with Condition 23 of the ECA.

Woodchips are used as interim cover . There was an adequate supply of woodchips at the site for use as interim cover . The use of woodchips is permitted by the ECA .

The intermediate cover on the south face of the landfill , east of the active tipping area was noted as requiring additional intermediate cover material to cover the waste . Waste could be seen through the intermediate cover in several places. See pictures below. Condition 24 of the ECA requires 300 mm of intermediate cover for any area where landfilling has been suspended for six months or more . See Section 5, below, for required actions.

Windblown litter was not observed on or off -site during the inspection.

No vector/vermin issues observed during the inspection .

2.6 WASTE BURNING:

Specifics:
The ECA site stipulates in Condition 22 that "No burning or incineration of any materials shall be permitted at the Site ."

Burning of waste is not an operational practice at this landfill site .

2.7 GROUNDWATER/SURFACEWATER IMPACT:

Specifics:
No leachate springs or seeps were noted during the inspection .

The 2014 Annual Landfill Monitoring Report for the South Easthope Landfill was reviewed , including a technical memorandum with comments from the MOECC Southwestern Region Groundwater Unit . The comments from the groundwater unit summarized the following ground water issues :

- An increasing trend in chloride concentrations at monitoring wells OW -5 and OW-6 since the wells were established in 2007.
- The chloride concentration at OW-5 exceeds the Reasonable Use criterion of 123 mg/L and the concentration at OW-6 is approaching that value as well.
- The upgradient monitoring well OW3-87 shows a notable increase in nitrate concentration but concurred that this result is unlikely related to landfilling activities .

The technical memorandum recommended that the next annual report provide further explanation of the results for OW-5, OW-6 and OW3-87.

The 2014 Annual Landfill Monitoring Report for the South Easthope Landfill indicates that leachate from the landfill is not impacting the Wilhelm Drain . The report does note that run-off from the landfill entering the on-site storm pond has resulted in small elevations of some parameters but with improving results in 2013 and 2014 following operation changes.

2.8 LEACHATE CONTROL SYSTEM:

Specifics:
Leachate from the landfill is collected in a trench which runs along the southern side of the landfill mound . See picture below.

Leachate, overland flow and precipitation collected in the trench is pumped to the on -site leachate treatment system. The treatment system consists of two leachate ponds , and a Waterloo Biofilter system which discharges to a pressure trench.

The 2014 Annual Landfill Monitoring Report indicates that the leachate treatment system is effectively treating leachate from the landfill.

2.9 METHANE GAS CONTROL SYSTEM:

Specifics:
The site does not have a methane gas collection system .

2.10 OTHER WASTES:

Specifics:

A number of other waste steams are diverted at the site :

- Clean wood and brush is collected the site . This material is later chipped. Chipped wood is used as weekly (interim) cover material and as road base during muddy conditions .
- Used tires are collected as part of the Ontario Tire Stewardship program .
- e-waste is collected for recycling.
- Bale wrap for recycling.
- Scrap metal and white goods are collected in segregated piles .

The scrap metal piles, in particular aluminium and white goods at the site have been accumulated in significant quantities and the various piles appear to be getting mixed together with other types of recyclable materials and vegetation has begun growing up through the older piles . The recycling area appears unsightly and somewhat disorganized compared to other similar landfill and recycling sites . See picture below.

Several pails of what appears to be waste motor oil were found near the recycling area . These were reportedly found in wastes deposited at the site. Unapproved wastes, such as these, should be segregated, placed in some form of secondary containment to minimize the risk of spills or leakage , and disposed of as soon as reasonably possible at a suitably licenced facility. Further, there was no entry on the unapproved waste log sheet for this waste .

See Section 6, below, for recommended actions.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

The last inspection at the site noted that some documentation required by the ECA was either not available at the site during the inspection, did not exist or was lacking information required in the ECA . This included:

- Making available the written record of environmental emergency situations and the written record of complaints received at the site.
- Amending the log of daily operations kept at the site , and the written record of site inspections conducted at the site to include all information required by the ECA .
- Creating a template for a written record of all occurrences of unapproved waste received at the site .

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:

None were found at the time of the inspection.

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

No

Specifics:

None were found at the time of the inspection.

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:

Intermediate cover on the south face of the landfill, east of the tipping face, was not in accordance with Condition 24 of the ECA.

The pails of waste motor oil found in the collection area for recyclable metals were not recorded on the unapproved waste log sheet.

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

No

Specifics:

None were found at the time of the inspection.

Was there any indication of minor administrative non-compliance?

No

Specifics:

None were found at the time of the inspection.

5.0 ACTION(S) REQUIRED

1. Please confirm to the undersigned by December 9, 2016 that adequate intermediate cover has been placed on the south face of the landfill, east of the tipping face as discussed during the inspection.

2. Please confirm to the undersigned by December 9, 2016 that proper procedures for completing the unapproved waste log sheet have been reviewed with landfill staff.

6.0 OTHER INSPECTION FINDINGS

The Township of Perth East should begin planning the replacement of the two signs found at the entranceway to the site as both are beginning to weather and will soon become difficult to read.

The Township of Perth East should consider shipping the various metals piles for recycling or alternatively, segregating the various metal types into bins for interim storage, as noted in Section 2.10, above. It is also understood from discussions during the inspection that the township is evaluating options for constructing an eviro -depot type recycling facility at the site for use in better managing recyclable materials.

The Township of Perth East should ensure that any unapproved waste received accidentally at the site, such as pails of waste motor oil, is segregated from the publically accessible area of the site, placed in some form of secondary containment to minimize the risk of spills or leakage, and disposed of as soon as reasonably possible at a suitably licenced facility. The landfill attendant should remain vigilant for unapproved waste, such as liquid wastes, commingled in loads of other acceptable wastes.

7.0 INCIDENT REPORT

Applicable
1380-AFXSCV

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:

Name:	**Glenn M Rutherford**
District Office:	**London District Office**
Date:	**2016/11/22**
Signature	Glenn Rutherford

REVIEWED BY:
District Supervisor:

Name:	**Dan Cromp**
District Office:	**London District Office**
Date:	**2016/11/23**
Signature:	Dan Cromp

File Storage Number:	PE PE C5 610 (SOUTH EASTHOPE)

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"

Ministry of the Environment and Climate Change

733 Exeter Road
London ON N6E 1L3
Tel': 519 873-5000
Fax: 519 873-5020

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

733, rue Exeter
London ON N6E 1L3
Tél.: 519 873-5000
Fax: 519 873-5020

Ontario

MEMORANDUM

File No. SI PE PE C5 610

TO: Fernando Circelli
Environmental Officer
London District Office

FROM: Simon Thuss
Hydrogeologist
Technical Support Section, Southwestern Regional Office

DATE: February 21, 2017

RE: 2015 and 2016 Monitoring Reports
South Easthope Landfill Site
Reference No. 5767-AJKQS2

As requested, I have reviewed the following reports:

- "2015 Landfill Monitoring Report, South Easthope Landfill, Township of Perth East", dated March 22, 2016 and prepared by Azimuth Environmental Consulting Inc.
- "2016 Landfill Monitoring Report, South Easthope Landfill, Township of Perth East", dated February 13, 2017 and prepared by Azimuth Environmental Consulting Inc.

The review was limited to the hydrogeological aspects of the landfill monitoring program as presented in the reports.

The landfill site is located on the south side of Line 29, approximately two kilometres northwest of the community of Tavistock, Ontario. It is situated within Lot 26, Concession 5 of the former Township of South Easthope, now within the Township of Perth East. The site is operated under Provisional Certificate of Approval (C of A) No. A150902, most recently amended in May 2007. A Municipal and Private Sewage Works C of A (No. 0032-5ZBJJH) was also issued in August 2004 for stormwater management and the operation of a leachate collection and treatment system at the site.

The shallow soils at the site reportedly consist of low permeability clay silt till with occasional discontinuous sandy zones. The local groundwater flow direction is anticipated to be towards the Wilhelm Drain to the southeast of the site, with estimated groundwater flow velocities of approximately 0.5 to 5 metres per year.

The current monitoring network includes six on-site monitoring wells and three off-site private water supply wells. Groundwater level measurements and sample collection is carried out twice per year (April and October).

Upon completing the review of the 2015 and 2016 reports, the following comments are provided:

1. Section 2.3.6 of the report states that the Reasonable Use Concept does not apply to the site; however, this statement is not consistent with MOECC policy for landfill sites. As indicated in the Ministry document titled “Incorporation of the Reasonable Use Concept into MOEE Groundwater Management Activities” Guideline B-7, the Reasonable Use concept applies not only to the present use of groundwater in the vicinity of the site, but also to the potential future use of these groundwater resources. Any exceptions to the Reasonable Use policy would only be considered if supported and approved by the MOECC Regional Director. As such, future reports should clearly indicate that the Reasonable Use concept does in fact apply to this site.

2. The property boundaries for the landfill site are not clearly defined on the various figures in the report. For example, Figure 5 outlines the limits of a Contaminant Attenuation Zone that does not coincide with the property boundary (labelled as “fence line”). The report should clearly define the compliance boundary for the purpose of the Reasonable Use assessment.

3. While it is acknowledged that chloride is typically considered a primary leachate indicator parameter at landfill sites, several other indicator parameters are also shown to be elevated in the leachate samples collected from the treatment system effluent (including alkalinity, hardness, nitrate, sulphate, sodium, boron and DOC). Accordingly, these additional parameters should be included in the Reasonable Use assessment for the site. All Reasonable Use criteria should be included for reference in the analytical data tables (Table 2 and Appendix B).

4. Based on the data provided in the report, an increasing trend for chloride has been observed at OW-5 and OW-6 since monitoring was initiated at these locations in 2007. The chloride concentrations at OW-5 and OW-6 now exceed the Reasonable Use criterion of 130 mg/L. While I agree with the Consultant’s assessment that the area of impact is likely limited in extent, the non-compliance with the Reasonable Use Guideline must be addressed.

   In the 2016 report, the Consultant has proposed three options to address the non-compliance issue. Once a preferred option has been selected, a work plan and estimated timeline should be developed and provided to the Ministry for review and comment.

5. As indicated in the report, there has been a significant increase in the nitrate concentration observed at the upgradient monitoring well OW3-87 since 2011. Since this well is located upgradient of the landfill, I would agree that the results do not appear to be attributable to leachate impacts. However, given the significant change in groundwater quality at this location, further discussion is warranted. Is this well still suitable to characterize the background groundwater quality of the site?

6. The analytical data time-series plots provided in Appendix F were plotted using a logarithmic scale on the concentration axis. The use of a logarithmic scale makes it difficult to evaluate the data trends for some parameters. Linear axes should be used on all data plots in future reports, with parameters split into separate plots (as required) to clearly illustrate the data.

7. The groundwater contours provided on Figures 6 and 7 have been corrected in the 2016 report to more accurately reflect the groundwater mounding in the vicinity of OW6. The groundwater level contours over the remainder of the site should be interpreted with caution, as the existing monitoring network cannot adequately evaluate groundwater/leachate mounding within the waste footprint. Radial flow away from the waste mound should be considered and discussed in future monitoring reports.

8. Given the potential for radial groundwater flow from the waste mound, the Consultant should discuss the adequacy of the existing monitoring network to evaluate groundwater quality along the northern boundary of the site.

9. Future reports should also include at least two site-specific cross-sections, detailing the monitoring well screen intervals, subsurface stratigraphy, horizontal and vertical extents of the waste, depth of any leachate collection trenches/drains, and depth of the leachate pressure trench. The leachate collection trench should also be shown on the various site plans in the report.

10. The Consultant recommended that VOCs be removed from the monitoring program (with the exception of OW4b), following a complete sampling round in April 2017. I agree with this recommendation, provided that the April 2017 sampling round confirms that the anomalous results recorded in October 2016 are not representative of groundwater quality at the site.

If you have any questions or require clarification on any of the points provided herein, please contact me at Simon.Thuss@ontario.ca or 519-873-5033.

Yours truly,

Simon Thuss, P.Geo.
Hydrogeologist
Technical Support Section
Southwestern Region

Limitations:
The purpose of the preceding review is to provide advice to the Ministry of the Environment and Climate Change regarding subsurface 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.

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Environmental Assessments & Approvals

May 24, 2018 AEC 18-003

Ministry of Environment & Climate Change
London District Office
733 Exeter Road
London, ON
N6E 1L3

Attention: Fernando Circelli – Provincial Officer

Re: **Trigger Exceedance Follow-up Notification – South Easthope Landfill Site Leachate Treatment System (ECA 0032-5ZBJJH)**

Dear Mr. Cicelli:

The purpose of this letter is to provide a follow-up to the Ministry of the Environment & Climate Change (MOECC) with respect to additional water quality sampling resulting from a previous trigger exceedance at the South Easthope Landfill Site. As identified in the previous notification letter issued May, 8, 2018, the $CBOD_5$ concentration exceeded its associated trigger criteria during the April 19, 2018 monitoring event. As such, the notification letter outlined an action plan that included a follow-up sample from the storm water management pond (SWMP) (SW-3) to confirm the exceeded criteria. The results are provided below in comparison with the original sample, indicating that although the $CBOD_5$ concentration has declined, they are still above the trigger criteria, while the remaining trigger parameters still remain below the trigger criteria.

642 Welham Road, Barrie, Ontario L4N 9A1
telephone: (705) 721-8451 • fax: (705) 721-8926 • info@azimuthenvironmental.com • www.azimuthenvironmental.com

Table 1 – Trigger Exceedance Summary

Trigger Parameter	Trigger Concentration (mg/L)	Observed SW-3 Concentration (mg/L) (19-Apr-18)	Observed SW-3 Concentration (mg/L) (11-May-18)	Average SW-3 Concentration (mg/L)
$CBOD_5$	10	**60**	**37**	5.6
	Non Exceeded Parameters			
Ammonia (unionized)*	0.1	0.075	0.092	0.06
Chloride	250	79.5	121	55

* - unionized ammonia calculated using total ammonia concentration, field temperature and pH.

Given the remaining trigger exceedance for $CBOD_5$, the Township will pump water from the SWMP into the existing leachate storage ponds such that the water level in the SWMP is at least 0.5 m below the outfall that discharges into the Wilhelm Drain. It is also noted that the Township has closed and capped the previous working cell, excavated a new working waste cell and graded the working area around the cell such that any runoff from the active waste area is controlled within the new waste cell. With the recent dry weather, the water levels within the leachate ponds have lowered such that there is minimal risk of these ponds overflowing. Given these factors, any additional runoff entering the SWMP should be un-impacted such that any residual leachate impacts within the SWMP will be attenuated limiting the potential for downstream impacts to occur.

If any additional information is requested or there are questions or comments pertaining to the trigger exceedance and / or proposed action, please contact the undersigned.

Yours truly,
AZIMUTH ENVIRONMENTAL CONSULTING, INC.

PROFESSIONAL GEOSCIENTIST MICHAEL G. JONES PRACTISING MEMBER 0595 ONTARIO

PROFESSIONAL GEOSCIENTIST COLIN ROSS PRACTISING MEMBER 2055 ONTARIO

Mike Jones, M.Sc., P.Geo.
President

Colin Ross, B.Sc., P.Geo.
Senior Hydrogeologist

cc: Wes Kuepfer, Township of Perth East

AZIMUTH ENVIRONMENTAL CONSULTING, INC.
Environmental Assessments & Approvals

May 8, 2018 AEC 18-003

Ministry of Environment & Climate Change
London District Office
733 Exeter Road
London, ON
N6E 1L3

Attention: Rob Wrigley - District Manager

Re: **ECA Amendment Application – South Easthope Landfill Site Leachate Treatment System (ECA 0032-5ZBJJH)**

Dear Mr. Wrigley:

The purpose of this letter is to notify the Ministry of the Environment & Climate Change (MOECC) of a trigger exceedance at the South Easthope Landfill Site as governed by the Certificate of Approval (CoA) #0032 – 5ZBJJH for the on-site leachate treatment system. As per the trigger concentrations outlined in Table 2 of this CoA, any exceedance of the established trigger values requires notification of the District Manager, while the discussion provided below relates to the values measured during the recent monitoring event, rationale for their exceedance and proposed action plan to further assess the exceedance.

Table 1 – Trigger Exceedance Summary

Trigger Parameter	Trigger Concentration (mg/L)	Observed SW-3 Concentration (mg/L) (19-Apr-18)	Average SW-3 Concentration (mg/L)
$CBOD_5$	10	**60**	5.6
Non Exceeded Parameters			
Ammonia (ionized)*	0.1	0.075	0.06
Chloride	250	79.5	55

* - unionized ammonia calculated using total ammonia concentration, field temperature and field pH.

As noted above the $CBOD_5$ concentration has exceeded its associated trigger criteria during the April 19, 2018 monitoring event, while the other two parameters are noted to fall below their associated threshold and are closer to their average concentration. The sample location for this trigger location is SW-3, which is the on-site storm water management pond (SWMP) for the Site, which ultimately discharges the Wihelm Drain, located approximately 100 m to the east of the SWMP (see appended Figure).

It was noted during the April 19th monitoring event that leachate impacted surface runoff from both the active waste area and leachate storage ponds was migrating towards the SWMP. This was the result of the leachate ponds being at capacity due to the spring melt and subsequent melt from the ice storm, while the active waste cell was reaching capacity such that was limited ability to control surface runoff in the working area. Township staff had indicated that elevated leachate pond levels were being controlled through removal by tanker truck and disposal at the Milverton Sewage lagoons, however, the amount of runoff had made it difficult to keep the pond levels down. As such, a small amount of leachate impacted runoff was allowed to enter the SWMP along with the clean runoff from the remainder of the Site.

It was also noted during this monitoring event that the SWMP was discharging to the Wilhelm Drain, albeit the flow was observed to be quite limited (estimated flow 0.001 m^3/sec) relative to the flow within Wilhelm Drain (see photo below), which is typical of spring freshet conditions. Flow in the Wilhelm Drain would provide more than 500x dilution.

Wilhelm Drain near area of SWMP discharge

Water quality within the Wilhelm Drain is monitored both up (SW-1) and downstream (SW-2) of the discharge channel from the SWMP such that any potential leachate influence on the drain can be assessed. SW-1 and SW-2 are approximately 200 meters apart and SW-2 also receives runoff from the adjacent farm fields plus a small tributary from the west. The data collected during the April 19, 2018 monitoring event indicates that there is no meaningful change in water quality between the two locations confirming the flow differential between the drain and SWMP outlet is sufficient to adequately attenuate any leachate influence observed at the SWMP. This is illustrated in the following table summarizing the concentrations of a few common leachate indicator parameters for the Site. It is noted that TKN and iron concentrations are slightly elevated in the downstream location; however, given the overall consistency in water quality for the remaining parameters, they are unlikely related to leachate influence.

Table 2 – Leachate Indicator Parameter Summary

Parameter	Leachate Pond	SW-1 (Upstream)	SW-2 (Downstream)	SW-3 (SWMP)
Alkalinity (as CaCO3)	601	194	196	321
Chloride	202	29.9	30.3	79.5
Sulphate	31.7	9.47	9.97	78.4
Calcium	111	72.4	71.2	100
Magnesium	37.1	13.9	13.7	22.4
Sodium	142	13.3	13.2	57.8
Potassium	52.2	2.77	2.69	15.4
Ammonia as N	28.6	0.06	0.09	4.12
Total Organic Carbon	150	5.2	5.6	60.2
Boron	1.51	0.013	0.018	0.356
Iron	1.43	0.175	0.231	0.698
Manganese	1.17	0.016	0.024	0.517
Total Dissolved Solids	1020	340	368	584
Total Hardness (as CaCO3)	430	238	234	342
BOD (5)	184	<5	<5	60
Total Kjeldahl Nitrogen	31.8	<0.1	0.71	6.54
Chemical Oxygen Demand	361	7	8	149
Phenols	0.088	<0.001	<0.001	0.015
Total Suspended Solids	44	16	18	120

All concentrations in mg/L

Despite the leachate influence observed at SW-3, the fact that the $CBOD_5$ concentration is more significantly elevated above the average SW-3 trigger parameter concentrations may suggest that the exceedance or at least the magnitude of the exceedance may be related to sediment or organic material entrainment of the $CBOD_5$ bottle causing an artificially elevated concentration. This is supported by the elevated TSS concentration observed at SW-3 (120 mg/L). As such, it is recommended that the SWMP be re-sampled to confirm this trigger exceedance.

Despite the above noted trigger exceedance for $CBOD_5$, the water quality within the Wilhelm Drain indicates that the impacts within the SWMP are adequately attenuated such that no off-site impacts are occurring. Similarly, the $CBOD_5$ exceedance may not be completely leachate derived such that the action plan to address this exceedance should first include a confirmatory sample collected from the SWMP within the next week. If trigger parameter(s) continue to exceed, the Township would pump out the SWMP into the on-site leachate ponds if capacity exists, or taken to the Milverton sewage lagoons for disposal.

Regardless of the results of the additional sample, the Township is undertaking the excavation of a new waste cell, which will help to the control leachate runoff within the active waste area, while also creating capacity for interim storage of leachate until leachate ponds reach a more manageable water level for the leachate treatment system.

If any additional information is requested or there are questions or comments pertaining to the trigger exceedance and / or proposed action, please contact the undersigned.

Yours truly,
AZIMUTH ENVIRONMENTAL CONSULTING, INC.

PROFESSIONAL GEOSCIENTIST MICHAEL G. JONES PRACTISING MEMBER 0595 ONTARIO

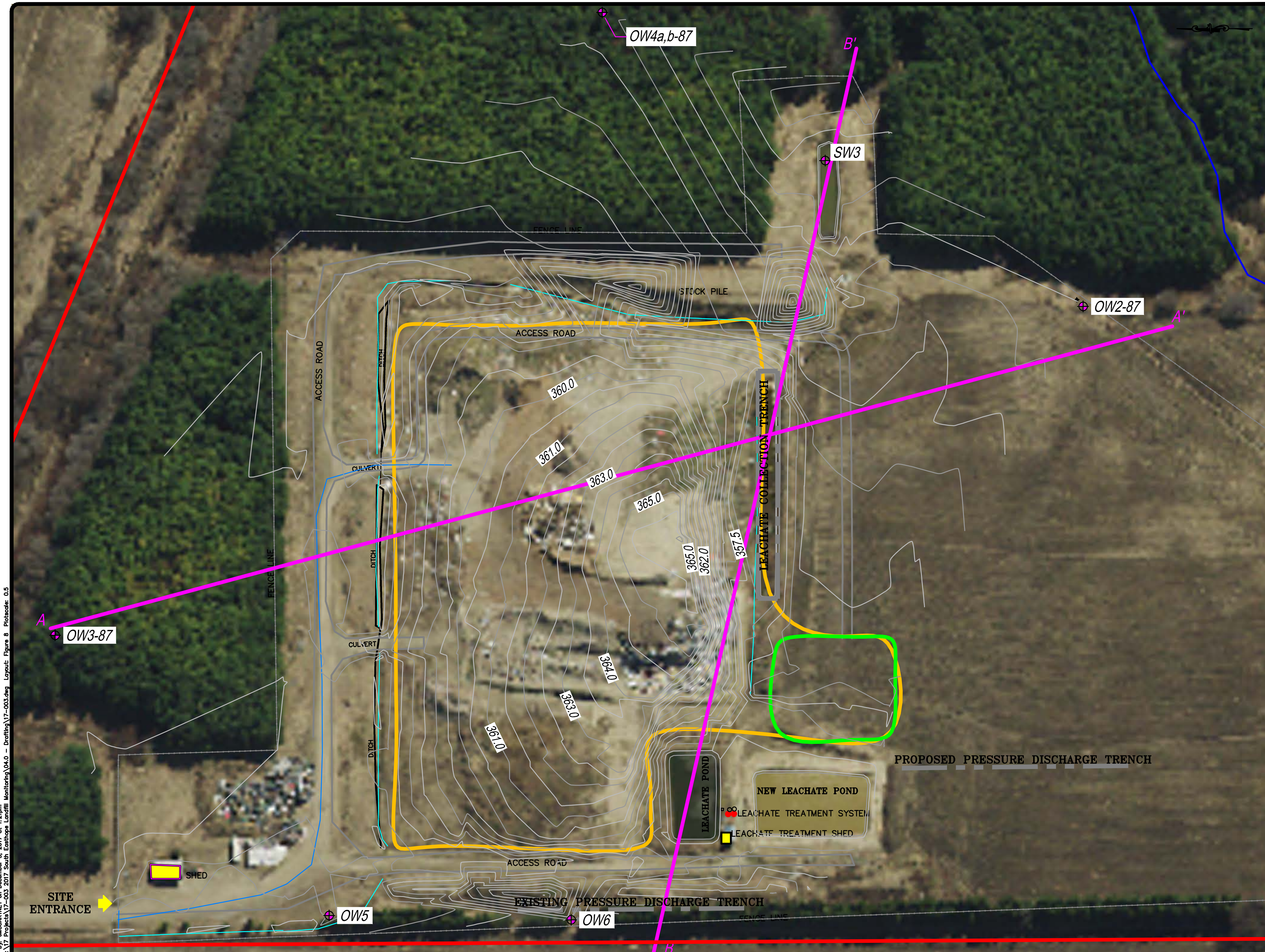
PROFESSIONAL GEOSCIENTIST COLIN ROSS PRACTISING MEMBER 2055 ONTARIO

Mike Jones, M.Sc., P.Geo.
President

Colin Ross, B.Sc., P.Geo.
Senior Hydrogeologist

Attach:

cc: Wes Kuepfer, Township of Perth East



LEGEND:

Surface water locations shown on Figure 5.

Topographic base from 2003 + Waste Surface Updated in 2016 Elevations are based on Blue Plan Engineering Survey.

- *Waste footprint (2017)*
- *Active Waste Area*
- *Cross Section Locations*
- *Fence Line*

15m 0 30m

HORIZONTAL SCALE 1:1,250

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Cross Section Locations

South Easthope Landfill
Perth East

DATE ISSUED:	November 2017	Figure No.
CREATED BY:	JLM	8
PROJECT NO.:	17-003	
REFERENCE:		

DAYSTAMP: M:\17 Projects\17-003 2017 South Easthope Landfill Monitoring\04.0 - Drafting\17-003.dwg

LEGEND:

Surface water locations shown on Figure 5.

Topographic base from 2003 + Waste Surface Updated in 2016 Elevations are based on Blue Plan Engineering Survey.

- *Property Boundary*
- *Waste footprint (2017)*
- *Active Waste Area*
- *Fence Line*

15m 0 30m

HORIZONTAL SCALE 1:1,250

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Landfill Property

South Easthope Landfill
Perth East

DATE ISSUED:	November 2017	Figure No.
CREATED BY:	JLM	11
PROJECT NO.:	17-003	
REFERENCE:		

DAYSTAMP: M:\17 Projects\17-003 2017 South Easthope Landfill Monitoring\04.0 - Drafting\17-003.dwg

Plotted by: JMCCARTNEY on December 5, 2017 at 1:22pm Layout: Figure 11 Plotscale: 0.5
File: M:\17 Projects\17-003 2017 South Easthope Landfill Monitoring\04.0 - Drafting\17-003.dwg

Colin Ross

From: Circelli, Fernando (MECP) [Fernando.Circelli@ontario.ca]
Sent: Friday, November 16, 2018 11:44 AM
To: Colin Ross
Cc: Mike Jones; Wes Kuepfer; Bill Wilson (bwilson@pertheast.ca)
Subject: RE: South Easthope Landfill Trigger Exceedance Notification

Hi Colin this is fine.

Thanks,

Fernando Circelli
Provincial Officer

Ministry of the Environment, Conservation and Parks
London District Office
Phone: (519) 873-4015

From: Colin Ross [mailto:ColinR@Azimuthenvironmental.Com]
Sent: November-16-18 10:26 AM
To: Circelli, Fernando (MECP)
Cc: Mike Jones; Wes Kuepfer; Bill Wilson (bwilson@pertheast.ca)
Subject: RE: South Easthope Landfill Trigger Exceedance Notification

Hi Fernando,

Further to the Trigger exceedances noted in the storm pond in the spring monitoring event, we were unable to collect samples during the summer as the pond had been pumped out following the spring exceedance and the dry summer did not allow for recharge of the pond until the fall. we collected a sample during the October monitoring event and the results were favourable indicating the control measures conducted by the Township were effective in isolating leachate from the storm pond. The results for the trigger parameters are summarized in the table below. I was planning on just formalizing in the annual report unless you need a more formal correspondence for your files now.

Table 4: LTS CoA Surface Water Trigger Concentrations (SW-3)

Parameter	Trigger Concentration	2018 (October Monitoring Event) Maximum Concentration
$CBOD_5$	10.0 mg/L	<5 mg/L

Unionized Ammonia	0.1 mg/L	<0.0002 mg/L
Chloride	250 mg/L	55.2 mg/L

If you have any questions, just let me know.

Colin Ross, B.Sc., P.Geo.
Hydrogeologist

Azimuth Environmental Consulting, Inc.
642 Welham Road
Barrie, ON, L4N 9A1
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Cell: (705) 795-7107
colin@azimuthenvironmental.com

Providing services in ***hydrogeology****,* ***terrestrial*** *and* ***aquatic ecology*** *&* ***environmental engineering***

From: Circelli, Fernando (MOECC) [mailto:Fernando.Circelli@ontario.ca]
Sent: Monday, June 04, 2018 4:21 PM
To: Colin Ross
Cc: Mike Jones; Wes Kuepfer; Bill Wilson (bwilson@pertheast.ca)
Subject: RE: South Easthope Landfill Trigger Exceedance Notification

That's fine Colin. Just send me a the results of the CBOD5, when you receive them.

Take care,

Fernando Circelli
Provincial Officer
Ministry of the Environment and Climate Change
London District Office
Phone: (519) 873-4015

From: Colin Ross [mailto:ColinR@Azimuthenvironmental.Com]
Sent: June-04-18 3:48 PM

To: Circelli, Fernando (MOECC)
Cc: Mike Jones; Wes Kuepfer; Bill Wilson (bwilson@pertheast.ca)
Subject: RE: South Easthope Landfill Trigger Exceedance Notification

Hi Fernando,

We are scheduled for Monitoring at the Site in July, I could schedule for the first week, which is not far off..

Colin Ross, B.Sc., P.Geo.
Hydrogeologist

Azimuth Environmental Consulting, Inc.
642 Welham Road
Barrie, ON, L4N 9A1
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Fax: (705) 721-8926
Cell: (705) 795-7107
colin@azimuthenvironmental.com

*Providing services in **hydrogeology**, **terrestrial** and **aquatic ecology** & **environmental engineering***

From: Circelli, Fernando (MOECC) [mailto:Fernando.Circelli@ontario.ca]
Sent: Monday, June 04, 2018 3:32 PM
To: Colin Ross
Cc: Mike Jones; Wes Kuepfer; Bill Wilson (bwilson@pertheast.ca)
Subject: RE: South Easthope Landfill Trigger Exceedance Notification

Thank you for the follow up. Is it possible to get one more sample of CBOD5 in a few more weeks.

Let me know.

Thanks,

Fernando Circelli
Provincial Officer
Ministry of the Environment and Climate Change
London District Office
Phone: (519) 873-4015

From: Colin Ross [mailto:ColinR@Azimuthenvironmental.Com]
Sent: May-25-18 2:01 PM
To: Circelli, Fernando (MOECC)
Cc: Mike Jones; Wes Kuepfer; Bill Wilson (bwilson@pertheast.ca)
Subject: RE: South Easthope Landfill Trigger Exceedance Notification

Hi Fernando,

We received the follow-up sample results, so I have attached a letter updating the trigger exceedance and plan.

If you have any comments, just let me know.

Thanks,

Colin Ross, B.Sc., P.Geo.
Hydrogeologist

Azimuth Environmental Consulting, Inc.
642 Welham Road
Barrie, ON, L4N 9A1
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Fax: (705) 721-8926
Cell: (705) 795-7107
colin@azimuthenvironmental.com

*Providing services in **hydrogeology**, **terrestrial** and **aquatic ecology** & **environmental engineering***

From: Circelli, Fernando (MOECC) [mailto:Fernando.Circelli@ontario.ca]
Sent: Monday, May 14, 2018 3:19 PM
To: Colin Ross
Cc: Mike Jones; Wes Kuepfer; Bill Wilson (bwilson@pertheast.ca)
Subject: FW: South Easthope Landfill Trigger Exceedance Notification

Hi Colin, please send any updates regarding this trigger exceedance to my attention.

Thanks,

Fernando Circelli
Provincial Officer

Ministry of the Environment and Climate Change
London District Office
Phone: (519) 873-4015

From: Wrigley, Rob (MOECC)
Sent: May-09-18 2:24 PM
To: Circelli, Fernando (MOECC)
Subject: FW: South Easthope Landfill Trigger Exceedance Notification

FYI

Rob Wrigley | District Manager
Ministry of the Environment and Climate Change
London District office
733 Exeter Road | London, ON | N6E 1L3
519-873-5031 | rob.wrigley@ontario.ca

Protecting our environment.
Fighting climate change.

From: Colin Ross [mailto:ColinR@Azimuthenvironmental.Com]
Sent: May-09-18 1:11 PM
To: Wrigley, Rob (MOECC)
Cc: Mike Jones; Wes Kuepfer; Bill Wilson
Subject: South Easthope Landfill Trigger Exceedance Notification

Hi Rob,

As per the Section 6 of Certificate of Approval #0032 – 5ZBJJH, any exceedance of a trigger parameter requires notification of the District Manager. Please see the appended document that outlines the exceedance, some rationale for the exceedance and the proposed action plan.

If you have any questions, please do not hesitate to contact me.

Thanks,

Colin Ross, B.Sc., P.Geo.
Hydrogeologist

Azimuth Environmental Consulting, Inc.
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Barrie, ON, L4N 9A1
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colin@azimuthenvironmental.com

*Providing services in **hydrogeology**, **terrestrial** and **aquatic ecology** & **environmental engineering***

December 14, 2018 AEC 18-003

Ministry of Environment & Climate Change
London District Office
733 Exeter Road
London, ON
N6E 1L3

Attention: Fernando Circelli – Provincial Officer

Re: **Response to MECP December 7, 2018 Review Comments – South Easthope Landfill Site (MECP File No. SI PE PE C5 610)**

Dear Mr. Circelli:

The purpose of this letter is to respond to review comments provided by MECP Hydrogeologist Simon Thuss regarding both the 2017 ECA amendment application and 2017 Annual Monitoring Report (AMR) for the South Easthope Landfill Site (Site). It is noted that the ECA Amendment application is to facilitate the construction of a new pressure trench further downgradient of the property boundary to alleviate potential Reasonable Use (RU) exceedances resulting from ground water mounding adjacent to the existing pressure trench location.

As some of the comments are related between the ECA amendment application and AMR, responses to the comments have been compiled as a single response document. The following summarizes each comment and the applicable response to each.

<u>ECA Amendment Application</u>

1. *During the recent site visit, it was observed that the waste cells in the southern portion of the landfill have been filled, and the leachate collection trench is no longer in the location shown on the figures. How is leachate currently collected and conveyed to the treatment system?*

The leachate collection trench identified in the AMR figures is a trench that was previously constructed to collect leachate impacted runoff originating from the active waste area when it was atop the more elevated waste mound. The Operations Plan identifies that the leachate collection trenches are temporary and will move as the waste cells are filled. Since 2017, when landfilling was shifted to below ground waste cells along the southern extent of the approved waste footprint area, leachate has been controlled within the excavated waste cells and pumped as needed using a trash pump and mobile intake and discharge lines into the LTS pond and / or storage pond immediately south of the LTS pond. As the active waste area shifted east during 2018, the historic collection trench was removed as it was incorporated into the below grade waste cell in that area.

2. *The consultant should confirm that the infiltration capacity of the soils have been sufficiently evaluated in the proposed location of the new pressure trench. This is a particular concern given that observations during the recent site visit suggest that leachate may be breaking out to ground surface along the existing pressure trench (detailed below in Comment #5). The new pressure trench should be inspected periodically to ensure that it is functioning as designed. A contingency plan should be developed to manage leachate at the site in the event that leachate break-outs are observed once the new pressure trench has been brought into service.*

The infiltration capacity of the soils were evaluated prior to the approval and construction of the original pressure trench in 2004. The results of the percolation testing completed along the alignment of the existing pressure trench have been appended provide an indication of the infiltration capacity of the clay silt till that underlies the entire Site. Given the previous testing completed and massive nature of this geological unit, additional testing is not considered necessary. To date, there has been no evidence of breakouts from the trench and the shallowest water level observed at OW6, which is located immediately adjacent to the trench has been 2.25 mbgs. The most recent monitoring event completed on October 23, 2018 did not indicate any standing water along the trench area as this area was traversed to get to OW6, while the measured water level was 2.77 mbgs at OW6. As no standing water was present in late October and the system flow rate has not been adjusted since that date, it is unlikely that the surface water represented a breakout. It is noted that the area of the trench does receive runoff from the Site entrance area adjacent to OW5 as the area around OW5 does have small pools of water during periods of heavy rain or springmelt, although this area is beyond the extent of the pressure trench. If road salt laden runoff were to migrate down the trench alignment, it would likely have an elevated electrical conductivity. Regardless, a site visit was conducted December 13th such that an inspection of the trench area was completed. During the site visit, only very small pools were noted that were of insufficient depth to collect a water sample. Elevated electrical conductivity was noted ~2,000 µS/cm, however, the pools were noted between OW5 and OW6 beyond the northern extents of the trench, which would support more salt laden runoff than trench breakout. As part of the 2018 annual monitoring report, a closer look at the LTS flow will be completed to assess whether conditions during 2018 differed from previous years, while these surface conditions will be more closely monitored during the 2019 monitoring events such that surface samples will be collected if more significant ponding is observed. Despite this, it is the intent to divert LTS effluent into the new trench location during 2018 once the amended ECA is issued.

The contingency plan for the Site is to shut the system down and remove from the Site (as needed) via tanker truck to the Milverton sewage lagoons. These types of events have occurred on two occasions historically to deal with excessively wet climatic conditions such that the storage capacity of the Site might become overwhelmed. Alternatively, the Township is looking to excavate an additional leachate storage pond, which could be used as an overflow location in the event the LTS needs to be shut down due to a break out.

3. *Additional monitoring wells are required to evaluate groundwater mounding in the vicinity of the new pressure trench, as well as groundwater quality downgradient of the trench. The Consultant should provide a plan indicating the proposed monitoring locations.*

It is proposed that monitoring wells could be installed immediately adjacent to the new pressure trench on the downgradient side such that it could delineate both downgradient water quality as well as potential ground water mounding associated with the pressure trench. Although OW2 is located generally downgradient of the proposed trench location, an additional well would be construction further south along the edge of the farm field to assess potential downgradient leachate impact in that area. The proposed location is illustrated on the appended figure.

4. *Monitoring indicates that there is a relatively large groundwater mound in the area of the existing leachate trench, approximately 2-3 metres higher than the surrounding groundwater levels as measured in October 2017. It is expected that there will be a similar level of groundwater mounding in the vicinity of the new pressure trench once it becomes operational. Accordingly, an additional monitoring well may also be required along the property boundary to the west of*

the new pressure trench to evaluate the potential for radial flow to impact groundwater quality in this area.

As indicated by the MECP reviewer, it is expected that a similar level of mounding could be expected at the new trench location, although the mound is not interpreted to be 2-3 m higher than surrounding ground elevations. In reference to OW5 alone, a larger differential is noted; however, the ground elevation difference between OW5 and OW6 (1.65 m) would contribute to this perceived mound, while if relating to the more regional ground water flow contours (i.e. OW3), the mound is interpreted to be approximately 1 to 1.5 m; however, the approximate 30 m separation distance between the proposed trench and upgradient property boundary would limit the ability for the ground water mound to influence upgradient ground water to such a distance. A mound would have to create a gradient that exceeds 0.1 to have any influence at the property boundary and this is difficult to do given the physiography. If the MECP views this additional monitoring location as critical to the Site evaluation, a monitoring well could be constructed along the property line perpendicular from the mid point of the trench; however, Azimuth does not endorse the need for this additional monitoring location.

<u>2017 Annual Monitoring Report</u>

5. *During the recent site visit, small areas of ponded water were observed in multiple locations along the top of the existing leachate pressure trench. Although no samples were collected, electrical conductivity measurements taken with a handheld field meter were similar to those reported for the LTS samples, suggesting that leachate may be breaking out to ground surface. The leachate pressure trench should be inspected by a qualified professional to determine if it is functioning as designed. If leachate is found to be breaking out to ground surface, an interim action plan should be implemented to manage leachate at the site until the replacement trench has been constructed*

Please see response to comment #2 above. If following the proposed Azimuth inspection, it is determined that there is a breakout from the pressure trench, the Township will take action to remedy this situation. The first step would be to reduce flows or potentially shut down the system for a specified time period and monitor the response. As indicated, an inspection is scheduled to take place December 13, 2018.

6. *Samples collected from OW -5 indicated elevated concentrations of several indicator parameters; however, this location was not considered in the Reasonable Use Assessment. Since this well is located on the property boundary and may be influenced by radial flow away from the landfill mound and/or leachate disposal trench, OW-5 should be included in the Reasonable Use Assessment in future monitoring reports.*

OW5 does indicate elevated concentrations of several leachate indicator parameters; however, of the parameters noted (chloride, TDS, calcium, alkalinity, manganese), similarly elevated concentrations or variable concentrations at the background location (OW3) have also been noted which would indicate their source is not related to the landfill. The Reasonable Use Policy evaluates parameters that are being emitted by the landfill waste as its source. A change in background levels would potentially change the RUP trigger levels, however, this is proportionate to the background directly. As such, it is viewed as inappropriate to assess this location as part of Reasonable Use.

7. *The height of the inferred leachate mound as shown on the cross-sections appears inconsistent with the elevation of the leachate collection trench. How were these leachate levels estimated?*

As there is no leachate mounding measurements, the figure extrapolated that there would be some degree of mounding relative to the surrounding environment, however, the mounding would be limited due to the fine grained cover material added and the lack of leachate seepage noted along the perimeter of the waste mound which would indicate it is unlikely a more significant leachate mound is present. The LTS primarily collects direct precipitation from the working area and the discharge of leachate-impacted ground water is interpreted to be minimal. This is based on the observed low permeability of the surficial soils, and that the leachate collection trenches / waste cells are dry in the summer every year. If the leachate mound within the waste was higher than the collection drain waste cells, then discharge would happen throughout the year. No dedicated leachate monitor has been installed or proposed within the waste mound as the LTS provides quality information with respect to leachate, while maintaining a dedicated leachate well within an active waste area for ground water elevations is problematic with respect to keeping it from being destroyed by Site equipment, and it creates a pathway for leachate to migrate to deeper horizons. The Site has been operating in lifts such that there has not been an ideal location to target such a monitor.

If any additional information or clarification is requested, please contact the undersigned.

Yours truly,
AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Mike Jones, M.Sc., P.Geo.
President

Colin Ross, B.Sc., P.Geo.
Senior Hydrogeologist

Attach:

cc: Wes Kuepfer, Township of Perth East
Simon Thuss, MECP
Hitesh Vaja, MECP

Figure - 2: Test Pit Details

TP-1

Total Depth 35 cm
Tops soil Depth 35 cm
area (cms) 30.5 x 30.5
depth (cms) 33
Water added 25 L

Time	Water Level (cm above bottom of hole)
10:20	31
10:21	30
10:24	29
10:31	28
10:46	24
11:28	19
11:40	18
12:01	16
12:25	12.5
12:50	10
13:03	9
13:20	8
13:40	7
14:14	5
14:56	3

TP-1 (B)

Total Depth 60 cm
Tops soil Depth 31 cm
area (cms) 30.5 x 30.5
depth (cms) 30.5
Water added 25 L

Time	Water Level (cm above bottom of hole)
11:59	30
12:26	27
12:49	23.5
13:00	23
13:21	20
13:41	19
14:14	16.5
14:54	13.5

TP-2

Total Depth 36 cm
Tops soil Depth 36 cm
area (cms) 30.5 x 30.5
depth (cms) 33
Water added 25 L

Time	Water Level (cm above bottom of hole)
10:43	30
10:56	22.5
11:27	20.5
12:02	15
12:47	11
12:59	10
13:19	9
13:39	7
14:06	5
14:55	4

TP-3

Total Depth 72 cm
Tops soil Depth 39 cm
area (cms) 40.6 x 45.7
depth (cms) 33
Water added 32 L

Time	Water Level (cm above bottom of hole)
11:23	33
12:03	26
12:23	25
12:46	24
13:00	24
13:17	23.5
13:38	23.5
14:01	23
15:00	21.5

TP-4

Total Depth 63 cm
Tops soil Depth 33 cm
area (cms) 30.5 x 30.5
depth (cms) 30.5
Water added 25 L

Time	Water Level (cm above bottom of hole)
12:33	30
12:45	22
12:56	18
13:18	13
13:38	11
13:58	9
14:58	6

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 6224-B5KK74
Issue Date: February 13, 2020

The Corporation of the Township of Perth East
25 Mill Street East
Post Office Box, No. 455
Milverton, Ontario
N0K 1M0

Site Location: South Easthope Landfill
Lot 26, Concession 5
Township of Perth East, County of Perth

You have applied under section 20.2 of Part II.1 of the *Environmental Protection Act*, *R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:*

construction of a leachate storage pond and a subsurface leachate disposal system at the South Easthope Landfill Site, located at the above site location and consisting of the following Works:

Proposed Works

construction of a leachate storage pond and a disposal system (located approximately 40 m east of the western upgradient property boundary) to complement the existing leachate management system comprising of the following:

- one (1) leachate storage pond to receive leachate overflow from the waste cells and,
- approximately 100 m long, 30 cm deep x 30 cm wide shallow buried pressure trench system to dispose treated leachate into the ground,

including all piping and pumping equipment, associated controls and appurtenances,

all in accordance with the documents listed in Schedule 'A'.

Existing Works

existing stormwater management facilities and establishment of leachate collection, treatment and disposal system to service the South Easthope Landfill Site, located at the above site location and consisting of the following Works:

Stormwater Management Facilities

The stormwater collection, treatment and disposal facilities constitute of the following:

- approximately 600 m of ditches and swales to collect stormwater from the landfill site;
- two (2) stormwater ponds (Pond 1 and Pond 2) connected in series having approximate volumes of 400 m^3 and 320 m^3, respectively and approximate areas of 270 m^2 and 220 m^2, respectively;
- approximately 25 m of vegetated riprap channel to the property boundary; and
- approximately 300 m of swale receiving stormwater from the vegetated riprap channel and discharging to the Wilhelm Drain.

Leachate Collection & Treatment System

The leachate collection, treatment and disposal system consists of the following:

- three (3) temporary storage ponds adjacent to the waste area to collect leachate from the waste cells, each measuring 40 m x 20 m x 2.5 m deep;
- one (1) 40 m x 20 m x 2.5 m deep proposed permanent holding pond having a volume of greater than 400 m^3 and an area of approximately 300 m^2 for secondary solids removal and balancing leachate received from the temporary ponds;
- one (1) pumping chamber of 1,000 L capacity for dosing the Waterloo Biofilter System reactor equipped with a dosing pump capable of pumping 1.1 L/s at 5 m TDH;
- one (1) 2.5 m diameter x 2.5 m high Waterloo Biofilter System bioreactor filled with foam media rated to handle flowrate up to 5 m^3/day;
- one (1) pumping chamber of 1,000 L capacity for recirculation and discharge to the pressure trench equipped with a discharge pump rated to pump 2.3 L/s at 5 m TDH;
- approximately 100 m long, 30 cm deep x 30 cm wide shallow buried pressure trench constructed fed from the center and having at least one inspection port for each 30 m of lateral; and
- all associated controls and appurtenances necessary for the operation of the Works.

all in accordance with the Application for Approval of Municipal and Private Sewage Works submitted by the Township of Perth East dated August 25, 2003 along with a design letter brief (modified on April 16, 2004), drawings and supporting data.

For the purpose of this environmental compliance approval, the following definitions apply:

"Approval" means this environmental compliance approval and any schedules attached to it, and the application;

"BOD5" (also known as $TBOD_5$) means five day biochemical oxygen demand measured in an unfiltered sample and includes carbonaceous and nitrogenous oxygen demand;

"CBOD5" means five day carbonaceous (nitrification inhibited) biochemical oxygen demand measured in an unfiltered sample.

"Director" means a person appointed by the Minister pursuant to section 5 of the EPA for the purposes of Part II.1 of the EPA;

"District Manager" means the District Manager of the appropriate local district office of the Ministry where the Works is geographically located;

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

"Ministry" means the ministry of the government of Ontario responsible for the EPA and OWRA and includes all officials, employees or other persons acting on its behalf;

"Owner" means The Corporation of the Township of Perth East and its successors and assignees.

"Overflow" means any discharge from the Works that does not undergo any treatment or only receives partial treatment before it is discharged to the environment.

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

"Partial Treatment" means any treatment that does not include the full train of unit processes described and approved in the Approval.

"Peak Flow Rate" means the maximum rate of sewage flow for which the plant or process unit was designed.

"Existing Works" means those portions of the sewage works previously constructed and approved under an Approval.

"Proposed Works" means the sewage works described in the Owner's application, this Approval, and to the extent approved by this Approval.

"Substantial Completion" has the same meaning as "substantial performance" in the Construction Lien Act;

"Works" means the sewage works described in the Owner's application and this Approval and includes both Existing Works and Proposed Works.

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

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

(1) The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

(2) Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this Approval.

(3) Where there is a conflict between a provision of any submitted document referred to in this Approval and the Conditions of this Approval, the Conditions in this Approval shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

(4) Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

(5) The requirements of this Approval are severable. If any requirement of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this Approval shall not be affected thereby.

2. EXPIRY OF APPROVAL

This Approval will cease to apply to those parts of the Proposed Works which have not been constructed within five (5) years of the date of this Approval.

3. CHANGE OF OWNER

(1) The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within 30 days of the change occurring:

(a) change of Owner;

(b) change of address of the Owner;

(c) change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c.B17 shall be included in the notification to the District Manager;

(d) change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C39 shall be included in the notification to the District Manager.

(2) In the event of any change in ownership of the Works, other than a change to a successor municipality, the Owner shall notify in writing the succeeding owner of the existence of this Approval, and a copy of such notice shall be forwarded to the District Manager and the Director.

4. OVERFLOW

(1) Any Overflow of untreated leachate from any portion of the Works is prohibited, except where:

(a) it is necessary to avoid loss of life, personal injury, danger to public health or severe property damage;

(b) the District Manager agrees that it is necessary for the purpose of carrying out essential maintenance and the District Manager has given prior written acknowledgment of the Overflow; or

(c) the District Manager has given prior written acknowledgment of the Overflow.

(2) The Owner shall maintain a logbook of all Overflow events which shall include, at a minimum, the time, location, duration, quantity of Overflow, the authority for Overflow pursuant to subsection (1), and the reasons for the occurrence.

5. MONITORING AND RECORDING

(1) The Owner shall, upon commencement of operation of the Works, carry out the following monitoring program:

(a) Leachate Monitoring

(i) influent leachate samples shall be collected in April, July and October each year from the existing temporary (leachate) storage ponds prior to the leachate entering the permanent holding pond and shall be analyzed for the following parameters:

pH	chlorides
alkalinity	sulphates

conductivity	calcium
total suspended solids	barium
chemical oxygen demand (COD)	boron
5-day biochemical oxygen demand (BOD5)	sodium
total Kjeldahl nitrogen (TKN)	iron
total ammonia nitrogen	magnesium
nitrates	

(ii) effluent leachate samples shall be collected in April, July and October each year from the pumping chamber discharging to the pressure trench and shall be analyzed for the parameters listed in columns 2 and 3 of Table 1. The samples collected in April and October shall be analyzed for the indicator parameters listed in column 3 of Table 1 while the sample collected in July shall be analyzed for the comprehensive parameters listed in column 2 of Table 1.

(b) Groundwater Monitoring

(i) groundwater samples shall be collected in April, July and October each year from a groundwater monitoring well installed upgradient of the pressure trench at the West property line (adjacent to the trench) and shall be analyzed for the parameters listed in columns 4 or 5 of Table 1. The samples collected in April and October shall be analyzed for the indicator parameters listed in column 5 of Table 1 while the sample collected during July shall be analyzed for the comprehensive parameters listed in column 4 of Table 1.

(c) Surface Water Monitoring

(i) surface water samples shall be collected twice each year in Spring and Autumn at the outlet of Pond 2 and shall be analyzed for the parameters listed in column 4 of Table 1.

Table 1

Parameter (Column 1)	**Leachate Monitoring**		**Ground and Surface Water Monitoring**	
	Comprehensive Parameter (Column 2)	**Indicator Parameter** (Column 3)	**Comprehensive Parameter** (Column 4)	**Indicator Parameter** (Column 5)
General				
Alkalinity	x	x	x	x[2]
BOD5	x	x	x[1]	
COD	x	x	x[1]	
DOC	x	x	x[2]	x[2]
Phenol	x		x	
Sulphate	x	x	x	x[2]
Total Dissolved Solids	x	x	x	x[2]
Suspended Solids	x	x	x[1]	

Table 1...continued

Parameter (Column 1)	Leachate Monitoring		Ground and Surface Water Monitoring	
	Comprehensive Parameter (Column 2)	**Indicator Parameter** (Column 3)	**Comprehensive Parameter** (Column 4)	**Indicator Parameter** (Column 5)
General - Nutrients				
Ammonia	x	x	x	x^2
Nitrate	x	x	x	x^2
Nitrite	x		x	
TKN	x		x	
Total Phosphorus	x		x	
General - Major Ions				
Chloride	x	x	x	x^2
Calcium	x	x	x^2	x^2
Iron	x	x	x	x^2
Magnesium	x	x	x^2	x^2
Manganese	x		x^2	
Potassium	x		x^2	
Sodium	x	x	x^2	x^2
Trace Metals				
Arsenic	x		x	
Barium	x	x	x	x^2
Boron	x	x	x	x^2
Cadmium	x		x	
Chromium	x		x	
Copper	x		x	
Lead	x		x	
Mercury	x		x	
Zinc	x		x	
Volatiles				
Benzene	x		x^2	
1,4 Dichlorobenzene	x		x^2	
Dichloromethane	x		x^2	
Toluene	x		x^2	
Vinyl Chloride	x		x^2	
Field Test				
Temperature			x^1	
Conductivity	x	x	x	x^2
Dissolved Oxygen			x^1	
pH	x	x	x	x^2

Note: x^1 only for surface water and x^2 only for groundwater

(2) The Owner shall retain for a minimum of three (3) years from the date of their creation, all records and information related to or resulting from the monitoring activities required by this Approval.

6. OPERATION AND MAINTENANCE

(1) The Owner shall review and assess monitoring results from the surface water sampling point outlined in Section 5 "Surface Water Monitoring" of this Approval against the following trigger points in Table 2:

Table 2

Trigger Concentrations for Surface Water Monitoring	
Parameter	**Trigger Concentration** (milligrams per litre)
CBOD5	>10.0
Ammonia (un-ionized)*	>0.1
Chlorides	>250

*Note: Ammonia (un-ionized) concentration shall be calculated from the monitoring results of ammonia, pH, and field temperature.

(2) In the event that a monitoring result for any of the trigger parameters listed in Table 2 exceeds the corresponding trigger concentration, the Owner shall notify the District Manager within seven (7) days of the receipt of the analytical results.

(3) The Owner shall exercise due diligence in ensuring that, at all times, the Works and the related equipment and appurtenances used to achieve compliance with this Approval are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate operator staffing and training, including training in all procedures and requirements of this Approval, the Act and regulations, process controls and alarms.

(4) The Owner shall prepare an operations manual within six (6) months of Substantial Completion of the Proposed Works, that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the Works;

(b) inspection programs, including frequency of inspection, for the Works and the methods or tests employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the Works;

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a spill prevention control and countermeasures plan, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the District Manager; and

(f) procedures for receiving, responding and recording public complaints, including recording any follow up actions taken.

(5) The Owner shall maintain the operations manual current and retain a copy at the location of the Works or operational office of the Owner for the operational life of the Works. Upon request, the Owner shall make the manual available to Ministry staff.

(6) The Owner shall provide for the overall operation of the Works with an operator who holds a licence that is applicable to that type of facility and that is of the same class as or higher than the class of the facility in accordance with Ontario Regulation 129/04.

(7) The Owner shall undertake an inspection of the condition of the stormwater management ponds and ditches, at least once a year, and undertake any necessary cleaning and maintenance to prevent the excessive build-up of sediment and/or decaying vegetation.

(8) The Owner shall undertake regular visual inspection of the trench bed and the field immediately adjacent to the trench bed for breakout and seepage, at least twice a year, and undertake any necessary mitigation measure to prevent future breakouts or seepages.

(9) The Owner shall develop a Contingency Plan to manage leachate at the site in the event leachate breakouts are observed after the construction and operation of the pressure trench.

(10) The Owner shall maintain a logbook to record the results of the stormwater management pond and the trench bed plus field inspections, and any cleaning and maintenance operations undertaken and shall keep the logbook at the site or operational office of the Owner for inspection by the Ministry.

(11) An additional groundwater monitoring well shall be installed immediately adjacent to the proposed pressure trench on the downstream side to evaluate downstream groundwater mounding.

7. REPORTING

(1) One week prior to the start up of the operation of the Proposed Works, the Owner shall notify the District Manager (in writing) of the pending start up date.

(2) In addition to the obligations under Part X of the Environmental Protection Act, the Owner shall, within 10 working days of the occurrence of any reportable spill as defined in Ontario Regulation 675/98, loss of any product, by-product, intermediate product, oil, solvent, waste material or any other polluting substance into the environment, submit a full written report of the occurrence to the District Manager describing the cause and discovery of the spill or loss, clean-up and recovery measures taken, preventative measures to be taken and schedule of implementation.

(3) The Owner shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to Ministry staff.

(4) The Owner shall prepare and submit to the District Manager, a performance report, on an annual basis, within ninety (90) days following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the Works and subsequent

7. Condition 7 is included to provide a performance record for future references, to ensure that the Ministry is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this Approval, so that the Ministry can work with the Owner in resolving any problems in a timely manner.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 0032-5ZBJJH issued on August 4, 2004.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary* Environmental Review Tribunal 655 Bay Street, Suite 1500 Toronto, Ontario M5G 1E5	<u>AND</u>	The Director appointed for the purposes of Part II.1 of the Environmental Protection Act Ministry of the Environment, Conservation and Parks 135 St. Clair Avenue West, 1st Floor Toronto, Ontario M4V 1P5

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

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 13th day of February, 2020

THIS APPROVAL WAS MAILED

ON FEB 21 2020

(Signed)

Fariha Pannu.

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

HV/

c: District Manager, DWECD, MECP London - District
Mike Jones, Azimuth Environmental Consulting

Ministry of the Environment, Conservation and Parks

733 Exeter Road
London ON N6E 1L3
Tel': 519 873-5000
Fax: 519 873-5020

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

733, rue Exeter
London ON N6E 1L3
Tél.: 519 873-5000
Fax: 519 873-5020

Ontario

MEMORANDUM

File No. SI PE PE C5 610

TO: Fernando Circelli
Environmental Officer
London District Office

FROM: Simon Thuss
Hydrogeologist
Water Resources Unit – Technical Support Section

DATE: September 13, 2021

RE: 2020 Annual Monitoring Report
South Easthope Landfill Site
Reference: 1-75351522

As requested, I have reviewed the following report:

- "2020 Landfill Monitoring Report, South Easthope Landfill, Township of Perth East", dated March 2021 and prepared by Azimuth Environmental Consulting Inc.

The review was limited to the hydrogeological aspects of the landfill monitoring program as presented in the report. My most recent review comments for this site were previously provided in a technical memorandum dated December 7, 2018.

The landfill site is located on the south side of Line 29, approximately two kilometres northwest of the community of Tavistock, Ontario. It is situated within Lot 26, Concession 5 of the former Township of South Easthope, now within the Township of Perth East. The site is operated under Provisional Certificate of Approval (C of A) No. A150902, most recently amended in 2018. The leachate collection and treatment system at the site is operated under Amended Environmental Compliance Approval No. 6224-B5KK74, issued February 2020.

The shallow soils at the site reportedly consist of low permeability clay silt till with occasional discontinuous sandy zones. The local groundwater flow direction is anticipated to be towards the Wilhelm Drain to the southeast of the site, with estimated groundwater flow velocities of up to 5 metres per year.

The current monitoring network includes nine on-site monitoring wells and three off-site domestic water supply wells. The domestic wells were not sampled in 2020 due to COVID-19 pandemic precautions.

Groundwater level measurements and sample collection is carried out twice per year (April and October).

Upon completing my review, the following comments are provided:

1. As detailed in the report, the discharge through the leachate treatment system averaged approximately 7,556 litres per day in 2020. This flow rate exceeds the reported maximum design capacity of 5,000 litres per day. It is understood that system efficiency appears to decline when the foam media becomes saturated. This condition may be exacerbated by excessive leachate flows. An assessment should be carried out to ensure that there is sufficient leachate treatment capacity at the site, particularly in the context of a possible landfill expansion.

2. Groundwater samples collected from OW5 continue to indicate elevated concentrations of chloride, calcium, hardness and alkalinity relative to background concentrations at the site. Although these parameters are often associated with landfill leachate impacts, the Consultant has attributed the elevated results to other potential sources or site activities such as road salting or dust suppressant. In order to support this conclusion, consideration should be given to including additional diagnostic tracer parameters (e.g. PFAS) during a one-time sampling event to better characterize the groundwater quality at the site and distinguish between leachate impacts and alternative sources.

3. It is noted that several parameters including chloride, TDS and hardness continue to exceed the Reasonable Use Guideline (RUG) criteria at OW6. It is anticipated that groundwater quality at this location will improve following the relocation of the leachate pressure trench in summer 2020; however, additional work may be required to delineate offsite impacts if compliance with the RUG cannot be achieved within a reasonable timeframe.

If you have any questions or require clarification on any of the points provided herein, please contact me at Simon.Thuss@ontario.ca or 226-688-9143.

Yours truly,

Simon Thuss, P.Geo.
Hydrogeologist
Technical Support Section
Southwestern Region

Limitations:
The purpose of the preceding review is to provide advice to the Ministry of the Environment, Conservation and Parks regarding subsurface 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.

Ontario

Ministry of the Environment, Conservation and Parks
Southwest Region
733 Exeter Road
London, ON N6E 1L3
Phone: 519-873-5000

Ministère de l'Environnement, de la Protection de la nature et des Parcs
Région Sud-Ouest
733 rue Exeter
London, ON N6E 1L3
Tél: 519-873-5000

Jake Collings
Township of Perth East
25 Mill Street East, Milverton, Perth East

December 14, 2021

Dear Mr. Collings,

Thank you for your cooperation during the inspection of South Easthope Landfill at 2439 Line 29 in Perth East on November 19, 2021.

The purpose of the inspection was to assess the township's compliance with requirements relating to its waste disposal approval and relevant ministry legislation and guidelines:

- Environmental Protection Act
  https://www.ontario.ca/laws/statute/90e19
- O.Reg.232/98: Landfilling sites
  https://www.ontario.ca/laws/regulation/980232
- O.Reg.347: General – Waste management
  https://www.ontario.ca/laws/regulation/900347
- C-5 Registration on title of Certificates of Approval for waste disposal sites
  https://www.ontario.ca/page/c-5-registration-title-certificates-approval-waste-disposal-sites#:~:text=Waste%20management-,C%2D5%20Registration%20on%20Title%20of%20Certificates%20of%20Approval%20for,municipal%20or%20privately%20owned%20land.

The inspection included a site visit, a record review, and discussions with Jake Collings (Operations Coordinator) and Justin Taylor (Roads Foreman).

Enclosed is the inspection report, which outlines identified items of non-compliance and actions necessary to bring the company into compliance (see pages 2 to 5 in the inspection report).

As a result of these findings, the Township of Perth East is requested to complete the following action item:

1. Prepare a written plan outlining how the township will complete and implement actions to correct items of non-compliance identified on pages 2 to 5. Include dates by which the township intends to complete and implement these actions. **Submit plan to undersigned officer on or before Monday, January 31, 2022.**

Please read the enclosed report carefully in its entirety. If you have any questions or concerns, you may reach me at 519-281-3591 or Sommer.Foster@ontario.ca.

Best regards,

Sommer Foster
Provincial Officer (Bilingual in English and French)
London District

ACRONYMS

CAZ	Contamination attenuation zone
D&O	Design and operations
ECA	Environmental Compliance Approval (previously known as Certificate of Approval)
O.Reg.	Ontario Regulation

South Easthope Landfill
2439 LINE 29, PERTH EAST, ON, N0B 2R0

Inspection Report

System Number:	
Inspection Start Date:	11/19/2021
Inspection End Date:	12/14/2021
Inspected By:	Sommer Foster
Badge #:	1902

Sommer Foster

(signature)

We want to hear from you. How was my service? You can provide feedback at
1-888-745-8888 or Ontario.ca/inspectionfeedback

NON-COMPLIANCE/NON-CONFORMANCE ITEMS

The following item(s) have been identified as non-compliance/non-conformance, based on a "No" response captured for a legislative or best management practice (BMP) question (s), respectively.

Question Group: Operations

Question ID	NOL 42		
Question		**Question Type**	**Legislative Requirement**
Is Daily cover applied to the waste at the end of each working day or as otherwise specified in the ECA?		Legislative	EPA | 27 | (1),EPA | O. Reg. 232/98 | 7
Observation/Corrective Action(s)			
No - ECA Conditions 23, 24, and 25 outline requirements for weekly cover, intermediate cover, and the use of woodchips as alternative cover material. Schedule B Conditions 4 and 5 require township to apply cover material over open refuse to minimize size of active working face to reduce vector/vermin. Township indicated that cover is applied approximately every week, but not all the time. During the inspection, the active face was larger than necessary. There was also a significant number of gulls on the working face. As indicated in previous questions, township is in the progress of hiring another full-time landfill employee. Right now, employees from the public works department come on-site in between other duties to compact waste and apply cover as needed. The second landfill employee would help to ensure that cover is applied more regularly. Slopes along the landfill's west border were showing signs of erosion. PERTH EAST IS REQUESTED TO: • APPLY COVER MATERIAL ON ACTIVE LANDFILL WASTE ON A WEEKLY BASIS, AS PER CONDITION 23. • FIX INTERMEDIATE/FINAL COVER IN PLACES THROUGHOUT THE LANDFILL FOOTPRINT THAT ARE SHOWING SIGNS OF EROSION.			

Question ID	NOL 43		
Question		**Question Type**	**Legislative Requirement**
Are procedures implemented to control rodents or other animals and insects at the site?		Legislative	EPA | 27 | (1)
Observation/Corrective Action(s)			
No - ECA Condition 27 and Schedule B outline vector/vermin control plan requirements. Schedule B Conditions 8 to 10 outline requirements to manage organisms if populations get too large, such as removing attracting mechanism, and conducting pest control activities as necessary or appropriate for the organism type.			

The attendant notes in the daily inspection log that they make observations throughout the site daily, as per Schedule B Conditions 1 and 2.

Litter along the perimeter is collected during quieter times and more in-depth litter pick-up events occur a couple of times per year, as per Schedule B Condition 3.

A large number of gulls were observed during inspection load on the open active landfilling face. As indicated in Question NOL 42, the active face has been left larger than necessary, cover not being applied as frequently as required in the ECA (weekly). Township is not complying with Schedule B Conditions 4 and 5.

Recyclable materials are left to accumulate, transferred off-site in bulk for economical purposes. Scrap metal, waste electronics, and other materials were stored on-site in reasonable amounts. However, tires had been left to accumulate in an excessive quantity and likely provided ample habitat, such as shelter and drinking water, for vermin/vectors. The quantity of tires on-site was much greater than a complete transfer load. Township indicated that they had been attempting to connect with a RETIRE hauler to remove tires, but there has been scheduling issues. Township is requested to remove recyclables/reusable material at an increased frequency to avoid materials to accumulate in excess and to reduce habitat for vector/vermin, in accordance with Schedule B Condition 6.

Grassed areas are left not cut to reduce the loafing potential for gulls, as required by Schedule B Condition 7.

Township is also not complying with Schedule B Condition 11 because vector/vermin activities are not discussed in the annual monitoring report.

PERTH EAST IS REQUESTED TO:
• APPLY COVER MATERIAL MORE DILIGENCY AND IN ACCORDANCE TO THE ECA (WEEKLY) TO MINIMIZE SIZE OF ACTIVE WORKING FACE AND TO ELIMINATE THE ATTRACTING MECHANISM FOR THE GULLS, AS PER SCHEDULE B CONDITIONS 4, 5, AND 8.
• REMOVE REYCLABLES/RECOVERED MATERIALS FROM THE SITE AS SOON AS COMPLETE TRANFSER LOADS ARE AVAILABLE OR BEFORE THE END OF THE YEAR, WHICHEVER OCCURS FIRST, AS PER SCHEDULE B CONDITION 6.
• DISCUSS VECTOR/VERMIN ACTIVITIES IN ANNUAL MONITORING REPORT, AS PER SCHEDULE B CONDITION 11.

Question Group: Other Inspection Findings

Question ID	949100	
Question	**Question Type**	**Legislative Requirement**
Were the inspection questions sufficient to address other identified non-compliance items?	Legislative	Not Applicable
Observation/Corrective Action(s)		

MONITORING WELLS During site tour, a well was observed unlocked. Leaving monitoring wells unlocked allows for potential tampering with the well and does not provide quality assurance for water quality sampling. PERTH EAST IS REQUESTED TO SECURE ALL WELLS LOCATED ON THE 29.6-HA SITE WITH LOCKS. SIGNS The two signs at the site entrance contain all the information required by ECA Condition 21. BURNING No burning or incineration of materials occurs on-site, in accordance with Condition 22. No visible evidence of burning was seen during the site visit either. LITTER The landfill attendant picks up litter during quieter times. A more thorough litter pick-up occurs a couple times per year. During the inspection, litter was present throughout the site but quantities were not excessive, and typically closer to the active face rather than in the Contaminant Attenuation Zone. There was little litter in ponds or drainage ditches. ODOUR Little to no odour was detected throughout the site. The exception was near the active waste filling area, where minor odours of landfill gas and refuse were detected. DUST Inspection was conducted while the site was closed and while the grounds were saturated with water. Dust impacts could not be evaluated. NOISE Inspection was conducted while the site was closed. Noise could not be evaluated.

Question Group: Records / Reports

Question ID	NOL 47	
Question	**Question Type**	**Legislative Requirement**
Has the annual operations report been submitted to MECP or available on site as required by the ECA?	Legislative	EPA | 27 | (1)
Observation/Corrective Action(s)		
No - ECA Condition 41(1) outlines the annual monitoring report requirements. Condition 41(2) explains the procedure to follow when proposing changes to the environmental monitoring plan. Conditions 17 and 33 require all records and information relating to/resulting from the activities		

approved under the site's approval to be retained for a minimum of 2 years.

Condition 11 in the ECA's Schedule B requires vector/vermin control activities to be discussed in the annual monitoring report.

O.Reg.232/98 section 21 requires annual reports to be retained until at least two years after site is closed.

Azimuth Environmental Consulting prepares the annual monitoring reports on behalf of the township. The consultant submitted the 2020 report to the ministry in late March 2021.

The most recent report concluded that "the landfill continues to have minimal impact to the surrounding environment. Leachate impacts are not discerned in the downgradient groundwater or surface water and the leachate treatment system continues to be effective, albeit has measurable influence along the western property boundary. With the use of the new infiltration trench, this influence should gradually lessen with time."

The annual monitoring report includes all information required by Condition 41(1), but does not speak to vector/vermin activities, as required by Schedule B Condition 11.

PERTH EAST IS REQUESTED TO INCLUDE DISCUSSIONS RELATING TO VECTOR/VERMIN ACTIVITIES IN SUBSEQUENT ANNUAL REPORTS, IN ACCORDANCE WITH SCHEDULE B CONDITION 11.

Question ID	NOL 65	
Question	**Question Type**	**Legislative Requirement**
Has the Certificate of Requirement been registered on Title?	Legislative	EPA | 27 | (1)
Observation/Corrective Action(s)		

No - ECA Conditions 13, 14, and 15 stipulates township to register the landfill's approval documents to the property's land registry title.

Guideline C-5 outlines the process of registering waste sites to a property's land title: "C-5 Registration on title of Certificates of Approval for waste disposal sites" available at www.ontario.ca/page/c-5-registration-title-certificates-approval-waste-disposal-sites

Township has not yet registered the landfill to the property's land registry title.

PERTH EAST IS REQUESTED TO REGISTER THE LANDFILL TO TITLE IN ACCORDANCE WITH CONDITIONS 13, 14, AND 15.

INSPECTION DETAILS

This section includes all questions that were assessed during the inspection.

Ministry Program: Regulated Activity: WASTE : Landfills

Question ID	NOL 1		
Question		**Question Type**	**Legislative Requirement**
Does the Open landfill site have an Environmental Compliance Approval (ECA)?		Legislative	EPA | 27 | (1)
Observation			

Yes - South Easthope Landfill is owned and operated by the Township of Perth East. The site is located along Perth Line 29 in Lot 26, Concession 5 in Perth East (former Township of South Easthope). It was established as a joint waste disposal site for the Townships of Mornington, North Easthope, and South Easthope, and the Village of Milverton. The village and townships amalgamated on January 1, 1998, with the Township of Ellice to create the Township of Perth East. The site now accepts waste from the residents of Perth East.

The landfill was inspected proactively on November 19, 2021. The inspection included a site visit, record review, and discussions with Jake Collins (Operations Coordinator) and Justin Taylor (Roads Foreman).

It was hailing during the site visit.

Township is authorized to operate the landfill under Waste Disposal Site ECA A150902. The site's stormwater management and leachate treatment systems are authorized under Sewage ECA 6224-B5KK74.

WASTE DISPOSAL SITE ECA A150902

- Originally issued November 14, 1988
- Notice 1 issued October 13, 2004, in response to operation changes
- Notice 2 issued November 15, 2004
- Notice 3 issued March 21, 2005, to add conditions for the vector/vermin control plan
- Amended ECA issued May 24, 2007, to consolidate notices with updated requirements and to add conditions relating to the development and operations plan and environmental monitoring/trigger mechanism. Revoked and replaced the 1988 waste disposal site approval and Notices 1, 2, and 3.
- Amended ECA Notice 1 issued September 25, 2018, to add transfer station conditions
- Design and operations manual (D&O report): December 2005 report prepared by Azimuth Environmental Consultants, Inc. "Trigger mechanism and contingency plan and the design and operations plan for the South Easthope Landfill - Township of Perth East".

NOTE: Notice 1 from 2004 was initially issued to the wrong ECA(A150901) on September 27. ECA A150901 was originally issued on November 1, 1974, to authorize the operation of a transfer

station on Lot 14, Concession 3 in South Easthope. The transfer station closed on April 1, 1980, but the ECA was not officially revoked. Approval A150901 was finally revoked on November 15, 2004. Some official paperwork issued for the landfill (e.g. approvals and annual reports) continue to state the wrong approval number (A150901 instead of A150902). SEWAGE • 3-0762-88-0106 issued March 14, 1990, for site's stormwater ditches and sedimentation pond. • 0032-5ZBJJH issued August 4, 2004, with contemporary requirements and to add conditions for site's leachate treatment system. Revoked and replaced the 1990 sewage approval. • 6224-B5KK74 issued February 13, 2020, to reflect changes made to leachate treatment system. Revoked and replaced the 2004 sewage approval.

Question ID	NOL 3	
Question	**Question Type**	**Legislative Requirement**
Does the holder of the landfill ECA own the entire site?	Information	EPA | 27 | (1), EPA | O. Reg. 232/98 | 3
Observation		
Yes		

Question ID	NOL 2	
Question	**Question Type**	**Legislative Requirement**
Is this landfill on Crown land?	Information	Not Applicable
Observation		
No - The landfill is located on a 29.6-ha property owned by the township.		

Question ID	NOL 4	
Question	**Question Type**	**Legislative Requirement**
Does the landfill have a Contaminant Attenuation Zone (CAZ)?	Information	Not Applicable
Observation		
Yes - The township operates the 5-ha landfill area within the 29.6-ha site, with the remainder of the property acting as a CAZ.		

Question ID	NOL 5	
Question	**Question Type**	**Legislative Requirement**
Is the CAZ on Crown land?	Information	Not Applicable
Observation		

No

Question ID	NOL 7	
Question	**Question Type**	**Legislative Requirement**
Is the CAZ on a public road?	Information	EPA | O. Reg. 232/98 | 7
Observation		
No		

Question ID	NOL 9	
Question	**Question Type**	**Legislative Requirement**
Does the holder of the landfill ECA own the property rights for the CAZ?	Legislative	EPA | 27 | (1), EPA | O. Reg. 232/98 | 4 | (1)
Observation		
Yes		

Question ID	NOL 10	
Question	**Question Type**	**Legislative Requirement**
Do the property rights for the CAZ meet the requirements of Reg 232?	Legislative	EPA | 27 | (1), EPA | O. Reg. 232/98 | 4 | (3)
Observation		
Yes - The property's CAZ meets requirements outlined in O.Reg.232/98 section 4(3). Township owns the CAZ land. It retains consultants to sample groundwater and leachate from observation wells, Wilhelm Drain, and stormwater management structures for monitoring purposes. The landfill's leachate treatment system discharges treated effluent on the CAZ. There are no features (e.g. structures, paving) or land use in the CAZ that would interfere with the functioning of the CAZ or impede the rights to discharge contaminants on the property or collect samples for monitoring purposes.		

Question ID	NOL 12	
Question	**Question Type**	**Legislative Requirement**
Does the landfill have a large enough Buffer Area as specified in the ECA or Regulation 232/98?	Legislative	EPA | 27 | (1)
Observation		
Yes - The landfill's buffer area meets requirements specified in O.Reg.232/98 section 7. NORTH, SOUTH, AND WEST BUFFER AREAS		

Township is authorized to use and operate a 5.0 ha landfilling site within a total site area of 29.6 ha. There is enough space to the north, south, and east of the landfill to provide buffer areas of at least 100 m wide, thus complying with section 7(2). WEST BUFFER AREA The site's west boundary is more restricted but still complies with section 7(3). Township monitores water quality conditions along the western boundary and buffer area and is taking action to reduce potential of adverse effects. There is enough room to provide a buffer area at least 30 m wide. There is also adequate space for vehicles and structures such as leachate and stormwater storage ponds, stormwater ditches, berms, catchbasins, monitoring wells, and leachate treatment system. The pressure trench, which is used to dispose of treated leachate effluent, was formerly located along the western boundary. It was decommissioned and a new one was constructed farther east in 2020 in response to water table anomalies detected in monitoring wells OW5 and OW6. These anomalies were interpreted to be a groundwater mound in vicinity of the pressure trench adjacent to OW6. There was also a gradual increase in chloride (a leachate indicator) concentration over the years, exceeding Reasonable Use Criteria trigger levels. The relocation was completed to reduce the potential for off-site impacts associated with groundwater mounding adjacent to the western property boundary. Monitoring remains on-going to determine if mounding impacts will diminish after relocation.

Question ID	NOL 13		
Question		**Question Type**	**Legislative Requirement**
Are access roads and on-site roads provided so that vehicles hauling waste to and on the site may travel readily on any day under all normal weather conditions?		Information	EPA | 27 | (1)
Observation			
Yes - Roads are compacted gravel and in good condition.			

Question ID	NOL 14		
Question		**Question Type**	**Legislative Requirement**
Is site access limited to times when an attendant is on duty?		Legislative	EPA | 27 | (1)
Observation			
Yes - Site is fenced with a gate that is locked when site is closed. Fence and gate are in good condition and can adequately limit access only to times when attendant is on duty.			

Question ID	NOL 15		
Question		**Question**	**Legislative**

	Type	Requirement
Does the site only receive waste from within its approved service area?	Legislative	EPA | 27 | (1)
Observation		
Yes - The landfill is authorized to accept waste generated within the Township of Perth East. Bluewater Recycling Association collects curbside waste throughout the township. Residents may also transport their waste themselves directly to the landfill, provided they proffer proof of residency to the landfill attendant.		

Question ID	NOL 16	
Question	**Question Type**	**Legislative Requirement**
Is the site required to have a ground water monitoring program by the ECA?	Information	Not Applicable
Observation		
Yes - The groundwater monitoring program is outlined in Waste ECA Conditions 34 to 38 and Schedule C, in the Sewage ECA, and in the D&O report. Results are presented in the annual monitoring reports as per ECA Condition 41. The groundwater monitoring network consists of 9 observation wells on the landfill property and three water wells on adjacent private properties. • OW2: Southeast corner of landfill, downgradient • OW3: North of landfill, background • OW4A: Shallow, downgradient • OW4B: Shallow, downgradient • OW5: Northwest corner of landfill along western boundary, background • OW6: West of landfill along western boundary near location of former pressure trench, background • OW7: South of landfill, downgradient • OW8: South of landfill along western boundary, immediately west of current pressure trench, background • OW9: Southwest corner of landfill next to current pressure trench, downgradient		

Question ID	NOL 17	
Question	**Question Type**	**Legislative Requirement**
Is the site implementing the groundwater monitoring program as required by the ECA?	Legislative	EPA | 27 | (1)
Observation		
Yes - Groundwater monitoring has been conducted annually for many years. Samples were not collected from private wells in 2020 due to the COVID pandemic, in keeping with physical distancing requirements and uncertainty about entering private buildings. Monitoring reports have been submitted to the ministry on an annual basis, most recently in late March 2021.		

Question ID	NOL 18		
Question		**Question Type**	**Legislative Requirement**
Are monitoring well samples taken and tested to determine the quality of the ground water?		Legislative	EPA | 27 | (1), EPA | O. Reg. 232/98 | 25
Observation			
Yes - Samples were taken in 2020 by Azimuth Environmental Consulting, Inc. The consultant group took Fall 2021 samples in October.			

Question ID	NOL 19		
Question		**Question Type**	**Legislative Requirement**
Is the ministry concerned with the results of the samples that have been tested?		Information	Not Applicable
Observation			

No - Monitoring work was last reviewed by a ministry hydrogeologist in 2018 (sewage ECA amendment application and 2017 monitoring report). The township addressed many of the concerns brought up, such as expanding the groundwater monitoring network and relocating the pressure trench.

As indicated in Question NOL 12, the subsurface pressure trench, formerly located adjacent to the western site boundary, caused localized groundwater mounding in the vicinity of the trench. This may have contributed to chloride concentrations in excess of the Reasonable Use Criteria at OW5 and OW6. Township has since decommissioned the trench along the western boundary and constructed a new one farther away from the property boundary to reduce the potential of off-site impacts. It may take a few years for the levels at OW5 and OW6 to stabilize.

The groundwater monitoring network also expanded from 6 to 9 monitoring wells in 2020 (OW7, OW8, OW9). One in the vicinity of the new pressure trench location, another downgradient of the pressure trench, and one along the property boundary west of the new pressure trench.

The 2020 annual monitoring report concluded that the landfill continues to have minimal impact to the surrounding environment, as observed in previous years. General report conclusions:

- Leachate impacts are not discerned in downgradient groundwater.
- Leachate treatment system continues to be effective, albeit has measurable influence along the western property boundary. With the use of the new infiltration trench in another location, this influence should gradually lessen with time.

The inspection was conducted on a day when the grounds were saturated with water due to precipitation events that occurred a couple days earlier and during the site visit. This made it difficult to detect the presence of leachate. However, there were no evident signs of leachate, such as iron staining or odours.

The ground around the pressure trench was more saturated than other areas due to discharged

effluent. Again, no signs of leachate were detected.

Question ID	NOL 21	
Question	**Question Type**	**Legislative Requirement**
Is the site required to manage leachate by the ECA?	Information	Not Applicable
Observation		
Yes - The landfill is approved to operate a leachate treatment system as per the sewage ECA and Conditions 39 and 40 in Waste ECA. The leachate collection and treatment system consists of the following: Three temporary storage ponds adjacent to waste area to collect leachate from waste cells, one permanent holding pond for secondary solids removal and balancing leachate received from temporary ponds, a pumping chamber for dosing the Waterloo Biofilter System bioreactor filled with foam media, another pumping chamber to recirculate some of the treated leachate back through the system and discharge the rest through a subsurface pressure trench to dispose the treated effluent to the ground. The leachate treatment system is designed to primarily reduce organics and particulate components. Further denitrification is expected to occur in the attenuation area between the trench and the downstream surface water (200 m) and property boundary (360 m). If the system is overloaded (e.g. during wet seasons), township may pump the ponds to collect the excess leachate and transport it to the Milverton wastewater treatment facility for treatment and disposal. The stormwater management system helps to collect and transmit stormwater runoff before it gets impacted by leachate. It consists of ditches, swales, two stormwater ponds connected in series, vegetated riprap channel to property boundary, and swale receiving and discharging stormwater from riprap channel to Wilhelm Drain and the downstream Thames River.		

Question ID	NOL 22	
Question	**Question Type**	**Legislative Requirement**
Is the landfill implementing the procedures required by the ECA to manage leachate?	Legislative	EPA | 27 | (1)
Observation		
Yes - The Waterloo Biofilter System operates every day to manage collected leachate, working every 9 minutes for 30 seconds at a time. A township wastewater operator inspects the system. Pond levels are also checked regularly to ensure that the system is within capacity. Efficiency issues were observed in 2020. The monitoring results indicated that the system was not as effective in treating elevated BOD, TSS, and ammonia concentrations from those observed in the leachate pond as has historically occurred. The system was inspected and cleaned in September 2020, foam media also replaced. It takes approximately two to three months for the efficiency to re-establish in the system. April 2021 sampling results will demonstrate if the system has returned to normal function or if further inspection and maintenance will be needed.		

Question ID	NOL 24	
Question	**Question Type**	**Legislative Requirement**
Is the ministry concered with the leachate quality?	Information	Not Applicable
Observation		
No - Leachate quality is evaluated by sampling the leachate pond. The 2020 annual report indicated that leachate quality appeared to be generally consistent with previous years. Despite the precipitation events that occurred the week of the inspection, the leachate collection ponds appeared to be below its maximum capacity with room to accommodate more leachate without risk of bypass/short-circuiting.		

Question ID	NOL 26	
Question	**Question Type**	**Legislative Requirement**
Is the site required to manage landfill gas by the ECA?	Information	Not Applicable
Observation		
No - Landfill gas is not expected to be an issue due to the impermeable soils and size of site and contamination attenuation zone. No engineered landfill gas management system in place. Minor landfill gas odours detected only when walking directly adjacent to active working face. None detected along Perth Line 29.		

Question ID	NOL 30	
Question	**Question Type**	**Legislative Requirement**
Is there ongoing abatement to address any concerns the ministry has with landfill gas at this site?	Information	Not Applicable
Observation		
No		

Question ID	NOL 31	
Question	**Question Type**	**Legislative Requirement**
Is the site required to have a surface water monitoring program by the ECA?	Information	Not Applicable
Observation		
Yes - The surface water monitoring program is outlined in ECA Conditions 34 to 38 and Schedule C, in the Sewage ECA, and in the D&O report. Results are presented in the annual monitoring reports as per ECA Condition 41. The surface water monitoring network consists of 3 sampling sites:		

• SW1: Upstream of landfill area on Wilhelm Drain (background/upstream). • SW2: Downstream of inlet where stormwater from landfill retention pond discharges into Wilhelm Drain (downstream). • SW3: Stormwater discharging from stormwater retention pond. Shallow groundwater from the landfill area discharges into the Wilhelm Drain. This stream flows southward past the landfill area and eventually into the Thames River.

Question ID	NOL 32	
Question	**Question Type**	**Legislative Requirement**
Is the site implementing the surface water monitoring program as required by the ECA?	Legislative	EPA | 27 | (1)
Observation		
Yes - Surface water monitoring has been conducted annually for many years. Monitoring reports are being submitted to the ministry annually, most recently in late March 2021. Routine monitoring in 2018 detected CBOD5 levels in excess of trigger concentrations specified in D&O report. Exceedances were detected in samples from SW3 in the stormwater management pond. Situation was addressed.		

Question ID	NOL 34	
Question	**Question Type**	**Legislative Requirement**
Are there water quality concerns with the results of the samples that have been tested?	Information	Not Applicable
Observation		
No - No water quality concerns were flagged in the 2020 annual monitoring report. Despite the precipitation events that occurred the week of the inspection, the stormwater management structures appeared to be well below capacity and able to handle more stormwater runoff without bypass/short-circuiting. Litter in the stormwater management infrastructures can lead to clogging. Little litter was observed in any of them.		

Question ID	NOL 36	
Question	**Question Type**	**Legislative Requirement**
Is proper equipment available for the compaction of waste and applying cover material?	Legislative	EPA | 27 | (1)
Observation		
Yes - Township has the following equipment available on-site:		

• Compactor: To compact waste and cover material
• Loader: To haul bins from the transfer station and to shuffle woodchips.
• Bulldozer: To tidy up the site.

Question ID	NOL 37		
Question		**Question Type**	**Legislative Requirement**
Is the landfill able to accurately determine the amount of waste received?		Legislative	EPA | 27 | (1)
Observation			
Yes - Truck scales were added to the site in 2020 and have been used since January 2021 to record waste quantity received at site in digital spreadsheet logs. Before the use of truck scales, the site operator would estimate the waste volume visually and recorded in paper logs. Site surveys were conducted to confirm this volume. Site surveys have been completed annually since 2004. Prior to that, surveys were completed but not as regularly. Estimated volumes are recorded in annual reports. Recyclable and reusable materials are tracked via invoices when material is removed from site.			

Question ID	NOL 38		
Question		**Question Type**	**Legislative Requirement**
Are all disposal operations at the site adequately and continually supervised?		Legislative	EPA | 27 | (1)
Observation			
Landfill attendant is present whenever site is open. They work at the scale house to greet waste haulers and residents depositing waste and complete other duties around the site during quieter times. Activities at the active face such as compaction and cover application are currently being conducted by employees from the township's Public Works department. These employees divide their time between the landfill and other public works duties. At time of site visit, township was in the process of hiring an additional dedicated landfill staff member to work on-site with the attendant to improve on-site operations, such as supervising haulers depositing waste on the working face, compaction and applying cover material.			

Question ID	NOL 39		
Question		**Question Type**	**Legislative Requirement**
Does the landfill operator have a site inspection program as required by the ECA?		Information	Not Applicable
Observation			

Yes - ECA Condition 31 outlines site inspection recording requirements.

Conditions 17 and 33 require all records and information relating to/resulting from the activities approved under the site's approval to be retained for a minimum of 2 years.

The vector/vermin control plan also outlines site inspection requirements in Schedule B Conditions 1 and 2.

The attendant conducts site inspections daily and records results in a written log kept on-site. Records from the last two years were available for review.

Question ID	NOL 40	
Question	**Question Type**	**Legislative Requirement**
Does the landfill operator have a procedure in place to address issues identified by staff during the site inspection?	Legislative	EPA | 27 | (1)
Observation		
Yes - If issues are identified, attendant notifies a Public Works operator working on-site or at the township office. Issues are addressed.		

Question ID	NOL 41	
Question	**Question Type**	**Legislative Requirement**
Is the waste being compacted adequately?	Legislative	EPA | 27 | (1)
Observation		
Yes - Waste is compacted multiple times per day by Public Works operators.		

Question ID	NOL 42	
Question	**Question Type**	**Legislative Requirement**
Is Daily cover applied to the waste at the end of each working day or as otherwise specified in the ECA?	Legislative	EPA | 27 | (1), EPA | O. Reg. 232/98 | 7
Observation		
No - ECA Conditions 23, 24, and 25 outline requirements for weekly cover, intermediate cover, and the use of woodchips as alternative cover material. Schedule B Conditions 4 and 5 require township to apply cover material over open refuse to minimize size of active working face to reduce vector/vermin. Township indicated that cover is applied approximately every week, but not all the time. During the inspection, the active face was larger than necessary. There was also a significant number of gulls on the working face. As indicated in previous questions, township is in the progress of hiring another full-time landfill		

employee. Right now, employees from the public works department come on-site in between other duties to compact waste and apply cover as needed. The second landfill employee would help to ensure that cover is applied more regularly. Slopes along the landfill's west border were showing signs of erosion. PERTH EAST IS REQUESTED TO: • APPLY COVER MATERIAL ON ACTIVE LANDFILL WASTE ON A WEEKLY BASIS, AS PER CONDITION 23. • FIX INTERMEDIATE/FINAL COVER IN PLACES THROUGHOUT THE LANDFILL FOOTPRINT THAT ARE SHOWING SIGNS OF EROSION.

Question ID	NOL 43	
Question	**Question Type**	**Legislative Requirement**
Are procedures implemented to control rodents or other animals and insects at the site?	Legislative	EPA | 27 | (1)
Observation		
No - ECA Condition 27 and Schedule B outline vector/vermin control plan requirements. Schedule B Conditions 8 to 10 outline requirements to manage organisms if populations get too large, such as removing attracting mechanism, and conducting pest control activities as necessary or appropriate for the organism type. The attendant notes in the daily inspection log that they make observations throughout the site daily, as per Schedule B Conditions 1 and 2. Litter along the perimeter is collected during quieter times and more in-depth litter pick-up events occur a couple of times per year, as per Schedule B Condition 3. A large number of gulls were observed during inspection load on the open active landfilling face. As indicated in Question NOL 42, the active face has been left larger than necessary, cover not being applied as frequently as required in the ECA (weekly). Township is not complying with Schedule B Conditions 4 and 5. Recyclable materials are left to accumulate, transferred off-site in bulk for economical purposes. Scrap metal, waste electronics, and other materials were stored on-site in reasonable amounts. However, tires had been left to accumulate in an excessive quantity and likely provided ample habitat, such as shelter and drinking water, for vermin/vectors. The quantity of tires on-site was much greater than a complete transfer load. Township indicated that they had been attempting to connect with a RETIRE hauler to remove tires, but there has been scheduling issues. Township is requested to remove recyclables/reusable material at an increased frequency to avoid materials to accumulate in excess and to reduce habitat for vector/vermin, in accordance with Schedule B Condition 6. Grassed areas are left not cut to reduce the loafing potential for gulls, as required by Schedule B		

Condition 7.

Township is also not complying with Schedule B Condition 11 because vector/vermin activities are not discussed in the annual monitoring report.

PERTH EAST IS REQUESTED TO:

• APPLY COVER MATERIAL MORE DILIGENCY AND IN ACCORDANCE TO THE ECA (WEEKLY) TO MINIMIZE SIZE OF ACTIVE WORKING FACE AND TO ELIMINATE THE ATTRACTING MECHANISM FOR THE GULLS, AS PER SCHEDULE B CONDITIONS 4, 5, AND 8.

• REMOVE REYCLABLES/RECOVERED MATERIALS FROM THE SITE AS SOON AS COMPLETE TRANFSER LOADS ARE AVAILABLE OR BEFORE THE END OF THE YEAR, WHICHEVER OCCURS FIRST, AS PER SCHEDULE B CONDITION 6.

• DISCUSS VECTOR/VERMIN ACTIVITIES IN ANNUAL MONITORING REPORT, AS PER SCHEDULE B CONDITION 11.

Question ID	NOL 44	
Question	**Question Type**	**Legislative Requirement**
Is site access restricted by use of a gate, fence, or physical barrier when the site is not operating?	Legislative	EPA | 27 | (1)
Observation		
Yes		

Question ID	NOL 45	
Question	**Question Type**	**Legislative Requirement**
Is the waste disposal area adequately screened from public view?	Legislative	EPA | 27 | (1)
Observation		
Yes - The landfill is set back from Perth Line 29 by over 200 metres of agricultural and forested land.		

Question ID	NOL 46	
Question	**Question Type**	**Legislative Requirement**
Are daily records of site operations available at the site for at least the past 2 years or as otherwise required by the ECA?	Legislative	EPA | 27 | (1), EPA | O. Reg. 232/98 | 21
Observation		
Yes - Condition 17 and 33 requires all records and information relating to/resulting from activities approved by the ECA to be retained for a minimum of two years. Exceptions, such as the D&O report, are required to be kept on-site at all times.		

O.Reg.232/98 section 21 requires annual reports to be retained until at least two years after site is closed.

Records to be kept for at least two years include, but are not limited to:
• Daily operations (Condition 28)
• Environmental emergency situations (Condition 29, see Questions NOL 54 and 55)
• Complaints (Condition 30, see Question NOL 59)
• Site inspections (Condition 31, see Questions NOL 39 and 40)
• Occurrences of unapproved waste (Condition 32, see Questions NOL 52 and 53)

Landfilled wastes: The site maintains records of waste received and landfilled in paper logs and electronic spreadsheets. Now that there is a truck scale, township is better able to track waste quantities received instead of estimating volumes.

Recyclable/reusable materials: Licensed haulers removing recyclable/reusable materials provide invoices to the township with quantity estimates upon removal.

These records are retained for a minimum of 5 years.

Question ID	NOL 47	
Question	**Question Type**	**Legislative Requirement**
Has the annual operations report been submitted to MECP or available on site as required by the ECA?	Legislative	EPA | 27 | (1)

Observation

No - ECA Condition 41(1) outlines the annual monitoring report requirements.

Condition 41(2) explains the procedure to follow when proposing changes to the environmental monitoring plan.

Conditions 17 and 33 require all records and information relating to/resulting from the activities approved under the site's approval to be retained for a minimum of 2 years.

Condition 11 in the ECA's Schedule B requires vector/vermin control activities to be discussed in the annual monitoring report.

O.Reg.232/98 section 21 requires annual reports to be retained until at least two years after site is closed.

Azimuth Environmental Consulting prepares the annual monitoring reports on behalf of the township. The consultant submitted the 2020 report to the ministry in late March 2021.

The most recent report concluded that "the landfill continues to have minimal impact to the surrounding environment. Leachate impacts are not discerned in the downgradient groundwater or surface water and the leachate treatment system continues to be effective, albeit has measurable influence along the western property boundary. With the use of the new infiltration trench, this influence should gradually lessen with time."

The annual monitoring report includes all information required by Condition 41(1), but does not speak to vector/vermin activities, as required by Schedule B Condition 11.

PERTH EAST IS REQUESTED TO INCLUDE DISCUSSIONS RELATING TO VECTOR/VERMIN ACTIVITIES IN SUBSEQUENT ANNUAL REPORTS, IN ACCORDANCE WITH SCHEDULE B CONDITION 11.

Question ID	NOL 48	
Question	**Question Type**	**Legislative Requirement**
Is scavenging being prevented?	Legislative	EPA | 27 | (1), EPA | O. Reg. 232/98 | 23
Observation		
Yes		

Question ID	NOL 51	
Question	**Question Type**	**Legislative Requirement**
Is the landfill only accepting the types of waste that they are approved to receive?	Legislative	EPA | 27 | (1)
Observation		

Yes - The landfill is approved to receive solid non-hazardous waste from domestic, commercial, and industrial sources.

The attendant inspects the waste before allowing entry to the site. Residents are directed to deposit waste or recyclable items in the designated transfer station area. Landfill operators later transfer waste to be landfilled waste into the working face afterwards. Trucks hauling curbside waste deposit loads directly on the working face.

Township encourages waste diversion to reduce waste directed to tipping face. Items such as tires, electronic waste, scrap metal, clean wood/yard waste/skids, stones/bricks/cement, are segregated for reuse/recycling:

• TIRES: Township partners with RETIRE YOUR TIRE to haul waste tires for recycling.

• E-WASTE: Township partners with EPRA (Electronic Products Recycling Association) to haul waste electronics for recycling.

• SCRAP METAL: Township contracts Benmet Steel to pick up bin of metal for recycling.

• CLEAN WOOD: Township brings a woodchipper on-site to process the clean wood and yard waste. Chipped wood is the main material used as landfill cover, especially during wet/freezing conditions when the on-site clay soils are difficult to handle.

• STONES: Township repurposes stone, cement, and bricks for road construction. Material is transported to township's gravel pit for storage.

If the site receives asbestos-containing waste, the attendant records the location in which that waste is deposited. Township has an agreement with the City of Stratford to allow the residents of Perth East to bring their household hazardous waste to Stratford's drop-off location on designated collection dates.

Question ID	NOL 52	
Question	**Question Type**	**Legislative Requirement**
Does the landfill have a waste refusal procedure in place to manage waste that arrives at the site that the site is not approved the accept?	Information	Not Applicable
Observation		
Yes - ECA Condition 32 outlines recording requirements for occurrences of unapproved waste. Conditions 17 and 33 require all records and information relating to/resulting from the activities approved under the site's approval to be retained for a minimum of 2 years. If attendant becomes aware that a resident is going to deposit unacceptable waste, the attendant informs the person that the site cannot accept the item and of the appropriate disposal method (i.e. household hazardous waste depot). If attendant finds any unapproved waste deposited on-site during their daily site observation tours, such as subject waste, they record the event and inform the Public Works operators. Material is trucked back to the Public Works shop to be stored until the next hazardous waste day when it will be transferred for disposal. Township indicates that finding unapproved waste on-site is a rare occurrence. No records reviewed.		

Question ID	NOL 53	
Question	**Question Type**	**Legislative Requirement**
is the waste refusal procedure being followed?	Legislative	EPA | 27 | (1)
Observation		
Yes		

Question ID	NOL 54	
Question	**Question Type**	**Legislative Requirement**
Does the landfill have a procedure in place to address and document spills and fires?	Legislative	EPA | 27 | (1)
Observation		

Yes - ECA Condition 29 outlines the recording requirements for environmental emergency situations. Conditions 17 and 33 require all records and information relating to/resulting from the activities approved under the site's approval to be retained for a minimum of 2 years. Spill kit is stored inside scale house in the utility room. If any environmental emergency situations such as spills and fire occur on-site, the landfill attendant records them in the daily site inspection log. The attendant notifies the public works manager and the appropriate emergency services via phone or radio. There have been no environmental emergency situations to occur within the last two years. Most recent environmental emergency situations: • Summer 2010: Recurring landfill fires occurred on-site. The fire department was called in. Cell excavated to find smouldering waste underneath. Situation was addressed. Ministry was notified. • 2018: Azimuth Environmental detected CBOD5 at concentrations exceeding the trigger level in samples taken from the stormwater management pond while conducting routine environmental monitoring. Consultant conducted confirmatory sampling to assess the degree and nature of impact. Leachate treatment ponds were at capacity due spring melt and ice storm melt and the active waste cell was reaching capacity. There was concern that leachate-impacted stormwater had migrated into the stormwater management pond. Situation was addressed. Ministry was notified and report submitted. No records reviewed.

Question ID	NOL 55	
Question	**Question Type**	**Legislative Requirement**
Does the landfill have emergency contingency plan as required by the ECA?	Legislative	EPA | 27 | (1)
Observation		
Yes - The emergency contingency plan is outlined in the site's December 2005 D&O report.		

Question ID	NOL 59	
Question	**Question Type**	**Legislative Requirement**
Does the landfill have a procedure in place to address complaints?	Legislative	EPA | 27 | (1)
Observation		
Yes - ECA Condition 30 outlines the recording requirements for environmental complaints. Conditions 17 and 33 require all records and information relating to/resulting from the activities approved under the site's approval to be retained for a minimum of 2 years.		

The complaint response procedure is outlined in the site's D&O report. Township has a form available to fill out should it receive an environmental complaint related to landfill operations. Township indicated that it receives few environmental complaints, if any. The landfill is located in a relatively isolated location, surrounded by agricultural lands and low density residential development.

There is also a public liaison committee in place, meeting once every year or as required. The committee is made of up four local homeowners and township staff. Township's consultants also attend the meetings. The committee meetings offer the opportunity to review and comment on annual reports, operations, and proposed site changes. For the last two years, due to the COVID pandemic, meetings took place over the phone.

No records reviewed.

Question ID	NOL 61	
Question	**Question Type**	**Legislative Requirement**
Has the landfill operator developed a Design and Operations Manual?	Information	EPA | 27 | (1)

Observation

Yes - The landfill's D&O report was prepared by Azimuth Environmental Consultants in December 2005.

Question ID	NOL 62	
Question	**Question Type**	**Legislative Requirement**
Is the Design and Operations Manual up to date?	Information	Not Applicable

Observation

No - ECA Condition 20 requires any changes to the site's D&O report to be submitted to the Ministry's Permissions Branch for acceptance prior to their implementation.

Condition 33 requires township to keep a copy of the Design, Operations, and Maintenance Plan at the landfill site.

The D&O report was prepared in December 2005. The township has made changes in the landfill' s operations since then.

• PRESSURE TRENCH RELOCATION: As discussed above, the pressure trench that discharges treated leachate effluent was relocated farther from the western property boundary.

• MONITORING WELL NETWORK EXPANSION: The monitoring network expanded from 6 to 9 groundwater monitoring wells in 2020. Observation wells OW7, OW8, and OW9 were installed south of the waste mound in April 2020 to monitor groundwater conditions around the new pressure trench south of the leachate pond.

• NEW TRUCK SCALE AND SCALE HOUSE: Truck scale added in 2020 and used starting January 2021 to record waste received. A new building was also added to the site adjacent to the scale.

• NEW TRANSFER DEPOT: The landfill operations have expanded to include a transfer site with bins to accept waste from residents. Waste and recyclable/reusable materials are later transferred to the active face or appropriate segregated collection areas.

The above changes were reflected in the ECA amendment applications submitted in 2017 for the sewage and waste ECAs and supporting documents listed in Schedule A of each approval. The most recent annual monitoring report (2020) also speaks to these changes.

Township did not have a copy of the D&O report available at the scale house office building, which is required by Condition 33.

Township is recommended to compile all information relating to landfill design, operations, and maintenance together, including information relating to landfill operations, the transfer depot, and updated sewage system.

Township is currently in discussion with the ministry regarding expanding the landfill's current capacity. There is also interest to expand the list of acceptable reusable/recyclable materials to be diverted from the landfill. ECA Condition 20 stipulates that any changes to the site D&O manual shall be submitted to the ministry's Permissions Branch for acceptance prior to their implementation. If township wishes to expand the list of acceptable recyclable/reusable materials, it would need to submit an updated D&O manual to the ministry's Permissions Branch, cc'ing the London District Office, for acceptance prior to implementation.

PERTH EAST IS REQUESTED TO:
• HAVE COPY OF THE D&O REPORT AVAILABLE AT THE LANDFILL, AS PER CONDITION 33.
• COMPILE ALL DOCUMENTS RELATING TO LANDFILL DESIGN, OPERATION, AND MAINTENANCE TO HAVE A COMPLETE D&O REPORT.
• UPDATE THE D&O REPORT TO REFLECT SITE'S CURRENT OPERATIONS.

Question ID	NOL 63	
Question	**Question Type**	**Legislative Requirement**
Does the landfill operator have training procedures for site personnel?	Legislative	EPA | 27 | (1)
Observation		
Yes - Township trains its site personnel upon being hired.		

Question ID	NOL 64	
Question	**Question Type**	**Legislative Requirement**
Is the landfill operator following the established training procedures?	Legislative	EPA | 27 | (1)
Observation		

Yes - During site visit, Mr. Collings indicate that township was in the process of hiring an additional full-time landfill employee. Township will be training that new person on landfill operations once hired.

Question ID	NOL 65	
Question	**Question Type**	**Legislative Requirement**
Has the Certificate of Requirement been registered on Title?	Legislative	EPA | 27 | (1)
Observation		

No - ECA Conditions 13, 14, and 15 stipulates township to register the landfill's approval documents to the property's land registry title.

Guideline C-5 outlines the process of registering waste sites to a property's land title: "C-5 Registration on title of Certificates of Approval for waste disposal sites" available at www.ontario.ca/page/c-5-registration-title-certificates-approval-waste-disposal-sites

Township has not yet registered the landfill to the property's land registry title.

PERTH EAST IS REQUESTED TO REGISTER THE LANDFILL TO TITLE IN ACCORDANCE WITH CONDITIONS 13, 14, AND 15.

Question ID	949100	
Question	**Question Type**	**Legislative Requirement**
Were the inspection questions sufficient to address other identified non-compliance items?	Legislative	Not Applicable
Observation		

MONITORING WELLS
During site tour, a well was observed unlocked. Leaving monitoring wells unlocked allows for potential tampering with the well and does not provide quality assurance for water quality sampling.

PERTH EAST IS REQUESTED TO SECURE ALL WELLS LOCATED ON THE 29.6-HA SITE WITH LOCKS.

SIGNS
The two signs at the site entrance contain all the information required by ECA Condition 21.

BURNING
No burning or incineration of materials occurs on-site, in accordance with Condition 22. No visible evidence of burning was seen during the site visit either.

LITTER
The landfill attendant picks up litter during quieter times. A more thorough litter pick-up occurs a couple times per year. During the inspection, litter was present throughout the site but quantities

were not excessive, and typically closer to the active face rather than in the Contaminant Attenuation Zone. There was little litter in ponds or drainage ditches.

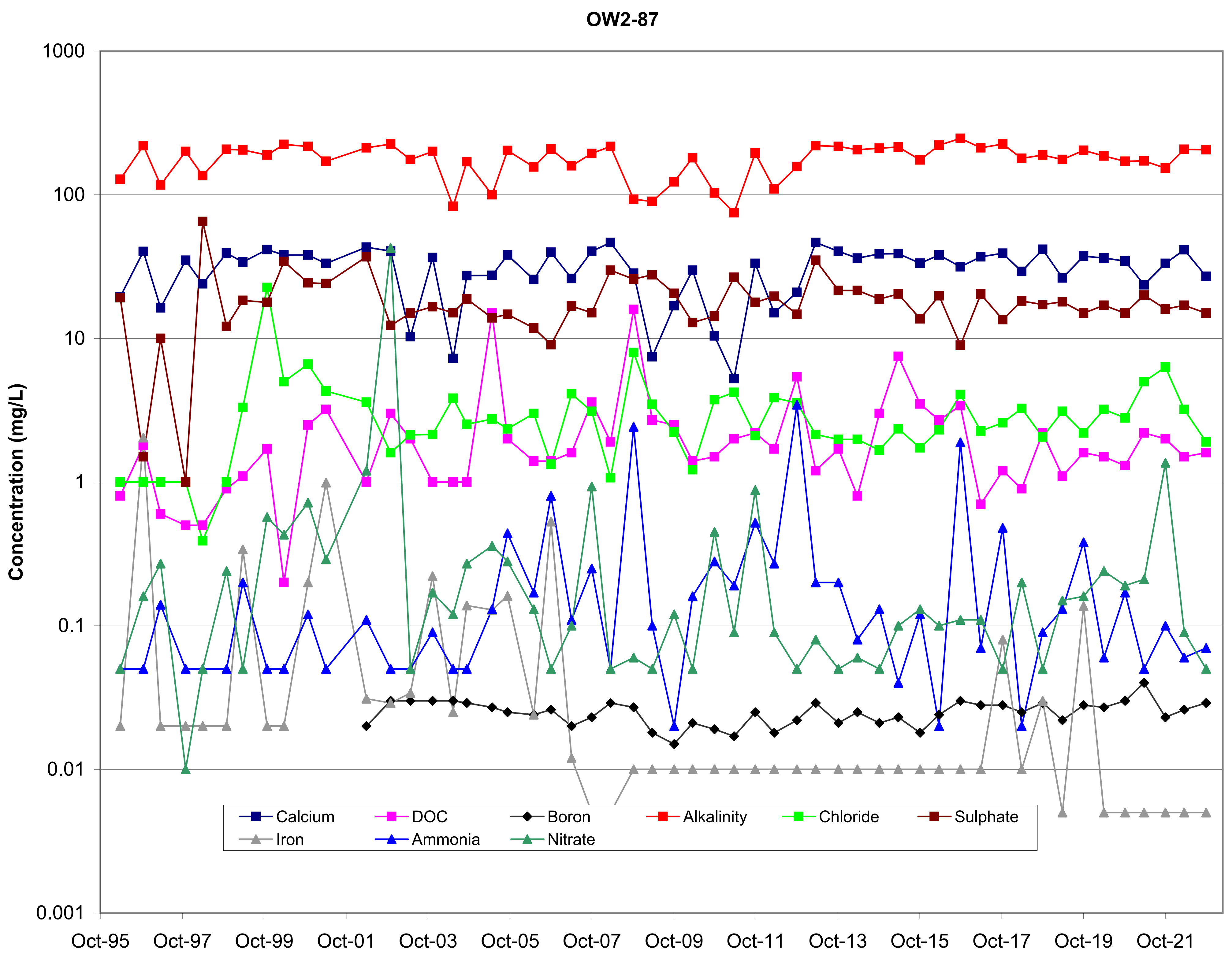
ODOUR
Little to no odour was detected throughout the site. The exception was near the active waste filling area, where minor odours of landfill gas and refuse were detected.

DUST
Inspection was conducted while the site was closed and while the grounds were saturated with water. Dust impacts could not be evaluated.

NOISE
Inspection was conducted while the site was closed. Noise could not be evaluated.

APPENDIX F

Temporal Chemistry Graphs



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Concentration (mg/L)
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100
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0.1
0.01
0.001
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Oct-97
Oct-99
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Oct-05
Oct-07
Oct-09
Oct-11
Oct-13
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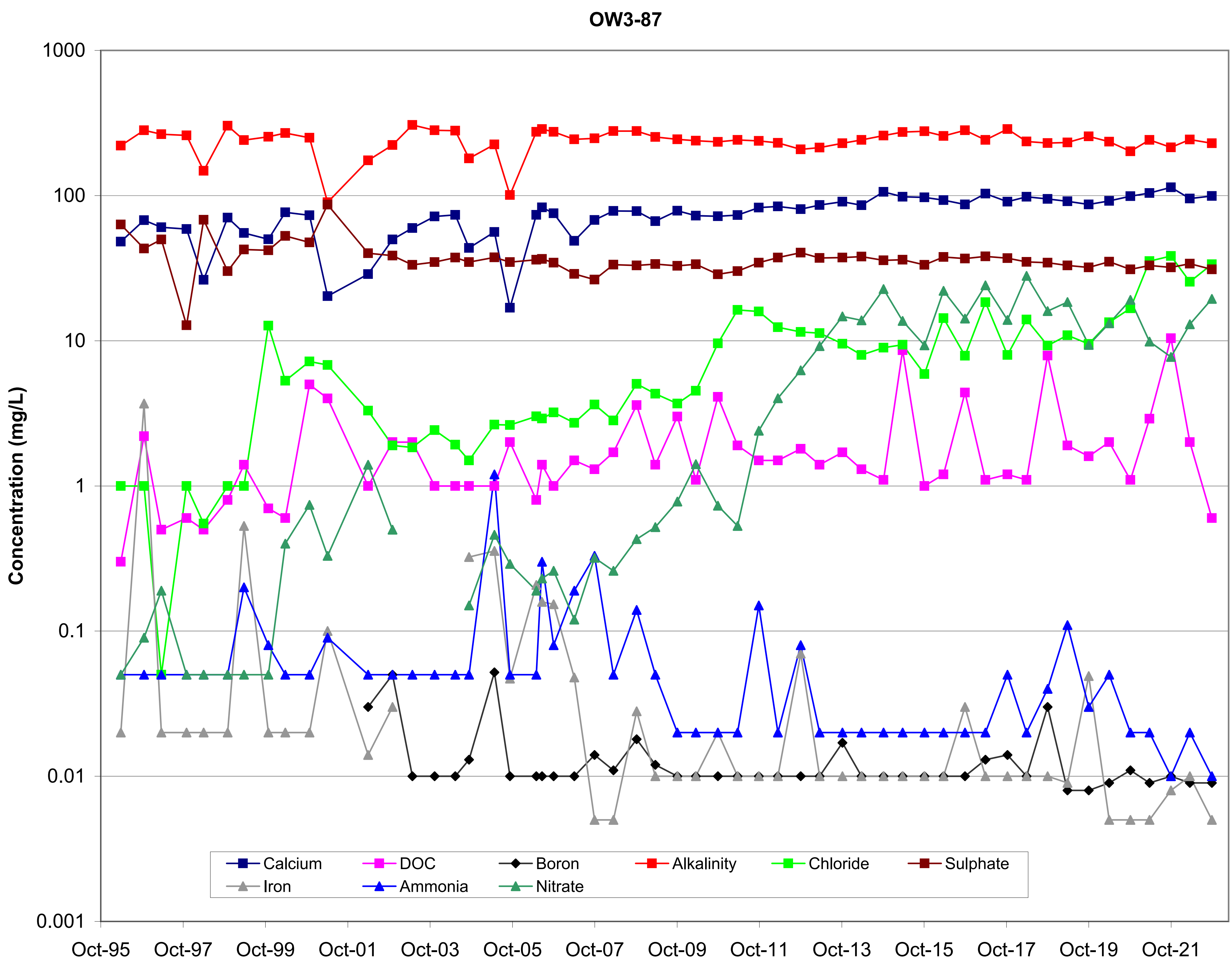

OW3-87
Concentration (mg/L)
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0.1
0.01
0.001
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Oct-97
Oct-99
Oct-01
Oct-03
Oct-05
Oct-07
Oct-09
Oct-11
Oct-13
Oct-15
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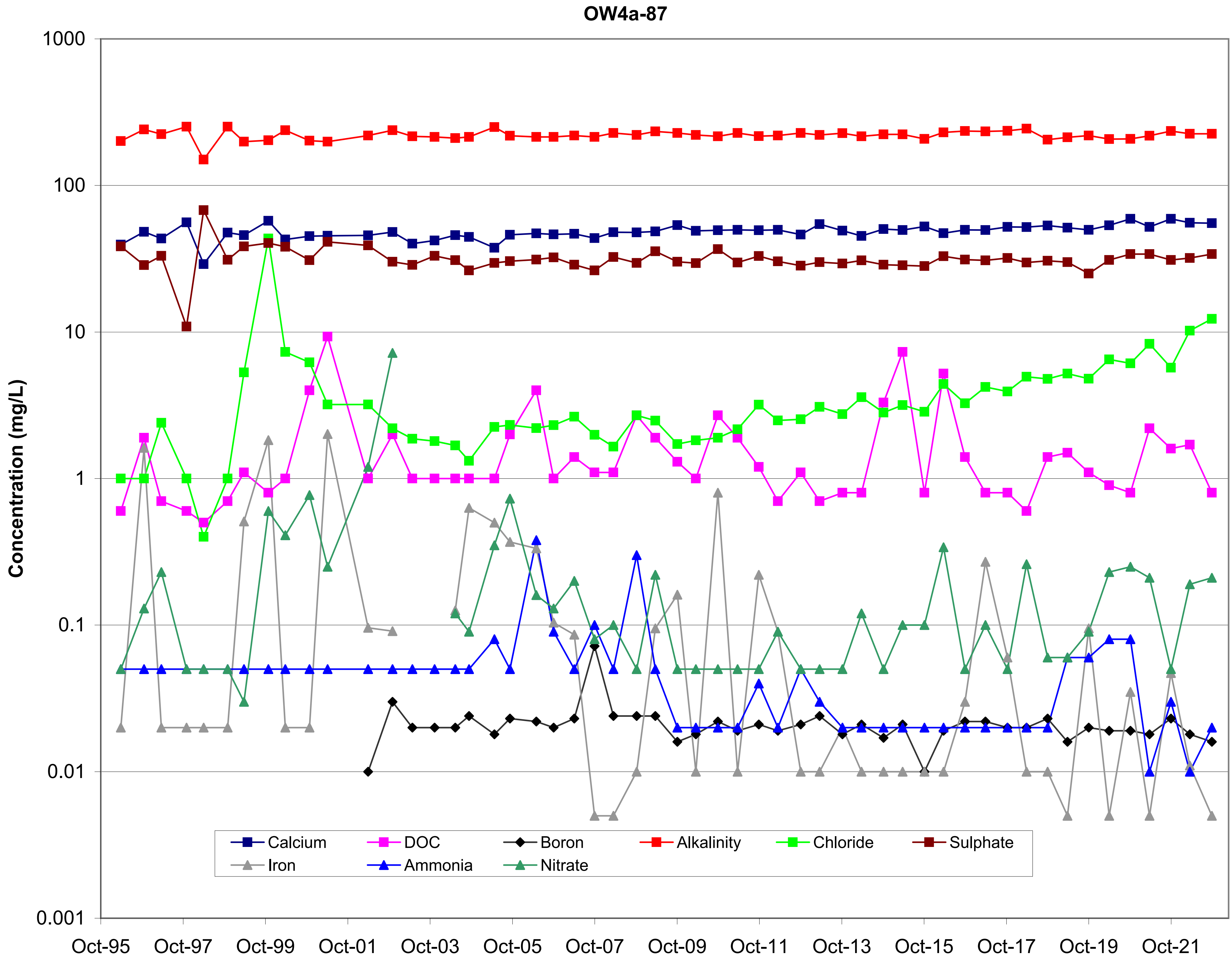
Iron
Ammonia
Nitrate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0.1
0.01
0.001
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Oct-97
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Oct-11
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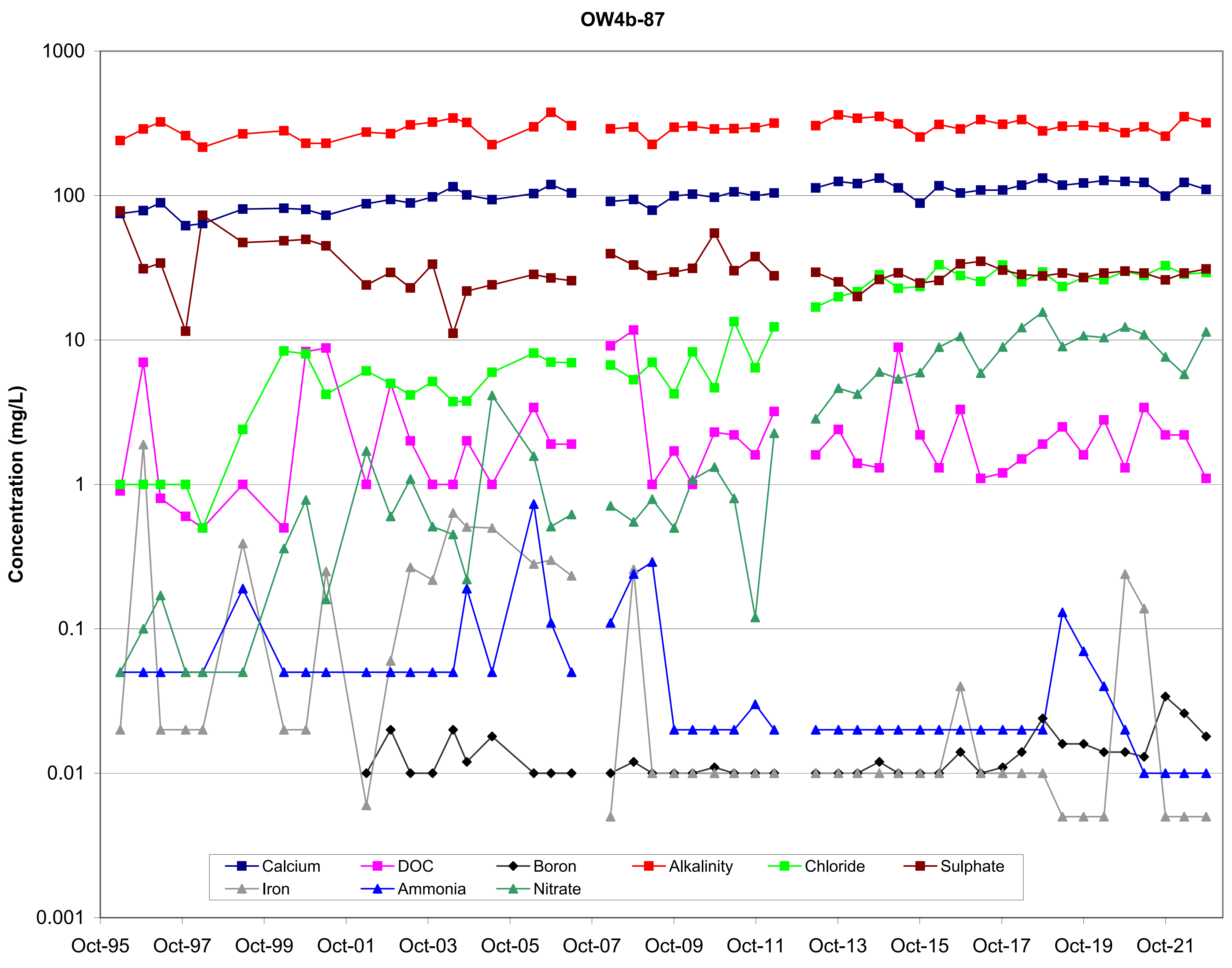
Iron
Ammonia
Nitrate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100
10
1
0.1
0.01
0.001
Concentration (mg/L)
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Oct-97
Oct-99
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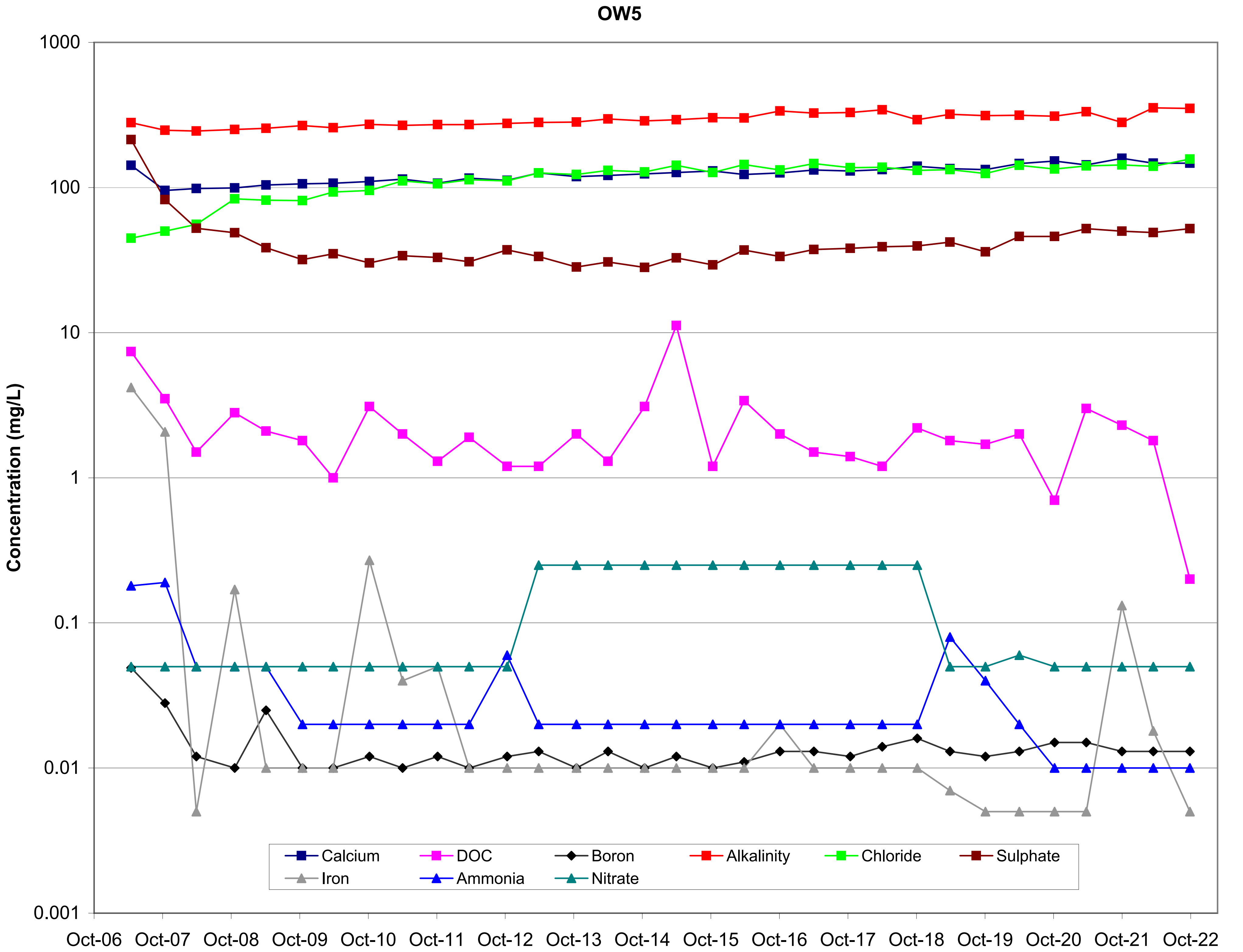
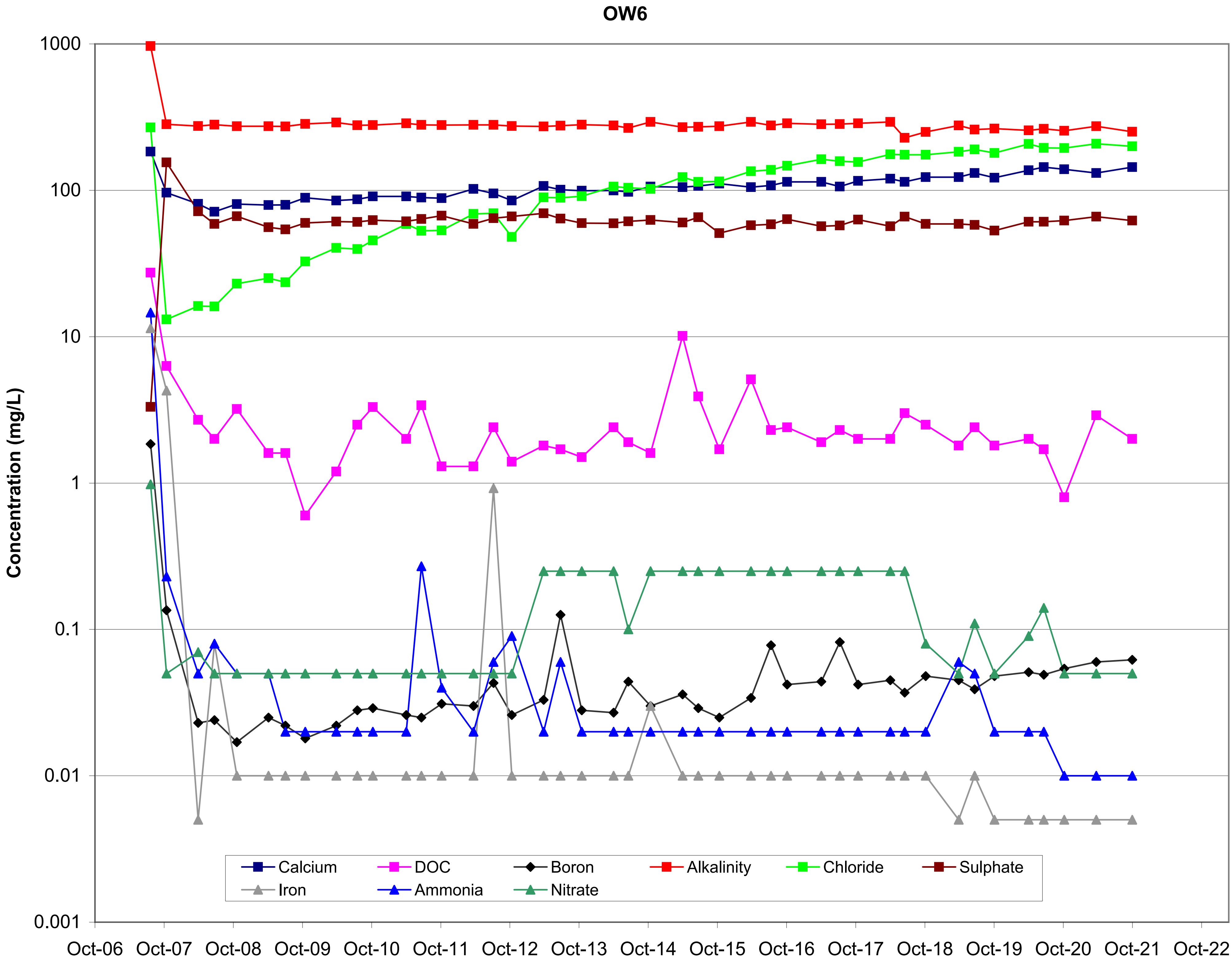
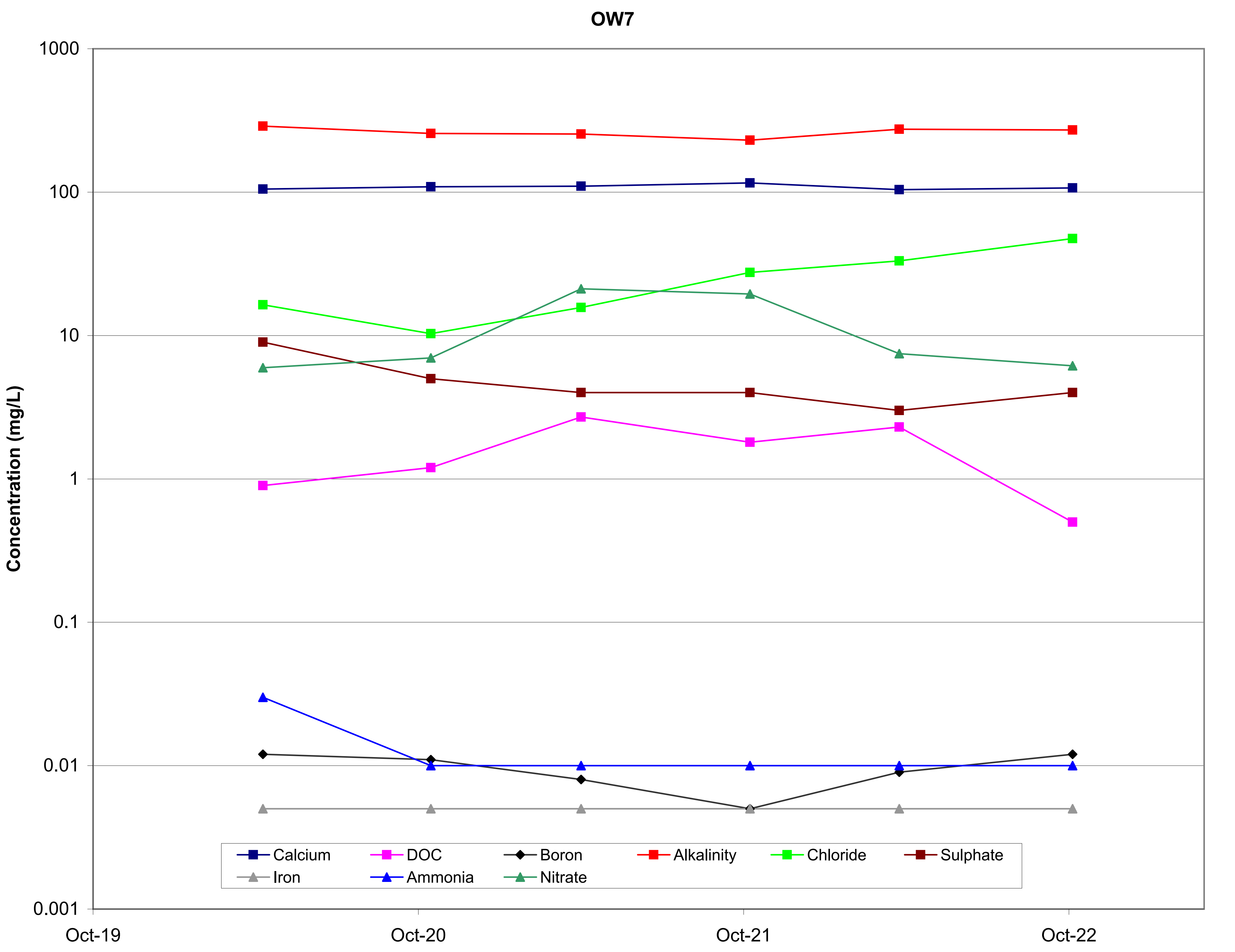
Oct-03
Oct-05
Oct-07
Oct-09
Oct-11
Oct-13
Oct-15
Oct-17
Oct-19
Oct-21
Calcium
DOC
Boron
Alkalinity
Chloride
Sulphate
Iron
Ammonia
Nitrate



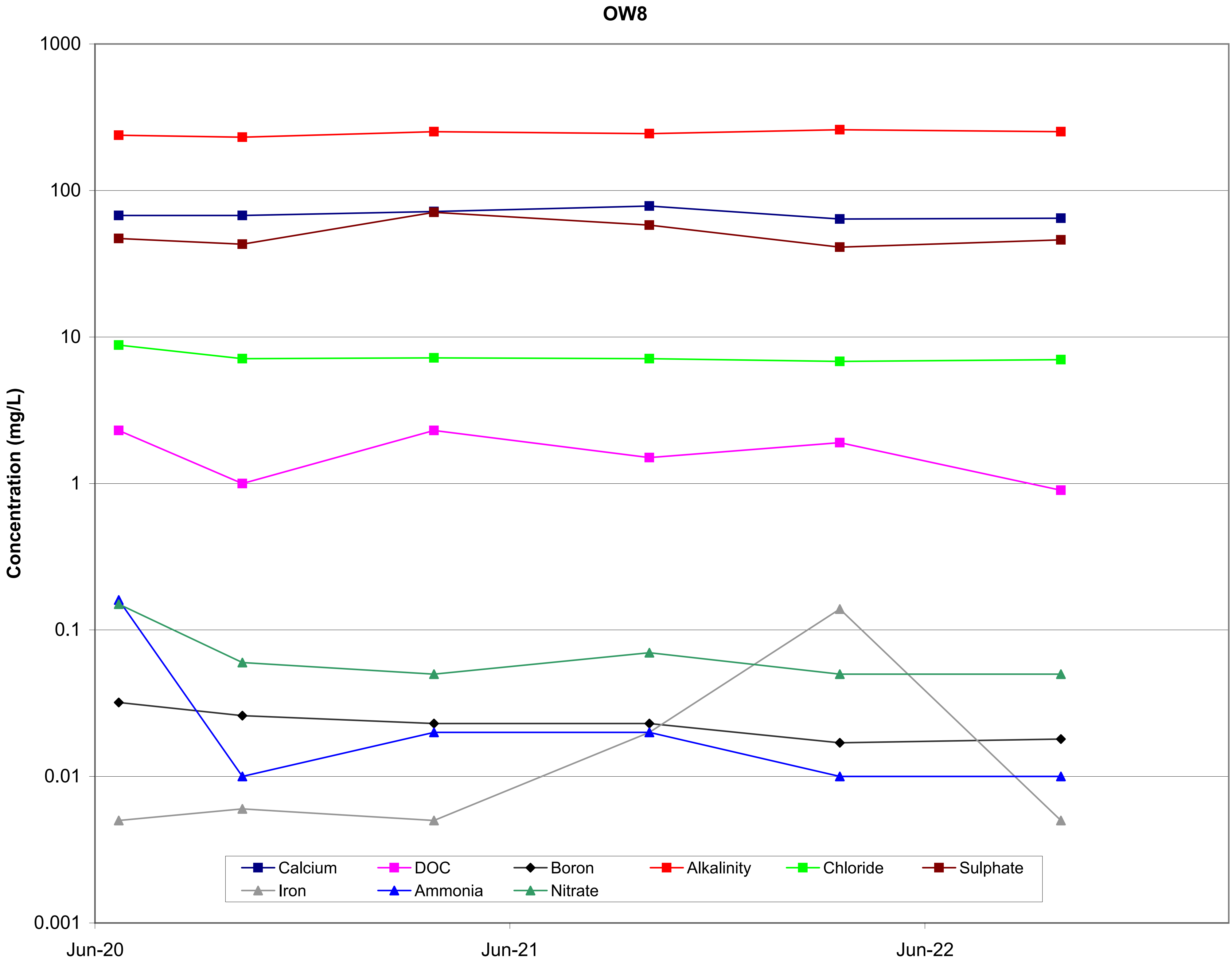
OW5
1000
100
10
1
0.1
0.01
0.001
Concentration (mg/L)
Oct-06
Oct-07
Oct-08
Oct-09
Oct-10
Oct-11
Oct-12
Oct-13
Oct-14
Oct-15
Oct-16
Oct-17
Oct-18
Oct-19
Oct-20
Oct-21
Oct-22
Calcium
DOC
Boron
Alkalinity
Chloride
Sulphate
Iron
Ammonia
Nitrate

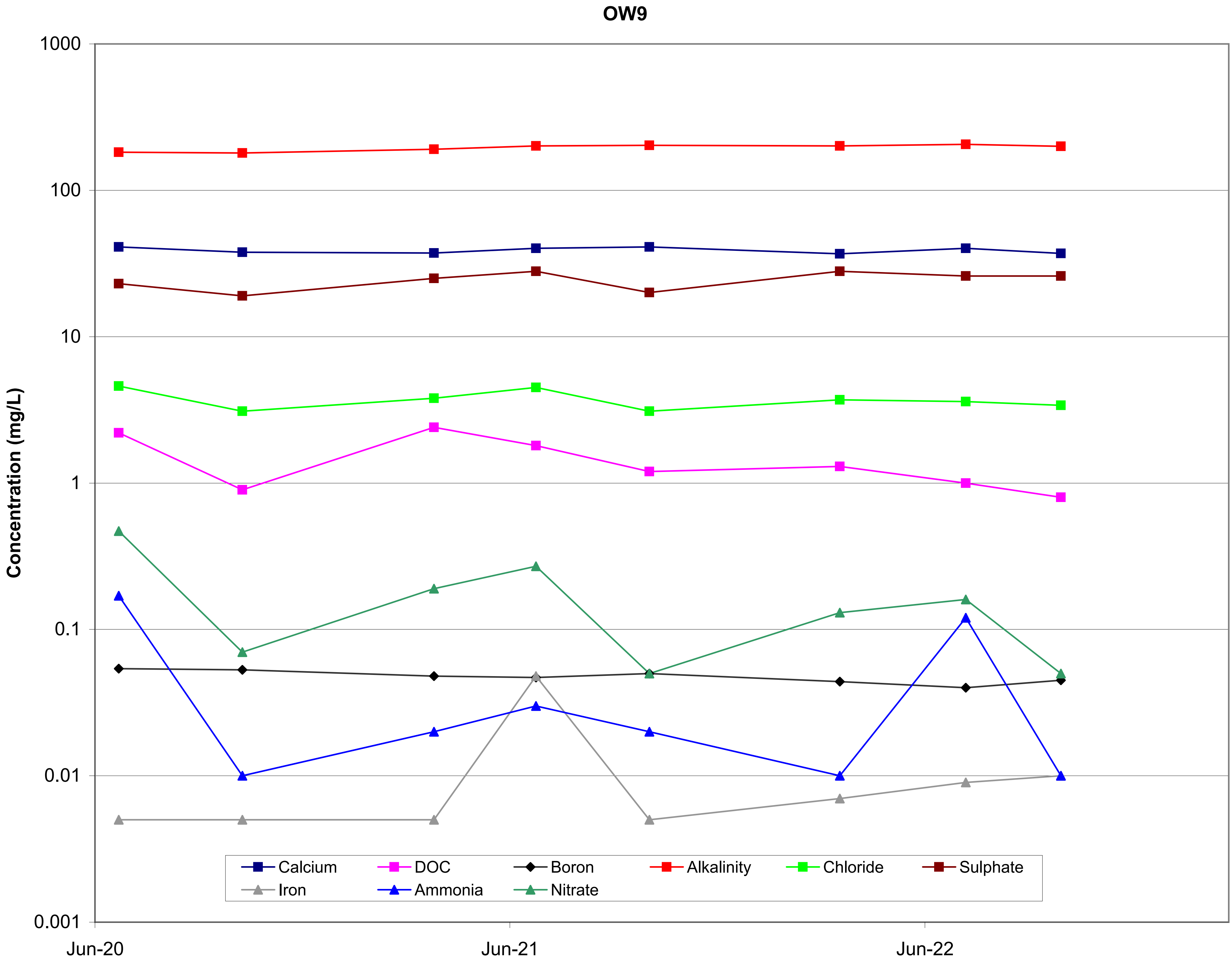


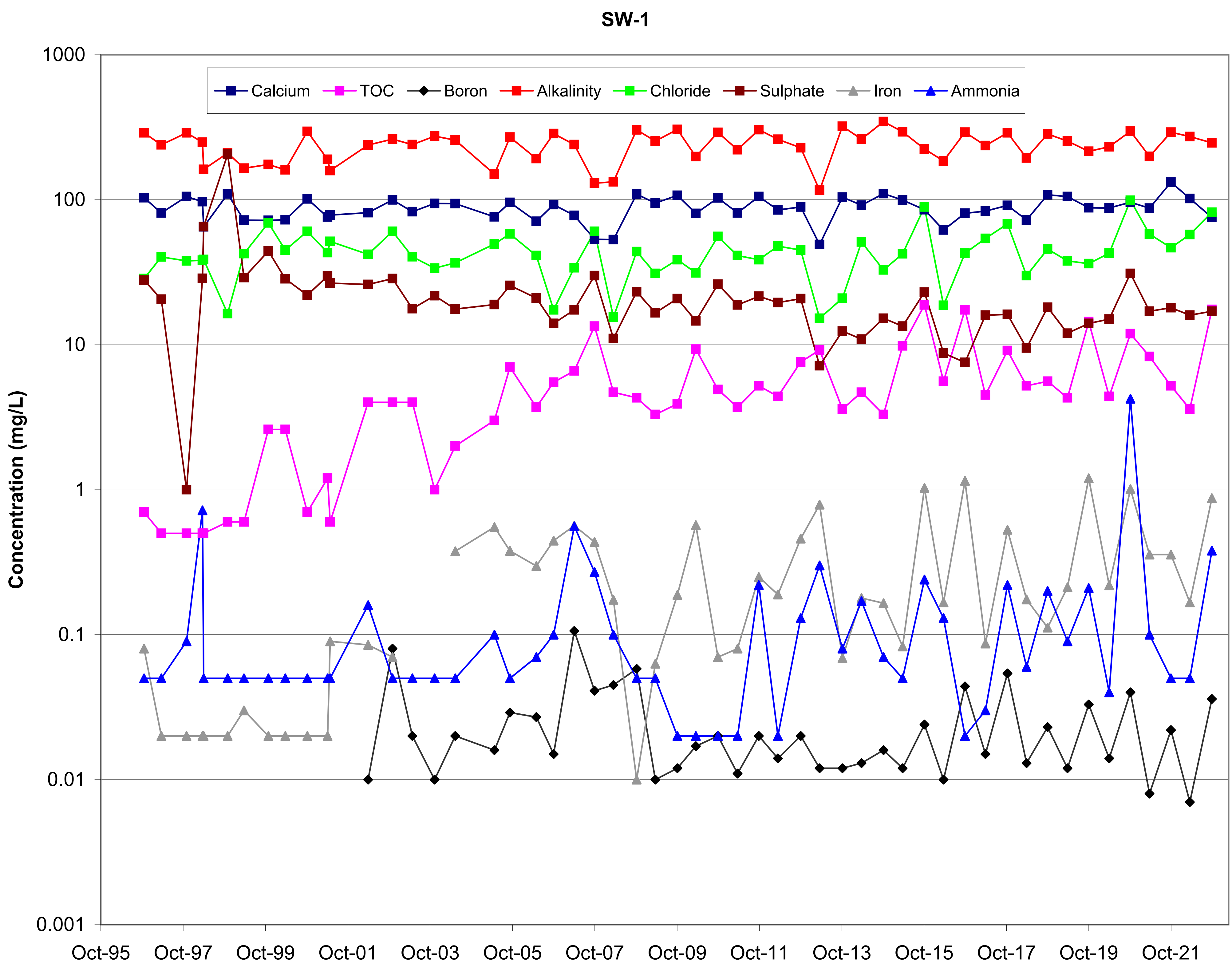
OW6
Concentration (mg/L)
1000
100
10
1
0.1
0.01
0.001
Oct-06
Oct-07
Oct-08
Oct-09
Oct-10
Oct-11
Oct-12
Oct-13
Oct-14
Oct-15
Oct-16
Oct-17
Oct-18
Oct-19
Oct-20
Oct-21
Oct-22
Calcium
DOC
Boron
Alkalinity
Chloride
Sulphate
Iron
Ammonia
Nitrate



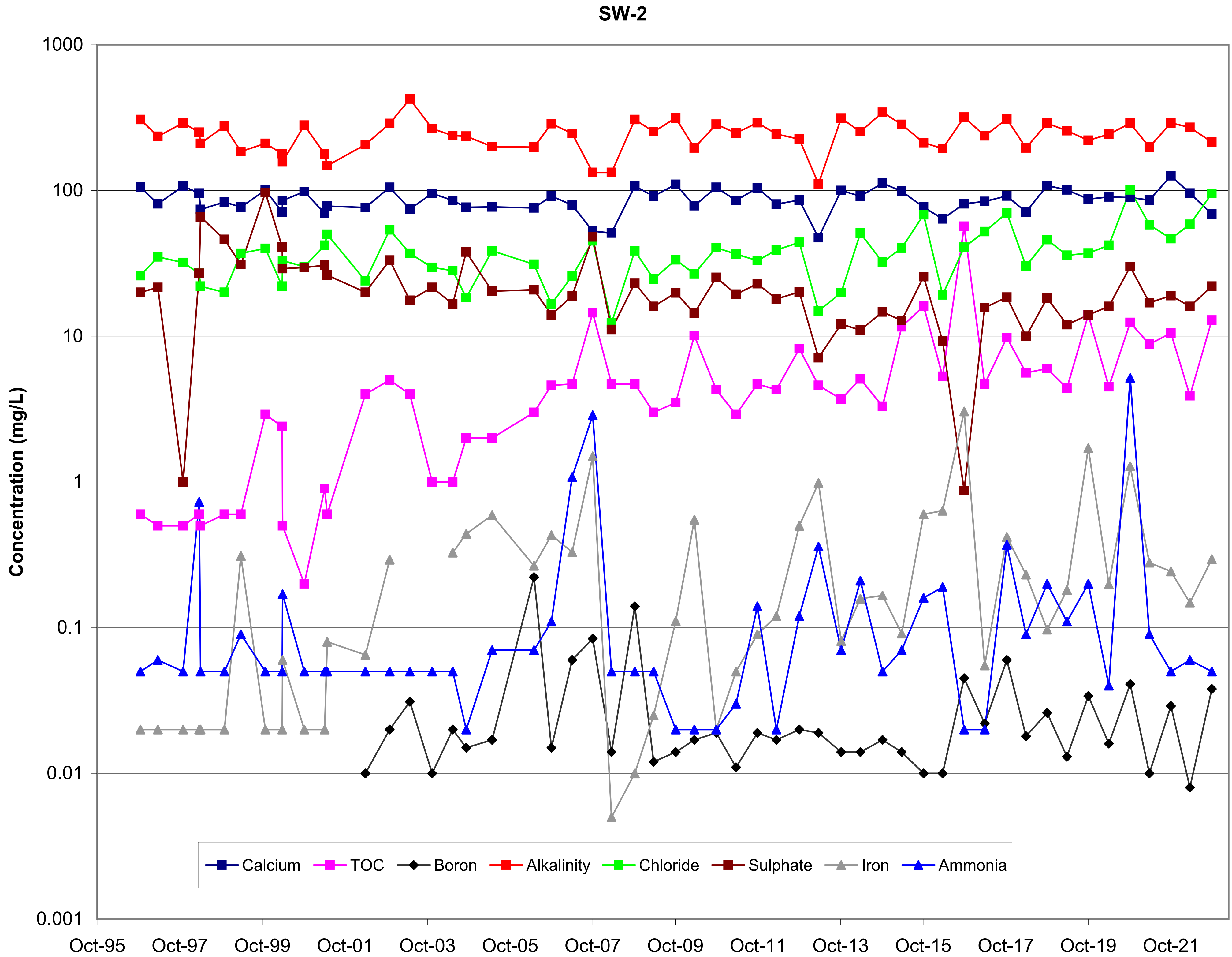
OW7
Concentration (mg/L)
1000
100
10
1
0.1
0.01
0.001
Oct-19
Oct-20
Oct-21
Oct-22
Calcium
DOC
Boron
Alkalinity
Chloride
Sulphate
Iron
Ammonia
Nitrate

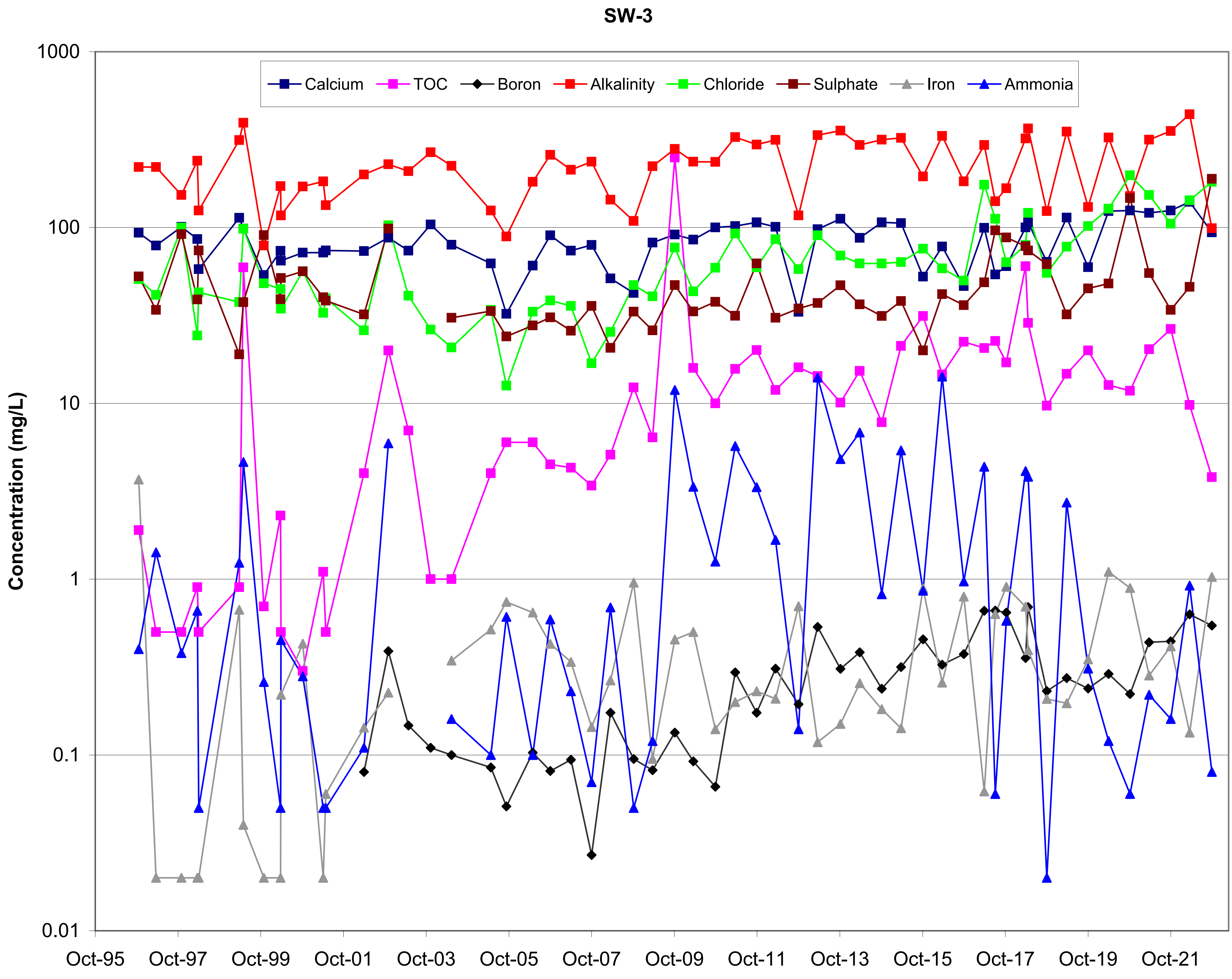

OW8
Concentration (mg/L)
1000
100
10
1
0.1
0.01
0.001
Jun-20
Jun-21
Jun-22
Calcium
DOC
Boron
Alkalinity
Chloride
Sulphate
Iron
Ammonia
Nitrate


OW9
1000
100
10
1
0.1
0.01
0.001
Concentration (mg/L)
Jun-20
Jun-21
Jun-22
Calcium
DOC
Boron
Alkalinity
Chloride
Sulphate
Iron
Ammonia
Nitrate

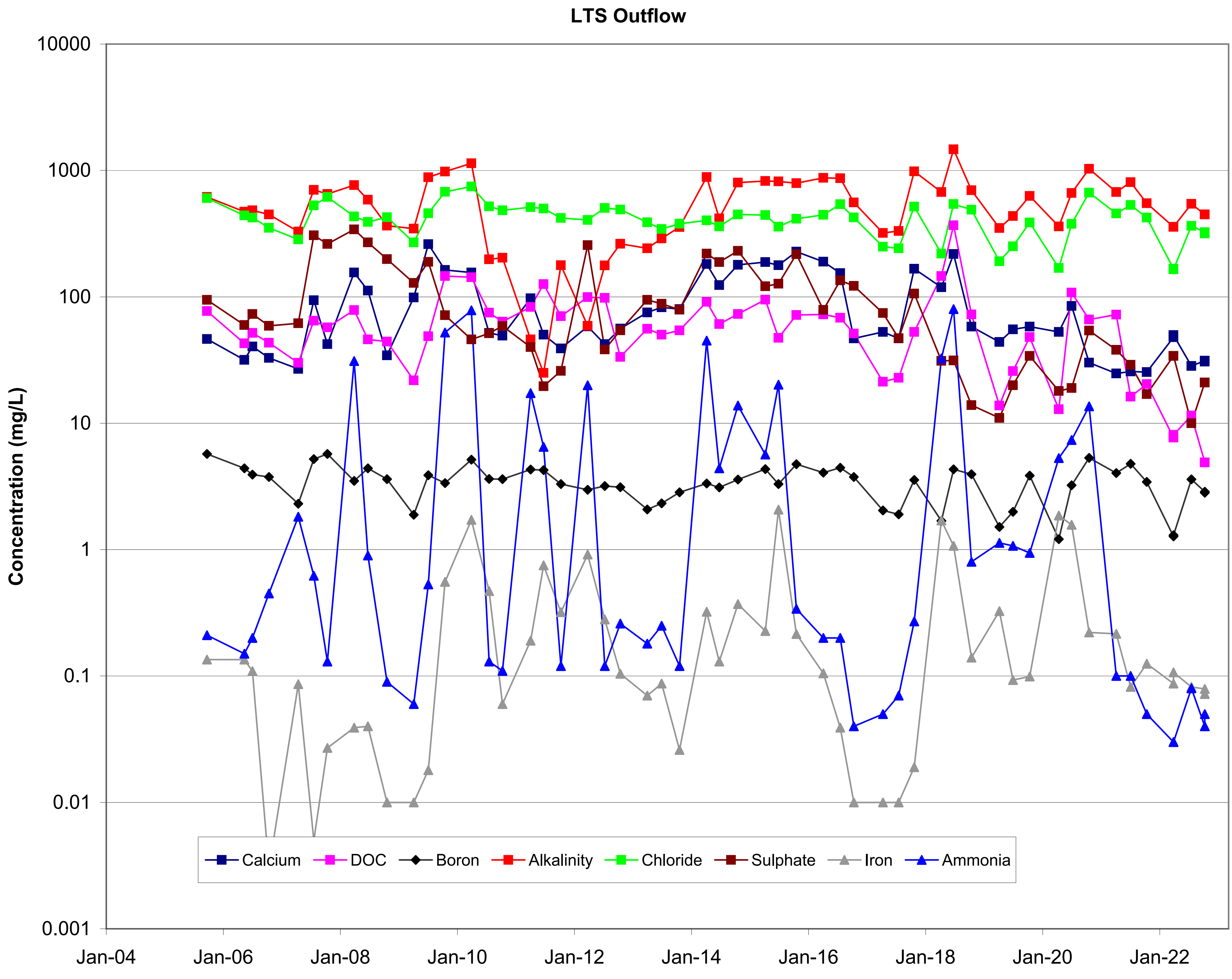


SW-1
Calcium
TOC
Boron
Alkalinity
Chloride
Sulphate
Iron
Ammonia
Concentration (mg/L)
1000
100
10
1
0.1
0.01
0.001
Oct-95
Oct-97
Oct-99
Oct-01
Oct-03
Oct-05
Oct-07
Oct-09
Oct-11
Oct-13
Oct-15
Oct-17
Oct-19
Oct-21

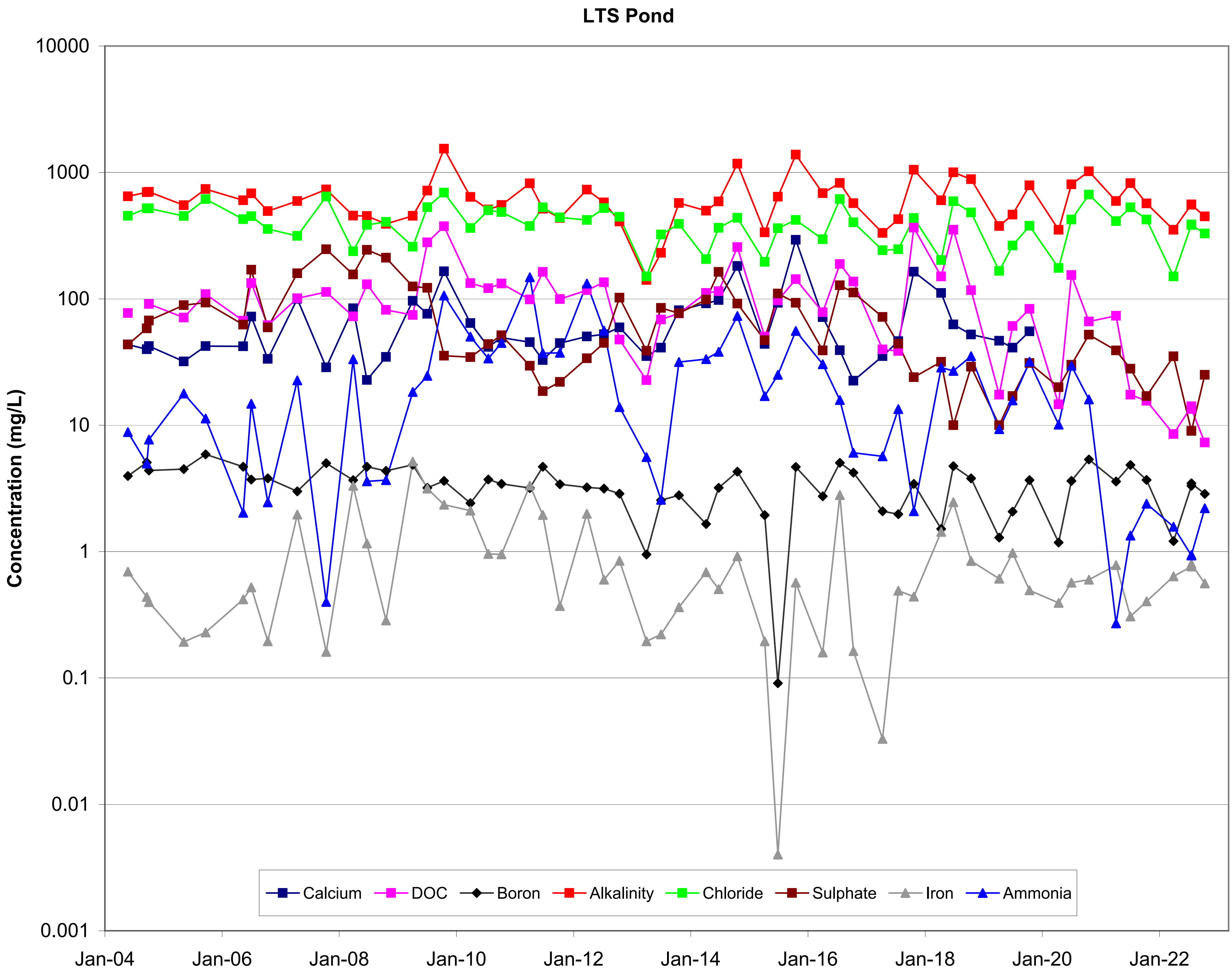

SW-2
Concentration (mg/L)
1000
100
10
1
0.1
0.01
0.001
Oct-95
Oct-97
Oct-99
Oct-01
Oct-03
Oct-05
Oct-07
Oct-09
Oct-11
Oct-13
Oct-15
Oct-17
Oct-19
Oct-21
Calcium
TOC
Boron
Alkalinity
Chloride
Sulphate
Iron
Ammonia

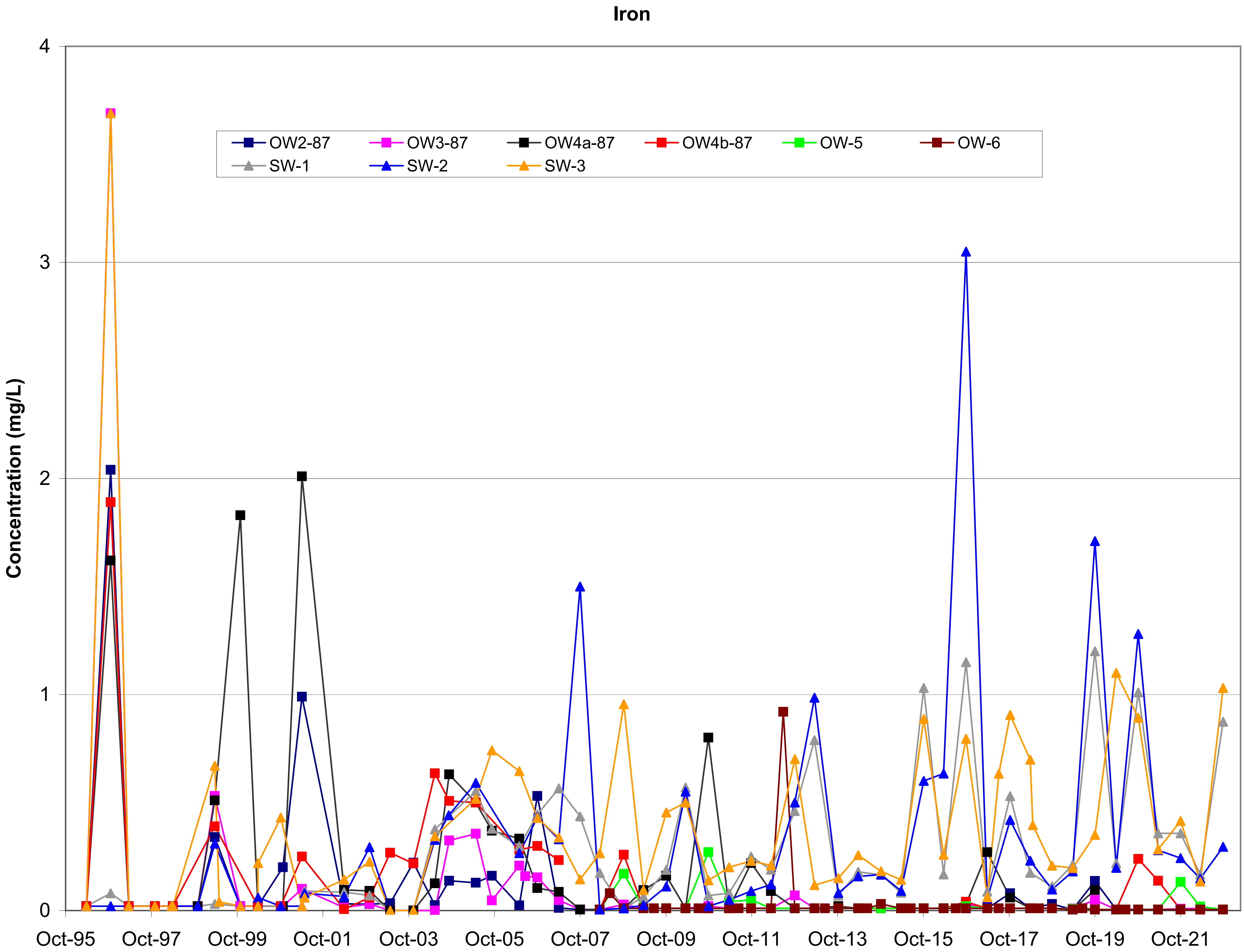


SW-3
Calcium
TOC
Boron
Alkalinity
Chloride
Sulphate
Iron
Ammonia
Concentration (mg/L)
1000
100
10
1
0.1
0.01
Oct-95
Oct-97
Oct-99
Oct-01
Oct-03
Oct-05
Oct-07
Oct-09
Oct-11
Oct-13
Oct-15
Oct-17
Oct-19
Oct-21

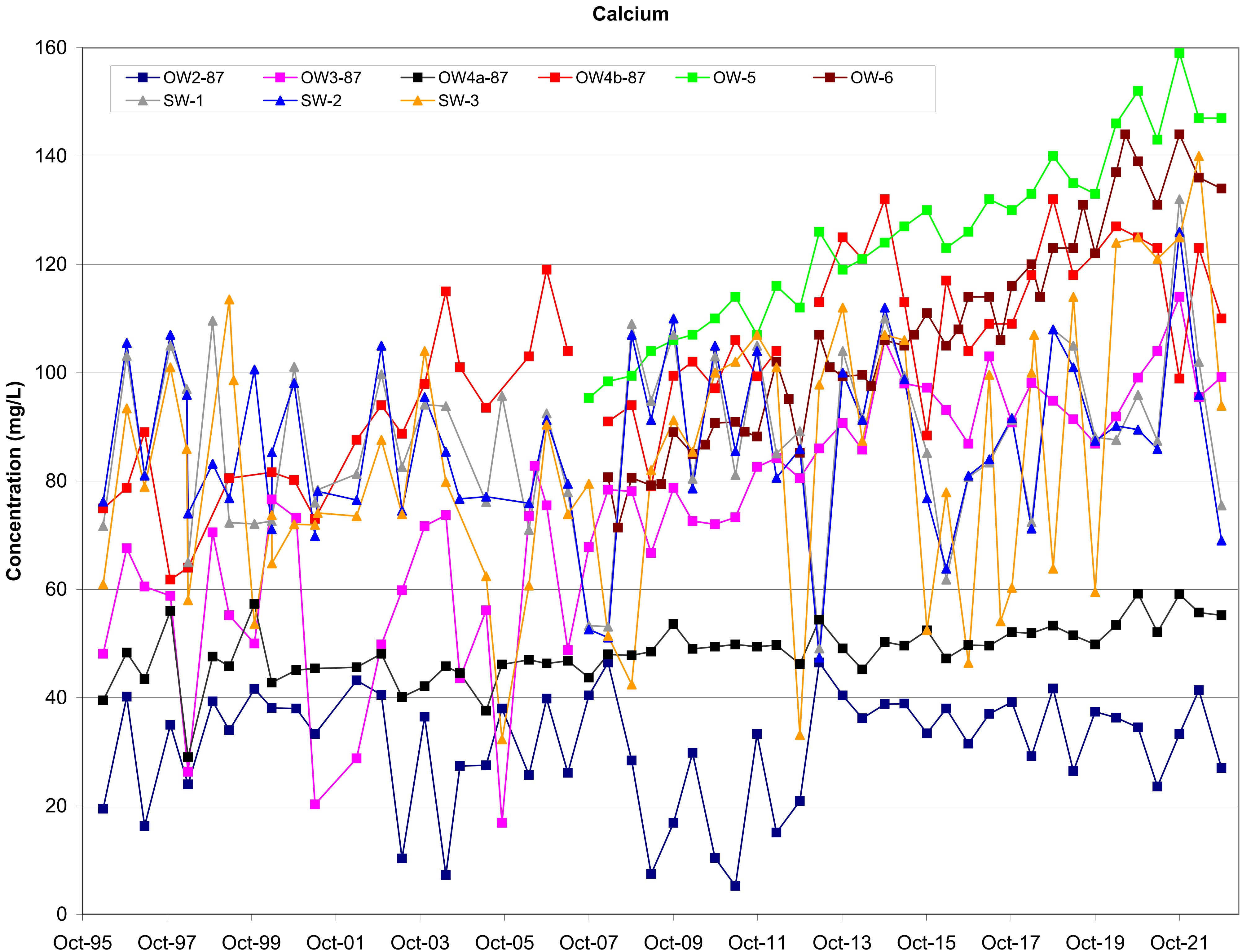


LTS Outflow
Concentration (mg/L)
10000
1000
100
10
1
0.1
0.01
0.001
Jan-04
Jan-06
Jan-08
Jan-10
Jan-12
Jan-14
Jan-16
Jan-18
Jan-20
Jan-22
Calcium
DOC
Boron
Alkalinity
Chloride
Sulphate
Iron
Ammonia

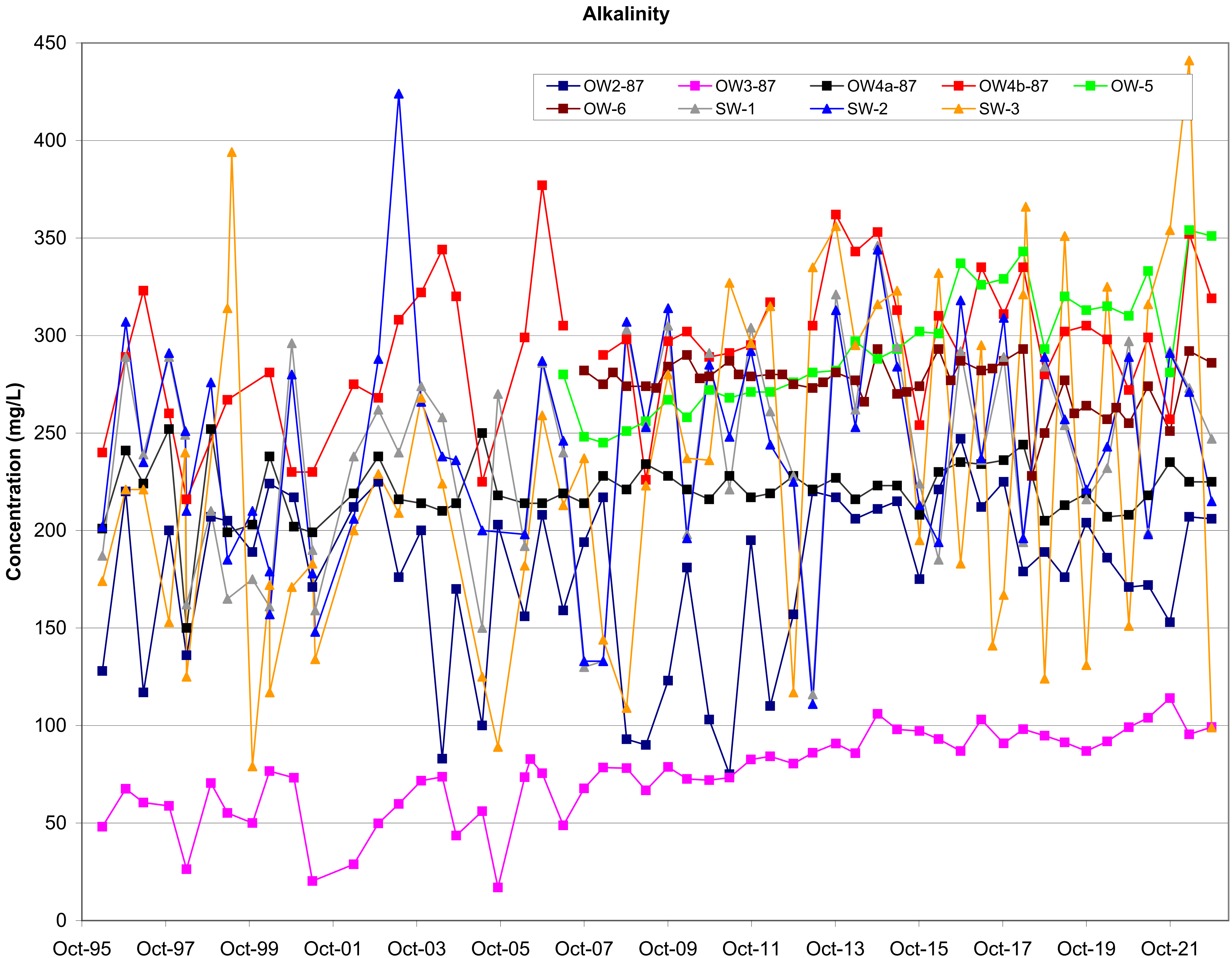

LTS Pond
Concentration (mg/L)
10000
1000
100
10
1
0.1
0.01
0.001
Jan-04
Jan-06
Jan-08
Jan-10
Jan-12
Jan-14
Jan-16
Jan-18
Jan-20
Jan-22
Calcium
DOC
Boron
Alkalinity
Chloride
Sulphate
Iron
Ammonia



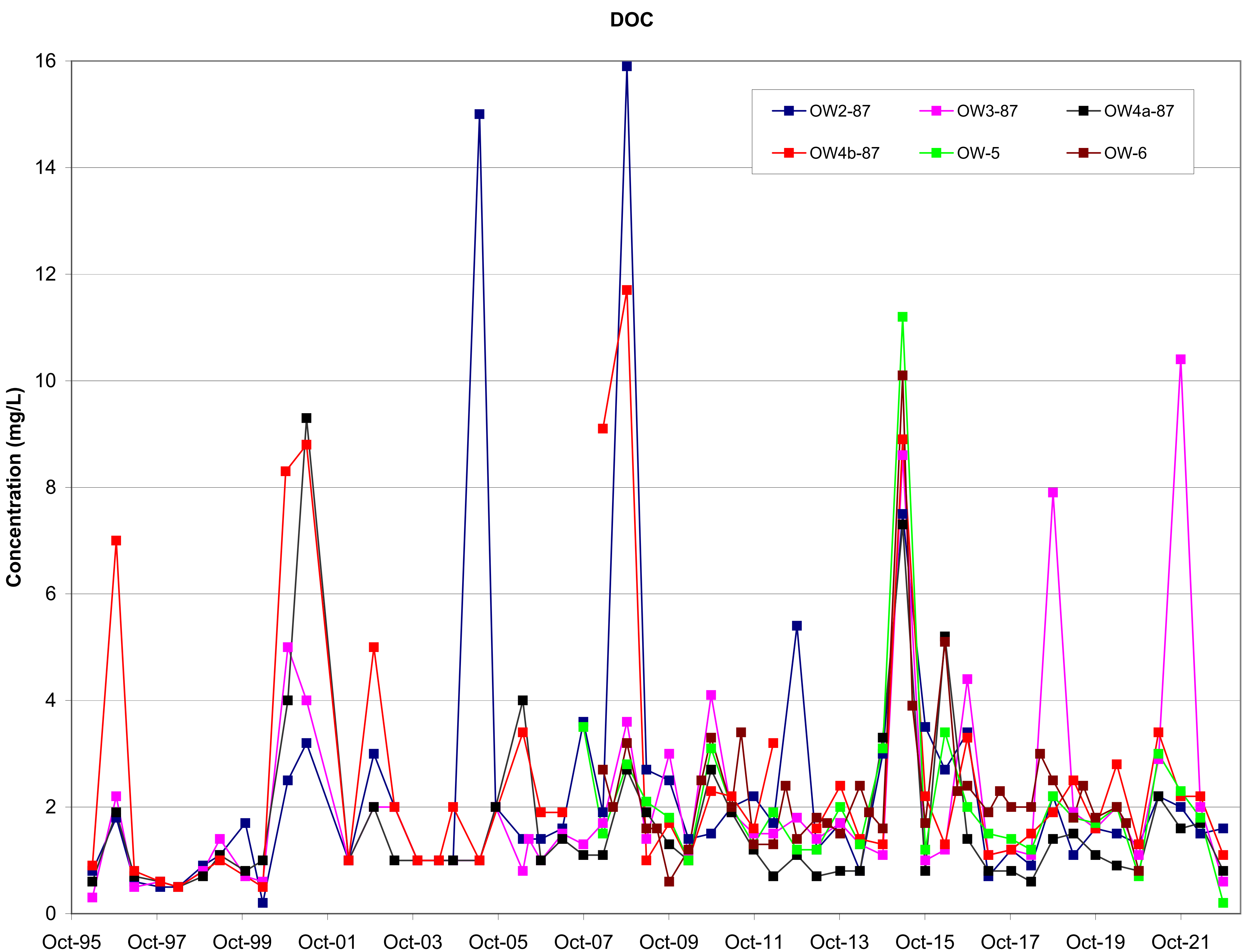
Iron
Concentration (mg/L)
0
1
2
3
4
OW2-87
OW3-87
OW4a-87
OW4b-87
OW-5
OW-6
SW-1
SW-2
SW-3
Oct-95
Oct-97
Oct-99
Oct-01
Oct-03
Oct-05
Oct-07
Oct-09
Oct-11
Oct-13
Oct-15
Oct-17
Oct-19
Oct-21

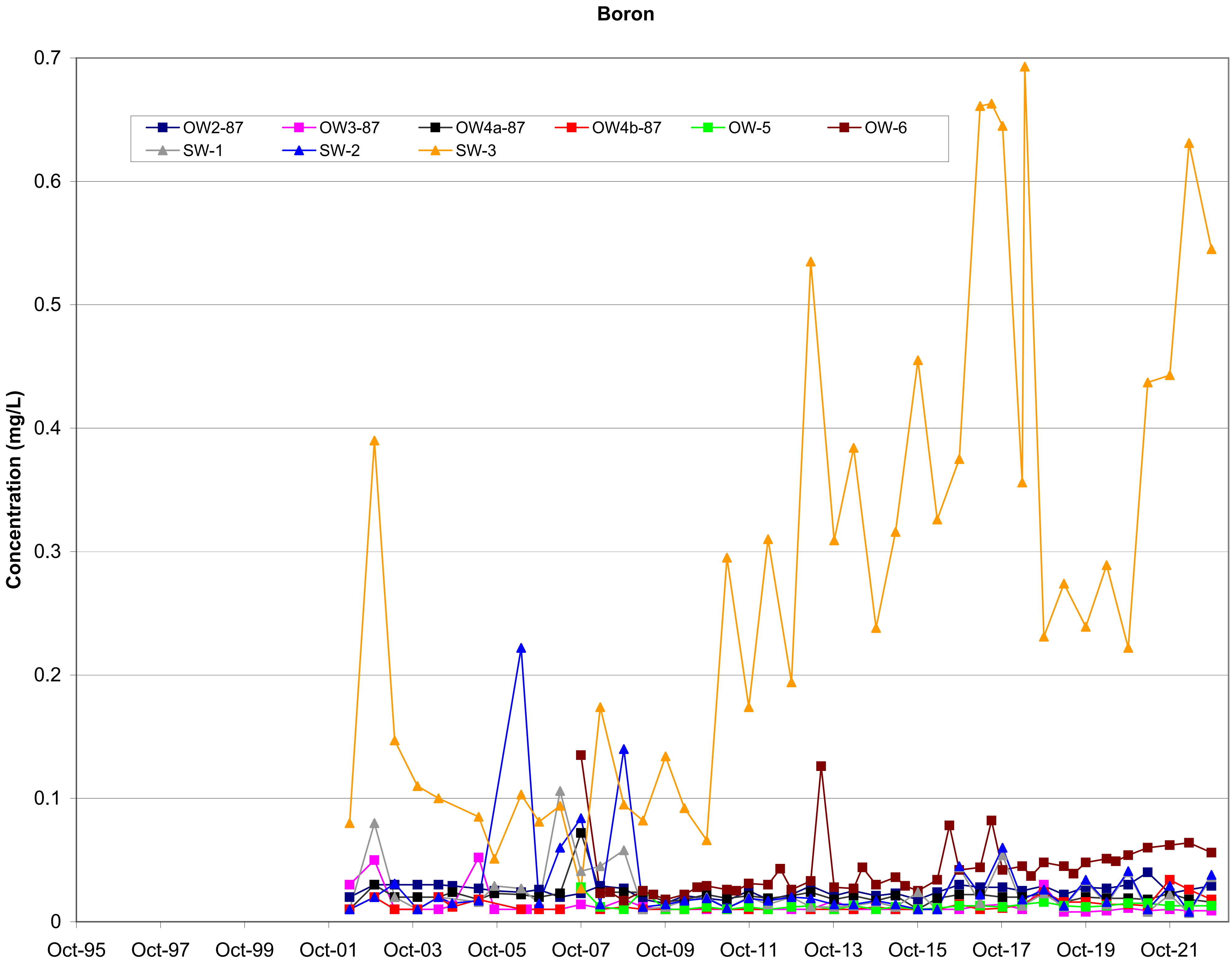


Calcium
Concentration (mg/L)
OW2-87
OW3-87
OW4a-87
OW4b-87
OW-5
OW-6
SW-1
SW-2
SW-3
0
20
40
60
80
100
120
140
160
Oct-95
Oct-97
Oct-99
Oct-01
Oct-03
Oct-05
Oct-07
Oct-09
Oct-11
Oct-13
Oct-15
Oct-17
Oct-19
Oct-21

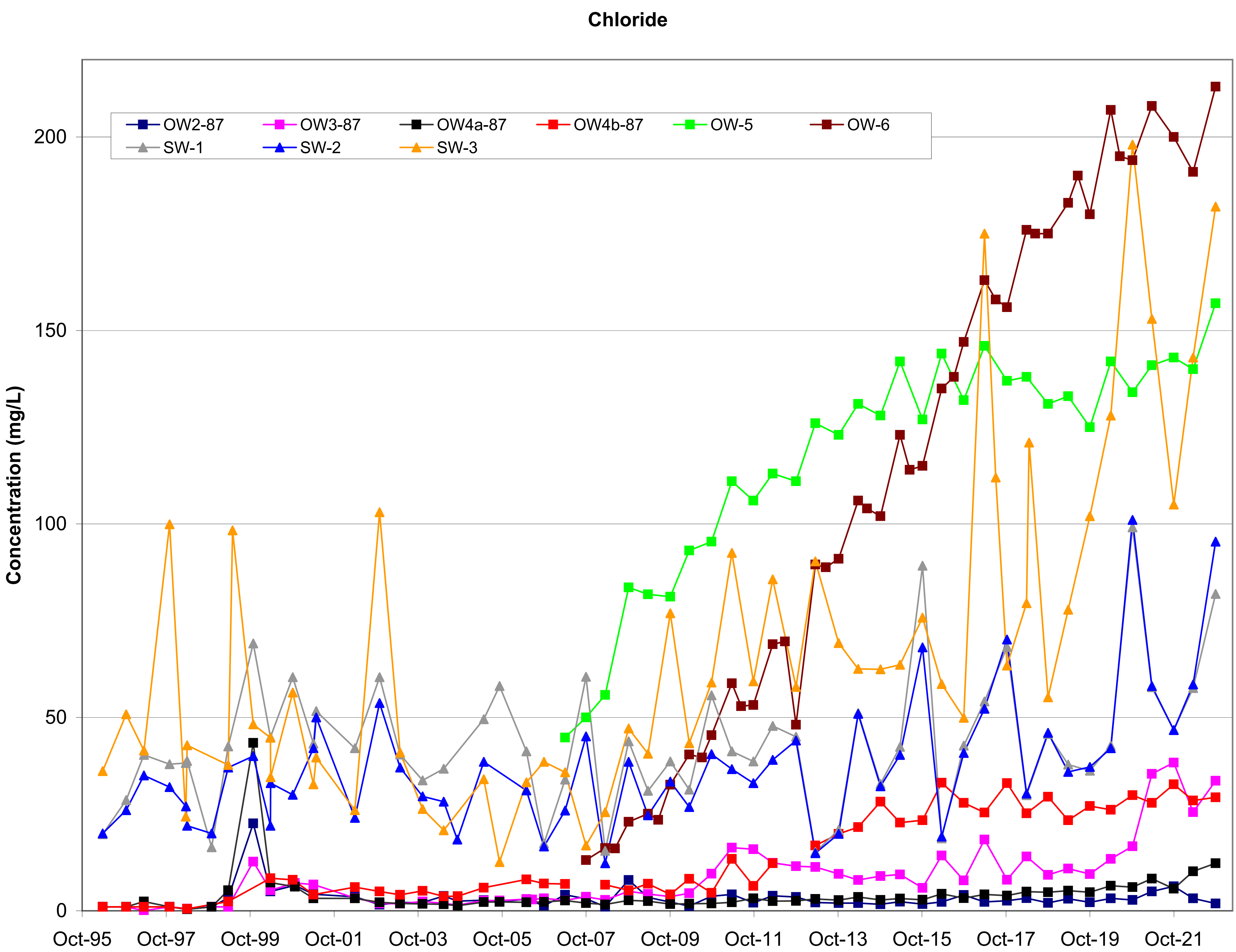


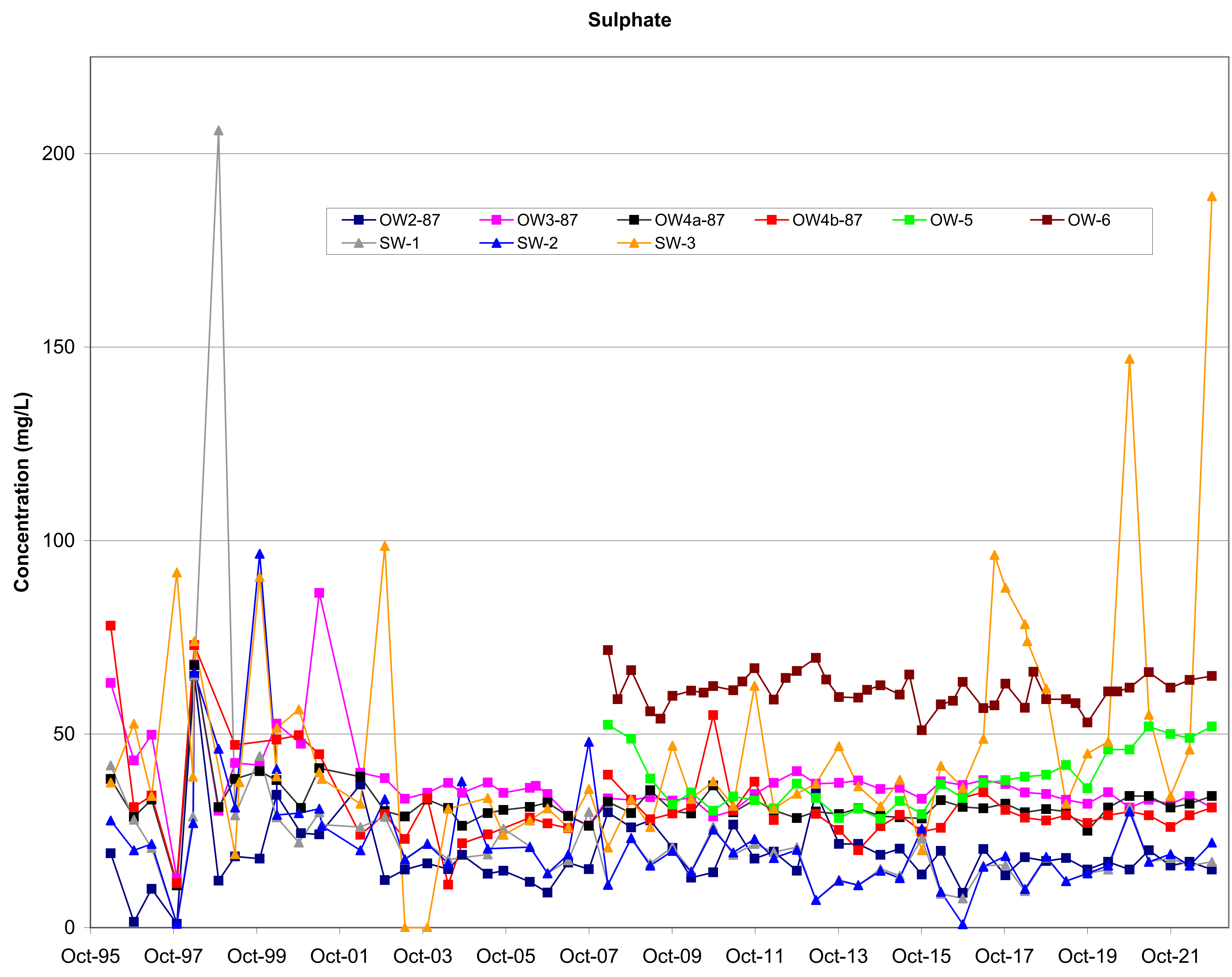
Alkalinity
Concentration (mg/L)
0
50
100
150
200
250
300
350
400
450
Oct-95
Oct-97
Oct-99
Oct-01
Oct-03
Oct-05
Oct-07
Oct-09
Oct-11
Oct-13
Oct-15
Oct-17
Oct-19
Oct-21
OW2-87
OW3-87
OW4a-87
OW4b-87
OW-5
OW-6
SW-1
SW-2
SW-3


DOC
Concentration (mg/L)
0
2
4
6
8
10
12
14
16
Oct-95
Oct-97
Oct-99
Oct-01
Oct-03
Oct-05
Oct-07
Oct-09
Oct-11
Oct-13
Oct-15
Oct-17
Oct-19
Oct-21
OW2-87
OW3-87
OW4a-87
OW4b-87
OW-5
OW-6

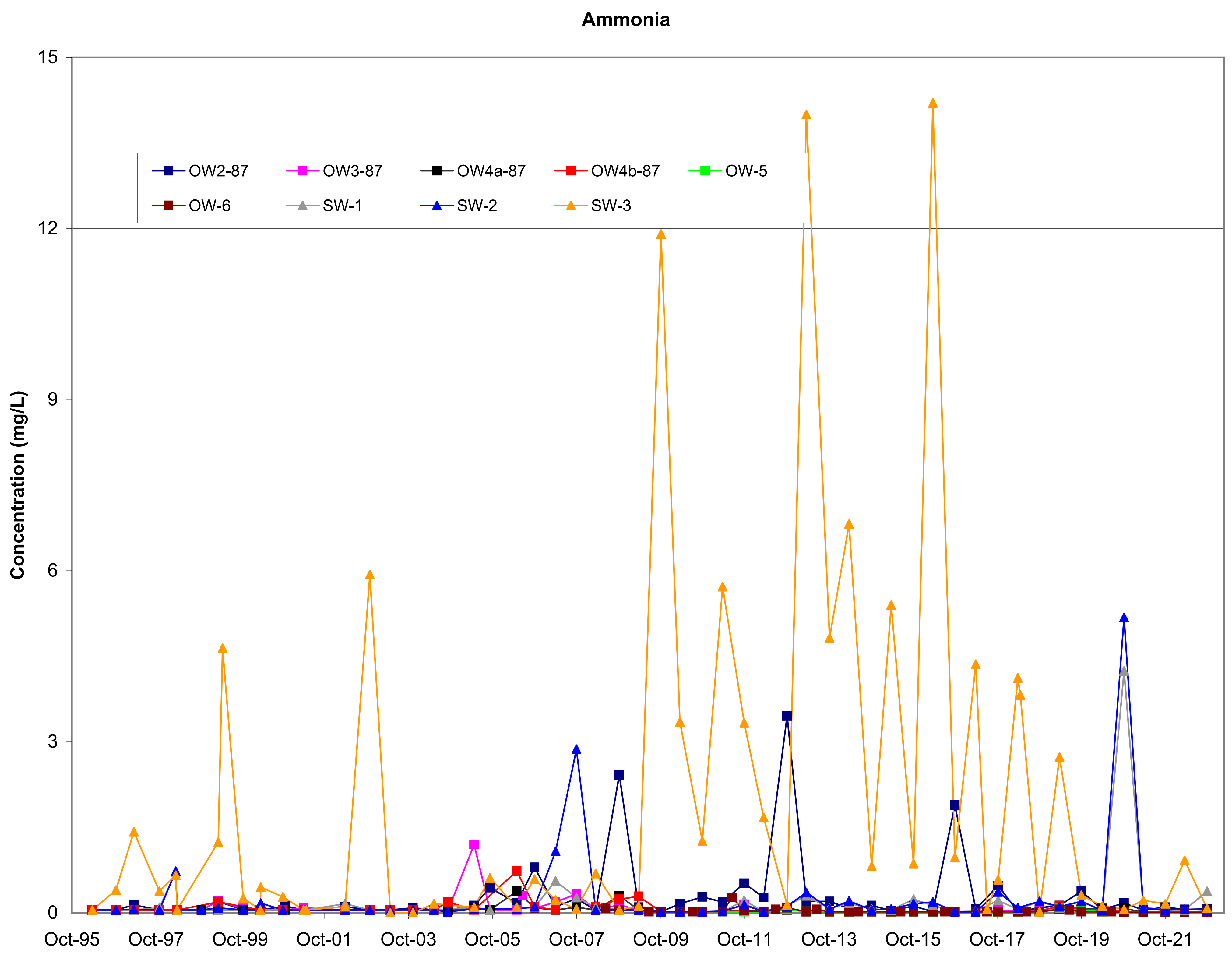


Boron
Concentration (mg/L)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
OW2-87
OW3-87
OW4a-87
OW4b-87
OW-5
OW-6
SW-1
SW-2
SW-3
Oct-95
Oct-97
Oct-99
Oct-01
Oct-03
Oct-05
Oct-07
Oct-09
Oct-11
Oct-13
Oct-15
Oct-17
Oct-19
Oct-21


Chloride
OW2-87
OW3-87
OW4a-87
OW4b-87
OW-5
OW-6
SW-1
SW-2
SW-3
Concentration (mg/L)
200
150
100
50
0
Oct-95
Oct-97
Oct-99
Oct-01
Oct-03
Oct-05
Oct-07
Oct-09
Oct-11
Oct-13
Oct-15
Oct-17
Oct-19
Oct-21



Sulphate
Concentration (mg/L)
200
150
100
50
0
Oct-95
Oct-97
Oct-99
Oct-01
Oct-03
Oct-05
Oct-07
Oct-09
Oct-11
Oct-13
Oct-15
Oct-17
Oct-19
Oct-21
OW2-87
OW3-87
OW4a-87
OW4b-87
OW-5
OW-6
SW-1
SW-2
SW-3


Ammonia
Concentration (mg/L)
0
3
6
9
12
15
OW2-87
OW3-87
OW4a-87
OW4b-87
OW-5
OW-6
SW-1
SW-2
SW-3
Oct-95
Oct-97
Oct-99
Oct-01
Oct-03
Oct-05
Oct-07
Oct-09
Oct-11
Oct-13
Oct-15
Oct-17
Oct-19
Oct-21

APPENDIX G

Surface Water Photographs

SW-1: April 6, 2022

SW-1: October 18, 2022

SW-2: April 6, 2022

SW-2: October 18, 2022

SW-3: April 6 , 2022

SW-3: October 18, 2022

LTS Pond: April 6 , 2022

LTS Pond: July 22, 2022

APPENDIX H

MECP Landfill Reporting Submission Forms

Appendix D-Monitoring and Screening Checklist
General Information and Instructions

General Information: The checklist is to be completed, and submitted with the Monitoring Report.
Instructions: A complete checklist consists of:
(a) a completed and signed checklist, including any additional pages of information which can be attached as needed to provide further details where indicated.
(b) completed contact information for the Competent Environmental Practitioner (CEP)
(c) self-declaration that CEP(s) meet(s) the qualifications as set out below and in Section 1.2 of the Technical Guidance Document.

Definition of Groundwater CEP:
For groundwater, the CEP must have expertise in hydrogeology and meet one of the following:
(a) the person holds a licence, limited licence or temporary licence under the *Professional Engineers Act*; or
(b) the person holds a certificate of registration under the *Professional Geoscientists Act, 2000* and is a practicing member, temporary, member or limited member of the Association of Professional Geoscientists of Ontario. O. Reg. 66/08, s. 2..
Definition of Surface water CEP:
A CEP for surface water assessments is a scientist, professional engineer or professional geoscientist as described in (a) and (b) above with demonstrated experience and post-secondary education, either a diploma or degree, in hydrology, aquatic ecology, limnology, aquatic biology, physical geography with specialization in surface water, and/or water resource management.

The type of scientific work that a CEP performs must be consistent with that person's education and experience. If an individual has appropriate training and credentials in both groundwater and surface water and is responsible for both areas of expertise, the CEP may then complete and validate both sections of the checklist.

Monitoring Report and Site Information

Waste Disposal Site Name	South Easthope Landfill Site
Location (e.g. street address, lot, concession)	2439 Line 29, Township of Perth East. Lot 26, Concession 5.
GPS Location (taken within the property boundary at front gate/ front entry)	510807 / 4797771
Municipality	Township of Perth East
Client and/or Site Owner	Township of Perth East
Monitoring Period (Year)	2022
This Monitoring Report is being submitted under the following:	
Certificate of Approval No.:	Landfill - A 150902. Leachate Treatment System - 0032-5ZBJJH (Sewage)
Director's Order No.:	Type Here
Provincial Officer's Order No.:	Type Here
Other:	Type Here

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

Groundwater WDS Verification:

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

Sampling and Monitoring Program Status:

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

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

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

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

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

Sampling and Monitoring Program Results/WDS Conditions and Assessment:

5) The site has an adequate buffer, Contaminant Attenuation Zone (CAZ) and/or contingency plan in place. Design and operational measures, including the size and configuration of any CAZ, are adequate to prevent potential human health impacts and impairment of the environment.	(●) Yes ( ) No	If no, the potential design and operational concerns/ exceptions are as follows (Type Here):	
6) The site meets compliance and assessment criteria.	( ) Yes (●) No	RUC values are exceeded and discussed in Section 2.3.7 of report	
7) The site continues to perform as anticipated. There have been no unusual trends/ changes in measured leachate and groundwater levels or concentrations.	(●) Yes ( ) No	If no, list exceptions and explain reason for increase/change (Type Here):	
1) Is one or more of the following risk reduction practices in place at the site: *(a)* There is minimal reliance on natural attenuation of leachate due to the presence of an effective waste liner and active leachate collection/treatment; or *(b)* There is a predictive monitoring program in-place (modeled indicator concentrations projected over time for key locations); or *(c)* The site meets the following two conditions (typically achieved after 15 years or longer of site operation): *i.* The site has developed stable leachate mound(s) and stable leachate plume geometry/concentrations; and *ii.* Seasonal and annual water levels and water quality fluctuations are well understood.	(●) Yes ( ) No	Note which practice(s):	☐ (a) ☒ (b) ☒ (c)
9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):	( ) Yes (●) No ( ) Not Applicable	If yes, list value(s) that are/have been exceeded and follow-up action taken (Type Here):	

Groundwater CEP Declaration:

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

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

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

6-Mar-2023

Recommendations:

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

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

Name:	Colin Ross, B.Sc., P.Geo.		
Seal:	Add Image 		
Signature:		**Date:**	6-Mar-2023
CEP Contact Information:	Colin Ross		
Company:	Azimuth Environmental Consulting Inc.		
Address:	642 Welham Road, Barrie, ON		
Telephone No.:	705-721-8451	Fax No. :	705-721-8926
E-mail Address:	colin@azimuthenvironmental.com		
Co-signers for additional expertise provided:			
Signature:		**Date:**	Select Date
Signature:		**Date:**	Select Date

Surface Water WDS Verification:

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

Name (s)	-Wilhelm Drain -Thames River
Distance(s)	-220 m -1.8 km

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

Sampling and Monitoring Program Status:

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

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

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

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

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

Sampling and Monitoring Program Results/WDS Conditions and Assessment:

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

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

Parameter	**Compliance or Assessment Criteria or Background**	**Amount by which Compliance or Assessment Criteria or Background Exceeded**
e.g. Nickel	e.g. C of A limit, PWQO, background	e.g. X% above PWQO
Total Phosphorus	0.03mg/L	>100%
Type Here	Type Here	Type Here
Type Here	Type Here	Type Here
Type Here	Type Here	Type Here
6) In my opinion, any exceedances listed in Question 5 are the result of non-WDS related influences (such as background, road salting, sampling site conditions)?	◉ **Yes** ◯ **No**	Similar elevated concentrations and exceedances have been noted in the upstream (SW-1) location currently and / or historical indicating the landfill was not the contributing source.

7) All monitoring program surface water parameter concentrations fall within a stable or decreasing trend. The site is not characterized by historical ranges of concentrations above assessment and compliance criteria.	(•) **Yes** ( ) **No**	
8) For the monitoring program parameters, does the water quality in the groundwater zones adjacent to surface water receivers exceed assessment or compliance criteria (e.g. , PWQOs, CWQGs, or toxicity values for aquatic biota (APVs)):	( ) Yes (•) No ( ) Not Known ( ) Not Applicable	If yes, provide details and whether remedial measures are necessary (Type Here)
9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):	( ) **Yes** (•) **No** ( ) **Not Applicable**	If yes, list value(s) that are/have been exceeded and follow-up action taken (Type Here)

Surface Water CEP Declaration:

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

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

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

6-Mar-2023

Recommendations:

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

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

CEP Signature	
Relevant Discipline	Hydrogeology
Date:	6-Mar-2023
CEP Contact Information:	Type Here
Company:	Azimuth Environmental Consulting Inc.
Address:	642 Welham Road, Barrie, ON
Telephone No.:	705-721-8451 x 205
Fax No. :	705-721-8926
E-mail Address:	colin@azimuthenvironmental.com
Save As	**Print Form**

APPENDIX I

Monthly Waste Tonnage

Township of Perth East

South Easthope Landfill

2022 - Waste Received by Month

Month	Weight (tonnes)
January	288.684
February	322.216
March	404.554
April	460.895
May	493.367
June	543.834
July	335.706
August	426.693
September	428.356
October	378.523
November	339.434
December	301.480
Total:	**4723.741**