May 15, 2023

David Bradley, District Manager
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Peterborough District Office
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**Subject: 2022 Annual Monitoring Report**
**Peterborough County/City Waste Management Facility**

This annual report was prepared pursuant to Conditions 183 and 184 of Amended Environmental Compliance Approval No. A341508 governing operation of the Peterborough County/City Waste Management Facility for the reporting period of January 1, 2022 to December 31, 2022.

If you have any questions please contact me at 289-678-0328 or by e-mail at Joe.Ovcjak@wsp.com.

Yours sincerely,

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# 2022 ANNUAL MONITORING REPORT

## Peterborough County/City Waste Management Facility

County/City of Peterborough

Project No.: 111-53296-16
Date: May 2023

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# TABLES



# FIGURES

# APPENDICES

## References to Conditions of Environmental Compliance Approval No. A341508

| Condition No. | Condition Description | Location in Report |
|---|---|---|
| 184 i) | An updated waste disposal site plan showing the areas of fill, buffer zones, present contours, monitoring locations and surface water control systems; | Figure 2.1 |
| 184 ii) | A calculation of the remaining capacity of the Site, an estimate of the remaining Site life and a comparison of actual capacity used to approved Site capacity; | Table 2.4 |
| 184 iii) | The optimization of remaining Site capacity with respect to refining final contours, having regard to minimizing the potential for off-site impacts; | Section 2 and Figure 2.2 |
| 184 iv) | Approved changes to the operation; | Section 3 |
| 184 v) | Procedures at the waste disposal site; | Section 3 |
| 184 vi) | A summary of any equipment changes at the site; | Section 3 |
| 184 vii) | An assessment of potential and actual impacts, if any, of the leachate on the Peterborough Water Pollution Control Plant; | Section 4.1.4 and Appendix F |
| 184 viii) | A summary of any occurrences or incidents where this Approval was not complied with, the reason for non-compliance and the measures to be implemented to ensure that future non-compliance does not occur; | Section 10 |
| 184 ix) | Results in tabular format and an interpretive analysis of the results of all leachate, groundwater, surface water and landfill gas monitoring and flaring, including an assessment of the need to amend the monitoring programs; | Sections 4, 5, 6 and 7 and Appendices E, F, G, H, I, J and K |

| Condition No. | Condition Description | Location in Report |
|---|---|---|
| 184 x) | The interpretive analysis referred to in Condition 184 ix) shall include a discussion of groundwater parameters and compliance with the Reasonable Use Policy at the property boundary as well as recommendations for future action (contingency measures) that may be necessary should the monitoring program detect failure of the design; | Section 5 |
| 184 xi) | Groundwater flow and contaminant migration analyses for the entire landfill Site; | Section 5 |
| 184 xii) | Surface water quality with respect to Provincial Drinking Water Objectives; | Section 6 |
| 184 xiii) | An assessment of the operation and performance of all engineered facilities, the need to amend the design or operation of the Site, and the adequacy of and need to implement the contingency plans/environmental emergency plan; | Section 3 and Section 8 |
| 184 xiv) | Leachate characterization results and a discussion of the potential impacts on the Water Pollution Control Plant; | Section 4 and Appendix F |
| 184 xv) | Total leachate volumes collected weekly, monthly and annually and the disposition of the collected leachate; | Section 4, Tables 4.1 and 4.2 |
| 184 xvi) | Site plans showing all surface and ground water monitoring locations and the existing contours of the Site; | Figure 2.1 |
| 184 xvii) | Areas of landfilling operation during reporting period; | Section 3 and Figure 2.1 |
| 184 xii) | Areas of intended operation during the next reporting period; | Section 3 |
| 184 xix) | Areas of excavation during the reporting period; | Section 3 |

| Condition No. | Condition Description | Location in Report |
|---|---|---|
| 184 xx) | The progress of final cover, vegetative cover, and any intermediate cover application; | Section 3 and Figure 2.1 |
| 184 xxi) | Facilities installed during the reporting period; | Section 2 |
| 184 xxii) | Site preparations and facilities planned for installation during the next reporting period; | Section 2 |
| 184 xxiii) | Calculations of the volume of waste, daily and intermediate cover, and final cover deposited or placed at the Site during the reporting period and a calculation of the total volume of Site capacity used during the reporting period; | Section 2 and Table 2.4 |
| 184 xxiv) | Calculations of the amount of contaminated soil used as alternative cover at the Site; | Section 2 |
| 184 xxv) | The amount of contaminated soil stored at the Site at the end of the previous year; | Section 2 |
| 184 xxvi) | Summary of weekly, maximum daily and total annual quantity (tonnes) of waste received at the Site; | Section 2 |
| 184 xxvii) | Summary of any complaints received and responses made; | Section 3 and Table 3.2 |
| 184 xxviii) | A discussion of any operational problems encountered at the Site and corrective action taken; | Section 3 |
| 184 xxix) | A report on the status of all monitoring wells and a statement as to compliance with Ontario Regulation 903; | Section 5 |
| 184 xxx) | Any other information with respect to the Site which the District Manager or Regional Director may require from time to time; | Section 10 |

| Condition No. | Condition Description | Location in Report |
|---|---|---|
| 184 xxxi) | A statement regarding compliance with all conditions of this Approval and other relevant Ministry requirements, guidelines and regulations; | Sections 5 and 11 |
| 184 xxxii) | Summary of inspections undertaken at the Site; | Table 3.1 |
| 184 xxxiii) | A summary of recycling efforts at the public drop-off area including the amount of recyclables received; | Section 3 |
| 184 xxxiv) | A summary of the requirements outlined in Condition 80 of this Approval regarding the use of contaminated soil for daily/intermediate landfill cover; | Section 2 |
| 184 xxxv) | Any changes in operations, equipment or procedures employed at the Site; and | Section 3 |
| 184 xxxvi) | Recommendations regarding any proposed changes in operations of the Site | Section 12 |

# 1 Introduction

This annual report was prepared pursuant to Conditions 183 and 184 of Amended Environmental Compliance Approval (ECA) No. A341508 governing operation of the Peterborough County/City Waste Management Facility (PCCWMF) for the year ending December 31, 2022. The ECA was amended in September 2018, consolidating previous amendments into one document. The ECA is provided in Appendix A. The preceding table provides details of ECA Conditions outlining requirements of the annual report and indicates sections of the report in which Conditions are addressed.

The PCCWMF encompasses 158 hectares (ha) and is located at 1260 Bensfort Road in the Township of Otonabee-South Monaghan, in the County of Peterborough. The PCCWMF is legally described as Part Lots 14 & 15, Concession 13 and Part Lots 13, 14, & 15, Concession 14, Township of Otonabee-South Monaghan, County of Peterborough. The PCCWMF is located 6.4 kilometers south of the City of Peterborough as shown on Figure 1.1. Property ownership around the PCCWMF is presented in Figure 1.2.

In 2022, waste disposal took place in Cells 2 and 3 of the 9.5 ha North Fill Area (NFA). Cell 2, the first cell of the NFA, was constructed in 2010. Cell 4 is the last approved landfill cell to be constructed at the site, and was substantially complete December 22, 2022 and approved to receive waste. Site development and operations are discussed in Sections 2 and 3 of this report.

The scope of the 2022 monitoring program for groundwater, surface water, leachate, and landfill gas is summarized in Table 1.1. The results of the monitoring program are discussed and assessed in Sections 4, 5, 6 and 7 of this report. Section 8 provides an update on contingency plans and Section 9 outlines the 2023 monitoring program.

## 1.1 Site Approvals Status and Background

In June 2002, the PCCWMF became the joint property of the County and City of Peterborough (County/City). The South Fill Area (SFA) was in operation from 1981 to 2012. The NFA began receiving waste in 2010 and is currently in operation.

On November 15, 2011, ECA No. A341508 was issued to the County/City. The ECA currently contains 199 Conditions that govern operation and development of the PCCWMF. An amendment to the ECA was issued on September 7, 2018, consolidating previous amendments into one document. A copy of the ECA is included in Appendix A.

The landfill is currently being operated under contract to the County/City by R.W. Tomlinson Limited of Ottawa. R.W. Tomlinson began operating the site on September 1, 2012.

Construction of Cell 4 in the NFA was completed in 2022. Condition 5 of the ECA requires that the County/City “continue to demonstrate the suitability of the in-situ overburden materials to meet design sections, i.e. permeability, for the proposed recompacted base and side slopes”. To satisfy this condition, a site preparation report of Cell 4 construction was submitted to the Ministry of Environment, Conservation and Parks (MECP). A copy of this report is included in Appendix B.

## 1.2 Waste Disposal By-Law and Tipping Fees

The City of Peterborough By-law Number 07-027 was enacted in 2007 to regulate the disposal of waste, including establishing tipping fees for the PCCWMF. By-law Number 07-027 has been amended by By-law Numbers 09-108, 14-095 and 15-132. By-law Number 07-027 and associated amendments are included in Appendix C.

# 2 Site Development

Pursuant to ECA Condition 184 i), Figure 2.1 – *Existing Conditions SFA & NFA (2022)*, was prepared to provide a record of current SFA and NFA contours, monitoring locations, stockpiles, active fill areas in 2022, site infrastructure, and current development of the site. Figure 2.2 shows the approved final contours for the SFA and NFA. Current and historical cell designations are shown on Figure 2.3.

Waste received in 2022 was placed in Cells 2 and 3. Cell 4 construction was substantially complete on December 22, 2022, however the City did not start landfilling in Cell 4 until 2023.

As part of the Cell 4 landfill construction, the expansion of the perimeter Landfill Gas (LFG) header was completed in 2022 as shown on Figure 7.1. Gas collected from the NFA is sent to the existing Landfill Gas Utilization Plant (LGUP) or the landfill gas flare onsite.

Earthworks for the future Source Separated Organics (SSO) and Leaf and Yard Waste compost facility north of the landfill commenced in summer 2021 and continued throughout 2022. Construction of the compost facility is expected to be completed in 2023.

## 2.1 Cell Development

Construction of Cell 4 started in March 2022, and was completed on December 22, 2022. Work included: excavation, construction of recompacted soil liner, installation of geotextile and a leachate collection system, LFG header installation, construction of a new stockpile location north of Cell 4, and construction of roads, swales and litter fence. Completion of the access roads and litter fence remain outstanding and are expected to be completed in the spring of 2023 when weather permits. Cell 4 was approved to receive waste on December 22, 2022. A copy of the site preparation report for the construction of Cell 4 is included in Appendix B.

## 2.2 Landfill Volumes and Site Life

In 2022, approximately 46,379 tonnes[1] of waste was disposed at the PCCWMF. Waste was placed in Cells 2 and 3 of the NFA. Table 2.1 provides a monthly breakdown of waste, diverted materials, and contaminated soil received in 2022. Table 2.2 provides a weekly breakdown of incoming material to the PCCWMF.

Historical annual waste quantities disposed at the site since 1981 are presented in Table 2.3. Approximately 2,315,261 tonnes of waste have been disposed at the PCCWMF to December 31, 2022. This total excludes contaminated soil.

As per ECA Condition 184 xxvi), a summary of the maximum daily quantity (tonnes) of waste received at the site is to be included in the Annual Report. The highest daily quantity of material received on site in 2022 was 1,721.72 tonnes, received on July 07, 2022. This amount consisted of the following:

| | |
|---|---|
| Asbestos | 1.26 tonnes |
| Construction & Demolition | 1.95 tonnes |
| Contaminated Soil – Cover | 1475.93 tonnes |
| Corrugated Cardboard | 0.01 tonnes |
| Dead stock | 0.42 tonnes |
| Electronics | 0.14 tonnes |
| Freon Items | 0.08 tonnes |
| Green Waste | 2.34 tonnes |
| Mattress | 0.51 tonnes |
| Mixed Recyclables | 0.46 tonnes |
| Mixed Solid Waste | 237.28 tonnes |
| Scrap Metal | 0.04 tonnes |
| Shingles | 0.99 tonnes |
| Tires | 0.31 tonnes |

The SFA reached capacity in 2012 and was under final cover in 2013. The SFA is closed and no longer receiving waste.

[1] The total quantity of waste disposed of at the PCCWMF is exclusive of contaminated soil.

A topographic survey of Cells 2, 3 and 4 of the NFA was completed in December 2022 to satisfy the requirements of Condition 184 i) of the ECA. Table 2.4 shows information on Cells 2, 3 and 4 of the NFA including volume used to December 2022 and the remaining site life estimates for the entire NFA.

The total approved airspace of the NFA is 1,527,000 $m^3$. The approved airspace is expected to provide capacity for approximately 992,550 tonnes of waste assuming an apparent waste density of 0.65 tonnes/$m^3$. Of this total capacity for the NFA, Cells 2 and 3 are estimated to have a combined operational volume of 855,000 $m^3$.

In 2022, 46,379 tonnes of waste was disposed in the NFA. This is a 1.7% decrease from the 47,176 tonnes of waste disposed in 2021. The combined apparent density of all waste disposed to date in Cells 2 and 3 is 0.66 tonnes/$m^3$. This is similar to the 0.67 tonnes/$m^3$ assumed apparent waste density used in remaining site life calculations.

The remaining waste disposal capacity of the PCCWMF is calculated annually based on the average incoming waste quantity over the past five years and an apparent waste density of 0.65 tonnes/$m^3$. The average incoming waste quantity over the past five years in 2022 was 46,600 tonnes, which was an increase from 46,250 tonnes in 2021.

It is estimated that the NFA will provide waste disposal capacity for approximately 11.1 years from December 20, 2022, assuming an annual waste disposal rate of 46,600 tonnes and an apparent waste density of 0.65 tonnes/$m^3$. If waste quantities received or apparent waste densities differ significantly from those assumed the assumptions made when calculating remaining site life will be adjusted accordingly.

### 2.2.1 Soil Balance – Including Alternative Daily Cover

In 2022, approximately 7,357.27 tonnes of material was received at the site for use as alternative daily cover. The material was comprised of the following:

| | |
|---|---|
| Clean wood/wood chips | 229.39 tonnes |
| Contaminated soil | 7,127.88 tonnes |

Cover soil for 2023 will be obtained from on-site stockpiles and imported material. Topsoil for final cover placement will be obtained from on-site stockpiles.

Due to Cell 4 construction, the soil stockpiled within the Cell 4 area was excavated and hauled to either the future SSO facility located north of the scale house within the City's property limits, or the newly constructed stockpile location north of Cell 4 for use as cover material. Stockpile locations are shown on Figure 2.1 for reference. Soil currently available on-site within the stockpile locations is approximately 146,822$m^3$. In 2022, soil from the Cell 4 excavation was not hauled off site.

The estimated remaining quantity of daily, interim and final cover required for the NFA (Cells 2, 3 and 4) is approximately 237,465m$^3$. Additional clean fill became available during Cell 4 construction and was hauled to the new stockpile location and earthwork placement north of the landfill. Contaminated soil will continue to be received at the site for use as alternative daily cover. Clean fill may be required depending on annual incoming contaminated soil for daily cover. Quantities will continue to be reviewed to determine future needs.

### 2.2.2 Diverted Materials

County/City residents have access to curbside blue box collection services, public drop-off depots, or local Township transfer stations and/or landfill sites for diverted materials. Material drop-off is available at the PCCWMF. Approximately 5,286 tonnes of recyclable material, not including materials received for use as alternate daily cover, were diverted from disposal at the on-site Public Drop-off Depot at the PCCWMF in 2022.

Blue Box recyclables are also accepted, at no charge, at the City-owned Materials Recycling Facility (MRF) at 390 Pido Road. The recycling depot at the MRF is open 24 hours per day, 7 days a week.

The City operates a permanent Household Hazardous Waste (HHW) facility, at 400 Pido Road, which is open to County and City residents every Wednesday to Saturday. In addition, the County owns and operates four seasonal HHW facilities and funds one facility for the Township of Otonabee-South Monaghan. The County offers Waste Electrical and Electronic Equipment (WEEE) drop-off at all HHW facilities and some Townships accept WEEE at local transfer stations.

Scrap metal is accepted from the City-owned MRF and the PCCWMF and is diverted to a scrap metal recycling facility.

The City provides weekly "green waste" curbside collection from April to November. Green waste can also be dropped off at the PCCWMF. Green waste includes grass clippings, yard plants, trimmings and brush. Green waste is composted at the Harper Road compost site. The City is currently in the approval process to establish a new leaf and yard material compost facility to replace the Harper Road compost site. Most County residents have access to green waste collection at local Township transfer stations and/or landfill sites. The County initiated a curbside leaf and yard material collection program in Lakefield, Bridgenorth, Norwood and Havelock in the fall of 2013. This program has been extended to other locations in the County in subsequent years.

A full-scale mattress diversion program began on September 2014. Customers pay a fee of $16.00 per unit to partially cover the cost of recycling mattresses. In 2022, a total of 286 tonnes of mattresses were received on site and diverted from disposal.

### 2.2.3 Non-Hazardous Contaminated Soil

The PCCWMF accepts non-hazardous contaminated soil for use as daily and intermediate cover as approved by Condition 80 of the ECA. The City completes Soil Acceptance Forms for contaminated soil received at the PCCWMF to ensure the requirements of ECA Condition 80 are adhered to. Copies of all soil acceptance forms and associated analytical test results are kept on site and/or at City offices.

ECA Condition 81 limits the amount of contaminated soil stored on site to three months of the annual daily/interim cover material volume required. Based on landfill volume utilized in 2022 shown in Table 2.4, the quantity of daily/interim cover soil required over a three-month period was calculated to be 3,340 $m^3$. This value was calculated assuming a waste to cover ratio of 4:1. In 2022 there were no violations of Condition 81 of the ECA where contaminated soil stockpiled onsite exceeded this amount.

## 2.3 Summary of Site Works

The following summarizes the work that was undertaken at the PCCWMF in 2022:

1. Drain Brothers have remained onsite since July 2021 to continue earthworks north of the scale house for the future SSO and Leaf and Yard Waste compost facility. Work was ongoing in 2022, until November 2022. Material for earthworks was obtained from the soil stockpile in Cell 4 and Cell 4 excavation.

2. Forcemain pump in the NFA was reset to 0.0 hours on January 25.

3. Electrical repairs completed on the flare communication system February 7.

4. There was a NFA electrical issue with the east pump control, which was repaired on February 16.

5. Cell 4 construction commenced March 2022 and was completed in December 2022.

6. SFA pump station was shut down on April 7 for electrical repairs and was back online April 8.

7. Electrical issues with the SFA communication system. Electrical repairs were completed throughout the month of April. Totalizer readings obtained from the control building totalizer.

8. The Landfill Gas Utilization Plant (LGUP) was offline May 10 for a short time period due to maintenance. The flare was not operating during LGUP downtime. LUGP was back online a few hours after shutdown.

9. The LGUP was offline from May 21 to May 30 due to power outage from a severe windstorm. The flare was operating during LGUP downtime.

10. The NFA and SFA pump stations were operating on backup generators during the power outage due to the May 21 windstorm. The back up generators were operating from May 21 to May 27 once power was restored.

11. Final cover was placed on the north slope of Cell 2 and 3 in May, August, September and December.

12. Dust control was completed periodically onsite during the months of May, June, July, August, September and October.

13. The LGUP was offline periodically during the month of June due to maintenance. The flare was running during LGUP downtime.

14. Cambium completed a site visit in June and noted maintenance work was required on the litter fence around Cells 2 and 3. Following the site visit the required repairs were completed to the liter fence to maintain its purpose.

15. A small seep observed by City staff was repaired in the NFA on July 12.

16. The LGUP was offline periodically during the month of July due to maintenance. The flare was running during LGUP downtime.

17. New hour meter installed in SCADA system on July 25.

18. Flushing and inspection of the leachate collection system (LCS) and holding tanks were completed throughout the months of August and September.

19. Nexicom wireless service was installed onsite and local towers around the site on September 23.

20. Level sensors, gas metres and flow meters were calibrated on September 23.

21. SCADA system work was ongoing from September to December. No hour meter was able to be installed and the control building totalizer was used for the remainder of the year.

22. The LGUP was offline periodically during the month of October due to maintenance. The flare was running during LGUP downtime.

23. The LGUP was offline periodically during the month of November due to maintenance. The flare was running during LGUP downtime.

24. Touch screen control system for the flare failed on November 22 and a replacement was ordered.

25. The LGUP was offline periodically during the month of December due to maintenance. The flare was running during LGUP downtime.

26. Barry Electric and Control Works were onsite periodically during December to install a new SCADA and control pump in the SFA pump station. Upgrades on the SCADA system continued throughout the remainder of the year.

# 3 Operations and Maintenance

The PCCWMF has been operated under contract by R.W. Tomlinson since September 2012. The site operator is responsible for the following:

1. Acceptance of waste at the site. Hours of operation are from 8:00 a.m. to 4:45 p.m. Monday to Friday and from 8:00 a.m. to 3:45 p.m. on Saturdays;
2. Operation of the weigh scale;
3. Placement and compaction of waste;
4. Application of daily, interim and final cover;
5. Maintenance and operation of the public drop-off depot;
6. Construction of perimeter berms;
7. Litter control; and
8. Segregation of recyclable materials from the waste stream at the public drop-off depot.

City staff carry out daily, weekly, monthly and quarterly inspections to verify the site is being operated in accordance with the operating contract and the requirements of the ECA. Inspection forms are kept on file by the City in accordance with ECA Condition 127. Table 3.1 summarizes monthly results of inspections undertaken in 2022.

## 3.1 Waste Disposal

When waste arrives at the site the weigh scale attendant obtains relevant information about the material to be disposed in order to screen for potential ECA violations. The attendant then directs the hauler to the disposal area. Signs also direct vehicles to the disposal area where drivers remove their tarps, if applicable, and back their vehicles into the tipping face as directed.

At the start of each day, the operator will excavate a hydraulic connection to the underlying waste layer to facilitate leachate movement to the drainage layer at the bottom of the landfill for collection. Waste is then placed in lifts approximately 0.5 meters (m) thick and compacted. Each daily lift of waste is approximately 2 m thick. Daily cover soil or alternative daily cover material is then spread over the waste to a depth of 0.15 m.

Grade stakes are periodically placed around the fill area to assist the operator in filling to approved final contours. At the end of each workday heavy equipment is cleaned, fueled and serviced. Prior to waste layers reaching adjacent ground elevations, a soil berm will be constructed around the perimeter of the fill area to isolate leachate impacted water and contain it within the active fill area.

Weigh scale records indicate that 46,379 tonnes of waste were disposed of on site in 2022. Non-commercial vehicles were directed to the Public Drop-off Depot where roll-off containers receive waste and recyclables. As waste containers reach capacity, they are hauled to the fill area. Containers with recyclable materials are taken off site for processing.

Further details of site operations are contained in the landfill operations contract. The Landfill Operations and Maintenance Manual (May 2013) provides additional information and is available for review.

ECA Condition 73 limits the disposal of waste to solid non-hazardous municipal, commercial and industrial wastes generated within the County/City. If it is found that haulers are bringing materials to the landfill that are not accepted under ECA Condition 73 or are materials that are banned under the solid waste By-law, a violation notice is issued. To ensure proper waste handling procedures are followed, daily inspections are carried out by City staff.

Violation notices are issued to site users that do not abide with site regulations. Violators are warned that repeated violations will result in a fine. The following violations were reported in 2022:

- 3 abusive language offenses were recorded;
- 2 warnings were issued for material brought into site that was banned;
- 9 occurrences where the public did not confirm where garbage was generated;
- 36 occurrences where a vehicle did not weigh out, fines were issued to some offenders;
- 2 offenses where direction from City staff was not obeyed;
- 3 occurrences of misrepresentation of facts;

- 81 occurrences where members of the public were from outside of the City/County of Peterborough;
- 81 violations where members of the public refused to pay and fines were subsequently issued to some offenders;
- 1 occurrence where safety concerns were identified by City staff, where the public was not obeying safety regulations onsite with the operation of a vehicle; and
- 3 untarped open load violations.

In accordance with City By-laws, users are charged a surcharge of $100 to $300 per load when the load does not conform to the By-law. The By-law does not permit loads with greater than 10 percent of recyclable material to be disposed of at the site. In 2022 there were no violations for loads containing excessive recyclables.

## 3.2 Daily, Interim and Final Cover

The site operator is responsible for hauling and placement of daily, interim and final cover at the landfill. The cover materials used in 2022 were obtained from the following sources:

1. On-site stockpiles of soil;
2. Contaminated soil received at the site; and
3. Clean wood/wood chips received at the site.

In 2022, final cover soil was placed within Cell 2 and on the north side of Cell 3. 2.01 ha of the NFA is currently under final cover. The approximate measured change in area under final cover from 2021 to 2022 is 0.52 ha.

In 2023, clean fill, contaminated soil, clean wood/wood chips, and compost screening overs will continue to be used as daily cover as required.

## 3.3 Equipment

Equipment used to operate the PCCWMF is owned, operated, and maintained by the site operator. The equipment used by the site operator was satisfactory to operate the landfill in 2022. The following equipment was used to operate the landfill in 2022:

1. 2012 CAT 826H Compactor;
2. 2012 CAT D6TXL Dozer;
3. 2012 CAT 329EL Excavator;

4. John Deere 250D Rock Truck;
5. 2012 CAT 950H Front End Loader;
6. International Paystar Service Truck;
7. 420F IT Backhoe;
8. Kubota 72-inch mower; and
9. 2012 GMC 2500 Series Crew Cab Truck.

There were no changes to equipment utilized by the site operator in 2022.

## 3.4 Public Drop-Off Area

Currently, there are eighteen 40 cubic yard collection bins being utilized at the Public Drop-Off Depot. The bins are designated for waste, blue box recyclables, construction and demolition material, drywall, cardboard, green waste, tires, shingles, WEEE, scrap metal, Freon-containing appliances, and untreated wood.

## 3.5 Signs

At the site entrance a sign identifies hours of operation, 24-hour emergency contact phone number, tipping fees, regulations, acceptable wastes, and landfill bans. Other signs include:

1. Speed limit and traffic routing signs;
2. "No Entry" signs at maintenance and monitoring roads and at two secondary entrances;
3. Individual material designation signs, at the Public Drop-Off Depot;
4. “Operational Issues Inquire” sign required as per Ministry regulations;
5. Public information signs at the scale house regarding site operations and respect to employees; and
6. Covid-19 protocols and guidelines while onsite.

## 3.6 Liaison Committee and Resident Concerns

The Site Liaison Committee (SLC) met virtually on February 1, 2022 and in person on July 5, 2022 . The key items discussed in 2022 were as follows:

1. General Facility Complaints presented by James Istchenko. From July 2021 to December 2021, a total of 134 offences and 3 complaints were observed.
2. A review of the 2021 Annual Monitoring Report was presented to the committee by WSP.

3. The City provided an update on the Source Separated Organics and Leaf and Yard Waste compost facility:
    a. Preliminary design and supporting reports are complete.
    b. Support towards a re-zoning application is underway and submitted to the County and Township in July 2021.
    c. Planning is underway to support the collection equipment and process specification and procurement.
    d. The project remains on track, targeting construction and commissioning in 2023 to divert organics from the landfill.
    e. The township is undertaking a planning review of the SSO facility and a public meeting is going to be held on February 7, 2022.
4. The committee was provided with an update on upcoming activities at the landfill including construction projects, status of contracts, and facility maintenance.
    a. The landfill operations contract with Tomlinson had been awarded in 2022 and the next 7-year operations contract has been tendered pending award.
    b. Sawtooth receiving area contract refurbishment underway and is a multi year contract.
    c. Annual monitoring and collection system maintenance underway.
    d. Cell 4 design and tending underway with construction planned for 2022.
5. The City announced that property rent increased by 1.2% for 2022.
6. City provided an update on landfill odours and gas collection. It was noted that LFG odours have not been an issue throughout the year of 2021 and the proposed Phase 4 LFG design is to be completed in 2022, with construction in 2023.
7. The Township retained Cambium to complete the Annual Monitoring Report review.
8. Residents raised questions about how the City ensures the liner for the landfill cells have met and will continue to meet the Ministry Requirements. WSP noted that the recompacted clay liner for the landfill cell had gone through an ECA approvals process with the MECP. All approval and measures are detailed within the PCCWMF ECA.
9. Residents shared concerns with the committee about the potential affects the landfill may have on their property with concerns to ground water. A list of concerns were emailed to Don Briand. City encouraged residents to reach out to the City immediately when a concern arises to allow the City an opportunity to investigate and assess conditions.
10. Overview of Cambiums annual landfill site inspection was presented to the committee. The need for some vegetation repairs were identified during the site walk through but overall the site was observed to be in compliance and no off-site issues were noted.

11. City provided an update in response to the PCCWMF noise complaint, which confirmed the noise was not landfill or generator related.

## 3.7 Site Maintenance

The landfill is inspected regularly to ensure operation in accordance with ECA Condition 49. City staff complete daily, weekly, and monthly inspections. These inspections are documented on appropriate information collection forms. In addition, landfill operations and maintenance meetings are attended by the Owner, the Operator, and the Consultant on a regular basis to discuss and address site related matters.

### 3.7.1 Road Maintenance

Maintenance of the access and service roads in 2022 included the following:

1. Grading of gravel roads onsite in June by the City of Peterborough;
2. Water was used to aid in dust control from June to November;
3. Snow plowing during winter months;
4. Placement of granular material or wood chips as necessary to provide access to the active fill area and cover material stockpiles; and
5. Sweeping of paved areas, as needed.

### 3.7.2 Final Cover

Final cover soil was placed on the entire SFA by 2013. Placement of topsoil and seeding on the SFA was completed in 2014. Planting of trees in the SFA as per the closure plan, originally planned for 2018, was postponed due to ongoing site works and repairs required to the LFGCS.

Final cover placement in the NFA is completed as waste is landfilled to approved elevations. Currently 2.01 ha of the NFA is under final cover.

### 3.7.3 Litter Control

The following measures were undertaken in 2022 to minimize wind-blown litter:

1. On and off-site cleanup of litter was completed as needed; and
2. Maintenance of litter fence as required throughout the year.

### 3.7.4 Dust Control

To minimize dust, the main site access road is paved. Unpaved service and haul roads are watered as needed to reduce dust. In 2022, no dust complaints were received.

### 3.7.5 Vermin Control

To minimize odours and to discourage use of the site by rodents and birds, soil or alternate cover is placed daily. Progressive placement of final cover further reduces the potential for odour, litter and vermin impacts.

The City requested renewal of Permit No. DA 2723 from Environment Canada to scare or cull gulls in 2022. An application to renew the gull culling program to December 31, 2022 was submitted by the City and is being processed by Environment Canada. No complaints related to gulls were received in 2022. The City will continue to evaluate the program on an annual basis.

### 3.7.6 Complaints Received in 2022

ECA Condition 170 requires the County/City to record and respond to complaints received regarding site operations. A Complaint Action Form is utilized for this purpose.

In 2022, ten complaints were received and documented in the complaints log. A summary of complaints received in 2022 is shown on Table 3.2. Complaints received are detailed below.

1. Five complaints were related to potential odours from the PCCWMF observed off-site of the landfill. Three of the five odour complaints were unrelated to the landfill and occurred due to farming operations.

2. Five complaints were emails addressing concerns raised by a resident that were discussed in the Site Liaison Committee Meeting held on February 1st 2022. The resident was asked to email the list of concerns to the City and included in this email were various residential responses to their concerns of groundwater, odours and the future of landfilling. During the SLC meeting, the City addressed some of the concerns with regards to groundwater monitoring, LFG odours, noise and general inquiries about landfilling operations. Since these concerns were addressed no landfill complaints were observed since this time from the subject residence.

In February 2020, three new wellheads were installed to improve the connections between the SFA landfill gas collection system and the LCS manholes on the North and East sides of the SFA. In the NFA, the third phase of the LFGCS was completed in February 2020. This included three new vertical gas collection wells in Cell 2 and two horizontal gas collection pipes in Cell 3. Landfill gas has been collected from the improved connections to the SFA LCS manholes, the new wells in the NFA, and the new horizontal collection pipes in NFA since the work was substantially completed in February 2020. A decrease in odour complaints was observed in the latter half of 2020 and complaints continue to be low through 2022.

A noise study was conducted from November 5, 2020 to November 20, 2020. The purpose of this study was to verify if operation of the mechanical equipment associated with the LGUP is resulting in the excess noise observed at the complainants' property. A report titled "*Peterborough Landfill Gas Generation Facility – Noise Complaint Investigation at 1175 Crowley Line, Peterborough, ON*" dated January 19, 2021 was prepared by WSP Canada Inc. summarizing the results of the noise study. A copy of the report is included in Appendix D. The study found that the Facility complies with the applicable sound level limits for ancillary facilities at the complainant's property.

# 4 Leachate Collection System

The SFA LCS and NFA LCS collect leachate generated within the waste, along with groundwater collected by the site's interceptor trench, and convey it to the City's Waste Water Treatment Plant (WWTP). A description of the LCS is provided in Appendix E. The LCS is shown on Figure E.1, Appendix E.

## 4.1 Leachate Monitoring

### 4.1.1 Leachate Quantity

Pursuant to ECA Condition 184 xv), Table 4.1 presents a monthly summary of leachate/groundwater collected and transferred to the sanitary sewer at Neal Drive. Also, Table 4.2 presents the weekly amount of leachate/groundwater collected and transferred to the sanitary sewer. The volume of leachate and groundwater removed in 2022 was 47,603 $m^3$. This is a 23.6% decrease from the 62,297 $m^3$ removed in 2021.

The largest amount of leachate removed from site in one year was 107,981 $m^3$, which occurred in 2011. Table E.1 (Appendix E) provides a historical comparison of recorded leachate/groundwater volumes.

Of the 47,603 $m^3$ of leachate and groundwater removed in 2022, 24,700 $m^3$ or 51.9% was from the SFA and 22,903 $m^3$ or 48.1% was from the NFA. In comparison, 62,297 $m^3$ of leachate and groundwater removed in 2021, 33,950 $m^3$ or 54.5% was from the SFA and 28,347 $m^3$ or 45.5% was from the NFA. The ratio of precipitation to leachate generation from the SFA is expected to be relatively consistent on an annual basis as the entire SFA is under final cover. The volume of leachate produced within Cells 2 and 3 decreased as Cells 2 and 3 continued to be filled, and final and interim cover is progressively placed. Leachate volumes in the NFA will begin to increase from December 2022 onward until waste elevations reach final contours and final cover placement begins in Cell 4. Leachate quantities collected from the NFA and SFA in 2022 were lower than 2021 quantities. This corresponds to final cover placement, weather patterns throughout the year and the lower precipitation received on site in 2022.

### 4.1.2 Meteorological Data and Water Balance Analysis

To evaluate LCS performance, an assessment was made for the contributing factors to leachate production at the site. The data and calculations are included in Tables E.1 and E.2 (Appendix E) and are discussed below. The monthly leachate/groundwater volumes discharged to the sewer are provided in Table 4.1.

The total precipitation received at the Peterborough Airport in 2022 was measured to be 638 mm (Environment Canada, 2022), which is 13.0% decrease from the precipitation received at this location in 2021. It is noted that the annual precipitation totals for 2021 and 2022 at the Peterborough Airport climate station have been supplemented by data from other, nearby climate stations for days in which data was unavailable at the Peterborough Airport station; for the calculations and interpretations within the 2022 monitoring report. A list of the supplemented data is on file. Approximately 14% of the collected leachate within the SFA during 2022 is attributed to precipitation infiltration through the landfill cap and refuse, with the remaining portion of the collected leachate attributed to groundwater inflow at various locations surrounding the cell. Appendix E provides a description of the calculations completed for the water balance.

The volume of leachate collected within the NFA in 2022 was a 19.2% decrease compared to the volume collected within the NFA in 2021. This corresponds with additional final cover placement and decrease in precipitation in 2022. The collected leachate within the NFA resulting from precipitation infiltration is approximately 69%, compared to 14% in the SFA, which is not unexpected, as the SFA is completely under final cover.

### 4.1.3 Leachate Quality

In 2022, leachate was characterized by samples collected from the collection system (holding tanks within the NFA and SFA, and maintenance hole MHT6-94) and from refuse monitor 23B. These locations were selected to ensure that representative samples are obtained which reflect actual leachate quality. The quality of the groundwater in the interceptor trench was characterized by samples collected from MH4.

Laboratory results for the leachate holding tanks and MHT6-94 are summarized in Table E.3 and E.4, respectively. Time-concentration graphs for the samples obtained from the holding tanks are presented in Figures E.6 and E.7, Appendix E. As shown in the graphs, parameter concentrations at the SFA leachate holding tank fluctuated within a narrow range between 1991 and 2003, but the fluctuating range was greater between 2004 and 2007, returning to a narrower range since that time. Parameter concentrations generally fluctuated between

2015 and 2022. As shown in the figures, the parameter concentrations at the NFA leachate holding tank were generally similar to, or lower than, the concentrations at the SFA holding tank in 2011 and 2012, but parameter concentrations within the NFA holding tank have increased and were similar to or greater than, the concentrations within the SFA holding tank between 2013 and 2022, reaching a peak in 2022. The lower parameter concentrations within the NFA holding tank during 2011 and 2012 were not unexpected, since refuse started being placed in Cell 2 of the NFA in late 2010.

The concentrations of most organic parameters analyzed for the leachate holding tank samples in 2022 were below the method detection limit for both sampling events, with the exception of those parameters listed in Table 4.3. In general, the detected parameters are similar to historical results.

Based on the leachate chemistry results within the leachate holding tanks, the 2022 leachate quality generally satisfied criteria contained in Sewer Use By-law No. 15-075 with the exceptions of the following:

1. Total Kieldahl Nitrogen (TKN) in the SFA and NFA holding tanks sampled both in March and October 2022.

2. Nonyl-phenols in the SFA holding tanks sampled both in March and October 2022, and NFA holding tank sampled in October 2022.

#### 4.1.3.1 In-Waste Leachate Characterization

In-waste monitor 23B is located at the south end of Cell 1 – South (SFA). The laboratory results for the sampling events in 2022 at this monitor, along with the historical results since 2016, are contained in Table E.5, Appendix E, and the long-term time-concentration graphs are presented in Figures E.8 and E.9.

As shown in the time-concentration graphs, concentrations for chloride, alkalinity, chemical oxygen demand (COD), TKN, sodium, potassium, and magnesium have generally fluctuated within a lower range since 2005 compared to the concentration ranges between 1986 and 1993 and have generally decreased between 2005 and 2022. Iron concentrations fluctuate over a large range between 2004 and 2022. In the short term, concentrations for most parameters in 2021 were similar to concentrations between 2008 and 2016 and then decreased to lower levels in 2022. It is noted there is no chemistry data available between 1993 and 2005 for monitor 23B, based on the historical data provided by the City. The fluctuations between sampling events are attributed to the variable nature of leachate within the refuse. The leachate quality at this location is typical of older leachate.

Monitor 23B provides a general understanding of the leachate quality over time at the Site. Installation of additional in-waste monitors within the SFA is not warranted at this time.

#### 4.1.3.2 Leachate Collection System Leachate Quality Characterization

As shown in Figures E.6 and E.7, the concentrations of several analyzed parameters from holding tank leachate samples have fluctuated over the long term, and more noticeably since 2004. The parameter concentrations during 2022 were within the lower portion of the recent concentration range for the SFA holding tank, but several parameter concentrations in the NFA holding tank samples continue to increase due to active landfilling. Since the SFA holding tank receives the groundwater pumped from the interceptor trench (MH4) and from the LCS, the concentration of leachate parameters will be affected by the relative proportion of groundwater that is in the holding tank at the time of sampling. The relative age of the existing waste at the site, along with the new waste recently placed in the NFA, also contributes to the variability of the leachate characteristics.

Grab samples collected from the holding tank when it has a higher proportion of groundwater will have lower concentrations of the parameters shown in Figures E.6 and E.7. Grab samples collected from the holding tank when groundwater is not discharging from MH4 will have higher concentrations of the parameters shown in Figures E.6 and E.7. Other operational factors, such as regulating the leachate discharge rate from cells, will also impact the characteristics of the leachate in the holding tanks. On this basis the following conditions for collection of leachate quality samples from the holding tanks should continue to be implemented:

1. No discharge from the leachate interceptor trench pumping station (MH4) to the holding tank for 24 hours prior to sampling event. Record the MH4 pump hour records for the day before the sampling event and the day of the sampling event.
2. Conduct sampling at least 72 hours after a precipitation event.
3. Record the position of the leachate control valves at MHT6-94 and TDCO-A0-05.

The above conditions were met during the collection of leachate samples obtained in 2022.

#### 4.1.3.3 Interceptor Quality Characterization

Laboratory results for the October 2022 sampling event at MH4 for the interceptor trench are contained in Table E.6, Appendix E, and the long-term time-concentration graphs are presented in Figures E.10 and E.11. In general, parameter concentrations fluctuate with no distinguishable trend, although chloride and sodium concentrations have exhibited a generally increasing trend since 2004. It is noted that, following a general decreasing trend between 2012 and 2015, concentrations for alkalinity, iron, TKN, potassium, and sodium increased in 2016 and have fluctuated since this time with levels decreasing to historical lows for some parameters in 2021 and rebounding in 2022. The concentration increases in 2016 may be attributed to the relatively low amount of precipitation received during the year but continued monitoring will permit a further assessment of the long-term trend for the interceptor trench.

It is noted that concentrations of some parameters prior to 1993, including potassium, biochemical oxygen demand, and TKN, were elevated compared to concentrations during the following years. The subsequent decrease after 1992 is attributed to the discontinuation of the direct release of leachate into this system. The groundwater in the interceptor system is characterized as somewhat degraded due to natural conditions and brine influences, along with low levels of some residual leachate related parameters.

### 4.1.4 Waste Water Treatment Plant

ECA Condition 184 vii) requires that the annual monitoring report include an assessment of potential and actual impacts, if any, of leachate on the WWTP. A detailed assessment is provided in Appendix F.

The impact of leachate on the WWTP was evaluated based on the quantity and quality of leachate discharged. The mass loading of key leachate components was compared to the overall loading of parameters entering the WWTP. Key observations from 2022 and recommendations for 2023 are summarized below:

1. Samples were collected in March and October 2022 for analysis and compared to selected parameters in the City of Peterborough Sewer Use By-law;
2. April had the highest average daily flow of leachate with 192 $m^3$/day;
3. August had the lowest average daily flow rate of leachate with 31 $m^3$/day;
4. The average daily leachate flow rate in 2022 was 68 $m^3$/day. This was a 60% decrease from 2021;
5. In 2022, the average influent volume from the PCCWMF to the WWTP was 0.17% of total influent volume which is considered insignificant in terms of hydraulic load;
6. In April 2022, the PCCWMF conveyed its highest fraction of influent, providing 0.40% of the total WWTP influent hydraulic load;
7. The leachate samples satisfied the By-Law criteria with the exception of TKN in the SFA and NFA holding tanks sampled both in March and October 2022, nonyl-phenols in the SFA holding tank sampling in March and October 2022, and nonyl-phenols in the NFA holding tank sampled in October 2022.
8. $BOD_5$, TSS, phosphorus, and COD loads on the WWTP from landfill leachate are low and represent only a small portion of the WWTP capacity; and
9. TKN load on the WWTP appears to be in the range of 0.8% and 1.2%.

Based on the analysis of this data, it is concluded that leachate from the PCCWMF had little effect on the loadings at the WWTP.

## 4.2 Leachate Collection System Performance

### 4.2.1 Leachate Head Monitoring Locations

Leachate levels were monitored at standpipes and inclined standpipes within the SFA. Standpipes are located in the vicinity of the leachate toe drain along the eastern and northern limit of waste. Inclined standpipes are located along the limit of waste for Cell 1 - South and at the base of the waste below the east side of Cell 1 - North. The location of all monitors in the SFA is shown on Figure 2.1 and Figure 5.1.

Inclined standpipes, designated ISP15 and ISP16 are installed in Cell 2 and Cell 3 of the NFA. Inclined standpipes are installed at the time of construction of the landfill cells and monitor leachate levels within the cells. The results for 2022 at these locations are included in Table G.4, Appendix G. A new incline standpipe, designated ISP17, was installed during Cell 4 construction to monitor leachate levels within Cell 4 of the NFA. Substantial completion of Cell 4 was completed on December 22, 2022 and incline standpipe ISP17 will be included in the 2023 monitoring program. The locations of the NFA inclined standpipe is shown on Figure 2.1 and Figure 5.1.

### 4.2.2 Leachate Mound Assessment

A summary of the standpipe and inclined standpipe monitoring results are presented in Tables G.3 and G.4, Appendix G, respectively. The long-term hydrograph for refuse Monitor 23B is shown in Figure G.49, Appendix G. As shown in Figure G.49, the leachate levels within monitor 23B have generally decreased between 2007 and 2010 and have remained at this lower level until September 2022, when it increased to a historical high. Further monitoring of 23B is required to assess the long-term trend. Based on data obtained at standpipes in 2022, the following presents key observations:

1. The standpipes were generally dry for 2022 with the exception of SP6-90, SP7-90, SP8-90, SP10-94, SP11-94, SP14-94 and SP15-91 on at least one occasion in 2022. The levels within SP14-94 confirm the leachate level and the hydraulic connection to the leachate holding tank. The other monitors had measurable levels during monitoring events mainly in February and May and likely related to seasonal precipitation. In general, the standpipe levels (with the exception of SP14-94) were observed to be dry during the monitoring event following a measured level.

2. Inclined standpipes generally had low levels, with the exception of ISP7-95 and ISP15, which is similar to historical results. Levels obtained from inclined standpipe ISP7-95 indicates there is some leachate mounding present within the upper cell of Cell 1-South but the low levels are generally consistent with historical data. These low levels indicate the LCSs in these locations are performing as designed and there is no evidence of significant mounding. Data obtained by the City for monitor ISP15 are approximate

readings as there were blockages and/or soil within the pipes. Monitor ISP15 appears to have been damaged but this monitor will be replaced with a vertical refuse monitor once the landfill cap within Cell 2 has been established, as recommended in the D&O report for the NFA.

3. Levels obtained from inclined standpipe ISP16 indicates there is minimal leachate present within the south side of the NFA Cell 3.

In summary, the leachate level mounding results at the monitored locations confirms the SFA is performing as designed, and the minimal leachate mounding is comparable to historical results; but continued monitoring and additional field investigations regarding monitor condition should be considered. Continued monitoring will permit ongoing assessments of potential mounding, in the future.

## 4.3 Surface Seepage Monitoring

As part of the surface water management strategy, inspection for evidence of leachate seepage is undertaken on a regular basis. In 2022, a small seep was noted on the south side of the NFA landfill by City staff June 23, 2022. The seep was repaired July 12, 2022 by Tomlinson. Throughout the remainder of the year, the seep was observed to be contained and was not observed after June 2022.

## 4.4 Leachate System and Interceptor Trench Inspection and Maintenance

During 2022, the City regularly inspected the operation of the leachate management system as part of the site inspection process. Table 3.1 summarizes the key maintenance activities that were undertaken on a monthly basis in 2022, for the entire site including the leachate management system.

### 4.4.1 Flushing and Video Inspection

The NFA and SFA LCS and Interceptor Line were flushed from August to September 2022. Cell 2 and 3 in the NFA were video inspected from June to September 2022 by the City. Once Cell 4 construction was complete, as part of the contract, LCS lines were to be flushed and video inspected. Eye View LTD. completed the video inspection in December 2022. A summary of inspection and flushing completed in 2022 is included in Table 4.4. Figures 4.1 and 4.2 illustrate the locations of the collection piping flushed in 2022.

On Figures 4.1 and 4.2, it can be seen that portions of the LCS were only partially flushed. Typically, this is due to flushing equipment having to climb up-slope through the LCS pipes. When the flushing equipment can no longer climb the slope, flushing is ceased. All of Cell 2 was flushed and part of Cell 3 was flushed. Cell 4 was unable to be flushed in 2022 due manhole accessibility. One metre of waste is required to be placed prior to accessing the manholes with flushing equipment to avoid damaging the liner system. Cell 4 will be flushed once access can be obtained in 2023.

As part of Cell 4 construction, access roads to manholes in Cells 2 and 3 were proposed to be constructed to allow better accessibility to manholes in the future. The access roads to the manholes were not able to be constructed in 2022 due to weather related restrictions at the time of year. Construction of the access roads will resume in spring of 2023.

It was observed that video inspected LCS pipes were in good condition with minor issues observed. Table 4.4 summarizes findings observed during the video inspection of LCS pipes in the NFA. The following was observed within the LCS pipes during the video inspection completed in 2022:

1. Pipe reference number 308090, as shown on Figure 4.1, was observed to have ponding leachate due to a slight sag of the LCS pipe at 90m North of MH1. No obstructions were observed due to the settlement of the pipe.

2. Inspection camera couldn't get proceed passed 144m on pipe reference number 308084 south of MH6 due to HDPE pipe coupler welds. City completed video inspection from down stream manhole to complete inspection of the entire line.

3. Pipe reference Cell 4-P3 at MH8 couldn't progress camera through pipe due to HDPE coupler weld. Pipe was observed to be in good condition at this location otherwise and would no restrict flow of leachate.

In conclusion, there were no obstructions to flow of leachate and the LCS continues to function as designed. The City will continue to flush the NFA and SFA LCS on an annual basis. Should conditions change, the frequency of maintenance and inspection will be re-evaluated.

Condition 108 iii) of the ECA requires newly installed LCS to be video inspected annually for 5 years following installation. Construction of Cell 4 of the NFA was completed in 2022, therefore the LCS in Cell 4 was video inspected in 2022 and will then be video inspected annually until 2027 and every even year thereafter. Cell 4 will be video inspected again in 2023.

ECA Condition 108 i) requires the LCS to be video inspected every two years, in odd years. The LCS in the SFA, Cell 2 and Cell 3 will be video inspected again in 2023.

### 4.4.2 Leachate Pump Stations and Forcemains

In 2010, Cell 2 of the NFA was constructed. Construction included a new pump station and forcemain to convey leachate from the NFA to the sanitary sewer manhole on Bensfort Road. The pump station and forcemain have been operational since July 2010. The NFA pump station and forcemain are operating as designed. These services will be maintained in accordance with the requirements of the ECA.

The following site works and maintenance activities related to the pump stations and forcemains were completed in 2022:

1. East forcemain pump in NFA was reset to 0.0 hours January 25.

2. Electrical issue with East pump control in the NFA repairs February 16.

3. Electrical repairs to SFA pump station complete on April 8.

4. SFA communication system electrical issues noted April 13 and repaired April 29.

5. SCADA system work on-going throughout the month of September, October and November at the SFA pump station, leading to no hour metering complete.

6. New SCADA system and south pump installed in the SFA pump station December 21.

7. All level sensors and flow meters were calibrated September 23.

# 5 Groundwater Monitoring Assessment

Groundwater monitoring was conducted in accordance with the current programs for the SFA and NFA, as shown in Table 1.1. A rationalized groundwater monitoring program was presented in the 2006 Annual Monitoring Report with the objectives to:

1. Update the program to reflect existing Site conditions (i.e., property limits and NFA approval);
2. Establish baseline monitoring in the NFA; and
3. Rationalize the SFA program in advance of closure of this area.

The rationalized program was implemented for the 2008 monitoring period (commencing January 1, 2008). Details of the rationalized program are provided in the 2006 Annual Monitoring Report. A summary of the groundwater monitor details is provided in Table G.1, Appendix G.

Upon completion of the NFA Cell 2 construction, additional groundwater monitoring nests, identified as monitoring locations 108, 109, and 110, were installed adjacent to Cell 2 in late 2010, in accordance with the recommendations provided in the Design and Operations Report (D&O Report) for the site. Monitors 63-I,II,III and 75-I,II were incorporated into the routine monitoring program in Fall 2014, in accordance with Ministry comments and ECA Amendment Notice No. 1, dated January 5, 2015.

In December 2016, additional groundwater monitoring nests, identified as 111 and 112, were installed adjacent to Cell 3, in accordance with the recommendations in the D&O Report for the site. The three monitors at monitoring location 70 were decommissioned in 2016 and replaced with three new groundwater monitors at monitoring location 113. The monitors at monitoring location 70 were decommissioned due to persistent flooded conditions at the monitoring location, and the replacement location permits compliance with Ontario Regulation (O.Reg.) 903. The new monitors were incorporated into the routine monitoring program in 2017.

In 2020, monitor 52-II was reported as damaged, and monitor 109-II was noted to be compromised. Both monitors 52-II and 109-II were replaced in September 2022.

The groundwater monitoring program is carried out by City of Peterborough staff, and field notes are maintained by City staff during each sampling event. Based on a review of information provided by the City of Peterborough, the groundwater monitors included in the monitoring network are capped, locked, and protected from damage in general compliance with O.Reg. 903. It is noted that monitors which require monitor cap replacements and minor repairs are generally repaired by the City, or their consultant, on an ongoing basis.

The existing on-site groundwater monitoring locations are used for monitoring purposes at the site and will continue to be included in the 2023 program.

Private well monitoring was undertaken based on the sampling program identified in the City of Peterborough/Township of Otonabee-South Monaghan Agreement. There was no reported measurable landfill influence on the water quality within the private wells that were sampled.

## 5.1 Groundwater Elevations and Flow

### 5.1.1 Site Geology

The geological features on, and surrounding, the site have been documented by others in previous reports. Groundwater flow is controlled by the drumlin, till plain and weathered limestone bedrock underlying the Site.

The Site geology and hydrogeology for the SFA are further detailed in the document entitled Gartner Lee 1991a, which includes findings from investigations and studies back to 1976.

An additional description of the Site geology and hydrogeology was provided in the 2002 Application for Certificate of Approval for the Site[2], as well as in previous annual monitoring reports.

### 5.1.2 Overburden Flow System

A summary of the 2022 groundwater elevations is presented in Table G.2, and water elevation graphs for each of the monitoring wells are presented in Figures G.1 to G.44, in Appendix G. Water level elevations during 2022 were generally comparable to historical values, with seasonal and climatic variations present. Based on the groundwater elevation graphs, the following trends are noted:

1. Water levels within several monitors rebounded in 2017 from historical lows that occurred in September and November 2016, and these levels were relatively maintained into 2022. The rebound in 2017 was attributed to the dry climatic conditions experienced in summer and fall 2016 and the return to normal climatic conditions in 2017.

2. Water levels at Monitors 19A (bedrock) and 19B decreased between 2007 and late 2010 and have seasonally fluctuated at the lower range since that time. Water level elevations at 19B reached a historical high during the May 2020 monitoring period but decreased to historical levels in 2021 through to 2022. It is noted that Monitors 19A and 19B are located within the southeast corner of the landfill site property. The reason for the slight water level decline from 2007 to 2010 is unknown at this time, but the lower water level elevations at these locations were still consistent with the overall groundwater patterns within this portion of the site at the time.

3. Water levels at Monitor 40-II remained generally consistent up to 2016 and have since started to display seasonal fluctuations at a lower level during periods of dry seasons, reaching a historical low in August 2020 before rebounding to historical levels in 2021 and the spring of 2022. The fall 2022 level was lower than usual, but still higher than the historical low in August 2020.

4. Water levels at Monitor 70-III and subsequently in replacement monitor 113-III generally stayed within a stable range up to 2019 and started to display a decreasing trend into 2020, reaching a historical low. In 2021 and into the spring of 2022, the groundwater level rebounded to historical levels, but then decreased to a value close to the historical low, during the fall 2023 event. Continued monitoring is required to access the long-term tends at this location.

5. Water level elevations at Monitors 87-I (bedrock) and 87-II fluctuate over the long term, with a slight decreasing trend. Noticeable decreases occurred within both monitors

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[2] Earth Tech Canada Inc., *Application for Provisional Certificate of Approval for the Proposed Oton-1 Landfill Site*, 2002.

during the September 2014 and September 2021 events, but subsequent water level measurements obtained between 2015 and 2020, and the November 2021 and the two events in 2022 were consistent with historical results and trends. Continued monitoring is required to access the tends at this location.

6. Over the long term, water levels at Monitors 91-I (bedrock) and 91-II exhibited a decreasing trend between 2005 and 2010 and have remained at the lower levels since that time. Water levels decreased to a new historical low in 2016 but increased slightly in 2017 and have remained within the lower range into 2022.
7. Water levels at Monitors 104-II and 104-III seasonally fluctuate over the long term but decreased slightly in 2012 and have remained at the lower level since that time. This decrease is likely an influence of the Cell 2 construction and operation.

An interpretation of the shallow groundwater flow regime, based on the Fall 2022 groundwater elevation data, is presented in Figure 5.1. In the SFA, a drumlin forms a topographical high and groundwater recharge area, with radial groundwater flow and discharge to the adjacent surface water features near the base of the drumlin.

Flow through the refuse and overburden to the east is captured by the landfill underdrain systems and toe drains. Additionally, some groundwater is removed from an interceptor system to the east of the SFA between the fill area and Bensfort Road. The NFA is characterized by the till plain with lower relief, and a gradual slope toward the wetland in the central portion of the Site.

The influence of the groundwater interceptor trench in the SFA is indicated by the lower groundwater level elevations in the vicinity of the trench at monitors T1 and T5, and at adjacent monitoring wells 17, 18, 19 and 20.

In the NFA, shallow groundwater flow is in a general southeasterly direction, towards the wetland area, with the exception of shallow groundwater within close proximity of Cells 2 and 3. As shown in Figures 5.1 and Figure 5.3, shallow groundwater in close proximity of the cells is towards the refuse cells, since the leachate/liquid levels within the cells are maintained at a level near the base of each cell, due to the underdrain LCS. The configuration of the shallow groundwater flow within the area of Cell 2, Cell 3, and Cell 4 indicates the “hydraulic trap” for the cell is functioning properly and as designed, as measured during monitoring events in 2022 and as shown in Figure 5.3.

### 5.1.3 Bedrock Flow System

Water level elevations during 2022 were generally comparable to historical values, with seasonal and climatic variations present. Based on the groundwater elevation graphs, the following trends are noted, in addition to those already described within the overburden flow system section:

1. Water level elevations at Monitor 5-IV remained within an established range between 1999 and 2014, but increased to a historical high in 2015, remaining within the elevated range in 2022 while slowly declining from the 2015 historical high. It appears the integrity of this monitor may be compromised, and rehabilitation options should be considered for this location.

2. Water levels at Monitor 16A decreased between 2007 and late 2010, reaching historical lows in October 2010, but rebounded between 2011 and 2016 and continue to reflect pre-2007 levels in 2022.

3. Water levels at 44-I increased from 1998 until 2014 when they appeared to stabilize, then decreased slightly during the August 2020 sampling event. Water levels increased to within the higher range of historical levels in 2021 and through 2022.

4. Water levels at Monitor 46-I fluctuated and increased over the long term, rising to levels above the historical range in 2011 and 2012, and plateauing between 2013 and 2017. The water elevations within this monitor were similar to the levels within the shallow monitors at this borehole location between 2012 and 2017, which suggested that the monitor may be compromised; but a significant decrease in 2018 resulted in the water level elevations decreasing to values similar to pre-2010 levels. The significant decrease in 2018 was considered questionable but elevations have remained consistent in 2022, staying within historic elevations prior to 2011. Continued monitoring is required to assess the long-term trends at this location.

5. Water levels at Monitor 62-IR are similar to, or slightly lower than, the low range of the historical water level range at Monitor 62-I. Monitor 62-IR was installed in 2014 to replace Monitor 62-I, since the integrity of the original monitor was suspect. Continued monitoring at 62-IR will confirm the long-term trend at this location.

6. Water levels at Monitor 75-I have exhibited a decreasing trend since resumption of monitoring activities at the well in 2014, and now fall within the former historic range of water levels recorded at the well in 1999 through 2007.

7. Water levels at Monitor 76-I remained within an established range between 1999 and 2012 but exhibited an increase from 2012 to 2020, and have fluctuated around this level into 2022. It is not known if this increase is attributed to climatic conditions, or other potential factors. Continued monitoring is required to access the long-term tends at this location.

8. Water levels within Monitor 104-I decreased during 2012, which is likely attributed to the construction and operation of Cell 2. Water levels decreased approximately 4 m through 2012 and 2013, and then generally fluctuated within a 2 m range of the lower level until an additional 1 m decrease in September 2016; a historical low. Levels subsequently rebounded in 2017 with water levels remaining within the lower range in 2018; and increasing in 2019 to higher levels. This could be attributed to the climatic conditions of

extended periods of rainfall during these months. In August and November 2019, the water levels started to decline again to the lower range. In 2020, the same water level spike occurred in the June sampling event and started to decline, following the climatic conditions of the August and November sampling events. In 2021 and 2022, levels increased to close to historical pre-2012 levels. Continued monitoring is required to assess the long-term trend at this location.

An interpretation of the groundwater potentiometric elevations within the shallow bedrock is presented in Figure 5.2. As shown in Figure 5.2, the bedrock groundwater flow pattern generally mirrors the flow directions within the overburden.

The bedrock topography forms a top of bedrock high beneath the drumlin and a low beneath surface water features, forming a subdued replica of the ground topography. Groundwater is typically found at about 10 m below ground surface near the crest of the drumlin, about 5 m or less below ground surface on the till plain, and near surface or discharging at surface water features.

As described above, the SFA is characterized by the high relief drumlin and the waste filling areas, with radial groundwater flow to the east towards the central watercourse and north toward the Crystal Springs Wetland. The groundwater interceptor trench has reduced the potential for off-site groundwater flow from the upgradient drumlin and waste filling areas and the potential discharge of leachate to the central watercourse. In the NFA, groundwater flow is controlled by the glacial till plain topography. In general, groundwater flow in the NFA is southerly toward the Crystal Springs Wetland.

The bedrock groundwater levels are generally lower than the overburden levels, indicating downward vertical gradients, with the exception of water levels near the low-lying Crystal Springs Wetland and central watercourse areas. The slightly higher groundwater level elevations within the bedrock monitors, compared to the overburden monitors, indicate localized upward vertical gradients in the low-lying areas, and groundwater discharge to the respective wetland and creek.

### 5.1.4 Flow System Interpretation

Based on the interpretation of the groundwater regimes established flow patterns were similar to 2021 and are presented in Figures 5.1 and 5.2. Monitors are grouped into areas relative to the direction of groundwater flow and their relative proximity to the refuse cells. These monitor designations are provided on Table 5.1. The areas have been divided as follows:

1. SFA Cell 1–South (including former Cells A, B, C and D and part of former Phase 1); which is representative of easterly flow toward the interceptor trench.
2. SFA Cell 1–North – east side (including Cells I and J); which is representative of north-easterly flow toward Bensfort Road.

3. SFA Cell 1–North – north side (including Cells G and H); which is representative of northerly flow toward the Crystal Springs Wetland.
4. SFA Cell 1–North – north and west side (including Phase 2); which is representative of northwesterly flow toward the Crystal Springs Wetland, and
5. NFA, which is representative of southerly flow toward the Crystal Springs Wetland

# 5.2 Groundwater Quality

The general chemistry results for the groundwater monitors are contained in Table H.1, Appendix H. Table 5.1 shows the monitors and their relative position.

## 5.2.1 Concentration Trends

The groundwater quality at the site has been classified as fresh, leachate impacted, brine, concentrated brine and road salt impacted, based on the interpretation of historical monitoring results at specific monitoring locations. The concentration ranges and average values for these groundwater types for historical monitoring, and for the 2022 monitoring period, are summarized in Table 5.2. As shown in Table 5.2, the parameter concentrations during 2022 were within or lower than the historical ranges for the classifications, except for alkalinity and calcium in the fresh bedrock. Time-concentration graphs for chloride, alkalinity, iron, and TKN at monitors sampled in 2022 are presented in Figures H.1 to H.57, Appendix H. The monitors were grouped according to designations presented in Table 5.1. The long-term concentration data generally indicate consistent concentrations, with values remaining constant or fluctuating within a range, with the exception of the following:

**I. SFA Cell 1 – South**

1. Immediately downgradient of the refuse but not past the groundwater interceptor trench (nests 5 and 19)
    a. Concentrations of chloride, alkalinity, and iron at Monitor 5-V (Figure H.39), screened in the shallow bedrock, generally increased between 2005 and 2009, but have decreased since that time. Concentrations returned to levels similar or lower than the pre-2007 levels between 2015 and 2019, with the exception of alkalinity reaching a historical high at this monitoring well in October of 2019. Alkalinity concentrations decreased to historical lows in 2020 and remained within this lower range through 2022. At Monitor 5-IV (Figure H.53), within the deeper bedrock, concentrations for chloride, alkalinity, iron and TKN fluctuate over a large range. Parameter concentrations have generally increased over the long term at Monitor 5-IV, but concentrations for these parameters generally decreased in 2016 and/or 2017 and remain on a decreasing trend or within the same range as the previous five years in 2022. Noticeable concentration increases for TKN occurred at Monitors 5-V and 5-VI (Figure H.1) in spring 2016 but the concentration returned to the historical range at Monitor 5-VI. The TKN

concentration at monitor 5V tends to increase during spring events and decrease in the fall. It is noted Monitor 5-VI is not typically sampled in the fall. Continued monitoring is required to assess the trends at this location.

b. Parameter concentrations at Monitor 19B (Figure H.3) fluctuate over the long term, but chloride, alkalinity, and TKN exhibit relative peaks prior to 1992 followed by decreases up to 1994. Chloride concentration “highs” have increased since 1994 although concentrations remained within the lower portion of the historical range between March 2010 and early 2014, prior to renewing the fluctuating trend in late 2014 and through 2022. Alkalinity and TKN concentrations exhibit a slight decreasing trend since 1994. At Monitor 19A (Figure H.3), concentrations for alkalinity and TKN have decreased over the long term. Chloride concentrations at Monitor 19A decreased between 1984 and 1993 but have generally fluctuated and increased since that time, reaching an historical high in 2015. Values decreased in 2017, followed by a rebound in 2018 and a slight decrease in chloride concentrations in 2020 through 2022. Continued monitoring is required to assess the trends at this location.

2. Between interceptor trench and central watercourse (nests 18, 20, 62 and 64)

   a. Chloride concentrations at Monitor 18B (Figure H.2) exhibited a relative peaking in or prior to 1989 followed by a decrease between 1989 and 1995. Chloride concentrations continued to decrease between 1995 and 2013 at a more gradual rate but have subsequently increased between 2013 and 2022. The increase in chloride concentrations was also accompanied by a comparable increase for sodium concentrations over the same period, although the concentrations of both parameters remain within the historical range. Chloride concentrations within Monitor 18A (Figure H.40) decreased between 1987 and 1997 but subsequently increased until 2007 and have remained relatively constant since that time. TKN concentrations have fluctuated and increased from 2017 to 2022.

   b. Chloride concentrations at Monitor 20B (Figure H.4) decreased between 1992 and 1997 and have remained at the lower level since that time. TKN at Monitor 20B spiked in the spring monitoring events in 2020, 2021, and 2022 but decreased back to historical ranges during the 2020, 2021, and 2022 fall monitoring events. Iron and alkalinity have stayed consistent throughout the longevity of monitoring 20B. At Monitor 20A (Figure H.42), alkalinity concentrations increased slightly between 1992 and 2008, and have remained constant since that time. Chloride and iron concentrations fluctuate over a large range, but no trend is exhibited over the long term. There was a spike in TKN in 2021, but the concentration decreased back to the normal range in 2022.

   c. Chloride concentrations at Monitor 62-II (Figure H.12) decreased between 1992 and 1997 and have remained at the lower level since that time, whereas alkalinity concentrations generally decreased between 1992 and 2011, and have fluctuated since that time. Concentrations for alkalinity at Monitor 62-I (Figure H.55) have remained fairly constant over the long term, while chloride, iron and TKN concentrations at this monitor exhibited a significant decrease in 2004 and remained at the low levels until 2013. The noticeable decrease in 2004 was attributed to a reduction in the monitor installation integrity, and the monitor was replaced by Monitor 62-IR in 2014. The water chemistry results for the sampling events between 2014 and 2022 at Monitor 62-IR are comparable to the pre-2004 concentration range for this location, although iron concentrations were at a new historical high in 2016, prior to returning to the historical range since 2017.

d. Parameter concentrations at Monitor 64-II (Figure H.12) are generally constant over the long term, with no distinguishable trends. Concentrations within Monitor 64-I (Figure H.56) have typically remained constant over the long term, although the concentration for alkalinity reached a historical high in 2016, followed by a decrease to the historical range in 2017, after which the concentration has continued to stay within historical range into 2022.

3. Beyond the Central Watercourse (nests 16, 52, 53 and 54)

    a. Historical chloride concentrations at Monitor 16C (Figure H.2) fluctuated and generally increased between 2000 and 2011. This monitor was subsequently destroyed during roadway expansion work. Chloride concentrations at Monitor 16A (H.40) increased between 2004 and 2014, reaching a historical high in 2014, but have decreased to within the historical range through 2022. Continued monitoring is required to assess the trend at this location.

    b. Chloride concentrations at Monitor 52-II (H.10) have fluctuated but generally increased from 1993 through to 2016, with a significant increase in 2017 followed by a decrease to 2019. Monitor 52-II was destroyed in 2020 and was redrilled in September 2022, but no samples were obtained in 2022. Chloride concentrations generally fluctuate over a large range within the bedrock monitor, 52-I (Figure H.45), although a slight increasing trend has occurred over the long term, with concentrations establishing a historical high in 2014, and concentrations remaining generally elevated since that time. Concentrations for iron and TKN at monitor 52-I also fluctuate over a large range, long term. Iron concentrations noticeably decreased in 2017, and have fluctuated and increased into 2022. Continued monitoring is required to assess the trends at this location.

    c. Chloride concentrations at Monitor 53-I (Figure H.45) increased between 1995 and 2006, peaking at 21.4 mg/L, but concentrations at this location have steadily decreased since that time. Alkalinity values at Monitor 53-I exhibit a slight increasing trend since 1998, while iron concentrations have exhibited an increasing trend from 1998 until 2016 before decreasing into 2022.

    d. Chloride concentrations at Monitor 54-II (Figure H.10) were generally at a low level of less than 25 mg/L until 2015, but the chloride concentrations within this monitor have steadily increased since that time, with the level in 2019 nearing the historical high for this location before dropping back down to pre-2015 concentrations in 2020 through 2022. Concentrations of the other parameters presented for Monitor 54-II are generally constant, or fluctuate within a defined range, over the long term, with no distinguishable trends observed. TKN concentrations within monitors 52-II and 54-II exhibited a relative peaking in the early 1990s and during the 2001 to 2004 period, but returned to historical lows, and have remained at the lower levels since that time.

There is a localized plume downgradient of Cell 1 - South. The extent of the plume in 2022 remains similar to the configuration since 2014, in both the overburden and bedrock; although a slight expansion of the plume is indicated based on some increasing parameter concentrations. Decreasing concentrations in the groundwater in this area are expected in the future as leachate concentrations decrease and the previously influenced area is ‘flushed’ by groundwater.

**II. SFA Cell 1 – North: east side**

1. Adjacent to landfill service roads (nests 48, 74 and 81)
    a. Alkalinity concentrations at Monitor 48 (Figure H.8) have fluctuated, but generally increased between 1990 and 2001, exhibiting a relative plateau between 2001 and 2011, and have decreased slightly since that time. The long-term iron concentrations at Monitor 48 fluctuate over a large range but exhibit an increasing trend, with a historical high reached in 2016. Chloride concentrations have fluctuated over a large range, with concentrations exhibiting a general increasing trend between 2012 and 2019, and subsequently decreasing to historical pre-2012 levels into 2022.
    b. Chloride concentrations within overburden Monitor 74-III (Figure H.15) have decreased over the long term, whereas the chloride concentrations within overburden Monitor 74-II have remained steady over the long term. Alkalinity concentrations within these monitors exhibit fluctuating and increasing trends over the long term, although the trend is more distinguished within Monitor 74-II. It is also noted that Monitor 74-III had a historically low alkalinity concentration in 2021, however a peak was subsequently encountered in 2022. Iron has been relatively stable with slight peaks in 2019 or 2020, however, levels reduced to the normal trend range in 2021 through 2022. The TKN concentrations at these monitors have generally decreased or trends have remained steady into 2022.
    c. Chloride concentrations at Monitors 81-II and 81-III (Figure H.17) decreased significantly between 2000 and 2004. Chloride concentrations subsequently increased within Monitor 81-II between 2008 and 2014 but have decreased since that time; whereas chloride concentrations within Monitor 81-III exhibited a slight increase between 2004 and 2008, followed by a continuing decreasing trend to 2011 and have remained at the lower level since that time. Iron concentrations at Monitor 81-III fluctuate within a 70 mg/L range whereas concentrations within monitor 81-II fluctuate within a 20 mg/L range. Concentrations for TKN at Monitor 81-III fluctuate over the long term; but reached historical highs in 2017 and continued to fluctuate and generally decrease into 2022. A notable spike in TKN concentration occurred in the fall of 2022 at Monitor 81-II. Continued monitoring

will determine whether this is an emerging trend. Chloride concentrations steadily increased from 1999 until 2017 within shallow bedrock Monitor 81-I (Figure H.48), after which the concentration has decreased into 2022. Alkalinity concentrations within Monitor 81-I have increased since 2013, reaching a historic high in 2021. Levels have decreased slightly into 2022.

2. Buffer zone on east side of Bensfort Road (nests 46, 50, and 61)
    a. Chloride concentrations at Monitor 46-II (Figure H.7) decreased between 1995 and 2007 but have increased since that time reaching a historical high in 2019, before decreasing into 2022. Alkalinity concentrations increased slightly between 1991 and 2005 and have remained constant since that time. Iron concentrations at the shallow bedrock Monitor 46-I (Figure H.44) fluctuate over the long term, and this trend continued in 2022. Chloride concentrations at Monitor 46-I exhibited a decreasing trend between 2002 and 2011, which has since increased and now fluctuates within its historic range into 2022. Concentrations of TKN at monitor 46-I have fluctuated over the long term, exhibiting a significant spike in 2018, with a subsequent decrease through to 2022. It is noted that the concentration increase for TKN coincides with a suspect water level elevation during the monitoring event.
    b. Iron concentrations at Monitor 50-II (Figure H.9) have fluctuated over the long term, with the fluctuating range increasing into 2014; although a noticeable decrease occurred between 2014 and 2016. Chloride concentrations within Monitor 50-I (Figure H.44) exhibited a slight increasing trend over the long term until 2014, and have since decreased into 2022.
    c. Chloride concentrations at Monitor 61-III (Figure H.11) exhibited a steady decrease between 1992 and 2007 and fluctuated at this lower level until 2017. From 2017 to 2019, a significant increase in concentrations reached historical highs for chloride in 2019, which has subsequently fluctuated in 2021 and 2022. The iron concentration at Monitor 61-III significantly increased in 2018 but decreased back to historical levels in 2019 through to 2022. Chloride concentrations at Monitor 61-II have exhibited a slightly increasing trend since 2011.
3. Further east in buffer lands (nests 63, 75 and 76)
    a. Monitors at Borehole Locations 63 and 75 were monitored from 1991 to 2008 and taken out of the routine monitoring program in 2008. These monitors were then reincorporated back into the routine monitoring program in the fall of 2014. Chloride concentrations at Monitor 63-I (Figure H.56) fluctuate over time but have remained within the lower end of the historical pre-2008 range, although values do show a slightly increasing trend into 2022. Alkalinity concentrations have increased from a historical low in 2014 and to stable concentrations in 2019 through 2022, at a concentration similar the pre-2008 historical range. TKN and iron concentrations spike to historical highs in 2019 with significant decreases in 2020 through to 2022. Concentrations at Monitor 75-II (Figure H.16) have

fluctuated within the historical pre-2008 ranges, with the exception of the 2020 spring monitoring event, where iron spiked to a historical high before dropping to low historical levels in the fall monitoring event and into 2022. Both monitoring locations reside in active agriculture fields where influences on the monitoring wells related to agricultural practices. Further monitoring is required to assess the long-term trends at these monitoring locations.

b. Chloride concentrations at Monitor 76-I (Figure H.57) increased between 1992 and 1999, and subsequently decreased until 2014; with concentrations fluctuating since that time. Chloride concentrations reached a historical high in 2016 but concentrations returned to the historical range in 2017 through 2022. Continued monitoring is required to assess the long-term significance of this increase. Concentrations for iron generally increased between 1992 and 2006 but decreased significantly in 2007, followed by a noticeable increase again into 2016. Concentrations then decreased from 2017 to 2020, and increased slightly into 2022. Concentrations of TKN at Monitor 76-I have fluctuated over a large range since 1992. Since 2010, less fluctuating results have occurred. A decreasing trend was exhibited between 2015 and 2019, but an increasing trend has been noted from 2019 into 2022.

The water quality in this area is complicated by the application of road salt to the on-site road and Bensfort Road for snow and ice control. The monitoring wells included in the routine sampling program are adjacent to the landfill cells, therefore, many of the monitors in this area show road salt impacts, and some leachate influences, within the groundwater.

Groundwater quality is similar to previous years; overburden monitors to the east are fresh water quality or indicate road salt impacts, and bedrock waters are brine influenced.

**III. SFA Cell 1 – North: north side (nests 33, 66, 70/113, and 77)**

a. Chloride concentrations at Monitors 33-II and 33-III (Figure H.5) significantly increased between 1991 and 2007/2008 but concentrations decreased between 2008 and 2011, increasing to a peak again in 2015/2016 before following a decreasing trend through 2022. Alkalinity concentrations at these monitors fluctuate but exhibited an increasing trend from 1991 to 2018 and then slightly decreasing trend from 2018 through 2022. Iron levels at monitor 33-III peaked significantly in 2019, but decreased back to historical range in 2020 through 2022. Further monitoring is required to assess the long-term trends at this location.

b. Concentrations of chloride, alkalinity, and iron at Monitor 66-II (Figure H.13) increased between 1992 and 2000 but concentrations have remained steady, with minor variations, since that time. Concentrations of TKN at Monitor 66-II steadily increased over the long term until 2014, decreased in 2015, and have fluctuated around this level into 2022. Concentrations for TKN at Monitor 66-III also increased significantly between 1999 and 2007, and fluctuated within this higher range until 2012. Since that time concentrations have generally fluctuated and decreased into 2022.

c. Parameter concentrations at Monitor 70-II (Figure H.14) were relatively constant, and concentrations within Monitor 70-III generally fluctuated, over the long term; with no distinguishable trends noted. It is noted the chloride concentrations for the 70-II replacement monitor, designated 113-II, are noticeably higher compared to the historical range at 70-II, whereas the remaining parameter concentrations are comparable to historical results. Parameter concentrations within Monitor 70-I (and 113-I) (Figure H.46) generally fluctuate over the long term. Iron at monitor 113-I spiked in 2019 and reached a historical high in 2020, but levels returned to lower levels in 2021 through 2022. Further monitoring is required to assess future trends. Alkalinity at Monitor 113-I spiked in 2018, but returned to its historical trend in 2019 through 2022. It is noted that the replacement borehole, 113, was installed in 2016 and is located closer to the SFA compared to borehole location 70. Further monitoring is required to assess the long-term trends at this location.

d. Chloride concentrations within overburden Monitor 77-I (Figure H.16) fluctuate but exhibited a generally increasing trend to 2017; concentrations have been relatively stable since 2017. Iron, alkalinity and TKN are generally constant or fluctuate with no distinguishable trend.

Similar to monitoring results from previous years, the water quality in this area shows landfill and road salt influences. These monitors are located on the north side of the drumlin and refuse, between the SFA and Crystal Springs Wetland. Water quality during the sampling events in 2022 for this area is generally similar to previous years, with the exceptions noted above. Leachate impacts and road salt influences are indicated at overburden Monitors 33-II, 33-III, 66-II and 66-III.

### IV. SFA Cell 1–North: north and west side

1. Vicinity of former Phase 2 (nest 101)

    a. Chloride concentrations at Monitor 101-II (Figure H.30) decreased between 2000 and 2005, increased slightly between 2005 and 2017, and have declined again since 2017. Chloride concentrations at Monitor 101-III decreased between 2000 and 2008 and have remained at the lower levels since that time, with a small spikes in 2006, 2016 and 2022. Chloride concentrations at shallow bedrock Monitor 101-I (Figure H.51) decreased between 2000 and 2008, increased from 2012 to 2017, and have declined again since 2017.

2. Further away in wetland to northwest (nests 40, 41, and 44)

    a. Parameter concentrations within the monitors at borehole locations 40, 41 and 44 (Figures H.6, H.43 and H.54) are generally constant or fluctuate over the long term with no distinguishable long-term trends, with the exception of a decreasing chloride trend at Monitor 40-II.

b. Alkalinity concentrations within monitors 40-II, 44-II, and 44-III exhibited a fluctuating but decreasing trend between 2002 and 2017 within the overburden and shallow bedrock monitors, with a slight rebound in 2018; and a comparable, but muted, pattern is exhibited within monitor 41-II. Monitor 44-III shows an increasing trend from 2016 to 2021 and then slight decrease in 2022, unlike 40-II and 44-II.

c. Chloride concentrations at Monitor 44-III fluctuate over the long term, but exhibited a general increasing trend from 2005 to 2016, after which concentrations have fluctuated and decreased into 2022.

Generally, the 2022 water quality in the overburden and bedrock for this area is similar to historical values. Groundwater quality is fresh overburden and brine influenced. The water quality at Monitor 101-III was previously classified as influenced, but the influence was not attributed to landfill leachate. Water quality improved, with lower concentrations of many parameters, and the water quality was reclassified as fresh overburden in 2005, and continues to be monitored at concentrations within this range.

**V. NFA (nests 82-95, 104, 106-110)**

The overburden and bedrock groundwater quality is representative of the natural baseline conditions up to late 2010 as no landfilling activities took place in the NFA prior to the sampling events in 2010. The long-term concentration data generally indicate consistent concentrations, with values remaining constant or fluctuating within a range, with the exception of the following:

a. Chloride concentrations at Monitor 84-I (Figure H.18), within the overburden, decreased slightly between 2006 and 2011, and have remained at this lower range since that time. Iron and alkalinity concentrations at Monitor 84-II have exhibited a generally increasing trend, with alkalinity reaching a peak in 2022. Iron at 84-II had a historical low in 2022.

b. Chloride concentrations within Monitor 85-I (Figure H.19) were generally constant until 2015, and have since increased into 2022. Chloride concentrations within Monitor 85-II follow similar pattern, although they fluctuate within a greater range. Alkalinity concentrations fluctuate within Monitor 94-II (Figure H.28), but have generally increased from 2006 to 2022. The chloride concentrations at Monitor 94-II exhibited a noticeable increase in 2016, followed by a moderate decrease in 2017. Chloride concentrations slightly fluctuated around these levels until another increase in 2021, and then decreased to the same levels as 2017 in 2022. Continued monitoring is required to confirm the trend at this location. This pattern was also reflected at Monitor 93-II, except that the second increase was encountered in 2022 at 93-II (Figure H.27). Monitor 93-II also reached a peak in TKN concentration in 2022.

c. Chloride concentrations at Monitor 86-III (Figure H.20), within the overburden, decreased slightly between 2006 and 2015, but exhibited a significant concentration increase in 2016. This was followed by a decrease into 2017, before increasing again in 2020, decreasing in 2021, and then increasing into 2022. Alkalinity concentrations experienced a similar trend, within a more muted concentration range. Similar to the recent parameter concentrations at Monitor 94-II (Figure H.28), continued monitoring is required to confirm the trends at this location.

d. Chloride and alkalinity concentrations at Monitors 87-II and 87-III (Figure H.21) have increased since 2012. Historically high concentrations for chloride at Monitor 87-II, and alkalinity at Monitor 87-III, occurred in 2017/2018. Iron concentrations at 87-III reach a historical high in the spring 2019, returning to historical range in 2019 to 2020 before increasing again in 2021, and then decreasing to normal range again in 2022.

e. Chloride concentrations within monitor 88-I (Figure H.49), a reference monitor screened in the shallow bedrock, have steadily increased over the long term but remain at low levels. Chloride concentrations within monitors 88-II and 88-III (Figure H.22) exhibited a steady increase between 2012 and 2016, subsequently decreasing within both monitors to 2022. Iron concentrations with monitors 88-II and 88-III generally fluctuate at higher levels than the concentrations within 88-II, over the long term, although concentrations within monitor 88-III have remained at low levels since 2017.

f. Chloride and alkalinity concentrations at Monitor 89-I (Figure H.50), within the shallow bedrock, have fluctuated since 2006, although an increasing trend was exhibited for alkalinity from 2012 to the spring of 2018, before decreasing in the fall 2018 and into 2022.

g. Concentrations for chloride at Monitor 92-III (Figure H.26) exhibited a significant increase in 2013, followed by a decrease during subsequent years. Concentrations for iron, alkalinity and TKN exhibit comparable noticeable increases in 2016/2017, followed by decreases in subsequent years. It is noted that iron levels were extremely elevated from 2016 through 2021 and were considered suspect. Levels in 2022 have reduced closer to the normal historical range.

h. Chloride concentrations within the overburden Monitors 93-II (Figure H.27), 94-II (Figure H.28), and 104-II (Figure H.31) are relatively low compared to the SFA monitors, and have remained relatively constant since 2006. Chloride concentrations within monitors 94-II and 104-III exhibit short-term spikes in 2017/2021, and 2013, respectively, but concentrations within these monitors returned to the general historical ranges.

i. Alkalinity concentrations at monitor 93-II (Figure H.27) exhibit a short-term increase between 2014 and early 2016 but concentrations have fluctuated and remained generally constant since that time.

j. Alkalinity and iron concentrations within the overburden Monitor 95-II (Figure H.29) have generally decreased since 2007, whereas chloride concentrations fluctuate but exhibit a slight increasing trend over the same time frame.

k. Chloride and alkalinity concentrations at Monitor 104-I (Figure H.51) follow similar trends of fluctuating results displaying a generally decreasing trend over the past 5 years, whereas iron concentrations display a generally increasing trend from 2017 to 2020 and then a decreasing trend from 2020 to 2022. Iron reached a historical high in 2020, but decreased to within the historic range in 2021 through 2022. Continued monitoring is required to assess the long-term trends at this location.

l. Chloride, alkalinity, iron and TKN concentrations at Monitor 104-III (Figure H.31) increased significantly between 2010 and 2013, but have exhibited a generally decreasing trend since that time. The chloride concentrations at Monitors 106-II and 106-III (Figure H.32) exhibited a noticeable and steady increase between 2010 and 2018, with concentrations remaining at the higher levels in 2022. TKN concentrations within Monitor 106-II also exhibited an increase in 2018, but concentrations returned to the historical range into 2021, and then increased to a historical high in 2022.

m. Chloride concentrations at Monitors 107-I (Figure H.52) and 107-III (Figure H.33) fluctuate over a large range, with concentrations in Monitors 107-I increasing from 2009 to 2015, before generally decreasing into 2022. Chloride concentrations at Monitors 108-I and 108-II (Figure H.34) exhibit a slight, steady increase since 2012. Alkalinity concentrations at Monitor 108-III also exhibit an increasing trend since 2012, reaching a historical high in the spring of 2021 and decreasing slightly into 2022.

n. Iron concentrations at Monitor 110-I (Figure H.36), chloride concentrations at Monitor 110-II, and alkalinity concentrations at Monitor 110-III, have steadily increased since 2011. Iron concentrations at Monitor 110-II and chloride concentrations at Monitor 110-III were exhibiting decreasing trend up to 2018, after which each monitor exhibited an increasing through 2022. Continued monitoring is required to assess the long-term trends at this borehole location as these monitors are located adjacent to the refuse area but are also downgradient of other infrastructure on site. The timeframe for the concentration increases at monitoring location 110 is comparable to the timeframe for concentration increases at other monitors that are upgradient or laterally removed from the refuse area, so the specific source of the concentration increases at this location cannot be determined at this time.

o. The parameter concentrations within the recently installed monitors at borehole locations 111 (Figure H.37) and 112 (Figure H.38), adjacent to Cell 3, are generally similar to the other monitors installed adjacent to the refuse area in the NFA, and only ten sampling events have been completed at these locations, to date. Alkalinity concentrations appear to be slowly increasing at Monitors 112-I, 112-II, and 112-III, while chloride concentrations have decreased at Monitor 112-II since 2020. Continued monitoring is required to assess the long-term trends at these locations.

Within Monitor 92-III (Figure H.26), the significant increases for concentrations for chloride, iron, TKN, and alkalinity at various times between 2013 and 2017 may be attributed to a localized perched condition within the waste, above grade, where leachate was not permitted to migrate downwards into the underlying waste due to the presence of interim cover or other soils. As a result, the leachate eventually migrated laterally through the waste and into the adjacent overburden. It is noted, however, that this condition may have been rectified during the construction of the landfill gas collection system (Phase 1) in the NFA, which was completed in 2015. Phase 1 included the installation of horizontal landfill gas collection pipes within Cell 2 which are placed in clear stone filled trenches. The installation of the stone filled trench would subsequently permit the perched leachate to migrate downwards into the underlying waste instead of through the adjacent overburden. This possibility is demonstrated by the subsequent decrease in concentrations of the identified parameters after the installation of the landfill gas system. The time lag between relative spikes and decreases for the parameters is attributed to the relative mobility of the parameters within the groundwater. Continued monitoring is required to confirm the trends for these parameters in the future.

The recent increase in parameter concentrations, between 2017 and 2022, at several monitoring locations, including 84, 86, 104, 106, and 108, are not attributed to landfill operations in the NFA, as monitoring locations 104 and 108 are located upgradient of the NFA, 106 is located near the scale house and is laterally removed from the NFA, and 84 and 86 are laterally removed from the fill area. The increase in chloride at these monitors may be associated with road salting on-site, due to the traffic increase from landfilling activities within the NFA, but continued monitoring is required to confirm the significance of the recent concentration increases.

The groundwater quality based on the results collected to date indicates fresh overburden and bedrock groundwater, and brine influenced bedrock groundwater.

The fresh overburden and bedrock groundwater typically has elevated concentrations of hardness, and at some monitoring locations in 2022 there were elevated concentrations of iron and manganese, above the Ontario Drinking Water Quality (ODWQ) Standards.

The brine influenced bedrock groundwater typically has concentrations of hardness, chloride, sodium, iron and total dissolved solids (TDS) above the ODWQ Standards. Brine influenced bedrock groundwater was encountered at Monitors 86-I and 89-I in 2022.

In summary, water quality effects from the landfill continue to consist of leachate and historical road salt impacts to the east and north of the SFA, similar to previous annual monitoring results. Leachate impacts are limited to overburden monitors immediately downgradient of the waste in these areas.

### 5.2.2 Organic Chemistry

The concentrations of most organic parameters analyzed were below the method detection limit for both sampling events in 2022, with the exception of those presented in Table 5.3. As shown in the table, organic parameters were detected at Monitors 18A, 48-I, 66-III, 74-III, 81-I, 81-II, 81-III, and 109-III. The number of detected organic parameters in 2022 was generally similar to the historical number of organics detected within the groundwater monitors at this site.

It is noted the organic parameters detected during 2022 were generally slightly above the laboratory detection limit, and were lower than the ODWQ Standards, with the exception of 1,4-dichlorobenzene at Monitor 81-III and benzene at 48-I, 66-III and 81-III, which exceeded the ODWQ Standards. Monitors 48-I, 66-III and 81-III are located near the toe of the north and east slopes of the SFA, within the central portion of the site.

### 5.2.3 Water Quality Compliance

ECA Condition 184 x) requires an assessment of the criteria set out in the Ministry Reasonable Use Guideline B-7.

The following formulae were used to calculate the criteria.

$$Cm = Cb + X(Cr-Cb)$$

Where:

Cm = Maximum acceptable concentration of a particular parameter.

Cb = Natural background concentration of a particular parameter.

Cr = Drinking Water Quality Standard for a particular parameter.

X = Reduction Factor. For drinking water X equals 0.5 for non-health related parameters, and 0.25 for health-related parameters.

$$Cm = Cw + Co + Cp$$

Where:

Cw = Maximum acceptable concentration of a particular parameter originating at the landfill site

Co = Concentration of a particular parameter from another source at the time of the assessment

Cp = Potential parameter concentration increase from another source

Since there are no other parameter sources that currently have, or will potentially have, an effect on groundwater quality under this site, Cp and Co = 0 and Cw = Cm.

A comparison of the groundwater quality within the different stratigraphic units beneath the site was made between the upgradient monitors and the monitors located near the property boundary, based on the Guideline B-7 criteria. This comparison is summarized in Table 5.4.

As shown in Table 5.4, the Guideline B-7 criteria has been applied to monitors at nests 16, 40, 41, 44, 53, 63, 64, and 75. Monitoring nests 16, 53, 63, 64, and 75 are located to the southeast of the refuse area, and nests 40, 41, and 44 are located near the property boundary to the northwest of the refuse area. Parameter concentrations in 2022 comply with the criteria with the exception of: iron at Monitors 41-I, 41-II, 44-II, 53-I and 76-I; organic nitrogen at Monitors 53-I, 63-I, 63-III, 75-I and 113-III; chloride at Monitor 76-I, and nitrate at Monitor 63-III, which are similar to historical results. The noted exceedances are similar to 2021 and historic results.

Groundwater quality sampling results from Monitor 41-I and 76-I in 2022 are reflective of concentrated brine and, as reported in previous years monitoring reports, the application of Guideline B-7 is difficult at the PCCWMF due to the presence of naturally occurring brines. These exceedances are not attributed to the landfill site or its operations, but are considered to be naturally occurring.

The exceedances for iron at 41-II, 44-II and 53-I are consistent with historical values and concentration trends are stable or decreasing into 2022.  The exceedances for organic nitrogen at 53-I, 63-I, 75-I and 113-III are also generally consistent with historical values. The exceedance of organic nitrogen at Monitor 113-III is likely attributed to its presence within a wetland area. Other leachate indicator parameters do not appear to be elevated at these locations.

The exceedances of organic nitrogen and nitrate at Monitor 63-III, which is located adjacent to an agricultural field, are not unexpected as these exceedances are attributed to agricultural practices and are not associated with the landfill site.

### 5.2.4 Groundwater Quality Trigger Level Compliance

ECA Conditions 137 to 139 require a comparison of the groundwater quality to trigger levels criteria set at 80% of the Guideline B-7 values for parameters that have an ODWQ Standards value, as outlined in the D&O Report for the site. The results of the comparison indicate the parameter exceedances of the trigger levels were comparable to the exceedances that are outlined in Section 5.2.3, and shown on Table 5.4, during the sampling events in 2022. As noted in Table 5.4 and Section 5.2.3, the parameters, which exceed the trigger levels, are not attributed to the landfill site or its operations, but are considered to be naturally occurring; therefore, the groundwater quality at the selected boundary monitors satisfied the trigger levels established for the site.

It is noted the City/County of Peterborough currently owns the properties adjacent to the PCCWMF, as shown in Figure 1.2. Should future groundwater quality assessments indicate that a landfill leachate influence has extended beyond the existing PCCWMF boundaries, the properties owned by the City/County would be available and sufficient for attenuation of elevated landfill related parameters, if required.

### 5.2.5 Compliance with Performance Monitoring Program

A Performance Monitoring Program has previously been prepared for the site, designed to consolidate the regular landfill monitoring program with the predictive landfill monitoring program to produce a statistically verifiable program that could be used to implement contingency measures, if required. Water chemistry results for the sampling events at the groundwater monitors are compared to historical ranges for the respective locations, with the established comparison level being equal to the concentration average plus two standard deviations. If the concentrations for two or more parameters at a location exceed the established comparison level, a further review of the results is carried out to determine if the elevated parameter concentrations are attributed to a new landfill influence which would trigger the action plan. It is noted the Performance Monitoring Program is an assessment tool to assist with identifying potential areas where a new landfill influence may be occurring, but the results are assessed and reviewed to account for previously known and interpreted water quality influences in the area.

A comparison of the groundwater quality in 2022 to the established trigger levels for the pertinent monitors is presented in Table H.2, Appendix H. As shown in Table H.2, the Performance Monitoring Program envelopes (average plus two standard deviations) were generally not exceeded, except at Monitors 5-V, 19A, 19B, 40-II, 50-II, 53-I, 54-II, 61-II, 66-III, 74-II, 74-III, 81-I, 81-III, and 101-I during the sampling events in 2022. It is noted these monitors are generally in locations that are not expected to be influenced by the landfill site and/or are in locations where adjacent monitors (situated closer to the landfill site) do not exhibit a landfill influence. This pattern indicates the elevated concentrations at these monitors are not attributed to the landfill site but are due to the natural variation of the water quality, the significant short-term change in water levels, or from road salting activities.

It is noted that only 53-I, 61-II, 81-I and 101-I had two or more parameters that exceeded the established comparison levels noted above. Concentrations exceeding the established comparison levels at monitoring wells 53-I, 61-II, and 101-I were still below the historical maximum concentrations at the respective monitors, prior to the establishment of the trigger levels. As such, these concentrations are not inferred to be the result of a landfill influence.

Monitoring well 81-I is located in a known area of leachate impact close to the landfill that is being closely monitored. Alkalinity concentrations within Monitor 81-I have notably increased since 2013, while other leachate indicator parameter appear to be decreasing into 2022. No remedial action as part of the action plan, is required at the present time, as monitoring wells downgradient of this location do not display the same increase. Regardless, the noticeable concentration increase for alkalinity in recent sampling events will continue to be assessed during future sampling programs to determine potential long-term trends.

## 5.3 QA/QC Results

As part of the field QA/QC program, duplicate samples were obtained in 2022 for the spring and fall sampling events and submitted for chemical analyses. Results of statistical comparisons between original and duplicate samples are provided for groundwater and surface water samples in Tables I.1 and I.2 in Appendix I.

It is considered that the results of samples for which the relative percent differences (RPD) are less than 20%, applied to parameter concentrations that are at least 5 times the Limit of Quantitation (LOQ), can generally be interpreted with confidence. As shown in Tables I.1 and I.2, the RPDs were generally less than 20% for the groundwater and surface water field duplicates. As shown in Table I.1, the RPD values for the groundwater duplicate samples that were higher than the 20% guideline are generally not applicable, as the concentrations for the original and duplicate samples are comparable to the historical ranges at these locations and the concentrations were less than 5 times the LOQ. Parameter concentrations which exceeded the 20% guideline include:

- Ammonia – 5-VI (March) and 70-II (April)
- Copper – 106-II (March) and 95-II (April)
- DOC – 63-III and 104-III (March)
- Iron – 63-III, 104-III, and 106-II (March)
- Hardness – 19A (September)
- Nitrate – 106-II (March)
- TKN – 70-II (April)
- Zinc – 106-II (March) and 95-II (April)
- Benzene – 74-III (September)

It is noted that the concentrations for the original and duplicate samples referenced above were within the historical range for these monitors, and/or the concentrations within these samples were only slightly above the 5 times detection limit.

The RPD values for the surface water duplicate samples, as shown in Table I.2, generally satisfy the 20% guideline with the exception of the following:

- SW1: (April) Ammonia, Copper, and Zinc
- SW21: (June) Ammonia, Phenols, and TSS

The exceedances of the 20% guideline at station SW1 and SW21 may be attributed to different amounts of sediment collected within the samples at the time of sampling or stagnant water, but the remaining parameters within the same sample indicate satisfactory RPD values.

Field blanks were also submitted to the laboratory to provide additional quality assurance. The results for the field blanks are provided in Table I.3, Appendix I. As shown in Table I.3, the concentrations for most inorganic parameters were lower than the laboratory LOQ with the exception of the following:

- Ammonia: nine samples
- Arsenic: one sample
- Boron: three samples
- Chromium: two samples
- Copper: four samples
- Dissolved Organic Carbon: two samples
- Iron: one sample
- Phenols: two samples
- TKN: two samples
- Zinc: one sample

The concentrations for the majority of the detected inorganic parameters within the field blanks were at, or slightly above, the method detection limit. The low detected levels for the field blank parameters are satisfactory for the sampling program at this site, as the natural concentrations within the groundwater and surface water are typically higher than the concentrations within the field blanks.

It is noted that two field/trip blanks for organic parameters were completed in 2022 and there were no parameters over the method detection limits.

Based on the results of the QA/QC program, it is concluded the overall chemistry results are accurate and precise for interpretation purposes.

# 6 Surface Water Monitoring

## 6.1 Surface Water Setting

The surface water that flows over and around the landfill site is ephemeral, having significant and continual flows on a seasonal basis (spring) and under storm conditions. The watercourses in proximity to the landfill outlet into the Otonabee River approximately 925 m southwest of the landfill site. The adjacent surface watercourses are defined as the following:

1. The central watercourse, which parallels the southeastern property boundary. Water flow within this channel is towards the southwest. Stations SW1, SW2, SW3, SW18, SW19 (upstream) and SW20 (upstream) are established along this watercourse.
2. The Bensfort Road ditch which runs north-south along the east side of Bensfort Road. Stations SW17, SW21 (upstream) and SW23 are established along this watercourse.
3. The western watercourse, within the Crystal Springs Wetland area, in the central portion of the site that divides the SFA and NFA, where station SW24 is established.

## 6.2 Surface Water Flow

In 2022, surface water flows were monitored in the months of February, April, June, August, October, and December, using a Global Water FP111 propeller type flow meter, where possible. A summary of the results are shown in Table J.1, Appendix J. As shown in Table J.1, the surface water stations were frozen during the February event. Several locations also had no measurable flow during the April and June sampling events. Locations were also dry or had no measurable flow during the August, October and December sampling events, due to climatic conditions. SW19, SW23, and SW24 did not have measurable flow for any events in 2022. It is noted, however, that water samples were obtained at the established stations if sufficient water was present.

## 6.3 Surface Water Quality

### 6.3.1 Concentration Trends

The surface water monitoring program included the collection of water samples at the surface water stations in April, and June 2022, when sufficient water was present. Field measurements were obtained for pH, conductivity, temperature, and dissolved oxygen. Laboratory chemical results for the events completed in 2022 are summarized in Table J.2, Appendix J. Time-concentration graphs for the historical concentrations of chloride, alkalinity, iron and TDS are contained in Figures J.1 to J.5, Appendix J. Generally, over the long term, and through 2022, these chemistry parameters show fluctuating values, with no distinguishable trends, with the following exceptions.

1. Parameter concentrations at the on-site and downstream stations, along the central watercourse, are generally comparable to the water quality at the upstream locations SW19 and SW20 (Figure J.3), although chloride concentrations at the on-site stations, SW1 and SW2 (Figure J.2), are generally slightly higher compared to the upstream stations. It is noted, however, that the chloride concentrations at stations SW1 and SW2 are comparable to, or lower than, the chloride concentrations at the stations within the Bensfort Road ditch, including SW17, SW21, and SW23 (Figure J.4). This pattern indicates the chloride concentrations at stations SW1 and SW2 are likely a reflection of the influence of a road salt usage and are not landfill related.

2. Parameter concentrations at station SW24 (Figure J.5), along the western watercourse within the Crystal Springs Wetland Area, have historically been similar to or lower than the values at the upstream stations along the central watercourse (SW19 and SW20). Chloride concentrations at station SW24 were lower than the upstream locations of the central watercourse in 2022.

3. Chloride concentrations at the stations within the ditch beside Bensfort Road generally fluctuate within a range but are generally elevated compared to the concentrations at the surface water stations along the central watercourse. This pattern is attributed to the effect of road salt operations along Bensfort Road. Parameter concentrations at stations SW17, SW21, and SW23, along the ditch are generally similar during specific sampling events.

### 6.3.2 Water Quality Compliance

Surface water quality at the surface water stations generally complied with the Provincial Water Quality Objectives (PWQO) during the sampling events in 2022, with the exceptions shown in Table 6.1. As shown in the table, exceedances were generally limited to iron, phosphorus, and phenols at several stations. Phosphorous exceedances were found at the upstream station SW19 and SW20 (central watercourse) in June. A phosphorous exceedance was also found at upstream station SW21 (along Bensfort Road) in June.

The magnitudes of the iron and phosphorus exceedances at the downstream stations have historically been generally similar to, or lower than, the exceedances at the upstream stations. This pattern has indicated that the exceedances which occur at the downstream stations are generally attributed to other sources upstream of the landfill site.

It is noted that in June 2022, iron concentrations exceeded the PWQO at several downgradient stations and were higher than concentrations at the upgradient stations. Phenols also exceeded the PWQO at surface water station SW24.

Phenols is naturally occurring, and is attributed to the decay of vegetation, which would be expected within a wetland area, and therefore, the presence of detectable phenol concentrations within the adjacent surface water stations is not attributed to the landfill site.

The PWQO exceedances for iron and phosphorus are likely attributed to sediment within the water at the time of sampling. The exceedances of phosphorus during multiple events at both of the upstream stations suggests the exceedances are mainly associated with sediment within the water and stagnant water located at the sampling location, and are not attributed to the landfill site. Iron levels have historically had greater exceedances at the Site and have not been attributed to the landfill.

Stations SW18 and SW3 are established along the central water course, downstream of the refuse area; with station SW3 located downstream of station SW18. As shown in Table 6.1, the PWQO exceedances at stations SW3 and SW18 for the April, October and November sampling events in 2022 were comparable to the exceedances exhibited at the upstream stations.

A comparison of the downstream alkalinity concentrations to the upstream water quality indicates that the surface water quality at the downstream stations satisfied the PWQO (permitting a 25% decrease compared to upstream water quality) along both surface water channels in 2022.

Based on the surface water chemical analyses, there is no measurable landfill influence on the surface water quality on or off-site. Continued monitoring is required to identify and assess any possible trends in the concentrations of parameters measured.

Surface water runoff that has been in contact with waste is treated as leachate. Berms and temporary swales are employed to contain potentially impacted stormwater within the active disposal area as required. Potentially impacted stormwater was directed into the LCS.

ECA Condition 118 states that leachate is to be removed from the collection system in a manner that prevents the overflow of leachate to any surface watercourse. During the 2022 reporting period, there was no overflow of leachate to adjacent surface watercourses.

### 6.3.3 Surface Water Quality Trigger Level Compliance

ECA Conditions 141 to 143 require a comparison of the surface water quality to trigger levels that are related to the PWQO and to the upstream surface water quality; similar to the comparison provided in Section 6.3.2. As indicated in Section 6.3.2, water quality at the downstream surface water stations generally satisfied the PWQO, with exceedances for iron, phosphorus and phenols at some of the stations during events in 2022. The magnitudes of the exceedances at the upstream stations were generally similar to the exceedances at the downstream stations, with the exceptions noted in Section 6.3.2. This pattern indicates the exceedances which occur at the downstream stations are generally attributed to other causes/sources and are not landfill related.

Based on results of the sampling events in 2022, the surface water quality satisfied the trigger levels established for the site.

## 6.4 Stormwater Pond Monitoring

The stormwater management system is approved and operated under a separate ECA (Amended ECA No. 2231-8YCPHG, September 28, 2012) under the Ontario Water Resources Act (OWRA). The ECA is provided in Appendix A. The stormwater management pond is located southeast of the NFA as shown in Figure 5.1. The stormwater management pond is intended to store, attenuate, and discharge stormwater into the western watercourse within the Crystal Springs Wetland. The pond consists of two 900 mm inlet culverts, which discharge the collected stormwater from the drainage ditches into the sediment forebay of the pond. The stormwater management pond is lined with compacted processed native till. A 250 mm diameter pipe then discharges the water from the forebay into the main cell. Water is discharged from the stormwater management pond via a 1500 mm diameter corrugated steel pipe riser outlet structure onto a rip rap splash pad, and a subsequent deep grassed outlet channel into the creek.

OWRA ECA Condition 6 outlines the monitoring program for the effluent from the stormwater management pond to provide a performance record for future references and to trigger corrective action proactively and voluntarily before environmental impairment occurs. Water samples were able to be obtained from the pond inlet on June 7, 2022; and from the pond outlet on February 17, June 7, and June 16, 2022. The ponds were utilized for dewatering of Cell 4 construction, as well as site dust control in 2022. It is noted that no discharge occurred during many additional attempts to sample the pond in 2022; Table J.3 lists the inlet and outlet sampling events that were attempted in 2022. The chemical results of the stormwater pond effluent monitoring program are summarized in Tables J.4 and J.5 in Appendix J. The City had sediment levels in their storm water receiving pond checked by City Staff throughout the year, and it was determined that they were within acceptable levels; therefore, no service was required.

OWRA ECA Condition 7 outlines the Pond Effluent Objectives (PEO) for discharge from the outlet of the stormwater management pond, which are included in Table J.4. As shown in Table J.4, the effluent water quality generally satisfied the Pond Effluent Objectives during the sampling events in 2022 for the parameters analyzed with the exception of the following:

1. Total Oil and Grease (February 17, June 7); and
2. Turbidity (February 17).

Organic parameters were not detected within the samples obtained at the inflow or outflow, for the parameters analysed, during the sampling events in 2022.

The elevated concentrations during the February event are attributed to high sediment content and limited stormwater retention time within the pond. The sampling event in February occurred after a rainfall event of 20.6 mm, while the pond surface was still frozen. This resulted in the bulk of stormwater flow travelling over the top of the frozen pond surface, thereby limiting the retention time of the stormwater within the pond and the pond's ability to mitigate sediment before discharge.

The elevated concentration during the June event is attributed to high sediment content and low water volumes within the water compared to typical pond conditions. The sampling event on June 7th occurred during the receipt of 26.9 mm of precipitation; which was received during the day of sampling. If there was a significant volume of water within the pond prior to the precipitation event, the pond would not have had suitable available capacity to mitigate sediment during the precipitation event. It is noted that the pond was able to be sampled again on June 16th, and no exceedances of the PEO were observed.

Continued monitoring of the water quality from the stormwater management pond is required to confirm the ongoing operation and performance of the pond.

# 7 Landfill Gas Control System

The LFGCS is operated as required by the ECA. The major components of the LFGCS are the gas collection fields in the SFA and NFA, the LGUP, and the landfill gas flare. Figure 7.1 presents the current layout of the LFGCS.

Soil gas probe monitoring is undertaken at the landfill to determine whether landfill gas is migrating outside the limit of waste. Soil gas probe monitoring was conducted in March, June, August and November in 2022. There were no exceedances to the 1 percent by volume (v/v) methane trigger level in 2022. During the monitoring events, the maximum concentration was found to be 0.3 percent methane (v/v), which indicates landfill gas is generally not migrating outside the limit of waste. The locations of soil gas probes are shown on Drawing 2.1. Gas probe monitoring results from 2022 are presented in Table 7.1 and discussed further in Section 7.4.

## 7.1 Landfill Gas Control System Development, Modifications and Maintenance

In December 2016, a new soil gas monitoring probe was installed north of Cell 3 to monitor potential migrating landfill gas from the recently constructed cell. Monitoring of the new soil gas probe, GP10, began in 2017.

In November 2019, replacement soil gas monitoring probes were installed near the original locations of GP2 and GP3, and the new gas probes were incorporated into the gas monitoring program in 2020.

Construction of Phase 3 of the landfill gas collection system in the NFA started in December of 2019 and was substantially completed February 12, 2020. Phase 3 included the installation of three vertical landfill gas extraction wells in Cell 2 and two horizontal landfill gas collection pipes in Cell 3.

The Phase 4 landfill gas collection system in the NFA is anticipated to be constructed in 2023.

## 7.2 Landfill Gas Control System Monitoring

In 2022, data collection took place at extraction points in the LFGCS to assist with balancing and maintaining efficient operation of the LFGCS. The pressure and concentration of LFGCS was monitored on a regular basis by the City and PUG staff. Monthly monitoring as required by the ECA is completed by the City’s engineer on record for the PCCWMF.

During monitoring, measurements of static pressure, percent methane, carbon dioxide and oxygen were obtained from each extraction point in the system. Adjustment of the collection field was undertaken based on monitoring results by the City or PUG staff. Appendix K includes a summary of the landfill gas monitoring program as well as the results of the monthly landfill gas monitoring for 2022.

During flare operations, the exhaust temperature was monitored in accordance with ECA Condition 145. The flare temperature was monitored by a programmable logic controller (PLC) and recorded by an on-site data-logger. The reliability of the data logger was greater than 99.5 percent. The landfill gas flare PLC is configured to automatically shut down when the flame temperature falls below or exceeds the operating temperature range. PUG records and retains temperature data. During 2022, the LFGCS operated in accordance with the ECA.

The LGUP is generally operational full time on site. In addition to gas from the NFA, the landfill gas flare handles gas collected from the SFA when the LGUP is not operational for maintenance or other reasons. During 2022, the LFGCS operated in compliance with the ECA.

## 7.3 Landfill Gas Surface Monitoring

A landfill gas surface monitoring program was undertaken on November 10, 23 and 24, 2022. Due to equipment malfunctions, THC and combustible gas monitoring was aborted on November 10, 2022. Monitoring resumed on November 23 and 24, 2022 after weather permitted. Site conditions only provided a limited window to obtain measurements on both days. As such, measurements were not acquired for approximately one third of the refuse area (to the NW of site). The associated report dated January 10, 2023 is included in Appendix K.

The report specifies that the majority of the SFA is covered with vegetation, with some small barren areas and unpaved roads. Total hydrocarbon (THC) concentrations greater than 500 ppm were measured at 3 of 188 sample locations. THC concentrations greater than 500 ppm were found near maintenance holes and one barren area. It is likely that landfill gas is entering the LCS and being released through these manholes. Several of the manholes and barren areas with elevated THC readings recorded during the 2021 survey were no longer elevated above 500ppm during the site visit.

The report recommended further observation of barren areas where THC emissions were found to determine if any damage to the final cover occurred as a result. Damage to final cover was recommended to be repaired in the summer and fall construction season as needed. Continued effort to remediate elevated THC concentrations emanating from manholes was also recommended.

## 7.4 Perimeter Soil Gas Monitoring

Landfill gas migration monitoring is undertaken at soil gas probes along the north, east and south boundaries of the SFA and near BH106, MHG2, and north of Cells 2 and 3 in the NFA. The probes are equipped with stopcock and hose barb assemblies to prevent atmospheric air intrusion. The LFGCS monitoring program consists of recording: percent by volume (v/v) for methane; carbon dioxide; oxygen; and water level in the probe.

Perimeter gas probe monitoring events were completed in 2022 to monitor soil gas quality and water levels. Monitoring was to be conducted at ten locations, GP1 through GP10, shown on Figure 2.1.

Typically, pressure readings are collected first, followed by combustible gas and oxygen readings. Water levels were measured to determine if the probe screen was flooded or not (i.e. if water level was above the screen). Table 7.1 summarizes the results of the perimeter soil gas probe monitoring in 2022.

The gas migration monitoring program shows no evidence of off-site landfill gas migration or potential for imminent off-site landfill gas migration. There has been no indication to date that landfill gas is migrating in the subsurface from the site.

**Trigger Condition**

If the 20 percent Lower Explosive Limit (1 percent methane (v/v)) trigger level is exceeded at any gas probe during two successive monitoring events it may be necessary to increase the monitoring frequency and to establish and monitor other landfill gas probes in the vicinity of the affected probe.

During the 2022 monitoring events no wells were found to exceed 1 percent methane (v/v).

# 8 Status of Contingency Plans

In accordance with ECA Conditions 137, 138, 139 and 140, the following presents an overview of the status of the Contingency Plans for the SFA and NFA. Contingency Plans are documented in the *Peterborough County/City Waste Management Facility Final Design, South Fill Area, Design & Operations Report – Volume 1* report dated January 2004 (Final Design Report).

The updated contingency plans included measures to address the following:

1. Leachate migration;
2. Leachate head build-up;
3. Leachate seepage; and
4. Landfill gas control.

Monitoring and inspection data for 2022 were reviewed relative to the requirements of the contingency plans. The results of the review indicate that none of the relevant trigger levels have been exceeded and the contingency measures related to leachate or landfill gas are therefore not required at this time.

# 9 Proposed 2023 Annual Monitoring Program

The monitoring program, as undertaken in 2022, is presented in Table 1.1. Alterations to the established monitoring program for the site were implemented in 2015 as required under Condition 188 b. of the ECA.

Pursuant to Section 2.7 of the Ministry Site Inspection Report of March 28, 2013, sampling and analysis of PCB within the collection system leachate will be continued on a quarterly basis as part of the 2023 monitoring program. The results of the PCB sampling will continue to be reported under a separate document prepared for the WWTP.

A review of the stormwater management system and sampling requirements is recommended in 2023, to address exceedances of the pond effluent objectives.

No further additional changes to the annual monitoring program are recommended for 2023.

# 10 Additional Information Requested in 2022

In 2022, there was no additional information requested by the Ministry (ECA Condition 184 xxx)) that is not included elsewhere in the 2022 Annual Monitoring Report.

# 11 Summary of Key Observations and Conclusions

The following presents the key observations and conclusions resulting from the 2022 annual monitoring program for the PCCWMF:

**Site Development**

1. R.W. Tomlinson is the Site Operator. They have operated the site since September 2012.
2. Construction of Cell 4 in the NFA was substantially completed on December 22, 2022. The City did not start placing waste in Cell 4 until 2023. Completion of access roads and litter fence installation remain outstanding and are expected to be completed in the spring of 2023 when weather permits.
3. As part of the Cell 4 construction, the LFG main header expansion was completed around Cell 4 in the NFA.
4. In 2022, 46,379 tonnes of waste was placed in the NFA.
5. To December 31, 2022, 2,315,261 tonnes of waste have been disposed in the PCCWMF.
6. The highest daily quantity of material received on site in 2022 was 1,721.72 tonnes, received on July 07, 2022.
7. The NFA will provide capacity for approximately 992,550 tonnes of waste based on air space of 1,527,000 $m^3$ and an apparent waste density of 0.65 tonnes/$m^3$.

8. Remaining waste disposal capacity for the County/City at the PCCWMF is approximately 11.2 years (from December 20, 2022) based on an assumed annual waste disposal rate of 46,250 tonnes and an apparent waste density of 0.65 tonnes/$m^3$.
9. Additional soil became available during Cell 4 construction and was hauled to a new stockpile location north of Cell 4 or the future SSO facility for earthworks. There is approximately 146,822 $m^3$ of soil currently available in on-site stockpiles. The estimated remaining quantity of daily, interim and final cover required for the NFA is 237,465 $m^3$. Contaminated soil will continue to be received at the site for use as daily cover.

**Operations and Maintenance**

10. Final cover was placed within Cell 2 and 3 in 2022 covering approximately 0.52ha.
11. In 2022, ten complaints were received and documented:
    a. Five complaints were related to potential odours from the PCCWMF observed off-site of the landfill. Three of the five odour complaints were unrelated to the landfill and occurred due to farming operations.
    b. Five complaints were emails addressing concerns raised by a resident that were discussed in the Site Liaison Committee Meeting held on February 1st 2022. The resident was asked to email the list of concerns to the City and included in this email were various residential responses to their concerns of groundwater, odours and the future of landfilling. During the SLC meeting the City addressed some of the concerns with regards to groundwater monitoring, LFG odours, noise and general inquiries about landfilling operations. Since these concerns were addressed no landfill complaints were observed since this time from the subjected residence.

**Site Liaison Committee**

12. The SLC met virtually on February 01, 2022 and in person on July 05, 2022. Key information discussed at the meetings included review of the 2021 monitoring report, site operations, complaints, capital works, and other related topics.

**Leachate Collection System Monitoring, Operation and Maintenance**

13. The volume of leachate and groundwater removed in 2022 was approximately 47,603 $m^3$, a 23.6% decrease from the 62,297 $m^3$ removed in 2021.
14. The quantity of leachate collected within the NFA and SFA decreased in 2022, compared to the amount collected in 2021. The decrease in leachate quantities from the SFA and NFA are mainly attributed to the progression of the landfilling activities within Cells 2 and 3 over the year and decrease in precipitation.
15. The quality of leachate generated in 2022 generally satisfied Sewer Use By-law No.15-075 criteria with the exception of TKN and nonyl-phenols in the SFA holding tanks both in March and October 2022, TKN in the NFA holding tank in both March and October 2022, and nonyl-phenols in the NFA holding tank in October. Historically, TKN and nonyl-phenols concentrations have periodically exceeded Sewer Use By-law criteria.

16. In-waste leachate concentrations of chloride, alkalinity, chemical oxygen demand (COD), TKN, sodium, potassium, and magnesium generally fluctuate within a lower range since 2005 compared to concentration ranges between 1986 and 1993, but have exhibited a decreasing trend between 2005 and 2022. The concentration fluctuations are attributed to the variable nature of leachate within refuse although it is expected that parameter concentrations within the refuse will decrease over the long term. Installation of additional in-waste monitors is not warranted provided a discrete leachate sample from the last cell (MHT10-07) can be obtained.
17. Groundwater interceptor leachate quality, in general, has fluctuated with no distinguishable trends. The groundwater in the interceptor system is somewhat degraded due to natural conditions, brine influences and low levels of some residual leachate related parameters. Several concentrations decreased to historic lows in 2021, but have rebounded in 2022. Continued monitoring will permit further assessment of the long-term trends within the interceptor system.
18. The quantity of leachate discharged to the City's sewer system in 2022 was within historical rates and is considered insignificant with respect to leachate hydraulic loading on the WWTP. Leachate contributed less than 1 percent of the total influent volume of the WWTP in 2022.
19. $BOD_5$, TSS, phosphorus, and COD loads on the WWTP from landfill leachate are low and represent only a small portion of the WWTP capacity.
20. TKN load on the WWTP in 2022 appears to be in the range of 0.8% to 1.2%.
21. A small seep was noted on the south side of the NFA landfill by City staff June 23, 2022. The seep was repaired on July 12, 2022, by Tomlinson. Throughout the remainder of the year, the seep was observed to be contained and was not observed after June 2022.
22. Both the SFA and NFA LCS were flushed in 2022 with the exception of Cell 4 due to accessibility with flushing equipment. One metre of waste will need to be placed prior to accessing the manholes to avoid damaging the liner system. The City will continue to flush the LCS on an annual basis.
23. The NFA LCS was video inspected in 2022. NFA and SFA LCS will be video inspected in 2023 as per ECA Condition 108 iii) and every odd year thereafter. NFA Cell 4 will be video inspected in 2023 as per ECA Condition 108 iii) and every year thereafter until 2027.

**Groundwater Monitoring Assessment**

24. Monitors ISP8 and ISP9 were decommissioned in 2020 due to localized cap enhancements in the SFA and replacement vertical standpipes will be installed at a later date.
25. Monitor 52-II was reported as damaged in 2020 and monitor 109-II was compromised. Both monitors 52-II and 109-II were replaced in September 2022.

26. Water quality effects from the landfill consist of leachate impacts and historical road salt effects to the east and north of the SFA, similar to previous annual monitoring results. Leachate influences are limited to overburden monitors immediately downgradient of the waste in these areas. In 2022, historical high levels of certain parameter concentrations were encountered, including alkalinity at 74-III, 84-II, 109-III and 110-III, chloride at 85-I, 93-II and 110-II/III, and TKN at several wells.
27. During 2022, organic parameters were detected within Monitors 18A, 48-I, 66-III, 74-III, 81-I/II/III and 109-III, which is similar to historical results. The majority of these monitors are located at the toe of the northern and eastern slopes of the SFA. Historical low concentrations of organic parameters in other downgradient monitors, and for monitors within the NFA, may be naturally occurring and/or attributed to other sources, although continued monitoring will permit an assessment of these occurrences.
28. The Reasonable Use Policy limits that were exceeded are generally related to road salt or natural groundwater quality variability at the site and are not attributed to landfill leachate. The performance monitoring program results from 2022 demonstrate that no contingency measures are required at this time.
29. The NFA overburden and bedrock groundwater quality is generally representative of the natural baseline conditions, as no landfilling activities took place until late 2010. Based on the 2022 results and previous monitoring, the groundwater quality indicates fresh overburden and bedrock groundwater, with brine influenced bedrock groundwater at two monitor locations, 86-I and 89-I. Concentrations for select parameters, including chloride, alkalinity, and iron have increased at several monitors within the NFA, but since several of these increases have also occurred at the upgradient monitors, these increases are generally not attributed to the landfill site.

**Surface Water Monitoring**

30. Surface water quality during 2022 was similar to previous years. Water quality generally satisfied the PWQO with the exception of iron, phenols and phosphorus at surface water stations, during at least one sampling event in 2022. The magnitudes of the iron and phosphorus exceedances at the downstream stations have historically been generally similar to, or lower than, the exceedances at the upstream stations. Phosphorous exceedances were observed at upstream stations SW19 and SW20 (central watercourse), as well as at upstream station SW21 (along Bensfort Road) in 2022. The exceedances for phosphorous at the upstream stations indicate that PWQO exceedances at the downstream stations are considered to be naturally occurring or the result of runoff from the roadway and/or adjacent lands; the exceedances are mainly associated with sediment within the water and stagnant water located at the sampling location. The landfill site does not have a measurable influence on the water quality within the adjacent surface water bodies.
31. Effluent from the stormwater management pond satisfied the PEO during the sampling events in 2022 for the parameters analysed, with the exception of total oil and grease in February and June, and turbidity in February. It is noted that the ponds were utilized for dewatering of Cell 4 construction and Site dust control in 2022 and no discharge

occurred during many additional attempts to sample the pond in 2022. The current configuration of the stormwater management pond is adequate for reducing the majority of parameter concentrations from discharging to the adjacent watercourse.

**Landfill Gas Odour Control System**

32. During 2022, the LFGCS operated in compliance with the ECA.
33. Landfill gas surface monitoring was undertaken on November 10, 23 and 24, 2022. Due to equipment malfunctions, THC and combustible gas monitoring was aborted on November 10, 2022. Monitoring resumed on November 23 and 24, 2022 after weather permitted. Site conditions only provided a limited window to obtain measurements on both days. As such, measurements were not acquired for approximately one third of the refuse area (to the NW of site). Total hydrocarbon (THC) concentrations greater than 500 ppm were measured at 3 of 188 sample locations. THC concentrations greater than 500 ppm were found near maintenance holes and one barren area.
34. Soil gas probe monitoring was completed four times in 2022. Soil gas probe monitoring from 2022 shows no evidence of gas migration beyond the property boundary.

**Contingency Plans**

35. Monitoring shows the implementation of contingency measures is not required at this time.

**Compliance with ECA**

36. No violations of ECA conditions were noted in 2022.

# 12 Recommendations

The following recommendations are based on the results of the 2022 annual monitoring program and other information collected in 2022:

1. A review of the stormwater management system and sampling requirements is recommended in 2023 to address exceedances of the pond effluent objectives.
2. THC levels should continue to be monitored in manholes where high levels were observed during 2022 surface monitoring, and remedial action should be taken as required.
3. Barren areas where THC emissions were observed should be further reviewed to determine if any damage occurred to the final cover. Final cover to be repaired if damaged.
4. Odour complaints continue to be addressed through operation and expansion of the LFGCS as required.

5. Monitoring well 5-IV is suspected to be compromised and should be replaced or rehabilitated during the 2023 monitoring program.
6. Monitors ISP8 and ISP9 should be replaced with vertical standpipe monitors upon completion of the localized capping activities.
7. A vertical refuse monitor should be installed as a replacement for ISP15, within the NFA, once the cell cap has been suitably established. The installation of the refuse monitor within Cell 2 would be in accordance with the recommendations in the D&O report.
8. Several standpipe casings were observed to be corroded during the 2022 monitoring program. Standpipe casings should be assessed and replaced as necessary, during the 2023 monitoring program.

# 13 Glossary of Terms

**COD**: Chemical Oxygen Demand

**County/City**: County of Peterborough/City of Peterborough

**D&O Report:** Design and Operations Report

**ECA**: Environmental Compliance Approval

**ha**: hectare

**HHW**: Household Hazardous Waste

**LCS**: Leachate Collection System

**LFGCS**: Landfill Gas Control System

**LOQ**: Limit of Quantitation

**LGUP**: Landfill Gas Utilization Plant

**m**: meters

**Ministry**: Ontario Ministry of the Environment, Conservation and Parks

**MRF**: Materials Recycling Facility

**NFA**: North Fill Area

**ODWQ**: Ontario Drinking Water Quality

**O.Reg.**: Ontario Regulation

**OWRA**: Ontario Water Resources Act

**PCCWMF**: Peterborough County/City Waste Management Facility

**PEO:** Pond Effluent Objectives

**PLC**: Programmable Logic Controller

**PUG**: Peterborough Utilities Group

**PWQO**: Provincial Water Quality Objectives

**RPD**: Relative Percent Differences

**SFA**: South Fill Area

**SLC**: Site Liaison Committee

**SSO:** Source Separated Organics

**TDS**: Total Dissolved Solids

**THC**: Total Hydrocarbon

**TKN:** Total Kjeldahl nitrogen

**(v/v)**: Percent by Volume

**WEEE**: Waste Electrical and Electronic Equipment

**WWTP**: Waste Water Treatment Plant

# 14 References


AECOM Canada Inc. August 2017. City of Peterborough Odour Study.

Conestoga-Rovers & Associates. January 2004. Peterborough County/City Waste Management Facility South Fill Design & Operations Report.

Earth Tech Canada Inc. January 2004. Peterborough County/City Waste Management Facility North Fill Design & Operations Report.

Ministry of the Environment. April 15, 2011. Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act.

# TABLES

**TABLE 1.1**
**2022 Monitoring Program**
**2022 ANNUAL MONITORING REPORT**
**Peterborough County/City Waste Management Facility**

**GROUNDWATER**

| Group | Monitoring Designation | Monitoring Events | | Comments |
|---|---|---|---|---|
| | | March / April | September / October | |
| G1 | 18A, 18B, 19A, 19B, 20B, 48,<br>63-I, 63-II, 63-III, 66-III, 75-I, 75-II,<br>81-I, 81-II, 81-III | Water Levels<br>Analysis List 1<br>Analysis List 2<br>Analysis List 3 | Water Levels<br>Analysis List 1 | |
| G2 | 16A, 20A, 33-II, 33-III, 40-II, 41-I, 41-II, 44-1, 44-II, 44-III, 46-I, 46-II, 46-III, 50-I, 50-II, 52-I, 52-II 53-I, 54-II, 61-I, 61-II, 61-III, 62-I, 64-I, 64-II, 66-I, 66-II, 74-II, 76-I, 77-I, 101-I, 101-II, 101-III, 113-I, 113-II, 113-III | Water Levels<br>Analysis List 1 | Water Levels | |
| G3 | 5-V, 5-VI, 62-II | Water Levels<br>Analysis List 1 | Water Levels<br>Analysis List 1 | |
| G4 | 5-IV, 50-III, 74-III | Water Levels<br>Analysis List 1 | Water Levels<br>Analysis List 3 | |
| G5 | 84-I, 84-II, 85-I, 85-II, 86-I, 86-II,<br>86-III, 87-I, 87-II, 87-III, 88-I, 88-II, 88-III, 89-I, 89-II, 89-III, 91-I, 91-II, 91-III, 92-I, 92-II, 92-III, 93-I, 93-II, 94-I, 94-II, 95-I, 95-II, 104-I, 104-II, 104-III, 106-I, 106-II, 106-III, 107-I, 107-II, 107-III, 108-I, 108-II, 108-III, 109-I, 109-II, 109-III, 110-I, 110-II, 110-III, 111-I, 111-II, 111-III, 112-I, 112-II, 112-III | Water Levels<br>Analysis List 1<br>Analysis List 2<br>Analysis List 3 | Water Levels<br>Analysis List 1 | |

**PRIVATE WELLS**

| Group | Monitoring Designation | Monitoring Events | Comments |
|---|---|---|---|
| | | March / April | |
| P1 | In accordance with the agreement between the Corporation of the City of Peterborough and the Corporation of the Township of Otonabee – January 1993 as amended by previous annual reports | Analysis List 4 | As per agreement |

**TABLE 1.1**
**2022 Monitoring Program**
**2022 ANNUAL MONITORING REPORT**
**Peterborough County/City Waste Management Facility**

**SURFACE WATER**

| Group | Monitoring Designation | Monitoring Events | | | | | | Comments |
|---|---|---|---|---|---|---|---|---|
| | | January / February | March / April | May / June | July / August | September / October | November / December | |
| S1 | SW1, SW2, SW3, SW17, SW18, SW19, SW20, SW21, SW23, SW24 | Flow Rate<br>Analysis List 1<br>Analysis List 6 | Flow Rate<br>Analysis List 1<br>Analysis List 6 | Flow Rate<br>Analysis List 1<br>Analysis List 6 | Flow Rate<br>Analysis List 1<br>Analysis List 6 | Flow Rate<br>Analysis List 1<br>Analysis List 6 | Flow Rate<br>Analysis List 1<br>Analysis List 6 | |

**LEACHATE**

| Group | Monitoring Designation | Monitoring Events | | | | | | Comments |
|---|---|---|---|---|---|---|---|---|
| | | January / February | March / April | May / June | July / August | September / October | November / December | |
| L1 | Holding Tank | | By-Law + COD | | | By-Law + COD<br>Analysis List 5a | | |
| L2 | MHT6-94 | | | | | Analysis List 5 | | |
| L3 | 23B | | Leachate Levels<br>Analysis List 1 | | | Leachate Levels<br>Analysis List 2 | | In-waste leachate monitors |
| L4 | ISP7-95, ISPL-1, ISPL-2, ISPL2-1, ISPL2-2, SP1-90, SP2-90, SP3-90, SP4-90, SP6-90, | Leachate Level | Leachate Level | Leachate Level | Leachate Level | Leachate Level | Leachate Level | |

**TABLE 1.1**
**2022 Monitoring Program**
**2022 ANNUAL MONITORING REPORT**
**Peterborough County/City Waste Management Facility**

| Group | Monitoring Designation | Monitoring Events | | | | | | Comments |
|---|---|---|---|---|---|---|---|---|
| | | January / February | March / April | May / June | July / August | September / October | November / December | |
| | SP7-90, SP8-90, SP10-94, SP11-94, SP14-91, SP15-91, SP16-91, SP17-91, SP18-91, SP19-91, SP20-91, Cell West Monitors, ISP15, ISP16 | | | | | | | |

**INTERCEPTOR TRENCH**

| Group | Monitoring Designation | Monitoring Events | | | | | | Comments |
|---|---|---|---|---|---|---|---|---|
| | | January / February | March / April | May / June | July / August | September / October | November / December | |
| T1 | MH-4 | | | | | Analysis List 5 | | |

**LANDFILL GAS**

| Group | Monitoring Designation | Monitoring Events | | | | | | Comments |
|---|---|---|---|---|---|---|---|---|
| | | January / February | March / April | May / June | July / August | September / October | November / December | |
| LFG-1 | GP1-96, GP2-96, GP3-96, GP4-96, GP5-96, GP6-96, GP7-13, GP8-13, GP9-13 and GP10-16 | | monitor | monitor | monitor | | monitor | Soil gas monitoring |

**TABLE 1.1**
**2022 Monitoring Program**
**2022 ANNUAL MONITORING REPORT**
**Peterborough County/City Waste Management Facility**

**Analysis List 1**: Ca, Mg, Na, K, Cl, $SO_4$, Alkalinity, $NO_3$, $NO_2$, $NH_3$, TKN, pH, Conductivity, Fe, Mn, As, DOC, COD, Total Phenolics, Total P, P (dissolved), field pH and field conductivity, Anion Sum, Cation Sum, Bicarbonate, Carbonate, Hardness, Ion Balance, Orthophosphate (as P), field temperature, and Total Dissolved Solids (TDS).

**Analysis List 2**: Al, Ba, Be, B, Cd, Cr, Co, Cu, Pb, Mo, Ni, and Zn.

**Analysis List 3**: VOC Scan

**Analysis List 4**: pH, conductivity, Alkalinity, Cl, $SO_4$, Total P, Soluble P, TKN, $NH_3$, $NO_2$, $NO_3$, K, Mg, Ca, Na, Fe, COD, DOC, Phenols, field pH and field conductivity.

**Analysis List 5**: cBOD5, BODs, TSS, TKN, $NH_4$, Phenolics, Fe, Cl, Sr, Br, Alkalinity, K, Na, field pH and field conductivity.

**Analysis List 5a:** cBOD5, Sr, Br, Alkalinity, K, Na, field pH and field conductivity.

**Analysis List 6**: BOD5, TOC, TSS, TDS, Turbidity, Fe (field filtered), temperature, DO, field pH and field conductivity.

**By-Law + COD:** City of Peterborough By-Law 05-104 Schedule ‘H’, Table 1 “Sanitary and Combined Sewer Discharge Limits.”

**TABLE 2.1**
**Summary of Monthly Disposal Quantities**
**2022 ANNUAL MONITORING REPORT**
**Peterborough County/City Waste Management Facility**

| | Monthly Disposal Quantities in Tonnes [1] | | | | | |
|---|---|---|---|---|---|---|
| **Month** | **Total Waste** | **Daily/Interim Cover[2]** | **Diverted Materials[3]** | **Total Waste, Cover, and Diverted Materials[4]** | **Total Contaminated Soil** | **Total Hazardous Waste** |
| January | 2,959.38 | 0.00 | 224.42 | 3,183.80 | 166.41 | 0.00 |
| February | 2,892.97 | 0.00 | 169.75 | 3,062.72 | 112.56 | 0.00 |
| March | 3,689.51 | 10.86 | 338.95 | 4,039.32 | 163.70 | 0.00 |
| April | 3,899.81 | 22.06 | 519.63 | 4,441.50 | 308.88 | 0.00 |
| May | 4,172.28 | 52.17 | 648.45 | 4,872.90 | 370.88 | 0.00 |
| June | 4,758.10 | 31.96 | 700.26 | 5,490.32 | 1,197.92 | 0.00 |
| July | 4,076.15 | 35.29 | 514.55 | 4,625.99 | 1,926.04 | 0.00 |
| August | 4,625.49 | 9.07 | 476.64 | 5,111.20 | 477.48 | 0.00 |
| September | 4,255.71 | 19.55 | 535.79 | 4,811.05 | 305.01 | 0.00 |
| October | 3,850.47 | 14.45 | 505.01 | 4,369.93 | 434.59 | 0.00 |
| November | 3,894.94 | 20.81 | 403.63 | 4,319.38 | 1,020.52 | 0.00 |
| December | 3,304.20 | 13.17 | 248.46 | 3,565.83 | 643.89 | 0.00 |
| **Totals** | **46,379** | **229** | **5,286** | **51,894** | **7,128** | **0.00** |

Notes:

1. Information provided by the City of Peterborough.
2. Daily/Interim Cover includes clean wood/woodchips and compost screening overs.
3. Diverted Materials include C&D, green waste, scrap metal, tires, drywall, electronics, cardboard/boxboard, other mixed recyclables, mattresses and re-use materials.
4. Quantities exclude contaminated soil and hazardous waste.

**TABLE 2.2**

**Weekly Summary of Inbound Material in 2022**
**2022 ANNUAL MONITORING REPORT**
**Peterborough County/City Waste Management Facility**

| Week | Clean Wood/ Woodchips | Contaminated Soil - Cover | Compost Screening Overs | Construction & Demolition | Green Waste | Scrap Metal | Tires | Drywall | Electronics | Cardboard/ Boxboard | Mixed Recyclables | Mattress | Hazardous Waste | Re-use Material | Textile Diversion | Mixed Solid Waste | Total Weekly Inbound |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jan 3-9 | | 26.82 | | 18.78 | | 3.77 | | | 3.75 | 2.58 | 0.69 | 1.92 | | 0.14 | 0.06 | 892.47 | 950.98 |
| Jan 10-16 | | 97.47 | | 51.35 | 3.44 | 0.67 | 2.59 | 9.83 | | 2.43 | | 5.12 | | 0.23 | 0.05 | 706.48 | 879.66 |
| Jan 17-23 | | 16.13 | | 18.13 | | 1.84 | | 9.50 | | 3.12 | | | | 0.46 | | 569.02 | 618.20 |
| Jan 24-30 | | 0.00 | | 31.21 | | 1.09 | 9.01 | 10.51 | | 0.83 | 0.92 | 6.30 | | 0.11 | 0.04 | 713.20 | 773.22 |
| Jan 31-Feb 6 | | 53.75 | | 34.24 | | 1.11 | | 11.13 | | 1.29 | | | | 0.47 | 0.12 | 775.39 | 877.50 |
| Feb 7-13 | | 66.84 | | 29.02 | | 4.70 | 2.18 | 10.01 | | 2.43 | 0.92 | 3.74 | | 0.18 | 0.03 | 786.19 | 906.24 |
| Feb 14-20 | | 17.96 | | 17.90 | | 0.40 | | 11.08 | | 2.70 | | 3.31 | | 0.50 | 0.10 | 676.25 | 730.20 |
| Feb 21-27 | | | | 21.21 | | 0.43 | | 11.02 | 3.72 | 2.27 | | | | 0.37 | | 660.82 | 699.84 |
| Feb 28-Mar 6 | | 12.56 | | 49.79 | | 1.11 | 1.46 | 9.07 | | 4.31 | 1.16 | 5.75 | | 0.58 | 0.02 | 745.21 | 831.02 |
| Mar 7-13 | | 27.41 | | 32.23 | 9.09 | 2.48 | 2.76 | 12.17 | | 3.84 | | 8.48 | | 0.30 | 0.01 | 676.42 | 775.19 |
| Mar 14-20 | | 11.81 | | 49.50 | | 3.55 | 6.77 | | | 4.06 | | 4.15 | | 0.14 | 0.11 | 903.29 | 983.38 |
| Mar 21-27 | | 21.34 | | 48.19 | 7.28 | 5.40 | | 10.88 | | 5.12 | | 1.09 | | 0.29 | 0.06 | 854.29 | 953.94 |
| Mar 28-April 3 | 10.86 | 106.62 | | 45.63 | 7.56 | 5.27 | | 11.30 | 4.87 | 4.30 | 1.21 | 6.45 | | 0.17 | 0.06 | 800.84 | 1005.14 |
| Apr 4-10 | 22.06 | 39.49 | | 49.63 | 33.45 | 2.85 | | 27.21 | | 3.77 | | 8.52 | | 0.45 | 0.01 | 872.68 | 1060.12 |
| Apr 11-17 | | 17.07 | | 35.93 | 30.68 | 8.03 | | | | 2.12 | | 5.43 | | 0.28 | 0.01 | 856.38 | 955.93 |
| Apr 18-24 | | 201.66 | | 66.64 | 32.59 | 3.63 | | 12.39 | | 5.28 | 1.16 | 9.22 | | 0.51 | 0.01 | 990.16 | 1323.25 |
| Apr 24-May 1 | | 34.62 | | 68.14 | 52.34 | 8.84 | 2.37 | 12.11 | 3.53 | 2.85 | | 6.89 | | 0.81 | | 962.58 | 1155.08 |
| May 2-8 | 9.99 | 144.87 | | 72.04 | 39.92 | 6.33 | | 11.99 | | 5.63 | 1.07 | 6.43 | | 0.90 | 0.07 | 979.88 | 1279.12 |
| May 9-15 | 7.70 | 20.83 | | 66.97 | 32.02 | 5.11 | 14.90 | 11.99 | | 4.71 | | 9.80 | | 0.76 | 0.02 | 942.71 | 1117.52 |
| May 16-22 | 28.78 | 177.20 | | 58.60 | 39.86 | 5.45 | | 8.27 | 5.86 | 3.78 | | 8.94 | | 0.62 | 0.02 | 938.36 | 1275.74 |
| May 23-29 | 0.83 | 23.09 | | 36.30 | 94.57 | 4.57 | 18.46 | 10.98 | | 2.32 | 0.80 | 3.85 | | 0.14 | | 978.72 | 1174.63 |
| May 30-June 5 | 14.97 | 19.94 | | 64.29 | 70.49 | 6.19 | | 9.14 | | 4.26 | | 2.13 | | 1.77 | 0.02 | 1048.38 | 1241.58 |
| June 6-12 | 0.02 | 38.97 | | 67.10 | 41.34 | 7.07 | | | | 3.72 | | 9.67 | | 1.21 | 0.06 | 1039.18 | 1208.34 |
| June 13-19 | 8.98 | 30.00 | | 63.80 | 48.80 | 4.67 | | 10.56 | 3.28 | 3.25 | 1.25 | 7.50 | | 0.97 | 0.01 | 937.08 | 1120.15 |
| June 20-26 | 9.42 | 35.78 | | 69.71 | 100.55 | 5.26 | 0.82 | | | 4.47 | | 5.74 | | 0.58 | 0.01 | 1117.37 | 1349.71 |
| June 27-July 3 | 3.44 | 1078.12 | | 44.48 | 76.84 | 3.94 | | 7.56 | | 3.89 | 1.09 | 8.15 | | 0.73 | | 1021.97 | 2250.21 |
| July 4 - 10 | 0.31 | 1494.16 | | 48.38 | 59.87 | 8.01 | | 10.78 | 5.31 | 4.31 | | 2.13 | | 0.30 | 0.08 | 1047.63 | 2681.27 |
| July 11-17 | | 104.66 | | 60.41 | 41.91 | 5.14 | | | | 4.10 | 0.75 | 4.76 | | 0.75 | 0.01 | 1048.28 | 1270.77 |
| July 18-24 | 26.70 | 285.84 | | 41.87 | 40.57 | 6.69 | 5.41 | 21.51 | | 3.37 | | 10.19 | | 0.42 | | 944.44 | 1387.01 |
| July 25-31 | 8.28 | 41.38 | | 53.82 | 30.42 | 4.99 | 2.68 | 10.81 | | 4.57 | 0.85 | 6.97 | | 0.70 | 0.00 | 962.53 | 1128.00 |

**TABLE 2.2**

**Weekly Summary of Inbound Material in 2022**
**2022 ANNUAL MONITORING REPORT**
**Peterborough County/City Waste Management Facility**

| Week | Clean Wood/ Woodchips | Contaminated Soil - Cover | Compost Screening Overs | Construction & Demolition | Green Waste | Scrap Metal | Tires | Drywall | Electronics | Cardboard/ Boxboard | Mixed Recyclables | Mattress | Hazardous Waste | Re-use Material | Textile Diversion | Mixed Solid Waste | Total Weekly Inbound |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aug 1-7 | | 208.74 | | 46.81 | 24.15 | 6.12 | | | 2.70 | 3.98 | | 3.43 | | 0.72 | | 965.28 | 1261.93 |
| Aug 8-14 | 1.96 | 125.95 | | 44.96 | 24.42 | 3.39 | 14.21 | 9.31 | | 2.11 | 0.78 | 7.82 | | 1.09 | | 1095.91 | 1331.91 |
| Aug 15-21 | | 32.79 | | 49.18 | 35.44 | 5.86 | | 11.25 | | 4.41 | | 2.43 | | 1.14 | 0.07 | 1036.90 | 1179.47 |
| Aug 22-28 | | 53.80 | | 51.61 | 26.39 | 4.75 | 0.83 | 11.21 | | 5.07 | | 5.14 | | 0.65 | 0.05 | 1014.81 | 1174.31 |
| Aug 29 -Sept 4 | 7.11 | 56.20 | | 66.24 | 31.42 | 4.98 | | | 4.88 | 3.29 | 0.96 | 10.83 | | 1.06 | 0.03 | 1015.19 | 1202.19 |
| Sept 5-11 | | 34.17 | | 35.67 | 32.09 | 4.04 | | 9.91 | | 2.34 | 0.64 | 7.00 | | 0.94 | 0.10 | 993.08 | 1119.98 |
| Sept 12-18 | 4.63 | 59.08 | | 70.93 | 34.38 | 3.97 | 12.85 | 10.14 | | 5.05 | | 6.37 | | 0.61 | 0.10 | 919.50 | 1127.61 |
| Sept 19-25 | 2.35 | 60.43 | | 49.12 | 42.10 | 3.47 | | 8.81 | 2.63 | 4.24 | 0.48 | 4.53 | | 0.61 | | 947.76 | 1126.53 |
| Sept 26-Oct 2 | 12.57 | 151.33 | | 52.00 | 35.85 | 6.48 | 5.29 | 9.69 | | 3.02 | | 11.37 | | 0.50 | | 956.79 | 1244.89 |
| Oct 3-9 | | 42.28 | | 77.77 | 37.62 | 3.96 | | | | 4.34 | 1.33 | 3.38 | | 1.53 | | 900.91 | 1073.12 |
| Oct 10-16 | | 42.33 | | 33.07 | 20.97 | 5.16 | | 12.80 | | 3.02 | | 9.63 | | 0.86 | | 921.14 | 1048.98 |
| Oct 17-23 | 12.01 | 159.20 | | 46.76 | 24.73 | 5.38 | | 9.89 | | 4.21 | | 3.82 | | 0.61 | | 993.29 | 1259.90 |
| Oct 24-30 | 2.44 | 181.81 | | 50.77 | 63.13 | 4.68 | | 10.59 | | 4.75 | | 6.85 | | 0.97 | 0.01 | 880.94 | 1206.94 |
| Oct 31-Nov 6 | 4.71 | 45.72 | | 51.29 | 49.24 | 5.13 | | 11.02 | 6.59 | 3.12 | 1.41 | 7.00 | | 0.96 | 0.03 | 968.23 | 1154.45 |
| Nov 7 - 13 | | 112.03 | | 49.58 | 42.37 | 5.38 | | 10.20 | | 4.31 | | 3.73 | | 1.61 | 0.11 | 800.55 | 1029.87 |
| Nov 14-20 | 5.62 | 762.62 | | 46.27 | 26.72 | 4.25 | | 10.09 | | 1.65 | | 0.97 | | 1.01 | 0.07 | 882.06 | 1741.33 |
| Nov 21-27 | 4.24 | 83.25 | | 34.92 | 9.95 | 4.13 | | 10.53 | | 3.06 | 1.09 | 7.72 | | 0.59 | 0.02 | 830.24 | 989.74 |
| Nov 28 -Dec 4 | 6.24 | 41.02 | | 37.60 | 8.87 | 3.97 | | 12.89 | | 5.31 | | | | 0.70 | | 837.75 | 954.35 |
| Dec 5-11 | 9.84 | 522.13 | | 36.31 | 12.99 | 3.77 | | 11.76 | 2.77 | 3.23 | | 14.04 | | 0.48 | 0.06 | 811.76 | 1429.14 |
| Dec 12-18 | 3.33 | 44.13 | | 31.10 | 3.71 | 1.18 | | | | 5.01 | | 3.96 | | 0.68 | 0.04 | 744.13 | 837.27 |
| Dec 19-25 | | 42.14 | | 20.04 | 6.15 | 2.81 | | 12.86 | | 2.50 | 1.56 | 3.44 | | 0.38 | 0.01 | 697.53 | 789.42 |
| Dec 26-31 | | 20.34 | | 18.54 | | | | 12.67 | | 5.10 | 1.31 | | | 0.53 | | 717.06 | 775.55 |
| **Yearly Total** | **229.39** | **7127.88** | **0.00** | **2415.83** | **1486.28** | **221.45** | **102.59** | **477.42** | **49.89** | **188.80** | **21.43** | **286.09** | **0.00** | **34.07** | **1.69** | **46379.01** | **59021.82** |

Notes:
1. All values are in tonnes.
2. There will be some discrepancies between the weekly data and the monthly data (shown on Table 2.1) due to weekly data being recorded on inbound traffic only, whereas data used for the monthly values is recorded on both inbound and outbound traffic.

**TABLE 2.3**
**Historical Waste Quantities**
**2022 ANNUAL MONITORING REPORT**
**Peterborough County/City Waste Management Facility**

| Year | Amount of Waste Disposed Annually | | | |
|---|---|---|---|---|
| | Peterborough [(1)] (tonnes) | Commercial Haulers [(2)] (tonnes) | Total Waste (tonnes) | Cumulative Total Waste (tonnes) |
| 1981 | 18,277 | 52,635 tons | 64,331 | 64,331 |
| 1982 | 18,533 | not recorded | NA [(3)] | 104,331 |
| 1983 | 19,174 | 34,445 tons & 10,176 $yd^3$ | 50,259 | 154,590 |
| 1984 | 19,168 | 297,277 $yd^3$ | 64,585 | 219,175 |
| 1985 | 19,613 | 296,119 $yd^3$ | 64,805 | 283,980 |
| 1986 | 20,571 | 146,559 $yd^3$ & 28,403 tons | 67,697 | 351,677 |
| 1987 | 19,644 | 58,023 tons | 70,460 | 422,137 |
| 1988 | 18,512 | 58,065 tons | 69,470 | 491,607 |
| 1989 | 23,669 | 54,441 tons | 70,861 | 562,468 |
| 1990 [(4)] | 19,052 | 35,495 tonnes | 54,548 | 617,016 |
| 1991 | 26,510 | 17,350 tonnes | 43,860 | 660,876 |
| 1992 | 16,260 | 19,975 tonnes | 36,235 | 697,111 |
| 1993 | 16,335 | 18,236 tonnes | 34,571 | 731,682 |
| 1994 | 15,760 | 17,007 tonnes | 32,767 | 764,449 |
| 1995 | 14,014 | 29,702 tonnes | 43,716 | 808,165 |
| 1996 | 13,731 | 30,247 tonnes | 43,978 | 852,143 |
| 1997 | 12,349 | 30,825 tonnes | 43,174 | 895,317 |
| 1998 | 12,126 | 34,120 tonnes | 46,296 | 941,613 |
| 1999 | 12,672 | 36,753 tonnes | 48,882 | 990,495 |
| 2000 | 13, 092 | 35,425 tonnes | 48,517 | 1,039,012 |
| 2001 | 15, 201 | 39,748 tonnes | 53,802 | 1,092,814 |
| 2002 [(5)] | - | - | 59,716 | 1,152,530 |
| 2003 | 27,136 | 41,380 tonnes | 68,516 | 1,221,046 |
| 2004 | 38,146 | 44, 214 tonnes | 82,360 | 1,303,406 |
| 2005 | 28,752 | 48,632 tonnes | 77,374 | 1,380,780 |
| 2006 [(6)] | 35,185 | 47,634 tonnes | 82,819 | 1,463,599 |

**TABLE 2.3**
**Historical Waste Quantities**
**2022 ANNUAL MONITORING REPORT**
**Peterborough County/City Waste Management Facility**

| **Year** | **Amount of Waste Disposed Annually** | | | |
|---|---|---|---|---|
| | **Peterborough (1) (tonnes)** | **Commercial Haulers (2) (tonnes)** | **Total Waste (tonnes)** | **Cumulative Total Waste (tonnes)** |
| 2007 | 32,796 | 41,422 | 74,218 | 1,537,817 |
| 2008 | 29,278 | 38,692 | 67,970 | 1,605,787 |
| 2009 (7) | N/A | N/A | 69,282 | 1,675,069 |
| 2010 | 46,754 | 13,494 | 60,248 | 1,735,317 |
| 2011 | 50,154 | 12,969 | 63,123 | 1,798,440 |
| 2012 | 38,931 | 21,151 | 60,082 | 1,858,522 |
| 2013 | 37,926 | 13,454 | 51,380 | 1,909,901 |
| 2014 | 32,393 | 12,571 | 44,964 | 1,954,865 |
| 2015 | 28,787 | 12,386 | 41,173 | 1,996,038 |
| 2016 | 31,454 | 10,194 | 41,649 | 2,037,687 |
| 2017 | 34,563 | 10,000 | 44,563 | 2,082,250 |
| 2018 | 37,897 | 6,743 | 44,640 | 2,126,890 |
| 2019 | 40,982 | 6,056 | 47,038 | 2,173,927 |
| 2020 | 40,703 | 7,076 | 47,779 | 2,221,706 |
| 2021 | 41,311 | 5,865 | 47,176 | 2,268,882 |
| 2022 | 38,539 | 7,840 | 46,379 | 2,315,261 |

Notes:
1. Waste tonnage for the City of Peterborough and the Townships of Otonabee-South Monaghan and Havelock-Belmont-Methuen. Tonnage from July 1, 2002 is from City and County of Peterborough.
2. Prior to 1990, all volumes in cubic yards were converted into tonnes (tons) assuming a density of 210 $kg/m^3$ (350 $lb/yd^3$). These volumes are based on assumed truck capacities prior to placement in the landfill and compaction.
3. Assumed 40,000 tonnes total waste for 1982.
4. Annual waste tonnages for 1990 to present are based on data from the computerized scale records.
5. Determination of waste based on these catagories not made.
6. Peterborough waste tonnage calculated based on report, "Details of Peterborough County by Material Source Code", printed on January 24, 2007.
7. Commercial Hauler waste tonnage based on difference between total waste tonnage and Peterborough waste tonnage.

**TABLE 2.4**
**Summary of Remaining Landfill Capacity, Soil Quantities and Site Life - North Fill Area (Cells 2, 3 and 4)**
**2022 ANNUAL MONITORING REPORT**
**Peterborough County/City Waste Management Facility**

| No. | Description | Unit | Jan-22 | Jan-23 |
|---|---|---|---|---|
| 1 | Approved 9.5 ha NFA volume (including final cover) | $m^3$ | 1,622,000 | 1,622,000 |
| 2 | Volume of final cover for 9.5 ha NFA | $m^3$ | 95,000 | 95,000 |
| 3 | Approved 9.5 ha NFA volume (excluding final cover) | $m^3$ | 1,527,000 | 1,527,000 |
| 4 | Cells 2, 3 & 4 - Volume utilized (excluding final cover) | $m^3$ | 675,039 | 732,900 |
| 5 | Cells 2, 3 & 4 - Volume **operational airspace*** remaining (excluding final cover) | $m^3$ | 179,961 | 794,100 |
| 6 | Cells 2, 3 & 4 - Cumulative quantity of waste landfilled | tonne | 446,071 | 492,450 |
| 7 | Cells 2, 3 & 4 - Final cover placed | ha | 1.49 | 2.01 |
| 8 | Cells 2, 3 & 4 - Remaining area requiring final cover | ha | 4.48 | 7.49 |
| 9 | Cells 2, 3 & 4 - Total fill area | ha | 5.97 | 9.50 |
| 10 | Cells 2, 3 & 4 - Volume required for final cover | $m^3$ | 47,040 | 78,645 |
| 11 | Cells 2, 3 & 4 - Volume remaining daily/intermediate cover required | $m^3$ | 35,992 | 158,820 |
| 12 | Cells 2, 3 & 4 - Apparent waste density | $tonnes/m^3$ | 0.66 | 0.67 |
| 13 | Estimated annual volume required | $m^3/yr$ | 71,154 | 71,692 |
| 14 | Cells 2, 3 & 4 Remaining operational site life | yr | 2.5 | 11.1 |
| 15 | NFA - Cells 2, 3 and 4 - Total site life remaining | yr | 12.0 | 11.1 |
| 16 | NFA - Cells 2, 3 and 4 - Total volume remaining (excluding final cover) | $m^3$ | 851,961 | 794,100 |

**Notes:**

1. Jan-22 data only contains information on Cells 2 & 3. Jan-23 data has been adjusted to include all NFA landfill Cells 2, 3 and 4. Cell 4 became operational at the end of 2022.
2. *** "Operational air space"** is defined as the volume of waste and daily cover that can be placed within the engineered part of the landfill allowing for volume constraints due to space required for future cell construction (e.g. Cell 4).

| Row No. | Additional Information |
|---|---|
| 1 | Volume from design of NFA. |
| 2 | Volume from design of NFA. |
| 3 | Equal to total NFA Volume (Row 1) minus Volume of Final Cover for NFA (Row 2) |
| 4 | Volume from topographic mapping. |
| 5 | Volume from topographic mapping. |
| 6 | Volume from City weighscale records. |
| 7 to 9 | Area from topographic mapping. |
| 10 | Volume based on depth of 0.9m of compacted soil and 0.15m of topsoil over area of Cells 2,3 and 4. |
| 11 | Volume equal to $1/5^{th}$ of total air space remaining for waste and daily cover (i.e. waste to daily cover ratio = 4:1). |
| 12 | Equal to total waste placed divided by total volume utilized from site opening for waste and daily cover only (Row 6 / Row 4). |
| 13 | 2021-Estimated annual volume assumed based on a 5 year average of 46,250 tonnes of waste per year and apparent waste density of 0.65 tonnes/cubic metre.<br>2022 - Increase estimated annual volume assumed based on a 5 year average of 46,600 tonnes of waste per year and apparent waste density of 0.65 tonnes/cubic metre. |
| 14 | Volume remaining for waste and daily cover in NFA (Row 5) divided by estimated volume required per year (Row 13). |
| 15 | Total Volume of NFA excluding final cover (Row 3) minus Landfill Volume Utilized (Row 4) divided by estimated volume required per year (Row 13). |
| 16 | Total Volume of NFA excluding final cover (Row 3) minus Landfill Volume Utilized (Row 4). |

**TABLE 3.1**
**2022 Daily Inspection Reports Summary**
**2022 ANNUAL MONITORING REPORT**
**Peterborough County/City Waste Management Facility**

| Month | Activities |
|---|---|
| January 2022 | • Drain Brothers, GHD, and DM Wills Associates onsite periodically during the month of January to complete earthworks and site monitoring North of the existing landfill.<br>• Peterborough Utilities Group (PUG) was onsite periodically throughout the month of January to complete maintenance work at the Landfill Gas Utilization Plant (LGUP).<br>• Drain Brothers onsite for RFP site meeting January 4.<br>• East forcemain pump in the North Fill Area (NFA) was reset to 0.0 hours January 25.<br>• City staff followed up with resident on January 26 regarding odour complaint made in December 2021. Odors haven't been an issue since the complaint.<br>• Wind-blown litter was collected on site during two (2) days in January. |
| February 2022 | • Drain Brothers and GHD onsite periodically during the month of February to complete earthworks and site monitoring North of the existing landfill.<br>• PUG was onsite periodically throughout the month of February to complete maintenance work at the LGUP.<br>• Barry Electric working on flare communication system February 7.<br>• 2 Redtail Hawks observed onsite February 8.<br>• Electrical issue with NFA East pump control repaired by Barry Electric February 16.<br>• Slight odours observed by City staff at tipping face February 16.<br>• Wind-blown litter was collected on site during two (2) days in February. |
| March 2022 | • Drain Brothers and GHD onsite periodically during the month of March to complete earthworks and site monitoring North of the existing landfill.<br>• 2 Red tail Hawks observed by City staff March 10.<br>• Todd Brothers and WSP onsite periodically during the month of March to complete works on Cell 4 construction.<br>• Electrical inspection by Electrical Safety Authority (ESA) March 21.<br>• Odours observed by City staff at tipping face March 28.<br>• Wind-blown litter was collected on site during eight (8) days in March. |
| April 2022 | • Todd Bros and WSP onsite periodically during the month of April to complete works on Cell 4 construction.<br>• Drain Brothers and GHD onsite periodically during the month of April to complete earthworks and site monitoring North of the existing landfill. |

**TABLE 3.1**
**2022 Daily Inspection Reports Summary**
**2022 ANNUAL MONITORING REPORT**
**Peterborough County/City Waste Management Facility**

| | |
|---|---|
| | • Pump station shut down for electrical repairs April 7 and back online April 8.<br>• Electrical issues with SFA communication system on April 13th. SFA pump station electrical repairs completed April 29.<br>• Wind-blown litter was collected on site during four (4) days in April. |
| May 2022 | • Todd Brothers and WSP onsite periodically during the month of May to complete works on Cell 4 construction.<br>• LGUP was offline May 10 for a few hours due to maintenance. Repair work was completed by PUG. The flare was not operational during repair. LGUP was back online a few hours later.<br>• Odours were noted by City staff on May 6 near the tipping face.<br>• By May 16, the flare had zero (0) hours of operation to date in 2022.<br>• LGUP was offline from May 21 to May 30 due to power outage from severe windstorm. The flare was operational during power outage.<br>• NFA and SFA pumping stations running off generator power during the power outage caused by the severe windstorm.<br>• Odours noted by City staff on May 26 near tipping face.<br>• Tomlinson started to place final cover on the north slope of Cell 3 May 26.<br>• Water was used to aid in dust control periodically in May.<br>• Wind-blown litter was collected on site during nineteen (19) days in May. |
| June 2022 | • Todd Brothers and WSP onsite periodically during the month of June to complete works on Cell 4 construction.<br>• Drain Brothers onsite periodically during the month of June to complete earthworks North of the existing landfill.<br>• LGUP was offline for maintenance from June 5 to 6. The flare was operational during the repair work.<br>• LGUP was offline for maintenance from June 14 to 21. The flare was operational during the repair work.<br>• Small seep noted in NFA by City staff on June 23. Repaired by Tomlinson on July 12.<br>• Water was used to aid in dust control periodically in June.<br>• Wind-blown litter was collected on site during twenty (20) days in June. |
| July 2022 | • Todd Brothers and WSP onsite periodically during the month of July to complete works on Cell 4 construction.<br>• Drain Brothers onsite periodically during the month of July to complete earthworks North of the existing landfill.<br>• LGUP was offline for maintenance from July 8 to July 11. The flare was operational during the repair work. |

**TABLE 3.1**
**2022 Daily Inspection Reports Summary**
**2022 ANNUAL MONITORING REPORT**
**Peterborough County/City Waste Management Facility**

| | |
|---|---|
| | • New Hour meter tracker installed in SCADA system by Barry Electric and Control Works on July 25.<br>• July 27 Barry Electric installed a new thermocouple to replace a failed one.<br>• Wind-blown litter was collected on site during nineteen (19) days in July. |
| August 2022 | • Todd Brothers and WSP onsite periodically during the month of August to complete works on Cell 4 construction.<br>• Drain Brothers onsite periodically during the month of August to complete earthworks North of the existing landfill.<br>• Tomlinson placed final cover on the north slope of Cells 2 and 3 August 30.<br>• Water was used to aid in dust control periodically in August.<br>• Wind-blown litter was collected on site during twenty one (21) days in August. |
| September 2022 | • Drain Brothers and GHD onsite periodically during the month of September to complete earthworks and site monitoring North of the existing landfill.<br>• Todd Bros and WSP onsite periodically during the month of September to complete works on Cell 4 construction.<br>• Nexicom and Peterborough Technology Services (PTS) onsite working on installing the new wireless cell service on local towers around the site and in scale house building on September 23.<br>• Franklin Empire onsite to calibrate flow meters, level sensors, and gas detectors on September 23.<br>• Wastewater Collection (WWC) team onsite on September 26.<br>• Odour noted by City staff on September 26 near tipping face.<br>• Tomlinson placed final cover around the north side of Cell 2 on September 26.<br>• Two (2) bald eagles observed by City staff on September 27.<br>• Scarborough Supply onsite on September 27 to aid in Cell 4 construction works.<br>• SCADA system work was ongoing on September 27.<br>• Wind-blown litter was collected on site during two (2) days in September.<br>• Water was used to aid in dust control periodically in September. |
| October 2022 | • Todd Brothers, Titan Environmental and WSP onsite periodically during the month of October to complete works on Cell 4.<br>• Drain Brothers onsite periodically during the month of October to complete earthworks and monitoring North of the existing landfill. |

**TABLE 3.1**
**2022 Daily Inspection Reports Summary**
**2022 ANNUAL MONITORING REPORT**
**Peterborough County/City Waste Management Facility**

| | |
|---|---|
| | • SCADA system work ongoing throughout the month of October for the south pump station leading to no hour metering completed.<br>• The generator was offline for three (3) hours during the week of October 19 for maintenance.<br>• Water was used to aid in dust control periodically in October.<br>• Wind-blown litter was collected on site during four (4) days in October. |
| November 2022 | • Todd Brothers, Titan Environmental and WSP onsite periodically during the month of November to complete works on Cell 4.<br>• Drain Brothers and GHD onsite periodically during the month of November to complete earth works and monitoring North of the existing landfill.<br>• Generator was shut off during gas main work on November 21 for approximately 1.5 hours in the afternoon.<br>• November 22 touch screen control for flare failed and replacement was ordered.<br>• November 23 and 24 an odour complaint was made by nearby residence. Upon inspection, the odour complaint was related to agricultural work nearby and not the landfill. MECP was informed.<br>• SCADA system repair work continued throughout the month of November.<br>• Slight odour noted by City staff near tipping face on November 24.<br>• Wind-blown litter was collected on site during four (4) days in November. |
| December 2022 | • Todd Brothers, Titan Environmental, Rose Erosion and WSP onsite periodically during the month of December to complete works on Cell 4.<br>• Two (2) bald eagles were observed by City staff on December 6 and again on December 29 and 30.<br>• Higher than usual number of gulls noted by City staff on December 6.<br>• Barry Electric and Control Works onsite to install new SCADA and control pump system in SFA pump station on December 20 and 21.<br>• Upgrades to and programming the SCADA system continued periodically throughout the remainder of the month from December 20.<br>• Tomlinson was observed placing final cover around the north edge of Cell 2 and 3 on December 29.<br>• Wind-blown litter was collected on-site during four (4) days in December. |

**TABLE 3.2**
**2022 Landfill Complaints**
**2022 ANNUAL MONITORING REPORT**
**Peterborough County/City Waste Management Facility**

| Complaint Number | Date of Complaint | Date of Incident /Complaint | Complaint Received By | Complaint | Reason/Outcome |
|---|---|---|---|---|---|
| 1 | February15th | February 15th - odour complaint | Don Briand | Odour complaint by Jay Schiller | Don Briand received complaint and spoke to Jay Schiller direct. By this time the odour had dissipated. |
| 2 | February 17th | February 16th, at 7:30 pm, Heavy odour was observed and still very distinct this morning (odour complaint) | Don Briand | Odour complaint by Jess Shannon - third party complaint, complaint saved on file from facebook. | Don Briand had responded via email and addressed her concern. |
| 3 | February 2nd | February 2nd - Email from Jessica Donoghue with multiple emails from concerned residents | Don Briand | Chris Long/Jessica Donoghue (Base line resident)— My family & I are are very concerned for how the Bensfort rd landfill is impeding on our home & the affects it will have on our drinking water. The closer this reaches our community, the more it will affect the aquifer, which will not only increase our water expenses but our taxes will increase depending on the treatment needed. We stand by bringing the Energy from waste site to life and hope that you can all look into the future for our children and theirs to come. This is important and a change needs to be made. | Conserns were addressed at SLC meeting February 01, 2022. City requested the residence email in their complaints to document. |
| 4 | February 2nd | February 2nd - Email from Jessica Donoghue with multiple emails from concerned residents | Don Briand | Chris Kierstead (Base line residence) — Besides the everyday issues of smell, possible water level contamination . The values of our properties are greatly effect now as the expansion is now within approx. 2kms or less of the sub division. The dump is way beyond the original date of life expectancy .Between the city and the township, maybe they should buy up all the area before we have a Love Canal issue with no recourse. --- its all monetary related to them with little regard to the residents. | Conserns were addressed at SLC meeting February 01, 2022. City requested the residence email in their complaints to document. |

| | | | | | |
|---|---|---|---|---|---|
| 5 | February 2nd | February 2nd - Email from Jessica Donoghue with multiple emails from concerned residents | Don Briand | Brittany Isabelle (Stewart hall resident)I'm under-prepared to provide much help in terms of feedback. I know a couple things though 1) I do experience poor smell here often, and sometimes confuse it with natural gas leaking smells. I've even called Enbridge and had someone out before to check! 2) I do not want it getting any closer to our neighbourhood! It's not just the community well water, it's people like me who are on a private well too! | Conserns were addressed at SLC meeting February 01, 2022. City requested the residence email in their complaints to document. |
| 6 | February 2nd | February 2nd - Email from Jessica Donoghue with multiple emails from concerned residents | Don Briand | Peter DeSanto (Peterborough resident)<br><br>1. Smell<br>(I have numerous emails back and forth with the City of Peterborough and they never fixed the increased potency of the smell due to constant generator shut down).<br>If you ask them how they complete their smell test, it's a real joke. They actually pay people to smell different bags to determine how strong the smell is. Very archaic! Everyone at the last meeting thought it was a joke, but unfortunately, that's how they complete the smell test. Crazy.<br><br>2. Noise<br>The challenge to get a proper reading of the noise they occurs or will occur during the shutdown timeframe. They always became uncomfortable when I asked for information regarding this issue. No proper testing has been ever done. | Conserns were addressed at SLC meeting February 01, 2022. City requested the residence email in their complaints to document. |

| | | | | | |
|---|---|---|---|---|---|
| 7 | February 2nd | February 2nd - Email from Jessica Donoghue with multiple emails from concerned residents | Don Briand | Hilary Flood (Peterborough resident)<br>As our communities continue to grow, it's important that the Peterborough Region is supported by sustainable waste management services. With so many neighboring municipalities adopting a Energy from Waste facilities including Durham County- it seems only logical that we consider adopting new innovations in the waste management space.<br>The Energy from Waste facility will help us reduce the amount of waste we create, and manage the generated waste as a resource, balancing financial needs and environmental sustainability.<br>Traditional landfill systems take up valuable resources and negatively impacts the health of our community, wetlands, and vital water shed. Energy from Waste has proven to be a viable and future-forward model that empowers responsible waste management without sacrificing community health.<br>I fully support this proposal build an Energy from Waste facility. We need to steward a new path forward for sustainable waste management in our community now, and for future generations.<br>Traditional landfill is not the answer. | Conserns were addressed at SLC meeting February 01, 2022. City requested the residence email in their complaints to document. |
| 8 | November 23rd | November 22nd and 23rd Email from Angela Lee | Karen Meekin forward by County of Peterborough staff | Email: Yesterday November 22 and today, there has been waves of a strong odour coming from the landfill. OSM has acknowledged that the scent is coming from the landfill but has not explained why or what. It smells like a mix of rotten hot summer garbage and burning wood. Residents here around Stewart Hall would like to know what is causing it and how many more days to expect. If you are doing maintenance on the old dump site, then please let us know, and for how long. | Construction work related to cell #4 construction has required us to shut down the flare and generator while the contractor hooks up new gas collection lines, in addition to these shut downs excavation in existing waste is also required but should be completed by end of day today. Both of these activities have caused the gas and odour issues related to the landfill over the last few days but everything will be back online and operating as normal tomorrow. Karen Meekin spoke to Angela at 3:45pm and explained the above reason for the odour |

| | | | | | |
|---|---|---|---|---|---|
| 9 | November 24th | November 24th<br>Call received from Lori | Karen Meekin | Odour complaint | Karen Meekin spoke with Lori about investigating the smell. Don Briand conducted a drive-by inspection of a nearby farm that had received a delivery of bio-soil fertilizer that was causing the smell and was unrelated to the landfill. Don also spoke with Lori to explain. |
| 10 | November 24th | November 24th | Don Briand | Odour complaint | Don checked on the concern and was aware that a farm close by received a delivery of bio-soil fertilizer that was causing the smell and was unrelated to the landfill. Email is on file in regards to the response to the MECP. |

**TABLE 4.1**
**Leachate / Groundwater Volume to Sanitary Sewer**
**2022 ANNUAL MONITORING REPORT**
**Peterborough County/City Waste Management Facility**

| Month | SFA Lift Station - Leachate Pumped[1] (cubic metres) | NFA Lift Station - Leachate Pumped[1] (cubic metres) | Cumulative Volume (cubic metres) | 2022 Monthly Leachate Flow to Sewer (cubic metres/month) |
|---|---|---|---|---|
| January | 3,110 | 1,231 | 4,340 | 4,340 |
| February | 1,148 | 4,583 | 10,070 | 5,730 |
| March | 1,906 | 5,783 | 17,760 | 7,690 |
| April | 5,764 | 1,821 | 25,344 | 7,585 |
| May | 2,159 | 1,569 | 29,072 | 3,728 |
| June | 2,556 | 1,813 | 33,441 | 4,369 |
| July | 1,172 | 740 | 35,353 | 1,911 |
| August | 946 | 760 | 37,058 | 1,706 |
| September | 1,328 | 669 | 39,055 | 1,997 |
| October | 1,477 | 843 | 41,376 | 2,321 |
| November | 1,044 | 700 | 43,120 | 1,744 |
| December | 2,091 | 2,392 | 47,603 | 4,483 |
| **2022 Total** | **24,700** | **22,903** | | **47,603** |

Notes:

1. Volumes provided by the City of Peterborough.

**TABLE 4.2**
**Weekly Leachate/Groundwater Volume to Sanitary Sewer**
**2022 ANNUAL MONITORING REPORT**
**Peterborough County/City Waste Management Facility**

| From | To | SFA | NFA | TOTAL |
|---|---|---|---|---|
| 1-Jan | 7-Jan | 646.5 | 335.2 | 981.7 |
| 8-Jan | 14-Jan | 784.9 | 328.6 | 1,113.5 |
| 15-Jan | 21-Jan | 565.1 | 188.0 | 753.1 |
| 22-Jan | 28-Jan | 848.9 | 263.4 | 1,112.3 |
| 29-Jan | 4-Feb | 371.4 | 230.5 | 601.9 |
| 5-Feb | 11-Feb | 309.7 | 275.6 | 585.2 |
| 12-Feb | 18-Feb | 271.7 | 1,093.4 | 1,365.1 |
| 19-Feb | 25-Feb | 238.2 | 2,049.3 | 2,287.5 |
| 26-Feb | 4-Mar | 443.8 | 1,617.5 | 2,061.3 |
| 5-Mar | 11-Mar | 564.1 | 2,202.8 | 2,766.9 |
| 12-Mar | 18-Mar | 249.5 | 1,369.1 | 1,618.7 |
| 19-Mar | 25-Mar | 221.4 | 1,187.3 | 1,408.7 |
| 26-Mar | 1-Apr | 570.2 | 542.4 | 1,112.6 |
| 2-Apr | 8-Apr | 35.4 | 359.5 | 394.9 |
| 9-Apr | 15-Apr | 124.9 | 354.4 | 479.4 |
| 16-Apr | 22-Apr | 123.2 | 489.8 | 613.0 |
| 23-Apr | 29-Apr | 1,298.0 | 472.4 | 1,770.4 |
| 30-Apr | 6-May | 1,298.0 | 618.2 | 1,916.2 |
| 7-May | 13-May | 831.1 | 228.6 | 1,059.6 |
| 14-May | 20-May | 831.1 | 430.7 | 1,261.7 |
| 21-May | 27-May | 540.9 | 196.4 | 737.3 |
| 28-May | 3-Jun | 620.9 | 203.7 | 824.6 |
| 4-Jun | 10-Jun | 620.9 | 826.3 | 1,447.2 |
| 11-Jun | 17-Jun | 620.9 | 542.8 | 1,163.7 |
| 18-Jun | 24-Jun | 620.9 | 199.6 | 820.5 |
| 25-Jun | 1-Jul | 620.9 | 186.0 | 806.9 |
| 2-Jul | 8-Jul | 620.9 | 154.1 | 775.0 |
| 9-Jul | 15-Jul | 620.9 | 155.5 | 776.4 |
| 16-Jul | 22-Jul | 620.9 | 184.3 | 805.2 |
| 23-Jul | 29-Jul | 580.5 | 158.2 | 738.7 |
| 30-Jul | 5-Aug | 347.3 | 148.2 | 495.5 |
| 6-Aug | 12-Aug | 426.5 | 153.2 | 579.7 |
| 13-Aug | 19-Aug | 413.5 | 164.5 | 578.1 |
| 20-Aug | 26-Aug | 379.2 | 223.3 | 602.5 |
| 27-Aug | 2-Sep | 248.2 | 119.7 | 367.9 |
| 3-Sep | 9-Sep | 221.2 | 12.6 | 233.8 |
| 10-Sep | 16-Sep | 221.2 | 217.2 | 438.4 |
| 17-Sep | 23-Sep | 221.2 | 301.0 | 522.2 |
| 24-Sep | 30-Sep | 221.2 | 118.0 | 339.2 |
| 1-Oct | 7-Oct | 221.2 | 168.9 | 390.1 |
| 8-Oct | 14-Oct | 235.9 | 135.6 | 371.5 |
| 15-Oct | 21-Oct | 182.8 | 180.0 | 362.8 |
| 22-Oct | 28-Oct | 227.5 | 141.4 | 368.9 |
| 29-Oct | 4-Nov | 128.3 | 166.7 | 295.0 |
| 5-Nov | 11-Nov | 633.2 | 143.5 | 776.7 |
| 12-Nov | 18-Nov | 451.0 | 163.4 | 614.4 |
| 19-Nov | 25-Nov | 132.5 | 252.8 | 385.3 |
| 26-Nov | 2-Dec | 159.3 | 370.2 | 529.5 |
| 3-Dec | 9-Dec | 432.0 | 355.5 | 787.5 |
| 10-Dec | 16-Dec | 408.3 | 260.3 | 668.6 |
| 17-Dec | 23-Dec | 328.5 | 732.9 | 1,061.3 |
| 24-Dec | 31-Dec | 871.9 | 852.3 | 1,724.2 |
| | **2022 TOTAL** | **23,827.5** | **22,824.7** | **46,652.2** |

Note:

1. Leachate totals vary from those found in Table 4.1 due to data ranging from January 3 to December 31, 2022 and electrical issues to the SFA totalizer panel.
2. Leachate volumes based on totalizer readings.

**Table 4.3**
**Detected Organic Parameters - Leachate Holding Tanks**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | SEWER USE BYLAW | SFA | | NFA | |
|---|---|---|---|---|---|---|
| | | | Mar-22 | Oct-22 | Mar-22 | Oct-22 |
| 1,1-Dichloroethane | µg/L | | **0.6** | <0.5 | <0.5 | <0.5 |
| 1,4-Dichlorobenzene | µg/L | 80 | **6.7** | **4.2** | <0.5 | <0.5 |
| Chlorobenzene | µg/L | | **4.6** | **2** | <0.5 | <0.5 |
| m/p-Xylene | µg/L | | **2.4** | <0.5 | <0.5 | **0.7** |
| nonyl-Phenols | µg/L | 1 | **3** | **2** | **1** | **2** |
| o-Xylene | µg/L | | **4.6** | <0.5 | <0.5 | <0.5 |
| Phenols - Total | µg/L | 1000 | **5** | **4** | **9** | **9** |
| Xylenes - total | µg/L | 1400 | **7** | <0.5 | <0.5 | **1** |

NOTES: 1) "-" - Indicates parameter not analysed.
Bolded values indicate detected concentration, above the laboratory reportable detection limit.
2) Only parameters that were detected at least once in 2022 are listed.
3) NFA - North Fill Area Leachate Holding Tank
SFA - South Fill Area Leachate Holding Tank

**TABLE 4.4**
**Leachate Collection System Inspection Checklist**
**2022 ANNUAL MONITORING REPORT**
**Peterborough Waste Management Facility**
**The County and The City of Peterborough**

## Peterborough Waste Management Facility
## Leachate Collection System Inspection & Cleaning Checklist

**Date Started:** August 2022

**Date Completed:** September 2022

**Completed By:** Tim Haffam (City of Peterborough)

| NORTH FILL AREA | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **DATE** | **PIPE REFERENCE** | **DESCRIPTION** | **PIPE SIZE** | **GAS ALARM** | **MANHOLE VACUUM** | **FLUSHED DISTANCE (m)** | **VIDEO DISTANCE (m)** | **PIPE CONDITION** | **COMMENTS** |
| N/A | 308080 | MHL1 (S. Inv.) - PS (Holding Tank) | Diameter = 200mm Length = ±40m | Yes No | Yes No | - | - | Poor Good | Can't go through valve |
| 2022-09-26 | 308090 | MHL1 (NE. Inv.) - MHL5 East Line | Diameter = 200mm Length = ±222m | Yes No | Yes No | 140.0 | 200.0 | Poor Good | Sag observed at 90m |
| 2022-09-01 | 308088 | MHL1 (N. Inv.) - MHL5 Central Line | Diameter = 200mm Length = ±185m | Yes No | Yes No | 140.0 | 185.0 | Poor Good | |
| 2022-09-26 | 308086 | MHL1 (NW. Inv.) - MHL5 West Line | Diameter = 200mm Length = ±184m | Yes No | Yes No | 114.3 | 120.8 | Poor Good | |
| 2022-09-26 | 308092 | MHL1 (SW. Inv.) - MHL2 | Diameter = 200mm Length = ±57m | Yes No | Yes No | 54.0 | 51.3 | Poor Good | |
| 2022-09-01 | 308090 | MHL5 (E. Inv.) - MHL1 East Line | Diameter = 200mm Length = ±222m | Yes No | Yes No | 202.0 | 61.9 | Poor Good | |
| 2022-09-01 | 308088 | MHL5 (SE. Inv.) - MHL1 Central Line | Diameter = 200mm Length = ±185m | Yes No | Yes No | 190.0 | 185.0 | Poor Good | |
| 2022-09-26 | 308086 | MHL5 (S. Inv.) - MHL1 West Line | Diameter = 200mm Length = ±184m | Yes No | Yes No | 122.0 | 75.2 | Poor Good | |
| 2022-09-01 | 316526 | MHL5 (W. Inv.) - MHL6 | Diameter = 200mm Length = ±50m | Yes No | Yes No | 51.0 | 47.8 | Poor Good | |
| 2022-09-01 | 308084 | MHL2 (N. Inv.) - MHL6 East Line | Diameter = 200mm Length = ±213m | Yes No | Yes No | 200.0 | 144.1 | Poor Good | |
| 2022-09-01 | 308082 | MHL2 (NW. Inv.) - MHL6 West Line | Diameter = 200mm Length = ±208m | Yes No | Yes No | 200.0 | 196.7 | Poor Good | |
| 2022-09-26 | 308096 | MHL2 (SW. Inv.) - MHL3 | Diameter = 200mm Length = ±53m | Yes No | Yes No | 52.0 | 54.2 | Poor Good | |
| 2022-09-01 | 308084 | MHL6 (SE. Inv.) - MHL2 East Line | Diameter = 200mm Length = ±213m | Yes No | Yes No | 150.0 | 144.1 | Poor Good | Couldn't pass HDPE coupler welds |
| 2022-09-01 | 308082 | MHL6 (S. Inv.) - MHL2 West Line | Diameter = 200mm Length = ±208m | Yes No | Yes No | 202.0 | 196.7 | Poor Good | |
| 2022-08-29 | 308298 | MHL3 (N. Inv.) - MHL7 East Line | Diameter = 200mm Length = ±274m | Yes No | Yes No | 105.7 | 94.8 | Poor Good | |
| 2022-08-29 | 308296 | MHL3 (N. Inv.) - MHL7 East Central Line | Diameter = 200mm Length = ±244m | Yes No | Yes No | 89.9 | 138.7 | Poor Good | |
| 2022-08-29 | 308292 | MHL3 (NE. Inv.) - MHL7 West Central Line | Diameter = 200mm Length = ±240m | Yes No | Yes No | 99.1 | 128.3 | Poor Good | |
| 2022-08-29 | 308288 | MHL3 (NE. Inv.) - MHL7 West Line | Diameter = 200mm Length = ±264m | Yes No | Yes No | 109.7 | 112.3 | Poor Good | |
| 2022-08-29 | 316530 | MHL3 (W. Inv.) - Capped End | Diameter = 200mm Length = ±88m | Yes No | Yes No | 75.3 | 83.8 | Poor Good | |
| 2022-08-30 | 308298 | MHL7 (E. Inv.) - MHL3 East Line | Diameter = 200mm Length = ±274m | Yes No | Yes No | 103.6 | 132.7 | Poor Good | |
| 2022-08-30 | 308296 | MHL7 (SE. Inv.) - MHL3 East Central Line | Diameter = 200mm Length = ±244m | Yes No | Yes No | 99.0 | 145.0 | Poor Good | |
| 2022-08-30 | 308292 | MHL7 (SE. Inv.) - MHL3 West Central Line | Diameter = 200mm Length = ±240m | Yes No | Yes No | 107.2 | 101.7 | Poor Good | |
| 2022-08-30 | 308288 | MHL7 (S. Inv.) - MHL3 West Line | Diameter = 200mm Length = ±264m | Yes No | Yes No | 107.2 | 87.5 | Poor Good | |

Note: Please provide comments if pipe condition is found to be "Poor".

| NORTH FILL AREA | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **DATE** | **PIPE REFERENCE** | **DESCRIPTION** | **PIPE SIZE** | **GAS ALARM** | **MANHOLE VACUUM** | **FLUSHED DISTANCE (m)** | **VIDEO DISTANCE (m)** | **PIPE CONDITION** | **COMMENTS** |
| 2022-12-19 | Cell 4 - P4 | MHL4 (N. Inv.) - MHL8 East Line | Diameter = 200mm Length = ±290m | Yes No | Yes No | 0.0 | 91.1 | Poor Good | - Eye View Services LTD. completed inspection of Cell 4 LCS pipes at completion of cell construction. Could not access mnaholes for flushing. |
| 2022-12-19 | Cell 4 - P3 | MHL4 (NW. Inv) - MHL8 East Central Line | Diameter = 200mm Length = ±265m | Yes No | Yes No | 0.0 | 96.3 | Poor Good | - Eye View Services LTD. completed inspection of Cell 4 LCS pipes at completion of cell construction. Could not access mnaholes for flushing. |
| 2022-12-19 | Cell 4 - P2 | MHL4 (NW. Inv) - MHL8 West Central Line | Diameter = 200mm Length = ±265m | Yes No | Yes No | 0.0 | 21.2 | Poor Good | - Eye View Services LTD. completed inspection of Cell 4 LCS pipes at completion of cell construction. Could not access mnaholes for flushing. |
| 2022-12-19 | Cell 4 - P1 | MHL4 (W. Inv.) - MHL8 West Line | Diameter = 200mm Length = ±300m | Yes No | Yes No | 0.0 | 80.4 | Poor Good | - Eye View Services LTD. completed inspection of Cell 4 LCS pipes at completion of cell construction. Could not access mnaholes for flushing. |
| - | 316530 | MHL4 (E. Inv.) - MHL3 | Diameter = 200mm Length = ±98m | Yes No | Yes No | 0.0 | 0.0 | Poor Good | Valve closed unable to access |
| 2022-12-20 | Cell 4 - P4 | MHL8 (E. Inv.) - MHL4 East Line | Diameter = 200mm Length = ±290m | Yes No | Yes No | 0.0 | 111.4 | Poor Good | - Eye View Services LTD. completed inspection of Cell 4 LCS pipes at completion of cell construction. Could not access mnaholes for flushing. |
| 2022-12-20 | Cell 4 - P3 | MHL8 (SE. Inv.) - MHL4 East Central Line | Diameter = 200mm Length = ±265m | Yes No | Yes No | 0.0 | 6.0 | Poor Good | - Eye View Services LTD. completed inspection of Cell 4 LCS pipes at completion of cell construction. Could not access mnaholes for flushing. Couldn't get camera passed HDPE pipe coupler welds. |
| 2022-12-20 | Cell 4 - P2 | MHL8 (SE. Inv.) - MHL4 West Central Line | Diameter = 200mm Length = ±265m | Yes No | Yes No | 0.0 | 49.1 | Poor Good | - Eye View Services LTD. completed inspection of Cell 4 LCS pipes at completion of cell construction. Could not access mnaholes for flushing. |
| 2022-12-20 | Cell 4 - P1 | MHL8 (S. Inv) - MHL4 West Line | Diameter = 200mm Length = ±300m | Yes No | Yes No | 0.0 | 115.5 | Poor Good | - Eye View Services LTD. completed inspection of Cell 4 LCS pipes at completion of cell construction. Could not access mnaholes for flushing. |

Note: Please provide comments if pipe condition is found to be "Poor".

| SOUTH FILL AREA | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **DATE** | **PIPE REFERENCE** | **DESCRIPTION** | **PIPE SIZE** | **GAS ALARM** | **MANHOLE VACCUM** | **FLUSHED DISTANCE (m)** | **VIDEO DISTANCE (m)** | **PIPE CONDITION** | **COMMENTS** |
| 2022-10-04 | 179538 | MHT10-07 - South Invert Underdrain | Diameter = 150mm Length = ±157m | Yes No | Yes No | 109.0 | | Poor Good | |
| 2022-10-04 | 179540 | MHT10-07 - MHT9-94 Gravity Drain | Diameter = 200mm Length = ±89m | Yes No | Yes No | 91.0 | | Poor Good | |
| 2022-10-04 | 179543 | MHT9-94 - South Invert Underdrain | Diameter = 150mm Length = ±95m | Yes No | Yes No | 78.0 | | Poor Good | |
| 2022-10-04 | 179544 | MHT9-94 - MHT8-94 Gravity Drain | Diameter = 200mm Length = ±39m | Yes No | Yes No | 36.0 | | Poor Good | |
| 2022-10-04 | 179547 | MHT8-94 - South Invert Underdrain | Diameter = 150mm Length = ±116m | Yes No | Yes No | 58.0 | | Poor Good | |
| - | 179548 | MHT7-94 - MHT8-94 Gravity Drain | Diameter = 200mm Length = ±40m | Yes No | Yes No | 0.0 | | Poor Good | |
| - | 179551 | MHT7-94 - South Invert Underdrain | Diameter = 150mm Length = ±172m | Yes No | Yes No | 0.0 | | Poor Good | |
| 2022-10-04 | 179552 | MHT7-94 - MHT6-94 Gravity Drain | Diameter = 200mm Length = ±61m | Yes No | Yes No | 3.0 | | Poor Good | Valve in way |
| 2022-10-04 | 179554 | MH-T5 - MHT6-94 Gravity Drain | Diameter = 200mm Length = ±86m | Yes No | Yes No | 67.0 | | Poor Good | |
| 2022-10-04 | 179580 | MH-T5 - MH-G Gravity Drain | Diameter = 200mm Length = ±11m | Yes No | Yes No | 11.0 | | Poor Good | |
| 2022-10-04 | 179574 | MH-G - East Cleanout Toe Drain | Diameter = 150mm Length = ±34m | Yes No | Yes No | 0.0 | | Poor Good | |
| 2022-10-04 | 179578 | MH-G - West Cleanout Toe Drain | Diameter = 150mm Length = ±51m | Yes No | Yes No | 47.0 | | Poor Good | |
| - | 179567 179561 | MH-G - South Invert Toe Drain | Diameter = 150mm Length = ±80m | Yes No | Yes No | 0.0 | | Poor Good | Do Not Attempt Flushing |
| 2022-10-04 | 179581 | MH-T4 - MH-T5 Gravity Drain | Diameter = 250mm Length = ±118m | Yes No | Yes No | 128.0 | | Poor Good | |
| 2022-10-04 | 179583 | MH-T3 - MH-T4 Gravity Drain | Diameter = 250mm Length = ±118m | Yes No | Yes No | 106.0 | | Poor Good | |
| 2022-10-06 | 179585 | MH-T2 - MH-T3 Gravity Drain | Diameter = 250mm Length = ±87m | Yes No | Yes No | 88.0 | | Poor Good | |
| 2022-10-06 | 179587 | MH-T1 - MH-T2 Gravity Drain | Diameter = 250mm Length = ±66m | Yes No | Yes No | 65.0 | | Poor Good | |
| 2022-10-06 | 179597 179595 | MH-I2 - MH-I1 Underdrain | Diameter = 200mm Length = ±155m | Yes No | Yes No | 149.0 | | Poor Good | - 179597 - 15m flushed<br>- 179595 - 134m flushed |
| 2022-10-06 | 179599 | MH-I2 - MH-I3 Gravity Drain | Diameter = 200mm Length = ±27m | Yes No | Yes No | 27.0 | | Poor Good | |
| 2022-10-06 | 179602 | MH-I3 - West Invert Underdrain | Diameter = 150mm Length = ±170m | Yes No | Yes No | 170.0 | | Poor Good | |
| 2022-10-06 | 179603 | MH-I3 - MH-I4 Gravity Drain | Diameter = 200mm Length = ±31m | Yes No | Yes No | 31.0 | | Poor Good | |
| 2022-10-06 | 179606 | MH-I4 - West Invert Underdrain | Diameter = 150mm Length = ±135m | Yes No | Yes No | 134.0 | | Poor Good | |
| 2022-10-06 | 179607 | MH-I4 - MH-I5 Gravity Drain | Diameter = 200mm Length = ±30m | Yes No | Yes No | 29.0 | | Poor Good | |

Note: Please provide comments if pipe condition is found to be "Poor".

**TABLE 4.4**
**Leachate Collection System Inspection Checklist**
**2022 ANNUAL MONITORING REPORT**
**Peterborough Waste Management Facility**
**The County and The City of Peterborough**

| SOUTH FILL AREA | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **DATE** | **PIPE REFERENCE** | **DESCRIPTION** | **PIPE SIZE** | **GAS ALARM** | **MANHOLE VACCUM** | **FLUSHED DISTANCE (m)** | **VIDEO DISTANCE (m)** | **PIPE CONDITION** | **COMMENTS** |
| 2022-10-06 | 179610 | MH-I5 - West Invert Underdrain | Diameter = 150mm Length = ±122m | Yes No | Yes No | 121.0 | | Poor Good | |
| 2022-10-06 | 179611 | MH-I5 - MH-J1 Gravity Drain | Diameter = 200mm Length = ±30m | Yes No | Yes No | 30.0 | | Poor Good | |
| 2022-10-06 | 179614 | MH-J1 - West Invert Underdrain | Diameter = 150mm Length = ±114m | Yes No | Yes No | 113.0 | | Poor Good | |
| 2022-10-06 | 179589 | MH-J2 - MH-T1 Gravity Drain | Diameter = 200mm Length = ±9m | Yes No | Yes No | 7.0 | | Poor Good | |
| 2022-10-06 | 179615 | MH-J2 - MH-J1 Gravity Drain | Diameter = 200mm Length = ±30m | Yes No | Yes No | 30.0 | | Poor Good | |
| 2022-10-06 | 179711 | MH-J2 - West Invert Underdrain | Diameter = 150mm Length = ±94m | Yes No | Yes No | 67.0 | | Poor Good | |
| 2022-10-06 | 179591 | MH-J2 - MH-J3 Gravity Drain | Diameter = 200mm Length = ±30m | Yes No | Yes No | 27.0 | | Poor Good | |
| 2022-10-06 | 179710 | MH-J3 - West Invert Underdrain | Diameter = 150mm Length = ±103m | Yes No | Yes No | 105.0 | | Poor Good | |
| 2022-10-06 | 179593 | MH-D2 - MH-J3 Gravity Drain | Diameter = 200mm Length = ±34m | Yes No | Yes No | 32.0 | | Poor Good | |
| 2022-10-06 | 179534, 179526, 179518, 179514, 179510 | MH-D2 - West Invert Underdrain | Diameter = 150mm Length = ±174m | Yes No | Yes No | 144.0 | | Poor Good | - 179534 - 12m flushed<br>- 179526 - 53m flushed<br>- 179518 - 46m flushed<br>- 179514 - 33m flushed |
| 2022-10-06 | 179536 | MH-D2 - PS (Holding Tank) | Diameter = 200mm Length = ±117m | Yes No | Yes No | 90.0 | | Poor Good | |
| 2022-10-06 | 179655 | MH-5 - MH-6 Intercept Drain | Diameter = 200mm Length = ±62m | Yes No | Yes No | 63.0 | | Poor Good | |
| 2022-10-06 | 179656 | MH-4 - MH-5 Intercept Drain | Diameter = 200mm Length = ±69m | Yes No | Yes No | 69.0 | | Poor Good | |
| - | 179657 | MH-4 - PS (Holding Tank) 179536 | Diameter = 75mm Length = ±37m | Yes No | Yes No | 0.0 | | Poor Good | Flushing Not Required |
| 2022-10-06 | 179654 | MH-4 - MH-3 Intercept Drain | Diameter = 300mm Length = ±91m | Yes No | Yes No | 78.0 | | Poor Good | |
| 2022-10-06 | 179653 | MH-3 - MH-2 Intercept Drain | Diameter = 300mm Length = ±108m | Yes No | Yes No | 107.0 | | Poor Good | |
| 2022-10-06 | 179652 | MH-2 - MH-1 Intercept Drain | Diameter = 250mm Length = ±86m | Yes No | Yes No | 91.0 | | Poor Good | |
| - | 316534 | TDCO-A1 - North Invert Toe Drain | Diameter = 150mm Length = ±360m | Yes No | Yes No | 0.0 | | Poor Good | |
| 2022-10-05 | 179428 | TDCO-A1 - TDCO-A2 Toe Drain | Diameter = 150mm Length = ±56m | Yes No | Yes No | 50.0 | | Poor Good | |
| 2022-10-05 | 179431 | TDCO-A2 - TDCO-A3 Toe Drain | Diameter = 150mm Length = ±60m | Yes No | Yes No | 26.0 | | Poor Good | |
| 2022-10-05 | 179433 | TDCO-A3 - MH-A1 Toe Drain | Diameter = 150mm Length = ±48m | Yes No | Yes No | 47.0 | | Poor Good | |
| 2022-10-05 | 179435 | MH-A1 - TDCO-A4 Toe Drain | Diameter = 150mm Length = ±58m | Yes No | Yes No | 111.0 | | Poor Good | |

Note: Please provide comments if pipe condition is found to be "Poor".

**TABLE 4.4**
**Leachate Collection System Inspection Checklist**
**2022 ANNUAL MONITORING REPORT**
**Peterborough Waste Management Facility**
**The County and The City of Peterborough**

| SOUTH FILL AREA | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **DATE** | **PIPE REFERENCE** | **DESCRIPTION** | **PIPE SIZE** | **GAS ALARM** | **MANHOLE VACCUM** | **FLUSHED DISTANCE (m)** | **VIDEO DISTANCE (m)** | **PIPE CONDITION** | **COMMENTS** |
| 2022-10-05 | 179437 | MH-B1 - TDCO-A4<br>Toe Drain | Diameter = 150mm<br>Length = ±46m | Yes No | Yes No | 50.0 | | Poor Good | |
| 2022-10-05 | 179463 | MH-B1 - LCO3-94<br>Transfer Piping | Diameter = 150mm<br>Length = ±42m | Yes No | Yes No | 42.0 | | Poor Good | |
| - | 179439 | MH-C1 - MH-B1<br>Toe Drain | Diameter = 200mm<br>Length = ±104m | Yes No | Yes No | 0.0 | | Poor Good | |
| 2022-10-05 | 179441 | MH-C1 - PS (Holding Tank) | Diameter = 200mm<br>Length = ±101m | Yes No | Yes No | 30.0 | | Poor Good | |
| 2022-10-05 | 179503 | MH-C1 - LCO5-94<br>Transfer Piping | Diameter = 150mm<br>Length = ±37m | Yes No | Yes No | 42.0 | | Poor Good | |
| 2022-10-05 | 179443 | HCO1-94 - HCO2-94<br>Phase 1 Header | Diameter = 150mm<br>Length = ±78m | Yes No | Yes No | 68.0 | | Poor Good | |
| 2022-10-05 | 179445, 179451, 179457, 179464, 179470, 179472 | HCO2-94 (North Invert) - HCO3-94<br>Phase 1 Header | Diameter = 150mm<br>Length = ±190m | Yes No | Yes No | 80.0 | | Poor Good | - 179445 - 19m flushed<br>- 179451 - 45m flushed<br>- 179457 - 16m flushed |
| - | 179472, 179470, 179464, 179457, 179451, 179445 | HCO3-94 (South Invert) - HCO2-94<br>Phase 1 Header | Diameter = 150mm<br>Length = ±190m | Yes No | Yes No | 0.0 | | Poor Good | |
| - | 179476, 179500, 179496, 179490, 179483, 179482 | HCO4-95 (North Invert) - HCO5-95<br>Phase 1 Header | Diameter = 150mm<br>Length = ±202m | Yes No | Yes No | 0.0 | | Poor Good | |
| 2022-10-05 | 179482, 179483, 179490, 179496, 179500, 179476 | HCO5-95 (South Invert) - HCO4-95<br>Phase 1 Header | Diameter = 150mm<br>Length = ±202m | Yes No | Yes No | 46.0 | | Poor Good | |
| - | 179529 | HCO91-1 - South Invert<br>Cell J Header | Diameter = 150mm<br>Length = ±75m | Yes No | Yes No | 0.0 | | Poor Good | No Access |
| 2022-10-05 | 179447<br>179449 | LCO1-94 - VC1-94<br>Underdrain | Diameter = 150mm<br>Length = ±101m | Yes No | Yes No | 74.0 | | Poor Good | - 179447 - 5m flushed<br>- 179449 - 69m flushed |
| 2022-10-05 | 179456<br>179454 | LCO2-94 - VC2-94<br>Underdrain | Diameter = 150mm<br>Length = ±118m | Yes No | Yes No | 4.0 | | Poor Good | - 179456 - 4m flushed |
| 2022-10-05 | 179461<br>179460 | LCO3-94 - VC3-94<br>Underdrain | Diameter = 150mm<br>Length = ±133m | Yes No | Yes No | 6.0 | | Poor Good | - 179461 - 6m flushed |
| 2022-10-05 | 179469<br>179467 | LCO4-94 - VC4-94<br>Underdrain | Diameter = 150mm<br>Length = ±138m | Yes No | Yes No | 42.0 | | Poor Good | - 179469 - 4m flushed<br>- 179467 - 38m flushed |
| 2022-10-05 | 179501<br>179499 | LCO5-94 - VC5-94<br>Underdrain | Diameter = 150mm<br>Length = ±152m | Yes No | Yes No | 111.0 | | Poor Good | - 179501 - 6m flushed<br>- 179499 - 105m flushed |
| 2022-10-05 | 179492<br>179495 | LCO6-94 - VC6-94<br>Underdrain | Diameter = 150mm<br>Length = ±160m | Yes No | Yes No | 89.0 | | Poor Good | - 179492 - 47m flushed<br>- 179495 - 42m flushed |
| 2022-10-05 | 179485<br>179489 | LCO7-94 - VC7-94<br>Underdrain | Diameter = 150mm<br>Length = ±168m | Yes No | Yes No | 6.0 | | Poor Good | - 179485 - 6m flushed |

Note: Please provide comments if pipe condition is found to be "Poor".

**Table 5.1**
**Groundwater Monitor Location Summary**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| RELATIVE LOCATION | | OVERBURDEN | SHALLOW BEDROCK | DEEP BEDROCK |
|---|---|---|---|---|
| **CELL 1 - SOUTH** | Downgradient of refuse, before interceptor | 5-VI 17B 19B 59-I 59-II | 5-V 17A 19A | 5-IV 17-I |
| | Between interceptor trench and central water course | 18B 20B 21B 21C<br>62-II 64-II | 18A 20A 21A | 62-I 64-I |
| | Beyond central water course | 15A 15B 16C 30-II 52-II<br>53-II 54-II | 16A 30-I 52-I 53-I | 54-I |
| **CELL 1 - NORTH**<br>**East Side** | Adjacent to landfill service roads | 45 47 48 49 65-I<br>74-II 74-III 81-II 81-III | 74-I 81-I | |
| | Buffer zone on east side of Bensfort Road | 46-II 46-III 50-II 50-III 61-II<br>61-III | 46-I 50-I 61-I | |
| | Further east in buffer lands | 31-II 75-II 63-II 63-III 76-III<br>76-IV | 31-I 76-II | 63-I 75-I<br>76-I |
| **CELL 1 - NORTH**<br>**North side** | Flow is towards central wetland | 8-II 8-III 33-II 33-III 66-II<br>66-III 71-II 71-III 72-II 72-III<br>77-I 78-I 113-II 113-III | 8-I 71-I 72-I 113-I | 33-I 66-I |
| **CELL 1 - NORTH**<br>**North and West side**<br>**Flow is towards Central wetland** | Vicinity of former Phase 2 | 38-II 38-III 42-I 42-II 42-III<br>100-II 100-III 101-II 101-III | 100-I 101-I | 38-I |
| | Further away in wetland to northwest | 37-II 40-II 41-III 44-III | 37-I 40-I 41-II 44-II | 41-I 44-I |
| **NFA** | Southerly flow toward central wetland | 82-I 84-II 85-II 86-III 87-II<br>87-III 88-III 89-III 90-II 90-III<br>91-II 91-III 92-II 92-III 93-I<br>93-II 94-I 94-II 95-I 95-II<br>104-II 104-III 106-II 106-III 107-II<br>107-III 108-I 108-II 108-III 109-I<br>109-II 109-III 110-I 110-II 110-III<br>111-I 111-II 111-III 112-I 112-II<br>112-III | 83-I 84-I 85-I 86-I<br>86-II 87-I 88-I 88-II<br>89-I 89-II 90-I 91-I<br>92-I 104-I 106-I 107-I | |

**Table 5.2**
**Summary Of Water Quality**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | Fresh Overburden [1] | | Fresh Bedrock [2] | | Refuse [3] | | Collection System [4] | | Concentrated Brine [5] | | Brine [6] | | Road Salt - Impacted [7] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Historical (Pre-2021) | 2022 | Historical (Pre-2021) | 2022 | Historical (Pre-2021) | 2022 | Historical (Pre-2021) | 2022 | Historical (Pre-2021) | 2022 | Historical (Pre-2021) | 2022 | Historical (Pre-2021) | 2022 |
| Alkalinity | mg/L | 58.8 - 634 | 165 - 361 | 80 - 330 | 163 - 348 | 1 - 11591 | 1010 | 115 - 7370 | 838 - 2920 | 66.8 - 376 | 165 - 218 | 111 - 853 | 168 - 601 | 123 - 491 | 232 - 317 |
| Ammonia | mg/L | 0.02 - 3.3 | 0.1 - 0.3 | 0.03 - 1.3 | 0.1 - 0.7 | 2.4 - 1290 | 84.3 | 0.6 - 1209 | 52.9 - 414 | 0.32 - 46.1 | 8.9 - 23.4 | 0.02 - 9.8 | 0.1 - 5.6 | 0.01 - 1.7 | 0.1 - 0.2 |
| Calcium | mg/L | 2.9 - 251 | 40 - 135 | 4.5 - 142 | 79.5 - 148 | 6.5 - 2940 | 133 | 56 - 1500 | - | 77 - 7780 | 453 - 1560 | 0.3 - 433 | 24.9 - 228 | 11 - 232 | 93.8 - 153 |
| Chloride | mg/L | 0.2 - 684 | 2.8 - 98.6 | 1.4 - 130 | 1.1 - 7.2 | 10.5 - 2830 | 130 | 7.3 - 2100 | 169 - 1430 | 20 - 55100 | 3640 - 16600 | 2.2 - 4430 | 15.5 - 2710 | 4.3 - 286 | 41.3 - 240 |
| Conductivity | µS/cm | 140 - 6700 | 491 - 837 | 270 - 995 | 464 - 681 | 769 - 26100 | 2270 | 1 - 18200 | - | 701 - 117000 | 12600 - 56000 | 330 - 13200 | 465 - 9250 | 103 - 1630 | 697 - 1440 |
| Potassium | mg/L | 0.08 - 7.77 | <0.5 - 2.2 | 1.05 - 6.93 | 1.8 - 2.2 | 5.39 - 1590 | 53.4 | 3.8 - 841 | 48.1 - 392 | 3.56 - 436 | 50.1 - 105 | 0.52 - 50.5 | 2.4 - 31.9 | 0.19 - 10.6 | 1 - 3.4 |
| Sodium | mg/L | 1.1 - 168 | 2.2 - 36.9 | 0.9 - 72 | 5.5 - 8 | 28 - 2200 | 101 | 6.7 - 2000 | 316 - 1130 | 62 - 16500 | 1440 - 5440 | 3.7 - 1490 | 35.2 - 948 | 3.9 - 126 | 35.3 - 94.9 |
| TKN | mg/L | 0.03 - 11.6 | <0.1 - 0.2 | 0.09 - 3.4 | <0.2 - 2 | 2.7 - 1734 | - | 2.7 - 1530 | 63.5 - 467 | 1.45 - 58.44 | 9.8 - 24.9 | 0.05 - 15.2 | <0.2 - 6.9 | 0.02 - 6.38 | <0.2 - 0.2 |

NOTES:
1) Sampled from 5-VI, 20B, 40-II, 44-III, 46-III, 64-II, 74-II, and 77-I in 2022.
2) Sampled from 41-II, 53-I, and 101-I in 2022.
3) Sampled from 23B in 2022.
4) Sampled from Holding Tanks, MH-4, and MHT6-94 in 2022.
5) Sampled from 41-I and 44-I in 2022.
6) Sampled from 18A, 20A, 46-I, 50-I, 52-I, 61-I, 61-II, 62-I, 64-I, 66-I, and 81-I in 2022.
7) Sampled from 33-II, 33-III, 50-II, and 50-III in 2022.

**Table 5.3**
**Detected Organic Parameters - Groundwater**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 5-IV | 18A | 18B | 19A | 19B | 20B | 48-I | 50-III | 63-I | 63-II | 63-III | 66-III | 74-III | 75-II | 81-I | 81-II | 81-III | 84-I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,1-Dichloroethane | µg/L | | | | | | | | | | | | | | | | | 0.9 | | |
| 1,4-Dichlorobenzene | µg/L | 5 | | | | | | | | | | | | 0.9 | | | | | 6.6 | |
| Benzene | µg/L | 1 | | | | | | | 1.6 | | | | | 4.4 | | | | | 1.7 | |
| Chlorobenzene | µg/L | 80 | | 0.8 | | | | | | | | | | 1.4 | | | | | 1.8 | |
| Chloroethane | µg/L | | | | | | | | 6.2 | | | | | | | | | | | |
| cis-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | | | | | 1.4 | | |
| Ethyl Benzene | µg/L | 140 | | | | | | | | | | | | | | | | | 0.7 | |
| m/p-Xylenes | µg/L | | | | | | | | | | | | | | | | | | 17.8 | |
| Toluene | µg/L | 60 | | | | | | | | | | | | | 48.5 | | | | | |
| Vinyl Chloride | µg/L | 1 | | | | | | | | | | | | | | | 0.2 | | | |
| Xylenes - total | µg/L | 90 | | | | | | | | | | | | | | | | | 18.0 | |

| PARAMETER | UNITS | ODWQS | 84-II | 85-I | 85-II | 86-I | 86-II | 86-III | 87-I | 87-II | 87-III | 88-I | 88-II | 88-III | 89-I | 89-II | 89-III | 91-I | 91-II |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,1-Dichloroethane | µg/L | | | | | | | | | | | | | | | | | | |
| 1,4-Dichlorobenzene | µg/L | 5 | | | | | | | | | | | | | | | | | |
| Benzene | µg/L | 1 | | | | | | | | | | | | | | | | | |
| Chlorobenzene | µg/L | 80 | | | | | | | | | | | | | | | | | |
| Chloroethane | µg/L | | | | | | | | | | | | | | | | | | |
| cis-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | | | | | | |
| Ethyl Benzene | µg/L | 140 | | | | | | | | | | | | | | | | | |
| m/p-Xylenes | µg/L | | | | | | | | | | | | | | | | | | |
| Toluene | µg/L | 60 | | | | | | | | | | | | | | | | | |
| Vinyl Chloride | µg/L | 1 | | | | | | | | | | | | | | | | | |
| Xylenes - total | µg/L | 90 | | | | | | | | | | | | | | | | | |

| PARAMETER | UNITS | ODWQS | 91-III | 92-I | 92-II | 92-III | 93-I | 93-II | 94-I | 94-II | 95-I | 95-II | 104-I | 104-II | 104-III | 106-I | 106-II | 106-III | 107-I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,1-Dichloroethane | µg/L | | | | | | | | | | | | | | | | | | |
| 1,4-Dichlorobenzene | µg/L | 5 | | | | | | | | | | | | | | | | | |
| Benzene | µg/L | 1 | | | | | | | | | | | | | | | | | |
| Chlorobenzene | µg/L | 80 | | | | | | | | | | | | | | | | | |
| Chloroethane | µg/L | | | | | | | | | | | | | | | | | | |
| cis-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | | | | | | |
| Ethyl Benzene | µg/L | 140 | | | | | | | | | | | | | | | | | |
| m/p-Xylenes | µg/L | | | | | | | | | | | | | | | | | | |
| Toluene | µg/L | 60 | | | | | | | | | | | | | | | | | |
| Vinyl Chloride | µg/L | 1 | | | | | | | | | | | | | | | | | |
| Xylenes - total | µg/L | 90 | | | | | | | | | | | | | | | | | |

| PARAMETER | UNITS | ODWQS | 107-II | 107-III | 108-I | 108-II | 108-III | 109-I | 109-II | 109-III | 110-I | 110-II | 110-III | 111-I | 111-II | 111-III | 112-I | 112-II | 112-III |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,1-Dichloroethane | µg/L | | | | | | | | | | | | | | | | | | |
| 1,4-Dichlorobenzene | µg/L | 5 | | | | | | | | | | | | | | | | | |
| Benzene | µg/L | 1 | | | | | | | | 0.5 | | | | | | | | | |
| Chlorobenzene | µg/L | 80 | | | | | | | | | | | | | | | | | |
| Chloroethane | µg/L | | | | | | | | | | | | | | | | | | |
| cis-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | | | | | | |
| Ethyl Benzene | µg/L | 140 | | | | | | | | | | | | | | | | | |
| m/p-Xylenes | µg/L | | | | | | | | | | | | | | | | | | |
| Toluene | µg/L | 60 | | | | | | | | | | | | | | | | | |
| Vinyl Chloride | µg/L | 1 | | | | | | | | | | | | | | | | | |
| Xylenes - total | µg/L | 90 | | | | | | | | | | | | | | | | | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards
2) Blank indicates parameter concentration was below the method detection limit.
3) Only samples that were analysed for a suite of organic parameters are listed.

**Table 5.4**
**Ministry Guideline B-7 Criteria**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| FRESH OVERBURDEN | | REFERENCE: 44-III | | GUIDELINE | TRIGGER | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| PARAMETER | ODWQS | AVERAGE | n | B-7 CRITERIA | CRITERIA (80% B-7) | 40-II | 63-III | 64-II | 75-II | 113-III |
| Chloride | 250 | 8 | 41 | 129 | 105 | 5.7 | 10.6 | 2.8 | 3.1 | 30.5 |
| Nitrate | 10.0 * | 0.99 | 41 | 3.24 | 2.79 | <0.5 | **23.1** | <0.5 | <0.5 | <0.5 |
| Nitrite | 1.0 * | 0.007 | 41 | 0.26 | 0.21 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Iron | 0.3 | 0.024 | 41 | 0.16 | 0.13 | 0.038 | 0.006 | 0.016 | 0.011 | 0.019 |
| Organic Nitrogen | 0.15 | 0.28 | 41 | 0.28 ** | 0.28 ** | <0.1 | **2.3** | <0.05 | <0.05 | **2.6** |
| Sulphate | 500 | 51 | 41 | 276 | 231 | 31.0 | 14.5 | 9.4 | 0.8 | 53.9 |

| FRESH BEDROCK | | REFERENCE: 101-I | | GUIDELINE | TRIGGER | | | |
|---|---|---|---|---|---|---|---|---|
| PARAMETER | ODWQS | AVERAGE | n | B-7 CRITERIA | CRITERIA (80% B-7) | 41-II | 53-I | 63-I |
| Chloride | 250 | 7 | 26 | 129 | 104 | 7.2 | 1.1 | 66.5 |
| Nitrate | 10.0 * | 0.10 | 26 | 2.57 | 2.08 | <0.5 | <0.5 | 0.08 |
| Nitrite | 1.0 * | 0.03 | 25 | 0.27 | 0.22 | <0.5 | <0.5 | <0.05 |
| Iron | 0.3 | 0.02 | 26 | 0.16 | 0.13 | **0.338** | **0.629** | 0.080 |
| Organic Nitrogen | 0.15 | 0.09 | 26 | 0.12 | 0.12 | <0.05 | **1.3** | **1.6** |
| Sulphate | 500 | 61 | 26 | 281 | 237 | 38.4 | 32.0 | 24.5 |

| BRINE | | REFERENCE: 38-I | | GUIDELINE | TRIGGER | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| PARAMETER | ODWQS | AVERAGE | n | B-7 CRITERIA | CRITERIA (80% B-7) | 16A | 16C | 44-II | 64-I | 75-I |
| Chloride | 250 | 257 | 50 | 257 ** | 257 ** | 24.1 | - | 40.1 | 75.6 | 95.4 |
| Nitrate | 10.0 * | 0.06 | 51 | 2.54 | 2.05 | 1.2 | - | <0.5 | 0.8 | <0.5 |
| Nitrite | 1.0 * | 0.01 | 51 | 0.26 | 0.21 | <0.05 | - | <0.5 | <0.5 | <0.5 |
| Iron | 0.3 | 0.09 | 51 | 0.19 | 0.17 | 0.007 | - | **0.406** | 0.009 | 0.080 |
| Organic Nitrogen | 0.15 | 0.12 | 51 | 0.14 | 0.13 | <0.05 | - | <0.05 | <0.05 | **0.3** |
| Sulphate | 500 | 33 | 51 | 267 | 220 | 3.8 | - | 22.1 | 55.3 | 28.3 |

| CONCENTRATED BRINE | | REFERENCE: 44-I | | GUIDELINE | TRIGGER | | |
|---|---|---|---|---|---|---|---|
| PARAMETER | ODWQS | AVERAGE | n | B-7 CRITERIA | CRITERIA (80% B-7) | 41-I | 76-I |
| Chloride | 250 | 18099 | 33 | 18099 ** | 18099 ** | 3640 | **26500** |
| Nitrate | 10.0 * | 0.02 | 30 | 2.52 | 2.79 | <0.5 | <5.0 |
| Nitrite | 1.0 * | 0.003 | 34 | 0.25 | 0.21 | <0.5 | <5.0 |
| Iron | 0.3 | 0.62 | 34 | 0.62 ** | 0.62 ** | **6.32** | **8.40** |
| Organic Nitrogen | 0.15 | 2.34 | 34 | 2.34 ** | 2.34 ** | 0.90 | <0.05 |
| Sulphate | 500 | 8 | 33 | 254 | 231 | <2 | 109 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006)
   * - Indicates parameter is health-related.
2) Reference average based on the geometric mean of historic concentrations for reference monitors.
   n - Indicates number of sample results included in the calculation of the reference average.
   "-" Indicates parameter not analysed.
3) ** - Indicates reference concentration exceeds ODWQS
   Highlighted values exceed Guideline B-7 Criteria
4) Monitor concentrations are from single sampling events in 2022.
5) All concentration values are in mg/L.

**Table 6.1**
**Surface Water PWQO Exceedances**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| AREA | LOCATION | STATION | SAMPLING EVENT | Iron (0.300 mg/L) | Phenols (1 µg/L) | Phosphorus (0.030 mg/L) |
|---|---|---|---|---|---|---|
| | | | | PARAMETER and PWQO | | |
| CENTRAL WATER COURSE | UPSTREAM | SW19 | Feb-22 | - | - | - |
| | | | Apr-22 | - | - | - |
| | | | Jun-22 | - | - | 0.05 |
| | | | Aug/22 | - | - | - |
| | | | Oct-22 | - | - | - |
| | | | Dec-22 | - | - | - |
| | | SW20 | Feb-22 | - | - | - |
| | | | Apr-22 | - | - | - |
| | | | Jun-22 | - | - | 0.06 |
| | | | Aug/22 | - | - | - |
| | | | Oct-22 | - | - | - |
| | | | Dec-22 | - | - | - |
| | ON-SITE | SW1 | Feb-22 | - | - | - |
| | | | Apr-22 | - | - | - |
| | | | Jun-22 | 0.35 | - | 0.09 |
| | | | Aug/22 | - | - | - |
| | | | Oct-22 | - | - | - |
| | | | Dec-22 | - | - | - |
| | | SW2 | Feb-22 | - | - | - |
| | | | Apr-22 | - | - | - |
| | | | Jun-22 | 0.77 | - | 0.10 |
| | | | Aug/22 | - | - | - |
| | | | Oct-22 | - | - | - |
| | | | Dec-22 | - | - | - |
| | DOWNSTREAM | SW18 | Feb-22 | - | - | - |
| | | | Apr-22 | - | - | - |
| | | | Jun-22 | - | - | 0.08 |
| | | | Aug/22 | - | - | - |
| | | | Oct-22 | - | - | - |
| | | | Dec-22 | - | - | - |
| | | SW3 | Feb-22 | - | - | - |
| | | | Apr-22 | - | - | - |
| | | | Jun-22 | - | - | 0.09 |
| | | | Aug/22 | - | - | - |
| | | | Oct-22 | - | - | - |
| | | | Dec-22 | - | - | - |
| BENSFORT ROAD | UPSTREAM | SW21 | Feb-22 | - | - | - |
| | | | Apr-22 | - | - | - |
| | | | Jun-22 | - | - | 0.07 |
| | | | Aug/22 | - | - | - |
| | | | Oct-22 | - | - | - |
| | | | Dec-22 | - | - | - |
| | DOWNGRADIENT OF SOUTH FILL AREA | SW23 | Feb-22 | - | - | - |
| | | | Apr-22 | - | - | - |
| | | | Jun-22 | - | - | 0.08 |
| | | | Aug/22 | - | - | - |
| | | | Oct-22 | - | - | - |
| | | | Dec-22 | - | - | - |
| | | SW17 | Feb-22 | - | - | - |
| | | | Apr-22 | - | - | - |
| | | | Jun-22 | 0.34 | - | 0.09 |
| | | | Aug/22 | - | - | - |
| | | | Oct-22 | - | - | - |
| | | | Dec-22 | - | - | - |
| WETLAND (WESTERN WATER COURSE) | | SW24 | Feb-22 | - | - | - |
| | | | Apr-22 | - | - | - |
| | | | Jun-22 | 0.64 | 4 | 0.09 |
| | | | Aug/22 | - | - | - |
| | | | Oct-22 | - | - | - |
| | | | Dec-22 | - | - | - |

NOTES: 1) PWQO - Provicial Water Quality Objectives (1999)
2) "-" - Indicates parameter not analysed.

**TABLE 7.1**
**Perimeter Landfill Gas Probe Monitoring**
**2022 ANNUAL MONITORING REPORT**
**Peterborough County/City Waste Management Facility**

| | GP1-96 | | | | GP2-19 | | | | GP3-19 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mar-22 | Jun-22 | Aug-22 | Nov-22 | Mar-22 | Jun-22 | Aug-22 | Nov-22 | Mar-22 | Jun-22 | Aug-22 | Nov-22 |
| Combustible Gas (v/v) | 0.0 | 0.3 | 0.3 | 0.0 | 0.2 | 0.3 | 0.3 | 0.1 | 0.2 | 0.3 | 0.3 | 0.0 |
| Carbon Dioxide (v/v) | 2.5 | 7.1 | 7.3 | 3.1 | 0.8 | 1.3 | 3.0 | 2.5 | 0.3 | 0.6 | 0.7 | 0.5 |
| Oxygen (v/v) | 18.1 | 18.3 | 18.3 | 18.8 | 20.1 | 20.7 | 20.7 | 19.4 | 20.4 | 20.7 | 20.7 | 20.0 |
| Water Elevation (mbgs) | DRY | DRY | DRY | DRY | 3.2 | 3.4 | 4.0 | 3.9 | 4.1 | 4.4 | 5.2 | 4.9 |

| | GP4-96 | | | | GP5-96 | | | | GP6-96 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mar-22 | Jun-22 | Aug-22 | Nov-22 | Mar-22 | Jun-22 | Aug-22 | Nov-22 | Mar-22 | Jun-22 | Aug-22 | Nov-22 |
| Combustible Gas (v/v) | 0.2 | 0.3 | 0.3 | 0.1 | 0.3 | 0.3 | 0.3 | 0.0 | 0.2 | 0.3 | 0.3 | 0.1 |
| Carbon Dioxide (v/v) | 0.2 | 0.0 | 0.5 | 0.3 | 0.9 | 1.2 | 1.0 | 1.2 | 0.4 | 0.1 | 1.1 | 0.3 |
| Oxygen (v/v) | 20.0 | 21.1 | 20.1 | 20.2 | 19.6 | 20.2 | 19.5 | 20.2 | 20.1 | 20.3 | 20.7 | 20.2 |
| Water Elevation (mbgs) | 1.6 | 1.7 | DRY | 1.9 | 5.0 | 5.2 | 5.6 | 5.5 | 2.7 | 2.8 | 3.7 | 3.4 |

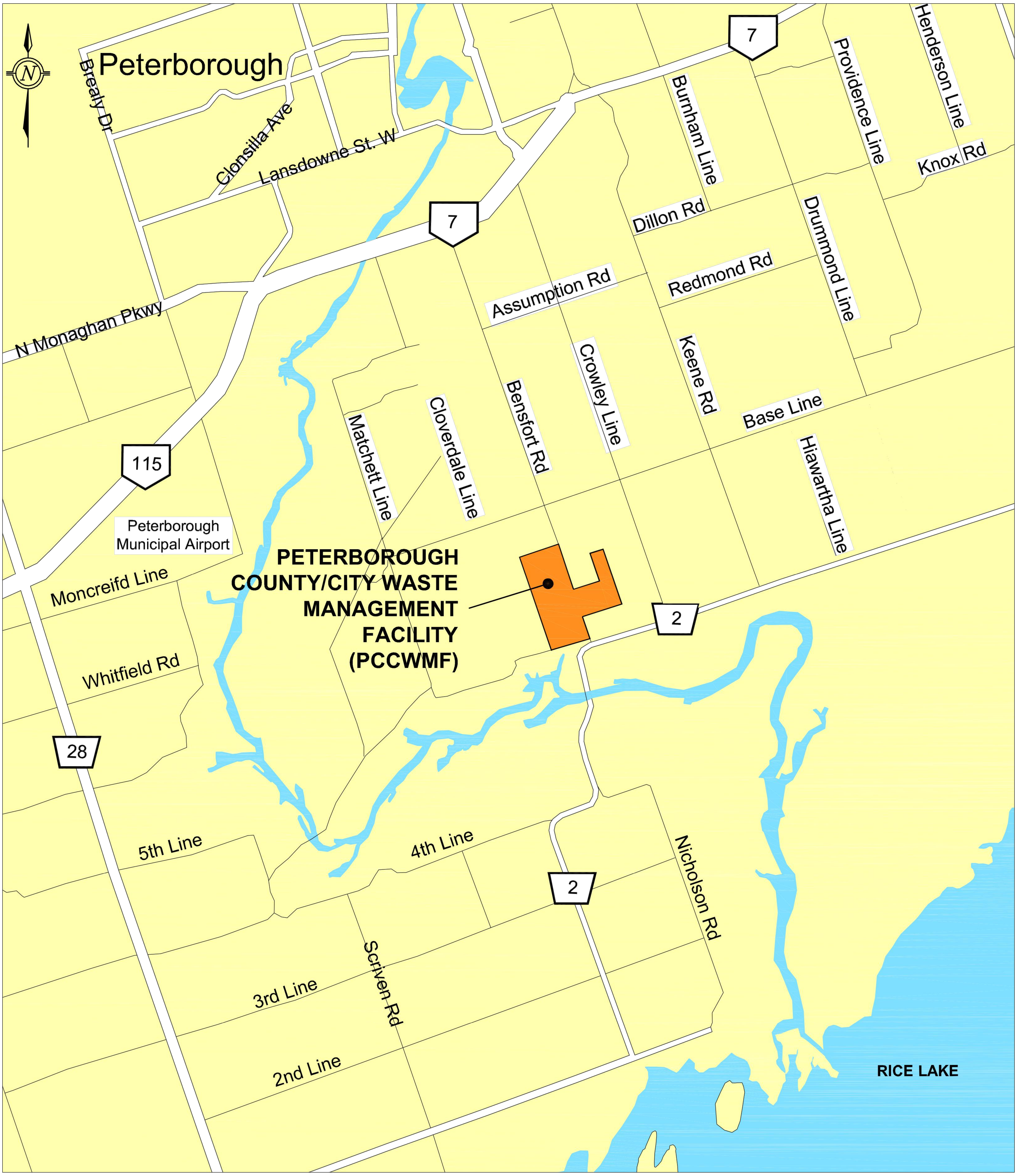
| | GP7-13 | | | | GP8-13 | | | | GP9-13 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mar-22 | Jun-22 | Aug-22 | Nov-22 | Mar-22 | Jun-22 | Aug-22 | Nov-22 | Mar-22 | Jun-22 | Aug-22 | Nov-22 |
| Combustible Gas (v/v) | 0.2 | 0.3 | 0.3 | 0.0 | 0.2 | 0.3 | 0.3 | 0.0 | 0.2 | 0.0 | 0.3 | 0.0 |
| Carbon Dioxide (v/v) | 0.4 | 0.7 | 1.4 | 1.0 | 1.0 | 1.2 | 1.5 | 1.7 | 0.6 | 0.6 | 1.1 | 0.5 |
| Oxygen (v/v) | 19.4 | 19.5 | 20.0 | 19.7 | 20.3 | 20.1 | 20.5 | 20.3 | 19.4 | 20.2 | 21.4 | 20.3 |
| Water Elevation (mbgs) | 2.1 | 2.1 | 2.6 | 2.5 | 2.4 | 2.5 | 2.8 | 2.8 | 1.8 | 2.0 | 2.2 | 2.2 |

| | GP10-16 | | | |
|---|---|---|---|---|
| | Mar-22 | Jun-22 | Aug-22 | Nov-22 |
| Combustible Gas (v/v) | 0.1 | 0.3 | 0.3 | 0.1 |
| Carbon Dioxide (v/v) | 0.9 | 1.0 | 6.3 | 1.7 |
| Oxygen (v/v) | 19.8 | 20.1 | 20.9 | 20.4 |
| Water Elevation (mbgs) | 3.6 | 3.7 | 3.7 | 3.6 |

**Notes:**

| | |
|---|---|
| Dry | water not present at monitoring location |
| Flooded/Frozen | water level above top of screen |
| - | not monitored |
| mbgs | meters below ground surface |
| v/v | percent by volume |

# FIGURES




| D/M/Y | DESCRIPTION | BY | APPROVED |
|---|---|---|---|
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| 12/05/22 | 2022 ANNUAL MONITORING REPORT | JVC | JJO |

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FIGURE 1.1

DWN BY: JVC DATE: MARCH 2023
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COUNTY OF PETERBOROUGH / CITY OF PETERBOROUGH

PROJECT NO. 111–53296–16

SITE LOCATION

2022 ANNUAL MONITORING REPORT
PETERBOROUGH COUNTY/CITY WASTE MANAGEMENT FACILITY

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THIS DRAWING IS NOT TO BE SCALED.

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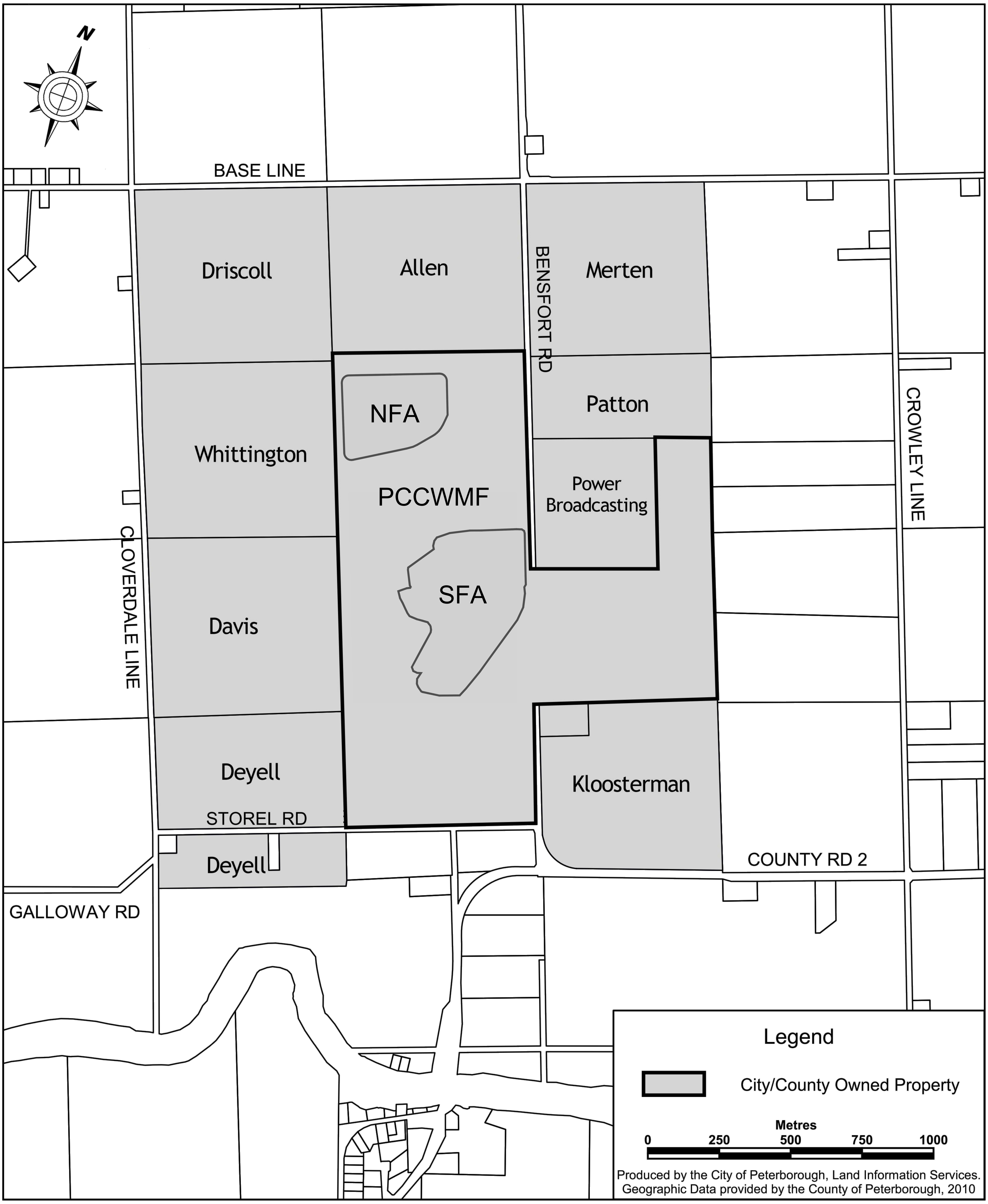
4 HUGHSON STREET SOUTH, SUITE 300
HAMILTON (ONTARIO) CANADA L8N 3Z1
TEL.: 905-529-4414 | FAX:905-521-2699 | WWW.WSP.COM

Plotted: Mar 15, 2023 – 2:49pm File: C:\Users\Jaclyn.Craig\OneDrive – WSP O365\Desktop\2023 Work\AMR PCCWMF\CADD Drawings\1 + 2 – Figure 1.1 and Figure 1.2.dwg




| D/M/Y | DESCRIPTION | BY | APPROVED |
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| | | | |
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| 15/03/2023 | 2022 ANNUAL MONITORING REPORT | JVC | JJO |

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FIGURE 1.2

DWN BY: JVC DATE: MARCH 2023
CHK BY: JJO SCALE: SEE SCALE BAR

COUNTY OF PETERBOROUGH / CITY OF PETERBOROUGH

PROJECT NO. 111–53296–16

**CITY/COUNTY OF PETERBOROUGH PROPERTY OWNERSHIP**

**2022 ANNUAL MONITORING REPORT PETERBOROUGH COUNTY/CITY WASTE MANAGEMENT FACILITY**



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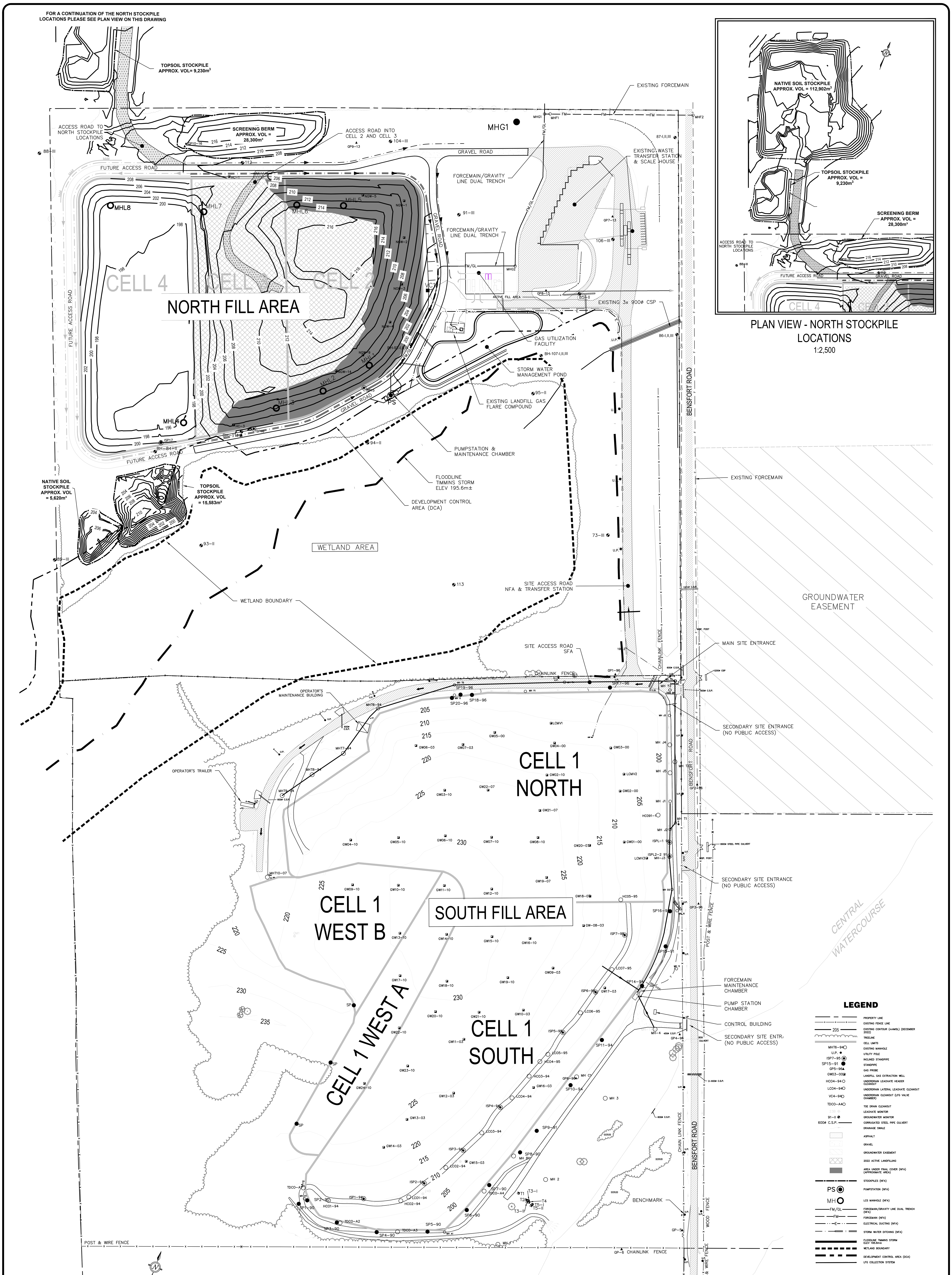


| D/M/Y | DESCRIPTION | BY | APPROVED |
|---|---|---|---|
| 15/03/2023 | 2022 ANNUAL MONITORING REPORT | J V C | J J O |

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FIGURE 2.1

DWN BY: JVC DATE: MARCH 2023
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**COUNTY OF PETERBOROUGH / CITY OF PETERBOROUGH**

PROJECT NO. 111-53296-14

**EXISTING CONDITIONS SFA & NFA (2022)**

**2022 ANNUAL MONITORING REPORT PETERBOROUGH COUNTY/CITY WASTE MANAGEMENT FACILITY**



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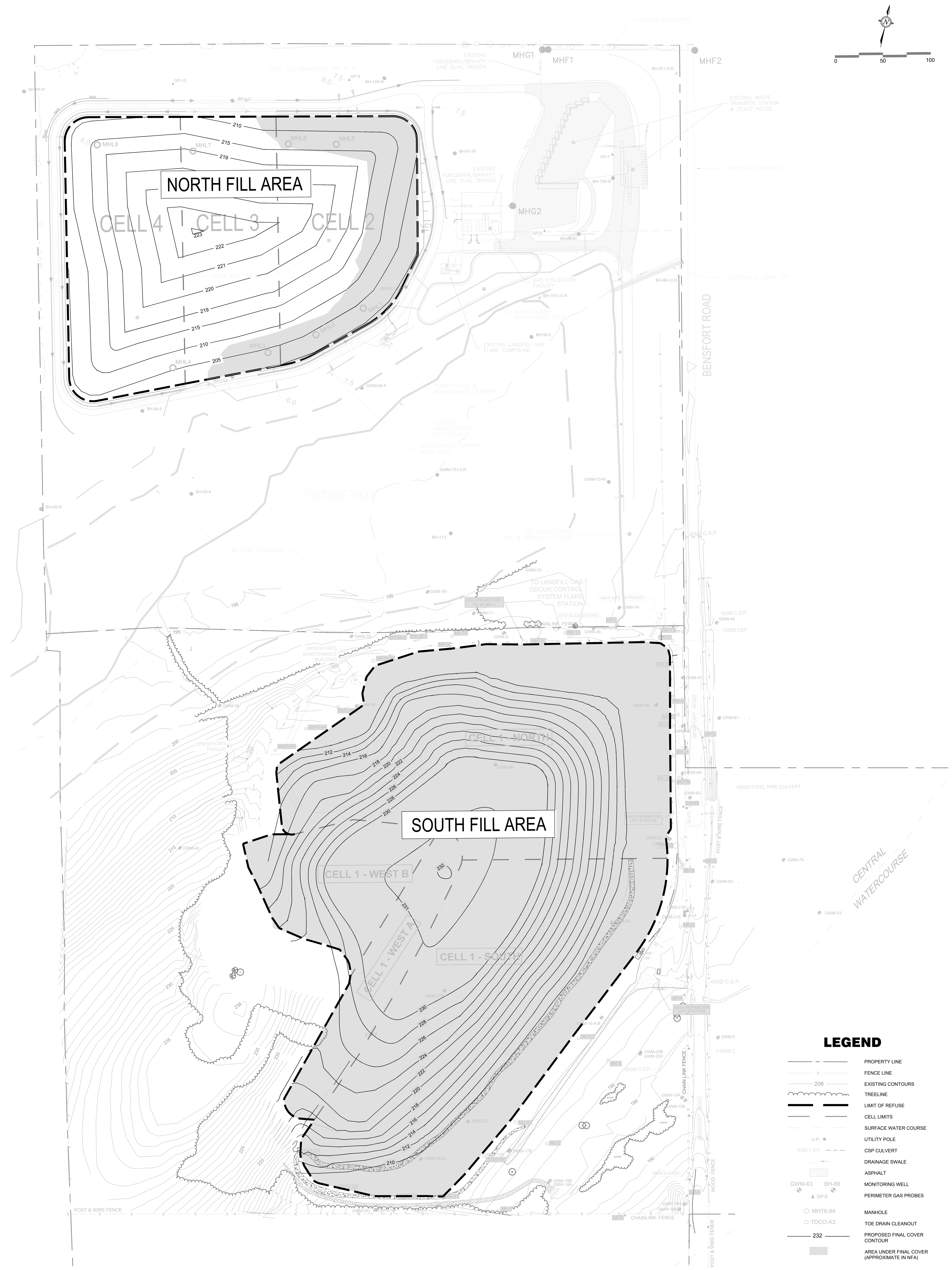


| D/M/Y | DESCRIPTION | BY | APPROVED |
|---|---|---|---|
| 15/03/2023 | 2022 ANNUAL MONITORING REPORT | JVC | JJO |

REVISION / ISSUE

FIGURE 2.2

DWN BY: JVC DATE: MARCH 2023
CHK BY: JJO SCALE: SEE SCALE BAR

COUNTY OF PETERBOROUGH / CITY OF PETERBOROUGH

PROJECT NO. 111-53296-16

**SFA & NFA APPROVED FINAL CONTOURS (2022)**

**2022 ANNUAL MONITORING REPORT PETERBOROUGH COUNTY/CITY WASTE MANAGEMENT FACILITY**



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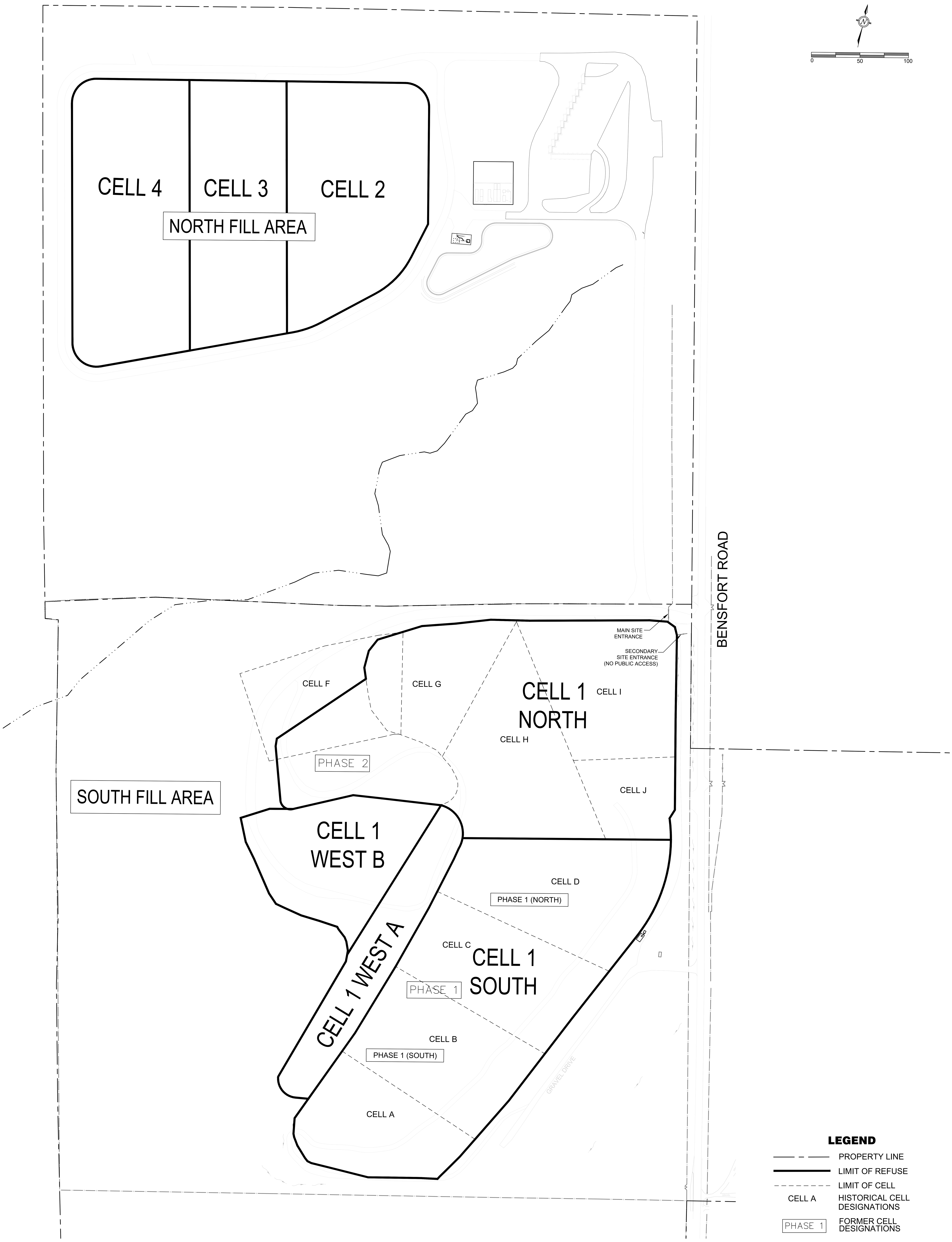


| D/M/Y | DESCRIPTION | BY | APPROVED |
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| | | | |
| | | | |
| 15/03/23 | 2022 ANNUAL MONITORING REPORT | JVC | JJO |

REVISION / ISSUE

FIGURE 2.3

DWN BY: JVC DATE: MARCH 2023
CHK BY: JJO SCALE: SEE SCALE BAR

COUNTY OF PETERBOROUGH / CITY OF PETERBOROUGH

PROJECT NO. 111–53296–16

**CURRENT AND HISTORICAL CELL DESIGNATIONS**

**2022 ANNUAL MONITORING REPORT PETERBOROUGH COUNTY/CITY WASTE MANAGEMENT FACILITY**



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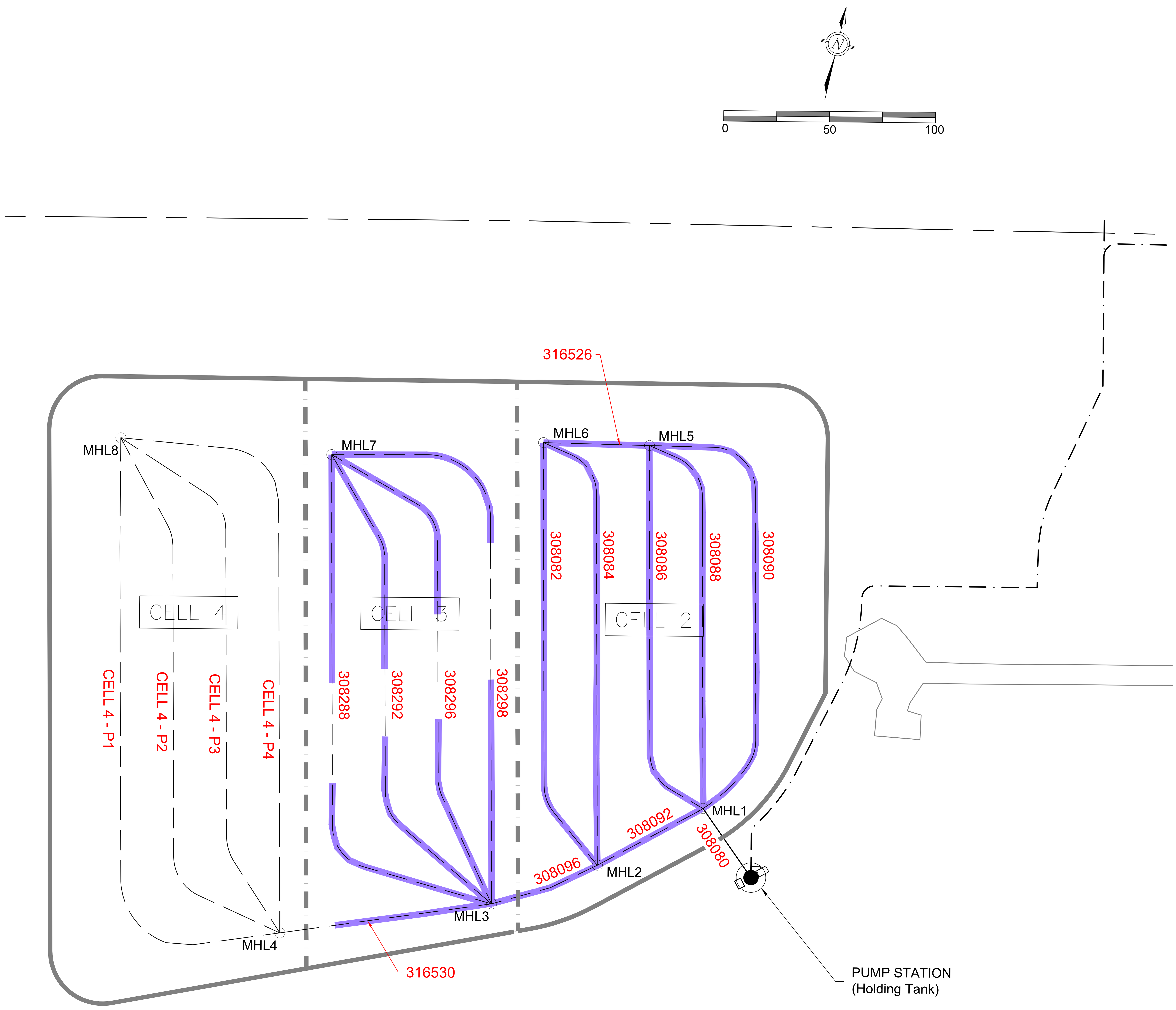


## LEGEND

- PROPERTY LINE
- LIMIT OF REFUSE
- LIMIT OF CELL
- NON-PERF. PIPE
- PERFORATED PIPE
- TDCO-A3 TOE DRAIN CLEANOUT
- LCO3-94 LATERAL CLEANOUT
- HCO2-94 HEADER CLEANOUT
- CB-2 CATCH BASIN
- VC7-95 VALVE CHAMBER
- MH-D2 LEACHATE COLLECTION SYSTEM TIE-IN
- TOE DRAIN PIPING
- LEACHATE FORCEMAIN
- FLUSHING LOCATION

| D/M/Y | DESCRIPTION | BY | APPROVED |
|---|---|---|---|
| 15/03/2023 | 2022 ANNUAL MONITORING REPORT | JVC | JJO |

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FIGURE 4.1

DWN BY: JVC DATE: MARCH 2023
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COUNTY OF PETERBOROUGH / CITY OF PETERBOROUGH

PROJECT NO. 111-53296-16

**NORTH FILL AREA**
**LEACHATE COLLECTION SYSTEM FLUSHING**
**2022 ANNUAL MONITORING REPORT**
**PETERBOROUGH COUNTY/CITY**
**WASTE MANAGEMENT FACILITY**



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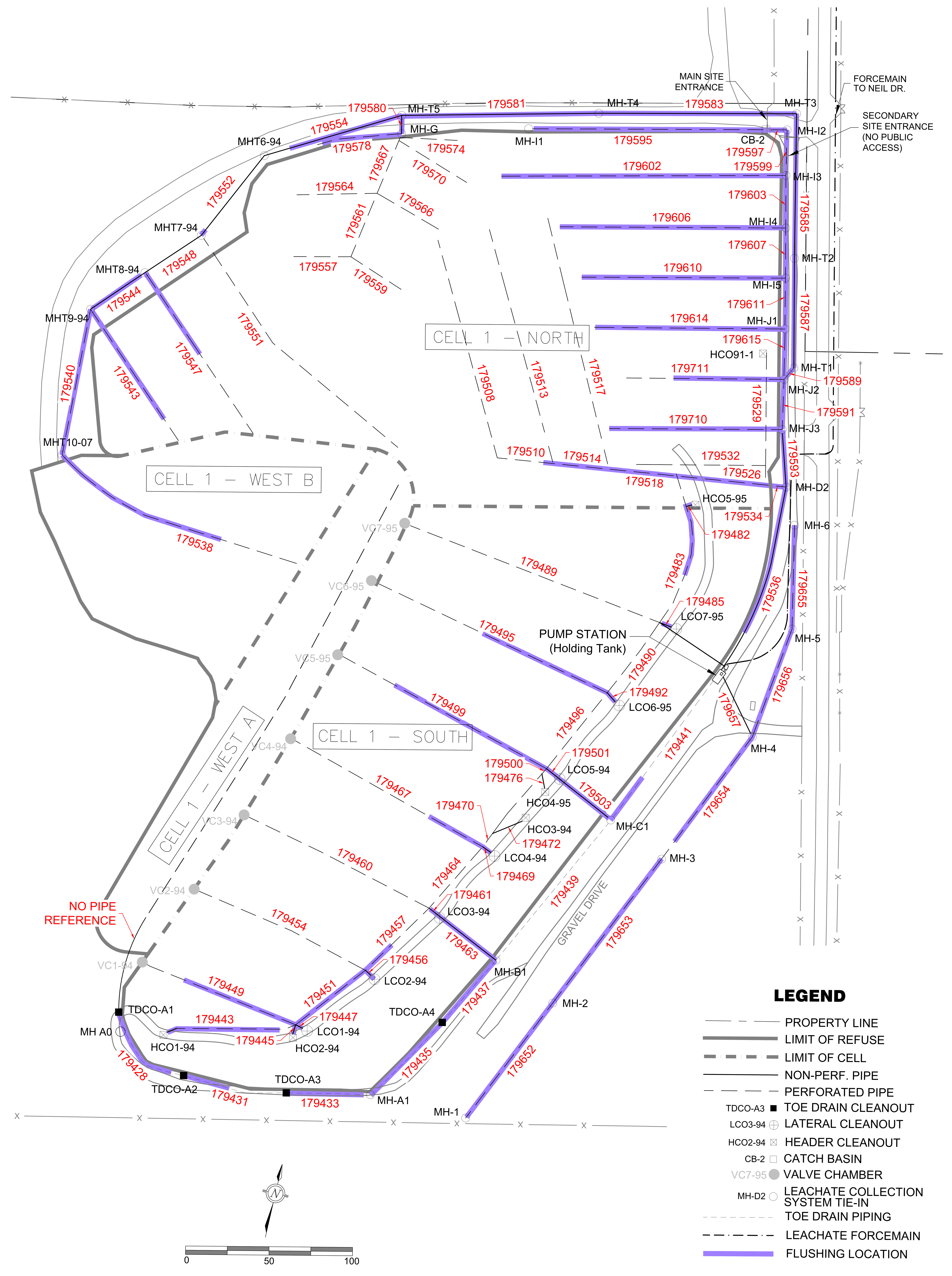


| D/M/Y | DESCRIPTION | BY | APPROVED |
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| | | | |
| | | | |
| 15/03/2023 | 2022 ANNUAL MONITORING REPORT | JVC | JJO |

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FIGURE 4.2

DWN BY: JVC DATE: MARCH 2023
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**COUNTY OF PETERBOROUGH / CITY OF PETERBOROUGH**

PROJECT NO. 111–53296–16

**SOUTH FILL AREA**
**LEACHATE COLLECTION SYSTEM FLUSHING**

**2022 ANNUAL MONITORING REPORT**
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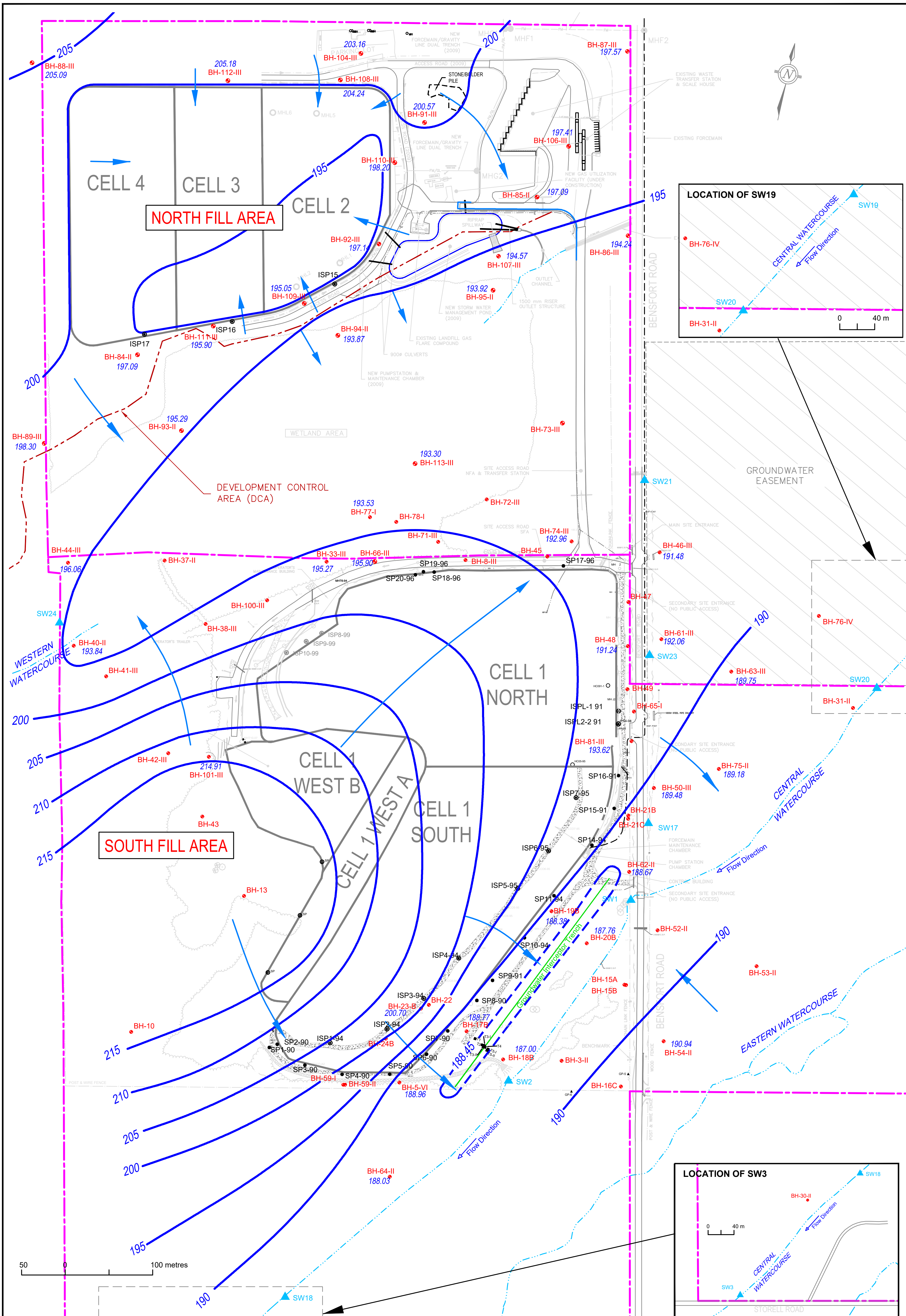



LEGEND

- PROPERTY BOUNDARY
- FENCE LINE
- GROUNDWATER EASEMENT
- 190 GROUNDWATER ELEVATION CONTOUR
- 187.8 GROUNDWATER ELEVATION IN mASL DATED SEPTEMBER 2022
- GROUNDWATER FLOW DIRECTION
- BH-95-II GROUNDWATER MONITOR LOCATION AND DESIGNATION
- SW18 SURFACE WATER MONITOR LOCATION AND DESIGNATION
- SP9-91 STANDPIPE
- IPS4-94 INCLINED STANDPIPE
- T1 INTERCEPTOR TRENCH MONITORING WELL
- ISP10-99 DECOMMISSIONED INCLINE STANDPIPE
- (205.0) EXCLUDED FROM INTERPRETATION

SCALE: 1:4000

REF. NO.: 111-53296-16 F5_1 M19

DATE: MARCH 2023

PROJECT: 111-53296-16

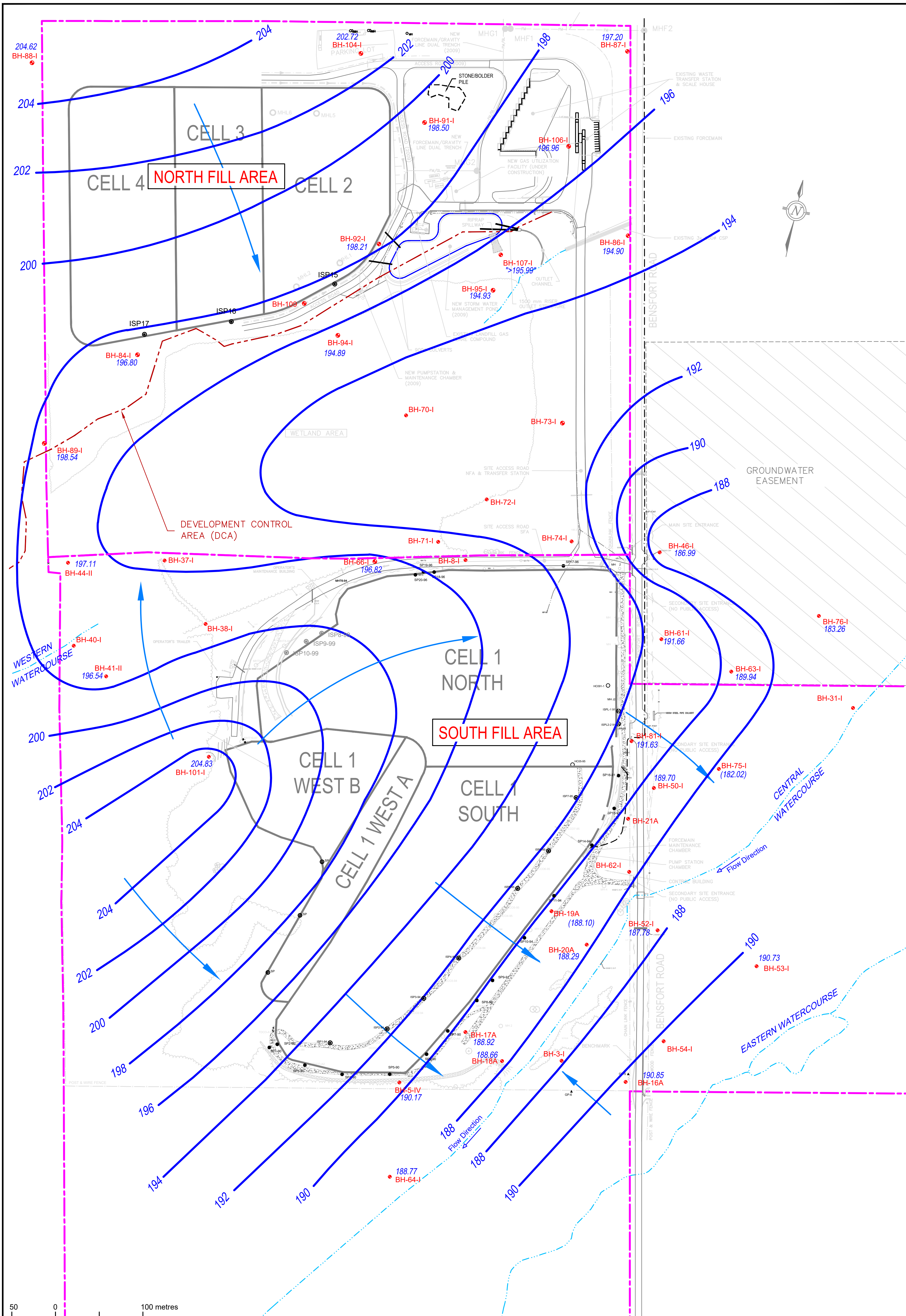
wsp

# SHALLOW GROUNDWATER FLOW REGIME - FALL 2022

2022 ANNUAL MONITORING REPORT
PETERBOROUGH COUNTY / CITY WASTE MANAGEMENT FACILITY
For The County and the City of Peterborough

FIGURE

5.1




LEGEND

| | |
|---|---|
| | PROPERTY BOUNDARY |
| | FENCE LINE |
| | GROUNDWATER EASEMENT |
| 190 | GROUNDWATER ELEVATION CONTOUR |
| 187.8 | GROUNDWATER ELEVATION IN mASL DATED SEPTEMBER 2022 |
| | GROUNDWATER FLOW DIRECTION |
| BH-95-II | GROUNDWATER MONITOR LOCATION AND DESIGNATION |
| SW18 | SURFACE WATER MONITOR LOCATION AND DESIGNATION |
| SP9-91 | STANDPIPE |
| IPS4-94 | INCLINED STANDPIPE |
| ISP10-99 | DECOMMISSIONED INCLINE STANDPIPE |
| (205.0) | EXCLUDED FROM INTERPRETATION |

SCALE: 1:4000

REF. NO.: 111-53296-16 F5_2 M19

DATE: MARCH 2023

PROJECT: 111-53296-16

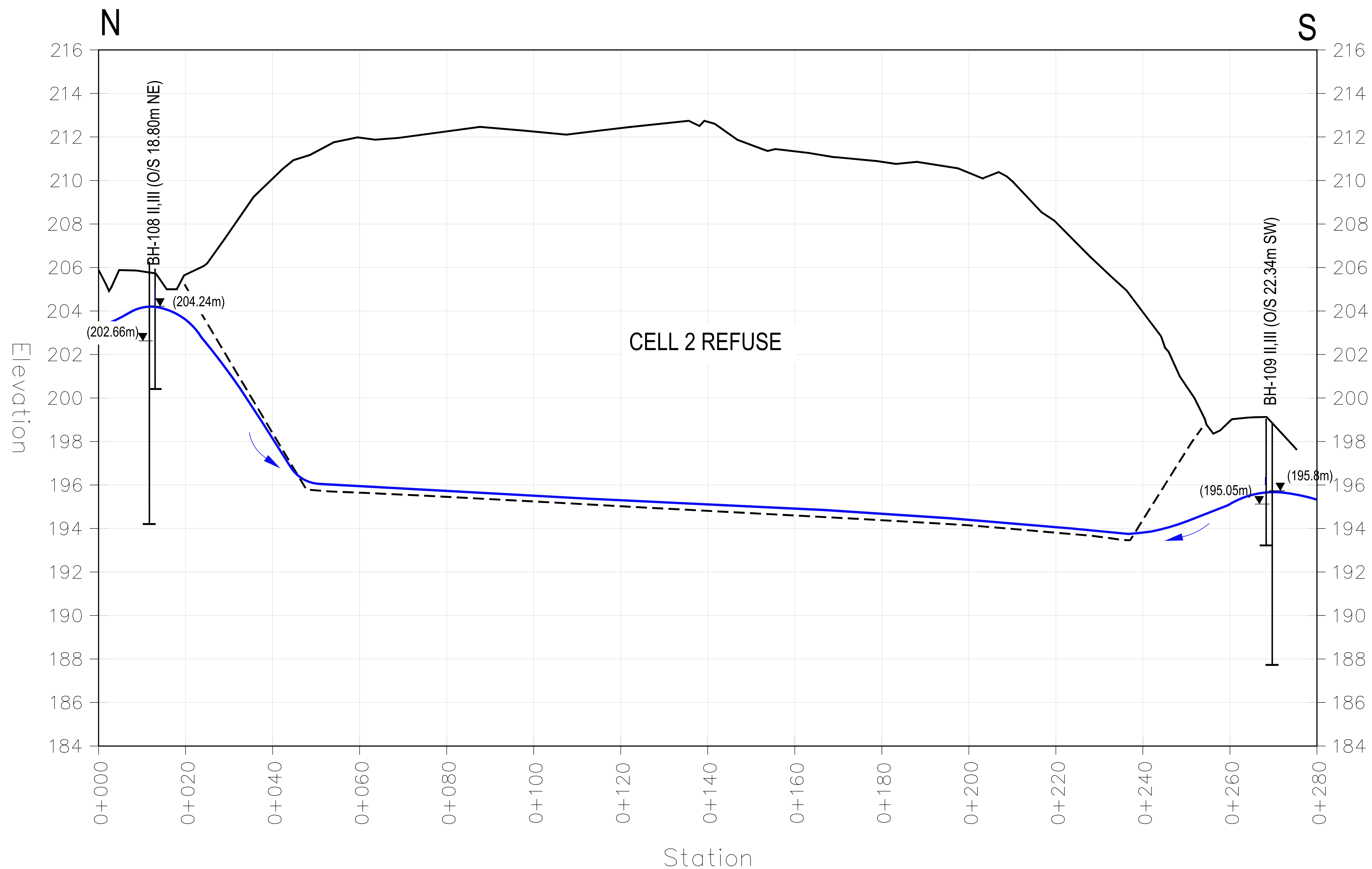
wsp

# SHALLOW BEDROCK POTENTIOMETRIC SURFACE - FALL 2022

2022 ANNUAL MONITORING REPORT
PETERBOROUGH COUNTY / CITY WASTE MANAGEMENT FACILITY
For The County and the City of Peterborough

FIGURE

5.2




## LEGEND

| | |
|---|---|
| (203.8m) | SHALLOW GROUNDWATER ELEVATIONS (MASL) (SEPTEMBER 2022) |
| | BOTTOM OF DRAINAGE LAYER TOP OF CORRUGATED BASE |
| | EXISTING GROUND ELEVATION (DECEMBER 2022) |
| | GROUNDWATER CONTOUR |

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|---|---|---|---|
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**CELL 2 CROSS-SECTION**

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**COUNTY OF PETERBOROUGH / CITY OF PETERBOROUGH**

PROJECT NO. 111-53296-16

FIGURE 5.3

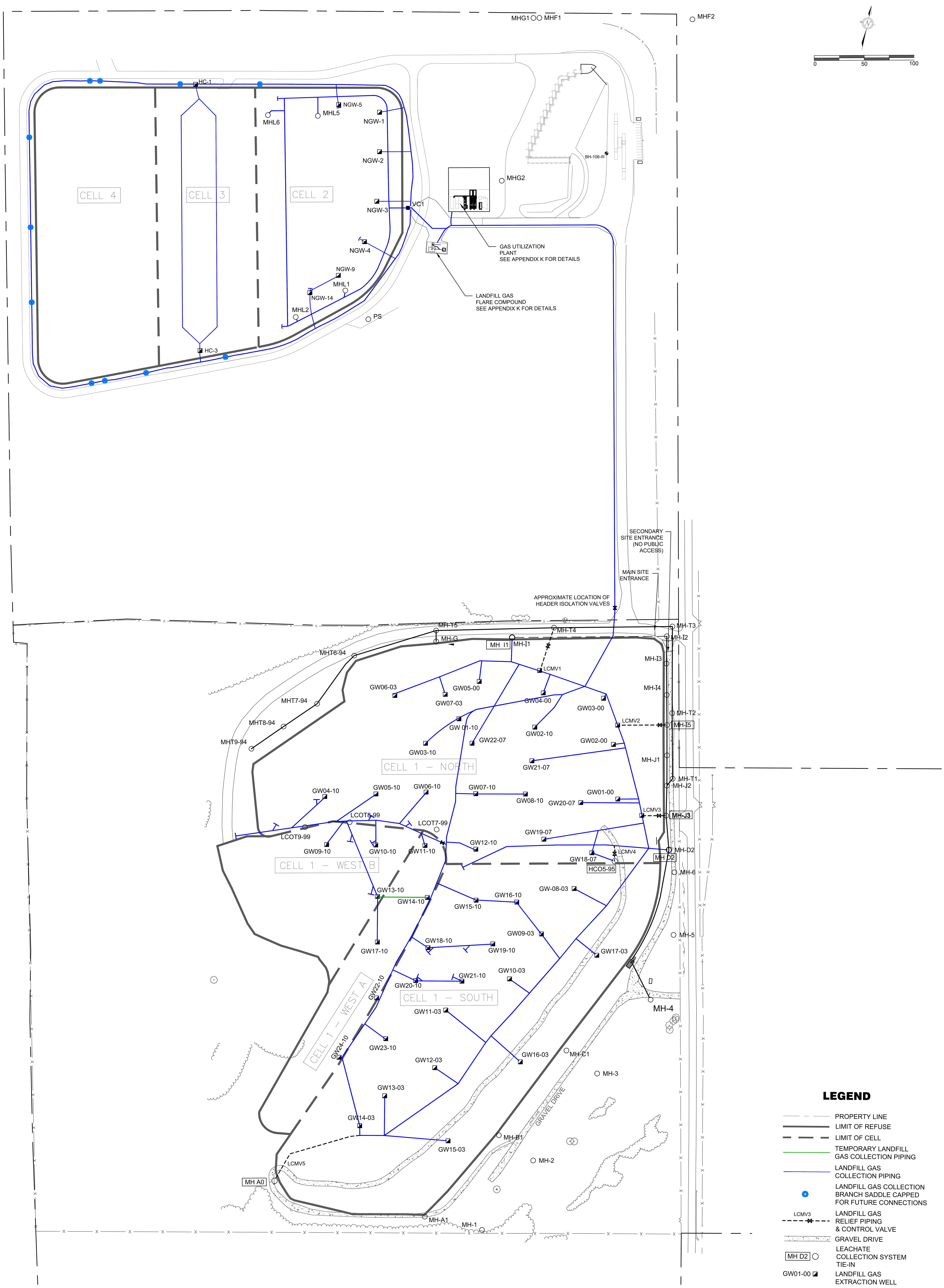


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FIGURE 7.1

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COUNTY OF PETERBOROUGH / CITY OF PETERBOROUGH

PROJECT NO. 111-53296-16

**LANDFILL GAS COLLECTION SYSTEM LAYOUT**

**2022 ANNUAL MONITORING REPORT**
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# APPENDIX

# A

## ENVIRONMENTAL COMPLIANCE APPROVAL

I) ECA – A341508

II) OWRA - 2231-8YCPHG

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 A341508
Issue Date: September 7, 2018

The Corporation of the City of Peterborough
500 George St N
Peterborough, Ontario
K9H 3R9

Site Location: 1260 Bensfort Road
Lot 15, Concession 14
Peterborough City, County of Peterborough

*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:*

a 27.5 hectare Waste Fill Area (9.5 hectares North Fill Area and 18 hectares South Fill Area) within a total Site area of 158 hectares, which includes a 15 hectare groundwater easement zone, as follows

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

***"Acceptable waste"*** and ***"Acceptable public drop-off waste"*** means municipal, commercial and institutional solid non-hazardous waste generated within the County of Peterborough;

***"agent of the City of Peterborough"*** means a person or company who is hired by the City of Peterborough to fulfil the requirement of *Competent Supervisor* or *Competent Supervisors* referred to in Conditions 37(l), 124, 125 and 168 of this *Approval.* Such person or company would provide independent reports directly to the City of Peterborough and would not be employed or closely associated with any company that the City of Peterborough has contracted to operate the *Site;*

***"Buffer Area"*** means that part of the *Site* that is not waste fill area and includes those lands and easements comprising 84.63 hectares as shown on Tab L of item 9 in Schedule "A";

**"*Approval* "** means this Environmental Compliance Approval and any Schedules to it, including the application and supporting documentation listed in Schedule "A".

***"characteristic waste"*** means a hazardous waste that is corrosive waste, ignitable waste, leachate toxic waste or reactive waste;

***"Competent Person"*** **or** ***"Competent People"*** means a person or people who has/have the following features:

**A.** *training and knowledge of the following:*
i. relevant waste management legislation, regulations and guidelines;
ii. major environmental concerns pertaining to the waste to be handled;
iii. contents of the *Owner's* Operations and Maintenance Manual required by Condition 37 and 38 of this *Approval;*
iv. the terms, conditions and operating requirements of the *Approval;*
v. contents of the Owner's Environmental Emergency Plan that is outlined in Conditions 167, 168 and 169 of this *Approval;*
vi. record keeping procedures;
vii. occupational health and safety concerns pertaining to the wastes to be processed;
viii. specific written procedures for the control of nuisance conditions; and
ix. specific written procedures for refusal of unacceptable waste loads; and

**B.** *through their knowledge, training and experience can carry out any necessary duties in the following, through instruction and practice:*
i. use and operation of any equipment to be used at the *Site;*
ii. operation and management of the Waste Disposal *Site,* in accordance with the specific job requirements of each individual operator, including concern for environmental protection and health and safety standards for the operator of the Waste Disposal *Site,* identification of unacceptable wastes, procedures for refusing the processing of unacceptable wastes, proper handling of waste, proper procedures for the storage of waste and proper maintenance of the *Site;* and
iii. process monitoring procedures; and

**C.** *training requirements:*
i. has been provided the necessary training by the *Owner* to become a *Competent Person* before starting at the *Site* as an operator; and
ii. is provided refresher training on the components of a *Competent Person* at least annually;

***"Competent Supervisor"*** and ***"Competent Supervisors"*** means a person or people who:
i) is/are an employee(s) of the City of Peterborough or in the alternative, is an agent of the City of Peterborough;
ii) has/have fulfilled the Section A part of the definition of a *Competent Person;*
iii) is/are qualified because of their knowledge, training and experience to assure that direction given by the City of Peterborough to any contractor that the City has hired for the *Site* and the organization of work and its performance by that contractor is sufficient to assure that the terms and Conditions of this *Approval* and associated legislation and regulations are followed; and
iv) is not an employee of the contractor that is referred to in part iii) of this definition and also operates at arms length from such a contractor;

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

"***District Manager*** " refers to the District Manager in the Ministry of the Environment's Peterborough District Office;

"***District Office*** " refers to the Ministry of the Environment Peterborough District Office;

***"EAA"*** refers to the Ontario Environmental Assessment Act as amended from time to time;

***"EAAB"*** refers to the Environmental Assessment and Approvals Branch of the Ministry of the Environment;

"**Environmental Emergency Plan**" is the plan that is required by Conditions 167, 168 and 169 of this *Approval;*

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

***"handbook"*** means the December 2009 Ministry of the Environment publication that has the title, "Land Disposal Restrictions (LDR) Handbook";

***"Land Disposal Restrictions"*** means the requirements of Sections 74 through 85 of Regulation 347, which prohibit the disposal of hazardous wastes that are listed wastes or characteristic waste until they have been treated to meet the land disposal treatment requirements;

***"Land Disposal Treatment Requirements"*** means the requirements identified in Schedule 1, Part A and Part B of Schedule 2 and Schedule 3 of Regulation 347 for listed wastes and in Schedule 5 of Regulation 347 for characteristic wastes. Land disposal treatment requirements are specified as either concentration-based numerical levels or as specified methods of treatment. Regulated constituents must be treated to meet the treatment requirements prior to land disposal;

***"Listed Waste"*** means a waste included in Schedule 1, Schedule 2 Part A, Schedule 2 Part B or Schedule 3 of *Ontario Regulation 347;*

***"MECP"*** or *"**Ministry**"* refers to the Ontario Ministry of the Environment, Conservation and Parks;

"***Operator*** " has the same meaning as "operator" as defined in s.25 of the *EPA* ;

***"Operations and Maintenance Manual"*** means the Manual that is required by Conditions 37 and 38 of the *Approval;*

"***Owner" and "City"*** means the City of Peterborough and the County of Peterborough and/or its successors and assignees;

**"OWRA"** refers to the Ontario Water Resources Act;

"***PA*** " means the *Pesticides Act* , R.S.O. 1990, c. P-11, as amended from time to time;

***"Peterborough"*** means The Corporation of the City of Peterborough;

***"Peterborough Landfill Public Liaison Committee" or PLPLC"*** means a committee comprised of representatives of the City of Peterborough and area residents established in accordance with Condition 22 of this *Approval;*

***"Provincial Officer "*** means any person designated in writing by the Minister as a provincial officer pursuant to section 5 of the *OWRA* or section 5 of the *EPA* or section 17 of *PA;*

***"North Fill Area"*** and ***"NFA"*** means the 9.5 hectares landfill *Site* that is located in the North part of the *Site;*

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

***"Regional Director"*** refers to the Director of the Ministry of the Environment's Eastern Region;

**"*Regulation 232* " or "*Reg. 232" or "O. Reg. 232/98"*** means Ontario Regulation 232/98 (New Landfill Standards) made under the *EPA* , as amended from time to time;

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

***"Site"*** and ***"waste disposal site"*** means the 27.5 hectare Waste Fill Area (9.5 hectares North Fill Area and 18 hectares South Fill Area) being more particularly described as PART OF LOTS 14 and 15, CONCESSION 14, OTONABEE, TOWNSHIP OF OTONABEE-SOUTH MONAGHAN), located within a total site area of 158 hectares which includes a 15 hectare groundwater easement zone, in which waste may be deposited pursuant to this *Approval* in accordance with the plans and specifications described on Schedule "A"; and

The 158 hectares are more particularly described as PART LOT 13, 14 and 15, CONCESSION 14 and PART OF LOTS 14 and 15, CONCESSION 13, OTONABEE, TOWNSHIP OF OTONABEE-SOUTH MONAGHAN;

***"South Fill Area"*** and ***"SFA"*** means the 18 hectares landfill site that is located in the South part of the *Site;* and

***"waste"*** has the same meaning as in the EPA and regulations made thereunder.

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

TERMS AND CONDITIONS

**GENERAL**

**Compliance**

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

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

**In Accordance**

3. Except as otherwise provided for in this *Approval* , the *Site* shall be designed, developed, constructed, operated and maintained in accordance with all documents listed in Schedule "A" to this *Approval.*

4. Waste disposal operations are approved for the South Fill Area and the North Fill Area, of the City of Peterborough Landfill Site, as generally described in the three volume supporting documentation reports listed as Items 36 to 38, of Schedule "A", submitted pursuant to the *Environmental Assessment Act* approval listed as Item 30, of Schedule "A". Only *acceptable waste* from within the City of Peterborough and the municipalities within the County of Peterborough may be disposed of at this *Site* .

5. As further compliance with the *Environmental Assessment Act* approval listed as Item 30, of Schedule "A", in particular Condition 5. A) of that approval, as it relates to the North Fill Area, the City/County shall continue to demonstrate the suitability of the *in situ* overburden materials to meet the design specifications, i.e. permeability, for the proposed recompacted base and side slopes.

6. Should it not be possible to achieve this design permeability referred to in Condition 5 of this *Approval,* recommendations shall be provided to the Director for an alternate design of the recompacted base and side slopes which will achieve an equivalent or better performance with respect to minimizing the flow of groundwater into the landfill.

**Other Legal Obligations**

7. The issuance of, and compliance with, this *Approval* does not:

   a. relieve any person of any obligation to comply with any provision of the *EPA* or any other 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 request

that any further information related to compliance with this *Approval* be provided to the *Ministry;*

unless a provision of this *Approval* specifically refers to the other requirement or authority and clearly states that the other requirement or authority is to be replaced or limited by this *Approval.*

**Adverse Effect**

8. The *Owner* or *Operator* remain responsible for any contravention of any other condition of this *Approval* or any applicable statute, regulation, or other legal requirement resulting from any act or omission that caused the adverse effect or impairment of air and/or water quality.

**Furnish Information**

9. Any information requested by the *Director* or a *Provincial Officer* concerning the *Site* and its operation under this *Approval* , including but not limited to any records required to be kept by this *Approval* shall be provided in a timely manner.

10. 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 *Approval* or under any statute, regulation or subordinate legal instrument, in relation to the information, shall not be construed as:

- an approval, waiver, or justification by the *Ministry* of any act or omission of any person that contravenes any condition of this *Approval* or any statute, regulation or other subordinate legal requirement; or
- acceptance by the *Ministry* of the information's completeness or accuracy.

11. Any information related to this *Approval* and contained in Ministry files may be made available to the public in accordance with the provisions of the Freedom of Information and Protection of Privacy Act, RSO 1990, CF-31.

**Interpretation**

12. This *Approval* revokes and replaces the previous Approval and all subsequent amendments.

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

14. 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 in writing**.**

15. 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.

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

**Certificate of Restriction**

17. (a) The Owner shall ensure a Certificate of Requirement is registered in the appropriate Land Registry Office on title to the Property and a registered copy is submitted to the Director the;

(b) Pursuant to Section 197 of the Environmental Protection Act, neither the Owner nor any person having an interest in the Property shall deal with the Property in any way without first giving a copy of this *Approval* to each person acquiring an interest in the Property as a result of the dealing.

**No Transfer or Encumbrance**

18. 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 is satisfied with the arrangements made to ensure that all conditions of this *Approval* will be carried out and that sufficient financial assurance is deposited with the *Ministry* to ensure that these conditions will be carried out.

**Change of Owner**

19. 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:
- the ownership of the *Site*;
- the Operator of the *Site*;
- the address of the *Owner* or *Operator*;
- 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; and
- the name of the corporation where the *Owner* or *Operator* is or at any time becomes a corporation, other than a municipal 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.

20. In the event of any change in the ownership of the Site, 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 forward to the *Director* and *District Manager*.

**Inspections**

21. 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 *Approval* relates, and without limiting the foregoing:

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

***Peterborough Landfill Public Liaison Committee, (PLPLC),***

22. The Owner shall continue and maintain the *Peterborough Landfill Public Liaison Committee, (PLPLC).* The *PLPLC* shall serve as a focal point for dissemination, review and exchange of information and monitoring results relevant to the operation of the undertaking. In addition, the purpose of the *PLPLC* shall be to provide community review of the development, operation (current and proposed) and ongoing monitoring, closure and post-closure care related to the landfill site.

23. The general mandate of the *PLPLC* shall include:

    a. Work cooperatively towards proper on-*Site* operations and the avoidance of off-site impacts from the *Site;*
    b. Review operations and provide regular input to the Owner with respect to all matters pertaining to landfill site operation, including issues pertaining to ongoing operations, fences that may be needed for litter, monitoring, the need for contingency plans/environmental emergency plan or remedial measures, response to community complaints, the need for changes to the *Approval,* post-closure monitoring and maintenance, and development of the proposed end use for the landfill site;
    c. Review operational and monitoring reports;
    d. Consider and make recommendations to the Owner regarding outside consulting advice in respect of the landfill *Site;*
    e. Facilitate ongoing dialogue between the Owner, the District Office and the community, including residents and businesses in the immediate vicinity of the landfill *Site;*
    f. Provide reports regularly to the community on the activities of the *PLPLC,* the landfill operations and landfill related issues and seek public input on these activities and issues;
    g. Monitor the Owner's complaint response program and make recommendations to the Owner with respect to this program; and
    h. Provide recommendations to the Owner with respect to unresolved complaints.

24. The *PLPLC* shall not exercise any supervisory, regulatory, approval, legal or other decision making role with respect to the operations (current and proposed) at the *Site.*

25. a) The Owner shall provide for the administrative costs of operating the *PLPLC,* including the cost of meeting places and clerical services up to a maximum annual cost of $5000; and

b) The *District Manager* may suggest to the City that a higher amount than $5000 of the cost be paid for by the City.

26. The *PLPLC* shall operate under a Terms of Reference of the committee. Suggestions to revise the *PLPLC* Terms of Reference may be made at any meeting that a quorum is present. No changes to the Terms of Reference can be made until the committee members mutually agree to changes.

27. A copy of the Terms of Reference shall be provided to the District Manager within thirty (30) days of issue of this *Approval.* Any changes to the Terms of Reference shall be provided to the District Manager for information purposes.

28. The community members shall be appointed by the *PLPLC* by the *Owner.* The community member positions are intended to be available to individuals that are not members of groups already represented on the *PLPLC* and have an interest in the operation of the landfill. The *PLPLC* shall encourage individuals who reside in close proximity to the landfill to participate. A community member is defined as a taxpayer and/or resident of the City of Peterborough.

29. The *PLPLC* shall determine the appropriate meeting frequency and review it on an annual basis.

30. Minutes and agendas of meetings shall be printed and distributed as per the mailing list on a timely basis.

31. The *PLPLC* shall have reasonable access to the *Site* and its landfill related facilities for the purpose of carrying out its objective and mandate and the Owner's consultants' reports relating to *Site* operations shall be provided to the *PLPLC.*

32. The Owner shall provide the *PLPLC* with access to the Owner's consultants as required and consultants reports in accordance with protocols agreed to between the Owner and the *PLPLC.*

33. Unless disclosure would be contrary to the Freedom of Information and Protection of Privacy Act, the *PLPLC* is to be provided all formal submissions and correspondence related to the *Site* operations by the Owner at the same time as these items are submitted to the Ministry, or any other body.

34. The Owner shall allow access to the landfill *Site* during normal operating hours, to enable any individual member of the *PLPLC* and member of the public recommended by local representatives on the *PLPLC,* to observe operations. An individual member of the *PLPLC* must contact the operator to arrange for a *Site* pass, be accompanied by an operators representative at all times and follow all safety procedures.

35. All recommendations made to the Owner with respect to ongoing landfill operations, monitoring

and the implementation of contingency measures shall be discussed at joint meetings between representatives of the Owner and the *PLPLC*. The purpose of these meetings will be to arrive at an agreement between the Owner and *PLPLC* with respect to implementation of the recommendations.

36. The Owner shall disclose all monitoring results to the *PLPLC* and deliver to the *PLPLC* all documents and information (except as may be privileged) relevant to the operation of the landfill.

**Landfill Operator's Manual**

37. Within 180 days of issuance of this *Approval,* the Owner shall submit to the District Manager a landfill operator's Operations and Maintenance Manual that is consistent with this *Approval* and that identifies the duties to be conducted by staff in key operational areas on a day to day basis. The operator's manual shall include:
    a. Health and safety;
    b. Best Management Plans for dust, litter and odour;
    c. Operation and maintenance of the *Site;*
    d. Waste acceptance;
    e. Waste disposal area and development;
    f. Nuisance management;
    g. Leachate management;
    h. Landfill gas management;
    i. Surface water/Storm water management;
    j. Inspections and monitoring;
    k. Complaints;
    l. a detailed job description of the duties of a *Competent Supervisor;* and
    m. Reporting and record keeping.

38. The Operations and Maintenance Manual shall be:
- retained at the *Site;*
- kept up to date through periodic revisions; and
- be available for inspection by *Ministry* staff.

**Signage**

39. A sign shall be installed and maintained at the main entrance/exit to the *Site* on which is legibly displayed the following information:
- the name of the *Site* and *Owner* ;
- the number of the *Approval;*
- the name of the *Operator;*
- the normal hours of operation;
- the allowable and prohibited waste types;
- a warning against unauthorized access;
- the telephone number to which complaints may be directed;
- a twenty-four (24) hour emergency telephone number (if different from above); and

- a warning against dumping outside the *Site* .

40. The Owner shall install and maintain signs to direct vehicles to the working face and recycling areas.

41. The Owner shall provide signs at recycling depot informing users what materials are acceptable and directing users to appropriate storage area.

**Closure Plan**

**South Fill Area**

42.1 At least 2 years prior to closure, the Owner shall submit to the Director for approval, with copies to the District Manager, and the *PLPLC* , a detailed *Site* closure plan pertaining to the termination of landfilling operations at the South Fill Area (SFA), post-closure inspection, maintenance and monitoring, and end use. The plan shall include the following:

a. a plan showing *Site* appearance after closure;
b. a description of the proposed end use of the *Site* ;
c. a description of the procedures for closure of the *Site,* including:
   i.) advance notification of the public of the landfill closure;
   ii) completion, inspection and maintenance of the final cover and landscaping;
   iii) *Site* security;
   iv) removal of unnecessary landfill-related structures, buildings and facilities; and
   v) final construction of any control, treatment, disposal and monitoring facilities for leachate, groundwater, surface water and landfill gas;
d. a schedule indicating the time-period for implementing sub-conditions i) to v) above.
e. 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;
f. an assessment of the adequacy of and need to implement the contingency plans for leachate and methane gas; and
g. an updated estimate of the contaminating life span of the SFA, based on the results of the monitoring programs to date.

42. 2 **North Fill Area**

At least 2 years prior to closure of the North Fill Area (NFA) or when 90% of the NFA allowed capacity is reached, whichever comes first, the Owner shall submit to the Director for approval, with copies to the District Manager, and the *PLPLC* , a detailed *Site* closure plan pertaining to the termination of landfilling operations at this *Site* , post-closure inspection, maintenance and monitoring, and end use. The plan shall include the following:

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

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

d. a schedule indicating the time-period for implementing sub-conditions i) to vi) above.
e. 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;
f. an assessment of the adequacy of and need to implement the contingency plans for leachate and methane gas; and
g. an updated estimate of the contaminating life span of the NFA and the entire *Site*, based on the results of the monitoring programs to date.

43. The SFA and/or the NFA and when applicable, the *Site* as a whole shall be closed in accordance with the closure plan(s) as approved by the *Director.*

**End Use**

44. The Owner shall consult with affected stakeholders on the proposed end uses prior to the submission of its closure report required under Condition 42.1 and 42.2. The proposed end use activities should be consistent with the types of activities consulted upon during the Environmental Assessment for the *Site.*

**Closure of the *Site***

45. Upon closure of the South Fill Area, and/or the North Fill area, the following features will be inspected, recorded on a quarterly basis and maintained as required on a seasonal basis :

- evidence of settlement;
- possible leachate seeps and springs;
- cover soil integrity;
- vegetative cover;
- surface water drainage works;
- erosion and sediment in surface water drainage system; and
- groundwater monitoring wells.

46. A vegetative cover consisting of vegetation that is suited to local conditions and that is capable with minimal care of providing vigorous, plentiful cover no later than its 3rd growing season shall be established over all completed areas to control erosion and maximize evapotranspiration. The Owner shall complete planting as soon as possible but no later than 6 months after reaching final contours.

47. If weather conditions do not allow timely placement of final and vegetative cover, silt curtains shall be employed to minimize silt loadings to surface water bodies.

**Landscape Plan**

48. The Owner shall ensure a completed landscape plan for the *Site* is submitted to the District Manager with copies to the *PLPLC* .

**OPERATION**

**Proper Operation**

49. The *Site* shall be properly operated and maintained at all times. All waste shall be managed and disposed of in accordance with the *EPA* , *Regulation 347* , *Regulation 232,* and the requirements of this *Approval.* At no time shall the discharge of a contaminant that causes or is likely to cause an adverse effect be permitted.

50. The Owner shall ensure that the MECP's Guideline B-7, *Reasonable Use Guideline,* is applied at the *Site* boundaries.

**Waste Inspection**

51. All loads of waste coming to the *Site* shall be properly inspected by a *Competent Person* prior to disposal at the *Site.* Waste vehicles shall be diverted to appropriate areas for waste disposal.

**Waste Deposit**

52. The Owner shall deposit waste in a manner that minimizes exposure area at the landfill working face and waste shall be compacted before cover is applied.

**Vermin, Dust, Litter, Odour, Noise, Traffic**

53. The *Site* shall be operated and maintained such that vermin, vectors, dust, litter, odour, noise and traffic do not create a nuisance.

**Scavenging**

54. The Owner shall ensure that there is no scavenging as defined in Reg. 347 at the *Site.*

**Dust, Litter and Odour Control**

55. The Owner shall control fugitive dust emissions from on-*Site* sources including but not limited to on-*Site* roads, stockpiled cover material and, closed landfill area prior to seeding especially during times of dry weather conditions. If necessary, major sources of dust shall be treated with water and/or dust suppression materials to minimize the overall dust emissions from the *Site.*

56. The Owner shall take all practical steps to prevent escape of litter from the *Site.* All loose, wind blown litter shall be collected and disposed of at the landfill working face.

57. The Owner shall respond to complaints of litter from the *Site* with one (1) week of the complaint's receipt.

58. Upon being notified of the approximate location of litter that has blown from the *Site* or from waste haulage vehicles that have used the *Site* or were en route to the *Site,* the Owner shall attempt to clean-up such litter as soon as is reasonably practicable.

59. The Owner shall ensure a Best Management Practices for the control of dust, odour and litter from the *Site* is submitted to the District Manager.

**Noise**

60. The Owner shall comply with noise criteria in MECP Guideline entitled "*Noise Guidelines for Landfill Sites"* dated October 1998 as amended from time to time and the *Site* shall comply with the limits set in Publication NPC205.

**Burning Waste Prohibited**

61. Burning of waste at the *Site* is prohibited.

**Asbestos Waste**

62. Any waste that is considered asbestos waste shall be handled in accordance with Section 17 of Reg. 347 as amended from time to time.

63. A suitable sized excavation for the asbestos waste shall be made by the Owner in a location away from the active landfilling face.

64. All asbestos waste shall be inspected to ensure that the asbestos waste is properly bagged or contained and free from puncture, tears or leaks.

65. The asbestos waste shall be placed in the excavation to avoid damage to the containers and to prevent dust and spillage.

66. Upon completion of the unloading and deposition of the asbestos in the excavation, at least 125 centimetres of cover or waste material shall be placed over the asbestos.

67. All asbestos waste shall be deposited to a level no higher that 1.25 metres below the general elevation of the disposal area to ensure that daily cover material removal in the future does not encounter the asbestos waste.

**Backup Power**

68. a) The Owner shall provide adequate backup power at the *Site* in order to ensure operation of the scale facility and operation of the landfill gas blower on-*Site* ; and

b) a portable generator would be considered sufficient for back-up power for the landfill gas blower.

69. A power supply connection at each leachate collection pumping station shall be installed by the Owner that will permit a portable generator to be connected during a power outage.

**Surface Water**

70. The Owner shall take all appropriate measures to minimize surface water from coming in contact with waste. Temporary berms and ditches shall be constructed around active waste disposal areas to prevent extraneous surface water from coming in contact with the active working face.

71. The owner shall not discharge surface water to receiving water bodies without an approval under Section 53 of the OWRA.

72. If surface water ponding occurs in any surface water ditches having a drainage slope less than 0.5%, the Owner shall regrade the ditches.

**Waste Type**

73. a) Only *acceptable waste* may be received at the *Site* and public drop-off area;

b) The public drop-off area may receive only *Acceptable public drop-off waste;*

c) *Acceptable public drop-off waste* that is received at the *Site* shall be for disposal at the *Site* or transfer off-site for recycling or reuse;

d) *Acceptable public drop-off waste* may be stored at the public drop-off area for a maximum of ninety (90) days; and

e) With the exception of using a chipper to process wood waste into more manageable sizes, no waste processing shall occur at the public drop-off area.

**Capacity**

74. **South Fill Area**
The *Owner* shall only accept and deposit waste at the SFA as long as there is available capacity as defined by the final contours for the SFA approved by this *Approval* . This *Approval* permits disposal of waste at the *Site* to fill an air space of 2,918,000 cubic metres (including waste, daily and interim cover material) for the SFA.

75. **North Fill Area**

The *Owner* shall only accept and deposit waste at the NFA as long as there is available capacity as defined by the final contours for the NFA approved by this *Approval* . This *Approval* permits disposal of waste at the *Site* to fill an air space of 1,527,000 cubic metres (including waste, daily and interim cover material) for the North Fill Area.

**Yearly Waste Limit**

76. a) The Owner may receive at the *Site* up to a maximum of 85,000 tonnes per year of waste including contaminated soil for disposal at the *Site;* and

b) In the event of an emergency, the Owner may request to the District Manager that the amount allowed to be received in one particular year be increased by 20,000 tonnes and the District Manager has the authority to grant written approval to such a request.

**Service Area**

77. Only waste that is generated within the County of Peterborough may be accepted at the *Site.*

**Cover Materials Allowed**

78. The following materials, in the corresponding thickness, may be used as an alternative to soil as a daily and intermediate cover:

i) non-hazardous contaminated soil that meets the Land Disposal Requirements of Regulation 347 and the *handbook;* and

ii) Wood chips and compost overs consisting of processed chipped wood.

79. The Owner shall keep a record of the delivery of all contaminated soil to the *Site* . The record shall include the following information as a minimum:

i) The name and Approval number of the hauler;
ii) The name and address of the generator of the waste;
iii) The date and time of delivery; and
iv) The quantity of waste delivered.

80. The use of non-hazardous contaminated soil for daily/intermediate cover referenced in Condition 78 of this *Approval,* shall be subject to the Owner:

a) making sure that the Generator has provided a signed statement with the following information at a minimum to the Owner regarding the contaminated soil including:

i) the date;
ii) the name of the Generator;
iii) Generator Registration number, if the Generator has one;
iv) the source of the non-hazardous contaminated soil;
v) whether the non-hazardous contaminated soil was ever categorized as a listed or characteristic hazardous waste;
vi) any records required by Section 79 and 84 of Regulation 347;

vii) if the waste were a characteristic waste but has been treated, a copy of the Land Disposal Restrictions Form required by Regulation 347 or a notification stating that the waste was a characteristic waste and that the waste can be land disposed as per Sections 79 and 84 of Regulation 347; and
viii) analytical test results of the contaminated soil.

b) taking all reasonable precautions to ensure that the requirements of the *Land Disposal Restrictions* and the *Land Disposal Treatment Requirements* outlined in Regulation 347 are being followed at the *Site.*

81. The volume of contaminated soils stored at the *Site* shall not exceed the three months limitation of the annual daily/ interim cover material requirements as determined by the previous annual report. The Owner shall ensure at all times that the stockpiled contaminated soils shall produce no off-Site nuisance odours.

82. In the event of a reported incident of odour from the contaminated soil at the *Site* which causes a nuisance and poses a threat to the health and safety of person(s) and the environment, the Owner shall forthwith implement a contingency plan to immediately abate the nuisance odour and/or run-off that may originate from the stockpile.

83. The use of any other alternative materials as daily or intermediate cover material is subject to approval by the Director.

84. Use of contaminated soil as daily or intermediate cover materials shall be discontinued within two (2) working days of receipt of written notification from the District Manager, stating that the use of the alternative daily or intermediate cover materials at the *Site* has proven to be environmentally unsuitable.

**Contaminated Soil as Daily or Intermediate Cover**

85. Prior to receipt at the *Site* , each source of contaminated soils which are to be used as daily or intermediate cover shall be tested to determine if the soils meet the criteria in this *Approval* and Regulation 347. A copy of the test results shall be kept in the daily records for the *Site.*

86. If confirmatory testing of the contaminated soil used for daily or intermediate cover indicates it is hazardous or exceeds the allowed Land Disposal Restrictions, the Owner shall report any failed sample of the contaminated soil testing to the District Manager forthwith.

87. Any contaminated soil that is determined to be hazardous shall be considered a hazardous waste and shall be disposed in the appropriate manner.

88. Subject to Conditions 80 and 85 of this *Approval,* contaminated soil for use as daily cover shall be stockpiled in areas of the *Site* that have a leachate collection system installed below.

89. Subject to Conditions 80 and 85 of this *Approval,* contaminated soil may be used for

daily/intermediate cover but only on slopes where surface water drainage is into the waste fill and isolated from the storm water collection system.

90. Surface water run off from the contaminated soils stockpile which exceeds the Provincial Water Quality Objectives shall not be discharged through the surface water management system.

91. The Owner must ensure that measures are in place for the on-*Site* treatment and disposal of any contaminated run off from the contaminated soils stockpile.

**Buffer Area**

92. A minimum 30 metre buffer area shall be provided and maintained between the disposal areas and the landfill property boundaries.

**Waste Limits**

93. a) No waste, including daily cover, intermediate cover or final cover layer, may be landfilled outside the limits of the base contours and the final contours outlined in Items 36, 37, and 38 of Schedule "A"; and

b) Notwithstanding Condition 93 a) of this *Approval,* daily, intermediate and/or final cover materials may be temporarily stockpiled up to five (5) metres above the approved final contours for the *Site* for a maximum of time of six (6) months. Where cover material is temporarily stockpiled above final contour elevations, silt fencing, dust control and/or all other appropriate measures shall be taken to prevent dust and surface water impacts on/off *Site.*

**Application of Cover Material**

94. Cover material shall be applied as follows:

a) Daily Cover - At the end of each working day, the entire working face shall be covered with a minimum thickness of 150 mm of soil cover or an approved alternative cover material;

b) Daily cover that is exposed shall be checked at least once every week to see if the 150 mm of soil cover or approved alternative cover material is being maintained;

c) Where the inspection required in Condition 94(b) reveals that the 150 mm cover has been compromised, soil cover or an approved alternative cover material shall be added to bring the thickness of the daily cover to a minimum of 150 mm;

d) Intermediate Cover - 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 alternative cover material shall be placed; and

e) Final Cover - In areas where landfilling has been completed to final contours, a minimum 0.9 metre thick layer of final cover soil shall be placed. Fill areas shall be progressively completed and rehabilitated as landfill development reaches final contours.

95. Final cover, consisting of material of low permeability that has hydraulic conductivity to allow at least 0.15 metres of infiltration per year, shall be applied and compacted in maximum 15 cm thick lifts. The total compacted thickness of the final cover shall be at least 0.9 metre. A minimum of 0.15 metres of topsoil or other material approved by the Director shall cover the 0.9 metre of cover so that plant growth may be sustained.

96. Appropriate surface inspections of the final cover will be made annually by the Owner to ensure that erosional problems are identified and remediated forthwith.

97. Final cover and topsoil layer shall be progressively applied to the *Site* as the final waste contours are reached.

**Hours of Operation**

98. Waste shall only be accepted at the *Site* during the following time periods:

- 7 AM to 7 PM - Monday to Saturday (except statutory holidays).

99. On-*Site* equipment used for daily *Site* preparation and closing activities shall only be used during the following time periods:

- 6 AM to 8 PM - Monday to Saturday (except statutory holidays).

100. With the prior written approval of the *District Manager* , the time periods may be extended to accommodate seasonal or unusual quantities of waste.

101. The Owner may provide limited hours of operation provided that the hours are posted at the landfill gate and that suitable notice is provided to the public of any change in operating hours.

102. Upon reasonable notice to the District Manager, contingency actions may take place outside normal hours of operation. Emergency response may occur at any time as required.

***Site* Security**

103. During non-operating hours, the *Site* entrance and exit gates shall be locked and the *Site* shall be secured against access by unauthorized persons.

**Fencing**

104. The Owner shall make sure that the necessary fencing for security of the *Site* is installed.

**Waste Inspection**

105. The *Owner* shall conduct waste inspection to ensure that the waste is of a type approved for acceptance under this *Approval.*

**Access Roads**

106. On-*Site* roads shall be provided and maintained in a manner that vehicles hauling waste to and on the *Site* may travel readily and safely on any operating day. During winter months, when the *Site* is in operation, roads must be maintained to ensure safe access to the landfill working face. Access roads must be clear of mud, ice and debris which may create hazardous conditions.

**Cleaning of Leachate Collection System**

107. The leachate collection system piping for each stage of the development of the North Fill Area of the landfill shall be inspected annually for the first five years after waste placement and then as often as future inspections indicate to be necessary. Additionally, leachate collection pipes must be cleaned whenever an inspection indicates that cleaning is necessary.

108. Leachate video system inspection shall be:
   - i. biannual (every 2 years, in odd years e.g. 2013, 2015 etc.)
   - ii. video inspection of the entire system or selected portions of the system shall be undertaken on an annual basis if obstructions or if significant changes in the ability to flush the system are encountered; and
   - iii. annual video inspection of newly installed leachate pipes shall be undertaken for five years following installation.

109. The leachate collection system for the North Fill Area and the South Fill Area shall be cleaned at least once per year, having regards with a report entitled "Annual Monitoring Report, Design and Operations - 1997, Bensfort Road Landfill, Peterborough, Ontario", date May 1998, prepared by CRA. A video inspection performed of the NFA and SFA, where practicable, biannually, having regard to the 2003 to 2004 Annual Monitoring Reports, Design and Operations, South Fill Area, City of Peterborough, Waste Facility, Peterborough, Ontario. An opinion of a professional engineer as to the structural integrity and efficiency of the leachate collection system of the NFA and the SFA shall be included in the Annual Report required under Condition 184 of this *Approval.*

110. In areas where leachate collection pipe slopes are less than 0.5%, the leachate collection pipes shall be inspected semi-annually for the first three (3) years after waste placement and then as often as future inspections indicate to be necessary. Additionally, leachate collection pipes must be cleaned whenever an inspection indicates that cleaning is necessary. After the three (3) year period, inspection and cleaning of the leachate collection pipes shall be in accordance with the previous condition.

**Leachate Collection System:**

111. No Waste shall be deposited in any cell in the North Fill Area of the *Site* until the leachate

collection system for that cell, as described in the documents listed in Item 37 in Schedule "A" has been installed.

112. Engineered components of the leachate collection system at the NFA, including those involving geotextile, granular blanket drainage layers, perforated pipes-french drains, and monitoring installations shall be inspected by a professional engineer prior to placement of waste, with appropriate maintenance and/or replacement of parts of the system occurring from time to time, as required and where feasible.

113. Leachate alarms shall be installed and maintained in the NFA and the SFA having regard to Section 6 of item 5 in Schedule "A".

114. The flow of leachate from the leachate collection systems shall be determined and the results integrated into the annual water balance.

115. The information referred to in Condition 114 of this *Approval* shall be used as part of an annual assessment of the performance of the under drain system and all interpretations and conclusions shall be included in the Annual Report.

116. Leachate that is to be removed from the leachate collection system shall be removed in a manner which prevents any overflow of leachate to any surface water course.

117. As-built drawings of the leachate control system for the North Fill area shall be submitted to the District Manager within 60 days of issue of this *Approval* or within sixty (60) days of the completion of the leachate control system for the North Fill area.

118. The leachate in the collection system shall be removed as required and in such a manner, to prevent any overflow of leachate to any surface watercourse.

119. Leachate samples shall be collected from the leachate collection system of the NFA and the SFA in order to characterize and monitor the leachate chemistry for a period of twenty-five (25) years subsequent to *Site* closure, at which time the monitoring program will be re-evaluated by the Owner to determine the need and/or type of monitoring to be continued. Recommendations from the Owner shall be submitted to the District Manager for acceptance. Leachate shall be sampled by the Owner at least two times per year (Spring and Fall) to monitor annual trends in leachate chemistry.

120. The flow of leachate from the leachate collection system shall be determined and the results integrated into an annual *Site* water balance. This information shall be used as part of an annual assessment of the performance of the leachate drain system and all interpretations and conclusions shall be included in the annual monitoring report.

**Inspections**

121. The owner shall inspect the *Site* monthly for the following items but not limited to these items:

- Erosion rills;

- General settlement areas or depressions;
- Shear and tension cracks;
- Condition of surface water drainage works;
- Erosion and sedimentation in surface water drainage system;
- Presence of any ponded water;
- Adequacy of cover material;
- Evidence of vegetative stress, distressed poplars or side slope plantings;
- Condition of groundwater monitoring wells and gas wells;
- Presence of insects, vermin, rodents and scavenging animals;
- The amount of litter at the *Site;*
- Condition of fence surrounding the *Site;* and,
- General *Site* appearance.

122. The owner shall inspect the *Site* weekly for presence of leachate seeps.

**Competent People and Competent Supervisor**

123. A training plan that is sufficient for people that operate any aspect of the *Site* to become a *Competent Person* shall be developed and implemented by the Operator. Only Competent People shall operate any aspect of the *Site* or carry out any activity required under this *Approval.* Workers at the *Site* shall provide proof of training to the Ministry upon request.

124. The Owner shall have a *Competent Supervisor* or *Competent Supervisors* for the *Site;*

125. (a) An up to date list of *Competent People* shall be kept at the *Site* and be readily available for inspection by a *Provincial Officer;*

(b) The District Manager shall be informed in writing within seven (7) days of any additions or changes to who is/are a *Competent Supervisor(s).*

**MONITORING, RECORDING NOTIFICATION**

**Daily Inspections and Log Book**

126. An inspection of the entire *Site* and all equipment on the *Site* shall be conducted each day the *Site* is in operation to ensure that the *Site* is being operated in compliance with this *Approval* . Any deficiencies discovered as a result of the inspection shall be remedied immediately, including temporarily ceasing operations at the *Site* if needed.

127. A record of the inspections shall kept in a daily log book or a dedicated electronic file that includes:
- the name and signature of person that conducted the inspection;
- the date and time of the inspection;
- the list of any deficiencies discovered;
- the recommendations for remedial action; and
- the date, time and description of actions taken.

128. A record shall be kept in a daily log book of all refusal of waste shipments, the reason(s) for refusal, and the origin of the waste, if known.

**Groundwater Monitors**

129. The Owner shall ensure all groundwater monitoring wells are properly capped, locked and protected from damage when not in use.

130. Any groundwater monitoring wells included in the monitoring program shall be assessed, repaired, replaced or decommissioned as required.

131. The Owner shall repair or replace any monitoring well which is destroyed or in any way made inoperable for sampling such that no more than one sampling event is missed.

132. All monitoring wells that are no longer required as part of the groundwater monitoring program shall be decommissioned in accordance with good standard practice that will prevent contamination through the abandoned well and in accordance with Ontario Regulation 903.

133. A report on the decommissioning referred to in Condition 132 of this *Approval* shall be provided in the annual monitoring report for the period during which the well was decommissioned.

**Monitoring Program**

134. Monitoring programs shall be carried out for leachate, groundwater, private wells, surface water, landfill gas in accordance with the Environmental Monitoring Plan, as amended by the *District Manager* from time to time, outlined in Schedule "B" of this *Approval.*

135. a) The *Site* environmental monitoring programs shall be continually evaluated and enhanced as required by the ministry or as recommended in the Annual Report; and

b) The frequency of sampling and parameters for analysis may be adjusted by the District Manager as monitoring information becomes available.

136. No alterations to the groundwater or surface water monitoring programs shall be implemented prior to receiving written approval from the District Manager. The Owner shall provide a copy of any requests for modification to the monitoring program to the *PLPLC* at the same time or prior to the time that such request is made to the District Manager.

**Contingency Plans and Trigger Mechanisms**

***Groundwater Quality***

137. The trigger concentration for groundwater quality shall be 80% of the Guideline B-7 values for parameters that have an Ontario Drinking Water Standards value.

138. Groundwater chemical concentrations must be assessed with the trigger concentrations within twelve (12) weeks of sample collection.

139. The assessment process for groundwater quality is detailed in Item 36, 37 and 38 of Schedule "A".

140. If the District Manager determines that leachate collection is not successful and that the monitoring program indicates that contamination will potentially be migrating off-site, or, if leachate springs and/or outbreaks down gradient of manhole J1 occur, the Owner must install and operate the contingency program outlined in the appended documents as defined by Items 24, 29, 36, 37 and 38 of Schedule "A" of this *Approval* and as instructed by the District Manager. The District Manager may, at any time, instruct the Owner to implement the recommendations made in the monitoring report.

***Surface Water Quality***

141. The trigger mechanisms for surface water quality shall be one of the following:

- Where off-site surface water quality satisfies the Ministry's PWQO, the respective PWQO shall be used as a trigger concentration; and
- Where the background surface water quality naturally exceeds the PWQO, the background concentration should be considered in evaluating and updating the trigger concentration.

142. Surface water quality results will be assessed with the trigger concentrations within twelve (12) weeks of sample collection.

143. The assessment process for surface water quality and response to results above the trigger concentration are as detailed in Item 36, 37, and 38 of Schedule "A".

**Landfill Gas**

144. (a) Before the placement of any waste in the North Fill Area of the *Site,* the Owner shall ensure that the proposed landfill gas management system specified in Item 45 and 48 of Schedule "A" is installed and operational;

(b) Within sixty (60) days of the flare equipment operating to control landfill gas, an acoustic audit to measure the noise emissions from the flare equipment shall be conducted by the Owner. The Owner shall report the results of the acoustic audit to the Director within 120 days of the flare equipment becoming operational; and

(c) All buildings are to be free of any landfill gas accumulation. The Owner shall provide adequate ventilation systems to relieve landfill gas accumulations in buildings if necessary.

145. The landfill gas collection and flaring/utilization system, South Fill Area, shall be constructed and operated in accordance with the detailed design and development, as described in Item 45

and in Sections 3.0 to 3.4 in Item 48 of Schedule "A".

146. Detailed design and operations report for the North Fill Area and all subsequent phases of the landfill gas collection and flaring system, shall be submitted by the Owner/Operator, for the approval of the Director, with copies to the District Manager, prior to construction. Any design optimization or modification shall be clearly identified, along with an explanation of the reasons for the change.

147. The detailed design and operations report shall, at a minimum, include the following:

(a) full-scale design drawings and specifications, including profiles, *Site* plan showing the entire *Site* (waste fill areas and buffers), all engineered facilities associated with the headers, laterals and sub-laterals, and material descriptions and requirements for delivery, storage, installation and sampling;

(b) detailed quality assurance/quality control (QA/QC) program for construction of the landfill gas collection and flaring system;

(c) details of nuisance control programs and necessary precautions to avoid disturbance to the natural environment caused by the operation of the landfill gas collection and flaring;

(d) details on the monitoring, maintenance, repair and replacement of components of the landfill gas collection and flaring system, as necessary; and

(e) contingency plans for environmental controls.

148. The Owner/Operator shall develop and operate the landfill gas collection and flaring system, including all approved facilities, in accordance with the approved detailed design and operations report, and shall implement QA/QC activities and procedures, as approved by the Director.

149. The Owner/Operator shall ensure the *Site's* Operations and Maintenance Manual required by Condition 37 of this *Approval* is updated to reflect the development and operation of the landfill gas collection and flaring system expansion, with respect to details on inspection and maintenance schedules, documentation procedures, shut-down procedures, Ministry contact procedures, and flare operation and maintenance. A copy of the Manual shall be provided to the District Manager and a copy retained on-*Site* and made available to Ministry staff upon request.

150. Prior to implementation of any change in the landfill gas collection and flaring system operation, that may result in activities not specified in the Design Report, identified in Item 48, in Schedule "A", attached to this *Approval,* or in the *Approval,* and that may likely cause the discharge of contaminant to the natural environment, the Owner/Operator shall obtain approval from the Director.

151. The Owner/Operator shall maintain records of landfill gas flow. Such records shall be made available for inspection upon request by a Provincial Officer.

152. In the event of a discharge of a contaminant, including landfill gas, landfill gas condensate, leachate, etc., that causes or is likely to cause an adverse effect, the Owner/Operator shall immediately notify the District Manager and the Ministry's "Spills Action Centre", and advise of actions being taken to contain, control and ameliorate the situation.

153. For any situation when landfill gas is not being collected and incinerated and which cannot be rectified within 48 hours, the Owner/Operator shall notify the District Manager and advise of actions being taken to contain, control and ameliorate the situation.

154. The Owner/Operator shall ensure a written report describing a plan and implementation schedule for landfill gas and odour management in conjunction with *Site* development and progressive rehabilitation is submitted to the Ministry. The plan shall include, as a minimum:

(a) A description of any anticipated progress of final cover placement until *Site* closure, based on progressive rehabilitation of the *Site;* and

(b) A program to evaluate the effectiveness of the landfill gas collection system which shall identify areas of the *Site* which require upgrading, alteration, or additional collection and control facilities. The program shall include an assessment to be conducted at least once a year, of the *Site's* conformance with an operating code of practice which includes the development of system design parameters, details on the management of the system to satisfy the design parameters and a description of rationale for landfill gas flow adjustments to optimize system operation.

155. During construction and continued use of the landfill gas collection system, the Owner/Operator shall implement as a minimum, odour control plan. The effectiveness of the odour control plan shall be monitored and evaluated regularly, and updated or amended as necessary, based on operational experience and odour complaints received.

156. As a component of the Annual Monitoring and Operation Report for the *Site,* the Owner/Operator shall include a written report covering each year’s construction season. The report shall detail the construction activities, QA/QC program carried out for the construction, as-built drawings of the landfill gas collection and flaring system to date, including a description and reasons for any changes to the design of the landfill gas collection and flaring system.

157. Any gas extraction well that needs to be replaced due to damage or the well is deemed to be not functioning properly, or additional wells to upgrade the system, the Owner/Operator shall install or replace the gas extraction well within a reasonable time frame of identifying the need for replacement. Any such changes to the gas extraction system shall be documented in the Annual Monitoring and Operation Report.

158. The Owner/Operator shall implement the monitoring program for landfill gas to monitor the performance of the landfill gas collection and flaring system as approved by the Ministry, as well as any written recommendations of the District Manager through the review of the Annual Monitoring Reports.

159. Components of the active gas collection system shall be monitored on an as-needed basis, with a routine frequency of once per month for the full collection field. Any observed deficiencies/problems shall be repaired as soon as practicable and a summary of remedial actions carried out, shall be reported in the Annual Monitoring and Operation Report, listed in Condition 186 of this *Approval.*

160. The Owner/Operator shall ensure that any proposed changes to the monitoring program under this *Approval* shall be implemented subject to prior written concurrence of the District Manager. The requirement for prior written concurrence does not apply to those actions required to contain, control and ameliorate a situation under Conditions 152 and 153 of this *Approval.*

**Subsurface Migration of Combustible Gas**

161. Buildings and structures existing or to be built on-*Site* shall be situated, constructed and monitored in a manner which minimizes the potential for explosive hazards due to combustible gas. Appropriate methane detection and alarm equipment, shall be installed and maintained for all enclosed, unvented buildings and/or structures on-*Site* which at times are occupied by people.

**Note:** For the purposes of Condition 161, vented building or structure is a building or structure built with its floor sealed and elevated above ground and having adequate air space underneath the floor of the building or structure.

162. Subsurface migration of combustible methane gas shall meet the following limits, as required by Ontario Reg. 232/98:

(a) The concentration of methane gas must be less than 2.5 percent by volume at the limits of the property boundary;

(b) The concentration of methane gas must be less than 1.0 percent by volume (15% of the Lower Explosive Limit of methane) in any on-*Site* building or enclosed structure, and in the area immediately outside the foundation or basement floor of the building or structure that is located on-*Site* , if the building or structure is accessible by people or contains electrical equipment or a potential source of ignition;

(c) Sub-condition (b) does not apply to a leachate collection, storage or pumping station or a landfill gas collection and/or treatment facility for which specific Occupational Health and Safety measures and procedures relating to the risk of asphyxiation and the risk of explosion, must be followed; and

(d) The concentration of methane gas from the *Site* in any off-site building or enclosed structure, and in the area immediately outside the foundation or basement floor of the building or structure, if the building or structure is accessible by people or contains electrical equipment or a potential source of ignition, must be less than 0.05 percent by volume.

163. If a measured gas concentration at any specific compliance location, reaches the applicable limit identified in Sub-Conditions 162 (a) and (b) above, the Owner shall undertake additional monitoring, or if a notification is given that gas concentration has reached the limit specified in Sub-condition 162 (d), above, or if landfill gas concentrations exceed 10% of the Lower Explosion Level (LEL), the reading shall be re-measured to assess the source and pathway of methane to determine if the elevated concentrations are landfill related. If these readings confirm an exceedance of the applicable limit, the District Manager shall be notified immediately, and appropriate control measures shall be implemented as soon as possible thereafter.

164. If the elevated concentrations are landfill related, the Owner shall undertake contingency measures.

165. The owner shall maintain the flare that is installed at the *Site* for controlling landfill gas in proper working order.

**General Contingency Measures**

166. In the event a result of a monitoring test exceeds the trigger mechanisms detailed in Conditions 162 and 163 of this *Approval,* the Owner shall:

a. notify the District Manager, and the *PLPLC* of any trigger level exceedances within twenty four (24) hours of receipt of the results;
b. conduct an investigation into the cause of the adverse result and submit a report to the *District Manager* that includes an assessment of whether contingency measures need to be carried out;
c. if contingency measures are needed, submit detailed plans, specifications and descriptions for the design, operation and maintenance of the contingency measures, and a schedule as to when these measures will be implemented, to the *Director* and notify *District Manager* ; and
d. implement the required contingency measures upon approval by the *Director.*

**Environmental Emergency Plan**

167. The Owner shall review the Environmental Emergency Plan on an annual basis as a minimum, and shall ensure that the names and telephone numbers of the persons to be contacted as required under Condition 168 are up-to-date, and that these numbers are prominently displayed and immediately available to all staff and emergency response personnel.

168. The Environmental Emergency Plan shall include, but not necessarily be limited to:

a) a requirement that an exceedance of any trigger concentration shall initiate contingency measures to ensure that groundwater and surface water discharging to the natural environment does not exceed surface water trigger concentrations outlined in Condition 141 of this *Approval;*

b) preparation for, prevention of, response to and recovery from an environmental emergency such as a spill or process upset, or emission of contaminants or odours;

c) a list of equipment and spill clean up materials available in case of an emergency;

d) contingency procedures to be followed in the event of equipment malfunction, a labour disruption, transportation disruption, inability of the Peterborough Water Pollution Control Plant to accept waste leachate or other business disruption to the operation;

e) a Fire and Explosion Safety Plan for the *Site* that has been developed by a *Professional Engineer* or other qualified person that is knowledgeable about fire and explosion issues at landfill sites;

f) management of unacceptable waste that may inadvertently end up at the *Site;*

g) *Site* emergency response team;

h) procedure for providing a written log or an electronic file to record the description of all spills or emission of a contaminant such as odour, the action taken for the clean-up or correction of the spill or emission of a contaminant, the time and date of the spill or emission of a contaminant, and for spills, the time that the *Ministry* and other persons were notified of the spill in fulfilment of the reporting requirements in the Act; and

i) notification protocol with names and telephone numbers of persons to be contacted, including persons responsible for the *Site,* the Ministry's District Office and Spills Action Centre, the local municipal fire department, the local municipal sewage treatment plant, the *Competent Supervisor* the local Medical Officer of Health, the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response.

169. a) Any proposed changes to the Environmental Emergency Plan shall be submitted to the District Manager for his/her acceptance;

b) The equipment, materials, information and personnel requirements outlined in the Environmental Emergency Plan are required to be kept on *Site* and shall be immediately available on the *Site* at all times. The equipment shall be kept in a good state of repair and in a fully operational condition; and

c) The Owner shall promptly take all necessary steps to contain and clean up any spills or upsets at the *Site.* All spills and upsets shall be recorded in a written log or an electronic file format, as to the nature of the spill or upset, and action taken for clean-up, correction and prevention of future occurrences.

**Complaints Procedure**

170. If at any time, the *Owner* receives complaints regarding the operation of the *Site* , the *Owner* shall respond to these complaints according to the following procedure:

a. The *Owner* shall record and number each complaint, either electronically or in a log book, and shall include the following information: the nature of the complaint, the name, address and the telephone number of the complainant if the complainant will provide this information, the time and date of the complaint, specific details of operations that were occurring, any changers from normal operations, types of waste loads (including source) and other on-*Site* activities;

b. The Owner, upon notification of the complaint, shall initiate appropriate steps to determine the validity of the complaint. If the complaint is determined to be valid, investigate all possible causes of the complaint, and proceed to take the necessary actions to eliminate the cause of the complaint. The Owner shall forward a formal reply to the complainant; and

c. The Owner shall complete and retain on-*Site* a report written within one (1) week of the complaint date, listing the actions taken to resolve the complaint and any recommendations for remedial measures, and managerial or operational changes to reasonably avoid the recurrence of similar incidents.

171. The Owner shall designate a person to receive any complaints and to respond with a written notice of action as soon as possible. The Owner shall post the *Site* complaints procedure at the *Site* entrance. All complaints and the Owner's actions taken to remedy the complaints shall be summarized in the Annual Report.

172. All complaints received by the Owner related to the environmental performance of the *Site,* including environmental performance related complaints that are determined by the *Owner* to be not valid, are to be reported within twenty-four (24) hours of receipt to the District Office. Complaints shall be reported to the *PLPLC* at the next *PLPLC* meeting.

**Daily Records**

173. Daily *Site* inspection records in the form of a written log or a dedicated electronic file shall include but not be limited to the following:

i) the type, geographic source, date and time of arrival, hauler, and quantity (tonnes) of all waste received at the *Site;*

ii) the area of the *Site* in which waste disposal operations are taking place;

iii) calculation of the total quantity (tonnes) of waste received at the *Site* during each operating day and each operating week;

iv) itemization of each load of contaminated soil delivered to the *Site* as is allowed by Condition 78 of this *Approval;*

v) results of any test done to determine the acceptability of waste at the *Site;*

vi) a reference for each load of solid non-hazardous industrial waste received, to the client and type of solid non-hazardous industrial waste;

vii) a record of any litter collection activities and the application of any dust suppressants;

viii) a record of the daily inspections;

ix) a description of any out-of-service period of any control, treatment, disposal or monitoring facilities, the reasons for the loss of service, and action taken to restore and maintain service;

x) type and amount of daily, intermediate and final cover used;

xi) emergency situations and actions taken to resolve them; and

xii) any other pertinent information required by the District Manager.

174. The Owner shall maintain on record at the *Site* for each client disposing of solid non-hazardous waste at the *Site*, a description of each type of solid non-hazardous waste received from the client and documentation to demonstrate that the Owner has taken reasonable care to ensure that waste classified as either hazardous or liquid industrial waste under Reg. 347 as amended from time to time, is not disposed of at the *Site.*

**Record Retention**

175. Except as authorized in writing by the Director, all records required by this *Approval* shall be retained at the *Site* for a minimum of five (5) years from their date of creation.

176. The Owner shall retain all documentation listed in Schedule "A" for as long as this *Approval* is valid.

177. All monthly *Site* inspection records are to be kept at the *Site* until they are included in the Annual Report.

178. The Owner shall retain employee training records as long as the employee is working at the *Site.*

179. The Owner shall make all of the above documents available for inspection upon request of Ministry staff.

**Emergency Situations**

180. In the event of a fire or discharge of a contaminant to the environment, *site* staff shall contact the MECP Spills Action Centre (1-800-268-6060) and the District Office of the MECP forthwith.

181. The Owner shall submit to the District Manager a written report within 3 days of the spill or incident, outlining the nature of the incident, remedial measures taken and measures taken to prevent future occurrences at the *Site.*

182. The Owner shall ensure that adequate fire fighting and contingency spill clean up equipment is available and that emergency response personnel are familiar with its use and location.

**Annual Report**

183. A written report on the development, operation and monitoring of the *Site,* shall be completed annually (the "Annual Report"). The Annual Report shall be submitted to the *District Manager,* and the *PLPLC*, by May 15th of each year, and shall cover the 12 month period preceding December 31st.

184. The Annual Report shall include the following:

i) an updated waste disposal site plan showing the areas of fill, buffer zones, present contours, monitoring locations and surface water control systems;

ii) a calculation of the remaining capacity of the *Site,* an estimate of the remaining *Site* life and a comparison of actual capacity used to approved *Site* capacity;
iii) the optimization of remaining *Site* capacity with respect to refining final contours, having regard to minimizing the potential for off-site impacts;
iv) approved changes to the operation;
v) procedures at the waste disposal site;
vi) a summary of any equipment changes at the site;
vii) an assessment of potential and actual impacts, if any, of the leachate on the Peterborough Water Pollution Control Plant;
viii) a summary of any occurrences or incidents where this *Approval* was not complied with, the reason for non-compliance and the measures to be implemented to ensure that future non-compliance does not occur;
ix) results in tabular format and an interpretive analysis of the results of all leachate, groundwater, surface water and landfill gas monitoring and flaring, including an assessment of the need to amend the monitoring programs;
x) the interpretive analysis referred to in Condition 184 ix) shall include a discussion of groundwater parameters and compliance with the *Reasonable Use Policy* at the property boundary as well as recommendations for future action (contingency measures) that may be necessary should the monitoring program detect failure of the design;
xi) groundwater flow and contaminant migration analyses for the entire landfill *Site;*
xii) surface water quality with respect to Provincial Drinking Water Objectives;
xiii) an assessment of the operation and performance of all engineered facilities, the need to amend the design or operation of the *Site* , and the adequacy of and need to implement the contingency plans/environmental emergency plan;
xiv) leachate characterization results and a discussion of the potential impacts on the Water Pollution Control Plant;
xv) total leachate volumes collected weekly, monthly and annually and the disposition of the collected leachate;
xvi) *Site* plans showing all surface and ground water monitoring locations and the existing contours of the *Site;*
xvii) areas of landfilling operation during the reporting period;
xviii) areas of intended operation during the next reporting period;
xix) areas of excavation during the reporting period;
xx) the progress of final cover, vegetative cover, and any intermediate cover application;
xxi) facilities installed during the reporting period;
xxii) *Site* preparations and facilities planned for installation during the next reporting period;
xxiii) calculations of the volume of waste, daily and intermediate cover, and final cover deposited or placed at the *Site* during the reporting period and a calculation of the total volume of *Site* capacity used during the reporting period;
xxiv) calculations of the amount of contaminated soil used as alternative cover at the *Site;*
xxv) the amount of contaminated soil stored at the *Site* at the end of the previous year;
xxvi) summary of the weekly, maximum daily and total annual quantity (tonnes) of waste received at the *Site* ;
xxvii) summary of any complaints received and the responses made;

xxviii) a discussion of any operational problems encountered at the *Site* and corrective action taken;
xxix) a report on the status of all monitoring wells and a statement as to compliance with Ontario Regulation 903;
xxx) any other information with respect to the *Site* which the *District Manager* or *Regional Director* may require from time to time;
xxxi) a statement regarding compliance with all conditions of this *Approval* and other relevant Ministry requirements, guidelines and regulations;
xxxii) summary of inspections undertaken at the *Site;*
xxxiii) a summary of recycling efforts undertaken at the public drop-off area including the amount of recyclable received;
xxxiv) a summary of the requirements outlined in Condition 80 of this *Approval* regarding the use of contaminated soil for daily/intermediate landfill cover;
xxxv) any changes in operations, equipment or procedures employed at the *Site;* and
xxxvi) recommendations regarding any proposed changes in operations of the *Site.*

185. The implementation of any of the recommendations contained in an Annual Report that come within the scope of Section 27 of the Act, shall be by the approval of the Director.

186. The Owner shall retain on-*Site,* or in a suitable location within the Owner copies of the annual reports referred to in the preceding condition and any associated documentation of compliance monitoring activities and shall continue to do so for a period of at least two (2) years after the closure of the *Site.*

187. In accordance with Environmental Compliance Application dated June 6, 2013, Waste Fill Area known as the South Fill is hereby approved for closure in accordance with Item No 51, Schedule A.

188. a. The Owner shall implement the recommendations outlined in the memorandums from Shawn Kinney, Hydrogeologist, MECP, dated March 5, 2014 and B.W. Metcalfe, Surface Water Specialist, MECP, dated December 19, 2013.

b. The Owner shall implement the following changes to the monitoring program:

- Monitors GMW63-I, II, III and GMW75-I, II shall be added to the monitoring program.

- Samples from monitors GWM-48, GWM-19A, 19B, GMW63-I, II, III and GMW 75-I, II shall be analyzed for the same suite of parameters as in Group G1, Table 1.1 of the Approval.

DETAILED DESIGN FOR LANDFILL GAS COLLECTION SYSTEM FOR THE NORTH FILL AREA

189. Approval is hereby granted for the detailed design and construction of the landfill gas collection system in the North Fill Area of the Landfill Site all in accordance with the Application for a Provisional Certificate of Approval for a Waste Disposal Site, dated September 30, 2016 and supporting documentation as listed below and forms part of Schedule "A", of the Provisional Certificate of Approval, No. A341508.

190. Within ninety (90) days of commissioning of each phase of the landfill gas collection and flaring system, the City shall submit to the *District Manager* a construction report detailing the construction activities and any design changes made to the Landfill Gas System during construction.

191. The updated landfill gas monitoring program, listed as Item 56 in Schedule "A" is hereby approved.

192. The Owner shall obtain an approval under section 9 of EPA and Section 27 of EPA for any future upgrade in the Landfill Gas Collection and Utilisation system.

**REUSE CENTRE**

193. The *Owner* may operate a "Reuse Centre" located on the public drop-off platform for the handling and temporary storage of reusable items in accordance with Items 54 and 55 of Schedule "A".

194. Only solid non-hazardous waste shall be stored at the "Reuse centre."

195. The following waste types are prohibited from being stored at the "Reuse centre":

i. Subject waste
ii. Asbestos waste
iii. Putrescible waste

196. The amount of waste stored at the "Reuse Centre" shall not exceed 30 cubic metres or 2 tonnes.

197. The *Owner* shall ensure that the "Reuse Centre" is only open during regular *Site* hours and that the facility is securely locked during other times.

198. The storage of waste outside of the "Reuse centre" is prohibited during non-operating hours.

199. Any solid, non-hazardous residual wastes arising from the operation of the "Reuse Centre" shall be disposed of at the *Site* as part of regular and normal operations.

## SCHEDULE "A"

**This Schedule "A" forms part of Approval No. A 341508**

1) Application for a Certificate of Approval for a Waste Disposal Site (Landfill) dated July 28, 1993 and as amended November 17, 1993.

2) Report entitled "City of Peterborough Bensfort Road Landfill Site - Application for Interim Expansion, Volume 1" by Gartner Lee Limited and the City of Peterborough, dated March 1991.

3) Report entitled "City of Peterborough Bensfort Road Landfill Site Application for Interim Expansion, Volume 2" by Gartner Lee Limited dated March 1991.

4) Report entitled "City of Peterborough Bensfort Road Landfill Site Application for Interim Expansion, Volume 3" by Gartner Lee Limited, CJB Air Quality Management, S.S. Wilson and Associates and Gore & Storrie Ltd., dated March 1991.

5) Report entitled "City of Peterborough Bensfort Road Landfill Site Application for Interim Expansion, Volume 4" by Conestoga-Rovers & Associates dated March 1991.

6) Report entitled "City of Peterborough Bensfort Road Landfill Site Application for Interim Expansion, Volume 5" by Mark L. Dorfman, Planner Inc., City of Peterborough and Marshall, Macklin & Monaghan, dated March 1991.

7) Report entitled "City of Peterborough Bensfort Road Landfill Site Application for Interim Expansion, Addendum 1" by Conestoga-Rovers & Associates, The City of Peterborough, Gartner Lee Limited, CJB Air Quality Management, S.S. Wilson and Associates, Gore & Storrie Limited, Marshall Macklin Monaghan and Mark L. Dorfman Planner Inc., dated December 1991.

8) Report entitled "City of Peterborough Bensfort Road Landfill Site Application for Interim Expansion, Addendum 2" by Gartner Lee Limited, Conestoga-Rovers & Associates, CJB Air Quality Management and S. S. Wilson and Associates, dated September 1992.

9) Report entitled "City of Peterborough Bensfort Road Landfill Site Application for Interim Expansion, Addendum 3" Tabs A-N by Gartner Lee Limited, Conestoga-Rovers & Associates, The City of Peterborough, CJB Air Quality Management, S. S. Wilson and Associates, Gore & Storrie Limited, Marshall Macklin Monaghan and Mark L. Dorfman Planner Inc., dated July 1993.

10) Report entitled "City of Peterborough Bensfort Road Landfill Site- 1992 Annual Monitoring Report" by Gartner Lee Limited dated March 1993.

11) Report entitled "City of Peterborough Bensfort Road Landfill Performance Monitoring Program" by Gartner Lee Ltd., dated October 1993.

12) Report entitled "Specifications for Tree Planting Bensfort Road Landfill Site" dated July 1992.

13) Draft Drawings 12-1, 12-2, 12-3, dated August 1993 and 12-4, 12-5 and 12-6 dated October 1993 by Conestoga- Rovers & Associates and any amendments to the Drawings which have been approved by the Director.

14) Report entitled "Annual Monitoring Report Design and Operations 1998, Bensfort Road Landfill Site Peterborough, Ontario," prepared by Conestoga Rovers & Associates dated May, 1999.

15) Report entitled: "City of Peterborough, Bensfort Road Landfill Provisional Certificate of number A341508 Application for an Emergency Certificate, prepared by Gartner Lee Limited in association with Conestoga-Rovers and Associates Limited dated May,1999.

16) Letter from G. L Treadwell, Conestoga-Rovers & Associates to S. Essop, EAAB dated June 8, 1999. Providing Clarification on Site size and area.

17) Letter from P. Douglas Petrie, Willms & Shier, Solicitor for municipality, the Township of Otonabee-South Monaghen to A. Dominski and S. Essop Environmental Assessment and Approvals Branch dated June 9,1999, response to City of Peterborough Bensfort Road Landfill, Application for Emergency Approval MECP Certificate of Approval nos. A341508 (Site) and 8-4006-99-006(Air).

18) Letter from R. E. J. Leech Gartner Lee Limited to A. Dominski and S. Essop, EAAB dated June 17, 1999 response to the letter from P. Douglas Petrie Township of Otonabee - South Monaghan dated June 9, 1999.

19) Letter from T. A. McIelwain, Older Associates Ltd on behalf of D. Petrie, Willms & Shier, to S. Essop, EAAB, date June 21, 1999, response to petroleum hydrocarbon contaminated soils handling and storage protocol at the site.

20) Letter from E. Warburton, of the organization SHAME, to A. Dominski and S. Essop, EAAB, dated June 15, 1999 response and comments on the draft Emergency Application Certificate of Approval.

21) Letter from J. W. Hart, City Solicitor, City of Peterborough to S. Essop, EAAB, dated June 28, 1999 response and comments on Draft Emergency Certificate of Approval.

22) Letter from J. W. Hart, City Solicitor, City of Peterborough to SHAME and S. Essop, EAAB, dated June 28,1999 response on land compensation issue, odour problems, funding and site closure date.

23) Letter from P. Douglas Petrie, Willms & Shier, Solicitor for municipality, the Township of Otonabee-South Monaghen to A. Dominski and S. Essop, EAAB dated June 28,1999,

response and comments on draft Emergency Application Certificate of Approval.

24) Letter report from E. J. Leech, Gartner Lee Limited to A. Dominski, Environmental Assessment and Approvals Branch, dated July 26, 2999, providing revised plans for the Site.

25) Application for an Emergency Approval dated November 30, 2000 and supporting documentation titled "City of Peterborough, Bensfort Road Landfill, Provisional Certificate of Approval, No. A341508 - Application for an Emergency Certificate", prepared by Gartner Lee Ltd. and Conestpoga-Rovers and Associated Ltd., dated December 2000.

26) Letter to Mr. A Dominski, Environmental Assessment and Approvals Branch, Ministry of the Environment form Gartner Lee Ltd. Dated December 21, 2000, which provided environmental justification for expanding the service area of the Bensford Road Landfill site to include the waste from the Township of Havelock-Belmont-Methuen.

27) Application for an Emergency Approval dated June 8, 2001 and supporting documentation titled “City of Peterborough, Bensfort Road Landfill, Provisional Certificate of Approval, No. A341508 - Application for an Emergency Certificate”, prepared by Gartner Lee Ltd. and Earth Tech (Canada) Inc., dated June, 2001.

28) Letter to Mr. Michael Williams, Environmental Assessment and Approvals Branch, Ministry of the Environment from City of Peterborough, City Solicitor, dated June 8, 2001, which provides justification for the application for an emergency approval and outlines the context of the application.

29) Letter to Mr. Michael Williams, Environmental Assessment and Approvals Branch, Ministry of the Environment from Gartner Lee Ltd., dated June 26, 2001 outlining the public consultation undertaken by the City of Peterborough regarding the emergency application.

30) Notice of Approval to Proceed with the Undertaking as required by the Environmental Assessment Act (EAA), O.C. 450/2002, dated January 23, 2002.

31) Application for a Provisional Certificate of Approval for a Waste Disposal Site, dated March 28, 2002.

32) Documentation supporting an Application for a Provisional Certificate of Approval, submitted in accordance with Section 27 of the *Environmental Protection Act* : titled "Oton-1 Landfill Site, located in the Township of Otonabee-South Monaghan, County of Peterborough, dated March 2002, prepared by Earth Tech Canada Inc. for the County of Peterborough and the City of Peterborough.

33) Letter requesting an extension for the submission of the North Fill Area design details prepared by Earth Tech Canada Inc., submitted on behalf of the County and City of Peterborough, to the Ministry of the Environment, with attachments

34) The letter requesting an extension for the submission of the North Fill Area design and

operations report, prepared by McCarthy Tetrault, submitted on behalf of the County and City of Peterborough, to the Ministry of the Environment, dated September 17, 2003.

35) Letter dated January 29, 2004 to the ministry from Earth Tech Canada Ltd. submitting the following design documentation in compliance with Condition 5.1.

36) Volume 1 – South Fill Area, Design and Operations Report, dated January 2004, including:
-Hydrogeological Assessment

37) Volume 2 – North Fill Area Design and Operations Report, dated January 2004, including:
-Hydrogeological Assessment
-Surface Water Quality Study.

38) Volume 3 – Technical Assessments, South Fill Area and North Fill Area, dated January 2004, including:
-Air Quality Impact Assessment
-Leachate Environment Study
-Natural Environment Study
-Noise Impact Study Traffic Impact Study
-Visual Impact Study.

39) Letter dated February 28, 2008 from Frederick (Rick) A. Mosher, Conestoga-Rovers & Associates to Director, Environmental Assessment and Approvals Branch, Ministry of the Environment regarding request for an amendment to Condition 17.

40) Report entitled "Annual Monitoring Report, Design and Operations - 1997, Bensfort Road Landfill, Peterborough, Ontario", date May 1998, prepared by Conestoga-Rovers & Associates.

41) 2003 to 2004 Annual Monitoring Reports, Design and Operations, South Fill Area, Peterborough County/City Waste Facility, Peterborough, Ontario, prepared by Conestoga-Rovers & Associates.

42) Application for an Amendment to Provisional Certificate of Approval for a Waste Disposal Site, dated June 29, 2007 from The Corporation of the City of Peterborough.

43) Letter dated February 28, 2008 Frederick Mosher, Connestoga-Rovers & Associates requesting a revised leachate video inspection system inspection.

44) E-mail dated April 29, 2009 from Melanie Kawalec, The Corporation of the City of Peterborough, to Roman Lysiak, MECP regarding submission of additional information.

45) Report entitled "Landfill Gas Collection System Report, Peterborough County/City Waste Management Facility Peterborough, Ontario (PCCWMF)" dated June 30, 2009 prepared by UEM.

46) Application for a Provisional Certificate of Approval for a Waste Disposal Site, dated November 8, 2010, signed by Melanie Kawalec, Manager, Waste Management Division, City of Peterborough.

47) Letter dated November 26, 2010, from Melanie Kawalec, Manager, Waste Management Division, City of Peterborough to the Director, Environmental Assessment and Approvals Branch, Ministry of the Environment, re: final detailed design for the landfill gas collection and flaring/utilization system in the South Fill Area of the Oton-1 Landfill Site.

48) Report entitled "Bensfort Road Landfill - Landfill Gas System Expansion", dated November 25, 2010 prepared by Dillon Consulting Ltd.

49) May 14, 2010, E-mail from Joe Ovcjak to K., Keeling, City of Peterborough with attached 2009 Monitoring Program.

50) September 1, 2011 e-mail from Wayne Jackson, Director, City of Peterborough, to Jim Chisholm of the Ministry of the Environment with the following attachments: 2010 Monitorimng Program, Groundwater and Leachate Monitoring Programs for the Site, Peterborough county/City Waste Management Facility; 2005 Annual Monitoring Report; and 2006 NFA Sampling Program

51) Report titled *South Fill Area Closure Plan, Peterborough Landfill, dated May 2013, prepared by Urban and Environmental Management Inc.*

52) Application for a Provisional Certificate of Approval for a Waste Disposal Site, dated September 30, 2016, and supporting documentation prepared by WSP.

53) Response letter dated June 16, 2017 received from WSP regarding the clarification of design basis.

54) Application for Approval of a "Reuse Centre" dated June 3, 2016 and supporting documentation prepared by the Corporation of the City of Peterborough.

55) Email dated August 29, 2017 from Virginia Swinson, City of Peterborough to Nick Zambito, MECP regarding additional "Reuse centre" construction and operation details.

56) Environmental Compliance Application dated September 13, 2017 signed by Don Briand, City of Peterborough and the supporting documentation regarding landfill gas monitoring program.

**SCHEDULE "B"**
**This Schedule "B" forms part of Approval No. A 341508**

**ENVIRONMENTAL MONITORING PROGRAM**

A) **GROUNDWATER**

| <u>Group</u> | <u>Monitoring Designation</u> | <u>Monitoring Events</u> | |
|---|---|---|---|
| **Groundwater** | | *March/April* | *September/October* |
| G1 | 18A, 18B, 20B, 66-III, 81-I,81-II, 81-III | Water Levels | Water Levels |
| | | Analysis List 1 | Analysis List 1 |
| | | Analysis List 2 | |
| | | Analysis List 3 | |
| | | | |
| | | | |
| G2 | 16A, 19B, 20A, 33-II, 33-III, 40-II, 41-I, 41-II, 44-1, 44-II, 44-III, 46-I,46-II, 46-III, 50-I, 50-II, 52-I, 52-II, 53-I, 54-II, 61-I, 61-II, 61-III, 62-I, 64-I, 64-II, 66-I, 66-II, 70-I, 70-II, 70-III, 74-II, 76-I, 77-I, 101-I, 101-II, 101-III | Water Levels | Water Levels |
| | | Analysis List 1 | |
| G3 | 5-V, 5-VI, 19A, 62-II, 48 | Water Levels | Water Levels |
| | | Analysis List 1 | Analysis List 1 |
| | | | |
| G4 | 5-IV, 16C, 50-III, 74-III | Water Levels | Water Levels |
| | | Analysis List 1 | Analysis List 3 |
| | | | |
| G5 | 84-I, 84-II, 85-I, 85-II, 86-I, 86-II, 86-III, 87-I, 87-II, 87-III, 88-I, 88-II, 88-III, 89-I, 89-II, 89-III, 90-I, 90-II, 90-III, 91-I, 91-II, 91-III, 92-I, 92-II, 92-III, 93-I, 93-II, 94-I, 94-II, 95-I, 95-II, 104-I, 104-II, 104-III, 106-I, 106-II, 106-III, 107-I, 107-II, 107-III, 108-I, 108-II, 108-III, 109-I, 109-II, 109-III, 110-I, 110-II, 110-III | Water Levels | Water Levels |
| | | Analysis List 1 | Analysis List 1 |
| | | Analysis List 2 | |
| | | Analysis List 3 | |

**B) PRIVATE WELLS**

| Group | Monitoring Designation | Monitoring Events | Comments |
|---|---|---|---|
| Private Wells | | *March/April* | |
| P1 | In Accordance with the Agreement Between the Corporation of the City of Peterborough and the Corporation of the Township of Otonabee. - January, 1993 as amended by previous annual reports. | Analysis List 4 | As per agreement |

**C) SURFACE WATER**

| Group | Monitoring Designation | Monitoring Events | | | | | |
|---|---|---|---|---|---|---|---|
| Surface Water | | *January/ February* | *March/April* | *May/ June* | *July/ August* | *September / October* | *November/December* |
| S1 | SW1, SW2, SW3, SW17, SW18, SW19, SW20, SW21, SW23, SW24 | Flow Rate | Flow Rate | Flow Rate | Flow Rate | Flow Rate | Flow Rate |
| | | | | | | | Anal |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Analysis List 1 | Analysis List 1 | Analysis List 1 | Analysis List 1 | Analysis List 1 | ysis List 1 |
| | | Analysis List 6 | Analysis List 6 | Analysis List 6 | Analysis List 6 | Analysis List 6 | Analysis List 6 |

**D) LEACHATE**

| Group | Monitoring Designation | Monitoring Events | | | | | |
|---|---|---|---|---|---|---|---|
| Leachate | | *January/ February* | *March/ April* | *May/ June* | *July/ August* | *September/ October* | *November/ December* |
| L1 | Holding Tank | | By-Law + COD | | | By-Law + COD | |
| | | | | | | Analysis List 5a | |
| L2 | MHT9-94[1] | | | | | Analysis List 5 | |
| L3 | 23B (In-Waste Leachate Monitors) | | Leachate Levels | | | Leachate Levels | |
| | | | Analysis List 1 | | | Analysis List 2 | |
| L4 | ISP7-95, ISPL-1, ISPL-2, ISPL2-1, ISPL2-2, ISP8, ISP9, SP1-90, SP2-90, SP3-90, SP4-90, SP6-90, SP7-90, SP8-90, SP10-94, SP11-94, SP14-91, P15-91, SP16-91, SP18-91, SP19-91, SP20-91, ISP11, ISP12, ISP13, ISP14, ISP15 | Leachate Levels | Leachate Levels | Leachate Levels | Leachate Levels | Leachate Levels | Leachate Levels |
| | | | | | | | |
| Inter-ceptor trench | | | | | | | |
| T1 | MH-4 | | | | | Analysis List 5 | |
| | | | | | | | |

[1] Location to be MHT6-94 following construction of Cell 1 West B

**E) LANDFILL GAS**

| Group | Monitoring Designation | Monitoring Events | | | | | |
|---|---|---|---|---|---|---|---|
| Landfill Gas | | *January/ February* | *March/ April* | *May/ June* | *July/ Au- gust* | *September/ October* | *November/December* |
| LFG-1 | GP-2, GP-3, GP4, GP-5 and GP-6 | | Soil gas monitor- ing | Soil gas monitor- ing | | Soil gas monitoring | Soil gas monitoring |

**Analysis List 1:** Ca, Mg, Na, K, Cl, SO4, Alkalinity, NO3, NO2, NH3, TKN, pH, Conductivity, Fe, Mn, As, DOC, COD, Total Phenolics, Total P, P(dissolved), field pH and field conductivity, Anion Sum, Cation Sum, Bicarbonate, Carbonate, Hardness, Ion Balance, Orthophosphate (as P), field temperature, and Total Dissolved Solids (TDS).

**Analysis List 2:** Al, Ba, Be, B, Cd, Cr, Co, Cu, Pb, Mo, Ni, and Zn.

**Analysis List 3:** VOC Scan.

**Analysis List 4:** pH, conductivity, Alkalinity, Cl, SO4, Total P, Soluble P, TKN, NH3, NO2, NO3, K, Mg, Ca, Na, Fe, COD, DOC, Phenols, field pH and field conductivity.

**Analysis List 5:** cBOD5, BOD, TSS, TKN, NH4, Phenolics, Fe, Cl, Sr, Br, Alkalinity, K, Na, field pH and field conductivity.

**Analysis List 5a:** cBOD5, Sr, Br, Alkalinity, K, Na, field pH and field conductivity.

**Analysis List 6:** BOD5, TOC, TSS, TDS, Turbidity, Fe (field filtered), temperature, DO, field pH and field conductivity.

**By-Law + COD:** City of Peterborough By-Law 05-104 Schedule 'H', Table 1: "Sanitary and Combined Sewer Discharge Limits".

**Soil Gas Monitoring:** percent by volume (v/v) for methane; carbon dioxide; oxygen; and water level in the probe.

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

1. *The reason for inclusion of the definitions is to define the specific meaning of terms and simplify the wording of conditions in this Approval.*

2. *The reasons for Conditions 1 to 6 inclusive are to ensure that the Site is designed, operated, monitored and maintained in accordance with the application and supporting documentation submitted by the Owner, and not in a manner which the Director has not been asked to consider.*

3. *The reason for Conditions 7, 8, 12, 13, 14, 15, and 16 is to clarify the legal rights and responsibilities of the Owner under this Approval.*

4. *Conditions 9 and 10 are included to ensure that the appropriate Ministry staff have ready access to information and the operations of the Site, which are approved under this Approval.*

5. *Condition 11 has been included in order to clarify what information may be subject to the Freedom of Information Act.*

6. *Condition 17 is included, pursuant to subsection 197(1) of the EPA, to provide that any persons having an interest in the Site are aware that the land has been approved and used for the purposes of waste disposal.*

7. *The reasons for Condition 18 are to restrict potential transfer or encumbrance of the Site without the approval of the Director and to ensure that any transfer of encumbrance can be made only on the basis that it will not endanger compliance with this Approval.*

8. *The reasons for Conditions 19 and 20 are to ensure that the Site is operated under the corporate name which appears on the application form submitted for this Approval and to ensure that the Director is informed of any changes.*

9. *The reason for Condition 21 is to ensure that appropriate Ministry staff have ready access to the Site for inspection of facilities, equipment, practices and operations required by the conditions in this Approval. This condition is supplementary to the powers of entry afforded a Provincial Officer pursuant to the EPA and OWRA.*

10. *The reason for Conditions 22 to 36 inclusive is to establish a forum for the exchange of information and public dialogue on activities carried out at the landfill Site. Open communication with the public and local authorities is important in helping to maintain high standards for site operation and environmental protection.*

11. *The reason for Conditions 37 and 38 is to ensure that a landfill operators manual is available with specific duties and responsibilities of employees provided in order to prevent an adverse impact on the environment.*

12. *The reason for Conditions 39 to 41 inclusive is to ensure that users of the Site are fully aware of important information and restrictions related to Site operations under this Approval.*

13. *The reasons for Conditions 42 and 43 are to ensure that final closure of the Site is completed in an aesthetically pleasing manner and to ensure the long-term protection of the natural environment.*

14. *Condition 44 has been inserted in order to ensure proper public consultation about the end use of the Site is undertaken and that the end use activities are consistent with those identified during the EA process.*

15. *Conditions 45 to 47 inclusive are included in order to ensure that certain activities are undertaken upon closure of the site in order to ensure that the closed site does not affect the natural environment.*

16. *The reason for Condition 48 is to ensure the timely submission by the Owner of a landscape plan for the site.*

17. *Condition 49 and 50 is needed to make certain that uses at the site are for waste disposal purposes only and not any other uses which may cause an adverse impact on the environment and human health.*

18. *Condition 51 is necessary in order to ensure that all waste loads are inspected and waste that is disposed of at the site is in accordance with the terms and conditions in this Approval.*

19. *The reasons for Conditions 52, 53, 55, 56, 57, 58, 59 and 122 to 125 inclusive are to ensure that the Site is operated, inspected and maintained in an environmentally acceptable manner*

*and does not result in a hazard or nuisance to the natural environment or any person.*

20. *The reasons for Condition 54 are the protection of public health and safety and minimization of the potential for damage to environmental control, monitoring and other works at the landfill Site. Scavenging is the uncontrolled removal of material from waste at a landfill site.*

21. *The reason for Condition 60 is to ensure that noise from or related to the operation of the landfill is kept to within Ministry limits and does not result in a hazard or nuisance to any person.*

22. *The reason for Condition 61 is that open burning of municipal waste is unacceptable because of concerns with air emissions, smoke and other nuisance affects, and the potential fire hazard.*

23. *Conditions 62 to 67 inclusive have been included in order to ensure asbestos waste is handled and disposed of in accordance with Reg. 347 as amended from time to time. Proper handling and disposal of asbestos waste ensures that the asbestos waste does not cause an adverse impact on the environment and also does not affect human health.*

24. *The reason for Condition 68 and 69 is to ensure that backup power is available so that all facilities remain operational during a power disruption thus preventing any adverse impacts on the environment.*

25. *The reason for Condition 70 and 71 is to ensure that appropriate measures are taken in order to prevent surface water from contacting waste so as not to cause an adverse effect on the environment.*

26. *The reason Condition 72 has been included is in order to prevent ponding in on site ditches and any adverse impact on the environment and human health.*

27. *The reason for Conditions 73, 74, 75, 76 and 77, 92, and 93 inclusive is to specify the approved areas from which waste may be accepted at the Site, minimum buffer area, and the types and amounts of waste that may be accepted for disposal at the Site, based on the Owner's application and supporting documentation.*

28. *The reason for Condition 78 to 91 inclusive is to specify the approval requirements for use of alternative cover material at the Site.*

29. *The reason for Condition 94, 95, 96, and 97 is to ensure that landfilling operations are conducted in an environmentally acceptable manner. Daily and intermediate cover is used to control potential nuisance effects, to facilitate vehicle access on the site, and to ensure an acceptable site appearance is maintained. The proper closure of a landfill site requires the application of a final cover which is aesthetically pleasing, controls infiltration, and is suitable for the end use planned for the site.*

30. *The reasons for Conditions 98 to 102 inclusive are to specify the normal hours of operation for*

*the landfill Site and a mechanism for amendment of the hours of operation.*

31. *The reason for Condition 103 is to provide security for the site.*

32. *The reason for Condition 104 is to create a means of capturing litter.*

33. *Condition 105 is needed in order to make certain that the waste received at the site is in accordance with the Approval and Reg. 347.*

34. *The reasons Condition 106 has been included are to ensure that access roads are clear and do not pose a safety hazard to the general public.*

35. *The reasons for Conditions 107 and 108 are to minimize the potential for clogging of leachate collection pipes and to ensure effective operation of the leachate collection system components for as long as they are required. Failure to clean out these components on a regular basis may result in a decrease in their service lives. Regular cleaning of the leachate collection pipes is especially important during stages of landfilling when the level of both organic and inorganic constituents in the leachate is high and, consequently, the potential for clogging due to encrustation is greatest. As the landfill reaches the more stable methane producing stage, pipe cleaning may be required less frequently.*

36. *Conditions 109 to 118 inclusive are to ensure that the leachate collection system is designed and built in accordance with Regulations and the ministry's requirements and to prevent off site migration of leachate which may cause an adverse effect on the environment.*

37. *Conditions 119 to 121 inclusive are needed to ensure leachate recirculation is undertaken in accordance with the ministry's requirements, there is proper monitoring and leachate recirculation does not pose an adverse impact on the environment.*

38. *The reason for Condition 126 to 128 is to ensure that the Site has proper inspections and records of the site.*

39. *The reason for Conditions 129 to 133 inclusive is to ensure that a properly working monitoring infrastructure is in place.*

40. *The reason for Conditions 134 to 136 inclusive is to demonstrate that the landfill site is performing as designed and the impacts on the natural environment are acceptable. Regular monitoring allows for the analysis of trends over time and ensures that there is an early warning of potential problems so that any necessary remedial/contingency action can be taken.*

41. *The reason for Conditions 137 to 143 inclusive is to ensure that the Owner follows a plan with an organized set of procedures for identifying and responding to unexpected but possible problems at the Site. A remedial action / contingency plan is necessary to ensure protection of the natural environment. A leachate contingency plan is a specific requirement of Reg. 232.*

42. *Conditions 144 to 160 have been inserted in order to ensure that concentrations of landfill gas*

*do not pose a hazard to human health or the environment and to ensure that landfill gas controls are built and managed in accordance with the Ministry's requirements and regulations.*

43. *The reasons for Conditions 161 to 166 inclusive are to ensure that landfill gas is properly managed and monitored.*

44. *The reason for Conditions 167 to 169 is so that the Owner has a robust plan for the preparation for, prevention of, response to and recovery from an environmental emergency.*

45. *The reason for Conditions 170 to 172 is so that the Owner has a robust procedure for responding to Complaints about the Site.*

46. *The reason for Conditions 173 to 179 inclusive is to ensure that accurate waste records are maintained to ensure compliance with the conditions in this Approval (such as fill rate, site capacity, record keeping, annual reporting, and financial assurance requirements), the EPA and its regulations.*

47. *The reasons for Conditions 180 to 182 inclusive are to ensure that the Ministry is informed of any spills or fires at the Site and to provide public health and safety and environmental protection.*

48. *The reasons for Conditions 183 to 186 inclusive are to ensure that regular review of site development, operations and monitoring data is documented and any possible improvements to site design, operations or monitoring programs are identified. An annual report is an important tool used in reviewing site activities and for determining the effectiveness of site design.*

49. *The reason for the conditions 189 to 192 is to approve the detailed design of Landfill Gas collection system for North Fill Area.*

50. *The reason for Conditions 193 to 199 is to ensure that the "Reuse centre" is built, maintained and operated in a manner as to minimize the likelihood of an adverse effect or a hazard to the natural environment or any person.*

**Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). A341508 issued on December 29, 1993**

*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*<br>Environmental Review Tribunal<br>655 Bay Street, Suite 1500<br>Toronto, Ontario<br>M5G 1E5 | AND | The Director appointed for the purposes of Part II.1 of the Environmental Protection Act<br>Ministry of the Environment, Conservation and Parks<br>135 St. Clair Avenue West, 1st Floor<br>Toronto, Ontario<br>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 7th day of September, 2018

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

RL/
c: District Manager, MECP Peterborough
Joe Ovcjak, and Paul Mulholland, WSP Canada Inc., The Corporation of the City of Peterborough

**Content Copy Of Original**

Ontario

**Ministry of the Environment**
**Ministère de l'Environnement**

**AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL**
NUMBER 2231-8YCPHG
Issue Date: September 28, 2012

The Corporation of the City of Peterborough
500 George Street North
Peterborough, Ontario
K9H 3R9

Site Location: Peterborough Waste Management System
1260 Bensfort Road
City of Peterborough, County of Peterborough

*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:*

the stormwater management facilities and leachate management facilities to service the Peterborough Waste Management Facility (Bensfort Road Landfill Site) located on Part of Lots 14 and 15, Concession 13, Part of Lots 13, 14 and 15, Concession 14, County of Peterborough, comprising of 18 ha South Fill Area, 9.5 ha North Fill Area, and 15 ha groundwater easement zone within a total of landfill property area of 158 ha, consisting of the following:

***PROPOSED SEWAGE WORKS:***

modifications to the existing stormwater management facilities and leachate management facilities to service the Peterborough Waste Management Facility (Bensfort Road Landfill Site) located on Part of Lots 14 and 15, Concession 13, Part of Lots 13, 14 and 15, Concession 14, County of Peterborough, comprising of 18 ha South Fill Area, 9.5 ha North Fill Area, and 15 ha groundwater easement zone within a total of landfill property area of 158 ha, consisting of the following:

- the realignment and lowering of three (3) sections of the existing 150 mm diameter Leachate Forcemain located along the east side of Bensfort Road, as part of the County Road No. 39 (Bensfort Road) Reconstruction, in the City of Peterborough, at the following three (3) separate locations along the east side of Bensfort Road: a 335 m long section from approx. 1,464 m north of Assumption Road to approx. 1,129 m north of Assumption Road, a 270 m long section from approx. 118 m south of Base Line Road to approx. 388 m south of Base Line Road and a 110 m long section from approx. 954 m north of Storell Road to approx. 844 m north of Storell Road;
- the replacement of five (5) existing Forcemain Valve Chambers, as part of the County Road No. 39 (Bensfort Road) Reconstruction, in the City of Peterborough, at the following locations along the east side of Bensfort Road: Leachate Forcemain Chamber # 1 located approx. 857 m north of Storell Road, Leachate Forcemain Chamber # 2 located approx. 180 m south of Base Line Road, Leachate Forcemain Chamber # 4 located approx. 1,064 m north of Base Line Road, Leachate Forcemain Chamber # 5 located approx. 1,097 m south of Assumption Road and Leachate Forcemain Chamber # 6 located approx. 438 m south of Assumption Road;

all in accordance with the application dated January 12, 2012 and received January 16, 2012, including final plans and specifications prepared by the Peterborough County Public Works.

*SEWAGE WORKS APPROVED ON SEPTEMBER 24, 2009:*

establishment of stormwater management facilities and leachate management facilities to service the Peterborough Waste Management Facility (Bensfort Road Landfill Site) located on Part of Lots 14 and 15, Concession 13, Part of Lots 13, 14 and 15, Concession 14, County of Peterborough, comprising of 18 ha South Fill Area, 9.5 ha North Fill Area, and 15 ha groundwater easement zone within a total of landfill property area of 158 ha, consisting of the following:

establishment of leachate management facility to service the North Fill Area ( **NFA** ) of the Bensfort Road Landfill Site consisting of the following:

**Leachate Collection System - NFA**

- four (4) 200 mm diameter perforated HDPE leachate collection pipes with an approximate total length of 1,131 m serving Cell 4 of the North Fill Area, spaced at no more than 50 m within a 500 mm thick layer of 50 mm clear stone, enclosed between top and bottom geotextile layers, extending from 2,400 mm diameter manhole MHL8 and discharging by gravity to 2,400 mm diameter manhole MHL4;
- four (4) 200 mm diameter perforated HDPE leachate collection pipes with an approximate total length of 1,022 m serving Cell 3 of the North Fill Area, spaced at no more than 50 m within a 500 mm thick layer of 50 mm clear stone, enclosed between top and bottom geotextile layers, extending from 2,400 mm diameter manhole MHL7 and discharging by gravity to 3,000 mm diameter manhole MHL3;
- two (2) 200 mm diameter perforated HDPE leachate collection pipes with an approximate total length of 437 m serving Cell 2 of the North Fill Area, spaced at no more than 50 m within a 500 mm thick layer of 50 mm clear stone, enclosed between top and bottom geotextile layers, extending from 2,400 mm diameter manhole MHL6 and discharging by gravity to 2,400 mm diameter manhole MHL2;

three (3) 200 mm diameter perforated HDPE leachate collection pipes with an approximate total length of 600 m serving Cell 2 of the North Fill Area, spaced at no more than 50 m within a 500 mm thick layer of 50 mm clear stone, enclosed between a top and a bottom geotextile layers, extending from 2,400 mm diameter manhole MHL5 and discharging by gravity to 2,400 mm diameter manhole MHL1;

one (1) approximately 211 m long 200 mm diameter solid HDPE perimeter leachate collector pipe with a 0.5% horizontal slope, extending through four (4) 2.4 to 3.0 m diameter precast concrete manholes (MHL4, MHL3, MHL2, and MHL1), discharging collected leachate through 37 m long 300 mm diameter solid HDPE pipe to a leachate pumping station described below;

**Leachate Pumping Station - NFA PS**

- one (1) leachate pumping station (NFA PS) consisting of 11.5 m deep 3.0 m diameter precast concrete wet well equipped with two (2) submersible pumps (one duty and one standby), each rated at 15.1 L/sec at 63.9 m TDH, located at the south east corner of the North Fill Area, equipped with one (1) 100 kw standby diesel generator, discharging through a meter chamber consisting of 4.9 m long x 2.6 m wide precast concrete chamber, one (1) 575 m long 150 mm diameter HDPE forcemain, and an existing 150 mm diameter South Fill Area leachate forcemain located on the east side of Bensfort Road to a manhole at Neal Drive and Bensfort Road where it reaches Peterborough sanitary sewage collection system for treatment at Peterborough Water Pollution Control Plant (WPCP); and

- including all controls and associated appurtenances.

all in accordance with the Application for Approval of Municipal and Private Sewage Works submitted by The Corporation of the City of Peterborough dated July 2, 2009 and design specifications and drawings prepared by Urban & Environmental Management Inc., Consulting Engineers, Mississauga, Ontario.

***SEWAGE WORKS APPROVED ON JULY 30, 2009:***

establishment of stormwater management facilities to service the Bensfort Road Landfill Site (Peterborough Waste Management Facility) North Fill Area of an approximately 15.63 ha. drainage catchment for enhanced (80% SS removal) level of quality control and to provide quantity control of post development 2 to 100-year flows to predevelopment levels, consisting of the following:

**Internal Peripheral Ditch/Grassed Swale:**

- approximately 270 m long (Ditch D6-D7), 1:2.5 side sloped triangular existing ditch to intercept storm drainage from the laydown area at the east of the landfill site, discharging via one (1) existing 600 mm diameter culvert under the service road to the main cell of the existing wet pond:
- approximately 450 m long (Ditches D3-D4), 1:2.5 side sloped triangular ditch to intercept storm drainage from the western part of the landfill site to ditch D4-D5 as described below:
- approximately 745 m long (Ditches D1-D2 and D4-D5), 1 m bottom width 1:2.5 side sloped trapezoidal ditch to intercept storm drainage from the eastern part of the landfill site, via two (2) 900 mm diameter culverts under the service road to a wet pond as described below:

**Wet pond** (approximate service area 14.23 ha.):

- a wet pond with two (2) 900 mm diameter inlet pipes into a sediment forebay and an existing 600 mm diameter inlet pipe to directly discharge into the main cell consisting of 1870 m3 in permanent, 4070 m3 in extended detention and a total volume of 5,290 m3 at a depth of 2.34 m (100-yr HWL-bottom level), to store, attenuate and discharge stormwater into a tributary of an unnamed Creek of the Crystal Springs Wetland and Otonabee River via the following control outlet:
- a 1500 mm diameter aluminized CSP riser perforated outlet control structure anchored on the pond bottom, surrounded with 50 mm diameter clear stone jacket with a 150 mm and a 200 mm diameter riser inlets to a 300 mm diameter outlet pipe and valve chamber to discharge via a rip rap splash pad to a 3.8 m wide 300 mm deep grassed outlet channel into the Creek,
- a 600 mm deep by 7.4 m wide rip rap overflow channel located in the south embankment of the pond to discharge storm water into the Creek;

**External Peripheral Ditch/Grassed Swale:**

- approximately 525 m long (Ditch D15-16), 1:2.5 side sloped triangular ditch to intercept storm drainage from the external drainage west of the landfill site and discharge overland via a rip-rap dispersion channel into the creek within the wooded area,
- approximately 280 m long (Ditch D13-14), 1:2.5 side sloped triangular ditch to intercept storm drainage from the external drainage north of the site and discharge into Bensfort Road side ditches,
- approximately 290 m long (Ditch D10-10), 1:2.5 side sloped triangular ditch to intercept storm drainage from the external drainage north of the site and discharge into an existing ditch as described below:
- approximately 580 m long (Ditches D10-11 and D11-12), 1:2.5 side sloped existing triangular

ditches to intercept storm drainage from the external drainage east of the site and discharge into existing Bensfort Road side ditch,

- approximately 126 m long (Ditch D8-D9), 1:3 side sloped triangular existing ditch to intercept storm drainage from the existing transfer station, parking and service area to an oil and grit separator as described below:

**Oil and Grit Separator** (approximate service area 1.4 ha.) **:**

- one (1) manhole type oil/grit separator (Model Stormceptor STC-2000 or approved equivalent), located in the north-east corner of the site, rated at 30 L/s flow without by-passing, having a sediment storage capacity of 7.7 m3, oil storage capacity of 2890 L and a total volume of 11.0 m3, discharging via a 600 mm diameter existing storm sewer to the Creek via a 2.8 m wide 300 mm deep grassed swale;

all in accordance with the **Application for Approval of Municipal and Private Sewage Works, Stormwater Management Facility,** dated April 20, 2009, North Landfill Area Stormwater Management Pond Design Brief, prepared and submitted by Joe Ovcjak, P.Eng., Urban & Environmental Management Inc., Consulting Engineers.

***SEWAGE WORKS APPROVED ON OR BEFORE DECEMBER 22, 1993 UNDER WASTE CofA# A341508:***

establishment of leachate management facility to service the South Fill Area ( **SFA** ) of the Bensfort Road Landfill Site consisting of the following:

**Leachate Pumping Station - SFA PS**

- one (1) leachate pumping station (SFA PS) consisting of a 2.5 m deep x 3.0 m wide x 7.3 m long precast concrete holding tank and wet well equipped with two (2) submersible pumps (one duty and one standby), each rated at 5.8 L/sec and combined capacity of 9.0 L/sec, located at the east side of the South Fill Area, discharging through a flow meter, one (1) 6,200 m long 150 mm diameter HDPE forcemain located on the east side of Bensfort Road to a manhole at Neal Drive and Bensfort Road where it reaches Peterborough sanitary sewage collection system for treatment at Peterborough Water Pollution Control Plant (WPCP);

all in accordance with the Application for Approval of Municipal and Private Sewage Works submitted by The Township of Otonabee dated August 1992 and design specifications and drawings prepared by Conestoga Rovers & Associates .

***SEWAGE WORKS APPROVED ON OR BEFORE JULY 2, 1996:***

establishment of stormwater management facilities to service the Bensfort Road Landfill Site (Peterborough Waste Management Facility) South Fill Area of an approximately 18 ha. drainage to provide quantity control of stormwater run-off by attenuating flows from storm events up to 1:100 year return frequency to predevelopment levels, consisting of the following:

- construction and upgrading of drainage swales including temporary sediment traps, installation of culverts at internal road crossings and associated appurtenances;

all in accordance with the information submitted by the Conestoga-Rovers and Associates Limited, Consulting Engineers and the following list of documents containing the information relied upon in the issuance of this Approval of Approval No. 3-1516-91-966:

1. Application for the sewage works dated September 9, 1991, signed by the City of Peterborough

and Frederick Mosher, P. Eng., Conestoga-Rovers and Associates Limited.

2. Report entitled "Surface Water Study For the Continued Operation of the Bensfort Road Landfill Site" dated February 1991, prepared by Gartner Lee Limited.
3. Report entitled "Report on the Impact of Leachate Discharge from the Peterborough Landfill on the Peterborough WPCP City of Peterborough WPCP" revised dated February 1991, prepared by Gore & Storrie Limited.
4. Reports entitled "City of Peterborough Bensfort Road Landfill Site Application for Interim Expansion" Volumes 3 and 4 both dated March 1991, prepared by Conestoga-Rovers and Associates Limited.
5. Letter dated September 20, 1991, signed by Frederick Mosher, P. Eng., Conestoga-Rovers and Associates Limited addressed to Paul Nieweglowski, Ministry of Environment and Energy.
6. Letter dated April 14, 1992, signed by Frederick Mosher, P. Eng., Conestoga-Rovers and Associates Limited addressed to Ranee Mahalingham, P. Eng., Approvals Branch, Ministry of Environment and Energy.
7. Letter dated May 12, 1992, signed by Philip J. Bauer, B.A.Sc. Eng., Conestoga-Rovers and Associates Limited addressed to Ranee Mahalingham, P. Eng., Approvals Branch, Ministry of Environment and Energy.

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

" *Approval* " means this Environmental Compliance Approval and any Schedules to it, including the application and supporting documentation.

" *Director* " means any Ministry employee appointed by the Minister pursuant to section 5 of the Part II.1 of the Environmental Protection Act ;

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

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

" *Owner* " means The Corporation of the City of Peterborough and includes its successors and assignees;

*"Previous 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 in the supporting documentation referred to herein, to the extent approved by this *Approval* ;

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

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

**TERMS AND CONDITIONS**

**PART I - GENERAL**

**1. GENERAL PROVISIONS**

(1) 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* .

(2) 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.

(3) 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.

**2. EXPIRY OF APPROVAL**

(1) Construction, operation, maintenance and removal of such items are the responsibility of the *Owner* and shall be coordinated with appropriate authorities in a timely fashion and on a priority basis as set by the County and the City of Peterborough and / or the *Ministry* . The *Approval* issued by this *Approval* will cease to apply to those parts of the *Works* which have not been constructed within ten (10) 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 thirty (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* ; and

(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*

**PART II - STORMWATER MANAGEMENT FACILITY**

**4. OPERATION AND MAINTENANCE**

(1) The *Owner* shall ensure that the design minimum liquid retention volume in the wet pond is

maintained at all times .

(2) The *Owner* shall inspect the *Works* at least once a year and, if necessary, clean and maintain the *Works* to prevent the excessive build-up of sediments, and/or vegetation.

(3) The *Owner* shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook ready and updated for inspection by the *Ministry* . The logbook shall include the following:

(a) the name of the *Works* ; and

(b) the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed.

**5. RECORD KEEPING**

(1) The *Owner* shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the operation and maintenance activities required by this *Approval.*

**6. EFFLUENT MONITORING**

The *Owner* shall establish and carry out, upon commencement of operation of the *Works* , the following effluent monitoring program:

(1) one (1) grab sample of the effluent from the outlet of the pond shall be collected within four (4) hour following commencement of a storm event with at least one (1) sample per season and with a minimum of three (3) samples during summer months of June, July and August and analyzed for the Total Suspended Solids, Turbidity, Un-ionized ammonia, Oxygen level ($O_2$), Temperature, pH and Oil and Grease; together with the following as per the schedule therein:

| **Table 1 - Effluent Monitoring for SWMF Pond for Landfill Sites** (Note-4)<br>Sampling Points: Pond Inlets (900 mm culverts from Landfill Site) and Pond Outlet | | |
|---|---|---|
| **Effluent Parameter** | **Frequency** | **Sample Type** |
| General Chemistry Note 1 | Semi-annually | Grab |
| Volatile Organic Compounds (VOC) Note 2 | Semi-annually | Grab |
| Metals Scan Note 3 | Semi-annually | Grab |

**Note 1: General Chemistry** - hardness, alkalinity, chloride, nitrite, nitrate, sulfate, ammonia, colour, Total Kjeldahl Nitrogen (TKN), total phosphorus, Dissolved Organic Carbon (DOC), phenols, Biological Oxygen Demand ($BOD_5$), Chemical Oxygen Demand (COD).

**Note 2: Volatile Organic Compounds (VOC)** - benzene, bromodichloromethan, bromoform, bromomethane, carbon tetrachloride, chlorobenzene, chlorethane, chloroform, chloromethane, dibromochloromethane, 1,2-dichlorbenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,1-dichloroethane, 1,2-dichloroethane, 1,1-dichloroethylene, trans-1,2-dichloroethylene, dichloromethane, 1,2-dichloropropane, cis-1,3-dichloropropene, ethylbenzene, styrene, 1,1,2,2-tetrachloroethane, tetrachloroethylene, toluene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, trichloroethylene, trichlorofluoromethane, vinyl chloride, m+p-zylene, o-xylene.

**Note 3: Metals Scan** - boron, calcium, magnesium, sodium, potassium, aluminium, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, selenium, vanadium, silver, zinc.

**Note 4:** Grab samples of stormwater from the two (2) Inlet pipes from the Landfill Site shall be collected, mixed and analyzed for the parameters and frequency as outlined in Table 1, along with grab sample from the pond outlet pipe for a storm event which results in a discharge from the works while maintaining a minimum of thirty (30) days between two consecutive sampling events.

(2) Unless otherwise stated, the protocol for sampling and analysis shall be in accordance with the principles specified in the Ministry's publication titled " Protocol for the Sampling and Analysis of Industrial and Municipal Waste Water" dated August 1994, (ISBN 0-7778-1880-9), as revised from time to time by more recently published edition.

(3) After the owner obtains a minimum of three (3) years of monitoring results, the monitoring frequency and monitoring parameters specified in subsection (1) Table 1 may be modified by the *District Manager* if written request is made by the Engineer on behalf of the *Owner* .

**7. EFFLUENT OBJECTIVES**

(1) The *Owner* shall use best efforts to design, construct and operate the *Works* with the objective that the concentrations of the materials named below as effluent parameters are not exceeded in the effluent from the *Works.*

**Table 2 - Pond Effluent Objectives**

| **Effluent Parameter** | **Concentration Objective** (milligrams per litre unless otherwise indicated) |
|---|---|
| pH | 6.5 - 8.5 |
| Turbidity | 25 NTU |
| Un-ionized ammonia | 0.02 mg/L |
| Oil and grease | 15 mg/L |
| Boron | 0.2 mg/L |
| Iron | 0.3 mg/L |

(2) The *Owner* shall use best efforts to ensure that the effluent from the *Works* is essentially free of floating and settleable solids and does not contain oil or any other substance in amounts sufficient to create a visible film or sheen or foam or discolouration on the receiving waters.

**PART III - LEACHATE COLLECTION AND DISPOSAL SYSTEM**

**8. OPERATION AND MAINTENANCE**

(1) 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.

(2) 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.

(3) Any diversion of sewage flow from any portion of the *Works* is prohibited, except:

(a) where it is unavoidable in preventing loss of life, danger to public health, personal injury or severe property damage; or

(b) where it is necessary for the purpose of essential maintenance of the *Works* to assure their efficient operation, and the *District Manager* has given a prior written approval for the bypass.

## 9. MONITORING AND RECORDING

The *Owner* shall carry out the following monitoring program:

(1) All samples and measurements taken for the purposes of this *Approval* are to be taken at a time and in a location characteristic of the quality and quantity of leachate over the time period being monitored.

(2) For the purposes of this condition, Quarterly means once every three months.

(3) A composite sample shall be collected at the following sampling point at a **quarterly frequency (May, August, and October)** and analyzed for each parameter listed and all results recorded:

| **Table 3<br>Leachate Monitoring<br>Sampling Location: Neal Drive Manhole** | | |
|---|---|---|
| **Parameters** | **Parameters** | **Field Parameters** |
| Alkalinity, Total (as CaCO3) | Cobalt | pH |
| Total Ammonia Nitrogen | Copper | Conductivity |
| Bromide | Iron | Temperature |
| CBOD5 | Lead | |
| Chloride | Manganese | |
| Iron | Mercury | |
| pH | Molybdenum | |
| Phenolics (Total) | Nickel | |
| Potassium | Selenium | |
| Sodium | Silver | |
| Total Kjeldahl Nitrogen (TKN) | Strontium | |
| Total Suspended Solids (TSS) | Tin | |
| Total Phosphorus | Titanium | |
| | Vanadium | |
| | Zinc | |
| | Zirconium | |

(4) The methods and protocols for sampling, analysis and recording shall conform, in order of

precedence, to the methods and protocols specified in the following:

(a) the Ministry's Procedure F-10-1, “Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only), as amended from time to time by more recently published editions;

(b) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (January 1999), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;

(c) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition), as amended from time to time by more recently published editions;

(5) The *Owner* shall install and maintain (a) flow measuring device(s), to measure the flow rate of leachate from the *Works* with an accuracy to within plus or minus 15 per cent (+/- 15%) of the actual flow rate for the entire design range of the flow measuring device in order to measure and record:

(i) the quantity of leachate being conveyed through Leachate Pumping Station NFA PS;

(ii) the quantity of leachate being conveyed through the Leachate Pumping Station SFA PS;

(6) 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* .

## PART IV - GENERAL

### 10. 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) The *Owner* shall report to the *District Manager* or designate, any exceedence of any parameter specified in Condition 7 orally, as soon as reasonably possible, and in writing within seven (7) days of the exceedence.

(3) 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, bypass or 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.

(4) The *Owner* shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to *Ministry* staff.

(5) The *Owner* shall prepare and submit to the *District Manager* a performance report as part of the Annual Monitoring and Design and Operations Report for the Site by **May 15 th** each year, covering the preceding calendar year. 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 summary and interpretation of all stormwater monitoring data and a comparison to the effluent objectives outlined in Condition 7, including an overview of the success and adequacy of the *Works* ;

(b) a summary and interpretation of all leachate monitoring data and volume of leachate disposed off-site during the reporting period;

(c) a description of any operating problems encountered and corrective actions taken;

(d) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the *Works* ;

(e) a summary of any effluent quality assurance or control measures undertaken in the reporting period;

(f) a summary of the calibration and maintenance carried out on all effluent monitoring equipment; and

(g) a description of efforts made and results achieved in meeting the Effluent Objectives under Condition 7.

(h) a summary of any complaints received during the reporting period and any steps taken to address the complaints;

(i) 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 *Approval* and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.

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 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. Conditions 4 and 8 are included to require that the *Works* be properly operated and maintained such that the environment is protected .

5. Condition 5 is included to require that all records are retained for a sufficient time period to adequately evaluate the long-term operation and maintenance of the *Works* .

6. Conditions 6 and 9 are 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.

7. Condition 7 is imposed to establish non-enforceable effluent quality objectives which the *Owner* is obligated to use best efforts to strive towards on an ongoing basis. These objectives are to be used as a mechanism to trigger corrective action proactively and voluntarily before environmental impairment occurs.

8. Condition 10 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). 6802-7VFRUK issued on September 24, 2009.**

*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:*

1. 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;
2. 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:*

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. 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*<br>Environmental Review Tribunal<br>655 Bay Street, Suite 1500<br>Toronto, Ontario<br>M5G 1E5 | AND | The Director appointed for the purposes of Part II.1 of the Environmental Protection Act<br>Ministry of the Environment<br>2 St. Clair Avenue West, Floor 12A<br>Toronto, Ontario<br>M4V 1L5 |

*** 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) 314-4506 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 28th day of September, 2012

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

KC/
c: District Manager, MOE Peterborough District Office
Pat Devlin, The Corporation of the City of Peterborough

# APPENDIX

# B

## PCCWMF CELL 4 SITE PREPARATION REPORT

CITY OF PETERBOROUGH

# PETERBOROUGH CITY/COUNTY WASTE MANAGEMENT FACILITY CELL 4 CONSTRUCTION

## SITE PREPARATION REPORT

DECEMBER 23, 2022

# PETERBOROUGH CITY/COUNTY WASTE MANAGEMENT FACILITY CELL 4 CONSTRUCTION

## SITE PREPARATION REPORT

CITY OF PETERBOROUGH

PROJECT NO.: 111-53296-14
DATE: DECEMBER 2022

WSP
SUITE 300
4 HUGHSON STREET SOUTH
HAMILTON, ON, CANADA  L8N 3Z1

T: +1 905 529-4414
F: +1 905 521-2699
WSP.COM

December 23, 2022

Don Briand
Co-ordinator, Waste Operations
The City of Peterborough
500 George Street North Peterborough ON, K9H 3R9

**Subject: Peterborough City/County Waste Management Facility Cell 4 Site Preparation Report**

**Client ref: RFP-40-21**

Dear Mr. Briand,

We are pleased to submit the Site Preparation Report for construction of Cell 4 at the Peterborough County/City Waste Management Facility, located at 1260 Bensfort Road, Peterborough, Ontario. Results of Construction Quality Assurance and Construction Quality Control (CQA/CQC) inspection and testing are detailed in the report.

The report is to be submitted to the Ministry of Environment, Conservation, and Parks prior to placement of waste in Cell 4 North Fill Area (NFA) as per ECA No. A341508. The following information is based on results obtained from onsite testing and inspections, as well as a laboratory testing program, completed between March and December 2022.

We trust that this report meets your requirements. Please contact us if you have any questions.

Yours truly,
WSP Canada Inc.

LICENSED PROFESSIONAL ENGINEER
P.R. MULHOLLAND
100113044
Dec. 23, 2022
PROVINCE OF ONTARIO

Pau Mulholland, P. Eng., PMP
Team Lead, Waste/Landfill Engineering

c.c. James Istchenko, The City of Peterborough
David Bradley, Ministry of Environment, Conservation and Parks
Glenn Rutherford, Ministry of Environment, Conservation and Parks
Peter Taylor, Ministry of Environment, Conservation and Parks

WSP ref.: 111-53296-14

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# 1 BACKGROUND AND PURPOSE OF REPORT

WSP Canada Inc. (WSP) was retained to carry out a Construction Quality Assurance and Construction Quality Control (CQA/CQC) inspection and testing program for the construction of Cell 4 in the North Fill Area (NFA) at the Peterborough County/City Waste Management Facility (PCCWMF), located at 1260 Bensfort Road in Peterborough, Ontario.

Design drawings and construction specifications for the project were prepared by WSP Canada Inc. The City of Peterborough awarded the construction contract to Todd Brothers Contracting LTD. in March 2022. Construction of Cell 4 began in March 2022. Refer to Appendix A for design drawings Issued for Construction.

In order for waste placement to commence within Cell 4 the Ministry of Environment, Conservation and Parks (Ministry) requires the Engineer to provide a report indicating that construction of Cell 4 was completed in compliance with the requirements of Environmental Compliance Approval (ECA) No. A341508 which governs the site. Among other aspects, this Site Preparation Report is to discuss the CQA/CQC procedures during the construction of the new landfill cell and any deviations from the approved plans.

## 1.1 REQUIREMENTS OF ECA No. A341508

Condition 5 of ECA No. A341508 requires that the County/City "*continue to demonstrate the suitability of the in situ overburden materials to meet design specifications, i.e. permeability, for the proposed recompacted base and side slopes*".

Further to this condition, the County/City were required to comply with the following prior to placement of waste in Cell 2 of the NFA as detailed in an email from the Ministry dated September 20, 2010:

*"No landfilling of wastes should occur on any portion of the North Fill Area liner and leachate collection system until the Director and District Manager have received an inspection report from the engineer indicating that the portion of the base liner and the leachate containment system has been constructed as required by Provisional Certificate of Approval No. A341508. Inspections with respect to the base liner system shall include assessment of the following:*

*a) The adequacy of extracted clay material from the landfill excavation and/or clayey material for base liner construction and leachate/liner compatibility;*

*b) The acceptability of foundation conditions to ensure adequare bearing capacity and slope stability, adequate provisions to prevent basal heave or blowout, absence of standing water, and absence of potential conduits for leachate and landfill gas migration; and*

*c) Compliance with installation specifications and QA/QC procedures related to items such as grain size distribution and clay content of native and borrow materials, clod size limits, removal of stones, Atterberg limits, compaction, moisture content, compaction effort, required Standard Proctor Density, lift thickness, scarification between lifts, permeability, and procedures to avoid desiccation of the clay liner."*

This Report is being submitted to comply with the ECA and allow landfilling of waste within Cell 4 in the NFA at the PCCWMF.

# 2 CONSTRUCTION OF LANDFILL EXPANSION CELL 4

## 2.1 CELL 4 CONSTRUCTION

Cell 4 is approximately 3.5 ha in area and construction was complete under ECA No. A341508 issued by the MECP. The work included excavation and processing of native material, placement of recompacted soil liner, installation of geotextile and clear stone with collector pipes for the leachate collection system (LCS), installation of manholes, expansion of the header pipe for landfill gas (LFG) collection system, and construction of various other works associated with the new landfill expansion.

## 2.2 SITE PREPARATION AND CELL EXCAVATION

Prior to completion of cell excavation, decommissioning of monitoring well BH-83II was completed on July 15, 2022 due to its location within the Cell 4 footprint. A copy of the decommissioning report is included in Appendix B. A replacement well is planned to be installed in 2023.

Based on groundwater levels prior to and during the cell construction, it was determined that depressurization (dewatering) of the underlying water-bearing layers was not required during construction. The native glacial till is generally hard and competent to support the design grades and side slopes, with the exception of occasional wet seams. These areas were repaired by the contractor using native glacial till material and recompacted to 98% SPMDD.

Material excavated from Cell 4 was stockpiled North of the existing landfill for interim and final cover use by the City for the NFA. An Environmental Impact Study (EIS) was completed prior to placement of the soil stockpile. Construction of the soil stockpiles were completed in accordance with the recommendations from with EIS to minimize impacts to vegetation and wildlife. A copy of the report is included in Appendix C.

Subgrade inspection was conducted during the excavation stage for the cell base and side slopes. Prior to placement of the compacted soil liner, subgrade surfaces were fine graded and smoothed out using a smooth drum roller, as per project specifications. Field compaction testing was conducted on the native backfill materials and native fill materials placed to achieve design grades. Testing was completed using nuclear densometer methods (ASTM D2922 method). Prior to testing the Contractor compacted each lift with a minimum of six (6) one-way passes using a sheepsfoot roller, as per the project specifications. In-situ density measurements were compared to the SPMDD of representative samples of the native backfill as determined by the laboratory ASTM D698 method presented in Appendix D. Field compaction test results and approximate test locations are presented in Appendix E. Excavation grades relative to the design grades were generally found to be within acceptable tolerance and approved for liner placement.

## 2.3 RECOMPACTED SOIL LINER

### *2.3.1 RECOMPACTED SOIL LINER MATERIAL AND LABORATORY TESTING*

Material for the recompacted base was obtained from two sources throughout the construction of Cell 4. Majority of the material used for the base liner was excavated from the cell footprint, with 1,500 $m^3$ of material imported to site from an approved outside source due to a shortage of clay availability on site. Material obtained from the cell excavation required conditioning and processing to specified gradation limits. Processing was accomplished by mechanical power-screen to remove stones larger than 50 mm diameter, and proportionally increase clay content, to produce a graded material capable of a minimum hydraulic conductivity of $2.5 \times 10^{-9}$ m/s at 95 percent of Standard Proctor Maximum Dry Density (ASTM D698 test method). Material imported to site was not required to be screened as particle size distribution analysis were provided to support documentation that minimal stone greater than 100 mm diameter was not present and clay content in the material was significantly higher than the material used from on-site sources at the PCCWMF. Imported material was included in the below testing requirements once placed to confirm material met project specifications.

WSP completed sixteen (16) particle size distribution analysis (ASTM D422) of the processed soil during placement. Results are provided in Appendix D. In most cases, sample gradations generally conformed to specifications or plotted slightly outside (coarse side) of the specified gradation envelope. Gradation results were similar those from Cells 2 and 3 constructed in 2010 and 2015 respectively. Clay content (i.e. particles finer than the 0.002 mm size) varied from approximately 12% to 20% in the sampled material.

Eighteen (18) Atterberg Limits tests (ASTM D4318) were completed on the processed material to evaluate plastic behaviour. Plasticity Index for the fine-grained fraction of the samples ranged from 3 to 6 percent, and Liquid Limit ranged from 14 to 22 percent. As such, the matrix material was classified as Inorganic Clay of Low Plasticity (type CL) to Inorganic Silts of Slight Plasticity (Type ML) in accordance with the Unified Soil Classification System.

Moisture content tests (ASTM D2216) were completed on the processed material during placement of the recompacted base liner. Moisture content varied throughout the sampling process which resulted in moisture contents obtained being under the minimum of 8% noted in the project specifications. Standard proctor testing results on some of the base liner material came back with an optimum moisture of 5.8%, which was used as the minimum moisture value to ensure proper compaction of the material being placed. Results are provided in Appendix D.

Samples were also collected and submitted for hydraulic conductivity testing, based on material recompaction of 95% SPMDD at optimum moisture. The hydraulic conductivity design criterion for the Cell 4 recompacted base is $2.5 \times 10^{-9}$ m/s. Five (5) Hydraulic Conductivity tests (ASTM 5084) were completed on the proposed material during placement, as well as two (2) samples collected using 75 mm diameter Shelby tubes after completion of the recompacted base liner at two randomly selected locations along the base and the slope of the cell, as specified in the project specifications. The permeability results indicated hydraulic conductivity of the re-compacted silt/clay liner meets project specifications. Results are provided in Appendix D.

In summary, the processed material was considered acceptable for use and the final recompacted liner met the necessary performance specifications.

### 2.3.2 RECOMPACTED SOIL LINER LIFT PLACEMENT

The design specifications required that the recompacted soil liner be placed in three lifts on the cell floor to a thickness of 0.5 m and five lifts on the cell slopes to a thicknesses of 1.0 m. Recompacted soil liner material was transported into the Cell using rock trucks and spread with a dozer, and then compacted using an appropriately sized compactor. Specifications required appropriate moisture content adjustments to above optimum levels prior to compaction. Onsite monitoring of the placement process was completed by WSP.

Following completion of placement, the compacted soil liner was monitored for desiccation, and moisture was added as necessary by the Contractor. No significant desiccation was observed by WSP during the construction process.

The top of “as-built” recompacted base grades was surveyed by Todd Brothers and checked by WSP. The base of the landfill as currently constructed will promote leachate drainage to the Cell 4 manholes.

### 2.3.3 RECOMPACTED SOIL LINER COMPACTION

Recompacted base compaction was applied with sheepsfoot and smooth drum rollers according to project specifications. The specifications also required that recompacted base material be placed at 1 % to 4 % above optimum moisture content, as determined by Standard Proctor compaction tests (ASTM D698). Six (6) standard proctor compaction tests were performed on the recompacted base material from the onsite source and indicated maximum dry density values ranging from 2123 to 2187 kg/m3, at optimum moisture contents of approximately 5.8 to 8.0 percent. The imported clay material brough to site to complete recompacted liner on the south slope of Cell 4 required one (1) standard proctor test which had a maximum dry density value of 1908 kg/m3, at an optimum moisture content of 12.2 percent.

During placement activities, compaction testing using nuclear densometer methods (ASTM D2922) was completed daily, at a frequency exceeding 15 tests per hectare per lift during placement of recompacted base material. Compaction test results are presented in Appendix E.

Based on the in-situ testing, the results meet the design specifications of 95% SPMDD. In locations with inadequate moisture content as detected by in-situ field tests, the Contactor was directed by WSP to rework the material and adjust the moisture content accordingly, prior to the section being retested and approved for subsequent lifts.

## 2.4 GEOTEXTILE SEPARATORS

Geotextile (filter fabric) separators were installed on top of the recompacted base and on top of the stone drainage layer, according to the design. Supplier specifications (shop drawings) were reviewed and approved by WSP prior to placement of Geotextile. Certificates of Conformance and Analysis for the geotextiles used on the project are included in Appendix F. Product specifications submitted as shop drawings are included in Appendix G.

## 2.5 LEACHATE COLLECTION SYSTEM

Installation of the leachate collection system for Cell 4 consists of installation of two (2) concrete manholes, installation of four (4) perforated HDPE leachate collection pipes, installation of the stone drainage on top of the geotextile filter layer and installation of the geotextile protection layer. A summary of these activities are presented in the following sections.

### 2.5.1 MAINTENANCE HOLES (MH4 AND MH8)

Two (2) leachate collection system maintenance holes, designated MH4 and MH8, were installed in the northwest and southeast portion of Cell 4. The manholes were manufactured by M Con Pipe and Products Inc. in Ayr Ontario. Shop drawings of the manholes as provided by M Con is presented in Appendix G.

Installation of MH4 and MH8 was completed in mid November 2022. In preparation for installation activities, a concrete base measuring approximately 3.8 m in diameter was cast as a support platform for each manhole. Concrete field and laboratory test results are provided in Appendix D. The elevation of the upper surface of the platforms were surveyed to ensure the invert elevations of leachate collection pipes into the manhole would conform to design elevations. Following placement of the manhole on the concrete platform, native material was placed and compacted around the base of the manhole to secure it in place. The as-built invert elevations for the manholes and pipes were surveyed to confirm that they were within acceptable tolerances of design elevations.

A 200 mm diameter PVC gate valve was installed in MH4 to regulate leachate quantities and flow to the adjacent cells and into force main as required.

### 2.5.2 LEACHATE COLLECTION PIPES

Perforated leachate collection pipes were installed within Cell 4 for the leachate collection system pipes. The pipes were connected to MH4 and MH8, and to the existing leachate collection pipes within the adjacent cell (Cell 3). Inspections completed by WSP personnel during installation activities confirmed that the pipe, which was installed met the required specifications, in that the pipe consisted of 200 mm diameter, HDPE, Standard Dimensional Ratio 11. All sections of collection pipes were perforated with 19 mm diameter holes aligned in four rows, with the rows spaced 90 degrees apart. The in-row spacing of the holes was 100 mm. Product specifications for the pipes are also provided in Appendix G. All fused sections of pipe were inspected prior to installation. See Appendix A for design drawings and Appendix G for relevant shop drawings.

### 2.5.3 STONE DRAINAGE AND PROTECTION LAYER

Contract specifications required the installation of four (4) 200 mm diameter perforated drainage pipes installed with the leachate collection system drainage layer, which consists 53 mm nominal diameter drainage stone placed to a thickness of 500 mm. WSP completed laboratory particle size distribution analysis (MOT LS-602) for the 53 mm nominal diameter drainage stone at the rate of one sample taken for every 2,000 $m^3$ of stone placed, and Micro-Deval Abrasion Loss analysis (LS618) for every 4,000 $m^3$ of stone placed, as per project specifications. A total of nine (9) stone samples were tested for particle size distribution and four (4) sample for Micro-Deval Abrasion Loss analysis (LS618) were submitted for the 50 mm nominal diameter drainage stone. Results from the particle size distribution analysis passed particle size analysis for material under 53mm diameter with some coarser material present within a few samples. Based on results obtained, the clear stone imported to site was acceptable for use and met project specification for the 50 mm nominal diameter drainage stone. Laboratory certificates are presented in Appendix D. In addition one (1) sample of the stone was obtained from the Drain Bros. Havelock Quarry during production, and was submitted for particle size distribution analysis prior to approval for use. Product data is presented in Appendix G.

## 2.6 PERIMETER BERMS AND ACCESS ROADS

Soil from the excavation of Cell 4 was used to construct the perimeter berms and subgrade of the access road around Cell 4. A combination of visual observation of compaction of the material was observed as well as field compaction testing conducted. Compaction was completed with a minimum of six (6) passes using a sheepsfoot roller, to meet the project specification of 98% of the SPMDD. Due to the construction completion date and inclement weather, completion of the remainder of the access road and perimeter berm is postponed until Spring 2023. A copy of the outstanding items list that remains for 2023 is included in Appendix H. However, waste placement will only take place on the base of Cell 4 prior to construction of the perimeter berms. After the perimeter berms are constructed waste placement will be permitted on the side slopes.

## 2.7 LANDFILL GAS COLLECTION SYSTEM

Lines and grades of header pipe was inspected throughout construction. Bedding, embedment and cover for pipes was Granular A as per OPSS 1010. Tracer wire (8-gauge) and warning tape were installed within the header trench as per project specifications, followed by native soil backfill placed on top of pipe cover. Inspection was conducted during placement of granular and native backfill.

The header pipe consisted of 200 mm diameter solid HDPE SDR-17 pipe. Pipe was joined by butt fusion in the field and connected to the existing LFG header pipes by electrofusion couplings. Eight (8) HDPE SDR 17 capped branch saddles were installed along the main header for future sub-header connections. Each branch saddle location was marked in the field with a wooden stake for future connections. The LFG header pipe was inspected prior to and during installation.

Shop drawings and product data were submitted by Todd Brothers prior to supply of materials. WSP reviewed shop drawings and provided comments as required to ensure products met design specifications. Relevant reviewed shop drawings are included in Appendix G.

# 3 CONCLUSION

In conclusion and as documented in this report, WSP has completed CQA/CQC inspections for the construction of Cell 4 in the NFA at the PCCWMF. WSP has verified that inspected and tested materials meet the project design specifications.

We trust that this information meets the Ministry's requirements under the ECA. Cell 4 will begin receiving waste upon submission of this report. Should you have any questions or concerns relating to this report, please do not hesitate to contact us.

Submitted by,
**WSP Canada Inc.**

Paul Mulholland, P. Eng., PMP
Team Lead, Waste/Landfill Engineering

# APPENDIX

# A

## CELL 4 ISSUED FOR CONSTRUCTION DRAWINGS

peterborough
outside the ordinary

# NORTH FILL AREA - CELL 4
# PETERBOROUGH COUNTY/CITY WASTE MANAGEMENT FACILITY

**1260 Bensfort Road, Peterborough, ON**

## ISSUED FOR CONSTRUCTION

WSP Project No: 111-53296-14
Date: March 2, 2022


## KEY PLAN

## DRAWING INDEX

| NO. | TITLE |
|---|---|
| C-101 | PRE-CONSTRUCTION SITE PLAN AND PROPOSED WORK AREA |
| C-102 | PRE-CONSTRUCTION EXISTING CONDITIONS (SEPTEMBER 2021) |
| C-103 | PROPOSED BOTTOM OF EXCAVATION |
| C-104 | PROPOSED TOP OF RECOMPACTED LINER |
| C-105 | PROPOSED TOP OF CLEAR STONE DRAINAGE LAYER AND LEACHATE COLLECTION SYSTEM |
| C-106 | PROPOSED TOP OF CLEAR STONE PROTECTION LAYER |
| C-107 | PROPOSED ACCESS ROADS AND LANDFILL GAS HEADER |
| C-108 | PROPOSED ACCESS ROAD TO STOCKPILE AND SCREENING AREA |
| C-201 | CROSS SECTIONS |
| C-401 | TYPICAL DETAILS (1 OF 2) |
| C-401 | TYPICAL DETAILS (2 OF 2) |

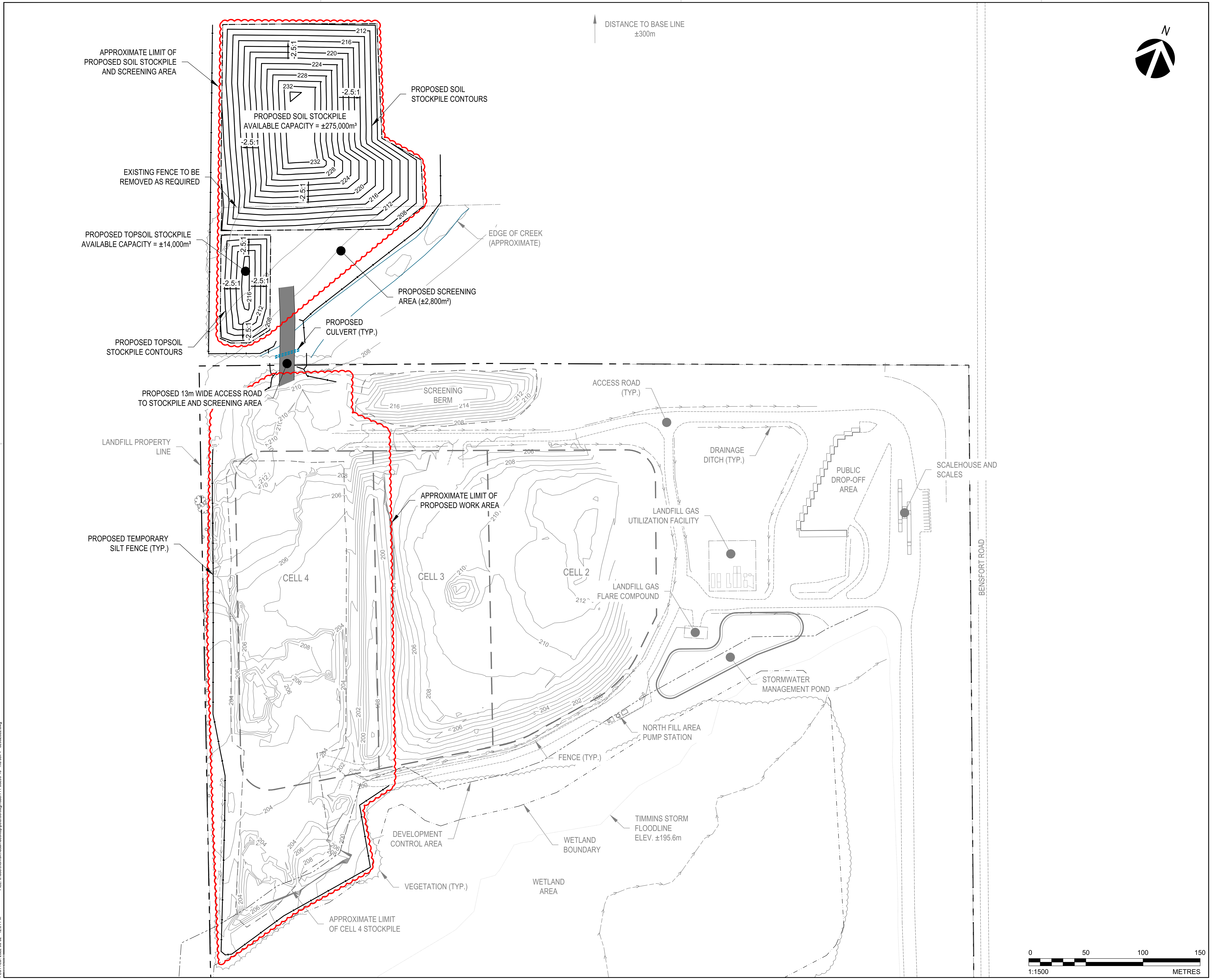
## LEGEND

| DESCRIPTION | EXISTING | PROPOSED |
|---|---|---|
| PROPERTY LINE | | |
| DEVELOPMENT CONTROL AREA | | |
| WETLAND BOUNDARY | | |
| FLOODLINE | | |
| WATERCOURSE | | |
| CELL BOUNDARY / LIMIT OF WASTE | | |
| VEGETATION | | |
| FENCE | | |
| ACCESS ROAD | | |
| DRAINAGE DITCH | | OR |
| CULVERT | | |
| SILT FENCE | | |
| LITTER FENCE | | |
| SOIL STOCKPILE | | |
| CONTOUR LINE | 205 | 205 |
| SLOPE / GRADE | | 3:1 |
| ELEVATION | | 208.77 |
| LCS FORCEMAIN / GRAVITY LINE | | |
| LCS PIPE (SOLID) | | |
| LCS PIPE (PERFORATED) | | |
| LCS MANHOLE | MHL3 | MHL4 |
| PUMP STATION | PS | |
| CONDENSATE SUMP | CS-1 | |
| LFG HEADER PIPE | | |
| BRANCH SADDLE | | |
| LFG COLLECTION PIPE (PERFORATED) | | |
| LFG COLLECTION WELLHEAD | NGW-3 | |
| LFG ISOLATION VALVE / CHAMBER | IV-3 OR VC | |
| BOREHOLE | BH-83-II | |
| MONITORING WELL | GWM-94-II OR GP10-16 OR ISP16 | |

We see the future more clearly and design for it today.

wsp

WSP Canada Inc. 300 - 4 Hughson Street South, Hamilton, Ontario, L8N 3Z1 T 905-529-4414 | www.wsp.com




NOTES:

1. ALL DIMENSIONS SHOWN ON THE DRAWINGS ARE IN METRES OR MILLIMETRES UNLESS OTHERWISE NOTED. CHECK ALL DIMENSIONS AND REPORT ANY INCONSISTENCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.
2. FEATURES SHOWN ON THE DRAWINGS ARE BASED ON DATA OBTAINED FROM OTHERS AND INTERPOLATED BY WSP.
3. PROPOSED LINER AND LEACHATE COLLECTION SYSTEM IS BASED ON THE NORTH FILL AREA DESIGN BRIEF PREPARED BY URBAN AND ENVIRONMENTAL MANAGEMENT INC. DATED JULY 13, 2009.
4. LOCATION OF UNDERGROUND AND ABOVE GROUND UTILITIES / STRUCTURES (HYDRO POLE, CONDUITS, ETC.) IS NOT NECESSARILY SHOWN ON THE DRAWINGS, AND, WHERE SHOWN THE ACCURACY OF SUCH UTILITIES / STRUCTURES IS NOT GUARANTEED. THE CONTRACTOR SHALL IDENTIFY LOCATION OF ALL UTILITIES / STRUCTURES PRIOR TO STARTING WORK AND ASSUME LIABILITY FOR DAMAGES.
5. NO MATERIAL STOCKPILING SHALL BE PERMITTED SOUTH OF THE LIMIT OF THE DEVELOPMENT CONTROL AREA.
6. BENCHMARK - CENTRE OF MANHOLE LID ADJACENT TO TOMLINSON TRAILER WITH THE FOLLOWING COORDINATES (NAD 83 UTM 17):

N: 4900814.990 E: 716563.973 ELEV. 206.925

REVISION:

| REV | DATE | DESCRIPTION | BY |
|---|---|---|---|
| 4 | 2022-03-02 | ISSUED FOR CONSTRUCTION | PRM |
| 3 | 2021-12-08 | ISSUED FOR RFP | PRM |
| 2 | 2021-10-22 | ISSUED FOR CLIENT REVIEW | PRM |
| 1 | 2021-10-18 | ISSUED FOR CLIENT REVIEW | PRM |

SEAL:

LICENSED PROFESSIONAL ENGINEER
P.R. MULHOLLAND
100113044
2022-03-02
PROVINCE OF ONTARIO



ORIGINAL SCALE: SEE SCALE BAR
DATE: 2022-03-02
APPROVED BY: P R M
CHECKED BY: --
DRAWN BY: I F H

IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.
25mm

DISCIPLINE: ENVIRONMENT


WSP Canada Inc.
300 - 4 Hughson Street South, Hamilton, Ontario, L8N 3Z1
T 905-529-4414 | www.wsp.com


PROJECT NUMBER: 111-53296-14

CLIENT:
peterborough
outside the ordinary

CLIENT REF. #: --

PROJECT:
NORTH FILL AREA - CELL 4
PETERBOROUGH COUNTY/CITY
WASTE MANAGEMENT FACILITY

TITLE:
PRE-CONSTRUCTION
SITE PLAN AND
PROPOSED WORK AREA

DRAWING NUMBER: C-101
REV. 4

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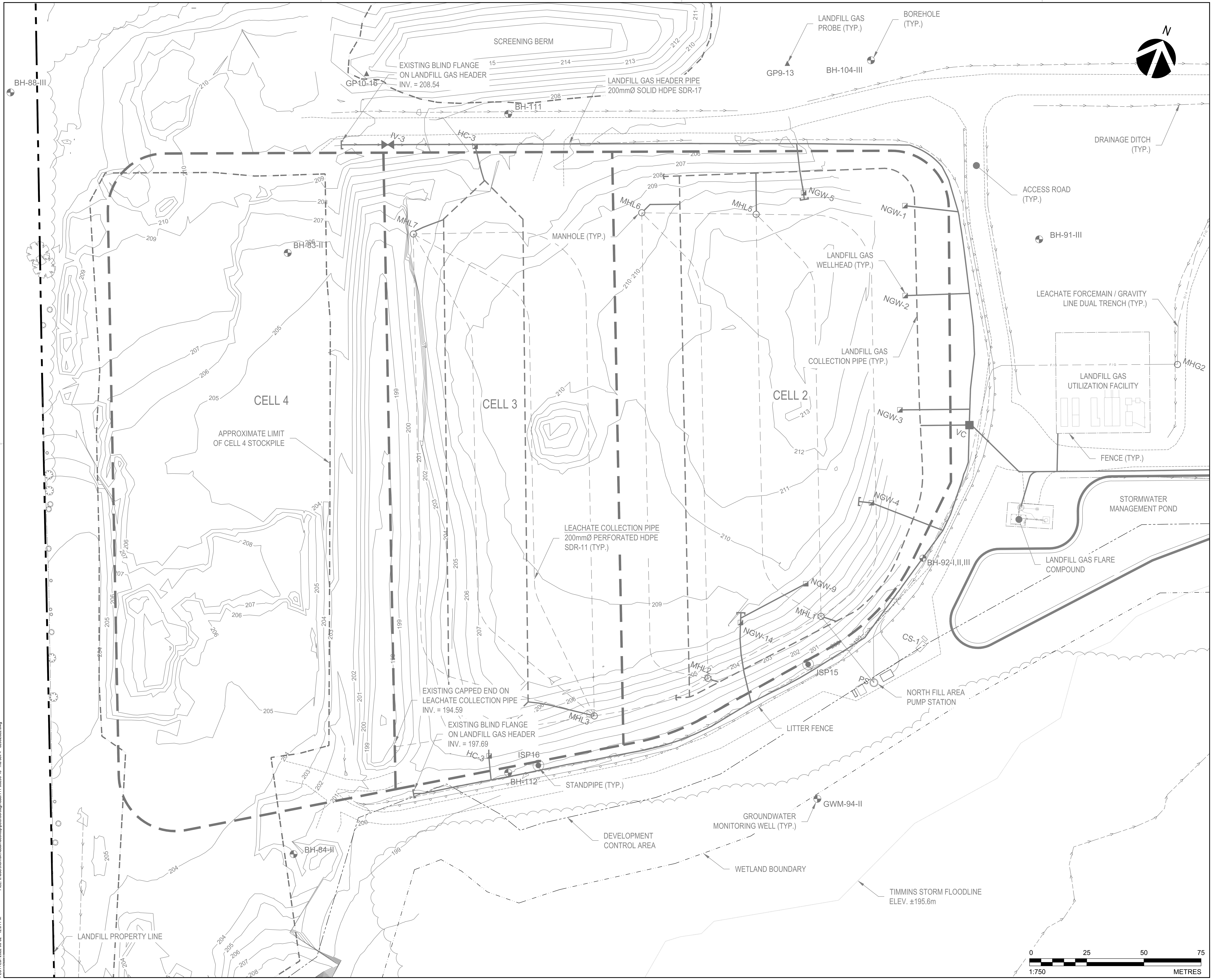


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N: 4900814.990 E: 716563.973 ELEV. 206.925

REVISION:

| REV | DATE | DESCRIPTION | BY |
|---|---|---|---|
| 4 | 2022-03-02 | ISSUED FOR CONSTRUCTION | PRM |
| 3 | 2021-12-08 | ISSUED FOR RFP | PRM |
| 2 | 2021-10-22 | ISSUED FOR CLIENT REVIEW | PRM |
| 1 | 2021-10-18 | ISSUED FOR CLIENT REVIEW | PRM |

SEAL:

LICENSED PROFESSIONAL ENGINEER
P.R. MULHOLLAND
100113044
2022-03-02
PROVINCE OF ONTARIO



ORIGINAL SCALE: SEE SCALE BAR
DATE: 2022-03-02
APPROVED BY: P R M
CHECKED BY: --
DRAWN BY: I F H

IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.

25mm

DISCIPLINE: ENVIRONMENT

wsp
WSP Canada Inc.
300 - 4 Hughson Street South, Hamilton, Ontario, L8N 3Z1
T 905-529-4414 | www.wsp.com

PROJECT NUMBER: 111-53296-14

CLIENT:

peterborough
outside the ordinary

CLIENT REF. #: --

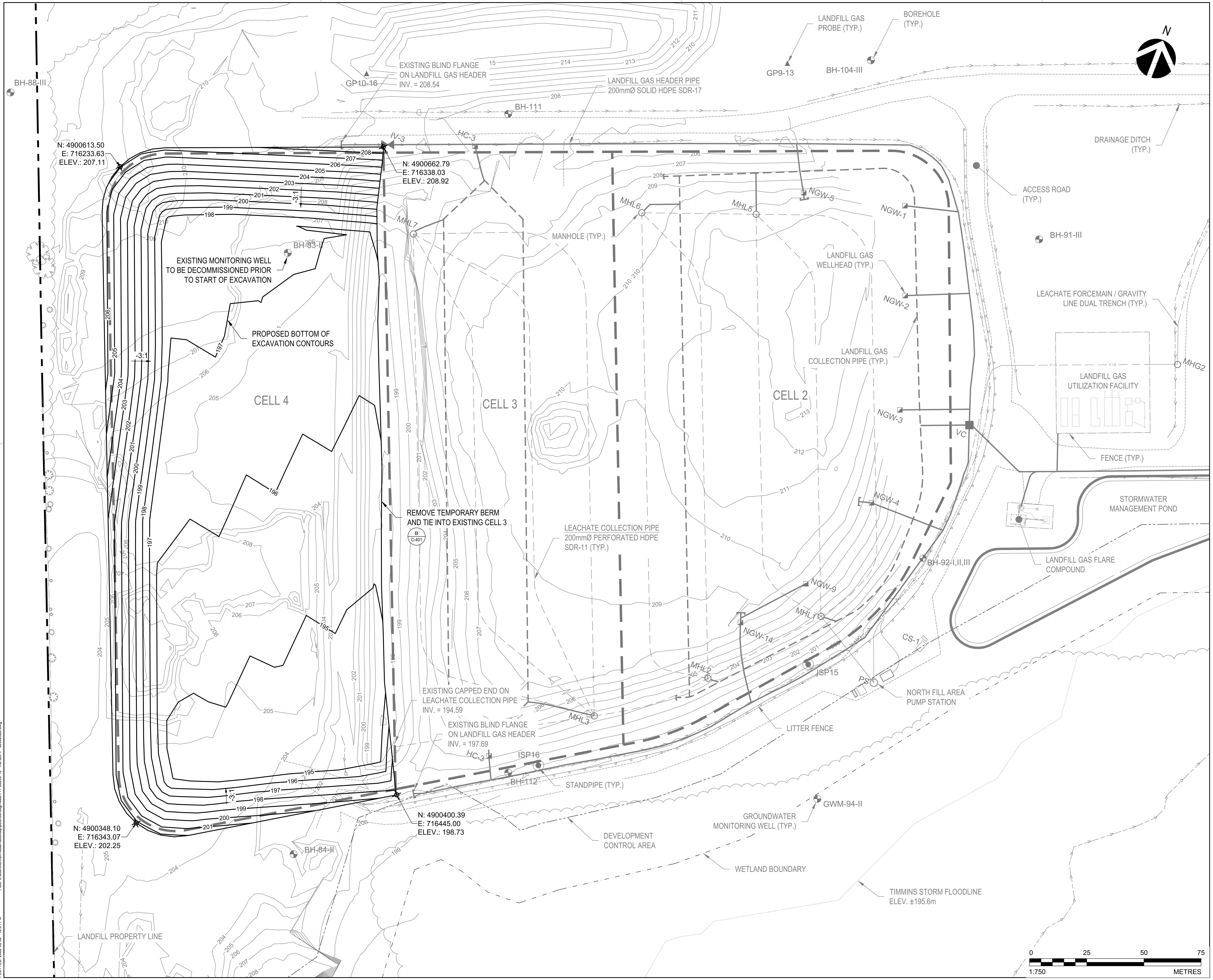
PROJECT:

NORTH FILL AREA - CELL 4
PETERBOROUGH COUNTY/CITY
WASTE MANAGEMENT FACILITY

TITLE:

PRE-CONSTRUCTION
EXISTING CONDITIONS
(SEPTEMBER 2021)

DRAWING NUMBER: C-102
REV. 4




NOTES:

1. ALL DIMENSIONS SHOWN ON THE DRAWINGS ARE IN METRES OR MILLIMETRES UNLESS OTHERWISE NOTED. CHECK ALL DIMENSIONS AND REPORT ANY INCONSISTENCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.
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3. PROPOSED LINER AND LEACHATE COLLECTION SYSTEM IS BASED ON THE NORTH FILL AREA DESIGN BRIEF PREPARED BY URBAN AND ENVIRONMENTAL MANAGEMENT INC. DATED JULY 13, 2009.
4. LOCATION OF UNDERGROUND AND ABOVE GROUND UTILITIES / STRUCTURES (HYDRO POLE, CONDUITS, ETC.) IS NOT NECESSARILY SHOWN ON THE DRAWINGS, AND, WHERE SHOWN THE ACCURACY OF SUCH UTILITIES / STRUCTURES IS NOT GUARANTEED. THE CONTRACTOR SHALL IDENTIFY LOCATION OF ALL UTILITIES / STRUCTURES PRIOR TO STARTING WORK AND ASSUME LIABILITY FOR DAMAGES.
5. NO MATERIAL STOCKPILING SHALL BE PERMITTED SOUTH OF THE LIMIT OF THE DEVELOPMENT CONTROL AREA.
6. BENCHMARK - CENTRE OF MANHOLE LID ADJACENT TO TOMLINSON TRAILER WITH THE FOLLOWING COORDINATES (NAD 83 UTM 17):

N: 4900814.990 E: 716563.973 ELEV. 206.925

REVISION:

| REV | DATE | DESCRIPTION | BY |
|---|---|---|---|
| 4 | 2022-03-02 | ISSUED FOR CONSTRUCTION | PRM |
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| 2 | 2021-10-22 | ISSUED FOR CLIENT REVIEW | PRM |
| 1 | 2021-10-18 | ISSUED FOR CLIENT REVIEW | PRM |

SEAL:

LICENSED PROFESSIONAL ENGINEER
P.R. MULHOLLAND
100113044
2022-03-02
PROVINCE OF ONTARIO



ORIGINAL SCALE: SEE SCALE BAR
DATE: 2022-03-02
APPROVED BY: P R M
CHECKED BY: --
DRAWN BY: I F H

IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.
25mm

DISCIPLINE: ENVIRONMENT

wsp
WSP Canada Inc.
300 - 4 Hughson Street South, Hamilton, Ontario, L8N 3Z1
T 905-529-4414 | www.wsp.com

PROJECT NUMBER: 111-53296-14

CLIENT:
peterborough
outside the ordinary

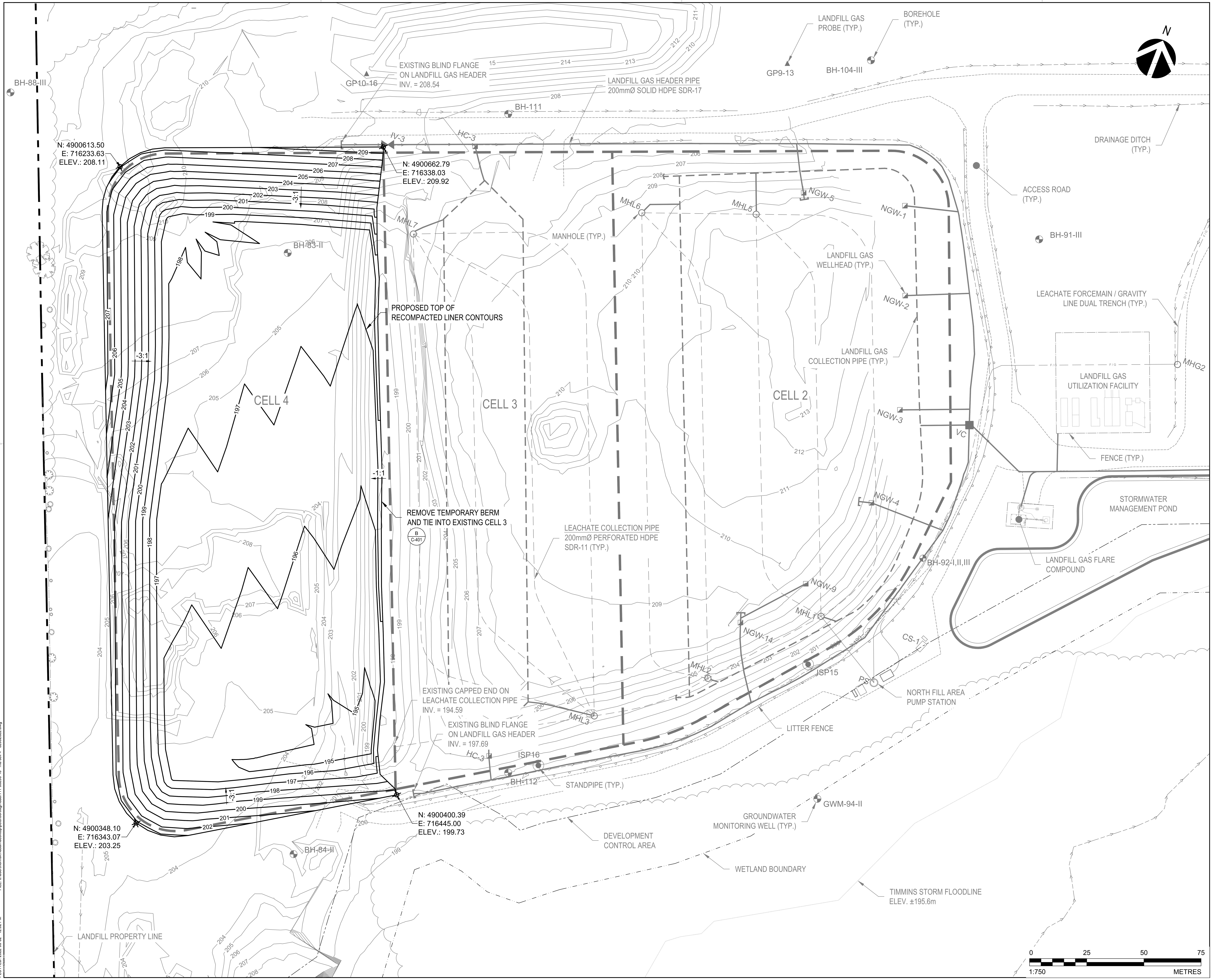
CLIENT REF. #: --

PROJECT:
NORTH FILL AREA - CELL 4
PETERBOROUGH COUNTY/CITY
WASTE MANAGEMENT FACILITY

TITLE:
# PROPOSED BOTTOM OF EXCAVATION

DRAWING NUMBER: C-103
REV. 4

CTB: cws colour - ih.ed5.ctb
PLOTTED: 2022-03-02 - 12:01 PM
FILE: c:\users\ishrak.hasan\desktop\peterborough\cad\111-53296-13 - nfa cell 4 - 02032022.dwg




NOTES:

1. ALL DIMENSIONS SHOWN ON THE DRAWINGS ARE IN METRES OR MILLIMETRES UNLESS OTHERWISE NOTED. CHECK ALL DIMENSIONS AND REPORT ANY INCONSISTENCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.
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5. NO MATERIAL STOCKPILING SHALL BE PERMITTED SOUTH OF THE LIMIT OF THE DEVELOPMENT CONTROL AREA.
6. BENCHMARK - CENTRE OF MANHOLE LID ADJACENT TO TOMLINSON TRAILER WITH THE FOLLOWING COORDINATES (NAD 83 UTM 17):

N: 4900814.990 E: 716563.973 ELEV. 206.925

REVISION:

| REV | DATE | DESCRIPTION | BY |
|---|---|---|---|
| 4 | 2022-03-02 | ISSUED FOR CONSTRUCTION | PRM |
| 3 | 2021-12-08 | ISSUED FOR RFP | PRM |
| 2 | 2021-10-22 | ISSUED FOR CLIENT REVIEW | PRM |
| 1 | 2021-10-18 | ISSUED FOR CLIENT REVIEW | PRM |

SEAL:

LICENSED PROFESSIONAL ENGINEER
P.R. MULHOLLAND
100113044
2022-03-02
PROVINCE OF ONTARIO



ORIGINAL SCALE: SEE SCALE BAR
DATE: 2022-03-02
APPROVED BY: P R M
CHECKED BY: --
DRAWN BY: I F H

IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.
25mm

DISCIPLINE: ENVIRONMENT

WSP Canada Inc.
300 - 4 Hughson Street South, Hamilton, Ontario, L8N 3Z1
T 905-529-4414 | www.wsp.com

PROJECT NUMBER: 111-53296-14

CLIENT:
peterborough
outside the ordinary

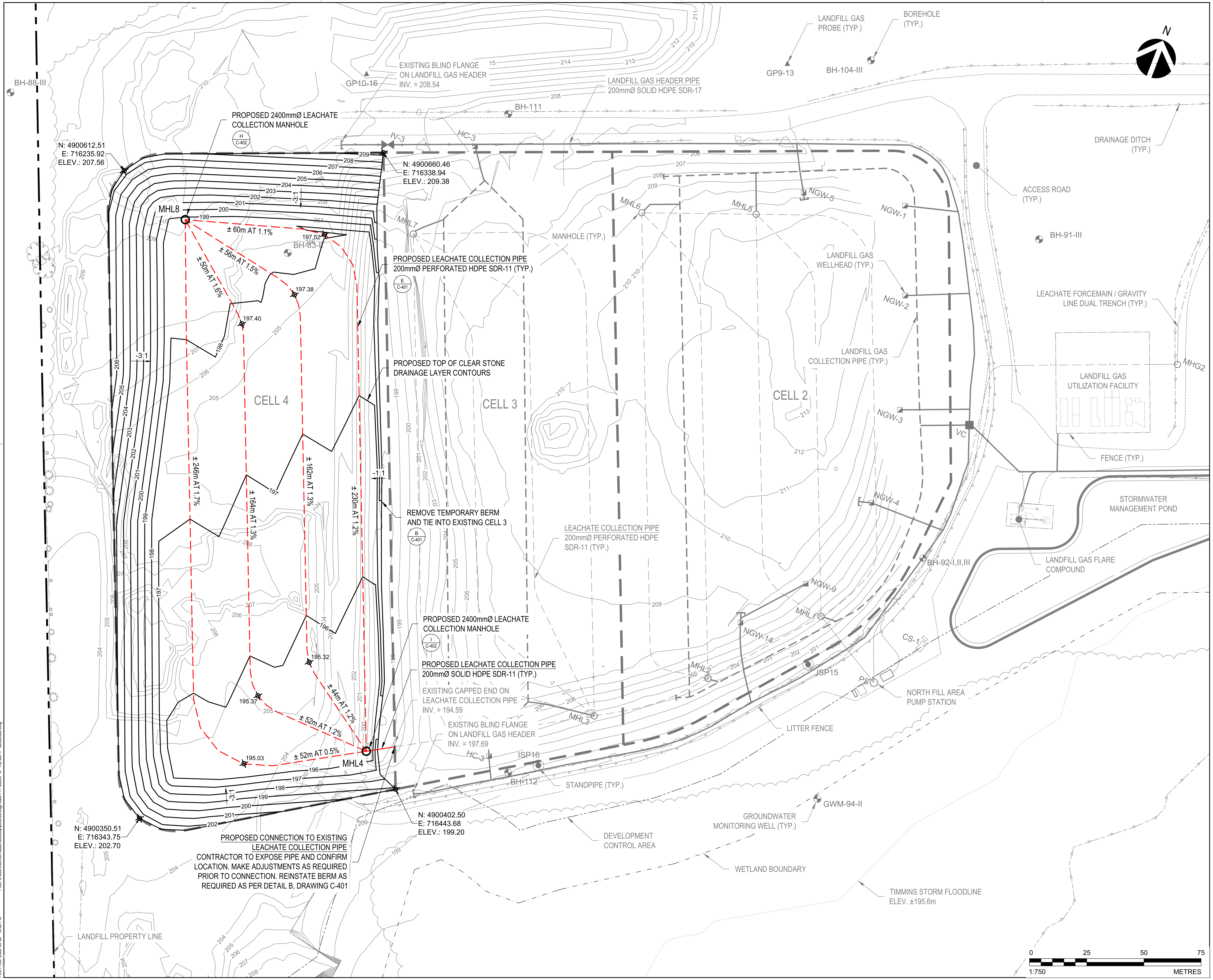
CLIENT REF. #: --

PROJECT:
NORTH FILL AREA - CELL 4
PETERBOROUGH COUNTY/CITY
WASTE MANAGEMENT FACILITY

TITLE:
PROPOSED TOP OF RECOMPACTED LINER

DRAWING NUMBER: C-104
REV. 4

CTB: ows colour - ifh.ctb
PLOTTED: 2022-03-02 - 12:02 PM
FILE: c:\users\ishrak.hasan\desktop\peterborough\cad\111-53296-13 - nfa cell 4 - 02032022.dwg




NOTES:

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5. NO MATERIAL STOCKPILING SHALL BE PERMITTED SOUTH OF THE LIMIT OF THE DEVELOPMENT CONTROL AREA.
6. BENCHMARK - CENTRE OF MANHOLE LID ADJACENT TO TOMLINSON TRAILER WITH THE FOLLOWING COORDINATES (NAD 83 UTM 17):

N: 4900814.990 E: 716563.973 ELEV. 206.925

REVISION:

| REV | DATE | DESCRIPTION | BY |
|---|---|---|---|
| 4 | 2022-03-02 | ISSUED FOR CONSTRUCTION | PRM |
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| 1 | 2021-10-18 | ISSUED FOR CLIENT REVIEW | PRM |

SEAL:

LICENSED PROFESSIONAL ENGINEER
P.R. MULHOLLAND
100113044
2022-03-02
PROVINCE OF ONTARIO



ORIGINAL SCALE: SEE SCALE BAR
DATE: 2022-03-02
APPROVED BY: P R M
CHECKED BY: --
DRAWN BY: I F H

IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.
25mm

DISCIPLINE: ENVIRONMENT

wsp
WSP Canada Inc.
300 - 4 Hughson Street South, Hamilton, Ontario, L8N 3Z1
T 905-529-4414 | www.wsp.com

PROJECT NUMBER: 111-53296-14

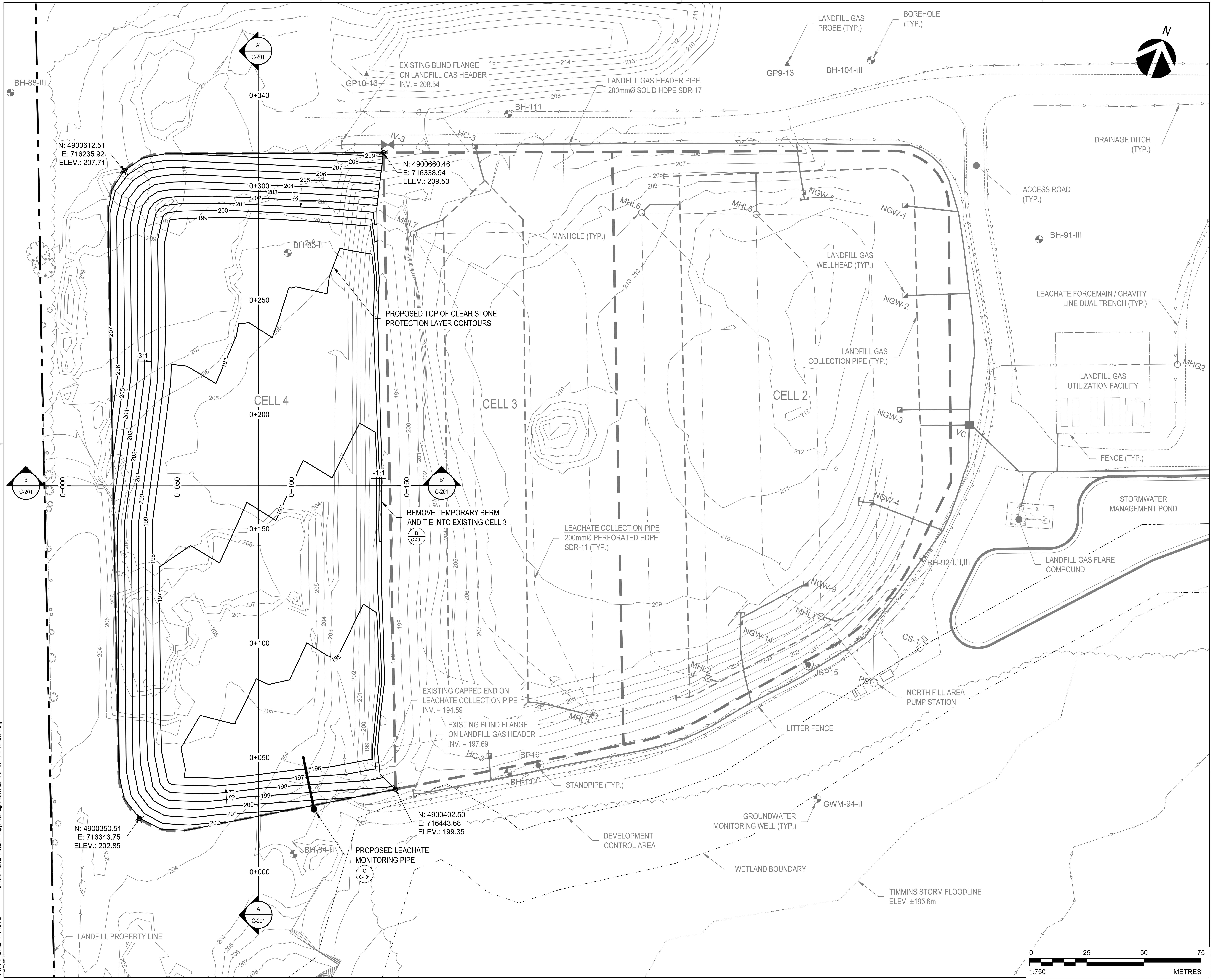
CLIENT:
peterborough
outside the ordinary

CLIENT REF. #: --

PROJECT:
NORTH FILL AREA - CELL 4
PETERBOROUGH COUNTY/CITY
WASTE MANAGEMENT FACILITY

TITLE:
PROPOSED TOP OF CLEAR
STONE DRAINAGE LAYER
AND LEACHATE
COLLECTION SYSTEM

DRAWING NUMBER: C-105
REV. 4

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6. BENCHMARK - CENTRE OF MANHOLE LID ADJACENT TO TOMLINSON TRAILER WITH THE FOLLOWING COORDINATES (NAD 83 UTM 17):

N: 4900814.990 E: 716563.973 ELEV. 206.925

REVISION:

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SEAL:

LICENSED PROFESSIONAL ENGINEER
P.R. MULHOLLAND
100113044
2022-03-02
PROVINCE OF ONTARIO



ORIGINAL SCALE: SEE SCALE BAR
DATE: 2022-03-02
APPROVED BY: P R M
CHECKED BY: --
DRAWN BY: I F H

IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.
25mm

DISCIPLINE: ENVIRONMENT


WSP Canada Inc.
300 - 4 Hughson Street South, Hamilton, Ontario, L8N 3Z1
T 905-529-4414 | www.wsp.com


PROJECT NUMBER: 111-53296-14

CLIENT:
peterborough
outside the ordinary

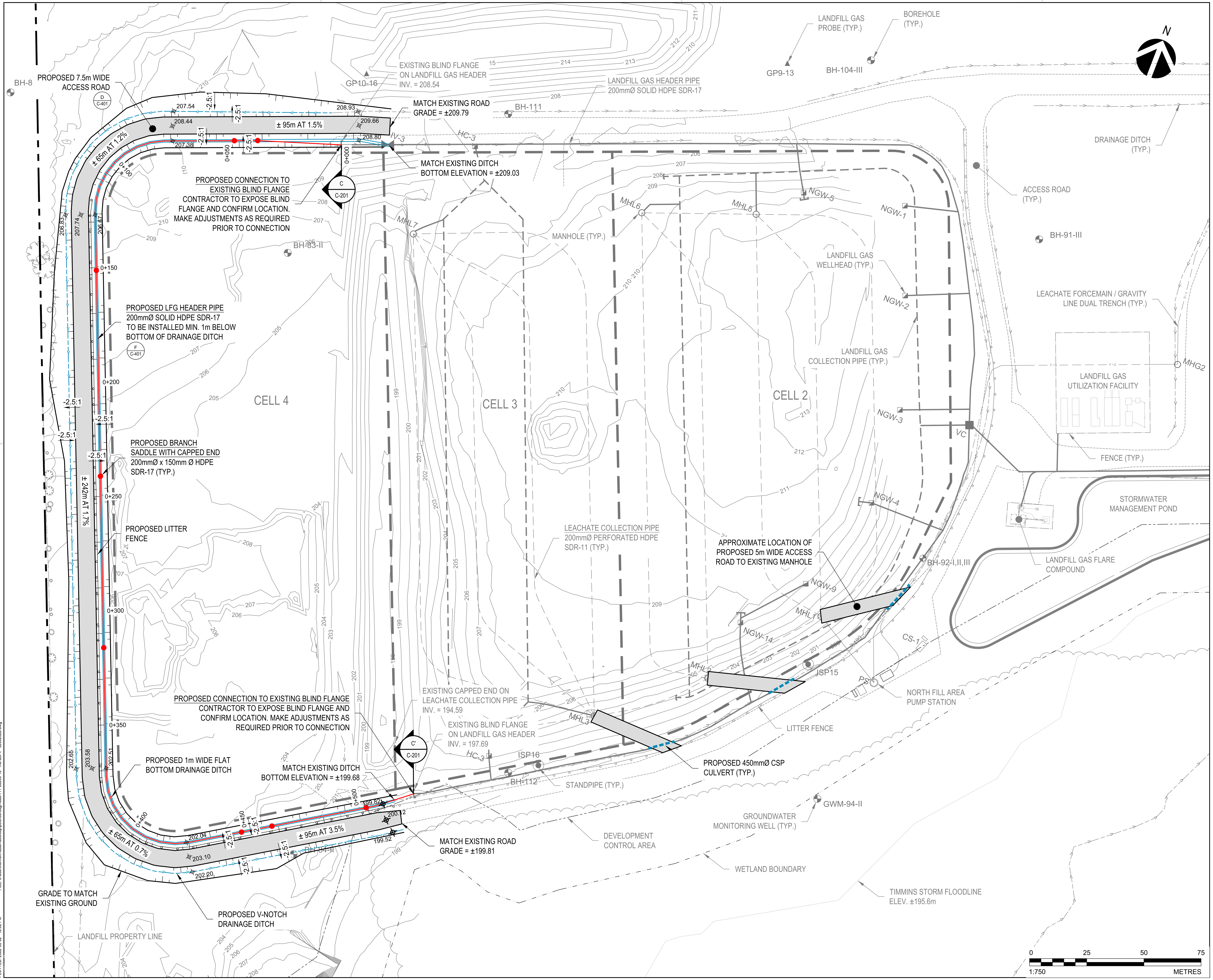
CLIENT REF. #: --

PROJECT:
NORTH FILL AREA - CELL 4
PETERBOROUGH COUNTY/CITY
WASTE MANAGEMENT FACILITY

TITLE:
PROPOSED TOP OF CLEAR STONE PROTECTION LAYER

DRAWING NUMBER: C-106
REV. 4


PLOTTED: 2022-03-02 - 12:02 PM




NOTES:

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N: 4900814.990 E: 716563.973 ELEV. 206.925

REVISION:

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SEAL:

LICENSED PROFESSIONAL ENGINEER
P.R. MULHOLLAND
100113044
2022-03-02
PROVINCE OF ONTARIO



ORIGINAL SCALE: SEE SCALE BAR
DATE: 2022-03-02
APPROVED BY: PRM
CHECKED BY: --
DRAWN BY: IFH
IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.
25mm

DISCIPLINE: ENVIRONMENT

wsp

WSP Canada Inc.
300 - 4 Hughson Street South, Hamilton, Ontario, L8N 3Z1
T 905-529-4414 | www.wsp.com

PROJECT NUMBER: 111-53296-14

CLIENT:

peterborough
outside the ordinary

CLIENT REF. #: --

PROJECT:

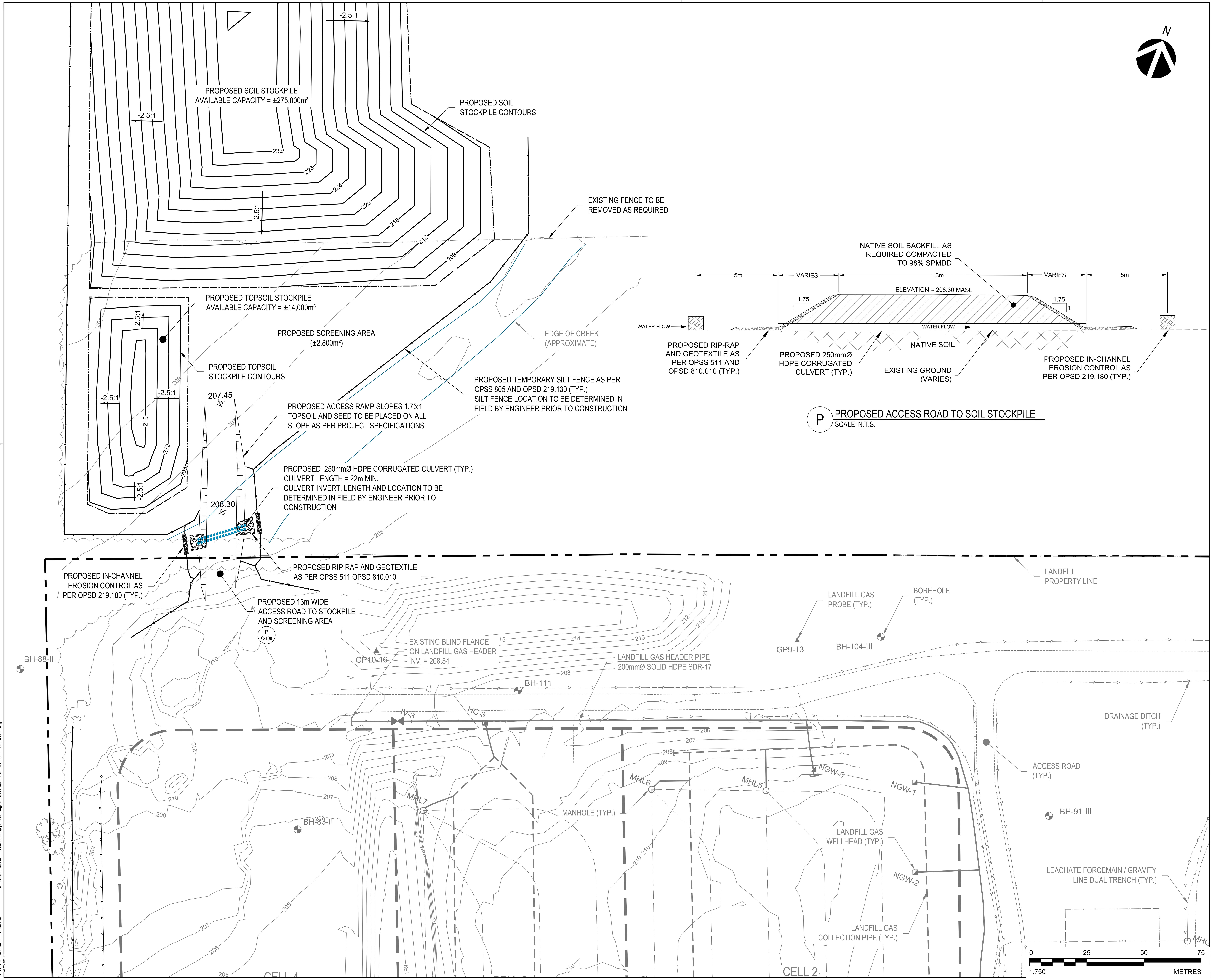
NORTH FILL AREA - CELL 4
PETERBOROUGH COUNTY/CITY
WASTE MANAGEMENT FACILITY

TITLE:

PROPOSED ACCESS ROADS AND LANDFILL GAS HEADER

DRAWING NUMBER: C-107
REV. 4

FILE: c:\users\shrak.hasan\desktop\peterborough\cad\111-53296-13 - nfa cell 4 - 02032022.dwg
CTB: ows colour - ih.ed8.ctb
PLOTTED: 2022-03-02 - 12:02 PM




NOTES:

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6. BENCHMARK - CENTRE OF MANHOLE LID ADJACENT TO TOMLINSON TRAILER WITH THE FOLLOWING COORDINATES (NAD 83 UTM 17):

N: 4900814.990 E: 716563.973 ELEV. 206.925

REVISION:

| REV | DATE | DESCRIPTION | BY |
|---|---|---|---|
| 4 | 2022-03-02 | ISSUED FOR CONSTRUCTION | PRM |
| 3 | 2021-12-08 | ISSUED FOR RFP | PRM |
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SEAL:

LICENSED PROFESSIONAL ENGINEER
P.R. MULHOLLAND
100113044
2022-03-02
PROVINCE OF ONTARIO



ORIGINAL SCALE: SEE SCALE BAR
DATE: 2022-03-02
APPROVED BY: P R M
CHECKED BY: --
DRAWN BY: I F H

IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.
25mm

DISCIPLINE: ENVIRONMENT

wsp
WSP Canada Inc.
300 - 4 Hughson Street South, Hamilton, Ontario, L8N 3Z1
T 905-529-4414 | www.wsp.com

PROJECT NUMBER: 111-53296-14

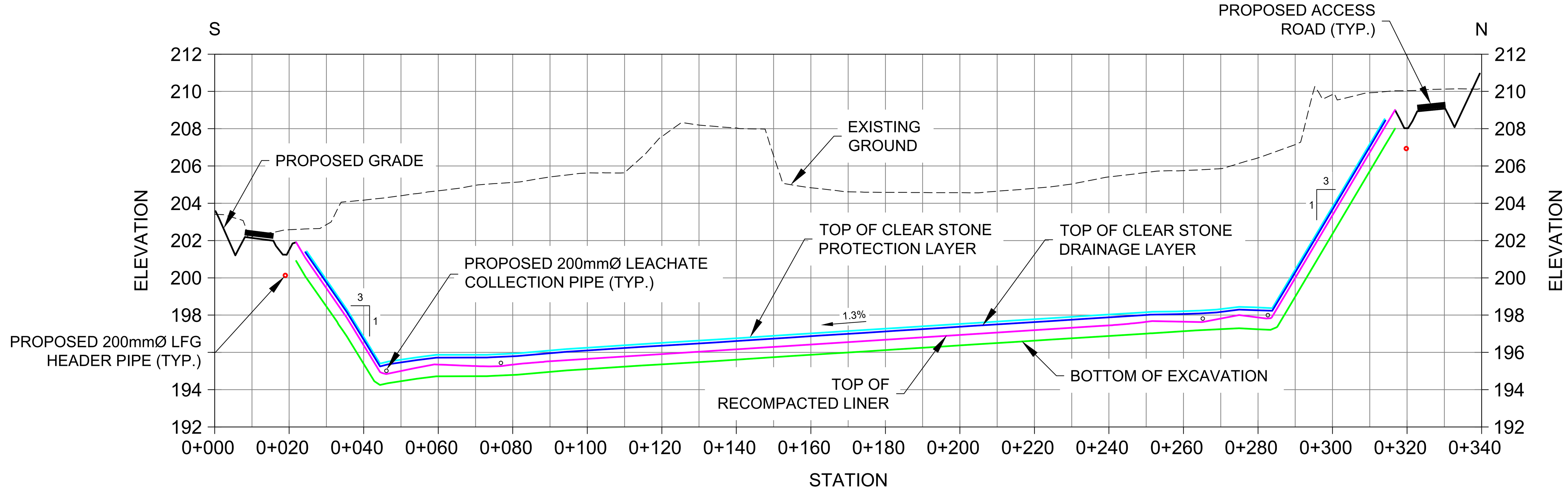
CLIENT:
peterborough
outside the ordinary

CLIENT REF. #: --

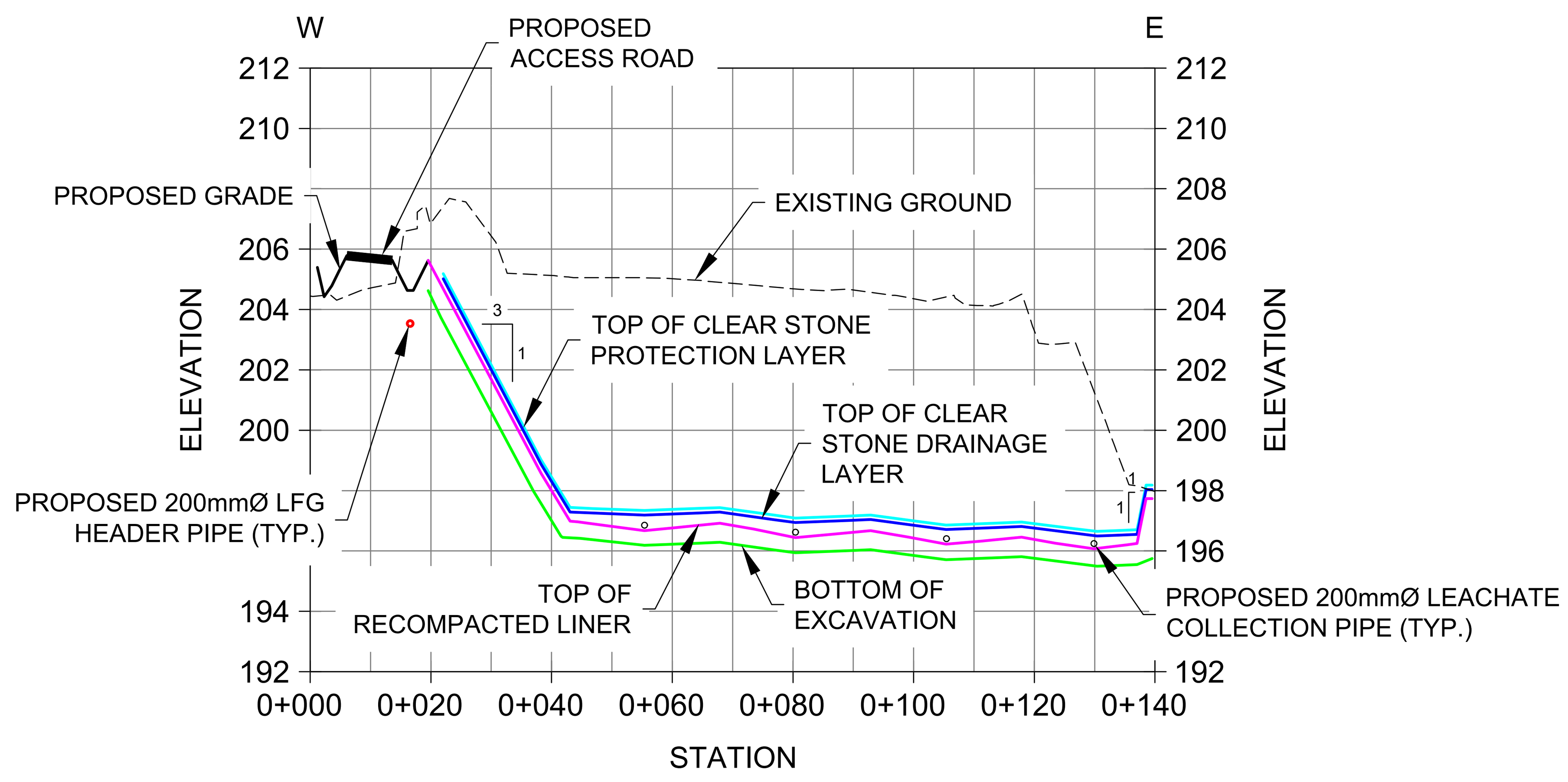
PROJECT:
NORTH FILL AREA - CELL 4
PETERBOROUGH COUNTY/CITY
WASTE MANAGEMENT FACILITY

TITLE:
# PROPOSED ACCESS ROAD TO SOIL STOCKPILE AND SCREENING AREA

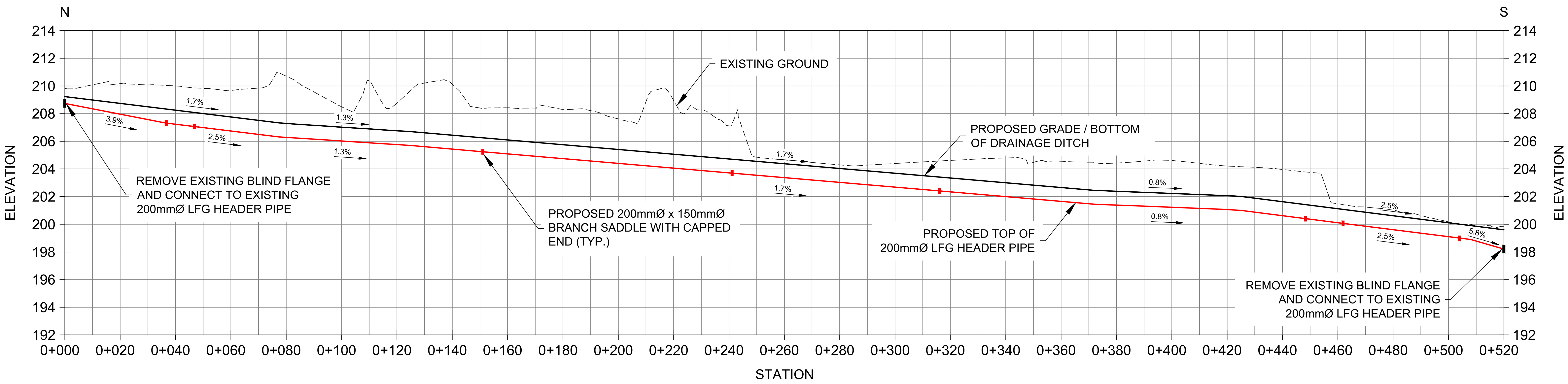
DRAWING NUMBER: C-108
REV. 4




A CROSS SECTION A-A'
C-106 VERTICAL EXAGGERATION = 5X




B CROSS SECTION B-B'
C-106 VERTICAL EXAGGERATION = 5X




C CROSS SECTION C-C'
C-107 VERTICAL EXAGGERATION = 5X

NOTES:

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N: 4900814.990 E: 716563.973 ELEV. 206.925

REVISION:

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SEAL:

LICENSED PROFESSIONAL ENGINEER
P.R. MULHOLLAND
100113044
2022-03-02
PROVINCE OF ONTARIO



ORIGINAL SCALE: SEE SCALE BAR
DATE: 2022-03-02
APPROVED BY: P R M
CHECKED BY: --
DRAWN BY: I F H

IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.
25mm

DISCIPLINE: ENVIRONMENT

WSP Canada Inc.
300 - 4 Hughson Street South, Hamilton, Ontario, L8N 3Z1
T 905-529-4414 | www.wsp.com

PROJECT NUMBER: 111-53296-14

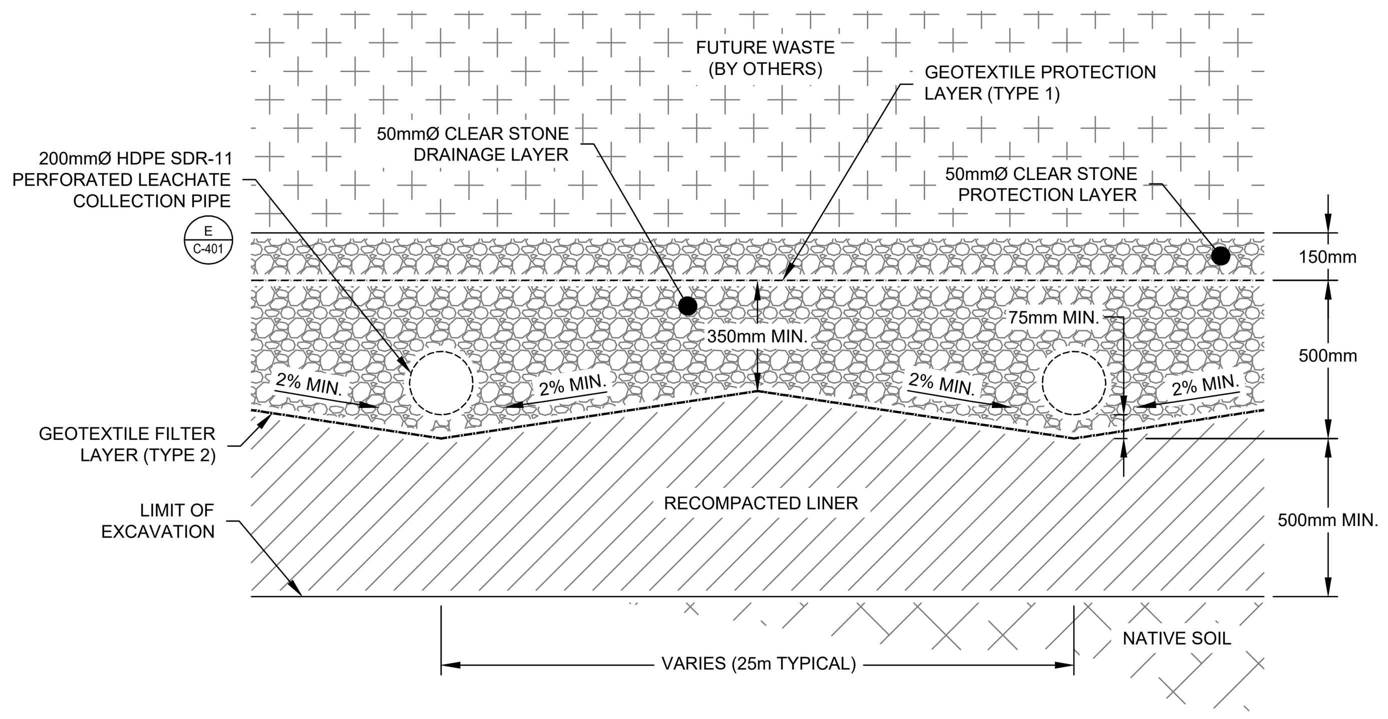
CLIENT:
peterborough
outside the ordinary

CLIENT REF. #: --

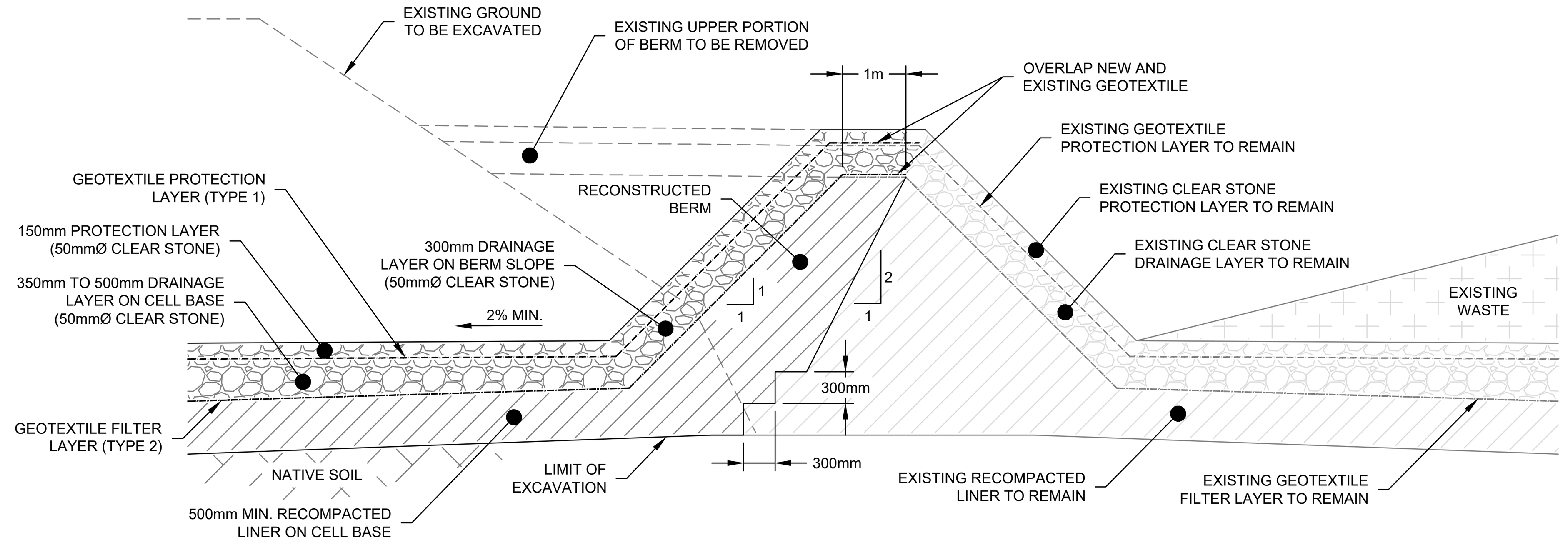
PROJECT:
NORTH FILL AREA - CELL 4
PETERBOROUGH COUNTY/CITY
WASTE MANAGEMENT FACILITY

TITLE:
CROSS SECTIONS

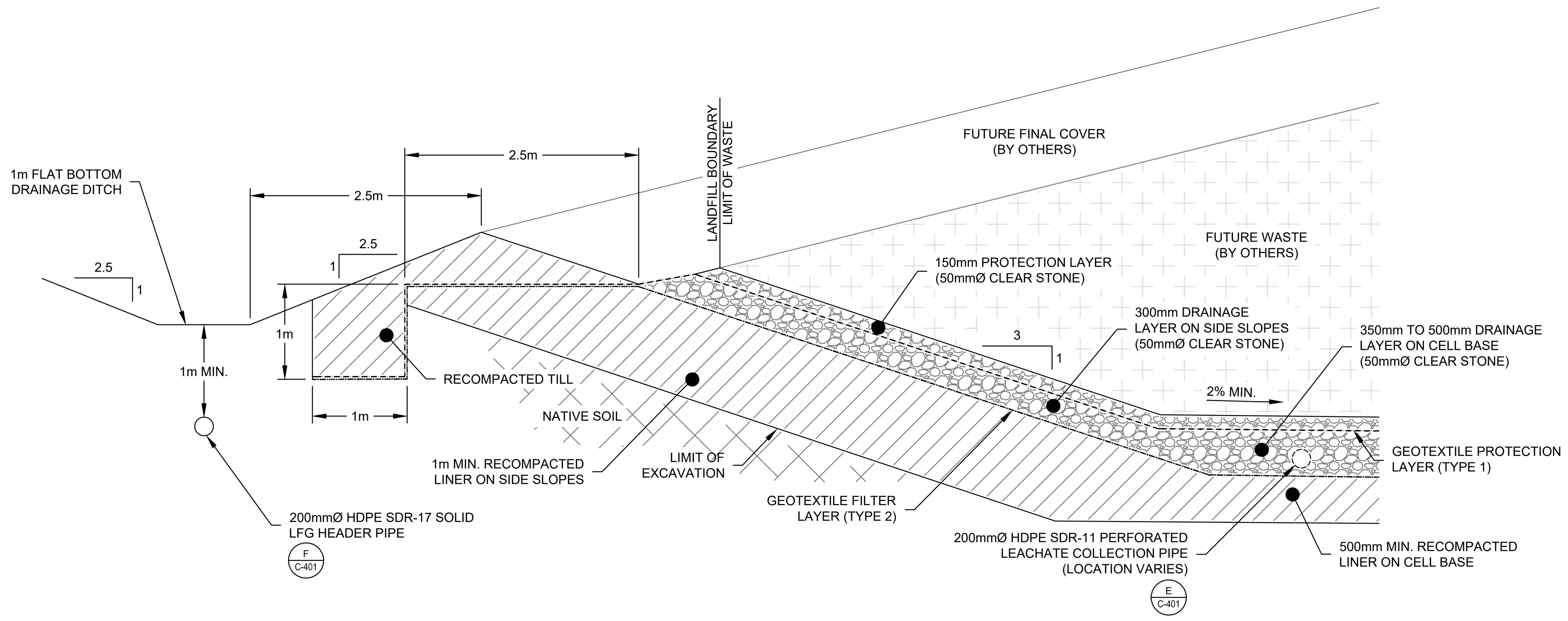
DRAWING NUMBER: C-201
REV. 4



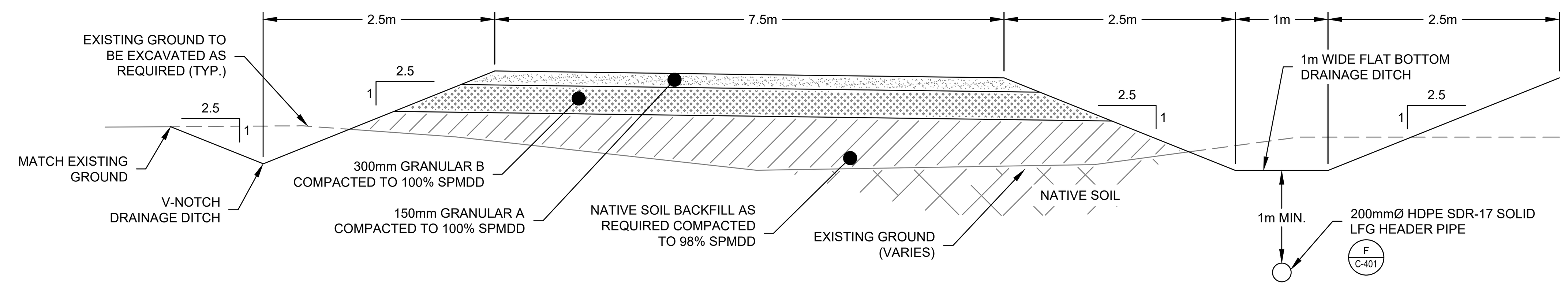

A PROPOSED BASE LINER AND LEACHATE COLLECTION SYSTEM
SCALE: N.T.S.



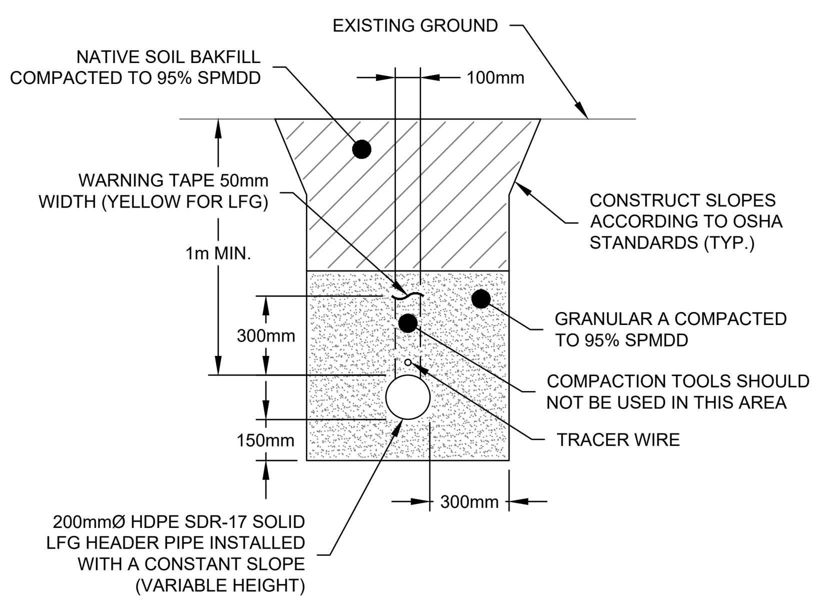

B PROPOSED BERM BETWEEN CELL 3 AND CELL 4
SCALE: N.T.S.



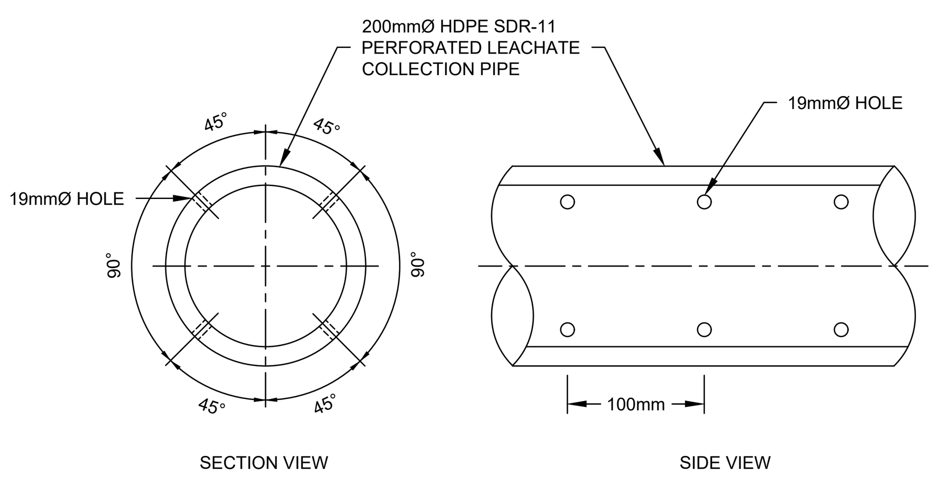

C PROPOSED SIDE SLOPES AND ANCHOR TRENCH
SCALE: N.T.S.



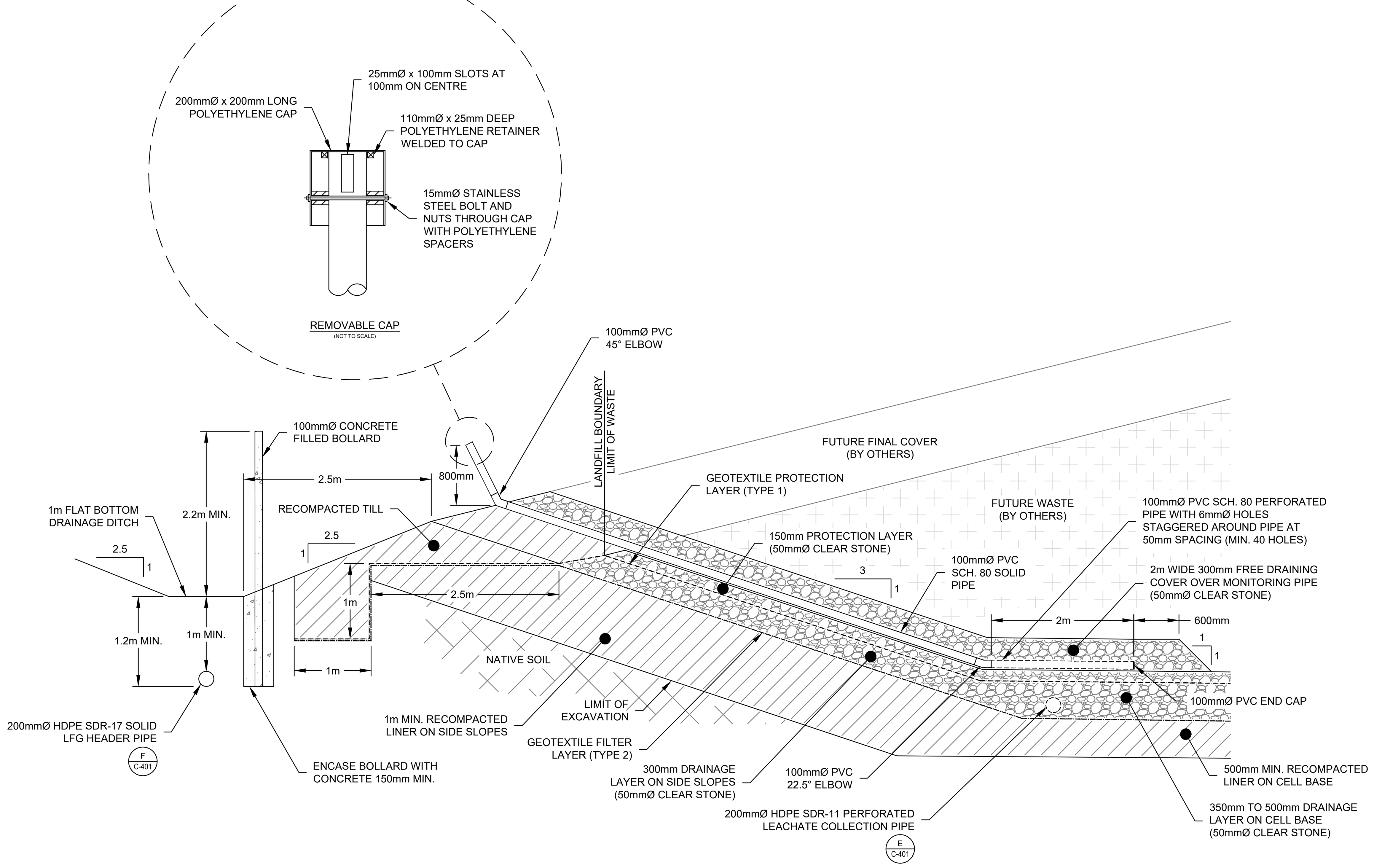

D PROPOSED DRAINAGE DITCH AND ACCESS ROAD
SCALE: N.T.S.




F LANDFILL GAS HEADER TRENCH
SCALE: N.T.S.




E PROPOSED LEACHATE COLLECTION PIPE HOLE SPACING
SCALE: N.T.S.




G PROPOSED LEACHATE MONITORING PIPE
SCALE: N.T.S.

NOTES:

1. ALL DIMENSIONS SHOWN ON THE DRAWINGS ARE IN METRES OR MILLIMETRES UNLESS OTHERWISE NOTED. CHECK ALL DIMENSIONS AND REPORT ANY INCONSISTENCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.
2. FEATURES SHOWN ON THE DRAWINGS ARE BASED ON DATA OBTAINED FROM OTHERS AND INTERPOLATED BY WSP.
3. PROPOSED LINER AND LEACHATE COLLECTION SYSTEM IS BASED ON THE NORTH FILL AREA DESIGN BRIEF PREPARED BY URBAN AND ENVIRONMENTAL MANAGEMENT INC. DATED JULY 13, 2009.
4. LOCATION OF UNDERGROUND AND ABOVE GROUND UTILITIES / STRUCTURES (HYDRO POLE, CONDUITS, ETC.) IS NOT NECESSARILY SHOWN ON THE DRAWINGS, AND, WHERE SHOWN THE ACCURACY OF SUCH UTILITIES / STRUCTURES IS NOT GUARANTEED. THE CONTRACTOR SHALL IDENTIFY LOCATION OF ALL UTILITIES / STRUCTURES PRIOR TO STARTING WORK AND ASSUME LIABILITY FOR DAMAGES.
5. NO MATERIAL STOCKPILING SHALL BE PERMITTED SOUTH OF THE LIMIT OF THE DEVELOPMENT CONTROL AREA.
6. BENCHMARK - CENTRE OF MANHOLE LID ADJACENT TO TOMLINSON TRAILER WITH THE FOLLOWING COORDINATES (NAD 83 UTM 17):
   N: 4900814.990 E: 716563.973 ELEV. 206.925

REVISION:

| REV | DATE | DESCRIPTION | BY |
|---|---|---|---|
| 4 | 2022-03-02 | ISSUED FOR CONSTRUCTION | PRM |
| 3 | 2021-12-08 | ISSUED FOR RFP | PRM |
| 2 | 2021-10-22 | ISSUED FOR CLIENT REVIEW | PRM |
| 1 | 2021-10-18 | ISSUED FOR CLIENT REVIEW | PRM |

SEAL:

LICENSED PROFESSIONAL ENGINEER
P. R. MULHOLLAND
100113044
2022-03-02
PROVINCE OF ONTARIO



ORIGINAL SCALE: SEE SCALE BAR
DATE: 2022-03-02
APPROVED BY: P R M
CHECKED BY: --
DRAWN BY: I F H
IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.
25mm

DISCIPLINE: ENVIRONMENT

WSP Canada Inc.
300 - 4 Hughson Street South, Hamilton, Ontario, L8N 3Z1
T 905-529-4414 | www.wsp.com

PROJECT NUMBER: 111-53296-14

CLIENT:
peterborough
outside the ordinary

CLIENT REF. #: --

PROJECT:
NORTH FILL AREA - CELL 4
PETERBOROUGH COUNTY/CITY
WASTE MANAGEMENT FACILITY

TITLE:
TYPICAL DETAILS
(PAGE 1 OF 2)

DRAWING NUMBER: C-401
REV. 4

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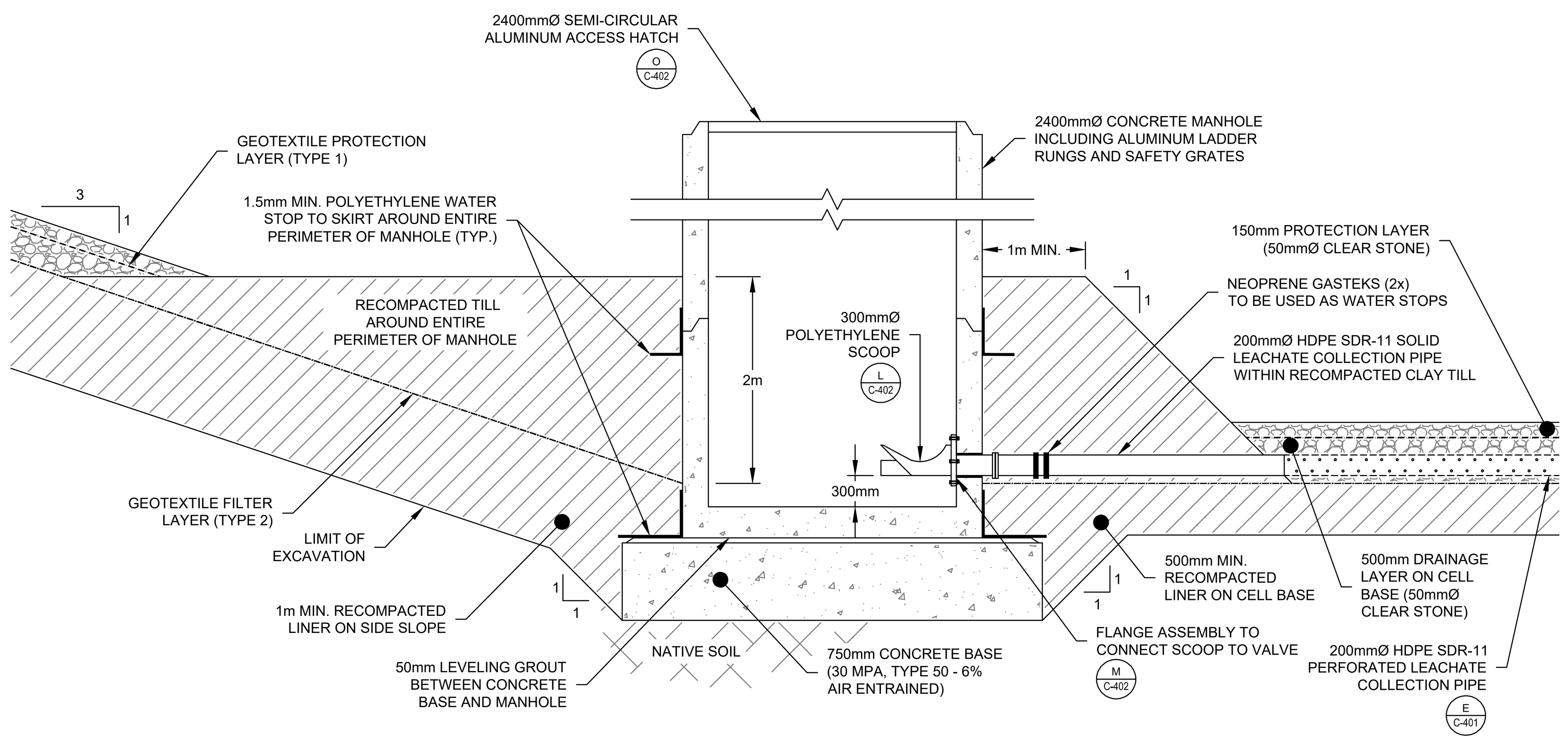
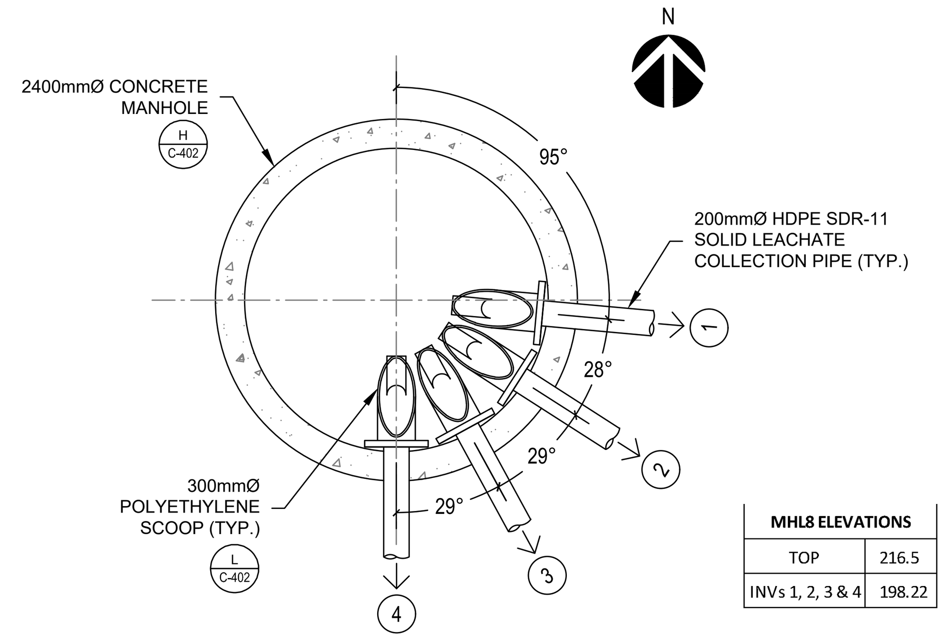
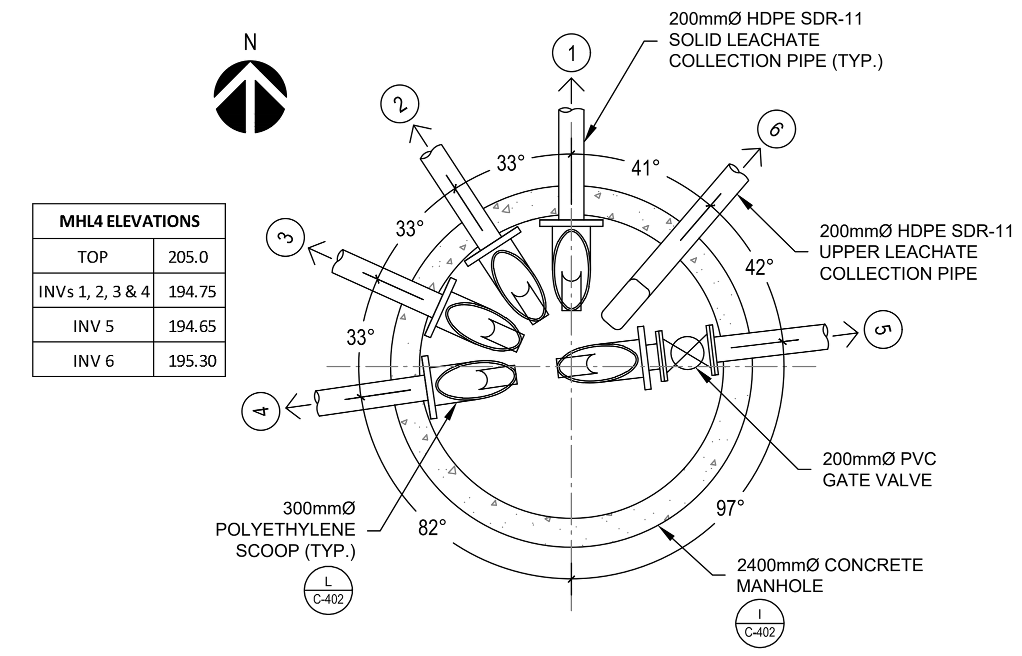



## H PROPOSED LEACHATE COLLECTION MANHOLE - MHL8
SCALE: N.T.S.



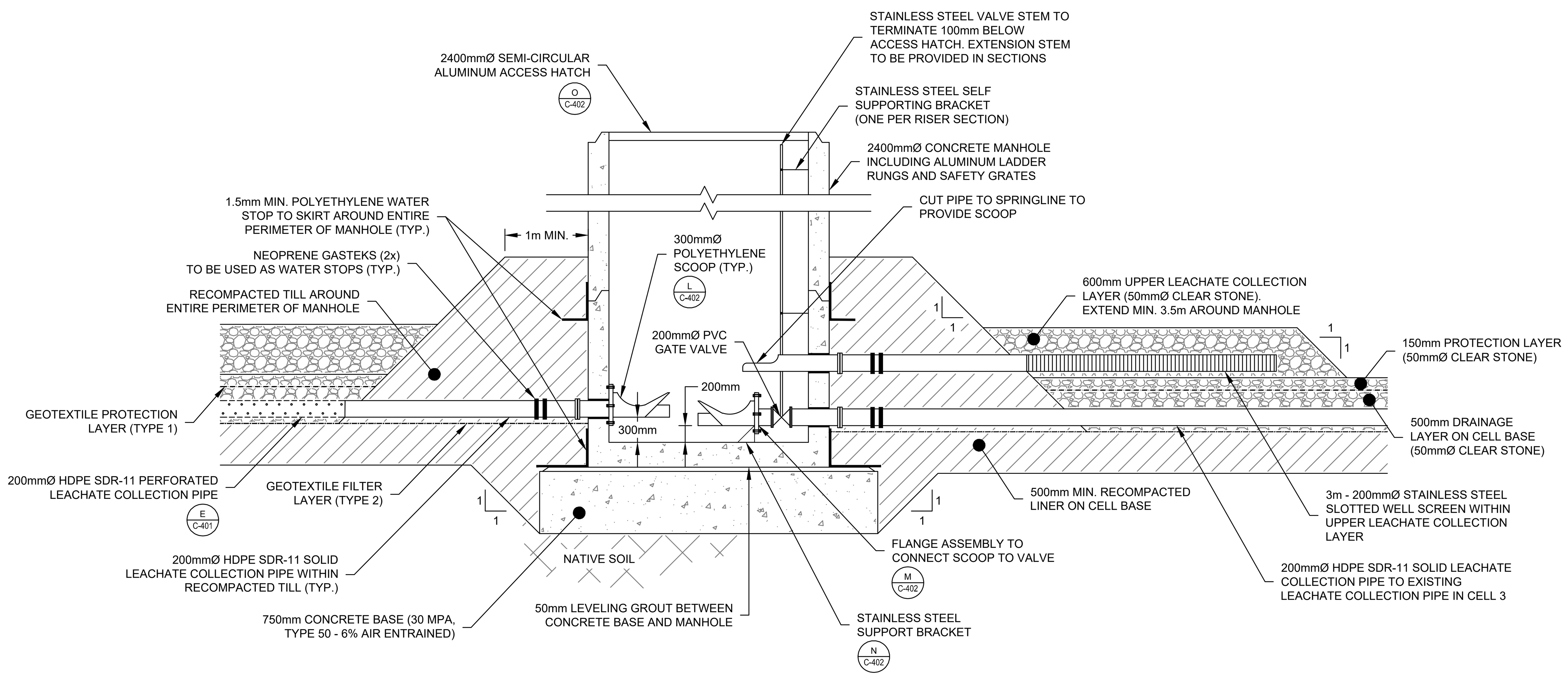

| MHL8 ELEVATIONS | |
|---|---|
| TOP | 216.5 |
| INVs 1, 2, 3 & 4 | 198.22 |

## J PROPOSED MHL8 PIPE ORIENTATION
SCALE: N.T.S.

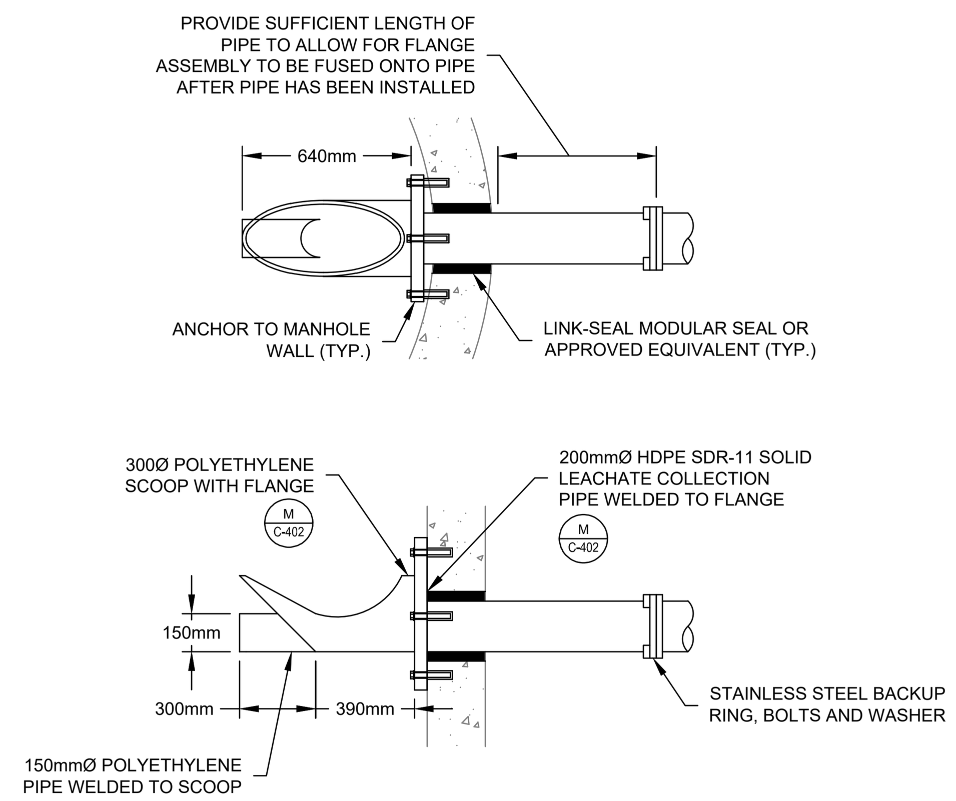



| MHL4 ELEVATIONS | |
|---|---|
| TOP | 205.0 |
| INVs 1, 2, 3 & 4 | 194.75 |
| INV 5 | 194.65 |
| INV 6 | 195.30 |

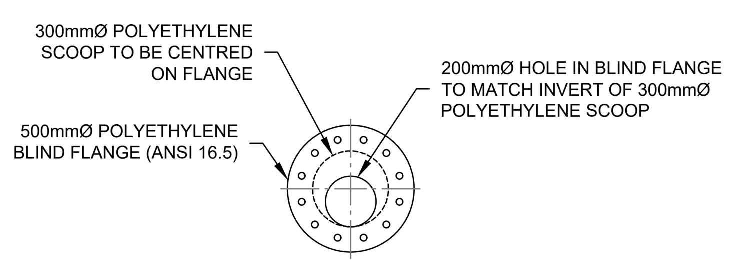
## K PROPOSED MHL4 PIPE ORIENTATION
SCALE: N.T.S.



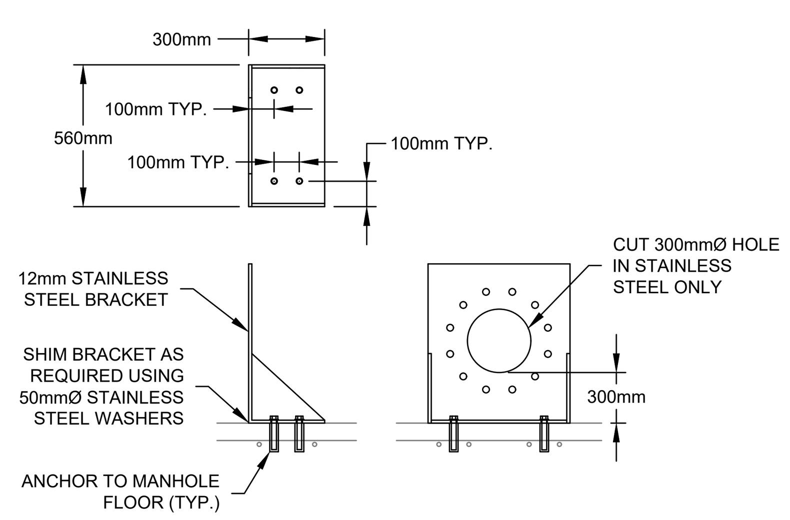

## I PROPOSED LEACHATE COLLECTION MANHOLE - MHL4
SCALE: N.T.S.



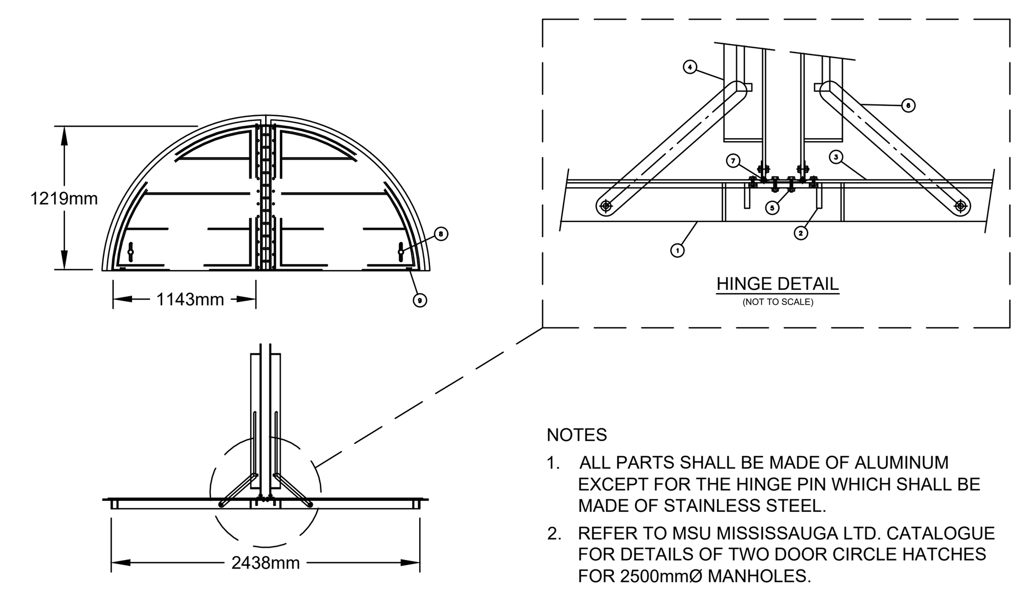

## L PROPOSED HDPE SCOOP
SCALE: N.T.S.




## M PROPOSED BLIND FLANGE FOR HDPE SCOOP
SCALE: N.T.S.




## N PROPOSED HDPE SCOOP SUPPORT BRACKET
SCALE: N.T.S.




| ITEM | QUANTITY | MATERIAL |
|---|---|---|
| 1 | 1 | 76mm x 76mm x 10mm ANGLE FRAME |
| 2 | 1 | 150mm x 50mm x 7.2mm C-CHANNEL |
| 3 | 2 | 6mm TREAD PLATE |
| 4 | 2 | 6mm x 76mm REINFORCING FRAME |
| 5 | AS REQ. | HEX BOLT 1/4" x 1 1/4" WITH FLAT WASHER HEX NUT |
| 6 | 2 | 90° HOLD OPEN ARM |
| 7 | 2 | ALUMINUM HINGE |
| 8 | 2 | RECESSED HANDLE |
| 9 | 2 | LOCK TAB |

NOTES
1. ALL PARTS SHALL BE MADE OF ALUMINUM EXCEPT FOR THE HINGE PIN WHICH SHALL BE MADE OF STAINLESS STEEL.
2. REFER TO MSU MISSISSAUGA LTD. CATALOGUE FOR DETAILS OF TWO DOOR CIRCLE HATCHES FOR 2500mmØ MANHOLES.
3. SHOP DRAWINGS FOR THE HATCHES TO BE SUBMITTED AND REVIEWED BY ENGINEER PRIOR TO INSTALLATION.

## O PROPOSED SEMI-CIRCULAR ALUMINUM ACCESS HATCH COVER
SCALE: N.T.S.

NOTES:
1. ALL DIMENSIONS SHOWN ON THE DRAWINGS ARE IN METRES OR MILLIMETRES UNLESS OTHERWISE NOTED. CHECK ALL DIMENSIONS AND REPORT ANY INCONSISTENCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.
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   N: 4900814.990 E: 716563.973 ELEV. 206.925

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SEAL:
LICENSED PROFESSIONAL ENGINEER
P. R. MULHOLLAND
100113044
2022-03-02
PROVINCE OF ONTARIO



ORIGINAL SCALE: SEE SCALE BAR
DATE: 2022-03-02
APPROVED BY: P R M
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DRAWN BY: I F H
IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.
25mm

DISCIPLINE: ENVIRONMENT

wsp
WSP Canada Inc.
300 - 4 Hughson Street South, Hamilton, Ontario, L8N 3Z1
T 905-529-4414 | www.wsp.com

PROJECT NUMBER: 111-53296-14

CLIENT:
peterborough
outside the ordinary

CLIENT REF. #: --

PROJECT:
NORTH FILL AREA - CELL 4
PETERBOROUGH COUNTY/CITY
WASTE MANAGEMENT FACILITY

TITLE:
TYPICAL DETAILS
(PAGE 2 OF 2)

DRAWING NUMBER: C-402
REV. 4

CTB: ows colour - ih.ctb
PLOTTED: 2022-03-02 - 12:03 PM
FILE: c:\users\shrak.hasan\desktop\peterborough\cad\111-53296-13 - nfa cell 4 - 02032022.dwg

# APPENDIX

# B

## MONITORING WELL DECOMMISSIONING REPORT

**Ontario** Ministry of the Environment, Conservation and Parks

**Well Tag No.** (Place Sticker and/or Print Below)

# Well Record

*Regulation 903 Ontario Water Resources Act*

Measurements recorded in: ☐ Metric ☐ Imperial

Page ____ of ____

## Well Owner's Information

| First Name | Last Name/Organization | E-mail Address | ☐ Well Constructed by Well Owner |
|---|---|---|---|
| [illegible] | Peterborough landfill, Otonabee South monoghan | | |

| Mailing Address (Street Number/Name) | Municipality | Province | Postal Code | Telephone No. (inc. area code) |
|---|---|---|---|---|
| 20 third Street, Keene | | ontario | K0L2G0 | 7052956852 |

## Well Location

| Address of Well Location (Street Number/Name) | Township | Lot | Concession |
|---|---|---|---|
| [illegible] 1260 Bensford Rd | Monoghan | PT 15 | 14 |

| County/District/Municipality | City/Town/Village | Province | Postal Code |
|---|---|---|---|
| Otonabee South monaghan | Peterborough | Ontario | K0L2G0 |

| UTM Coordinates | Zone | Easting | Northing | Municipal Plan and Sublot Number | Other |
|---|---|---|---|---|---|
| NAD 83 | 17 | 716276 | 4900412 | | |

## Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

| General Colour | Most Common Material | Other Materials | General Description | Depth (m/ft) From | To |
|---|---|---|---|---|---|
| | Decommission of A drilled well | | | | |
| | - Steel casing constructed | | | | |
| | - 6inch diameter | | | | |
| | - 83.5 FT deep | | | | |
| | - 28 FT static | | | | |

## Annular Space

| Depth Set at (m/ft) From | To | Type of Sealant Used (Material and Type) | Volume Placed (m³/ft³) |
|---|---|---|---|
| | | | |

## Method of Construction

☐ Cable Tool ☐ Diamond ☐ Rotary (Conventional) ☐ Jetting ☐ Rotary (Reverse) ☐ Driving ☐ Boring ☐ Digging ☐ Air percussion ☐ Other, specify ______

## Well Use

☐ Public ☐ Commercial ☐ Not used ☐ Domestic ☐ Municipal ☐ Dewatering ☐ Livestock ☐ Test Hole ☐ Monitoring ☐ Irrigation ☐ Cooling & Air Conditioning ☐ Industrial ☐ Other, specify ______

## Construction Record - Casing

| Inside Diameter (cm/in) | Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel) | Wall Thickness (cm/in) | Depth (m/ft) From | To |
|---|---|---|---|---|
| | | | | |

## Construction Record - Screen

| Outside Diameter (cm/in) | Material (Plastic, Galvanized, Steel) | Slot No. | Depth (m/ft) From | To |
|---|---|---|---|---|
| | | | | |

## Status of Well

☐ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☐ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Abandoned, other, specify ______ ☐ Other, specify ______

## Water Details

Water found at Depth ____ (m/ft) ☐ Gas — Kind of Water: ☐ Fresh ☐ Untested ☐ Other, specify ______

Water found at Depth ____ (m/ft) ☐ Gas — Kind of Water: ☐ Fresh ☐ Untested ☐ Other, specify ______

Water found at Depth ____ (m/ft) ☐ Gas — Kind of Water: ☐ Fresh ☐ Untested ☐ Other, specify ______

## Hole Diameter

| Depth (m/ft) From | To | Diameter (cm/in) |
|---|---|---|
| | | |

## Results of Well Yield Testing

After test of well yield, water was: ☐ Clear and sand free ☐ Other, specify ______

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping ____ hrs + ____ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min/GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min/GPM)

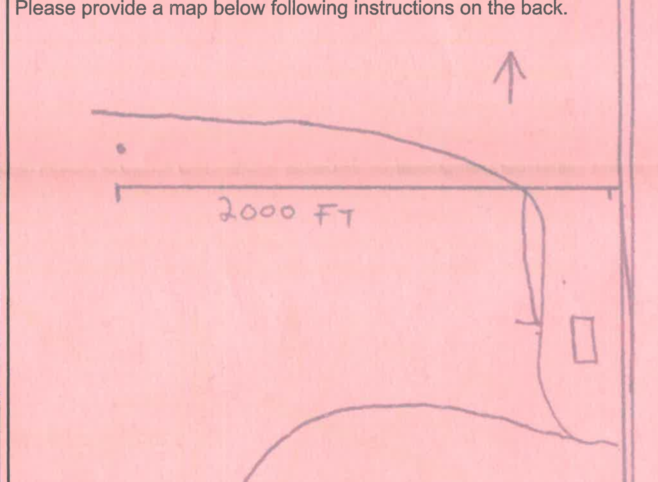
Well production (l/min/GPM)

Disinfected? ☐ Yes ☐ No

| Draw Down Time (min) | Water Level (m/ft) | Recovery Time (min) | Water Level (m/ft) |
|---|---|---|---|
| Static Level | | | |
| 1 | | 1 | |
| 2 | | 2 | |
| 3 | | 3 | |
| 4 | | 4 | |
| 5 | | 5 | |
| 10 | | 10 | |
| 15 | | 15 | |
| 20 | | 20 | |
| 25 | | 25 | |
| 30 | | 30 | |
| 40 | | 40 | |
| 50 | | 50 | |
| 60 | | 60 | |

## Map of Well Location

Please provide a map below following instructions on the back.




Comments:

## Well Contractor and Well Technician Information

| Business Name of Well Contractor | Well Contractor's Licence No. |
|---|---|
| Accurate water solutions and treatment | 7613 |

| Business Address (Street Number/Name) | Municipality |
|---|---|
| 4526 Adjala tecumseth town line | |

| Province | Postal Code | Business E-mail Address |
|---|---|---|
| ontario | L9R1V4 | mwmaltby@live.ca |

| Bus.Telephone No. (inc. area code) | Name of Well Technician (Last Name, First Name) |
|---|---|
| 9059551669 | maltby mark |

| Well Technician's Licence No. | Signature of Technician and/or Contractor | Date Submitted |
|---|---|---|
| 3473 | Mark Maltby | 20220715 |

Well owner's information package delivered: ☒ Yes ☐ No

Date Package Delivered: 20220715

Date Work Completed: 202207[illegible]

**Ministry Use Only**

Audit No. Z366209

Received



**Well Owner's Copy**

# APPENDIX

# C

## PETERBOROUGH LANDFILL STOCKPILE AREA (EIS)

CITY OF PETERBOROUGH

# PETERBOROUGH LANDFILL STOCKPILE AREA

## ENVIRONMENTAL IMPACT STUDY

NOVEMBER 30, 2021

# PETERBOROUGH LANDFILL STOCKPILE AREA

## ENVIRONMENTAL IMPACT STUDY

CITY OF PETERBOROUGH

PROJECT NO.: 211-08069-000
DATE: NOVEMBER 30, 2021

WSP
SUITE 103
294 RINK STREET
PETERBOROUGH, ON, CANADA  K9J 2K2

T: +1 705 743-6850
F: +1 705 743-6854
WSP.COM

# SIGNATURES

PREPARED BY

Jaclyn Rodo, B.Sc.
Ecologist

REVIEWED BY

Erin Fitzpatrick, M.Sc.
Project Ecologist, Ecology and EIA

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# TABLE OF CONTENTS

*APPENDICES*

# 1 INTRODUCTION

WSP Canada Inc (WSP) was retained by the City of Peterborough (the City) to complete an Environmental Impact Study (EIS) to support site alteration required to open Cell 4 of the existing Peterborough Landfill. The subject site occurs north of the Peterborough Landfill, at civic address 1923 Base Line Road, within Part Lot 16, Concession 14, Township of Otonabee-South Monaghan, County of Peterborough; herein referred to as 'the Site'.

The proposed works require removal of the top layer of native soil within Cell 4 and the temporary storage of this native topsoil within a stockpile area north of the existing landfill (Figure 1). The intent is for the City to draw upon the stockpiled material to slowly overtop waste deposited into Cell 4. The limits of the *Site* as represented on Figure 1 assume the greater limit of two (2) stockpiles – one permanent and one temporary, and a staging area for equipment. The exact footprint of the stockpiles is not currently known but will remain within the Site limit. The estimated height of each stockpile is 18 m. Outside of the Site occurs the drive access which will allow for a 12m wide road between the existing landfill and stockpile area. The specific drive access location will be selected by the successful contractor and will inevitably include a wetland crossing with culvert. For the purpose of this report, two (2) crossings options are presented – identified as Option A and B on Figure 1. The *Study Area* is comprised of the Site and adjacent 120 m lands.

The Site occurs within the jurisdiction of the Otonabee Region Conservation Authority (ORCA), and portions are subject to Ontario Regulation 167/06 of the Conservation Authorities Act given its proximity to confirmed wetland limits. A permit under this Act will be required to construct the drive access through, and stockpile area adjacent to an unevaluated wetland.

The purpose of the EIS is to document natural heritage features on and adjacent to the Site, assess the potential for impacts to these features and their functions as a result of the proposed site alteration, and provide recommendations to avoid, minimize and/or mitigate identified impacts. Corresponding figures for this EIS are provided in **Appendix A**.

# 2 STUDY APPROACH

## 2.1 BACKGROUND INFORMATION COLLECTION

Background information on the natural environment in and surrounding the Site was obtained and reviewed from the following sources:

- On-line database of the Ministry of Northern Development, Mines, Natural Resources and Forestry's (NDMNRF; former the Ministry of Natural Resources and Forestry (MNRF)) Natural Heritage Information Centre (NHIC – squares 17QK1500, 17QK1600 and 17QK1601) (MNRF, 2021);
- Ontario Breeding Bird Atlas (Cadman et al., 2007);
- On-line database of the Cornell Lab of Ornithology, eBird (Sullivan et al., 2009);
- iNaturalist (2021);
- Ontario Reptile and Amphibian Atlas (Ontario Nature, 2015);
- Land Information Ontario (LIO; NDMNRF; 2021;
- Topographical Maps (County of Peterborough, 2021); and,
- Aerial Photography (Google Earth, 2021).

## 2.2 AGENCY CONSULTATION

All records of correspondence with agencies can be found in **Appendix B**.

### 2.2.1 MINISTRY OF THE ENVIRONMENT, CONSERVATION AND PARKS

The MECP was contacted on September 23, 2021 to review site findings related to Bobolink (*Dolichonyx oryzivorus;* Threatened) and Eastern Meadowlark (*Sturnella magna;* Threatened) occurrences. The MECP agreed with the conclusion that the habitat in the area is not limiting for either species and in following the general vegetation removal timing restriction, overall populations and habitat availability in the area is unlikely to be impacted.

WSP spoke with a MECP Management Biologist on November 2, 2021 to determine if registration under Ontario Regulation 242/08 is required given the removal of potential Bobolink and Eastern Meadowlark habitat. The MECP confirmed that it is not their role to confirm the need to register, rather the process is proponent-led. Further details related to the determination for Registration is in Section 4.5.1.

### 2.2.2 OTONABEE REGION CONSERVATION AUTHORITY

The ORCA was originally consulted on March 29, 2021 to present a Terms of Reference (ToR) for the study and to also request available background information. A conference call was held with the ORCA to discuss the intent of the proposed works on April 20, 2021, and meeting summary email issued by ORCA's Planning and Development Office (Appendix B).

As it relates to ecological matters, ORCA suggested the City first delineate wetland boundaries and define the drainage feature, to determine if the proposed works extends into ORCA's regulatory area. A ground-truthing exercise completed by WSP (Section 4.1.1), confirmed that wetland occurs west, south and east of the site, and creation of a drive access between the landfill and stockpile area will inevitably require crossing through wetland habitat.

***Terms of Reference***

The ToR presented to ORCA included the following:

*Scope of Work:*

- *Review background information (Lands Information Ontario mapping, NHIC database, iNaturalist and eBird)*
- *Agency consultation (ORCA, MECP, MNRF)*
- *Field Assessments*
  - *Breeding Bird Surveys (2 visits between May and July)*
  - *Amphibian Surveys (3 visits between April and June)*
  - *Botanical Survey and Ecological Land Classification (ELC) mapping (1 visit between May and July)*
  - *Headwater Drainage Assessment of the 'drainage feature' (1 visit in April, 2 visits in June)*
    - *This includes 1 overnight set of minnow traps if standing water is present.**
  - *Species at Risk and Significant Wildlife Habitat screening (1 visit)*
- *Preparation of an EIS report. The report will document background information, agency consultation and field assessments, speak to provincial and local policies as it relates to Natural Heritage Features, identify potential impacts, and outline mitigation strategies.*

The Planning and Development Officer indicated the ToR from a "…cursory glance, should be adequate" (pers. comm. April 9, 2021; Appendix B). No further comment was provided by the ORCA in relation to the ToR above. It is noted that upon completion of the first visit to the Site to carry out the headwater drainage assessment, the channel was determined to be dry and therefore a second visit (i.e. aquatic sampling) was not completed. ORCA acknowledged this scope modification in their email dated April 20, 2021. ORCA was consulted again on October 14, 2021 to determine if a road access through a confirmed wetland requires special consideration, such as offsetting or compensation requirements. ORCA recommended using Option A given this location already provides limited access to the area of the stockpile and has a gap in the hedgerow. ORCA indicated that where an alternative access (e.g. Option B) is used and a new area is to be cut, offsetting will be required to meet their regulatory policy.

Records of the Correspondence with ORCA are available in **Appendix B**.

## 2.3 FIELD SURVEYS

The following field surveys were completed within the Study Area:

- A single survey to classify and map vegetation communities using Ecological Land Classification (ELC) for Southern Ontario (Lee et al., 1998) (May 27, 2021);
- Three amphibian surveys as per the Marsh Monitoring Program (Bird Studies Canada, 2008) (April 14, May 27, June 24, 2021;
- Three breeding bird surveys based on the Forest Bird Monitoring Program (Konze and McLaren, 1997) (May 27, June 18, July 3, 2021);
- Three targeted surveys for Bobolink and Eastern Meadowlark as per the Survey Protocol for Eastern Meadowlark (*Sturnella magna*) in Ontario (MNRF, 2013) (May 27, June 18, July 3, 2021);
- One visit to complete part of the Headwater Drainage Assessment (April 8, 2021);
- Fall reconnaissance visit (October 7, 2021); and,
- Incidental wildlife observations were documented during all field surveys.

Descriptions of the field survey methodologies are provided under Section 4.0.

# 3 POLICY ANALYSIS

Planning legislation and policies pertinent to the Site have been reviewed and are summarized in the following sections. An overview of key policies and implications is provided along with an assessment of the policy as it relates to natural heritage features within and adjacent to the Site.

## 3.1 PROVINCIAL POLICY STATEMENT

The PPS (OMMAH, 2020) is a planning document that provides a framework for, and governs development within, the Province of Ontario. In order to preserve various ecological resources deemed significant in the Province, development lands must be assessed for the presence of natural heritage features prior to construction. These natural heritage features (listed below) are both defined and afforded protections under the PPS. Linkages between natural heritage features, surface water and groundwater features are also recognized and afforded similar protections under the policy. Section 2.1.2 of the PPS also requires that the diversity and connectivity of all-natural heritage features and the long-term ecological function of natural heritage systems be maintained, restored or improved where possible. Further to this, natural heritage systems within Ecoregions 6E and 7E are to be identified as per Section 2.1.3.

Under the PPS (OMMAH, 2020), development or site alteration is prohibited within significant wetlands in Ecoregions 5E, 6E and 7E and in significant coastal wetlands, but may be allowed adjacent to these features provided the adjacent lands have been evaluated and it has been demonstrated that there will be no negative impacts to these features or their ecological functions. Development may be permitted in or adjacent to significant wetlands in the Canadian Shield north of Ecoregions 5E, 6E and 7E, significant woodlands and significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Mary's River), significant wildlife habitat (SWH), significant areas of natural and scientific interest (ANSI), and coastal wetland in Ecoregions 5E, 6E and 7E provided there will be no negative impacts to these features or their ecological function due to the proposed undertaking. In addition, development and site alteration is not permitted in fish habitat, or habitat of endangered or threatened species, unless in accordance with provincial and federal legislation.

Natural heritage features as defined by the PPS (OMMAH, 2020) include:

- Fish Habitat;
- Habitats of Endangered and Threatened Species;
- Areas of Natural and Scientific Interest (ANSI);
- Significant Wetlands;
- Significant Coastal Wetlands;
- Other Coastal Wetlands in Ecoregions 5E, 6E and 7E;
- Significant Wildlife Habitat;
- Significant Woodlands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Mary's River); and,
- Significant Valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Mary's River).

NHFs identified on or adjacent to the Site during the background review are depicted on **Figure 1 of Appendix A**. NHFs on or adjacent to the Site are discussed in greater detail in Section 4.1; descriptions include information obtained through the 2020 field investigation**.**

1. **Fish habitat**. A wetland (swale) occurs along the southeast limit of the Site, does not contain direct fish habitat, but does contribute indirectly to fish habitat downstream (north) of the Site.
2. **Habitat of endangered and threatened species**. Bobolink was confirmed in the area as part of a nearby study (Wills, 2020). Breeding bird surveys completed as part of the WSP study confirmed the presence of Bobolink within and/or north of the Site, Eastern Meadowlark east of the Site, and Barn Swallow overhead of the Site.
3. **ANSI**. No ANSIs are present within or adjacent to the Site.
4. **Significant wetlands**. No Provincially Significant Wetlands (PSW) are present within the Site or in the immediate vicinity. The County of Peterborough Public GIS mapping depicts a *non-evaluated wetland* west of the Site.
5. **Significant wildlife habitat (SWH)**. SWH was not identified in publicly available background information; however, Eastern Wood-pewee (*Contopus virens;* Special Concern) was detected calling from the woodland west of the Site and Monarch (*Danaus plexippus*; Special Concern) observed flying through the Site. A single occurrence of a Special Concern species satisfies the criteria for SWH – Special Concern and Rare Wildlife Species.
6. **Significant woodlands**. The County of Peterborough Public GIS does not depict any Significant Woodlands within the Study Area. The County mapping depicts *vegetation* west of the Site, which is consistent with provincial woodland mapping (NDMNRF, 2021; Figure 2)

7. **Significant valleylands**. No significant valleylands were identified within the Site.

The identified impacts and recommended mitigation measures for NHF identified on, or adjacent to, the Site is provided in **Sections 6** and **Section 7**, respectively.

## 3.2 OFFICIAL PLAN POLICIES

### 3.2.1 COUNTY OF PETERBOROUGH OFFICIAL PLAN (2020)

The County of Peterborough Official Plan (CPOP; 2020) describes a goal to protect and enhance natural features and ecological systems (Section 4.1.1). The CPOP outlines policies to regulate land use and resource management within three primary area types: hazard lands, natural heritage features and natural resources (Section 4.1). The focus of this EIS report is to address potential impacts related to development and/or site alteration within natural heritage features.

The CPOP requires an EIS be completed when development or site alteration is proposed within or adjacent to natural heritage features, as follows:

- *significant wetlands - all lands within 120 metres;*
- *significant portions of the habitat of endangered and threatened species - all lands within 50 metres;*
- *fish habitat - all lands within 30 metres of the highwater mark of all watercourses;*
- *significant wildlife habitat - all lands within 50 metres;*
- *significant woodlands south of the southern limit of the Canadian Shield - all lands within 50 metres;*
- *significant valleylands south of the southern limit of the Canadian Shield - all lands within 50 metres; and,*
- *significant areas of natural and scientific interest - all lands within 50 metres.*

Section 4.1.3.1 states that EIS reports shall include:

- *a description of the proposal and statement of rationale for the undertaking;*
- *a description of the existing land use(s) on site and adjacent lands;*
- *the land use designation on site and adjacent lands, as identified by the County and local municipal Official Plans;*
- *a description of alternative development proposals for the site as well as the environmental impacts of the alternatives;*
- *a comprehensive description of the proposal including its direct and indirect effect on the environment and considering both the advantages and disadvantages of the proposal;*
- *an identification of environmental constraint areas;*
- *an environmental inventory of the area under development consideration (plant life, land-based and aquatic wildlife, wetlands, natural landforms, surface waters, hydrogeological features); and*

- *a statement of environmental and ecological significance of the area affected by the proposed development.*

Section 4.1.3.1 also states that EIS reports should be:

- *prepared by professionals, at the applicant's cost unless determined otherwise by the local municipality, and approved by the local municipality;*
- *circulated to the County for review, and to any other agency the local municipality deems appropriate;*
- *subject to independent peer review at the applicant's cost if deemed appropriate by the County;*
- *approved by the County as well as the local municipality and the Conservation Authority where one exists. If the study determines that the lands adjacent to a significant natural heritage feature are lesser in extent than the natural heritage screening area as prescribed below, development may proceed;*
- *prepared in accordance with watershed or subwatershed plans where they exist; and,*
- *prepared using as a guide the Natural Heritage Reference Manual, June 1999 as amended, and supporting technical manuals produced by the Ministry of Natural Resources.*

The County of Peterborough's online *Public GIS* mapping was reviewed for the Study Area. Mapping depicts an unevaluated wetland and woodland west of the Site. An unmapped swale and associated wetland were documented during field investigations southeast of the Site, and determined to have a connection to a small unevaluated wetland and ponds northeast of the Study Area.

### 3.2.2 TOWNSHIP OF OTONABEE-SOUTH MONAGHAN (2020)

The Township of Otonabee-South Monaghan's Official Plan (OSMOP; 2000 (Amendment No. 13)) is meant to "…encourage and provide for the optimum use and management of the natural resources..." through protection and management of "…lands and waters with significant natural heritage features and areas, and to protect such features and areas from incompatible land uses and development" (Section 2.3.2b).

The OSMOP at a minimum, must follow the CPOP policies, therefore aims to protect and regulate development and site alteration within and adjacent to natural heritage features in a similar way as the County. The adjacent lands, as listed in the section above, is repeated within the OSMOP; however, differentiates between the two (2) types of ANSI, and includes:

- In or within 120 m of an ANSI (Life Science); and,
- In or within 50 m of an ANSI (Earth Science).

Applications for development or site alteration within a natural heritage feature or the adjacent lands must be accompanied by an EIS.

Schedule A: Land Use Plan (Map 3; 2018) of OSMOP identifies the Site within a *Waste Disposal Area of Influence* and Schedule B: Natural Features (2014), does not depict any natural heritage features within the Study Area. The Township of Otonabee-South Monaghan's website does refer to the County of Peterborough's *Public GIS* website to access additional information, which was discussed in the section above.

## 3.3 CONSERVATION AUTHORITIES ACT

The *Conservation Authorities Act* gives individual conservation authorities the power to regulate development and activities in or adjacent to river or stream valleys, Great Lakes and large inland lakes and shorelines, watercourses, hazardous lands and wetlands. Regulations made under the Conservation Authorities Act specify the Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulations managed by individual Conservation Authorities. These regulations apply to lands within river or stream valleys, flood plains, wetlands, watercourses, lakes, hazardous lands or lands within 120 metres (m) of a Provincially Significant Wetland or wetlands greater than 2 hectares, or lands within 30 m of non-provincially significant wetlands. Development or site alteration within these regulated areas may be permitted provided development is conducted in accordance with existing policies.

A portion of the site is located within the jurisdiction of the ORCA and a permit under Ontario Regulation 167/06 may be required for work within the regulated area.

## 3.4 MIGRATORY BIRDS CONVENTION ACT, 1994

The Migratory Bird Convention Act (MBCA; Government of Canada, 1994) protects migratory birds, sperm, eggs, embryos, tissue cultures and parts of a set list of species and subspecies identified in Article 1 of the Act from any activities that may result in harm or capture of the species. Activities associated with construction, and in particular work in or around vegetation or human made structures, have potential to result in harm to nesting birds.

There are currently no special permissions under the Act that would allow work to harm or disturb a bird or active nest (e.g. relocate nest outside of work zone), with the exception of a safety concern, and therefore it is important to plan work appropriately using standard best management practices to avoid an encounter with a nesting migratory bird.

Mitigation measures to protect for Migratory Birds (i.e., clearing and grubbing timing windows, and pre-screening nest surveys) are identified to avoid contraventions to the MBCA and provided in **Section 7.2.1**.

## 3.5 FEDERAL FISHERIES ACT, 1985

The focus of the Fisheries Act is to protect the productivity of recreational, commercial and Aboriginal fisheries by focusing protection on real and significant threats to the fisheries and the habitat that supports them. Section 35 (1) of the Fisheries Act states: “No person shall carry on any work, undertaking or activity that results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery.” The Act interprets ‘serious harm to fish’ as “the death of fish or any permanent alteration to, or destruction of, fish habitat.” Proponents that plan to undertake activities in or near water have potential to negatively affect fisheries, as such, are responsible for avoiding, mitigating, and offsetting ‘serious harm to fish.’

## 3.6 ENDANGERED SPECIES ACT, 2007

Species listed under the Endangered Species Act, 2007 (ESA) extirpated, endangered or threatened have protection from being killed, harmed, or harassed. Species listed as endangered or threatened also have habitat protection, which may be identified specifically in regulation or more generally in a general habitat description.

Habitat of species of Special Concern is not protected under the ESA, however, is protected as SWH under the PPS (OMMAH, 2020) (refer to **Section 4.5.2**).

Three (3) Threatened species (Bobolink, Eastern Meadowlark and Barn Swallow) and two (2) Special Concern species (Eastern Wood-pewee and Monarch) were detected during the field assessments.

The SAR screening table is provided in **Appendix C** with further information provided in **Section 4.4**.

# 4 EXISTING CONDITIONS

The Site is located in the Otonabee River Outlet watershed which encompasses the area south of the City of Peterborough through to Rice Lake, and west to the Otonabee River's headwater system near Millbrook, Ontario.

The Site is almost entirely former agricultural lands edged with hedgerows and extending outward within the Study Area includes a small mixed forest and treed swamp to the west.

## 4.1 VEGETATION

A vegetation survey was conducted to document the characteristics of the natural and culturally influenced vegetation communities. Assessments focused on identifying dominant vegetation within each layer, rather than the completion of an exhaustive botanical inventory. In accordance with the ToR, a single visit was completed on May 27, 2021. An additional visit was completed on October 7, 2021 and while on site, additional vegetation notes were taken. Vegetation field work and associated data assessment involved:

- Classifying and mapping vegetation communities according to the Ecological Land Classification (ELC) System for Southern Ontario (Lee et.al., 1998) for all natural and cultural vegetation communities within the Site. For mapping of the identified ELC units, refer to **Appendix A**, **Figure 2**.
- Evaluating the sensitivity and significance of vegetation species and vegetation communities using the NDMNRF's NHIC website for provincial rarity ranks (i.e., S-Ranks); the Species at Risk in Ontario (SARO) list (updated periodically) for provincial status designations; the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and the Species at Risk Act (SARA) Public Registry websites for national status designations (updated periodically); and,
- Evaluating habitat potential for locally rare vegetation and SAR known or thought to exist in the general vicinity of the project limits.

### *4.1.1 VEGETATION COMMUNITIES*

Two (2) communities occurred within the Site and extended to include much of the Study Area, namely: Dry-Moist Old Field Meadow Type (CUM1-1) and Hedgerows (HR). Beyond the Site and within the Study Area occurred a Dry-Fresh Poplar Deciduous Forest (FOD3-1) and Deciduous Swamp (SWD) to the west, and Reed-canary Grass Mineral Meadow Marsh Type (MAM2-2) to the south and east. Active agricultural fields were also noted almost entirely within the Site and much of the Study Area.

These communities are discussed below, ELC mapping is provided in **Appendix A**, **Figure 2**. Representative photos of each community are located in **Appendix E**.

**Dry-moist Old Field Meadow Type (CUM1-1)**

The CUM1-1 community comprised the entirety of the Site, with the exception of a hedgerow which centrally bisects the Site. The area north of the hedgerow was dominated by graminoid species, where the area to the south of the hedgerow was dominated by forb species. Similar species were present in both areas; however, dominant species within the two areas differed. Timothy (*Phleum pratense*), Orchard Grass (*Dactylis glomerata*), Smooth Brome (*Bromus inermis*) dominated the field to the north, while Alfalfa

(*Medicago sativa*), Annual Fleabane (*Erigeron annuus*), Red Clover (*Trifolium pratense*) dominated the field to the south.

**Hedgerows (HR)**

This unit occurred as narrow bands of trees and/or shrubs underlain by species from the adjacent meadow. The hedgerow which occurs centrally within the Site was comprised almost entirely of Common Buckthorn (*Rhamnus cathartica*), while the hedgerow south of the Site, between the landfill and proposed stockpile area, was comprised of Eastern White Cedar (*Thuja occidentalis*) and Green Ash, with lesser occurrences of Common Buckthorn.

**Dry – Fresh Poplar Deciduous Forest (FOD3-1)**

This unit occurred west of the Site. It was dominated by Trembling Aspen (*Populus tremuloides*), with occurrences of Green Ash (*Fraxinus pennsylvanica*), Sugar Maple (*Acer saccharum*), Eastern Hop-hornbeam (*Ostrya virginiana*), Red Oak (*Quercus rubra),* Basswood *(Tilia americana)* and Common Buckthorn*.* Groundcover included species such as False Solomon's Seal (*Maianthemum racemosum), Giant Blue Cohosh (Caulophyllum giganteum)* and Zigzag Goldenrod *(Solidago flexicaulis).*

**Deciduous Swamp Type (SWD)**

This unit also occurred west of Site, among the FOD3-1 type. This community had a hummocky topography, which is anticipated to support pockets of standing water or vernal pool features during the spring freshet and after significant rainfall events. It was dominated by Trembling Aspen, with occasional Red Maple (*Acer rubrum*) and Paper Birch (*Betula papyrifera*), and rare occurrences of Eastern White Cedar (*Thuja occidentalis*) and Eastern Hemlock (*Tsuga canadensis*). Herbaceous species, including Common Lady Fern (*Athyrium filix-femina*) and Zigzag Goldenrod were noted among the groundcover vegetation.

**Reed-Canary Grass Mineral Meadow Marsh Type (MAM2-2)**

This unit occurred south and east of the Site and is associated with a swale and ephemeral watercourse. It was dominated by Reed Canarygrass (*Phalaris arundinacea*) and Panicled Aster (*Symphyotrichum lanceolatum*) adjacent to the southern portion of the Site, with rare occurrences of Purple Loosestrife (*Lythrum salicaria*), Fox Sedge (*Carex vulpinoidea*), Broad-leaved Cattail (*Typha latifolia*), Tall Mannagrass (*Glyceria grandis*) and willow (*Salix* sp.).

## 4.2 WILDLIFE

Habitat features present within the Study Area consist largely of meadow and hedgerow types, with a small deciduous forest and treed swamp to the west and wetland to the south and east. Review of aerial imagery suggests that much of the area within the Township consists of open habitat types (i.e. agricultural land, meadows) bordered by hedgerows. Forest communities do exist; however, appear to mostly consist of scattered, small stands of trees, with the exception of larger swaths that occur within natural corridors of the Otonabee River and large wetland complexes.

During the 2021 field investigations, a total of sixty-two (62) wildlife species were recorded within and/or adjacent to the site (See **Appendix D**), including thirty-eight (38) birds, four (4) herpetofauna, three (3) mammals and seventeen (17) insects.

A breeding bird species list for the property (2021) is presented in **Appendix D**, while all other wildlife species are listed in appropriate sections below.

Survey results are discussed in the following sections.

### 4.2.1 BIRDS

Normally two (2) breeding bird surveys are completed in accordance with the protocol of the Ontario Breeding Bird Atlas (Cadman et al. 2007), an industry standard protocol. However, due to nearby occurrences of both Bobolink and Eastern Meadowlark, the Survey Protocol for Eastern Meadowlark (*Sturnella magna*) in Ontario (MNRF, 2013) was completed, which requires a minimum of three (3) visits. Additional effort, beyond the standard breeding bird survey protocol was given to seasonal bird surveys with respect to additional survey length (i.e. 10 minutes) and an additional visit.

As per the Survey Protocol for Eastern Meadowlark (*Sturnella magna*) in Ontario (MNRF, 2013), surveys were completed:

- by a qualified wildlife ecologist;
- between May 21st and July 3rd, during the survey window suitable to document both Eastern Meadowlark and Bobolink;
- during a period of little to no wind or precipitation, and high visibility;
- on three (3) separate occasions (May 27, June 18 and July 3, 2021), with seven (7) to ten (10) days between each survey;
- a minimum of 400 m apart, such that each survey point adequately captured a 200 m radius or an area of 12.6 ha (Figure 3);
- at or within 4 hours of sunrise and for 10 minutes at each station;
- such that a compass bearing reading was taken to adequately place the location of each detected individual; and,
- such that breeding behaviour of each individual was noted.

Transect surveys are also required where the site area is equal to or greater than 15 ha and where more than a single (1) point count station is required. As the Site is less than 15 ha, transects were not completed.

Species observed mainly included generalists which tolerate some human disturbance (such as American Goldfinch [*Spinus tristis*], Black-capped Chickadee [*Poecile atricapillus*]), as well as wetland species (such as Red-winged Blackbird [*Agelaius phoeniceus*].

Four (4) sensitive species were detected during the surveys, including: Bobolink, Eastern Meadowlark, Barn Swallow (*Hirundo rustica*) and Eastern Wood-pewee (*Contopus virens*).

Species with potential sensitivities are outlined below.

- **Species at Risk**: Two (2) SAR species with breeding evidence were recorded within the Study Area, including: Bobolink (Threatened) and Eastern Wood-pewee (Special Concern). Barn Swallow (Threatened) was foraging overhead. No breeding habitat (e.g. man-made structures) occur within the Study Area to suggest Barn Swallow nesting habitat. Eastern Meadowlark was detected east of the Study Area and was presumed to be nesting.
- **Provincially Significant**: None of the species observed are provincially rare species (i.e., Srank S1-S3).

### 4.2.2 AMPHIBIANS AND REPTILES

Amphibian calling activity was assessed using the Marsh Monitoring Program (MMP) protocol (Bird Studies Canada 2008). The surveys were conducted during the evenings of April 14, May 27, and June 24,

2021. Following guidelines of the MMP, the survey was conducted during a suitable time of the year and under appropriate weather conditions: low wind and night time air temperatures were greater than 5°C in April, 10°C in May, and 17°C in June. Calling activity from the station was assessed using 3 minutes of passive listening. Surveys started one half hour after sunset and were completed before midnight.

– Surveys were completed at three (3) stations within the Study Area. Each station was selected to best cover an area with potential amphibian breeding habitat, notably the mapped wetland to the west and swale/wetland to the south and east (**Appendix A, Figure 3**).
– Using the MMP, amphibian calling activity was rated using three levels: Level 1 (individual calls can be counted with no overlap), Level 2 (some calls can be counted or estimated, some overlap) or Level 3 (calls continuous and overlapping, individuals not distinguishable).
– Incidental amphibian observations were also noted during other surveys.

Amphibians were detected only during the first survey (April 14, 2021) at stations 2 and 3. Surveys were taken in both the northeast and northwest direction at each station. The calling code and number of individuals detected are represented in brackets.

- Station 2
  - Facing Northeast: Spring Peeper (*Pseudacris crucifer*; 1-2), Spring Peeper (1-1) and Northern Leopard Frog (*Lithobates pipiens*; 1-2)
  - Facing Southwest: Spring Peeper (1-4) and Northern Leopard Frog (1-1)
- Station 3
  - Facing Northeast: Spring Peeper (1-4) and Northern Leopard (1-2)
  - Facing Southwest: no calls were recorded.

Calling frogs were detected within the southern portion of the SWD community and swale (MAM2-2) during the April visit. Frogs were not detected during the May and June visits, which may be explained by the dryer conditions observed within each feature at the time.

As part of the SAR screening efforts (Section 4.4; **Appendix C**), potential for turtle habitat within the greater area was considered. In particular, the potential for Midland Painted Turtle (*Chrysemys picta marginata*), Snapping Turtle (Chelydra serpentina), Northern Map Turtle (*Graptemys geographica*), and Blanding's Turtle (*Emydoidea blandingii*) were assessed while in the field. The absence of large bodies of water or large marshes in the area suggest low potential for these species. It is known that some turtle species will travel substantial distances in order to move between large wetland complexes, or travel to find suitable nesting sites. The absence of large wetland complexes adjacent to the Site or on either side suggest the area is unlikely to support a movement corridor for turtle species. No gravel or sandy exposed areas within the Site were noted during field investigations to suggest suitable nesting habitat opportunities. Given the ephemeral watercourse east of the Site, it remains possible that turtles may move southerly from the ponds northeast of the Site when surface water is present. There were no turtles observed during the site visits.

### 4.2.3 GENERAL WILDLIFE

In addition to the targeted surveys described in the preceding sections, a general wildlife survey and habitat assessment was undertaken during all field surveys, as follows:

– Recording direct wildlife observations and wildlife signs (including browse, tracks / trails, animal scat, bird nesting activity, tree cavities, burrows and vocalizations) and identifying potential wildlife usage and habitat functions associated with vegetation communities;
– Assessing SAR habitat availability; and
– Assessing potential for Significant Wildlife Habitat (SWH) features within the property.

In addition to breeding birds and herpetofauna results described above, a Raccoon (*Procyon lotor*) was observed during the second amphibian survey (May 27, 2021) and a Monarch was observed during the June 18, 2021 bird survey.

Bats were not observed during the evening amphibian surveys; however, the forest west of the Study Area is likely to support suitable habitat for SAR bats (Little Brown Bat [*Myotis lucifugus*], Small-footed Bat [*M. leibii*], Northern Long-eared Bat [*M. septentrionalis*], and Tri-colored Bat [*Perimyotis subflavus*]), including potential maternity roost habitat. The hedgerow centrally within the Site was dominated by Common Buckthorn with diameter at breast height (dbh) less than 10 cm and is unlikely to support roosting habitat. The hedgerow south of the Site was comprised of both Eastern White Cedar and Ash trees with an average dbh of 10 cm; however, the absence of loose bark, cracks or cavities suggest low potential for roosting habitat.

## 4.3 AQUATIC HABITAT

A drainage feature was identified in the Study Area through aerial imagery and the EIS for the Peterborough Organics Facility proposed on the adjacent western portion of the property (Wills, 2020). The previous EIS identified a watercourse and wetland community traversing the field which occurs south and east of the Site. The watercourse was determined to contain shallow (10 cm) standing water in the spring of 2019, and was dry by late May 2019. WSP vegetation surveys identified the wetland as Reed-Canary Grass Mineral Meadow Marsh (MAM2-2), and it was confirmed to be dry by May 2021 as well.

The drainage feature originates as an unevaluated wetland (SWD) west of the Study Area, and extends within a meadow marsh (MAM2-2) easterly and south of the Site, and northerly and east of the Site. Topographic mapping shows the drainage feature continues to the northwest as a mapped watercourse, which joins with several other tributaries as it meanders to the north, east, then south to flow into the Otonabee River approximately 9.5 downstream of the ponds just outside of the Study Area.

The drainage feature meets the criteria of a Headwater Drainage Feature (HDF) as per review of aerial imagery, in the Evaluation, Classification, and Management of Headwater Drainage Features Guidelines (TRCA & CVC, 2014). Namely HDFs are defined with the following characteristics:

- non-permanently flowing drainage features
- may not have defined bed or banks
- first-order and zero-order intermittent and ephemeral channels, swales and connected headwater wetlands
- part of the drainage network (i.e. drainage channels that are identified from aerial photography, and/or drainage lines result from ArcHydro analysis),
- a connected headwater wetland (a surface outlet connects to downstream),
- does not include rills, furrows or mapped or known perennially flowing streams.

Therefore, to supplement the data presented in the previous EIS (Wills, 2020), an HDF Assessment was undertaken in spring 2021 to determine the appropriate management strategy for the drainage feature.

### 4.3.1 EXISTING CONDITIONS

The HDF assessment involved a single visit on April 8, 2021 to identify HDF characteristics as per the Ontario Stream Assessment Protocol (OSAP) Headwater Drainage module. Subsequent data regarding hydroperiod and vegetation later in the spring and summer were collected during site visits for vegetation and wildlife surveys (Refer to Section 4.3).

The HDF was divided into three distinct reaches (**Appendix A, Figure 3**). Reach 1 is the Meadow Marsh MAM2- 2 community south and east of the Site, reaching from the southwest wetland (point of origin), north to the fence separating the two fields within the Site. Reach 2 is the undefined swale through the pasture north of the downstream reach, and Reach 3 begins at the fence between the pasture, and the northeast field and flows through wetland vegetation to a pond.

At the April 8 site visit, Reach 1 was identified as a wetland, with standing water only (no flow). The feature width of Reach 1 was 17.0 m, with a bankfull depth of approximately 10 cm of standing water and no evidence of sediment transport or deposition. Feature entrenchment was greater than three times the bankfull width. The feature had 100% cover from wetland vegetation, and riparian vegetation up to 30 m was meadow (CUM1-1). Reaches 2 and 3 were defined as swales, with standing water (no flow) and no evidence of sediment transport or deposition. Reach 2 was an indistinct swale through cow pasture, with a feature width of approximately 7.0 m and some standing puddles of approximately 10 cm depth, and 100% meadow vegetation within the feature and riparian area. Reach 3 was a swale with a wetted width of 4.8 m within a wetland feature approximately 43 m wide. Standing water was approximately 15 cm deep with wetland vegetation within the feature and riparian area up to 10-20 m from the wetted swale, beyond which is meadow and cropped agriculture.

Data from the 2020 EIS (Wills) as well as site visits from WSP ecologists shows that this HDF is dry by late spring. Wetland vegetation persists in Reach 1, and around the downstream pond, located northeast of the Study Area. There is no fish habitat within this HDF, however for the purposes of the HDF evaluation, it is assumed that it contributes to downstream fish habitat in the pond, and ultimately in downstream watercourses.

Review of the County of Peterborough's *Public GIS,* specifically of the 2m contour information, suggests that surface flow from the fields west of the Site may convey water towards the SWD which then flow towards the origin (southern extent) of the MAM2-2 wetland and swale. Surface flows from the Site are generally directed towards the swale. No flow within the MAM2-2 community was noted during the field visits which also may suggest that water eventually infiltrates the soil, with little or no water movement throughout the swale itself.

### 4.3.2 CLASSIFICATION, EVALUATION, AND MANAGEMENT

The HDF was classified in terms of the importance of four types of function as per the TRCA and CVC HDF Guidelines: Hydrology, Riparian, Fish and Fish Habitat, and Terrestrial Habitat. Based on those classifications, the recommended management level for the HDF was determined following the decision-making tool in the HDF Guidelines. The classification is summarized in Table 1 below.

## Table 1. Summary of HDF Classification and Management Evaluation

| REACH | FUNCTION | HDF CODE / DESCRIPTION | CLASSIFICATION | MANAGEMENT RECOMMENDATION |
|---|---|---|---|---|
| Reach 1 | Hydrology | FT = 6, FC = 2<br>Ephemeral, wetland with standing water in early April | Contributing Functions | **Protection** |
| | Riparian | FT = 6, RC = 4<br>Wetland features with wetland, meadow, and cropped riparian vegetation | Important Functions | |
| | Fish and Fish Habitat | No fish habitat present | Contributing Functions | |
| | Terrestrial Habitat | FT = 6<br>Wetland with breeding amphibians | Important Functions | |
| Reach 2 | Hydrology | FT = 7, FC = 2<br>Ephemeral swale with wetland (FT = 6) upstream | Contributing Functions | **Mitigation** |
| | Riparian | RC = 4<br>Meadow riparian vegetation | Valued Functions | |
| | Fish and Fish Habitat | No fish habitat present | Contributing Functions | |
| | Terrestrial Habitat | FT = 7 (swale) | Limited Functions | |
| Reach 3 | Hydrology | FT = 6, FC = 2<br>Ephemeral, wetland with standing water in early April | Contributing Functions | **Protection** |
| | Riparian | FT = 6, RC = 4<br>Wetland features with meadow riparian vegetation | Important Functions | |
| | Fish and Fish Habitat | No fish habitat present | Contributing Functions | |
| | Terrestrial Habitat | FT = 6<br>Wetland with breeding amphibians | Important Functions | |

Reach 1, adjacent to the Site, is assessed at the Protection Management Level. The following guidelines are in place for Protection of HDFs:

- Protect and/or enhance the existing feature and its riparian zone corridor, and groundwater discharge or wetland in-situ;
- Maintain hydroperiod;
- Incorporate shallow groundwater and base flow protection techniques such as infiltration treatment;
- Use natural channel design techniques or wetland design to restore and enhance existing habitat features, if necessary; realignment not generally permitted; and,
- Design and locate the stormwater management system (e.g. extended detention outfalls) to avoid impacts (i.e. sediment, temperature) to the feature.

## 4.4 SPECIES AT RISK

SAR are defined here as species that are "designated" by the COSEWIC and / or listed under the SARA and species "designated" by the Committee on the Status of Species at Risk in Ontario [COSSARO], including those Endangered and Threatened species listed and regulated under Ontario's ESA [2007]).

A SAR screening exercise was completed to identify SAR that have potential to occur on the Site, in order to identify the need for additional targeted SAR surveys, and to inform mitigation, and / or ESA requirements. This screening exercise involved compiling a list of potential SAR for the property based on a review of the background data obtained through review of the NHIC database, Ontario Breeding Bird Atlas, eBird and Ontario Reptile and Amphibian databases. In summary, there were fourteen (14) species designated as either Threatened or Endangered, and fourteen (14) species designated as rare. These twenty-eight (28) potential SAR were screened in **Appendix C** for likelihood of presence and likelihood of impact from the project works based on known habitat descriptions.

### CONFIRMED SPECIES AT RISK

The following SAR species was confirmed within the Site and wider property:

- **Barn Swallow** (Threatened): one pair was observed flying/foraging over the Site. Alteration to the Site will have minimal impacts on foraging opportunities for this species.
- **Bobolink** (Threatened): individuals were observed within and outside of the Study Area (Figure 3). The CUM1-1 community offers limited habitat for this species. Refer to Section 4.5.1 for details.
- **Eastern Meadowlark** (Threatened): individuals were detected outside of the Study Area. CUM1-1 habitat within and outside of the Study Area may offer limited breeding habitat for this species. Refer to Section 4.5.1 for details.
- **Eastern Wood-pewee** (Special Concern): one individual was detected calling from the adjacent forest to the west. This forest will not be disturbed from the proposed site alteration.
- **Monarch** (Special Concern): one individual was observed flying through the CUM1-1 community. Common Milkweed plants were observed within the CUM1-1 north of the central hedgerow and east of the Site and may support breeding habitat. Milkweed plant occurrences were considered rare. Given that Monarch are known to lay 300 to 400 eggs over a few weeks and only one egg is deposited per Milkweed plant (Mission Monarch, 2018), it is believed the Site does not provide significant habitat

for this species. Tracked occurrences of Monarch in the area (iNaturalist, 2021) suggest that there is available habitat within the area of the Site.

### POTENTIAL SPECIES AT RISK

Eight (8) SAR are moderately to highly likely to occur within or adjacent to the Site:

- **Chimney Swift (***Chaetura pelagica*; Threatened): This species is commonly observed within agricultural landscapes due the presence of old farmhouses and open chimney structures. The Site does not offer suitable nesting habitat opportunities but may serve as foraging habitat.
- **Grasshopper Sparrow** (*Ammodramus savannarum*; Threatened): There is potential this species may nest within the CUM1-1 community, although completion of the nesting period may be restricted due to active agricultural operations and mowing.
- **SAR bats** (Endangered; Little brown myotis, Northern myotis, Eastern small-footed myotis, Tri-colored Bat*)* : The forest community west of the Site contains mature Sugar Maple, Trembling Aspen, Green Ashand Eastern Hop-hornbeam, while the treed swamp contains Trembling Aspen, Red Maple and Paper Birch. Both communities may provide habitat opportunities to support roosting bat species. The hedgerow south of the Site contains trees with small diameters (i.e. average of 10 cm dbh) and didn't have characteristics typical of roosting trees (e.g. cracks, loose bark).
- **SAR turtles** (Special Concern; Midland Painted Turtle (federally listed only), Snapping Turtle): The absence of a permanent water feature on site and suitable nesting habitat suggests low potential for turtles in the area. However, given the presence of a pond northeast of the Study Area, it is possible that turtles may be found within this area.

The ESA protects Threatened and Endangered species, as well as their habitats. Habitats for species of Special Concern are granted protection as SWH, specifically *Special Concern and Rare Wildlife Species*, refer to **Section 4.5.2**.

See **Section 7.4** for recommended mitigation measures and next steps regarding SAR.

## 4.5 NATURAL HERITAGE FEATURES

Based on the background review, several designated features were determined to be present within or adjacent to the Site. An impact assessment is provided in **Section 6**, and mitigation recommendations for these features are provided in **Section 7**.

NHF within, or adjacent to the Site included habitat of Threatened and Endangered species, Significant Wildlife Habitat, and wetlands.

### *4.5.1 HABITAT OF ENDANGERED AND THREATENED SPECIES*

The likelihood of endangered and threatened species and habitat present on or adjacent to the Site was determined using field observations and is documented in a SAR screening table (**Appendix C**). Three (3) Threatened species, namely: Barn Swallow, Bobolink and Eastern Meadowlark were detected within or just outside of the Study Area.

**Barn Swallow**

A Barn Swallow individual was observed flying overhead. Nesting habitat is unlikely to occur within the Site limits due to the absence of structures known to support nests (e.g. barn, abandoned building), although is anticipated to occur in the general area.

**Eastern Meadowlark and Bobolink**

The Survey Protocol for Eastern Meadowlark (*Sturnella magna*) in Ontario (MNR, 2013) was carried out and confirmed the presence of both Bobolink and Eastern Meadowlark in the area. The protocol indicates that an inspection to find specific nest locations is not recommended as it could result in harm to the species. It was therefore not possible to delineate the three (3) habitat types (i.e. categories 1 through 3) for Bobolink and Eastern Meadowlark, as described by the respective *general habitat descriptions*. The CUM1-1 type within the Site was separated by a hedgerow and fence. The CUM1-1 area north of the fence contained a higher percentage of graminoid species, while the CUM1-1 area south of the hedgerow contained mostly forb species. Bobolink and Eastern Meadowlark are known to inhabit areas with a greater percentage of graminoid species and in this case, the area north of the fence offers more suitable nesting habitat.

The CUM1-1 area is maintained agricultural lands. The area south of the hedgerow is cut annually in June and August of every year, while the area north of the hedgerow supports grazing cattle. It is understood that Bobolink fledglings commonly leave their nests by the beginning of July, while Eastern Meadowlark generally leave in mid-June but may leave as late as early July (McCracken et al., 2013). This suggests that the current agricultural operation south of the hedgerow does not permit either species to successfully complete a reproductive cycle. Continuous grazing by cattle also has potential to impact nesting grassland birds, including direct impact by trampling the nests and by impacting the vegetation height or composition depended on by both species.

Section 4.1(3) of Ontario Regulation 242/08 made under the ESA, confirms that agricultural practises are exempt from the provincial regulation that protects Bobolink and Eastern Meadowlark habitat and therefore the presence of these species does not restrict agricultural practises.

The CUM1-1 community contains characteristics of suitable nesting habitat in terms of vegetation presence; however, given the possible destruction of nests during annual cutting practise, it is anticipated that this area is considered unsuitable for Bobolink and Eastern Meadowlark to successfully reproduce.

The MECP was contacted to determine if registration in accordance with Ontario Regulation 242/08 was required while considering the Site was determined to provide poor habitat conditions. The MECP indicated that since the registration is a proponent-led process, it falls to the proponent or consultant to determine if the activity is likely to *damage* or *destroy* habitat as defined in the *Categorizing and Protection Habitat Under the Endangered Species Act* (MNRF, 2012) guidance document and to make the decision as to whether the activity should be registered.

The guidance document (MNRF, 2012) provides the following definitions as it relates to *damaging* and *destroying* habitat.

Damaging Habitat:

> *An activity that destroys the habitat of a species is one that alters the habitat in ways that eliminate the function (usefulness) of the habitat for supporting one or more of the species' life processes (3.1.1).*

Destroying Habitat:

> *An activity that destroys the habitat of a species is one that alters the habitat in ways that eliminate the function (usefulness) of the habitat for supporting one or more of the species' life processes. In some cases, the anticipated alteration that a proposed activity will have on habitat may be so minor*

*that the function of the habitat for supporting the species' life processes will not become impaired or eliminated. In such cases the activity would not contravene subsection 10(1) of the ESA and would not require authorization under the Act with respect to this provision. In other cases, the alteration may be more significant such that the function of the habitat for supporting one or more of the species' life processes may become impaired or eliminated. Such activities would contravene subsection 10(1) of the ESA and would require authorization under the Act prior to proceeding (3.1.2).*

WSP completed a self-assessment on behalf of the client to determine the need to register the activity. The self-assessment was broken into two phases to:

1) Determine if the Site provides habitat; and if habitat is confirmed,
2) Determine if the proposed activity will damage or destroy the habitat.

The discussion above indicates the Site does not offer optimal habitat conditions given the higher composition of forb species in the area south of the central hedgerow, and active agricultural practices throughout the Site. Given the limitations of the survey protocol (e.g. avoid locating nests), it is difficult to confirm whether the Bobolink observed just outside of the Site were nesting or simply passing through the area. Similarly, Eastern Meadowlark was observed west of the Site and the nesting location was not confirmed. Although habitat is not considered optimal for either species, they were detected within the area and for the purpose of this assessment will consider the second phase of this assessment.

Upon reviewing eBird (i.e. a public database in which professionals and naturalists can upload bird sightings), it is evident that both Bobolink and Eastern Meadowlark habitat is abundant throughout the area. Additionally, satellite imagery (GoogleEarth, 2006-2020) indicates that much of the municipality is comprised of agricultural lands. In the immediate area, Bobolink and Eastern Meadowlark were documented along Baseline Road, Storell Road, and Bensfort Road, the roads which bound the Site (eBird, 2021). These species were also documented from almost every other road in the general area. While considering the wide habitat area across the local landscape, it is believed that development of the stockpile area and associated drive access will not *damage* or *destroy* the habitat such that it eliminates the function or nesting habitat. Both species will continue to nest and carry out reproductive processes in the greater area. Direct impacts to bird individuals will be avoided through timing restrictions of vegetation removal. It is also noted here, that the MECP agreed that there is no shortage of habitat in the area and through employment of mitigation measures, there would be no impact to the overall population and habitat availability in the area (Appendix B).

It therefore has been determined that since the activity will not damage or destroy Bobolink and Eastern Meadowlark habitat, that registration under Ontario Regulation 242/08 is not required.

**SAR Bats**

Targeted surveys for bats were not completed as no forested habitat will be directly impacted by the proposed works. The hedgerow centrally within the Site was comprised almost entirely of Common Buckthorn and does not provide suitable conditions for roosting. The hedgerow south of the Site did contain mature cedar and ash trees; however, given the absence of loose bark, cracks, and leaf clusters, was determined not to provide candidate habitat.

Two (2) species listed as Special Concern on the Species at Risk in Ontario (SARO) List were confirmed within or adjacent to the Site, namely, Eastern Wood-pewee and Monarch. For more detailed information regarding Special Concern species, refer to **Section 4.5.2**.

### 4.5.2 SIGNIFICANT WILDLIFE HABITAT

In accordance with the Significant Wildlife Habitat Technical Guide (OMNR 2000) and Ecoregion Criteria Schedules for Ecoregion 6E (MNRF, 2015), candidate and confirmed SWH were identified within or adjacent to the Site.

SWH is broadly categorized as seasonal concentration areas (e.g., conifer forests for deer wintering), rare vegetation communities or specialized habitats for wildlife, habitats of species of conservation concern (excluding the habitats of endangered and threatened species), and animal movement corridors. The following types of SWH were identified within or adjacent to the Site during field investigations:

**Habitat for Species of Conservation Concern**

- Confirmed Special Concern and Rare Wildlife Species (Eastern Wood-Pewee and Monarch):
  - Eastern Wood-pewee was detected calling from the adjacent forest community (FOD3-1), which is consistent with their habitat preference of deciduous and mixed forest types. With the recommended development setback (15m) from the forest dripline, direct impacts to trees and possible nesting habitat will be avoided.
  - Monarch was observed flying within the CUM1-1 community. Due to occurrences of Milkweed plants within the CUM1-1 type north of the central hedgerow and east of the Site, it is expected Monarch may occur within the Site. Due to the Monarch's dependency on milkweed for reproduction (e.g. host plant for egg/caterpillar), the presence of few Milkweed plants suggests that this Site does not support Significant habitat. Additionally, documented occurrences of Monarch (iNaturalist, 2021) and candidate habitat areas (e.g. agricultural fields, meadows; GoogleEarth, 2020) within Township further suggest disturbance to the Site is unlikely to impact or eliminate habitat within the area.

### 4.5.3 FISH HABITAT

Fish habitat was not confirmed within the Site or Study Area; however, the pond located northeast of the Site is expected to support indirect fish habitat. The swale (Reaches 1 through 3) and the pond, appear to be contiguous; however, it is anticipated the swale functions to collect surface flow from adjacent fields, which infiltrate the soils immediately or shortly after collection. Reach 2, in particular, consisted of a very indistinct channel within the cow pasture, and vegetation within the channel was the same as that of the adjacent meadow to suggests the channel soils are dry throughout most of the year.

Additional information is provided in **Section 4.3**.

### 4.5.4 WOODLANDS

A small forest (FOD3-1) occurs west of the Site. Official Plan mapping (County of Peterborough, 2020; Otonabee South-Monaghan, 2000) does not identify Significant Woodlands, therefore an assessment in accordance with provincial guidelines (MNR, 2010) was completed. The following table summarizes the criteria of each of the four (4) assessment categories, and the results in the last column.

## Table 2: Evaluation of Significance for the Woodland Located on and Adjacent to the Site

| CRITERIA | SIGNIFICANCE CRITERIA | SIGNIFICANCE ASSESSMENT |
|---|---|---|
| **Woodland Size Criteria** | | |
| | Where woodlands cover:<br>– is less than about 5% of the land cover, woodlands 2 ha in size or larger should be considered significant<br>– is about 5–15% of the land cover, woodlands 4 ha in size or larger should be considered significant<br>– is about 15–30% of the land cover, woodlands 20 ha in size or larger should be considered significant<br>– is about 30–60% of the land cover, woodlands 50 ha in size or larger should be considered significant<br>– occupies more than about 60% of the land, a minimum size is not suggested, and other factors should be considered significant | The Township of Otonabee South-Monaghan is 38,898.5 ha in area.<br>The total woodland area in the township is 7,117 ha. Woodland cover equates to 18%, therefore a woodland is considered Significant when it exceeds more than 20 ha in size.<br><br>The woodland to the west is 1.8 ha, where the treed habitats (FOD3-1 + SWD) is 3.9 ha<br><br>This criterion does not meet the definition of Significance. |
| **Ecological Functions Criteria** | | |
| Woodland Interior | Woodlands with a minimum interior habitat area of 2ha ha are considered Significant. Interior habitat is more than 100 m from the woodland edge. | The woodland does not contain interior habitat. |
| Proximity to Other Woodlands of other habitats | Woodlands within close proximity to other Significant NHFs, provides ecological benefit to adjacent (30m) fish habitat and meets the minimum area threshold, are considered Significant. | The woodland does not meet or come close to the minimum size criteria, therefore this woodland is not considered significant. |
| Linkages | Woodlands within a defined Natural Heritage System or provide a connecting link between two significant features, and meets the minimum area threshold. | The woodland is generally isolated and does not occur within the County's Natural Heritage System (County of Peterborough, 2021). |
| Water Protection | Woodlands within 50 m of a threatened watershed, groundwater discharge area, sensitive headwater area or fish habitat which is considered significant. | The woodland does not occur within a threatened watershed, groundwater discharge area or near fish habitat which is considered significant. |
| Woodland Diversity | Woodland with a diversity of forest species which may have declined south of the Canadian Shield, or diversity provided by topography (e.g. hilltop and valleyland). | The woodland type and species are common throughout Southern Ontario. |
| **Uncommon Characteristics** | | |
| Woodlands which are considered uncommon (e.g. uncommon species, cover type) or greater than 100 years old. | Woodlands with a unique species composition or the site is represented by less than 5% overall in woodland area. | The woodland contained species common throughout southeastern Ontario. |
| | NHIC community ranking of S1, S2 or S3 and meet the minimum area threshold. | Not present. |

| CRITERIA | SIGNIFICANCE CRITERIA | SIGNIFICANCE ASSESSMENT |
|---|---|---|
| | Habitat of rare, uncommon or restricted woodland plants (e.g. 10 stems of an uncommon species) | The woodland contained species common throughout southeastern Ontario. |
| | Characteristics of older woodlands or woodlands with larger tree size structure (i.e. 10 or more trees per hectare which are at least 50 centimetres in diameter). | The vegetation communities within the woodland were considered to be mid-aged and didn't contain large diameter trees. |
| **Economic and Social Functional Values Criteria** | | |
| | Woodlands with a high productivity in terms of economical products with continuous native attributes that meet the minimum area threshold. | This woodland is located on private property and is not selectively harvested. Trees are generally 'young' and 'mid-aged' and would not be considered optimal for harvesting. |
| | Woodlands with a high value in special service (e.g. air quality improvement or recreation) and meet the minimum area threshold of 10 ha should be considered Significant. | This woodland is located on private land and is not used for the identified purpose. |
| | Woodlands that provide an identified appreciation for education, cultural or historical value and meet the minimum area threshold. | This woodland is located on private land and is not used for the identified purpose. |

The evaluation of significance, as completed in accordance with the Natural Heritage Reference Manual, confirms that the forest west of the Site is not Significant.

# 5 PROPOSED WORKS

## 5.1 STOCKPILE AREA

The proposed works includes removal of the top layer of native soil within an area of the existing landfill lands known as Cell 4, and temporarily storing the material within the Site, or area north of the existing landfill. The City will use the stockpile material to overtop waste deposited into Cell 4 over a period of approximately thirteen (13) years.

The Site boundary on Figure 1 represents the outermost limit of: two (2) separate stockpile areas, one which will be permanent, and one for cover operations; and staging area for equipment. The stockpiles are estimated to have a height of 18m.

## 5.2 DRIVE ACCESS

A drive access between the existing landfill and stockpile area will extend through the wetland and drainage channel. The precise crossing location will be determined by the contractor; however, the two most feasible locations have been identified on the figures (Appendix A), identified as crossing A and B. The access will consist of a 12 m wide road to allow for heavy trucks and necessary grading. A culvert will be installed to maintain ephemeral flows.

# 6 IMPACT ASSESSMENT

This section reviews potential impacts or condition changes to natural heritage features within or adjacent to the Site, based on site alteration activities (e.g., vegetation clearing and grading), as well as post-development activities/operations. Direct and indirect impacts to designated natural heritage features, vegetation, wildlife, SAR, and aquatic habitat are reviewed in terms of immediate potential impacts and residual effects. For recommended mitigation measures, refer to **Section 7.0**.

## 6.1 VEGETATION

Site preparation will result in vegetation removal within a portion of CUM1-1 type, MAM2-2 wetland and the central hedgerow. Selective tree removal may also be required within the southern hedgerow. Where drive access Option A is selected, minor vegetation removal may also be required within the SWD wetland.

Potential direct and indirect, long- and short-term impacts to associated Natural Heritage Features and ecological functions are discussed in detail below.

### *6.1.1 WOODLAND*

The FOD3-1 forest and SWD wetland within the Study Area is small, generally isolated and not connected to a contiguous NHS.

An assessment of woodland significance confirmed the woodland is not considered Significant. The existing forest edge will be maintained, and a 15 m buffer will be left to naturalize between the FOD3-1 forest edge and western limit of the Site. Currently, the CUM1-1 and active agricultural field extends into the dripline, so a new naturalized buffer will provide an overall net benefit to this feature. Over the long term, the 15 m wide swath will allow for tree regeneration and natural enhancement of existing forest edge.

Indirect impacts to the forest may include damage beyond the footprint of the Site, and spills of contaminants, fuels and other materials that may reach natural areas. Mitigation measures for these indirect impacts are outlined in **Sections 7.0**.

### *6.1.2 HEDGEROW*

Site preparation activities within the Site will include removal of a portion of an existing hedgerow located within the CUM1-1 community. This hedgerow was comprised almost entirely of Common Buckthorn which although considered invasive, does still provide wildlife habitat opportunities.

The drive access will extend through the hedgerow south of the Site, although the specific location has not been determined. For the purpose of this report, the two (2) most probable drive access locations have been presented on **Figure 3** (**Appendix A**). Crossing A takes advantage of an existing opening in the hedgerow, in which none or only a few trees may require removal. The hedgerow in the area of Crossing B is not densely wooded, and will only require removal of a few trees. As previously mentioned in

Section 2.2.2, ORCA indicated that given a gap within the hedgerow associated with Option A, this is the option they would recommend.

Mitigation measures to protect wildlife which may use the hedgerows are outlined in **Sections 7.2** and **7.3**.

### 6.1.3 UNEVALUATED WETLANDS

The unevaluated wetlands adjacent to the Site have not been identified as provincially or locally significant. A 15 m VPZ will be maintained from the MAM2-2 wetland community, while through application of a 15 m VPZ to the forest community, the swamp (SWD) will be protected with an average VPZ of approximately 38 m.

Anticipated direct impacts to unevaluated wetlands include the removal of a small area (i.e. approximately 250 to 300 $m^2$ or approximately 0.13% of total wetland area area) to allow for a driveway access between the existing landfill and Site. The MAM2-2 community provides some ecological function, by collecting and holding surface water and provides habitat for breeding amphibians. Calling frogs were detected in this community during the April visit.

Mitigation measures to protect wildlife, including amphibians, are outlined in **Sections 7.1**.

### 6.1.4 HABITAT FOR SPECIES OF CONSERVATION CONCERN

Two (2) species of conservation concern were confirmed within or adjacent to the site, namely Eastern Wood-pewee and Monarch. Habitat for Eastern Wood-pewee does not occur within the Site (**Section 4.4**). Monarch was observed flying through the Site and rare occurrences of Milkweed plants were observed north of the central hedgerow and east of the Site. The limited number of Milkweed plants observed suggest the Site is unlikely to provide Significant habitat for this species (Section 4.5.2).

Additionally, it is believed that the habitat opportunities for this species are not limited to the Site, therefore removal of CUM1-1 within the Site will not negatively impact reproductive success or the Monarch population in the wider area.

Direct impact to Monarch individuals (i.e. eggs, larva, pupa, adults) can be avoided by limiting activities in the CUM1-1 area during the period in which the habitat is known to be used by the species (i.e. June – September). Limiting vegetation removal during this period will result in protection of this species.

Mitigation measures related to vegetation removal is outlined in **Section 7.1**.

## 6.2 WILDLIFE

As outlined above in the vegetation discussion, there will be partial removals of forest vegetation within the Site and the wildlife habitat associated with this vegetation will therefore also be affected. Potential impacts to Wildlife and associated Natural Heritage Features are discussed below.

***Monarch Habitat***

The CUM1-1 may provide limited habitat for Monarch. Removal of Milkweed host plants prior to July, when adults begin laying eggs will result in protection of immotile stages of this species (e.g. eggs, larva and pupa).

***Breeding Bird Habitat***

The removal of vegetation within the breeding bird season has the potential to impact nests, eggs and young of numerous species. Specific mitigation measures to address the protection of breeding birds as per the MBCA are outlined in **Section 7.2.1**.

***Amphibian Habitat***

The removal of wetland habitat within the amphibian breeding season has the potential to directly impact amphibians (e.g. eggs, tadpoles, adults). Specific mitigation measures to address the protection of breeding amphibians are outlined in **Section 7.2.2**.

***Other Wildlife***

The removal of vegetation within the Site, as well as other site alteration activities, have the potential to impact other resident wildlife, such as turtles and snakes, that inhabit or travel into the work zone. General mitigation measures to address the protection of wildlife are outlined in **Section 7.2.2**.

Wildlife habitat functions of the landscape are not anticipated to be significantly negatively impacted by the proposed site alteration. These potential impacts to wildlife and Natural Heritage Features can be managed through implementation of the wildlife mitigation measures outlined in **Section 7.2**, and SAR mitigation measures outlined in **Section 7.4**.

## 6.3 SPECIES AT RISK

In addition to the above noted impacts to general wildlife, the background review and field investigations identified three (3) SAR within or adjacent to the Site, namely Bobolink, Eastern Meadowlark and Barn Swallow.

Nesting habitat for Barn Swallow was not observed on Site and it is thought the individual may have been foraging overhead. Impacts to habitat for Barn Swallow is not anticipated.

Bobolink and Eastern Meadowlark were confirmed within the general area; although vegetation composition (e.g. high forb to graminoid composition) observed on Site suggest suboptimal habitat. Additionally, after further review of the agricultural activities that occur within the CUM1-1 area, it was determined that Bobolink and Eastern Meadowlark are unlikely to successfully reproduce in this area given the regular mowing practices and agricultural (pastureland) use of these areas.

As part of the proposed site alteration works, mitigation measures (Section 7.4) have been developed to prevent direct impacts to species with the potential to be on or adjacent to the Site.

## 6.4 AQUATIC HABITAT

Site alteration activities for the proposed stock-piling area and future use have the potential to result in both permanent and temporary impacts to indirect fish habitat adjacent to the Site.

It is believed that impairment to the water quality from added suspended sediments in Reach 1 is unlikely to travel downgradient and outlet into the pond under normal conditions. However, it is also noted that during extreme weather events, there is potential when the swale soils are saturated, that surface water may slowly flow toward the pond.

Potential long-term impacts may include water quality impairment to the downstream pond considered to be fish habitat from the transport of deleterious substances, such as sediment run off from the stockpiles or leaking of gas and oils from heavy equipment or machinery.

With appropriate design considerations and mitigation, these potential impacts are expected to be effectively mitigated, so as to avoid long-term negative impacts on the ephemeral watercourse. Specifically, a minimum 15 m VPZ from the MAM2-2 community containing the swale or ephemeral watercourse will be maintained. This will allow for naturalization and respective enhancement of the buffer. It is noted that the existing active agricultural operation extends to the limit of the MAM2-2 community, with no buffer.

Potential temporary construction-related impacts include water quality impairment to the swale and downstream pond (i.e. sediment, fuel, lubricants) from installation of a culvert and construction of the road access between the landfill and stockpiling area. As the swale does not function as direct fish habitat, it is anticipated that with appropriate erosion and sediment control measures, in-channel sedimentation can be captured and removed prior to reaching the pond downstream.

Where mitigation measures are appropriately employed, the harmful alteration, disruption or destruction of fish habitat (HADD) can be avoided through employment of standard mitigation measures. In accordance with the DFO guidelines, since the channel is unlikely to contain fish at any time during the year, project review by way of a Request for Review submission to DFO is not required.

# 7 MITIGATION RECOMMENDATIONS

## 7.1 VEGETATION

Feature limits, setbacks, and environmental management recommendations were reviewed and refined through field visits and details of the proposed works. The focus area includes development within the MAM2-2 and ephemeral watercourse.

Recommended measures for mitigating effects to the local vegetation communities and their associated habitat functions include the following:

***General Construction Mitigation for Vegetation***

- Minimizing the extent of vegetation removal and damage within construction access, work and staging areas, particularly adjacent to the woodland or wetlands. These areas will be clearly identified in the Contract documents, and then delineated in the field using erosion and sediment control fencing. Erosion and sediment control fencing will be maintained throughout the construction period.
- Re-stabilize and re-vegetate exposed soil surfaces as soon as possible, using native seed mixes where possible.
- Ensure that machinery arrives on site in a clean condition and is maintained free of fluid leaks, invasive species and noxious weeds.
- Conduct vehicle maintenance and fueling at the designated and properly contained maintenance areas in the works yards or at commercial garages located well away from retained vegetation areas.
- All construction-related materials, equipment, and construction-generated materials (e.g., sediment in dewatering or runoff from exposed soils, stockpiled soils or other materials from clearing and grubbing) shall be properly stored/contained, maintained, filtered and otherwise handled and managed within the limit of the Site.

***General Erosion Control Measures***

- Siltation fencing shall be placed along the western, southern and eastern limits of the Site. The end of the fencing should be angled away from the feature.
  - Fencing shall have a minimum height of 60 cm above-grade in order to also function as an exclusionary fence for wildlife.
  - Fencing should be inspected regularly to ensure it is functioning as intended, and any deficiencies corrected immediately.
  - Additional measures (e.g. second layer of fencing around the stockpiles) should be employed to ensure no sediment is released beyond the Site limit.
- Dust released from the stockpiles should be minimized where possible. Measures to limit or control dust might include use of a biodegradable blankets (e.g. coconut fiber blankets) and native seed mix to stabilize the *permanen*t stockpile. Measures to control dust from the temporary stockpile could include use of tarps or sheeting, and/or development of a trigger mechanism to undertake an immediate response, such as watering the stockpiles.
- Stockpiles shall be sloped at an incline in order to avoid slope failure or collapse and to prevent nesting birds (see **Section 7.4**).

## 7.2 WILDLIFE

The vegetation mitigation measures outlined above are designed to minimize impacts to vegetation and protect adjacent vegetation areas, which in turn protect the associated wildlife habitat functions. However, it is also necessary to ensure the protection of breeding birds, as well as other wildlife that may nest or otherwise use areas where construction and/or site alteration is proposed. Wildlife-specific mitigation measures are outlined below.

### *7.2.1 MIGRATORY BIRDS*

Nesting migratory birds are protected under the Migratory Birds Convention Act, 1994 (MBCA). No work is permitted to proceed that would result in the destruction of active nests (nests with eggs or young birds), or the wounding or killing of birds protected under the MBCA and/or Regulations under that Act.

In order to protect nesting migratory birds, in accordance with the MBCA, the contractor will ensure that:

- Vegetation removal (including grubbing) will be avoided during the identified migratory bird nesting season (April 1 to August 31).
- No active nests (nests with eggs or young birds) will be removed or disturbed in accordance with the MBCA.
- If a nesting migratory bird is identified within or adjacent to the construction site and the construction activities are such that continuing construction in that area would result in a contravention of the

MBCA, all activities will stop, and the Contract Administrator and Environment Canada will be contacted to discuss mitigation options.

### 7.2.2 OTHER WILDLIFE

For the protection of wildlife in general, the contractor will ensure that:

– Any wildlife incidentally encountered during construction will not be knowingly harmed and will be allowed to move away on its own. In the event that an animal encountered during construction does not move from the construction zone and construction activities are such that continuing construction in the area would result in harm to the animal, all activities that could potentially harm the animal will cease immediately and the Contract Administrator will be notified.
– Any equipment parked overnight in the area will also be inspected to ensure no wildlife have climbed into or beneath it.
– Site preparation activities within the wetland should occur outside of the amphibian breeding period (March – August) and if conditions permit, in the dry. Where work must occur in wet conditions, a *wildlife salvage operation* should be completed by a qualified ecologist prior to any disturbance. Exclusionary fencing (i.e. siltation fencing 60 cm in height) should be installed around the wetland to prevent frogs from accessing the area for breeding. Fencing should be installed prior to March or immediately following the spring thaw when the fencing stakes can penetrate the ground surface to meet the manufacturer specifications.

## 7.3 AQUATIC HABITAT

In addition to the mitigation measures outlined above to protect vegetation within Natural Heritage Features, the following mitigation measures will be implemented to protect aquatic habitat where relevant based on the specific works during and following construction activities:

– Erosion and sediment control (ESC) measures shall be identified in the contract and all associated contract drawings. More specifically, the Contractor shall control erosion and sediment caused by construction methods and operations including but not limited to stockpiles, access and service roads, storage and work areas, and non-designated disposal areas to meet all legislative requirements to prevent the entry of sediment into the watercourse and prevent any migration of sediment beyond the construction area.
– All construction-related activities should be controlled so as to prevent entry of any petroleum products, debris or other potential contaminants / deleterious substances, in addition to sediment as outlined above, to the watercourse.
– In-channel ESC measures, such as reinforced siltation fencing, shall be placed within the wetland community upstream and downstream of two locations, including, 1) the final access road crossing location, and 2) the temporary construction crossing location to contain any suspended sediment. No additional crossing locations are permitted. Installation of ESC within the channel shall be coordinated with the timing to also protect breeding amphibians (Section 7.2).
– Mud mats or an alternative measure to limit rutting within the temporary or permanent crossing locations, should be used.
– Continuous ESC should occur along either side of the crossing locations and along the edge of the wetland community (see Figure 4).

## 7.4 SPECIES AT RISK

Based on the site conditions, eight (8) SAR (Bobolink, Eastern Meadowlark, Barn Swallow, Little Brown Bat, Small-footed Bat, Northern Long-eared Bat, Tri-colored Bat, and Monarch have reasonable potential to occur within the work area, and therefore there is some risk of harm to these species, as discussed in **Section 6.3**. The remaining species (Monarch) is listed as Special Concern under the ESA. The following outlines specific mitigation measures to protect these SAR, as well as additional general SAR mitigation.

### BOBOLINK & EASTERN MEADOWLARK

Adherence to the recommendations outlined in Section 7.2 (i.e. vegetation removal timing restriction) will also serve to protect both Bobolink and Eastern Meadowlark.

### BANK SWALLOW

Bank Swallows (Threatened) are known to create nests in vertical faces of loosely piled material, such as stockpiles. To avoid attracting this species (which would disrupt operations), the following measures are recommended:

- Avoid creating vertical faces from excavator use; slope afterward to at least July 15th.
- Slopes should remain at 70% or less.
- Where sloping is not reasonable, a cover (e.g. geotextile, plastic, tarp) should be secured over the slope in early spring (April) to prevent use of the stockpile by nesting Bank Swallows. Yellow strips of material have also been successfully used as a scarecrow effect.

### ENDANGERED BATS

Contravention of Section 9 of the ESA (prohibition on killing, harming, harassing, etc.), can be avoided though timing restrictions for tree and vegetation removal.

- All tree removals will be undertaken during the bat hibernation period (i.e. October 1 to March 31) to ensure that no direct harm to SAR bat individuals occurs (including potential maternal and day-roosting bats).

### MONARCH

- Impact to Monarch species can be avoided though timing restrictions for vegetation removal.

### OTHER SAR

The following mitigation measures are to protect other SAR species with the potential to occur on or adjacent to the Site:

- If a SAR or possible SAR is found within or adjacent to the construction zone, all activities that could harm the SAR will cease immediately and the Contract Administrator will be notified. The Contract Administrator will then contact an MECP SAR Biologist for direction. SAR identification information can be found at: https://www.ontario.ca/environment-and-energy/species-risk-ontario-list
- SAR or potential SAR will not be handled prior to consulting with the MECP SAR Branch.

# 8 SUMMARY

This document provides an EIS to support development of a stockpile area north of the existing Peterborough landfill and drive access between the stockpile area and existing landfill.

Potential vegetation impacts associated with the construction activities include the removal of bird nesting and bat roosting habitat, and habitat associated with the unevaluated wetlands. The affected vegetation community types, species and associated habitats are common or are present within the broader landscape.

The wildlife species recorded within the current project area are generally common species to the area. Based on the available background information and field survey findings, three (3) SAR have potential to use habitat within the project limits, specifically: Bobolink, Eastern Meadowlark and Monarch.

Specific measures for some species, such as the use of a timing restriction for tree removals to protect SAR bats and breeding birds, are required to ensure that impacts are minimized.

Key recommendations include General Construction Mitigation for Vegetation, timing windows to protect breeding birds and bats, and employment of erosion and sediment control measures. All other potential impacts to SAR, fish habitat, vegetation communities and general wildlife species can be minimized through general mitigation measures (e.g. vegetation timing window, installation of ESC measures).

It is WSP’s opinion that the results of this EIS indicate that potential negative impacts to the Natural Heritage Features or their ecological functions adjacent to the Site can be effectively avoided, minimized or mitigated with the implementation of mitigation measures provided in **Section 7.0**.

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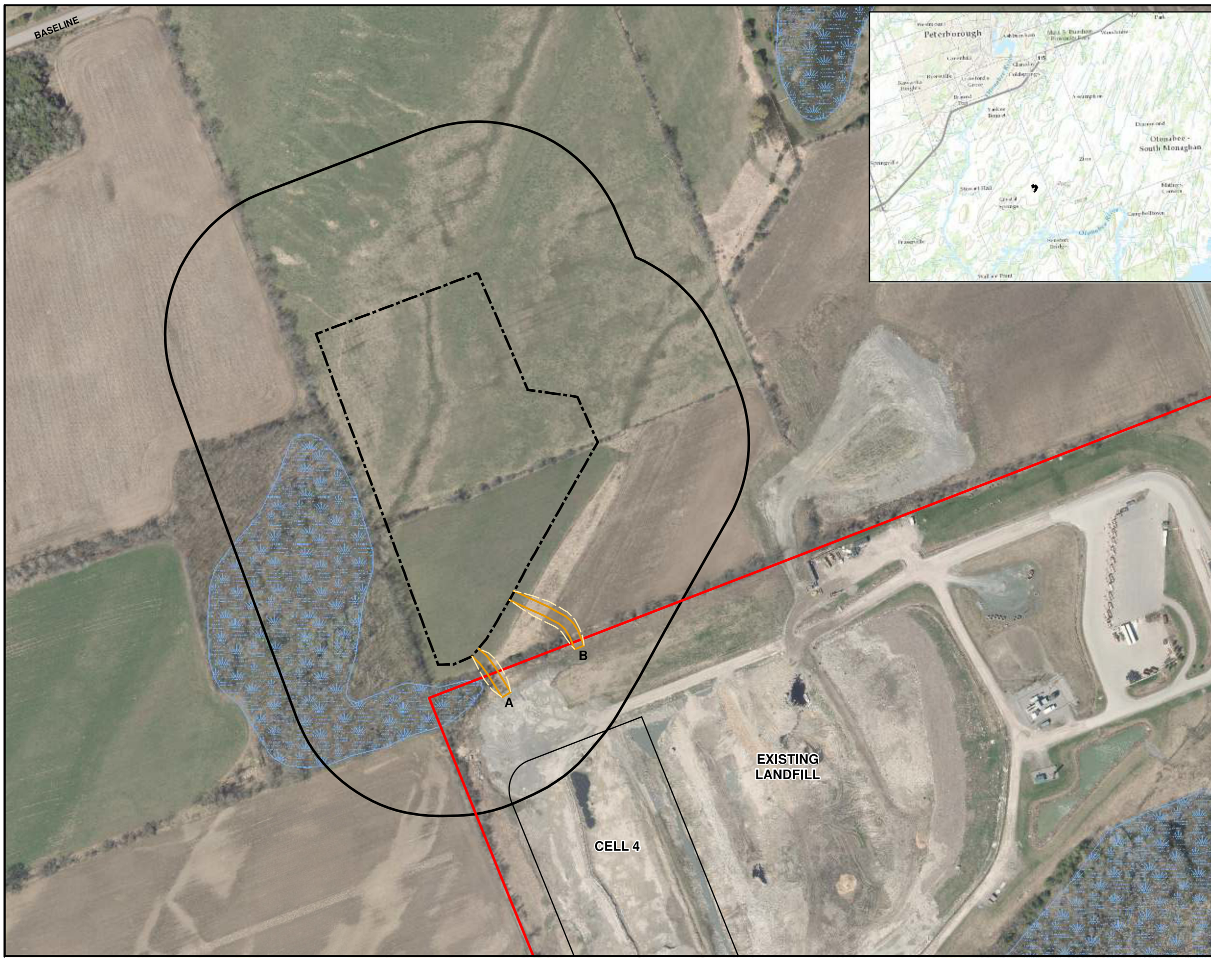
# APPENDIX

# A FIGURES




**LEGEND**

- PETERBOROUGH LANDFILL SITE
- SITE
- 120 m STUDY AREA
- CONCEPTUAL ROAD ACCESS
- CONCEPTUAL GRADING LIMIT
- UNEVALUATED WETLANDS

40 20 0 40 Metres

CLIENT:

CITY OF PETERBOROUGH

PROJECT:

ENVIRONMENTAL IMPACT STUDY
PETERBOROUGH LANDFILL STOCKPILE AREA

| | |
|---|---|
| PROJECT NO: 211-08069-00 | DATE: NOVEMBER 2021 |
| DESIGNED BY: - | |
| DRAWN BY: TP | |
| CHECKED BY: - | |
| FIGURE NO: 1 | SCALE: 1:3,000 |

TITLE:

SITE PLAN

DISCIPLINE:

ENVIRONMENT

ISSUE:


**LEGEND**

- SITE
- 120 m STUDY AREA
- CONCEPTUAL ROAD ACCESS
- CONCEPTUAL GRADING LIMIT
- ECOLOGICAL LAND CLASSIFICATION

CUM1-1 - DRY-MOIST OLD FIELD MEADOW TYPE
FOD3-1 - DRY-FRESH POPULAR DECIDUOUS FOREST
HR - HEDGEROWS
MAM2-2 - REED-CANARY GRASS MINERAL MEADOW MARSH TYPE
SWD3-3 - TREBLING ASPEN ORGANIC DECIDUOUS SWAMP TYPE

40 20 0 40 Metres

N E S W

CLIENT:
CITY OF PETERBOROUGH

PROJECT:
ENVIRONMENTAL IMPACT STUDY
PETERBOROUGH LANDFILL STOCKPILE AREA

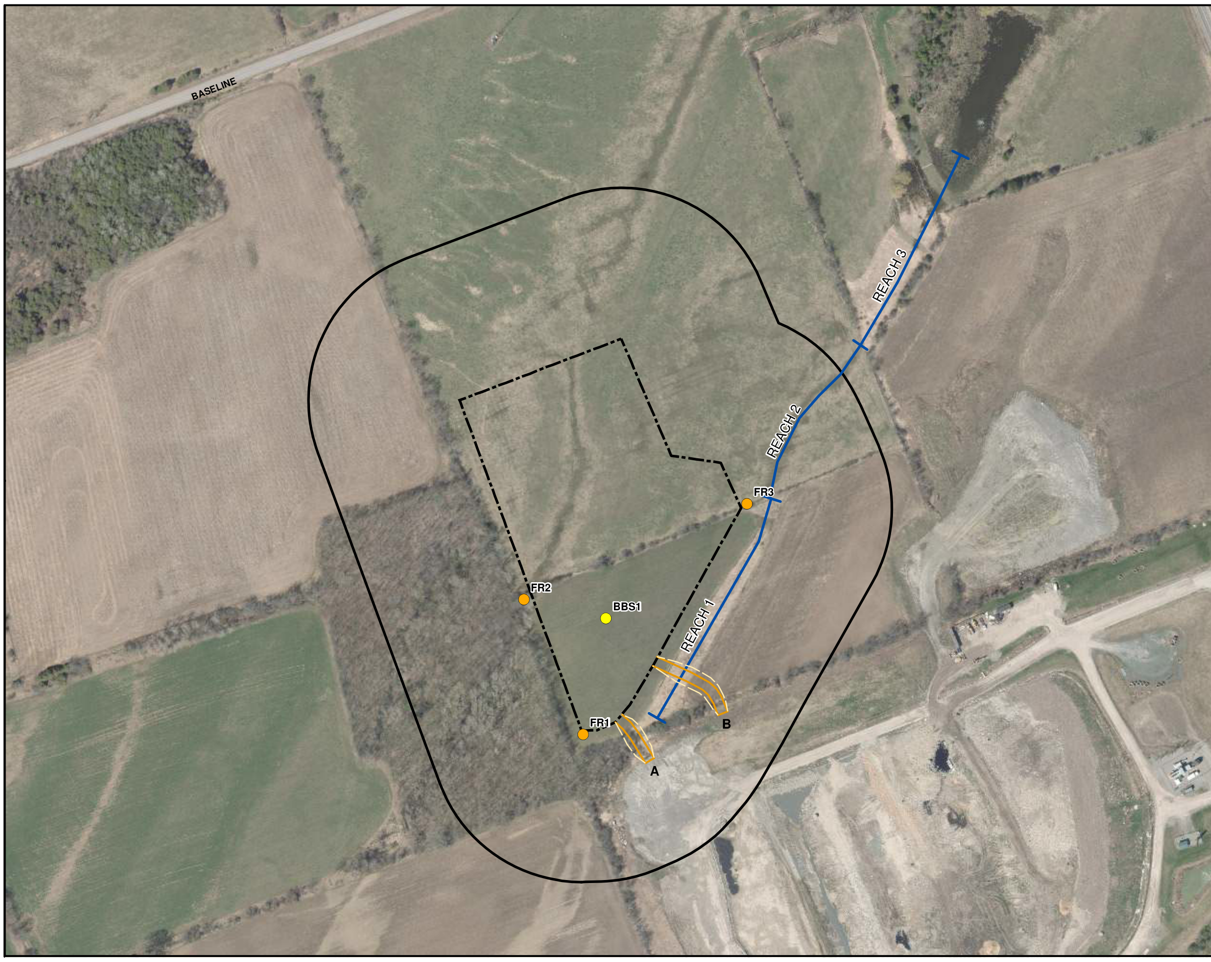
| PROJECT NO: 211-08069-00 | DATE: OCTOBER 2021 |
|---|---|
| DESIGNED BY: - | |
| DRAWN BY: TP | |
| CHECKED BY: - | |
| FIGURE NO: 2 | SCALE: 1:3,000 |

TITLE:
ECOLOGICAL LAND CLASSIFICATION

DISCIPLINE:
ENVIRONMENT

ISSUE:

Document Path: D:\aProjects\211-08069-00\MXD\EIS\211-08069-00 Figure 2 ELC.mxd




**LEGEND**

- SITE
- 120 m STUDY AREA
- CONCEPTUAL ROAD ACCESS
- CONCEPTUAL GRADING LIMIT
- AMPHIBIAN SURVEY STATION
- BREEDING BIRD SURVEY STATION
- AQUATIC ASSESSMENT

40 20 0 40 Metres

CLIENT:
CITY OF PETERBOROUGH

PROJECT:
ENVIRONMENTAL IMPACT STUDY
PETERBOROUGH LANDFILL STOCKPILE AREA

| | |
|---|---|
| PROJECT NO: 211-08069-00 | DATE: OCTOBER 2021 |
| DESIGNED BY: - | |
| DRAWN BY: TP | |
| CHECKED BY: - | |
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TITLE:
FAUNAL SURVEYS

DISCIPLINE:
ENVIRONMENT

ISSUE:

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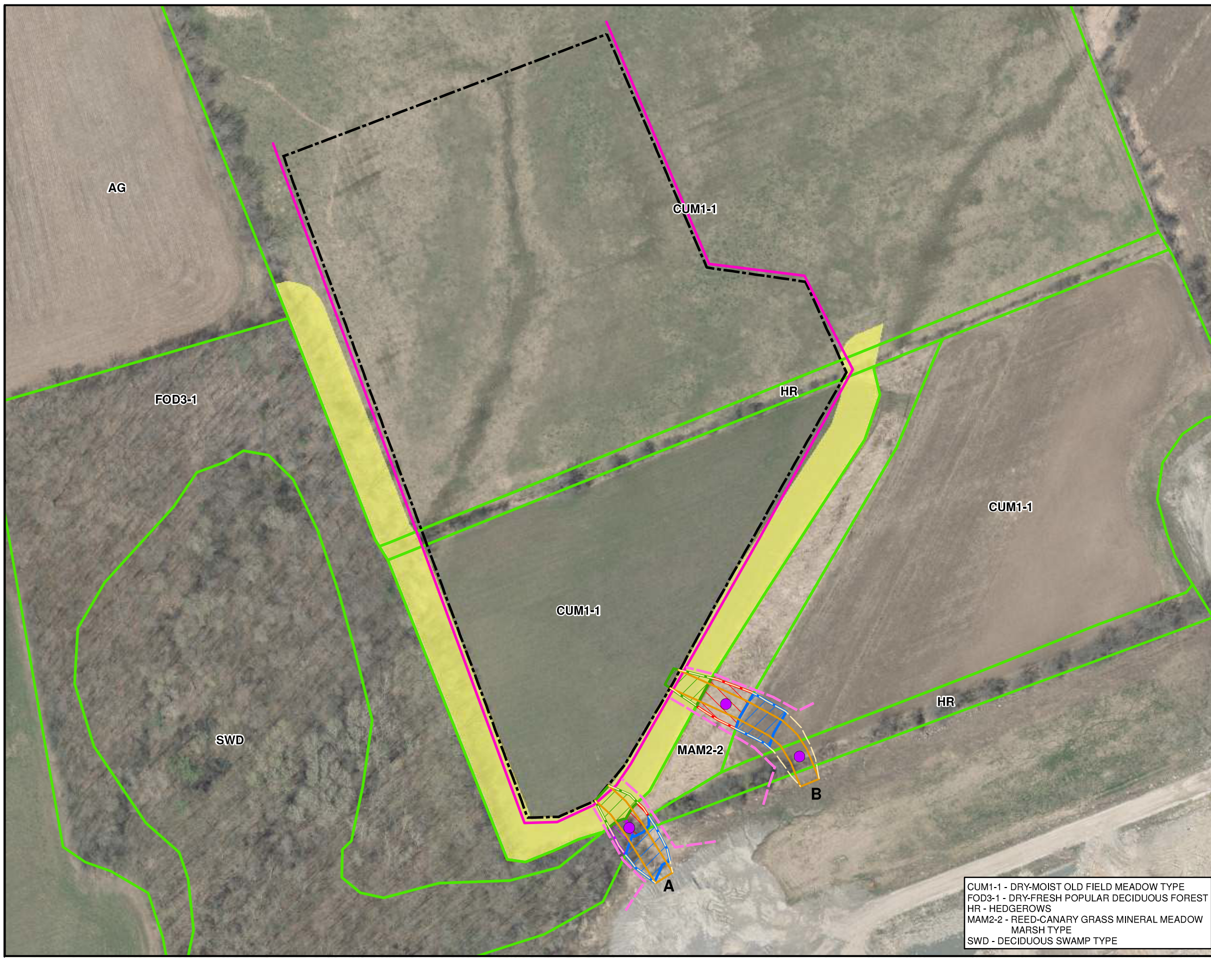


**LEGEND**

- SITE
- CONCEPTUAL ROAD ACCESS
- CONCEPTUAL GRADING LIMIT
- APPROXIMATE CULVERT LOCATION
- VEGETATION PROTECTION ZONE
- SILTATION FENCING
- CONCEPTUAL SILTATION FENCING

IMPACTS TO SITE ACCESS CONCEPT A:

- MAM2-2 (80.0 sq.m.)
- SWD3-3 (72.0 sq.m.)
- VPZ LANDFILL (237.0 sq.m.)
- VPZ STOCKPILE (153.6 sq.m.)

IMPACTS TO SITE ACCESS CONCEPT B:

- MAM2-2 (255.2 sq.m.)
- VPZ LANDFILL (232.0 sq.m.)
- VPZ STOCKPILE (149.0 sq.m.)
- ECOLOGICAL LAND CLASSIFICATION

40 20 0 40 Metres

N W E S

CLIENT:

CITY OF PETERBOROUGH

PROJECT:

ENVIRONMENTAL IMPACT STUDY
PETERBOROUGH LANDFILL STOCKPILE AREA

| | |
|---|---|
| PROJECT NO: 211-08069-00 | DATE: NOVEMBER 2021 |
| DESIGNED BY: - | |
| DRAWN BY: TP | |
| CHECKED BY: - | |
| FIGURE NO: 4 | SCALE: 1:1,500 |

TITLE:

MITIGATION PLAN

DISCIPLINE:

ENVIRONMENT

ISSUE:

Document Path: D:\aProjects\211-08069-00\MXD\EIS\211-08069-00 Figure 4 Mitigation Plan.mxd

# APPENDIX

# B

## PCCWMF CELL 4 SITE PREPARATION REPORT

## Rodo, Jaclyn

**From:** Donald Allin <dallin@otonabeeconservation.com>
**Sent:** November 4, 2021 2:38 PM
**To:** Rodo, Jaclyn
**Cc:** Jasmine Gibson
**Subject:** RE: Peterborough Landfill - Stockpile Project - opening cell 4 (PGCO-707)
**Attachments:** RE: Peterborough Landfill - Stockpile Project - opening cell 4 (PGCO-707)

RE: Landfill Stockpile Project – ORCA Permitting – EIS Report

Jaclyn,

ORCA staff have been on site for other projects in the adjacent vicinity of this project. Based on observations taken at that time I have the following comments:

- RECOMMENDED: If you use the location denoted in red then compensation would not be required. This site is already in use, cleared and of less ecological value. The key will be to ensure no negative hydrologic impacts from the upgraded crossing construction through the feature and of course provide mitigation and rehab where required.
- If a new area is needed to be cut for access through undisturbed wetland (such as the MAM2-2) then **offsetting elsewhere in the near vicinity will be necessary in order to meet current regulatory policies (see 7.1(2)).** If the footprint of the disturbed area is small as you suggest, then there may be an argument for enhancements in the buffer areas as you proposed, but there would need to be site specific circumstances as why this is the case and justified in your report. To be honest, when another access is feasible (such as the one already existing and noted above), then our policies don't lend themselves well to creating another one. Either way – if WSP thinks they have a solution that can meet our policy requirements for permitting then we are all ears. It may be best to simply submit the report with a permit application and we will review it and go from there.

You mention that you anticipate 300 square metres of MAM2-2 community removal – is this utilizing the existing access (expanding etc.,) or is this to allow for a new access through undisturbed wetland community?

**Don Allin**
Acting Manager, Plan Review & Permitting Services
Otonabee Region Conservation Authority
705-745-5791 x225



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**From:** Rodo, Jaclyn <Jaclyn.Rodo@wsp.com>
**Sent:** October 14, 2021 1:45 PM
**To:** Donald Allin <dallin@otonabeeconservation.com>
**Cc:** Jasmine Gibson <jgibson@otonabeeconservation.com>
**Subject:** RE: Peterborough Landfill - Stockpile Project - opening cell 4 (PGCO-707)

Hi Don,

We have completed the ELC mapping for the area – see attached. We did confirm that the swale supports a meadow marsh type (MAM2-2) and the wetland associated with the treed habitat to the west generally follows what is mapped by the province.

I have attached the ELC mapping and also the location of two *potential* drive access locations between the existing landfill and proposed stockpile area that are being considered. The final single drive access will pass through wetland to access the stockpile area. Referring to the attached figure, the *red* option passes through both treed swamp and meadow marsh, while the *orange* option only passes through meadow marsh.

The design considers a 15 m setback/vegetation protection zone (VPZ) from the wetland and woodland, installation of a culvert to maintain ephemeral surface flow, and employment of siltation fencing to protect the woodland and wetland features. The 15 m VPZ will be left to naturalize with existing, native vegetation. The EIS will contain the full suite of mitigation measures to be undertaken as part of the work.

While considering the small loss of wetland area to allow for the drive access, does ORCA require any further mitigative/compensatory action to be undertaken as a condition of the approval?

Thank you,

**Jaclyn Rodo**
Ecologist

T +1 705-270-0178
M +1 705 761 7792

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**From:** Donald Allin <dallin@otonabeeconservation.com>
**Sent:** April 20, 2021 3:58 PM
**To:** Mulholland, Paul <Paul.Mulholland@wsp.com>; Rodo, Jaclyn <Jaclyn.Rodo@wsp.com>; Jasmine Gibson <jgibson@otonabeeconservation.com>
**Cc:** Neil MacFarlane <nmacFarlane@otonabeeconservation.com>; Jennifer Clinesmith <jclinesmith@otonabeeconservation.com>; Don Briand <DBriand@peterborough.ca>
**Subject:** RE: Peterborough Landfill - Stockpile Project - opening cell 4 (PGCO-707)

Noted. Any ORCA permit applications will thus require City approval via letter of authorization (when we get to that point).

**Don Allin**
Planning and Development Officer
Otonabee Region Conservation Authority
705-745-5791 x225


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**From:** Mulholland, Paul <Paul.Mulholland@wsp.com>
**Sent:** April 20, 2021 3:56 PM
**To:** Donald Allin <dallin@otonabeeconservation.com>; Rodo, Jaclyn <Jaclyn.Rodo@wsp.com>; Jasmine Gibson <jgibson@otonabeeconservation.com>
**Cc:** Neil MacFarlane <nmacFarlane@otonabeeconservation.com>; Jennifer Clinesmith <jclinesmith@otonabeeconservation.com>; Don Briand <DBriand@peterborough.ca>
**Subject:** RE: Peterborough Landfill - Stockpile Project - opening cell 4 (PGCO-707)

Hi Donald,

One item to note, the City owns the land north of the landfill where we want to place the proposed stockpile. However, the land is not part of the existing landfill property.

Thanks,

**Paul Mulholland**, P.Eng., PMP
T +1 289-678-0326
M +1 905-537-3687

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**From:** Donald Allin <dallin@otonabeeconservation.com>
**Sent:** Tuesday, April 20, 2021 3:28 PM
**To:** Rodo, Jaclyn <Jaclyn.Rodo@wsp.com>; Jasmine Gibson <jgibson@otonabeeconservation.com>
**Cc:** Neil MacFarlane <nmacFarlane@otonabeeconservation.com>; Jennifer Clinesmith <jclinesmith@otonabeeconservation.com>; Don Briand <DBriand@peterborough.ca>; Mulholland, Paul <Paul.Mulholland@wsp.com>
**Subject:** RE: Peterborough Landfill - Stockpile Project - opening cell 4 (PGCO-707)

Hi All,

Summary notes from todays meeting:

- Scope of meeting was to discuss ORCA PERMITTING requirements only
  - As of now we have not been told that we require to review the project under a "planning lens" via MOU as it pertains to natural heritage features or stormwater (i.e site plan approval via municipal body with jurisdiction) – recommend pre-consultation meeting with Otonabee South-Monaghan/County/City staff if you believe this is applicable
- MECP approvals regarding landfill expansion/use of cell 4 are already in place
  - Stockpile design not yet determined – the extent of the future stockpile area will be an ongoing work site – long term some material will stay, some material will be used to go back to the landfill for differing phases of decommission etc. if I understood correctly
  - Alternative areas to the east of the drainage feature are already in use – ultimately, alternatives/site selection rationale will need to be discussed and part of an ORCA permit submission (when we get to that point)
- Lands to the North are part of the existing landfill – crossing property lines is not an issue
- Features are to be delineated firstly (this is in essence a very scoped EIS as Jaclyn pointed out), but ultimately a mapping exercise and will help inform ORCA regulatory jurisdiction and in turn the ORCA permit scope/applicable policy and thus submission requirements. This may lead to further field work or report

requirements (i.e. possible compensation for wetland disturbance at the location of a proposed watercrossing – if found applicable)

  - Interim guidelines for headwater drainage feature assessment to be used (CVC/TRCA) on the unmapped feature east of the proposed stockpile – this work will help ORCA determine appropriate setback limits to the watercourse feature and may inform water crossing permit requirements (re: sizing). Some field work has already taken place – stream is ephemeral and some of the field visits as noted in prior communication from WSP may not be required as the feature will be dry most of the year
  - ELC to inform wetland boundary delineation (seasonal timing is key – we are approaching the appropriate field work window) – Jasmine please comment/confirm. This does not mean that further OWES work is not required down the road

At this point, we will rely on the field work of WSP to delineate site constraints surrounding the stockpile area and the best possible location for the watercrossing. Once mapping is complete and additional consideration has been put into a location for the access to the stockpile I recommend that we reconvene to continue the pre-consultation process.

Did I miss anything? I think this paves a smooth path forward. If there are any questions or clarifications do not hesitate to reach out. Jasmine please follow up with me regarding the terms they had presented as it relates to the above when you can find the chance/opportunity.

**Don Allin**
Planning and Development Officer
Otonabee Region Conservation Authority
705-745-5791 x225


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**From:** Jasmine Gibson <jgibson@otonabeeconservation.com>
**Sent:** April 14, 2021 4:39 PM
**To:** Rodo, Jaclyn <Jaclyn.Rodo@wsp.com>
**Cc:** Donald Allin <dallin@otonabeeconservation.com>; Matt Wilkinson <mwilkinson@otonabeeconservation.com>; Neil MacFarlane <nmacFarlane@otonabeeconservation.com>
**Subject:** Peterborough Landfill - Site Inquiry, re: opening cell 4 (PGCO-707)

Hi Jaclyn,

I hope this email finds you well. Don forwarded me the email below and I have a couple of comments and questions for you before confirming the Terms of Reference.

I can confirm that there is a watercourse/drainage feature (intermittent or ephemeral) as well as wetland features within the study area. There are NHIC occurrence squares for eastern meadowlark and bobolink, as well as painted and snapping turtle.

Based on the draft site plan provided, can the stockpile area be located to the east of the drainage feature? How will the proposed stockpile area be accessed – through the wetland/regulated features? How high will the pile be and is it permanent? If the proposal can be located outside of the regulated features an Otonabee Conservation permit may not be required.

Does the proposal require Planning Act approvals, e.g., Site Plan?

I have copied other staff that may be involved on this project; thanks.

FYI – I am off work tomorrow and Friday. So if we need to chat let’s defer until next week, otherwise I will wait for your response.

Regards,
Jasmine

Otonabee CONSERVATION

**Jasmine Gibson**
Planning Ecologist
Otonabee Region Conservation Authority
250 Milroy Drive, Peterborough, ON, K9H 7M9
705-745-5791 x233
jgibson@otonabeeconservation.com


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**ARE YOU PLANNING AN UPCOMING CONSTRUCTION PROJECT ON YOUR PROPERTY?** Submit a Property Inquiry Form so we can help you understand how natural hazards may affect your property.



---

**From:** Rodo, Jaclyn <Jaclyn.Rodo@wsp.com>
**Sent:** Monday, March 29, 2021 3:24 PM
**To:** Donald Allin <dallin@otonabeeconservation.com>
**Subject:** Peterborough Landfill - Site Inquiry

Hi Don,

WSP is working with the City of Peterborough to support opening up Cell 4 of the existing landfill area of Bensfort Road. As part of this, they will be removing existing native material from Cell 4 and would like to stockpile it to the north, adjacent to a wetland feature. I've 'sketched' the approximate location of cell 4 and the stockpile area on the County's mapping (attached) for reference. Imagery also indicates a drainage feature to the east, although is not mapped as a watercourse or area regulated by ORCA. I have been pulled into the project team to complete an Environmental Impact Study (EIS).

There are two parts to this email, the first I am requesting any relevant information for this site, particularly for the wetland, drainage feature and sensitive (locally rare) species that should be consider as part of an EIS. If ORCA can kindly provide this, it would be greatly appreciated.

The second part, we would like to have ORCA review and confirm the Scope of Work for the EIS. I have provided a point form summary below of our intended scope of work.

Scope of Work:

- Review background information (Lands Information Ontario mapping, NHIC database, iNaturalist and eBird)
- Agency consultation (ORCA, MECP, MNRF)
- Field Assessments
  - Breeding Bird Surveys (2 visits between May and July)
  - Amphibian Surveys (3 visits between April and June)
  - Botanical Survey and Ecological Land Classification (ELC) mapping (1 visit between May and July)
  - Headwater Drainage Assessment of the ‘drainage feature’ (1 visit in April, 2 visits in June)
    - This includes 1 overnight set of minnow traps if standing water is present.
  - Species at Risk and Significant Wildlife Habitat screening (1 visit)
- Preparation of an EIS report. The report will document background information, agency consultation and field assessments, speak to provincial and local policies as it relates to Natural Heritage Features, identify potential impacts, and outline mitigation strategies.

If you can kindly provide background information site, and comment on the scope of work, it would be greatly appreciated.

If you have any questions, do not hesitate to contact me.

Thank you!

**Jaclyn Rodo**
Ecologist

M 705 761 7792

294 Rink Street, Suite 103
Peterborough, Ontario K9J 2K2

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prière de le transférer au conformitelcap@wsp.com afin que nous puissions rapidement traiter votre demande. Notez que ce ne sont pas tous les messages transmis par WSP qui constituent des messages electroniques commerciaux.

-LAEmHhHzdJzBlTWfa4Hgs7pbKI

## Rodo, Jaclyn

**From:** Rodo, Jaclyn
**Sent:** July 12, 2021 3:46 PM
**To:** Species at Risk (MECP)
**Subject:** Property Inquiry - Peterborough Landfill
**Attachments:** Study Area.jpg

Good afternoon,

WSP is working with the City of Peterborough to support opening up Cell 4 of the existing landfill area of Bensfort Road, within Part Lot 16, Concession 14, Geographic Township of Otonabee, County of Peterborough.

We have completed a background review which has revealed potential for various Species at Risk, including, Eastern Meadowlark, Bobolink, Eastern Painted Turtle and Snapping Turtle.

Can you please indicate any additional Species at Risk which should be considered as part of our impact study.

Thank you,

**Jaclyn Rodo**
Ecologist

M 705 761 7792

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Peterborough, Ontario K9J 2K2

## Rodo, Jaclyn

**From:** Rodo, Jaclyn
**Sent:** October 7, 2021 1:10 PM
**To:** Species at Risk (MECP)
**Subject:** FW: City of Peterborough Landfill - Project Review
**Attachments:** October Photos.pdf

Good afternoon,

Since my email below, I've completed one additional visit to the site for a separate matter. When on site, I discovered that the southern field (delineated in blue; appended figure) had been cut as part of routine agricultural maintenance. In speaking with the landowner, I understand this field is cut in June and again in August every year. I also inspected the vegetation from the cut field to discover that its composition differs slightly from the field to the north. The southern field is comprised mainly of forb species, oppose to graminoid typical of Bobolink and Eastern Meadowlark habitat.

The northern field (delineated in pink; appended figure) does have a higher composition of graminoid species; however, is used as a cow pasture between spring and fall. Cows were present during the October 7th visit (i.e. located next to the tower).

Two photos of each field had been added to the appended figure for reference.

Thank you,

**Jaclyn Rodo**
Ecologist

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---

**From:** Rodo, Jaclyn
**Sent:** September 22, 2021 3:40 PM
**To:** 'Species at Risk (MECP)' <SAROntario@ontario.ca>
**Subject:** City of Peterborough Landfill - Project Review

Good afternoon,

WSP has prepared the attached letter which provides details related to both Bobolink and Eastern Meadowlark occurrence within a study area located south of the City of Peterborough. I am familiar with registration process; however, am asking that the MECP review the details of the letter to determine if formal authorization is required in this case. Impacts to (potential) habitat will last approximately 13 years, after which time the area will be restored. Measures to protect both Bobolink and Eastern Meadowlark individuals are also contained within this letter.

After your review, I would appreciate an opportunity to discuss this project further.

Thank you,

**Jaclyn Rodo**
Ecologist

M  705 761 7792

294 Rink Street, Suite 103
Peterborough, Ontario K9J 2K2

2021-09-22

Ministry of the Environment, Conservation and Parks
Ontario

**Subject: Creation of stockpile area adjacent to the City of Peterborough's existing Bensfort Road Landfill**

***Eastern Meadowlark and Bobolink Habitat Review***

To whom it may concern:

WSP Canada Inc. (WSP) has been retained by the City of Peterborough (the City) to support opening Cell 4 of the Peterborough landfill, located at 1260 Bensfort Rd within the Township of Otonabee-South Monaghan. As a measure to prepare for this, the City intends to remove the top layer of native material of Cell 4 and stockpile the material temporarily to the north. The City will draw material from the stockpile to slowly cover waste deposited within the Cell 4 area. The specific footprint of the stockpile area has not yet been determined; therefore, two conceptual footprints have been presented within this letter – Option 1 and Option 2. Option 2 is preferred for logistical reasons and Option 1 was presented with the intention to avoid potential Category 1 Bobolink habitat. Both options also consider 15 m setbacks from the forest and wetland (swale) communities identified on the site. The maximum stockpile footprint area is 4.1 ha and will occur within one or portions of both footprints.

The final stockpile area is anticipated to have a life of approximately 13 years.

# 1 SITE DESCRIPTION

The subject lands occur north of the existing landfill and occur within the Township of Otonabee-South Monaghan and southern half of the County of Peterborough, which has a landscape dominated by agricultural lands (Google Earth, 2020; Figure 1 below).


**Figure 1: Aerial imagery (Google Earth, 2020) of the Bensfort Landfill and surrounding area.**

Ecological Land Classification (ELC) completed for the study area confirmed a Dry-Moist Old Field Meadow Type (CUM1-1) within the outermost limit of the stockpile area, as well as the area south of Baseline Road, and from the area east of the swale to the edge of the disturbed area (as visible in Figure 1, attached). The CUM1-1 community contained a mix of Timothy (*Phleum pratense*), Orchard Grass (*Dactylis glomerata*), Smooth Brome (*Bromus inermis*), Alfalfa (*Medicago sativa*), Annual Fleabane (*Erigeron annuus*), and Red Clover (*Trifolium pratense*). The area east of CUM1-1 unit and west of Bensfort Rd is Open Pasture (OAGM4) type, which was described as being reminiscent of a hay field (D.M. Wills Associates Ltd.; 2020).

A Fresh-moist Sugar Maple – Lowland Ash Deciduous Forest Type (FOD6-1) was identified to the west of the site, and a hedgerow in the south separates the site from the existing landfill (Figure 1, attached).

# 2 METHODOLOGY

As part of the impact assessment study to support the creation of the stockpile area, WSP completed various natural environment surveys, including a targeted survey for Eastern Meadowlark *(Sturnella magna)* and Bobolink (*Dolichonyx oryzivorus*). This survey was conducted in accordance with the Survey Protocol for Eastern Meadowlark (*Sturnella magna*) in Ontario (MNRF, 2013) in order to document the presence or absence of both species within and adjacent to the stockpile area.

As per the provincial protocol, surveys were completed:

- by a qualified wildlife ecologist;
- between May 21st and July 3rd, during the survey window suitable to document both Eastern Meadowlark and Bobolink;
- during a period of little to no wind or precipitation, and high visibility;
- on three (3) separate occasions (May 27, June 18 and July 3, 2021), with seven (7) to ten (10) days between each survey;
- a minimum of 400 m apart, such that each survey point adequately captured a 200 m radius or an area of 12.6 ha;
- at or within 4 hours of sunrise and for 10 minutes at each station;
- such that a compass bearing reading was taken to adequately place the location of each detected individual; and,
- such that breeding behaviour of each individual was noted.

The stockpile footprint area is represented by an approximate maximum area of 4.1 ha, and approximately 250 m across at its widest location. A single survey station was located centrally within the proposed stockpile area in order to detect birds within the site and surrounding lands.

# 3 SURVEY RESULTS

The results from the Bobolink and Eastern Meadowlark surveys are summarized in the table below.

**Table 1: Survey Results.**

| | MAY 27, 2021 | JUNE 18, 2021 | JULY 3, 2021 |
|---|---|---|---|
| Weather | 11°C, partly cloudy, no precipitation, light breeze | 16°C, partly cloudy, no precipitation, no wind | 14°C, partly cloudy, no precipitation, no wind |
| Bobolink Observations | 1 adult male detected perched on top of grass.<br>Breeding Behaviour: Suitable Habitat (H) | 4 adult males observed flying approximately 80-110 m north of site.<br>Breeding Behaviour: Territory (T) for at least 1 individual | |
| Eastern Meadowlark Observations | | 1 adult singing from forest west of site & 1 adult singing from east of site<br>Breeding Behaviour: Suitable Habitat (H) | 1 adult singing more than 250 m east of the site<br>Breeding Behaviour: Territory (T) |

A maximum of four (4) Bobolink and two (2) Eastern Meadowlark individuals were detected per survey round and the locations are depicted on Figure 1 (attached). It is noted that each observation location is represented by a polygon (i.e. circle with 40 m diameter), rather than a point. In following the protocol, the area was not inspected to confirm the specific location of any nests, therefore these locations represent the approximate area of species *observations* and not necessarily nest locations.

# 4 DISCUSSION

Bobolink and Eastern Meadowlark were confirmed within and adjacent to the proposed stockpile areas during the 2021 survey. The observation locations (i.e. circle with 40 m diameter) have been identified for each bird as the *potential* nesting areas. From each of these locations, Category 1, 2 and 3 habitat areas have been delineated to assess the potential impacts of the stockpile footprint and associated construction disturbances. The habitat categories differ among species and are summarized in Table 2, below.

**Table 2: Species tolerance to alteration.**

| | EASTERN MEADOWLARK | BOBOLINK |
|---|---|---|
| Category 1 | Nest and within 10 m of the nest are highly sensitive to alteration. | Nest and within 10 m of the nest are highly sensitive to alteration. |

| | EASTERN MEADOWLARK | BOBOLINK |
|---|---|---|
| Category 2 | Within 10 m and 100 m of the nest has a moderate level of tolerance to alteration. | Within 10 m and 60 m of the nest has a moderate level of tolerance to alteration. |
| Category 3 | Within 100 m and 300 m has a high level of tolerance to alteration. | Within 60 m and 300 m has a high level of tolerance to alteration. |

The two stockpile areas options have been depicted on Figure 1 and together represent the outermost area of where the stockpile area will be placed when the final footprint requirement is identified. Option 2 is the preferred option due to the logistical nature of the operation (i.e. with fewer angles). Option 1 has been proposed as an alternative to avoid impacts on Category 1 Bobolink habitat and would be considered if this allows the proponent to proceed without an ESA authorization.

The following table summarizes the footprint of each option with respect to the *potential* habitat categories (note that these are estimated areas based on species observation locations, not based on precise nest locations).

**Table 3: Potential impact to Eastern Meadowlark and Bobolink Habitat types.**

| | EASTERN MEADOWLARK | BOBOLINK |
|---|---|---|
| Category 1 | No Impacts | Option 1: 0 ha<br>Option 2: 0.28 ha |
| Category 2 | No Impacts | Option 1: 0.84 ha<br>Option 2: 1.2 ha |
| Category 3 | Option 1: 3.6 ha<br>Option 2: 4.1 ha | Option 1: 2.7 ha<br>Option 2: 2.5 ha |

As the CUM1-1 community is contiguous across the fields north of the existing landfill and within both Options 1 and 2, it is presumed that although a quantitative loss has been identified in Table 3, above, the entire area can support nesting habitat. Upon reviewing eBird for current (i.e. 2020-2021) records, it is evident that the southern half of the County of Peterborough, including the area immediately surrounding the site has no shortage of habitat opportunities for both Eastern Meadowlark and Bobolink (Appendix A).

It is of WSP’s opinion that upon employment of measures to avoid direct impacts to Eastern Meadowlark and Bobolink individuals, there will be no impact to the overall populations or habitat availability in the area.

The following mitigation measures will be implemented by the City:

- The area of disturbance and stockpile area should remain as small as possible.

- Vegetation removal or any disturbance within the CUM1-1 habitat will occur outside of the nesting period (April 1st – July 31st), until such time that the area is no longer considered habitat.
- Where an Eastern Meadowlark, Bobolink or other Species at Risk individual(s) is identified within the work area and doesn't leave on its own, works will cease immediately and the MECP Species at Risk branch will be contacted for direction. The species will not be handled.
- Where possible, portions or the entire stockpile area should be restored to pre-disturbance conditions and enhanced with native grass seed mix known to reach a height of at least 50 cm. The seeding rate should provide for 60% to 80% coverage.

# 5 CLOSURE

This memo was prepared by WSP Canada Inc. The assessment represents the conditions at the subject property only at the time of the assessment and is based on the information referenced and contained herein. The conclusions presented respecting current conditions represent the best judgment of the assessors based on current environmental standards. WSP Canada Inc. attests that to the best of our knowledge, the information presented in this report is accurate. The information in this report should be evaluated, interpreted, and implemented only in the context of the assignment. The use of this memo or any of its parts for other projects without written permission of the Client and WSP Canada Inc. is solely at the user's own risk. This report must be reviewed and approved by the relevant regulating agencies prior to being relied on for planning and/or construction purposes.

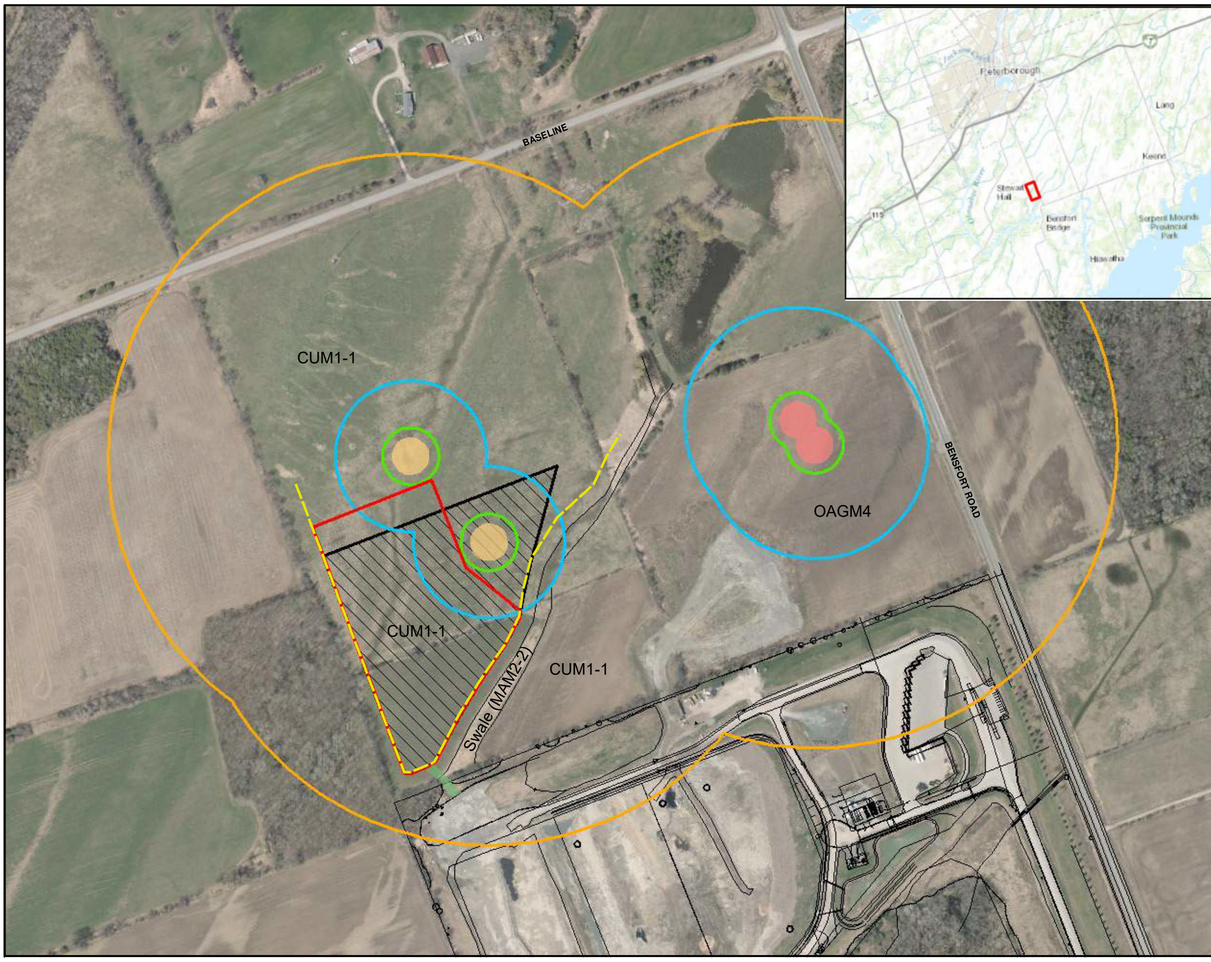
We trust that this information is satisfactory for your current requirements. Please contact us if we can be of further assistance.

Yours truly,

Jaclyn Rodo, B.Sc.
Ecologist

WSP ref.: 211-08069-00

# FIGURES




**LEGEND**

- APPROXIMATE BOBOLINK LOCATION
- APPROXIMATE LOCATION OF EASTERN MEADOWLARK
- CATEGORY 1 HABITAT
- CATEGORY 2 HABITAT
- CATEGORY 3 HABITAT
- SETBACKS
- POTENTIAL STOCKPILE 1 (35,779.3 sq.m.)
- POTENTIAL STOCKPILE 2 (40,582.1 sq.m.)
- POTENTIAL ACCESS ROUTE

40 20 0 40 Metres

CLIENT:
CITY OF PETERBOROUGH

PROJECT:
WEST STOCKPILE AREA ECOLOGICAL STUDY
PETERBOROUGH LANDFILL

| PROJECT NO: | DATE: |
|---|---|
| 211-08069-00 | SEPTEMBER 2021 |

DESIGNED BY:
-

DRAWN BY:
TP

CHECKED BY:
-

| FIGURE NO: | SCALE: |
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TITLE:
HABITAT AREA

DISCIPLINE:
ENVIRONMENT

ISSUE:

Document Path: D:\aProjects\211-08069-00\MXD\211-08069-00 Figure 2 Habitat Area.mxd

# APPENDIX

# A

## EBIRD SEARCH RESULTS

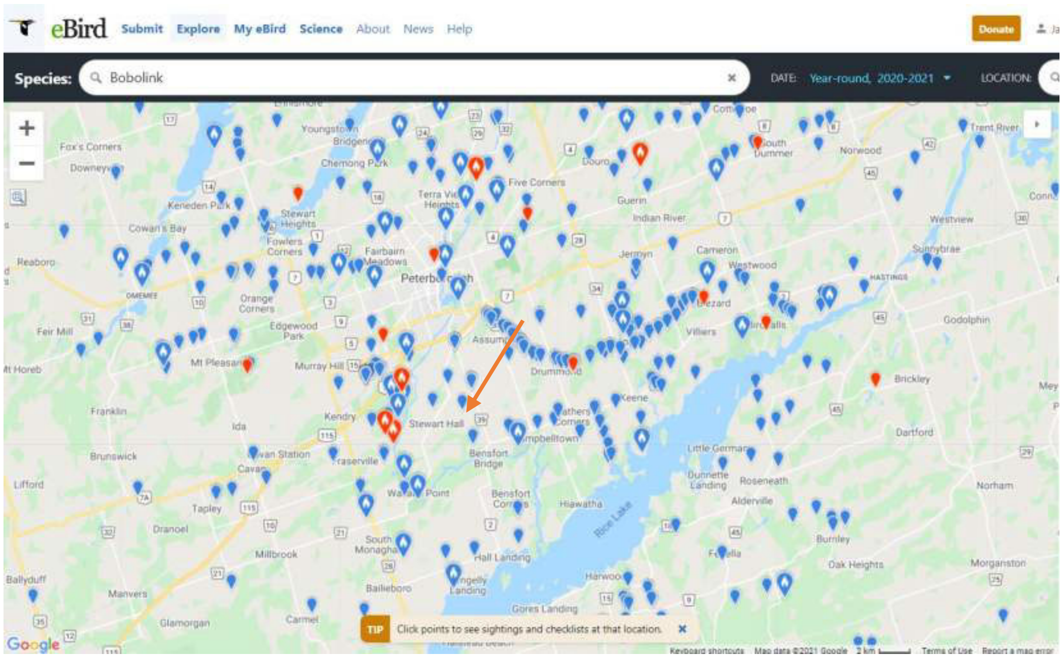



*Figure 1: Bobolink observations (2020-2021) within the surrounding area. The orange arrow points to the approximate location of the site.*

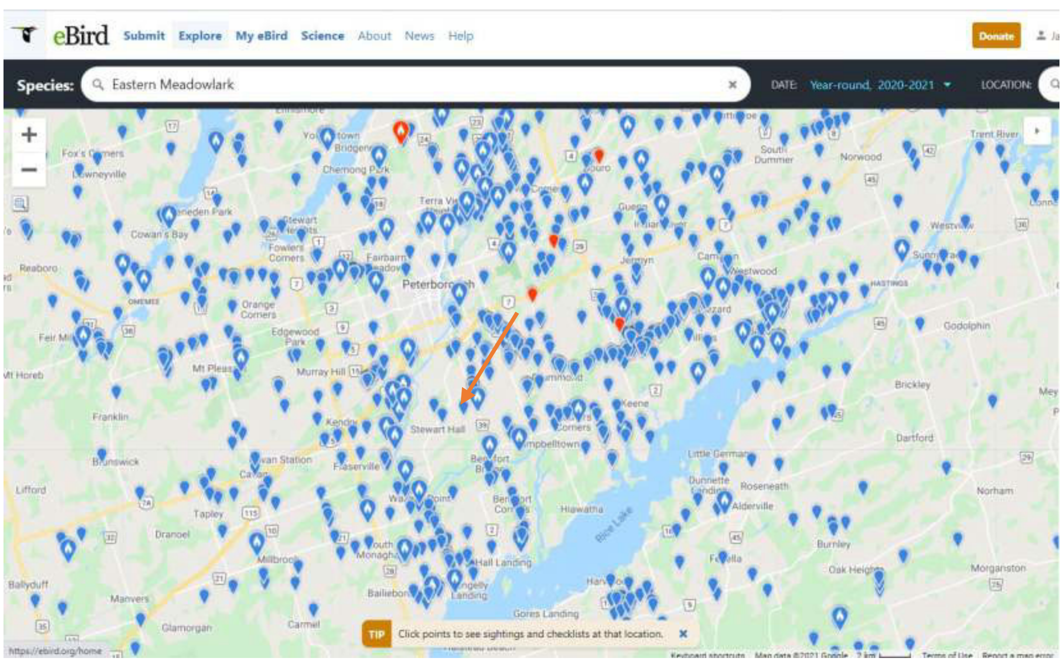
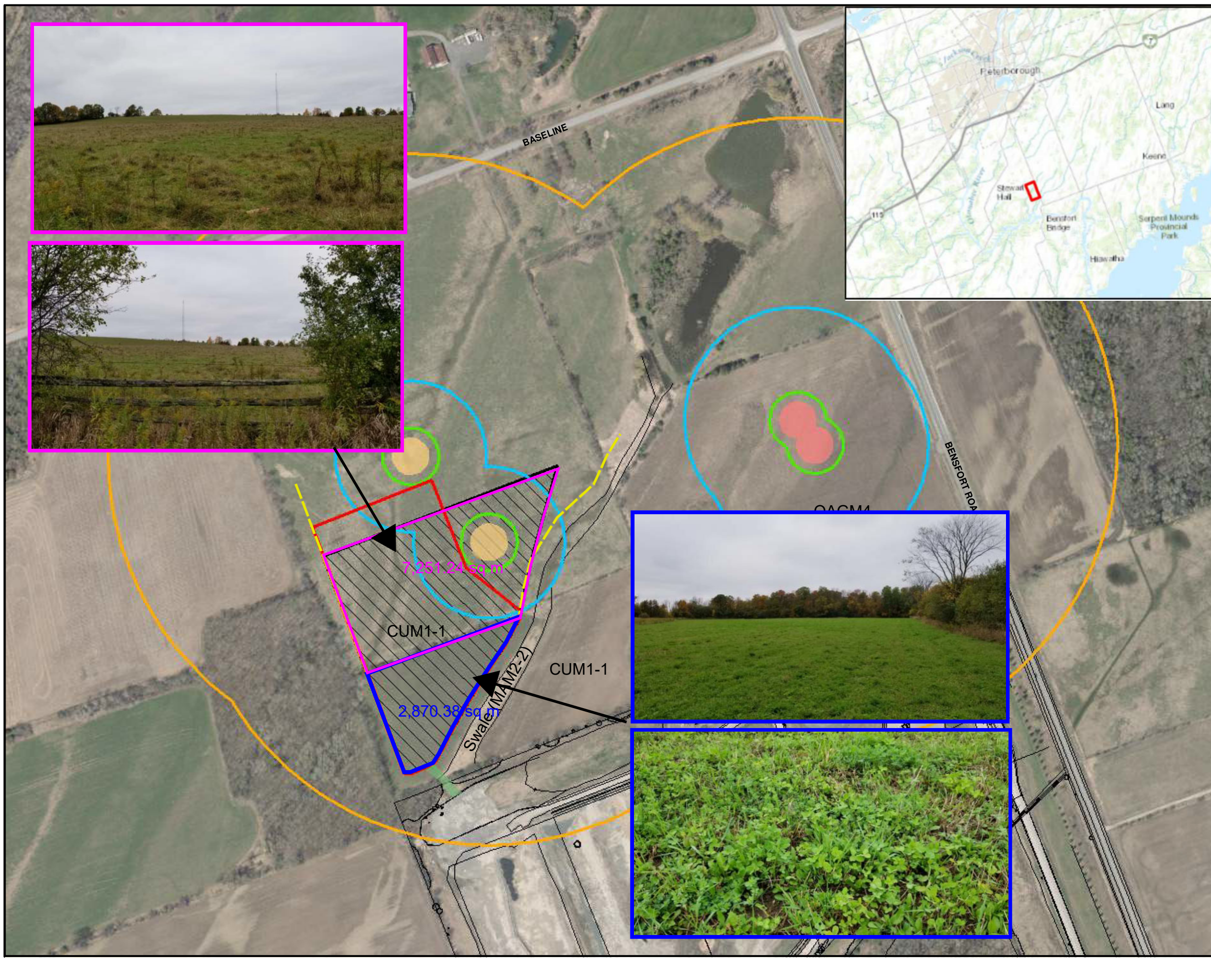



*Figure 2: Eastern Meadowlark observations (2020-2021) within the surrounding area. The orange arrow points to the approximate location of the site.*




**LEGEND**

- APPROXIMATE BOBOLINK LOCATION
- APPROXIMATE LOCATION OF EASTERN MEADOWLARK
- CATEGORY 1 HABITAT
- CATEGORY 2 HABITAT
- CATEGORY 3 HABITAT
- SETBACKS
- POTENTIAL STOCKPILE 1 (35,779.3 sq.m.)
- POTENTIAL STOCKPILE 2 (40,582.1 sq.m.)
- POTENTIAL ACCESS ROUTE

40 20 0 40 Metres

CLIENT:
CITY OF PETERBOROUGH

PROJECT:
WEST STOCKPILE AREA ECOLOGICAL STUDY
PETERBOROUGH LANDFILL

| PROJECT NO: | DATE: |
|---|---|
| 211-08069-00 | SEPTEMBER 2021 |

DESIGNED BY: -

DRAWN BY: TP

CHECKED BY: -

| FIGURE NO: | SCALE: |
|---|---|
| 1 | 1:4,000 |

TITLE:
HABITAT AREA

DISCIPLINE:
ENVIRONMENT

ISSUE:

Document Path: D:\aProjects\211-08069-00\MXD\211-08069-00 Figure 2 Habitat Area.mxd

## Rodo, Jaclyn

**From:** Rodo, Jaclyn
**Sent:** November 2, 2021 11:15 AM
**To:** Charette, Monique (MNR) (monique.charette@ontario.ca)
**Subject:** RE: City of Peterborough Landfill - Project Review

Hi Monique,

Thank you for speaking with me this morning - I really appreciate it.

Below I have summarized the main points from our conversation as a way to keep a record for our client.

From what I understand, the MECP's role does not include identifying or confirming the need to Register an activity. Rather, the process is proponent-led and typically involves a consultant to help determine whether the activity should be Registered.

You directed me to an online document (Categorizing and Protecting Habitat under the Endangered Species Act; https://www.ontario.ca/page/categorizing-and-protecting-habitat-under-endangered-species-act) to help determine if the activity is likely to damage or destroy habitat protected under subsection 10(1) of the Endangered Species Act.

I understand that if we are able to make a supportive determination that the activity will not impair or eliminate the habitat, we do not need to Register the activity. In your email from October 12, 2021 (below) you indicate you agree with our opinion that there is no shortage of Bobolink and Eastern Meadowlark habitat in the area, the presented mitigation measures, and determination that there would likely be no impact to the overall population and habitat availability.

I will include a record of our determination and rationale in the Environmental Impact Study as a formal record.

Thank you again for your time.

Regards,

**Jaclyn Rodo**
Ecologist

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---

**From:** Rodo, Jaclyn
**Sent:** November 1, 2021 2:58 PM
**To:** Species at Risk (MECP) <SAROntario@ontario.ca>
**Subject:** RE: City of Peterborough Landfill - Project Review

Hi Monique,

You can call me on my direct line (705-270-0178) at 10am.

Thanks!

**Jaclyn Rodo**
Ecologist

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---

**From:** Species at Risk (MECP) <SAROntario@ontario.ca>
**Sent:** November 1, 2021 2:56 PM
**To:** Rodo, Jaclyn <Jaclyn.Rodo@wsp.com>
**Subject:** RE: City of Peterborough Landfill - Project Review

Hi Jaclyn,

I can call you at 10am tomorrow if that still works for you. Should I call your cell phone?

Monique

---

**From:** Rodo, Jaclyn <Jaclyn.Rodo@wsp.com>
**Sent:** November 1, 2021 10:40 AM
**To:** Species at Risk (MECP) <SAROntario@ontario.ca>
**Subject:** RE: City of Peterborough Landfill - Project Review



That's great. I am available anytime between 9 am and 3 pm.
Let me know what works best for you.

**Jaclyn Rodo**
Ecologist

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---

**From:** Species at Risk (MECP) <SAROntario@ontario.ca>
**Sent:** November 1, 2021 8:31 AM
**To:** Rodo, Jaclyn <Jaclyn.Rodo@wsp.com>
**Subject:** RE: City of Peterborough Landfill - Project Review

Hi Jaclyn,

I am available tomorrow if you are free to talk.

Monique

**From:** Rodo, Jaclyn <Jaclyn.Rodo@wsp.com>
**Sent:** October 25, 2021 9:19 AM
**To:** Species at Risk (MECP) <SAROntario@ontario.ca>
**Cc:** Charette, Monique (MECP) <monique.charette@ontario.ca>
**Subject:** RE: City of Peterborough Landfill - Project Review

**CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.**

Hi Monique,

Is there a time we can connect and have a quick discussion related to this?

Let me know what works best for you.

Thanks,

**Jaclyn Rodo**
Ecologist

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**From:** Rodo, Jaclyn
**Sent:** October 12, 2021 3:33 PM
**To:** Species at Risk (MECP) <SAROntario@ontario.ca>
**Subject:** RE: City of Peterborough Landfill - Project Review

Hi Monique,

Thank you very much for the quick response.

I am familiar with the proponent-led process under O. Reg. 242/08; however, would like to determine if we can proceed without registering the activity in this case.

Bobolink was detected in the field to the north. Should individuals attempt to nest in this field, there is potential grazing cattle may disrupt the nest/eggs/young.

Providing the mitigation measures presented in the letter are implemented, can we proceed without registering the activity as per O. Reg. 242/08? Our client relies on us to provide direction in terms of limiting impacts and ensuring compliance with applicable regulations. I am interested to know what you mean by "…it is up to the proponent to decide whether they want to register their activity or not". I was always under the impression there was no choice.

Any additional direction you can provide would be greatly appreciated.

Thank you,

**Jaclyn Rodo**
Ecologist

T +1 705-270-0178
M +1 705 761 7792

**From:** Species at Risk (MECP) <SAROntario@ontario.ca>
**Sent:** October 12, 2021 3:09 PM
**To:** Rodo, Jaclyn <Jaclyn.Rodo@wsp.com>
**Subject:** RE: City of Peterborough Landfill - Project Review

Good afternoon,

I have reviewed the Eastern Meadowlark and Bobolink Habitat Review document provided on September 22, 2021 and agree with your opinion that there is no shortage of habitat for both species in the immediate area surrounding the site. I also agree that provided the recommended mitigation measures are followed, there likely would be no impact to the overall populations and habitat availability in the area.

I have also reviewed the new information provided on October 7, 2021. It is my understanding that the northern field consists of more suitable habitat then the southern field which has been cut. Based on the information provided, it appears that the activity may be eligible for an exemption under O. Reg. 242/08. As this is a proponent-led process, it is up to the proponent to decide whether they want to register their activity or not. It is also the responsibility of the proponent to ensure that they meet the eligibility requirements of the exemption. Should they determine that the activity is not eligible for registration, an authorization may be required under the *Endangered Species Act, 2007*.

Please let me know if you would like to discuss this further.

***Monique Charette***
Management Biologist
Ministry of the Environment, Conservation and Parks
Permissions and Compliance Section
Species At Risk Branch
(613) 583-3162
Monique.charette@ontario.ca

**From:** Rodo, Jaclyn <Jaclyn.Rodo@wsp.com>
**Sent:** September 22, 2021 3:40 PM
**To:** Species at Risk (MECP) <SAROntario@ontario.ca>
**Subject:** City of Peterborough Landfill - Project Review



Good afternoon,

WSP has prepared the attached letter which provides details related to both Bobolink and Eastern Meadowlark occurrence within a study area located south of the City of Peterborough. I am familiar with registration process; however, am asking that the MECP review the details of the letter to determine if formal authorization is required in this case. Impacts to (potential) habitat will last approximately 13 years, after which time the area will be restored. Measures to protect both Bobolink and Eastern Meadowlark individuals are also contained within this letter.

After your review, I would appreciate an opportunity to discuss this project further.

Thank you,

**Jaclyn Rodo**
Ecologist

M  705 761 7792

294 Rink Street, Suite 103
Peterborough, Ontario K9J 2K2

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# APPENDIX

# C SAR SCREENING

APPENDIX C
Peterborough Landfill Stockpile Area

Species at Risk Screening

| | Species | Reasonable Likelihood of Presence in Study Area | Surveys Undertaken | Results of Field Surveys | Likelihood and Magnitude of Impacts to Species or Habitat |
|---|---|---|---|---|---|
| 1 | Bank Swallow (*Riparia riparia*) | Some potential: May be pits or soil storage piles on surrounding lands that offer nesting opportunities and species may forage over the Site. | Breeding bird and general | No observation | Minimal: Would have negligible effect should species forage over Site. |
| 2 | Barn Swallow (*Hirundo rustica*) | Some potential: May nest on nearby buildings or bridges and forage over the sites. | Breeding bird and general | 1 pair observed | Minimal: Would have negligible effect on foraging. |
| 3 | Bobolink (*Dolichonyx oryzivorus*) | Moderate potential: Field north of the Site provides 15ha of continuous grassland within an agricultural matrix where woody growth is controlled by grazing cattle. | Bobolink/Eastern Meadowlark, breeding bird and general | 1 and 4 males seen approx. 80m & 190m north of north HR. | Moderate: A small portion of the contiguous meadow within 300 m of potential sighting locations will be removed (Figure 3). |
| 4 | Chimney Swift (*Chaetura pelagica*) | Some potential: May be chimneys beyond study area that offer nesting opportunities and species may forage over the Site. | Breeding bird and general | No observation | Minimal: Would have negligible effect should species forage over the Site. |
| 5 | Eastern Meadowlark (*Sturnella magna*) | Moderate potential: Field north of the Site provides 15ha of continuous grassland within an agricultural matrix where woody growth is controlled by grazing cattle. | Bobolink/Eastern Meadowlark, breeding bird and general | Singing from beyond 250m at Study Area during 2 surveys. | Minimal: Though the Site may be within 300 m of a nest, a storage pile occurs between and it is therefore not continuous meadow. |
| 6 | Eastern Wood-pewee (*Contopus virens*) | Some potential: Forest west of the site one offers open understorey for foraging. | Breeding bird and general | 1 individual singing from the adjacent forest on June 18, 2021. | Minimal: Forest will not be removed but will be noise disturbance. |
| 7 | Grasshopper Sparrow (*Ammodramus savannarum*) | Some potential: May breed in 15ha field north of the Site. | Breeding bird and general | No observation | None: Not present. |
| 8 | Rusty Blackbird (*Euphagus carolinus*) | None: Would not breed here and forests at the sites are not suitable for migratory stopover. | Breeding bird and general | No observation | None: Not present. |
| 9 | Bald Eagle (*Haliaeetus leucocephalus*) | None: No habitat. | Breeding bird and general | No observation | None: Not present. |
| 10 | Wood Thrush (*Hylocichla mustelina*) | None: Forests are too young and disturbed to support this species. | Breeding bird and general | No observation | None: Not present. |
| 11 | Least Bittern (*Ixobrychus exilis*) | None: No habitat. | Breeding bird and general | No observation | None: Not present. |
| 12 | Golden-winged Warbler (*Vermivora chrysoptera*) | None: Early successional habitat is too small to support the species (needs to be >10ha [OMNR 2000]) | Breeding bird and general | No observation | None: Not present. |
| 13 | Common Nighthawk (*Chordeiles minor*) | Some potential: May be flat roofs that offer nesting opportunities and species may forage over the Site. | Breeding bird and general | No observation | Minimal: Would have negligible effect should species forage over the Site. |
| 14 | Monarch (*Danaus plexippus*) | High potential/confirmed: Meadows with foraging and breeding host plants at the site. | General habitat assessment | Observed within the Site. | Minimal: Ample foraging and breeding habitat is |

| | Species | Reasonable Likelihood of Presence in Study Area | Surveys Undertaken | Results of Field Surveys | Likelihood and Magnitude of Impacts to Species or Habitat |
|---|---|---|---|---|---|
| | | | | | available in surrounding area. |
| 15 | Little Brown Bat (Little Brown Myotis) (*Myotis lucifugus*) | Moderate: Trees within the adjacent treed habitat may support maternity roost habitat. | General habitat assessment | No observation | None: Proposed activities will not alter the adjacent treed habitat (i.e. possible maternity roosting location), and trees within the hedgerow were determined to be unsuitable. |
| 16 | Northern Long-eared Bat (Northern Myotis) (*Myotis septentrionalis*) | Moderate: Trees within the adjacent treed habitat may support maternity roost habitat. | General habitat assessment | No observation | None: Proposed activities will not alter the adjacent treed habitat (i.e. possible maternity roosting location), and trees within the hedgerow were determined to be unsuitable. |
| 17 | Small-footed Bat (*Myotis leibii*) | Moderate: Trees within the adjacent treed habitat may support maternity roost habitat. | General habitat assessment | No observation | None: Proposed activities will not alter the adjacent treed habitat (i.e. possible maternity roosting location), and trees within the hedgerow were determined to be unsuitable. |
| 18 | Woodland Vole (*Microtus pinetorum*) | None: Restricted to Carolinian zone to west | General habitat assessment | No observation | None: Not present. |
| 19 | Tri-colored Bat (*Perimyotis subflavus*) | Moderate: Trees within the adjacent treed habitat may support maternity roost habitat. | General habitat assessment | No observation | None: Proposed activities will not alter the adjacent treed habitat (i.e. possible maternity roosting location), and trees within the hedgerow were determined to be unsuitable. |
| 20 | Butternut (*Juglans cinerea*) | None: This species was not observed. | General habitat assessment | No observation | Minimal: Was not observed. |
| 21 | Midland Painted Turtle (*Chrysemys picta marginata*) | None: Insufficient aquatic habitat for turtles in, and around, study area | General habitat assessment | No observation | None: Not present. |
| 22 | Snapping Turtle (*Chelydra serpentina*) | Low: The MAM2-2 within the Study Area is an ephemeral feature and does not provide optimal habitat for this species. | General habitat assessment | No observation | None: Not present. |

| | Species | Reasonable Likelihood of Presence in Study Area | Surveys Undertaken | Results of Field Surveys | Likelihood and Magnitude of Impacts to Species or Habitat |
|---|---|---|---|---|---|
| 23 | Northern Map Turtle (*Graptemys geographica*) | None: The MAM2-2 within the Study Area is an ephemeral feature and does not provide optimal habitat for this species. | General habitat assessment | No observation | None: Not present. |
| 24 | Blanding's Turtle (*Emydoidea blandingii*) | Low: The MAM2-2 within the Study Area is an ephemeral feature and does not provide optimal habitat for this species. | General habitat assessment | No observation | None: Not present. |
| 25 | Western Chorus (*Plestiodon fasciatus*) | Low: The MAM2-2 habitat has potential to support this species; however, was not detected during the 2021 amphibian surveys. | General habitat assessment | No observation | None: Not present. |
| 26 | Eastern Musk Turtle (*Sternotherus odoratus*) | Low: The MAM2-2 within the Study Area is an ephemeral feature and does not provide optimal habitat for this species. | General habitat assessment | No observation | None: Not present. |
| 27 | Loggerhead Shrike (*Lanius ludovicianus*) | None: Fields are too small (need to be >25ha [OMNR 2000]) | General habitat assessment | No observation | None: Not present. |
| 28 | Cerulean Warbler (*Setophaga cerulea*) | None: Forests are too small (need to be >100ha [OMNR 2000]) | General habitat assessment | No observation | None: Not present. |

OMNR 2000:

Ontario Ministry of Natural Resources. 2000. Significant Wildlife Habitat Technical Guide. Fish and Wildlife Branch, Wildlife Section. Science Development and Transfer Branch,

Southcentral Science Section. 151pp. + appendices.

# APPENDIX

# D SPECIES LISTS

*Table 1: Breeding Bird Survey Results*

| **Common Name** | ***Scientific Name*** | **Point Count 1:** Stockpile Area<br>**Point Count UTM:** 716206 m E/4900786 m | | | | | |
|---|---|---|---|---|---|---|---|
| | | May 27, 2021 | | June 18, 2021 | | July 3, 2021 | |
| | | # | BE* | # | BE* | # | BE* |
| American Crow | *Corvus brachyrhynchos* | 3 | H | 2 | SH | 8 | SH |
| American Goldfinch | *Spinus tristis* | | | | | 4 | SH |
| Barn Swallow | *Hirundo rustica* | | | 2 | SH | | |
| Black-capped Chickadee | *Poecile atricapillus* | 1 | SH | 1 | SH | 1 | SH |
| Blue Jay | *Cyanocitta cristata* | 1 | SH | | | | |
| Bobolink | *Dolichonyx oryzivorus* | | | 4 | SH | | |
| Eastern Meadowlark | *Sturnella magna* | | | 1 | SH | | |
| Eastern Wood-pewee | *Contopus virens* | | | 1 | SH | | |
| European Starling | *Sturnus vulgaris* | 2 | FY | 1 | SH | | |
| Great Crested Flycatcher* | *Myiarchus crinitus* | 1 | SH | | | 1 | SH |
| House Wren | *Troglodytes aedon* | 1 | SH | 1 | SH | 1 | SH |
| Northern Flicker | *Colaptes auratus* | | | | | 1 | SH |
| Red-tailed Hawk | *Buteo jamaicensis* | 1 | X | | | | |
| Red-winged Blackbird | *Agelaius phoeniceus* | 1 | SH | | | | |
| Savannah Sparrow | *Passerculus sandwichensis* | 1 | SH | 2 | SH | 2 | SH |
| Song Sparrow | *Melospiza melodia* | 1 | SH | 1 | SH | 3 | SH |

BE* = Breeding Evidence. See Breeding Evidence Codes table below.

**BREEDING EVIDENCE CODES**
**(From: Ontario Breeding Bird Atlas. 2001. Guide for Participants. Atlas Management Board, Federation of Ontario Naturalists, Don Mills)**

OBSERVED

X Species observed in its breeding season (no evidence of breeding). Presumed migrants should not be recorded.

POSSIBLE BREEDING

H Species observed in its breeding season in suitable nesting habitat.
S Singing male present, or breeding calls heard, in its breeding season in suitable nesting habitat.

PROBABLE BREEDING

P Pair observed in their breeding season in suitable nesting habitat.
T Permanent territory presumed through registration of territorial song on at least 2 days, a week or more apart, at the same place.
D Courtship or display between a male and a female or 2 males, including courtship feeding or copulation.
V Visiting probable nest site.
A Agitated behaviour or anxiety calls of an adult.
B Brood patch on adult female or cloacal protuberance on adult male.
N Nest-building or excavation of nest hole.

CONFIRMED BREEDING

DD Distraction display or injury feigning.
NU Used nest or egg shell found (occupied or laid within the period of the study).
FY Recently fledged young or downy young, including young incapable of sustained flight.
AE Adults leaving or entering nest site in circumstances indicating occupied nest.
FS Adult carrying faecal sac.
CF Adult carrying food for young.
NE Nest containing eggs.
NY Nest with young seen or heard.

APPENDIX D

*Table 2: Incidental Data – Birds*

| Common Name | Scientific Name | SRANK | SARO | Survey Date (2021) | | |
|---|---|---|---|---|---|---|
| | | | | May 27 | June 18 | July 3 |
| Alder Flycatcher | *Empidonax alnorum* | S5B | | | | |
| American Crow | *Corvus brachyrhynchos* | S5B | | | | 14 |
| American Goldfinch | *Spinus tristis* | S5B | | | | 3 |
| American Robin | *Turdus migratorius* | S5B | | | | |
| Baltimore Oriole | *Icterus galbula* | S4B | | | | |
| Barn Swallow | *Hirundo rustica* | S4B | THR | | | 2 |
| Black-capped Chickadee | *Poecile atricapillus* | S5 | | | | 1 |
| Blue Jay | *Cyanocitta cristata* | S5 | | | | 1 |
| Bobolink | *Dolichonyx oryzivorus* | S4B | THR | 1 | | |
| Brown-headed Cowbird | *Molothrus ater* | S5 | | | | |
| Chipping Sparrow | *Spizella passerina* | S5B | | | | |
| Common Yellowthroat | *Geothlypis trichas* | S5B, S3N | | | | |
| Eastern Kingbird | *Tyrannus tyrannus* | S4B | | | | |
| Eastern Meadowlark | *Sturnella magna* | S4B, S3N | THR | 1 | 1 | 1 |
| European Starling | *Sturnus vulgaris* | SNA | | | | 2 |
| Gray Catbird | *Dumetella carolinensis* | S5B, S3N | | | | |
| Great Blue Heron | *Ardea herodias* | S4 | | | | |
| Great Crested Flycatcher | *Myiarchus crinitus* | S5B | | | | 1 |
| Green Heron | *Butorides virescens* | S4B | | | | |
| Hairy Woodpecker | *Dryobates villosus* | S5 | | | | |
| House Wren | *Troglodytes aedon* | S5B | | | | |
| Mourning Dove | *Zenaida macroura* | S5 | | | | |
| Northern Cardinal | *Cardinalis cardinalis* | S5 | | | | |
| Osprey | *Pandion haliaetus* | S5B | | | | |
| Red-winged Blackbird | *Agelaius phoeniceus* | S4 | | | | |
| Savannah Sparrow | *Passerculus sandwichensis* | S5B, S3N | | | | |
| Song Sparrow | *Melospiza melodia* | S5B | | | | 1 |
| Swamp Sparrow | *Melospiza georgiana* | S5B, S4N | | | | |
| Turkey Vulture | *Cathartes aura* | S5B, S3N | | | | |
| Tree Swallow | *Tachycineta bicolor* | S4S5B | | | | 1 |
| American Woodcock | *Scolopax minor* | S4B | | | | |
| Yellow Warbler | *Setophaga petechia* | S5B | | | | |

*Table 3: Incidental Data – Other Taxa*

| Common Name | Scientific Name | SRANK | SARO |
|---|---|---|---|
| Eastern Gartersnake | *Thamnophis sirtalis sirtalis* | S5 | |
| Green Frog | *Lithobates clamitans* | S5 | |
| Coyote | *Canis latrans* | S5 | |
| Eastern Gray Squirrel | *Sciurus carolinensis* | S5 | |
| White-tailed Deer | *Odocoileus virginianus* | S5 | |
| Raccoon | *Procyon lotor* | S5 | |
| Calico Pennant | *Celithemis elisa* | S5 | |
| Clouded Sulphur | *Colias philodice* | S5 | |
| Common Green Darner | *Anax junius* | S5 | |
| Common Ringlet | *Coenonympha tullia* | S5 | |
| Common Whitetail | *Plathemis lydia* | S5 | |
| Common Wood-nymph | *Cercyonis pegala* | S5 | |
| Eastern Forktail | *Ischnura verticalis* | S5 | |
| Gypsy Moth | *Lymantria dispar* | SNA | |
| Hobomok Skipper | *Poanes hobomok* | S5 | |
| Meadowhawk sp. | *Sympetrum sp.* | n/a | |
| Monarch | *Danaus plexippus* | S2N,S4B | SC |
| Northern Crescent | *Phyciodes cocyta* | S5 | |
| Northern Pearly-Eye | *Lethe anthedon* | S5 | |
| Spring Azure | *Celastrina ladon* | SU | |
| Toothed Somberwing | *Euclidia cuspidea* | S4S5 | |
| Virginia Ctenucha Moth | *Ctenucha virginica* | S5 | |
| Widow Skimmer | *Libellula luctuosa* | S5 | |

**CODE: Provincial Species at Risk in Ontario (SARO) Designation and Natural Heritage Information Centre Status (S-Rank)**

**(From: Natural Heritage Information Centre Online Glossary of Terms)**

**SARO**

**SC (special concern)** - A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats (COSEWIC 2010).

**THR -** A wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction (COSEWIC 2010).

**S-Rank**

**S3 (vulnerable)** - Vulnerable in the province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation (NatureServe 2010).

**S4 (apparently secure)** - Uncommon but not rare in the province; some cause for long-term concern due to declines or other factors (NatureServe 2010).

**S5 (secure)** - Common, widespread, and abundant in the province (NatureServe 2010).

**S#S# (range rank)** - A numeric range rank (e.g., S2S3, S1S3) used to indicate the range of uncertainty about the exact status of a taxon or ecosystem type (NatureServe 2010).

**S#B (breeding) -** Conservation status refers to the breeding population of the species in the province (NatureServe 2010).

**S#N (nonbreeding)** - Conservation status refers to the non-breeding population of the species in the province (NatureServe 2010).

**SNA (not applicable)** - A conservation status rank is not applicable because the species is not a suitable target for conservation activities.

# APPENDIX

# E

## REPRESENTATIVE PHOTOGRAPHS

APPENDIX E

Peterborough Landfill Stockpile Area

**Site Photographs**

(Photos 1-5 taken October 7, 2021, and Photo 6 taken April 8, 2021.)

*Photo 1: CUM1-1 community: South of central hedgerow, facing north.*

*Photo 2: CUM1-1 community: At central hedgerow, facing north.*

*Photo 3: Central Hedgerow: facing northwest.*

*Photo 4: Poplar Deciduous Forest: facing northwest.*

# APPENDIX

# D

# LABORATORY TEST RESULTS

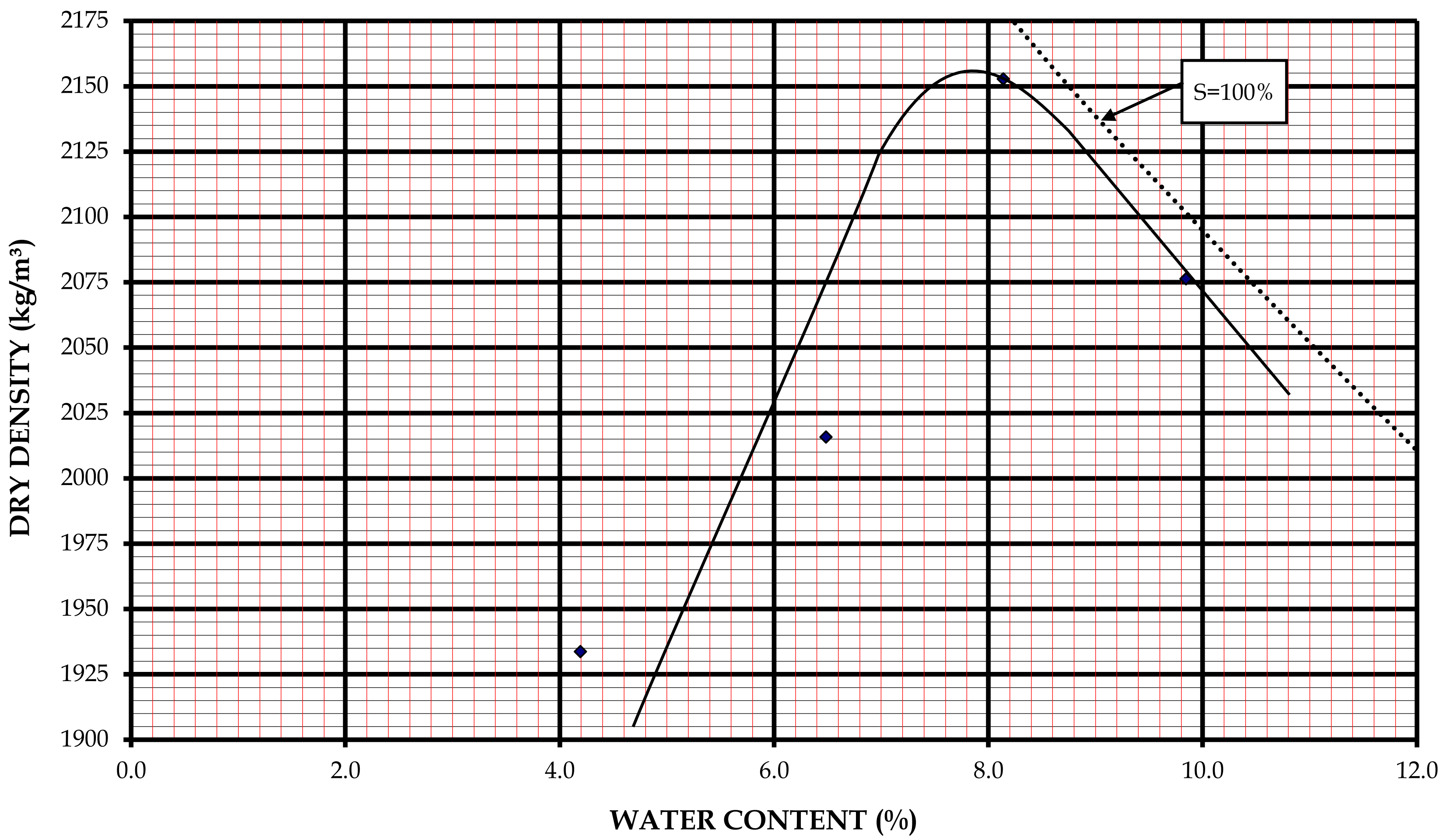
APPENDIX

# D-1 *STANDARD PROCTOR TEST RESULTS (RECOMMPACTED BASE MATERIAL)*

294 Rink Street Suite 103
Peterborough, ON K9J 2K2
Phone: (705) 743-6850
Fax: (705) 743-6854

# STANDARD PROCTOR TEST
# ASTM D-698 (METHOD B )

PROJECT NAME: Peterborough Landfill - Cell 4 Construction
CLIENT: Peterborough Landfill
LOCATION: Peterborough, On
PROJECT No. 111-53296-14




PREPARED SAMPLE: [x] DRY [ ] MOIST

ASSUMED $G_s$: 2.65

| | | | |
|---|---|---|---|
| DESCRIPTION: | Clay | TEST DATE: | May 17, 2022 |
| SAMPLE DATE: | 12-May-22 | TESTED BY: | JG |
| SAMPLED BY: | BW | | |
| SAMPLE LOCATION: | - | | |
| SAMPLE DEPTH: | N/A | | |
| SAMPLE NUMBER: | S1 | | |

| | | |
|---|---|---|
| **MAX. Dry Density:** | **2155** | **$kg/m^3$** |
| ***Corrected MAX. Dry Density:** | **2123.0** | **$kg/m^3$** |
| **Optimum Moisture:** | **7.8** | **%** |

VERIFIED BY: MSN
DATE: May 17, 2022

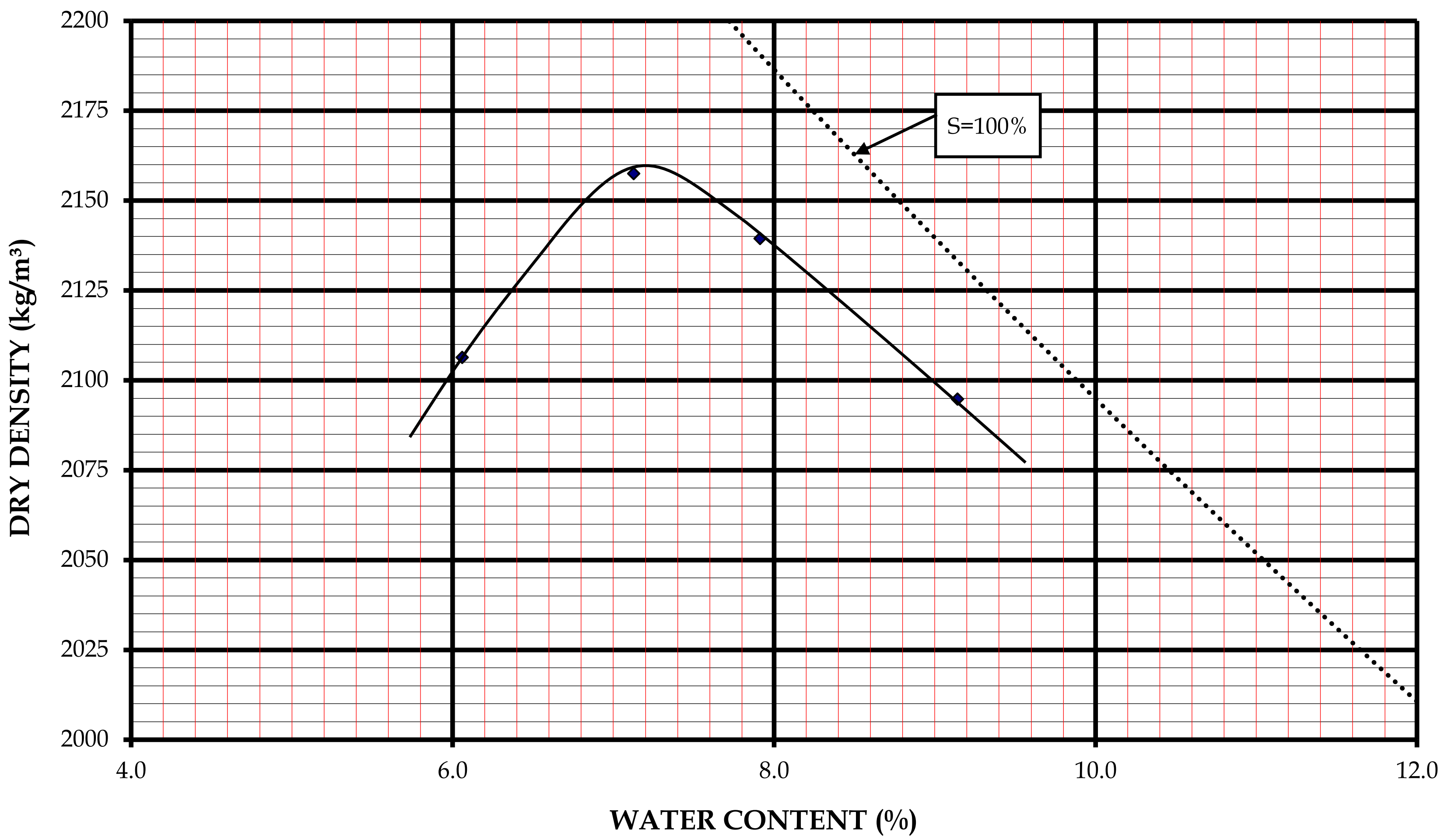
NOTES:
In the Standard Proctor Test the mold is compacted in 3 layers with 25 blows per layer using a Standard Proctor Hammer Methodology as per ASTM document D 698.
* Method B may be used if 25% or less by mass of the material is retained on the 3/8" (9.5mm) sieve

* According to ASTM Document D 4718-87 a correction should be applied when a test specimen contains more than 5% by mass of oversize fraction and the material will not be used in the test. The correction calculation is also valid for samples with up to 25% of the sample retained on 3/8" (9.5mm) sieve

294 Rink Street Suite 103
Peterborough, ON K9J 2K2
Phone: (705) 743-6850
Fax: (705) 743-6854

# STANDARD PROCTOR TEST
# ASTM D-698 (METHOD B )

PROJECT NAME: Peterborough Lanfill
CLIENT: City of Peterborough
LOCATION: Peterborough , On
PROJECT No. 111-53296-14




PREPARED SAMPLE: [ ] DRY [x] MOIST

ASSUMED $G_s$: 2.65

DESCRIPTION: Blue Clay
SAMPLE DATE: 21-Jun-22
SAMPLED BY: AA
SAMPLE LOCATION: Stockpile
SAMPLE DEPTH: N/A
SAMPLE NUMBER: S2

TEST DATE: June 27, 2022
TESTED BY: JG

| | | |
|---|---|---|
| **MAX. Dry Density:** | **2160** | **$kg/m^3$** |
| ***Corrected MAX. Dry Density:** | **2200.7** | **$kg/m^3$** |
| **Optimum Moisture:** | **7.2** | **%** |

VERIFIED BY: MSN
DATE: June 27, 2022

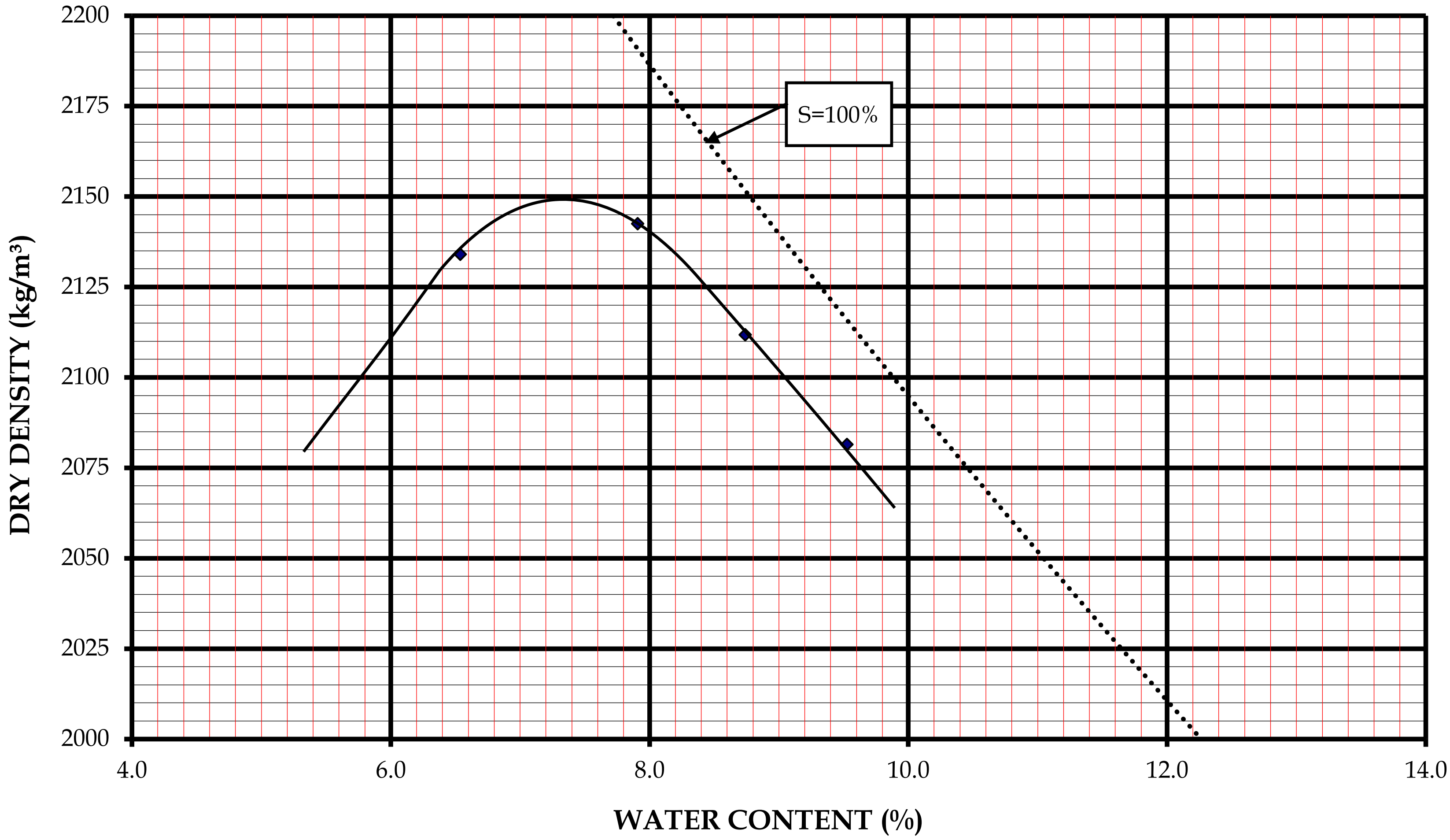
NOTES:
In the Standard Proctor Test the mold is compacted in 3 layers with 25 blows per layer using a Standard Proctor Hammer Methodology as per ASTM document D 698.
* Method B may be used if 25% or less by mass of the material is retained on the 3/8" (9.5mm) sieve

* According to ASTM Document D 4718-87 a correction should be applied when a test specimen contains more than 5% by mass of oversize fraction and the material will not be used in the test. The correction calculation is also valid for samples with up to 25% of the sample retained on 3/8" (9.5mm) sieve

294 Rink Street Suite 103
Peterborough, ON K9J 2K2
Phone: (705) 743-6850
Fax: (705) 743-6854

# STANDARD PROCTOR TEST
# ASTM D-698 (METHOD B )

PROJECT NAME: Peterborough Landfill
CLIENT: City of Peterborough
LOCATION: Peterborough, On
PROJECT No. 111-53296-14




PREPARED SAMPLE: [ ] DRY [x] MOIST

ASSUMED $G_s$: 2.65

| | | | |
|---|---|---|---|
| DESCRIPTION: | Blue Clay | TEST DATE: | June 23, 2022 |
| SAMPLE DATE: | 21-Jun-22 | TESTED BY: | JG |
| SAMPLED BY: | AA | | |
| SAMPLE LOCATION: | Stockpile | **MAX. Dry Density:** | **2150 kg/m$^3$** |
| SAMPLE DEPTH: | N/A | ***Corrected MAX. Dry Density:** | **2187.1 kg/m$^3$** |
| SAMPLE NUMBER: | S3 | **Optimum Moisture:** | **7.3 %** |

VERIFIED BY: MSN
DATE: June 23, 2022

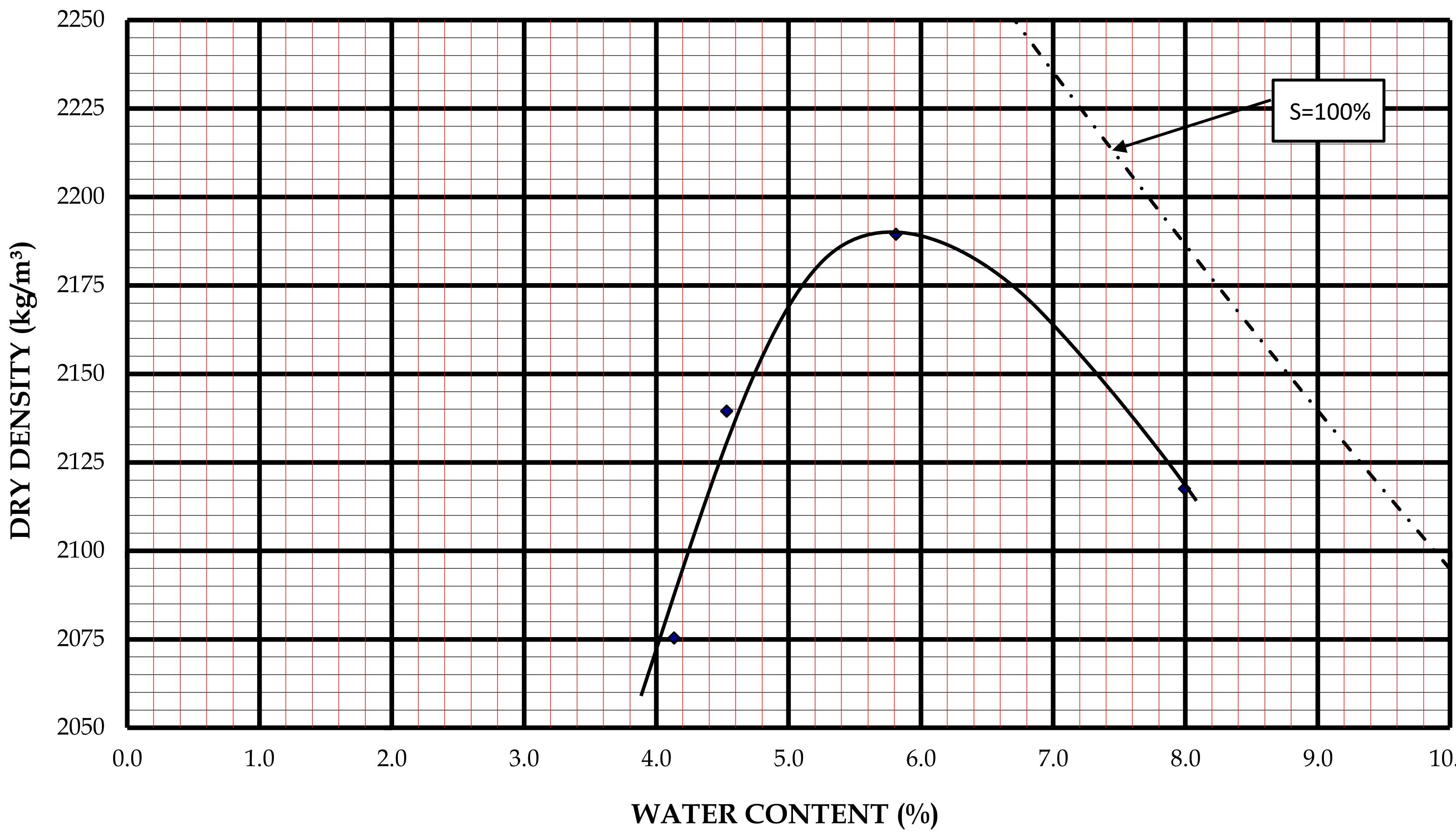
NOTES:
In the Standard Proctor Test the mold is compacted in 3 layers with 25 blows per layer using a Standard Proctor Hammer Methodology as per ASTM document D 698.
* Method B may be used if 25% or less by mass of the material is retained on the 3/8" (9.5mm) sieve

* According to ASTM Document D 4718-87 a correction should be applied when a test specimen contains more than 5% by mass of oversize fraction and the material will not be used in the test. The correction calculation is also valid for samples with up to 25% of the sample retained on 3/8" (9.5mm) sieve

294 Rink Street Suite 103
Peterborough, ON K9J 2K2
Phone: (705) 743-6850
Fax: (705) 743-6854

# PROCTOR TEST
## ASTM D-698 (METHOD C)

PROJECT NAME: Peterborough Landfill
CLIENT: City of Peterborough
LOCATION: Peterborough , On
PROJECT No.: 111-53296-11




PREPARED SAMPLE: [x] DRY [ ] MOIST

ASSUMED $G_s$: 2.65

| | | | |
|---|---|---|---|
| DESCRIPTION: | Blue Clay | TEST DATE: | July 21, 2022 |
| SAMPLE DATE: | 5-Jul-22 | TESTED BY: | NLO |
| SAMPLED BY: | AA | | |
| SAMPLE LOCATION: | Stockpile | **MAX. Dry Density:** | **2091 kg/m$^3$** |
| SAMPLE DEPTH: | N/A | ***Corrected MAX. Dry Density:** | **2159.3 kg/m$^3$** |
| SAMPLE NUMBER: | #4 | **Optimum Moisture:** | **5.8 %** |

VERIFIED BY: MSN
DATE: July 21, 2022

NOTES:

In the Modified Proctor Test the mold is compacted in 3 layers with 56 blows per layer using a Standard Proctor Hammer Methodology as per ASTM document D 698.

* Method C may be used if 30% or less by mass of the material is retained on the 3/4" (19mm) sieve

* According to ASTM Document D 4718-87 a correction should be applied when a test specimen contains more than 5% by mass of oversize fraction. and the material will not be used in the test. The correction calculation is also valid for samples with up to 30% of the sample retained on 3/4" (19mm) sieve

294 Rink Street Suite 103
Peterborough, ON K9J 2K2
Phone: (705) 743-6850
Fax: (705) 743-6854

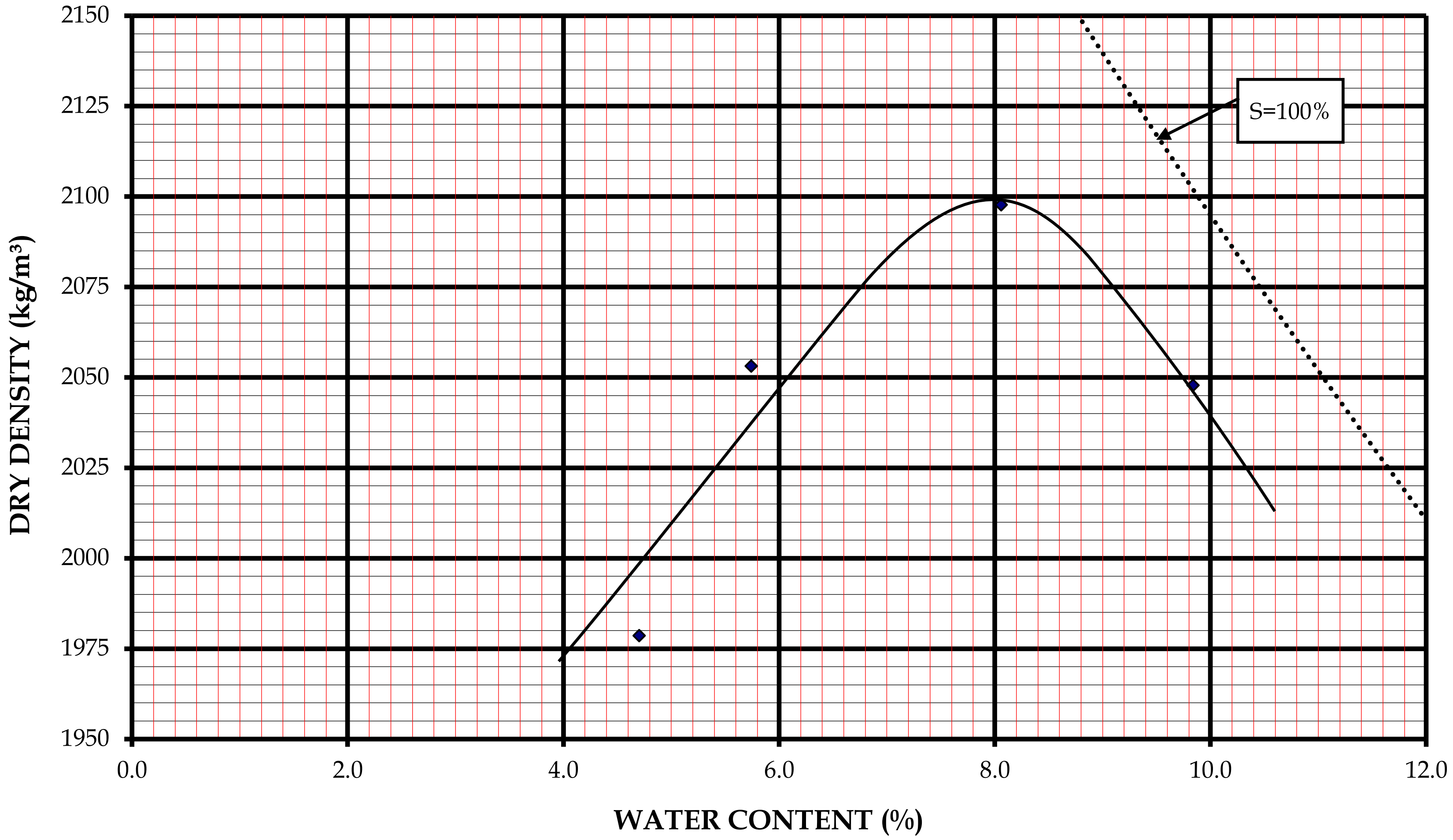
# STANDARD PROCTOR TEST
# ASTM D-698 (METHOD B )

PROJECT NAME: Peterborough Landfill

CLIENT: City of Peterborough

LOCATION: Peterborough, On

PROJECT No. 111-53296-14




PREPARED SAMPLE: x DRY MOIST

ASSUMED $G_s$: 2.65

| | | | |
|---|---|---|---|
| DESCRIPTION: | Blue Clay | TEST DATE: | July 25, 2022 |
| SAMPLE DATE: | 20-Jul-22 | TESTED BY: | WGH |
| SAMPLED BY: | AA | | |
| SAMPLE LOCATION: | Stockpile | **MAX. Dry Density:** | **2100 kg/m³** |
| SAMPLE DEPTH: | N/A | ***Corrected MAX. Dry Density:** | **2139.9 kg/m³** |
| SAMPLE NUMBER: | S5 | **Optimum Moisture:** | **8 %** |

VERIFIED BY: MSN

DATE: July 25, 2022

NOTES:
In the Standard Proctor Test the mold is compacted in 3 layers with 25 blows per layer using a Standard Proctor Hammer Methodology as per ASTM document D 698.
* Method B may be used if 25% or less by mass of the material is retained on the 3/8" (9.5mm) sieve

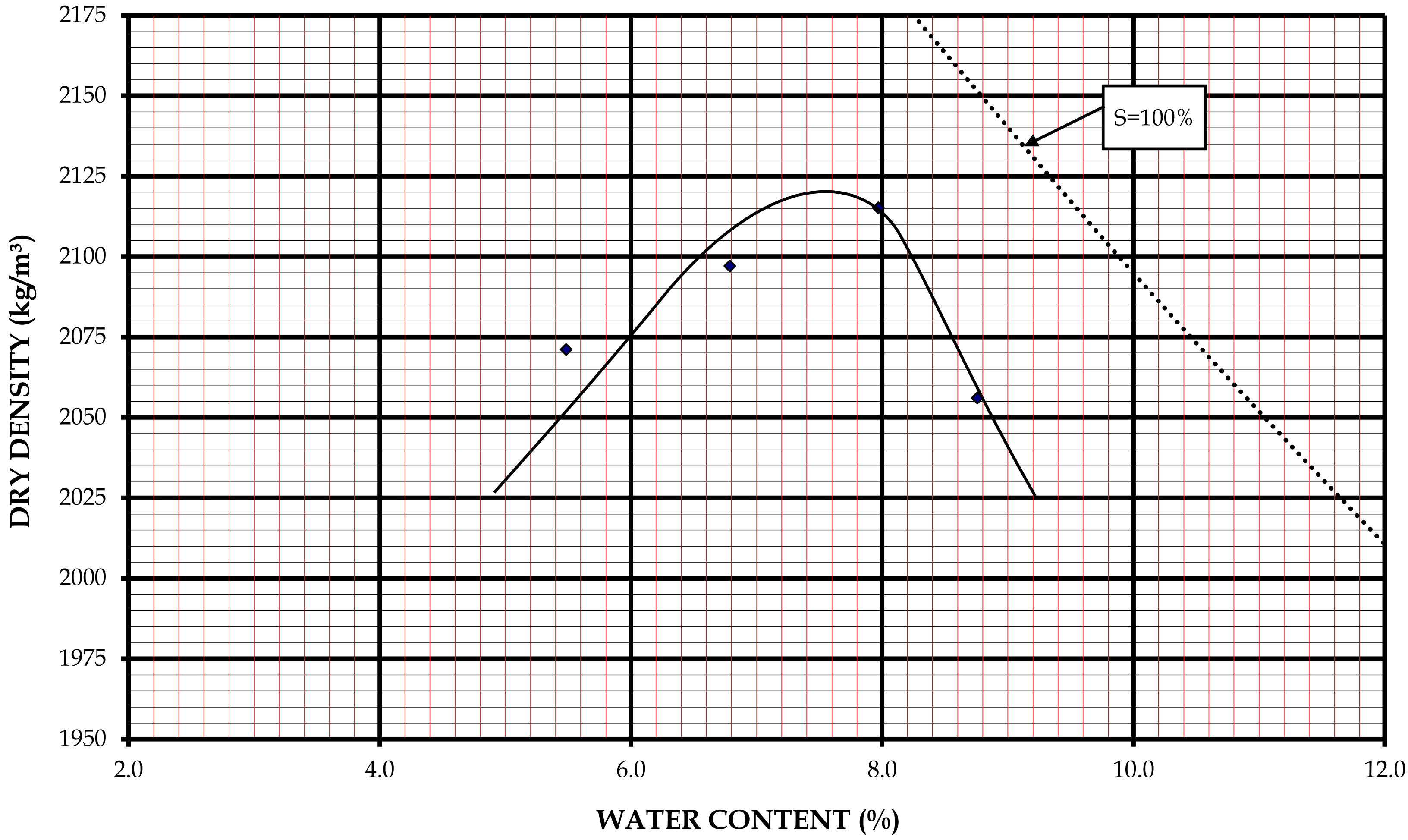
CERTIFIED BY
CCIL
Canadian Council of Independent Laboratories
For specific tests as listed on www.ccil.com

* According to ASTM Document D 4718-87 a correction should be applied when a test specimen contains more than 5% by mass of oversize fraction and the material will not be used in the test. The correction calculation is also valid for samples with up to 25% of the sample retained on 3/8" (9.5mm) sieve

294 Rink Street Suite 103
Peterborough, ON K9J 2K2
Phone: (705) 743-6850
Fax: (705) 743-6854

# STANDARD PROCTOR TEST
# ASTM D-698 (METHOD B )

PROJECT NAME: Peteborough Landfill Cell 4
CLIENT: City of Peterborough
LOCATION: Peterborough, On
PROJECT No. 111-53296-14




PREPARED SAMPLE: [X] DRY [ ] MOIST

ASSUMED $G_s$: 2.65

DESCRIPTION: Blue Clay
SAMPLE DATE: Aug
SAMPLED BY: AA
SAMPLE LOCATION: Stockpile
SAMPLE DEPTH: N/A
SAMPLE NUMBER: S12

TEST DATE: August 15, 2022
TESTED BY: JG

**MAX. Dry Density:** **2120 kg/m$^3$**
***Corrected MAX. Dry Density:** **2163.2 kg/m$^3$**
**Optimum Moisture:** **7.6 %**

VERIFIED BY: MSN
DATE: August 15, 2022

NOTES:
In the Standard Proctor Test the mold is compacted in 3 layers with 25 blows per layer using a Standard Proctor Hammer Methodology as per ASTM document D 698.
* Method B may be used if 25% or less by mass of the material is retained on the 3/8" (9.5mm) sieve

* According to ASTM Document D 4718-87 a correction should be applied when a test specimen contains more than 5% by mass of oversize fraction and the material will not be used in the test. The correction calculation is also valid for samples with up to 25% of the sample retained on 3/8" (9.5mm) sieve

CERTIFIED BY CCIL
Canadian Council of Independent Laboratories
For specific tests as listed on www.ccil.com

# LABORATORY COMPACTION TEST
Clayey Silt
MTO LS-702/MTO LS-706

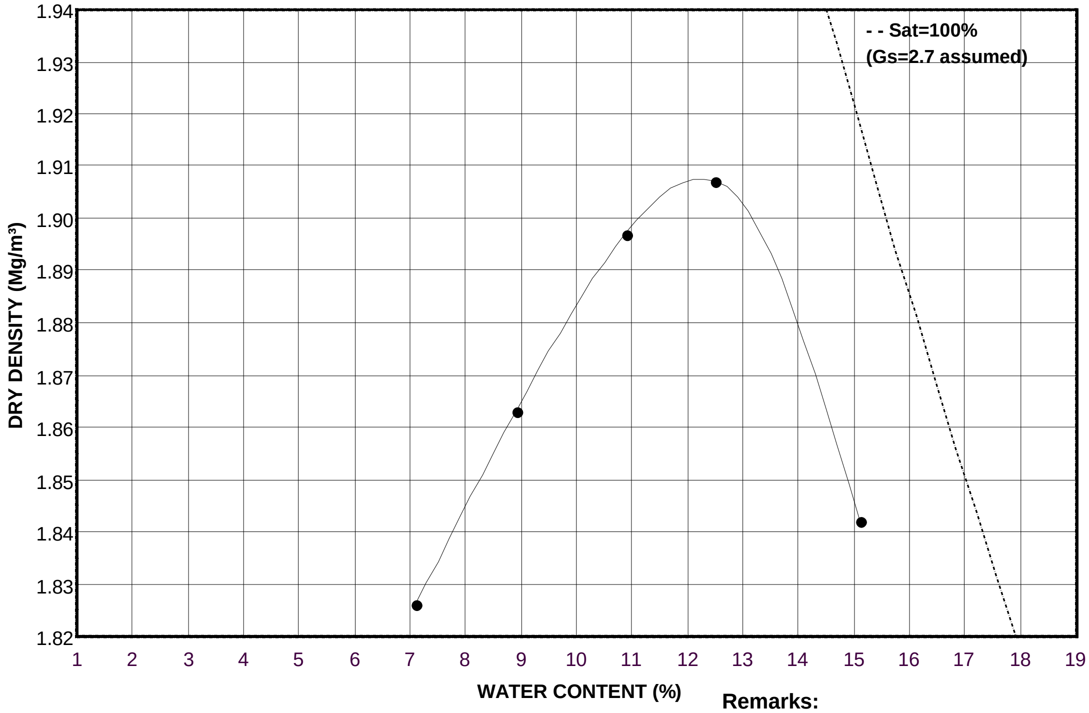
FIGURE CL-1

**Test Results Summary**

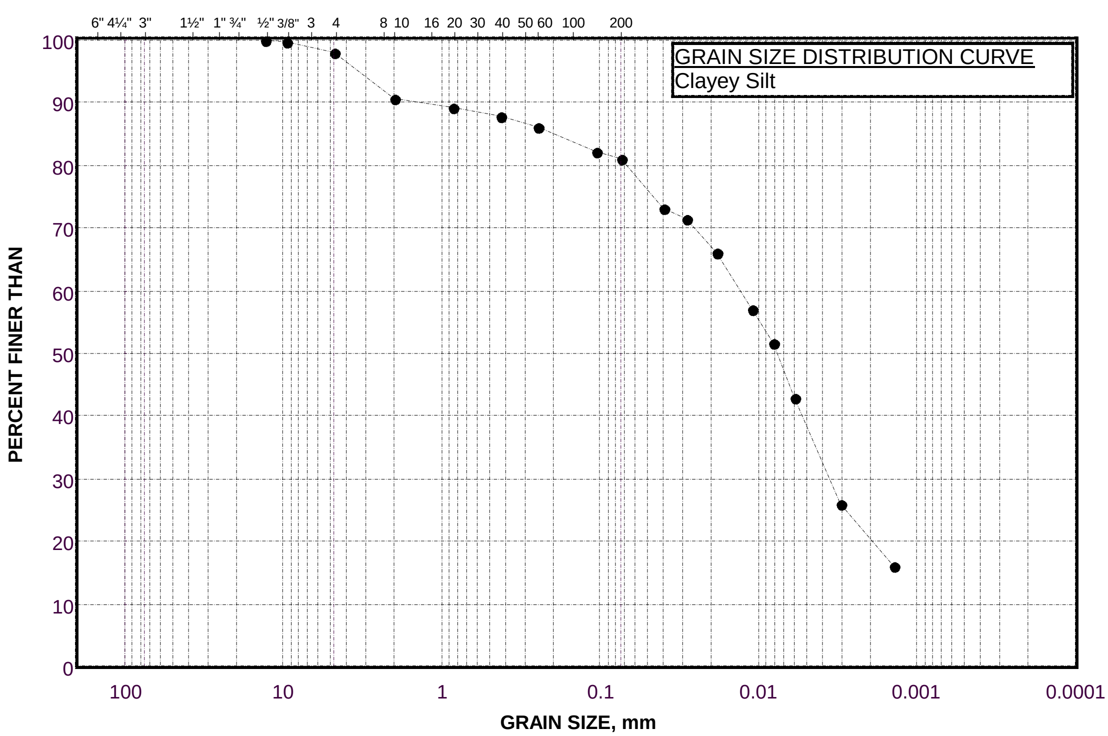
TEST: Standard
MAX. DRY DENSITY(Mg/m³): 1.908

NATURAL WATER CONTENT(%): N/A
OPTIMUM WATER CONTENT(%): 12.2

SAMPLE: CL-1
SOURCE: Leahy Stockpile




**Remarks:**
Date Sampled: October 3, 2022




| | | | | | | |
|---|---|---|---|---|---|---|
| **COBBLE** | COARSE | FINE | COARSE | MEDIUM | FINE | SILT AND CLAY SIZES |
| **SIZE** | **GRAVEL SIZE** | | **SAND SIZE** | | | **FINE GRAINED** |

Project Number: 18103810AR (WSP 111-53296-14)
Checked By: ____________________

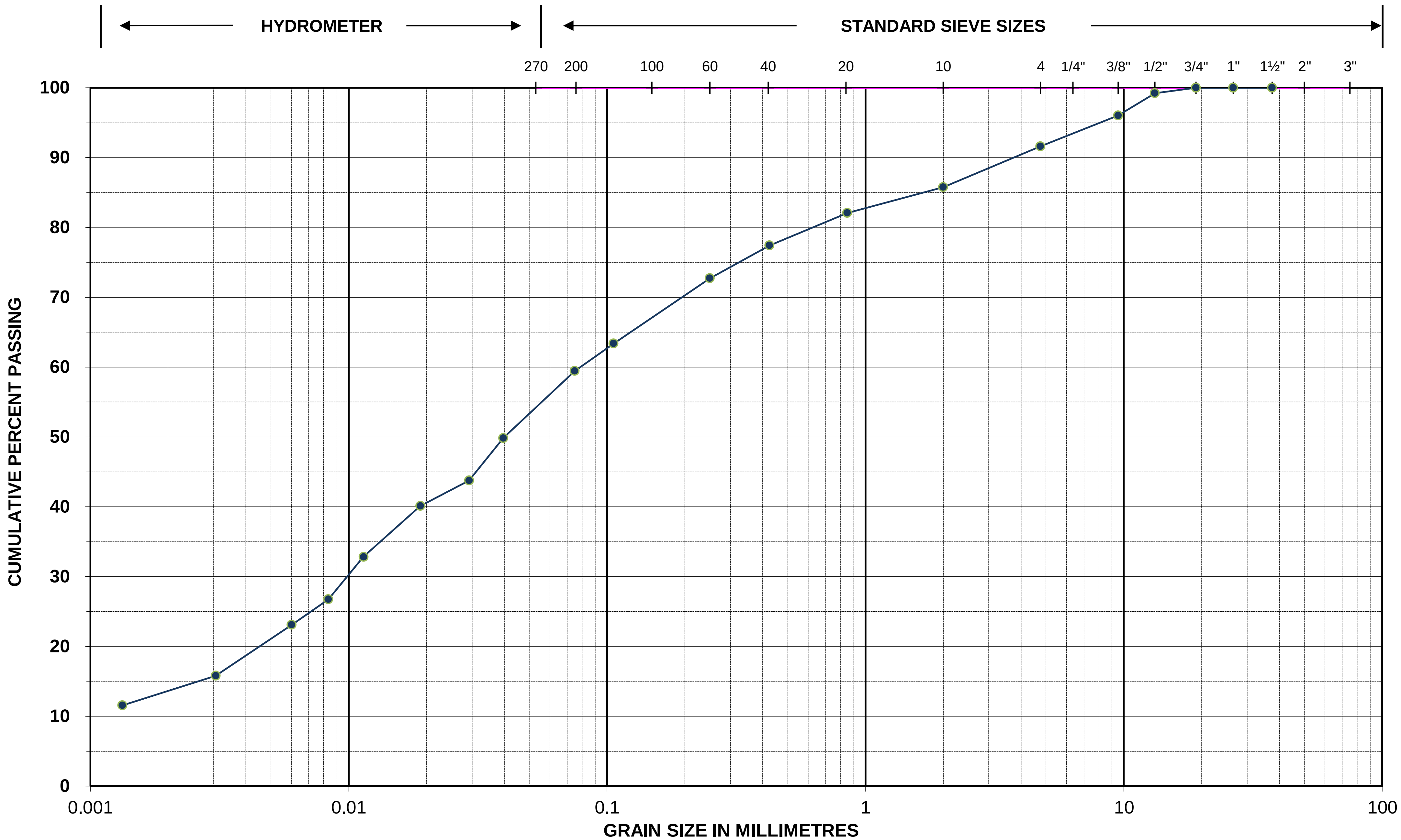
**Golder Associates**

LABID: '22-2080'
Date: 06-Oct-22

APPENDIX

# D-2 PARTICLE SIZE DISTRIBUTION ANALYSIS (RECOMMPACTED BASE MATERIAL)

# PARTICLE SIZE DISTRIBUTION LS702/ASTM D422




*Unified Classification System*

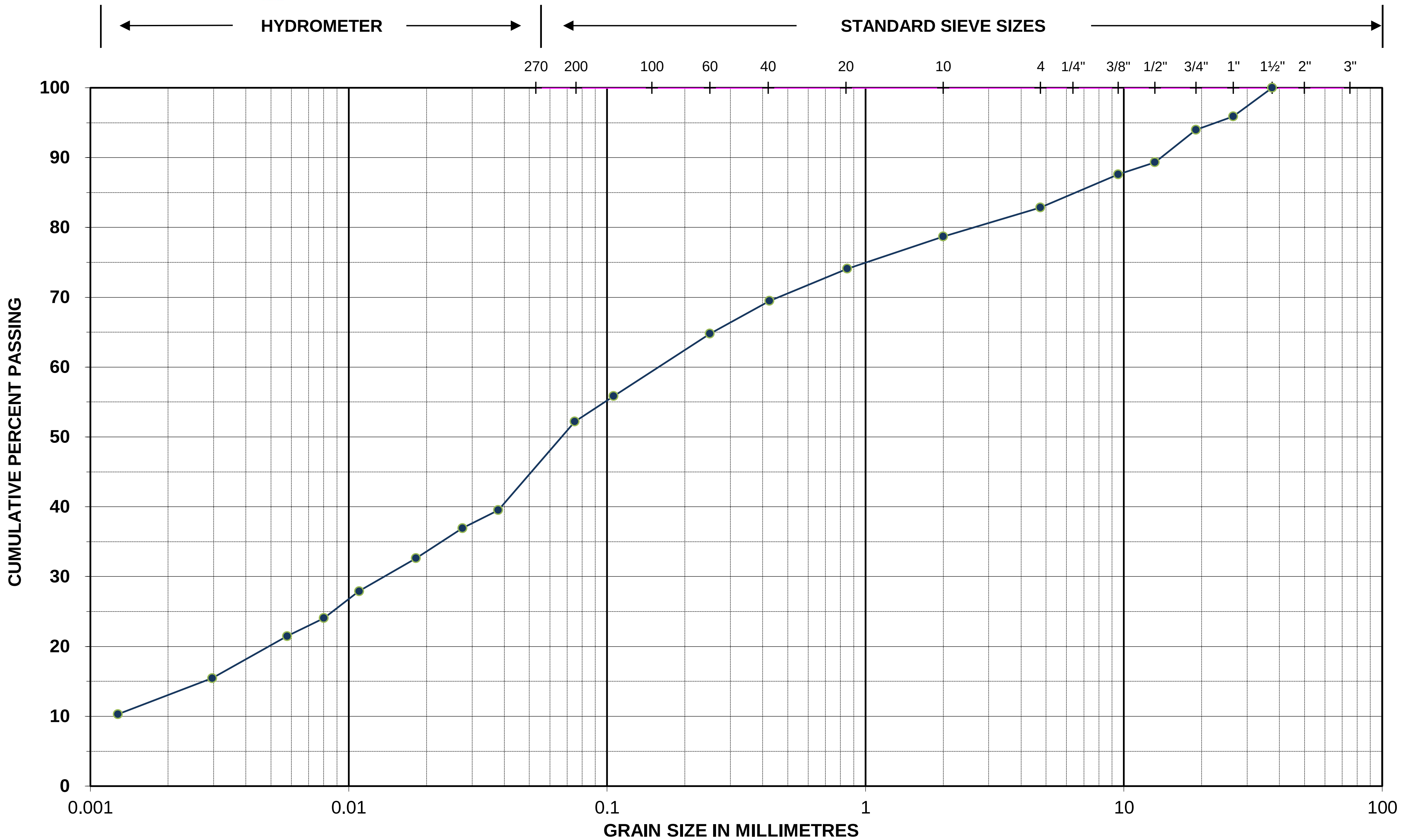
| SILT AND CLAY | SAND | GRAVEL |
|---|---|---|

| | | | |
|---|---|---|---|
| **Project Name:** | Cell 4 Construction | **Project No.:** | 111-53296-14 |
| **Location ID.:** | Clay | **Sample No./Depth:** | #1 |

| Sieve Size | % Passing Coarse | Sieve Size | % Passing Fine | Hydrometer (mm) | % Passing |
|---|---|---|---|---|---|
| **37.5 mm** | 100.0 | **2.00 mm** | 85.8 | **0.040** | 49.8 |
| **26.5 mm** | 100.0 | **0.850 mm** | 82.1 | **0.019** | 40.1 |
| **19.0 mm** | 100.0 | **0.425 mm** | 77.4 | **0.008** | 26.7 |
| **13.2 mm** | 99.2 | **0.250 mm** | 72.7 | **0.003** | 15.8 |
| **9.50 mm** | 96.0 | **0.106 mm** | 63.4 | **0.001** | 11.6 |
| **4.75 mm** | 91.6 | **0.075 mm** | 59.5 | | |

Note: More information is available upon request. Tested by: WGH Reviewed by: Date: 16-May-22

# PARTICLE SIZE DISTRIBUTION LS702/ASTM D422




*Unified Classification System*

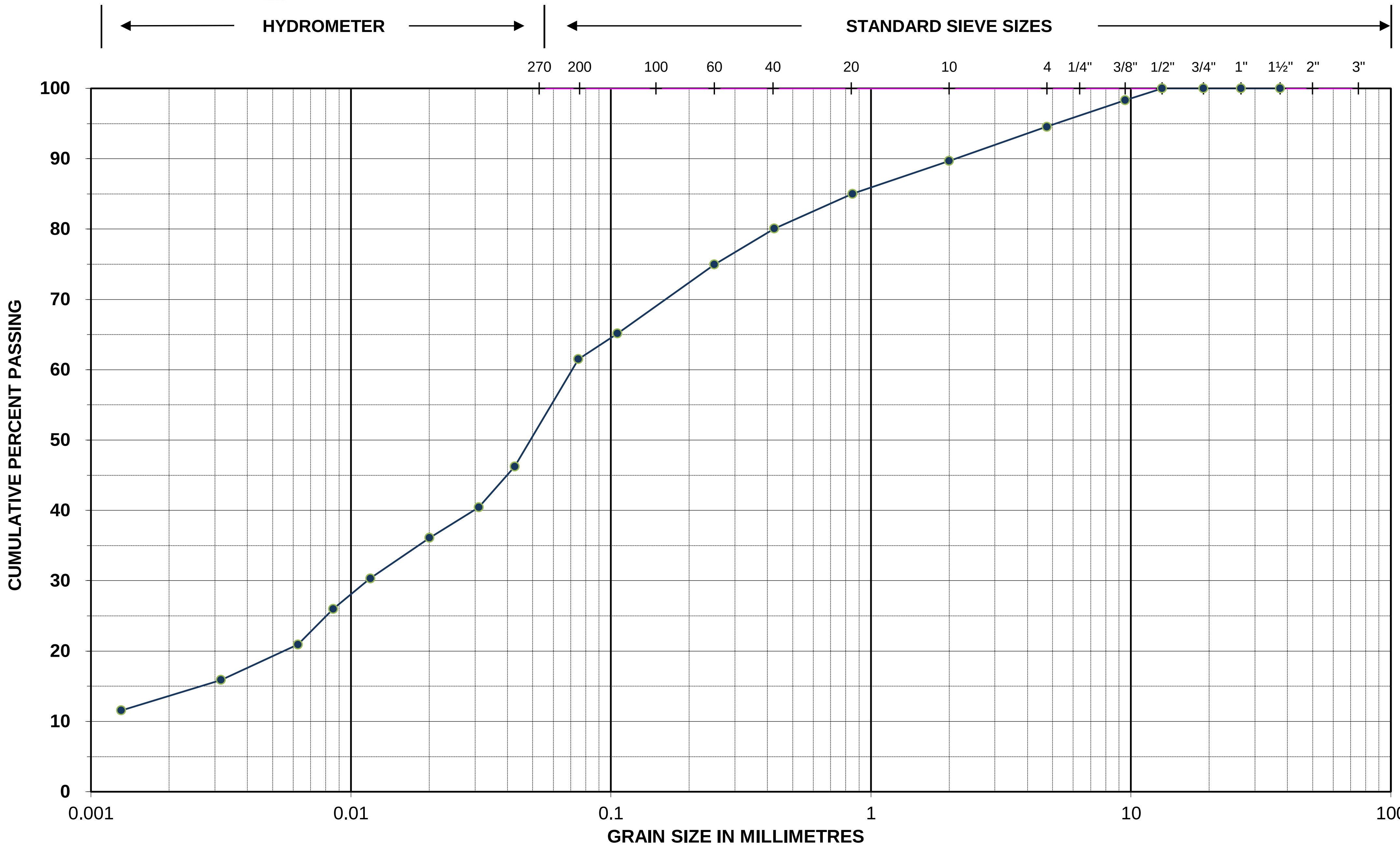
| SILT AND CLAY | SAND | GRAVEL |
|---|---|---|

| | | | |
|---|---|---|---|
| **Project Name:** | Peterborough Landfill | **Project No.:** | 111-53296-14 |
| **Location ID.:** | Stockpile | **Sample No./Depth:** | S1 |

| Sieve Size | % Passing Coarse | Sieve Size | % Passing Fine | Hydrometer (mm) | % Passing |
|---|---|---|---|---|---|
| **37.5 mm** | 100.0 | **2.00 mm** | 78.7 | **0.038** | 39.5 |
| **26.5 mm** | 95.9 | **0.850 mm** | 74.1 | **0.018** | 32.6 |
| **19.0 mm** | 94.0 | **0.425 mm** | 69.5 | **0.008** | 24.0 |
| **13.2 mm** | 89.3 | **0.250 mm** | 64.8 | **0.003** | 15.5 |
| **9.50 mm** | 87.6 | **0.106 mm** | 55.9 | **0.001** | 10.3 |
| **4.75 mm** | 82.9 | **0.075 mm** | 52.2 | | |

Note: More information is available upon request. Tested by: NLO/WGH Reviewed by: Date: 14-Jun-22

# PARTICLE SIZE DISTRIBUTION LS702/ASTM D422




*Unified Classification System*

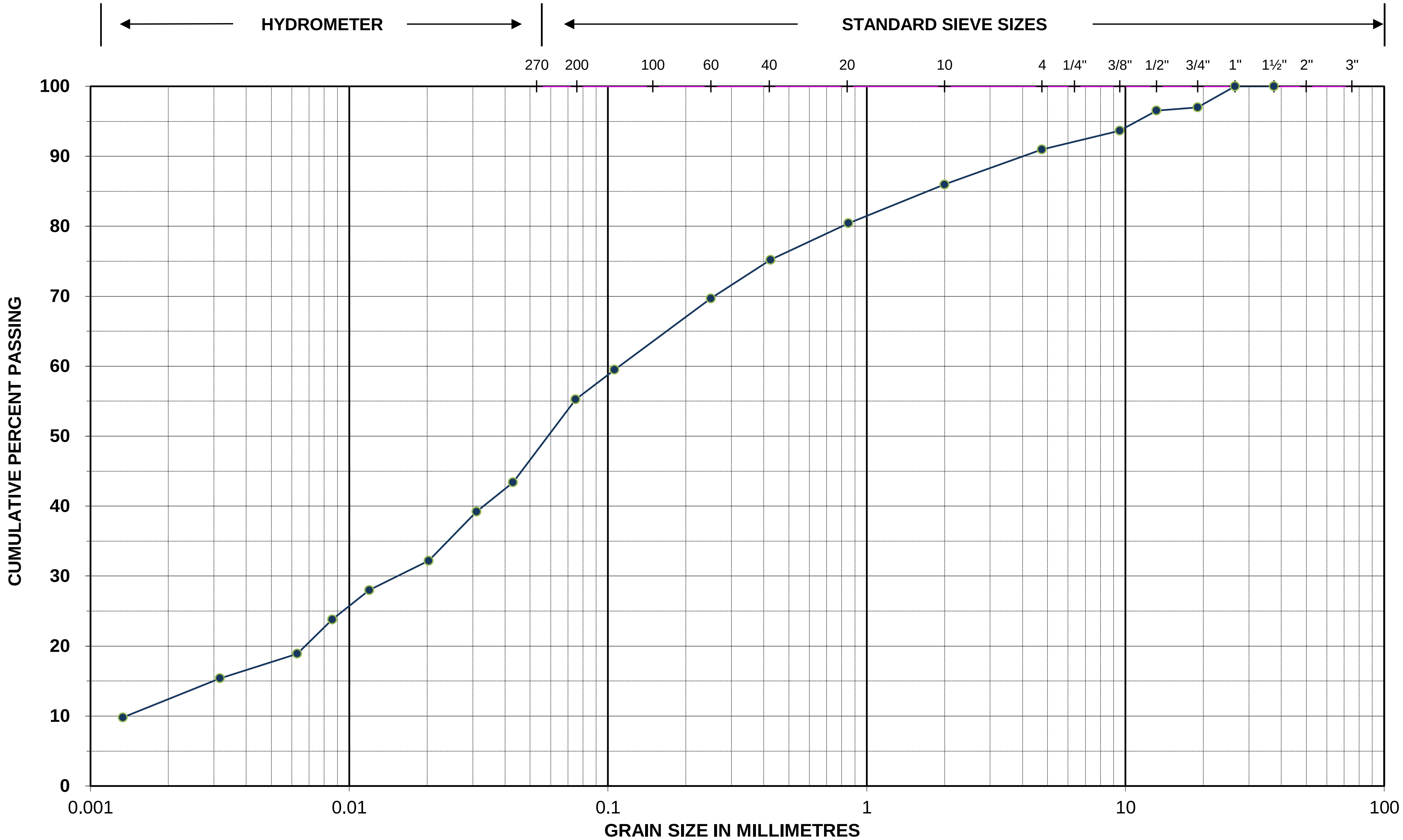
| SILT AND CLAY | SAND | GRAVEL |
|---|---|---|

| | | | |
|---|---|---|---|
| **Project Name:** | Peterborough Landfill Cell 4 | **Project No.:** | 111-53296-14 |
| **Location ID.:** | Base Cell | **Sample No./Depth:** | S2 |

| Sieve Size | % Passing Coarse | Sieve Size | % Passing Fine | Hydrometer (mm) | % Passing |
|---|---|---|---|---|---|
| **37.5 mm** | 100.0 | **2.00 mm** | 89.7 | **0.043** | 46.2 |
| **26.5 mm** | 100.0 | **0.850 mm** | 85.0 | **0.020** | 36.1 |
| **19.0 mm** | 100.0 | **0.425 mm** | 80.1 | **0.009** | 26.0 |
| **13.2 mm** | 100.0 | **0.250 mm** | 74.9 | **0.003** | 15.9 |
| **9.50 mm** | 98.3 | **0.106 mm** | 65.2 | **0.001** | 11.6 |
| **4.75 mm** | 94.5 | **0.075 mm** | 61.5 | | |

Note: More information is available upon request. Tested by: WGH Reviewed by: Date: 23-Jun-22

# PARTICLE SIZE DISTRIBUTION LS702/ASTM D422




*Unified Classification System*

| SILT AND CLAY | SAND | GRAVEL |
|---|---|---|

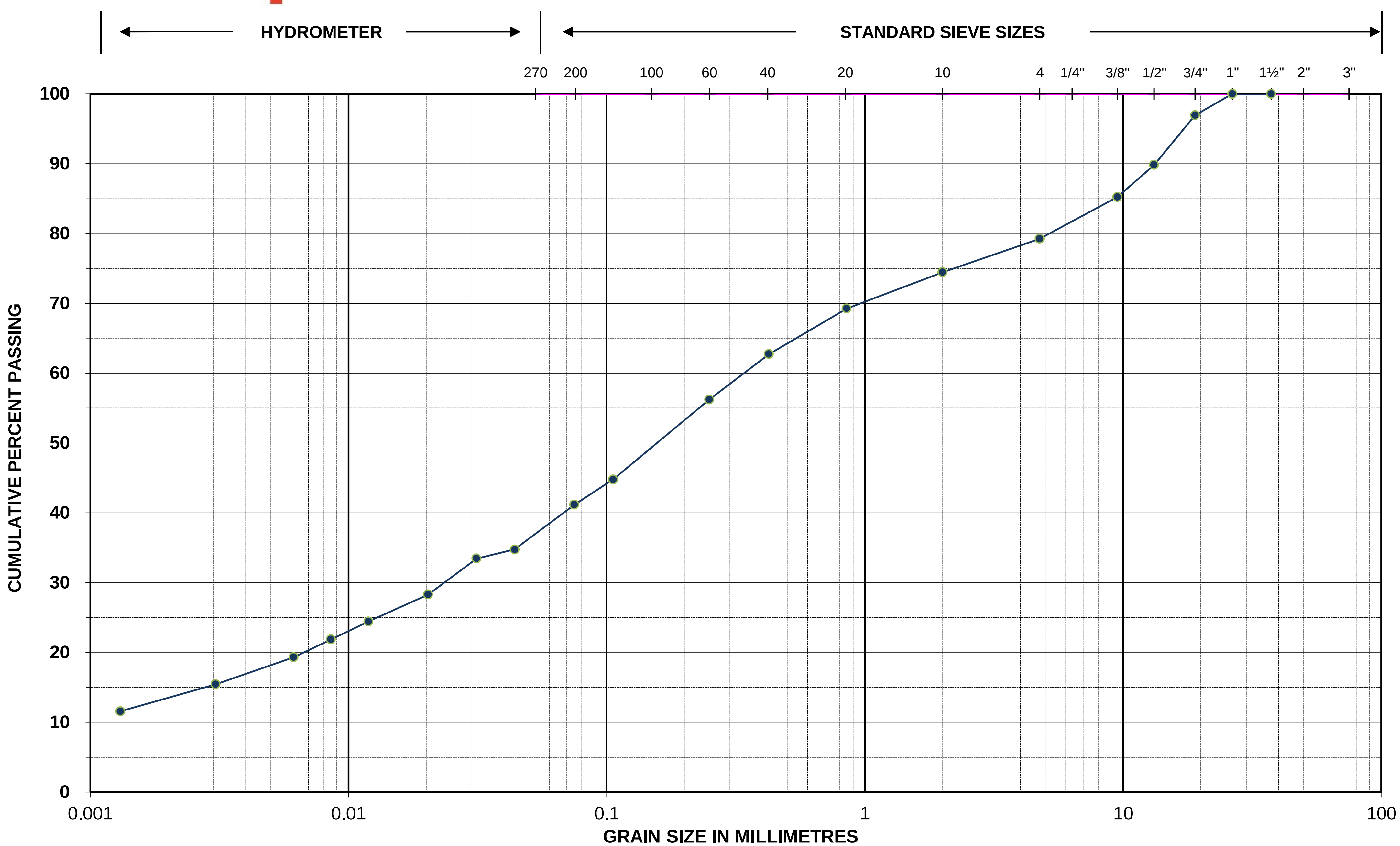
**Project Name:** Peterborough Landfill Cell 4 **Project No.:** 111-53296-14

**Location ID.:** Blue Clay **Sample No./Depth:** #3

| Sieve Size | % Passing Coarse | Sieve Size | % Passing Fine | Hydrometer (mm) | % Passing |
|---|---|---|---|---|---|
| **37.5 mm** | 100.0 | **2.00 mm** | 86.0 | **0.043** | 43.4 |
| **26.5 mm** | 100.0 | **0.850 mm** | 80.4 | **0.020** | 32.2 |
| **19.0 mm** | 97.0 | **0.425 mm** | 75.2 | **0.009** | 23.8 |
| **13.2 mm** | 96.5 | **0.250 mm** | 69.7 | **0.003** | 15.4 |
| **9.50 mm** | 93.7 | **0.106 mm** | 59.5 | **0.001** | 9.8 |
| **4.75 mm** | 91.0 | **0.075 mm** | 55.2 | | |

Note: More information is available upon request. Tested by: WGH Reviewed by: Date: 23-Jun-22

# PARTICLE SIZE DISTRIBUTION LS702/ASTM D422




*Unified Classification System*

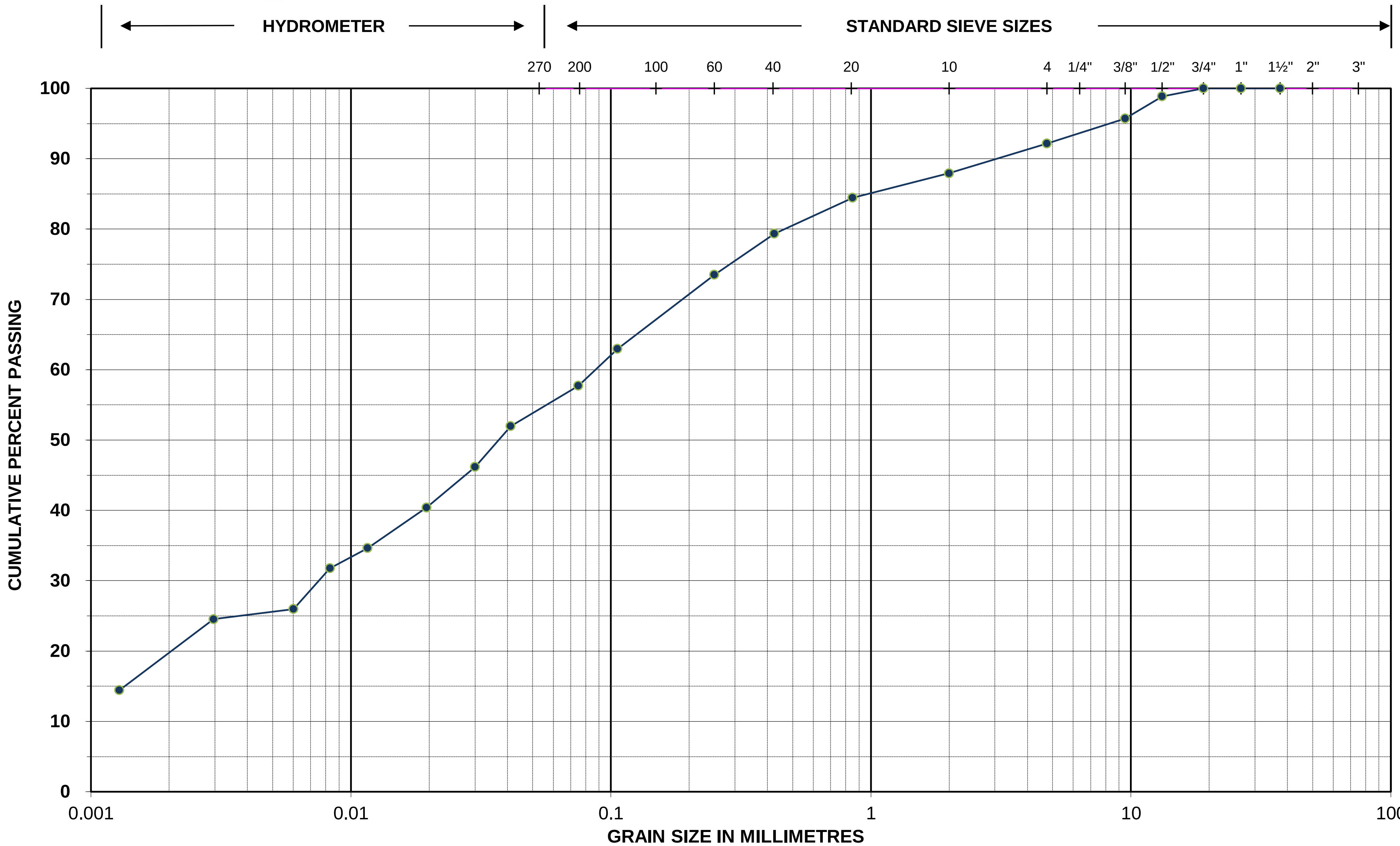
| SILT AND CLAY | SAND | GRAVEL |
|---|---|---|

| | | | |
|---|---|---|---|
| **Project Name:** | Peterborough Landfill Cell #4 | **Project No.:** | 111-53269-14 |
| **Location ID.:** | Cell #4 | **Sample No./Depth:** | 4 |

| Sieve Size | % Passing Coarse | Sieve Size | % Passing Fine | Hydrometer (mm) | % Passing |
|---|---|---|---|---|---|
| **37.5 mm** | 100.0 | **2.00 mm** | 74.5 | **0.044** | 34.7 |
| **26.5 mm** | 100.0 | **0.850 mm** | 69.3 | **0.020** | 28.3 |
| **19.0 mm** | 97.0 | **0.425 mm** | 62.7 | **0.009** | 21.9 |
| **13.2 mm** | 89.8 | **0.250 mm** | 56.2 | **0.003** | 15.4 |
| **9.50 mm** | 85.2 | **0.106 mm** | 44.8 | **0.001** | 11.6 |
| **4.75 mm** | 79.3 | **0.075 mm** | 41.1 | | |

Note: More information is available upon request. Tested by: WGH Reviewed by: Date: 6-Jul-22

# PARTICLE SIZE DISTRIBUTION LS702/ASTM D422




*Unified Classification System*

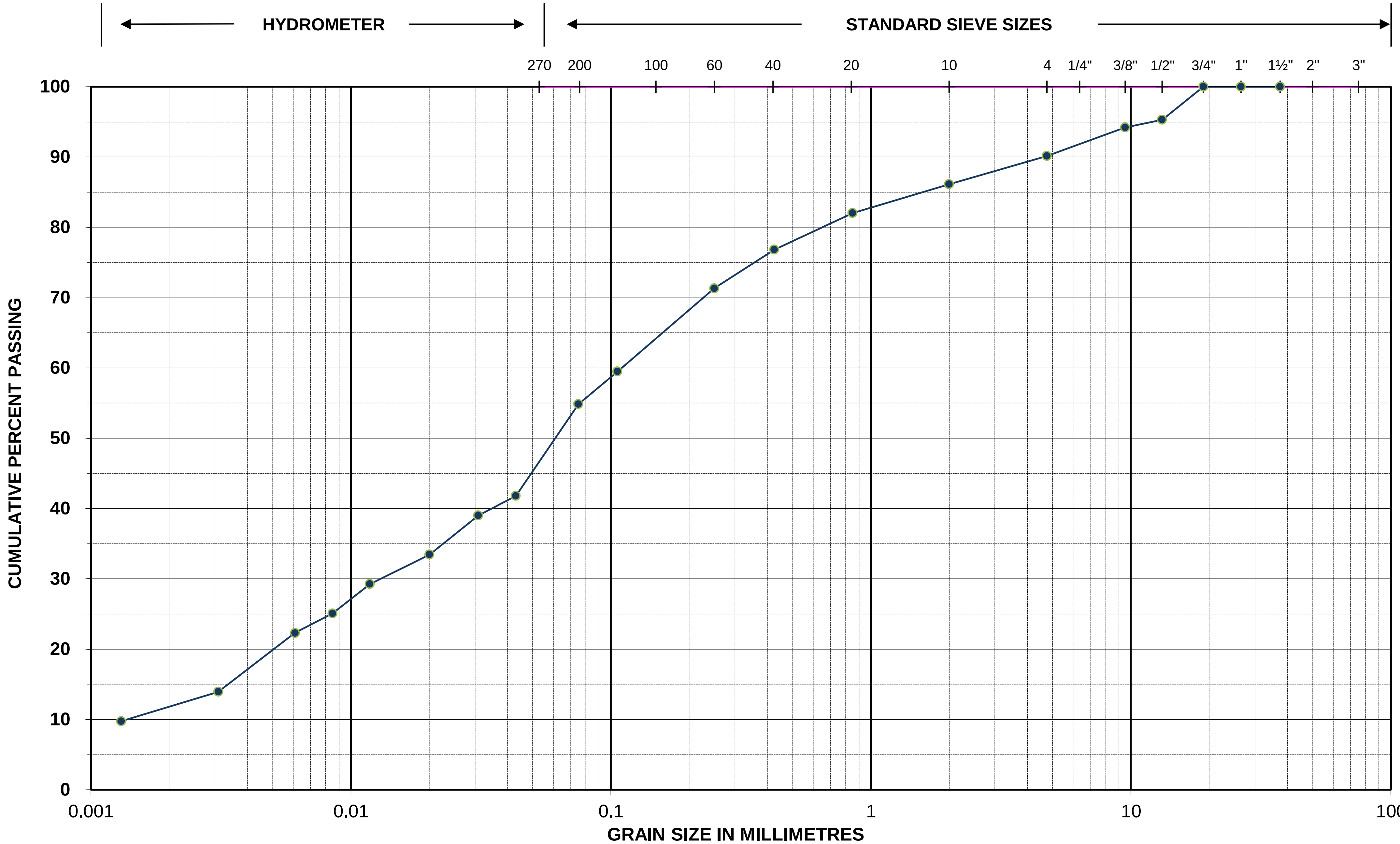
| SILT AND CLAY | SAND | GRAVEL |
|---|---|---|

| | | | |
|---|---|---|---|
| **Project Name:** | Peterborough Landfill | **Project No.:** | 111-53296-14 |
| **Location ID.:** | Stockpile | **Sample No./Depth:** | S5 |

| Sieve Size | % Passing Coarse | Sieve Size | % Passing Fine | Hydrometer (mm) | % Passing |
|---|---|---|---|---|---|
| **37.5 mm** | 100.0 | **2.00 mm** | 87.9 | **0.041** | 52.0 |
| **26.5 mm** | 100.0 | **0.850 mm** | 84.4 | **0.020** | 40.4 |
| **19.0 mm** | 100.0 | **0.425 mm** | 79.3 | **0.008** | 31.8 |
| **13.2 mm** | 98.9 | **0.250 mm** | 73.5 | **0.003** | 24.5 |
| **9.50 mm** | 95.7 | **0.106 mm** | 63.0 | **0.001** | 14.4 |
| **4.75 mm** | 92.1 | **0.075 mm** | 57.7 | | |

Note: More information is available upon request. Tested by: NLO Reviewed by: Date: 0-Jan-00

# PARTICLE SIZE DISTRIBUTION LS702/ASTM D422




*Unified Classification System*

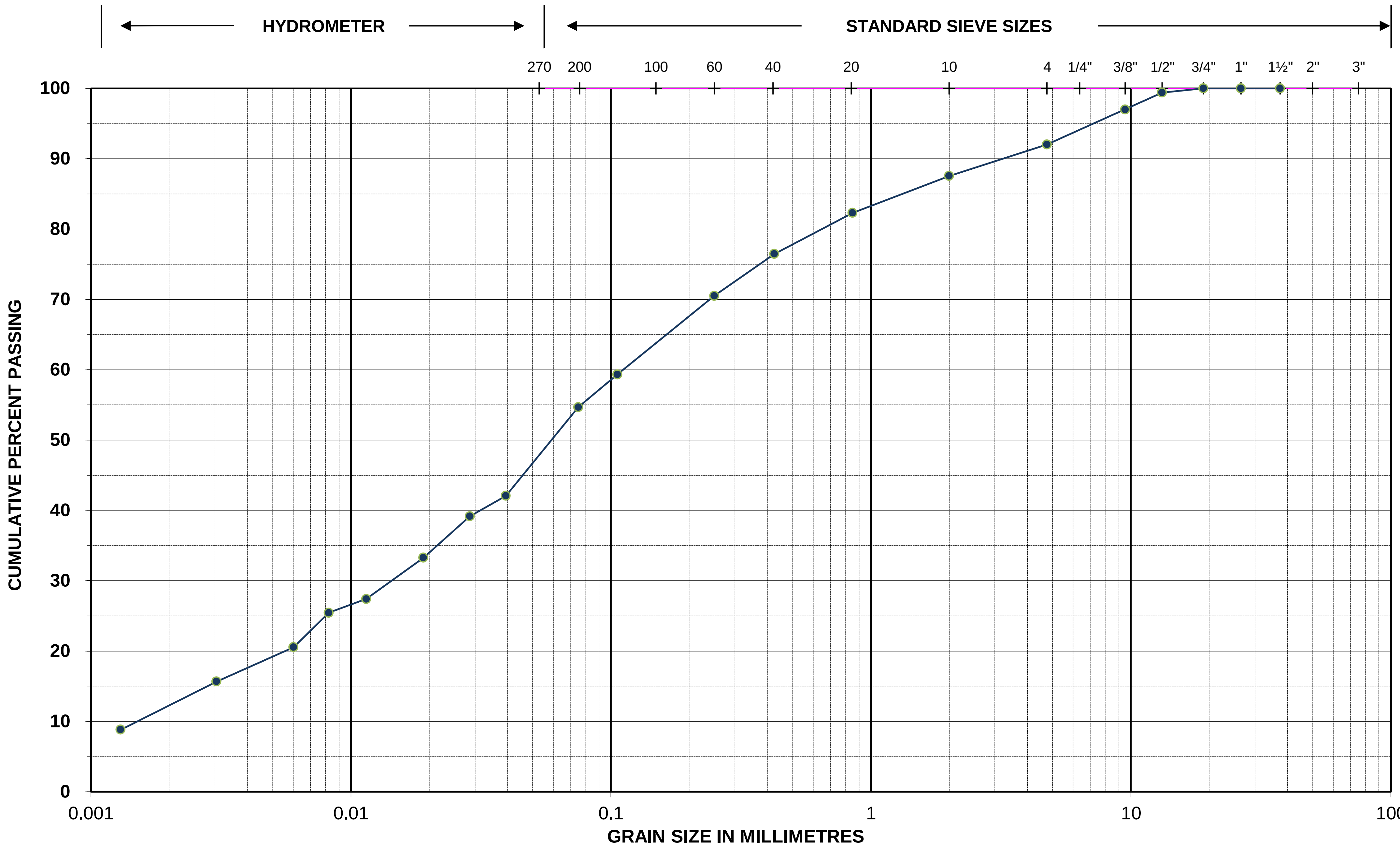
| SILT AND CLAY | SAND | GRAVEL |
|---|---|---|

| | | | |
|---|---|---|---|
| **Project Name:** | Peterborough Landfill | **Project No.:** | 111-53296-14 |
| **Location ID.:** | Stockpile North | **Sample No./Depth:** | #6 |

| Sieve Size | % Passing Coarse | Sieve Size | % Passing Fine | Hydrometer (mm) | % Passing |
|---|---|---|---|---|---|
| **37.5 mm** | 100.0 | **2.00 mm** | 86.1 | **0.043** | 41.8 |
| **26.5 mm** | 100.0 | **0.850 mm** | 82.0 | **0.020** | 33.4 |
| **19.0 mm** | 100.0 | **0.425 mm** | 76.8 | **0.009** | 25.1 |
| **13.2 mm** | 95.3 | **0.250 mm** | 71.3 | **0.003** | 13.9 |
| **9.50 mm** | 94.2 | **0.106 mm** | 59.5 | **0.001** | 9.8 |
| **4.75 mm** | 90.2 | **0.075 mm** | 54.8 | | |

Note: More information is available upon request. Tested by: WGH/NLO Reviewed by: Date: 25-Jul-22

# PARTICLE SIZE DISTRIBUTION LS702/ASTM D422




*Unified Classification System*

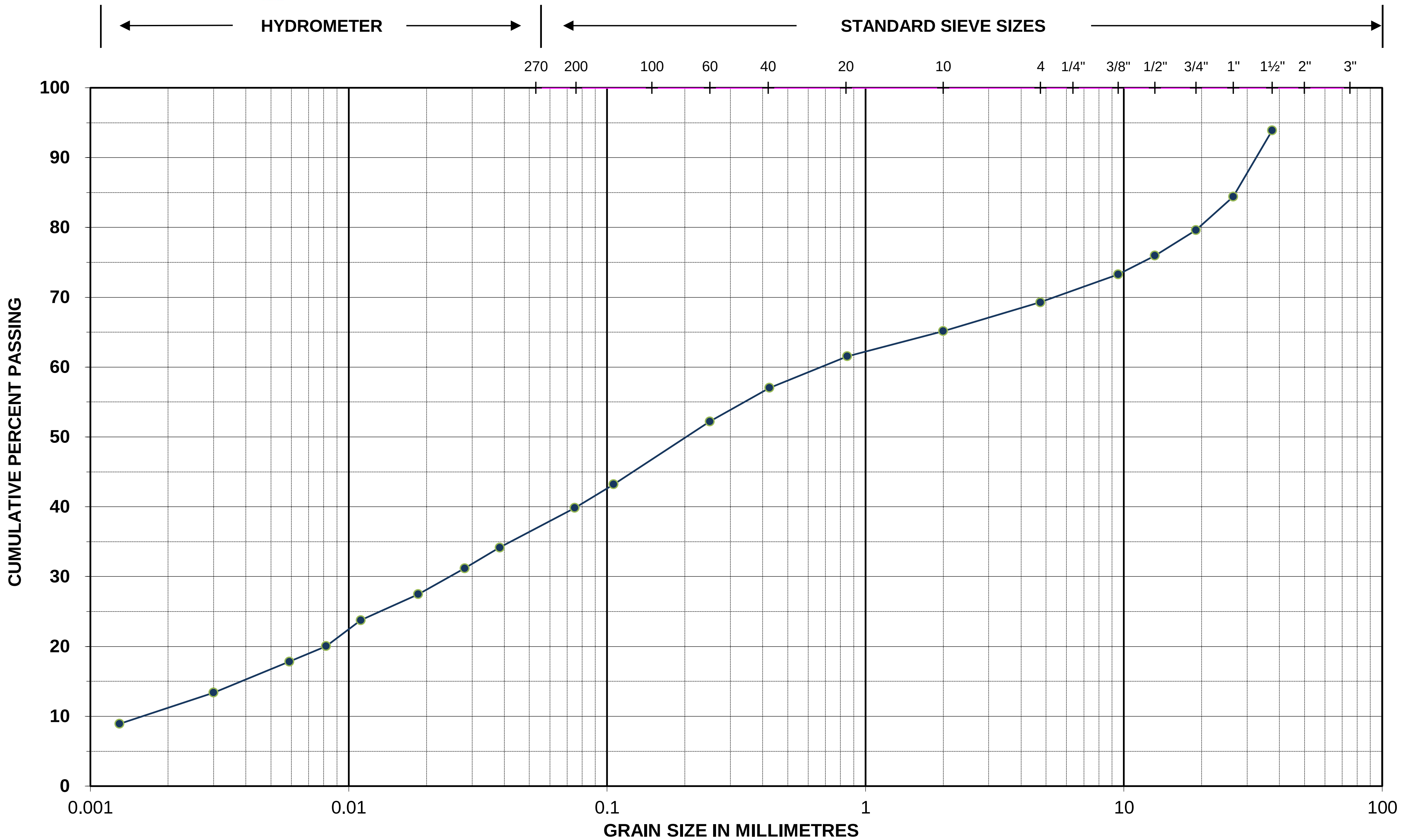
| SILT AND CLAY | SAND | GRAVEL |
|---|---|---|

| | | | |
|---|---|---|---|
| **Project Name:** | Peterborough Landfill | **Project No.:** | 111-53296-14 |
| **Location ID.:** | Stockpile - South | **Sample No./Depth:** | S7 |

| Sieve Size | % Passing Coarse | Sieve Size | % Passing Fine | Hydrometer (mm) | % Passing |
|---|---|---|---|---|---|
| **37.5 mm** | 100.0 | **2.00 mm** | 87.5 | **0.039** | 42.1 |
| **26.5 mm** | 100.0 | **0.850 mm** | 82.3 | **0.019** | 33.3 |
| **19.0 mm** | 100.0 | **0.425 mm** | 76.5 | **0.008** | 25.4 |
| **13.2 mm** | 99.4 | **0.250 mm** | 70.5 | **0.003** | 15.7 |
| **9.50 mm** | 97.0 | **0.106 mm** | 59.3 | **0.001** | 8.8 |
| **4.75 mm** | 92.0 | **0.075 mm** | 54.7 | | |

Note: More information is available upon request. Tested by: WGH/NLO Reviewed by: Date: 27-Jul-22

# PARTICLE SIZE DISTRIBUTION LS702/ASTM D422




*Unified Classification System*

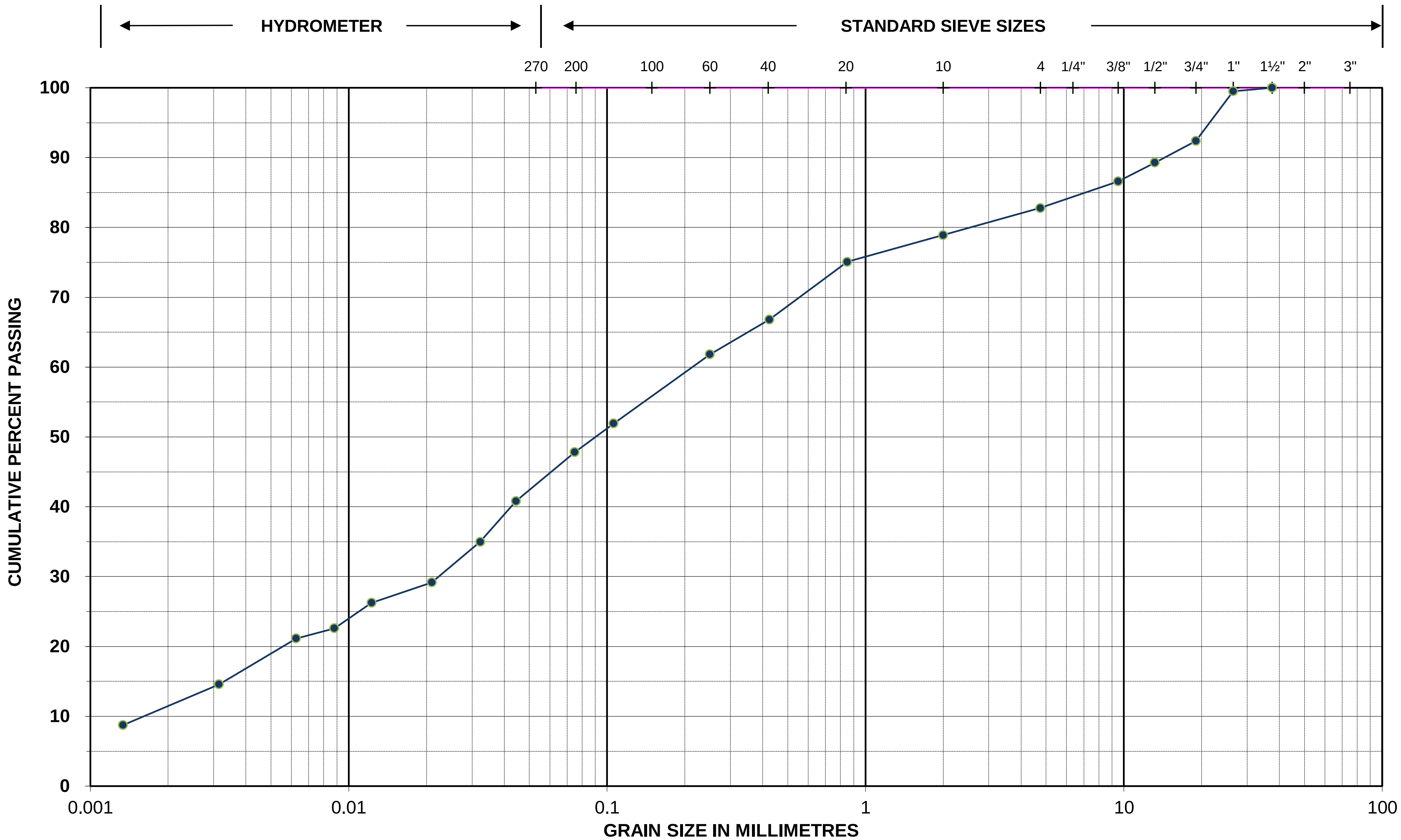
| SILT AND CLAY | SAND | GRAVEL |
|---|---|---|

| | | | |
|---|---|---|---|
| **Project Name:** | Peterborough Landfill | **Project No.:** | 111-53296-14 |
| **Location ID.:** | Stockpile - Mutiple Locations | **Sample No./Depth:** | S8 |

| Sieve Size | % Passing Coarse | Sieve Size | % Passing Fine | Hydrometer (mm) | % Passing |
|---|---|---|---|---|---|
| **37.5 mm** | 93.9 | **2.00 mm** | 65.1 | **0.038** | 34.2 |
| **26.5 mm** | 84.4 | **0.850 mm** | 61.5 | **0.019** | 27.5 |
| **19.0 mm** | 79.6 | **0.425 mm** | 57.0 | **0.008** | 20.1 |
| **13.2 mm** | 76.0 | **0.250 mm** | 52.2 | **0.003** | 13.4 |
| **9.50 mm** | 73.3 | **0.106 mm** | 43.2 | **0.001** | 8.9 |
| **4.75 mm** | 69.3 | **0.075 mm** | 39.8 | | |

Note: More information is available upon request. Tested by: NLO/WGH Reviewed by: Date: 27-Jul-22

# PARTICLE SIZE DISTRIBUTION LS702/ASTM D422




*Unified Classification System*

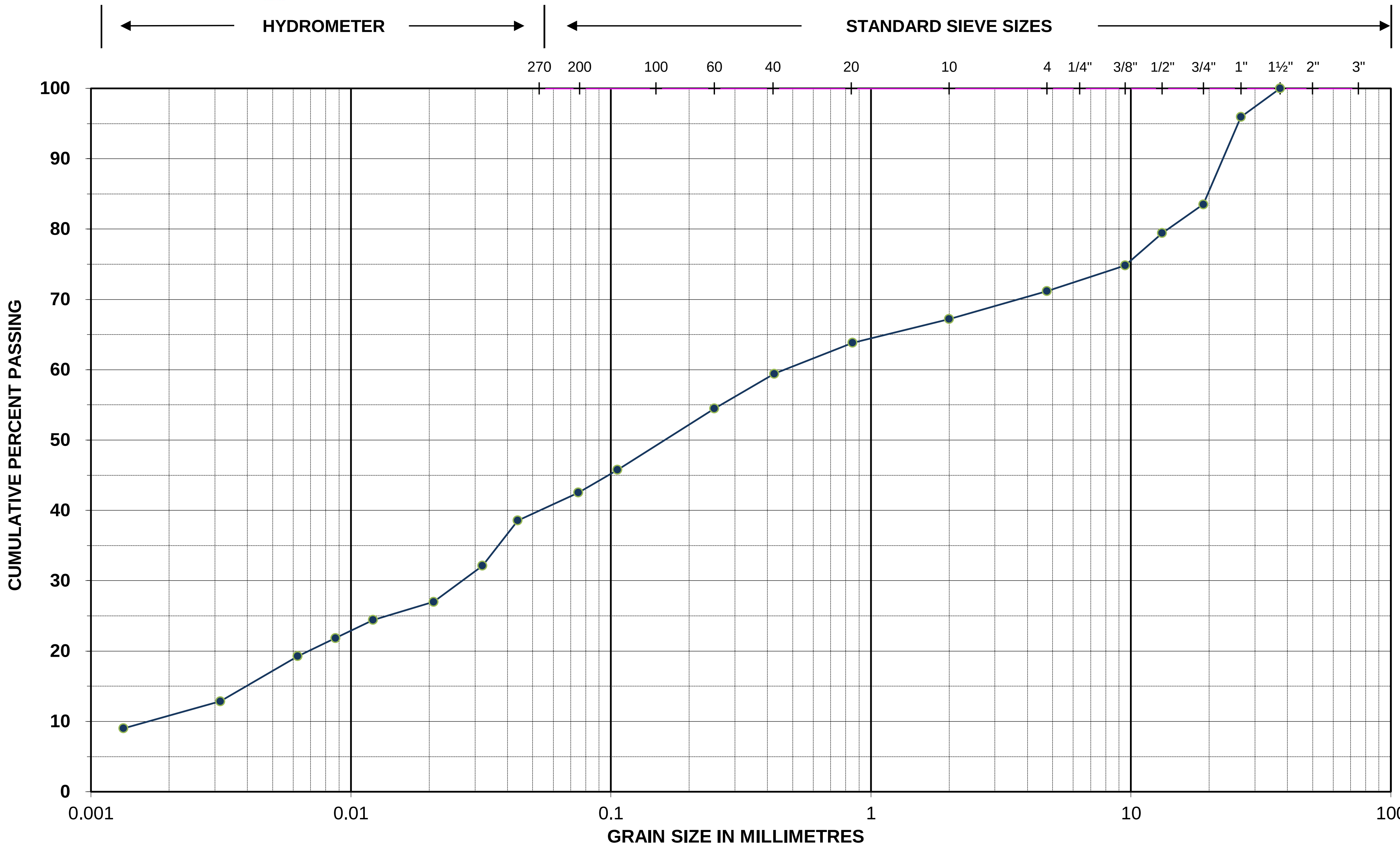
| SILT AND CLAY | SAND | GRAVEL |
|---|---|---|

| | | | |
|---|---|---|---|
| **Project Name:** | Peterborough Landfill | **Project No.:** | 111-53296-14 |
| **Location ID.:** | Cell 4 | **Sample No./Depth:** | S9 |

| Sieve Size | % Passing Coarse | Sieve Size | % Passing Fine | Hydrometer (mm) | % Passing |
|---|---|---|---|---|---|
| **37.5 mm** | 100.0 | **2.00 mm** | 78.9 | **0.044** | 40.8 |
| **26.5 mm** | 99.5 | **0.850 mm** | 75.1 | **0.021** | 29.2 |
| **19.0 mm** | 92.4 | **0.425 mm** | 66.8 | **0.009** | 22.6 |
| **13.2 mm** | 89.3 | **0.250 mm** | 61.8 | **0.003** | 14.6 |
| **9.50 mm** | 86.6 | **0.106 mm** | 51.9 | **0.001** | 8.7 |
| **4.75 mm** | 82.8 | **0.075 mm** | 47.8 | | |

Note: More information is available upon request. Tested by: NLO/WGH Reviewed by: Date: 8-Aug-22

# PARTICLE SIZE DISTRIBUTION LS702/ASTM D422




*Unified Classification System*

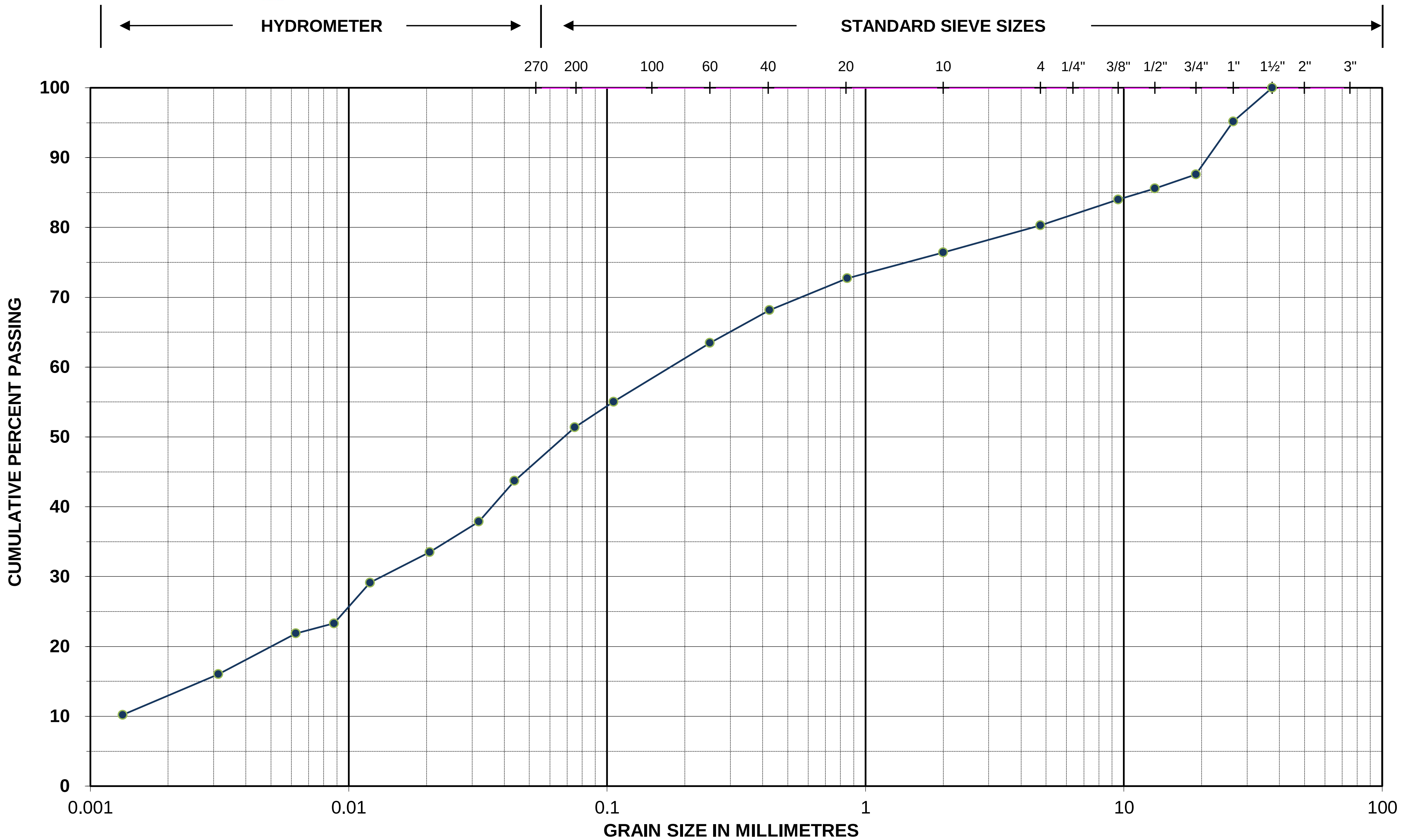
| SILT AND CLAY | SAND | GRAVEL |
|---|---|---|

| | | | |
|---|---|---|---|
| **Project Name:** | Peterborough Landfill | **Project No.:** | 111-53296-14 |
| **Location ID.:** | Cell 4 Strip | **Sample No./Depth:** | #10 |

| Sieve Size | % Passing Coarse | Sieve Size | % Passing Fine | Hydrometer (mm) | % Passing |
|---|---|---|---|---|---|
| **37.5 mm** | 100.0 | **2.00 mm** | 67.2 | **0.044** | 38.6 |
| **26.5 mm** | 95.9 | **0.850 mm** | 63.8 | **0.021** | 27.0 |
| **19.0 mm** | 83.5 | **0.425 mm** | 59.4 | **0.009** | 21.8 |
| **13.2 mm** | 79.4 | **0.250 mm** | 54.5 | **0.003** | 12.9 |
| **9.50 mm** | 74.8 | **0.106 mm** | 45.8 | **0.001** | 9.0 |
| **4.75 mm** | 71.2 | **0.075 mm** | 42.5 | | |

Note: More information is available upon request. Tested by: JG/WG Reviewed by: Date: 8-Aug-22

# PARTICLE SIZE DISTRIBUTION LS702/ASTM D422




*Unified Classification System*

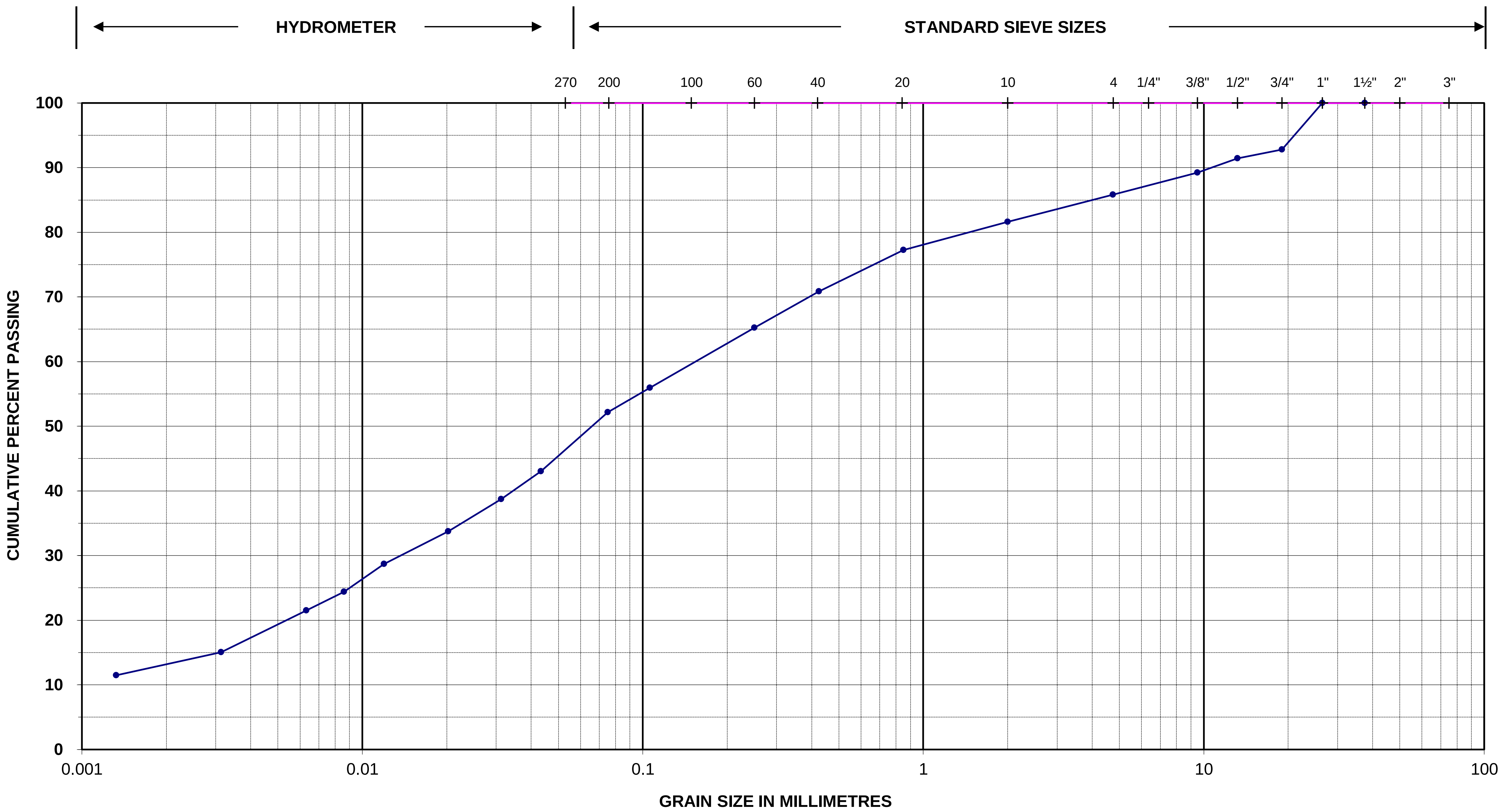
| SILT AND CLAY | SAND | GRAVEL |
|---|---|---|

| | | | |
|---|---|---|---|
| **Project Name:** | Peterborough Landfill | **Project No.:** | 111-53296-14 |
| **Location ID.:** | Road Sample | **Sample No./Depth:** | S11 |

| Sieve Size | % Passing Coarse | Sieve Size | % Passing Fine | Hydrometer (mm) | % Passing |
|---|---|---|---|---|---|
| **37.5 mm** | 100.0 | **2.00 mm** | 76.4 | **0.044** | 43.7 |
| **26.5 mm** | 95.2 | **0.850 mm** | 72.7 | **0.021** | 33.5 |
| **19.0 mm** | 87.6 | **0.425 mm** | 68.2 | **0.009** | 23.3 |
| **13.2 mm** | 85.6 | **0.250 mm** | 63.4 | **0.003** | 16.0 |
| **9.50 mm** | 84.0 | **0.106 mm** | 55.1 | **0.001** | 10.2 |
| **4.75 mm** | 80.3 | **0.075 mm** | 51.4 | | |

Note: More information is available upon request. Tested by: JG/WGH Reviewed by: Date: 8-Aug-22

# PARTICLE SIZE DISTRIBUTION LS702/ASTM D422




*Unified Classification System*

| SILT AND CLAY | SAND | GRAVEL |
|---|---|---|

| | | |
|---|---|---|
| GRAVEL | 14 | % |
| SAND | 34 | % |
| SILT | 39 | % |
| CLAY | 13 | % |

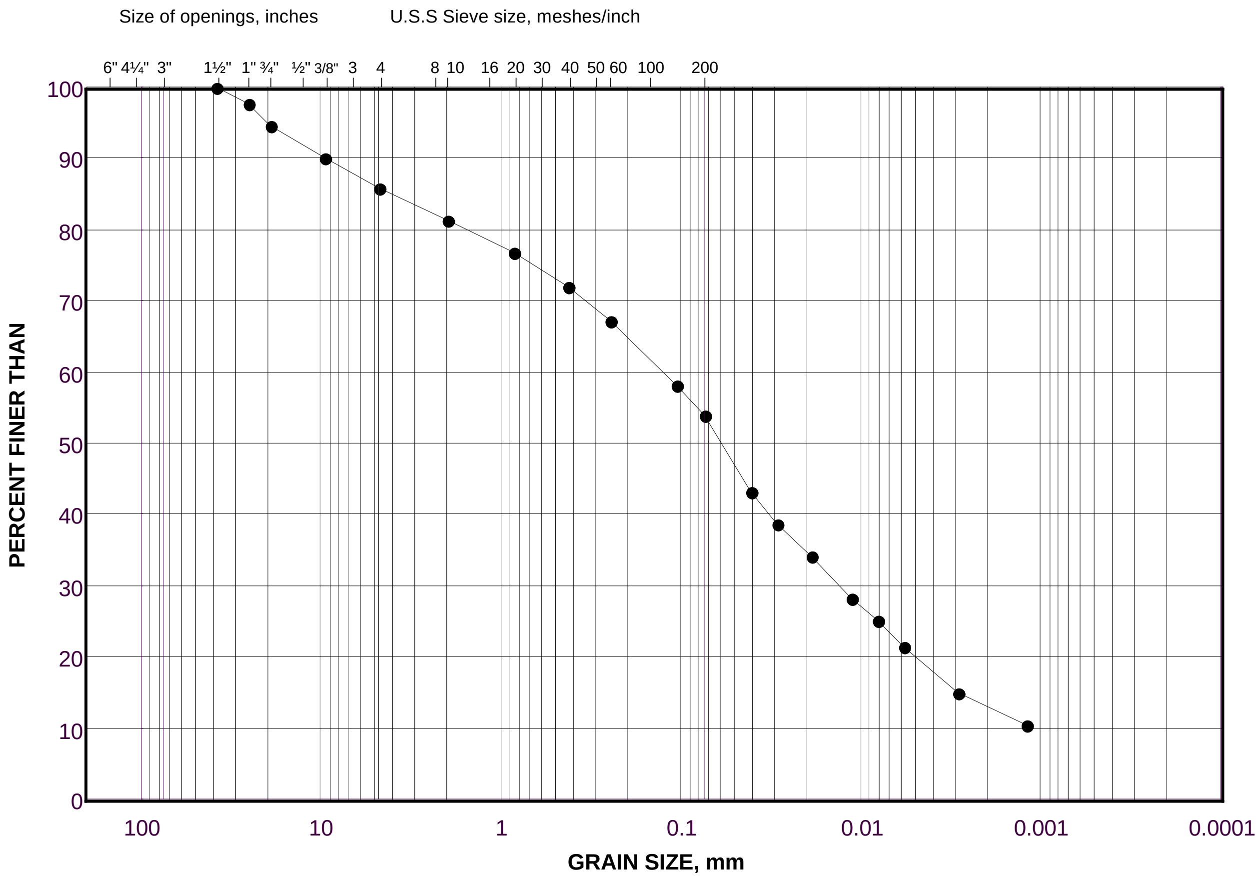
| | | | |
|---|---|---|---|
| **Project Name:** | Peterborough Landfill Cell 4 | **Project No.:** | 111-53296-14 |
| **Location ID.:** | Road | **Sample No./Depth:** | S12 |

| Sieve Size | % Passing Coarse | Sieve Size | % Passing Fine | Hydrometer (mm) | % Passing |
|---|---|---|---|---|---|
| **37.5 mm** | 100.0 | **2.00 mm** | 81.61 | **0.043** | 43.0 |
| **26.5 mm** | 100.0 | **0.850 mm** | 77.3 | **0.020** | 33.7 |
| **19.0 mm** | 92.8 | **0.425 mm** | 70.9 | **0.009** | 24.4 |
| **13.2 mm** | 91.4 | **0.250 mm** | 65.2 | **0.003** | 15.1 |
| **9.50 mm** | 89.2 | **0.106 mm** | 55.9 | **0.001** | 11.5 |
| **4.75 mm** | 85.8 | **0.075 mm** | 52.2 | | |

Note: More information is available upon request.

Tested by: WGH Reviewed by: Date: 12-Aug-22

| GRAIN SIZE DISTRIBUTION | FIGURE |
|---|---|




| COBBLE | COARSE | FINE | COARSE | MEDIUM | FINE | SILT AND CLAY SIZES |
|---|---|---|---|---|---|---|
| SIZE | GRAVEL SIZE | | SAND SIZE | | | FINE GRAINED |

## LEGEND

| SYMBOL | SAMPLE |
|---|---|
| ● | 1B |

Project Number: 20140924 (26000)

Checked By: AH

**Golder Associates**

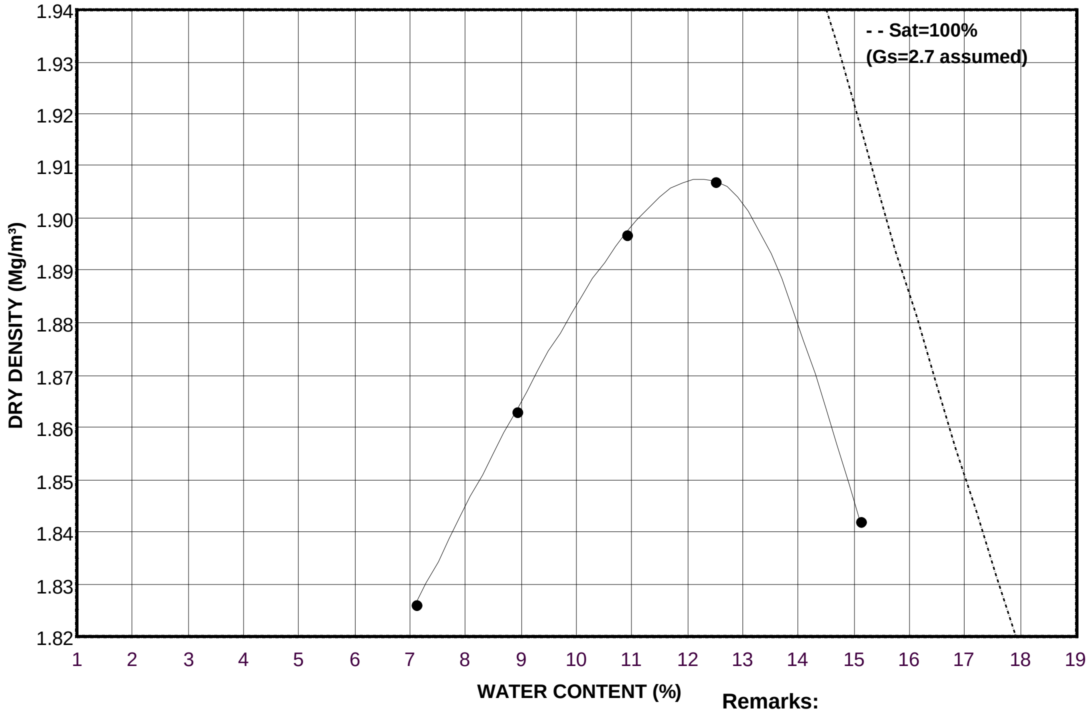
Date: 14-Sep-22

# LABORATORY COMPACTION TEST
Clayey Silt
MTO LS-702/MTO LS-706

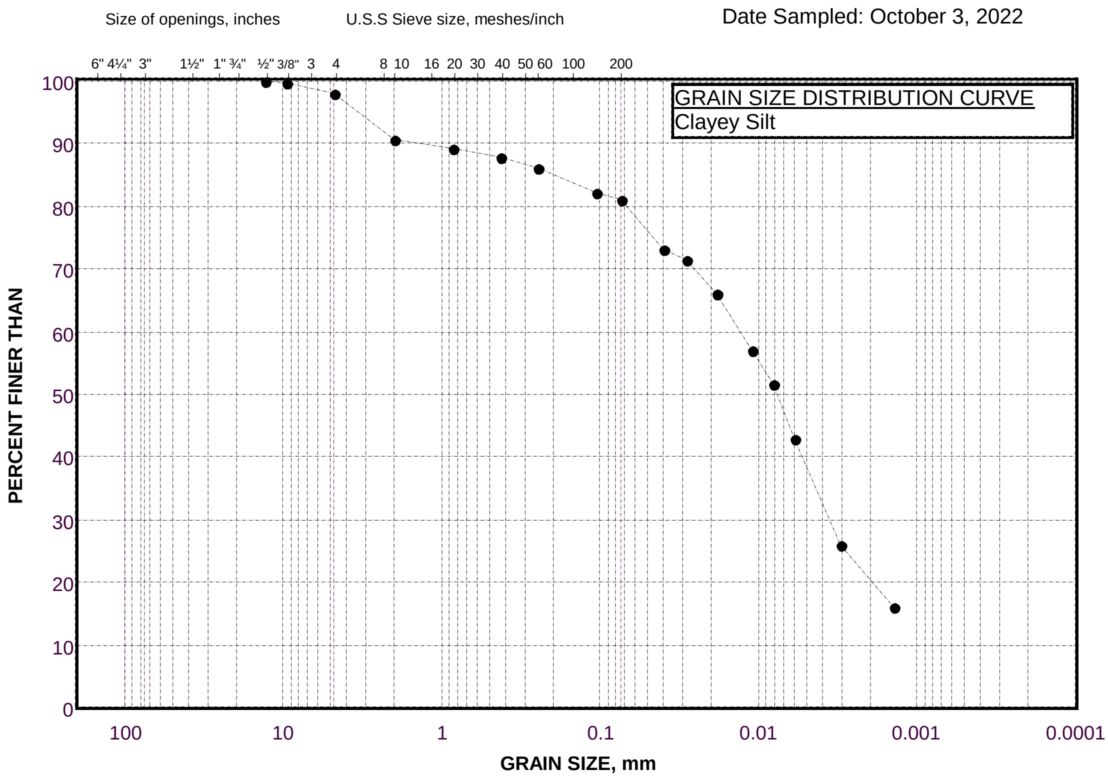
FIGURE CL-1

**Test Results Summary**

TEST: Standard
MAX. DRY DENSITY(Mg/m³): 1.908
NATURAL WATER CONTENT(%): N/A
OPTIMUM WATER CONTENT(%): 12.2
SAMPLE: CL-1
SOURCE: Leahy Stockpile




**Remarks:**
Date Sampled: October 3, 2022




| COBBLE | COARSE | FINE | COARSE | MEDIUM | FINE | SILT AND CLAY SIZES |
|---|---|---|---|---|---|---|
| SIZE | GRAVEL SIZE | | SAND SIZE | | | FINE GRAINED |

Project Number: 18103810AR (WSP 111-53296-14)
Checked By: ______________________

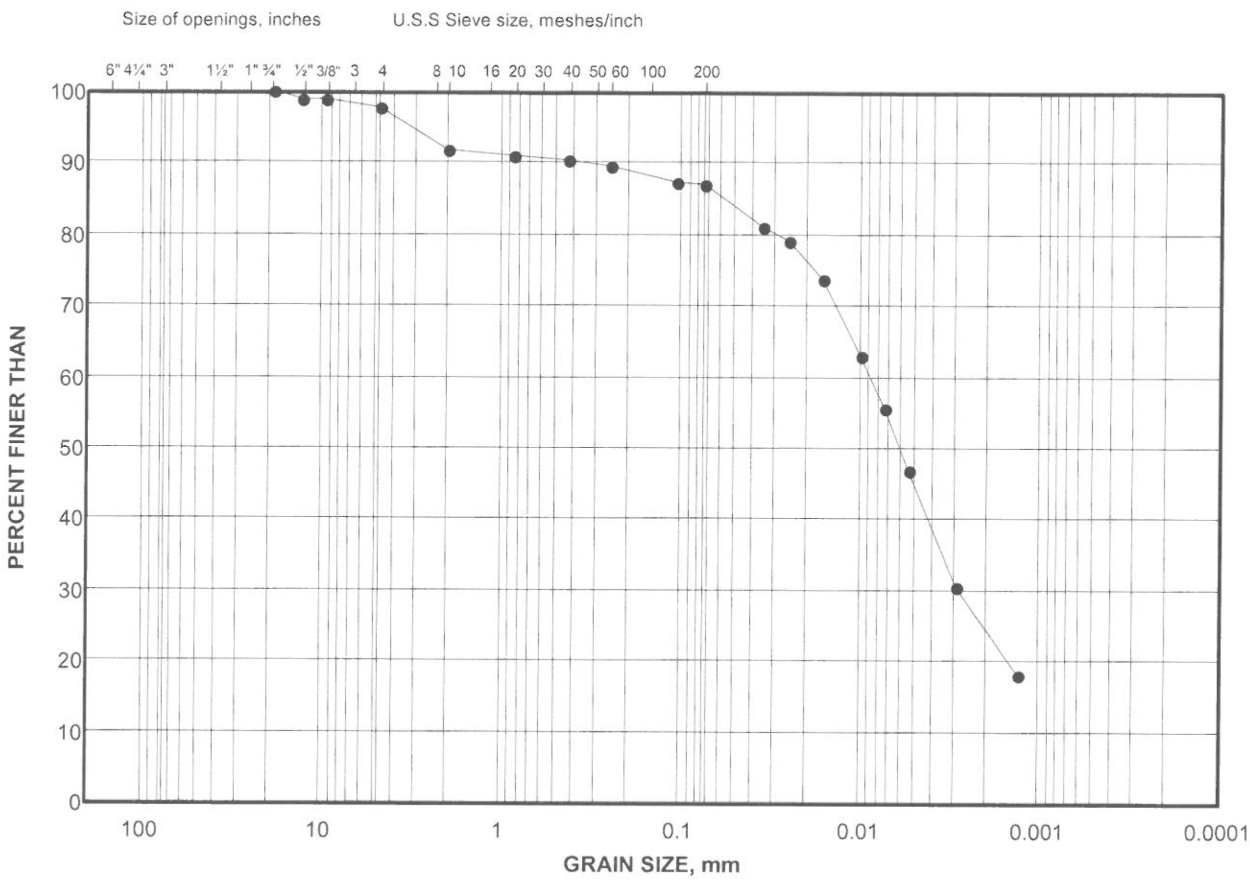
**Golder Associates**

LABID: '22-2080'
Date: 06-Oct-22

# GRAIN SIZE DISTRIBUTION

MTO LS-702

FIGURE CL 22-02




| COBBLE | COARSE | FINE | COARSE | MEDIUM | FINE | SILT AND CLAY SIZES |
|---|---|---|---|---|---|---|
| SIZE | GRAVEL SIZE | | SAND SIZE | | | FINE GRAINED |

## LEGEND

| SYMBOL | BOREHOLE | SAMPLE | DEPTH(m) |
|---|---|---|---|
| ● | CELL 4- S. SLOPE | CL 22-02 | |

Project Number: 18103810AR (WSP 111-53296-14)

Checked By: ____ *(signature)*

**Golder Associates**

Date: 27-Oct-22

# SOIL SIEVE AND HYDROMETER ANALYSIS

Initial weight of dry sample = 743.02(g)
Weight measured for back sieving = 50.45(g)
Weight of Sample for Hydrometer = 50.45(g)

**COARSE SIEVING**

| SIEVE | CUM. MASS RETAINED (g) | % RETAINED | PARTICLE SIZE(mm) | % PASSING |
|---|---|---|---|---|
| 150mm | 0.00 | 0.00 | 150.00 | 100.0 |
| 125mm | 0.00 | 0.00 | 125.00 | 100.0 |
| 75mm | 0.00 | 0.00 | 75.00 | 100.0 |
| 63mm | 0.00 | 0.00 | 63.00 | 100.0 |
| 53mm | 0.00 | 0.00 | 53.00 | 100.0 |
| 37.5mm | 0.00 | 0.00 | 37.50 | 100.0 |
| 26.5mm | 0.00 | 0.00 | 26.50 | 100.0 |
| 19.0mm | 0.00 | 0.00 | 19.00 | 100.0 |
| 13.2mm | 8.74 | 1.18 | 13.20 | 98.8 |
| 9.5mm | 8.74 | 0.00 | 9.50 | 98.8 |
| 4.75mm | 17.36 | 1.16 | 4.75 | 97.7 |
| 2.00mm | 61.35 | 5.92 | 2.00 | 91.7 |
| PAN | 678.87 | 91.74 | 0.00 | 0.0 |

**HYDROMETER BACK SIEVING**

| SIEVE | CUM. MASS RETAINED (g) | % RETAINED | PARTICLE SIZE(mm) | % PASSING |
|---|---|---|---|---|
| 850µm | 0.41 | 0.75 | 0.85 | 91.0 |
| 425µm | 0.78 | 0.67 | 0.43 | 90.3 |
| 250µm | 1.22 | 0.80 | 0.25 | 89.5 |
| 106µm | 2.41 | 2.16 | 0.11 | 87.4 |
| 75µm | 2.68 | 0.49 | 0.08 | 86.9 |

**HYDROMETER**

| | DATE (MM\DD\YYYY) | TIME (HH:MM:SS) |
|---|---|---|
| Started : | 2022-10-25 | 9:24:00 AM |
| Finished : | 2022-10-26 | 8:13:00 AM |

| Elapsed Time (min) | HYDROMETER READING | DEFLOCCULANT CORRECTION | WATER TEMP (°C) | CORRECTED HYDROMETER READING | PARTICLE SIZE (mm) | % PASSING | PLOT |
|---|---|---|---|---|---|---|---|
| 1.00 | 51.00 | 6.0 | 25.6 | 45.00 | 0.0350 | 81.0 | True |
| 2.00 | 50.00 | 6.0 | 25.6 | 44.00 | 0.0250 | 79.2 | True |
| 5.00 | 47.00 | 6.0 | 25.6 | 41.00 | 0.0163 | 73.8 | True |
| 15.00 | 41.00 | 6.0 | 25.3 | 35.00 | 0.0100 | 63.0 | True |
| 30.00 | 37.00 | 6.0 | 25.2 | 31.00 | 0.0073 | 55.8 | True |
| 60.00 | 32.00 | 6.0 | 24.7 | 26.00 | 0.0054 | 46.8 | True |
| 250.00 | 23.00 | 6.0 | 24.0 | 17.00 | 0.0029 | 30.6 | True |
| 1369.00 | 16.00 | 6.0 | 25.6 | 10.00 | 0.0013 | 18.0 | True |

| | | | |
|---|---|---|---|
| Project Number | 18103810AR (WSP 111-53296-14) | Depth | |
| Project Task | 1000 | Units | Metric |
| Borehole Number | CELL 4- S. SLOPE | Testing Date | 2022-10-27 9:52:45 AM |
| Sample Number | CL 22-02 | Tested By | Sieve - SI, Hydrometer - KM |
| Checked By | gp | LabID | 22-2224 |

**Golder Associates**

# D-3 ATTERBERG LIMIT TEST RESULTS (RECOMMPACTED BASE MATERIAL)

# LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS (ASTM D4318)

September 28, 2022
Golder Project Number: 18103810AR
WSP Project Number: 111-53296-14

Attention:

Sample Description:

| | |
|---|---|
| Date Sampled: N/A | Date Tested: September 27, 2022 |
| Sampled By: Client | Tested By: J. Timms |
| Date Received: September 22, 2022 | |

| Borehole Number | Sample Number | Golder Lab Number | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | Soil Classification |
|---|---|---|---|---|---|---|
| Cell 4 Base | SS - ATT 1 | -- | 14.8 | 10.4 | 4.4 | CL-ML |
| Cell 4 Base | SS - ATT 2 | -- | 15.5 | 10.5 | 5.0 | CL-ML |
| Cell 4 Base | SS - ATT 3 | -- | 15.2 | 10.7 | 4.5 | CL-ML |
| Cell 4 Base | SS - ATT 4 | -- | 14.9 | 10.3 | 4.6 | CL-ML |

See Attached Figure 1

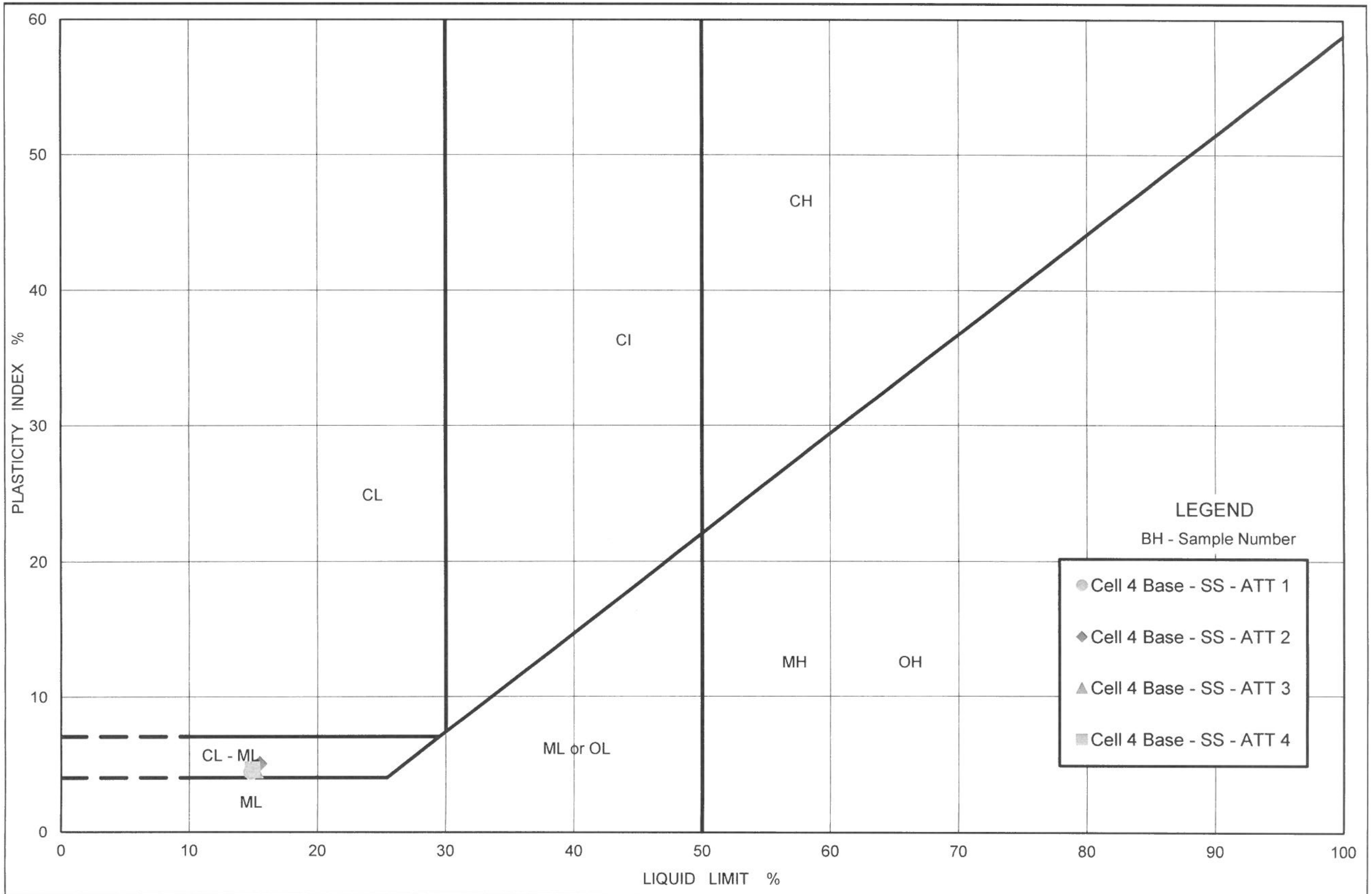
Data Input By: J.Timms

Reviewed by:

John Taylor, Laboratory Supervisor

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other production zones/periods. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

# LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS (ASTM D4318)




| | | |
|---|---|---|
| GOLDER | **PLASTICITY CHART** | Figure No.: 1 |
| | | Project No.: 18103810AR (WSP 111-53296-14) |
| | | Checked By: John Taylor, Laboratory Supervisor |

GOLDER

# LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS (ASTM D4318)

September 30, 2022
Golder Project Number: 18103810AR
WSP Project Number: 111-53296-14

Attention:

Sample Description:

| | | | |
|---|---|---|---|
| Date Sampled: | N/A | Date Tested: | September 28, 2022 |
| Sampled By: | Client | Tested By: | J. Timms |
| Date Received: | September 26, 2022 | | |

| Borehole Number | Sample Number | Golder Lab Number | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | Soil Classification |
|---|---|---|---|---|---|---|
| Cell 4 Base | SS - ATT 5 | -- | 15.1 | 10.6 | 4.5 | CL-ML |
| Cell 4 Base | SS - ATT6 | -- | 15.4 | 11.2 | 4.2 | CL-ML |
| Cell 4 North Slope | SS - ATT 7 | -- | 15.6 | 10.5 | 5.1 | CL-ML |
| Cell 4 North Slope | SS - ATT8 | -- | 14.1 | 10.3 | 3.8 | CL-ML |
| Cell 4 North Slope | SS - ATT9 | -- | 15.0 | 10.5 | 4.5 | CL-ML |
| Cell 4 North Slope | SS - ATT10 | -- | 15.3 | 10.6 | 4.7 | CL-ML |
| Cell 4 West Slope | SS - ATT11 | -- | 14.9 | 10.6 | 4.3 | CL-ML |
| Cell 4 West Slope | SS - ATT12 | -- | 14.7 | 10.6 | 4.1 | CL-ML |

See Attached Figure 1

Data Input By: J.Timms

Reviewed by:

John Taylor, Laboratory Supervisor

CCIL

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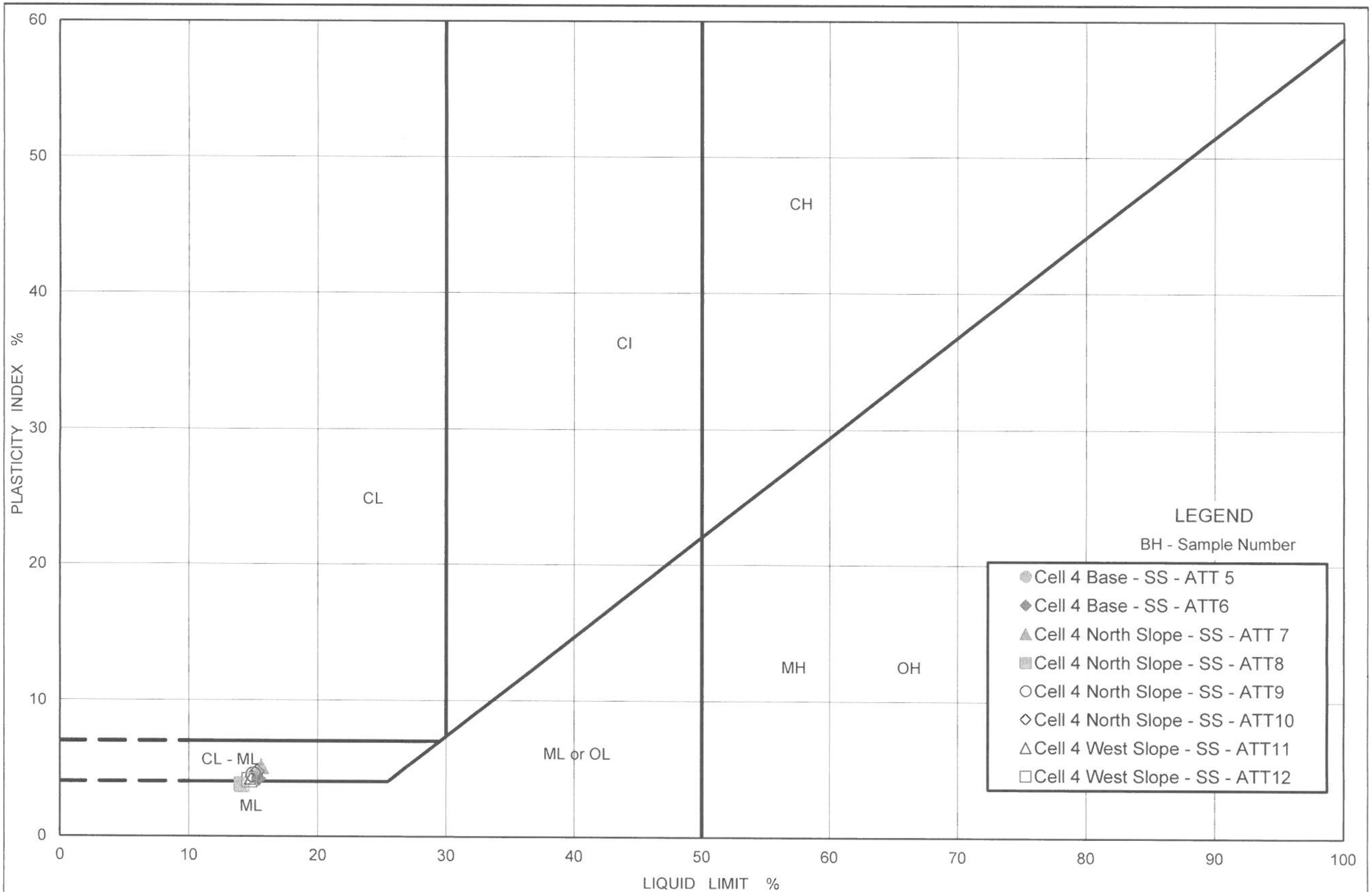
# LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS (ASTM D4318)




GOLDER

## PLASTICITY CHART

Figure No.: 1

Project No.: 18103810AR (WSP 111-53296-14)

Checked By: John Taylor, Laboratory Supervisor

GOLDER

# LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS (ASTM D4318)

September 30, 2022
Golder Project Number: 18103810AR
WSP Project Number: 111-53296-14

Attention:

Sample Description:

| | | | |
|---|---|---|---|
| Date Sampled: | N/A | Date Tested: | September 28, 2022 |
| Sampled By: | Client | Tested By: | J.Timms |
| Date Received: | September 26, 2022 | | |

| Borehole Number | Sample Number | Golder Lab Number | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | Soil Classification |
|---|---|---|---|---|---|---|
| Cell 4 West Slope | SS - ATT13 | -- | 14.6 | 10.5 | 4.1 | CL-ML |
| Cell 4 West Slope | SS - ATT14 | -- | 15.2 | 10.2 | 5.0 | CL-ML |

See Attached Figure 1

Data Input By: J.Timms

Reviewed by:

John Taylor, Laboratory Supervisor

CCIL

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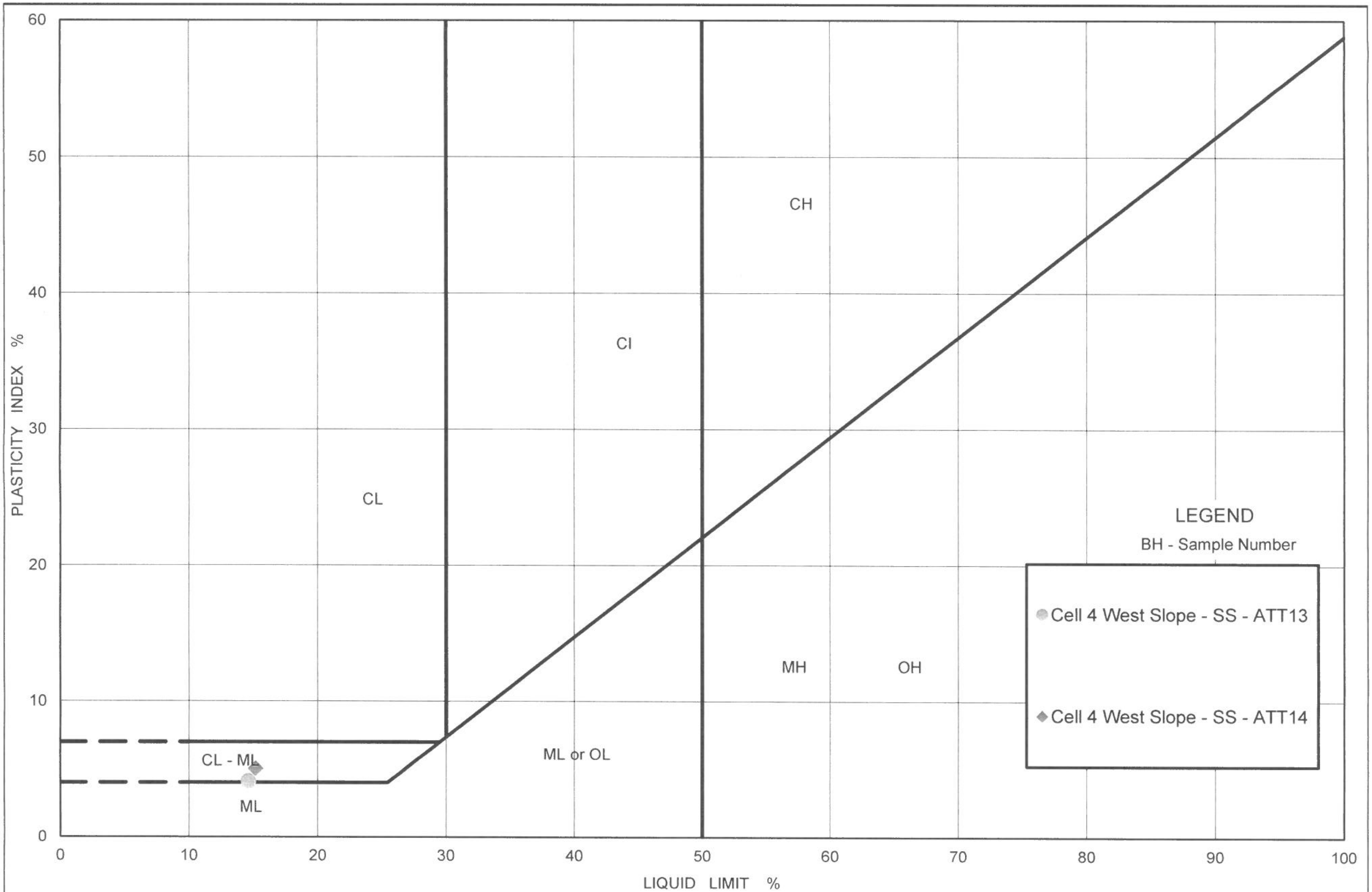
GOLDER ASSOCIATES LTD., 100 Scotia Court Whitby, Ontario. Canada L1N 8Y6 Tel: 905-723-2727 Fax: 905-723-2182

# LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS (ASTM D4318)




GOLDER

## PLASTICITY CHART

Figure No.: 1

Project No.: 18103810AR (WSP 111-53296-14)

Checked By: John Taylor, Laboratory Supervisor

# LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS (ASTM D4318)

October 5, 2022
Golder Project Number: 18103810AR
WSP Project Number: 111-53296-14

Attention:

Sample Description:

| | |
|---|---|
| Date Sampled: N/A | Date Tested: October 5, 2022 |
| Sampled By: Client | Tested By: K.Marren |
| Date Received: October 3, 2022 | |

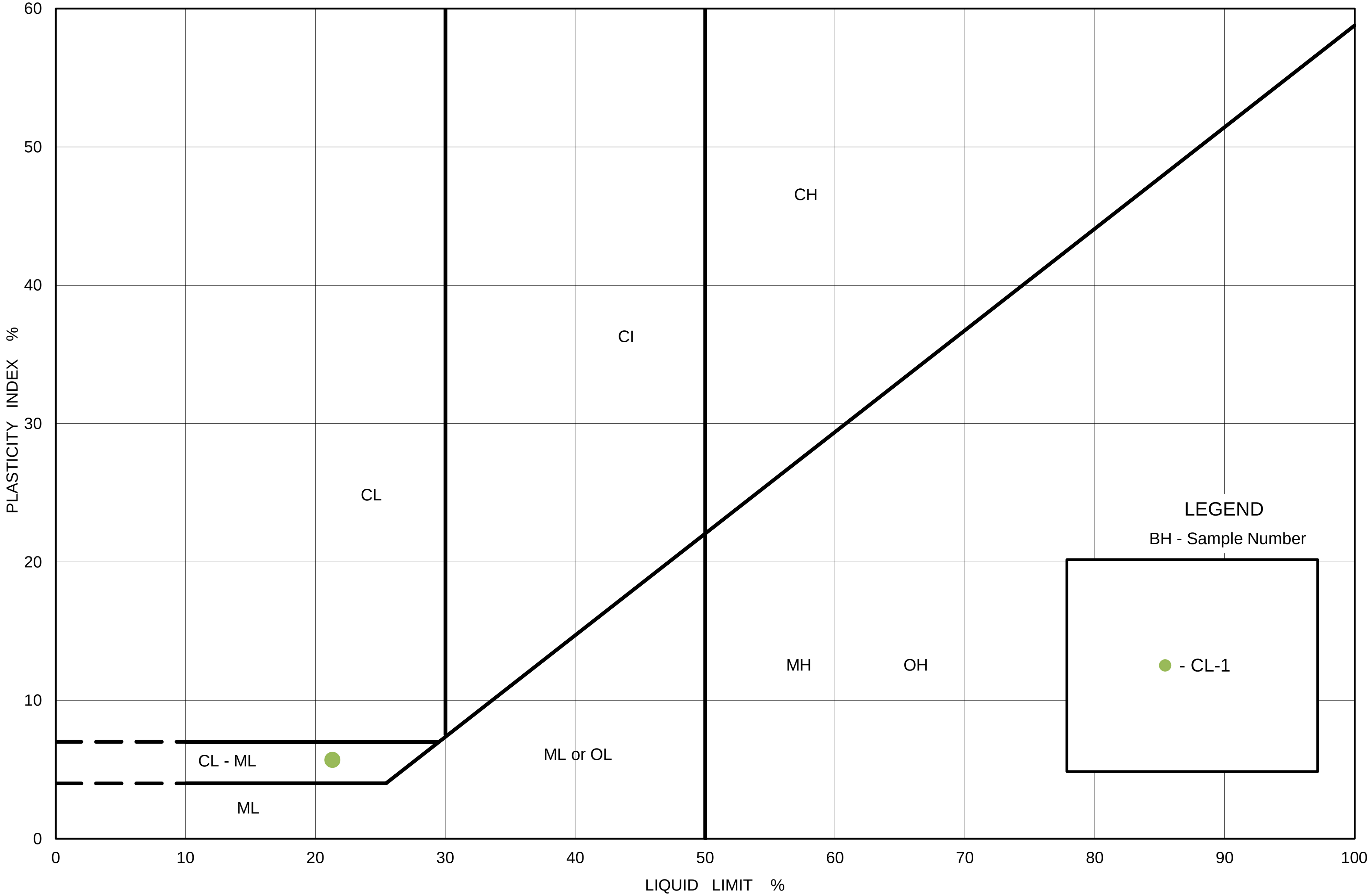
| Borehole Number | Sample Number | Golder Lab Number | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | Soil Classification |
|---|---|---|---|---|---|---|
| -- | CL-1 | -- | 21.3 | 15.6 | 5.7 | CL-ML |

See Attached Figure 1

Data Input By: J.Timms

Reviewed by: ______________________
John Taylor, Laboratory Supervisor

# LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS (ASTM D4318)




| | | |
|---|---|---|
| GOLDER | **PLASTICITY CHART** | Figure No.: 1 |
| | | Project No.: 18103810AR (WSP 111-53296-14) |
| | | Checked By: John Taylor, Laboratory Supervisor |

GOLDER

# LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS (ASTM D4318)

October 6, 2022
Golder Project Number: 1810318AR
WSP Project Number: 111-53296-14

Attention:

Sample Description:

| | | | |
|---|---|---|---|
| Date Sampled: | N/A | Date Tested: | October 5, 2022 |
| Sampled By: | Client | Tested By: | J.Timms |
| Date Received: | October 3, 2022 | | |

| Borehole Number | Sample Number | Golder Lab Number | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | Soil Classification |
|---|---|---|---|---|---|---|
| Cell 4 Base | SS ATT15 | -- | 15.2 | 10.8 | 4.4 | CL-ML |
| Cell 4 South Slope | SS ATT16 | -- | 14.6 | 10.8 | 3.8 | CL-ML |

See Attached Figure 1

Data Input By: J.Timms

Reviewed by:

John Taylor, Laboratory Supervisor

CCIL

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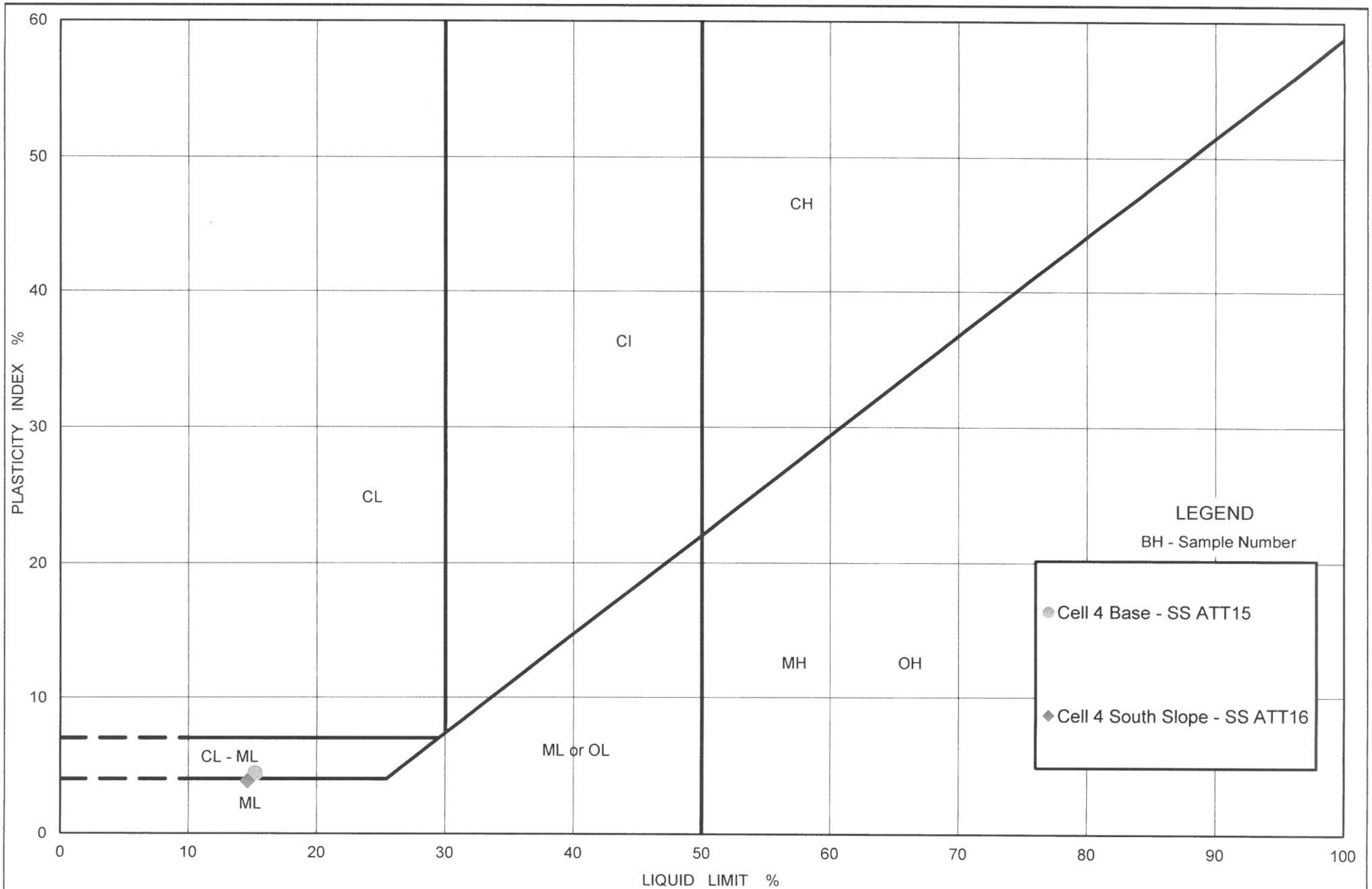
# LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS (ASTM D4318)




| GOLDER | PLASTICITY CHART | Figure No.: 1 |
|---|---|---|
| | | Project No.: 1810318AR (WSP 111-53296-14) |
| | | Checked By: John Taylor, Laboratory Supervisor |

GOLDER

# LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS (ASTM D4318)

October 27, 2022
Golder Project Number: 18103810AR
WSP Project Number: 111-53296-14

Attention:

Sample Description:

| | |
|---|---|
| Date Sampled: N/A | Date Tested: October 26, 2022 |
| Sampled By: Client | Tested By: J. Timms |
| Date Received: October 14, 2022 | |

| Borehole Number | Sample Number | Golder Lab Number | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | Soil Classification |
|---|---|---|---|---|---|---|
| Cell 4 S. Slope | Sa. CL 22-02 | -- | 22.1 | 15.7 | 6.4 | CL-ML |

See Attached Figure 1

Data Input By: J.Timms

Reviewed by:

John Taylor, Laboratory Supervisor

CCIL

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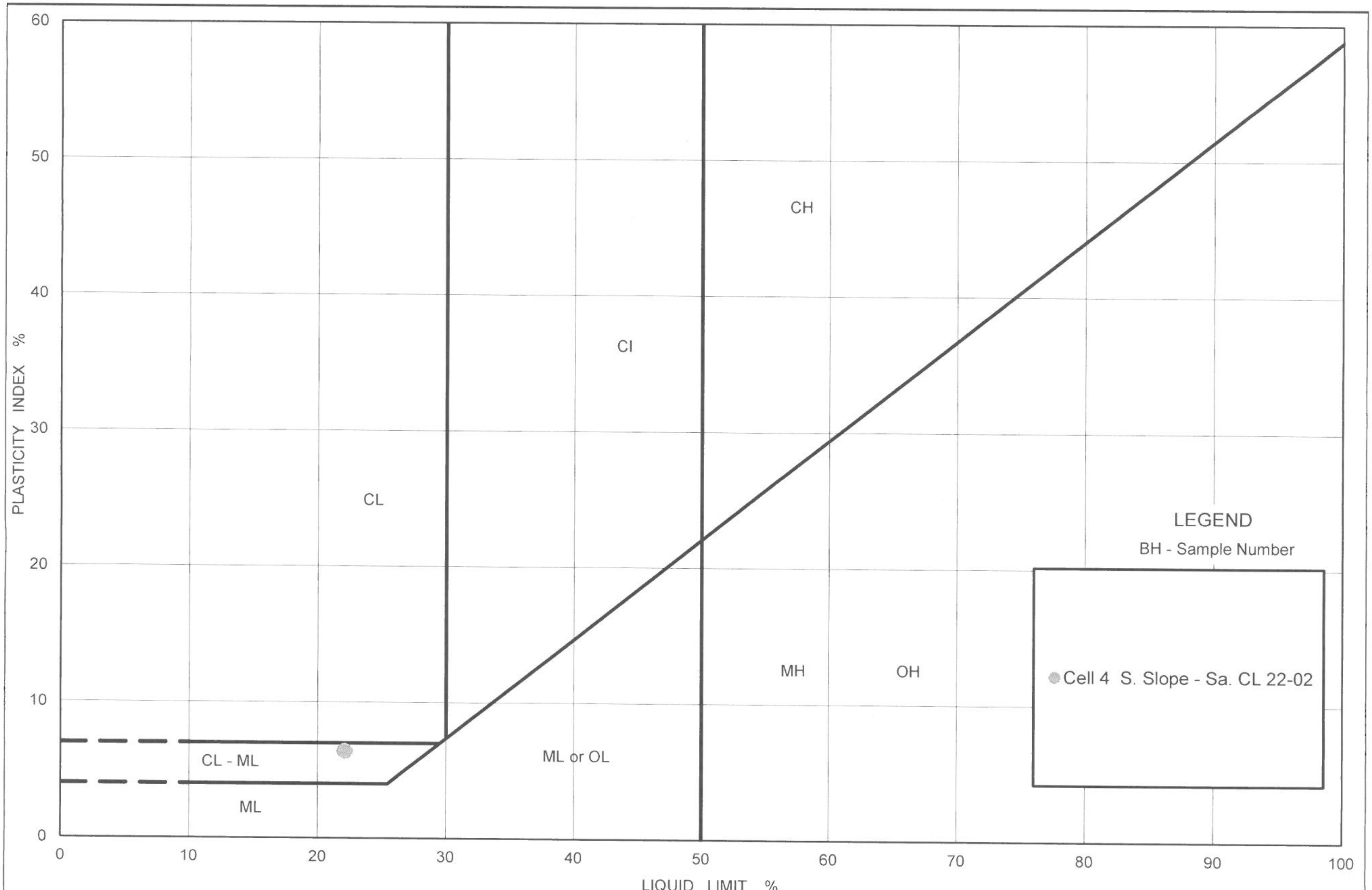
# LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS (ASTM D4318)




GOLDER

## PLASTICITY CHART

Figure No.: 1

Project No.: 18103810AR (WSP 111-53296-14)

Checked By: John Taylor, Laboratory Supervisor

# D-4 *MOISTURE TINS (RECOMMPACTED BASE MATERIAL)*

# MOISTURE CONTENTS

**Project Location:** Cell 4 Construction **Tech:** WGH
**File No.:** 111-53296-14 **Date:** 15-May-22

| | | | | | |
|---|---|---|---|---|---|
| TIN NO. | S3 | | | | |
| BOREHOLE NO. | Clay | | | | |
| SAMPLE & DEPTH | #1 | | | | |
| WT of TIN & WET SOIL (g) | 96.2 | | | | |
| WT of TIN & DRY SOIL (g) | 90.9 | | | | |
| WT of WATER (g) | 5.2 | | | | |
| TARE WT (g) | 19.8 | | | | |
| WT of DRY SOIL (g) | 71.1 | | | | |
| MOISTURE CONTENT | 7.3% | | | | |
| | | | | | |
| TIN NO. | | | | | |
| BOREHOLE NO. | | | | | |
| SAMPLE & DEPTH | | | | | |
| WT of TIN & WET SOIL (g) | | | | | |
| WT of TIN & DRY SOIL (g) | | | | | |
| WT of WATER (g) | | | | | |
| TARE WT (g) | | | | | |
| WT of DRY SOIL (g) | | | | | |
| MOISTURE CONTENT | | | | | |
| | | | | | |
| TIN NO. | | | | | |
| BOREHOLE NO. | | | | | |
| SAMPLE & DEPTH | | | | | |
| WT of TIN & WET SOIL (g) | | | | | |
| WT of TIN & DRY SOIL (g) | | | | | |
| WT of WATER (g) | | | | | |
| TARE WT (g) | | | | | |
| WT of DRY SOIL (g) | | | | | |
| MOISTURE CONTENT | | | | | |
| | | | | | |
| TIN NO. | | | | | |
| BOREHOLE NO. | | | | | |
| SAMPLE & DEPTH | | | | | |
| WT of TIN & WET SOIL (g) | | | | | |
| WT of TIN & DRY SOIL (g) | | | | | |
| WT of WATER (g) | | | | | |
| TARE WT (g) | | | | | |
| WT of DRY SOIL (g) | | | | | |
| MOISTURE CONTENT | | | | | |
| | | | | | |
| TIN NO. | | | | | |
| BOREHOLE NO. | | | | | |
| SAMPLE & DEPTH | | | | | |
| WT of TIN & WET SOIL (g) | | | | | |
| WT of TIN & DRY SOIL (g) | | | | | |
| WT of WATER (g) | | | | | |
| TARE WT (g) | | | | | |
| WT of DRY SOIL (g) | | | | | |
| MOISTURE CONTENT | | | | | |

# MOISTURE CONTENTS

**Project Location:** Peterborough Landfill
**File No.:** 111-53269-14
**Tech:** WGH
**Date:** 5-Jul-22

| TIN NO. | CL7 | C2 | AB5 | JD3 | K04 |
|---|---|---|---|---|---|
| BOREHOLE NO. | | | | | |
| SAMPLE & DEPTH | S1 | S1A | S2 | S2A | S3 |
| WT of TIN & WET SOIL (g) | 101.1 | 92.9 | 120.4 | 93.8 | 87.4 |
| WT of TIN & DRY SOIL (g) | 100.0 | 89.6 | 120.0 | 90.5 | 86.9 |
| WT of WATER (g) | 1.1 | 3.3 | 0.4 | 3.3 | 0.6 |
| TARE WT (g) | 15.5 | 15.5 | 15.5 | 15.6 | 15.2 |
| WT of DRY SOIL (g) | 84.5 | 74.0 | 104.5 | 74.9 | 71.6 |
| MOISTURE CONTENT | 1.3% | 4.5% | 0.4% | 4.4% | 0.8% |

| TIN NO. | MX2 | B15 | K4 | Y23 | GA8 |
|---|---|---|---|---|---|
| BOREHOLE NO. | | | | | |
| SAMPLE & DEPTH | S3A | S4 | S4A | S5 | S5A |
| WT of TIN & WET SOIL (g) | 92.4 | 97.3 | 97.3 | 106.1 | 104.3 |
| WT of TIN & DRY SOIL (g) | 90.3 | 93.3 | 93.8 | 104.0 | 99.5 |
| WT of WATER (g) | 2.1 | 4.0 | 3.6 | 2.1 | 4.8 |
| TARE WT (g) | 15.2 | 15.7 | 15.7 | 14.6 | 14.6 |
| WT of DRY SOIL (g) | 75.1 | 77.7 | 78.1 | 89.4 | 84.9 |
| MOISTURE CONTENT | 2.7% | 5.2% | 4.6% | 2.4% | 5.7% |

| TIN NO. | | | | | |
|---|---|---|---|---|---|
| BOREHOLE NO. | | | | | |
| SAMPLE & DEPTH | | | | | |
| WT of TIN & WET SOIL (g) | | | | | |
| WT of TIN & DRY SOIL (g) | | | | | |
| WT of WATER (g) | | | | | |
| TARE WT (g) | | | | | |
| WT of DRY SOIL (g) | | | | | |
| MOISTURE CONTENT | | | | | |

| TIN NO. | | | | | |
|---|---|---|---|---|---|
| BOREHOLE NO. | | | | | |
| SAMPLE & DEPTH | | | | | |
| WT of TIN & WET SOIL (g) | | | | | |
| WT of TIN & DRY SOIL (g) | | | | | |
| WT of WATER (g) | | | | | |
| TARE WT (g) | | | | | |
| WT of DRY SOIL (g) | | | | | |
| MOISTURE CONTENT | | | | | |

| TIN NO. | | | | | |
|---|---|---|---|---|---|
| BOREHOLE NO. | | | | | |
| SAMPLE & DEPTH | | | | | |
| WT of TIN & WET SOIL (g) | | | | | |
| WT of TIN & DRY SOIL (g) | | | | | |
| WT of WATER (g) | | | | | |
| TARE WT (g) | | | | | |
| WT of DRY SOIL (g) | | | | | |
| MOISTURE CONTENT | | | | | |

## SUMMARY OF WATER CONTENT DETERMINATIONS

**ASTM D 2216-10**

| | |
|---|---|
| PROJECT NUMBER | 18103810AR |
| PROJECT NAME | WSP Project Number: 111-53296-14 |
| DATE TESTED | September 22, 2022 |

| Borehole No. | Sample No. | Water Content (%) | Atterberg Limits LL, PL, PI |
|---|---|---|---|
| Cell 4 Base | K26 | 8.2% | |
| Cell 4 Base | K25 | 5.8% | |
| Cell 4 Base | K32 | 8.7% | |
| Cell 4 Base | K19 | 9.3% | |
| Cell 4 Base | K36 | 6.1% | |
| Cell 4 Base | T58 | 6.6% | |
| Cell 4 Base | K49 | 8.4% | |
| Cell 4 Base | K21 | 9.5% | |
| Cell 4 Base | K16 | 9.5% | |

## SUMMARY OF WATER CONTENT DETERMINATIONS

### ASTM D 2216-10

| | |
|---|---|
| PROJECT NUMBER | 18103810AR |
| PROJECT NAME | WSP Project Number: 111-53296-14 |
| DATE TESTED | September 26, 2022 |

| Borehole No. | Sample No. | Water Content (%) | Atterberg Limits LL, PL, PI |
|---|---|---|---|
| Cell 4 Base | K55 | 8.4% | |
| Cell 4 Base | K44 | 9.9% | |
| | | | |
| Cell 4 North Slope | T28 | 6.7% | |
| Cell 4 North Slope | K17 | 8.8% | |
| Cell 4 North Slope | K53 | 8.5% | |
| Cell 4 North Slope | K33 | 8.1% | |
| Cell 4 North Slope | ZA | 8.5% | |
| Cell 4 North Slope | K54 | 7.1% | |
| | | | |
| Cell 4 West Slope | I5 | 5.4% | |
| Cell 4 West Slope | T1 | 6.5% | |
| Cell 4 West Slope | K48 | 6.1% | |
| Cell 4 West Slope | LD1 | 4.9% | |
| Cell 4 West Slope | KZK | 6.1% | |
| Cell 4 West Slope | X34 | 5.4% | |

Checked By: 

## SUMMARY OF WATER CONTENT DETERMINATIONS

### ASTM D 2216-10

| | |
|---|---|
| PROJECT NUMBER | 18103810AR |
| PROJECT NAME | |
| DATE TESTED | October 3, 2022 |

| Borehole No. | Sample No. | Water Content (%) | Atterberg Limits LL, PL, PI |
|---|---|---|---|
| Cell 4 Base | T12 | 8.6% | |
| Cell 4 Base | T20 | 8.5% | |
| Cell 4 Base | T02 | 9.7% | |
| Cell 4 Base | T66 | 7.6% | |
| | | | |
| Cell 4 South Slope | T34 | 10.4% | |
| Cell 4 South Slope | K39 | 9.4% | |
| Cell 4 South Slope | T44 | 7.2% | |
| Cell 4 South Slope | T09 | 8.3% | |

## SUMMARY OF WATER CONTENT DETERMINATIONS

### ASTM D 2216-10

| | |
|---|---|
| PROJECT NUMBER | 18103810 AR (WSP Project Number 111-53296-14) |
| PROJECT NAME | |
| DATE TESTED | October 14, 2022 |

| Borehole No. | Sample No. | Water Content (%) | Atterberg Limits LL, PL, PI |
|---|---|---|---|
| Cell 4 South Slope | K20 | 13.9% | |
| Cell 4 South Slope | T08 | 7.4% | |
| Cell 4 South Slope | T56 | 10.0% | |

Checked By: JP

## SUMMARY OF WATER CONTENT DETERMINATIONS

### ASTM D 2216-10

| | |
|---|---|
| PROJECT NUMBER | 18103810AR (WSP 111-53296-14) |
| PROJECT NAME | |
| DATE TESTED | October 21, 2022 |

| Borehole No. | Sample No. | Water Content (%) | Atterberg Limits LL, PL, PI |
|---|---|---|---|
| Cell 4 Base | T05 | 8.6% | |
| Cell 4 Base | T31 | 8.8% | |
| Cell 4 Base | K27 | 12.3% | |
| | | | |
| Cell 4 West Slope | T41 | 7.9% | |
| Cell 4 West Slope | K11 | 5.7% | |

APPENDIX

# D-5 HYDRAULIC CONDUCTIVITY TESTING (RECOMMPACTED BASE MATERIAL)

# HYDRAULIC CONDUCTIVITY TEST

**ASTM D 5084 (CONSTANT HEAD - Method A)**

**SAMPLE IDENTIFICATION**

| | | | |
|---|---|---|---|
| PROJECT NUMBER | 18103810(10038) | SAMPLE | 1 |
| PROJECT TITLE | WSP/LaboratoryTesting/Whitby | SAMPLE DEPTH, m | - |
| BOREHOLE NUMBER | - | DATE | September 6, 2022 |

**SPECIMEN PROPERTIES AND DIMENSIONS (INITIAL)**

| | | | |
|---|---|---|---|
| SAMPLE HEIGHT, cm | 5.96 | UNIT WEIGHT, kN/m$^3$ | 21.78 |
| SAMPLE DIAMETER, cm | 6.99 | DRY UNIT WEIGHT, kN/m$^3$ | 20.56 |
| SAMPLE AREA, cm$^2$ | 38.37 | SPECIFIC GRAVITY, assumed | 2.70 |
| SAMPLE VOLUME, cm$^3$ | 228.71 | VOLUME OF SOLIDS, cm$^3$ | 177.62 |
| TOTAL MASS, g | 508.00 | VOLUME OF VOIDS, cm$^3$ | 51.10 |
| DRY MASS, g | 479.56 | VOID RATIO | 0.29 |
| WATER CONTENT, % | 5.9 | | |

**SATURATION STAGE**

| | | | |
|---|---|---|---|
| CELL PRESSURE, kPa | 420.00 | EFFECTIVE CONSOLIDATION STRESS, kPa | 10 |
| HEAD PRESSURE, kPa | 410.00 | DURATION, min | 5,395 |
| BACK PRESSURE, kPa | 410.00 | $B$ COEFFICIENT | 0.96 |

**CONSOLIDATION STAGE**

| | | | |
|---|---|---|---|
| CELL PRESSURE, kPa | 576.00 | EFFECTIVE CONSOLIDATION STRESS, kPa | 166 |
| HEAD PRESSURE, kPa | 410.00 | DURATION, min | 1,490 |
| BACK PRESSURE, kPa | 410.00 | VOLUME CHANGE, cm$^3$ | 8.40 |
| | | DRAINAGE | Top and Bottom |

**SPECIMEN PROPERTIES AND DIMENSIONS (AFTER CONSOLIDATION)**

| | | | |
|---|---|---|---|
| SAMPLE HEIGHT, cm | 5.89 | SAMPLE AREA, cm$^2$ | 37.44 |
| SAMPLE DIAMETER, cm | 6.90 | SAMPLE VOLUME, cm$^3$ | 220.38 |

**HYDRAULIC CONDUCTIVITY STAGE**

| | | | |
|---|---|---|---|
| CELL PRESSURE, kPa | 586 | EFFECTIVE CONSOLIDATION STRESS, kPa | 166 |
| HEAD PRESSURE, kPa | 420 | DURATION, min | 8518 |
| BACK PRESSURE, kPa | 410 | HYDRAULIC GRADIENT, $i$ | 17 |

**SPECIMEN PROPERTIES AND DIMENSIONS (FINAL)**

| | | | |
|---|---|---|---|
| SAMPLE HEIGHT, cm | 5.89 | UNIT WEIGHT, kN/m$^3$ | 23.07 |
| SAMPLE DIAMETER, cm | 6.90 | DRY UNIT WEIGHT, kN/m$^3$ | 21.34 |
| SAMPLE AREA, cm$^2$ | 37.44 | SPECIFIC GRAVITY, assumed | 2.70 |
| SAMPLE VOLUME, cm$^3$ | 220.38 | VOLUME OF SOLIDS, cm$^3$ | 177.62 |
| TOTAL MASS, g | 518.41 | VOLUME OF VOIDS, cm$^3$ | 42.77 |
| DRY MASS, g | 479.56 | VOID RATIO | 0.24 |
| WATER CONTENT, % | 8.1 | | |

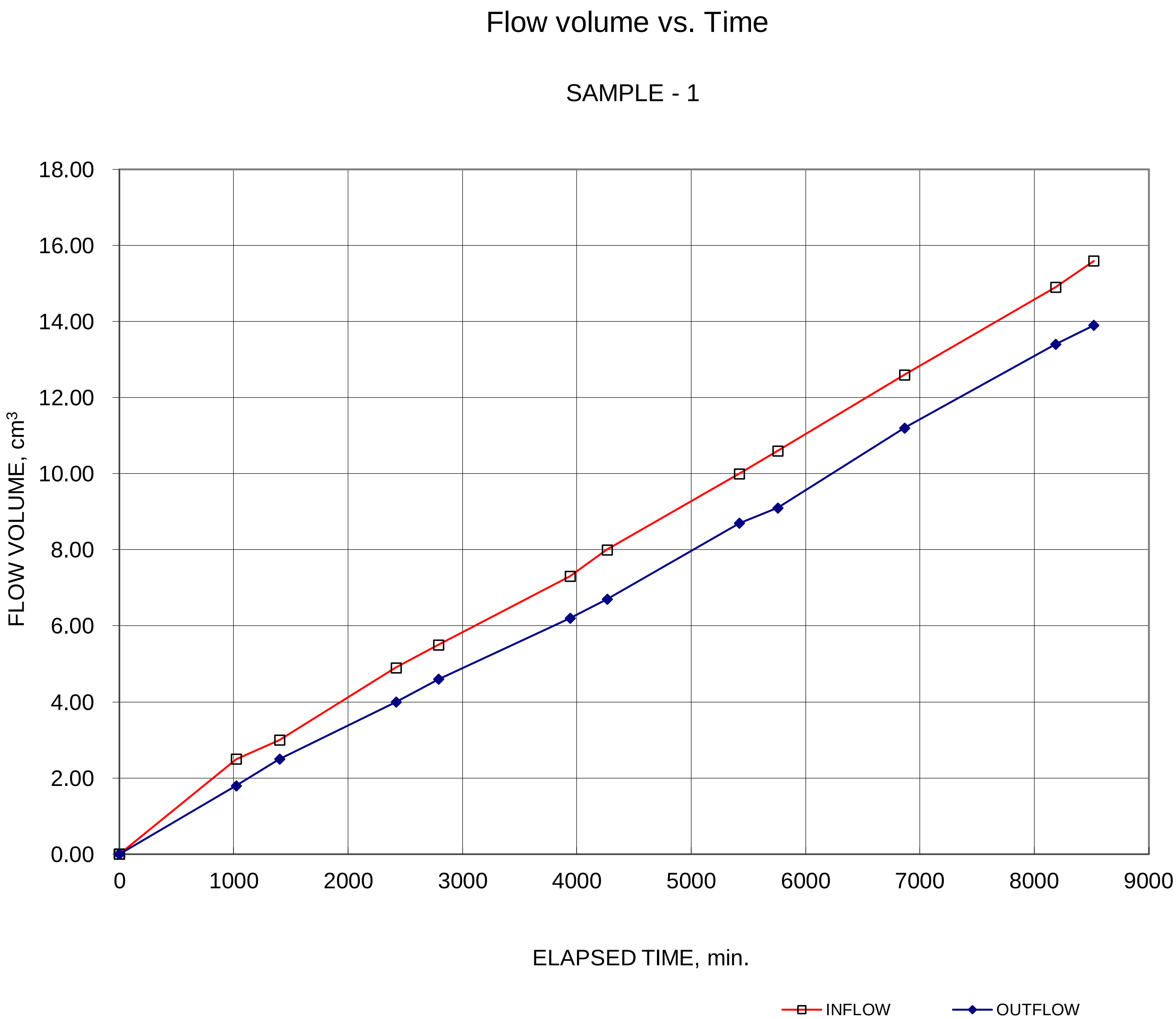
**TEST RESULTS**

| | |
|---|---|
| ELAPSED TIME TO STEADY STATE FLOW (min) | 0.0 |
| DURATION OF STEADY STATE FLOW (min) | 8518 |
| INFLOW VOLUME UNDER STEADY STATE FLOW (cm$^3$) | 15.6 |
| OUTFLOW VOLUME UNDER STEADY STATE FLOW (cm$^3$) | 13.9 |
| INFLOW TO OUTFLOW RATIO | 1.1 |
| HYDRAULIC CONDUCTIVITY (INFLOW) (m/s) | 4.71E-10 |
| HYDRAULIC CONDUCTIVITY (OUTFLOW) (m/s) | 4.19E-10 |
| HYDRAULIC CONDUCTIVITY, K, m/s | 4.45E-10 |
| **HYDRAULIC CONDUCTIVITY AT STANDARD TEMPERATURE, $K_{20}$, m/s** | **4.14E-10** |

**NOTES:**

Effective consolidation stress assigned, by client.

| | |
|---|---|
| PERMEANT FLUID | Deaired tap water |
| AVERAGE TEST TEMPERATURE | 23.0 °C |




Project number : 18103810(10038)
Prepared by : MM

**Golder**

Checked by : AH

**HYDRAULIC CONDUCTIVITY TEST**

Project title: WSP/LaboratoryTesting/Whitby
Borehole number: -
Sample depth: -

# HYDRAULIC CONDUCTIVITY TEST

**ASTM D 5084 (CONSTANT HEAD - Method A)**

## SAMPLE IDENTIFICATION

| | | | |
|---|---|---|---|
| PROJECT NUMBER | 20140924 (26000) | SAMPLE | 5 |
| PROJECT TITLE | WSP/ Lab Testing/ Miss | SAMPLE DEPTH, m | - |
| BOREHOLE NUMBER | - | DATE | August 26, 2022 |

## SPECIMEN PROPERTIES AND DIMENSIONS (INITIAL)

| | | | |
|---|---|---|---|
| SAMPLE HEIGHT, cm | 5.88 | UNIT WEIGHT, kN/m$^3$ | 22.57 |
| SAMPLE DIAMETER, cm | 6.98 | DRY UNIT WEIGHT, kN/m$^3$ | 20.94 |
| SAMPLE AREA, cm$^2$ | 38.26 | SPECIFIC GRAVITY, assumed | 2.70 |
| SAMPLE VOLUME, cm$^3$ | 225.00 | VOLUME OF SOLIDS, cm$^3$ | 177.93 |
| TOTAL MASS, g | 517.89 | VOLUME OF VOIDS, cm$^3$ | 47.07 |
| DRY MASS, g | 480.42 | VOID RATIO | 0.26 |
| WATER CONTENT, % | 7.8 | | |

## SATURATION STAGE

| | | | |
|---|---|---|---|
| CELL PRESSURE, kPa | 490.00 | EFFECTIVE CONSOLIDATION STRESS, kPa | 10 |
| HEAD PRESSURE, kPa | 480.00 | DURATION, min | 5,760 |
| BACK PRESSURE, kPa | 480.00 | $B$ COEFFICIENT | 0.96 |

## CONSOLIDATION STAGE

| | | | |
|---|---|---|---|
| CELL PRESSURE, kPa | 646.00 | EFFECTIVE CONSOLIDATION STRESS, kPa | 166 |
| HEAD PRESSURE, kPa | 480.00 | DURATION, min | 972 |
| BACK PRESSURE, kPa | 480.00 | VOLUME CHANGE, cm$^3$ | 3.40 |
| | | DRAINAGE | Top and Bottom |

## SPECIMEN PROPERTIES AND DIMENSIONS (AFTER CONSOLIDATION)

| | | | |
|---|---|---|---|
| SAMPLE HEIGHT, cm | 5.85 | SAMPLE AREA, cm$^2$ | 37.88 |
| SAMPLE DIAMETER, cm | 6.94 | SAMPLE VOLUME, cm$^3$ | 221.61 |

## HYDRAULIC CONDUCTIVITY STAGE

| | | | |
|---|---|---|---|
| CELL PRESSURE, kPa | 658 | EFFECTIVE CONSOLIDATION STRESS, kPa | 166 |
| HEAD PRESSURE, kPa | 492 | DURATION, min | 7053 |
| BACK PRESSURE, kPa | 480 | HYDRAULIC GRADIENT, $i$ | 21 |

## SPECIMEN PROPERTIES AND DIMENSIONS (FINAL)

| | | | |
|---|---|---|---|
| SAMPLE HEIGHT, cm | 5.85 | UNIT WEIGHT, kN/m$^3$ | 23.07 |
| SAMPLE DIAMETER, cm | 6.94 | DRY UNIT WEIGHT, kN/m$^3$ | 21.26 |
| SAMPLE AREA, cm$^2$ | 37.88 | SPECIFIC GRAVITY, assumed | 2.70 |
| SAMPLE VOLUME, cm$^3$ | 221.61 | VOLUME OF SOLIDS, cm$^3$ | 177.93 |
| TOTAL MASS, g | 521.24 | VOLUME OF VOIDS, cm$^3$ | 43.68 |
| DRY MASS, g | 480.42 | VOID RATIO | 0.25 |
| WATER CONTENT, % | 8.5 | | |

## TEST RESULTS

| | |
|---|---|
| ELAPSED TIME TO STEADY STATE FLOW (min) | 0.0 |
| DURATION OF STEADY STATE FLOW (min) | 7053 |
| INFLOW VOLUME UNDER STEADY STATE FLOW (cm$^3$) | 6.7 |
| OUTFLOW VOLUME UNDER STEADY STATE FLOW (cm$^3$) | 6.3 |
| INFLOW TO OUTFLOW RATIO | 1.1 |
| HYDRAULIC CONDUCTIVITY (INFLOW) (m/s) | 2.00E-10 |
| HYDRAULIC CONDUCTIVITY (OUTFLOW) (m/s) | 1.86E-10 |
| HYDRAULIC CONDUCTIVITY, K, m/s | 1.93E-10 |
| **HYDRAULIC CONDUCTIVITY AT STANDARD TEMPERATURE, $K_{20}$, m/s** | **1.80E-10** |

**NOTES:**

Effective consolidation stress assigned, by client.

PERMEANT FLUID Deaired tap water

AVERAGE TEST TEMPERATURE 23.0 °C

# HYDRAULIC CONDUCTIVITY TEST

Project title: WSP/ Lab Testing/ Miss
Borehole number: -
Sample depth: -

Project number : 20140924 (26000)
Prepared by : LL

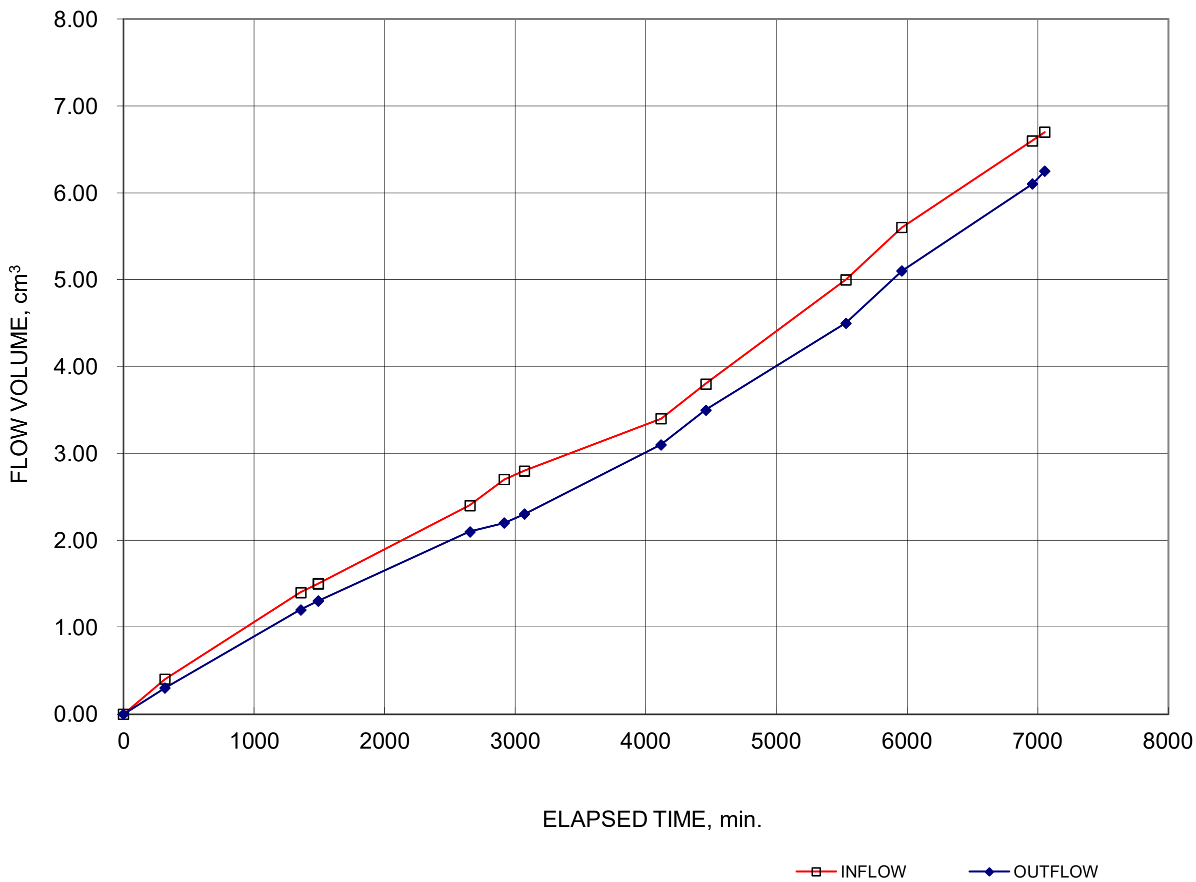
**Golder**

Checked by : AH

Flow volume vs. Time

BOREHOLE NUMBER - -

SAMPLE - 5



# HYDRAULIC CONDUCTIVITY TEST

## ASTM D 5084 (CONSTANT HEAD - Method A)

### SAMPLE IDENTIFICATION

| | | | |
|---|---|---|---|
| PROJECT NUMBER | 20140924 (26000) | SAMPLE | 9 |
| PROJECT TITLE | WSP/ Lab Testing/ Miss | SAMPLE DEPTH, m | - |
| BOREHOLE NUMBER | - | DATE | August 31, 2022 |

### SPECIMEN PROPERTIES AND DIMENSIONS (INITIAL)

| | | | |
|---|---|---|---|
| SAMPLE HEIGHT, cm | 5.99 | UNIT WEIGHT, $kN/m^3$ | 22.75 |
| SAMPLE DIAMETER, cm | 6.97 | DRY UNIT WEIGHT, $kN/m^3$ | 21.10 |
| SAMPLE AREA, $cm^2$ | 38.18 | SPECIFIC GRAVITY, assumed | 2.70 |
| SAMPLE VOLUME, $cm^3$ | 228.53 | VOLUME OF SOLIDS, $cm^3$ | 182.13 |
| TOTAL MASS, g | 530.11 | VOLUME OF VOIDS, $cm^3$ | 46.40 |
| DRY MASS, g | 491.75 | VOID RATIO | 0.25 |
| WATER CONTENT, % | 7.8 | | |

### SATURATION STAGE

| | | | |
|---|---|---|---|
| CELL PRESSURE, kPa | 490.00 | EFFECTIVE CONSOLIDATION STRESS, kPa | 10 |
| HEAD PRESSURE, kPa | 480.00 | DURATION, min | 7,126 |
| BACK PRESSURE, kPa | 480.00 | $B$ COEFFICIENT | 0.96 |

### CONSOLIDATION STAGE

| | | | |
|---|---|---|---|
| CELL PRESSURE, kPa | 646.00 | EFFECTIVE CONSOLIDATION STRESS, kPa | 166 |
| HEAD PRESSURE, kPa | 480.00 | DURATION, min | 1,144 |
| BACK PRESSURE, kPa | 480.00 | VOLUME CHANGE, $cm^3$ | 1.20 |
| | | DRAINAGE | Top and Bottom |

### SPECIMEN PROPERTIES AND DIMENSIONS (AFTER CONSOLIDATION)

| | | | |
|---|---|---|---|
| SAMPLE HEIGHT, cm | 5.98 | SAMPLE AREA, $cm^2$ | 38.04 |
| SAMPLE DIAMETER, cm | 6.96 | SAMPLE VOLUME, $cm^3$ | 227.33 |

### HYDRAULIC CONDUCTIVITY STAGE

| | | | |
|---|---|---|---|
| CELL PRESSURE, kPa | 652 | EFFECTIVE CONSOLIDATION STRESS, kPa | 166 |
| HEAD PRESSURE, kPa | 486 | DURATION, min | 4139 |
| BACK PRESSURE, kPa | 480 | HYDRAULIC GRADIENT, $i$ | 10 |

### SPECIMEN PROPERTIES AND DIMENSIONS (FINAL)

| | | | |
|---|---|---|---|
| SAMPLE HEIGHT, cm | 5.98 | UNIT WEIGHT, $kN/m^3$ | 23.12 |
| SAMPLE DIAMETER, cm | 6.96 | DRY UNIT WEIGHT, $kN/m^3$ | 21.21 |
| SAMPLE AREA, $cm^2$ | 38.04 | SPECIFIC GRAVITY, assumed | 2.70 |
| SAMPLE VOLUME, $cm^3$ | 227.33 | VOLUME OF SOLIDS, $cm^3$ | 182.13 |
| TOTAL MASS, g | 536.00 | VOLUME OF VOIDS, $cm^3$ | 45.20 |
| DRY MASS, g | 491.75 | VOID RATIO | 0.25 |
| WATER CONTENT, % | 9.0 | | |

### TEST RESULTS

| | |
|---|---|
| ELAPSED TIME TO STEADY STATE FLOW (min) | 0.0 |
| DURATION OF STEADY STATE FLOW (min) | 4139 |
| INFLOW VOLUME UNDER STEADY STATE FLOW ($cm^3$) | 7.8 |
| OUTFLOW VOLUME UNDER STEADY STATE FLOW ($cm^3$) | 7.2 |
| INFLOW TO OUTFLOW RATIO | 1.1 |
| HYDRAULIC CONDUCTIVITY (INFLOW) (m/s) | 8.01E-10 |
| HYDRAULIC CONDUCTIVITY (OUTFLOW) (m/s) | 7.44E-10 |
| HYDRAULIC CONDUCTIVITY, K, m/s | 7.73E-10 |
| **HYDRAULIC CONDUCTIVITY AT STANDARD TEMPERATURE, $K_{20}$, m/s** | **7.19E-10** |

**NOTES:**

Effective consolidation stress assigned, by client.

| | |
|---|---|
| PERMEANT FLUID | Deaired tap water |
| AVERAGE TEST TEMPERATURE | 23.0 °C |

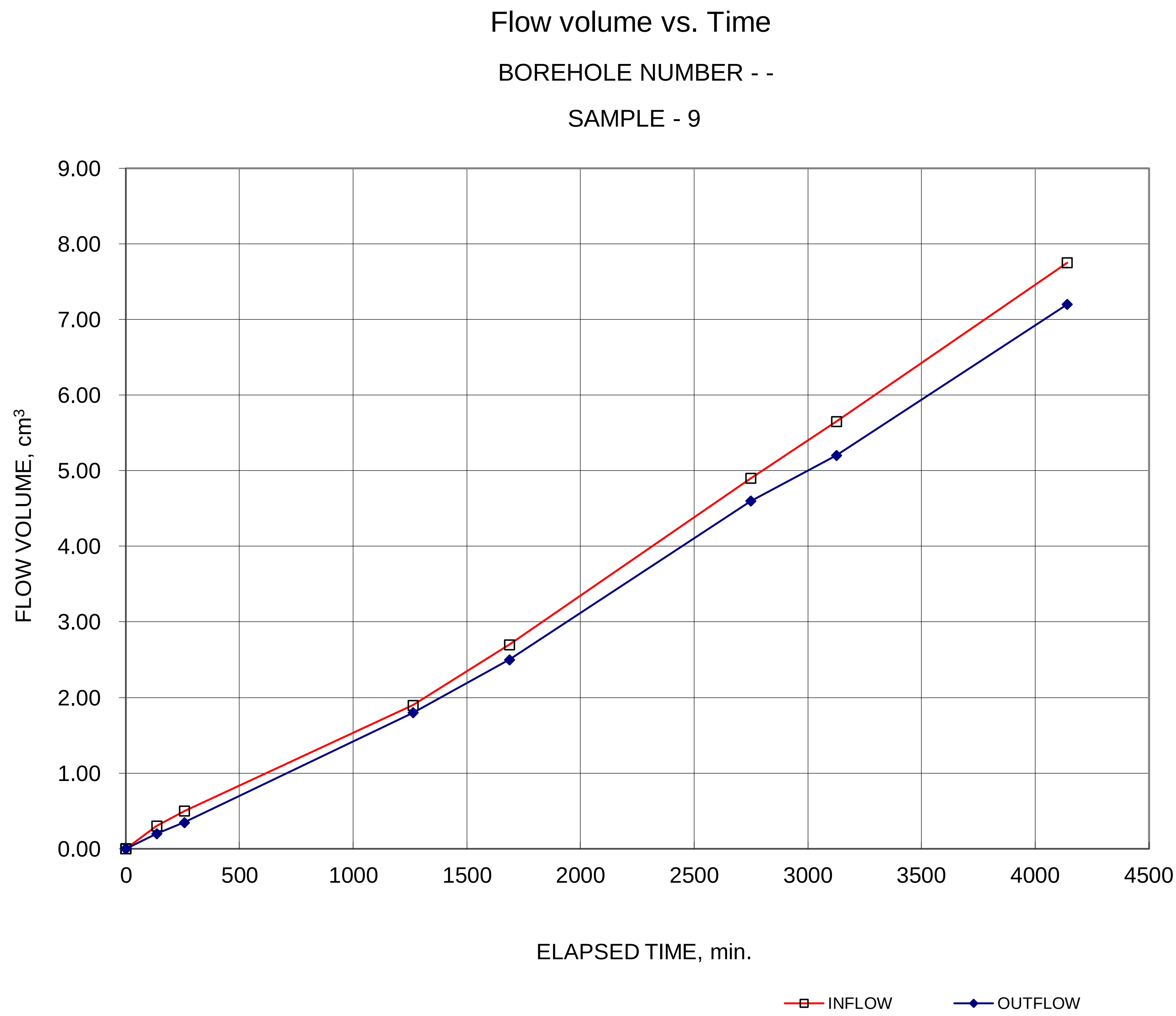
Project number : 20140924 (26000)
Prepared by : AH

**Golder**

Checked by : MM

# HYDRAULIC CONDUCTIVITY TEST

Project title: WSP/ Lab Testing/ Miss
Borehole number: -
Sample depth: -



## HYDRAULIC CONDUCTIVITY TEST

**ASTM D 5084 (CONSTANT HEAD - Method A)**

**SAMPLE IDENTIFICATION**

| | | | |
|---|---|---|---|
| PROJECT NUMBER | 20140924 (26000) | SAMPLE | 10 |
| PROJECT TITLE | WSP/ Lab Testing/ Miss | SAMPLE DEPTH, m | - |
| BOREHOLE NUMBER | - | DATE | August 31, 2022 |

**SPECIMEN PROPERTIES AND DIMENSIONS (INITIAL)**

| | | | |
|---|---|---|---|
| SAMPLE HEIGHT, cm | 6.06 | UNIT WEIGHT, kN/m$^3$ | 22.70 |
| SAMPLE DIAMETER, cm | 6.96 | DRY UNIT WEIGHT, kN/m$^3$ | 21.21 |
| SAMPLE AREA, cm$^2$ | 38.05 | SPECIFIC GRAVITY, assumed | 2.70 |
| SAMPLE VOLUME, cm$^3$ | 230.56 | VOLUME OF SOLIDS, cm$^3$ | 184.70 |
| TOTAL MASS, g | 533.60 | VOLUME OF VOIDS, cm$^3$ | 45.86 |
| DRY MASS, g | 498.69 | VOID RATIO | 0.25 |
| WATER CONTENT, % | 7.0 | | |

**SATURATION STAGE**

| | | | |
|---|---|---|---|
| CELL PRESSURE, kPa | 490.00 | EFFECTIVE CONSOLIDATION STRESS, kPa | 10 |
| HEAD PRESSURE, kPa | 480.00 | DURATION, min | 8,275 |
| BACK PRESSURE, kPa | 480.00 | $B$ COEFFICIENT | 0.96 |

**CONSOLIDATION STAGE**

| | | | |
|---|---|---|---|
| CELL PRESSURE, kPa | 646.00 | EFFECTIVE CONSOLIDATION STRESS, kPa | 166 |
| HEAD PRESSURE, kPa | 480.00 | DURATION, min | 174 |
| BACK PRESSURE, kPa | 480.00 | VOLUME CHANGE, cm$^3$ | 5.00 |
| | | DRAINAGE | Top and Bottom |

**SPECIMEN PROPERTIES AND DIMENSIONS (AFTER CONSOLIDATION)**

| | | | |
|---|---|---|---|
| SAMPLE HEIGHT, cm | 6.02 | SAMPLE AREA, cm$^2$ | 37.50 |
| SAMPLE DIAMETER, cm | 6.91 | SAMPLE VOLUME, cm$^3$ | 225.58 |

**HYDRAULIC CONDUCTIVITY STAGE**

| | | | |
|---|---|---|---|
| CELL PRESSURE, kPa | 658 | EFFECTIVE CONSOLIDATION STRESS, kPa | 166 |
| HEAD PRESSURE, kPa | 492 | DURATION, min | 5462 |
| BACK PRESSURE, kPa | 480 | HYDRAULIC GRADIENT, $i$ | 20 |

**SPECIMEN PROPERTIES AND DIMENSIONS (FINAL)**

| | | | |
|---|---|---|---|
| SAMPLE HEIGHT, cm | 6.02 | UNIT WEIGHT, kN/m$^3$ | 23.28 |
| SAMPLE DIAMETER, cm | 6.91 | DRY UNIT WEIGHT, kN/m$^3$ | 21.68 |
| SAMPLE AREA, cm$^2$ | 37.50 | SPECIFIC GRAVITY, assumed | 2.70 |
| SAMPLE VOLUME, cm$^3$ | 225.58 | VOLUME OF SOLIDS, cm$^3$ | 184.70 |
| TOTAL MASS, g | 535.59 | VOLUME OF VOIDS, cm$^3$ | 40.88 |
| DRY MASS, g | 498.69 | VOID RATIO | 0.22 |
| WATER CONTENT, % | 7.4 | | |

**TEST RESULTS**

| | |
|---|---|
| ELAPSED TIME TO STEADY STATE FLOW (min) | 0.0 |
| DURATION OF STEADY STATE FLOW (min) | 5462 |
| INFLOW VOLUME UNDER STEADY STATE FLOW (cm$^3$) | 3.8 |
| OUTFLOW VOLUME UNDER STEADY STATE FLOW (cm$^3$) | 4.4 |
| INFLOW TO OUTFLOW RATIO | 0.9 |
| HYDRAULIC CONDUCTIVITY (INFLOW) (m/s) | 1.50E-10 |
| HYDRAULIC CONDUCTIVITY (OUTFLOW) (m/s) | 1.76E-10 |
| HYDRAULIC CONDUCTIVITY, K, m/s | 1.63E-10 |
| **HYDRAULIC CONDUCTIVITY AT STANDARD TEMPERATURE, $K_{20}$, m/s** | **1.52E-10** |

**NOTES:**

Effective consolidation stress assigned, by client.

| | |
|---|---|
| PERMEANT FLUID | Deaired tap water |
| AVERAGE TEST TEMPERATURE | 23.0 °C |

# HYDRAULIC CONDUCTIVITY TEST

Project title: WSP/ Lab Testing/ Miss
Borehole number: -
Sample depth: -

Project number : 20140924 (26000)
Prepared by : AH

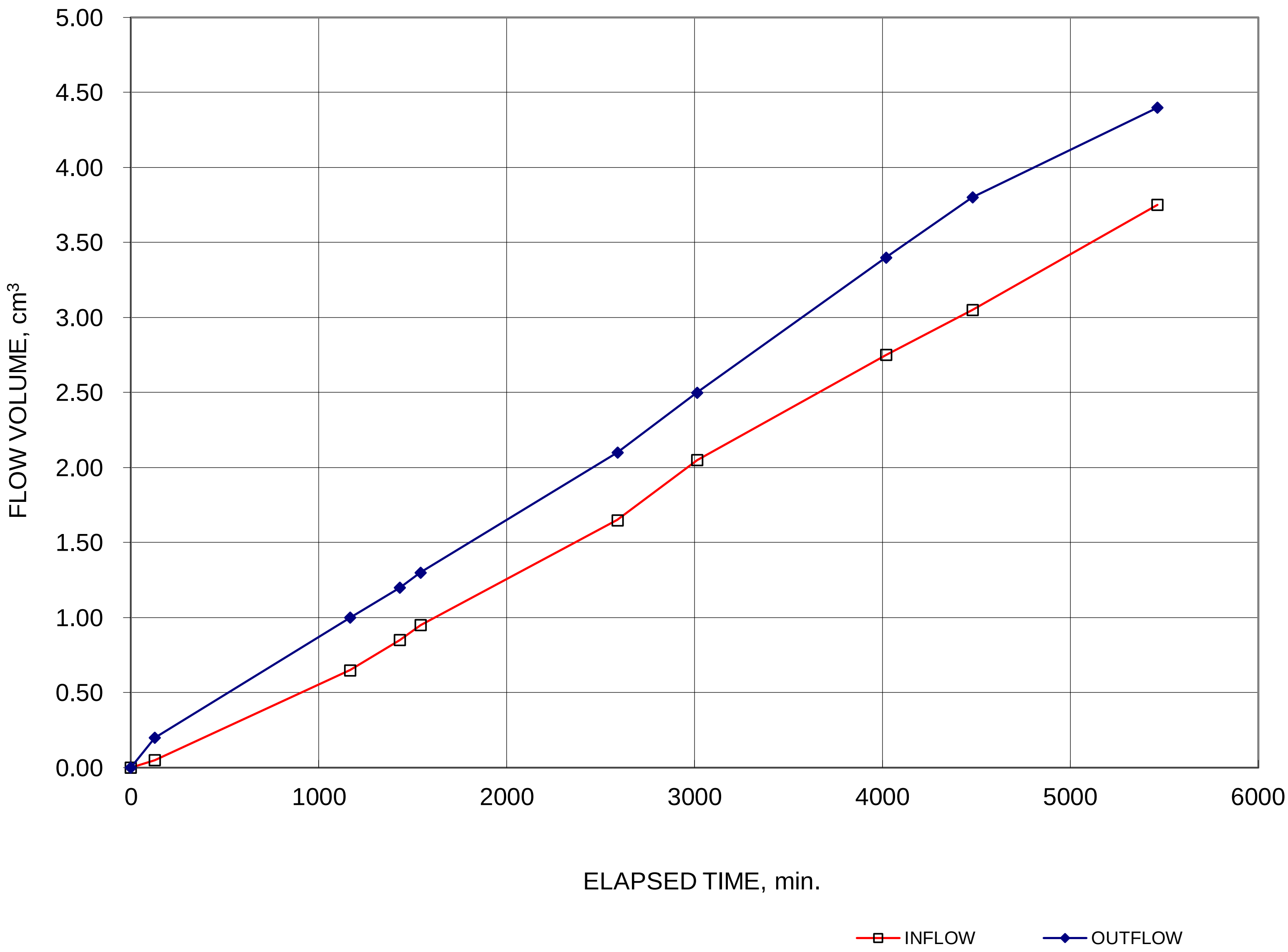
**Golder**

Checked by : MM

## Flow volume vs. Time

BOREHOLE NUMBER - -

SAMPLE - 10



# HYDRAULIC CONDUCTIVITY TEST

## ASTM D 5084 (CONSTANT HEAD - Method A)

### SAMPLE IDENTIFICATION

| | | | |
|---|---|---|---|
| PROJECT NUMBER | 20140924 (26000) | SAMPLE | 11 |
| PROJECT TITLE | WSP/ Lab Testing/ Miss | SAMPLE DEPTH, m | - |
| BOREHOLE NUMBER | - | DATE | August 31, 2022 |

### SPECIMEN PROPERTIES AND DIMENSIONS (INITIAL)

| | | | |
|---|---|---|---|
| SAMPLE HEIGHT, cm | 6.01 | UNIT WEIGHT, kN/m$^3$ | 22.64 |
| SAMPLE DIAMETER, cm | 6.98 | DRY UNIT WEIGHT, kN/m$^3$ | 21.02 |
| SAMPLE AREA, cm$^2$ | 38.26 | SPECIFIC GRAVITY, assumed | 2.70 |
| SAMPLE VOLUME, cm$^3$ | 229.97 | VOLUME OF SOLIDS, cm$^3$ | 182.57 |
| TOTAL MASS, g | 530.89 | VOLUME OF VOIDS, cm$^3$ | 47.40 |
| DRY MASS, g | 492.93 | VOID RATIO | 0.26 |
| WATER CONTENT, % | 7.7 | | |

### SATURATION STAGE

| | | | |
|---|---|---|---|
| CELL PRESSURE, kPa | 490.00 | EFFECTIVE CONSOLIDATION STRESS, kPa | 10 |
| HEAD PRESSURE, kPa | 480.00 | DURATION, min | 8,249 |
| BACK PRESSURE, kPa | 480.00 | $B$ COEFFICIENT | 0.96 |

### CONSOLIDATION STAGE

| | | | |
|---|---|---|---|
| CELL PRESSURE, kPa | 646.00 | EFFECTIVE CONSOLIDATION STRESS, kPa | 166 |
| HEAD PRESSURE, kPa | 480.00 | DURATION, min | 184 |
| BACK PRESSURE, kPa | 480.00 | VOLUME CHANGE, cm$^3$ | 3.15 |
| | | DRAINAGE | Top and Bottom |

### SPECIMEN PROPERTIES AND DIMENSIONS (AFTER CONSOLIDATION)

| | | | |
|---|---|---|---|
| SAMPLE HEIGHT, cm | 5.98 | SAMPLE AREA, cm$^2$ | 37.92 |
| SAMPLE DIAMETER, cm | 6.95 | SAMPLE VOLUME, cm$^3$ | 226.83 |

### HYDRAULIC CONDUCTIVITY STAGE

| | | | |
|---|---|---|---|
| CELL PRESSURE, kPa | 658 | EFFECTIVE CONSOLIDATION STRESS, kPa | 166 |
| HEAD PRESSURE, kPa | 492 | DURATION, min | 5463 |
| BACK PRESSURE, kPa | 480 | HYDRAULIC GRADIENT, $i$ | 20 |

### SPECIMEN PROPERTIES AND DIMENSIONS (FINAL)

| | | | |
|---|---|---|---|
| SAMPLE HEIGHT, cm | 5.98 | UNIT WEIGHT, kN/m$^3$ | 23.20 |
| SAMPLE DIAMETER, cm | 6.95 | DRY UNIT WEIGHT, kN/m$^3$ | 21.31 |
| SAMPLE AREA, cm$^2$ | 37.92 | SPECIFIC GRAVITY, assumed | 2.70 |
| SAMPLE VOLUME, cm$^3$ | 226.83 | VOLUME OF SOLIDS, cm$^3$ | 182.57 |
| TOTAL MASS, g | 536.54 | VOLUME OF VOIDS, cm$^3$ | 44.26 |
| DRY MASS, g | 492.93 | VOID RATIO | 0.24 |
| WATER CONTENT, % | 8.8 | | |

### TEST RESULTS

| | |
|---|---|
| ELAPSED TIME TO STEADY STATE FLOW (min) | 0.0 |
| DURATION OF STEADY STATE FLOW (min) | 5463 |
| INFLOW VOLUME UNDER STEADY STATE FLOW (cm$^3$) | 11.2 |
| OUTFLOW VOLUME UNDER STEADY STATE FLOW (cm$^3$) | 11.0 |
| INFLOW TO OUTFLOW RATIO | 1.0 |
| HYDRAULIC CONDUCTIVITY (INFLOW) (m/s) | 4.39E-10 |
| HYDRAULIC CONDUCTIVITY (OUTFLOW) (m/s) | 4.33E-10 |
| HYDRAULIC CONDUCTIVITY, K, m/s | 4.36E-10 |
| **HYDRAULIC CONDUCTIVITY AT STANDARD TEMPERATURE, $K_{20}$, m/s** | **4.06E-10** |

**NOTES:**

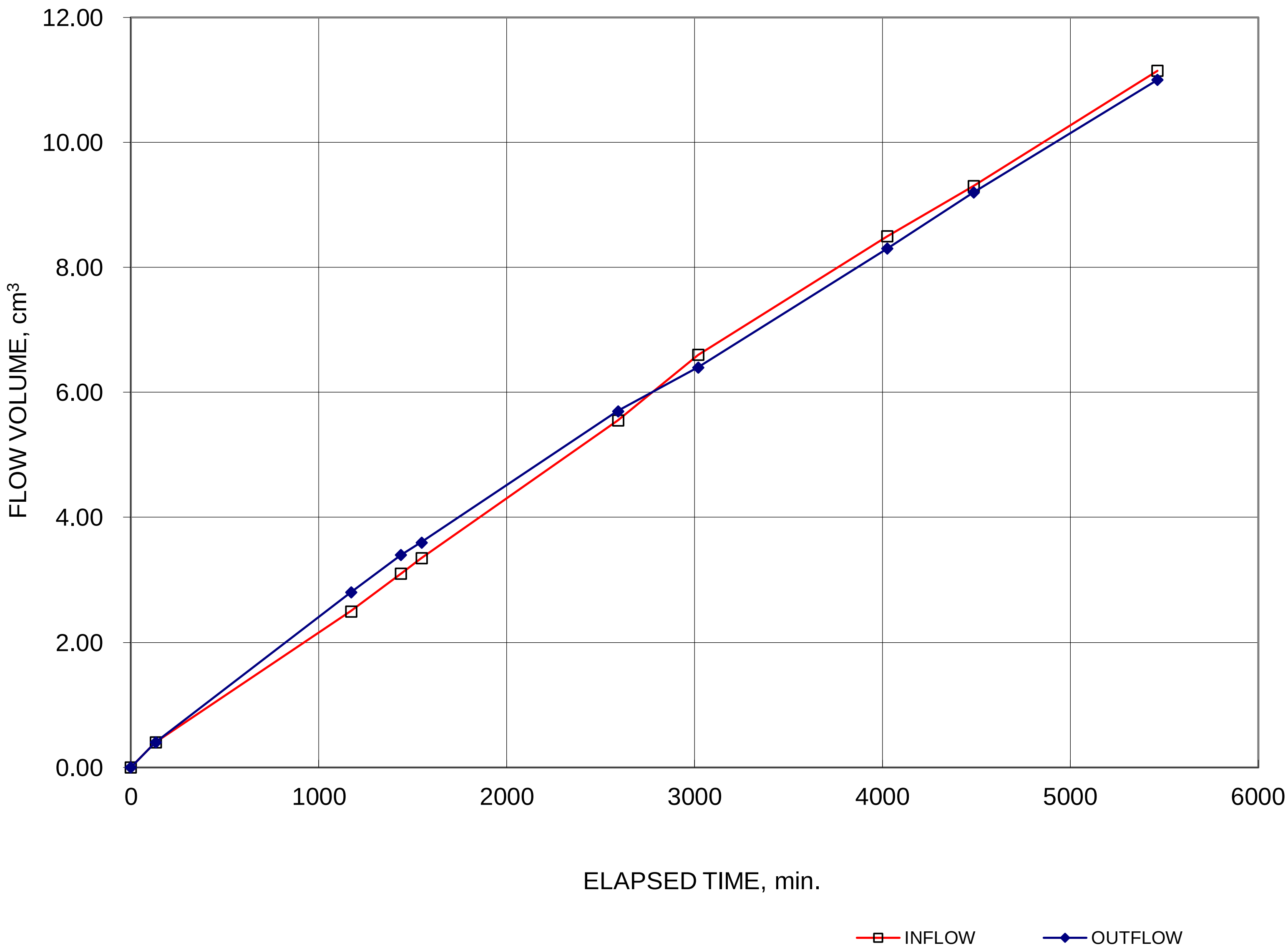
Effective consolidation stress assigned, by client.

| | |
|---|---|
| PERMEANT FLUID | Deaired tap water |
| AVERAGE TEST TEMPERATURE | 23.0 °C |

# Flow volume vs. Time

BOREHOLE NUMBER - -

SAMPLE - 11




Project number : 20140924 (26000)
Prepared by : AH

**Golder**

Checked by : MM

**HYDRAULIC CONDUCTIVITY TEST**

Project title: WSP/ Lab Testing/ Miss
Borehole number: -
Sample depth: -

# D-6 *SHELBY TUBE RESULTS (RECOMMPACTED BASE MATERIAL)*

# HYDRAULIC CONDUCTIVITY TEST

**ASTM D 5084 (CONSTANT HEAD - Method A)**

**SAMPLE IDENTIFICATION**

| | | | |
|---|---|---|---|
| PROJECT NUMBER | 20140924 (26000) | SAMPLE | SS-1 |
| PROJECT TITLE | WSP/ Lab Testing/ Miss | SAMPLE DEPTH, m | - |
| BOREHOLE NUMBER | - | DATE | November 2, 2022 |

**SPECIMEN PROPERTIES AND DIMENSIONS (INITIAL)**

| | | | |
|---|---|---|---|
| SAMPLE HEIGHT, cm | 8.99 | UNIT WEIGHT, kN/m$^3$ | 22.75 |
| SAMPLE DIAMETER, cm | 6.91 | DRY UNIT WEIGHT, kN/m$^3$ | 21.50 |
| SAMPLE AREA, cm$^2$ | 37.48 | SPECIFIC GRAVITY, assumed | 2.70 |
| SAMPLE VOLUME, cm$^3$ | 336.94 | VOLUME OF SOLIDS, cm$^3$ | 273.59 |
| TOTAL MASS, g | 781.54 | VOLUME OF VOIDS, cm$^3$ | 63.35 |
| DRY MASS, g | 738.70 | VOID RATIO | 0.23 |
| WATER CONTENT, % | 5.8 | | |

**SATURATION STAGE**

| | | | |
|---|---|---|---|
| CELL PRESSURE, kPa | 480.00 | EFFECTIVE CONSOLIDATION STRESS, kPa | 10 |
| HEAD PRESSURE, kPa | 470.00 | DURATION, min | 9,760 |
| BACK PRESSURE, kPa | 470.00 | $B$ COEFFICIENT | 0.96 |

**CONSOLIDATION STAGE**

| | | | |
|---|---|---|---|
| CELL PRESSURE, kPa | 636.00 | EFFECTIVE CONSOLIDATION STRESS, kPa | 166 |
| HEAD PRESSURE, kPa | 470.00 | DURATION, min | 162 |
| BACK PRESSURE, kPa | 470.00 | VOLUME CHANGE, cm$^3$ | 6.60 |
| | | DRAINAGE | Top and Bottom |

**SPECIMEN PROPERTIES AND DIMENSIONS (AFTER CONSOLIDATION)**

| | | | |
|---|---|---|---|
| SAMPLE HEIGHT, cm | 8.93 | SAMPLE AREA, cm$^2$ | 36.99 |
| SAMPLE DIAMETER, cm | 6.86 | SAMPLE VOLUME, cm$^3$ | 330.37 |

**HYDRAULIC CONDUCTIVITY STAGE**

| | | | |
|---|---|---|---|
| CELL PRESSURE, kPa | 645 | EFFECTIVE CONSOLIDATION STRESS, kPa | 166 |
| HEAD PRESSURE, kPa | 479 | DURATION, min | 4255 |
| BACK PRESSURE, kPa | 470 | HYDRAULIC GRADIENT, $i$ | 10 |

**SPECIMEN PROPERTIES AND DIMENSIONS (FINAL)**

| | | | |
|---|---|---|---|
| SAMPLE HEIGHT, cm | 8.93 | UNIT WEIGHT, kN/m$^3$ | 23.53 |
| SAMPLE DIAMETER, cm | 6.86 | DRY UNIT WEIGHT, kN/m$^3$ | 21.93 |
| SAMPLE AREA, cm$^2$ | 36.99 | SPECIFIC GRAVITY, assumed | 2.70 |
| SAMPLE VOLUME, cm$^3$ | 330.37 | VOLUME OF SOLIDS, cm$^3$ | 273.59 |
| TOTAL MASS, g | 792.62 | VOLUME OF VOIDS, cm$^3$ | 56.78 |
| DRY MASS, g | 738.70 | VOID RATIO | 0.21 |
| WATER CONTENT, % | 7.3 | | |

**TEST RESULTS**

| | |
|---|---|
| ELAPSED TIME TO STEADY STATE FLOW (min) | 0.0 |
| DURATION OF STEADY STATE FLOW (min) | 4255 |
| INFLOW VOLUME UNDER STEADY STATE FLOW (cm$^3$) | 20.0 |
| OUTFLOW VOLUME UNDER STEADY STATE FLOW (cm$^3$) | 20.6 |
| INFLOW TO OUTFLOW RATIO | 1.0 |
| HYDRAULIC CONDUCTIVITY (INFLOW) (m/s) | 2.06E-09 |
| HYDRAULIC CONDUCTIVITY (OUTFLOW) (m/s) | 2.12E-09 |
| HYDRAULIC CONDUCTIVITY, K, m/s | 2.09E-09 |
| **HYDRAULIC CONDUCTIVITY AT STANDARD TEMPERATURE, $K_{20}$, m/s** | **1.95E-09** |

**NOTES:**

Effective consolidation stress assigned, by client.

| | |
|---|---|
| PERMEANT FLUID | Deaired tap water |
| AVERAGE TEST TEMPERATURE | 23.0 °C |

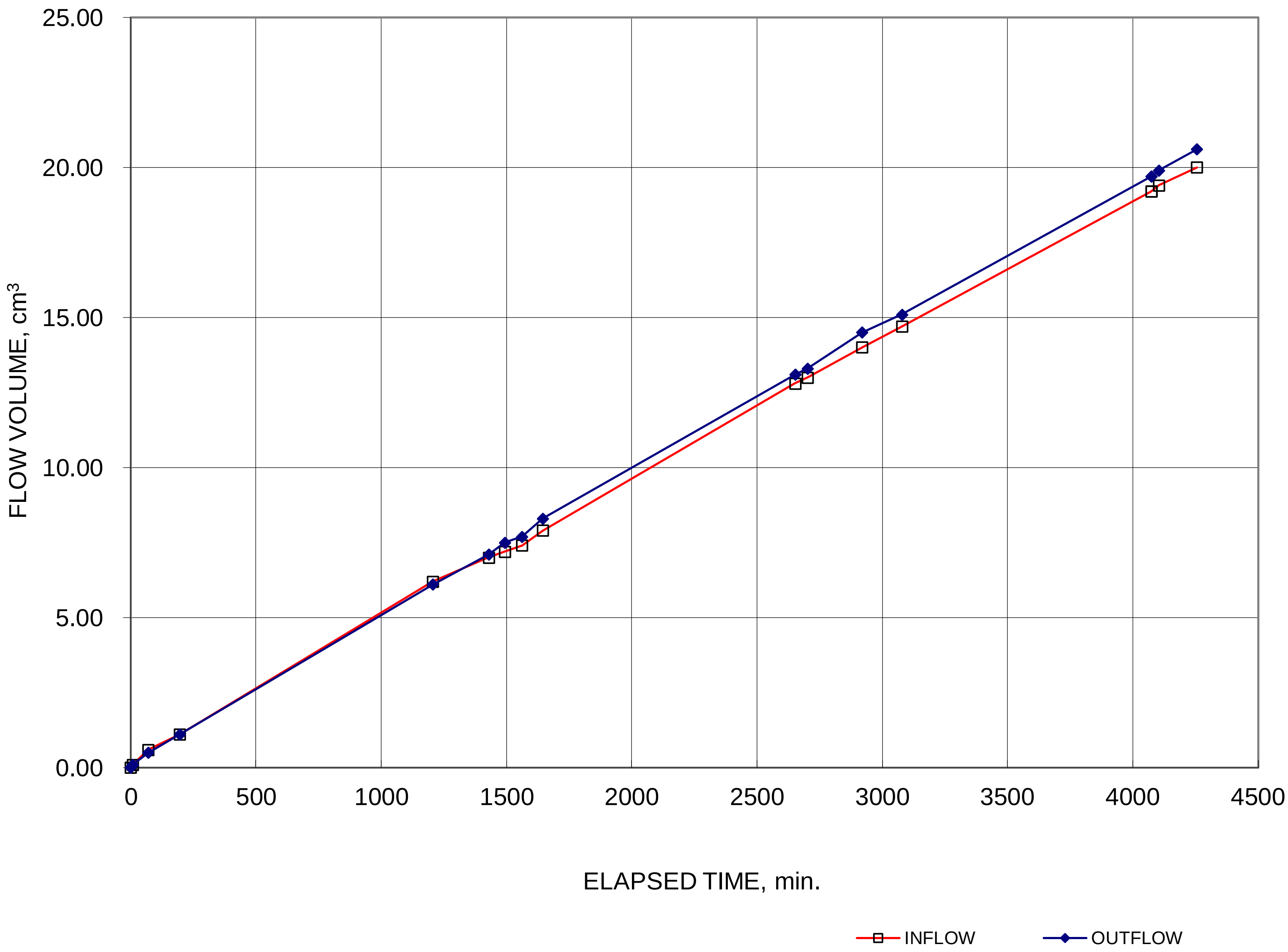
Project number : 20140924 (26000)
Prepared By: LL

**Golder**

# Flow volume vs. Time

BOREHOLE NUMBER - -

SAMPLE - SS-1




Checked by : AH

## HYDRAULIC CONDUCTIVITY TEST

Project title: WSP/ Lab Testing/ Miss
Borehole number: -
Sample depth: -

## HYDRAULIC CONDUCTIVITY TEST

**ASTM D 5084 (CONSTANT HEAD - Method A)**

**SAMPLE IDENTIFICATION**

| | | | |
|---|---|---|---|
| PROJECT NUMBER | 20140924 (26000) | SAMPLE | SS-2 |
| PROJECT TITLE | WSP/ Lab Testing/ Miss | SAMPLE DEPTH, m | - |
| BOREHOLE NUMBER | - | DATE | November 2, 2022 |

**SPECIMEN PROPERTIES AND DIMENSIONS (INITIAL)**

| | | | |
|---|---|---|---|
| SAMPLE HEIGHT, cm | 6.96 | UNIT WEIGHT, $kN/m^3$ | 26.21 |
| SAMPLE DIAMETER, cm | 6.13 | DRY UNIT WEIGHT, $kN/m^3$ | 24.75 |
| SAMPLE AREA, $cm^2$ | 29.51 | SPECIFIC GRAVITY, assumed | 2.70 |
| SAMPLE VOLUME, $cm^3$ | 205.41 | VOLUME OF SOLIDS, $cm^3$ | 192.03 |
| TOTAL MASS, g | 549.08 | VOLUME OF VOIDS, $cm^3$ | 13.38 |
| DRY MASS, g | 518.49 | VOID RATIO | 0.07 |
| WATER CONTENT, % | 5.9 | | |

**SATURATION STAGE**

| | | | |
|---|---|---|---|
| CELL PRESSURE, kPa | 420.00 | EFFECTIVE CONSOLIDATION STRESS, kPa | 10 |
| HEAD PRESSURE, kPa | 410.00 | DURATION, min | 6,863 |
| BACK PRESSURE, kPa | 410.00 | $B$ COEFFICIENT | 0.96 |

**CONSOLIDATION STAGE**

| | | | |
|---|---|---|---|
| CELL PRESSURE, kPa | 576.00 | EFFECTIVE CONSOLIDATION STRESS, kPa | 166 |
| HEAD PRESSURE, kPa | 410.00 | DURATION, min | 277 |
| BACK PRESSURE, kPa | 410.00 | VOLUME CHANGE, $cm^3$ | 4.30 |
| | | DRAINAGE | Top and Bottom |

**SPECIMEN PROPERTIES AND DIMENSIONS (AFTER CONSOLIDATION)**

| | | | |
|---|---|---|---|
| SAMPLE HEIGHT, cm | 6.91 | SAMPLE AREA, $cm^2$ | 29.10 |
| SAMPLE DIAMETER, cm | 6.09 | SAMPLE VOLUME, $cm^3$ | 201.13 |

**HYDRAULIC CONDUCTIVITY STAGE**

| | | | |
|---|---|---|---|
| CELL PRESSURE, kPa | 583 | EFFECTIVE CONSOLIDATION STRESS, kPa | 166 |
| HEAD PRESSURE, kPa | 417 | DURATION, min | 2876 |
| BACK PRESSURE, kPa | 410 | HYDRAULIC GRADIENT, $i$ | 10 |

**SPECIMEN PROPERTIES AND DIMENSIONS (FINAL)**

| | | | |
|---|---|---|---|
| SAMPLE HEIGHT, cm | 6.91 | UNIT WEIGHT, $kN/m^3$ | 27.28 |
| SAMPLE DIAMETER, cm | 6.09 | DRY UNIT WEIGHT, $kN/m^3$ | 25.28 |
| SAMPLE AREA, $cm^2$ | 29.10 | SPECIFIC GRAVITY, assumed | 2.70 |
| SAMPLE VOLUME, $cm^3$ | 201.13 | VOLUME OF SOLIDS, $cm^3$ | 192.03 |
| TOTAL MASS, g | 559.45 | VOLUME OF VOIDS, $cm^3$ | 9.10 |
| DRY MASS, g | 518.49 | VOID RATIO | 0.05 |
| WATER CONTENT, % | 7.9 | | |

**TEST RESULTS**

| | |
|---|---|
| ELAPSED TIME TO STEADY STATE FLOW (min) | 0.0 |
| DURATION OF STEADY STATE FLOW (min) | 2876 |
| INFLOW VOLUME UNDER STEADY STATE FLOW ($cm^3$) | 1.6 |
| OUTFLOW VOLUME UNDER STEADY STATE FLOW ($cm^3$) | 1.8 |
| INFLOW TO OUTFLOW RATIO | 0.9 |
| HYDRAULIC CONDUCTIVITY (INFLOW) (m/s) | 3.10E-10 |
| HYDRAULIC CONDUCTIVITY (OUTFLOW) (m/s) | 3.55E-10 |
| HYDRAULIC CONDUCTIVITY, K, m/s | 3.33E-10 |
| **HYDRAULIC CONDUCTIVITY AT STANDARD TEMPERATURE, $K_{20}$, m/s** | **3.10E-10** |

**NOTES:**

Effective consolidation stress assigned, by client.

PERMEANT FLUID Deaired tap water

AVERAGE TEST TEMPERATURE 23.0 °C

HYDRAULIC CONDUCTIVITY TEST

Project title: WSP/ Lab Testing/ Miss
Borehole number: -
Sample depth: -

Project number : 20140924 (26000)
Prepared by : LL

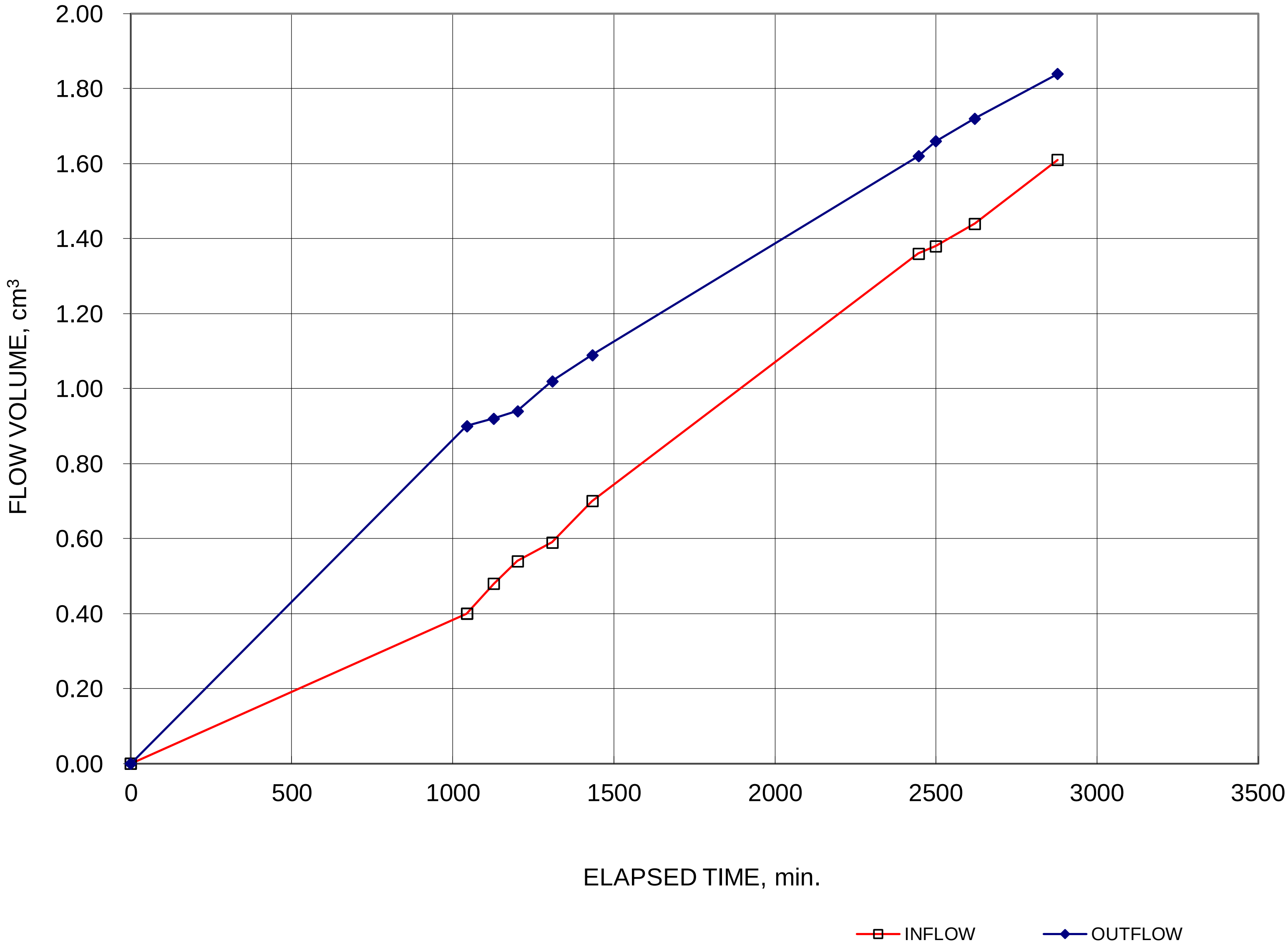
**Golder**

Checked by : AH

# Flow volume vs. Time

BOREHOLE NUMBER - -

SAMPLE - SS-2



# D-7 53MM DIAMETER CLEAR STONE PARTICAL SIZE DISTRIBUTION ANALYSIS

GOLDER
MEMBER OF WSP

# SIEVE ANALYSIS OF COARSE AND FINE AGGREGATES (MTO LS-602 Rev.33)

WSP
294 Rink Street
Peterborough, ON K9J 2K2

November 3, 2022
Golder Project Number: 18103810AR

Attention: Paul Mulholland & Jaclyn Craig

Sample Description: **111-53296-14, Peterborough Landfill Cell 4 Construction, Onsite Stockpile, Clear Stone- S1**

| | | | |
|---|---|---|---|
| Date Sampled: | October 7, 2022 | Sampled By: | J.Craig |
| Date Received: | October 19, 2022 | Golder Lab No.: | G-22-292 |
| Date Tested: | October 26, 2022 | Tested By: | E.Shallhorn |
| Initial Dry Mass (g): | 29104.7 | Fineness Modulus: | 11.5 |
| Final Mass (g): | 29082.6 | Percent Coarse: | 99.7 |
| Percent Loss: | 0.1 | Percent Fine: | 0.3 |

| Sieve Size | Cumulative Mass Retained (g) | Cumulative Percent Retained | Cumulative Percent Passing | Acceptance Requirement as per OPSS.PROV 1004 Table 2 53 mm Clear Stone |
|---|---|---|---|---|
| | | | | Percent Passing |
| 63 mm | 752.7 | 2.6 | 97.4 | 100 |
| 53 mm | 3490.1 | 12.0 | 88.0 | 90 - 100 |
| 19 mm | 28885.5 | 99.2 | 0.8 | 0 - 15 |
| 75 µm | 37.1 | 99.9 | 0.1 | 0 - 2 |

Note: Shaded areas indicate results lying outside of acceptable limits.

Data Input By: E.Shallhorn

Reviewed by:

John Taylor, M.Sc., Laboratory Team Leader

CCIL
The Voice Of Independent Canadian Laboratories
La voix des laboratoires indépendants canadiens

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other production zones/periods. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

GOLDER
MEMBER OF WSP

# SIEVE ANALYSIS OF COARSE AND FINE AGGREGATES (MTO LS-602 Rev.33)

WSP
294 Rink Street
Peterborough, ON K9J 2K2

November 3, 2022
Golder Project Number: 18103810AR

Attention: Paul Mulholland & Jaclyn Craig

Sample Description: **111-53296-14, Peterborough Landfill Cell 4 Construction, Onsite Stockpile, Clear Stone (CS-22-02)**

| | | | |
|---|---|---|---|
| Date Sampled: | October 14, 2022 | Sampled By: | J.Craig |
| Date Received: | October 24, 2022 | Golder Lab No.: | G-22-293 |
| Date Tested: | November 1, 2022 | Tested By: | E.Shallhorn |
| Initial Dry Mass (g): | 25047.3 | Fineness Modulus: | 11.4 |
| Final Mass (g): | 25012.4 | Percent Coarse: | 99.4 |
| Percent Loss: | 0.1 | Percent Fine: | 0.6 |

| Sieve Size | Cumulative Mass Retained (g) | Cumulative Percent Retained | Cumulative Percent Passing | Acceptance Requirement as per OPSS.PROV 1004 Table 2 53 mm Clear Stone |
|---|---|---|---|---|
| | | | | Percent Passing |
| 63 mm | 0.0 | 0.0 | 100.0 | 100 |
| 53 mm | 1359.4 | 5.4 | 94.6 | 90 - 100 |
| 19 mm | 24721.2 | 98.7 | 1.3 | 0 - 15 |
| 75 µm | 100.5 | 99.9 | 0.1 | 0 - 2 |

Note: Shaded areas indicate results lying outside of acceptable limits.

Data Input By: E.Shallhorn

Reviewed by:

John Taylor, M.Sc., Laboratory Team Leader

CCIL
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# SIEVE ANALYSIS OF COARSE AND FINE AGGREGATES (MTO LS-602 Rev.33)

WSP
294 Rink Street
Peterborough, ON K9J 2K2

November 3, 2022
Golder Project Number: 18103810AR

Attention: Paul Mulholland & Jaclyn Craig

Sample Description: **111-53296-14, Peterborough Landfill Cell 4 Construction, Onsite Stockpile, Clear Stone (CS-22-03)**

| | | | |
|---|---|---|---|
| Date Sampled: | October 20, 2022 | Sampled By: | J.Craig |
| Date Received: | October 28, 2022 | Golder Lab No.: | G-22-295 |
| Date Tested: | October 31, 2022 | Tested By: | E.Shallhorn |
| Initial Dry Mass (g): | 18042.8 | Fineness Modulus: | 11.4 |
| Final Mass (g): | 18013.6 | Percent Coarse: | 99.6 |
| Percent Loss: | 0.2 | Percent Fine: | 0.4 |

| Sieve Size | Cumulative Mass Retained (g) | Cumulative Percent Retained | Cumulative Percent Passing | Acceptance Requirement as per OPSS.PROV 1004 Table 2 53 mm Clear Stone |
|---|---|---|---|---|
| | | | | Percent Passing |
| 63 mm | 0.0 | 0.0 | 100.0 | 100 |
| 53 mm | 1504.8 | 8.3 | 91.7 | 90 - 100 |
| 19 mm | 17217.7 | 95.4 | 4.6 | 0 - 15 |
| 75 µm | 20.1 | 99.8 | 0.2 | 0 - 2 |

Note: Shaded areas indicate results lying outside of acceptable limits.

Data Input By: E.Shallhorn

Reviewed by:

John Taylor, M.Sc., Laboratory Team Leader

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# SIEVE ANALYSIS OF COARSE AND FINE AGGREGATES (MTO LS-602 Rev.33)

WSP
294 Rink Street
Peterborough, ON K9J 2K2

November 3, 2022
Golder Project Number: 18103810AR

Attention: Paul Mulholland & Jaclyn Craig

Sample Description: **111-53296-14, Peterborough Landfill Cell 4 Construction, Onsite Stockpile, Clear Stone (CS-22-04)**

| | | | |
|---|---|---|---|
| Date Sampled: | October 26, 2022 | Sampled By: | J.Craig |
| Date Received: | October 28, 2022 | Golder Lab No.: | G-22-296 |
| Date Tested: | November 1, 2022 | Tested By: | E.Shallhorn |
| Initial Dry Mass (g): | 18511.3 | Fineness Modulus: | 11.4 |
| Final Mass (g): | 18480.8 | Percent Coarse: | 99.5 |
| Percent Loss: | 0.2 | Percent Fine: | 0.5 |

| Sieve Size | Cumulative Mass Retained (g) | Cumulative Percent Retained | Cumulative Percent Passing | Acceptance Requirement as per OPSS.PROV 1004 Table 2 53 mm Clear Stone |
|---|---|---|---|---|
| | | | | Percent Passing |
| 63 mm | 0.0 | 0.0 | 100.0 | 100 |
| 53 mm | 1626.4 | 8.8 | 91.2 | 90 - 100 |
| 19 mm | 17957.0 | 97.0 | 3.0 | 0 - 15 |
| 75 µm | 31.8 | 99.7 | 0.3 | 0 - 2 |

Note: Shaded areas indicate results lying outside of acceptable limits.

Data Input By: E.Shallhorn

Reviewed by:

John Taylor, M.Sc., Laboratory Team Leader

The Voice Of Independent Canadian Laboratories
La voix des laboratoires indépendants canadiens

# SIEVE ANALYSIS OF COARSE AND FINE AGGREGATES (MTO LS-602 Rev.33)

GOLDER
MEMBER OF WSP

WSP
294 Rink Street
Peterborough, ON K9J 2K2

November 22, 2022
Golder Project Number: 18103810AR

Attention: Paul Mulholland & Jaclyn Craig

Sample Description: **111-53296-14, Peterborough Landfill Cell 4 Construction, Onsite Stockpile, Clear Stone (CS-22-05)**

| | | | |
|---|---|---|---|
| Date Sampled: | November 7, 2022 | Sampled By: | J.Craig |
| Date Received: | November 11, 2022 | Golder Lab No.: | G-22-323 |
| Date Tested: | November 14, 2022 | Tested By: | K.Marren |
| Initial Dry Mass (g): | 24581.5 | Fineness Modulus: | 12.1 |
| Final Mass (g): | 24576.7 | Percent Coarse: | 99.9 |
| Percent Loss: | 0.0 | Percent Fine: | 0.1 |

| Sieve Size | Cumulative Mass Retained (g) | Cumulative Percent Retained | Cumulative Percent Passing | Acceptance Requirement as per OPSS.PROV 1004 Table 2 53 mm Clear Stone |
|---|---|---|---|---|
| | | | | Percent Passing |
| 63 mm | 5030.0 | 20.5 | 79.5 | 100 |
| 53 mm | 14512.0 | 59.0 | 41.0 | 90 - 100 |
| 19 mm | 24407.3 | 99.3 | 0.7 | 0 - 15 |
| 75 µm | 6.3 | 100.0 | 0.0 | 0 - 2 |

Note: Shaded areas indicate results lying outside of acceptable limits.

Data Input By: E.Shallhorn

Reviewed by:

John Taylor, M.Sc., Laboratory Team Leader

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The Voice Of Independent Canadian Laboratories
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# SIEVE ANALYSIS OF COARSE AND FINE AGGREGATES (MTO LS-602 Rev.33)

GOLDER
MEMBER OF WSP

WSP
294 Rink Street
Peterborough, ON K9J 2K2

November 22, 2022
Golder Project Number: 18103810AR

Attention: Paul Mulholland & Jaclyn Craig

Sample Description: **111-53296-14, Peterborough Landfill Cell 4 Construction, Onsite Stockpile, Clear Stone (CS-22-06)**

| | | | |
|---|---|---|---|
| Date Sampled: | November 16, 2022 | Sampled By: | J.Craig |
| Date Received: | November 21, 2022 | Golder Lab No.: | G-22-313 |
| Date Tested: | November 22, 2022 | Tested By: | E.Shallhorn |
| Initial Dry Mass (g): | 19952.8 | Fineness Modulus: | 12.0 |
| Final Mass (g): | 19937.6 | Percent Coarse: | 99.8 |
| Percent Loss: | 0.1 | Percent Fine: | 0.2 |

| Sieve Size | Cumulative Mass Retained (g) | Cumulative Percent Retained | Cumulative Percent Passing | Acceptance Requirement as per OPSS.PROV 1004 Table 2 53 mm Clear Stone |
|---|---|---|---|---|
| | | | | Percent Passing |
| 63 mm | 1897.1 | 9.5 | 90.5 | 100 |
| 53 mm | 8655.9 | 43.4 | 56.6 | 90 - 100 |
| 19 mm | 19893.2 | 99.7 | 0.3 | 0 - 15 |
| 75 µm | 20.7 | 99.9 | 0.1 | 0 - 2 |

Note: Shaded areas indicate results lying outside of acceptable limits.

Data Input By: E.Shallhorn

Reviewed by:

John Taylor, M.Sc., Laboratory Team Leader

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# SIEVE ANALYSIS OF COARSE AND FINE AGGREGATES (MTO LS-602 Rev.33)

GOLDER
MEMBER OF WSP

WSP
294 Rink Street
Peterborough, ON K9J 2K2

November 22, 2022
Golder Project Number: 18103810AR

Attention: Paul Mulholland & Jaclyn Craig

Sample Description: **111-53296-14, Peterborough Landfill Cell 4 Construction, Onsite Stockpile, Clear Stone (CS-22-07)**

| | | | |
|---|---|---|---|
| Date Sampled: | November 16, 2022 | Sampled By: | J.Craig |
| Date Received: | November 21, 2022 | Golder Lab No.: | G-22-314 |
| Date Tested: | November 22, 2022 | Tested By: | E.Shallhorn |
| Initial Dry Mass (g): | 22486.5 | Fineness Modulus: | 12.0 |
| Final Mass (g): | 22472.9 | Percent Coarse: | 99.9 |
| Percent Loss: | 0.1 | Percent Fine: | 0.1 |

| Sieve Size | Cumulative Mass Retained (g) | Cumulative Percent Retained | Cumulative Percent Passing | Acceptance Requirement as per OPSS.PROV 1004 Table 2 53 mm Clear Stone |
|---|---|---|---|---|
| | | | | Percent Passing |
| 63 mm | 1287.6 | 5.7 | 94.3 | 100 |
| 53 mm | 9522.7 | 42.3 | 57.7 | 90 - 100 |
| 19 mm | 22461.8 | 99.9 | 0.1 | 0 - 15 |
| 75 µm | 5.1 | 100.0 | 0.0 | 0 - 2 |

Note: Shaded areas indicate results lying outside of acceptable limits.

Data Input By: E.Shallhorn

Reviewed by:

John Taylor, M.Sc., Laboratory Team Leader

CCIL
The Voice Of Independent Canadian Laboratories
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# SIEVE ANALYSIS OF COARSE AND FINE AGGREGATES (MTO LS-602 Rev.33)

GOLDER
MEMBER OF WSP

WSP
294 Rink Street
Peterborough, ON K9J 2K2

December 7, 2022
Golder Project Number: 18103810AR

Attention: Paul Mulholland & Jaclyn Craig

Sample Description: **111-53296-14, Peterborough Landfill Cell 4 Construction, Onsite Stockpile, Clear Stone (CS-22-08)**

| | | | |
|---|---|---|---|
| Date Sampled: | December 2, 2022 | Sampled By: | J.Craig |
| Date Received: | December 6, 2022 | Golder Lab No.: | G-22-335 |
| Date Tested: | December 7, 2022 | Tested By: | E.Shallhorn |
| Initial Dry Mass (g): | 16662.8 | Fineness Modulus: | 11.5 |
| Final Mass (g): | 16656.1 | Percent Coarse: | 99.2 |
| Percent Loss: | 0.0 | Percent Fine: | 0.8 |

| Sieve Size | Cumulative Mass Retained (g) | Cumulative Percent Retained | Cumulative Percent Passing | Acceptance Requirement as per OPSS.PROV 1004 Table 2 53 mm Clear Stone |
|---|---|---|---|---|
| | | | | Percent Passing |
| 63 mm | 519.7 | 3.1 | 96.9 | 100 |
| 53 mm | 3473.2 | 20.8 | 79.2 | 90 - 100 |
| 19 mm | 16153.1 | 96.9 | 3.1 | 0 - 15 |
| 75 µm | 74.1 | 99.7 | 0.3 | 0 - 2 |

Note: Shaded areas indicate results lying outside of acceptable limits.

Data Input By: E.Shallhorn

Reviewed by: 

John Taylor, M.Sc., Laboratory Team Leader

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# SIEVE ANALYSIS OF COARSE AND FINE AGGREGATES (MTO LS-602 Rev.33)

GOLDER
MEMBER OF WSP

WSP
294 Rink Street
Peterborough, ON K9J 2K2

December 7, 2022
Golder Project Number: 18103810AR

Attention: Paul Mulholland & Jaclyn Craig

Sample Description: **111-53296-14, Peterborough Landfill Cell 4 Construction, Onsite Stockpile, Clear Stone (CS-22-09)**

| | | | |
|---|---|---|---|
| Date Sampled: | December 2, 2022 | Sampled By: | J.Craig |
| Date Received: | December 6, 2022 | Golder Lab No.: | G-22-336 |
| Date Tested: | December 7, 2022 | Tested By: | E.Shallhorn |
| Initial Dry Mass (g): | 16762.4 | Fineness Modulus: | 11.5 |
| Final Mass (g): | 16743.7 | Percent Coarse: | 98.3 |
| Percent Loss: | 0.1 | Percent Fine: | 1.7 |

| Sieve Size | Cumulative Mass Retained (g) | Cumulative Percent Retained | Cumulative Percent Passing | Acceptance Requirement as per OPSS.PROV 1004 Table 2 53 mm Clear Stone |
|---|---|---|---|---|
| | | | | Percent Passing |
| 63 mm | 487.9 | 2.9 | 97.1 | 100 |
| 53 mm | 3232.9 | 19.3 | 80.7 | 90 - 100 |
| 19 mm | 15992.9 | 95.4 | 4.6 | 0 - 15 |
| 75 µm | 75.9 | 98.8 | 1.2 | 0 - 2 |

Note: Shaded areas indicate results lying outside of acceptable limits.

Data Input By: E.Shallhorn

Reviewed by:

John Taylor, M.Sc., Laboratory Team Leader

CCIL
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La voix des laboratoires indépendants canadiens

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APPENDIX

# D-8 53MM DIAMETER CLEAR STONE ABRASION ANALYSIS

# RESISTANCE OF COARSE AGGREGATE TO DEGRADATION BY ABRASION IN THE MICRO-DEVAL APPARATUS (MTO LS-618 Rev.33)

WSP
294 Rink Street
Peterborough, ON K9J 2K2

November 2, 2022
Golder Project Number: 18103810AR

Attention: Paul Mulholland & Jaclyn Craig

Sample Description: **111-53296-14, Peterborough Landfill Cell 4 Construction, Onsite Stockpile, Clearstone-S1**

| | | | |
|---|---|---|---|
| Date Sampled: | October 7, 2022 | Sampled By: | J.Craig |
| Date Received: | October 19, 2022 | Golder Lab No.: | G-22-292 |
| Date Tested: | November 1, 2022 | Tested By: | E.Shallhorn |

| Grading | Loss of Sample (%) | Acceptance Requirement as per OPSS.PROV 1004 Table 1 for 53mm Clear Stone |
|---|---|---|
| A | **9.4** | 25 Max. |

| Validation Test Data: Control Aggregate (Drain Brothers Stoney Lake Quarry) | |
|---|---|
| Test Date | Percent Loss (11.4% to 14.8%) |
| November 1, 2022 | 13.7 |

Note: Shaded areas indicate results lying outside of acceptable limits.

Data Input By: E.Shallhorn

Reviewed by:

John Taylor, M.Sc., Laboratory Team Leader

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other production zones/periods. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

GOLDER
MEMBER OF WSP

# RESISTANCE OF COARSE AGGREGATE TO DEGRADATION BY ABRASION IN THE MICRO-DEVAL APPARATUS (MTO LS-618 Rev.33)

WSP
294 Rink Street
Peterborough, ON K9J 2K2

November 2, 2022
Golder Project Number: 18103810AR

Attention: Paul Mulholland & Jaclyn Craig

Sample Description: **111-53296-14, Peterborough Landfill Cell 4 Construction, Onsite Stockpile, Clear Stone (CS-22-02)**

| | | | |
|---|---|---|---|
| Date Sampled: | October 14, 2022 | Sampled By: | J.Craig |
| Date Received: | October 24, 2022 | Golder Lab No.: | G-22-293 |
| Date Tested: | November 1, 2022 | Tested By: | E.Shallhorn |

| Grading | Loss of Sample (%) | Acceptance Requirement as per OPSS.PROV 1004 Table 1 for 53mm Clear Stone |
|---|---|---|
| A | **8.9** | 25 Max. |

| Validation Test Data: Control Aggregate (Drain Brothers Stoney Lake Quarry) | |
|---|---|
| Test Date | Percent Loss (11.4% to 14.8%) |
| November 1, 2022 | 13.7 |

Note: Shaded areas indicate results lying outside of acceptable limits.

Data Input By: E.Shallhorn

Reviewed by:

John Taylor, M.Sc., Laboratory Team Leader

CCIL
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Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other production zones/periods. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

# RESISTANCE TO DEGRADATION OF LARGE SIZE COARSE AGGREGATE BY ABRASION AND IMPACT IN THE LOS ANGELES MACHINE (ASTM C535-16)

WSP
294 Rink Street
Peterborough, ON K9J 2K2

November 3, 2022
Golder Project Number: 18103810AR

Attention: Paul Mulholland & Jaclyn Craig

Sample Description: **111-53296-14, Peterborough Landfill Cell 4, OnsiteStockpile, Clear Stone (CS-22-04)**

| | | | |
|---|---|---|---|
| Date Sampled: | October 26, 2022 | Sampled By: | J.Craig |
| Date Received: | October 28, 2022 | Golder Lab No.: | G-22-296 |
| Date Tested: | November 2, 2022 | Tested By: | E.Shallhorn |

| | |
|---|---|
| Grading | 2 |
| Nominal Maximum Aggregate Size (mm) | 53 |
| Initial Sample Mass (g) | 10031.2 |
| Mass of Sample After Abrasion (g) | 9190.7 |
| Loss After Abrasion (%) | **8.4** |

Data Input By: E.Shallhorn

Reviewed by:

John Taylor, M.Sc., Laboratory Team Leader

The Voice Of Independent Canadian Laboratories
La voix des laboratoires indépendants canadiens

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other production zones/periods. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

# RESISTANCE TO DEGRADATION OF COARSE AGGREGATE BY ABRASION AND IMPACT IN THE LOS ANGELES MACHINE (MTO LS-603 Rev.33)

GOLDER
MEMBER OF WSP

WSP
294 Rink Street
Peterborough, ON K9J 2K2

November 22, 2022
Golder Project Number: 18103810AR

Attention: Paul Mulholland & Jaclyn Craig

Sample Description: **111-53296-14, Peterborough Landfill Cell 4 Construction, Onsite Stockpile, Clear Stone (CS-22-07)**

| | | | |
|---|---|---|---|
| Date Sampled: | November 16, 2022 | Sampled By: | J.Craig |
| Date Received: | November 21, 2022 | Golder Lab No.: | G-22-314 |
| Date Tested: | November 22, 2022 | Tested By: | E.Shallhorn |

| | |
|---|---|
| Grading | B |
| Nominal Maximum Aggregate Size (mm) | 19 |
| Initial Sample Mass (g) | 5011.9 |
| Mass of Sample After Abrasion (g) | 4594.8 |
| Loss After Abrasion (%) | **8** |

| Validation Test Data: Control Aggregate (Drain Brothers Stoney Lake Quarry) | |
|---|---|
| Test Date | Loss After Abrasion (23.2% to 28.8%) |
| November 10, 2022 | 24.9 |

Data Input By: E.Shallhorn

Reviewed by:

John Taylor, M.Sc., Laboratory Team Leader

CCIL
The Voice Of Independent Canadian Laboratories
La voix des laboratoires indépendants canadiens

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other production zones/periods. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

# D-9 LFG HEADER GRANULAR A RESULTS

Aggregate
# 25 North,11th Line of Asphodel
RR#2 Norwood Ontario

DRAIN BROS
Excavating Limited

# Gradation Test With Sieve Chart Report

**Plant** 01-Aggregate
**Product** 0052-3/4" (19mm) Minus Gran A Crusher Run
**Specification** OPSS 1010 Road Base Granular A

49051244

## Sample Information

**Sample No** 49051244
**Date Sampled** 11/09/2022 09:00
**Sampled By** Bill Cummings
**Type** Shipping
**Method** Stockpile Pad
**Location** Sand Road Pit

**Split Sample** ☐
**Resample** ☐

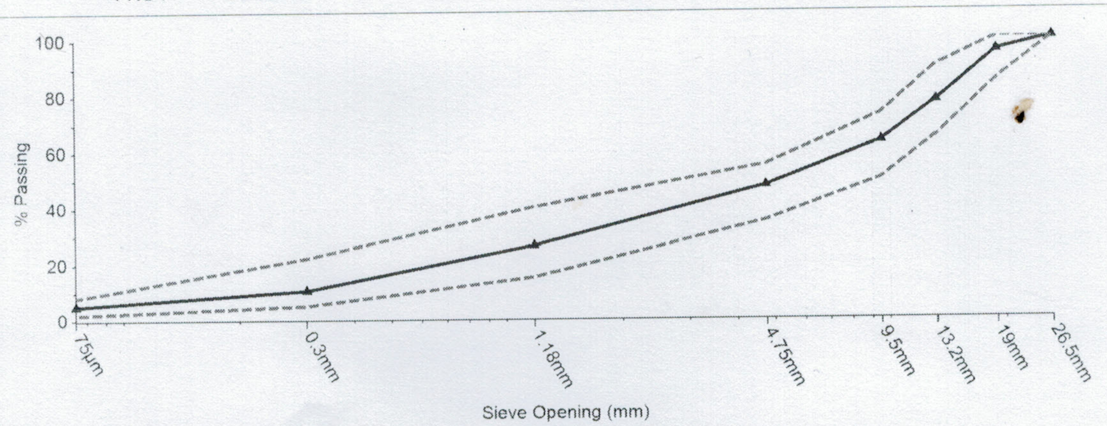
## Gradation Results

**Date Completed** 11/09/2022 09:00

**Tested By** Kasey Conlon

| Unit | Moist Mass | Dry Mass | Wash Mass | Moisture % | Wash Loss % | Procedure |
|---|---|---|---|---|---|---|
| g | 10366.60 | 10026.30 | 9560.19 | 3.4 | 4.6 | |

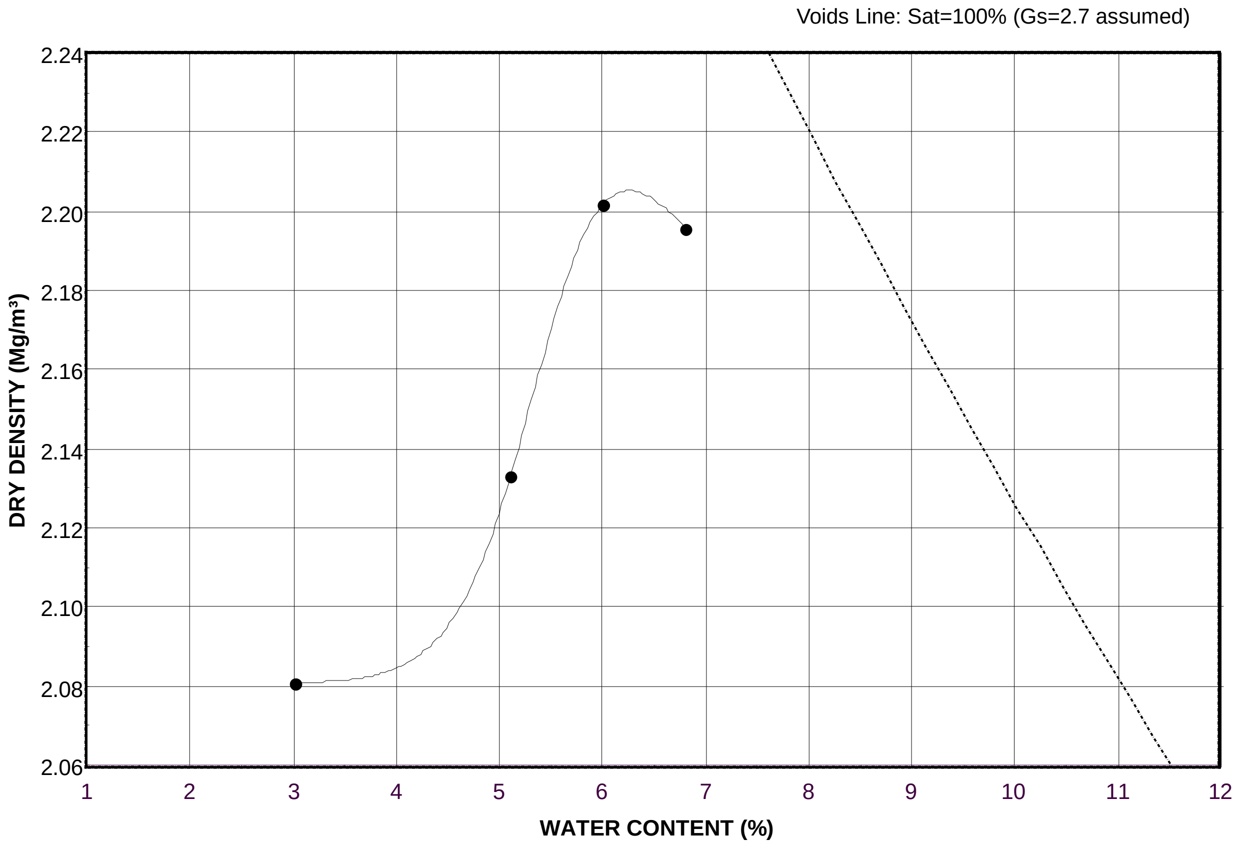
| Sieve | Mass Retained | Cum Mass Retained | Ind % Retained | % Retained | % Passing | Target | Specification | Comment |
|---|---|---|---|---|---|---|---|---|
| 1.06" (26.5mm) | 0.00 | 0.00 | 0.0 | 0.0 | 100.0 | | 100-100 | |
| 3/4" (19mm) | 458.40 | 458.40 | 4.6 | 4.6 | 95.4 | | 85-100 | |
| 0.530" (13.2mm) | 1796.60 | 2255.00 | 17.9 | 22.5 | 77.5 | | 65-90 | |
| 3/8" (9.5mm) | 1428.20 | 3683.20 | 14.2 | 36.7 | 63.3 | | 50-73 | |
| #4 (4.75mm) | 1583.50 | 5266.70 | 15.8 | 52.5 | 47.5 | | 35-55 | |
| #16 (1.18mm) | 2113.67 | 7380.37 | 21.1 | 73.6 | 26.4 | | 15-40 | |
| #50 (.3mm) | 1579.87 | 8960.24 | 15.8 | 89.4 | 10.6 | | 5-22 | |
| #200 (75µm) | 558.41 | 9518.65 | 5.6 | 94.9 | 5.1 | | 2-8 | |
| Pan | 41.54 | 9560.19 | 5.1 | 100.0 | 0.0 | | | |




Tests: 1 D10(ES): 0.258 D15: 0.439 D30: 1.496 D50: 5.301 D60: 8.220 D85: 15.376 D90: 17.023 Cu: 31.872 Cc: 1.056

# LABORATORY COMPACTION TEST
MTO LS-706
Granular A

FIGURE A-03




Standard
Proctor Test Results

Sample: A-03

Source: On Site

Max Dry Density:
2.205 $Mg/m^3$

Optimum Water
Content: 6.3%

Natural Water
Content: N/A

**REMARKS**

Sampled By: JC

Project Number: 18103810AR (WSP 111-53296-14)
Checked By: ______________

**Golder Associates**

LABID: 22-2568
Date: 18-Nov-22

APPENDIX

# D-10 MANHOLE FOUNDATION SLAB RESULTS

**Golder**
100 Scotia Court
Whitby, ON L1N 8Y6
905-723-2727



## Compressive Strength of Cylindrical Concrete Specimens

Test Standard: CSA A23.2:19-9C

Client: WSP Canada Inc.
Project: 18103810AR - 111-53296-14
Element: Chamber base south end.
External ID:
Report Number: WHB2020-22

**Minimum Strength 30 MPa at 28 Days**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Batching Date: | 09/23/2022 | Time: | 11:50 | Air Temp. During Pour (°C): | 14.0 | | |
| Sampling Date: | 09/23/2022 | Time: | 13:05 | Concrete Temp. During Pour (°C): | 20.5 | | |
| Supplier: | Dufferin Concrete | | | Specified Slump (mm): | 50 | To | 110 |
| Concrete Mix ID: | S3029310 | | | Measured Slump (mm): | 120 | | |
| Delivery Ticket No.: | 21088379 | | | Specified Air Content (%): | 5.0 | To | 8.0 |
| Truck No.: | 1988 | | | Measured Air Content (%): | 6.0 | | |
| Load No.: | 1 | | | Water Added on Site: | NA | | |
| Contractor: | Dufferin | | | Type of Admixtures: | NA | | |
| Departure From Site: | 09/24/2022 | Time: | 14:45 | Nominal Aggregate Size (mm): | 20 | | |
| Received in Lab: | 09/24/2022 | Time: | NA | Plastic Density (kg/m³): | NA | | |

**Test Specimen**

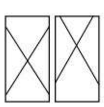
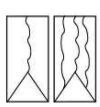
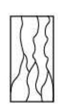
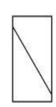
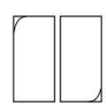
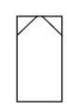
| | | | | | |
|---|---|---|---|---|---|
| Cast by: | Trent | Cast Time: | 13:24 | Lab Number: | WHB22-2591 |
| Total Number: | 5 | Mold Type: | Plastic 102mm x 201mm | Curing Location: | On site in GAL curing box with max/min. |
| Initial Curing Temp. (°C): | Min 16.0 Max 23.0 | **Self Consolidating Concrete (SCC Only)** | | *Slump Flow* | *NA* |
| Non-Standard Curing Conditions | NA | *VSI Value* | *NA* | *T50 cm Time* | *NA* |
| | | *VSI Values (As per CSA A23.2-19C): 0=Highly stable; 1=Stable; 2=Unstable; 3=Highly unstable* | | | |

**Results**

| Cylinder ID | Date Tested | Tested By | Age of test (days) 'x' if Hold | Curing Condition (Standard or Field) | Avg. Diameter (mm) | Avg. Length (mm) | Mass (g) | Hardened Density (kg/m³) | Type of Fracture | Cylinder Compressive Strength (MPa) |
|---|---|---|---|---|---|---|---|---|---|---|
| A | 09/26/2022 | Shafiee, Elmira | 3 | Standard | 101.5 | 200.0 | 3796 | 2350 | 1 | 28.0 |
| B | 09/30/2022 | Shafiee, Elmira | 7 | Standard | 101.5 | 200.0 | 3858 | 2380 | 1 | 28.6 |
| C | 10/07/2022 | Shafiee, Elmira | 14 | Standard | 101.5 | 200.0 | 3857 | 2380 | 1 | 34.8 |
| D | 10/21/2022 | Maracle, Melissa | 28 | Standard | 101.5 | 200.0 | 3830 | 2370 | 1 | 37.6 |
| E | 11/18/2022 | Shafiee, Elmira | 56 | Standard | 101.5 | 200.0 | 3832 | 2370 | 1 | 40.7 |

**Average Strength at: 28 Days: 37.6**

Type of fracture (As per CSA A23.2-9C)

**1. Cones on both ends**

**2. Cone on one end**

**3. Columnar vertical cracking**

**4. Diagonal fracture with no cracking through ends**

**5. Side fracture at top / bottom**

**6. Similar to type 5 with pointed end(s)**


Lab Reporting Comments / Deviations

General Comments

Reviewed By: John Taylor
Title: Laboratory Supervisor
Signature:

CERTIFIED BY CCIL

**Golder**
100 Scotia Court
Whitby, ON L1N 8Y6
905-723-2727



## Compressive Strength of Cylindrical Concrete Specimens

Test Standard: CSA A23.2:19-9C

Client: WSP Canada Inc.
Project: 18103810AR - 111-53296-14
Element: Chamber base north and south.
External ID:
Report Number: WHB2077-22

**Minimum Strength 30 MPa at 28 Days**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Batching Date: | 09/23/2022 | Time: | 12:41 | Air Temp. During Pour (°C): | 13.0 | | |
| Sampling Date: | 09/23/2022 | Time: | 13:57 | Concrete Temp. During Pour (°C): | 20.0 | | |
| Supplier: | Dufferin Concrete | | | Specified Slump (mm): | 50 | To | 110 |
| Concrete Mix ID: | S3029310 | | | Measured Slump (mm): | 150 | | |
| Delivery Ticket No.: | 21088380 | | | Specified Air Content (%): | 5.0 | To | 8.0 |
| Truck No.: | 1152 | | | Measured Air Content (%): | 5.8 | | |
| Load No.: | 2 | | | Water Added on Site: | NA | | |
| Contractor: | Todd Bros | | | Type of Admixtures: | NA | | |
| Departure From Site: | 09/24/2022 | Time: | 14:25 | Nominal Aggregate Size (mm): | 20 | | |
| Received in Lab: | 09/24/2022 | Time: | NA | Plastic Density (kg/m³): | NA | | |

**Test Specimen**

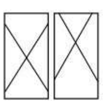
| | | | | | |
|---|---|---|---|---|---|
| Cast by: | Trent | Cast Time: | 14:17 | Lab Number: | WHB22-2592 |
| Total Number: | 1 | Mold Type: | Plastic 102mm x 201mm | Curing Location: | On site in GAL curing box with max/min. |
| Initial Curing Temp. (°C): | Min 16.0 Max 23.0 | **Self Consolidating Concrete (SCC Only)** | | *Slump Flow* | *NA* |
| Non-Standard Curing Conditions | NA | *VSI Value* | *NA* | *T50 cm Time* | *NA* |
| | | *VSI Values (As per CSA A23.2-19C): 0=Highly stable; 1=Stable; 2=Unstable; 3=Highly unstable* | | | |

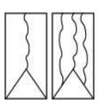
**Results**

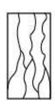
| Cylinder ID | Date Tested | Tested By | Age of test (days) 'x' if Hold | Curing Condition (Standard or Field) | Avg. Diameter (mm) | Avg. Length (mm) | Mass (g) | Hardened Density (kg/m³) | Type of Fracture | Cylinder Compressive Strength (MPa) |
|---|---|---|---|---|---|---|---|---|---|---|
| A | 10/21/2022 | Maracle, Melissa | 28 | Standard | 101.5 | 200.0 | 3802 | 2350 | 1 | 38.7 |

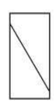
**Average Strength at: 28 Days: 38.7**

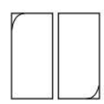
Type of fracture (As per CSA A23.2-9C)

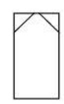
**1. Cones on both ends**


**2. Cone on one end**


**3. Columnar vertical cracking**


**4. Diagonal fracture with no cracking through ends**


**5. Side fracture at top / bottom**


**6. Similar to type 5 with pointed end(s)**


Lab Reporting Comments / Deviations

General Comments

| | | | |
|---|---|---|---|
| Reviewed By: | John Taylor | Title: | Laboratory Supervisor |
| Signature: | | | |

CERTIFIED BY CCIL

**Golder**
100 Scotia Court
Whitby, ON L1N 8Y6
905-723-2727



## Compressive Strength of Cylindrical Concrete Specimens

Test Standard: CSA A23.2:19-9C

Client: WSP Canada Inc.
Project: 18103810AR - 111-53296-14
Element: Chamber base north end.
External ID: Report Number: WHB2004-22

**Minimum Strength 30 MPa at 28 Days**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Batching Date: | 09/23/2022 | Time: | 13:27 | Air Temp. During Pour (°C): | 15.0 | | |
| Sampling Date: | 09/23/2022 | Time: | 14:58 | Concrete Temp. During Pour (°C): | 21.0 | | |
| Supplier: | Dufferin Concrete | | | Specified Slump (mm): | 50 | To | 110 |
| Concrete Mix ID: | S3029310 | | | Measured Slump (mm): | 90 | | |
| Delivery Ticket No.: | 21088382 | | | Specified Air Content (%): | 5.0 | To | 8.0 |
| Truck No.: | 1905 | | | Measured Air Content (%): | 5.4 | | |
| Load No.: | 3 | | | Water Added on Site: | NA | | |
| Contractor: | Dufferin | | | Type of Admixtures: | NA | | |
| Departure From Site: | 09/24/2022 | Time: | 14:25 | Nominal Aggregate Size (mm): | 20 | | |
| Received in Lab: | 09/24/2022 | Time: | NA | Plastic Density (kg/m³): | NA | | |

**Test Specimen**

| | | | | | |
|---|---|---|---|---|---|
| Cast by: | Trent | Cast Time: | 14:58 | Lab Number: | WHB22-2593 |
| Total Number: | 5 | Mold Type: | Plastic 102mm x 201mm | Curing Location: | On site in GAL curing box with max/min. |
| Initial Curing Temp. (°C): | Min 16.0 Max 23.0 | **Self Consolidating Concrete (SCC Only)** | | *Slump Flow* | *NA* |
| Non-Standard Curing Conditions | NA | *VSI Value* | *NA* | *T50 cm Time* | *NA* |
| | | *VSI Values (As per CSA A23.2-19C): 0=Highly stable; 1=Stable; 2=Unstable; 3=Highly unstable* | | | |

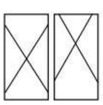
**Results**

| Cylinder ID | Date Tested | Tested By | Age of test (days) 'x' if Hold | Curing Condition (Standard or Field) | Avg. Diameter (mm) | Avg. Length (mm) | Mass (g) | Hardened Density (kg/m³) | Type of Fracture | Cylinder Compressive Strength (MPa) |
|---|---|---|---|---|---|---|---|---|---|---|
| A | 09/26/2022 | Shafiee, Elmira | 3 | Standard | 101.5 | 200.0 | 3856 | 2380 | 1 | 24.8 |
| B | 09/30/2022 | Shafiee, Elmira | 7 | Standard | 101.5 | 200.0 | 3858 | 2380 | 1 | 28.0 |
| C | 10/07/2022 | Shafiee, Elmira | 14 | Standard | 101.5 | 200.0 | 3829 | 2370 | 1 | 33.9 |
| D | 10/21/2022 | Maracle, Melissa | 28 | Standard | 101.5 | 200.0 | 3847 | 2380 | 1 | 38.8 |
| E | 11/18/2022 | Shafiee, Elmira | 56 | Standard | 101.5 | 200.0 | 3851 | 2380 | 1 | 42.6 |

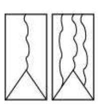
**Average Strength at: 28 Days: 38.8**

Type of fracture (As per CSA A23.2-9C)

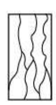
**1. Cones on both ends**



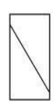
**2. Cone on one end**



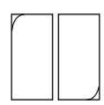
**3. Columnar vertical cracking**



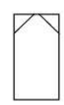
**4. Diagonal fracture with no cracking through ends**



**5. Side fracture at top / bottom**



**6. Similar to type 5 with pointed end(s)**



Lab Reporting Comments / Deviations

General Comments

| | | | |
|---|---|---|---|
| Reviewed By: | John Taylor | Title: | Laboratory Supervisor |
| Signature: | | | |

CERTIFIED BY CCIL

Notice: The test data given herein pertain to the sample provided and may not be applicable to other samples or to material from earlier or subsequent production. Reporting of these results constitutes a testing service only. Engineering interpretation and advice may be provided upon written request.

# APPENDIX

# E

## FIELD TESTING DATA

# FIELD COMPACTION TEST REPORT

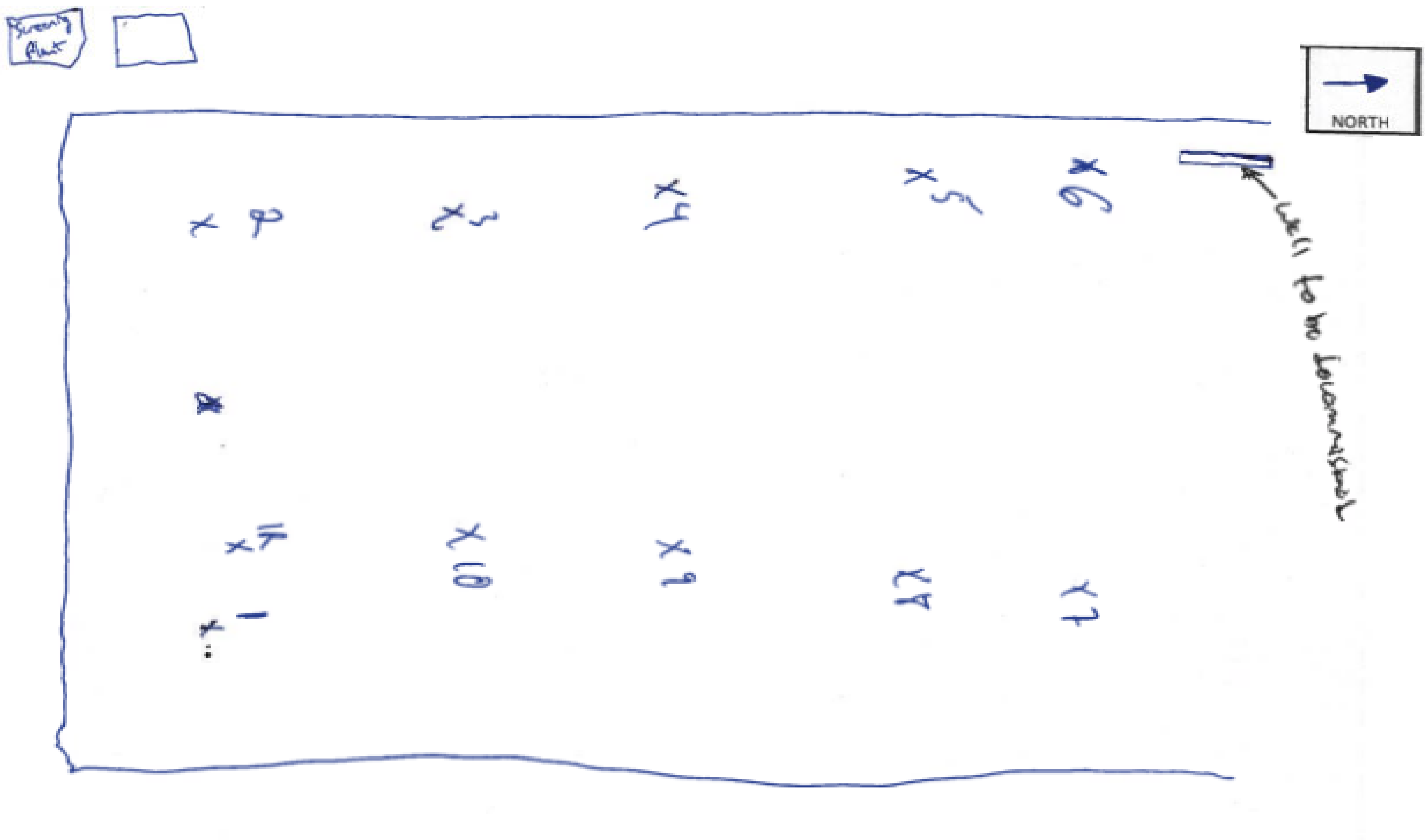
**PROJECT NAME:** Peterborough Landfill - Cell 4
**PROJECT NO.:** 111-53296-14
**PROJECT LOCATION:** Bensfort Road, Peterborough, ON
**CLIENT:** City of Peterborough
**CONTRACTOR:** Todd Brothers

**DATE AND TIME:** June 20, 2022 9:00 am to 1:00 pm
**WEATHER:** Mostly Sunny/Partly Cloudy 17°C
**REF. GRADE:** 20 cm Lift off Base
**GAUGE NO.:** 5985
**TECHNICIAN:** AA

| Test No. | Below Reference (m) | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. (kg/m$^3$) | Specified Degree of Compact. (%) | Wet Density (kg/m$^3$) | Dry Density (kg/m$^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2065 | 1969 | 4.9 | 92.7 | 50 | Fail |
| 1R | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2250 | 2145 | 4.9 | 100.0 | 100 | Pass |
| 2 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2219 | 2128 | 4.3 | 100.0 | 100 | Pass |
| 3 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2228 | 2114 | 5.4 | 99.6 | 100 | Pass |
| 4 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2333 | 2235 | 4.4 | 100.0 | 100 | Pass |
| 5 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2300 | 2190 | 5.0 | 100.0 | 100 | Pass |
| 6 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2205 | 2108 | 4.6 | 99.3 | 50 | Pass |
| 7 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2206 | 2107 | 4.7 | 99.2 | 100 | Pass |
| 8 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2245 | 2163 | 3.8 | 100.0 | 50 | Pass |
| 9 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2176 | 2068 | 5.2 | 97.4 | 100 | Pass |
| 10 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2245 | 2146 | 4.6 | 100.0 | 100 | Pass |

* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks: Water truck was available in case moisture needed to be adjusted.




Project Name: Peterborough Landfill - Cell 4

Project #: 111-53296-14

Date: 20-Jun-22

Tech: AA

# FIELD COMPACTION TEST REPORT

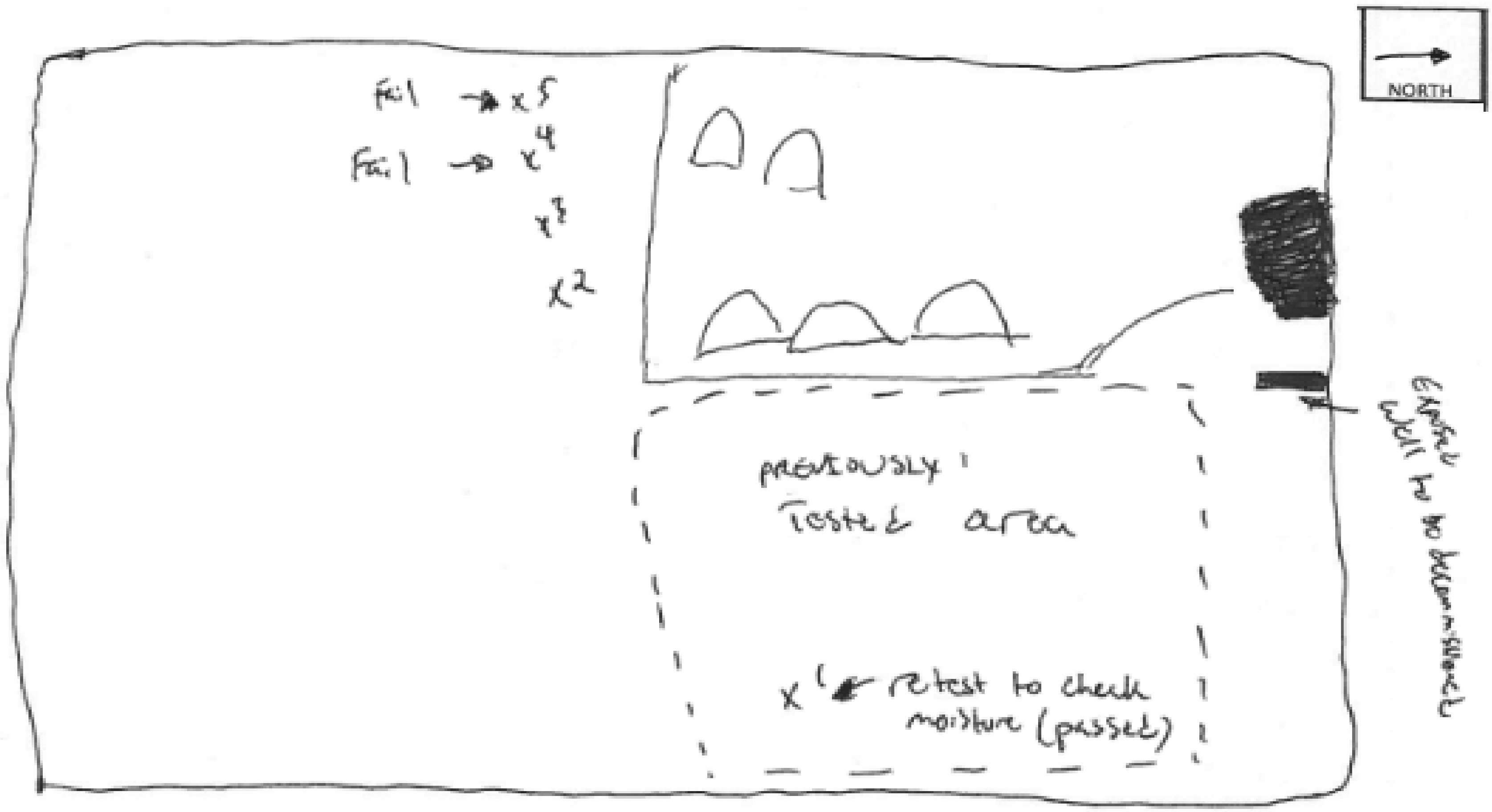
**PROJECT NAME:** Peterborough Landfill - Cell 4
**PROJECT NO.:** 111-53296-14
**PROJECT LOCATION:** Bensfort Road, Peterborough, ON
**CLIENT:** City of Peterborough
**CONTRACTOR:** Todd Brothers

**DATE AND TIME:** June 22, 2022 8:50 am to 3:30 pm
**WEATHER:** Sunny 29°C
**REF. GRADE:** First 20 cm Lift
**GAUGE NO.:** 5985
**TECHNICIAN:** AA

| Test No. | Below Reference (m) | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. ($kg/m^3$) | Specified Degree of Compact. (%) | Wet Density ($kg/m^3$) | Dry Density ($kg/m^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2263 | 2163 | 4.6 | 100.0 | 100 | Pass |
| 2 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2219 | 2101 | 5.6 | 99.0 | 100 | Pass |
| 3 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2305 | 2183 | 5.6 | 100.0 | 100 | Pass |
| 4 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2060 | 1940 | 6.2 | 91.4 | 100 | Fail |
| 5 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2065 | 1954 | 5.7 | 92.0 | 100 | Fail |

* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks: Areas where compaction failed should be gone over again with compactor.




wsp

Project Name: Peterborough Landfill - Cell 4

Project #: 111-53296-14

Date: 22-Jun-22

Tech: AA

# FIELD COMPACTION TEST REPORT

| | | | |
|---|---|---|---|
| **PROJECT NAME:** | Peterborough Landfill - Cell 4 | **DATE AND TIME:** | June 23, 2022 9:00 am to 5:20 pm |
| **PROJECT NO.:** | 111-53296-14 | **WEATHER:** | Sunny 20°C |
| **PROJECT LOCATION:** | Bensfort Road, Peterborough, ON | **REF. GRADE:** | 20 cm Clay Liner Lift on Base Grade |
| **CLIENT:** | City of Peterborough | **GAUGE NO.:** | 5985 |
| **CONTRACTOR:** | Todd Brothers | **TECHNICIAN:** | AA |

| Test No. | Below Reference (m) | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. ($kg/m^3$) | Specified Degree of Compact. (%) | Wet Density ($kg/m^3$) | Dry Density ($kg/m^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2072 | 1949 | 6.3 | 91.8 | 100 | Fail |
| 1R | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2207 | 2096 | 5.3 | 98.7 | 100 | Pass |
| 2 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2202 | 2066 | 6.6 | 97.3 | 100 | Pass |
| 2R | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2002 | 1890 | 5.9 | 89.0 | 100 | Fail |
| 3 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2274 | 2174 | 4.6 | 100.0 | 100 | Pass |
| 4 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2279 | 2164 | 5.3 | 100.0 | 100 | Pass |
| 5 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2264 | 2156 | 5.0 | 100.0 | 100 | Pass |
| 6 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2218 | 2118 | 4.7 | 99.8 | 100 | Pass |
| 7 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2284 | 2141 | 6.7 | 100.0 | 100 | Pass |
| 8 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2295 | 2169 | 5.8 | 100.0 | 100 | Pass |
| 9 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2079 | 1976 | 5.2 | 93.1 | 100 | Fail |
| 9R | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2215 | 2106 | 5.2 | 99.2 | 100 | Pass |
| 10 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2370 | 2259 | 4.9 | 100.0 | 100 | Pass |
| 11 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2240 | 2158 | 3.8 | 100.0 | 50 | Pass |
| 12 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2262 | 2167 | 4.4 | 100.0 | 100 | Pass |
| 13 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2081 | 2013 | 3.4 | 94.8 | 100 | Pass |
| | | | | | | | | | | | | | |
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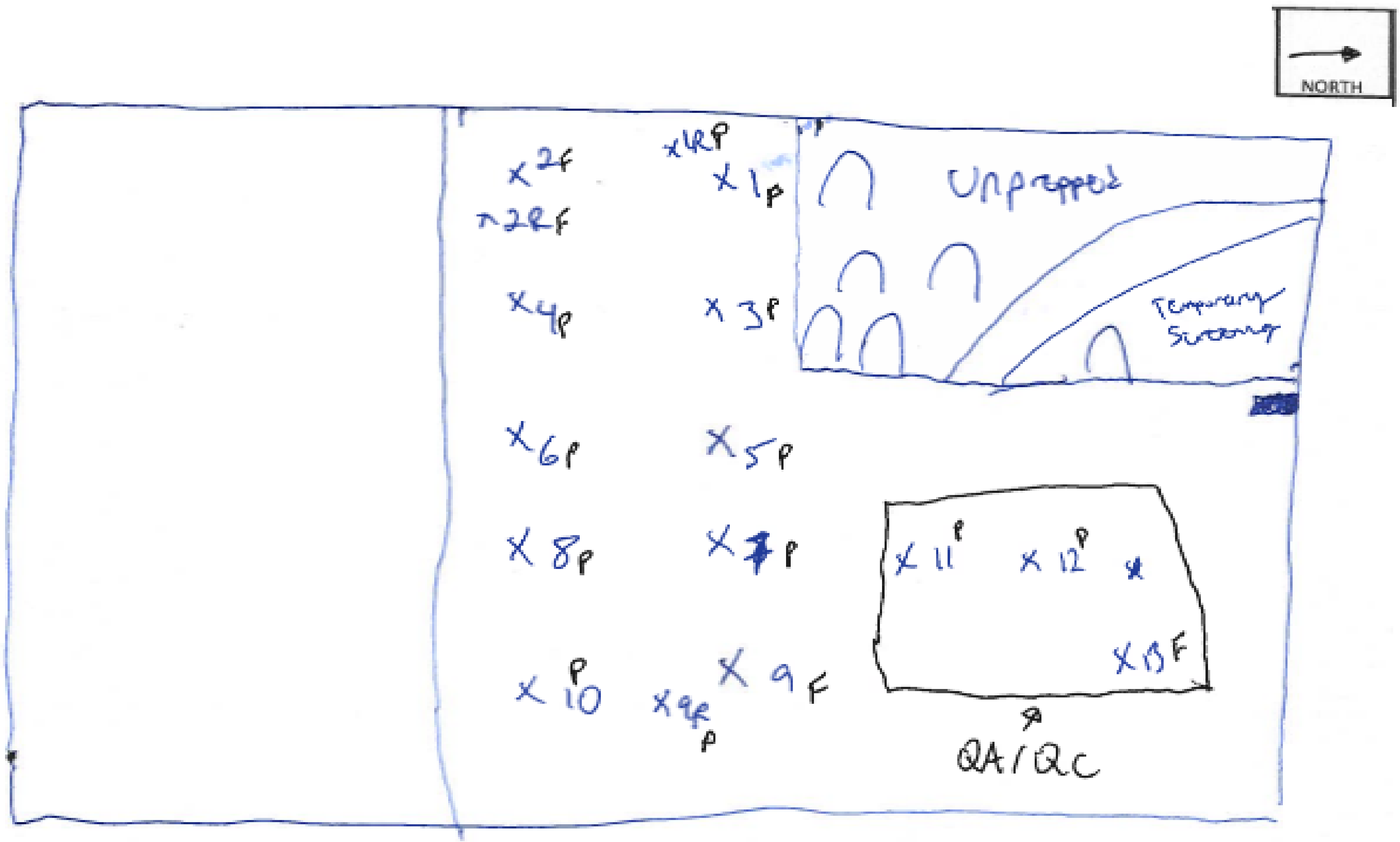
* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks: QA/QC done on previously tested has reduced in moisture resulting in one test barely passing and one test failing to meet moisture.




Project Name: Peterborough Landfill - Cell 4

Project #: 111-53296-14

Date: 23-Jun-22

Tech: AA

# FIELD COMPACTION TEST REPORT

| | | | |
|---|---|---|---|
| **PROJECT NAME:** | Peterborough Landfill - Cell 4 | **DATE AND TIME:** | June 24, 2022 8:45 am to 5:00 pm |
| **PROJECT NO.:** | 111-53296-14 | **WEATHER:** | Sunny 27°C |
| **PROJECT LOCATION:** | Bensfort Road, Peterborough, ON | **REF. GRADE:** | 15 cm Lift above 20 cm Lift off Base |
| **CLIENT:** | City of Peterborough | **GAUGE NO.:** | 33491 |
| **CONTRACTOR:** | Todd Brothers | **TECHNICIAN:** | AA |

| Test No. | Below Reference (m) | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. (kg/m$^3$) | Specified Degree of Compact. (%) | Wet Density (kg/m$^3$) | Dry Density (kg/m$^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2328 | 2230 | 4.4 | 100.0 | 100 | Pass |
| 2 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2136 | 2042 | 4.6 | 96.2 | 100 | Pass |
| 3 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2086 | 2006 | 4.0 | 94.5 | 100 | Pass |
| 3R | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2091 | 2014 | 3.8 | 94.9 | 100 | Pass |
| 4 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2296 | 2212 | 3.8 | 100.0 | 100 | Pass |
| 5 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2367 | 2276 | 4.0 | 100.0 | 100 | Pass |
| 6 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 1860 | 1788 | 4.0 | 84.2 | 50 | Fail |
| 7 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2214 | 2119 | 4.5 | 99.8 | 50 | Pass |
| 6R | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2265 | 2182 | 3.8 | 100.0 | 100 | Pass |
| 8 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2322 | 2228 | 4.2 | 100.0 | 50 | Pass |
| 9 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2137 | 2041 | 4.7 | 96.1 | 100 | Pass |
| 10 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2126 | 2029 | 4.8 | 95.6 | 100 | Pass |
| 11 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2293 | 2190 | 4.7 | 100.0 | 100 | Pass |
| 12 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2333 | 2239 | 4.2 | 100.0 | 100 | Pass |
| 13 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2221 | 2105 | 5.5 | 99.2 | 100 | Pass |
| 14 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2172 | 2080 | 4.4 | 98.0 | 100 | Pass |
| 15 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2285 | 2150 | 6.3 | 100.0 | 50 | Pass |
| 16 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2261 | 2133 | 6.0 | 100.0 | 50 | Pass |
| 17 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2214 | 2097 | 5.6 | 98.8 | 50 | Pass |
| | | | | | | | | | | | | | |
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* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks: Areas where compaction failed looked like operator did not pass as much as areas that passed.

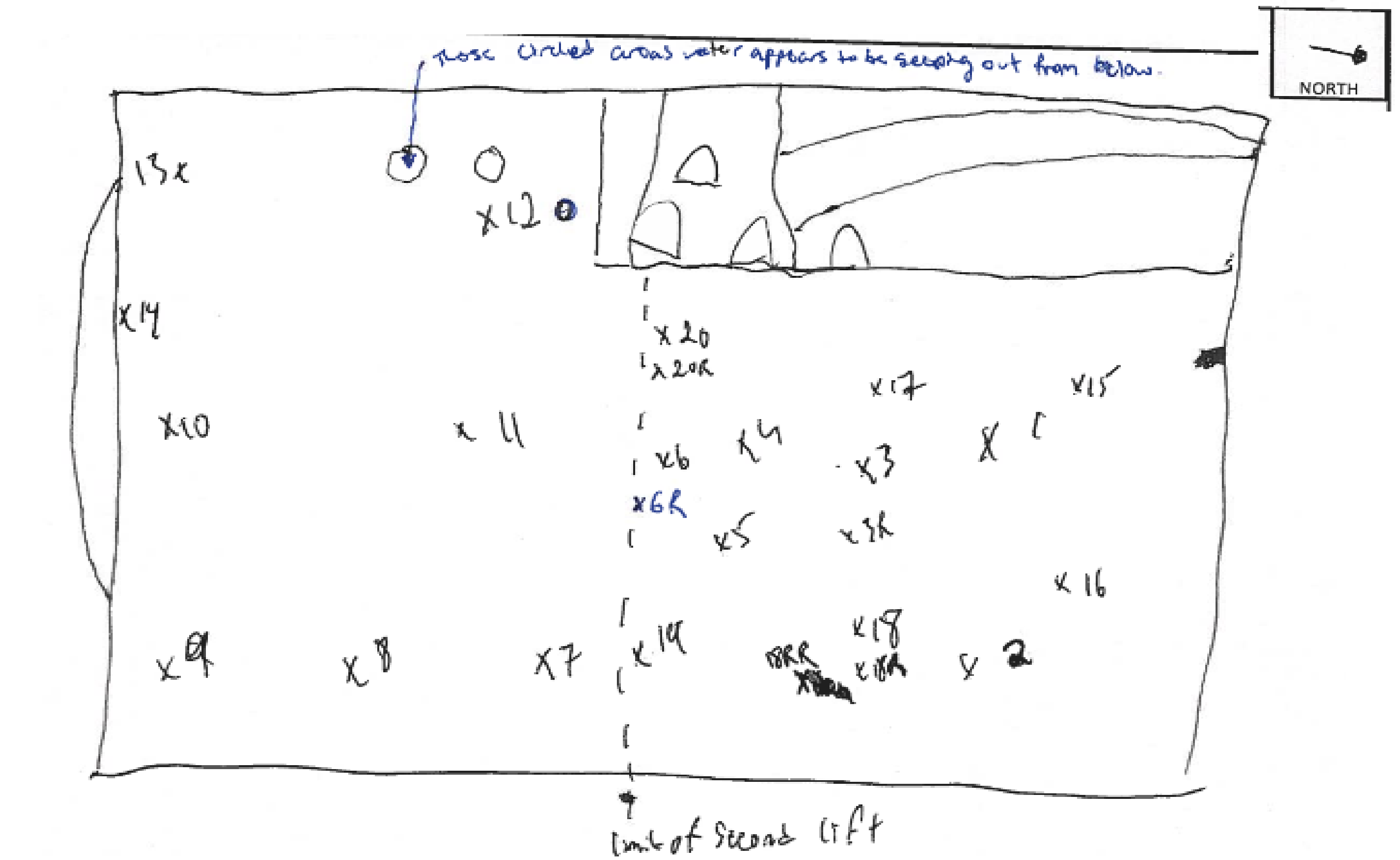
# FIELD COMPACTION TEST REPORT

| | | | |
|---|---|---|---|
| **PROJECT NAME:** | Peterborough Landfill - Cell 4 | **DATE AND TIME:** | June 24, 2022 8:45 am to 5:00 pm |
| **PROJECT NO.:** | 111-53296-14 | **WEATHER:** | Sunny 27°C |
| **PROJECT LOCATION:** | Bensfort Road, Peterborough, ON | **REF. GRADE:** | 15 cm Lift above 20 cm Lift off Base |
| **CLIENT:** | City of Peterborough | **GAUGE NO.:** | 33491 |
| **CONTRACTOR:** | Todd Brothers | **TECHNICIAN:** | AA |

| Test No. | Below Reference (m) | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. ($kg/m^3$) | Specified Degree of Compact. (%) | Wet Density ($kg/m^3$) | Dry Density ($kg/m^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 1995 | 1887 | 5.7 | 88.9 | 50 | Fail |
| 18R | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2071 | 1961 | 5.6 | 92.4 | 50 | Fail |
| 18RR | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2176 | 2078 | 4.7 | 97.9 | 50 | Pass |
| 19 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2137 | 2045 | 4.5 | 96.3 | 50 | Pass |
| 20 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2063 | 1955 | 5.5 | 92.1 | 50 | Fail |
| 20R | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2200 | 2095 | 5.0 | 98.7 | 50 | Pass |

* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks: QA/QC done on previously tested has reduced in moisture resulting in one test barely passing and one test failing to meet moisture.




Project Name: Peterborough Landfill - Cell 4
Project #: 111-53296-14

Date: 24-Jun-22
Tech: AA

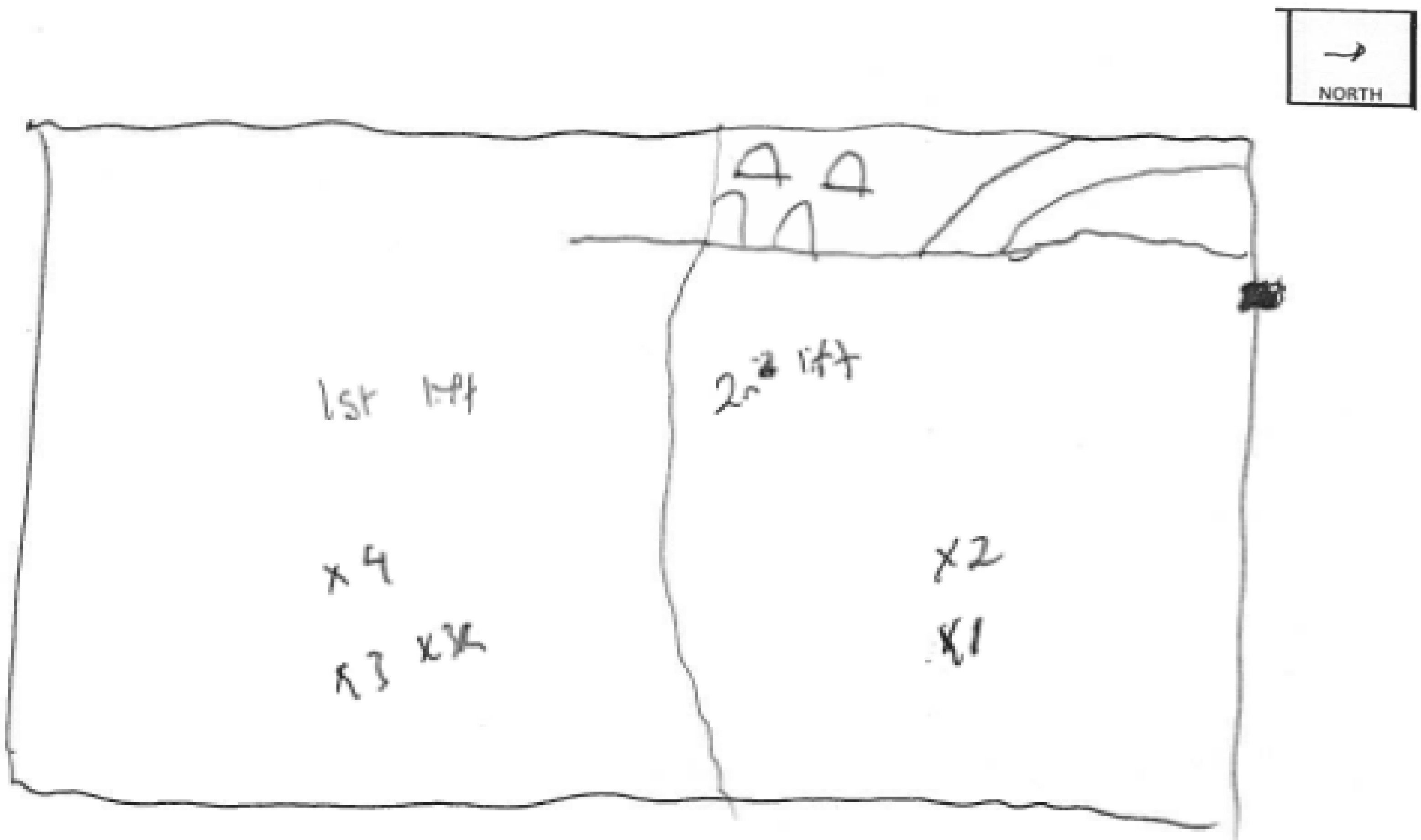
# FIELD COMPACTION TEST REPORT

| | | | |
|---|---|---|---|
| **PROJECT NAME:** | Peterborough Landfill - Cell 4 | **DATE AND TIME:** | June 27, 2022 8:10 am to 5:30 pm |
| **PROJECT NO.:** | 111-53296-14 | **WEATHER:** | Sunny and Cloud 18°C |
| **PROJECT LOCATION:** | Bensfort Road, Peterborough, ON | **REF. GRADE:** | 20 cm 1st Lift (35.5 cm combined 1st & 2nd Lift) |
| **CLIENT:** | City of Peterborough | **GAUGE NO.:** | 5985 |
| **CONTRACTOR:** | Todd Brothers | **TECHNICIAN:** | AA |

| Test No. | Below Reference (m) | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. (kg/m$^3$) | Specified Degree of Compact. (%) | Wet Density (kg/m$^3$) | Dry Density (kg/m$^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 1920 | 1818 | 5.6 | 85.6 | 100 | Fail |
| 2 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2140 | 2032 | 5.3 | 95.7 | 100 | Pass |
| 3 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 1933 | 1852 | 4.4 | 87.2 | 100 | Fail |
| 3R | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2077 | 1988 | 4.5 | 93.6 | 100 | Fail |
| 4 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2069 | 1989 | 4.0 | 93.7 | 100 | Fail |

* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks: Lift should be moist before adding additional lifts.
Dry material should not be recompacted until being sprayed with water truck




Project Name: Peterborough Landfill - Cell 4

Project #: 111-53296-14

Date: 27-Jun-22

Tech: AA

# FIELD COMPACTION TEST REPORT

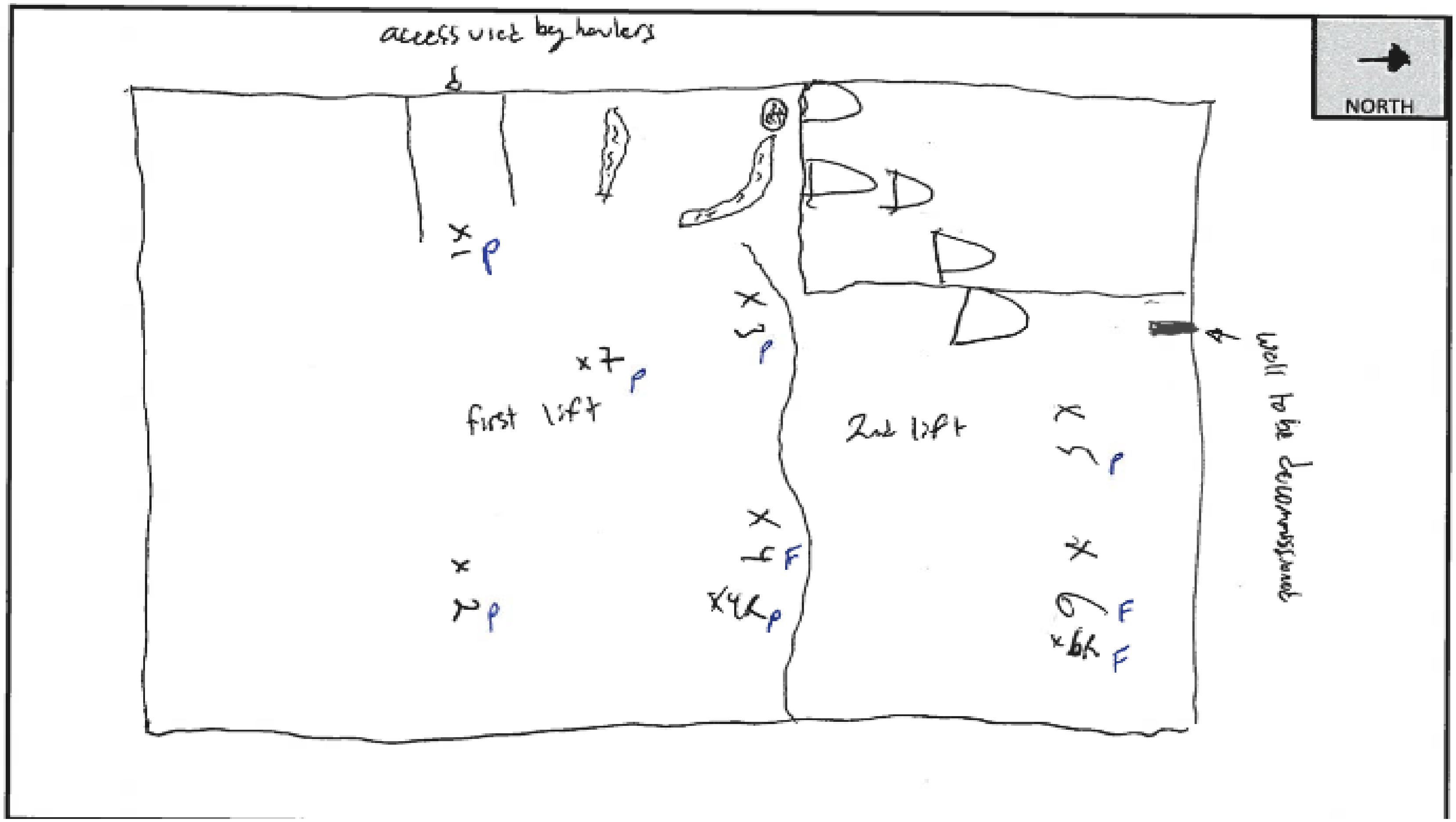
**PROJECT NAME:** Peterborough Landfill - Cell 4
**PROJECT NO.:** 111-53296-14
**PROJECT LOCATION:** Bensfort Road, Peterborough, ON
**CLIENT:** City of Peterborough
**CONTRACTOR:** Todd Brothers

**DATE AND TIME:** June 28, 2022 8:30 am to 5:10 pm
**WEATHER:** Sunny 22°C
**REF. GRADE:** 20 cm Lift above Base & 30 cm 1st & 2nd Lift off Base
**GAUGE NO.:** 5985
**TECHNICIAN:** AA

| Test No. | Below Reference (m) | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. (kg/m$^3$) | Specified Degree of Compact. (%) | Wet Density (kg/m$^3$) | Dry Density (kg/m$^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2240 | 2141 | 4.6 | 100.0 | 100 | Pass |
| 2 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2168 | 2059 | 5.3 | 97.0 | 100 | Pass |
| 3 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2326 | 2209 | 5.3 | 100.0 | 100 | Pass |
| 4 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2051 | 1974 | 3.9 | 93.0 | 100 | Fail |
| 4R | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2250 | 2153 | 4.5 | 100.0 | 100 | Pass |
| 5 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2163 | 2072 | 4.4 | 97.6 | 100 | Pass |
| 6 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2087 | 2022 | 3.2 | 95.3 | 50 | Pass |
| 6R | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2086 | 2014 | 3.6 | 94.8 | 50 | Pass |
| 7 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2219 | 2111 | 5.1 | 99.4 | 50 | Pass |

* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks: Liner material should not be spread over dry lifts.
Area should be kept moist as specified.




Project Name: Peterborough Landfill - Cell 4

Project #: 111-53296-14

Date: 28-Jun-22

Tech: AA

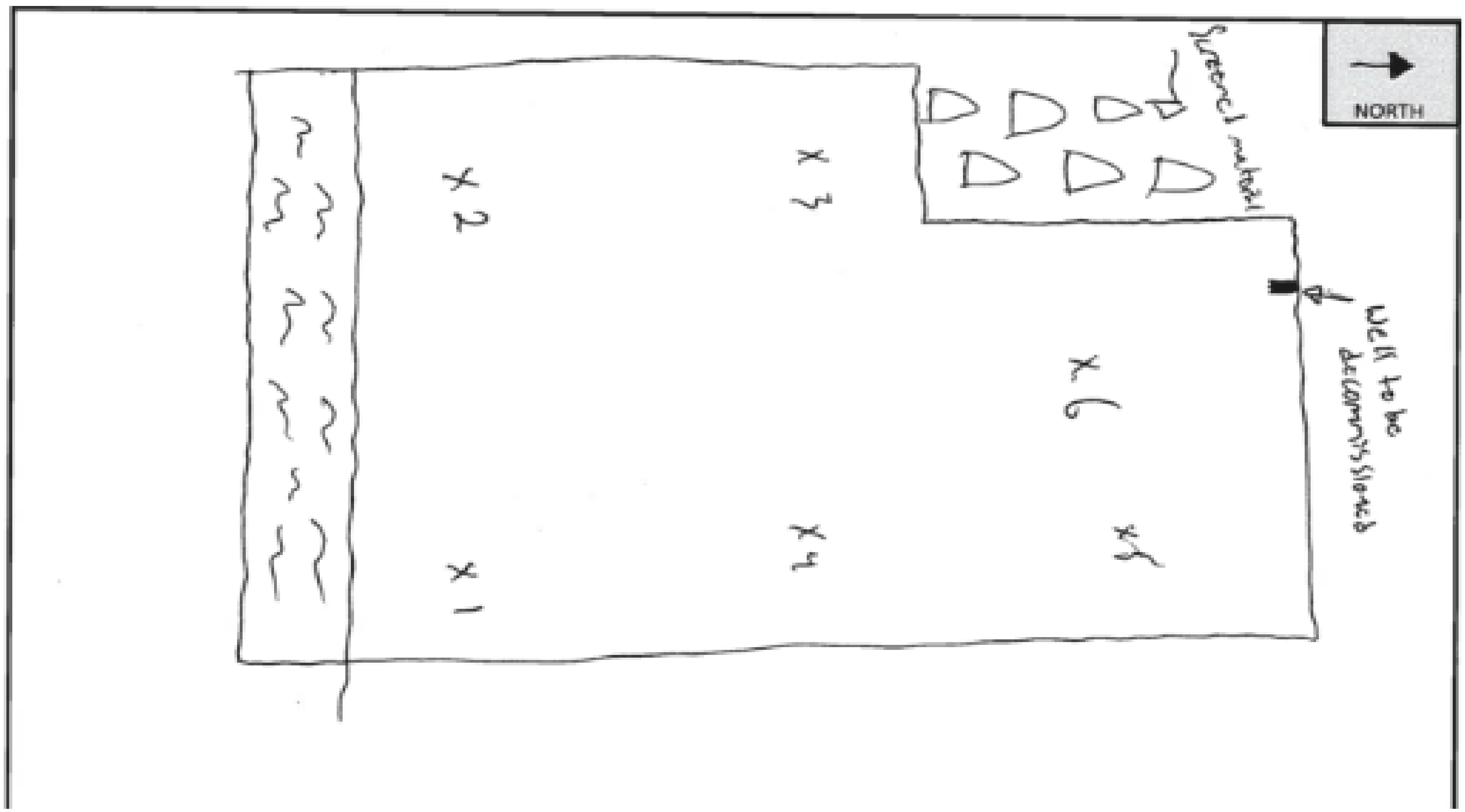
# FIELD COMPACTION TEST REPORT

| | | | |
|---|---|---|---|
| **PROJECT NAME:** | Peterborough Landfill - Cell 4 | **DATE AND TIME:** | June 30, 2022 8:05 am to 4:20 pm |
| **PROJECT NO.:** | 111-53296-14 | **WEATHER:** | Sunny 21°C |
| **PROJECT LOCATION:** | Bensfort Road, Peterborough, ON | **REF. GRADE:** | 20 cm Lift above Base & 30 cm 1st & 2nd Lift off Base |
| **CLIENT:** | City of Peterborough | **GAUGE NO.:** | 5985 |
| **CONTRACTOR:** | Todd Brothers | **TECHNICIAN:** | AA |

| Test No. | Below Reference (m) | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. (kg/m$^3$) | Specified Degree of Compact. (%) | Wet Density (kg/m$^3$) | Dry Density (kg/m$^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2156 | 2065 | 4.4 | 97.3 | 100 | Pass |
| 2 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2155 | 2066 | 4.3 | 97.3 | 50 | Pass |
| 3 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2230 | 2136 | 4.4 | 100.0 | 50 | Pass |
| 4 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2137 | 2020 | 5.8 | 95.1 | 50 | Pass |
| 5 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2090 | 2010 | 4.0 | 94.7 | 50 | Pass |
| 6 | - | See Sketch | Native Blue Clay | L | 7.8 | 2123 | 95 | 2248 | 2162 | 4.0 | 100.0 | 50 | Pass |

* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks: Site requires better care when it comes to watering to ensure liner does not crack or dry out.




Project Name: Peterborough Landfill - Cell 4

Project #: 111-53296-14

Date: 30-Jun-22

Tech: AA

# FIELD COMPACTION TEST REPORT

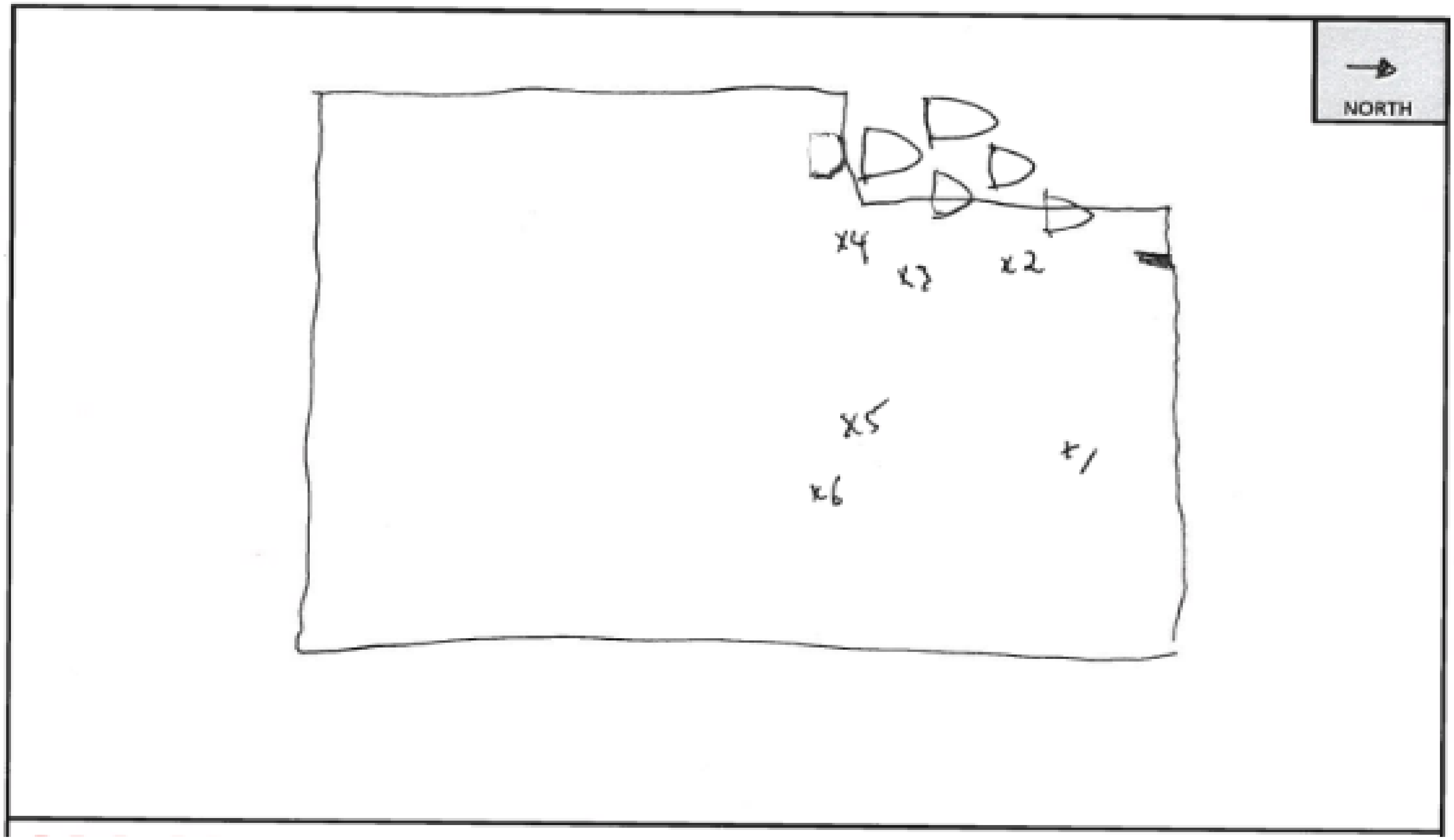
**PROJECT NAME:** Peterborough Landfill - Cell 4
**PROJECT NO.:** 111-53296-14
**PROJECT LOCATION:** Bensfort Road, Peterborough, ON
**CLIENT:** City of Peterborough
**CONTRACTOR:** Todd Brothers

**DATE AND TIME:** July 4, 2022 8:45 am to 5:20 pm
**WEATHER:** Cloudy 24°C
**REF. GRADE:** 20 cm Lift above Base & 30 cm 1st & 2nd Lift off Base
**GAUGE NO.:** 5985
**TECHNICIAN:** AA

| Test No. | Below Reference (m) | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. (kg/m$^3$) | Specified Degree of Compact. (%) | Wet Density (kg/m$^3$) | Dry Density (kg/m$^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2163 | 2088 | 3.6 | 95.5 | 50 | Pass |
| 2 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2005 | 1928 | 4.0 | 88.2 | 50 | Fail |
| 2R | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 1968 | 1894 | 3.9 | 86.6 | 50 | Fail |
| 3 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2050 | 1981 | 3.5 | 90.6 | 50 | Fail |
| 4 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2056 | 1985 | 3.6 | 90.7 | 50 | Fail |
| 5 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2044 | 1981 | 3.2 | 90.6 | 50 | Fail |
| 6 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2157 | 2096 | 2.9 | 95.8 | 50 | Pass |

* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks:




Project Name: Peterborough Landfill - Cell 4

Project #: 111-53296-14

Date: 04-Jul-22

Tech: AA

# FIELD COMPACTION TEST REPORT

**PROJECT NAME:** Peterborough Landfill - Cell 4
**PROJECT NO.:** 111-53296-14
**PROJECT LOCATION:** Bensfort Road, Peterborough, ON
**CLIENT:** City of Peterborough
**CONTRACTOR:** Todd Brothers

**DATE AND TIME:** July 7, 2022 6:18 am to 5:20 pm
**WEATHER:** Sunny 19°C
**REF. GRADE:** 1st Lift of Slope & 2nd Lift
**GAUGE NO.:** 5985
**TECHNICIAN:** AA

| Test No. | Below Reference (m) | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. (kg/m$^3$) | Specified Degree of Compact. (%) | Wet Density (kg/m$^3$) | Dry Density (kg/m$^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Lift 1 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2190 | 2064 | 6.1 | 94.4 | 100 | Fail |
| 2 | Lift 1 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2199 | 2065 | 6.5 | 94.4 | 100 | Pass |
| 3 | Lift 1 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2232 | 2104 | 6.1 | 96.2 | 100 | Pass |
| 4 | Lift 1 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2279 | 2142 | 6.4 | 97.9 | 100 | Pass |
| 5 | Lift 1 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2229 | 2083 | 7.0 | 95.3 | 100 | Pass |
| 6 | Lift 1 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2157 | 2014 | 7.1 | 92.1 | 100 | Fail |
| 7 | Lift 1 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2089 | 1954 | 6.9 | 89.4 | 100 | Fail |
| 8 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 1928 | 1782 | 8.2 | 81.5 | 100 | Fail |
| 9 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2197 | 2034 | 8.0 | 93.0 | 100 | Fail |
| 10 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 913 | 788 | 15.8 | 36.1 | 100 | Fail |
| 11 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2100 | 1941 | 8.2 | 88.7 | 100 | Fail |
| 12 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2016 | 1881 | 7.2 | 86.0 | 100 | Fail |
| 13 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2121 | 1951 | 8.7 | 89.2 | 100 | Fail |
| 14 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 1869 | 1723 | 8.5 | 78.8 | 100 | Fail |
| | | | | | | | | | | | | | |
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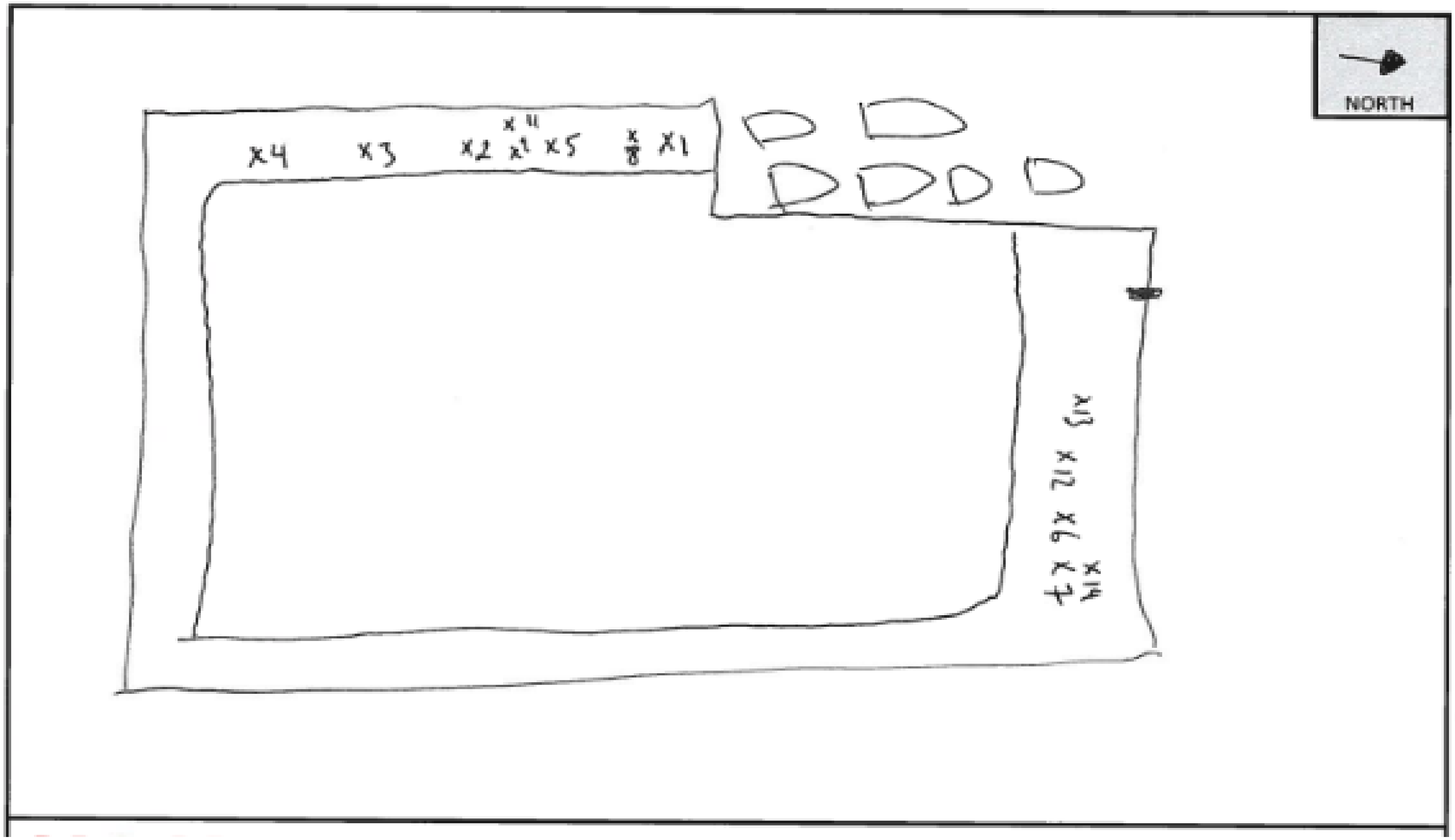
* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks: Location with high water content may be the area where water was exiting slope.
Next day will test after additional compaction.




Project Name: Peterborough Landfill - Cell 4

Project #: 111-53296-14

Date: 07-Jul-22

Tech: AA

# FIELD COMPACTION TEST REPORT

| | | | |
|---|---|---|---|
| **PROJECT NAME:** | Peterborough Landfill - Cell 4 | **DATE AND TIME:** | July 9, 2022 6:50 am to 3:15 pm |
| **PROJECT NO.:** | 111-53296-14 | **WEATHER:** | Sunny 11°C |
| **PROJECT LOCATION:** | Bensfort Road, Peterborough, ON | **REF. GRADE:** | 1st Lift of Slope & 2nd Lift |
| **CLIENT:** | City of Peterborough | **GAUGE NO.:** | 5985 |
| **CONTRACTOR:** | Todd Brothers | **TECHNICIAN:** | BW |

| Test No. | Below Reference (m) | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. (kg/m$^3$) | Specified Degree of Compact. (%) | Wet Density (kg/m$^3$) | Dry Density (kg/m$^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Lift 1 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2037 | 1929 | 5.6 | 88.2 | 50 | Fail |
| 2 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2095 | 1980 | 5.8 | 90.5 | 50 | Fail |
| 3 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2218 | 2100 | 5.6 | 96.0 | 100 | Pass |
| 4 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2241 | 2128 | 5.3 | 97.3 | 100 | Pass |
| 5 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2333 | 2216 | 5.3 | 100.0 | 100 | Pass |
| 6 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2242 | 2131 | 5.2 | 97.4 | 100 | Pass |
| 7 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2303 | 2187 | 5.3 | 100.0 | 100 | Pass |
| 8 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2226 | 2114 | 5.3 | 96.7 | 100 | Pass |
| 9 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2211 | 2102 | 5.2 | 96.1 | 100 | Pass |
| 10 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2231 | 2119 | 5.3 | 96.9 | 100 | Pass |
| 11 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2221 | 2109 | 5.3 | 96.4 | 100 | Pass |
| 12 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2291 | 2188 | 4.7 | 100.0 | 100 | Pass |
| 13 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2282 | 2163 | 5.5 | 98.9 | 100 | Pass |
| 14 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2327 | 2212 | 5.2 | 100.0 | 100 | Pass |
| 15 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2253 | 2136 | 5.5 | 97.6 | 100 | Pass |
| 16 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2295 | 2173 | 5.6 | 99.4 | 100 | Pass |
| 17 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2234 | 2106 | 6.1 | 96.3 | 100 | Pass |
| 18 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2282 | 2171 | 5.1 | 99.3 | 100 | Pass |
| 19 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2271 | 2155 | 5.4 | 98.5 | 100 | Pass |
| 20 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2271 | 2153 | 5.5 | 98.4 | 100 | Pass |
| 21 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2238 | 2135 | 4.8 | 97.6 | 50 | Pass |

* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks: Tests 1 and 2 were recompacted and retested as Test 28 and 29 and passed.

# FIELD COMPACTION TEST REPORT

| | | | |
|---|---|---|---|
| **PROJECT NAME:** | Peterborough Landfill - Cell 4 | **DATE AND TIME:** | July 9, 2022 6:50 am to 3:15 pm |
| **PROJECT NO.:** | 111-53296-14 | **WEATHER:** | Sunny 11°C |
| **PROJECT LOCATION:** | Bensfort Road, Peterborough, ON | **REF. GRADE:** | 2nd Lift of Slope & 3rd Lift |
| **CLIENT:** | City of Peterborough | **GAUGE NO.:** | 5985 |
| **CONTRACTOR:** | Todd Brothers | **TECHNICIAN:** | BW |

| Test No. | Below Reference (m) | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. (kg/m$^3$) | Specified Degree of Compact. (%) | Wet Density (kg/m$^3$) | Dry Density (kg/m$^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2233 | 2119 | 5.4 | 96.9 | 50 | Pass |
| 23 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2288 | 2165 | 5.7 | 99.0 | 50 | Pass |
| 24 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2254 | 2126 | 6.0 | 97.2 | 50 | Pass |
| 25 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2263 | 2133 | 6.1 | 97.5 | 50 | Pass |
| 26 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2219 | 2105 | 5.4 | 96.3 | 50 | Pass |
| 27 | Lift 2 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2224 | 2118 | 5.0 | 96.8 | 50 | Pass |
| 28 | Lift 1 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2241 | 2112 | 6.1 | 96.6 | 50 | Pass |
| 29 | Lift 1 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2216 | 2104 | 5.3 | 96.2 | 50 | Pass |
| 30 | Lift 1 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2221 | 2111 | 5.2 | 96.5 | 50 | Pass |
| 31 | Lift 1 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2206 | 2117 | 4.2 | 96.8 | 50 | Pass |
| 32 | Lift 1 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2219 | 2101 | 5.6 | 96.1 | 50 | Pass |
| 33 | Lift 1 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2228 | 2116 | 5.3 | 96.7 | 50 | Pass |
| 34 | Lift 1 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2231 | 2119 | 5.3 | 96.9 | 50 | Pass |
| 35 | 3rd Lift | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2291 | 2182 | 5.0 | 99.8 | 50 | Pass |
| 36 | 3rd Lift | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2284 | 2161 | 5.7 | 98.8 | 50 | Pass |
| 37 | 3rd Lift | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2178 | 2098 | 3.8 | 95.9 | 50 | Pass |
| 38 | 3rd Lift | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2199 | 2090 | 5.2 | 95.6 | 50 | Pass |
| 39 | 3rd Lift | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2231 | 2101 | 6.2 | 96.1 | 50 | Pass |
| 40 | 3rd Lift | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2266 | 2158 | 5.0 | 98.7 | 50 | Pass |
| 41 | 3rd Lift | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2289 | 2143 | 6.8 | 98.0 | 50 | Pass |
| 42 | 3rd Lift | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2268 | 2162 | 4.9 | 98.9 | 50 | Pass |

* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks:

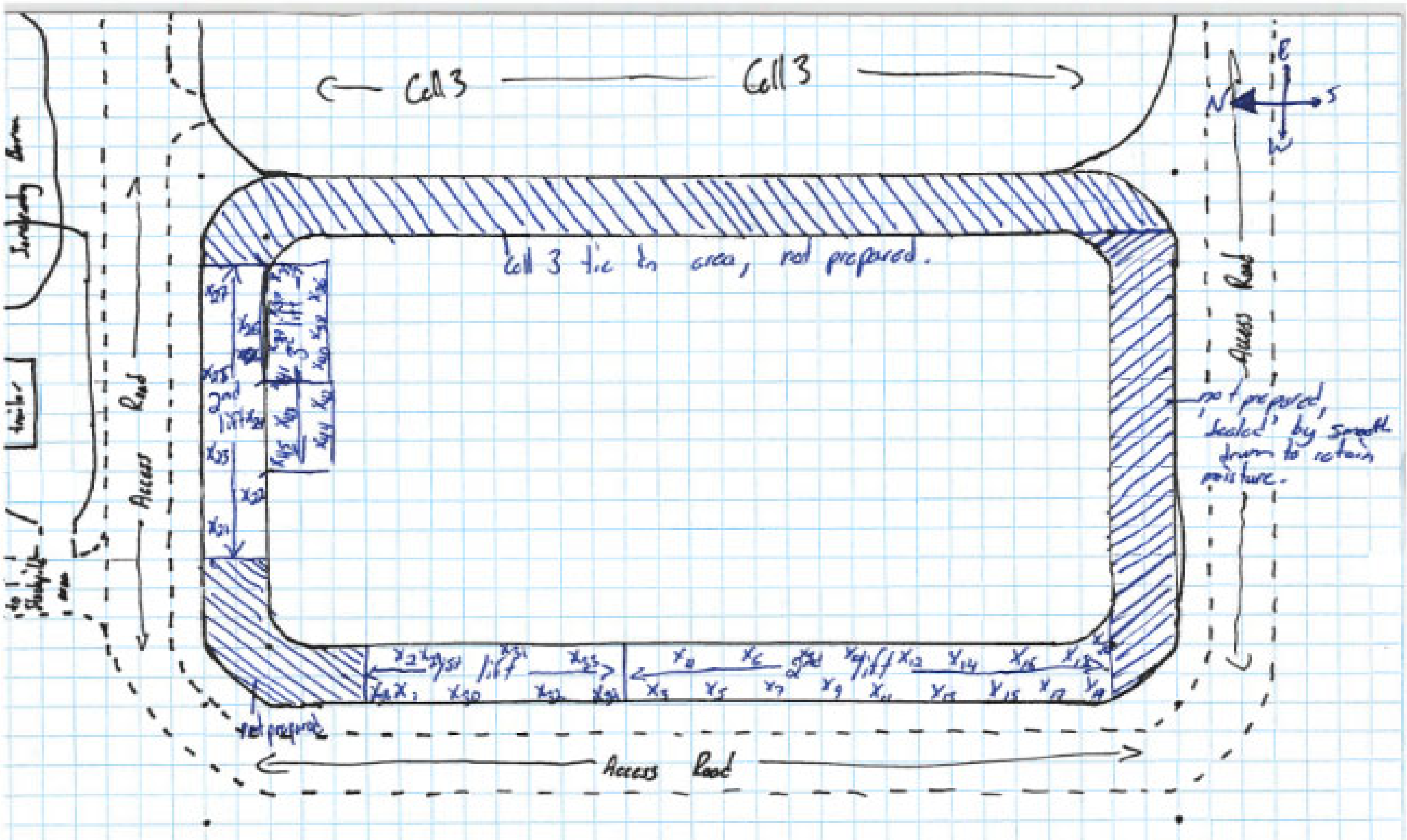
# FIELD COMPACTION TEST REPORT

| | | | |
|---|---|---|---|
| **PROJECT NAME:** | Peterborough Landfill - Cell 4 | **DATE AND TIME:** | July 9, 2022 6:50 am to 3:15 pm |
| **PROJECT NO.:** | 111-53296-14 | **WEATHER:** | Sunny 11°C |
| **PROJECT LOCATION:** | Bensfort Road, Peterborough, ON | **REF. GRADE:** | 3rd Lift of Cell Wall Slope |
| **CLIENT:** | City of Peterborough | **GAUGE NO.:** | 5985 |
| **CONTRACTOR:** | Todd Brothers | **TECHNICIAN:** | BW |

| Test No. | Below Reference (m) | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. ($kg/m^3$) | Specified Degree of Compact. (%) | Wet Density ($kg/m^3$) | Dry Density ($kg/m^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 43 | Lift 3 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2236 | 2103 | 6.3 | 96.2 | 50 | Pass |
| 44 | Lift 3 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2231 | 2093 | 6.6 | 95.7 | 50 | Pass |
| 45 | Lift 3 | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2294 | 2191 | 4.7 | 100.0 | 50 | Pass |

* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks:




Project Name: Peterborough Landfill - Cell 4

Project #: 111-53296-14

Date: 09-Jul-22

Tech: BW

# FIELD COMPACTION TEST REPORT

| | | | |
|---|---|---|---|
| **PROJECT NAME:** | Peterborough Landfill - Cell 4 | **DATE AND TIME:** | July 11, 2022 6:25 am to 5:15 pm |
| **PROJECT NO.:** | 111-53296-14 | **WEATHER:** | Sunny 16 - 29°C |
| **PROJECT LOCATION:** | Bensfort Road, Peterborough, ON | **REF. GRADE:** | See Sketch |
| **CLIENT:** | City of Peterborough | **GAUGE NO.:** | 5985 |
| **CONTRACTOR:** | Todd Brothers | **TECHNICIAN:** | AA |

| Test No. | Below Reference (m) | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. (kg/m$^3$) | Specified Degree of Compact. (%) | Wet Density (kg/m$^3$) | Dry Density (kg/m$^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Lift 1 | 1 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2366 | 2271 | 4.2 | 100.0 | 100 | Pass |
| 2 | Lift 1 | 2 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2274 | 2178 | 4.4 | 99.6 | 100 | Pass |
| 3 | Lift 1 | 3 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2301 | 2206 | 4.3 | 100.0 | 100 | Pass |
| 4 | Lift 1 | 4 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2151 | 2062 | 4.3 | 94.3 | 100 | Fail |
| 5 | Lift 1 | 5 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2286 | 2194 | 4.2 | 100.0 | 100 | Pass |
| 6 | Lift 1 | 6 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2249 | 2130 | 5.6 | 97.4 | 100 | Pass |
| 7 | Lift 1 | 7 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2257 | 2160 | 4.5 | 98.8 | 100 | Pass |
| 8 | Lift 1 | 8 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2346 | 2262 | 3.7 | 100.0 | 100 | Pass |
| 9 | Lift 1 | 9 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2355 | 2234 | 5.4 | 100.0 | 100 | Pass |
| 10 | Lift 1 | 10 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2344 | 2237 | 4.8 | 100.0 | 100 | Pass |
| 11 | Lift 4 | 11 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2229 | 2091 | 6.6 | 95.6 | 100 | Pass |
| 12 | Lift 4 | 12 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2251 | 2108 | 6.8 | 96.4 | 100 | Pass |
| 13 | Lift 4 | 13 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2281 | 2116 | 7.8 | 96.8 | 100 | Pass |
| 14 | Lift 4 | 14 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2198 | 2052 | 7.1 | 93.8 | 100 | Fail |
| 15 | Lift 4 | 15 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2237 | 2114 | 5.8 | 96.7 | 100 | Pass |
| 16 | Lift 4 | 16 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2286 | 2148 | 6.4 | 98.2 | 100 | Pass |
| 17 | Lift 4 | 17 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2191 | 2044 | 7.2 | 93.5 | 100 | Fail |
| 18 | Lift 4 | 17R | Native Blue Clay | L | 7.3 | 2187 | 95 | 2210 | 2065 | 7.0 | 94.4 | 100 | Pass |
| 19 | Lift 5 | 18 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2093 | 1951 | 7.3 | 89.2 | 100 | Fail |
| 20 | Lift 5 | 19 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2227 | 2075 | 7.3 | 94.9 | 100 | Pass |
| 21 | Lift 5 | 20 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2299 | 2141 | 7.4 | 97.9 | 100 | Pass |

* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks: Areas where compaction failed met moisture. Todd Brothers should go over with compactor again.

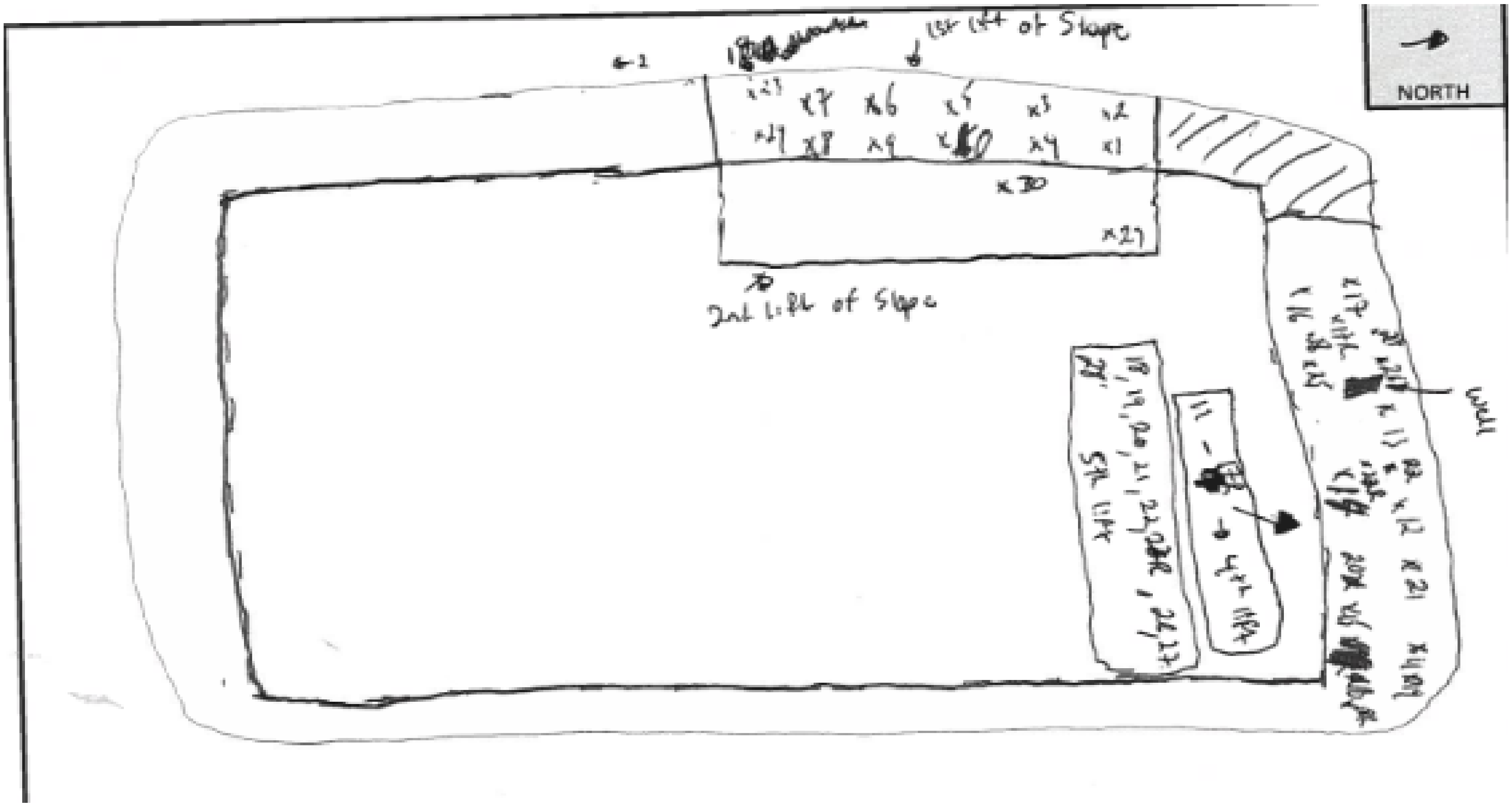
# FIELD COMPACTION TEST REPORT

| | | | |
|---|---|---|---|
| **PROJECT NAME:** | Peterborough Landfill - Cell 4 | **DATE AND TIME:** | July 11, 2022 6:25 am to 5:15 pm |
| **PROJECT NO.:** | 111-53296-14 | **WEATHER:** | Sunny 16 - 29°C |
| **PROJECT LOCATION:** | Bensfort Road, Peterborough, ON | **REF. GRADE:** | See Sketch |
| **CLIENT:** | City of Peterborough | **GAUGE NO.:** | 5985 |
| **CONTRACTOR:** | Todd Brothers | **TECHNICIAN:** | AA |

| Test No. | Below Reference (m) | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. ($kg/m^3$) | Specified Degree of Compact. (%) | Wet Density ($kg/m^3$) | Dry Density ($kg/m^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22 | Lift 5 | 21 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2288 | 2150 | 6.4 | 98.3 | 100 | Pass |
| 23 | Lift 5 | 22 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2098 | 1959 | 7.1 | 89.6 | 100 | Fail |
| 24 | Lift 5 | 22R | Native Blue Clay | L | 7.3 | 2187 | 95 | 2211 | 2088 | 5.9 | 95.5 | 100 | Pass |
| 25 | Lift 5 | 18R | Native Blue Clay | L | 7.3 | 2187 | 95 | 2248 | 2115 | 6.3 | 96.7 | 100 | Pass |
| 26 | Moisture | 23 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2165 | 2074 | 4.4 | 94.8 | 100 | Pass |
| 27 | Moisture | 24 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2296 | 2178 | 5.4 | 99.6 | 100 | Pass |
| 28 | Lift 5 | 25 | Native Blue Clay | L | 7.3 | 2187 | 95 | 1947 | 1837 | 6.0 | 84.0 | 100 | Fail |
| 29 | Lift 5 | 26 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2049 | 1937 | 5.8 | 88.6 | 100 | Fail |
| 30 | Lift 5 | 27 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2162 | 2034 | 6.3 | 93.0 | 100 | Fail |
| 31 | Lift 5 | 28 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2058 | 1953 | 5.4 | 89.3 | 100 | Fail |
| 32 | Lift 2 | 29 | Native Blue Clay | L | 7.3 | 2187 | 95 | 1951 | 1851 | 5.4 | 84.6 | 100 | Fail |
| 33 | Lift 2 | 30 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2099 | 1960 | 7.1 | 89.6 | 100 | Fail |

* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks: Areas where compaction failed met moisture. Todd Brothers should go over with compactor again.




Project Name: Peterborough Landfill - Cell 4
Project #: 111-53296-14

Date: 11-Jul-22
Tech: AA

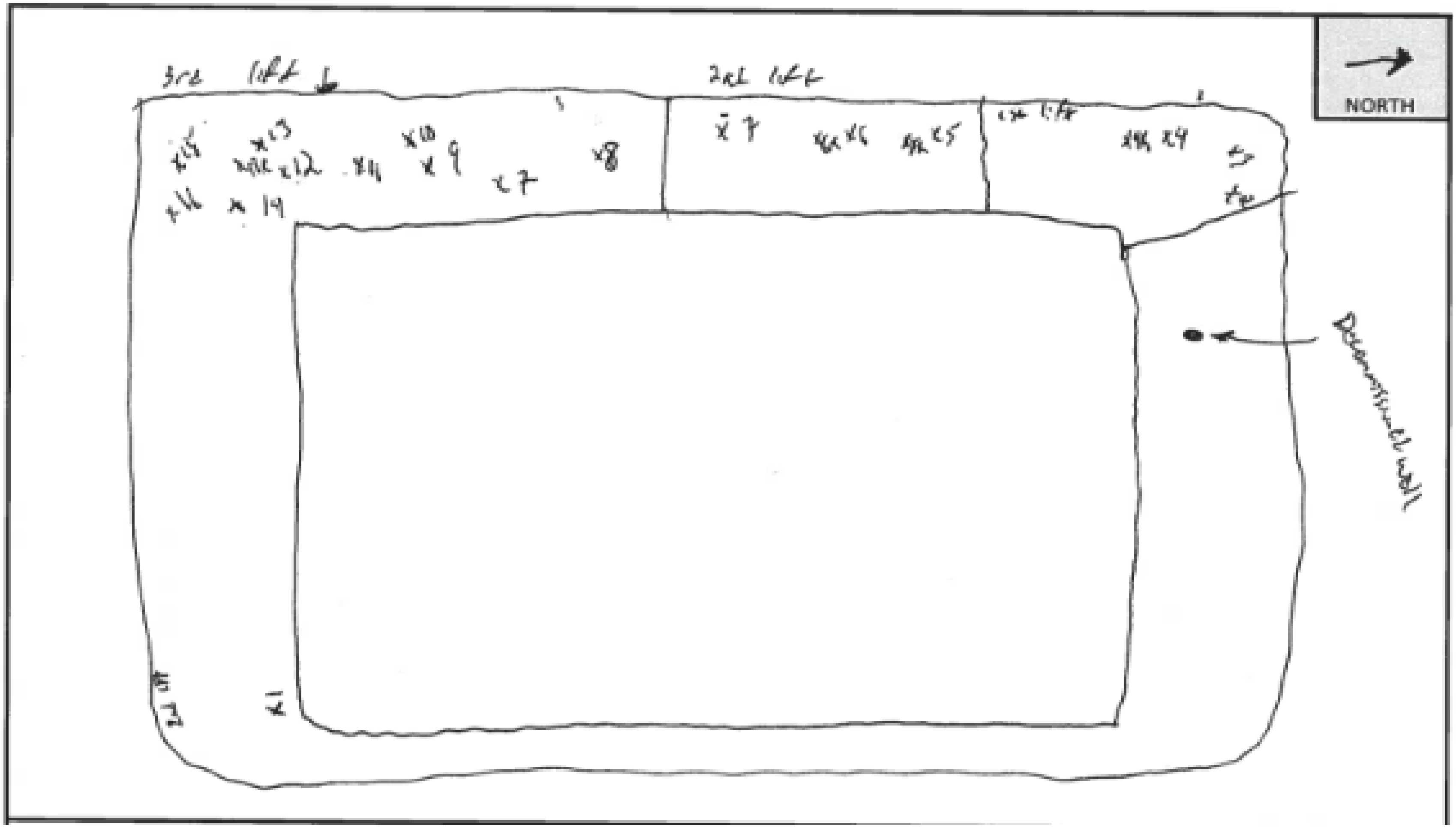
# FIELD COMPACTION TEST REPORT

| | | | |
|---|---|---|---|
| **PROJECT NAME:** | Peterborough Landfill - Cell 4 | **DATE AND TIME:** | July 13, 2022 6:15 am to 1:25 pm |
| **PROJECT NO.:** | 111-53296-14 | **WEATHER:** | Sun and Cloud 15 - 22°C |
| **PROJECT LOCATION:** | Bensfort Road, Peterborough, ON | **REF. GRADE:** | 1st Lift of Slope & 2nd Lift |
| **CLIENT:** | City of Peterborough | **GAUGE NO.:** | 5985 |
| **CONTRACTOR:** | Todd Brothers | **TECHNICIAN:** | AA |

| Test No. | Below Reference (m) | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. ($kg/m^3$) | Specified Degree of Compact. (%) | Wet Density ($kg/m^3$) | Dry Density ($kg/m^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | 1 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2057 | 1935 | 6.3 | 88.5 | 100 | Fail |
| 2 | - | 2 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2250 | 2103 | 7.0 | 96.2 | 100 | Pass |
| 3 | - | 3 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2220 | 2079 | 6.8 | 95.0 | 100 | Pass |
| 4 | - | 4 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2149 | 2014 | 6.7 | 92.1 | 100 | Fail |
| 5 | - | 4R | Native Blue Clay | L | 7.3 | 2187 | 95 | 2300 | 2166 | 6.2 | 99.0 | 100 | Pass |
| 6 | - | 5 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2040 | 1908 | 6.9 | 87.3 | 100 | Fail |
| 7 | - | 5R | Native Blue Clay | L | 7.3 | 2187 | 95 | 2146 | 2019 | 6.3 | 92.3 | 100 | Fail |
| 8 | - | 6 | Native Blue Clay | L | 7.3 | 2187 | 95 | 1974 | 1871 | 5.5 | 85.6 | 100 | Fail |
| 9 | - | 6R | Native Blue Clay | L | 7.3 | 2187 | 95 | 2120 | 2006 | 5.7 | 91.7 | 100 | Fail |
| 10 | - | 7 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2218 | 2106 | 5.3 | 96.3 | 100 | Pass |
| 11 | - | 8 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2005 | 1877 | 6.8 | 85.8 | 100 | Fail |
| 12 | - | 9 | Native Blue Clay | L | 7.3 | 2187 | 95 | 1973 | 1853 | 6.5 | 84.7 | 100 | Fail |
| 13 | - | 10 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2222 | 2090 | 6.3 | 95.6 | 100 | Pass |
| 14 | - | 11 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2224 | 2106 | 5.6 | 96.3 | 100 | Pass |
| 15 | - | 12 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2229 | 2117 | 5.3 | 96.8 | 100 | Pass |
| 16 | - | 13 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2002 | 1883 | 6.3 | 86.1 | 100 | Fail |
| 17 | - | 13R | Native Blue Clay | L | 7.3 | 2187 | 95 | 2180 | 2051 | 6.3 | 93.8 | 100 | Fail |
| 18 | - | 14 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2226 | 2100 | 6.0 | 96.0 | 100 | Pass |
| 19 | - | 15 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2184 | 2045 | 6.8 | 93.5 | 100 | Fail |
| 20 | - | 16 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2294 | 2187 | 4.9 | 100.0 | 100 | Pass |
| | | | | | | | | | | | | | |

* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks:




Project Name: Peterborough Landfill - Cell 4

Project #: 111-53296-14

Date: 13-Jul-22

Tech: AA

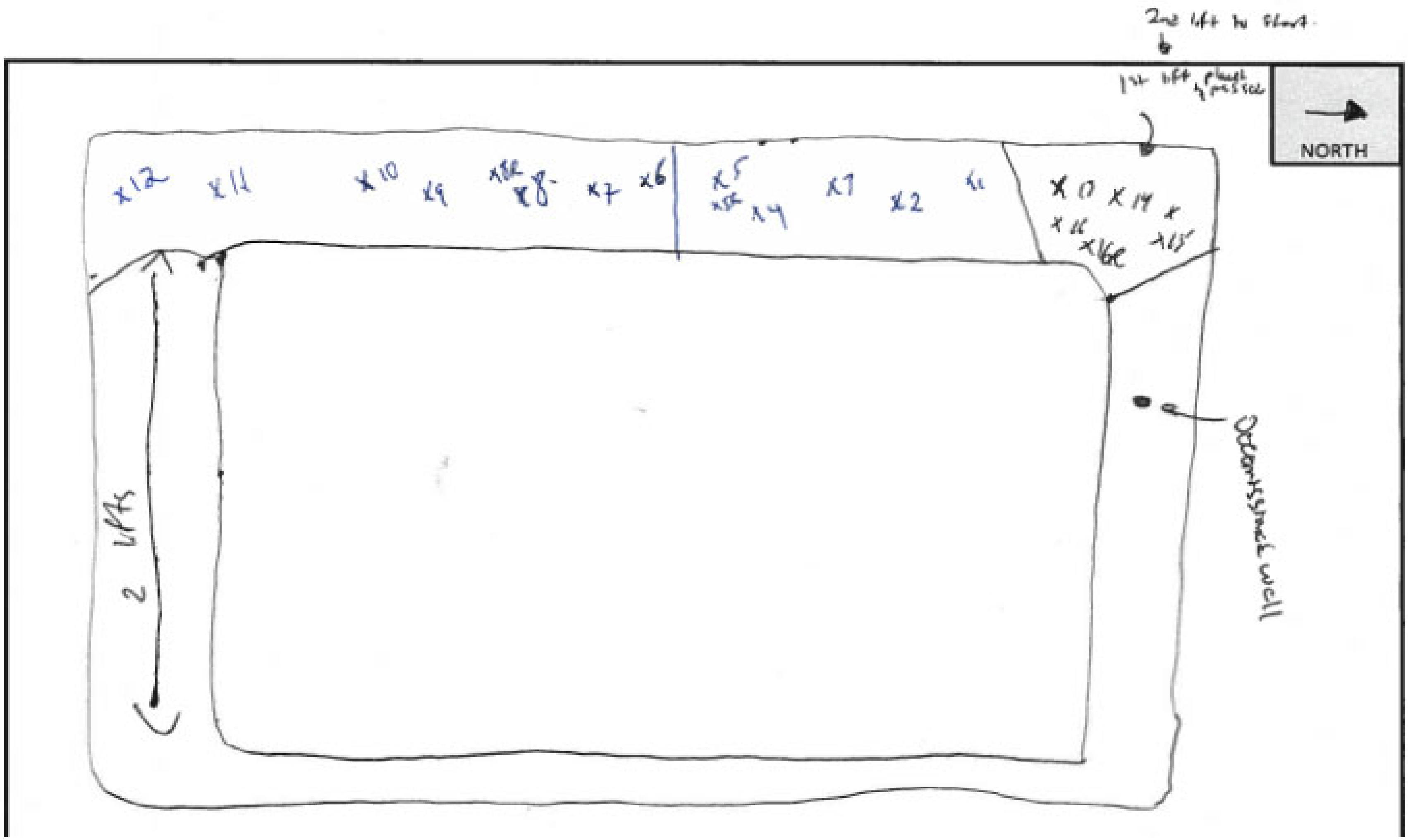
# FIELD COMPACTION TEST REPORT

| | | | |
|---|---|---|---|
| **PROJECT NAME:** | Peterborough Landfill - Cell 4 | **DATE AND TIME:** | July 14, 2022 6:05 am to 4:30 pm |
| **PROJECT NO.:** | 111-53296-14 | **WEATHER:** | Sunny 13 - 27°C |
| **PROJECT LOCATION:** | Bensfort Road, Peterborough, ON | **REF. GRADE:** | See Sketch |
| **CLIENT:** | City of Peterborough | **GAUGE NO.:** | 5985 |
| **CONTRACTOR:** | Todd Brothers | **TECHNICIAN:** | AA |

| Test No. | Below Reference (m) | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. (kg/m$^3$) | Specified Degree of Compact. (%) | Wet Density (kg/m$^3$) | Dry Density (kg/m$^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | 1 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2326 | 2186 | 6.4 | 100.0 | 100 | Pass |
| 2 | - | 2 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2267 | 2133 | 6.3 | 97.5 | 100 | Pass |
| 3 | - | 3 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2251 | 2118 | 6.3 | 96.8 | 100 | Pass |
| 4 | - | 4 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2195 | 2067 | 6.2 | 94.5 | 100 | Pass |
| 5 | - | 5 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2118 | 1987 | 6.6 | 90.8 | 100 | Fail |
| 6 | - | 5R | Native Blue Clay | L | 7.3 | 2187 | 95 | 2267 | 2137 | 6.1 | 97.7 | 100 | Pass |
| 7 | - | 6 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2320 | 2164 | 7.2 | 99.0 | 100 | Pass |
| 8 | - | 7 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2358 | 2229 | 5.8 | 100.0 | 100 | Pass |
| 9 | - | 8 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2201 | 2049 | 7.4 | 93.7 | 100 | Fail |
| 10 | - | 8R | Native Blue Clay | L | 7.3 | 2187 | 95 | 2275 | 2134 | 6.6 | 97.6 | 100 | Pass |
| 11 | - | 9 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2292 | 2138 | 7.2 | 97.8 | 100 | Pass |
| 12 | - | 10 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2224 | 2102 | 5.8 | 96.1 | 100 | Pass |
| 13 | - | 11 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2293 | 2171 | 5.6 | 99.3 | 100 | Pass |
| 14 | - | 12 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2179 | 2071 | 5.2 | 94.7 | 100 | Pass |
| 15 | - | 13 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2147 | 2008 | 6.9 | 91.8 | 100 | Fail |
| 16 | - | 14 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2203 | 2080 | 5.9 | 95.1 | 100 | Pass |
| 17 | - | 15 | Native Blue Clay | L | 7.3 | 2187 | 95 | 1988 | 1868 | 6.4 | 85.4 | 100 | Fail |
| 18 | - | 15R | Native Blue Clay | L | 7.3 | 2187 | 95 | 2088 | 1985 | 5.2 | 90.8 | 100 | Fail |
| 19 | - | 16 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2042 | 1912 | 6.8 | 87.4 | 100 | Fail |
| 20 | - | 16R | Native Blue Clay | L | 7.3 | 2187 | 95 | 2188 | 2064 | 6.0 | 94.4 | 100 | Fail |
| | | | | | | | | | | | | | |

* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks: Progress being made. Operator who compacted liner this morning did a very good job.




Project Name: Peterborough Landfill - Cell 4

Project #: 111-53296-14

Date: 14-Jul-22

Tech: AA

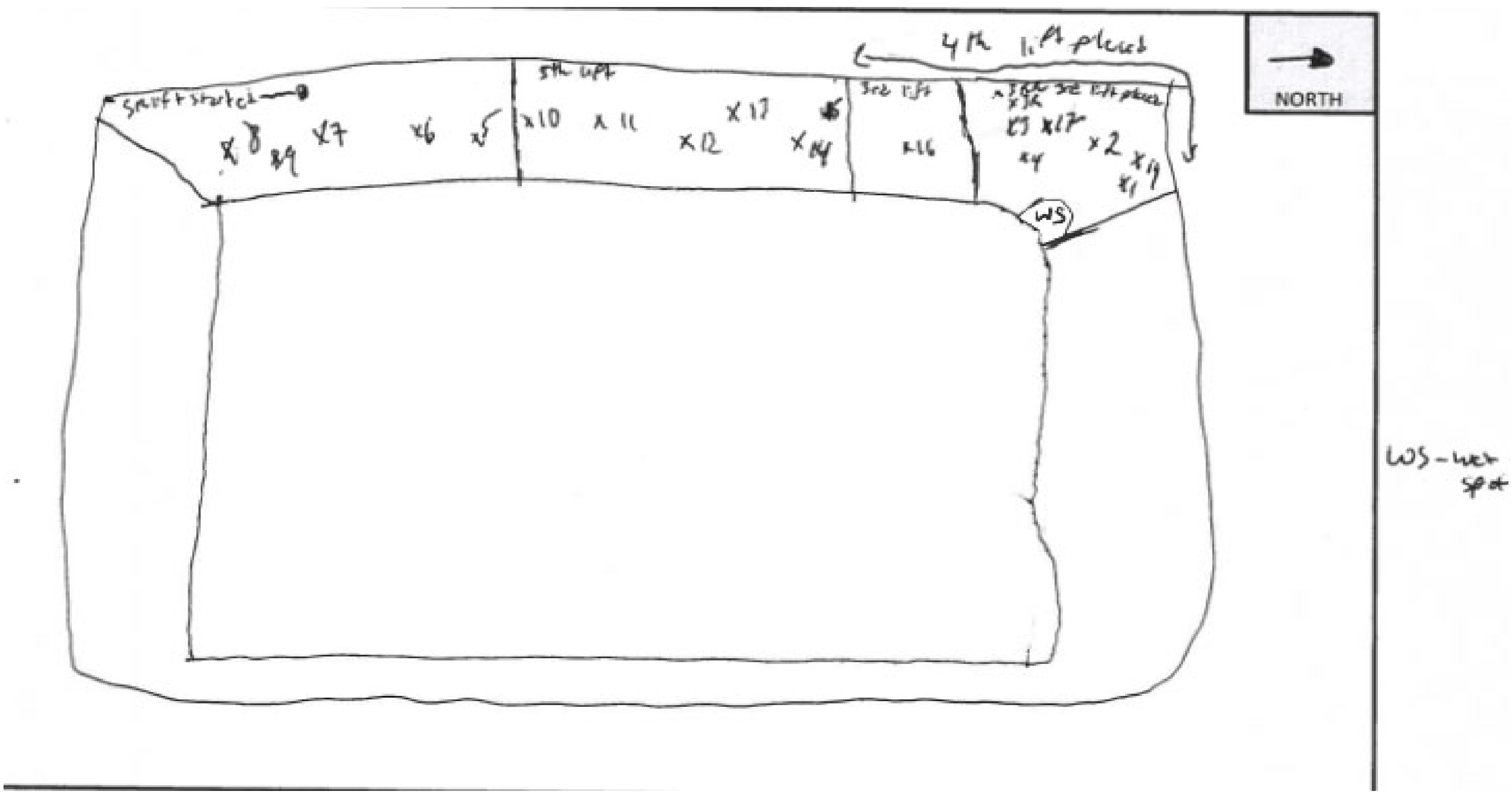
# FIELD COMPACTION TEST REPORT

| | | | |
|---|---|---|---|
| **PROJECT NAME:** | Peterborough Landfill - Cell 4 | **DATE AND TIME:** | July 21, 2022 7:35 am to 5:00 pm |
| **PROJECT NO.:** | 111-53296-14 | **WEATHER:** | Sunny/Cloudy/Sprinkling 24 - 27°C |
| **PROJECT LOCATION:** | Bensfort Road, Peterborough, ON | **REF. GRADE:** | See Sketch |
| **CLIENT:** | City of Peterborough | **GAUGE NO.:** | 5985 |
| **CONTRACTOR:** | Todd Brothers | **TECHNICIAN:** | AA |

| Test No. | Below Reference (m) | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. (kg/m$^3$) | Specified Degree of Compact. (%) | Wet Density (kg/m$^3$) | Dry Density (kg/m$^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | 1 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2316 | 2191 | 5.7 | 100.0 | 100 | Pass |
| 2 | - | 2 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2287 | 2162 | 5.8 | 98.8 | 100 | Pass |
| 3 | - | 3 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2152 | 2034 | 5.8 | 93.0 | 100 | Fail |
| 4 | - | 3R | Native Blue Clay | L | 7.3 | 2187 | 95 | 2062 | 1940 | 6.3 | 88.7 | 100 | Fail |
| 5 | - | 3RR | Native Blue Clay | L | 7.3 | 2187 | 95 | 2024 | 1897 | 6.7 | 86.7 | 100 | Fail |
| 6 | - | 4 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2252 | 2115 | 6.5 | 96.7 | 100 | Pass |
| 7 | - | 5 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2166 | 2034 | 6.5 | 93.0 | 100 | Fail |
| 8 | - | 6 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2149 | 2025 | 6.1 | 92.6 | 100 | Fail |
| 9 | - | 7 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2260 | 2126 | 6.3 | 97.2 | 100 | Pass |
| 10 | - | 8 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2173 | 2035 | 6.8 | 93.0 | 100 | Fail |
| 11 | - | 9 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2355 | 2222 | 6.0 | 100.0 | 100 | Pass |
| 12 | - | 10 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2329 | 2177 | 7.0 | 99.5 | 100 | Pass |
| 13 | - | 11 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2328 | 2148 | 8.4 | 98.2 | 100 | Pass |
| 14 | - | 12 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2286 | 2132 | 7.2 | 97.5 | 100 | Pass |
| 15 | - | 13 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2317 | 2186 | 6.0 | 99.9 | 100 | Pass |
| 16 | - | 14 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2314 | 2157 | 7.3 | 98.6 | 100 | Pass |
| 17 | - | 15 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2347 | 2167 | 8.3 | 99.1 | 100 | Pass |
| 18 | - | 16 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2296 | 2156 | 6.5 | 98.6 | 100 | Pass |
| 19 | - | 17 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2418 | 2268 | 6.6 | 100.0 | 100 | Pass |
| 20 | - | 18 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2418 | 2288 | 5.7 | 100.0 | 100 | Pass |
| | | | | | | | | | | | | | |

* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks:




Project Name: Peterborough Landfill - Cell 4

Project #: 111-53296-14

Date: 21-Jul-22

Tech: AA

# FIELD COMPACTION TEST REPORT

**PROJECT NAME:** Peterborough Landfill - Cell 4
**PROJECT NO.:** 111-53296-14
**PROJECT LOCATION:** Bensfort Road, Peterborough, ON
**CLIENT:** City of Peterborough
**CONTRACTOR:** Todd Brothers

**DATE AND TIME:** July 23, 2022 7:10 am to 3:50 pm
**WEATHER:** Sunny 27 - 31°C
**REF. GRADE:** See Sketch
**GAUGE NO.:** 5985
**TECHNICIAN:** AA

| Test No. | Below Reference (m) | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. (kg/m$^3$) | Specified Degree of Compact. (%) | Wet Density (kg/m$^3$) | Dry Density (kg/m$^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2360 | 2204 | 7.1 | 100.0 | 100 | Pass |
| 2 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2374 | 2219 | 7.0 | 100.0 | 100 | Pass |
| 3 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2307 | 2158 | 6.9 | 98.7 | 100 | Pass |
| 4 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2388 | 2249 | 6.2 | 100.0 | 100 | Pass |
| 5 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2340 | 2185 | 7.1 | 99.9 | 100 | Pass |
| 6 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2281 | 2144 | 6.4 | 98.0 | 100 | Pass |
| 7 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2383 | 2229 | 6.9 | 100.0 | 100 | Pass |
| 8 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2359 | 2186 | 7.9 | 100.0 | 100 | Pass |
| 9 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2408 | 2265 | 6.3 | 100.0 | 100 | Pass |
| 10 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2351 | 2197 | 7.0 | 100.0 | 100 | Pass |
| 11 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2227 | 2095 | 6.3 | 95.8 | 100 | Pass |
| 12 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2341 | 2217 | 5.6 | 100.0 | 100 | Pass |
| 13 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2383 | 2242 | 6.3 | 100.0 | 100 | Pass |
| 14 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2294 | 2162 | 6.1 | 98.9 | 100 | Pass |
| 15 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2346 | 2230 | 5.2 | 100.0 | 100 | Pass |
| 16 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2372 | 2238 | 6.0 | 100.0 | 100 | Pass |
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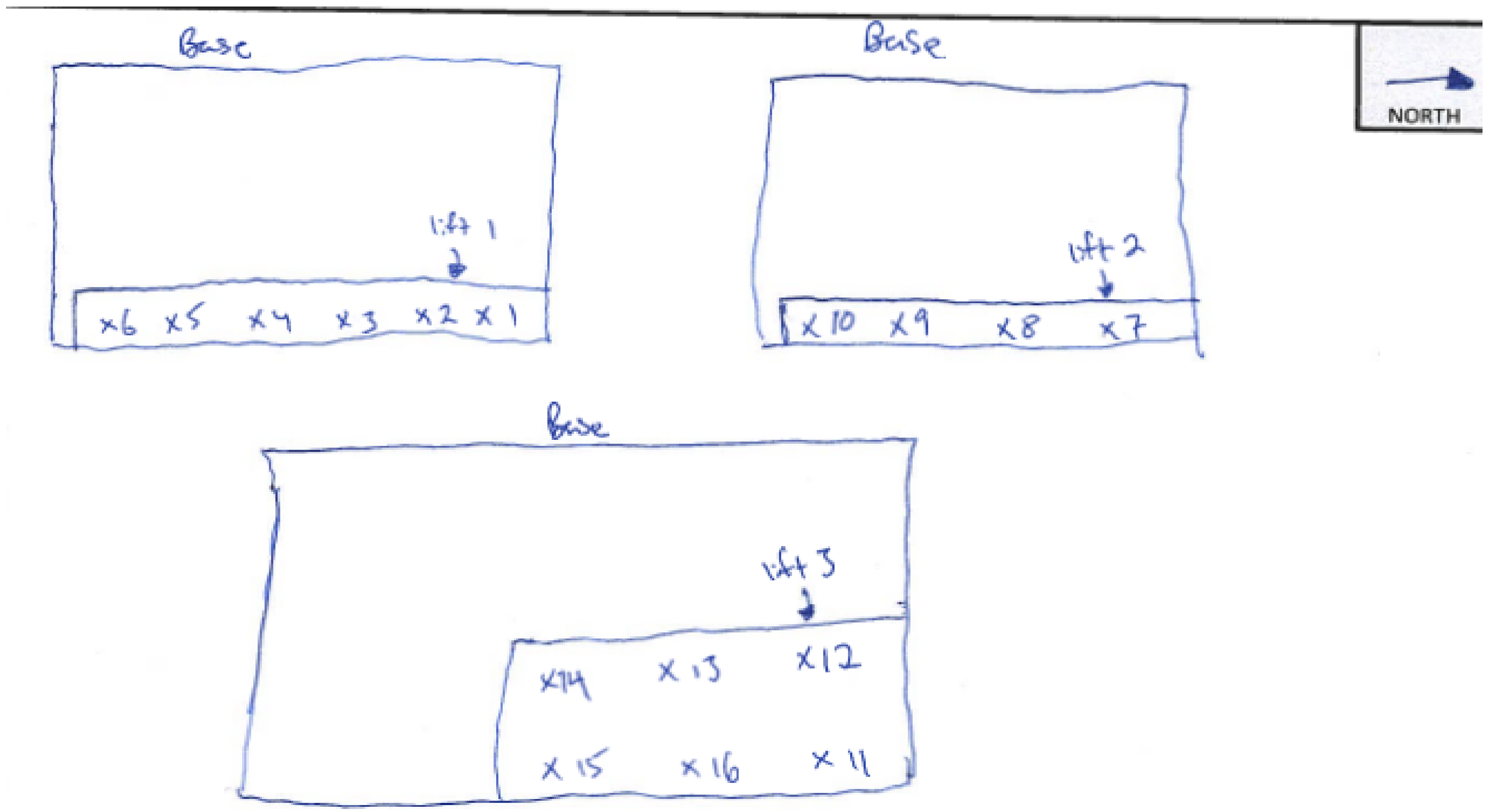
* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks:




wsp

Project Name: Peterborough Landfill - Cell 4
Project #: 111-53296-14

Date: 23-Jul-22
Tech: AA

# FIELD COMPACTION TEST REPORT

| | | | |
|---|---|---|---|
| **PROJECT NAME:** | Peterborough Landfill - Cell 4 | **DATE AND TIME:** | July 27, 2022 7:05 am to 5:00 pm |
| **PROJECT NO.:** | 111-53296-14 | **WEATHER:** | Sun and Cloud 14 - 27°C |
| **PROJECT LOCATION:** | Bensfort Road, Peterborough, ON | **REF. GRADE:** | See Sketch |
| **CLIENT:** | City of Peterborough | **GAUGE NO.:** | 5985 |
| **CONTRACTOR:** | Todd Brothers | **TECHNICIAN:** | AA |

| Test No. | Below Reference (m) | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. (kg/m$^3$) | Specified Degree of Compact. (%) | Wet Density (kg/m$^3$) | Dry Density (kg/m$^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2358 | 2220 | 6.2 | 100.0 | 100 | Pass |
| 2 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2296 | 2172 | 5.7 | 99.3 | 100 | Pass |
| 3 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2325 | 2193 | 6.0 | 100.0 | 100 | Pass |
| 4 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2353 | 2214 | 6.3 | 100.0 | 100 | Pass |
| 5 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2382 | 2249 | 5.9 | 100.0 | 100 | Pass |
| 6 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2374 | 2244 | 5.8 | 100.0 | 100 | Pass |
| 7 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2366 | 2215 | 6.8 | 100.0 | 100 | Pass |
| 8 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2358 | 2235 | 5.5 | 100.0 | 100 | Pass |
| 9 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2326 | 2184 | 6.5 | 99.9 | 100 | Pass |
| 10 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2401 | 2272 | 5.7 | 100.0 | 100 | Pass |
| 11 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2287 | 2151 | 6.3 | 98.4 | 100 | Pass |
| 12 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2377 | 2238 | 6.2 | 100.0 | 100 | Pass |
| 13 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2391 | 2245 | 6.5 | 100.0 | 100 | Pass |
| 14 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2296 | 2146 | 7 | 98.1 | 100 | Pass |
| 15 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2410 | 2280 | 5.7 | 100.0 | 100 | Pass |
| 16 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2340 | 2183 | 7.2 | 99.8 | 100 | Pass |
| 17 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2259 | 2131 | 6.0 | 97.4 | 100 | Pass |
| 18 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2332 | 2181 | 6.9 | 99.7 | 100 | Pass |
| 19 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2329 | 2177 | 7.0 | 99.5 | 100 | Pass |
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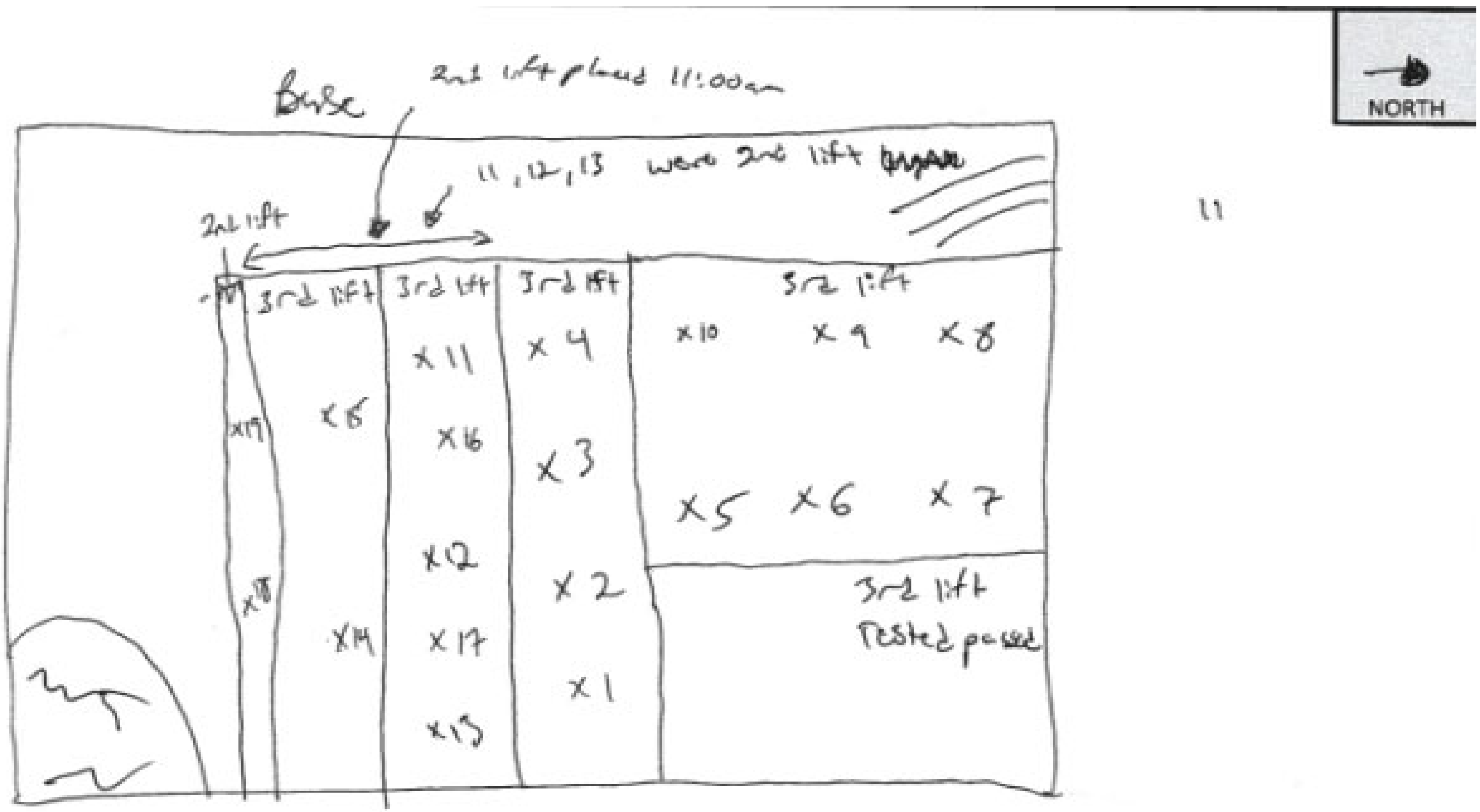
* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks:




Project Name: Peterborough Landfill - Cell 4

Project #: 111-53296-14

Date: 27-Jul-22

Tech: AA

# FIELD COMPACTION TEST REPORT

| | | | |
|---|---|---|---|
| **PROJECT NAME:** | Peterborough Landfill - Cell 4 | **DATE AND TIME:** | July 28, 2022 7:05 am to 4:00 pm |
| **PROJECT NO.:** | 111-53296-14 | **WEATHER:** | Sunny/Cloudy/Sprinkling 16 - 27°C |
| **PROJECT LOCATION:** | Bensfort Road, Peterborough, ON | **REF. GRADE:** | See Sketch |
| **CLIENT:** | City of Peterborough | **GAUGE NO.:** | 5985 |
| **CONTRACTOR:** | Todd Brothers | **TECHNICIAN:** | AA |

| Test No. | Below Reference (m) | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. ($kg/m^3$) | Specified Degree of Compact. (%) | Wet Density ($kg/m^3$) | Dry Density ($kg/m^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | See Sketch | Native Blue Clay | L | 7.3 | 2187 | 95 | 2358 | 2241 | 5.2 | 100.0 | 100 | Pass |
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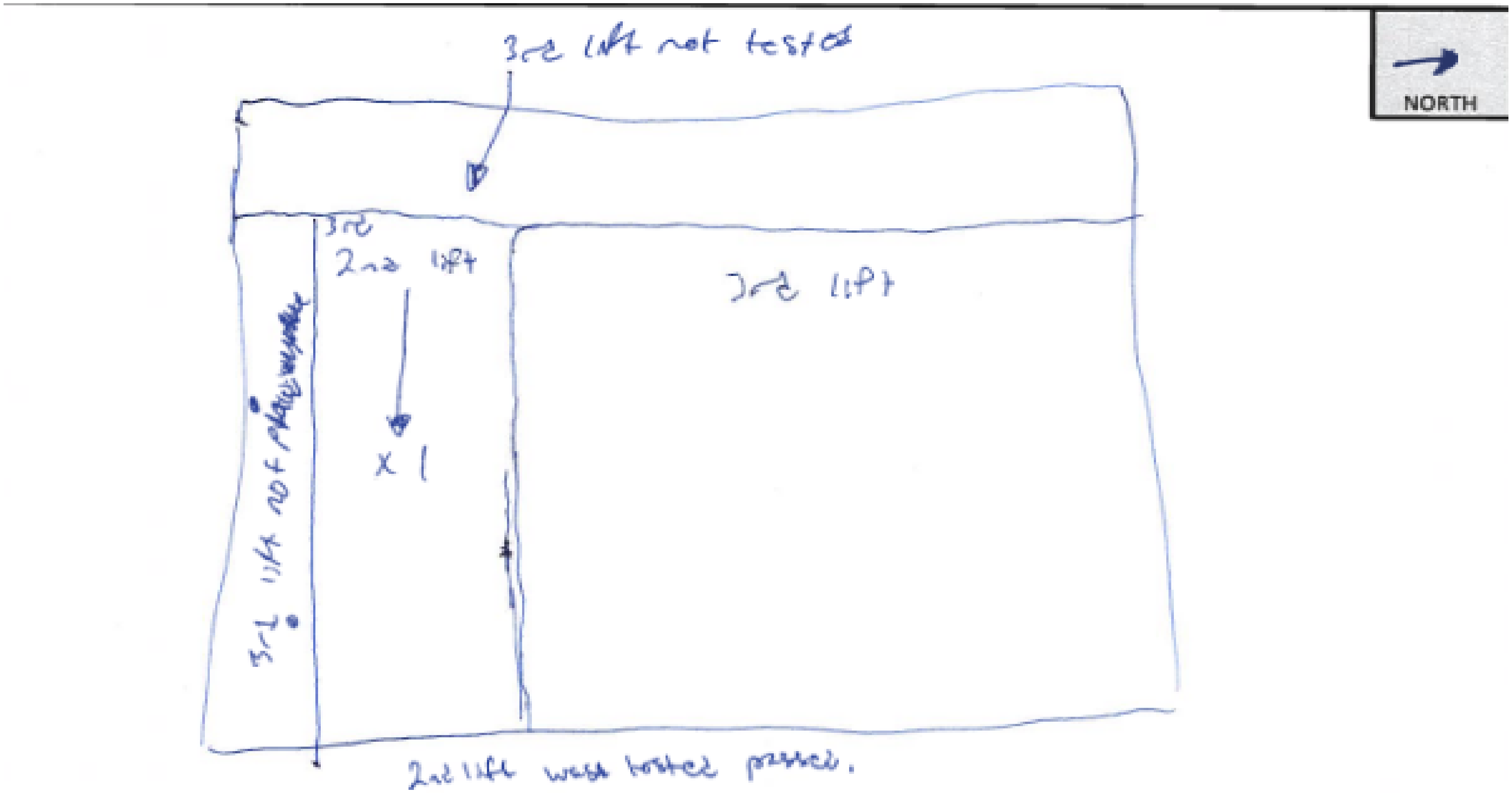
* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks:




Project Name: Peterborough Landfill - Cell 4
Project #: 111-53296-14
Date: 28-Jul-22
Tech: AA

# FIELD COMPACTION TEST REPORT

| | | | |
|---|---|---|---|
| **PROJECT NAME:** | Peterborough Landfill - Cell 4 | **DATE AND TIME:** | August 2, 2022 7:45 am to 1:45 pm |
| **PROJECT NO.:** | 111-53296-14 | **WEATHER:** | Sunny and Cloudy 18 - 24°C |
| **PROJECT LOCATION:** | Bensfort Road, Peterborough, ON | **REF. GRADE:** | See Sketch |
| **CLIENT:** | City of Peterborough | **GAUGE NO.:** | 5985 |
| **CONTRACTOR:** | Todd Brothers | **TECHNICIAN:** | AA |

| Test No. | Below Reference (m) | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. (kg/m$^3$) | Specified Degree of Compact. (%) | Wet Density (kg/m$^3$) | Dry Density (kg/m$^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | 1 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2284 | 2135 | 7.0 | 97.6 | 100 | Pass |
| 2 | - | 2 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2382 | 2258 | 5.5 | 100.0 | 100 | Pass |
| 3 | - | 3 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2129 | 1990 | 7.0 | 91.0 | 100 | Fail |
| 4 | - | 3R | Native Blue Clay | L | 7.3 | 2187 | 95 | 2326 | 2192 | 6.1 | 100.0 | 100 | Pass |
| 5 | - | 4 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2169 | 2086 | 4.0 | 95.4 | 100 | Pass |
| 6 | - | 5 | Native Blue Clay | L | 7.3 | 2187 | 95 | 2288 | 2167 | 5.6 | 99.1 | 100 | Pass |
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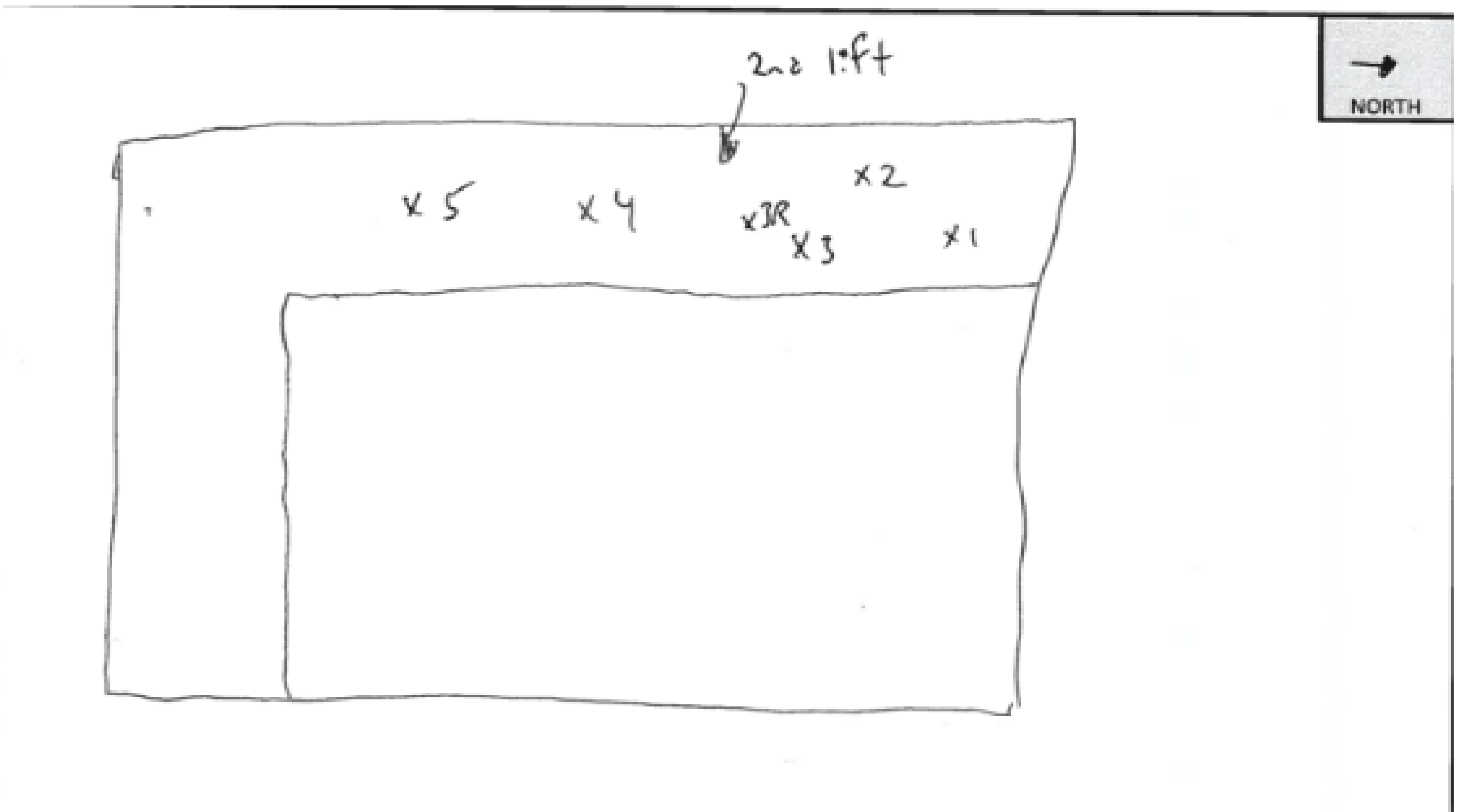
* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks:




Project Name: Peterborough Landfill - Cell 4
Project #: 111-53296-14
Date: 02-Aug-22
Tech: AA

# FIELD COMPACTION TEST REPORT

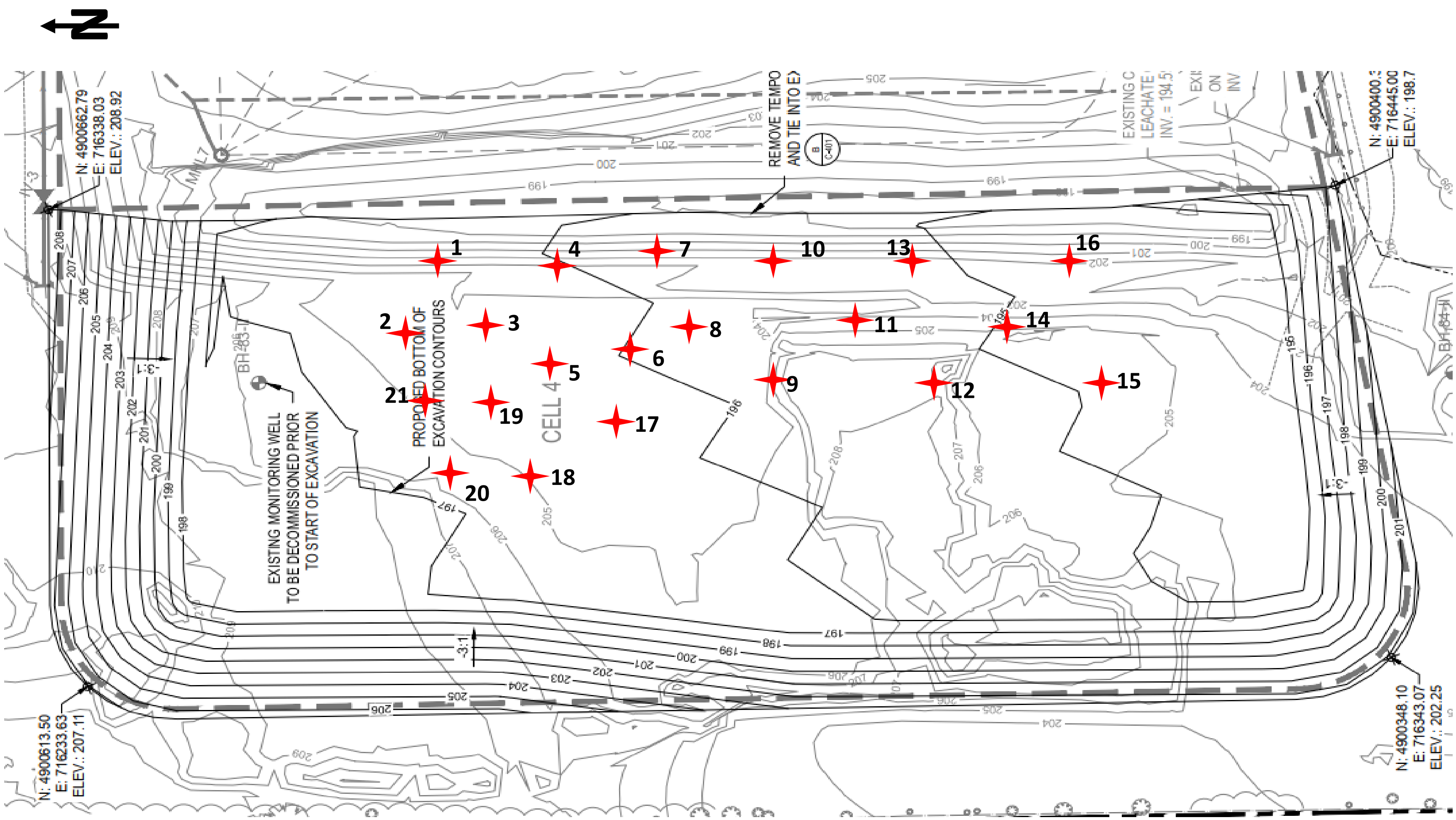


| | | | |
|---|---|---|---|
| **PROJECT NAME:** | PCCWMF - Cell 4 Construction | **DATE:** | 20-Sep-22 |
| **PROJECT NO.:** | 111-53296-14 | **WEATHER:** | Sunny 22oC |
| **PROJECT LOCATION:** | Peterborough, Ontario | **REF. GRADE:** | Top of Clay Liner |
| **CLIENT:** | City of Peterborough | **GAUGE NO.:** | Troxler |
| **CONTRACTOR:** | Todd Brothers Inc. | **TECHNICIAN:** | JVC |

| Test No. | Elevation | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. (kg/m$^3$) | Specified Degree of Compact. (%) | Wet Density (kg/m$^3$) | Dry Density (kg/m$^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2308 | 2213 | 4.3 | 100.0 | 100 | Pass |
| 2 | 0.0 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2436 | 2283 | 6.7 | 100.0 | 100 | Pass |
| 3 | 0.0 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2365 | 2250 | 5.1 | 100.0 | 100 | Pass |
| 4 | 0.0 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2399 | 2320 | 3.4 | 100.0 | 100 | Pass |
| 5 | 0.0 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2374 | 2267 | 4.7 | 100.0 | 100 | Pass |
| 6 | 0.0 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2355 | 2260 | 4.2 | 100.0 | 100 | Pass |
| 7 | 0.0 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2288 | 2175 | 5.2 | 100.0 | 100 | Pass |
| 8 | 0.0 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2418 | 2314 | 4.5 | 100.0 | 100 | Pass |
| 9 | 0.0 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2335 | 2230 | 4.7 | 100.0 | 100 | Pass |
| 10 | 0.0 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2432 | 2325 | 4.6 | 100.0 | 100 | Pass |
| 11 | 0.0 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2441 | 2336 | 4.5 | 100.0 | 100 | Pass |
| 12 | 0.0 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2203 | 2098 | 5.0 | 98.0 | 100 | Pass |
| 13 | 0.0 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2412 | 2310 | 4.4 | 100.0 | 100 | Pass |
| 14 | 0.0 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2230 | 2126 | 4.9 | 99.3 | 100 | Pass |
| 15 | 0.0 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2321 | 2210 | 5.0 | 100.0 | 100 | Pass |
| 16 | 0.0 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2313 | 2213 | 4.5 | 100.0 | 100 | Pass |
| 17 | 0.0 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2403 | 2291 | 4.9 | 100.0 | 100 | Pass |
| 18 | 0.0 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2386 | 2266 | 5.3 | 100.0 | 100 | Pass |
| 19 | 0.0 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2409 | 2296 | 4.9 | 100.0 | 100 | Pass |
| 20 | 0.0 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2467 | 2336 | 5.6 | 100.0 | 100 | Pass |
| 21 | 0.0 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2448 | 2323 | 5.4 | 100.0 | 100 | Pass |

* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks: Soil samples obtained:
- Test #1 Moisture Tin K26 and SS-ATT1
- Test #10 Moisture Tin T25 and SS-ATT2
- Test #16 Moisture Tin K19
- Test #21 Moisture Tin K32




= Approximate test location

Project Name: Peterborough Landfill - Cell 4

Project #: 111-53296-14

Date: 20-Sep-22

Tech: JVC

# FIELD COMPACTION TEST REPORT

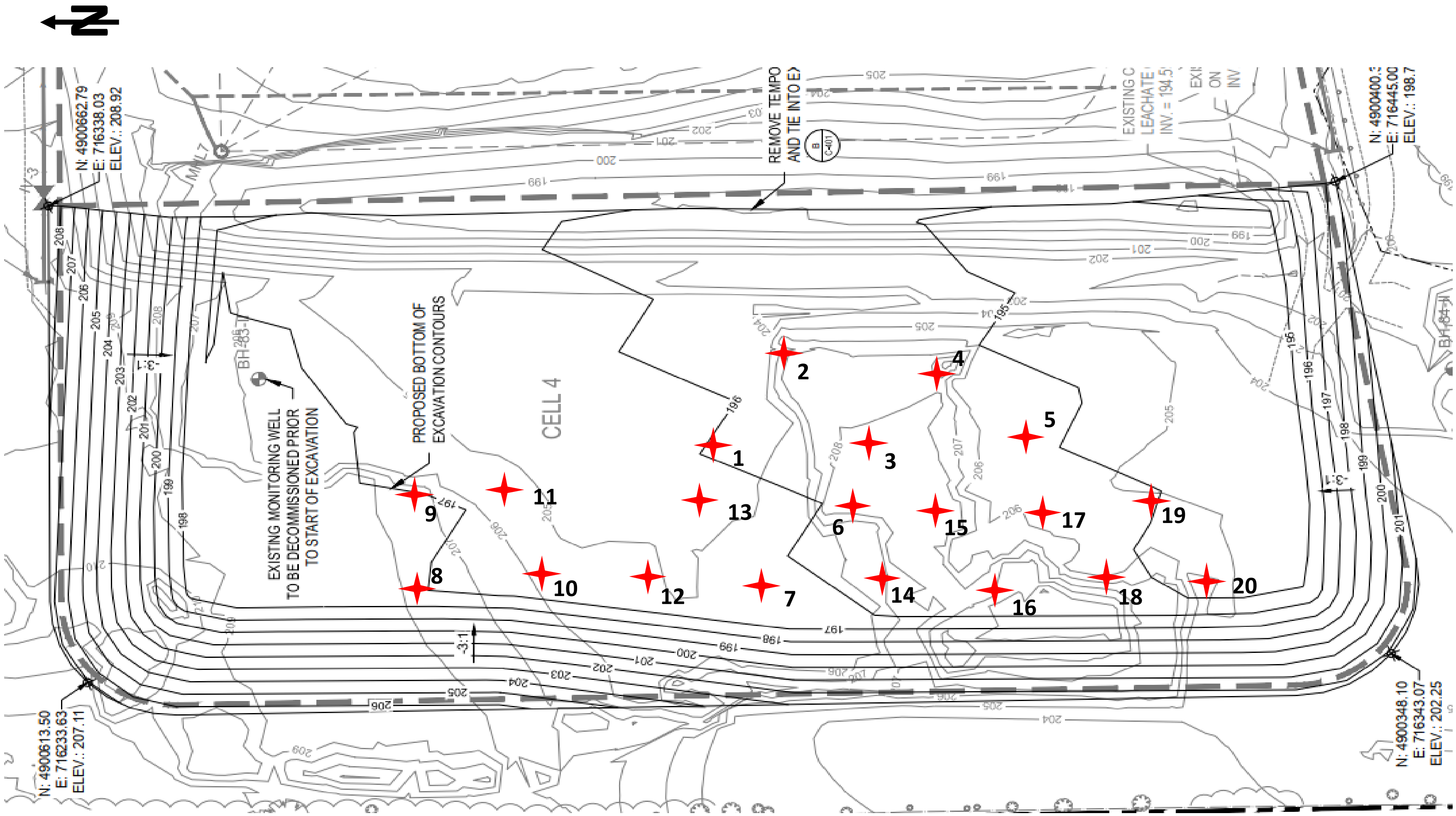


| | | | |
|---|---|---|---|
| **PROJECT NAME:** | PCCWMF - Cell 4 Construction | **DATE:** | 21-Sep-22 |
| **PROJECT NO.:** | 111-53296-14 | **WEATHER:** | Sunny 22oC |
| **PROJECT LOCATION:** | Peterborough, Ontario | **REF. GRADE:** | Top of Clay Liner |
| **CLIENT:** | City of Peterborough | **GAUGE NO.:** | Troxler |
| **CONTRACTOR:** | Todd Brothers Inc. | **TECHNICIAN:** | JVC |

| Test No. | Elevation | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. (kg/m3) | Specified Degree of Compact. (%) | Wet Density (kg/m3) | Dry Density (kg/m3) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.00 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2398 | 2297 | 4.4 | 100.0 | 100 | Pass |
| 2 | 0.00 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2379 | 2283 | 4.2 | 100.0 | 150 | Pass |
| 3 | 0.00 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2338 | 2229 | 4.9 | 100.0 | 150 | Pass |
| 4 | 0.00 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2242 | 2156 | 4.0 | 100.0 | 150 | Pass |
| 5 | 0.00 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2277 | 2160 | 5.4 | 100.0 | 100 | Pass |
| 6 | -0.30 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2323 | 2212 | 5.0 | 100.0 | 150 | Pass |
| 7 | -0.30 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2314 | 2200 | 5.2 | 100.0 | 100 | Pass |
| 8 | -0.30 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2289 | 2170 | 5.5 | 100.0 | 100 | Pass |
| 9 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2377 | 2279 | 4.3 | 100.0 | 100 | Pass |
| 10 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2271 | 2171 | 4.6 | 100.0 | 150 | Pass |
| 11 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2446 | 2334 | 4.8 | 100.0 | 150 | Pass |
| 12 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2247 | 2130 | 5.5 | 99.5 | 150 | Pass |
| 13 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2319 | 2204 | 5.2 | 100.0 | 100 | Pass |
| 14 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2439 | 2327 | 4.8 | 100.0 | 100 | Pass |
| 15 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2162 | 2045 | 5.7 | 95.6 | 100 | Pass |
| 16 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2436 | 2313 | 5.3 | 100.0 | 100 | Pass |
| 17 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2410 | 2282 | 5.6 | 100.0 | 100 | Pass |
| 18 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2434 | 2294 | 6.1 | 100.0 | 150 | Pass |
| 19 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2365 | 2246 | 5.3 | 100.0 | 150 | Pass |
| 20 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2409 | 2299 | 4.8 | 100.0 | 150 | Pass |

* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks: Soil samples obtained:
- Test #1 Moisture Tin K30
- Test #5 Moisture Tin T58
- Test #8 Moisture Tin K49
- Test #12 Moisture Tin K16
- Test #21 Moisture Tin K21 and SS-ATT4




**= Approximate test location**

wsp

Project Name: Peterborough Landfill - Cell 4

Project #: 111-53296-14

Date: 21-Sep-22

Tech: JVC

# FIELD COMPACTION TEST REPORT



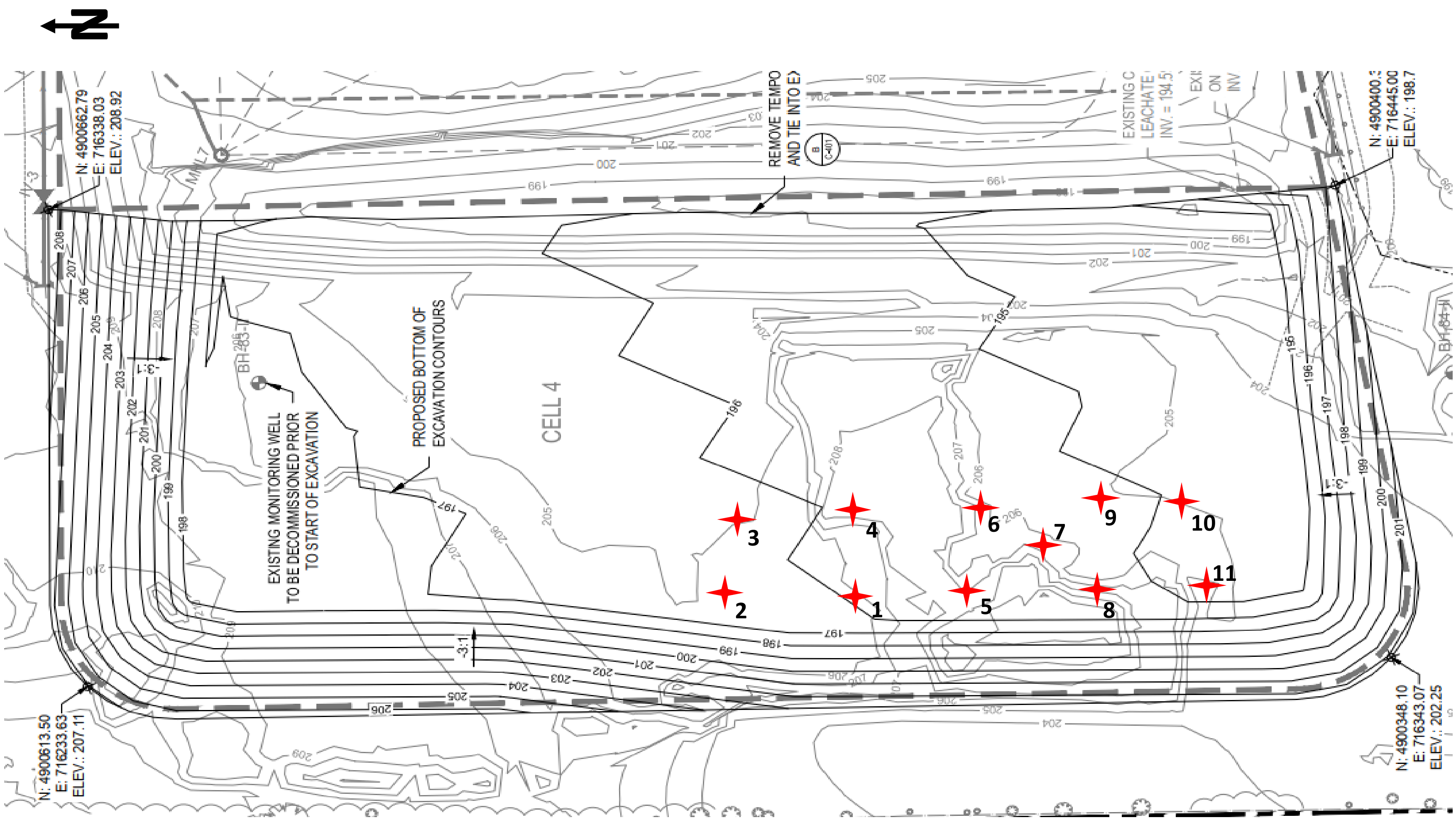
**PROJECT NAME:** PCCWMF - Cell 4 Construction
**PROJECT NO.:** 111-53296-14
**PROJECT LOCATION:** Peterborough, Ontario
**CLIENT:** City of Peterborough
**CONTRACTOR:** Todd Brothers Inc.

**DATE:** 22-Sep-22
**WEATHER:** Overcast 12oC
**REF. GRADE:** Top of Clay Liner
**GAUGE NO.:** Troxler
**TECHNICIAN:** JVC

| Test No. | Elevation | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. ($kg/m^3$) | Specified Degree of Compact. (%) | Wet Density ($kg/m^3$) | Dry Density ($kg/m^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.00 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2382 | 2271 | 4.9 | 100.0 | 150 | Pass |
| 2 | 0.00 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2214 | 2115 | 4.7 | 98.8 | 150 | Pass |
| 3 | 0.00 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2325 | 2191 | 6.1 | 100.0 | 150 | Pass |
| 4 | 0.00 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2057 | 1963 | 4.8 | 91.7 | 150 | Fail |
| 4R | 0.00 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2366 | 2245 | 5.4 | 100.0 | 150 | Pass |
| 5 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2300 | 2199 | 4.6 | 100.0 | 150 | Pass |
| 6 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2287 | 2170 | 5.4 | 100.0 | 150 | Pass |
| 7 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2132 | 2046 | 4.2 | 95.6 | 150 | Pass |
| 8 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2259 | 2158 | 4.7 | 100.0 | 100 | Pass |
| 9 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2138 | 2044 | 4.6 | 95.5 | 100 | Pass |
| 10 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2230 | 2142 | 4.1 | 100.0 | 150 | Pass |
| 11 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2262 | 2160 | 4.7 | 100.0 | 150 | Pass |

* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks: Soil samples obtained:
- Test #2 Moisture Tin K55 and SS-ATT5
- Test #11 Moisture Tin K44 and SS-ATT6




= Approximate test location

Project Name: Peterborough Landfill - Cell 4

Project #: 111-53296-14

Date: 22-Sep-22

Tech: JVC

# FIELD COMPACTION TEST REPORT



| | | | |
|---|---|---|---|
| **PROJECT NAME:** | PCCWMF - Cell 4 Construction | **DATE:** | 23-Sep-22 |
| **PROJECT NO.:** | 111-53296-14 | **WEATHER:** | Sunny 12oC |
| **PROJECT LOCATION:** | Peterborough, Ontario | **REF. GRADE:** | Top of Clay Liner |
| **CLIENT:** | City of Peterborough | **GAUGE NO.:** | Troxler |
| **CONTRACTOR:** | Todd Brothers Inc. | **TECHNICIAN:** | JVC |

| Test No. | Elevation | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. ($kg/m^3$) | Specified Degree of Compact. (%) | Wet Density ($kg/m^3$) | Dry Density ($kg/m^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -0.15 | Cell 4 North Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2293 | 2169 | 5.7 | 100.0 | 150 | Pass |
| 2 | -0.15 | Cell 4 North Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2288 | 2173 | 5.3 | 100.0 | 150 | Pass |
| 3 | -0.15 | Cell 4 North Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2350 | 2232 | 5.3 | 100.0 | 150 | Pass |
| 4 | -0.15 | Cell 4 North Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2291 | 2155 | 6.3 | 100.0 | 150 | Pass |
| 5 | -0.15 | Cell 4 North Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2343 | 2208 | 6.1 | 100.0 | 150 | Pass |
| 6 | -0.15 | Cell 4 North Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2358 | 2237 | 5.4 | 100.0 | 150 | Pass |
| 7 | -0.15 | Cell 4 North Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2190 | 2080 | 5.3 | 97.2 | 150 | Pass |
| 8 | -0.15 | Cell 4 North Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2243 | 2140 | 4.8 | 100.0 | 150 | Pass |
| 9 | -0.15 | Cell 4 North Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2419 | 2306 | 4.9 | 100.0 | 150 | Pass |
| 10 | -0.15 | Cell 4 North Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2311 | 2186 | 5.7 | 100.0 | 150 | Pass |
| 11 | -0.15 | Cell 4 North Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2334 | 2233 | 4.5 | 100.0 | 150 | Pass |
| 12 | -0.15 | Cell 4 North Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2373 | 2262 | 4.9 | 100.0 | 150 | Pass |
| 13 | -0.15 | Cell 4 North Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2382 | 2243 | 6.2 | 100.0 | 150 | Pass |
| 14 | -0.15 | Cell 4 North Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2261 | 2143 | 5.5 | 100.0 | 150 | Pass |
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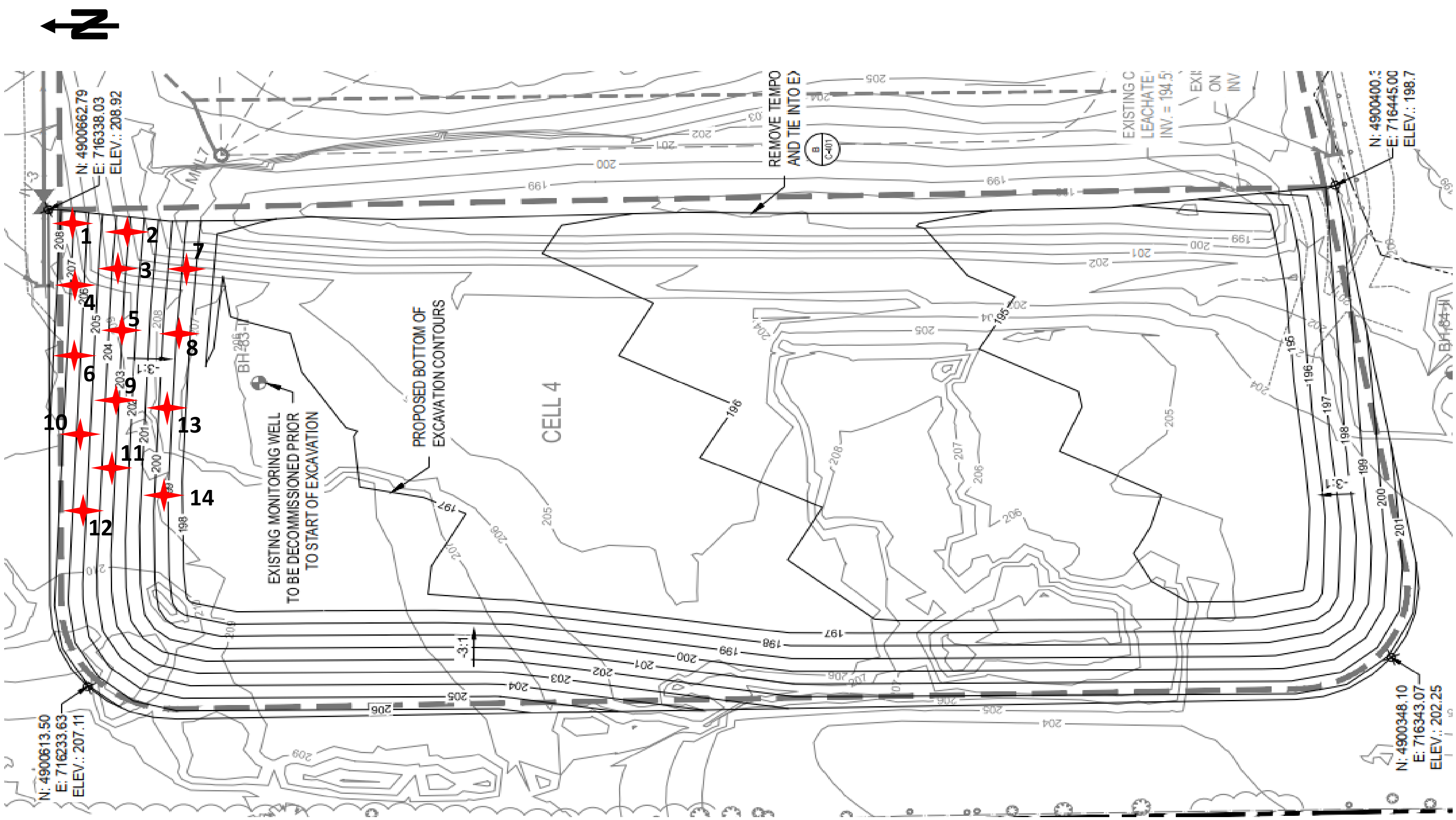
* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks: Soil samples obtained:
- Test #14 Moisture Tin K17 and SS-ATT7
- Test #15 Moisture Tin T28
- Test #7 Moisture Tin K53 and SS-ATT8




= Approximate test location

Project Name: Peterborough Landfill - Cell 4

Project #: 111-53296-14

Date: 23-Sep-22

Tech: JVC

# FIELD COMPACTION TEST REPORT

**PROJECT NAME:** Peterborough Landfill - Cell 4
**PROJECT NO.:** 111-53296-14
**PROJECT LOCATION:** Bensfort Road, Peterborough, ON
**CLIENT:** City of Peterborough
**CONTRACTOR:** Todd Brothers

**DATE AND TIME:** September 24, 2022 7:30 am to 2:45 pm
**WEATHER:** Sunny 19°C
**REF. GRADE:** Top of Surface
**GAUGE NO.:** 33491
**TECHNICIAN:** DAY

| Test No. | Below Reference (m) | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. ($kg/m^3$) | Specified Degree of Compact. (%) | Wet Density ($kg/m^3$) | Dry Density ($kg/m^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2349 | 2208 | 6.4 | 100.0 | 100 | Pass |
| 2 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2370 | 2230 | 6.3 | 100.0 | 100 | Pass |
| 3 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2391 | 2254 | 6.1 | 100.0 | 100 | Pass |
| 4 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2382 | 2230 | 6.8 | 100.0 | 100 | Pass |
| 5 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2216 | 2121 | 4.5 | 99.1 | 100 | Pass |
| 6 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2233 | 2137 | 4.5 | 99.9 | 100 | Pass |
| 7 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2235 | 2133 | 4.8 | 99.7 | 100 | Pass |
| 8 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2365 | 2231 | 6 | 100.0 | 100 | Pass |
| 9 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2375 | 2236 | 6.2 | 100.0 | 100 | Pass |
| 10 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2190 | 2084 | 5.1 | 97.4 | 100 | Pass |
| 11 | 0.15 | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2374 | 2242 | 5.9 | 100.0 | 100 | Pass |
| 12 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2198 | 2105 | 4.4 | 98.4 | 100 | Pass |
| 13 | 0.15 | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2308 | 2173 | 6.2 | 100.0 | 100 | Pass |
| 14 | 0.15 | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2377 | 2238 | 6.2 | 100.0 | 100 | Pass |
| 15 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2357 | 2195 | 7.4 | 100.0 | 100 | Pass |
| 16 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2268 | 2144 | 5.8 | 100.0 | 100 | Pass |
| 17 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2188 | 2080 | 5.2 | 97.2 | 100 | Pass |
| 18 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2368 | 2247 | 5.4 | 100.0 | 100 | Pass |
| 19 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2380 | 2250 | 5.8 | 100.0 | 100 | Pass |
| 20 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2322 | 2226 | 4.3 | 100.0 | 100 | Pass |
| 21 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2306 | 2192 | 5.2 | 100.0 | 100 | Pass |

* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks:

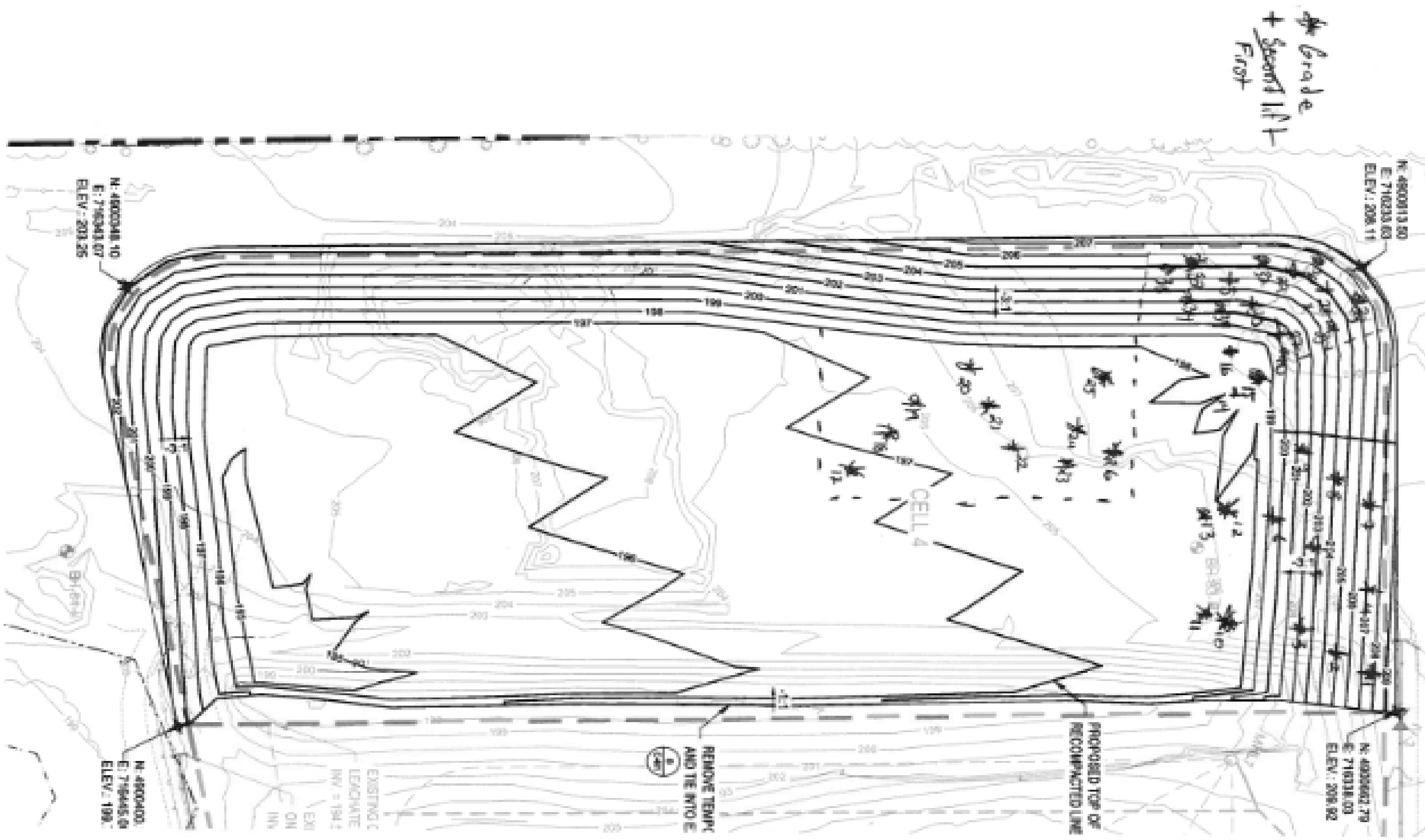
# FIELD COMPACTION TEST REPORT

| | | | |
|---|---|---|---|
| **PROJECT NAME:** | Peterborough Landfill - Cell 4 | **DATE AND TIME:** | September 24, 2022 7:30 am to 2:45 pm |
| **PROJECT NO.:** | 111-53296-14 | **WEATHER:** | Sunny 19°C |
| **PROJECT LOCATION:** | Bensfort Road, Peterborough, ON | **REF. GRADE:** | Top of Surface |
| **CLIENT:** | City of Peterborough | **GAUGE NO.:** | 33491 |
| **CONTRACTOR:** | Todd Brothers | **TECHNICIAN:** | DAY |

| Test No. | Below Reference (m) | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. (kg/m$^3$) | Specified Degree of Compact. (%) | Wet Density (kg/m$^3$) | Dry Density (kg/m$^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2319 | 2215 | 4.7 | 100.0 | 100 | Pass |
| 23 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2306 | 2188 | 5.4 | 100.0 | 100 | Pass |
| 24 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2262 | 2146 | 5.4 | 100.0 | 100 | Pass |
| 25 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2193 | 2094 | 4.7 | 97.8 | 100 | Pass |
| 26 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2325 | 2227 | 4.4 | 100.0 | 100 | Pass |
| 27 | 0.15 | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2211 | 2118 | 4.4 | 99.0 | 100 | Pass |
| 28 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2333 | 2222 | 5.0 | 100.0 | 100 | Pass |
| 29 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2306 | 2192 | 5.2 | 100.0 | 100 | Pass |
| 30 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2280 | 2141 | 6.5 | 100.0 | 100 | Pass |
| 31 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2315 | 2194 | 5.5 | 100.0 | 100 | Pass |
| 32 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2259 | 2162 | 4.5 | 100.0 | 100 | Pass |
| 33 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2205 | 2090 | 5.5 | 97.7 | 100 | Pass |
| 34 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2268 | 2160 | 5 | 100.0 | 100 | Pass |
| 35 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2324 | 2190 | 6.1 | 100.0 | 100 | Pass |
| 36 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2334 | 2204 | 5.9 | 100.0 | 100 | Pass |
| 37 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2192 | 2104 | 4.2 | 98.3 | 100 | Pass |
| 38 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2329 | 2203 | 5.7 | 100.0 | 100 | Pass |
| 39 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2202 | 2117 | 4.0 | 98.9 | 100 | Pass |
| 40 | - | See Sketch | Clay | L | 8.0 | 2140 | 95 | 2350 | 2225 | 5.6 | 100.0 | 100 | Pass |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks: After additional compaction and retesting, the material was deemed acceptable.




Project Name: Peterborough Landfill - Cell 4

Project #: 111-53296-14

Date: 24-Sep-22

Tech: DAY

# FIELD COMPACTION TEST REPORT



| | | | |
|---|---|---|---|
| **PROJECT NAME:** | PCCWMF - Cell 4 Construction | **DATE:** | 28-Sep-22 |
| **PROJECT NO.:** | 111-53296-14 | **WEATHER:** | Overcast 15°C |
| **PROJECT LOCATION:** | Peterborough, Ontario | **REF. GRADE:** | Top of Clay Liner |
| **CLIENT:** | City of Peterborough | **GAUGE NO.:** | 445 |
| **CONTRACTOR:** | Todd Brothers Inc. | **TECHNICIAN:** | JVC |

| Test No. | Elevation | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. ($kg/m^3$) | Specified Degree of Compact. (%) | Wet Density ($kg/m^3$) | Dry Density ($kg/m^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2184 | 2060 | 6.0 | 96.3 | 150 | Pass |
| 2 | -0.30 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2055 | 1901 | 8.1 | 88.8 | 150 | Fail |
| 3 | -0.30 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2155 | 2020 | 6.7 | 94.4 | 150 | Fail |
| 4 | -0.30 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 1798 | 1650 | 9.0 | 77.1 | 150 | Fail |
| 5 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2205 | 2086 | 5.7 | 97.5 | 150 | Pass |
| 6 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2461 | 2302 | 6.9 | 100.0 | 150 | Pass |
| 2R | -0.30 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2324 | 2220 | 4.7 | 100.0 | 150 | Pass |
| 3R | -0.30 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2440 | 2302 | 6 | 100.0 | 150 | Pass |
| 4R | -0.30 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2389 | 2256 | 5.9 | 100.0 | 150 | Pass |
| 7 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2212 | 2103 | 5.2 | 98.3 | 150 | Pass |
| 8 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2308 | 2184 | 5.7 | 100.0 | 150 | Pass |
| 9 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2324 | 2203 | 5.5 | 100.0 | 150 | Pass |
| 10 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2158 | 2038 | 5.9 | 95.2 | 150 | Pass |
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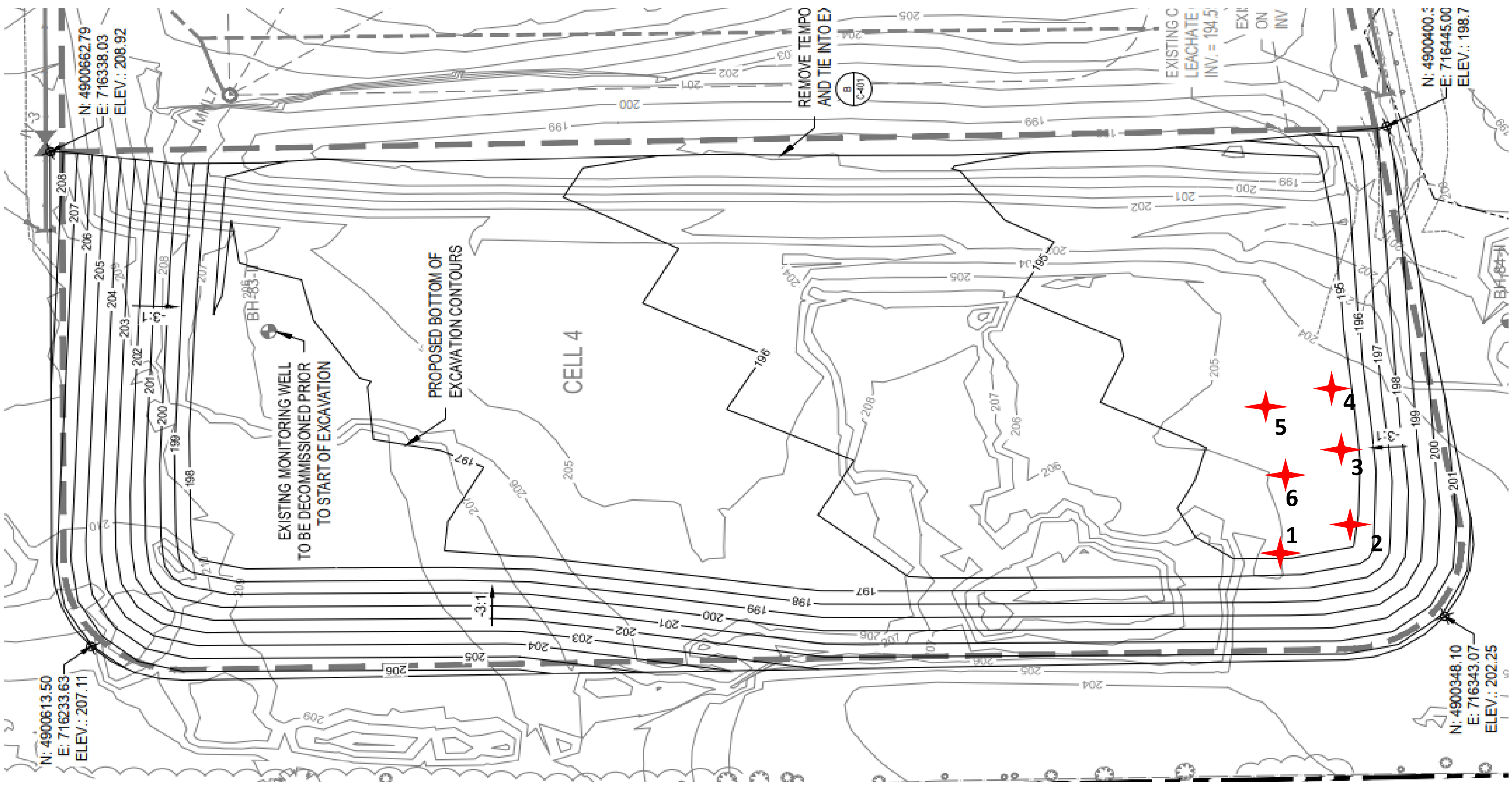
* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

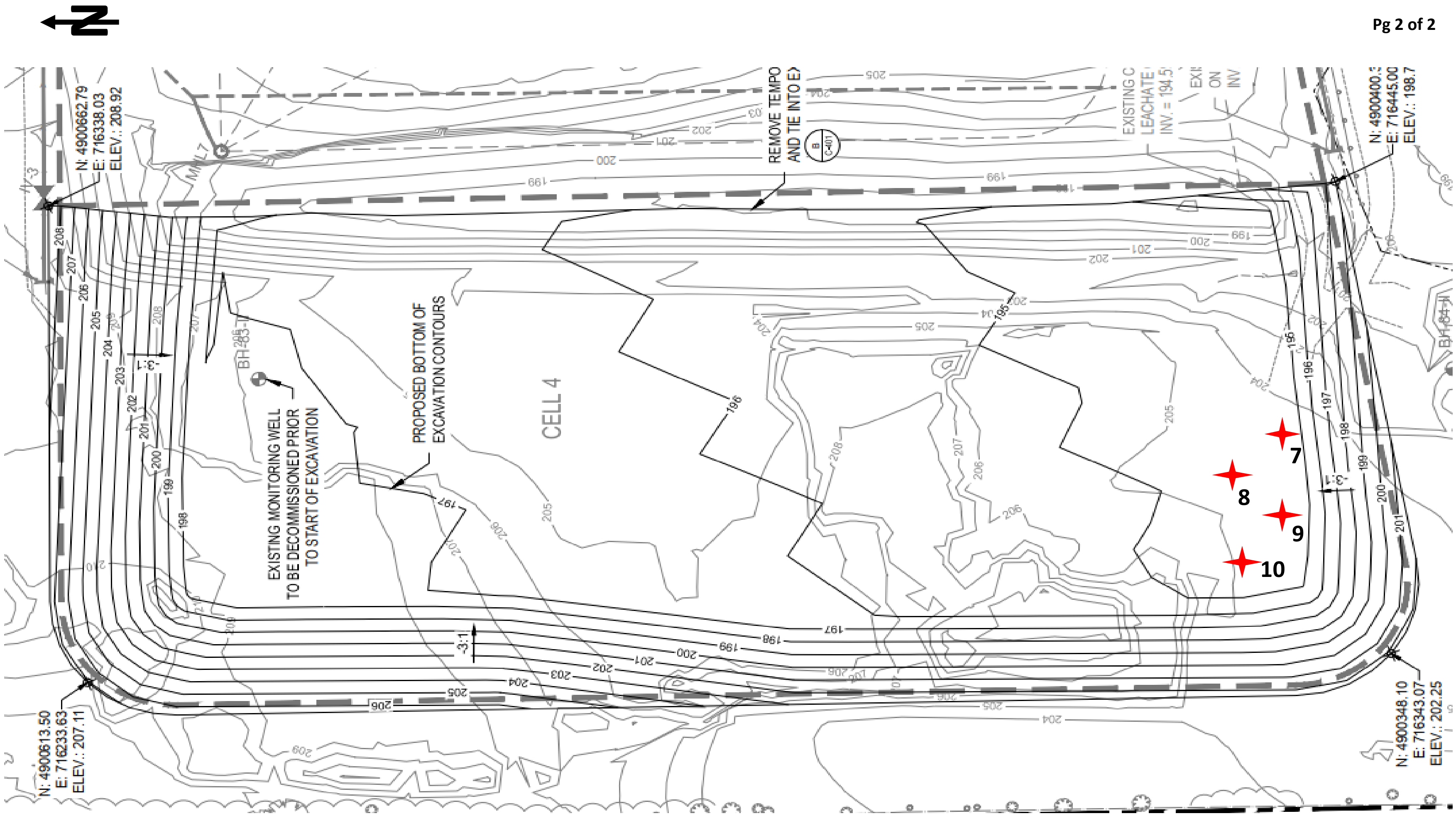
Remarks: Soil samples obtained:
- Test #5 Moisture Tin KT12
- Test #2 Moisture Tin T20
- Test #4 Moisture Tin T02 and Atterberg SS-ATT15
- Test #10 Moisture  T66




= Approximate test location

Project Name: Peterborough Landfill - Cell 4
Project #: 111-53296-14

Date: 28-Sep-22
Tech: JVC




= Approximate test location

Project Name: Peterborough Landfill - Cell 4

Project #: 111-53296-14

Date: 28-Sep-22

Tech: JVC

# FIELD COMPACTION TEST REPORT

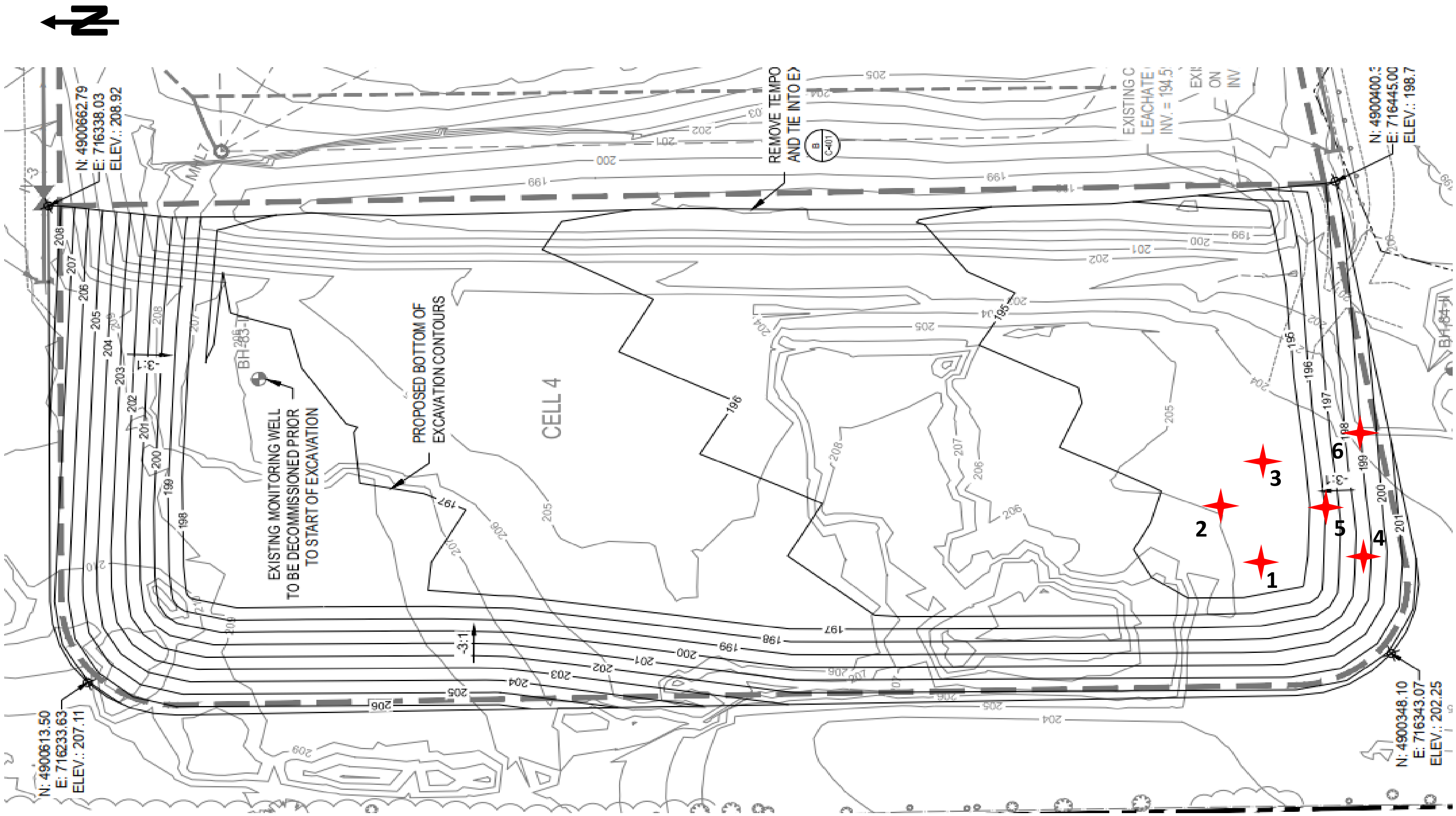
PAGE: 1 of 1

| | | | |
|---|---|---|---|
| **PROJECT NAME:** | PCCWMF - Cell 4 Construction | **DATE:** | 29-Sep-22 |
| **PROJECT NO.:** | 111-53296-14 | **WEATHER:** | Sunny 15oC |
| **PROJECT LOCATION:** | Peterborough, Ontario | **REF. GRADE:** | Top of Clay Liner |
| **CLIENT:** | City of Peterborough | **GAUGE NO.:** | Troxler |
| **CONTRACTOR:** | Todd Brothers Inc. | **TECHNICIAN:** | JVC |

| Test No. | Elevation | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. (kg/m³) | Specified Degree of Compact. (%) | Wet Density (kg/m³) | Dry Density (kg/m³) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.00 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2317 | 2205 | 5.1 | 100.0 | 150 | Pass |
| 2 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2274 | 2145 | 6.0 | 100.0 | 150 | Pass |
| 3 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2205 | 2076 | 6.2 | 97.0 | 150 | Pass |
| 4 | -0.15 | Cell 4 South Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2314 | 2141 | 8.1 | 100.0 | 150 | Pass |
| 5 | -0.15 | Cell 4 South Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2372 | 2250 | 5.4 | 100.0 | 150 | Pass |
| 6 | -0.15 | Cell 4 South Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2238 | 2086 | 7.3 | 97.5 | 150 | Pass |

* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks: Soil samples obtained:
- Test #1 Moisture Tin K34
- Test #6 Moisture Tin K39 and SS-ATT16




= Approximate test location

wsp

Project Name: Peterborough Landfill - Cell 4

Project #: 111-53296-14

Date: 29-Sep-22

Tech: JVC

# FIELD COMPACTION TEST REPORT

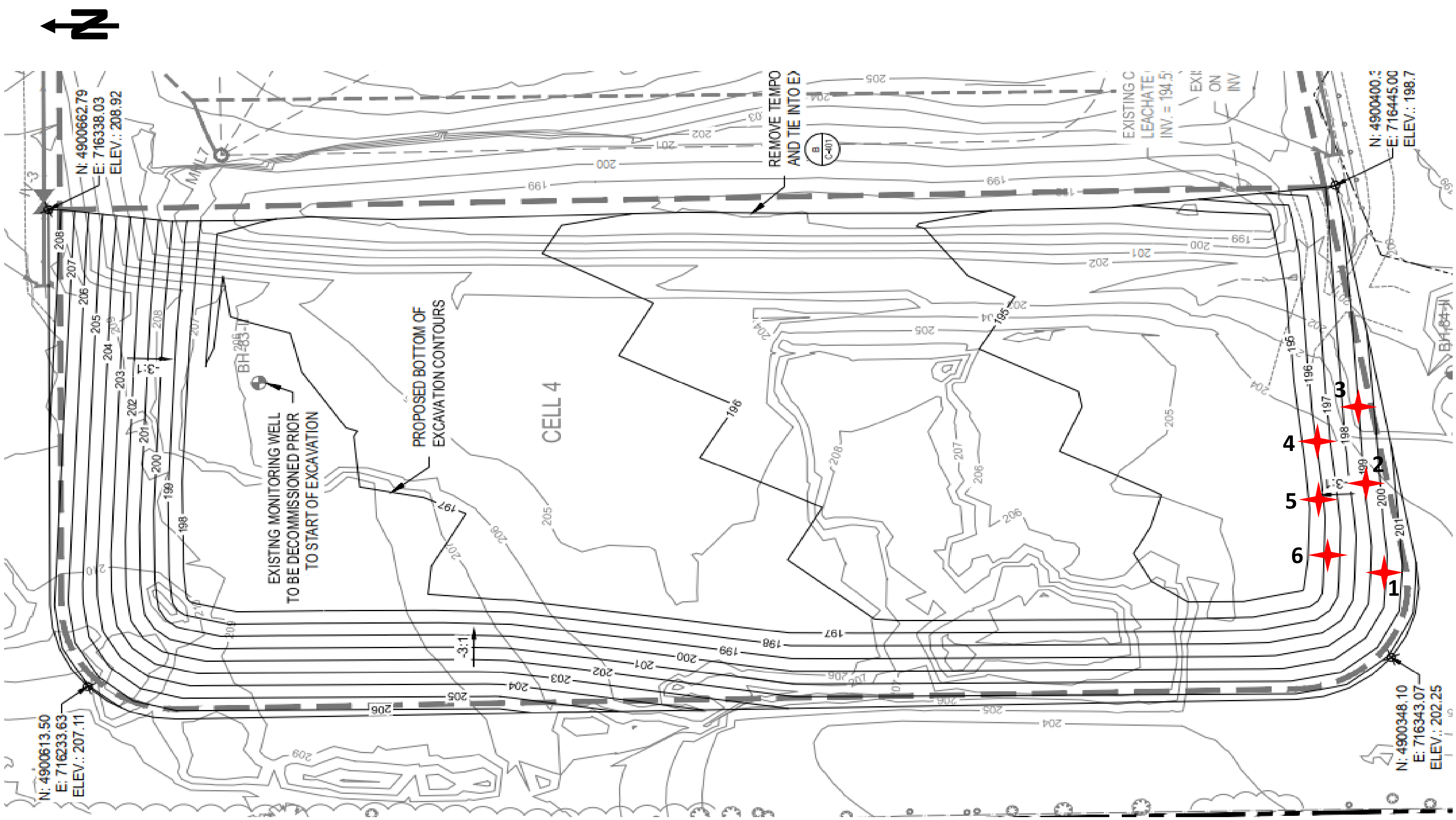


| | | | |
|---|---|---|---|
| **PROJECT NAME:** | PCCWMF - Cell 4 Construction | **DATE:** | 30-Sep-22 |
| **PROJECT NO.:** | 111-53296-14 | **WEATHER:** | Sunny 15oC |
| **PROJECT LOCATION:** | Peterborough, Ontario | **REF. GRADE:** | Top of Clay Liner |
| **CLIENT:** | City of Peterborough | **GAUGE NO.:** | 445 |
| **CONTRACTOR:** | Todd Brothers Inc. | **TECHNICIAN:** | JVC |

| Test No. | Elevation | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. ($kg/m^3$) | Specified Degree of Compact. (%) | Wet Density ($kg/m^3$) | Dry Density ($kg/m^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.00 | Cell 4 South Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2140 | 2034 | 5.2 | 95.1 | 150 | Pass |
| 2 | 0.00 | Cell 4 South Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2204 | 2085 | 5.7 | 97.4 | 150 | Pass |
| 3 | 0.00 | Cell 4 South Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2328 | 2196 | 6.0 | 100.0 | 150 | Pass |
| 4 | 0.00 | Cell 4 South Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2305 | 2172 | 6.1 | 100.0 | 150 | Pass |
| 5 | 0.00 | Cell 4 South Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2319 | 2198 | 5.5 | 100.0 | 150 | Pass |
| 6 | 0.00 | Cell 4 South Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2217 | 2093 | 5.9 | 97.8 | 150 | Pass |

* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks: Soil samples obtained:
- Test #1 Moisture Tin T09
- Test #4 Moisture Tin T44




= Approximate test location

| | | | |
|---|---|---|---|
| Project Name: | Peterborough Landfill - Cell 4 | Date: | 30-Sep-22 |
| Project #: | 111-53296-14 | Tech: | JVC |

# FIELD COMPACTION TEST REPORT

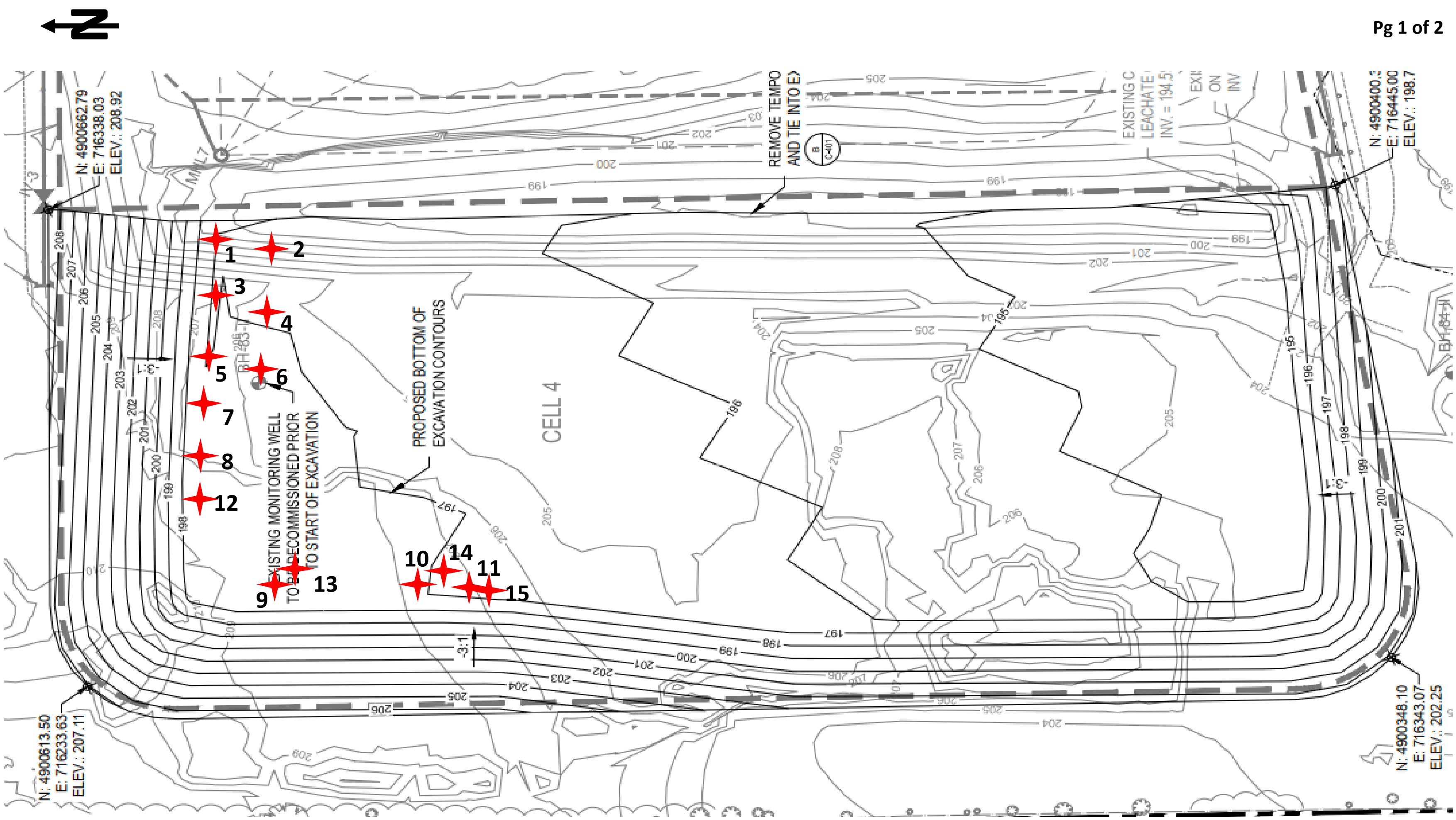


| | | | |
|---|---|---|---|
| **PROJECT NAME:** | PCCWMF - Cell 4 Construction | **DATE:** | 03-Oct-22 |
| **PROJECT NO.:** | 111-53296-14 | **WEATHER:** | Sunny 16oC |
| **PROJECT LOCATION:** | Peterborough, Ontario | **REF. GRADE:** | Top of Clay Liner |
| **CLIENT:** | City of Peterborough | **GAUGE NO.:** | 445 |
| **CONTRACTOR:** | Todd Brothers Inc. | **TECHNICIAN:** | JVC |

| Test No. | Elevation | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. (kg/m$^{3}$) | Specified Degree of Compact. (%) | Wet Density (kg/m$^{3}$) | Dry Density (kg/m$^{3}$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 1920 | 1747 | 9.9 | 81.6 | 150 | Fail |
| 2 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2183 | 2021 | 8.0 | 94.5 | 150 | Pass |
| 3 | 0.00 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2530 | 2403 | 5.3 | 100.0 | 150 | Pass |
| 4 | 0.00 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2505 | 2368 | 5.8 | 100.0 | 150 | Pass |
| 5 | 0.00 | Cell 4 Base - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2063 | 1914 | 7.8 | 100.0 | 150 | Pass |
| 6 | 0.00 | Cell 4 Base - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2204 | 2060 | 7.0 | 100.0 | 150 | Pass |
| 1R | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2103 | 1960 | 7.3 | 100.0 | 150 | Pass |
| 7 | 0.00 | Cell 4 Base - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2050 | 1912 | 7.2 | 100.0 | 150 | Pass |
| 8 | -0.30 | Cell 4 Base - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 1952 | 1807 | 8.0 | 94.7 | 150 | Pass |
| 9 | -0.30 | Cell 4 Base - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 1935 | 1805 | 7.2 | 94.6 | 150 | Pass |
| 10 | -0.30 | Cell 4 Base - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 1979 | 1802 | 9.8 | 94.5 | 150 | Pass |
| 11 | -0.30 | Cell 4 Base - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2003 | 1865 | 7.4 | 97.7 | 150 | Pass |
| 12 | -0.30 | Cell 4 Base - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2001 | 1826 | 9.6 | 95.7 | 150 | Pass |
| 13 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2023 | 1841 | 9.9 | 96.5 | 150 | Pass |
| 14 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 1998 | 1803 | 10.8 | 94.5 | 150 | Pass |
| 15 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2052 | 1891 | 8.5 | 99.1 | 150 | Pass |
| 16 | 0.00 | Cell 4 Base - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 1982 | 1808 | 9.6 | 94.8 | 150 | Pass |
| 17 | 0.00 | Cell 4 Base - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 1996 | 1833 | 8.9 | 96.1 | 150 | Pass |
| 18 | 0.00 | Cell 4 Base - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 1976 | 1803 | 9.6 | 94.5 | 150 | Pass |
| | | | | | | | | | | | | | |

* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks: Soil samples obtained:
- Test #7 Moisture Tin T05
- Test #9 Moisture Tin T31
- Test #18 Moisture Tin K27



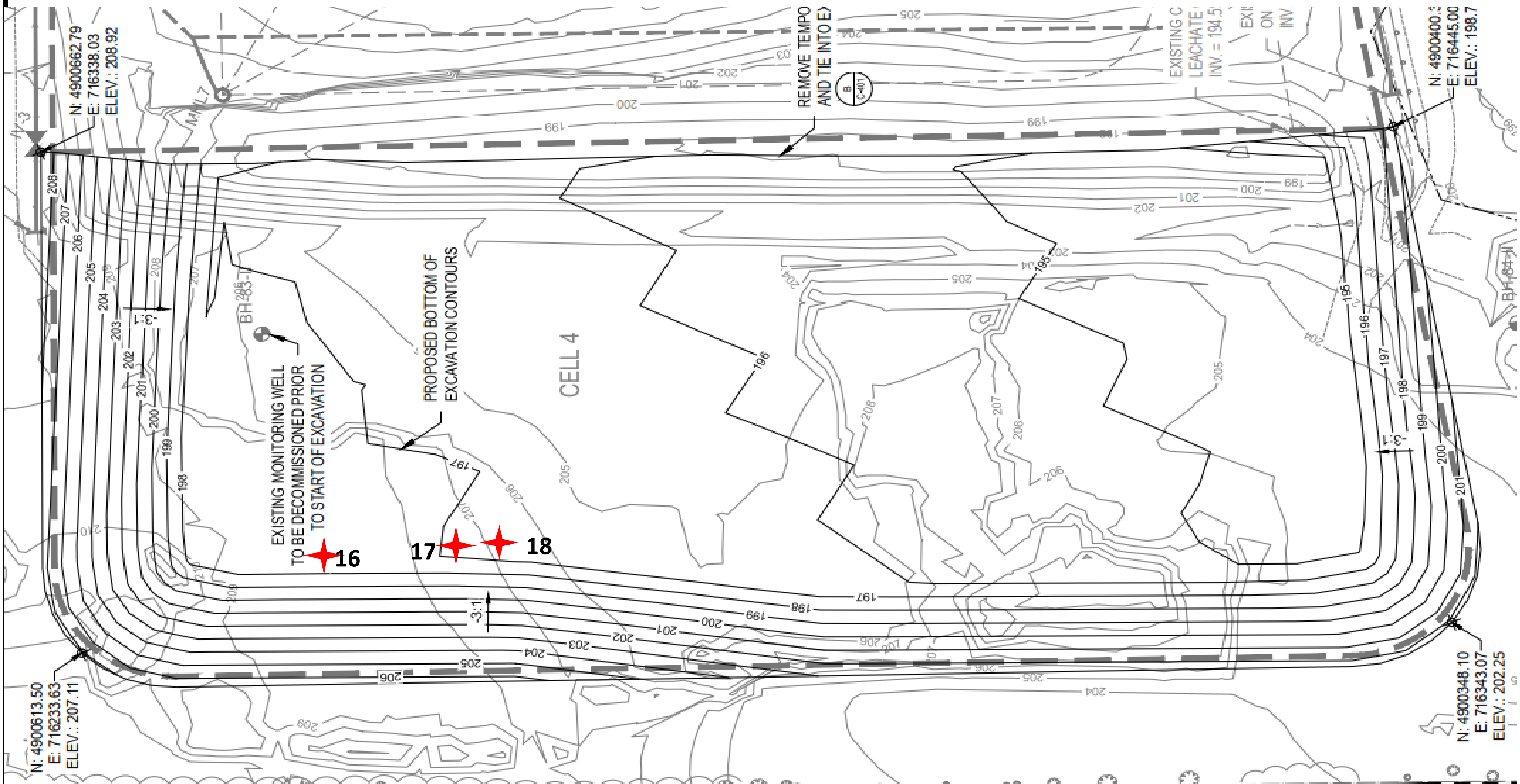

= Approximate test location

Project Name: Peterborough Landfill - Cell 4

Project #: 111-53296-14

Date: 03-Oct-22

Tech: JVC




= Approximate test location

Project Name: Peterborough Landfill - Cell 4

Project #: 111-53296-14

Date: 03-Oct-22

Tech: JVC

# FIELD COMPACTION TEST REPORT

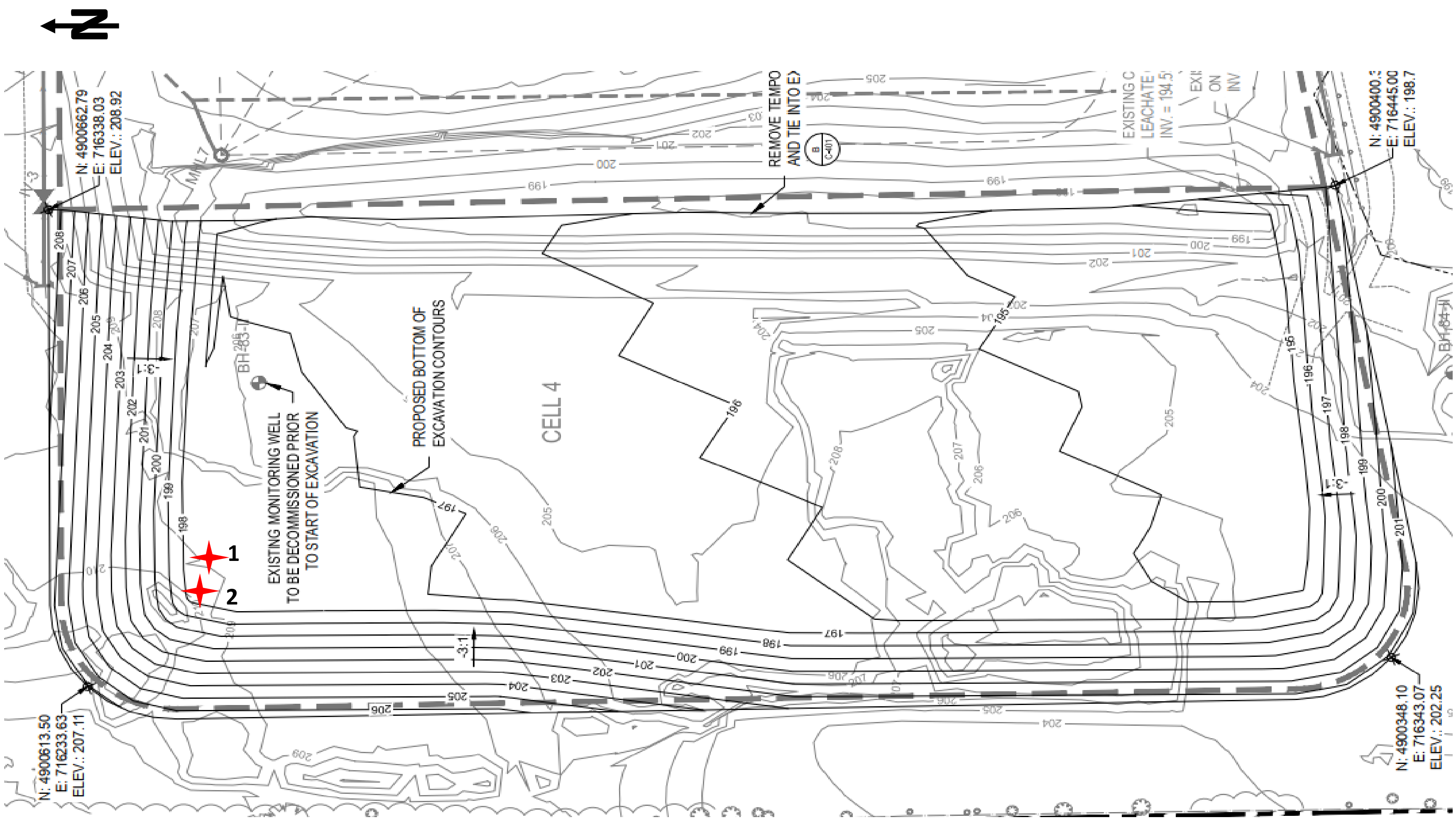


| | | | |
|---|---|---|---|
| **PROJECT NAME:** | PCCWMF - Cell 4 Construction | **DATE:** | 04-Oct-22 |
| **PROJECT NO.:** | 111-53296-14 | **WEATHER:** | Overcast 18°C |
| **PROJECT LOCATION:** | Peterborough, Ontario | **REF. GRADE:** | Top of Clay Liner |
| **CLIENT:** | City of Peterborough | **GAUGE NO.:** | 445 |
| **CONTRACTOR:** | Todd Brothers Inc. | **TECHNICIAN:** | JVC |

| Test No. | Elevation | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. (kg/m$^3$) | Specified Degree of Compact. (%) | Wet Density (kg/m$^3$) | Dry Density (kg/m$^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.00 | Cell 4 Base - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2177 | 2036 | 6.9 | 100.0 | 150 | Pass |
| 2 | 0.00 | Cell 4 Base - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2062 | 1858 | 11.0 | 97.4 | 150 | Pass |

* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks:




= Approximate test location

Project Name: Peterborough Landfill - Cell 4

Project #: 111-53296-14

Date: 04-Oct-22

Tech: JVC

# FIELD COMPACTION TEST REPORT



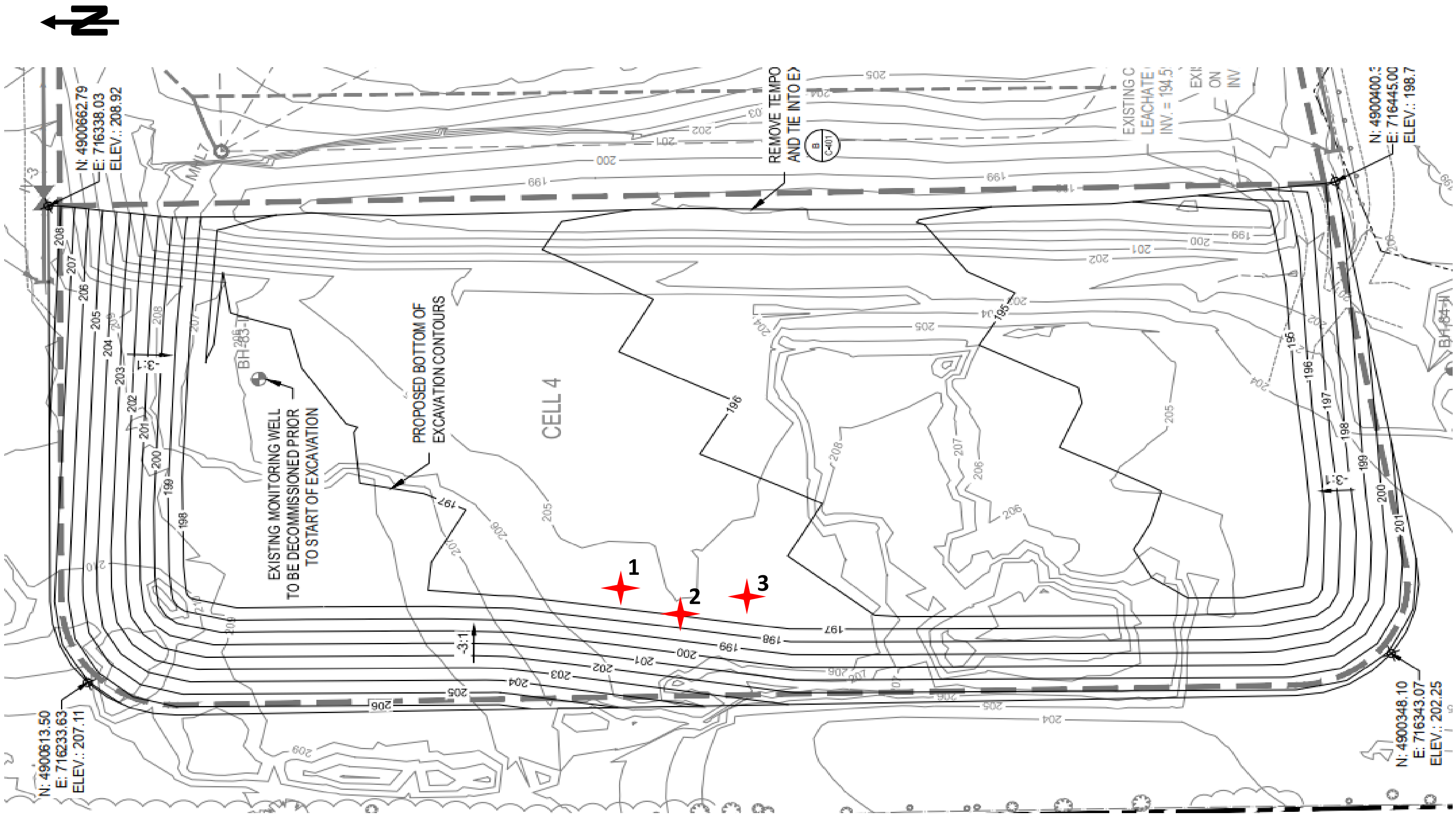
**PROJECT NAME:** PCCWMF - Cell 4 Construction
**PROJECT NO.:** 111-53296-14
**PROJECT LOCATION:** Peterborough, Ontario
**CLIENT:** City of Peterborough
**CONTRACTOR:** Todd Brothers Inc.

**DATE:** 06-Oct-22
**WEATHER:** Overcast 20°C
**REF. GRADE:** Top of Clay Liner
**GAUGE NO.:** 445
**TECHNICIAN:** JVC

| Test No. | Elevation | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. ($kg/m^3$) | Specified Degree of Compact. (%) | Wet Density ($kg/m^3$) | Dry Density ($kg/m^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.00 | Cell 4 Base - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2127 | 1971 | 7.9 | 100.0 | 150 | Pass |
| 2 | 0.00 | Cell 4 Base - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 1986 | 1802 | 10.2 | 94.5 | 150 | Pass |
| 3 | 0.00 | Cell 4 Base - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 1993 | 1823 | 9.3 | 95.6 | 150 | Pass |

* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks: Soil samples obtained:
- Test #2 Moisture Tin T41




= Approximate test location

Project Name: Peterborough Landfill - Cell 4
Project #: 111-53296-14
Date: 06-Oct-22
Tech: JVC

# FIELD COMPACTION TEST REPORT



| | | | |
|---|---|---|---|
| **PROJECT NAME:** | PCCWMF - Cell 4 Construction | **DATE:** | 07-Oct-22 |
| **PROJECT NO.:** | 111-53296-14 | **WEATHER:** | Overcast 9°C |
| **PROJECT LOCATION:** | Peterborough, Ontario | **REF. GRADE:** | Top of Clay Liner |
| **CLIENT:** | City of Peterborough | **GAUGE NO.:** | 445 |
| **CONTRACTOR:** | Todd Brothers Inc. | **TECHNICIAN:** | JVC |

| Test No. | Elevation | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. (kg/m$^3$) | Specified Degree of Compact. (%) | Wet Density (kg/m$^3$) | Dry Density (kg/m$^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -0.80 | Cell 4 West Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 1913 | 1834 | 4.3 | 85.7 | 150 | Fail |
| 1R | -0.80 | Cell 4 West Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2250 | 2135 | 5.4 | 99.8 | 150 | Pass |
| 2 | -0.80 | Cell 4 West Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2217 | 2103 | 5.4 | 98.3 | 150 | Pass |
| 3 | -0.65 | Cell 4 West Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2190 | 2051 | 6.8 | 95.8 | 150 | Pass |
| 4 | -0.65 | Cell 4 West Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2280 | 2157 | 5.7 | 100.0 | 150 | Pass |
| 5 | -0.50 | Cell 4 West Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2344 | 2205 | 6.3 | 100.0 | 150 | Pass |
| 6 | -0.35 | Cell 4 West Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2217 | 2099 | 5.6 | 98.1 | 150 | Pass |
| 7 | -0.50 | Cell 4 West Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2248 | 2123 | 5.9 | 99.2 | 150 | Pass |
| 8 | -0.50 | Cell 4 West Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2200 | 2085 | 5.5 | 97.4 | 150 | Pass |
| 9 | -0.30 | Cell 4 West Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2211 | 2086 | 6.0 | 97.5 | 150 | Pass |
| 10 | -0.30 | Cell 4 West Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2195 | 2067 | 6.2 | 96.6 | 150 | Pass |
| 11 | -0.15 | Cell 4 West Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2224 | 2110 | 5.4 | 98.6 | 150 | Pass |
| 12 | -0.15 | Cell 4 West Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2216 | 2096 | 5.7 | 98.0 | 150 | Pass |
| 13 | 0.00 | Cell 4 West Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2184 | 2060 | 6 | 96.3 | 150 | Pass |
| 14 | 0.00 | Cell 4 West Slope - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2226 | 2110 | 5.5 | 98.6 | 150 | Pass |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
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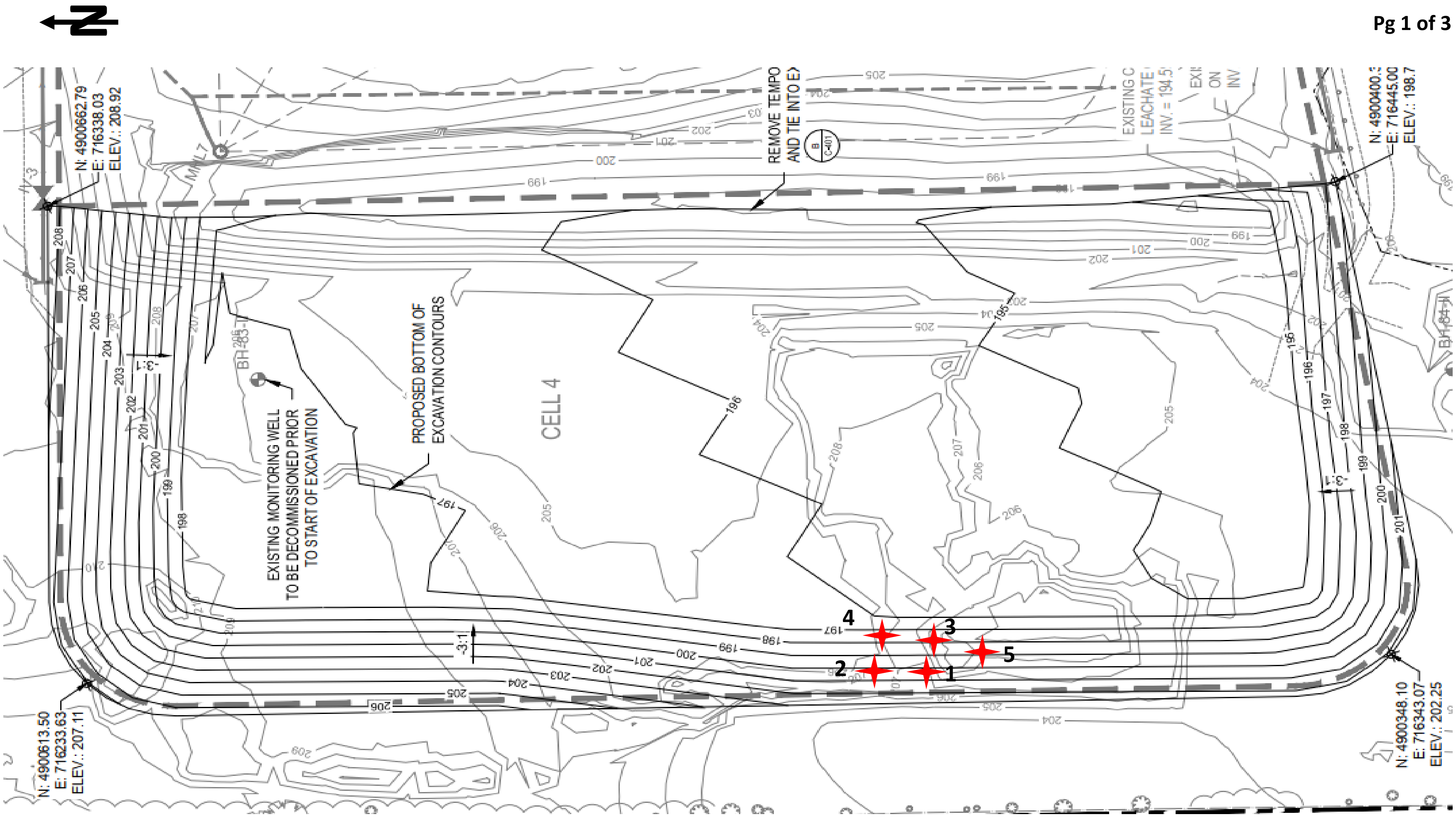
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks: Soil samples obtained:
- Test #2 Moisture Tin K11



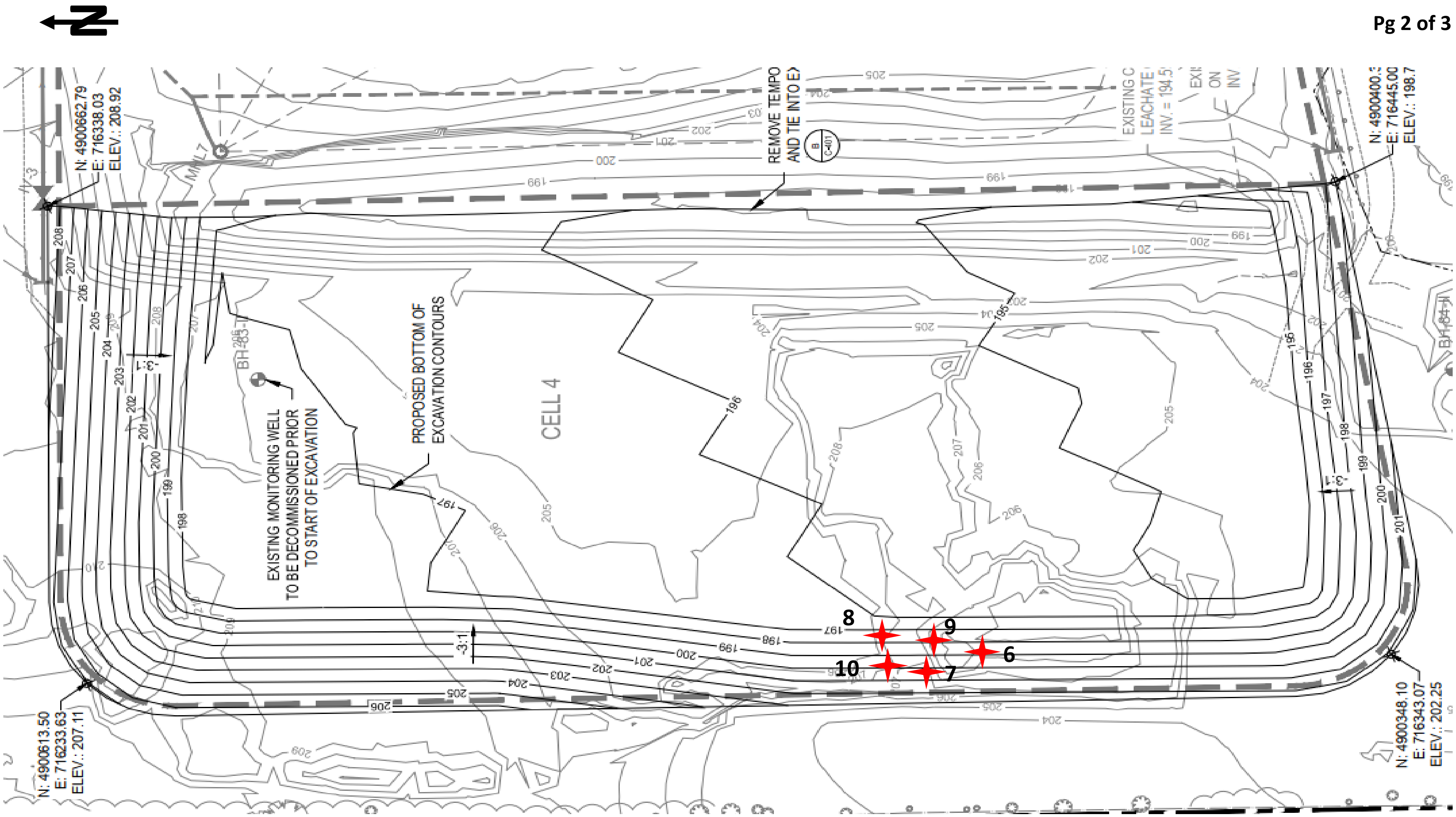

= Approximate test location

Project Name: Peterborough Landfill - Cell 4

Project #: 111-53296-14

Date: 07-Oct-22

Tech: JVC




= Approximate test location

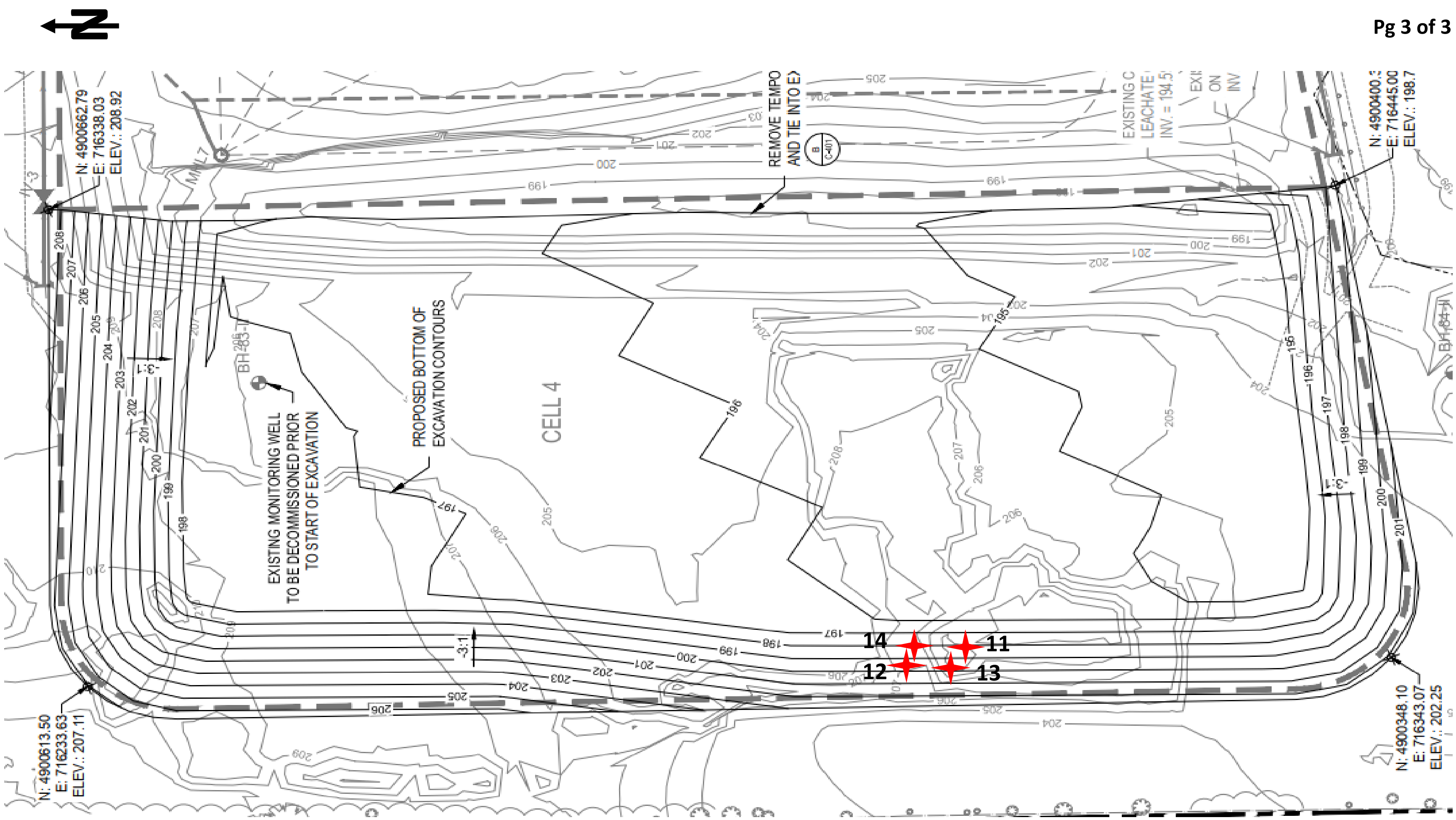
wsp

Project Name: Peterborough Landfill - Cell 4

Project #: 111-53296-14

Date: 07-Oct-22

Tech: JVC




= Approximate test location

Project Name: Peterborough Landfill - Cell 4

Project #: 111-53296-14

Date: 07-Oct-22

Tech: JVC

# FIELD COMPACTION TEST REPORT



**PROJECT NAME:** PCCWMF - Cell 4 Construction
**PROJECT NO.:** 111-53296-14
**PROJECT LOCATION:** Peterborough, Ontario
**CLIENT:** City of Peterborough
**CONTRACTOR:** Todd Brothers Inc.

**DATE:** 11-Oct-22
**WEATHER:** Sunny/Cloud 13$^{o}$C
**REF. GRADE:** Top of Clay Liner
**GAUGE NO.:** 445
**TECHNICIAN:** JVC

| Test No. | Elevation | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. (kg/m$^{3}$) | Specified Degree of Compact. (%) | Wet Density (kg/m$^{3}$) | Dry Density (kg/m$^{3}$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -0.30 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2210 | 2065 | 7.0 | 96.5 | 150 | Pass |
| 2 | -0.30 | Cell 4 Base - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2183 | 2054 | 6.3 | 96.0 | 150 | Pass |
| 3 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2051 | 1883 | 8.9 | 98.7 | 150 | Pass |
| 4 | -0.15 | Cell 4 Base - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2098 | 1957 | 7.2 | 100.0 | 150 | Pass |
| 5 | 0.00 | Cell 4 Base - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2047 | 1869 | 9.5 | 98.0 | 150 | Pass |
| 6 | 0.00 | Cell 4 Base - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2056 | 1904 | 8.0 | 99.8 | 150 | Pass |
| 7 | 1.00 | Cell 3/4 Separation Berm - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2139 | 2026 | 5.6 | 94.7 | 150 | Pass |
| 8 | -0.80 | Cell 4 South Slope - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2112 | 1934 | 9.2 | 100.0 | 150 | Pass |
| 9 | 1.20 | Cell 3/4 Separation Berm - See drawing | Clay Liner | L | 8.0 | 2140 | 95 | 2231 | 2101 | 6.2 | 98.2 | 150 | Pass |
| 10 | -0.80 | Cell 4 South Slope - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2092 | 1928 | 8.5 | 100.0 | 150 | Pass |
| 11 | -0.80 | Cell 4 South Slope - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2245 | 2081 | 7.9 | 100.0 | 150 | Pass |
| 12 | -0.65 | Cell 4 South Slope - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2234 | 2072 | 7.8 | 100.0 | 150 | Pass |
| 13 | -0.65 | Cell 4 South Slope - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2130 | 1981 | 7.5 | 100.0 | 150 | Pass |
| 14 | -0.65 | Cell 4 South Slope - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 1970 | 1864 | 5.7 | 97.7 | 150 | Pass |
| 15 | -0.50 | Cell 4 South Slope - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 1798 | 1714 | 4.9 | 89.8 | 150 | Fail |
| 16 | -0.50 | Cell 4 South Slope - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 1978 | 1777 | 11.3 | 93.1 | 150 | Fail |
| 17 | -0.50 | Cell 4 South Slope - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2003 | 1826 | 9.7 | 95.7 | 150 | Pass |
| 15R | -0.50 | Cell 4 South Slope - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2107 | 1960 | 7.5 | 100.0 | 150 | Pass |
| 16R | -0.50 | Cell 4 South Slope - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2006 | 1804 | 11.2 | 94.5 | 150 | Pass |
| 18 | -0.50 | Cell 4 South Slope - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2130 | 1928 | 10.5 | 100.0 | 150 | Pass |

* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks:

# FIELD COMPACTION TEST REPORT

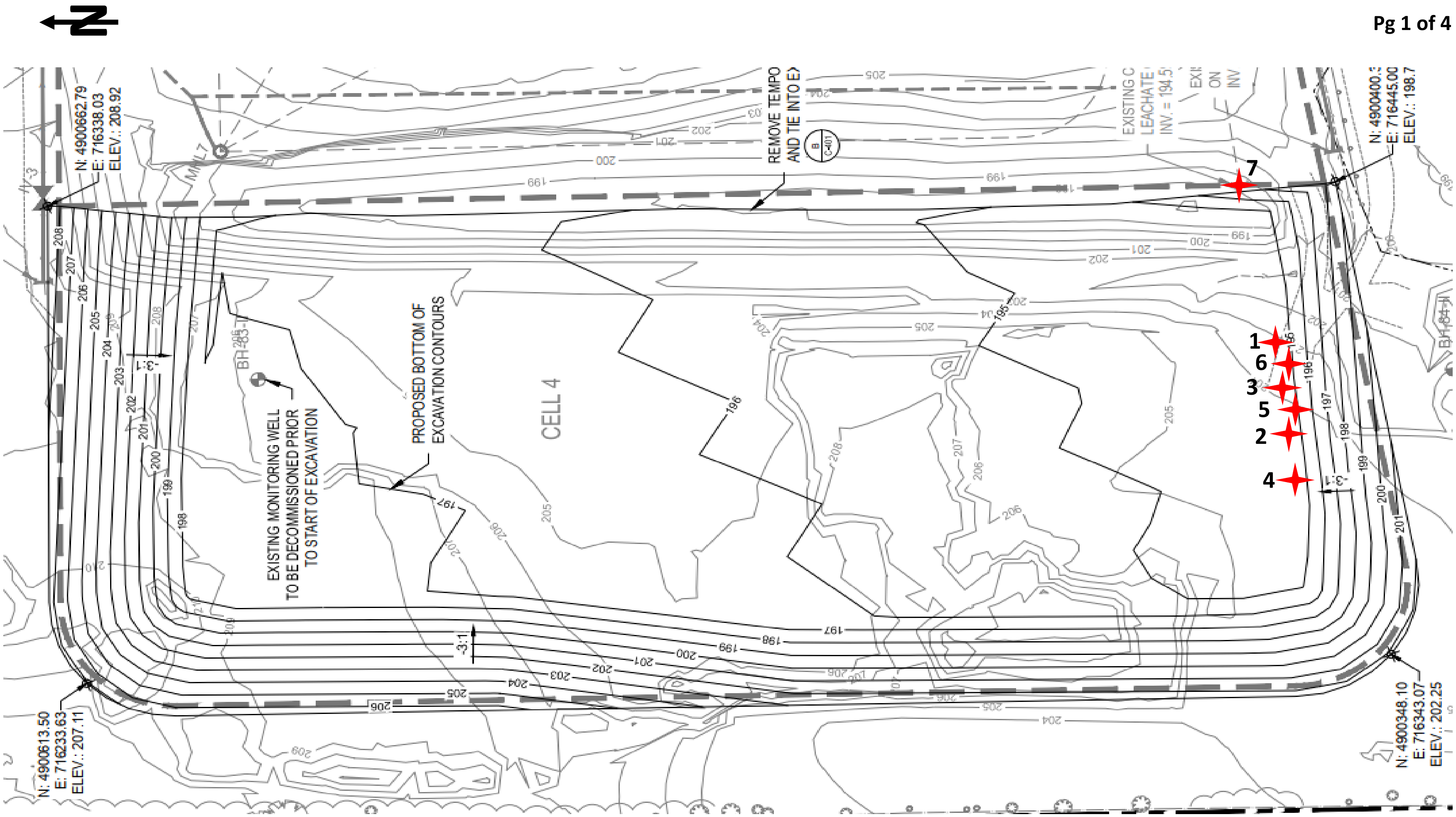


| | | | |
|---|---|---|---|
| **PROJECT NAME:** | PCCWMF - Cell 4 Construction | **DATE:** | 11-Oct-22 |
| **PROJECT NO.:** | 111-53296-14 | **WEATHER:** | Sunny/Cloud 13°C |
| **PROJECT LOCATION:** | Peterborough, Ontario | **REF. GRADE:** | Top of Clay Liner |
| **CLIENT:** | City of Peterborough | **GAUGE NO.:** | 445 |
| **CONTRACTOR:** | Todd Brothers Inc. | **TECHNICIAN:** | JVC |

| Test No. | Elevation | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. (kg/m$^3$) | Specified Degree of Compact. (%) | Wet Density (kg/m$^3$) | Dry Density (kg/m$^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 19 | -0.30 | Cell 4 South Slope - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2114 | 1871 | 13.0 | 98.1 | 150 | Pass |
| 20 | -0.30 | Cell 4 South Slope - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2052 | 1842 | 11.4 | 96.5 | 150 | Pass |
| 21 | -0.30 | Cell 4 South Slope - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2041 | 1840 | 10.9 | 96.5 | 150 | Pass |
| 22 | -0.30 | Cell 4 South Slope - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2070 | 1838 | 12.6 | 96.4 | 150 | Pass |

* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks: Soil samples obtained:
- Test #20 Moisture Tin K20



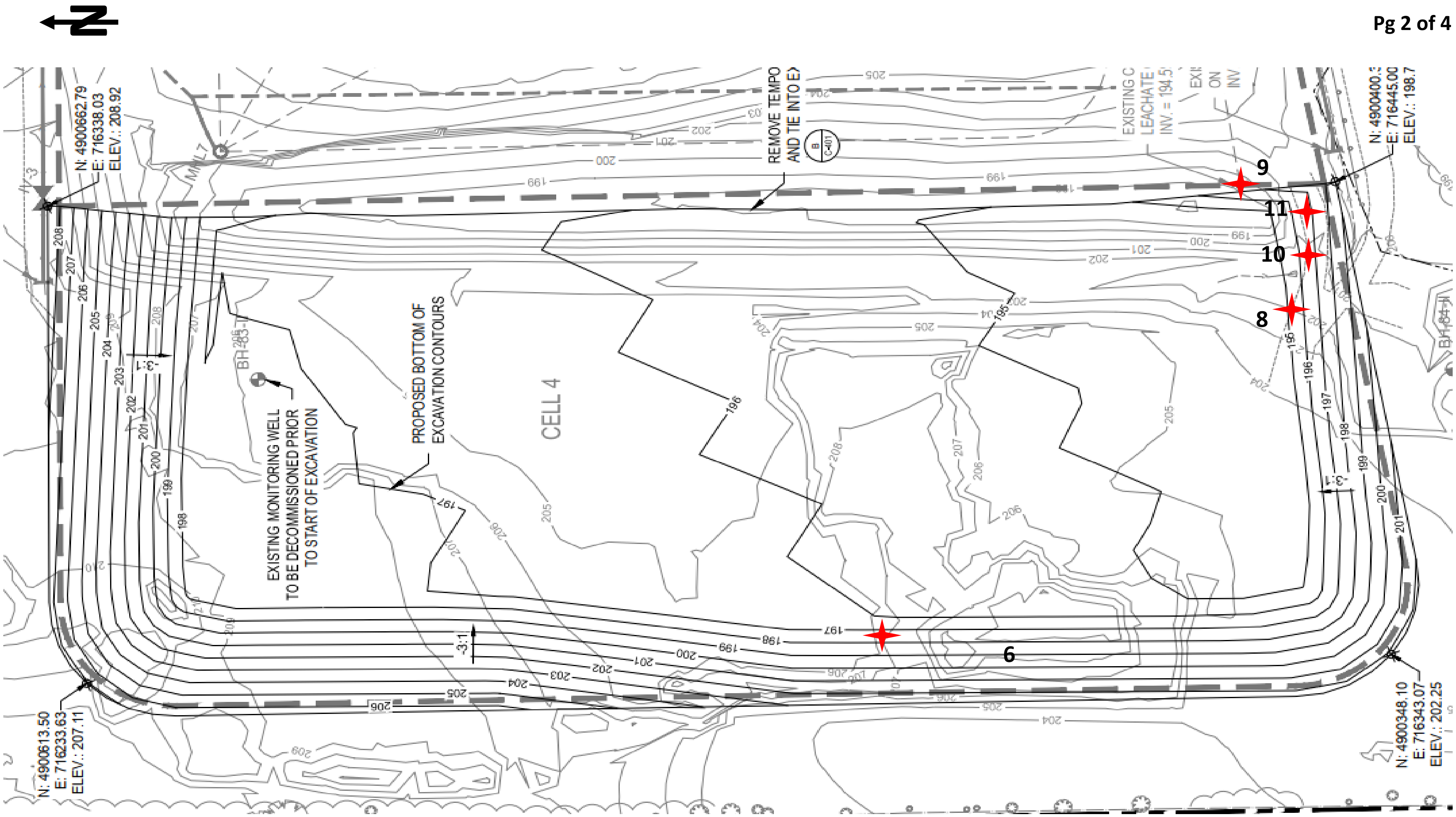

= Approximate test location

Project Name: Peterborough Landfill - Cell 4

Project #: 111-53296-14

Date: 11-Oct-22

Tech: JVC



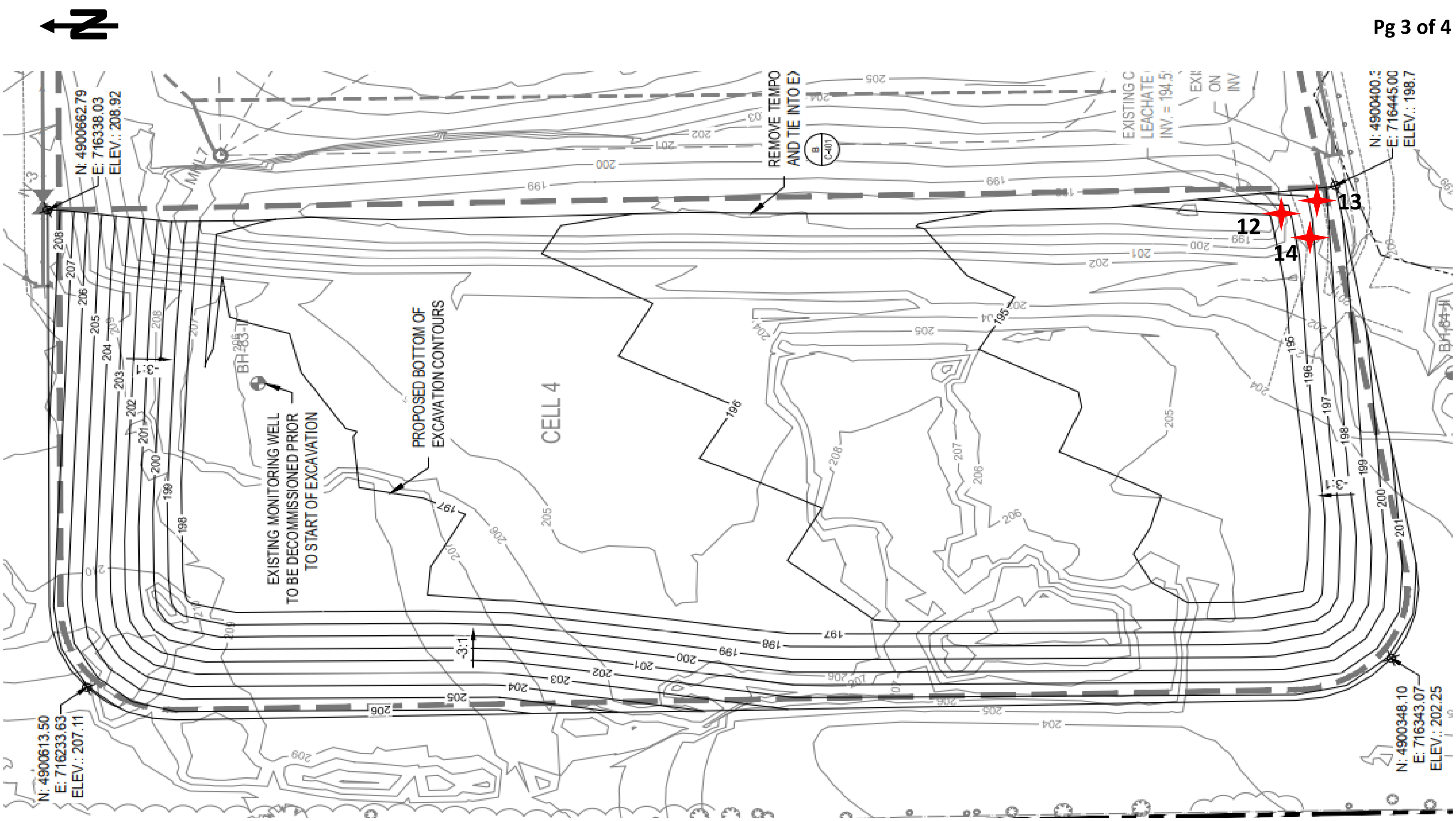

= Approximate test location

Project Name: Peterborough Landfill - Cell 4

Project #: 111-53296-14

Date: 11-Oct-22

Tech: JVC



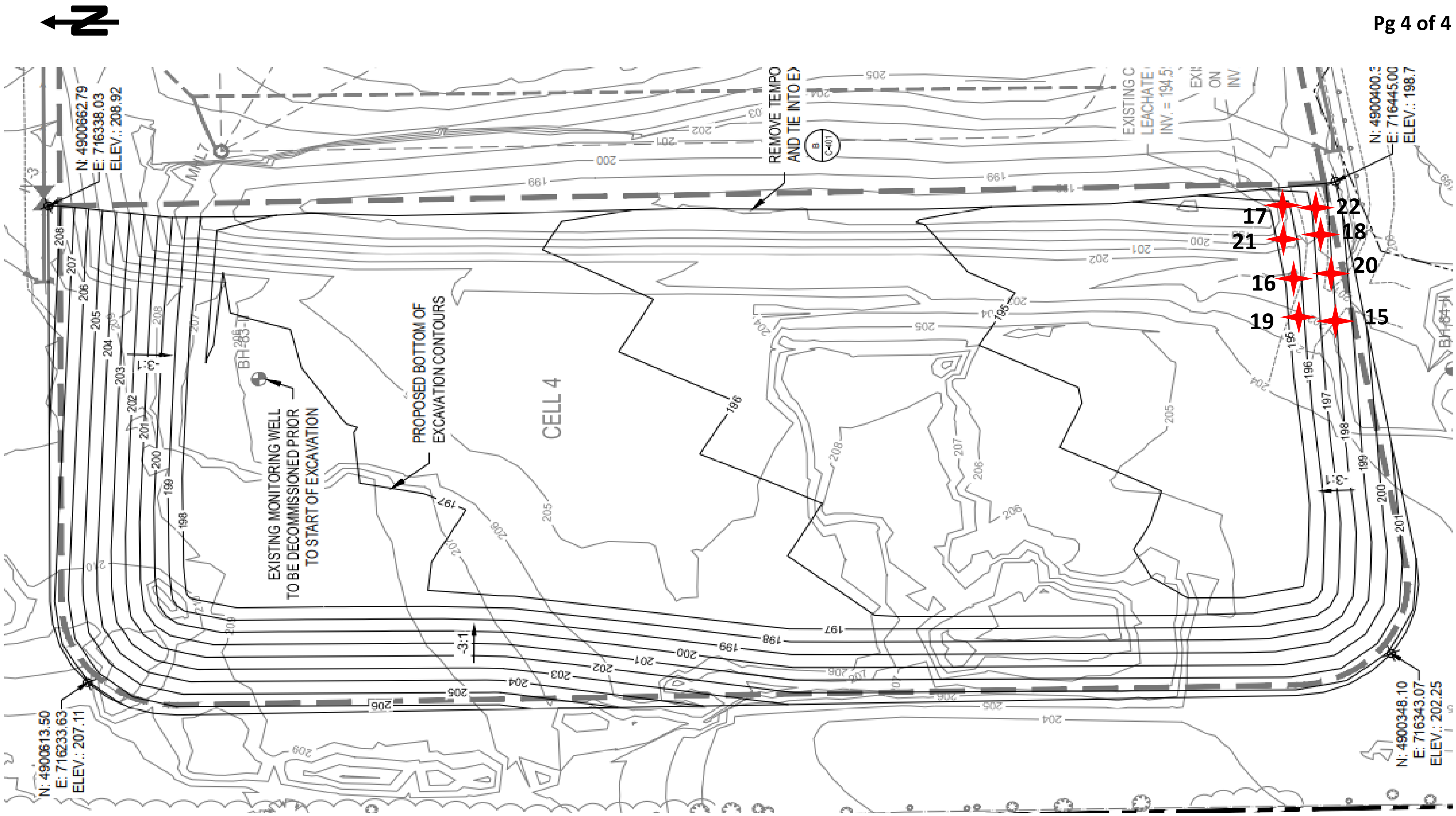

= Approximate test location

Project Name: Peterborough Landfill - Cell 4

Project #: 111-53296-14

Date: 11-Oct-22

Tech: JVC




= Approximate test location

Project Name: Peterborough Landfill - Cell 4

Project #: 111-53296-14

Date: 11-Oct-22

Tech: JVC

# FIELD COMPACTION TEST REPORT



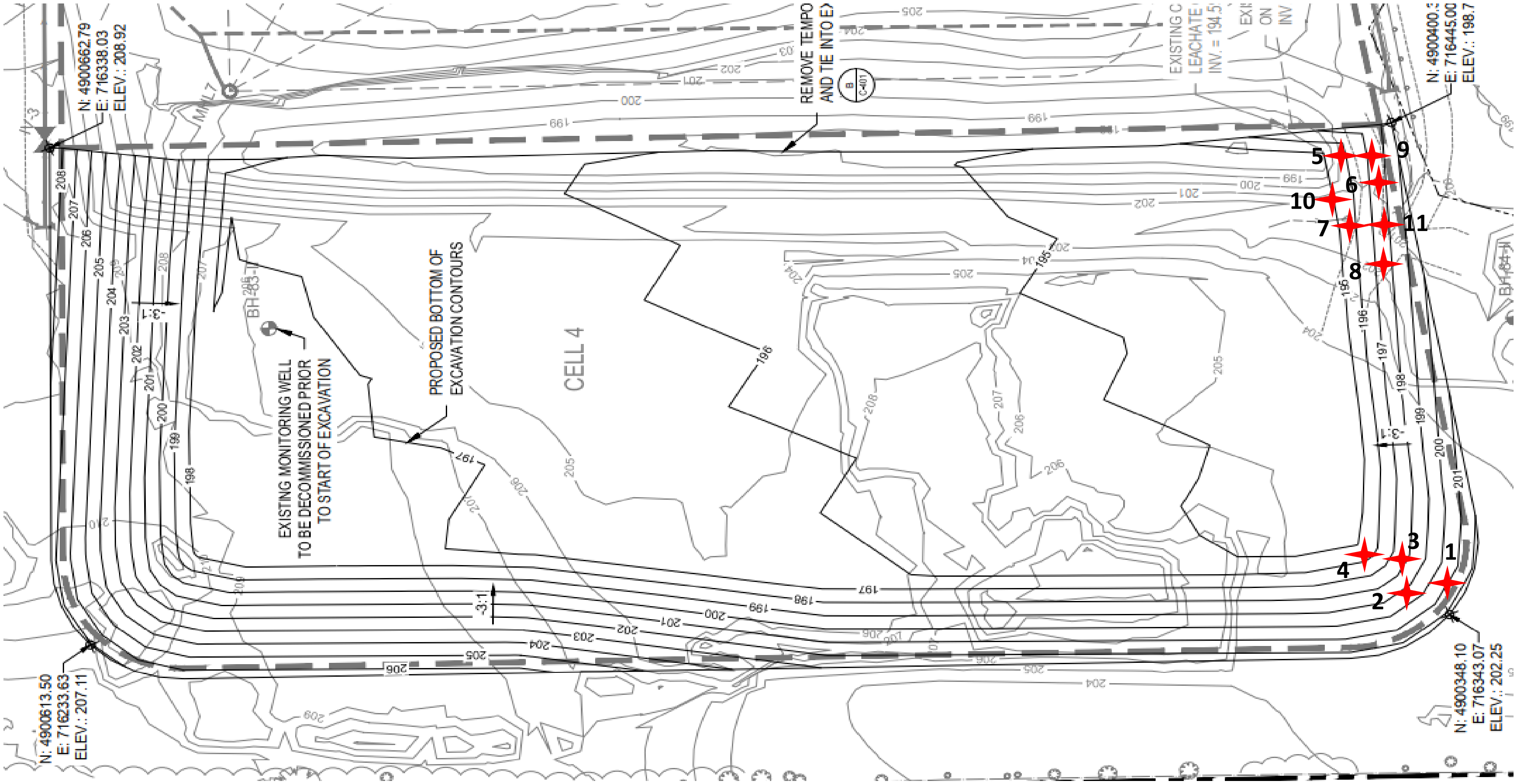
**PROJECT NAME:** PCCWMF - Cell 4 Construction
**PROJECT NO.:** 111-53296-14
**PROJECT LOCATION:** Peterborough, Ontario
**CLIENT:** City of Peterborough
**CONTRACTOR:** Todd Brothers Inc.

**DATE:** 12-Oct-22
**WEATHER:** Overcast 15°C
**REF. GRADE:** Top of Clay Liner
**GAUGE NO.:** 445
**TECHNICIAN:** JVC

| Test No. | Elevation | Station | Material Tested | S.P.M.D.D. Assumed or Lab (A/L) | Optimum Moisture (%) | S.P.M.D.D. (kg/m$^3$) | Specified Degree of Compact. (%) | Wet Density (kg/m$^3$) | Dry Density (kg/m$^3$) | Moisture (%) | Compact. Obtained (%) | Probe Depth (mm) | Pass / Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.00 | Cell 4 South Slope - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2087 | 1925 | 8.4 | 100.0 | 150 | Pass |
| 2 | 0.00 | Cell 4 South Slope - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2146 | 1949 | 10.1 | 100.0 | 150 | Pass |
| 3 | 0.00 | Cell 4 South Slope - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2395 | 2266 | 5.7 | 100.0 | 150 | Pass |
| 4 | 0.00 | Cell 4 South Slope - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2168 | 2028 | 6.9 | 100.0 | 150 | Pass |
| 5 | -0.15 | Cell 4 South Slope - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2012 | 1808 | 11.3 | 94.7 | 150 | Pass |
| 6 | -0.15 | Cell 4 South Slope - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2015 | 1819 | 10.8 | 95.3 | 150 | Pass |
| 7 | -0.15 | Cell 4 South Slope - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2027 | 1807 | 12.2 | 94.7 | 150 | Pass |
| 8 | -0.15 | Cell 4 South Slope - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2021 | 1826 | 10.7 | 95.7 | 150 | Pass |
| 9 | 0.00 | Cell 4 South Slope - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2033 | 1836 | 10.7 | 96.3 | 150 | Pass |
| 10 | 0.00 | Cell 4 South Slope - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2058 | 1856 | 10.9 | 97.3 | 150 | Pass |
| 11 | 0.00 | Cell 4 South Slope - See drawing | Clay Liner | L | 12.2 | 1908 | 95 | 2098 | 1887 | 11.2 | 98.9 | 150 | Pass |

* Nuclear Density Test per ASTM D2922
* S.P.M.D.D. = Standard Proctor Maximum Dry Density
* R= Retest

Remarks: Soil samples obtained:
- Test #2 Moisture Tin T56




= Approximate test location

Project Name: Peterborough Landfill - Cell 4

Project #: 111-53296-14

Date: 12-Oct-22

Tech: JVC

# APPENDIX

# F

## GEOTEXTILE MANUFACTURING CERTIFICATES OF CONFORMANCE

# APPENDIX

# F-1 TE-12 GEOTEXTILE

RANDALL MFG

## *Non-woven Geotextile Properties*
## *TE-12 4.57m x 91.44m*

*Production Date: 7/08/2022*

*Lot: 202275*

*PO: 2524*

| | Tensile ASTM D4632 (MD) | Elongation ASTM D4632 (MD) | Tensile ASTM D4632 (CD) | Elongation ASTM D4632 (CD) | Trap Tear ASTM D4533 (MD) | Trap Tear ASTM D4533 (CD) | CBR Puncture ASTM D6241 | FOS CGS B-148 | AOS - D 4751 | Permitivity ASTM D4491 | Water Flow ASTM D4491 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | N | N | µm | mm | Sec-1 | L/min/M2 |
| 1 | 1520 | 92 | 1488 | 97 | 609 | 735 | 4698 | 72 | 0.12 | 1.2 | 2236 |
| 2 | 1520 | 92 | 1488 | 97 | 609 | 735 | 4698 | 72 | 0.12 | 1.2 | 2236 |
| 3 | 1520 | 92 | 1488 | 97 | 609 | 735 | 4698 | 72 | 0.12 | 1.2 | 2236 |
| 4 | 1520 | 92 | 1488 | 97 | 609 | 735 | 4698 | 72 | 0.12 | 1.2 | 2236 |
| 5 | 1520 | 92 | 1488 | 97 | 609 | 735 | 4698 | 72 | 0.12 | 1.2 | 2236 |
| 6 | 1520 | 92 | 1488 | 97 | 609 | 735 | 4698 | 72 | 0.12 | 1.2 | 2236 |
| 7 | 1520 | 92 | 1488 | 97 | 609 | 735 | 4698 | 72 | 0.12 | 1.2 | 2236 |
| 8 | 1520 | 92 | 1488 | 97 | 609 | 735 | 4698 | 72 | 0.12 | 1.2 | 2236 |
| 9 | 1520 | 92 | 1488 | 97 | 609 | 735 | 4698 | 72 | 0.12 | 1.2 | 2236 |
| 10 | 1486 | 84 | 1461 | 96 | 596 | 608 | 4439 | 72 | 0.12 | 1.2 | 2236 |
| 11 | 1486 | 84 | 1461 | 96 | 596 | 608 | 4439 | 72 | 0.12 | 1.2 | 2236 |
| 12 | 1486 | 84 | 1461 | 96 | 596 | 608 | 4439 | 72 | 0.12 | 1.2 | 2236 |
| 13 | 1486 | 84 | 1461 | 96 | 596 | 608 | 4439 | 72 | 0.12 | 1.2 | 2236 |
| 14 | 1486 | 84 | 1461 | 96 | 596 | 608 | 4439 | 72 | 0.12 | 1.2 | 2236 |
| 15 | 1486 | 84 | 1461 | 96 | 596 | 608 | 4439 | 72 | 0.12 | 1.2 | 2236 |
| 16 | 1486 | 84 | 1461 | 96 | 596 | 608 | 4439 | 72 | 0.12 | 1.2 | 2236 |
| 17 | 1486 | 84 | 1461 | 96 | 596 | 608 | 4439 | 72 | 0.12 | 1.2 | 2236 |
| 18 | 1486 | 84 | 1461 | 96 | 596 | 608 | 4439 | 72 | 0.12 | 1.2 | 2236 |
| 19 | 1486 | 84 | 1461 | 96 | 596 | 608 | 4439 | 72 | 0.12 | 1.2 | 2236 |
| 20 | 1486 | 84 | 1461 | 96 | 596 | 608 | 4439 | 72 | 0.12 | 1.2 | 2236 |
| 21 | 1486 | 84 | 1461 | 96 | 596 | 608 | 4439 | 72 | 0.12 | 1.2 | 2236 |
| 22 | 1442 | 83 | 1409 | 105 | 603 | 614 | 4486 | 72 | 0.12 | 1.2 | 2236 |
| 23 | 1442 | 83 | 1409 | 105 | 603 | 614 | 4486 | 72 | 0.12 | 1.2 | 2236 |

RANDALL MFG

# *Non-woven Geotextile Properties*
## *TE-12 4.57m x 91.44m*

*Production Date: 7/08/2022*

*Lot: 202275*

*PO: 2524*

| | Tensile ASTM D4632 (MD) | Elongation ASTM D4632 (MD) | Tensile ASTM D4632 (CD) | Elongation ASTM D4632 (CD) | Trap Tear ASTM D4533 (MD) | Trap Tear ASTM D4533 (CD) | CBR Puncture ASTM D6241 | FOS CGS B-148 | AOS - D 4751 | Permitivity ASTM D4491 | Water Flow ASTM D4491 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | N | N | µm | mm | Sec-1 | L/min/M2 |
| 24 | 1442 | 83 | 1409 | 105 | 603 | 614 | 4486 | 72 | 0.12 | 1.2 | 2236 |
| 25 | 1442 | 83 | 1409 | 105 | 603 | 614 | 4486 | 72 | 0.12 | 1.2 | 2236 |
| 26 | 1442 | 83 | 1409 | 105 | 603 | 614 | 4486 | 72 | 0.12 | 1.2 | 2236 |
| 27 | 1442 | 83 | 1409 | 105 | 603 | 614 | 4486 | 72 | 0.12 | 1.2 | 2236 |
| 28 | 1442 | 83 | 1409 | 105 | 603 | 614 | 4486 | 72 | 0.12 | 1.2 | 2236 |
| 29 | 1442 | 83 | 1409 | 105 | 603 | 614 | 4486 | 72 | 0.12 | 1.2 | 2236 |
| 30 | 1442 | 83 | 1409 | 105 | 603 | 614 | 4486 | 72 | 0.12 | 1.2 | 2236 |
| 31 | 1442 | 83 | 1409 | 105 | 603 | 614 | 4486 | 72 | 0.12 | 1.2 | 2236 |
| 32 | 1442 | 83 | 1409 | 105 | 603 | 614 | 4486 | 72 | 0.12 | 1.2 | 2236 |
| 33 | 1442 | 83 | 1409 | 105 | 603 | 614 | 4486 | 72 | 0.12 | 1.2 | 2236 |
| 34 | 1442 | 83 | 1409 | 105 | 603 | 614 | 4486 | 72 | 0.12 | 1.2 | 2236 |
| 35 | 1442 | 83 | 1409 | 105 | 603 | 614 | 4486 | 72 | 0.12 | 1.2 | 2236 |
| 36 | 1459 | 77 | 1431 | 99 | 627 | 644 | 4328 | 72 | 0.12 | 1.2 | 2236 |
| 37 | 1459 | 77 | 1431 | 99 | 627 | 644 | 4328 | 72 | 0.12 | 1.2 | 2236 |
| 38 | 1459 | 77 | 1431 | 99 | 627 | 644 | 4328 | 72 | 0.12 | 1.2 | 2236 |
| 39 | 1459 | 77 | 1431 | 99 | 627 | 644 | 4328 | 72 | 0.12 | 1.2 | 2236 |
| 40 | 1459 | 77 | 1431 | 99 | 627 | 644 | 4328 | 72 | 0.12 | 1.2 | 2236 |
| 41 | 1459 | 77 | 1431 | 99 | 627 | 644 | 4328 | 72 | 0.12 | 1.2 | 2236 |
| 42 | 1459 | 77 | 1431 | 99 | 627 | 644 | 4328 | 72 | 0.12 | 1.2 | 2236 |

Lab values in this document were obtained at the time of production. Handling and storage conditions may change certain properties. Final put up rolls are taken from a single master roll and have identical properties.

*Randall Manufacturing Inc.*

RANDALL MFG

# Non-woven Geotextile Properties
## TE-12 4.57m x 91.44m

Production Date: 7/08/2022
Lot: 202275
PO: 2524

| | Tensile ASTM D4632 | Elongation ASTM D4632 | Tensile ASTM D4632 | Elongation ASTM D4632 | Trap Tear ASTM D4533 | Trap Tear ASTM D4533 | CBR Puncture ASTM | FOS CGS B- | AOS - D 4751 | Permitivity ASTM D4491 | Water Flow ASTM |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | N | N | µm | mm | Sec-1 | L/min/M2 |
| 43 | 1459 | 77 | 1431 | 99 | 627 | 644 | 4328 | 72 | 0.12 | 1.2 | 2236 |
| 44 | 1459 | 77 | 1431 | 99 | 627 | 644 | 4328 | 72 | 0.12 | 1.2 | 2236 |
| 45 | 1459 | 77 | 1431 | 99 | 627 | 644 | 4328 | 72 | 0.12 | 1.2 | 2236 |
| 46 | 1459 | 77 | 1431 | 99 | 627 | 644 | 4328 | 72 | 0.12 | 1.2 | 2236 |
| 47 | 1459 | 77 | 1431 | 99 | 627 | 644 | 4328 | 72 | 0.12 | 1.2 | 2236 |
| 48 | 1488 | 89 | 1511 | 95 | 642 | 668 | 4497 | 72 | 0.12 | 1.2 | 2236 |
| 49 | 1488 | 89 | 1511 | 95 | 642 | 668 | 4497 | 72 | 0.12 | 1.2 | 2236 |
| 50 | 1488 | 89 | 1511 | 95 | 642 | 668 | 4497 | 72 | 0.12 | 1.2 | 2236 |
| 51 | 1488 | 89 | 1511 | 95 | 642 | 668 | 4497 | 72 | 0.12 | 1.2 | 2236 |
| 52 | 1488 | 89 | 1511 | 95 | 642 | 668 | 4497 | 72 | 0.12 | 1.2 | 2236 |
| 53 | 1488 | 89 | 1511 | 95 | 642 | 668 | 4497 | 72 | 0.12 | 1.2 | 2236 |
| 54 | 1488 | 89 | 1511 | 95 | 642 | 668 | 4497 | 72 | 0.12 | 1.2 | 2236 |
| 55 | 1488 | 89 | 1511 | 95 | 642 | 668 | 4497 | 72 | 0.12 | 1.2 | 2236 |
| 56 | 1488 | 89 | 1511 | 95 | 642 | 668 | 4497 | 72 | 0.12 | 1.2 | 2236 |
| 57 | 1488 | 89 | 1511 | 95 | 642 | 668 | 4497 | 72 | 0.12 | 1.2 | 2236 |
| 58 | 1488 | 89 | 1511 | 95 | 642 | 668 | 4497 | 72 | 0.12 | 1.2 | 2236 |
| 59 | 1488 | 89 | 1511 | 95 | 642 | 668 | 4497 | 72 | 0.12 | 1.2 | 2236 |
| 60 | 1488 | 89 | 1511 | 95 | 642 | 668 | 4497 | 72 | 0.12 | 1.2 | 2236 |
| 61 | 1488 | 89 | 1511 | 95 | 642 | 668 | 4497 | 72 | 0.12 | 1.2 | 2236 |
| 62 | 1503 | 91 | 1536 | 98 | 672 | 684 | 4698 | 72 | 0.12 | 1.2 | 2236 |
| 63 | 1503 | 91 | 1536 | 98 | 672 | 684 | 4698 | 72 | 0.12 | 1.2 | 2236 |
| 64 | 1503 | 91 | 1536 | 98 | 672 | 684 | 4698 | 72 | 0.12 | 1.2 | 2236 |
| 65 | 1503 | 91 | 1536 | 98 | 672 | 684 | 4698 | 72 | 0.12 | 1.2 | 2236 |

RANDALL MFG

## *Non-woven Geotextile Properties*
## *TE-12 4.57m x 91.44m*

*Production Date: 7/08/2022*
*Lot: 202275*
*PO: 2524*

| | Tensile ASTM D4632 (MD) | Elongation ASTM D4632 (MD) | Tensile ASTM D4632 (CD) | Elongation ASTM D4632 (CD) | Trap Tear ASTM D4533 (MD) | Trap Tear ASTM D4533 (CD) | CBR Puncture ASTM D6241 | FOS CGS B-148 | AOS - D 4751 | Permitivity ASTM D4491 | Water Flow ASTM D4491 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | N | N | µm | mm | Sec-1 | L/min/M2 |
| 66 | 1503 | 91 | 1536 | 98 | 672 | 684 | 4698 | 72 | 0.12 | 1.2 | 2236 |
| 67 | 1503 | 91 | 1536 | 98 | 672 | 684 | 4698 | 72 | 0.12 | 1.2 | 2236 |
| 68 | 1503 | 91 | 1536 | 98 | 672 | 684 | 4698 | 72 | 0.12 | 1.2 | 2236 |
| 69 | 1503 | 91 | 1536 | 98 | 672 | 684 | 4698 | 72 | 0.12 | 1.2 | 2236 |
| 70 | 1503 | 91 | 1536 | 98 | 672 | 684 | 4698 | 72 | 0.12 | 1.2 | 2236 |
| 71 | 1503 | 91 | 1536 | 98 | 672 | 684 | 4698 | 72 | 0.12 | 1.2 | 2236 |
| 72 | 1503 | 91 | 1536 | 98 | 672 | 684 | 4698 | 72 | 0.12 | 1.2 | 2236 |
| 73 | 1503 | 91 | 1536 | 98 | 672 | 684 | 4698 | 72 | 0.12 | 1.2 | 2236 |
| 74 | 1503 | 91 | 1536 | 98 | 672 | 684 | 4698 | 72 | 0.12 | 1.2 | 2236 |
| 75 | 1431 | 83 | 1457 | 103 | 654 | 671 | 4326 | 72 | 0.12 | 1.2 | 2236 |
| 76 | 1431 | 83 | 1457 | 103 | 654 | 671 | 4326 | 72 | 0.12 | 1.2 | 2236 |
| 77 | 1431 | 83 | 1457 | 103 | 654 | 671 | 4326 | 72 | 0.12 | 1.2 | 2236 |
| 78 | 1431 | 83 | 1457 | 103 | 654 | 671 | 4326 | 72 | 0.12 | 1.2 | 2236 |
| 79 | 1431 | 83 | 1457 | 103 | 654 | 671 | 4326 | 72 | 0.12 | 1.2 | 2236 |
| 80 | 1431 | 83 | 1457 | 103 | 654 | 671 | 4326 | 72 | 0.12 | 1.2 | 2236 |
| 81 | 1431 | 83 | 1457 | 103 | 654 | 671 | 4326 | 72 | 0.12 | 1.2 | 2236 |
| 82 | 1431 | 83 | 1457 | 103 | 654 | 671 | 4326 | 72 | 0.12 | 1.2 | 2236 |
| 83 | 1431 | 83 | 1457 | 103 | 654 | 671 | 4326 | 72 | 0.12 | 1.2 | 2236 |
| 84 | 1431 | 83 | 1457 | 103 | 654 | 671 | 4326 | 72 | 0.12 | 1.2 | 2236 |

Lab values in this document were obtained at the time of production. Handling and storage conditions may change certain properties. Final put up rolls are taken from a single master roll and have identical properties.

*Randall Manufacturing Inc.*

RANDALL MFG

## *Non-woven Geotextile Properties*
## *TE-12 4.57m x 91.44m*

*Production Date: 7/08/2022*
*Lot: 202275*
*PO: 2524*

| | Tensile ASTM D4632 (MD) | Elongation ASTM D4632 (MD) | Tensile ASTM D4632 (CD) | Elongation ASTM D4632 (CD) | Trap Tear ASTM D4533 (MD) | Trap Tear ASTM D4533 (CD) | CBR Puncture ASTM D6241 | FOS CGS B-148 | AOS - D 4751 | Permitivity ASTM D4491 | Water Flow ASTM D4491 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | N | N | µm | mm | Sec-1 | L/min/M2 |
| 85 | 1428 | 87 | 1442 | 95 | 634 | 662 | 4269 | 72 | 0.12 | 1.2 | 2236 |
| 86 | 1428 | 87 | 1442 | 95 | 634 | 662 | 4269 | 72 | 0.12 | 1.2 | 2236 |
| 87 | 1428 | 87 | 1442 | 95 | 634 | 662 | 4269 | 72 | 0.12 | 1.2 | 2236 |
| 88 | 1428 | 87 | 1442 | 95 | 634 | 662 | 4269 | 72 | 0.12 | 1.2 | 2236 |
| 89 | 1428 | 87 | 1442 | 95 | 634 | 662 | 4269 | 72 | 0.12 | 1.2 | 2236 |
| 90 | 1428 | 87 | 1442 | 95 | 634 | 662 | 4269 | 72 | 0.12 | 1.2 | 2236 |
| 91 | 1428 | 87 | 1442 | 95 | 634 | 662 | 4269 | 72 | 0.12 | 1.2 | 2236 |
| 92 | | | | | | | | | | | |
| 93 | | | | | | | | | | | |
| 94 | | | | | | | | | | | |
| 95 | | | | | | | | | | | |
| 96 | | | | | | | | | | | |
| 97 | | | | | | | | | | | |
| 98 | | | | | | | | | | | |
| 99 | | | | | | | | | | | |
| 100 | | | | | | | | | | | |
| 101 | | | | | | | | | | | |
| 102 | | | | | | | | | | | |
| 103 | | | | | | | | | | | |
| 104 | | | | | | | | | | | |
| 105 | | | | | | | | | | | |
| 106 | | | | | | | | | | | |
| 107 | | | | | | | | | | | |

# TE-12 Mill Certificate

**Titan Environmental**
**777 Quest Blvd**
**Ille des Chênes, MB R0A 0T1**
**Canada**

Production Date: 7/08/2022
Lot: 202275
PO: 202275

This document certifies Titan Environmental TE-12 is a non-woven needle punched geotextile composed of polypropylene fibers, formed in a three-dimenstional stable network and finished such that fibers retain their relative position. Polypropylene geotextile is inert to biological degradation and resistant to naturally ecountered chemicals, alkalis, and acids.

| *Mechanical Properties* | | *Method* | *Minimum Avg Roll Value* |
|---|---|---|---|
| Grab Tensile Strength | (MD) | ASTM D4632 | 1330 N |
| Grab Tensile Strength | (CD) | ASTM D4632 | 1330 N |
| Grab Elongation | (MD) | ASTM D4632 | 50% |
| Grab Elongation | (CD) | ASTM D4632 | 50% |
| Trap Tear Strength | (MD) | ASTM D4533 | 511 N |
| Trap Tear Strength | (CD) | ASTM D4533 | 511 N |
| CBR Puncture Strength | | ASTM D6241 | 3780 N |
| UV Resistance 500 HRS | | ASTM D4355 | 70% |

| *Hydraulic Properties* | *Method* | *Minimum Avg Roll Value* |
|---|---|---|
| Filtration Opening Size | CGS B-148 | 70 - 120 µm |
| Apparent Opening Size* | ASTM D4751 | 0.15mm* |
| Permittivity | ASTM D4491 | 1.0 sec-1 |
| Water Flow Rate | ASTM D4491 | 2035 L/min/m2 |

Values stated are mimimum average roll values with the exception of Apparent Opening Size(*). Apparent Opening Size value is specified as maximum average roll value.

Randall Manufacturing Inc.
95 Gerald Parkway
Thorndale, ON N0M 2P0
Canada

RANDALL MFG

Matt Clarke

*Matt Clarke*
*General Manager*

APPENDIX

# F-2 TE-8 GEOTEXTILE

TITAN INV: 1989
PO2451

TITAN
ENVIRONMENTAL CONTAINMENT

| Packing List | | | | | | | | | Test Reports | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Sr. No. | PRODUCT NAME | COLOUR | WIDTH MTR | LENGTH MTR | SQ. YARD | SQ MTR | G. WT | N.WT | Grab Strength (205 lbs) | Grab Elongation (50%) | Trapezoid Tear (75 lbs) | CRB Puncture (475 lbs) | Water Flow 4481 $l/m^2/m$ |
| PG080 Width 15 Feet X 300 Feet | | | | | | | | | | | | | |
| 1. | PG080 | Black | 15 | 300 | 500 | 418.22 | 95.000 | 89.200 | | | | | |
| 2. | PG080 | Black | 15 | 300 | 500 | 418.22 | 105.900 | 100.100 | | | | | |
| 3. | PG080 | Black | 15 | 300 | 500 | 418.22 | 103.300 | 97.500 | | | | | |
| 4. | PG080 | Black | 15 | 300 | 500 | 418.22 | 97.100 | 91.300 | | | | | |
| 5. | PG080 | Black | 15 | 300 | 500 | 418.22 | 100.800 | 95.000 | | | | | |
| 6. | PG080 | Black | 15 | 300 | 500 | 418.22 | 97.800 | 92.000 | | | | | |
| 7. | PG080 | Black | 15 | 300 | 500 | 418.22 | 100.900 | 95.100 | | | | | |
| 8. | PG080 | Black | 15 | 300 | 500 | 418.22 | 96.900 | 91.100 | | | | | |
| 9. | PG080 | Black | 15 | 300 | 500 | 418.22 | 102.100 | 96.300 | | | | | |
| 10. | PG080 | Black | 15 | 300 | 500 | 418.22 | 103.200 | 97.400 | | | | | |
| 11. | PG080 | Black | 15 | 300 | 500 | 418.22 | 102.300 | 96.500 | | | | | |
| 12. | PG080 | Black | 15 | 300 | 500 | 418.22 | 98.400 | 92.600 | | | | | |
| 13. | PG080 | Black | 15 | 300 | 500 | 418.22 | 101.700 | 95.900 | | | | | |
| 14. | PG080 | Black | 15 | 300 | 500 | 418.22 | 101.500 | 95.700 | | | | | |
| 15. | PG080 | Black | 15 | 300 | 500 | 418.22 | 97.200 | 91.400 | 207 | 55 | 77 | 477 | 4490 |
| 16. | PG080 | Black | 15 | 300 | 500 | 418.22 | 99.000 | 93.200 | | | | | |
| 17. | PG080 | Black | 15 | 300 | 500 | 418.22 | 95.600 | 89.800 | | | | | |
| 18. | PG080 | Black | 15 | 300 | 500 | 418.22 | 94.300 | 88.500 | | | | | |
| 19. | PG080 | Black | 15 | 300 | 500 | 418.22 | 101.700 | 95.900 | | | | | |
| 20. | PG080 | Black | 15 | 300 | 500 | 418.22 | 109.800 | 104.000 | | | | | |
| 21. | PG080 | Black | 15 | 300 | 500 | 418.22 | 107.800 | 102.000 | | | | | |
| 22. | PG080 | Black | 15 | 300 | 500 | 418.22 | 103.500 | 97.700 | | | | | |
| 23. | PG080 | Black | 15 | 300 | 500 | 418.22 | 109.200 | 103.400 | | | | | |
| 24. | PG080 | Black | 15 | 300 | 500 | 418.22 | 99.100 | 93.300 | | | | | |
| 25. | PG080 | Black | 15 | 300 | 500 | 418.22 | 95.200 | 89.400 | | | | | |
| 26. | PG080 | Black | 15 | 300 | 500 | 418.22 | 97.200 | 91.400 | | | | | |
| 27. | PG080 | Black | 15 | 300 | 500 | 418.22 | 97.100 | 91.300 | 205 | 52 | 76 | 475 | 4490 |
| 28. | PG080 | Black | 15 | 300 | 500 | 418.22 | 100.800 | 95.000 | | | | | |

TITAN INV: 1989
PO2451

TITAN
ENVIRONMENTAL CONTAINMENT

| Packing List | | | | | | | | | Test Reports | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Sr. No. | PRODUCT NAME | COLOUR | WIDTH MTR | LENGTH MTR | SQ. YARD | SQ MTR | G. WT | N.WT | Grab Strength (205 lbs) | Grab Elongation (50%) | Trapezoid Tear (75 lbs) | CRB Puncture (475 lbs) | Water Flow 4481 l/m²/m |
| PG080 Width 15 Feet X 300 Feet | | | | | | | | | | | | | |
| 29. | PG080 | Black | 15 | 300 | 500 | 418.22 | 97.800 | 92.000 | | | | | |
| 30. | PG080 | Black | 15 | 300 | 500 | 418.22 | 100.900 | 95.100 | | | | | |
| 31. | PG080 | Black | 15 | 300 | 500 | 418.22 | 96.900 | 91.100 | | | | | |
| 32. | PG080 | Black | 15 | 300 | 500 | 418.22 | 102.100 | 96.300 | | | | | |
| 33. | PG080 | Black | 15 | 300 | 500 | 418.22 | 103.200 | 97.400 | | | | | |
| 34. | PG080 | Black | 15 | 300 | 500 | 418.22 | 102.300 | 96.500 | | | | | |
| 35. | PG080 | Black | 15 | 300 | 500 | 418.22 | 98.400 | 92.600 | | | | | |
| 36. | PG080 | Black | 15 | 300 | 500 | 418.22 | 101.700 | 95.900 | | | | | |
| 37. | PG080 | Black | 15 | 300 | 500 | 418.22 | 101.500 | 95.700 | | | | | |
| 38. | PG080 | Black | 15 | 300 | 500 | 418.22 | 97.200 | 91.400 | | | | | |
| 39. | PG080 | Black | 15 | 300 | 500 | 418.22 | 99.000 | 93.200 | | | | | |
| 40. | PG080 | Black | 15 | 300 | 500 | 418.22 | 95.600 | 89.800 | | | | | |
| 41. | PG080 | Black | 15 | 300 | 500 | 418.22 | 97.100 | 91.300 | | | | | |
| 42. | PG080 | Black | 15 | 300 | 500 | 418.22 | 100.800 | 95.000 | 206 | 55 | 77 | 476 | 4490 |
| 43. | PG080 | Black | 15 | 300 | 500 | 418.22 | 97.800 | 92.000 | | | | | |
| 44. | PG080 | Black | 15 | 300 | 500 | 418.22 | 100.900 | 95.100 | | | | | |
| 45. | PG080 | Black | 15 | 300 | 500 | 418.22 | 96.900 | 91.100 | | | | | |
| 46. | PG080 | Black | 15 | 300 | 500 | 418.22 | 102.100 | 96.300 | | | | | |
| 47. | PG080 | Black | 15 | 300 | 500 | 418.22 | 103.200 | 97.400 | | | | | |
| 48. | PG080 | Black | 15 | 300 | 500 | 418.22 | 102.300 | 96.500 | | | | | |
| 49. | PG080 | Black | 15 | 300 | 500 | 418.22 | 98.400 | 92.600 | | | | | |
| 50. | PG080 | Black | 15 | 300 | 500 | 418.22 | 101.700 | 95.900 | | | | | |
| 51. | PG080 | Black | 15 | 300 | 500 | 418.22 | 101.500 | 95.700 | | | | | |
| 52. | PG080 | Black | 15 | 300 | 500 | 418.22 | 97.200 | 91.400 | | | | | |
| 53. | PG080 | Black | 15 | 300 | 500 | 418.22 | 99.000 | 93.200 | | | | | |
| 54. | PG080 | Black | 15 | 300 | 500 | 418.22 | 95.600 | 89.800 | | | | | |
| 55. | PG080 | Black | 15 | 300 | 500 | 418.22 | 97.800 | 92.000 | | | | | |
| 56. | PG080 | Black | 15 | 300 | 500 | 418.22 | 97.100 | 91.300 | | | | | |

TITAN INV: 1989
PO2451

TITAN
ENVIRONMENTAL CONTAINMENT

| Packing List | | | | | | | | | Test Reports | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Sr. No. | PRODUCT NAME | COLOUR | WIDTH MTR | LENGTH MTR | SQ. YARD | SQ MTR | G. WT | N.WT | Grab Strength (205 lbs) | Grab Elongation (50%) | Trapezoid Tear (75 lbs) | CRB Puncture (475 lbs) | Water Flow 4481 l/m²/m |
| PG080 Width 15 Feet X 300 Feet | | | | | | | | | | | | | |
| 57. | PG080 | Black | 15 | 300 | 500 | 418.22 | 100.800 | 95.000 | 207 | 55 | 77 | 477 | 4490 |
| 58. | PG080 | Black | 15 | 300 | 500 | 418.22 | 97.800 | 92.000 | | | | | |
| 59. | PG080 | Black | 15 | 300 | 500 | 418.22 | 100.900 | 95.100 | | | | | |
| 60. | PG080 | Black | 15 | 300 | 500 | 418.22 | 96.900 | 91.100 | | | | | |
| 61. | PG080 | Black | 15 | 300 | 500 | 418.22 | 102.100 | 96.300 | | | | | |
| 62. | PG080 | Black | 15 | 300 | 500 | 418.22 | 103.200 | 97.400 | | | | | |
| 63. | PG080 | Black | 15 | 300 | 500 | 418.22 | 102.300 | 96.500 | | | | | |
| 64. | PG080 | Black | 15 | 300 | 500 | 418.22 | 98.400 | 92.600 | | | | | |
| 65. | PG080 | Black | 15 | 300 | 500 | 418.22 | 101.700 | 95.900 | | | | | |
| 66. | PG080 | Black | 15 | 300 | 500 | 418.22 | 101.500 | 95.700 | | | | | |
| 67. | PG080 | Black | 15 | 300 | 500 | 418.22 | 97.200 | 91.400 | | | | | |
| 68. | PG080 | Black | 15 | 300 | 500 | 418.22 | 99.000 | 93.200 | | | | | |
| 69. | PG080 | Black | 15 | 300 | 500 | 418.22 | 95.600 | 89.800 | | | | | |
| 70. | PG080 | Black | 15 | 300 | 500 | 418.22 | 97.100 | 91.300 | | | | | |
| 71. | PG080 | Black | 15 | 300 | 500 | 418.22 | 100.800 | 95.000 | | | | | |
| 72. | PG080 | Black | 15 | 300 | 500 | 418.22 | 97.800 | 92.000 | 207 | 55 | 77 | 477 | 4490 |
| 73. | PG080 | Black | 15 | 300 | 500 | 418.22 | 100.900 | 95.100 | | | | | |
| 74. | PG080 | Black | 15 | 300 | 500 | 418.22 | 96.900 | 91.100 | | | | | |
| 75. | PG080 | Black | 15 | 300 | 500 | 418.22 | 102.100 | 96.300 | | | | | |
| 76. | PG080 | Black | 15 | 300 | 500 | 418.22 | 103.200 | 97.400 | | | | | |
| 77. | PG080 | Black | 15 | 300 | 500 | 418.22 | 102.300 | 96.500 | | | | | |
| 78. | PG080 | Black | 15 | 300 | 500 | 418.22 | 98.400 | 92.600 | | | | | |
| 79. | PG080 | Black | 15 | 300 | 500 | 418.22 | 101.700 | 95.900 | | | | | |
| 80. | PG080 | Black | 15 | 300 | 500 | 418.22 | 101.500 | 95.700 | | | | | |
| 81. | PG080 | Black | 15 | 300 | 500 | 418.22 | 97.200 | 91.400 | | | | | |
| 82. | PG080 | Black | 15 | 300 | 500 | 418.22 | 99.000 | 93.200 | | | | | |
| 83. | PG080 | Black | 15 | 300 | 500 | 418.22 | 95.600 | 89.800 | | | | | |
| 84. | PG080 | Black | 15 | 300 | 500 | 418.22 | 97.200 | 91.400 | | | | | |

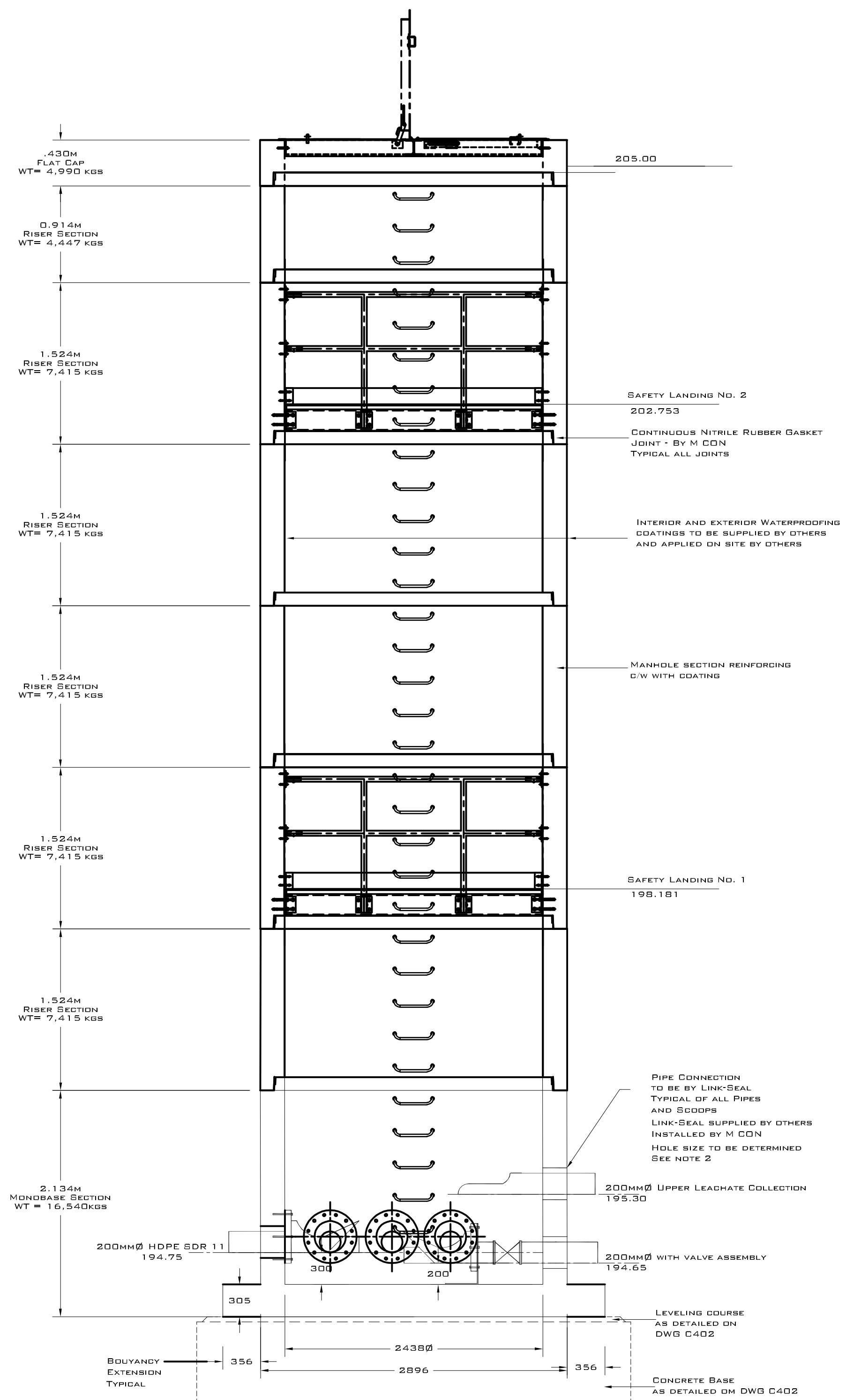
TITAN INV: 1989
PO2451

| Packing List | | | | | | | | | Test Reports | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Sr. No. | PRODUCT NAME | COLOUR | WIDTH MTR | LENGTH MTR | SQ. YARD | SQ MTR | G. WT | N.WT | Grab Strength (205 lbs) | Grab Elongation (50%) | Trapezoid Tear (75 lbs) | CRB Puncture (475 lbs) | Water Flow 4481 l/m²/m |
| **PG080 Width 15 Feet X 300 Feet** | | | | | | | | | | | | | |
| 85. | PG080 | Black | 15 | 300 | 500 | 418.22 | 99.000 | 93.200 | 205 | 52 | 76 | 475 | 4490 |

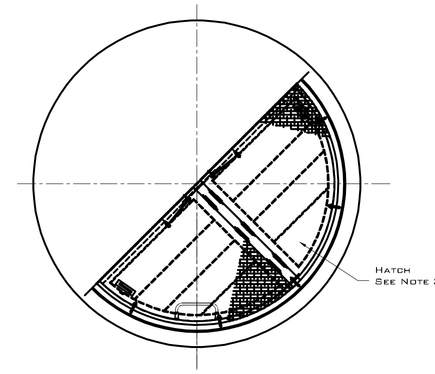
# APPENDIX

# G APPROVED SHOP DRAWINGS AND PRODUCT DATA

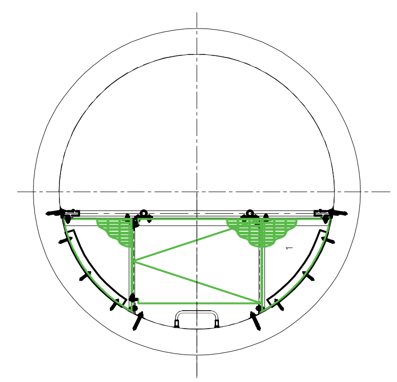
# G-1 MANHOLES (MH4 AND MH8)



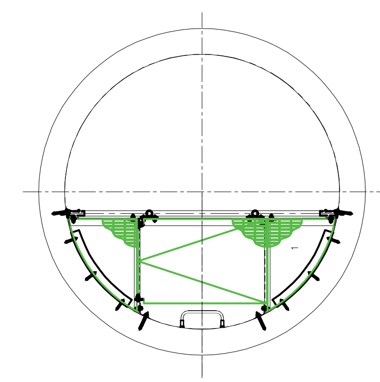

SECTION A-A
MHL 4



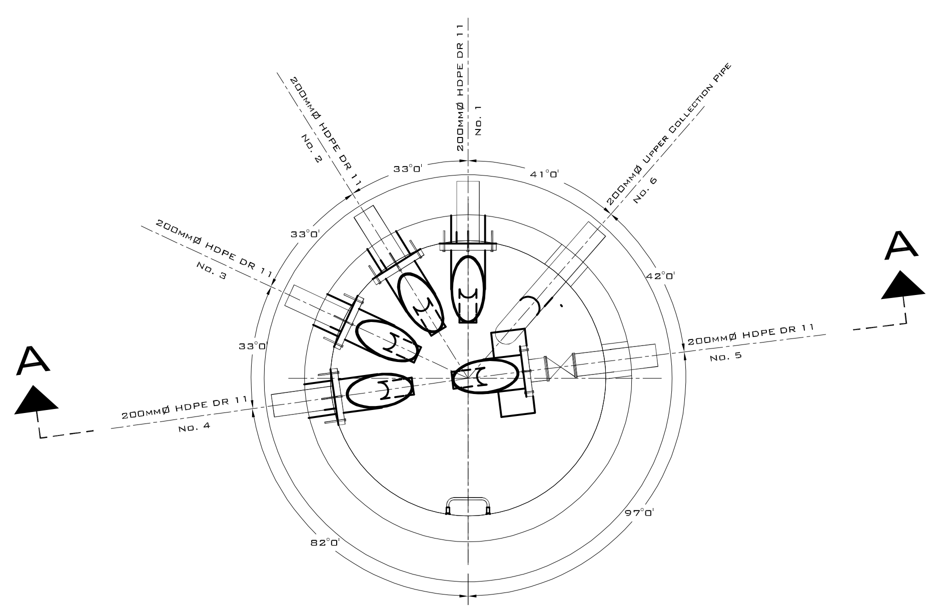

PLAN
Half Hatch Elevation



PLAN
Safety Landing No. 1



PLAN
Safety Landing No. 2




PLAN
Elevation Below Safety Grate No. 1

wsp SHOP DRAWING DATA SHEET

*Affixing this stamp confirms that an administrative approval and/or a verification of compliance with shop drawings or specifications was made, but does not entail the liability of the author of the work or its owner with regards to this shop drawing or data sheet, for which the contractor is the sole responsible.*

- [x] Reviewed
- [ ] Revise and resubmit
- [ ] Rejected
- [ ] Revise as noted

*The contractor, supplier and/or sub-contractor is responsible for: confirming and coordinating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating his or her work with that of all other trades and performing all work in a safe and satisfactory manner.*

By: Date: 2022/05/11

Project #: RFP-40-21


M CON
PIPE & PRODUCTS INC
PO Box 1191
2691 Greenfield Road
Ayr, Ontario
N0B 1E0
TEL 519-632-9112
866-537-3338
FAX 519-632-7440


## Manhole No. 4 Notes

1. Precast monobase section designed and manufactured to prevent bouyancy.
   - Overall design by GM BluePlan.
2. Precast riser sections designed and manufactured as per OPSD 701.013,
   - Welded wire fabric reinforcing - CSA G30.15
   - Reinforcing coating by M CON
   - Concrete strength: 40MPa
   - Pipe connection type as per contract drawings - Pipe Scoop to be supplied by others and installed by M Con - Ayr Plant.
     Link-Seal for pipe scoop install to be supplied by others and installed by M Con - Ayr Plant.
   - Additional items not detailed are to be supplied and installed by others including;
     - Interior and exterior waterproofing coatings
     - Valve operating stem
3. Access hatch;
   - Hatch depicted as MSU Type AL-96 - to be confirmed
   - Design and fabrication by MSU Mississauga -
   - Hatch supplied by Todd Bros. Contracting and installed by M Con
4. All dimensions are in millimetres unless otherwise specified.

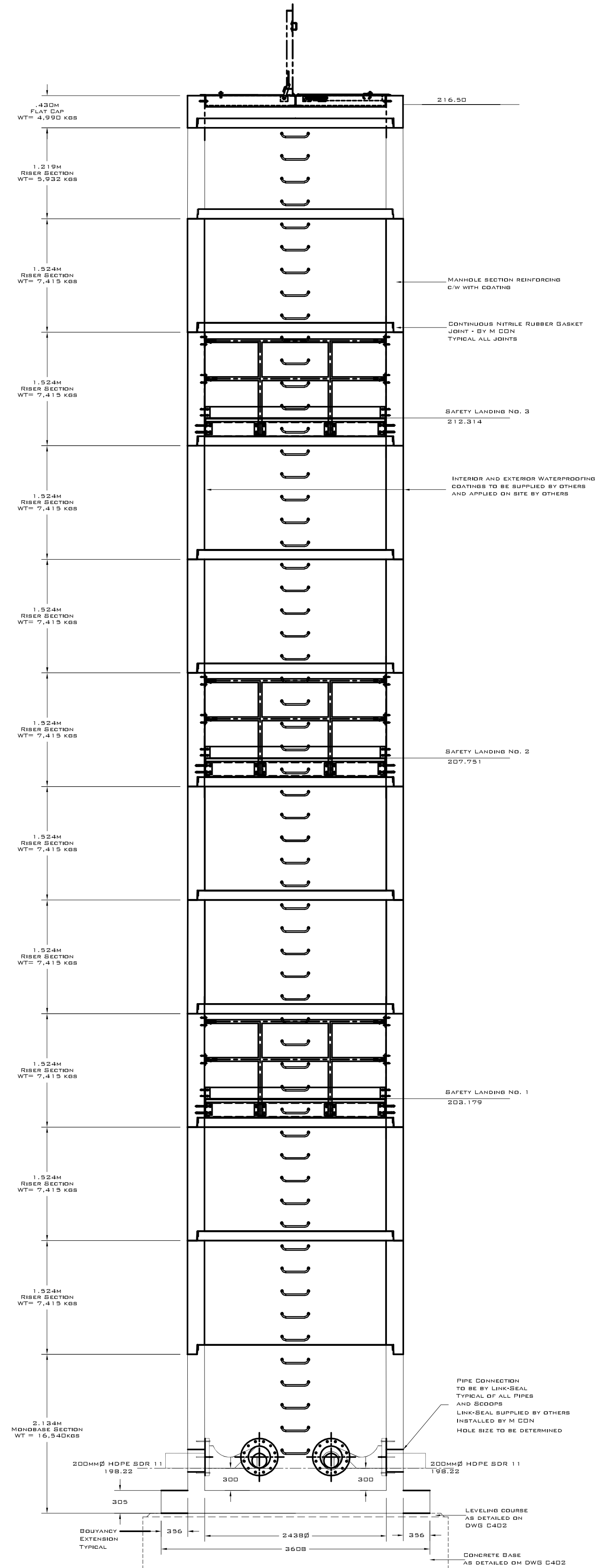
## Section Weights ⚠

| | |
|---|---|
| 2400mm x 0.430m Section - | 4,930 kgs |
| 2400mm x 0.914m Riser Section - | 4,447 kgs |
| 2400mm x 1.524m Riser Section - | 7,415 kgs |
| 2400mm x 2.134m Monobase Section - | 16,540 kgs |

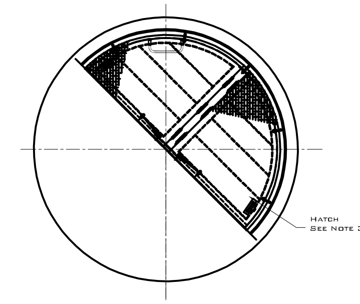
Revisions

| | | |
|---|---|---|
| 1 | Component weight adjustments | May10-22 |
| 2 | | |
| 3 | | |
| 4 | | |
| | | |

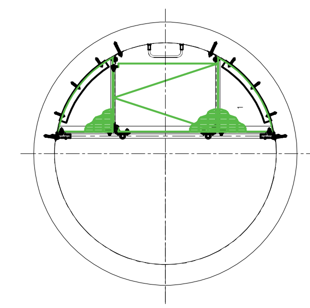
| | |
|---|---|
| Project: | North Fill Area - Cell 4<br>MHL 4<br>2400mmØ Maintenance Hole Detail<br>Precast Components as supplied by M CON |
| Location: | Peterborough Landfill<br>Peterborough, Ontario |
| Consultant: | WSP |
| Dwg.#: | 22-167-1 |
| File: | N:\Common\Orders\2022 Job Folders\22-167-Todd Bros - Peterborough Landfill\22-167 - Todd Bros - Peterborough Landfill - 2400mm Manholes.dwg |
| Contractor: | Todd Brothers Contracting Ltd. |
| Date: | April 19, 2022 |
| Scale: | NTS |
| Sheet: | 1 of 1 |
| Chk'd by: | Dwn by: S.K. |



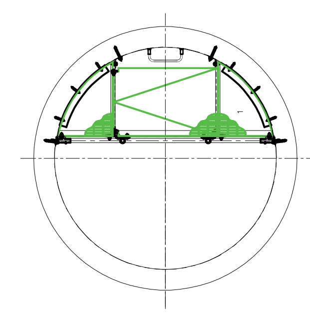

SECTION A-A
MHL 8



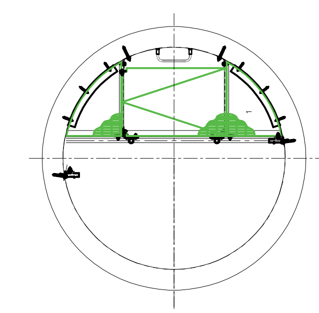

PLAN
HALF HATCH ELEVATION



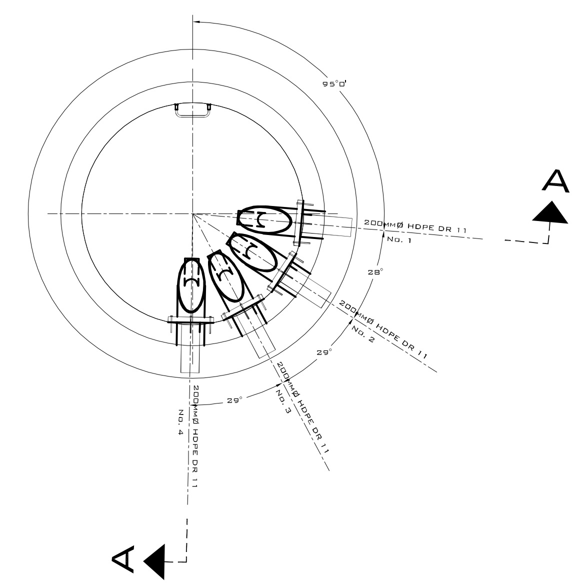
PLAN
SAFETY LANDING NO. 3



PLAN
SAFETY LANDING NO. 1



PLAN
SAFETY LANDING NO. 2




PLAN
ELEVATION BELOW SAFETY GRATE NO. 1

wsp

SHOP DRAWING
DATA SHEET

*Affixing this stamp confirms that an administrative approval and/or a verification of compliance with shop drawings or specifications was made, but does not entail the liability of the author of the work or its owner with regards to this shop drawing or data sheet, for which the contractor is the sole responsible.*

- [x] Reviewed
- [ ] Revise and resubmit
- [ ] Rejected
- [ ] Revise as noted

*The contractor, supplier and/or sub-contractor is responsible for: comfirming and coordinating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating his or her work with that of all other trades and performing all work in a safe and satisfactory manner.*

By: Date: 2022/05/11

Project #: RFP-40-21

# M CON
PIPE & PRODUCTS INC


PO Box 1191
2691 Greenfield Road
Ayr, Ontario
N0B 1E0

TEL 519-632-9112
866-537-3338
FAX 519-632-7440


## MANHOLE NO. 8 NOTES

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   - Overall design by GM BluePlan.
2. Precast riser sections designed and manufactured as per OPSD 701.013.
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   - Reinforcing coating by M CON
   - Concrete strength: 40MPa
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   - Additional items not detailed are to be supplied and installed by others including;
     - Interior and exterior waterproofing coatings
     - Valve operating stem
3. Access hatch;
   - Hatch depicted as MSU Type AL-96 - to be confirmed
   - Design and fabrication by MSU Mississauga -
   - Hatch supplied by Todd Bros. Contracting and installed by M CON
4. All dimensions are in millimetres unless otherwise specified.

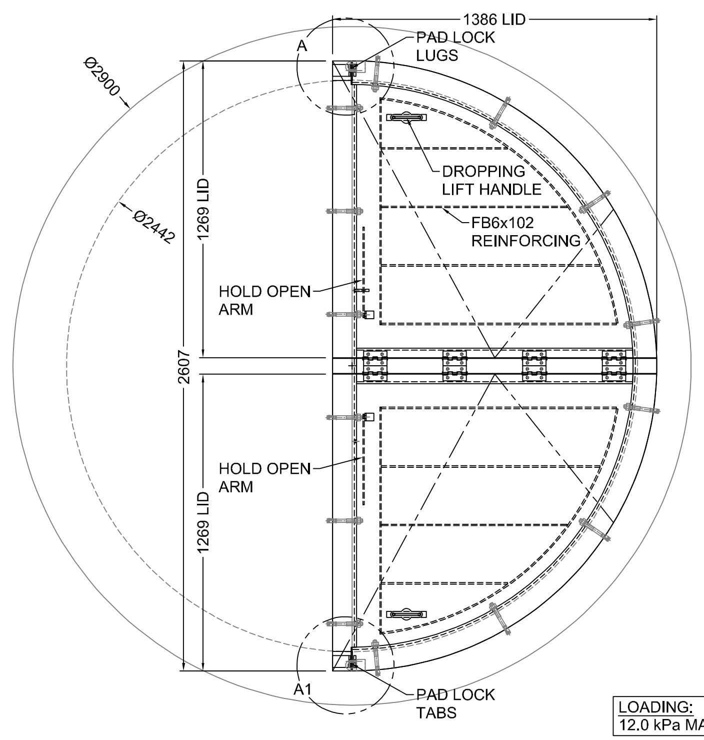
SECTION WEIGHTS △1

| | |
|---|---|
| 2400mm x .430m Flat Cap Section - | 4,930 kgs |
| 2400mm x 1.219m Riser Section - | 5,932 kgs |
| 2400mm x 1.524m Riser Section - | 7,415 kgs |
| 2400mm x 2.134m Monobase Section - | 16,540 kgs |

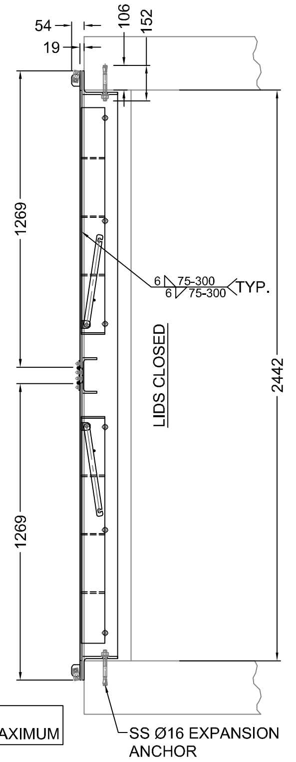
REVISIONS

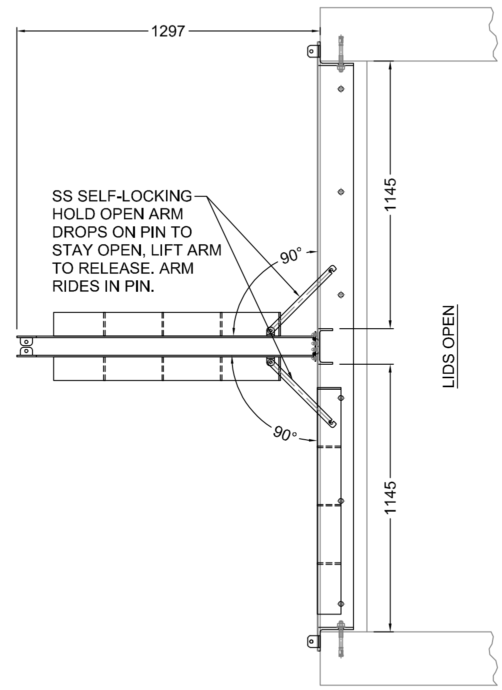
| | | |
|---|---|---|
| △1 | Component weight adjustments | MAY10-22 |
| △2 | | |
| △3 | | |
| △4 | | |
| | | |

| | |
|---|---|
| Project: | North Fill Area - Cell 4<br>MHL 8<br>2400mmØ Maintenance Hole Detail<br>Precast Components as supplied by M CON |
| Location: | Peterborough Landfill<br>Peterborough, Ontario |
| Consultant: | WSP |
| Dwg.#: | 22-167-2 |
| File: | N:\Common\Orders\2022 Job Folders\22-167-Todd Bros - Peterborough Landfill\22-167 - Todd Bros - Peterborough Landfill - 2400mm Manholes.dwg |
| Contractor: | Todd Brothers Contracting Ltd. |
| Date: | April 19, 2022 |
| Scale: | NTS |
| Sheet: | 1 of 1 |
| Chk'd by: | Dwn by: S.K. |




LOADING:
12.0 kPa MAXIMUM



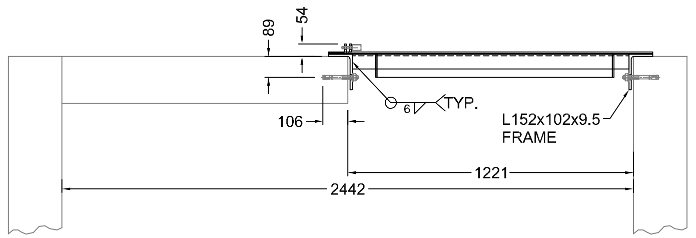

wsp
SHOP DRAWING
DATA SHEET

*Affixing this stamp confirms that an administrative approval and/or a verification of compliance with shop drawings or specifications was made, but does not entail the liability of the author of the work or its owner with regards to this shop drawing or data sheet, for which the contractor is the sole responsible.*

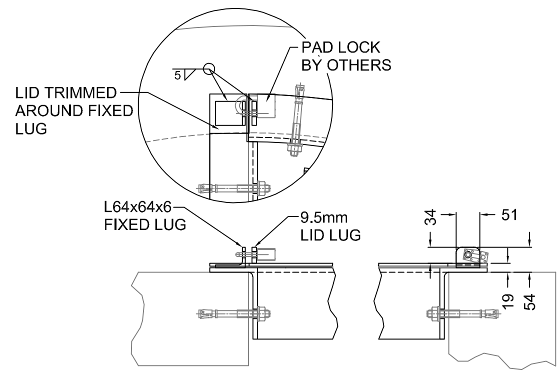
- [x] Reviewed
- [ ] Revise and resubmit
- [ ] Rejected
- [ ] Revise as noted

*The contractor, supplier and/or sub-contractor is responsible for: confirming and coordinating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating his or her work with that of all other trades and performing all work in a safe and satisfactory manner.*

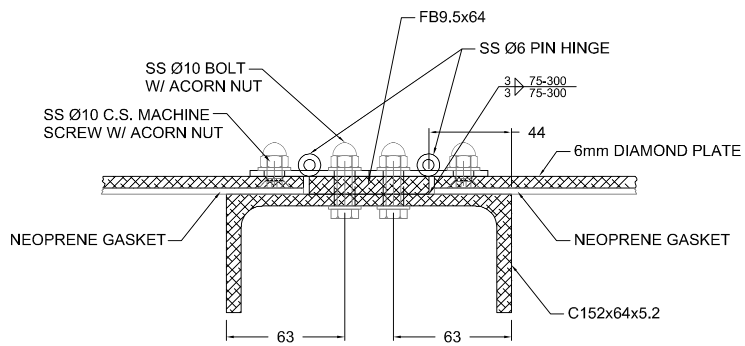
By: ______ Date: 2022/05/11
Project #: RFP-40-21




ALUMINUM IN CONTACT WITH
CONCRETE OR DISSIMILAR METAL
TO HAVE (2) COATS BITUMASTIC




DETAIL 'A' - 'A1' SIMILAR




SECTION THRU HINGED LIDS

GENERAL ALUMINUM NOTES:
1. ALUMINUM SECTIONS AND PLATES TO CSA HA SERIES 6061 T6.
2. DESIGN, FABRICATION, ERECTION AS PER CAN3-S157. OBC 2012
3. WELDING AS PER CSA W47.2- LATEST EDITION.

REFERENCE DWG.: X

NOTES: ANCHORS - NOTES - ETC

BAR IS 25mm ON ORIGINAL DRAWING

| | | |
|---|---|---|
| QTY: | (1) ASSY. | DIMENSIONS ARE IN MILLIMETERS U.N.O |
| MATERIAL: | ALUMINUM U.N.O | |
| FINISH: | MILL | |
| INSTALLED BY: | X | TOLERANCE ± - |

| | | |
|---|---|---|
| R1 | MAY 9/22 | AS PER CUSTOMER |
| A | | ISSUED FOR APPROVAL |

REVISIONS

TRADE-TECH INDUSTRIES

| | | | |
|---|---|---|---|
| PROJECT No.: | 2804 | PROJECT TITLE: | NORTH FILL AREA - CELL 4 |
| CUSTOMER: | TODD BROTHERS CONSTRUCTION | | |
| DRAWING TITLE: | SEMI CIRCULAR HATCH @ 2400 CHAMBER | | |

| DRAWN: | CHECKED: | DATE: | SCALE: | SIZE: | DRAWING NUMBER: | REV |
|---|---|---|---|---|---|---|
| LUNT | | MAY 4/22 | NTS | C | 2804-01 | R1 |

# G-2 MANHOLE WATERPROOFING

INTERNATIONAL CHEM-CRETE CORPORATION
CORPORATE OFFICE
800 SECURITY ROW
RICHARDSON, TX 75081

Ref. CCC100-061516

June 15, 2016

Dear Sir,

This is to confirm that our CHEM-CRETE PAVIX® CCC100 applied to concrete substrates, and after it is fully cured, will resist gases produced from waste in landfills and sewage systems. Among these gases are ammonia, sulfides, methane and carbon dioxide. CHEM-CRETE PAVIX® CCC100 will also resist chemical solutions formed by these gases.

Due to its affinity to water, the hydrophilic and hygroscopic crystals formed by CHEM-CRETE PAVIX® CCC100 continually seek water and moisture in concrete. This will reduce the ability of these gases to become active when in contact with concrete and protect the concrete from deterioration by these gases or moisture.

We highly recommend CHEM-CRETE PAVIX® CCC100 for the protection of concrete sewer pipes, concrete sewer tanks, concrete sewer manholes, concrete lining in landfills and concrete landfill covers.

If you have any questions or need further information concerning the above, please don't hesitate to contact me.

Best Regards,

Radi Al-Rashed
President, International Chem-Crete Corporation

International Chem-Crete Corp.
www.chem-crete.com
800 Security Row
Richardson TX 75081

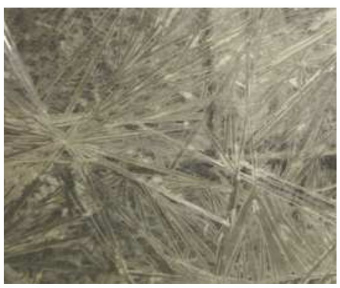
# CHEM-CRETE PAVIX®

**Concrete Water & Moisture Protection** Used for treatment and protection against water and moisture associated problems for all concrete and cementitious structures

## PRODUCT DESCRIPTION

Chem-Crete Pavix, is a patented dual crystalline penetrating concrete and masonry sealer that is 100% water-based compound ($H_2O$) containing only natural ingredients. Designed to protect surfaces from the delaminating effects of water, moisture saturation, freeze/thaw, Alkali Silica Reaction (ASR), and chloride ion penetration.

The protective properties are a distinctive surface repellent and moisture blocker, offering hygroscopic and hydrophilic capacities. Pavix is ideal for exterior or interior concrete and masonry surfaces and can be applied in both positive or negative side applications. Pavix will dramatically reduce maintenance costs and positively affect the life cycle of concrete and masonry products.



## ADVANTAGES & BENEFITS

- Can be used on green & cured concrete.
- 100% green, environmentally safe, & non-toxic.
- Reduce damage caused by repeated freezing and thawing cycles.
- Prevents concrete scaling.
- Seals and protects cracks up to 1/16th inch (1.5 mm).
- Reduces alkali-silica damage and can reduce silicate dusting.
- Can help reduce calcium oxychloride reaction due to use of magnesium chlorides.
- Reduces and/or eliminates early joint deterioration.
- Prevents penetration of chloride ions from de-icing salts.
- Excellent repelling properties that help prevent water, jet fuel, and oil from saturating into the surface.
- Helps concrete stay whiter and brighter.
- Protects reinforcing steel bars against corrosion without any negative effects on existing steel cathodic protection.
- Maximizes joint sealant adhesion by reducing moisture.
- Can be applied vertically, horizontally, and overhead.
- Provides long-lasting internal waterproofing and moisture blocking from positive and negative sides.
- Eliminates fungal growth.

## FIELDS OF APPLICATION

| | |
|---|---|
| Airports | Highways |
| Tunnels | Bridge structures |
| Ports authorities | Concrete structures |
| Parking surfaces & structures | Sidewalks & drives |
| Retaining walls | Precast/tilt concrete |

## PACKAGING

| Product | Packaging |
|---|---|
| CHEM-CRETE PAVIX CCC100 | 1 GAL (3.785 LITER) JUG |
| | 5 GAL (18.925 LITER) PAIL |
| | 55 GAL (208 LITER) DRUM |

## TECHNICAL SPECIFICATIONS

### Physical Properties

| | |
|---|---|
| Specific Gravity | 1.1 – 1.2 |
| Viscosity | 2.4 centipoises |
| Freezing Point | 25ºF (-3.89°C) |
| Boiling Point | 219ºF (104°C) |
| Color | Clear |
| Environmental Hazards | None |
| Drying Time @ 77ºF (25°C) | 2 – 3 hours |
| Odor | None |
| Toxicity | None |
| Fumes | None |
| Flammability | None |

**Product Performance:** PAVIX complies with the following test standards:

- ASTM C1202-91 Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration.
- AASHTO T260 Sampling and Testing for Chloride Ion in Concrete and Concrete Raw Materials.
- AASHTO T277 Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration.
- ASTM C-1567 Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar Bar Method).
- ASTM C1218 Water-Soluble Chloride in Mortar and Concrete.
- ASTM D6489-99 Determining the Water Absorption of Hardened Concrete Treated with a Water Repelling Coating.
- ASTM C642-97 Density, Absorption, and Voids in Hardened Concrete.
- ASTM C457-98 Microscopical Determination of Parameters of the Air-Void System in Hardened Concrete.
- ASTM D7234: Pull-Off Adhesion Strength of Coatings on Concrete.
- ASTM D4541-95 Pull-Off Strength of Coatings Using Portable Adhesion Testers.
- ASTM C1583: Bond Strength or Tensile Strength of Overlay Materials by Direct Tension.
- AASHTO T259-00 Resistance of Concrete to Chloride Ion Penetration.

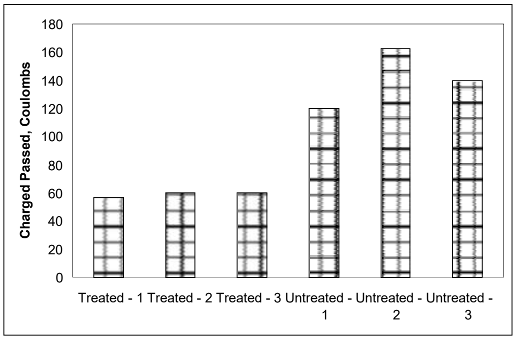



Fig. 1: ASTM C1202-91 & AASHTO T259: Chloride ion penetration tests on treated & untreated concrete samples

- ASTM C666-97 Resistance of Concrete to Rapid Freezing & Thawing.

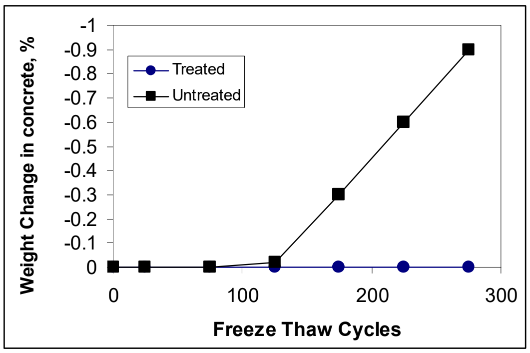



Fig. 2: ASTM C666-97: Freezing & thawing effect on treated & untreated concrete samples

- ASTM F609-96 Standard Test Method for Using a Horizontal Pull Slipmeter (HPS).
- ASTM E303-93 Measuring Surface Frictional Properties Using the British Pendulum Tester.

### Fresh Concrete

- ASTM C672-98 Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals.

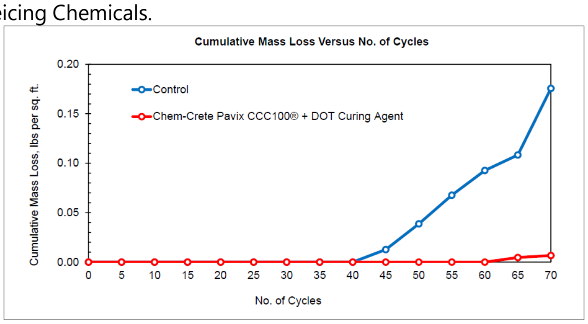
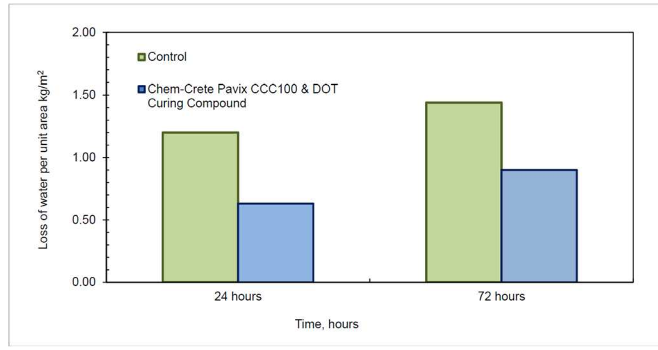



Fig. 3: ASTM C672-98 Scaling resistance of concrete surfaces exposed to deicing chemicals.

Control sample without Pavix and curing compound after 70 cycles of freezing and thawing

Sample with Pavix and curing compound after 70 cycles of freezing and thawing

- ASTM C156 Standard Test Method for Water Loss [from a Mortar Specimen] Through Liquid Membrane-Forming Curing Compounds for Concrete




**Fully cured or existing concrete:** Repair and seal joints, cracks, and voids greater than 1/16th inch prior to application. Concrete surfaces must be clean and sound prior to application of the product. Proper cleaning will open the surface pores and capillaries to enhance the penetration process. Compressed air can be used to remove dust and loose particles from the surface. Flushing the area to be treated with water can improve the cleaning process. However, for heavily contaminated areas special concrete cleaning agents such as Chem-Crete CONCLEAN CCC060 can be used to remove dirt, grease, and oil from those areas.

**Green/plastic application:**

1) A test should always be performed for product absorption.
2) Only consider an application when concrete finishing is completed.
3) Concrete should not be in duress and should be curing normally.
4) Apply when all bleed water has dissipated from the surface.
5) Apply Pavix uniformly and at the manufacturer's recommended rate.
6) DO NOT allow the Pavix to puddle or pool. Should Pavix puddle or pool, remove this condition immediately by the best way possible. Additional movement of product with a broom, vacuum, or air blower is recommended.
7) Application of membrane forming curing compound should then immediately commence and not longer than 20 minutes from the initial Pavix application.
8) Apply the membrane curing compound at manufacturer's recommended coverage rate.

**Coverage:** Apply at an average coverage rate of 150-200 $ft^2$/gal (3.7-4.9 $m^2$/liter) in one coat. Do not attempt additional coatings.

**Limitations:** Do not apply PAVIX in the following cases:

- If concrete surface temperature falls below 40°F (5°C).
- If the area has been previously treated with sealing agents unless the sealers are removed by chemical or mechanical means.

## STORAGE

PAVIX must be stored under room temperature. Cold temperatures may cause the product to crystallize. Shelf life is two years in its original unopened packaging. **Do not allow product to freeze.**

## SAFETY PRECAUTIONS

As with all construction chemical products, adequate precautions and care must be taken during usage and storage. Avoid direct contact with foodstuff, eyes, skin, and mouth. Any direct contact with skin should be washed thoroughly with clean running water and soap.

Always wear protective goggles and gloves. In case of eye contact, flush for 15 minutes with warm water. If eye irritation persists, seek medical attention. In case of ingestion or swallowing, drink 2 glasses of clean water and seek medical attention. Keep out of reach of children.

## TECHNICAL ASSISTANCE

Please contact International Chem-Crete Corporation for technical personnel.

## WARRANTY

**Limited Warranty**: International Chem-Crete Inc. warrants that, at the time and place we make shipment, our materials will be of good quality and will conform to our published specifications on the date of acceptance of the order.

**Disclaimer**: The information contained herein is included for illustrative purposes only and, to the best of our knowledge, is accurate and reliable. International Chem-Crete Corp. is not under any circumstances liable for the use of this information, as International Chem-Crete Corp. has no control over the use to which others may put its products. It is recommended that the products be tested to determine the suitability for specific applications and if our information is valid in particular circumstances. Responsibility remains with the architect, engineer, contractor, and owner of the application for proper installation of each product. Specifier and user shall determine the suitability of the product for specific application and assume all responsibility in connection therewith. AM160818PR1-3.

**Manufactured By:**

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Tel: (972) 671-6477, Fax: (972) 238-0307
contactus@chem-crete.com ● www.chem-crete.com

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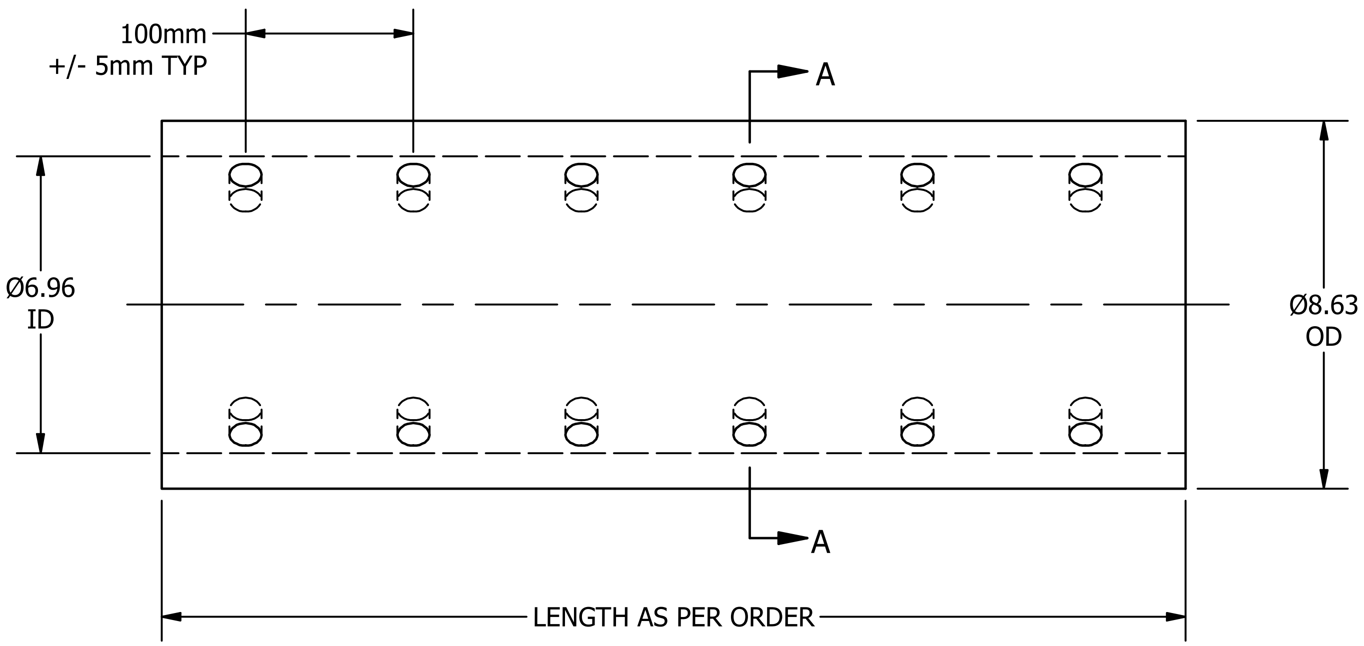
Stanicna 13, 90851 Holic, Slovakia
Tel: +421 34 668 3181 Fax: +421 34 668 3119
info@chem-crete.sk● www.chem-crete.sk

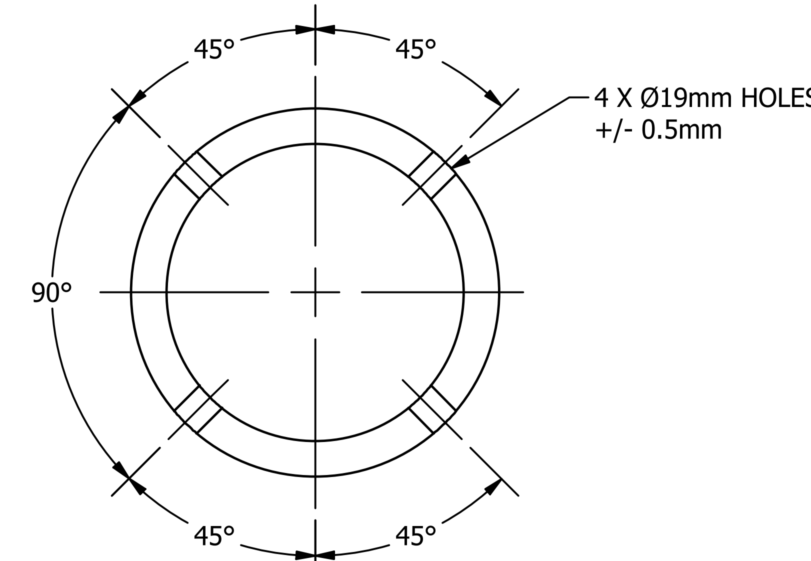
# G-3 HDPE PIPES

FOR APPROVAL

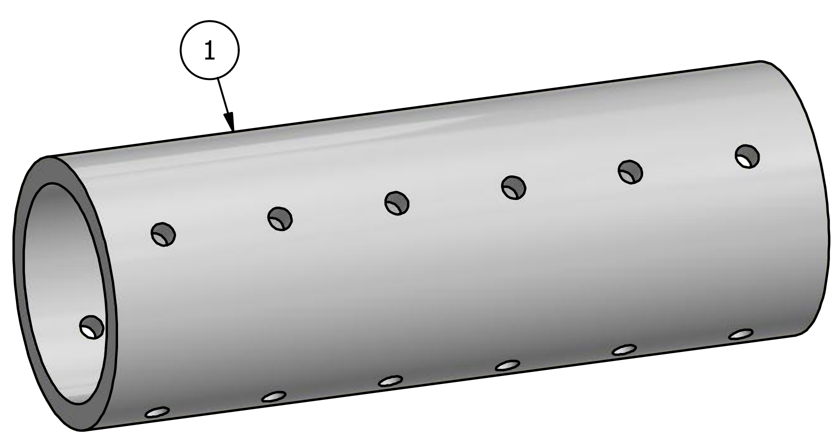
| BILL OF MATERIALS | | |
|---|---|---|
| ITEM | DESCRIPTION | QTY |
| 1 | 8" DR11 HDPE PERFORATED PIPE | 1 |




**SIDE VIEW**




**SECTION A-A**




**ISOMETRIC VIEW**

wsp
SHOP DRAWING
DATA SHEET

*Affixing this stamp confirms that an administrative approval and/or a verification of compliance with shop drawings or specifications was made, but does not entail the liability of the author of the work or its owner with regards to this shop drawing or data sheet, for which the contractor is the sole responsible.*

- [x] Reviewed
- [ ] Revise and resubmit
- [ ] Rejected
- [ ] Revise as noted

*The contractor, supplier and/or sub-contractor is responsible for: confirming and coordinating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating his or her work with that of all other trades and performing all work in a safe and satisfactory manner.*

By: Date: 2022/04/14
Project #: RFP-40-21

NOTES:

1. ALL DIMENSIONS APPLY @ 23°C ±2°, ACTUAL LENGTHS WILL VARY BASED ON AMBIENT TEMPERATURE.
2. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.

| | | |
|---|---|---|
| DRAWN BY: CR | 4/13/2022 | TITLE: 8" DR11 PERFORATED PIPE PE4710 c/w Ø19mm HOLES |
| CHECKED BY: DP | 4/13/2022 | |
| Infra Pipe Solutions Ltd. THIS DOCUMENT IS INTENDED FOR MANUFACTURING PURPOSES ONLY. POSSESSION OF THIS DOCUMENT DOES NOT CONVEY ANY RIGHTS TO USE, REPRODUCE OR DISCLOSE TO OTHERS, WITHOUT THE WRITTEN PERMISSION OF AN OFFICER OF INFRA PIPE SOLUTIONS LTD. | UNITS: INCHES | DWG #: 2737 |
| | INFRAPIPE SOLUTIONS LTD. | REV: |
| | | SHEET: 1 of 1 |
| | SIZE: B L3 | PROJECT: Scarborough Supply — PROJECT #: PO-12623 |

# Sclairpipe®

**VERSATILE HIGH DENSITY HDPE PIPE**

# Sclairpipe

Sclairpipe® high density polyethylene (HDPE) pipe represents the latest advances in both material and manufacturing techniques. Since 1968, Sclairpipe has been proven in a wide range of municipal and industrial piping applications. It has been used extensively in pressure and non-pressure applications such as sewers, sewage forcemains, and potable drinking water. Infra Pipe is recognised by the brand name Sclairpipe, a large diameter pipe (>63") ideal for marine intake and outfall installations, river and lake crossings as well as other high volume, high pressure applicaitons.

## Lighter. Stronger. Chemical Resistant.

Sclairpipe is a tough, lightweight, solid wall pipe with a smooth internal surface. Available in various diameters from 3″ to 63″. It is a well suited alternative to copper, PVC, ductile iron and concrete pipe in a variety of applications.

Sclairpipe weighs approximately 1/10 that of a similar sized concrete pipe. Handling requires a minimum of heavy equipment and Sclairpipe can easily be assembled on ice or through wet marshy areas. It will not corrode, tuberculate or support biological growth, making it the material of ideal for use in sanitary sewage effluent applications or in "hot" soil projects. Sclairpipe has a smooth ID and maintains its flow capability over time - Hazen Williams C Factor remains 150, even after years of use.

## Easier to Transport and Install. Leak Proof.

Sclairpipe is much easier to handle and install than heavier, rigid concrete pipe, offering potential cost savings during the construction process. It is structurally designed to withstand impact, especially in cold weather installations when other pipes are prone to cracks and breaks. Sclairpipe will float even when full of water. For marine applications long lengths of pipe can be assembled on shore and then floated into position.

Thermal butt fusion provides an economical and fast method of delivering a complete, long, continuous length of pipe. Thermal fusion eliminates potential leak points every 8-20 feet commonly found with gasketed (or bell or spigot) pipe materials. The fused joints provide a continuous leak proof system that eliminates the risk of joint leakage due to ground shifting. Fused joints are fully restrained and as such may reduce or eliminate the need for expensive thrust blocks. With Sclairpipe infiltration and exfiltration problems are eliminated.

## Sclairpipe Advantages

- Leak Proof
- Corrosion Resistant
- Chemical Resistant
- Fatigue Resistant
- Impact Resistant
- Lightweight
- Flexible
- UV Resistant
- Environmentally Friendly
- Lower Life Cycle Cost

## Cost Effective. Permanent.

Sclairpipe offers distinct advantages. It can be cold bent during installation to a radius as small as 25 times the pipe's nominal diameter, and the installed bend radius can be as small as 50 times the nominal pipe diameter. Sclairpipe, installed on a radius, eliminates many of the fittings that would be required for directional changes when using other pipe materials. In addition, the flexibility of Sclairpipe allows it to adapt to uneven ground, unconsolidated river bottoms and excavated underwater trenches without the need for expensive foundations or minor degree elbows. It is well suited for dynamic soils and it is extremely seismic resistant.

Sclairpipe is cost effective in both the short and long term. The fact that it is lightweight makes it easier to transport and install. It is leak proof and fatigue resistant means there will be years of maintenance free use. The Plastics Pipe Institute estimates the service life for HDPE pipe to conservatively be 100 years.

## Proven performance in a wide range of applications

Since its development in 1955, large diameter HDPE pipe has been successfully used in many installations worldwide. In North America, Sclairpipe high density polyethylene pipe was first introduced in 1968. Since then it has been installed for river, lake and salt water crossings, municipal and industrial fresh and salt water intakes and effluent outfalls. Sclairpipe has also been used extensively for pipeline repair and rehabilitation.

**Some popular applications of Sclairpipe include:**

- Potable Water Distribution
- Pressure Water Systems
- Sewage Systems
- Water Mains
- Sliplining
- Fire Mains
- Directional Drilling
- Trenchless Technologies
- Conduit
- Slurry Pipe
- Mining
- Marine Pipelines & Crossings
- Deep Water Intakes
- Deep Water Outfalls
- Irrigation Lines
- Biofilters
- Gas Gathering
- Landfill

## Potable Water

Sclairpipe is used for both new water main installations and to rehabilitate deteriorated piping systems made from other materials. It can accept repetitive pressure surges that far exceed the static pressure rating of the pipe. Sclairpipe is easy to handle and is available in long lengths that cut down on jointing time. Thermal fusion on site reduces installation time and ensures leakproof joints that eliminate infiltration and exfiltration problems. Sclairpipe is well suited for dynamic soils and is extremely seismic resistant.

## Sewage Systems

After more than 50 years of use in municipal and industrial sewer applications, Sclairpipe has proven to be a reliable, cost effective, long-term solution for sewer and wastewater systems. It offers resistance to corrosion and chemicals with durability and strength that rigid concrete, PVC or ductile iron pipes can't duplicate. Lightweight Sclairpipe is easy to install, extremely flexible and does not corrode or tuberculate over time.

## Industry

Long-term reliable piping solutions are always in demand by industry. Sclairpipe offers resistance to corrosion, abrasion and chemicals resulting in a durable, strong and cost-effective installation.

## Mining

Sclairpipe solid wall HDPE pipe is commonly used in mining applications for tailings disposal and water management including: river water diversion, reclamation lines, culvert, sewer and sub-drainage systems and slurry pipe. It is lightweight, flexible, durable. It is virtually leak proof, and can withstand corrosive chemicals, acids or salts commonly found in mines. Sclairpipe combines strength and durability in above ground applications and is UV resistant.

## Irrigation

Sclairpipe is a cost effective solution for irrigation and agricultural drainage applications such as river and canal diversion, agricultural irrigation systems and pipelines, and water conservation. A Sclairpipe irrigation system will withstand the test of time.

## Heating & Cooling

Sclairpipe has proven to be a strong, leak proof and chemically inert solution for district cooling applications including dual-purpose projects providing cooling and potable water. It can be assembled on shore in a continuous flexible length, floated on the water's surface and then sunk by a controlled process. The pipe can also be manufactured in specific lengths and connected on site by flanges with the aid of marine divers. Sclairpipe's resistance to both corrosion and zebra mussel fouling makes it an ideal solution.

| | | DR13.5 (160 psi) | | | DR11 (200 psi) | | | DR9 (250 psi) | | | DR7.3 (317 psi) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NPS | Avg OD (in) | Avg ID (in) | Min Wall (in) | Avg Weight (lbs/ft) | Avg ID (in) | Min Wall (in) | Avg Weight (lbs/ft) | Avg ID (in) | Min Wall (in) | Avg Weight (lbs/ft) | Avg ID (in) | Min Wall (in) | Avg Weight (lbs/ft) | NPS |
| 3 | 3.50 | 2.95 | 0.259 | 1.16 | 2.83 | 0.318 | 1.39 | 2.68 | 0.389 | 1.66 | 2.48 | 0.479 | 1.99 | 3 |
| 4 | 4.50 | 3.79 | 0.333 | 1.91 | 3.63 | 0.409 | 2.30 | 3.44 | 0.500 | 2.75 | 3.19 | 0.616 | 3.28 | 4 |
| 5 | 5.56 | 4.69 | 0.412 | 2.93 | 4.49 | 0.506 | 3.52 | 4.25 | 0.618 | 4.20 | 3.95 | 0.762 | 5.02 | 5 |
| 6 | 6.63 | 5.58 | 0.491 | 4.15 | 5.35 | 0.602 | 4.99 | 5.06 | 0.736 | 5.96 | 4.70 | 0.908 | 7.12 | 6 |
| 7 | 7.13 | 6.01 | 0.528 | 4.80 | 5.75 | 0.648 | 5.78 | 5.45 | 0.792 | 6.89 | 5.06 | 0.976 | 8.23 | 7 |
| 8 | 8.63 | 7.27 | 0.639 | 7.03 | 6.96 | 0.784 | 8.47 | 6.59 | 0.958 | 10.10 | 6.12 | 1.182 | 12.07 | 8 |
| 10 | 10.75 | 9.06 | 0.796 | 10.93 | 8.68 | 0.977 | 13.15 | 8.22 | 1.194 | 15.69 | 7.63 | 1.473 | 18.75 | 10 |
| 12 | 12.75 | 10.75 | 0.944 | 15.37 | 10.29 | 1.159 | 18.50 | 9.75 | 1.417 | 22.08 | 9.05 | 1.747 | 26.37 | 12 |
| 13 | 13.38 | 11.27 | 0.991 | 16.92 | 10.80 | 1.216 | 20.36 | 10.22 | 1.486 | 24.29 | 9.49 | 1.832 | 29.02 | 13 |
| 14 | 14.00 | 11.80 | 1.037 | 18.53 | 11.30 | 1.273 | 22.31 | 10.70 | 1.556 | 26.62 | 9.93 | 1.918 | 31.79 | 14 |
| 16 | 16.00 | 13.49 | 1.185 | 24.21 | 12.92 | 1.455 | 29.13 | 12.23 | 1.778 | 34.76 | 11.35 | 2.192 | 41.53 | 16 |
| 18 | 18.00 | 15.17 | 1.333 | 30.64 | 14.53 | 1.636 | 36.87 | 13.76 | 2.000 | 44.00 | 12.77 | 2.466 | 52.56 | 18 |
| 20 | 20.00 | 16.86 | 1.481 | 37.82 | 16.15 | 1.818 | 45.52 | 15.29 | 2.222 | 54.32 | 14.19 | 2.740 | 64.89 | 20 |
| 22 | 22.00 | 18.55 | 1.630 | 45.77 | 17.76 | 2.000 | 55.08 | 16.82 | 2.444 | 65.72 | 15.61 | 3.014 | 78.51 | 22 |
| 24 | 24.00 | 20.23 | 1.778 | 54.47 | 19.37 | 2.182 | 65.55 | 18.35 | 2.667 | 78.22 | 17.03 | 3.288 | 93.44 | 24 |
| 26 | 26.00 | 21.92 | 1.926 | 63.92 | 20.99 | 2.364 | 76.93 | 19.88 | 2.889 | 91.80 | | | | 26 |
| 28 | 28.00 | 23.60 | 2.074 | 74.13 | 22.60 | 2.545 | 89.22 | 21.40 | 3.111 | 106.46 | | | | 28 |
| 30 | 30.00 | 25.29 | 2.222 | 85.10 | 24.22 | 2.727 | 102.42 | 22.93 | 3.333 | 122.22 | | | | 30 |
| 32 | 32.00 | 26.97 | 2.370 | 96.83 | 25.83 | 2.909 | 116.53 | 24.46 | 3.556 | 139.05 | | | | 32 |
| 36 | 36.00 | 30.35 | 2.667 | 122.55 | 29.06 | 3.273 | 147.49 | 27.52 | 4.000 | 175.99 | | | | 36 |
| 40 | 40.00 | 33.72 | 2.963 | 151.29 | | | | | | | | | | 40 |
| 42 | 42.00 | 35.40 | 3.111 | 166.80 | | | | | | | | | | 42 |
| 48 | 48.00 | | | | | | | | | | | | | 48 |
| 54 | 54.00 | | | | | | | | | | | | | 54 |
| 63 | 63.00 | | | | | | | | | | | | | 63 |

Pipe dimensions are in accordance with ASTM F714 and AWWA C906. Pressure Ratings are for water at 73°F. Ratings will vary for other fluids and temperatures. Some of the pipe sizes and DR's above are available only on request. Check with your representative for availability. Other dimensions and DR's not listed may be available upon special request. Weights are calculated by the methodology established in PPI's TR-7. Technical information contained herein is furnished without charge or obligation and is given and accepted at recipient's sole risk. As conditions of use may vary and are beyond the control of Infra Pipe Solutions., no representations or warranty, express or implied, are made with respect to the accuracy, reliability, or completeness of the this information.

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DATA SHEET

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- [x] Reviewed
- [ ] Revise and resubmit
- [ ] Rejected
- [ ] Revise as noted

*The contractor, supplier and/or sub-contractor is responsible for: comfirming and correlating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating his or her work with that of all other trades and performing all work in a safe and satisfactory manner.*

By: ______ Date: 2022/04/06
Project #: RFP-40-21

## Product innovation and quality assurance

For 50 years Infra Pipe has been a leader in the design, development, manufacture and support of polyethylene piping systems. Infra Pipe's experienced engineers can offer design and engineering assistance, assuring you of a dependable piping system designed to meet your needs. Visit our website (www.Infrapipes.com) and see how our innovative online calculator can assist you. Extensive R&D in the early 1960's led us to produce 16" diameter polyethylene pipe at a time when many considered large diameter polyethylene pipes a technical impossibility.

Today Infra Pipe produces solid wall Sclairpipe in sizes up to 63". All Infra Pipe products are manufactured from special, high strength resins with complete quality control maintained from raw material to finished pipe product. Infra Pipe was the first North American manufacturer of polyethylene pipe and fittings to have its Quality Management System registered to the ISO 9001:2015 level.

Our strict manufacturing specifications are verified daily, using precise dimensional controls and accelerated long term hydrostatic testing. A continuous quality control process assures you of long-term pipe performance. Sclairpipe resins are classified in accordance with ASTM D3350. Sclairpipe's material classification is based on PPI's (Plastic Pipe Institute) method of determining and validating the Long-Term Hydrostatic Stress (LTHS) of polyethylene pipe. The pipe resin used to extrude bi-modal PE4710 Sclairpipe has a minimum cell classification of PE445574C and a minimum PENT of 2,000 hrs.

| | | DR32.5 (64 psi) | | | DR26 (80 psi) | | | DR21 (100 psi) | | | DR17 (125 psi) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NPS | Avg OD (in) | Avg ID (in) | Min Wall (in) | Avg Weight (lbs/ft) | Avg ID (in) | Min Wall (in) | Avg Weight (lbs/ft) | Avg ID (in) | Min Wall (in) | Avg Weight (lbs/ft) | Avg ID (in) | Min Wall (in) | Avg Weight (lbs/ft) | NPS |
| 3 | 3.50 | 3.27 | 0.108 | 0.51 | 3.21 | 0.135 | 0.63 | 3.15 | 0.167 | 0.77 | 3.06 | 0.206 | 0.94 | 3 |
| 4 | 4.50 | 4.21 | 0.138 | 0.84 | 4.13 | 0.173 | 1.03 | 4.05 | 0.214 | 1.27 | 3.94 | 0.265 | 1.55 | 4 |
| 5 | 5.56 | 5.20 | 0.171 | 1.28 | 5.11 | 0.214 | 1.58 | 5.00 | 0.265 | 1.94 | 4.87 | 0.327 | 2.36 | 5 |
| 6 | 6.63 | 6.19 | 0.204 | 1.81 | 6.08 | 0.255 | 2.24 | 5.96 | 0.315 | 2.75 | 5.80 | 0.390 | 3.35 | 6 |
| 7 | 7.13 | 6.66 | 0.219 | 2.09 | 6.54 | 0.274 | 2.59 | 6.41 | 0.339 | 3.18 | 6.24 | 0.419 | 3.88 | 7 |
| 8 | 8.63 | 8.06 | 0.265 | 3.07 | 7.92 | 0.332 | 3.80 | 7.75 | 0.411 | 4.66 | 7.55 | 0.507 | 5.68 | 8 |
| 10 | 10.75 | 10.05 | 0.331 | 4.77 | 9.87 | 0.413 | 5.91 | 9.66 | 0.512 | 7.24 | 9.41 | 0.632 | 8.83 | 10 |
| 12 | 12.75 | 11.92 | 0.392 | 6.70 | 11.71 | 0.490 | 8.31 | 11.46 | 0.607 | 10.18 | 11.16 | 0.750 | 12.42 | 12 |
| 13 | 13.38 | 12.50 | 0.412 | 7.38 | 12.28 | 0.514 | 9.14 | 12.02 | 0.637 | 11.21 | 11.71 | 0.787 | 13.67 | 13 |
| 14 | 14.00 | 13.09 | 0.431 | 8.08 | 12.86 | 0.538 | 10.02 | 12.59 | 0.667 | 12.28 | 12.25 | 0.824 | 14.98 | 14 |
| 16 | 16.00 | 14.96 | 0.492 | 10.56 | 14.70 | 0.615 | 13.08 | 14.38 | 0.762 | 16.04 | 14.00 | 0.941 | 19.56 | 16 |
| 18 | 18.00 | 16.83 | 0.554 | 13.36 | 16.53 | 0.692 | 16.56 | 16.18 | 0.857 | 20.29 | 15.76 | 1.059 | 24.76 | 18 |
| 20 | 20.00 | 18.70 | 0.615 | 16.49 | 18.37 | 0.769 | 20.44 | 17.98 | 0.952 | 25.06 | 17.51 | 1.176 | 30.56 | 20 |
| 22 | 22.00 | 20.56 | 0.677 | 19.96 | 20.21 | 0.846 | 24.74 | 19.78 | 1.048 | 30.32 | 19.26 | 1.294 | 36.98 | 22 |
| 24 | 24.00 | 22.43 | 0.738 | 23.75 | 22.04 | 0.923 | 29.44 | 21.58 | 1.143 | 36.08 | 21.01 | 1.412 | 44.01 | 24 |
| 26 | 26.00 | 24.30 | 0.800 | 27.87 | 23.88 | 1.000 | 34.55 | 23.38 | 1.238 | 42.34 | 22.76 | 1.529 | 51.65 | 26 |
| 28 | 28.00 | 26.17 | 0.862 | 32.33 | 25.72 | 1.077 | 40.07 | 25.17 | 1.333 | 49.11 | 24.51 | 1.647 | 59.90 | 28 |
| 30 | 30.00 | 28.04 | 0.923 | 37.11 | 27.55 | 1.154 | 46.00 | 26.97 | 1.429 | 56.37 | 26.26 | 1.765 | 68.77 | 30 |
| 32 | 32.00 | 29.91 | 0.985 | 42.22 | 29.39 | 1.231 | 52.34 | 28.77 | 1.524 | 64.14 | 28.01 | 1.882 | 78.24 | 32 |
| 36 | 36.00 | 33.65 | 1.108 | 53.44 | 33.06 | 1.385 | 66.24 | 32.37 | 1.714 | 81.18 | 31.51 | 2.118 | 99.02 | 36 |
| 40 | 40.00 | 37.39 | 1.231 | 65.98 | 36.74 | 1.538 | 81.77 | 35.96 | 1.905 | 100.22 | 35.01 | 2.353 | 122.25 | 40 |
| 42 | 42.00 | 39.26 | 1.292 | 72.74 | 38.58 | 1.615 | 90.16 | 37.76 | 2.000 | 110.49 | 36.76 | 2.471 | 134.78 | 42 |
| 48 | 48.00 | 44.87 | 1.477 | 95.01 | 44.09 | 1.846 | 117.76 | 43.15 | 2.286 | 144.32 | 42.01 | 2.824 | 176.04 | 48 |
| 54 | 54.00 | 50.48 | 1.662 | 120.24 | 49.60 | 2.077 | 149.03 | 48.55 | 2.571 | 182.65 | 47.27 | 3.176 | 222.81 | 54 |
| 63 | 63.00 | 58.89 | 1.938 | 163.66 | 57.86 | 2.423 | 202.85 | 56.64 | 3.000 | 248.61 | | | | 63 |

Pipe dimensions are in accordance with ASTM F714 and AWWA C906. Pressure Ratings are for water at 73°F. Ratings will vary for other fluids and temperatures. Some of the pipe sizes and DR's above are available only on request. Check with your representative for availability. Other dimensions and DR's not listed may be available upon special request. Weights are calculated by the methodology established in PPI's TR-7. Technical information contained herein is furnished without charge or obligation and is given and accepted at recipient's sole risk. As conditions of use may vary and are beyond the control of Infra Pipe Solutions., no representations or warranty, express or implied, are made with respect to the accuracy, reliability, or completeness of the this information.

## Innovative joining methods and equipment

Sclairpipe piping systems can be assembled by heat fusion (butt, electrofusion, socket and saddle fusion), flanged connections, compression couplings and various mechanical couplings. A full range of pressure rated fittings is available to suit any application.

The standard stocked length of Sclairpipe pipe is 50 feet, in sizes above 4".

**Please visit our website: www.infrapipes.com to use the online design tools to determine the pipe size best suited for your application.**

## Choose the size that's right for you

Sclairpipe is available in standard Dimensional Ratio's (DR's), in sizes ranging from 3" to 63" in diameter. Sclairpipe is available in PE 4710. With the higher allowable stress rating of PE 4710, the pipe wall can be thinner for the same pressure rating (higher DR).

The Dimensional Ratio relates the minimum wall thickness of the pipe to its outside diameter, and is important to define the pressure rating of a particular pipe. The maximum continuous operating pressure stated is based on the allowable hydrostatic design stress of each specific material (per ASTM D3350 and PPI's TR-3), and the pipe wall thickness (DR), at a service temperature of 73.4° F.

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By: ______ Date: 2022/04/06

Project #: RFP-40-21

## Ordering & shipping information

Infra Pipe welcomes your inquiries for non-standard sizes, lengths and pressure ratings of Sclairpipe pipe.

We can meet most special packaging requirements and provide custom pipe fittings. Please contact your local Infra Pipe representative or visit our web site.

The charts below outline standard shipment sizes for straight length and coiled pipe.

## Standard Shipments - Straight Lengths

| IPS PIPE | | | | |
|---|---|---|---|---|
| PIPE SIZE | AVG OD | BUNDLE QTY | TRUCK LOAD QTY | CONTAINER QTY |
| 4" | 4.50 | 38 | 380 | 480 |
| 5" | 5.563 | 23 | 276 | 320 |
| 6" | 6.625 | 20 | 200 | 208 |
| 7" | 7.125 | 17 | 136 | 180 |
| 8" | 8.625 | 14 | 112 | 120 |
| 10" | 10.750 | 11 | 66 | 80 |
| 12" | 12.750 | 4 | 56 | 52 |
| 13" | 13.375 | 42 | | 48 |
| 14" | 14.000 | 42 | | 42 |
| 16" | 16.000 | 30 | | 30 |
| 18" | 18.000 | 25 | | 25 |
| 20" | 20.000 | 20 | | 20 |
| 22" | 22.000 | 16 | | 16 |
| 24" | 24.000 | 16 | | 14 |
| 26" | 26.000 | 9 | | 9 |
| 28" | 28.000 | 9 | | 9 |
| 30" | 30.000 | 9 | | 9 |
| 32" | 32.000 | 9* | | 8 |
| 36" | 36.000 | 4 | | 6 |
| 42" | 42.000 | 4 | | 4 |
| 48" | 48.000 | 4* | | 3 |
| 54" | 54.000 | 2* | | 2 |
| 63" | 63.000 | 2* | | 2 |

Notes:
* Bunks required
** Drop deck trailer - maximum 42' length
Typical pipe lengths range from 40 to 50 feet in size
Other pipe lengths available including 60 feet upon request.

# Sclairpipe general specifications & material standards

**REFERENCE SPECIFICATIONS**

ASTM F714: Standard Specification for Polyethylene Plastic Pipe Based on Outside Diameter
ASTM D3035: Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter
ISO 9001:2015: Model for Quality Assurance in Production and Installation.
AWWA C906: Polyethylene (PE) Pressure Pipe and Fittings 4 In. (100 mm) Through 63 In. (1,600 mm) for Water Distribution and Transmission
NSF / ANSI 61 Drinking Water System Components–Health Effects
BNQ 3624-027 Polyethylene Pipe for the Transport of Fluids Under Pressure

**GENERAL REQUIREMENTS**

The pipe manufacturer shall provide, upon request, an outline of quality control procedures performed on polyethylene system components.

QULAIFICATION OF MANUFACTURER

The general quality assurance practices and methods shall be in accordance with ISO 9001:2015.

**MATERIAL**

The pipe shall be made from a HDPE material having a minimum material designation code of PE4710. The material shall have a minimum cell classification of 445574C as defined in ASTM D3350. PE4710 resins shall have a minimum PENT value of 2,000 hours. The Hydrostatic Design Stress (HDS) at 23°C (73.4°F) shall be 1,000 psi for PE4710 resin and shall be listed in the name of pipe manufacturer in PPI TR-4. In addition, the material shall be listed as meeting NSF/ANSI 61. The pipe material shall contain 2% - 3% well dispersed carbon black. Additives which can be conclusively proven not to be detrimental to the pipe may also be used, provided the pipe produced meets the requirements of this specification.

**PIPE**

The pipe shall be manufactured in accordance with ______ [User specified] [ AWWA C906, ASTM F714, ASTM D3035, BNQ 3624-027]. HDPE pipe shall be rated for use at a pressure class of _____ [User specified] psi. [The specifier chooses the pressure class from table below]. The outside diameter of the pipe shall be based upon the IPS or DIPS sizing system. [User to specify the appropriate sizing system.]

| Pipe Standard Dimension Ratio (DR) | Pressure Rating (PR) or, Pressure Class (PC) for water @ 73°F, psig | Allowable Total Pressure During Recurring Surge | Allowable Total Pressure During Occasional Surge |
|---|---|---|---|
| 32.5 | 63 | 95 | 126 |
| 26 | 80 | 120 | 160 |
| 21 | 100 | 150 | 200 |
| 17 | 125 | 188 | 250 |
| 13.5 | 160 | 240 | 320 |
| 11 | 200 | 300 | 400 |
| 9 | 250 | 375 | 500 |
| 7.3 | 320 | 480 | 640 |

MARKING

The pipe shall be marked in accordance with the standards to which it is manufactured.

JOINING METHODS

The preferred method to join pipe shall be the butt fusion procedure outlined in ASTM F2620 or PPI TR-33. All fusion joints shall be made in compliance with the pipe or fitting manufacturer's recommendations. Fusion joints shall be made by qualified fusion technicians per PPI TN-42 and ASTM F3190.

Mechanical connection of HDPE to auxiliary equipment such as valves, pumps, and fittings shall use mechanical joint adapters and other devices as outlined in the PPI Handbook of Polyethylene Pipe ( 2nd Edition), Chapter 9 and AWWA Manual of Practice M55, Chapter 6.

INSTALLATION

Buried HDPE pressure pipe and fittings shall be installed in accordance with ASTM D2774 or AWWA M55.

TESTING

Hydrostatic leakage testing for pressure piping should comply with ASTM F2164 and PPI TN-46.

**Infra Pipe Solutions Ltd.**
**6507 Mississauga Road**
**Mississauga, ON, L5N 1A6**
**Canada**

**T: 905.858.0206**
**F: 905.858.0208**
**E: sales.infrapipes@infrapipes.com**
**W: www.infrapipes.com**

# The difference MOLDED Makes

Molded Flange Adapters from Integrity Fusion Products have quickly become a market leader. By injection molding our flange adapters, we offer a high quality and consistent product every time. The self sealing design on the hub face eliminates the need for a gasket for most applications. Integrity Fusion ensures our Flanges meet ASTM F2880 by conducting 100% X-Ray inspection as an important part of our Quality Control program.

IntegriFuse Fittings are manufactured from the highest quality black high density bimodal polyethylene copolymer designed for use in, but not limited to, potable water, natural gas, industrial, landfill, oil & gas, and mining applications.

All IntegriFuse fittings meet ASTM –D2513 & ASTM D3261(where applicable). FM Approved.

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270 Parkade Court
Peachtree City, GA 30269
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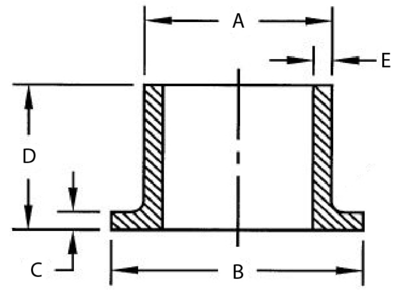


**SDR 17** - (Standard Dimension Ratio) 125 PSI (Working Pressure at 73.4˚ F)

| Nominal Size | A (OD) | B | C | D (length) | E (wall) | Weight | Item Code |
|---|---|---|---|---|---|---|---|
| 2″ IPS | 2.375″ | 3.94″ | 0.40″ | 5.71″ | 0.140″ | 0.30 lbs. | 100401 |
| 3″ IPS | 3.500″ | 5.00″ | 0.42″ | 5.82″ | 0.206″ | 0.55 lbs. | 100405 |
| 4″ IPS | 4.500″ | 6.00″ | 0.54″ | 6.54″ | 0.265″ | 1.10 lbs. | 100409 |
| 6″ IPS | 6.625″ | 8.50″ | 0.80″ | 8.00″ | 0.390″ | 2.75 lbs. | 100413 |
| 8″ IPS | 8.625″ | 10.63″ | 1.02″ | 9.02″ | 0.507″ | 5.50 lbs. | 100417 |
| 10″ IPS | 10.750″ | 12.75″ | 1.29″ | 10.01″ | 0.632″ | 9.10 lbs. | 100421 |
| 12″ IPS | 12.750″ | 15.00″ | 1.55″ | 10.75″ | 0.750″ | 13.55 lbs. | 100424 |
| 14″ IPS | 14.000″ | 17.50″ | 1.62″ | 12.00″ | 0.824″ | 20.00 lbs. | 100427 |
| 16″ IPS | 16.000″ | 20.00″ | 1.85″ | 12.00″ | 0.941″ | 26.00 lbs. | 100429 |
| 18″ IPS | 18.000″ | 21.12″ | 2.08″ | 12.00″ | 1.059″ | 30.00 lbs. | 100431 |
| 20″ IPS | 20.000″ | 23.50″ | 2.31″ | 12.00″ | 1.176″ | 38.00 lbs. | 100433 |
| 24″ IPS | 24.000″ | 28.00″ | 2.77″ | 14.00″ | 1.412″ | 66.00 lbs. | 100437 |
| 28″ IPS | 28.000″ | 32.30″ | 3.23″ | 14.00″ | 1.647″ | 88.00 lbs. | 100439 |
| 30″ IPS | 30.000″ | 34.30″ | 3.46″ | 14.00″ | 1.765″ | 101.00 lbs. | 100441 |
| 32″ IPS | 32.000″ | 34.30″ | 3.69″ | 14.00″ | 1.882″ | 118.00 lbs. | 100443 |
| 36″ IPS | 36.000″ | 40.80″ | 4.16″ | 14.00″ | 2.118″ | 148.00 lbs. | 100445 |

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By: [signature] Date: 2022/04/06

Project #: RFP-40-21

INTEGRITY Fusion Products, Inc.

# The difference MOLDED Makes

Molded Flange Adapters from Integrity Fusion Products have quickly become a market leader. By injection molding our flange adapters, we offer a high quality and consistent product every time. The self sealing design on the hub face eliminates the need for a gasket for most applications. Integrity Fusion ensures our Flanges meet ASTM F2880 by conducting 100% X-Ray inspection as an important part of our Quality Control program.

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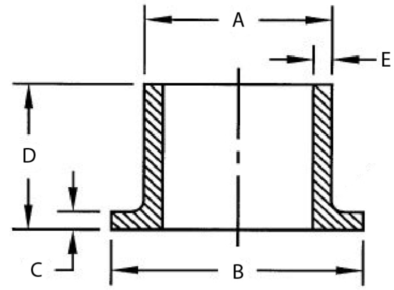
All IntegriFuse fittings meet ASTM –D2513 & ASTM D3261(where applicable). FM Approved.




FM APPROVED

**SDR 11** - (Standard Dimension Ratio) 200 PSI (Working Pressure at 73.4˚ F)

| Nominal Size | A | B | C | D | E | Weight | Item Code | Notes |
|---|---|---|---|---|---|---|---|---|
| 2″ IPS | 2.375″ | 3.94″ | 0.40″ | 5.71″ | 0.216″ | 0.50 lbs. | 100400 | FM 200 |
| 3″ IPS | 3.500″ | 5.00″ | 0.42″ | 5.82″ | 0.318″ | .55 lbs. | 100404 | FM 200 |
| 4″ IPS | 4.500″ | 6.00″ | 0.54″ | 6.54″ | 0.409″ | 1.50 lbs. | 100408 | FM 200 |
| 6″ IPS | 6.625″ | 8.50″ | 0.80″ | 8.00″ | 0.602″ | 3.95 lbs. | 100412 | FM 200 |
| 8″ IPS | 8.625″ | 10.63″ | 1.02″ | 9.02″ | 0.784″ | 7.40 lbs. | 100416 | FM 200 |
| 10″ IPS | 10.750″ | 12.75″ | 1.29″ | 10.01″ | 0.977″ | 12.80 lbs. | 100420 | FM 200 |
| 12″ IPS | 12.750″ | 15.00″ | 1.55″ | 10.75″ | 1.159″ | 19.60 lbs. | 100423 | FM 200 |
| 14″ IPS | 14.000″ | 17.50″ | 1.62″ | 12.00″ | 1.273″ | 27.00 lbs. | 100426 | - |
| 16″ IPS | 16.000″ | 20.00″ | 1.85″ | 12.00″ | 1.455″ | 36.00 lbs. | 100428 | - |
| 18″ IPS | 18.000″ | 21.12″ | 2.08″ | 12.00″ | 1.636″ | 42.00 lbs. | 100430 | - |
| 20″ IPS | 20.000″ | 23.50″ | 2.31″ | 12.00″ | 1.818″ | 54.00 lbs. | 100432 | - |
| 24″ IPS | 24.000″ | 28.00″ | 2.77″ | 14.00″ | 2.182″ | 91.00 lbs. | 100436 | - |
| 28″ IPS | 28.000″ | 32.30″ | 3.23″ | 14.00″ | 2.545″ | 123.00 lbs. | 100438 | - |
| 30″ IPS | 30.000″ | 34.30″ | 3.46″ | 14.00″ | 2.727″ | 140.00 lbs. | 100440 | - |
| 32″ IPS | 32.000″ | 34.30″ | 3.69″ | 14.00″ | 2.909″ | 160.00 lbs. | 100442 | - |
| 36″ IPS | 36.000″ | 40.80″ | 4.16″ | 14.00″ | 3.273″ | 205.00 lbs. | 100444 | - |

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By: Date: 2022/04/06

Project #: RFP-40-21

Integrity Fusion Products, Inc.
270 Parkade Court
Peachtree City, GA 30269
P: 1-888-770-6330 • P: 770-632-7530
F: 770-632-7540
E: Info@IntegrityFusion.com

INTEGRITY Fusion Products, Inc.

# The difference MOLDED Makes

At Integrity Fusion, our goal is to provide the highest quality products to the industry, and to our customers. This philosophy has been applied to our backup rings. Integrity Fusion offers 316 Stainless Steel Convoluted Backup Rings up through 24" IPS & flat plate style rings in 28"-36" IPS, as well as offering DIPS convoluted rings in sizes 4" – 12".

316 Stainless Steel Rings:

- ASTM A351 CF8M
- Class 150 # bolt pattern
- FM Approved

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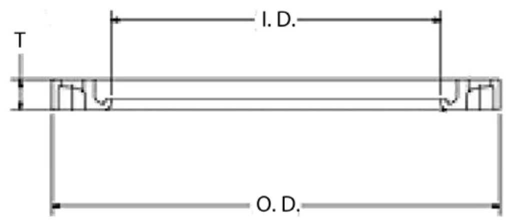


FM APPROVED

**IPS-SDR 11** - 316 Stainless Steel Backup Ring **SDR 11** (Standard Dimension Ratio) 200 PSI - 150# Bolt Pattern

| Nominal Size | SDR | OD | ID | Thickness | # Bolt Holes | Hole Diameter | Weight | Code | Notes |
|---|---|---|---|---|---|---|---|---|---|
| 2" IPS | SDR 11 | 6.00" | 2.64" | 0.45" | 4 | 0.75" | 1.7 lbs. | 100241 | FM 200 |
| 3" IPS | SDR 11 | 7.50" | 3.75" | 0.53" | 4 | 0.75" | 2.6 lbs. | 100242 | FM 200 |
| 4" IPS | SDR 11 | 9.00" | 4.80" | 0.55" | 8 | 0.75" | 3.8 lbs. | 100243 | FM 200 |
| 6" IPS | SDR 11 | 11.00" | 6.90" | 0.63" | 8 | 0.88" | 5.5 lbs. | 100244 | FM 200 |
| 8" IPS | SDR 11 | 13.50" | 8.90" | 0.85" | 8 | 0.88" | 9.5 lbs. | 100245 | FM 200 |
| 10" IPS | SDR 11 | 16.00" | 11.00" | 0.99" | 12 | 1.00" | 13.9 lbs. | 100246 | FM 200 |
| 12" IPS | SDR 11 | 19.00" | 13.15" | 1.26" | 12 | 1.00" | 16.6 lbs. | 100247 | FM 200 |
| 14" IPS | SDR 11 | 21.00" | 14.42" | 1.38" | 12 | 1.13" | 33.0 lbs. | 100248 | - |
| 16" IPS | SDR 11 | 23.50" | 16.47" | 1.57" | 16 | 1.13" | 44.0 lbs. | 100249 | - |
| 18" IPS | SDR 11 | 25.00" | 18.50" | 1.65" | 16 | 1.25" | 48.0 lbs. | 100250 | - |
| 20" IPS | SDR 11 | 27.50" | 20.50" | 1.85" | 20 | 1.25" | 63.0 lbs. | 100252 | - |
| 24" IPS | SDR 11 | 32.00" | 24.60" | 2.18" | 20 | 1.38" | 98.0 lbs. | 100253 | - |
| 28" IPS (1) | SDR 11 | 36.42" | 28.66" | 2.76" | 28 | 1.42" | 277.8 lbs. | 100265 | - |
| 30" IPS (1) | SDR 11 | 38.78" | 30.67" | 2.87" | 28 | 1.42" | 327.5 lbs. | 100266 | - |
| 32" IPS (1) | SDR 11 | 41.73" | 32.52" | - | 28 | 1.63" | 204.6 lbs. | 100267 | - |
| 34" IPS (1) | SDR 11 | 43.74" | 34.53" | - | 32 | 1.63" | 224.9 lbs. | 100268 | - |
| 36" IPS (1) | SDR 11 | 46.06" | 36.81" | 3.50" | 32 | 1.65" | 520.0 lbs. | 100269 | - |

**IPS-SDR 7** - 316 Stainless Steel Backup Ring **SDR 7** (Standard Dimension Ratio) 335PSI - 150# Bolt Pattern

| Nominal Size | SDR | OD | ID | Thickness | # Bolt Holes | Hole Diameter | Weight | Code | Notes |
|---|---|---|---|---|---|---|---|---|---|
| 4" IPS | SDR 7 | 9.00" | 4.75" | 0.72" | 8 | 0.75" | 6.00 lbs. | 100272 | FM 335 |
| 6" IPS | SDR 7 | 11.00" | 6.88" | 0.76" | 8 | 0.88" | 8.55 lbs. | 100273 | FM 335 |
| 8" IPS | SDR 7 | 13.50" | 8.88" | 0.83" | 8 | 0.88" | 12.65 lbs. | 100274 | FM 335 |
| 10" IPS | SDR 7 | 16.00" | 11.00" | 0.95" | 12 | 1.00" | 19.55 lbs. | 100275 | FM 335 |
| 12" IPS | SDR 7 | 19.00" | 13.15" | 1.22" | 12 | 1.00" | 34.55 lbs. | 100276 | FM 335 |

(1) - Flat Plate style

INTEGRITY Fusion Products, Inc.

STRONGBRIDGE INTERNATIONAL INC.

wsp SHOP DRAWING DATA SHEET

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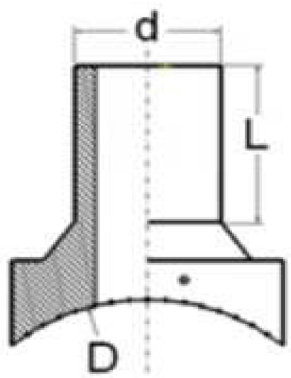
By: Date: 2022/04/06

Project #: RFP-40-21

# Branch Saddles Large
# TEGA IPS/CTS/DIPS SERIES SDR11

Molded Electrofusion Large Branch Saddles
Suitable for Water, Fluids & Slurry's
Engineered for PE3408, PE4710 & PE100 HDPE Pipe Systems
Manufactured in accordance with ASTM F-714, ASTM F-1055, ASTM D-2513
ASTM D-3035, ASTM D-3261, ASTM D-3350, AWWA C-901, AWWA C-906
DIN16963, EN1555, EN12201, ISO-9001/2000
Also Suitable For Use On IPS/DIPS SDR13.5, SDR15.5, SDR17 Series HDPE Pipe
**Also available with Brass and SS threaded outlet connections in Male & Female**




**IPS x IPS Large Branch Saddle**

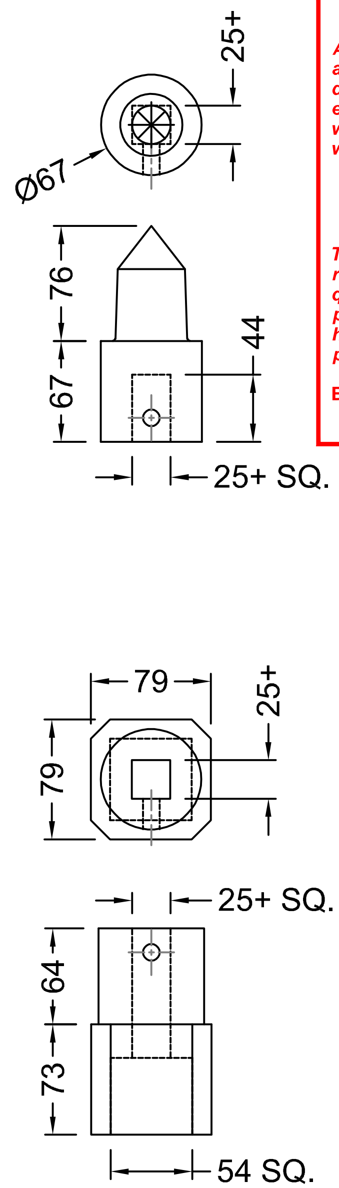
| Nom Main Size (D) | Main Pipe | Outlet Nom Size (d) | Outlet Pipe | L (inches) | Unit Weight in lbs | PSI Operating Pressure | Item Code |
|---|---|---|---|---|---|---|---|
| 3" | IPS | 3" | IPS | 3.54 | 1.32 | 200 | 30.BS1.11.11.11WW |
| 4" | IPS | 3" | IPS | 3.54 | 1.32 | 240 | 30.BS1.11.11.1388 |
| 4" | IPS | 4" | IPS | 3.54 | 1.32 | 200 | 30.BS1.11.11.11XX |
| 5" | IPS | 3" | IPS | 3.54 | 1.32 | 240 | 30.BS1.11.11.1388 |
| 5" | IPS | 4" | IPS | 3.54 | 2.65 | 240 | 30.BS1.11.11.1311 |
| 6" | IPS | 3" | IPS | 3.54 | 1.32 | 240 | 30.BS1.11.11.1688 |
| 6" | IPS | 4" | IPS | 3.54 | 2.65 | 240 | 30.BS1.11.11.1611 |
| 6" | IPS | 5" | IPS | 4.33 | 3.97 | 240 | 30.BS1.11.11.1613 |
| 6" | IPS | 6" | IPS | 4.33 | 3.97 | 200 | 30.BS1.11.11.16YY |
| 7" | IPS | 3" | IPS | 3.54 | 1.32 | 240 | 30.BS1.11.11.1888 |
| 7" | IPS | 4" | IPS | 3.54 | 2.65 | 240 | 30.BS1.11.11.1811 |
| 7" | IPS | 5" | IPS | 4.33 | 3.97 | 240 | 30.BS1.11.11.1813 |
| 7" | IPS | 6" | IPS | 5.91 | 5.07 | 200 | 30.BS1.11.11.1816 |
| 8" | IPS | 3" | IPS | 3.54 | 1.32 | 240 | 30.BS1.11.11.2188 |
| 8" | IPS | 4" | IPS | 3.54 | 2.65 | 240 | 30.BS1.11.11.2111 |
| 8" | IPS | 5" | IPS | 4.33 | 3.97 | 240 | 30.BS1.11.11.2113 |
| 8" | IPS | 6" | IPS | 5.91 | 5.07 | 200 | 30.BS1.11.11.2116 |

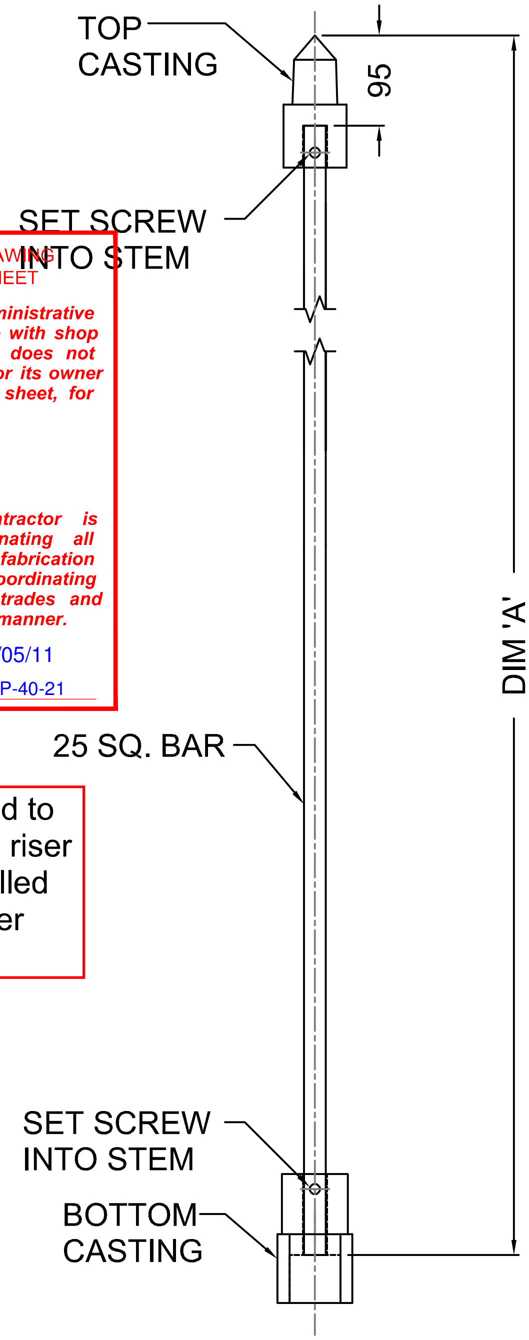
**APPENDIX**

# G-4 *LEACHATE COLLECTION SYTEM VALVE*

| | |
|---|---|
| CHAMBER # | |
| DIM "A" | |
| QUANTITY | |

** CUSTOMER TO PROVIDE OR SUPPLY DIMENSION **

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By: Date: 2022/05/11

Project #: RFP-40-21

Note: Extension stems need to be supplied for all manhole riser sections. They will be installed periodically as manhole riser sections are added.

| | | |
|---|---|---|
| R1 | MAY 9/22 | AS PER CUSTOMER |
| A | | ISSUED FOR APPROVAL |
| REVISIONS | | |

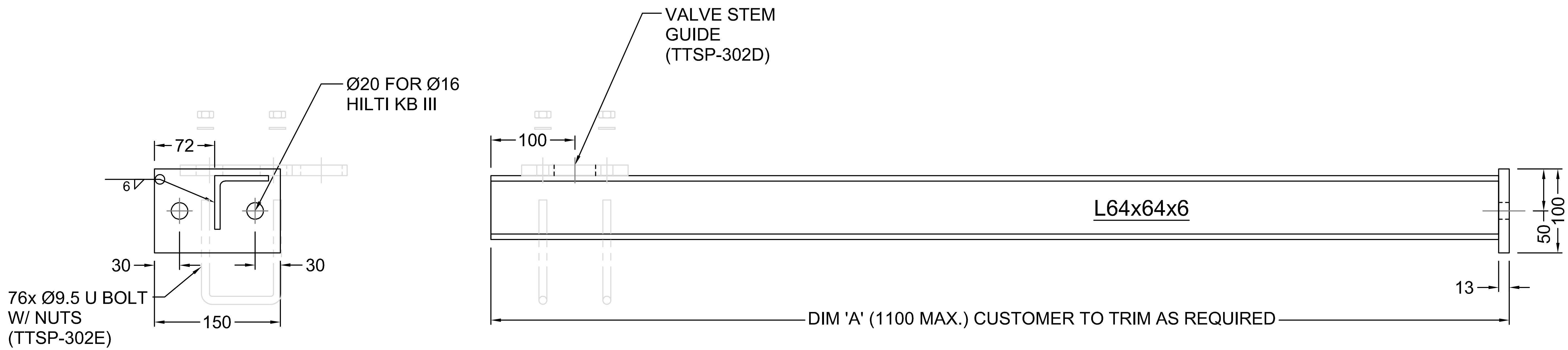
TRADE-TECH INDUSTRIES

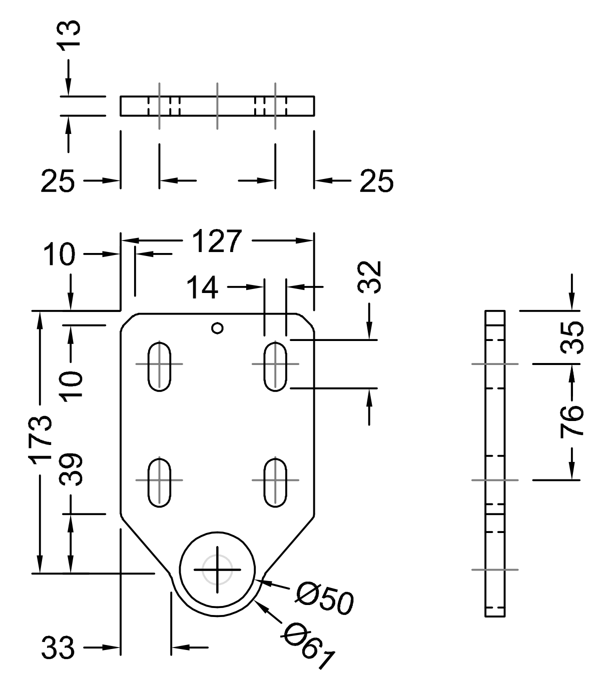
| | | | |
|---|---|---|---|
| PROJECT No.: | 2804 | PROJECT TITLE: | NORTH FILL AREA - CELL 4 |
| CUSTOMER: | TODD BROTHERS CONSTRUCTION | | |
| DRAWING TITLE: | VALVE STEM OPERATOR | | |

| DRAWN: | CHECKED: | DATE: | SCALE: | SIZE: | DRAWING NUMBER: | REV |
|---|---|---|---|---|---|---|
| LUNT | | MAY 4/22 | NTS | A | 2804-02 | R1 |

| | |
|---|---|
| INSTALLED BY: X | TOLERANCE ± - |
| MATERIAL: 304 STAINLESS STEEL AS NOTED | |
| QTY: (1) | FINISH: MILL |

DIMENSIONS ARE IN MILLIMETERS U.N.O




VALVE STEM GUIDE

wsp

SHOP DRAWING
DATA SHEET

*Affixing this stamp confirms that an administrative approval and/or a verification of compliance with shop drawings or specifications was made, but does not entail the liability of the author of the work or its owner with regards to this shop drawing or data sheet, for which the contractor is the sole responsible.*

- [x] Reviewed
- [ ] Revise and resubmit
- [ ] Rejected
- [ ] Revise as noted

*The contractor, supplier and/or sub-contractor is responsible for: comfirming and coordinating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating his or her work with that of all other trades and performing all work in a safe and satisfactory manner.*

By: Date: 2022/05/11

Project #: RFP-40-21

| CHAMBER | DIM 'A' |
|---|---|
| - | - |
| - | - |
| - | - |
| - | - |
| - | - |

| | | |
|---|---|---|
| R1 | MAY 9/22 | AS PER CUSTOMER |
| A | | ISSUED FOR APPROVAL |

REVISIONS

TRADE-TECH INDUSTRIES

BAR IS 25MM ON ORIGINAL DRAWING

| | |
|---|---|
| QTY: | (1) |
| DIMENSIONS ARE IN MILLIMETERS U.N.O | |
| MATERIAL: | 304 STAINLESS STEEL U.N.O |
| FINISH: | MILL |
| INSTALLED BY: | X |
| TOLERANCE | ±- |

| | | | |
|---|---|---|---|
| PROJECT No.: | 2804 | PROJECT TITLE: | NORTH FILL AREA - CELL 4 |
| CUSTOMER: | TODD BROTHERS CONSTRUCTION | | |
| DRAWING TITLE: | VALVE STEM BRACKET - | | |

| DRAWN: | CHECKED: | DATE: | SCALE: | SIZE: | DRAWING NUMBER: | REV |
|---|---|---|---|---|---|---|
| LUNT | | MAY 4/22 | NTS | B | 2804-03 | R1 |

REFERENCE DWG.: X

NOTES: AS PER PEEL REGION STANDARD 1-2-4

PDF Published May 2, 2019

# Gate Valves

CHEMLINE PLASTICS
SUPERIOR FLOW SOLUTIONS

The Chemline **CGA Series** flanged Gate Valve is an excellent isolating valve, but is also versatile. Fully open it has an unobstructed port and streamlined seating area, making pressure drop low. Water hammer can be a problem with quick closing valves such as ball and butterfly. Use of this multi-turn, slow closing valve eliminates water hammer. Unlike metal gate valves, this one may be throttled. The plastic disc is not subject to erosion by high fluid velocities, and the fully guided plug disc will not chatter. This valve is an excellent choice for underground services.

PVC

CRN Registered Consult Chemline

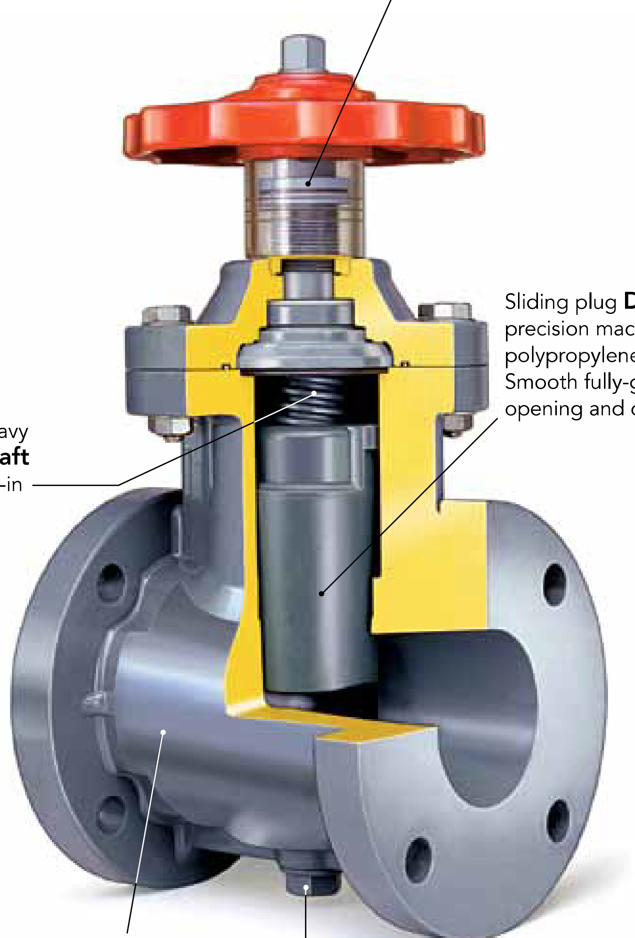
NSF[1] Certified to NSF/ANSI 61

SERIES: CGA

SIZES: 1-1/2" – 14"

ENDS: Flanged

SEALS: EPDM, FKM (Viton®)



Clear polycarbonate **Indicator** clearly shows valve position

Sliding plug **Disc** of precision machined polypropylene. Smooth fully-guided opening and closing.

Non-rising heavy duty **PVC Shaft** with moulded-in steel core

One-piece moulded **Flanged Body** is strong enough for underground piping systems

**Drain Plug**

## features

- **Full Port**
- **NSF 61 Certified**[1]
- **Ideal for Underground Service**

**Light Weight**

- Fast and easy to install

**AWWA Flanged Face-to-Face Dimensions**

- In sizes up to 8". Can easily replace corroded steel valves.

**CRN Registration numbers by province**

- Ontario: OC11045.5
- Newfoundland: OC11045.50
- Saskatchewan/Manitoba/Quebec: OC11045.56
- New Brunswick: OC11045.57
- Nova Scotia: OC11045.58
- P.E.I.: OC11045.59
- British Columbia: not required
- Alberta: not required[2]

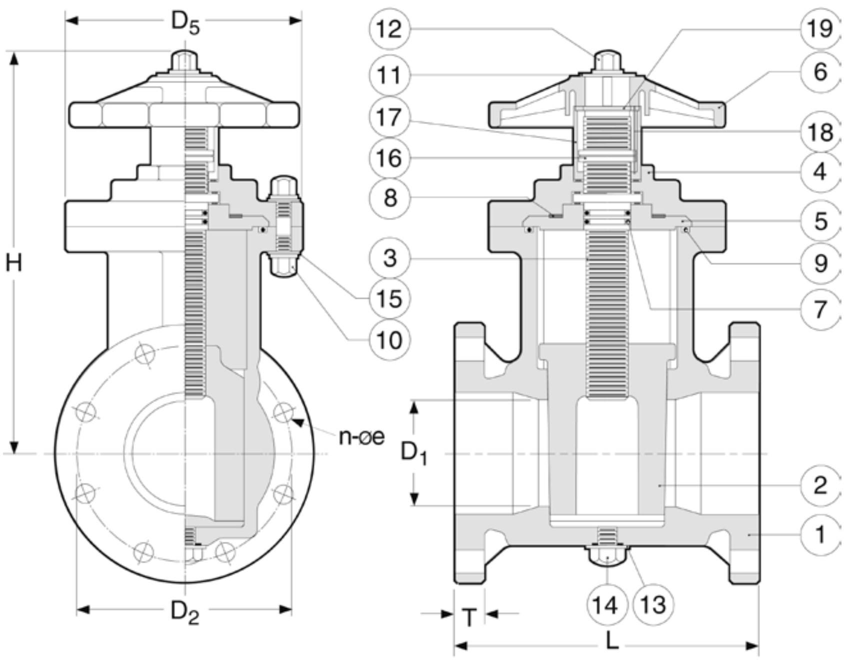
**Streamlined Seating Area and Full Port**

- Low Pressure Drop
- Little Sediment Buildup – Self Flushing

**Cylindrical Disc and Large Seating Area**

- High Working Pressures
- Good Abrasion Resistance

[1] PVC valves with EPDM or FKM (Viton®) seals are certified under NSF/ANSI Standard 61 for contact with drinking water.
[2] Not required for non-expandable fluids.




## PARTS

▲ Available Spare Parts

| No. | Part | Pcs. | Materials |
|---|---|---|---|
| 1 | Body | 1 | PVC |
| 2 | Disc | 1 | PP |
| 3 | Shaft | 1 | PVC/Steel Core |
| 4 | Bonnet | 1 | PVC |
| 5 | Stem Retainer | 1 | PVC 8″ – 14″ |
| 6▲ | Handwheel | 1 | PP |
| 7▲ | Shaft O-Ring | 2 | EPDM, FKM (Viton®) |
| 8 | Thrust Ring | 2 | PTFE 1-1/2″ – 6″ |
| 8 | Thrust Bearing | 2 | 8″ – 14″ |
| 9▲ | Bonnet O-Ring | 1 | EPDM, FKM (Viton®) |
| 10 | Bolt & Nut | Set | Stainless Steel |
| 11▲ | Washer | 1 | PVC 1-1/2″ – 6″ |
| 12▲ | Handwheel Nut | 1 | PVC |
| 13▲ | Gasket | 1 | EPDM, FKM (Viton®) |
| 14 | Drain Plug | 1 | PVC |
| 15 | Washer | Set | Stainless Steel |
| 16▲ | Indicator Ring | 1 | PVC |
| 17▲ | Indicator Tube | 1 | Polycarbonate |
| 18▲ | Indicator Pin | 1 | Stainless Steel |
| 19▲ | Indicator O-Ring | 1 | EPDM, FKM (Viton®) |

## DIMENSIONS INCHES / NET WEIGHTS / WORKING PRESSURES PSI / Cv VALVES

| Size | $D_1$ | $D_2$ | n | e | $D_5$ | L | H | T | KG | LB. | 0-50°C 32-122°F | USGPM @ 1 PSI Pressure Drop |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1-1/2″ | 1.52 | 3.88 | 4 | 0.63 | 4.72 | 6.50 | 9.26 | 0.87 | 2.5 | 5.5 | 150 | 130 |
| 2″ | 1.96 | 4.74 | 4 | 0.75 | 5.12 | 7.00 | 10.15 | 0.91 | 3.4 | 7.5 | 150 | 180 |
| 2-1/2″ | 2.54 | 5.49 | 4 | 0.75 | 6.10 | 7.50 | 11.42 | 0.94 | 4.7 | 10.3 | 150 | 415 |
| 3″ | 2.94 | 6.00 | 4 | 0.75 | 6.69 | 8.00 | 12.20 | 0.98 | 6.1 | 13.5 | 150 | 470 |
| 4″ | 3.94 | 7.50 | 8 | 0.75 | 7.68 | 9.00 | 13.78 | 1.06 | 9.1 | 20. | 150 | 690 |
| 5″ | 4.33 | 8.50 | 8 | 0.87 | 9.25 | 10.24 | 16.03 | 1.06 | 14.3 | 31. | 150 | 1,000 |
| 6″ | 5.12 | 9.51 | 8 | 0.87 | 10.63 | 10.50 | 17.52 | 1.06 | 18.2 | 40. | 150 | 1,400 |
| 8″ | 6.61 | 11.75 | 8 | 0.87 | 12.20 | 11.50 | 22.72 | 1.10 | 30.0 | 66. | 150 | 2,900 |
| 10″ | 8.27 | 14.25 | 12 | 0.98 | 14.17 | 14.96 | 27.17 | 1.18 | 52.5 | 116. | 110 | 3,700 |
| 12″ | 10.04 | 17.01 | 12 | 0.98 | 16.14 | 15.75 | 31.50 | 1.22 | 66.5 | 147. | 70 | 5,200 |
| 14″ | 11.69 | 18.74 | 12 | 1.14 | 17.91 | 16.93 | 35.82 | 1.26 | 80.0 | 187. | 70 | 7,000 |

**Max. Temp.** 60°C (140°F)

wsp

SHOP DRAWING
DATA SHEET

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☑ Reviewed ☐ Revise and resubmit
☐ Rejected ☐ Revise as noted

*The contractor, supplier and/or sub-contractor is responsible for: comfirming and coordinating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating his or her work with that of all other trades and performing all work in a safe and satisfactory manner.*

By: [signature] Date: 2022/04/06

Project #: RFP-40-21

## options + accessories

### Municipal Operating Nut
- 2″ square nut for operating valves below grade using a standard municipal “key”
- Stainless Steel for corrosion resistance

### Handwheel Lock-out
- To prevent unauthorized operation of the valve during maintenance shut-downs
- For use with padlocks or hasps

### Shaft Extensions
- Different materials and lengths are available
- Several designs:
  - with no housing for indoors
  - with waterproofed PVC housing for indoors or outdoors
  - with stainless steel housing for buried or actuated services

### OTHER ACCESSORIES
- **Low Torque Flange Gaskets**

### Chain Wheel Operator
- For overhead opeation, with 7′ of chain drop
- Cast iron standard, stainless steel is also available

### VACUUM RATING
- 29.9 inches mercury

### SAMPLE SPECIFICATION
1. All PVC Gate Valves 1-1/2″ to 14″ are to be Chemline CGA Series or equal with a one-piece moulded PVC body flanged to ANSI 150. Valve material shall be PVC with cell classification 12454-A as per ASTM D-1784. Cylindrical disc shall be polypropylene and o-ring seals EPDM.
2. PVC valves with EPDM or FKM (Viton®) seals shall be certified under NSF/ANSI Standard 61 for contact with drinking water.

### ORDERING EXAMPLE

| Chemline PVC Flanged Gate Valves | | | | | | CGA | 060 | E |
|---|---|---|---|---|---|---|---|---|
| Size | **015** – 1-1/2″ | **020** – 2″ | **025** – 2-1/2″ | **030** – 3″ | **040** – 4″ | **050** – 5″ | | |
| | **060** – 6″ | **080** – 8″ | **100** – 10″ | **120** – 12″ | **140** – 14″ | | | |
| Seals | **E** – EPDM | **V** – FKM (Viton®) | | | | | | |

**Example:** Chemline CGA Gate Valve, PVC, 6″, with EPDM seals.

# G-5 WELL SCREEN

# Free-Flow 304 Stainless Steel Screens

## Large Diameter Free-Flow Screens: Sizes 6P - 16T

| Size (in.) | Max Depth (ft.) | OD: (in.) | ID (in.) | Weight[1] (lbs./ft.) | Recom. Hang Weight[2] (lbs.) | Collapse Strength[1] (PSI) | Intake Area[3] - sq. in./ft. of Screen | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Screen Slot Size (thousandths of an in.) | | | | | | | |
| | | | | | | | 10 | 20 | 30 | 40 | 50 | 60 | 80 | 100 |
| 6P | 100 | 6.6 | 6.1 | 4.5 | 4,315 | 83 | 36 | 62 | 83 | 100 | 113 | 124 | 142 | 156 |
| | 250 | 6.7 | 6.1 | 4.8 | 4,315 | 187 | 20 | 37 | 52 | 65 | 76 | 86 | 103 | 117 |
| | 600 | 6.7 | 5.9 | 6.0 | 8,813 | 185 | 20 | 37 | 52 | 65 | 76 | 86 | 103 | 117 |
| | 1,000 | 6.8 | 5.9 | 9.0 | 10,987 | 681 | 16 | 30 | 43 | 54 | 64 | 73 | 89 | 102 |
| | 1,600 | 6.9 | 5.9 | 14.2 | 16,498 | 870 | 16 | 30 | 43 | 55 | 65 | 74 | 90 | 104 |
| 8T | 250 | 7.6 | 6.8 | 7.1 | 11,016 | 130 | 23 | 45 | 59 | 73 | 86 | 97 | 116 | 132 |
| | 600 | 7.6 | 6.8 | 6.1 | 10,404 | 487 | 18 | 34 | 48 | 60 | 72 | 82 | 100 | 115 |
| | 1,000 | 7.6 | 6.7 | 10.5 | 13,734 | 485 | 18 | 34 | 48 | 60 | 72 | 82 | 100 | 115 |
| | 1,600 | 7.7 | 6.7 | 16.6 | 20,622 | 622 | 18 | 34 | 48 | 61 | 72 | 83 | 101 | 116 |
| 8P | 250 | 8.7 | 7.9 | 8.0 | 12,118 | 84 | 26 | 48 | 67 | 84 | 98 | 111 | 133 | 151 |
| | 600 | 8.7 | 7.9 | 10.0 | 11,444 | 323 | 21 | 39 | 55 | 69 | 82 | 94 | 114 | 131 |
| | 1,000 | 8.8 | 7.9 | 11.9 | 15,107 | 315 | 21 | 39 | 55 | 70 | 83 | 95 | 115 | 133 |
| | 1,600 | 8.9 | 7.9 | 18.8 | 22,684 | 406 | 21 | 39 | 56 | 70 | 84 | 96 | 116 | 134 |
| 10T | 250 | 9.5 | 8.7 | 9.0 | 14,321 | 65 | 28 | 53 | 74 | 92 | 108 | 122 | 146 | 166 |
| | 1,000 | 9.5 | 8.6 | 11.2 | 13,525 | 250 | 22 | 42 | 60 | 75 | 89 | 102 | 125 | 143 |
| | 1,600 | 9.6 | 8.6 | 21.1 | 26,809 | 317 | 23 | 43 | 61 | 76 | 91 | 104 | 126 | 145 |
| 10P | 600 | 10.7 | 9.9 | 12.5 | 14,566 | 173 | 25 | 48 | 68 | 85 | 101 | 116 | 141 | 162 |
| | 1,000 | 10.8 | 9.9 | 20.1 | 19,228 | 227 | 25 | 48 | 68 | 86 | 102 | 116 | 141 | 163 |
| | 1,600 | 11.0 | 9.9 | 28.3 | 28,871 | 523 | 27 | 51 | 72 | 91 | 108 | 123 | 149 | 171 |
| 12T | 600 | 11.3 | 10.4 | 13.5 | 16,646 | 149 | 27 | 50 | 71 | 90 | 107 | 122 | 148 | 170 |
| | 1,000 | 11.5 | 10.4 | 26.8 | 21,974 | 463 | 28 | 53 | 75 | 95 | 112 | 128 | 156 | 179 |
| | 1,600 | 11.5 | 10.4 | 30.5 | 32,995 | 453 | 29 | 54 | 76 | 96 | 113 | 129 | 157 | 180 |
| 12P | 250 | 12.7 | 11.8 | 14.7 | 16,646 | 104 | 30 | 57 | 80 | 101 | 120 | 137 | 167 | 192 |
| | 600 | 12.7 | 11.8 | 16.2 | 16,646 | 138 | 30 | 57 | 80 | 101 | 120 | 137 | 167 | 192 |
| | 1,000 | 12.9 | 11.8 | 29.2 | 21,974 | 325 | 32 | 60 | 85 | 107 | 127 | 144 | 175 | 201 |
| | 1,600 | 13.0 | 11.8 | 33.0 | 32,995 | 319 | 32 | 60 | 85 | 108 | 127 | 145 | 176 | 202 |
| 14T | 250 | 12.5 | 11.6 | 13.6 | 13,525 | 111 | 29 | 55 | 78 | 99 | 117 | 134 | 163 | 188 |
| | 600 | 12.5 | 11.6 | 19.6 | 13,525 | 147 | 29 | 55 | 78 | 99 | 117 | 134 | 163 | 188 |
| | 1,000 | 12.6 | 11.5 | 27.4 | 17,854 | 347 | 31 | 59 | 83 | 105 | 124 | 141 | 171 | 197 |
| | 1,600 | 12.7 | 11.5 | 30.5 | 26,809 | 341 | 31 | 59 | 84 | 105 | 125 | 142 | 173 | 198 |
| 14P/16T | 250 | 14.0 | 13.0 | 15.5 | 16,126 | 79 | 33 | 62 | 88 | 111 | 132 | 151 | 183 | 211 |
| | 600 | 14.1 | 13.0 | 28.5 | 16,126 | 249 | 35 | 66 | 93 | 117 | 138 | 158 | 192 | 220 |
| | 1,000 | 14.1 | 12.9 | 31.1 | 21,288 | 248 | 35 | 66 | 93 | 117 | 139 | 158 | 192 | 220 |
| | 1,600 | 14.3 | 12.9 | 38.6 | 31,964 | 356 | 38 | 72 | 101 | 126 | 149 | 170 | 205 | 234 |

**Notes:**

1. Based on 0.030 in. slot size (collapse values contain no safety factor)
2. Recommended hang weight is 50 percent of the calculated tensile strength
3. Transmitting capacity in gpm./ft. of screen = open area x 0.31 @ 0.1 ft./sec.

- Screens are available in up to 40 ft. lengths of continuously wrapped screen with no mid-weld
- Technical information is available upon request for 316 stainless steel screens
- P - pipe size, T - telescope
- For application depths > 1,600 ft., contact Technical Support

Telescope size screens install through the casing and usually have a Figure K packer as the upper fitting. Pipe size screens (right) usually have weld rings at each end and attach directly to the casing.

# G-6 CLEAR STONE

PNJ ENGINEERING INC.
Pavement · Materials · Geo-Environmental · Engineering
21 Rodinea Road, Suite 1
Vaughan, Ontario L6A 1R3
Tel: 905 597 8383 • Fax: 905 597 0825

May 6, 2022

Mr. Brian Shorey

**Drain Bros. Excavating**
2130 8th Line Road, North Dummer
Douro-Dummer, Ontario, K0L 2H0

Project No.: 22-1035-01

Subject: Dump Stone, Drain Bros - Havelock Quarry PNJ Lab # 4677

As requested, PNJ Engineering Inc. (PNJ) performed grading and physical properties testing on the Dump Stone sourced from Drain Bros – Havelock Quarry, delivered to PNJ's laboratory on April 12, 2022.

The samples delivered were tested in as received condition with the exception of the Micro-Deval Abrasion of Coarse Aggregate which required further processing by means of crushing. The crushing process further reduced the size of the 2 inch dump stone to a 19.0 mm stone size required to perform the tests.

The tests performed on the submitted 2 inch dump stone are as follows:

- LS-602 Particle Size Distribution
- LS-604 Bulk Specific Gravity & Absorption
- LS-606 Magnesium Sulphate Soundness
- LS-608 Flat and Elongated Particles
- LS-609 Petrographic Number
- LS-618 Micro-Deval Abrasion of Coarse Aggregate

The specification referenced is the County of Peterborough Land Fill Cell #4, Leachate collection system, Table 5-1 Clear Stone. The results of the 2 inch Dump Stone from Drain Bros - Havelock Quarry, are in the attached table and meet the physical requirements specified.

If you have any questions or need anything further, do not hesitate to contact our office.

Yours truly
PNJ Engineering Inc.

NSibilia

Nick Sibilia, A.Sc.T, rcji
*Project Manager*
*Manager Quality Assurance*

wsp SHOP DRAWING DATA SHEET

***Affixing this stamp confirms that an administrative approval and/or a verification of compliance with shop drawings or specifications was made, but does not entail the liability of the author of the work or its owner with regards to this shop drawing or data sheet, for which the contractor is the sole responsible.***

- [x] Reviewed
- [ ] Revise and resubmit
- [ ] Rejected
- [ ] Revise as noted

***The contractor, supplier and/or sub-contractor is responsible for: comfirming and coordinating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating his or her work with that of all other trades and performing all work in a safe and satisfactory manner.***

By: Date: 2022/05/13
Project #: RFP-40-21

21 Rodinea Road, Suite 1
Vaughan, Ontario L6A 1R3
Tel: 905 597 8383 • Fax: 905 597 0825

## Laboratory Test Results

### Physical Properties Analysis

| Procedure | PNJ Lab # 4677 | County of Peterborough Land Fill Cell #4 - Leachate collection system, Table 5-1, Clear Stone Physical Requirements |
|---|---|---|
| Particle Size Distribution LS-602 | D85 - 48.2 mm<br>D10 - 22.4 mm<br>D60/D10 - 1.8 %<br><br>Passing #200 mesh by washing - 0.2 % | ≥ 37 mm<br>≥ 19 mm<br>< 2.0 %<br><br>≤ 1.0 % |
| Bulk Specific Gravity (SSD) & Absorption LS-602 | S.G. 2.985<br>Absorption 0.25 % | S.G. N/A<br>Absorption 2.0 % Max. |
| Magnesium Sulfate Soundness LS-606 | 0.2 % | 12.0 % Max. loss |
| Flat & Elongated Particles LS-608 | 4.8 % | 20.0 % Max. |
| Petrographic Number LS609 | 100 (see attached) | 125 Max. |
| Micro-Deval Abrasion of Coarse Aggregate LS-618 | 6.8 % | 14.0 % Max. loss |

Note:

# COARSE AGGREGATE PETROGRAPHIC ANALYSIS (LS-609)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Project #:** | 22-1035-01 | **Client:** | Drain Bros. Excavating | **Date Tested:** | April 18, 2022 | **Lab #:** | **4677** |
| **Material:** | 2 inch Dump Stone | **Source:** | Havelock Quarry | **Date Sampled:** | April 12, 2022 | **MAIDB#:** | C01-054 |
| **Contract:** | Various | **Location** | Various | **Sampled By:** | Client | | |

| TYPE # | TYPE | MASS (g) | % (R19) | MASS (g) | % (19-13.2) | MASS (g) | % (13.2-9.5) | MASS (g) | % (9.5-4.75) | WEIGHTED (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | CARBONATE (hard; silty, hard) | | | | | | | | | |
| 20 | CARBONATE(surf.weath.;silty, surf.weath.;med. hard;silty, med. ha | | | | | | | | | |
| 2 | CARBONATE (sandy, hard or medium hard) | | | | | | | | | |
| 21 | CARBONATE (slightly cherty; <5% chert) | | | | | | | | | |
| 23 | MARBLE (hard or medium hard) | | | | | | | | | |
| 3 | CONGLOMERATE-SANDSTONE-ARKOSE (hard) | | | | | | | | | |
| 22 | CONGLOMERATE-SANDSTONE-ARKOSE (m.h) | | | | | | | | | |
| 6 | GREYWACKE-ARGILLITE (hard or medium hard) | | | | | | | | | |
| 4 | GNEISS-AMPHIBOLITE-SCHIST (hard)(some magnetic) | | | | | | | | | |
| 5 | QUARTZITE | | | | | | | | | |
| 8 | GRANITE-DIORITE-GABBRO (hard)(some magnetic) | | | | | | | | | |
| 7 | VOLCANIC (hard or medium hard) | | | | | | | | | |
| 9 | TRAP (hard)(some magnetic) | 5020.0 | 100.00 | | | | | | | 100.00 |
| 10 | QUARTZ (vein or pegmatitic) | | | | | | | | | |
| | **TOTAL GOOD AGGREGATE** | **5020.0** | **100.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **100.0** |
| 35 | CARBONATE (soft; silty, soft; slightly shaley) | | | | | | | | | |
| 41 | CARBONATE (soft; pitted) | | | | | | | | | |
| 42 | CARBONATE (deeply weathered; silty, deeply weathered) | | | | | | | | | |
| 40 | CARBONATE (sandy, soft) | | | | | | | | | |
| 24 | MARBLE (brittle) | | | | | | | | | |
| 26 | CHERT-CHERTY CARBONATE (<20% leached chert) | | | | | | | | | |
| 30 | CONGLOMERATE-SANDSTONE-ARKOSE (brittle) | | | | | | | | | |
| 29 | GREYWACKE (brittle) | | | | | | | | | |
| 52 | ENCRUSTATION | | | | | | | | | |
| 25 | GNEISS-AMPHIBOLITE-SCHIST (brittle) | | | | | | | | | |
| 27 | GRANITE-DIORITE-GABBRO (brittle) | | | | | | | | | |
| 28 | VOLCANINC (soft) | | | | | | | | | |
| 34 | ARGILLITE (medium soft) | | | | | | | | | |
| - | **TOTAL FAIR AGGREGATE** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** |
| 43 | CARBONATE (shaley; clayey; silty, clayey) | | | | | | | | | |
| 44 | CARBONATE (ochreous; sandy, ochreous) | | | | | | | | | |
| 49 | MARBLE (friable) | | | | | | | | | |
| 45 | CHERT-CHERTY CARBONATE (≥20% leached chert) | | | | | | | | | |
| 46 | CONGLOMERATE-SANDSTONE-ARKOSE (friable) | | | | | | | | | |
| 56 | SILTSTONE | | | | | | | | | |
| 53 | CEMENTATION (partial) | | | | | | | | | |
| 54 | CEMENTATION (total) | | | | | | | | | |
| 50 | GNEISS-AMPHIBOLITE (friable) | | | | | | | | | |
| 55 | SCHIST (soft) | | | | | | | | | |
| 51 | GRANITE-DIORITE-GABBRO (friable) | | | | | | | | | |
| 48 | VOLCANIC (very soft, porous) | | | | | | | | | |
| - | **TOTAL POOR AGGREGATE** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** |
| 60 | OCHRE | | | | | | | | | |
| 61 | SHALE | | | | | | | | | |
| 62 | CLAY | | | | | | | | | |
| 63 | VOLCANIC-GNEISS-SCHIST (decomposed) | | | | | | | | | |
| - | **TOTAL DELETERIOUS AGGREGATE** | **0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** |
| - | **TOTALS** | **5020.0** | **100.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **100.0** |
| | CONTAMINANTS (not included in PN calculations) | | | | | | | | | |
| | TOTALS (with contaminants) | | | | | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Estimate % Crushed =** | **% GOOD** | x 1 | 100.0 | x 1 | 0.0 | x 1 | 0.0 | x 1 | 0.0 | **WEIGHTED AVERAGE PN** |
| | **% FAIR** | x 3 | 0.0 | x 3 | 0.0 | x 3 | 0.0 | x 3 | 0.0 | |
| | **% POOR** | x 6 | 0.0 | x 6 | 0.0 | x 6 | 0.0 | x 6 | 0.0 | |
| | **% DELETERIOUS** | x 10 | 0.0 | x 10 | 0.0 | x 10 | 0.0 | x 10 | 0.0 | |
| | **PN =** | 100 | | 0 | | 0 | | 0 | | **100** |

**Additional Information:**
**Testing Lab: SNC Lavalin Inc.**
**Analyst: A.Liang**
**Reviewed by: Z.Brcic, P.Eng.**

| **COARSE AGGREGATE GRADATION OF AS-RECEIVED SAMPLE, % RETAINED** | **75-53** | **53-37.5** | **37.5-26.5** | **26.5-19** | **19-13.2** | **13.2-9.5** | **9.5-4.75** | **Total** |
|---|---|---|---|---|---|---|---|---|
| | 1.1 | - | - | 98.9 | - | - | - | 100.0 |

APPENDIX

# G-7 GEOTEXTILES

# TE-8

## 8oz CIVIL NONWOVEN GEOTEXTILE

**TITAN ENVIRONMENTAL CONTAINMENT**

Titan has provided the containment and erosions control industries with the highest quality geotextiles available. Our nonwoven needle punched geotextiles are manufactured using polypropylene fibers, which are formed into a dimensionally stable network which allows the fibers to maintain their relative position. These products resist ultraviolet deterioration, rotting, biological degradation, and are inert to commonly encountered soil chemicals.

| TESTED PROPERTY | TEST METHOD | UNIT ENGLISH (METRIC) | VALUE ENGLISH (METRIC) |
|---|---|---|---|
| | | | |
| Weight | ASTM D 5261 | oz/yd$^2$ (g/m$^2$) | 8.0 (271) |
| Tensile Strength (Grab) | ASTM D 4632 | lbs (N) | 205 (911) |
| Elongation | ASTM D 4632 | % | 50 |
| CBR Puncture | ASTM D 6241 | lbs (N) | 500 (2224) |
| Trapezoid Tear | ASTM D 4355 | lbs (N) | 80 (356) |
| U.V. Resistance | ASTM D 4355 | %/hrs | 70/500 |
| Apparent Opening Size (AOS)* | ASTM D 4751 | U.S. Sieve (mm) | 80 (0.180) |
| Permittivity | ASTM D 4491 | sec$^{-1}$ | 1.4 |
| Water Flow | ASTM D 4491 | gpm/ft$^2$ (l/min/m$^2$) | 95 (3870) |
| TYPICAL ROLL DIMENSIONS | | | |
| Roll Dimensions | | ft | 12.5 x 360<br>15 x 300 |
| Roll Area | | yd$^2$ | 500 |
| Estimated Roll Weight | | lbs | 250 |

NOTES:
*Maximum average roll value.
Mullen Burst ASTM D 3768 has been removed. It is not recognized by ASTM D 35 on Geosynthetics.
Puncture ASTM D 4833 has been removed. It is not recognized by AASHTO M288 and has been replaced with CBR Puncture ASTM D 6241.

wsp SHOP DRAWING DATA SHEET

*Affixing this stamp confirms that an administrative approval and/or a verification of compliance with shop drawings or specifications was made, but does not entail the liability of the author of the work or its owner with regards to this shop drawing or data sheet, for which the contractor is the sole responsible.*

- [x] Reviewed
- [ ] Revise and resubmit
- [ ] Rejected
- [ ] Revise as noted

*The contractor, supplier and/or sub-contractor is responsible for: comfirming and coordinating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating his or her work with that of all other trades and performing all work in a safe and satisfactory manner.*

By: Date: 2022/03/30
Project #: RFP-40-21

Titan Environmental warrants that the geotextile furnished hereunder shall conform to the specification stated herein. Any other warranty including merchantability and fitness for a particular purpose are hereby excluded. If the geotextile does not meet the specification on this page and is notified prior to installation Titan Environmental will replace the geotextile at no additional cost to the customer. The geotextile specified herein has not been tested, calibrated or validated in relation to any design methodology for either unpaved roads or flexible pavements. Titan Environmental is not responsible for any loss or damage incurred during transit and storage after leaving the manufacturing site. This product specification supersedes all prior specifications for the product described above and is not applicable to any products shipped prior to November 14, 2019.

# TE-12

## 12oz CIVIL NONWOVEN GEOTEXTILE

TITAN

Titan has provided the containment and erosions control industries with the highest quality geotextiles available. Our nonwoven needle punched geotextiles are manufactured using polypropylene fibers, which are formed into a dimensionally stable network which allows the fibers to maintain their relative position. These products resist ultraviolet deterioration, rotting, biological degradation, and are inert to commonly encountered soil chemicals.

| TESTED PROPERTY | TEST METHOD | UNIT ENGLISH (METRIC) | VALUE ENGLISH (METRIC) |
|---|---|---|---|
| | | | |
| Tensile Strength (Grab) | ASTM D 4632 | lbs (N) | 300 (1335) |
| Elongation | ASTM D 4632 | % | 50 |
| CBR Puncture | ASTM D 6241 | lbs (N) | 825 (3671) |
| Trapezoid Tear | ASTM D 4533 | lbs (N) | 115 (511) |
| U.V. Resistance | ASTM D 4355 | %/hrs | 70/500 |
| Apparent Opening Size (AOS)* | ASTM D 4751 | U.S. Sieve (mm) | 100 (0.150) |
| Permittivity | ASTM D 4491 | $sec^{-1}$ | 1.0 |
| Water Flow | ASTM D 4491 | $gpm/ft^2$ ($l/min/m^2$) | 75 (3055) |
| TYPICAL ROLL DIMENSIONS | | | |
| Roll Dimensions | | ft | 12.5 x 360<br>15 x 300 |
| Roll Area | | $yd^2$ | 500 |
| Estimated Roll Weight | | lbs | 375 |

NOTES:
*Maximum average roll value.
Mullen Burst ASTM D 3768 has been removed. It is not recognized by ASTM D 35 on Geosynthetics.
Puncture ASTM D 4833 has been removed. It is not recognized by AASHTO M288 and has been replaced with CBR Puncture ASTM D 6241.

wsp

SHOP DRAWING
DATA SHEET

*Affixing this stamp confirms that an administrative approval and/or a verification of compliance with shop drawings or specifications was made, but does not entail the liability of the author of the work or its owner with regards to this shop drawing or data sheet, for which the contractor is the sole responsible.*

- [x] Reviewed
- [ ] Revise and resubmit
- [ ] Rejected
- [ ] Revise as noted

*The contractor, supplier and/or sub-contractor is responsible for: comfirming and coordinating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating his or her work with that of all other trades and performing all work in a safe and satisfactory manner.*

By: Date: 2022/03/30
Project #: RFP-40-21

# APPENDIX

# H OUTSTANDING ITEMS LIST

**WSP Canada Inc.**
**Professional Consulting Services**

**North Fill Area Cell 4 Construction**
**Peterborough County/City Waste Management Facility**
**Outstanding Items List**
**December 23, 2022**

| Item No. | Description | Outstanding Items | Notes |
|---|---|---|---|
| **Section B - Site and Road Work** | | | |
| **B1** | Supply and install temporary silt fence. | - Silt fence removal onsite as described in submitted site instruction #5. | - Deferred until spring 2023 |
| **B2** | Supply, install, maintain and remove snow fence to protect existing monitoring wells, LFG collection wells, standpipes, etc. | **Todd Brothers to complete in the Spring of 2023**<br>- Remove snow fence around protected monitoring wells once project is substantially complete. | - Deferred until spring 2023 |
| **B3** | Clear and grub work area including Cell 4, access roads, drainage ditches, stockpile and screening area (Approximate area = 8.3 ha). | | - Complete |
| **B4** | Strip and remove topsoil (approximately 300 mm thick) within work area. | | -Complete |
| **B5** | Excavation to bottom of recompacted liner elevation. | | -Complete |
| **B6** | Hauling, stockpiling and grading of excavated material to designated stockpile areas. Excludes soil to be used for construction of recompacted liner. | | -Complete |
| **B7** | Construct granular access road around the perimeter of Cell 4 | - To be completed in the Spring of 2023 | - Deferred until spring 2023 |
| **B7.1** | Grading to sub-base elevation (Approximately 4,400 $m^3$ cut). | **Todd Brothers to complete in the Spring of 2023**<br>- Grade subgrade and remove saturated/unsuitable material as required to meet subgrade specifications. (Two areas that require cut, and NW corner may require work due to saturated conditions and low area not maintained for drainage) | - Deferred until spring 2023 |
| **B7.2** | Supply, place and compact Granular B (300 mm thick). | - To be completed in the Spring of 2023 | - Deferred until spring 2023 |
| **B7.3** | Supply, place and compact Granular A (150 mm thick). | - To be completed in the Spring of 2023 | - Deferred until spring 2023 |
| **B8** | Construct and maintain 12 m wide granular access road from work area to staging and stockpiling area including supply and installation of two 250 mm dia. corrugated HDPE SDR-17 culverts with rip rap and geotextile at inlets and outlets. Includes removal of trees as required to accommodate road construction. | - Culverts to be flushed. | - Deferred until spring 2023 |
| **B9** | Construct 5 m wide granular access roads from existing access road to existing manholes including supply and installation of 450 mm dia. CSP culverts with rip rap and geotextile at inlets and outlets. | - To be completed in the Spring of 2023 | - Deferred until spring 2023 |
| **B9.1** | MHL1 (measured along center line) | - To be completed in the Spring of 2023 | - Deferred until spring 2023 |
| **B9.2** | MHL2 (measured along center line) | - To be completed in the Spring of 2023 | - Deferred until spring 2023 |
| **B9.3** | MHL3 (measured along center line) | - To be completed in the Spring of 2023 | - Deferred until spring 2023 |
| **B10** | Construct 1 m wide flat bottom drainage ditch. | **Todd Brothers to complete in the Spring of 2023**<br>- Regrade and shape 1m wide flat bottom ditch along perimeter berms.<br>- Construct perimeter berm along the south end of Cell 4. | - Deferred until spring 2023 |
| **B11** | Construct V-notch drainage ditch. | **Todd Brothers to complete in the Spring of 2023**<br>- Finish shaping and excavating v-notch ditch along exterior of site access road around Cell 4. | - Deferred until spring 2023 |
| **B12** | Supply and install litter fence including posts, mesh and fasteners. | **Todd Brothers to complete in the Spring of 2023**<br>- Litter fence mesh and fasteners to be installed in the spring of 2023<br>- Fence posts to be cut to proposed height and sealed by Rose Erosion (4m from existing ground). | - Deferred until spring 2023 |
| **B13** | Place 150 mm topsoil from on-site stockpile and hydroseed. | - To be completed in the Spring of 2023 | - Deferred until spring 2023 |
| **B14** | Restoration of all areas and appurtenances disturbed by construction including reinstatement of roads, ditches, litter fence, etc. | **Todd Brothers to complete in the Spring of 2023**<br>- Regrade south access road of Cell's 2 and 3 to the staging area for clear stone and repair areas along existing litter fence or ditch that have been rutted.<br>- Repair eroded areas south of Cell 4 at dewatering location.<br>- Repair monitoring well 84 at the south end of Cell 4 that was damaged during construction.<br>- Complete Cell 3 tie in repair at south end of Cell 3.<br>- Remove remainder of clear stone left at the top of Cell 4 slope (plateau) down to geotextile at the old access location utilized for the construction of the drainage layer prior to placement of recompact till for the perimeter berm. | - Deferred until spring 2023 |
| **Section C - Liner and Leachate Collection System** | | | |
| **C1** | Process, remove unsuitable material, place and compact suitable on-site till for recompacted liner on cell base (500 mm thick). | | -Complete |
| **C2** | Process, remove unsuitable material, place and compact suitable on-site till for recompacted liner on cell base (1 m thick). | | -Complete |
| **C3** | Supply and place 50 mm dia. clear stone for leachate drainage layer. | | -Complete |
| **C4** | Supply and place 50 mm dia. clear stone for protection layer. | | -Complete |
| **C5** | Supply and place geotextile for protection layer (Type 1) including anchor trench excavation and backfilling. | | -Complete |
| **C6** | Supply and place geotextile for filter layer (Type 2) including anchor trench excavation and backfilling. | | -Complete |
| **C7** | Supply and install 2400 mm dia. precast concrete leachate manhole MHL8 including scoops, pipes, connections, and all other appurtenances as shown on the drawings. | **Todd Brothers to complete in the Spring of 2023**<br>- Waterproof interior of manhole riser sections stored onsite for future use (Weather permitting as per product specifications). | - Deferred until spring 2023 |
| **C8** | Supply and install 2400 mm dia. precast concrete leachate manhole MHL4 including scoops, pipes, valve, connections, and all other appurtenances as shown on the drawings. | **Todd Brothers to complete in the Spring of 2023**<br>- Waterproof interior of manhole riser sections stored onsite for future use (Weather permitting as per product specifications). | - Deferred until spring 2023 |
| **C9** | Supply and install 200 mm dia. perforated HDPE SDR-11 leachate collection pipe. | **Todd Brothers to complete in the Spring of 2023**<br>- Flushing of LCS pipes deferred to the spring once manholes are accessible for flushing trucks. | - Deferred until spring 2023 |
| **C10** | Supply and install 200 mm dia. solid HDPE SDR-11 leachate collection pipe for connection to Cell 3 leachate collection system. Includes all work required to remove existing cap and make connection to existing pipe. | | -Complete |
| **C11** | Supply and install 200 mm dia. stainless steel slotted well screen for MHL4 upper leachate collection system. | | -Complete |

| Item No. | Description | Outstanding Items | Notes |
|---|---|---|---|
| C12 | Supply and install complete leachate monitoring pipe and all other appurtenances as shown on the drawings. | **Todd Brothers to complete in the Spring of 2023**<br>- Concrete bollard to be installed at leachate monitoring pipe | - Deferred until spring 2023 |
| C13 | Repair recompacted clay liner test areas where Shelby Tubes installed. | | -Complete |
| **Section D - Landfill Gas Collection System** | | | |
| D1 | Supply and install 200 mm dia. solid HDPE SDR-17 landfill gas collection system header pipe including trench excavation, Granular A bedding/backfill, and connections to existing header. | | -Complete |
| D2 | Supply and install 200 mm dia. x 150 mm dia. HDPE SDR-17 branch saddle with capped end for future connections. | | -Complete |
| **Section E - Provisional Items** | | | |
| E1 | Supply and place 50 mm clear stone. | | N/A |
| E2 | Supply, place and compact Granular B. | | N/A |
| E3 | Supply, place and compact Granular A. | | N/A |
| E4 | Supply and place woven geotextile. | | N/A |
| E5 | Supply and install straw bales. | | N/A |
| E6 | Remove and dispose of existing silt fence. | | N/A |
| E7 | Remove existing boulders within work area (Approximately 35 boulders with maximum size 3m x 2m x 2m). | | N/A |
| E8 | Over excavate subgrade (bottom of clay liner) to remove unsuitable areas and fill using liner quality material. | | N/A |
| E9 | Relocate existing waste from work area to active landfill area. | | N/A |
| E10 | Construct granular access road into Cell 4 including supply and installation of a 450 mm dia. CSP culvert with rip rap and geotextile on inlet and outlet. | | N/A |
| E11 | Rock excavation. | | N/A |
| E12 | Depressurization of aquifer if required. | | N/A |
| E13 | Decommissioning of BH-83-II | | N/A |
| **Change Orders** | | | |
| CO#1 | ORCA Place card | | -Complete |
| CO#2 | Relocation of Boulders | | -Complete |
| CO#3 | Erosion control blanket | | - To be reviewed in the spring |
| CO#4 | Hauling to SSO Facility | | -Complete |
| CO#5 | Culvert Extensions | | -Complete |
| CO#6 | Well Decommissioning | | -Complete |
| CO#7 | Liner Remediation | | -Complete |
| CO#8 | Clay soil import | | -Complete |

# APPENDIX

# C

CITY'S BY-LAW
NUMBER 07-027

Amended by 09-108
Amended by 14-095
Amended by 15-132

# THE CORPORATION OF THE CITY OF PETERBOROUGH

## BY-LAW NUMBER 07-027
## Amended by 09-108, 14-095, 15-132

**BEING A BYLAW FOR THE PURPOSE OF REGULATING THE DISPOSAL OF WASTE, INCLUDING ESTABLISHING OF TIPPING FEES FOR THE PETERBOROUGH COUNTY-CITY WASTE MANAGEMENT FACILITY**

**WHEREAS** Council of the City of Peterborough wishes to enact a By-law for the purposes of regulating the disposal of waste;

**AND WHEREAS** Section 391 of the *Municipal Act, 2001* provides that a municipality may pass by-laws imposing fees or charges;

**AND WHEREAS** solid waste tipping fees will be included in the By-law;

**AND WHEREAS** the City of Peterborough held a public meeting on December 11, 2006 at City Hall, 500 George Street North, Peterborough, in accordance with Regulation 244/02 under the *Municipal Act, 2001*;

**NOW THEREFORE** the Council of the City of Peterborough enacts as follows:

**1. INTERPRETATION**

In this By-law:

“City” means the City of Peterborough;

“Director” means the Director of Utility Services for the City of Peterborough and where applicable includes a person designated by the Director to perform a task or exercise a power in his or her place and stead;

“garbage” means dry waste other than recyclable materials, organic materials and hazardous waste;

“green waste” has the meaning set out in Schedule “A”;

“hazardous waste” means hazardous waste as defined in R.R.O. 1990, Regulation 347, as amended from time to time, pursuant to the Environmental Protection Action, R.S.O 1990, cE19, which includes:

a) hazardous industrial waste;
b) acute hazardous waste chemical;
c) hazardous waste chemical;
d) severely toxic waste;
e) ignitable waste;
f) corrosive waste;
g) reactive waste;
h) radioactive waste, except radioisotope wastes disposed of in a landfilling site in accordance with the written instructions of the Atomic Energy Control Board or the Canadian Nuclear Safety Commission;
i) pathological waste;
j) leachate toxic waste;
k) PCB waste as defined in Regulation of 362 of Revised Regulations of Ontario, 1990;

“recyclable materials” means those materials set out in Schedule “A”;

“waste” means anything for which the holder has no further use and which the holder has discarded and includes, but is not limited to garbage and recyclable material;

"waste management facility" means the Peterborough County/City Waste Management Facility, formerly known as Bensfort Landfill Site, located at 1260 Bensfort Road, Township of Otonabee, South Monaghan, County of Peterborough. For the purpose of this by-law, the waste management facility includes the landfill site and the Public Drop-off Depot.

## 2. GENERAL PROVISIONS AND PROHIBITIONS

2.1 No person shall, at the waste management facility:

(a) deposit waste outside the posted hours of operation;

(b) deposit waste or recyclable materials at any place other than the place respectively designated for the receipt of such waste;

(c) deposit hazardous waste;

(d) deposit any waste which originated from outside the County or City of Peterborough. If requested, the person shall provide proof of the origin of the waste prior to depositing the waste;

(e) refuse to remove, at the person's expense, any waste which has been deposited by the person which is not in compliance with this by-law;

(f) remove or scavenge any deposited waste without the prior written approval of the Director;

(g) deposit waste which has been transported to the facility except when such waste has been properly secured or covered in canvas, tarpaulins or nets, so fastened down around the edges as to prevent any of the contents from leaving the vehicle during transport.

2.2 Not withstanding Section 2.1 (b), any load which contains less than 10% by volume of recyclable materials may be deposited at the place designated for the receipt of garbage.

## 3. FEES

3.1 No person shall deposit waste at the waste management facility without paying the appropriate fee for that type of waste, as set out in Schedule "B".

3.2 If any cheque provided in payment of a fee payable under Subsection 3.1 is returned marked "Not Sufficient Funds", the amount of the fee shall remain unpaid, and together with the administrative charge for NSF cheques, determined in accordance with the City's Financial Policies shall be a debt to the City owing by that person recoverable by action or other means open to the City.

## 4. ENFORCEMENT PROCEDURES

4.1 In the event that a person deposits, or attempts to deposit waste, not in compliance with this by-law:

(a) The person may be refused access to the waste management facility;

(b) The person shall receive a written warning on the first such occasion;

(c) The person shall pay surcharges in the following amounts on any subsequent occasions:

(i) $100 on the first subsequent occasion;

(ii) $200 on the second subsequent occasion;

(iii) $300 on the third and any other subsequent occasions.

5. **SCHEDULES**

The following Schedules attached hereto form a part of this By-law:

Schedule “A” –Recyclable Materials; and
Schedule “B” – Waste Management Tipping Fees.

6. **PENALTY**

Any person who contravenes this by-law is guilty of an offence and, upon conviction, is liable to a fine or penalty provided for in the ***Provincial Offences Act***, as amended.

7. **EFFECTIVE DATE**

This By-law shall come into force and take effect on Thursday, March 1, 2007.

By-law read a first, second and third time this 26th day of February, 2007.

(Sgd.) D. Paul Ayotte, Mayor

(Sgd.) Nancy Wright-Laking, City Clerk

## SCHEDULE "A"

## TO BY-LAW 07 -027
## RECYCLABLE MATERIALS

The following materials are banned from disposal at the waste management facility but are accepted for recycling at the facility's Public Drop-off Depot:

"blue box materials" means recyclable materials as collected in the City of Peterborough Blue Box Collection program, as amended from time to time, namely:

a) clear and coloured glass from food & beverage bottles and jars; aseptic containers;
b) metal cans and foil; including food & beverage cans, aluminum foil & trays;
c) empty metal paint and aerosol cans;
d) gable top drink cartons and tetra paks including milk and juice cartons and tetra pack containers for juice, milk, soup;
e) plastic soft drink and water containers made out of polyethylene terephthalate (PET or PETE #1);
f) plastic bottles and jugs made out of high density polyethylene (HDPE #2);
g) tubs and lids (#5);
h) polystyrene and styrofoam containers (#6) including clear trays and clamshells marked with the #6 only; plant pots up to 12 inches in size, cell-paks, carrying flats; foam meat trays, plates, cups, take-out containers and egg cartons only;
i) film plastic bags including bread, milk , fresh and frozen produce bags, bulk food, dry cleaning, toilet-tissue packaging, and cereal box liners;
j) boxboard, including cereal, crackers, detergent, toothpaste, shoe boxes;
k) corrugated cardboard consisting of triple-layer cardboard boxes. Waxed, stained, painted or contaminated cardboard must be discarded as garbage;
l) paper including envelopes, direct mail advertising, paper egg cartons, greeting cards and all remaining paper and paper products generated by households
m) newspapers & magazines, including inserts, catalogues, white envelopes, computer paper; writing papers, telephone directories, manuals & softcover books;

"clean wood waste" includes untreated lumber and wood products such as pallets and raw lumber, but does not include painted wood, paneling, pressboard or similar treated products;

"drywall" includes drywall scraps or drywall material, which may contain paint and screws, segregated from supporting building material;

"green waste" means leaves, grass clippings; trees, excluding stumps; garden roots and cuttings; hedge and shrub trimmings; brush cuttings; twigs and branches; natural Christmas trees; other plant material;

"scrap metal" includes metal auto parts, large appliances, bicycles, tools, etc; and

"tires" means tires without wheel rims.

## SCHEDULE "B"

## TO BY-LAW 07-027
## WASTE MANAGEMENT TIPPING FEES

### 1. GARBAGE

| | | Rate |
|---|---|---|
| a) | **Load of 100 kg or less** | $5.00 flat rate |
| b) | **Load over 100 kg** | $90.00 per metric tonne |

### 2. RECYCLABLE MATERIALS

All loads of recyclable materials must be segregated and cannot contain garbage.

| | | Rate |
|---|---|---|
| a) | **Load of 100 kg or less** | FREE |
| b) | **Load over 100 kg** | $45.00 per metric tonne |
| c) | **On-road tires** (tire diameter:124cm/49 inches or less) | |
| | - up to 5 tires in a load | $3 surcharge per tire |
| | - more than 5 tires in a load | $225 per metric tonne |
| d) | **Off-road tires** (tire diameter:127 cm/ 50" or more) | |
| | - up to 5 tires in a load | $40 surcharge per tire |
| | - more than 5 tires in a load | $225 per metric tonne |
| e) | Freon-containing appliances | $15 surcharge per appliance |

### 3. UNCONTAMINATED GRANULAR MATERIAL AND NON-HAZARDOUS CONTAMINATED SOIL TIPPING FEE

| | | Rate |
|---|---|---|
| a) | Granular materials determined by the Director to be suitable as cover material at the waste management facility, and deposited in the area specified by the Director, for such use; | FREE |
| b) | Non-hazardous contaminated soil, tested for suitability by owner of the material and determined by the Director to be suitable as cover material at the waste management facility, and deposited in the area specified by the Director for such use. | $20.00 per metric tonne |

**THE CORPORATION OF THE CITY OF PETERBOROUGH**

**BY-LAW NUMBER 09-108**

**BEING A BY-LAW TO AMEND BY-LAW 07-027 FOR THE PURPOSE OF REGULATING THE DISPOSAL OF WASTE, INCLUDING ESTABLISHING OF TIPPING FEES FOR THE PETERBOROUGH COUNTY-CITY WASTE MANAGEMENT FACILITY**

**WHEREAS** the Council of the City of Peterborough passed By-law 07-027 being a by-law for the purpose of regulating the Disposal of Waste, including establishing of Tipping Fees for the Peterborough County-City Waste Management Facility;

**AND WHEREAS** the Council of the City of Peterborough deems it expedient to amend Schedule "B" of By-law 07-027 to reflect changes in Tipping Fees;

**THEREFORE** the Council of the Corporation of the City of Peterborough enacts as follows:

1. That Section 1 of Schedule "B" of By-law 07-027 be amended by adding the following:

| | **Rate** |
|---|---|
| "c) Asbestos | $200.00 per metric tonne" |

2. That Section 2 of Schedule "B" of By-law 07-027 be amended by replacing items c) and d) with the following:

| | **Rate** |
|---|---|
| "c) On-road tires | Free |
| d) Off-road tires | Free" |

3. That Schedule "B" of By-law 07-027 be amended by adding the following Section.

"4. Electronic or Hazardous Waste

All loads of waste electronics and electrical equipment or municipal hazardous or special waste must be taken to the Household Hazardous Waste Drop-off Depot for recycling or proper disposal.

| | **Rate** |
|---|---|
| a) Monitors | Free |
| b) Fluorescent Light Tubes | Free" |

4. That this By-law shall come into effect on Tuesday, September 1, 2009.

By-law read a first, second and third time this 10th day of August, 2009.

(Sgd.) D. Paul Ayotte, Mayor

(Sgd.) Kevin Arjoon, Deputy Clerk

City of Peterborough

# The Corporation of the City of Peterborough

## By-Law Number 14-095

Being a By-law to amend By-law 07-027 Being a By-law for the purpose of regulating the Disposal of Waste, including establishing of Tipping Fees for the Peterborough County-City Waste Management Facility

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**Whereas** the Council of the City of Peterborough passed By-law 07-027 being a by-law for the purpose of regulating the Disposal of Waste, including establishing of Tipping Fees for the Peterborough County-City Waste Management Facility;

**And Whereas** the Council of the City of Peterborough deems it necessary to amend Schedule “A” of By-law 07-027 to reflect changes in acceptable recyclable materials;

**Now Therefore**, The Corporation of the City of Peterborough by the Council thereof hereby enacts as follows:

1. That Schedule “A” of By-law 07-027 be amended by adding the following Recyclable Materials:

   “boxsprings” of all sized, must be clean

   “mattresses: of all sizes, including futons; must be clean

2. That this By-law shall come into effect on Tuesday, September 2, 2014.

By-law read a first, second and third time this 5th day of August, 2014.

(Sgd.) Daryl Bennett, Mayor

(Sgd.) Natalie Garnett, Deputy City Clerk

City of Peterborough

## The Corporation of the City of Peterborough

## By-Law Number 15-132

Being a By-law to amend By-law 07-027 Being a By-law for the purpose of regulating the Disposal of Waste, including establishing of Tipping Fees for the Peterborough County-City Waste Management Facility

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**Whereas** the Council of the City of Peterborough passed By-law 07-027 being a by-law for the purpose of regulating the Disposal of Waste, including establishing of Tipping Fees for the Peterborough County-City Waste Management Facility;

**And Whereas** the Council of the City of Peterborough deems it necessary to amend Schedule “B” of By-law 07-027 to reflect changes in the tipping fee for Garbage, loads over 100 kg;

**Now Therefore**, The Corporation of the City of Peterborough by the Council thereof hereby enacts as follows:

1. That Schedule “B” of By-law 07-027 be amended by changing the tipping fee for 1.b) Garbage – Loads over 100 kg to $90.00 per metric tonne:
2. That this By-law shall come into force and effect on Tuesday, September 8, 2015.

By-law read a first, second and third time this 8th day of September, 2015.

(Sgd.) Daryl Bennett, Mayor

(Sgd.) John Kennedy, City Clerk

# APPENDIX

# D

## PETERBOROUGH LANDFILL GAS GENERATION FACILITY-NOISE COMPLAINT INVESTIGATION

## MEMO

**TO:** James Istchenko / Don Briand

**FROM:** Jeffery Park / Cris delos Santos

**SUBJECT:** **Peterborough Landfill Gas Generation Facility – Noise Complaint Investigation at 1175 Crowley Line, Peterborough, ON**

**DATE:** **January 19, 2021**

---

WSP Canada Group Limited (WSP) was retained by the City of Peterborough (the City) to conduct noise complaint investigation at 1175 Crowley Line in Peterborough, ON (the complainant's property). The purpose of the investigation was to verify if the operation of the mechanical equipment associated with the Peterborough Landfill Gas Generation Facility (the Facility) is resulting in the excess noise at the complainant's property. This memorandum summarizes the investigation procedures and WSP's findings.

# BACKGROUND

As part of the noise complaint investigation, WSP initially communicated with the complainant to understand the nature of the noise complaint. It was understood that the excess noise is noticeable during the nighttime, approximately from 9 PM to 6 AM. The sound is described as humming and pulsing that is low in pitch, which fluctuates in volume throughout the night. The complainant conducted his own investigations and determined that loud noise is emanated from the Facility when excess noise is present at the complainant's property.

WSP conducted a long-term sound monitoring at the Facility and the complainant's property to determine if the operation of the mechanical equipment associated with the Facility is in fact causing the excess noise. Continuous sound monitoring was conducted from November 5, 2020 to November 20, 2020. While the monitoring was in progress, the complainant kept track of a log to note whenever excess noise was present at the complainant's property. Sound data collected from the monitoring was compared to the complainant's noise tracking log.

# ENVIRONMENTAL NOISE GUIDELINE

The Ministry of Environment, Conservation and Parks' (MECP) Publication "Noise Guidelines for Landfill Sites (Draft)", dated October 1998 (the Landfill Noise Guideline), provides the sound level limits for landfill site operations. It should be noted that although the Landfill Noise Guideline is still in draft, MECP requires that all landfill sites comply with the sound level limits indicated in this document and thus, this publication is the applicable noise guideline for the Facility.

The Landfill Noise Guideline considers the power generation system associated with the Facility as an ancillary facility (stationary noise source) and thus, as discussed in the publication, the applicable sound level limits provided in "Part B – Stationary Sources" of the MECP Noise Pollution Control (NPC) Publication NPC-300 "Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning" was used in the noise investigation. Since the Facility and the complainant's property are in a rural area, sound level limits for a Class 3 area was considered.

Accordingly, the sound level limit of 40 dBA over 1-hour period (evening and nighttime limit, 7 PM to 7 AM) at the complainant's property was used for the purpose of this investigation.

# MONITORING PROGRAM

## INSTRUMENTATION AND SITE WORK

The sound monitoring program was completed using Larson Davis Model LxT® and 831 Class 1 precision integrating sound level meters (SLMs). The equipment setup included environmental protection kits, microphones with windscreens and tripods. The SLMs were set to record hourly A-weighted equivalent sound level ($LA_{eq}$). Calibration of SLMs was verified both before and after deployment to verify data integrity. Calibration of SLMs were verified using an acoustic calibrator; calibration certificates of the equipment and calibrator are attached to this memo.

The monitoring program was completed at two different locations as shown in **Figure 1**. Monitoring Location 1 was monitored at the Facility near the mechanical equipment and Monitoring Location 2 was monitored at the complainant's property. As noted previously, sound was continuously monitored from November 5, 2020 to November 20, 2020. It was completed under conditions suitable for outdoor measurements (e.g. moderate winds, little to no precipitation). If non-suitable conditions were noted, sound data during those conditions were not considered in the assessment. Weather data from the Environment Canada's Peterborough A weather station are attached to this memo.

**Figure 2** shows the overall sound level time history measured at the landfill site (Monitoring Location 1) and at the complainant's property (Monitoring Location 2).

## NOISE TRACKING LOG

**Table 1** summarizes the dates and times when the excess noise was present as provided by the complainant. It should be noted that high winds were noted in the weather data during the night of November 17, 2020. Therefore, the sound data collected during this time was omitted from the analysis.

**Table 1: Summary of Complainant's Noise Tracking Log**

| Date and Time | Observations |
|---|---|
| **November 5, 2020<br>9 PM to Midnight** | Farm – but you can hear the dump through the farm noise |
| **November 6, 2020<br>Midnight to Morning** | Farm stopped, but dump sound continued |
| **November 8, 2020, 9 PM** | Dump – medium sound |
| **November 9, 2020, 2:20 AM** | Dump – medium sound – gone by morning |
| **November 9, 2020, 9 PM** | Dump in the distance – loud mechanical |
| **November 10, 2020<br>12:30 AM, 2:30 AM** | Dump – mechanical sound |
| **November 11, 2020, 9 PM** | Dump humming into night, but not at morning |

| Date and Time | Observations |
|---|---|
| **November 13, 2020, 9 PM** | Dump humming into night |
| **November 16, 2020<br>9 PM to Midnight** | Dump humming into night |
| **November 17, 2020<br>Midnight to Morning** | Dump humming into night |
| **November 17, 2020<br>9 pm to Midnight (1)** | Dump humming into night |
| **November 18, 2020<br>Midnight to Morning (1)** | Dump – medium sound |
| **November 19, 2020<br>All Evening** | Dump humming into night – loud |
| **November 20, 2020<br>Midnight to Morning** | Dump humming into night – woke up a couple of times, specially 4:30 am |

(1) High winds noted in the weather data. This date was omitted from the analysis.

**Figure 3** to **Figure 9** show the sound level time histories during the times noted in **Table 1**.

# 1/3 OCTAVE BAND ANALYSIS

A 1/3 octave band analysis was completed to determine the nature or characteristics of sound observed at each monitoring location. In the event that a pronounced tonal quality sound (e.g. whine, screech, buzz or hum) is observed at a noise sensitive receptor, MECP requires that the measured sound level at the receptor be increased by 5 dB to account for the potential increased annoyance.

To determine the presence of a pronounced tonal quality, the simplified method provided in the ISO 1996-2 (2007) "*Acoustics – Description, assessment and measurement of environmental noise, Part 2: Determination of environmental noise levels*" was used in the assessment. The difference between the adjacent two 1/3 octave bands should not exceed the following:

- 15 dB in the low-frequency bands (25 Hz to 125 Hz);
- 8 dB in the middle-frequency bands (160 Hz to 400 Hz); and
- 5 dB in the high-frequency bands (500 Hz to 10,000 Hz).

# DISCUSSIONS

## NOVEMBER 5, 9 PM – NOVEMBER 6, 6 AM

**Figure 3** shows the overall sound level time history, as well as the 1/3 Octave Band Analysis result.

As it can be seen in **Figure 3A**, sound levels ($LA_{eq}$ 1-hour) of about 63 dBA were observed at Monitoring Location 1 from November 5$^{th}$, 9 PM to November 6$^{th}$, 6 AM. The 1/3 Octave Band Analysis, as shown in **Figures 3B** and **3C**, indicated that there are pronounced tonal quality sounds observed at the Facility at 160 Hz and 3150 Hz bands.

At Monitoring Location 2, sound levels ($LA_{eq}$ 1-hour) of about 45 dBA were observed from November 5$^{th}$, 9 PM to November 6$^{th}$, 1 AM. As per the complainant's observations, this is mainly due to the activities at the farm located at 1184 Crowley Line, near the complainant's property. As shown in **Figure 3B**, a pronounced tonal quality sound at 100 Hz band was present at Monitoring

Location 2, but not at Monitoring Location 1. There is also an elevated level at 250 Hz band during this time at Monitoring Location 2, but not high enough to be considered tonal.

The measured sound levels ($LA_{eq}$ 1-hour) at Monitoring Location 2 were observed to be varying every hour between just below 40 dBA to about 43 dBA after 1 AM of November 6th. As per the complainant's observations, the farm has stopped operating at around midnight.

As shown in **Figure 3C**, the pronounced tonal quality sound at 100 Hz is now gone. This could be attributable to the operations at the farm. A pronounced tonal quality sound at 250 Hz is now audible at the complainant's property. The measured data was not able to locate the source of this tonal sound. Also, an elevated level at 160 Hz (could be attributable to the operations at the Facility) was also present at Monitoring Location 2, but not high enough to be considered tonal.

Due to the presence of tonal frequencies (specifically at 100 Hz and 250 Hz band) at the complainant's property, as per the MECP noise guidelines, a tonal penalty of 5 dB will need to be added to the measured sound levels observed at Monitoring Location 2. Thus, accounting for the 5 dB tonal penalty, the sound levels ($LA_{eq}$ 1-hour) at 1175 Crowley Line would range from about 45 dBA to 52 dBA between 9 PM and 6 AM, which is above the 40 dBA sound level limit considered in this assessment.

## NOVEMBER 8 – 14 & 19

As can be seen in **Figures 4** to **7,** and **9**, pronounced tonal quality sounds at 160 Hz and 3150 Hz were observed at the Facility with overall sound levels ranging from 63 dBA to 78 dBA measured at Monitoring Location 1.

The measured sound levels ($LA_{eq}$ 1-hour) at Monitoring Location 2 were below the 40 dBA sound level limit with a few exceptions. As shown in **Figure 5A**, the peaks observed at Monitoring Location 2 were localized and could be attributed to the vehicle movements on Regional Road 2. There was no pronounced tonal quality sound observed during these times.

## NOVEMBER 16, 9 PM – NOVEMBER 17, 6AM

As shown in **Figure 8**, a pronounced tonal quality sound at 160 Hz was observed at the Facility with elevated level at 3150 Hz. The overall sound levels observed at Monitoring Location 1 were about 80 dBA.

The measured sound level ($LA_{eq}$ 1-hour) at Monitoring Location 2 started from about 48 dBA at 9 PM and slowly decreased to about 30 dBA at around 1 AM. A pronounced tonal quality sound at 160 Hz was observed at Monitoring Location 2 between 2 AM and 4 AM when the ambient was really low (at about 30 dBA). When the ambient started increasing from 5 AM onwards, the tonal sound was no longer present. There was an elevated level at 160 Hz, but not high enough to be considered tonal.

Due to the presence of tonal frequency at 160 Hz band at the complainant's property, a tonal penalty of 5 dB will need to be added to the measured sound levels observed at Monitoring Location 2. Thus, accounting for the 5 dB tonal penalty, the sound levels ($LA_{eq}$ 1-hour) at the complainant's property between 2 AM and 4 AM would be about 35 dBA. This is still below the 40 dBA sound level limit considered in this assessment.

## CONCLUSIONS

There were three pronounced tonal quality sounds (at 100 Hz, 160 Hz and 250 Hz bands) observed at the complainant's property.

- The farm located at 1184 Crowley Line appears to be the source of the tonal sound at 100 Hz band. While the farm was in operation, the tonal sound at 100 Hz was present at the complainant's property, but not at the Facility.
- The Facility produces tonal sounds at 160 Hz and 3150 Hz bands. However, 3150 Hz band was not observed to be tonal at the complainant's property.
- The tonal sound at 250 Hz was observed on November 5, 2020, but was not present on any other days during the monitoring program. During the time when this tonal sound was present, the measured sound level at the complainant's property was 46 dBA including the 5 dB tonal penalty, which is above the sound level limit considered in this assessment. However, the measured data was not able to locate the source of this tonal sound.

The 160 Hz tonal sound was observed at both the Facility and the complainant's property on November 17, 2020 between 2AM and 4AM. With the 5 dB tonal penalty, the adjusted sound levels were still below the 40 dBA sound level limit. Therefore, the Facility complies with the applicable sound level limits for ancillary facilities at the complainant's property at 1175 Crowley Line.

## CLOSURE

WSP prepared this report solely for the use of the intended recipient, the City of Peterborough, in accordance with the professional services agreement. The intended recipient is solely responsible for the disclosure of any information contained in this report. The content and opinions contained in the present report are based on the observations and/or information available to WSP at the time of preparation. If a third party makes use of, relies on, or makes decisions in accordance with this report, said third party is solely responsible for such use, reliance or decisions. WSP does not accept responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken by said third party based on this report. This limitations statement is considered an integral part of this report.

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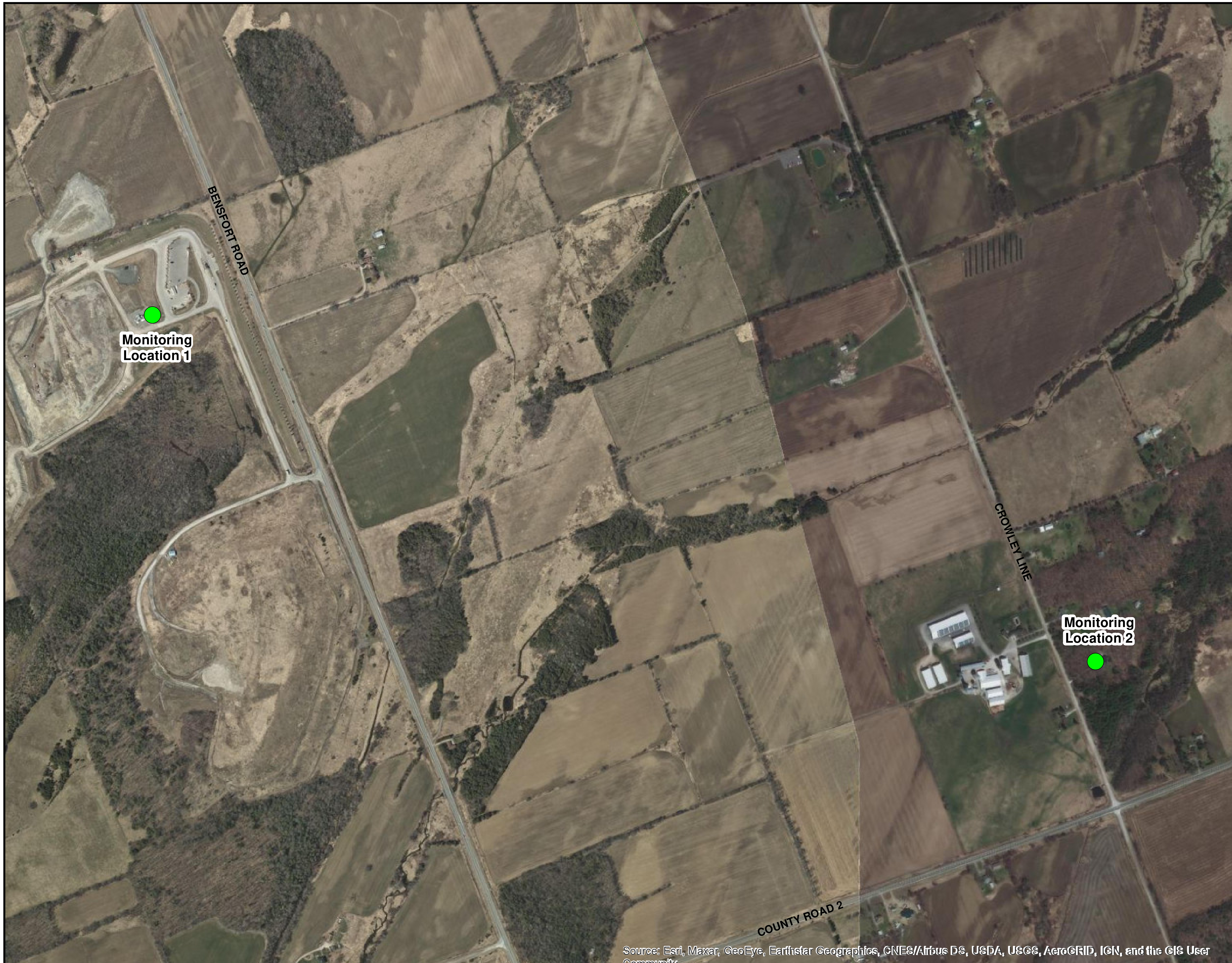
Yours sincerely,

Jeffery Park, P.Eng.
Project Engineer – Acoustics, Noise & Vibration

Cris delos Santos, M.Eng., P.Eng.
Team Lead & Senior Engineer – Acoustics, Noise & Vibration

Encl. Figures, Calibration Certificates, Weather Data
WSP ref.: 20M-01246-00

# FIGURES

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**LEGEND**

MONITORING LOCATIONS

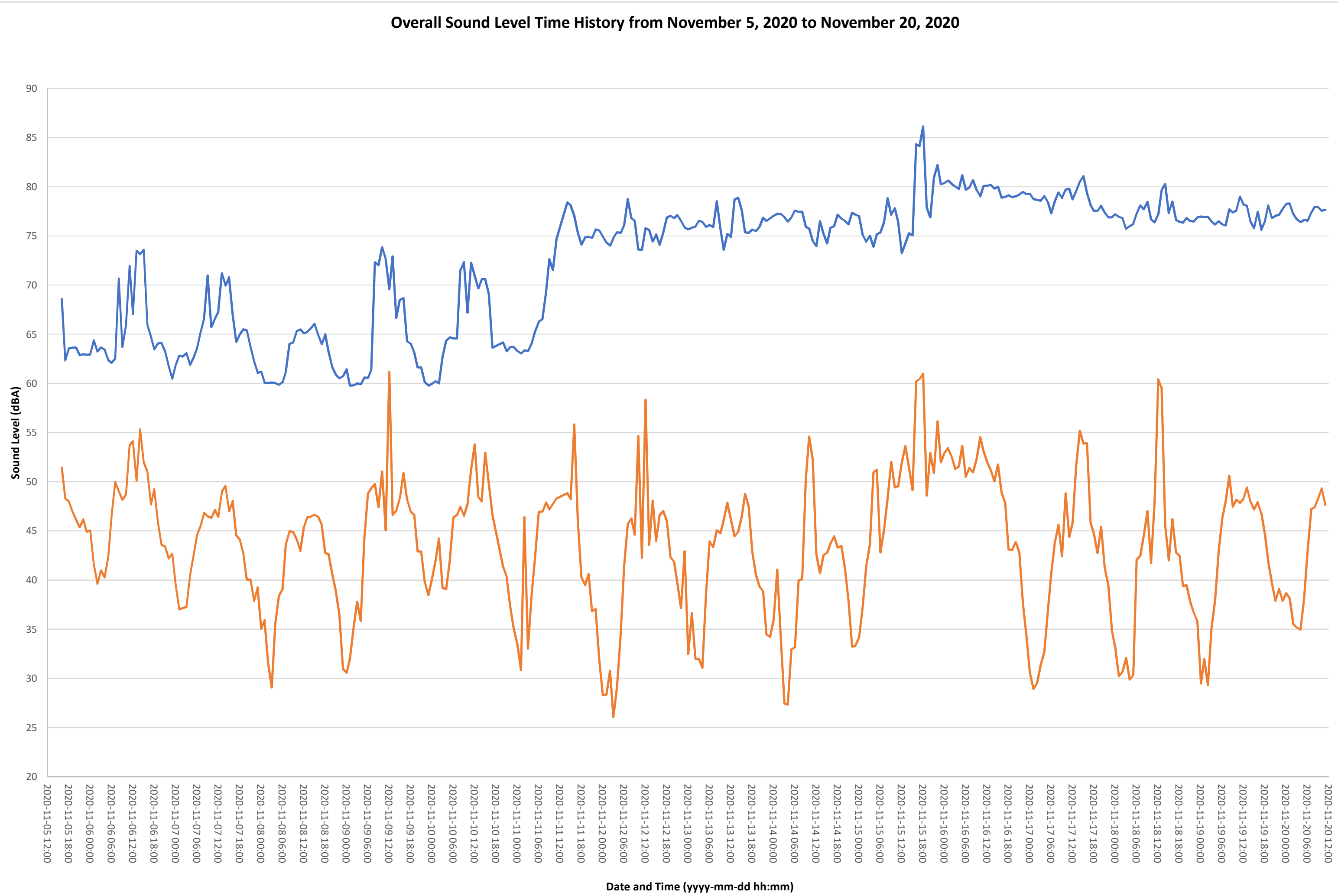
80 40 0 80 Metres

N W E S

Data Source: Ministry of Natural Resources, Ontario Base Mapping, October 2019.

| | |
|---|---|
| CLIENT: CITY OF PETERBOROUGH | |
| PROJECT: PETERBOROUGH LANDFILL GAS GENERATION FACILITY – NOISE COMPLAINT INVESTIGATION AT 1175 CROWLEY LINE PETERBOROUGH, ONTARIO | |
| PROJECT NO: 20M-01246-00 | DATE: DECEMBER 2020 |
| DESIGNED BY: - | |
| DRAWN BY: T.P. | |
| CHECKED BY: - | |
| FIGURE NO: 1 | SCALE: 1:8,000 |
| TITLE: MONITORING LOCATIONS | |
| DISCIPLINE: ENVIRONMENT | |
| ISSUE: - | REV.: - |

Document Path: D:\aProjects\20M-01246-00\MXD\20M-01246-00 Figure 1 Monitoring Locations.mxd





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LEGEND

LAeq 1-hour
Monitoring Location 1
Peterborough Landfill

LAeq 1-hour
Monitoring Location 2
1175 Crowley Line

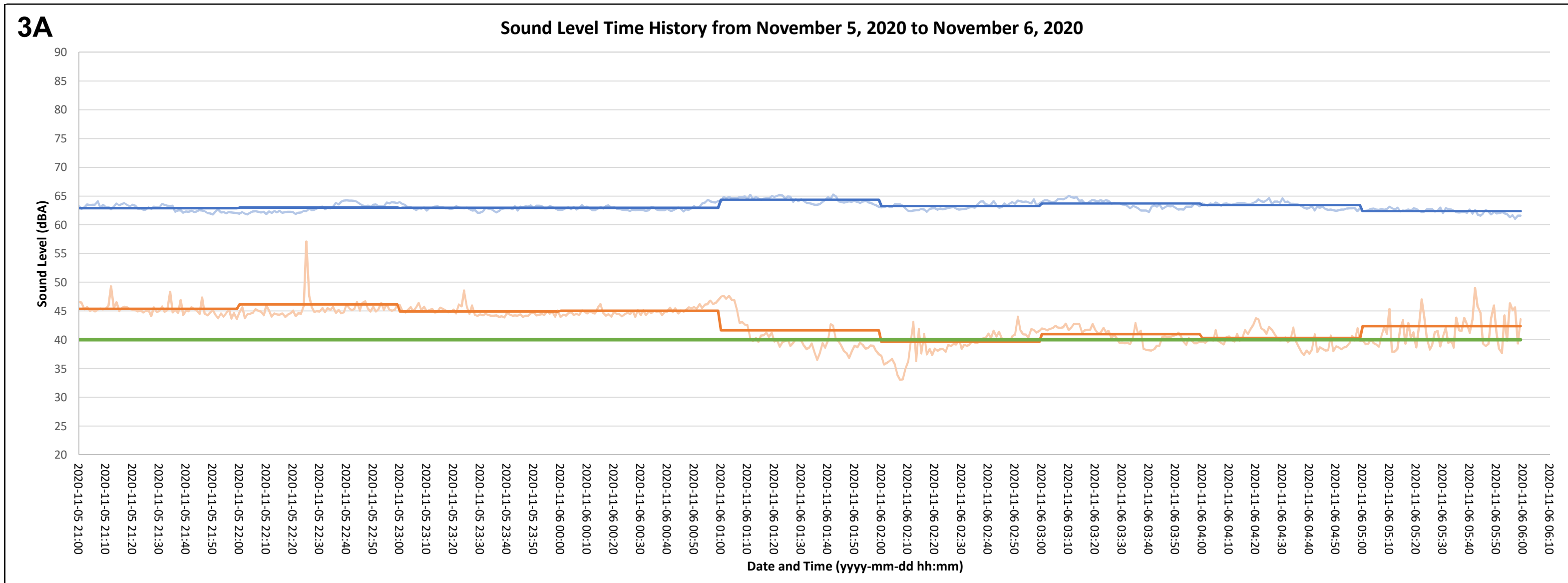
CLIENT:

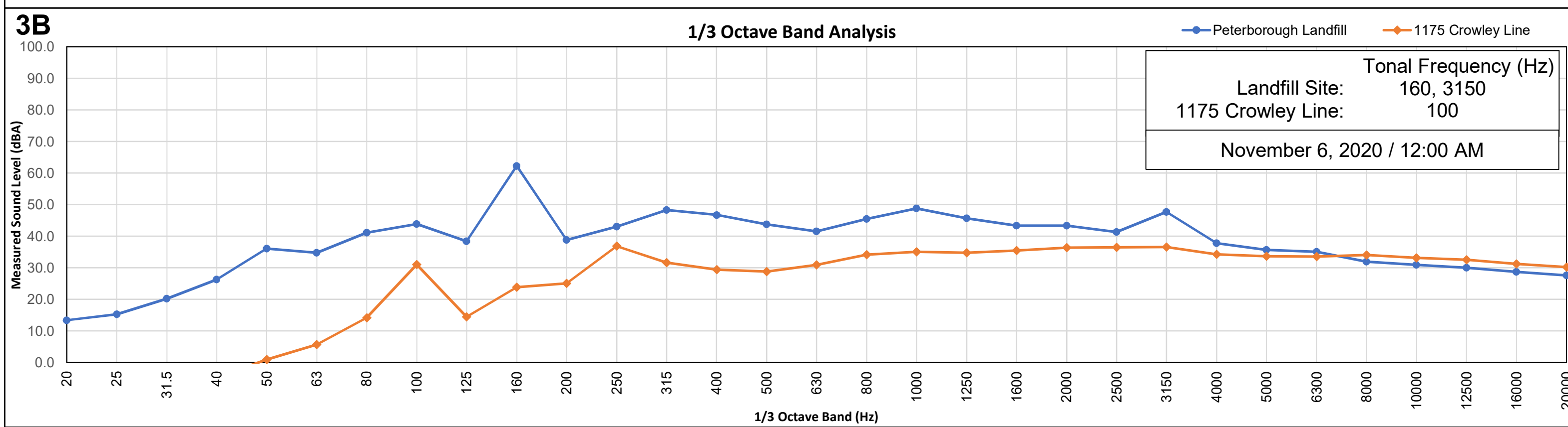
City of Peterborough

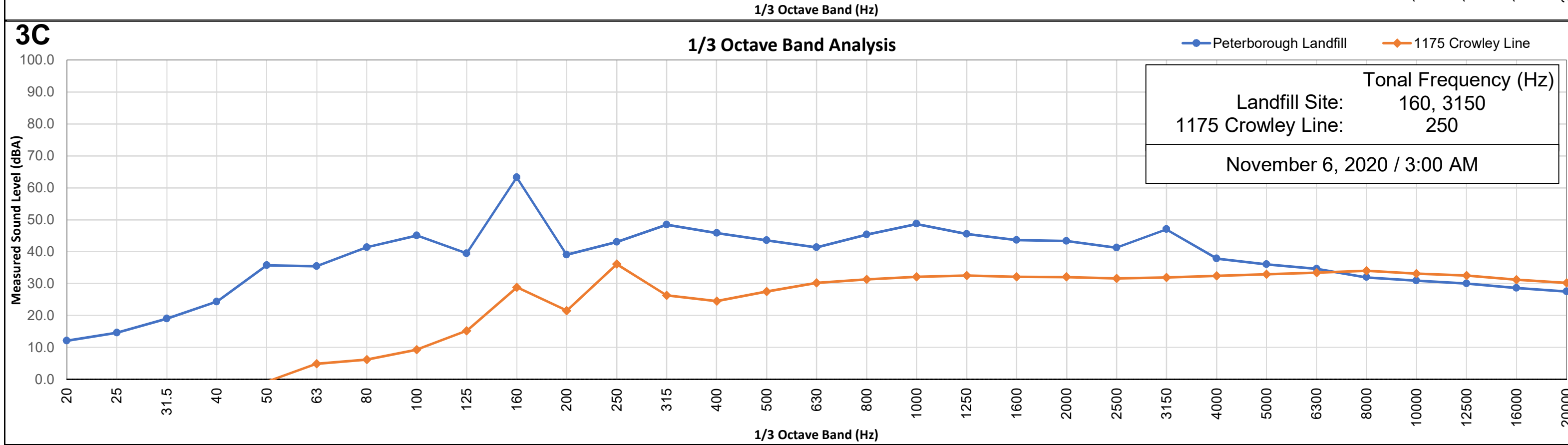
PROJECT:

Peterborough Landfill Gas Generation Facility – Noise Complaint Investigation at 1175 Crowley Line, Peterborough, ON

| | |
|---|---|
| PROJECT NO: 20M-01246-00 | DATE: 21-Dec-20 |
| DESIGNED BY: - | |
| DRAWN BY: JP | |
| CHECKED BY: CDS | |
| FIGURE NO.: 2 | SCALE: - |
| TITLE: OVERALL SOUND LEVEL TIME HISTORY AT MONITORING LOCATION 1 & 2 (November 5 - 20, 2020) | |
| DISCIPLINE: ENVIRONMENT | |
| ISSUE: | REV: - |

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**LEGEND**

- LAeq 1-hour Monitoring Location 1 Peterborough Landfill
- LAeq 1-hour Monitoring Location 2 1175 Crowley Line
- LAeq 1-min Monitoring Location 1 Peterborough Landfill
- LAeq 1-min Monitoring Location 2 1175 Crowley Line
- LAeq 1-hour MECP 40 dBA Sound Level Limit

CLIENT: City of Peterborough

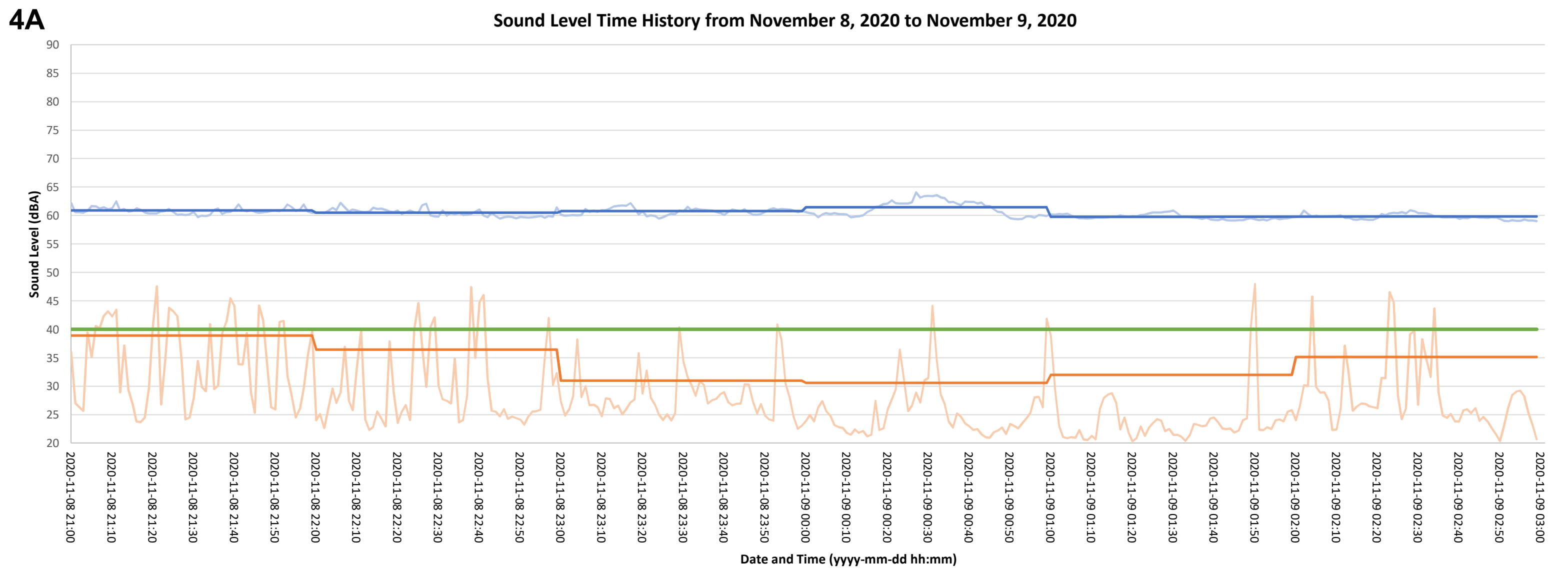
PROJECT: Peterborough Landfill Gas Generation Facility – Noise Complaint Investigation at 1175 Crowley Line, Peterborough, ON

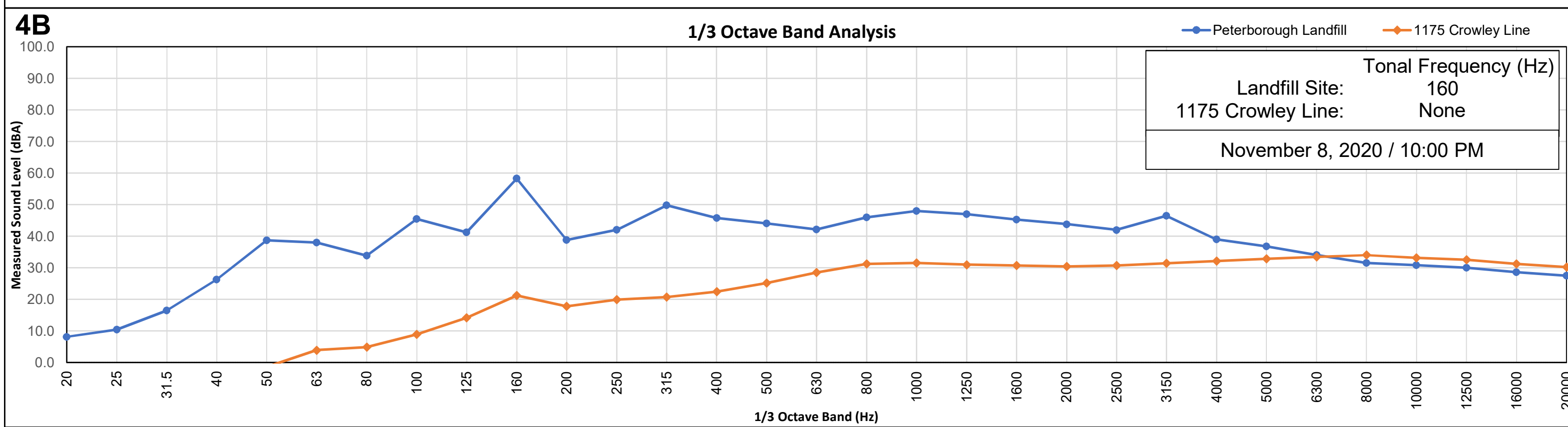
| | |
|---|---|
| PROJECT NO: 20M-01246-00 | DATE: 21-Dec-20 |
| DESIGNED BY: - | |
| DRAWN BY: JP | |
| CHECKED BY: CDS | |
| FIGURE NO.: 3 | SCALE: - |

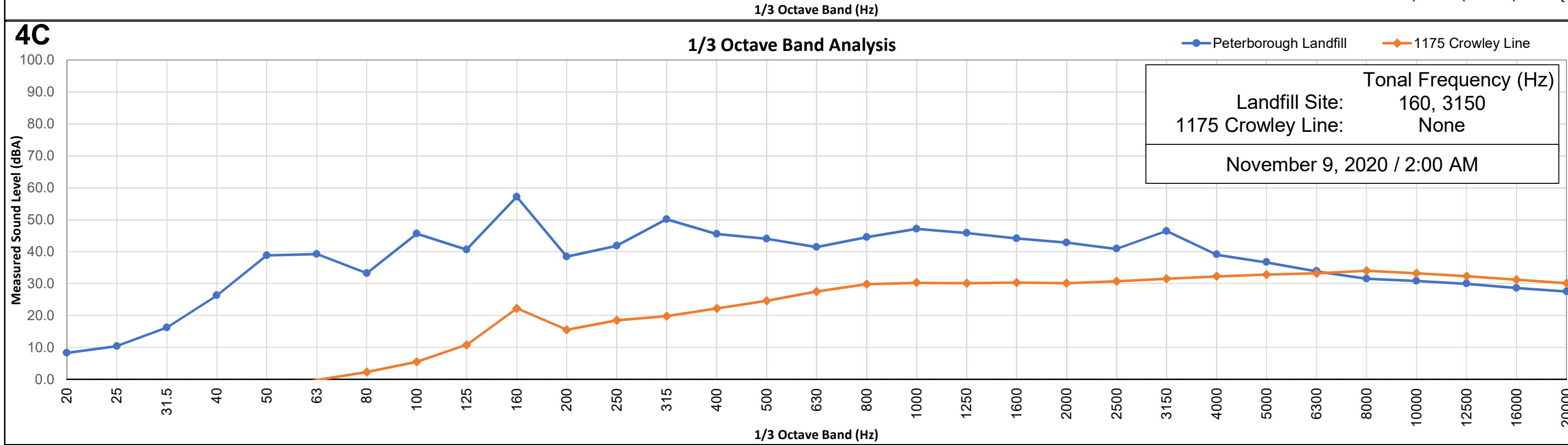
TITLE: SOUND LEVEL TIME HISTORY AND 1/3 OCTAVE BAND ANALYSIS (November 5 - 6, 2020)

DISCIPLINE: ENVIRONMENT

ISSUE: | REV: -

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LEGEND

- LAeq 1-hour Monitoring Location 1 Peterborough Landfill
- LAeq 1-hour Monitoring Location 2 1175 Crowley Line
- LAeq 1-min Monitoring Location 1 Peterborough Landfill
- LAeq 1-min Monitoring Location 2 1175 Crowley Line
- LAeq 1-hour MECP 40 dBA Sound Level Limit

CLIENT: City of Peterborough

PROJECT: Peterborough Landfill Gas Generation Facility – Noise Complaint Investigation at 1175 Crowley Line, Peterborough, ON

| | |
|---|---|
| PROJECT NO: 20M-01246-00 | DATE: 21-Dec-20 |
| DESIGNED BY: - | |
| DRAWN BY: JP | |
| CHECKED BY: CDS | |
| FIGURE NO.: 4 | SCALE: - |

TITLE: SOUND LEVEL TIME HISTORY AND 1/3 OCTAVE BAND ANALYSIS (November 8 - 9, 2020)

DISCIPLINE: ENVIRONMENT

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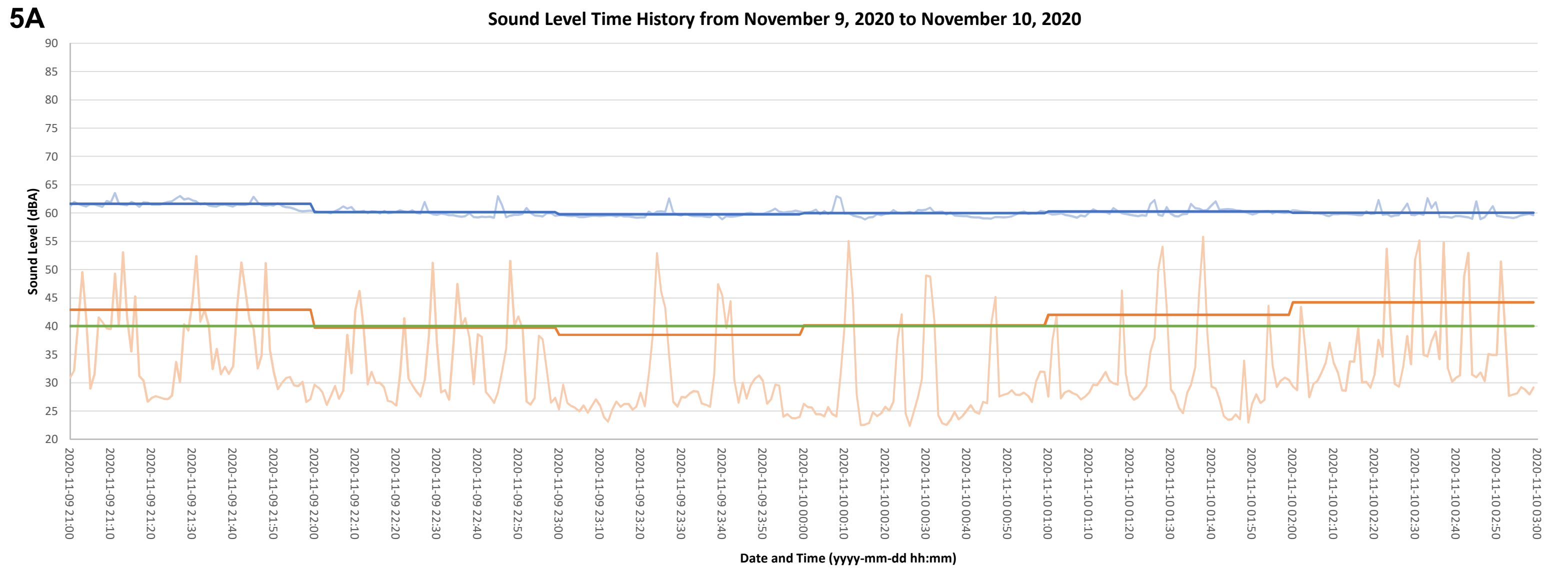
| ISSUE: | REV: - |

5A

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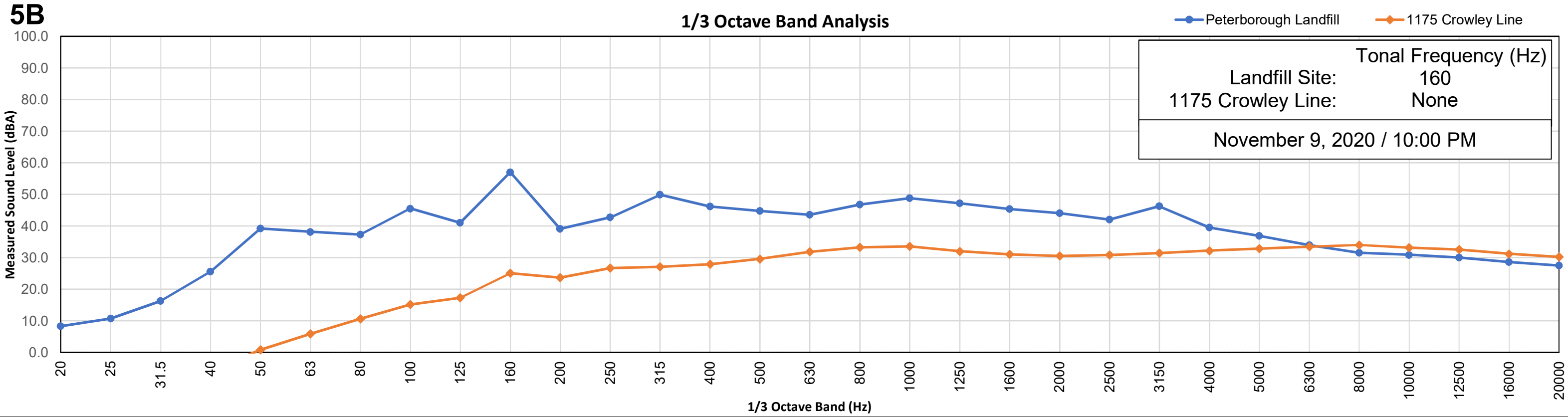


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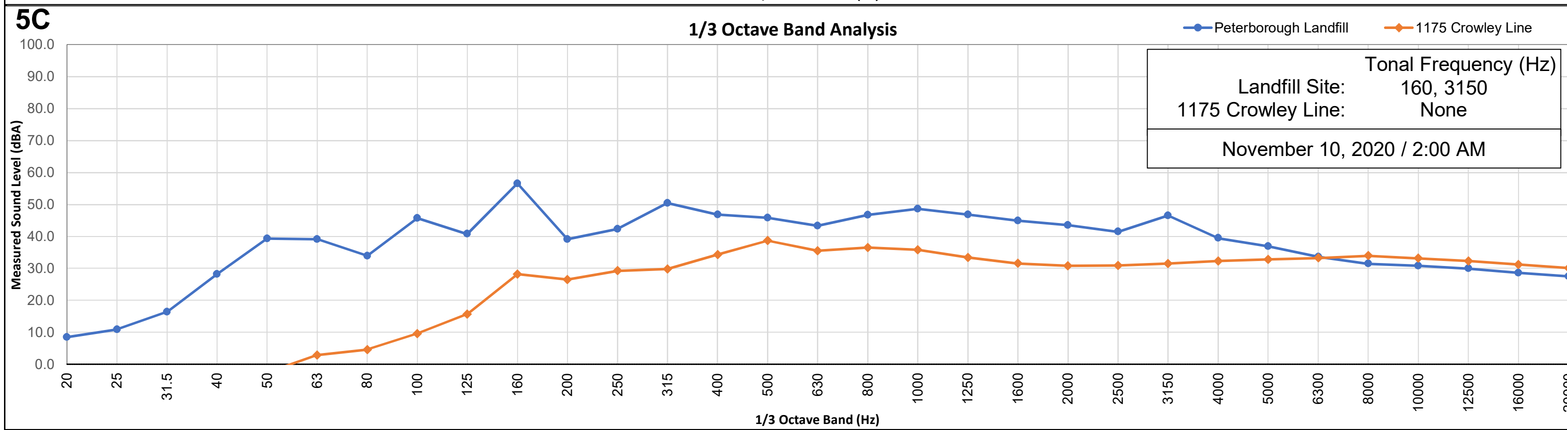



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**LEGEND**

- LAeq 1-hour Monitoring Location 1 Peterborough Landfill
- LAeq 1-hour Monitoring Location 2 1175 Crowley Line
- LAeq 1-min Monitoring Location 1 Peterborough Landfill
- LAeq 1-min Monitoring Location 2 1175 Crowley Line
- LAeq 1-hour MECP 40 dBA Sound Level Limit

CLIENT: City of Peterborough

PROJECT: Peterborough Landfill Gas Generation Facility – Noise Complaint Investigation at 1175 Crowley Line, Peterborough, ON

| | |
|---|---|
| PROJECT NO: 20M-01246-00 | DATE: 21-Dec-20 |
| DESIGNED BY: - | |
| DRAWN BY: JP | |
| CHECKED BY: CDS | |
| FIGURE NO.: 5 | SCALE: - |

TITLE: SOUND LEVEL TIME HISTORY AND 1/3 OCTAVE BAND ANALYSIS (November 9 - 10, 2020)

DISCIPLINE: ENVIRONMENT

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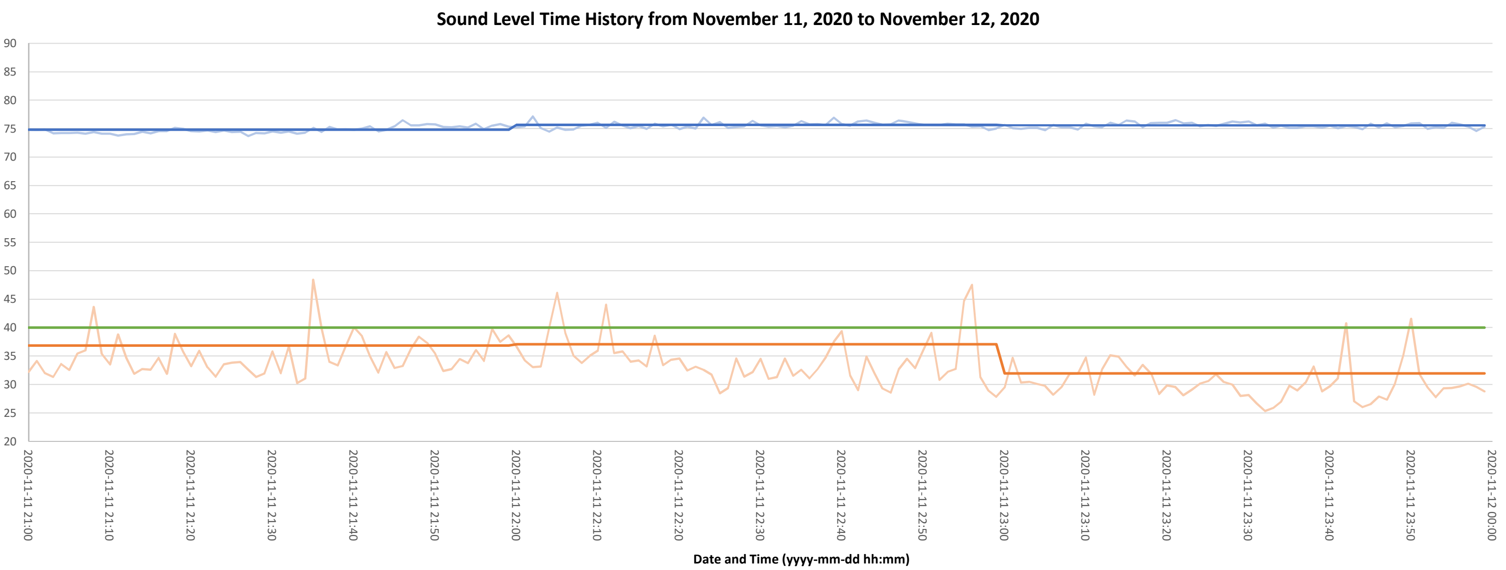
| ISSUE: | REV: - |

6A

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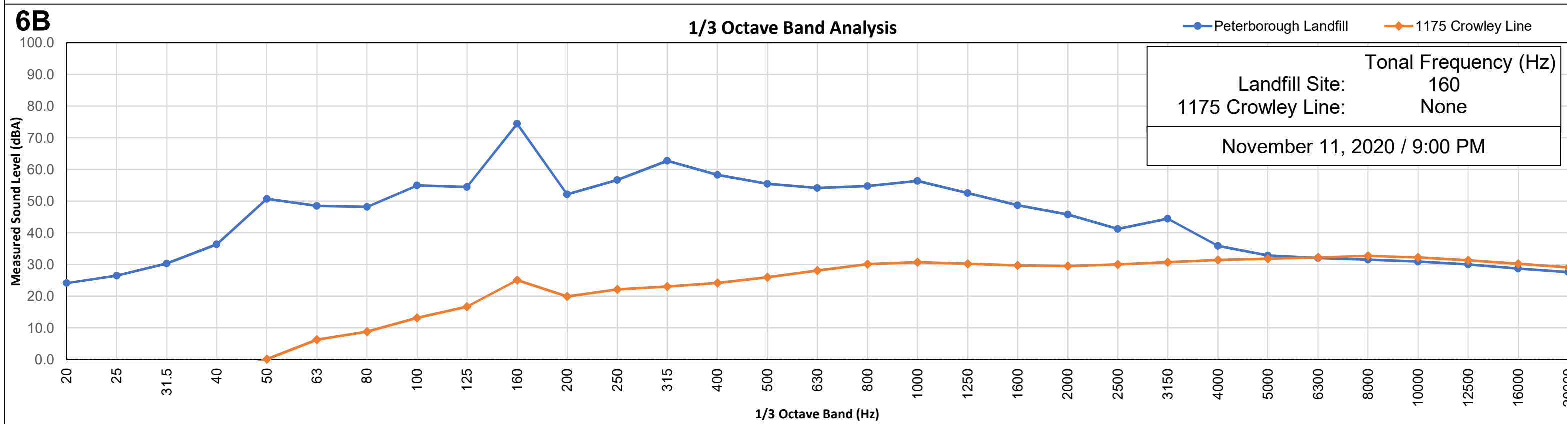


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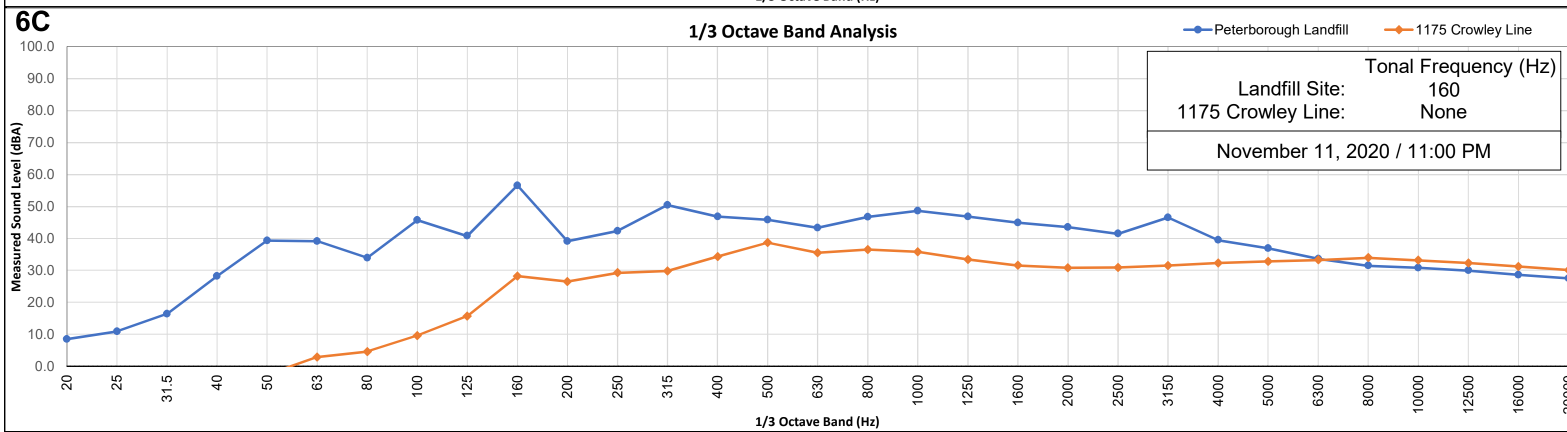



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LEGEND

LAeq 1-hour
Monitoring Location 1
Peterborough Landfill

LAeq 1-hour
Monitoring Location 2
1175 Crowley Line

LAeq 1-min
Monitoring Location 1
Peterborough Landfill

LAeq 1-min
Monitoring Location 2
1175 Crowley Line

LAeq 1-hour
MECP 40 dBA Sound Level Limit

CLIENT:

City of Peterborough

PROJECT:

Peterborough Landfill Gas Generation Facility – Noise Complaint Investigation at 1175 Crowley Line, Peterborough, ON

| PROJECT NO: | DATE: |
|---|---|
| 20M-01246-00 | 21-Dec-20 |
| DESIGNED BY: - | |
| DRAWN BY: JP | |
| CHECKED BY: CDS | |
| FIGURE NO.: 6 | SCALE: - |

TITLE:

SOUND LEVEL TIME HISTORY
AND 1/3 OCTAVE BAND ANALYSIS
(November 11 - 12, 2020)

DISCIPLINE:

ENVIRONMENT

| ISSUE: | REV: |
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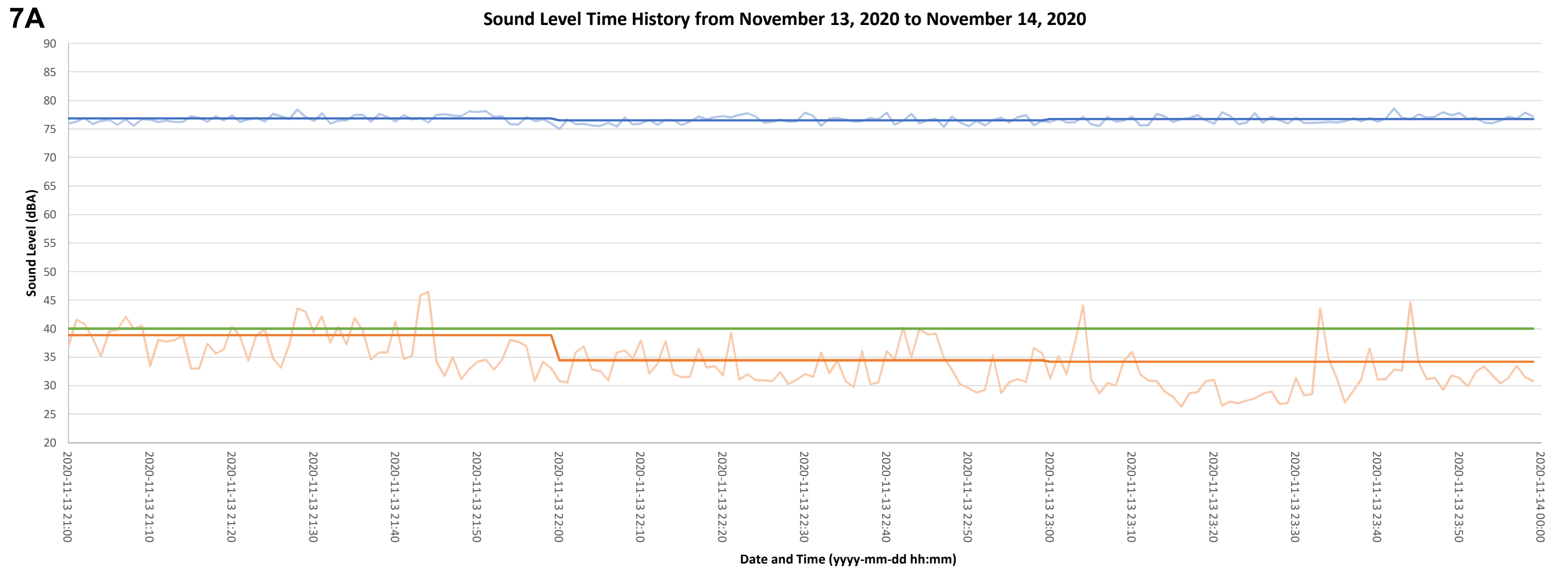
7A

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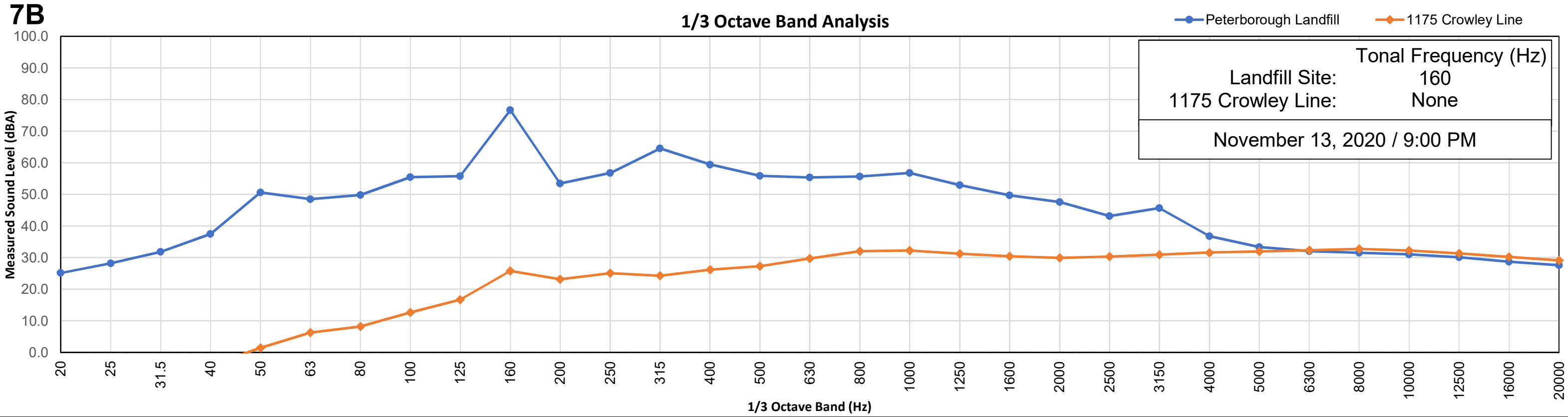


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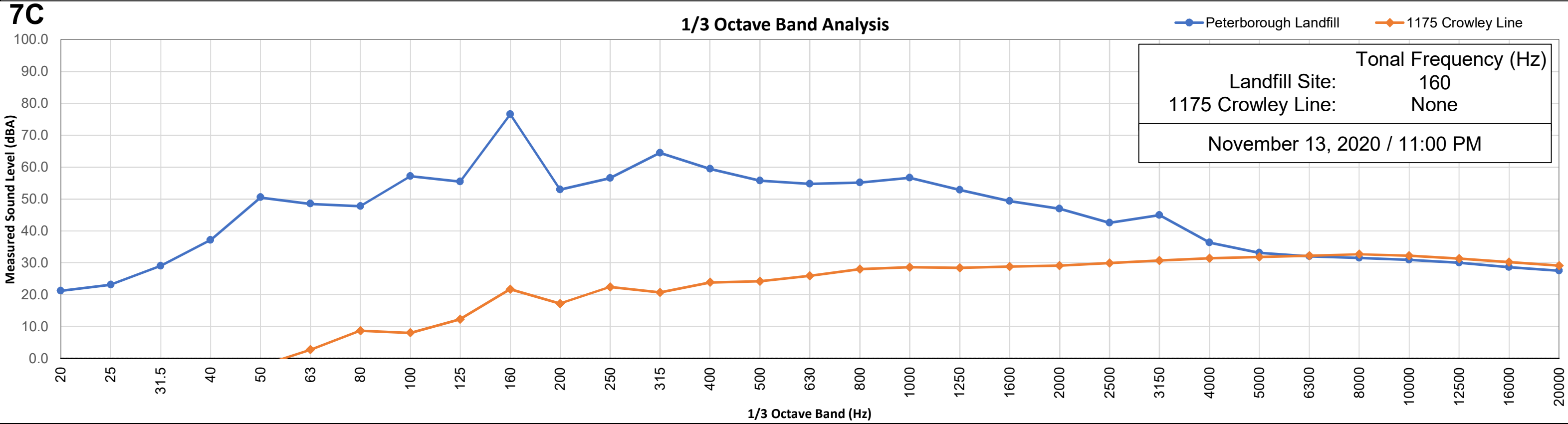


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**LEGEND**

- LAeq 1-hour Monitoring Location 1 Peterborough Landfill
- LAeq 1-hour Monitoring Location 2 1175 Crowley Line
- LAeq 1-min Monitoring Location 1 Peterborough Landfill
- LAeq 1-min Monitoring Location 2 1175 Crowley Line
- LAeq 1-hour MECP 40 dBA Sound Level Limit

CLIENT: City of Peterborough

PROJECT: Peterborough Landfill Gas Generation Facility – Noise Complaint Investigation at 1175 Crowley Line, Peterborough, ON

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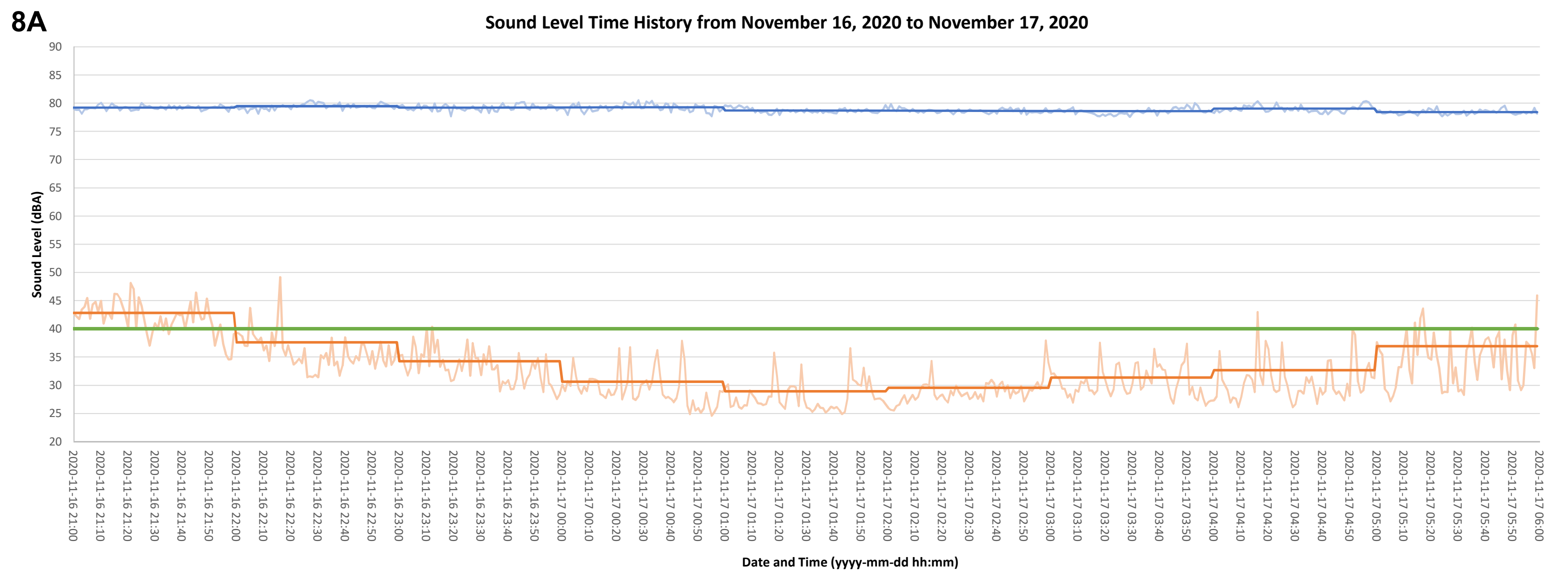
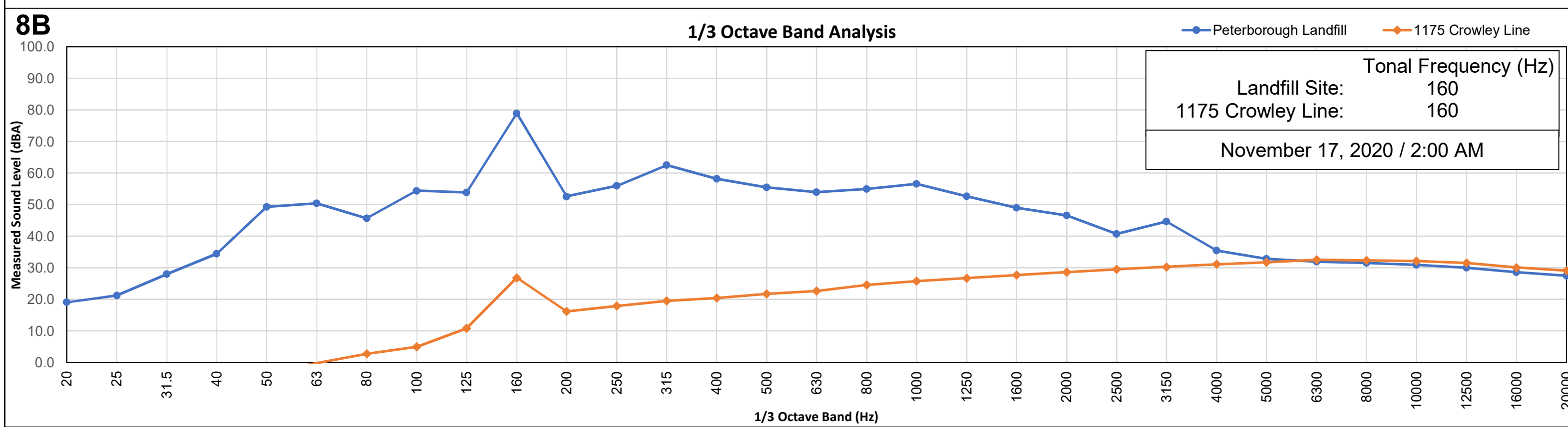
|---|---|
| PROJECT NO: 20M-01246-00 | DATE: 21-Dec-20 |
| DESIGNED BY: - | |
| DRAWN BY: JP | |
| CHECKED BY: CDS | |
| FIGURE NO.: 7 | SCALE: - |

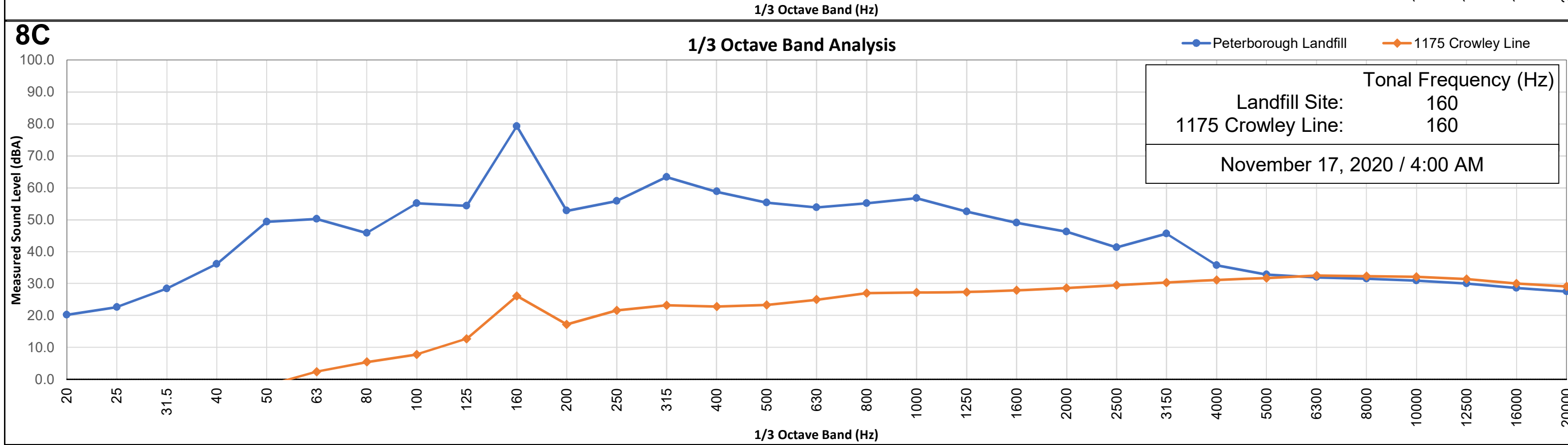
TITLE: SOUND LEVEL TIME HISTORY AND 1/3 OCTAVE BAND ANALYSIS (November 13 - 14, 2020)

DISCIPLINE: ENVIRONMENT

ISSUE: | REV: -

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**LEGEND**

- LAeq 1-hour Monitoring Location 1 Peterborough Landfill
- LAeq 1-hour Monitoring Location 2 1175 Crowley Line
- LAeq 1-min Monitoring Location 1 Peterborough Landfill
- LAeq 1-min Monitoring Location 2 1175 Crowley Line
- LAeq 1-hour MECP 40 dBA Sound Level Limit

CLIENT:
City of Peterborough

PROJECT:
Peterborough Landfill Gas Generation Facility – Noise Complaint Investigation at 1175 Crowley Line, Peterborough, ON

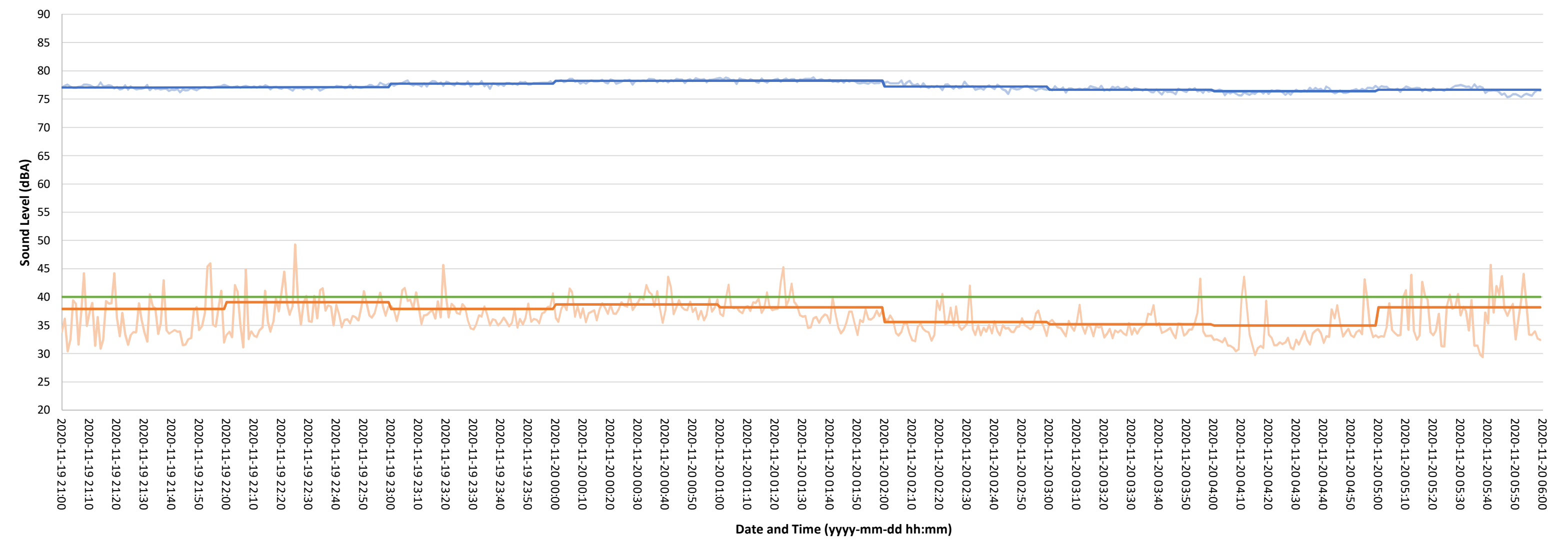
| PROJECT NO: | DATE: |
|---|---|
| 20M-01246-00 | 21-Dec-20 |
| DESIGNED BY: - | |
| DRAWN BY: JP | |
| CHECKED BY: CDS | |
| FIGURE NO.: 8 | SCALE: - |

TITLE:
SOUND LEVEL TIME HISTORY AND 1/3 OCTAVE BAND ANALYSIS (November 16 - 17, 2020)

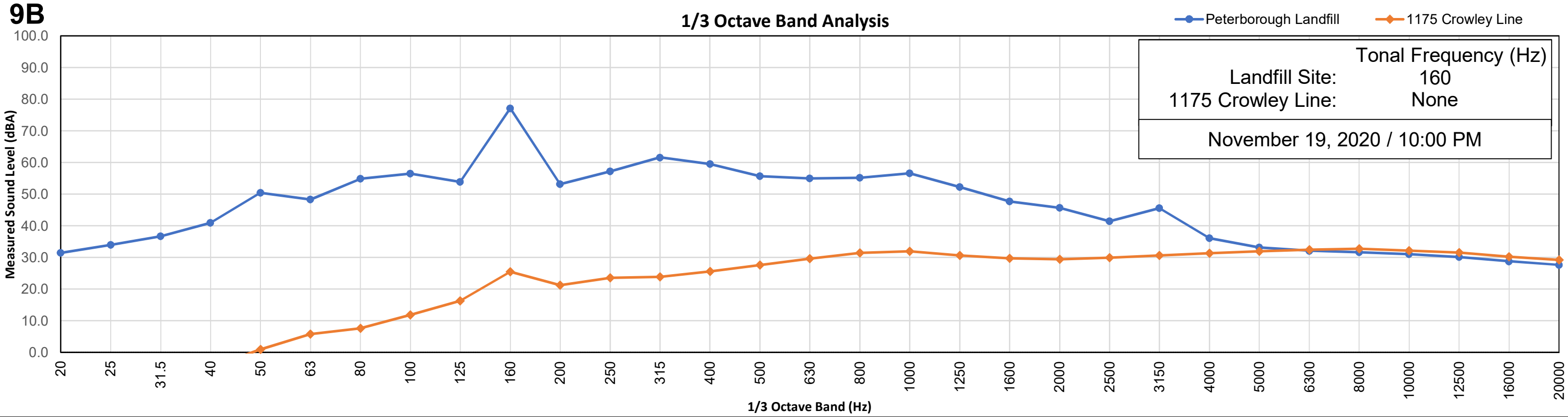
DISCIPLINE:
ENVIRONMENT

| ISSUE: | REV: |
|---|---|
| | - |

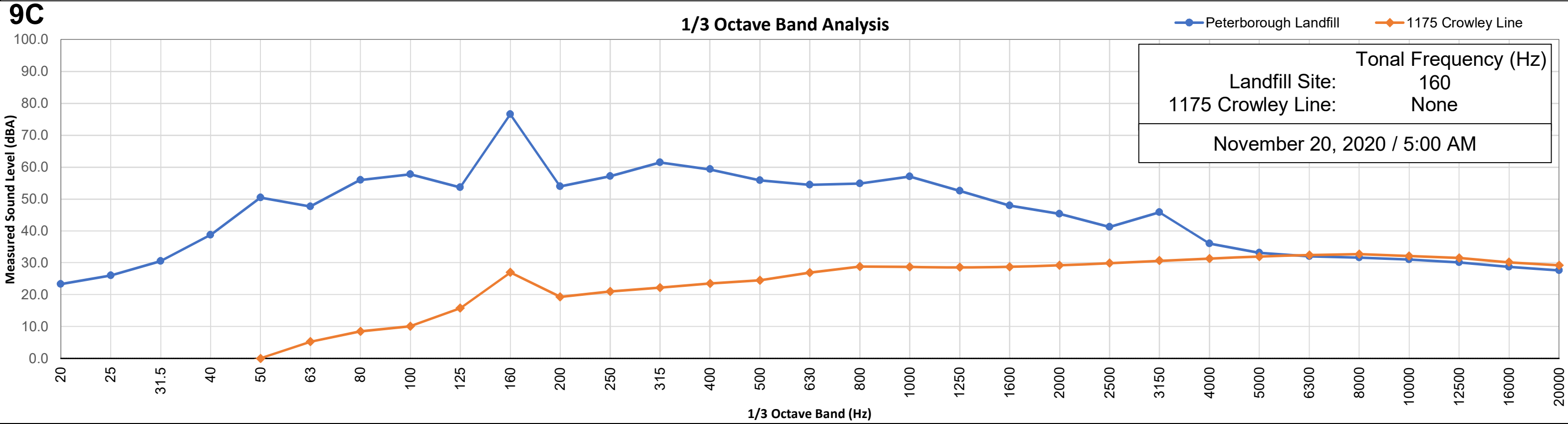
9A




9B




9C




126 DON HILLOCK DRIVE, UNIT 2
AURORA, ONTARIO, CANADA L4G 0G9
TEL: 905-750-3080 | FAX: 905-727-0483 | WWW.WSP.COM

**LEGEND**

- LAeq 1-hour — Monitoring Location 1 — Peterborough Landfill
- LAeq 1-hour — Monitoring Location 2 — 1175 Crowley Line
- LAeq 1-min — Monitoring Location 1 — Peterborough Landfill
- LAeq 1-min — Monitoring Location 2 — 1175 Crowley Line
- LAeq 1-hour — MECP 40 dBA Sound Level Limit

CLIENT: City of Peterborough

PROJECT: Peterborough Landfill Gas Generation Facility – Noise Complaint Investigation at 1175 Crowley Line, Peterborough, ON

| | |
|---|---|
| PROJECT NO: 20M-01246-00 | DATE: 21-Dec-20 |
| DESIGNED BY: - | |
| DRAWN BY: JP | |
| CHECKED BY: CDS | |
| FIGURE NO.: 9 | SCALE: - |

TITLE: SOUND LEVEL TIME HISTORY AND 1/3 OCTAVE BAND ANALYSIS (November 19 - 20, 2020)

DISCIPLINE: ENVIRONMENT

ISSUE: | REV: -

# CALIBRATION CERTIFICATES

# *CERTIFICATE of CALIBRATION*

| | | | |
|---|---|---|---|
| Make : | Larson Davis | Reference # : | 158541 |
| Model : | 831 | Customer : | WSP Canada Inc<br>Aurora, ON |
| Descr. : | Sound Level Meter Type 1 | | |
| Serial # : | 0003603 | P. Order : | NC1-GT011-00.169 |
| Asset # : | NAN | | |

Cal. status : Received out of spec's, adjustments made.
Level was 6.6dB.

*Navair Technologies certifies that the above listed instrument was calibrated on date noted and was released from this laboratory performing in accordance with the specifications set forth by the manufacturer.*

*Unless otherwise noted in the calibration report a 4:1 accuracy ratio was maintained for this calibration.*

*Our calibration system complies with the requirements of ISO-17025 standard, working standards used for calibration are certified by or traceable to the National Research Council of Canada or the National Institute of Standards and Technology.*

Calibrated : Aug 23, 2019 By : T. Beilin

Cal. Due : Aug 23, 2020

Temperature : 23 °C ± 2 °C Relative Humidity : 30% to 70%

Standards used : J-216 J-303 J-512

## ***Navair Technologies***

REPAIR AND CALIBRATION TRACEABLE TO NRC AND NIST

6375 Dixie Rd. Mississauga, ON, L5T 2E7
Phone : 800-668-7440 Fax: 905 565 8325
http: // www.navair.com
e-Mail: service @ navair.com

# *CERTIFICATE of CALIBRATION*

| | | | |
|---|---|---|---|
| Make : | Larson Davis | Reference # : | 159558 |
| Model : | LXT1 | Customer : | WSP Canada Inc<br>Aurora, ON |
| Descr. : | Sound Level Meter Type 1 | | |
| Serial # : | 0005686 | P. Order : | NC1-GT011-00.169 |
| Asset # : | NAN | | |

Cal. status : Received in spec's, minor adjustment made.
Level was 0.39dB.

*Navair Technologies certifies that the above listed instrument was calibrated on date noted and was released from this laboratory performing in accordance with the specifications set forth by the manufacturer.*

*Unless otherwise noted in the calibration report a 4:1 accuracy ratio was maintained for this calibration.*

*Our calibration system complies with the requirements of ISO-17025 standard, working standards used for calibration are certified by or traceable to the National Research Council of Canada or the National Institute of Standards and Technology.*

Calibrated : Nov 22, 2019 By :

Cal. Due : Nov 22, 2020 T. Beilin

Temperature : 23 °C ± 2 °C Relative Humidity : 30% to 70%

Standards used : J-216 J-303 J-512

## *Navair Technologies*

REPAIR AND CALIBRATION TRACEABLE TO NRC AND NIST
6375 Dixie Rd. Mississauga, ON, L5T 2E7
Phone : 800-668-7440 Fax: 905 565 8325
http: // www.navair.com
e-Mail: service @ navair.com

# CERTIFICATE of CALIBRATION

| | | | |
|---|---|---|---|
| Make : | Bruel & Kjaer | Reference # : | 163504 |
| Model : | 4231 | Customer : | WSP Canada Inc<br>Aurora, ON |
| Descr. : | Sound cal 94/114dB 1KHz Type 1 | | |
| Serial # : | 3015047 | P. Order : | |
| Asset # : | NAN | | |

Cal. status : Received in spec's, no adjustment made.

*Navair Technologies certifies that the above listed instrument was calibrated on date noted and was released from this laboratory performing in accordance with the specifications set forth by the manufacturer.*

*Unless otherwise noted in the calibration report a 4:1 accuracy ratio was maintained for this calibration.*

*Our calibration system complies with the requirements of ISO-9001-2015 and is registered under certificate CA96/269, working standards used for calibration are certified by or traceable to the National Research Council of Canada or the National Institute of Standards and Technology.*

Calibrated : Oct 16, 2020 By :

Cal. Due : Oct 16, 2021 Petro Onasko

Temperature : 23 °C ± 2 °C Relative Humidity : 30% to 70%

Standards used : J-163 J-261 J-282 J-512

## *Navair Technologies*

REPAIR AND CALIBRATION TRACEABLE TO NRC AND NIST

6375 Dixie Rd. Mississauga, ON, L5T 2E7 http: // www.navair.com
Phone : 800-668-7440 Fax: 905 565 8325 e-Mail: service @ navair.com

# WEATHER DATA

Government of Canada / Gouvernement du Canada



## Hourly Data Report for November 05, 2020

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time where and when it is observed.

**PETERBOROUGH A**
**ONTARIO**
**Current Station Operator: NAVCAN**

| | | | | | |
|---|---|---|---|---|---|
| **Latitude:** | 44°13'48.000" N | **Longitude:** | 78°21'48.000" W | **Elevation:** | 191.40 m |
| **Climate ID:** | 6166415 | **WMO ID:** | 71436 | **TC ID:** | YPQ |

| TIME | Temp °C | Dew Point °C | Rel Hum % | Wind Dir 10's deg | Wind Spd km/h | Visibility km | Stn Press kPa | Hmdx | Wind Chill | Weather |
|---|---|---|---|---|---|---|---|---|---|---|
| 00:00 | 15.2 | 5.2 | 51 | 22 | 22 | 16.1 | 99.79 | | | NA |
| 01:00 | 14.4 | 5.3 | 54 | 21 | 22 | 16.1 | 99.79 | | | NA |
| 02:00 | 13.3 | 5.5 | 59 | 21 | 24 | 16.1 | 99.77 | | | NA |
| 03:00 | 12.9 | 5.5 | 61 | 21 | 21 | 16.1 | 99.74 | | | NA |
| 04:00 | 12.6 | 5.6 | 62 | 22 | 17 | 16.1 | 99.73 | | | NA |
| 05:00 | 12.0 | 5.9 | 66 | 22 | 15 | 16.1 | 99.72 | | | NA |
| 06:00 | 10.4 | 6.0 | 74 | 21 | 11 | 16.1 | 99.72 | | | NA |
| 07:00 | 9.3 | 6.1 | 80 | 21 | 11 | 16.1 | 99.74 | | | NA |
| 08:00 | 11.8 | 7.0 | 72 | 22 | 11 | 16.1 | 99.77 | | | NA |
| 09:00 | 12.9 | 7.2 | 68 | 22 | 15 | 16.1 | 99.78 | | | NA |
| 10:00 | 14.1 | 8.0 | 66 | 22 | 13 | 16.1 | 99.74 | | | NA |
| 11:00 | 16.1 | 8.1 | 59 | 22 | 13 | 16.1 | 99.74 | | | NA |
| 12:00 | 16.0 | 8.2 | 60 | 22 | 17 | 16.1 | 99.71 | | | NA |
| 13:00 | 16.5 | 8.3 | 58 | 21 | 17 | 16.1 | 99.66 | | | NA |
| 14:00 | 18.5 | 8.6 | 52 | 21 | 21 | 16.1 | 99.65 | | | NA |
| 15:00 | 17.1 | 8.7 | 58 | 21 | 21 | 16.1 | 99.64 | | | NA |
| 16:00 | 15.8 | 8.6 | 62 | 21 | 15 | 16.1 | 99.65 | | | NA |
| 17:00 | 14.2 | 8.2 | 67 | 21 | 13 | 16.1 | 99.70 | | | NA |
| 18:00 | 14.6 | 7.5 | 62 | 22 | 13 | 16.1 | 99.70 | | | NA |
| 19:00 | 14.4 | 7.6 | 63 | 22 | 11 | 16.1 | 99.71 | | | NA |
| 20:00 | 14.8 | 7.1 | 60 | 22 | 13 | 16.1 | 99.68 | | | NA |
| 21:00 | 15.1 | 6.7 | 57 | 22 | 13 | 16.1 | 99.67 | | | NA |
| 22:00 | 14.2 | 6.7 | 60 | 22 | 11 | 16.1 | 99.73 | | | NA |
| 23:00 | 13.3 | 6.8 | 64 | 22 | 8 | 16.1 | 99.73 | | | NA |

**Legend**

- E = Estimated
- M = Missing
- NA = Not Available*
- [empty] = Indicates an unobserved value

**Date modified:**

2020-09-17

Government of Canada / Gouvernement du Canada



## Hourly Data Report for November 06, 2020

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time where and when it is observed.

**PETERBOROUGH A**
**ONTARIO**
**Current Station Operator: NAVCAN**

| | | | | | |
|---|---|---|---|---|---|
| **Latitude:** | 44°13'48.000" N | **Longitude:** | 78°21'48.000" W | **Elevation:** | 191.40 m |
| **Climate ID:** | 6166415 | **WMO ID:** | 71436 | **TC ID:** | YPQ |

| TIME | Temp °C | Dew Point °C | Rel Hum % | Wind Dir 10's deg | Wind Spd km/h | Visibility km | Stn Press kPa | Hmdx | Wind Chill | Weather |
|---|---|---|---|---|---|---|---|---|---|---|
| 00:00 | 12.0 | 6.8 | 71 | 22 | 9 | 16.1 | 99.71 | | | NA |
| 01:00 | 11.2 | 6.8 | 74 | 22 | 8 | 16.1 | 99.70 | | | NA |
| 02:00 | 6.5 | 5.3 | 92 | 23 | 5 | 16.1 | 99.65 | | | NA |
| 03:00 | 5.0 | 4.5 | 96 | 23 | 5 | 16.1 | 99.67 | | | NA |
| 04:00 | 3.1 | 2.7 | 97 | 23 | 8 | 16.1 | 99.66 | | | NA |
| 05:00 | 3.0 | 2.4 | 96 | 23 | 8 | 16.1 | 99.68 | | | NA |
| 06:00 | 2.7 | 2.6 | 99 | 23 | 9 | 12.9 | 99.67 | | | NA |
| 07:00 | 2.2 | 2.2 | 100 | M | 4 | 4.8 | 99.71 | | | Fog |
| 08:00 | 5.2 | 5.2 | 100 | 23 | 8 | 16.1 | 99.73 | | | NA |
| 09:00 | 11.5 | 8.1 | 79 | 22 | 9 | 16.1 | 99.72 | | | NA |
| 10:00 | 14.4 | 8.5 | 67 | 24 | 9 | 16.1 | 99.69 | | | NA |
| 11:00 | 17.2 | 8.6 | 57 | 23 | 11 | 16.1 | 99.69 | | | NA |
| 12:00 | 19.5 | 8.1 | 47 | 26 | 18 | 16.1 | 99.62 | | | NA |
| 13:00 | 20.2 | 9.0 | 48 | 25 | 15 | 16.1 | 99.58 | | | NA |
| 14:00 | 19.7 | 9.0 | 50 | 23 | 15 | 16.1 | 99.58 | | | NA |
| 15:00 | 18.1 | 9.8 | 58 | 22 | 13 | 16.1 | 99.59 | | | NA |
| 16:00 | 16.7 | 9.6 | 63 | 22 | 13 | 16.1 | 99.64 | | | NA |
| 17:00 | 15.4 | 9.8 | 69 | 22 | 11 | 16.1 | 99.66 | | | NA |
| 18:00 | 14.3 | 9.9 | 75 | 22 | 13 | 16.1 | 99.68 | | | NA |
| 19:00 | 14.0 | 9.7 | 75 | 22 | 9 | 16.1 | 99.71 | | | NA |
| 20:00 | 10.9 | 8.8 | 87 | 23 | 5 | 16.1 | 99.74 | | | NA |
| 21:00 | 8.9 | 7.9 | 93 | 22 | 9 | 16.1 | 99.74 | | | NA |
| 22:00 | 6.6 | 6.2 | 97 | 29 | 8 | 16.1 | 99.78 | | | NA |
| 23:00 | 9.1 | 7.4 | 89 | 23 | 8 | 16.1 | 99.78 | | | NA |

**Legend**

- E = Estimated
- M = Missing
- NA = Not Available*
- [empty] = Indicates an unobserved value

**Date modified:**

2020-09-17

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## Hourly Data Report for November 07, 2020

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time where and when it is observed.

**PETERBOROUGH A**
**ONTARIO**
**Current Station Operator: NAVCAN**

| | | | | | |
|---|---|---|---|---|---|
| **Latitude:** | 44°13'48.000" N | **Longitude:** | 78°21'48.000" W | **Elevation:** | 191.40 m |
| **Climate ID:** | 6166415 | **WMO ID:** | 71436 | **TC ID:** | YPQ |

| TIME | Temp °C | Dew Point °C | Rel Hum % | Wind Dir 10's deg | Wind Spd km/h | Visibility km | Stn Press kPa | Hmdx | Wind Chill | Weather |
|---|---|---|---|---|---|---|---|---|---|---|
| 00:00 | 6.2 | 5.8 | 97 | 23 | 8 | 16.1 | 99.77 | | | NA |
| 01:00 | 5.1 | 5.0 | 99 | 23 | 8 | 16.1 | 99.78 | | | NA |
| 02:00 | 10.4 | 8.3 | 87 | 23 | 8 | 16.1 | 99.82 | | | NA |
| 03:00 | 8.4 | 7.7 | 95 | 22 | 9 | 16.1 | 99.84 | | | NA |
| 04:00 | 4.4 | 4.4 | 100 | 24 | 5 | 2.0 | 99.84 | | | Fog |
| 05:00 | 2.6 | 2.6 | 100 | 23 | 8 | 1.0 | 99.86 | | | Fog |
| 06:00 | 2.4 | 2.4 | 100 | 23 | 8 | 9.7 | 99.85 | | | Fog |
| 07:00 | 7.2 | 6.8 | 97 | 22 | 11 | 12.9 | 99.90 | | | NA |
| 08:00 | 8.8 | 8.2 | 96 | 22 | 11 | 9.7 | 99.93 | | | Fog |
| 09:00 | 12.9 | 10.1 | 83 | 21 | 9 | 16.1 | 99.91 | | | NA |
| 10:00 | 16.4 | 10.7 | 69 | 21 | 11 | 16.1 | 99.90 | | | NA |
| 11:00 | 19.9 | 10.8 | 55 | 24 | 13 | 16.1 | 99.91 | | | NA |
| 12:00 | 21.2 | 10.9 | 51 | 21 | 15 | 16.1 | 99.83 | | | NA |
| 13:00 | 20.9 | 10.8 | 52 | 23 | 15 | 16.1 | 99.80 | | | NA |
| 14:00 | 19.8 | 10.7 | 55 | 20 | 18 | 16.1 | 99.80 | | | NA |
| 15:00 | 18.3 | 10.1 | 58 | 21 | 17 | 16.1 | 99.82 | | | NA |
| 16:00 | 17.6 | 9.4 | 58 | 21 | 13 | 16.1 | 99.86 | | | NA |
| 17:00 | 15.8 | 9.1 | 64 | 22 | 11 | 16.1 | 99.88 | | | NA |
| 18:00 | 13.3 | 8.5 | 73 | 22 | 9 | 16.1 | 99.91 | | | NA |
| 19:00 | 12.5 | 8.3 | 75 | 22 | 9 | 16.1 | 99.94 | | | NA |
| 20:00 | 12.9 | 8.0 | 72 | 22 | 11 | 16.1 | 99.93 | | | NA |
| 21:00 | 13.2 | 8.1 | 71 | 22 | 11 | 16.1 | 99.97 | | | NA |
| 22:00 | 8.0 | 6.9 | 92 | 3 | 8 | 16.1 | 100.01 | | | NA |
| 23:00 | 6.6 | 6.0 | 96 | 15 | 5 | 16.1 | 100.01 | | | NA |

**Legend**

- E = Estimated
- M = Missing
- NA = Not Available*
- [empty] = Indicates an unobserved value

**Date modified:**

2020-09-17

Government of Canada Gouvernement du Canada



# Hourly Data Report for November 08, 2020

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time where and when it is observed.

## PETERBOROUGH A
## ONTARIO
## Current Station Operator: NAVCAN

| | | | | | |
|---|---|---|---|---|---|
| **Latitude:** | 44°13'48.000" N | **Longitude:** | 78°21'48.000" W | **Elevation:** | 191.40 m |
| **Climate ID:** | 6166415 | **WMO ID:** | 71436 | **TC ID:** | YPQ |

| TIME | Temp °C | Dew Point °C | Rel Hum % | Wind Dir 10's deg | Wind Spd km/h | Visibility km | Stn Press kPa | Hmdx | Wind Chill | Weather |
|---|---|---|---|---|---|---|---|---|---|---|
| **00:00** | 4.7 | 4.3 | 97 | M | 4 | 16.1 | 100.05 | | | NA |
| **01:00** | 4.2 | 4.2 | 100 | M | 4 | 4.8 | 100.07 | | | **Fog** |
| **02:00** | 2.5 | 2.5 | 100 | | 0 | 0.4 | 100.10 | | | **Fog** |
| **03:00** | 1.6 | 1.6 | 100 | 29 | 4 | 4.8 | 100.15 | | | **Fog** |
| **04:00** | 1.0 | 1.0 | 100 | M | 4 | 2.0 | 100.17 | | | **Fog** |
| **05:00** | 0.5 | 0.5 | 100 | | 0 | 4.8 | 100.24 | | | **Fog** |
| **06:00** | 0.3 | 0.3 | 100 | M | 4 | 12.9 | 100.30 | | | NA |
| **07:00** | -0.2 | -0.2 | 100 | 29 | 4 | 11.3 | 100.35 | | -1 | NA |
| **08:00** | 1.9 | 1.9 | 100 | M | 4 | 16.1 | 100.42 | | | NA |
| **09:00** | 8.1 | 6.4 | 89 | M | 4 | 16.1 | 100.45 | | | NA |
| **10:00** | 15.2 | 10.4 | 73 | | 0 | 16.1 | 100.44 | | | NA |
| **11:00** | 19.4 | 9.3 | 52 | 22 | 9 | 16.1 | 100.43 | | | NA |
| **12:00** | 20.6 | 9.9 | 50 | 18 | 15 | 16.1 | 100.38 | | | NA |
| **13:00** | 21.1 | 9.7 | 48 | 19 | 17 | 16.1 | 100.32 | | | NA |
| **14:00** | 21.5 | 9.3 | 45 | 20 | 17 | 16.1 | 100.31 | | | NA |
| **15:00** | 21.0 | 8.1 | 43 | 21 | 15 | 16.1 | 100.33 | | | NA |
| **16:00** | 20.0 | 7.3 | 43 | 23 | 11 | 16.1 | 100.34 | | | NA |
| **17:00** | 16.0 | 7.4 | 56 | 23 | 8 | 16.1 | 100.36 | | | NA |
| **18:00** | 9.8 | 6.0 | 77 | 22 | 8 | 16.1 | 100.37 | | | NA |
| **19:00** | 7.9 | 5.8 | 87 | 23 | 5 | 16.1 | 100.35 | | | NA |
| **20:00** | 5.6 | 4.5 | 93 | | 0 | 16.1 | 100.33 | | | NA |
| **21:00** | 5.3 | 4.2 | 92 | | 0 | 16.1 | 100.34 | | | NA |
| **22:00** | 3.7 | 3.0 | 95 | M | 4 | 16.1 | 100.33 | | | NA |
| **23:00** | 3.7 | 3.6 | 99 | M | 4 | 12.9 | 100.31 | | | NA |

**Legend**

- E = Estimated
- M = Missing
- NA = Not Available*
- [empty] = Indicates an unobserved value

**Date modified:**

2020-09-17

## Hourly Data Report for November 09, 2020

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time where and when it is observed.

**PETERBOROUGH A**
**ONTARIO**
**Current Station Operator: NAVCAN**

| | | | | | |
|---|---|---|---|---|---|
| **Latitude:** | 44°13'48.000" N | **Longitude:** | 78°21'48.000" W | **Elevation:** | 191.40 m |
| **Climate ID:** | 6166415 | **WMO ID:** | 71436 | **TC ID:** | YPQ |

| TIME | Temp °C | Dew Point °C | Rel Hum % | Wind Dir 10's deg | Wind Spd km/h | Visibility km | Stn Press kPa | Hmdx | Wind Chill | Weather |
|---|---|---|---|---|---|---|---|---|---|---|
| **00:00** | 3.4 | 3.0 | 97 | M | 4 | 16.1 | 100.31 | | | NA |
| **01:00** | 3.2 | 3.0 | 99 | 26 | 5 | 16.1 | 100.32 | | | NA |
| **02:00** | 3.1 | 2.8 | 98 | 29 | 4 | 16.1 | 100.32 | | | NA |
| **03:00** | 3.1 | 2.7 | 97 | 28 | 4 | 16.1 | 100.30 | | | NA |
| **04:00** | 2.2 | 2.1 | 99 | | 0 | 11.3 | 100.31 | | | NA |
| **05:00** | 3.0 | 2.9 | 99 | | 0 | 16.1 | 100.32 | | | NA |
| **06:00** | 2.2 | 2.2 | 100 | | 0 | 16.1 | 100.30 | | | NA |
| **07:00** | 2.3 | 2.3 | 100 | | 0 | 14.5 | 100.28 | | | NA |
| **08:00** | 4.9 | 4.3 | 96 | M | 4 | 16.1 | 100.32 | | | NA |
| **09:00** | 9.9 | 7.4 | 84 | | 0 | 16.1 | 100.30 | | | NA |
| **10:00** | 14.0 | 9.1 | 72 | M | 4 | 16.1 | 100.25 | | | NA |
| **11:00** | 16.6 | 8.7 | 59 | 22 | 9 | 16.1 | 100.23 | | | NA |
| **12:00** | 18.5 | 7.8 | 49 | 20 | 11 | 16.1 | 100.12 | | | NA |
| **13:00** | 20.2 | 8.0 | 45 | 20 | 15 | 16.1 | 100.01 | | | NA |
| **14:00** | 21.3 | 8.9 | 45 | 20 | 15 | 16.1 | 99.93 | | | NA |
| **15:00** | 19.6 | 7.8 | 46 | 18 | 9 | 16.1 | 99.90 | | | NA |
| **16:00** | 19.3 | 7.2 | 45 | 21 | 9 | 16.1 | 99.87 | | | NA |
| **17:00** | 15.4 | 7.3 | 58 | 15 | 4 | 16.1 | 99.83 | | | NA |
| **18:00** | 10.0 | 6.6 | 79 | M | 4 | 16.1 | 99.82 | | | NA |
| **19:00** | 7.2 | 5.4 | 88 | | 0 | 16.1 | 99.84 | | | NA |
| **20:00** | 6.3 | 4.5 | 88 | 24 | 8 | 16.1 | 99.80 | | | NA |
| **21:00** | 5.0 | 4.0 | 93 | M | 4 | 16.1 | 99.74 | | | NA |
| **22:00** | 3.9 | 3.2 | 95 | 24 | 8 | 16.1 | 99.70 | | | NA |
| **23:00** | 4.0 | 3.7 | 98 | | 0 | 16.1 | 99.64 | | | NA |

**Legend**

- E = Estimated
- M = Missing
- NA = Not Available*
- [empty] = Indicates an unobserved value

**Date modified:**

2020-09-17

Government of Canada / Gouvernement du Canada



# Hourly Data Report for November 10, 2020

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time where and when it is observed.

## PETERBOROUGH A
## ONTARIO
## Current Station Operator: NAVCAN

| | | | | | |
|---|---|---|---|---|---|
| **Latitude:** | 44°13'48.000" N | **Longitude:** | 78°21'48.000" W | **Elevation:** | 191.40 m |
| **Climate ID:** | 6166415 | **WMO ID:** | 71436 | **TC ID:** | YPQ |

| TIME | Temp °C | Dew Point °C | Rel Hum % | Wind Dir 10's deg | Wind Spd km/h | Visibility km | Stn Press kPa | Hmdx | Wind Chill | Weather |
|---|---|---|---|---|---|---|---|---|---|---|
| **00:00** | 3.6 | 3.0 | 96 | M | 4 | 16.1 | 99.61 | | | NA |
| **01:00** | 3.2 | 2.9 | 98 | | 0 | 16.1 | 99.55 | | | NA |
| **02:00** | 3.0 | 2.7 | 98 | M | 4 | 16.1 | 99.53 | | | NA |
| **03:00** | 3.0 | 2.7 | 98 | | 0 | 16.1 | 99.48 | | | NA |
| **04:00** | 3.7 | 3.0 | 95 | | 0 | 16.1 | 99.43 | | | NA |
| **05:00** | 4.2 | 3.9 | 98 | M | 4 | 16.1 | 99.42 | | | NA |
| **06:00** | 5.4 | 5.0 | 97 | 24 | 5 | 16.1 | 99.41 | | | NA |
| **07:00** | 8.3 | 7.3 | 94 | 21 | 8 | 16.1 | 99.36 | | | NA |
| **08:00** | 12.4 | 9.8 | 84 | 21 | 9 | 16.1 | 99.36 | | | NA |
| **09:00** | 14.9 | 10.7 | 76 | 20 | 13 | 16.1 | 99.35 | | | NA |
| **10:00** | 16.8 | 11.2 | 69 | 19 | 8 | 16.1 | 99.31 | | | NA |
| **11:00** | 18.1 | 11.4 | 64 | 21 | 13 | 16.1 | 99.28 | | | NA |
| **12:00** | 19.7 | 11.7 | 60 | 21 | 21 | 16.1 | 99.21 | | | NA |
| **13:00** | 20.7 | 12.3 | 58 | 20 | 21 | 16.1 | 99.14 | | | NA |
| **14:00** | 21.9 | 12.8 | 56 | 21 | 21 | 16.1 | 99.10 | **25** | | NA |
| **15:00** | 20.7 | 12.5 | 59 | 21 | 18 | 16.1 | 99.06 | | | NA |
| **16:00** | 20.1 | 12.5 | 61 | 21 | 15 | 16.1 | 99.03 | | | NA |
| **17:00** | 17.3 | 12.1 | 71 | 19 | 11 | 16.1 | 99.03 | | | NA |
| **18:00** | 14.8 | 10.9 | 77 | 19 | 11 | 16.1 | 99.03 | | | NA |
| **19:00** | 11.3 | 9.9 | 91 | 29 | 4 | 16.1 | 99.02 | | | NA |
| **20:00** | 9.5 | 8.9 | 96 | | 0 | 16.1 | 98.97 | | | NA |
| **21:00** | 8.8 | 8.4 | 98 | | 0 | 16.1 | 98.93 | | | NA |
| **22:00** | 9.0 | 8.6 | 97 | | 0 | 16.1 | 98.88 | | | NA |
| **23:00** | 8.8 | 8.2 | 96 | | 0 | 16.1 | 98.79 | | | NA |

**Legend**

- E = Estimated
- M = Missing
- NA = Not Available*
- [empty] = Indicates an unobserved value

**Date modified:**

2020-09-17

Government of Canada / Gouvernement du Canada



## Hourly Data Report for November 11, 2020

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time where and when it is observed.

**PETERBOROUGH A**
**ONTARIO**
**Current Station Operator: NAVCAN**

| | | | | | |
|---|---|---|---|---|---|
| **Latitude:** | 44°13'48.000" N | **Longitude:** | 78°21'48.000" W | **Elevation:** | 191.40 m |
| **Climate ID:** | 6166415 | **WMO ID:** | 71436 | **TC ID:** | YPQ |

| TIME | Temp °C | Dew Point °C | Rel Hum % | Wind Dir 10's deg | Wind Spd km/h | Visibility km | Stn Press kPa | Hmdx | Wind Chill | Weather |
|---|---|---|---|---|---|---|---|---|---|---|
| 00:00 | 13.8 | 11.4 | 85 | 19 | 9 | 16.1 | 98.74 | | | NA |
| 01:00 | 15.3 | 11.1 | 76 | 17 | 13 | 16.1 | 98.65 | | | NA |
| 02:00 | 15.1 | 11.5 | 79 | 16 | 9 | 16.1 | 98.62 | | | Rain |
| 03:00 | 14.7 | 12.1 | 84 | 16 | 8 | 16.1 | 98.55 | | | NA |
| 04:00 | 14.3 | 12.2 | 87 | 18 | 11 | 16.1 | 98.51 | | | NA |
| 05:00 | 15.5 | 13.0 | 85 | 20 | 17 | 16.1 | 98.53 | | | NA |
| 06:00 | 16.2 | 14.4 | 89 | 19 | 24 | 16.1 | 98.55 | | | NA |
| 07:00 | 16.2 | 15.2 | 94 | 20 | 18 | 16.1 | 98.51 | | | NA |
| 08:00 | 16.3 | 15.7 | 96 | 19 | 21 | 8.1 | 98.50 | | | Fog |
| 09:00 | 16.1 | 15.3 | 95 | 21 | 15 | 16.1 | 98.55 | | | NA |
| 10:00 | 16.9 | 15.4 | 91 | 21 | 21 | 16.1 | 98.58 | | | NA |
| 11:00 | 17.3 | 14.6 | 84 | 22 | 15 | 16.1 | 98.59 | | | NA |
| 12:00 | 19.5 | 14.2 | 71 | 21 | 21 | 16.1 | 98.56 | | | NA |
| 13:00 | 19.4 | 6.2 | 42 | 27 | 24 | 16.1 | 98.56 | | | NA |
| 14:00 | 18.1 | 7.2 | 49 | 28 | 30 | 16.1 | 98.62 | | | NA |
| 15:00 | 13.8 | 5.1 | 56 | 28 | 30 | 16.1 | 98.73 | | | NA |
| 16:00 | 11.1 | 4.1 | 62 | 29 | 28 | 16.1 | 98.85 | | | NA |
| 17:00 | 7.9 | 2.2 | 67 | 30 | 21 | 16.1 | 98.98 | | | NA |
| 18:00 | 6.3 | 1.2 | 70 | 30 | 24 | 16.1 | 99.11 | | | NA |
| 19:00 | 4.7 | 0.8 | 76 | 30 | 13 | 16.1 | 99.18 | | | NA |
| 20:00 | 4.4 | 0.4 | 75 | 31 | 8 | 16.1 | 99.24 | | | NA |
| 21:00 | 5.1 | -0.1 | 69 | 31 | 17 | 16.1 | 99.29 | | | NA |
| 22:00 | 4.4 | -0.6 | 70 | 31 | 18 | 16.1 | 99.35 | | | NA |
| 23:00 | 4.7 | -0.5 | 69 | 30 | 18 | 16.1 | 99.40 | | | NA |

**Legend**

- E = Estimated
- M = Missing
- NA = Not Available*
- [empty] = Indicates an unobserved value

### Date modified:

2020-09-17

Government of Canada / Gouvernement du Canada



## Hourly Data Report for November 12, 2020

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time where and when it is observed.

**PETERBOROUGH A**
**ONTARIO**
**Current Station Operator: NAVCAN**

| | | | | | |
|---|---|---|---|---|---|
| **Latitude:** | 44°13'48.000" N | **Longitude:** | 78°21'48.000" W | **Elevation:** | 191.40 m |
| **Climate ID:** | 6166415 | **WMO ID:** | 71436 | **TC ID:** | YPQ |

| TIME | Temp °C | Dew Point °C | Rel Hum % | Wind Dir 10's deg | Wind Spd km/h | Visibility km | Stn Press kPa | Hmdx | Wind Chill | Weather |
|---|---|---|---|---|---|---|---|---|---|---|
| 00:00 | 4.4 | -0.5 | 71 | 29 | 15 | 16.1 | 99.40 | | | NA |
| 01:00 | 5.1 | 0.1 | 70 | 29 | 8 | 16.1 | 99.45 | | | NA |
| 02:00 | 4.8 | 1.2 | 77 | 31 | 11 | 16.1 | 99.53 | | | NA |
| 03:00 | 3.6 | 1.5 | 86 | 32 | 8 | 16.1 | 99.56 | | | NA |
| 04:00 | 2.4 | 1.2 | 92 | 30 | 5 | 16.1 | 99.63 | | | NA |
| 05:00 | 2.6 | 1.4 | 92 | 31 | 11 | 16.1 | 99.69 | | | NA |
| 06:00 | 3.2 | 1.4 | 88 | 30 | 11 | 16.1 | 99.73 | | | NA |
| 07:00 | 1.4 | 0.4 | 93 | 28 | 9 | 16.1 | 99.78 | | | NA |
| 08:00 | -0.7 | -0.7 | 100 | 27 | 5 | 16.1 | 99.87 | | -2 | NA |
| 09:00 | 2.3 | 1.6 | 95 | M | 5 | 16.1 | 99.95 | | | NA |
| 10:00 | 6.0 | 1.4 | 72 | 29 | 11 | 16.1 | 99.94 | | | NA |
| 11:00 | 6.7 | 1.0 | 67 | 29 | 11 | 16.1 | 99.90 | | | NA |
| 12:00 | 8.0 | 1.3 | 63 | 32 | 13 | 16.1 | 99.83 | | | NA |
| 13:00 | 8.8 | -0.4 | 52 | 31 | 15 | 16.1 | 99.80 | | | NA |
| 14:00 | 9.4 | 0.2 | 52 | 32 | 15 | 16.1 | 99.79 | | | NA |
| 15:00 | 9.2 | 0.1 | 53 | 30 | 8 | 16.1 | 99.78 | | | NA |
| 16:00 | 8.3 | 0.2 | 56 | M | 4 | 16.1 | 99.70 | | | NA |
| 17:00 | 6.7 | -0.1 | 62 | 9 | 5 | 16.1 | 99.66 | | | NA |
| 18:00 | 1.3 | -0.8 | 86 | 23 | 5 | 16.1 | 99.69 | | | NA |
| 19:00 | 1.1 | -0.2 | 91 | | 0 | 16.1 | 99.77 | | | NA |
| 20:00 | -0.2 | -0.2 | 100 | 21 | 8 | 16.1 | 99.76 | | -3 | NA |
| 21:00 | -1.2 | -1.5 | 98 | 29 | 5 | 16.1 | 99.75 | | -3 | NA |
| 22:00 | -3.4 | -3.6 | 98 | 28 | 4 | 16.1 | 99.72 | | -5 | NA |
| 23:00 | -3.2 | -3.2 | 100 | 25 | 5 | 16.1 | 99.70 | | -5 | NA |

**Legend**

- E = Estimated
- M = Missing
- NA = Not Available*
- [empty] = Indicates an unobserved value

### Date modified:

2020-09-17

Government of Canada / Gouvernement du Canada



## Hourly Data Report for November 13, 2020

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time where and when it is observed.

**PETERBOROUGH A**
**ONTARIO**
**Current Station Operator: NAVCAN**

| | | | | | |
|---|---|---|---|---|---|
| **Latitude:** | 44°13'48.000" N | **Longitude:** | 78°21'48.000" W | **Elevation:** | 191.40 m |
| **Climate ID:** | 6166415 | **WMO ID:** | 71436 | **TC ID:** | YPQ |

| TIME | Temp °C | Dew Point °C | Rel Hum % | Wind Dir 10's deg | Wind Spd km/h | Visibility km | Stn Press kPa | Hmdx | Wind Chill | Weather |
|---|---|---|---|---|---|---|---|---|---|---|
| 00:00 | -3.3 | -3.3 | 100 | M | 5 | 16.1 | 99.64 | | -5 | NA |
| 01:00 | -4.0 | -4.1 | 99 | 29 | 8 | 16.1 | 99.56 | | -7 | NA |
| 02:00 | -2.7 | -3.0 | 98 | M | 4 | 16.1 | 99.49 | | -4 | NA |
| 03:00 | -1.5 | -1.5 | 100 | M | 4 | 16.1 | 99.43 | | -3 | NA |
| 04:00 | -2.2 | -2.3 | 99 | M | 4 | 16.1 | 99.39 | | -4 | NA |
| 05:00 | -2.0 | -2.1 | 99 | 7 | 5 | 16.1 | 99.32 | | -4 | NA |
| 06:00 | -0.9 | -0.9 | 100 | 7 | 5 | 16.1 | 99.24 | | -3 | NA |
| 07:00 | -0.5 | -0.5 | 100 | M | 4 | 16.1 | 99.20 | | -2 | NA |
| 08:00 | 0.8 | 0.4 | 97 | 34 | 8 | 16.1 | 99.20 | | | NA |
| 09:00 | 1.7 | 0.5 | 91 | 2 | 5 | 16.1 | 99.15 | | | NA |
| 10:00 | 2.2 | 0.7 | 90 | 4 | 5 | 16.1 | 99.11 | | | NA |
| 11:00 | 4.3 | 1.1 | 80 | 3 | 9 | 16.1 | 99.00 | | | NA |
| 12:00 | 5.4 | 0.7 | 71 | M | 4 | 16.1 | 98.95 | | | NA |
| 13:00 | 6.3 | 1.2 | 70 | 28 | 5 | 16.1 | 99.00 | | | NA |
| 14:00 | 6.1 | 3.4 | 83 | 26 | 13 | 16.1 | 98.98 | | | Rain |
| 15:00 | 7.4 | 2.3 | 70 | 27 | 21 | 16.1 | 99.00 | | | NA |
| 16:00 | 7.3 | 1.6 | 67 | 27 | 18 | 16.1 | 99.06 | | | NA |
| 17:00 | 6.8 | 2.1 | 72 | 23 | 8 | 16.1 | 99.08 | | | NA |
| 18:00 | 6.6 | 2.1 | 73 | 25 | 15 | 16.1 | 99.13 | | | NA |
| 19:00 | 4.4 | 3.1 | 91 | 28 | 15 | 16.1 | 99.19 | | | Rain |
| 20:00 | 4.7 | 3.1 | 89 | 28 | 18 | 16.1 | 99.21 | | | NA |
| 21:00 | 4.2 | 1.4 | 82 | 28 | 21 | 16.1 | 99.25 | | | NA |
| 22:00 | 4.1 | 1.2 | 82 | 28 | 17 | 16.1 | 99.30 | | | NA |
| 23:00 | 4.0 | 0.7 | 79 | 27 | 15 | 16.1 | 99.33 | | | NA |

**Legend**

- E = Estimated
- M = Missing
- NA = Not Available*
- [empty] = Indicates an unobserved value

**Date modified:**

2020-09-17

Government of Canada / Gouvernement du Canada



# Hourly Data Report for November 14, 2020

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time where and when it is observed.

**PETERBOROUGH A**
**ONTARIO**
**Current Station Operator: NAVCAN**

| | | | | | |
|---|---|---|---|---|---|
| **Latitude:** | 44°13'48.000" N | **Longitude:** | 78°21'48.000" W | **Elevation:** | 191.40 m |
| **Climate ID:** | 6166415 | **WMO ID:** | 71436 | **TC ID:** | YPQ |

| TIME | Temp °C | Dew Point °C | Rel Hum % | Wind Dir 10's deg | Wind Spd km/h | Visibility km | Stn Press kPa | Hmdx | Wind Chill | Weather |
|---|---|---|---|---|---|---|---|---|---|---|
| 00:00 | 4.0 | -0.6 | 72 | 27 | 15 | 16.1 | 99.34 | | | NA |
| 01:00 | 3.8 | -1.2 | 70 | 26 | 17 | 16.1 | 99.38 | | | NA |
| 02:00 | 3.3 | 0.5 | 82 | 29 | 21 | 16.1 | 99.44 | | | Rain |
| 03:00 | 2.7 | -0.4 | 80 | 30 | 13 | 16.1 | 99.53 | | | NA |
| 04:00 | 2.5 | -1.8 | 74 | 31 | 13 | 16.1 | 99.57 | | | NA |
| 05:00 | 1.9 | -2.1 | 75 | 30 | 11 | 16.1 | 99.65 | | | NA |
| 06:00 | 1.9 | -2.6 | 72 | 30 | 9 | 16.1 | 99.71 | | | NA |
| 07:00 | 1.3 | -1.6 | 81 | 27 | 5 | 16.1 | 99.75 | | | NA |
| 08:00 | 1.3 | -2.6 | 75 | M | 4 | 16.1 | 99.80 | | | NA |
| 09:00 | 3.2 | -4.2 | 58 | 30 | 13 | 16.1 | 99.84 | | | NA |
| 10:00 | 4.3 | -5.3 | 50 | 31 | 15 | 16.1 | 99.87 | | | NA |
| 11:00 | 4.9 | -4.6 | 50 | 33 | 13 | 16.1 | 99.86 | | | NA |
| 12:00 | 6.0 | -4.7 | 46 | 28 | 18 | 16.1 | 99.89 | | | NA |
| 13:00 | 6.3 | -4.3 | 47 | 28 | 11 | 16.1 | 99.88 | | | NA |
| 14:00 | 6.9 | -4.0 | 46 | 27 | 11 | 16.1 | 99.88 | | | NA |
| 15:00 | 6.7 | -4.7 | 44 | 30 | 9 | 16.1 | 99.87 | | | NA |
| 16:00 | 6.0 | -4.2 | 48 | 26 | 9 | 16.1 | 99.90 | | | NA |
| 17:00 | 3.2 | -2.8 | 65 | 22 | 11 | 16.1 | 99.94 | | | NA |
| 18:00 | 1.7 | -1.9 | 77 | | 0 | 16.1 | 99.91 | | | NA |
| 19:00 | -2.0 | -2.8 | 94 | M | 4 | 16.1 | 99.90 | | -3 | NA |
| 20:00 | -3.5 | -4.5 | 93 | 29 | 4 | 16.1 | 99.84 | | -5 | NA |
| 21:00 | -4.0 | -4.7 | 95 | M | 4 | 16.1 | 99.84 | | -6 | NA |
| 22:00 | -4.8 | -5.1 | 98 | M | 4 | 16.1 | 99.82 | | -7 | NA |
| 23:00 | -5.7 | -6.1 | 97 | 29 | 4 | 16.1 | 99.75 | | -8 | NA |

**Legend**

- E = Estimated
- M = Missing
- NA = Not Available*
- [empty] = Indicates an unobserved value

**Date modified:**

2020-09-17

Government of Canada / Gouvernement du Canada



## Hourly Data Report for November 15, 2020

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time where and when it is observed.

**PETERBOROUGH A**
**ONTARIO**
**Current Station Operator: NAVCAN**

| | | | | | |
|---|---|---|---|---|---|
| **Latitude:** | 44°13'48.000" N | **Longitude:** | 78°21'48.000" W | **Elevation:** | 191.40 m |
| **Climate ID:** | 6166415 | **WMO ID:** | 71436 | **TC ID:** | YPQ |

| TIME | Temp °C | Dew Point °C | Rel Hum % | Wind Dir 10's deg | Wind Spd km/h | Visibility km | Stn Press kPa | Hmdx | Wind Chill | Weather |
|---|---|---|---|---|---|---|---|---|---|---|
| **00:00** | -5.3 | -5.6 | 98 | M | 4 | 16.1 | 99.62 | | -7 | NA |
| **01:00** | -3.6 | -3.9 | 98 | 7 | 5 | 16.1 | 99.52 | | -6 | NA |
| **02:00** | 3.6 | 1.3 | 85 | 12 | 17 | 16.1 | 99.35 | | | NA |
| **03:00** | 4.5 | 0.6 | 76 | 12 | 18 | 16.1 | 99.24 | | | NA |
| **04:00** | 5.2 | 0.4 | 71 | 13 | 21 | 16.1 | 99.16 | | | NA |
| **05:00** | 4.7 | 1.5 | 80 | 13 | 21 | 16.1 | 99.04 | | | Rain |
| **06:00** | 3.8 | 2.4 | 91 | 11 | 15 | 16.1 | 98.82 | | | Rain |
| **07:00** | 4.0 | 2.8 | 92 | 13 | 18 | 16.1 | 98.54 | | | Rain |
| **08:00** | 4.9 | 3.2 | 89 | 13 | 18 | 16.1 | 98.33 | | | NA |
| **09:00** | 5.8 | 2.4 | 79 | 14 | 30 | 16.1 | 98.25 | | | NA |
| **10:00** | 6.0 | 2.9 | 80 | 13 | 22 | 16.1 | 98.01 | | | Rain |
| **11:00** | 6.5 | 3.6 | 82 | 15 | 18 | 16.1 | 97.88 | | | Rain |
| **12:00** | 6.9 | 5.7 | 92 | 14 | 21 | 16.1 | 97.62 | | | Rain |
| **13:00** | 7.8 | 6.7 | 93 | 16 | 18 | 11.3 | 97.40 | | | Rain |
| **14:00** | 9.6 | 8.8 | 95 | 16 | 26 | 16.1 | 97.04 | | | Rain |
| **15:00** | 10.0 | 9.2 | 95 | 16 | 22 | 16.1 | 97.02 | | | Rain |
| **16:00** | 10.4 | 9.3 | 93 | 19 | 22 | 16.1 | 96.86 | | | Rain |
| **17:00** | 8.5 | 6.1 | 85 | 21 | 30 | 16.1 | 97.01 | | | NA |
| **18:00** | 8.1 | 5.5 | 84 | 22 | 34 | 16.1 | 97.12 | | | Rain |
| **19:00** | 6.2 | 2.1 | 75 | 24 | 30 | 16.1 | 97.42 | | | NA |
| **20:00** | 5.7 | 3.4 | 85 | 25 | 15 | 16.1 | 97.54 | | | Rain |
| **21:00** | 5.6 | 3.1 | 84 | 24 | 24 | 16.1 | 97.60 | | | Rain |
| **22:00** | 5.4 | 2.1 | 79 | 24 | 30 | 16.1 | 97.65 | | | Rain |
| **23:00** | 5.1 | 0.3 | 71 | 23 | 24 | 16.1 | 97.73 | | | NA |

**Legend**

- E = Estimated
- M = Missing
- NA = Not Available*
- [empty] = Indicates an unobserved value

### Date modified:

2020-09-17

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Home > Environment and natural resources > Weather, Climate and Hazard > Past weather and climate > Historical Data

# Hourly Data Report for November 16, 2020

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time where and when it is observed.

## PETERBOROUGH A
## ONTARIO
## Current Station Operator: NAVCAN

| | | | | | |
|---|---|---|---|---|---|
| **Latitude:** | 44°13'48.000" N | **Longitude:** | 78°21'48.000" W | **Elevation:** | 191.40 m |
| **Climate ID:** | 6166415 | **WMO ID:** | 71436 | **TC ID:** | YPQ |

| TIME | Temp °C | Dew Point °C | Rel Hum % | Wind Dir 10's deg | Wind Spd km/h | Visibility km | Stn Press kPa | Hmdx | Wind Chill | Weather |
|---|---|---|---|---|---|---|---|---|---|---|
| 00:00 | 4.6 | 0.3 | 74 | 24 | 28 | 16.1 | 97.80 | | | Rain |
| 01:00 | 4.0 | -1.0 | 70 | 24 | 41 | 16.1 | 97.81 | | | NA |
| 02:00 | 3.7 | -0.8 | 73 | 24 | 30 | 16.1 | 97.90 | | | NA |
| 03:00 | 3.7 | -0.8 | 72 | 23 | 26 | 16.1 | 98.01 | | | NA |
| 04:00 | 3.6 | -0.8 | 73 | 25 | 26 | 16.1 | 98.08 | | | NA |
| 05:00 | 3.5 | -0.9 | 73 | 24 | 28 | 16.1 | 98.15 | | | NA |
| 06:00 | 3.4 | -1.0 | 73 | 24 | 24 | 16.1 | 98.24 | | | NA |
| 07:00 | 3.7 | -0.7 | 73 | 25 | 30 | 16.1 | 98.33 | | | NA |
| 08:00 | 3.4 | -0.1 | 78 | 24 | 26 | 16.1 | 98.42 | | | NA |
| 09:00 | 3.5 | -0.2 | 77 | 24 | 24 | 16.1 | 98.53 | | | NA |
| 10:00 | 4.5 | -0.7 | 69 | 23 | 26 | 16.1 | 98.59 | | | NA |
| 11:00 | 4.6 | -1.1 | 67 | 24 | 30 | 16.1 | 98.65 | | | NA |
| 12:00 | 4.9 | -1.1 | 65 | 25 | 26 | 16.1 | 98.69 | | | NA |
| 13:00 | 4.3 | -1.1 | 68 | 25 | 24 | 16.1 | 98.71 | | | NA |
| 14:00 | 3.3 | -0.4 | 77 | 25 | 21 | 16.1 | 98.73 | | | Rain |
| 15:00 | 3.5 | -2.0 | 67 | 25 | 28 | 16.1 | 98.75 | | | NA |
| 16:00 | 3.1 | -2.5 | 67 | 25 | 30 | 16.1 | 98.80 | | | NA |
| 17:00 | 2.9 | -2.6 | 67 | 24 | 21 | 16.1 | 98.86 | | | NA |
| 18:00 | 2.3 | -2.6 | 70 | 25 | 21 | 16.1 | 98.90 | | | Rain |
| 19:00 | 2.5 | -2.7 | 69 | 25 | 18 | 16.1 | 98.93 | | | NA |
| 20:00 | 2.5 | -2.7 | 69 | 26 | 26 | 16.1 | 98.96 | | | Rain |
| 21:00 | 2.4 | -2.7 | 69 | 24 | 22 | 16.1 | 98.96 | | | NA |
| 22:00 | 2.3 | -2.8 | 69 | 24 | 18 | 16.1 | 98.94 | | | NA |
| 23:00 | 2.2 | -2.9 | 69 | 25 | 13 | 16.1 | 98.94 | | | NA |

**Legend**

- E = Estimated
- M = Missing
- NA = Not Available*
- [empty] = Indicates an unobserved value

**Date modified:**

2020-09-17

# Hourly Data Report for November 17, 2020

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time where and when it is observed.

**PETERBOROUGH A**
**ONTARIO**
**Current Station Operator: NAVCAN**

| | | | | | |
|---|---|---|---|---|---|
| **Latitude:** | 44°13'48.000" N | **Longitude:** | 78°21'48.000" W | **Elevation:** | 191.40 m |
| **Climate ID:** | 6166415 | **WMO ID:** | 71436 | **TC ID:** | YPQ |

| TIME | Temp °C | Dew Point °C | Rel Hum % | Wind Dir 10's deg | Wind Spd km/h | Visibility km | Stn Press kPa | Hmdx | Wind Chill | Weather |
|---|---|---|---|---|---|---|---|---|---|---|
| **00:00** | 2.1 | -3.0 | 69 | 24 | 13 | 16.1 | 98.94 | | | NA |
| **01:00** | 1.4 | -2.9 | 73 | 25 | 9 | 16.1 | 98.91 | | | NA |
| **02:00** | 0.4 | -3.0 | 78 | 22 | 8 | 16.1 | 98.86 | | | NA |
| **03:00** | -0.1 | -3.0 | 81 | 21 | 5 | 16.1 | 98.87 | | -2 | NA |
| **04:00** | 0.0 | -1.9 | 87 | 24 | 8 | 16.1 | 98.85 | | -3 | Snow |
| **05:00** | -0.2 | -1.1 | 94 | 23 | 5 | 11.3 | 98.87 | | -2 | Snow |
| **06:00** | -0.2 | -0.6 | 97 | 26 | 8 | 16.1 | 98.92 | | -3 | NA |
| **07:00** | -0.1 | -2.0 | 87 | M | 4 | 16.1 | 98.95 | | -1 | NA |
| **08:00** | -0.2 | -0.9 | 95 | 21 | 4 | 16.1 | 99.03 | | -1 | NA |
| **09:00** | 0.4 | -1.9 | 85 | 28 | 13 | 16.1 | 99.12 | | | Snow |
| **10:00** | 1.1 | -3.8 | 70 | 30 | 17 | 16.1 | 99.16 | | | NA |
| **11:00** | 1.3 | -3.8 | 69 | 31 | 22 | 16.1 | 99.22 | | | NA |
| **12:00** | 1.9 | -4.0 | 65 | 31 | 24 | 16.1 | 99.23 | | | NA |
| **13:00** | -0.2 | -2.8 | 83 | 29 | 30 | 14.5 | 99.32 | | -7 | Snow |
| **14:00** | -0.8 | -3.4 | 82 | 32 | 30 | 16.1 | 99.39 | | -8 | Snow |
| **15:00** | -0.9 | -6.2 | 67 | 29 | 35 | 16.1 | 99.47 | | -8 | NA |
| **16:00** | -2.2 | -8.3 | 63 | 29 | 35 | 16.1 | 99.62 | | -10 | NA |
| **17:00** | -3.4 | -9.4 | 63 | 29 | 30 | 16.1 | 99.74 | | -11 | NA |
| **18:00** | -3.8 | -10.3 | 61 | 31 | 30 | 16.1 | 99.86 | | -11 | NA |
| **19:00** | -5.3 | -10.6 | 66 | 33 | 17 | 16.1 | 99.99 | | -11 | NA |
| **20:00** | -5.8 | -11.4 | 65 | 33 | 22 | 16.1 | 100.10 | | -13 | NA |
| **21:00** | -6.0 | -11.7 | 64 | 33 | 30 | 16.1 | 100.16 | | -14 | NA |
| **22:00** | -6.5 | -12.0 | 65 | 33 | 21 | 16.1 | 100.27 | | -14 | NA |
| **23:00** | -6.9 | -12.0 | 67 | 32 | 18 | 16.1 | 100.34 | | -14 | NA |

**Legend**

- E = Estimated
- M = Missing
- NA = Not Available*
- [empty] = Indicates an unobserved value

### Date modified:

2020-09-17

Government of Canada Gouvernement du Canada



## Hourly Data Report for November 18, 2020

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time where and when it is observed.

**PETERBOROUGH A**
**ONTARIO**
**Current Station Operator: NAVCAN**

| | | | | | |
|---|---|---|---|---|---|
| **Latitude:** | 44°13'48.000" N | **Longitude:** | 78°21'48.000" W | **Elevation:** | 191.40 m |
| **Climate ID:** | 6166415 | **WMO ID:** | 71436 | **TC ID:** | YPQ |

| TIME | Temp °C | Dew Point °C | Rel Hum % | Wind Dir 10's deg | Wind Spd km/h | Visibility km | Stn Press kPa | Hmdx | Wind Chill | Weather |
|---|---|---|---|---|---|---|---|---|---|---|
| 00:00 | -6.8 | -11.9 | 67 | 33 | 22 | 16.1 | 100.42 | | -14 | Snow |
| 01:00 | -6.6 | -11.8 | 67 | 31 | 21 | 16.1 | 100.44 | | -14 | Snow |
| 02:00 | -6.6 | -12.1 | 65 | 32 | 17 | 16.1 | 100.54 | | -13 | NA |
| 03:00 | -6.3 | -12.1 | 64 | 35 | 22 | 16.1 | 100.64 | | -14 | NA |
| 04:00 | -6.2 | -12.2 | 63 | 33 | 15 | 16.1 | 100.69 | | -12 | NA |
| 05:00 | -6.5 | -12.0 | 65 | 33 | 17 | 16.1 | 100.77 | | -13 | NA |
| 06:00 | -7.0 | -12.3 | 66 | 32 | 15 | 16.1 | 100.86 | | -13 | NA |
| 07:00 | -8.2 | -12.2 | 73 | 30 | 9 | 16.1 | 100.92 | | -13 | NA |
| 08:00 | -7.7 | -10.6 | 80 | 26 | 9 | 16.1 | 100.99 | | -12 | NA |
| 09:00 | -5.9 | -11.6 | 64 | 31 | 13 | 16.1 | 101.04 | | -11 | NA |
| 10:00 | -5.1 | -11.8 | 60 | 31 | 17 | 16.1 | 101.09 | | -11 | NA |
| 11:00 | -3.9 | -11.2 | 57 | 32 | 18 | 16.1 | 101.07 | | -10 | NA |
| 12:00 | -2.7 | -10.5 | 55 | 30 | 21 | 16.1 | 101.04 | | -9 | NA |
| 13:00 | -1.6 | -9.9 | 53 | 30 | 18 | 16.1 | 100.95 | | -7 | NA |
| 14:00 | -1.9 | -9.3 | 57 | 28 | 13 | 16.1 | 100.93 | | -6 | NA |
| 15:00 | -2.2 | -8.9 | 60 | 30 | 9 | 16.1 | 100.94 | | -6 | NA |
| 16:00 | -2.4 | -8.3 | 64 | 27 | 9 | 16.1 | 100.93 | | -6 | NA |
| 17:00 | -2.7 | -7.5 | 70 | M | 4 | 16.1 | 100.91 | | -4 | NA |
| 18:00 | -2.8 | -7.2 | 72 | 21 | 5 | 16.1 | 100.89 | | -5 | NA |
| 19:00 | -2.9 | -6.4 | 77 | 23 | 8 | 16.1 | 100.87 | | -6 | NA |
| 20:00 | -2.9 | -5.9 | 80 | 24 | 5 | 16.1 | 100.81 | | -5 | NA |
| 21:00 | -3.3 | -5.8 | 83 | | 0 | 16.1 | 100.80 | | | NA |
| 22:00 | -3.4 | -5.0 | 89 | | 0 | 16.1 | 100.68 | | | NA |
| 23:00 | -3.0 | -4.3 | 91 | 30 | 4 | 16.1 | 100.60 | | -5 | NA |

**Legend**

- E = Estimated
- M = Missing
- NA = Not Available*
- [empty] = Indicates an unobserved value

**Date modified:**

2020-09-17

Government of Canada Gouvernement du Canada



## Hourly Data Report for November 19, 2020

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time where and when it is observed.

### PETERBOROUGH A
### ONTARIO
### Current Station Operator: NAVCAN

| | | | | | |
|---|---|---|---|---|---|
| **Latitude:** | 44°13'48.000" N | **Longitude:** | 78°21'48.000" W | **Elevation:** | 191.40 m |
| **Climate ID:** | 6166415 | **WMO ID:** | 71436 | **TC ID:** | YPQ |

| TIME | Temp °C | Dew Point °C | Rel Hum % | Wind Dir 10's deg | Wind Spd km/h | Visibility km | Stn Press kPa | Hmdx | Wind Chill | Weather |
|---|---|---|---|---|---|---|---|---|---|---|
| 00:00 | -2.5 | -3.8 | 91 | 19 | 8 | 16.1 | 100.55 | | -6 | NA |
| 01:00 | -1.5 | -3.3 | 87 | 19 | 8 | 16.1 | 100.49 | | -5 | NA |
| 02:00 | -2.3 | -3.7 | 90 | 23 | 8 | 16.1 | 100.40 | | -5 | NA |
| 03:00 | 0.8 | -1.0 | 88 | 17 | 11 | 16.1 | 100.29 | | | NA |
| 04:00 | 1.6 | -0.8 | 84 | 17 | 17 | 16.1 | 100.16 | | | NA |
| 05:00 | 2.3 | -1.0 | 79 | 19 | 21 | 16.1 | 100.04 | | | NA |
| 06:00 | 2.5 | -2.2 | 71 | 20 | 18 | 16.1 | 99.92 | | | NA |
| 07:00 | 2.2 | -2.4 | 71 | 20 | 13 | 16.1 | 99.84 | | | NA |
| 08:00 | 2.7 | -1.5 | 74 | 22 | 9 | 16.1 | 99.74 | | | NA |
| 09:00 | 4.1 | -0.8 | 70 | 21 | 15 | 16.1 | 99.68 | | | NA |
| 10:00 | 5.9 | -0.2 | 65 | 22 | 13 | 16.1 | 99.59 | | | NA |
| 11:00 | 8.3 | 0.2 | 57 | 21 | 17 | 16.1 | 99.47 | | | NA |
| 12:00 | 9.8 | -0.2 | 50 | 22 | 18 | 16.1 | 99.41 | | | NA |
| 13:00 | 9.9 | 0.3 | 51 | 22 | 18 | 16.1 | 99.34 | | | NA |
| 14:00 | 10.3 | 0.8 | 52 | 21 | 17 | 16.1 | 99.28 | | | NA |
| 15:00 | 10.3 | 1.7 | 55 | 21 | 15 | 16.1 | 99.23 | | | NA |
| 16:00 | 9.3 | 2.1 | 61 | 22 | 9 | 16.1 | 99.23 | | | NA |
| 17:00 | 9.6 | 1.8 | 58 | 22 | 11 | 16.1 | 99.23 | | | NA |
| 18:00 | 9.5 | 1.4 | 57 | 22 | 9 | 16.1 | 99.25 | | | NA |
| 19:00 | 10.5 | 0.7 | 50 | 22 | 13 | 16.1 | 99.29 | | | NA |
| 20:00 | 12.7 | 0.2 | 42 | 22 | 15 | 16.1 | 99.32 | | | NA |
| 21:00 | 9.8 | 1.0 | 54 | 21 | 11 | 16.1 | 99.34 | | | NA |
| 22:00 | 9.5 | 1.9 | 59 | 21 | 13 | 16.1 | 99.34 | | | NA |
| 23:00 | 11.6 | 1.9 | 51 | 22 | 15 | 16.1 | 99.32 | | | NA |

**Legend**

- E = Estimated
- M = Missing
- NA = Not Available*
- [empty] = Indicates an unobserved value

### Date modified:

2020-09-17

## Hourly Data Report for November 20, 2020

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time where and when it is observed.

**PETERBOROUGH A**
**ONTARIO**
**Current Station Operator: NAVCAN**

| | | | | | |
|---|---|---|---|---|---|
| **Latitude:** | 44°13'48.000" N | **Longitude:** | 78°21'48.000" W | **Elevation:** | 191.40 m |
| **Climate ID:** | 6166415 | **WMO ID:** | 71436 | **TC ID:** | YPQ |

| TIME | Temp °C | Dew Point °C | Rel Hum % | Wind Dir 10's deg | Wind Spd km/h | Visibility km | Stn Press kPa | Hmdx | Wind Chill | Weather |
|---|---|---|---|---|---|---|---|---|---|---|
| 00:00 | 12.1 | 1.9 | 49 | 22 | 15 | 16.1 | 99.34 | | | NA |
| 01:00 | 12.5 | 0.9 | 45 | 22 | 18 | 16.1 | 99.32 | | | NA |
| 02:00 | 12.8 | 0.6 | 43 | 23 | 17 | 16.1 | 99.33 | | | NA |
| 03:00 | 13.0 | 0.1 | 41 | 22 | 21 | 16.1 | 99.37 | | | NA |
| 04:00 | 12.9 | 0.4 | 42 | 23 | 15 | 16.1 | 99.38 | | | NA |
| 05:00 | 12.3 | 0.8 | 45 | 22 | 17 | 16.1 | 99.40 | | | NA |
| 06:00 | 12.1 | 1.0 | 47 | 22 | 11 | 16.1 | 99.40 | | | NA |
| 07:00 | 11.4 | 1.9 | 52 | 21 | 11 | 16.1 | 99.40 | | | NA |
| 08:00 | 11.5 | 2.3 | 53 | 21 | 17 | 16.1 | 99.42 | | | NA |
| 09:00 | 13.0 | 2.7 | 49 | 21 | 18 | 16.1 | 99.43 | | | NA |
| 10:00 | 13.5 | 3.0 | 49 | 22 | 21 | 16.1 | 99.44 | | | NA |
| 11:00 | 14.4 | 3.1 | 46 | 22 | 18 | 16.1 | 99.45 | | | NA |
| 12:00 | 15.6 | 3.9 | 45 | 22 | 21 | 16.1 | 99.40 | | | NA |
| 13:00 | 16.4 | 4.0 | 43 | 23 | 18 | 16.1 | 99.37 | | | NA |
| 14:00 | 16.3 | 4.7 | 46 | 21 | 24 | 16.1 | 99.33 | | | NA |
| 15:00 | 15.9 | 5.1 | 48 | 22 | 21 | 16.1 | 99.36 | | | NA |
| 16:00 | 14.8 | 5.5 | 53 | 22 | 15 | 16.1 | 99.47 | | | NA |
| 17:00 | 13.6 | 6.3 | 61 | 26 | 15 | 16.1 | 99.59 | | | NA |
| 18:00 | 12.6 | 6.0 | 64 | 26 | 18 | 16.1 | 99.66 | | | NA |
| 19:00 | 11.5 | 5.8 | 68 | 26 | 17 | 16.1 | 99.73 | | | NA |
| 20:00 | 10.1 | 5.8 | 75 | 31 | 22 | 16.1 | 99.83 | | | NA |
| 21:00 | 8.3 | 5.8 | 84 | 29 | 17 | 16.1 | 99.96 | | | NA |
| 22:00 | 7.7 | 4.7 | 81 | 31 | 15 | 16.1 | 100.03 | | | NA |
| 23:00 | 7.4 | 3.8 | 78 | 29 | 18 | 16.1 | 100.05 | | | NA |

**Legend**

- E = Estimated
- M = Missing
- NA = Not Available*
- [empty] = Indicates an unobserved value

**Date modified:**

2020-09-17

# APPENDIX

# E

## LEACHATE COLLECTION SYSTEM, WATER BALANCE AND LEACHATE QUALITY

# LEACHATE COLLECTION SYSTEM, WATER BALANCE AND LEACHATE QUALITY

## TABLE OF CONTENTS

# 1.0 Leachate Management

One of the primary operations at the Peterborough County/City Waste Management Facility (PCCWMF) is the management and disposal of leachate. Leachate is the infiltration water collected after passing through the waste. A multi-component leachate collection and pumping system has been designed and constructed to collect and dispose of leachate generated at the PCCWMF. In addition to handling and disposing of collected leachate it is also important to monitor leachate levels and inspect areas of the Site under interim or final cover for evidence of leachate seepage as part of the overall landfill and surface water management strategy.

All cells referenced in this text are based on the historical site cell designations to assist in explaining the system development and operations. These historical cell designations can be found on Figure 2.3.

The leachate collection and pumping system is a combination of gravity drainage systems to pumping stations that discharge leachate via forcemains to the City's sanitary sewer system for subsequent treatment.

## 1.1 Leachate Collection System Overview

Leachate and potentially impacted surface water/groundwater are directed into the leachate collection system from a number of separate areas and conveyed to a common holding area/pumping station in either the North Fill Area (NFA) or South Fill Area (SFA). Figure E.1 provides a layout of the various leachate collection piping systems at the Site. From either pumping station, collected liquids are pumped through a forcemain to the City's Sanitary Sewer System via a sanitary sewer manhole located at Neal Drive and Bensfort Road. The leachate pumping system schematic for the SFA is shown on Figure E.2. Final treatment of the leachate takes place at the City's Wastewater Treatment Plant. Table E.1 presents historical leachate/groundwater volumes discharged to the forcemain.

The combination of leachate and potentially impacted surface water and groundwater is collected at the Site using differing systems and sub-systems that correspond to the following areas:

i) Cell 1 – South (above former Phase 1 Area and former Cells A to D);

ii) West Portion of Cell 1 – North (some new areas and areas above former Phase 2 Area);

iii) East Portion of Cell 1 – North (former Cells G, H, I &J);

iv) Cell 1 – West A;

v) Cell 1 – West B;

vi) Groundwater Interceptor Trench to the east of the fill area adjacent to Bensfort Road;

vii) Cell 2 in the NFA;

viii) Cell 3 in the NFA; and

ix) Cell 4 in the NFA.

## 1.2 Cell 1 – South

A toe drain is installed along the south and east perimeter of former Cells A to D, which collects leachate from the base of the former cells. The toe drain conveys collected leachate by gravity from the base of former Cells A to D and the collection system in Phase 1 and Cell 1 West A area to the SFA pumping station. The toe drain is accessed by manholes MH-A0, MH-A1, MH-B1, MH-C1 and MH-D2.

The leachate collection system on the upper portion of Cell 1 - South (Phase 1) is comprised of perforated underdrain piping installed in conjunction with a stone drainage blanket on the prepared base of the cell. The combination of the leachate collection system and cell base grading direct leachate to a perforated header installed along the inside base of the eastern perimeter berm. Leachate collected from Phase 1 is directed by gravity to the toe drain manholes that drain to the SFA pumping station.

## 1.3 West Portion of Cell 1 – North

The leachate collection system on the West Portion of Cell 1 – North (former Phase 2) is comprised of perforated underdrain laterals installed in conjunction with a stone drainage blanket on the prepared base of the cells. Leachate drains from the underdrain laterals to manholes MHT7-94, MHT8-94, and MHT9-94, which flow by gravity through the perimeter leachate header to MH-J3. MH-J3 acts as a lift station in which the leachate level is continuously monitored and pumped to the SFA pumping station when it reaches pre-set elevations.

## 1.4 East Portion of Cell 1 – North

The network of leachate collection piping for the east portion of Cell 1 – North, the area above former Cells G to J, is comprised of perforated underdrain laterals installed in conjunction with a stone drainage blanket on the prepared base of the cells. The leachate drains from the laterals to manholes MH-I2 to MH-J3 and then it drains by gravity through the perimeter leachate header to MH-J3.

Leachate collected in the toe drain at the base of former Cell G drains via MH-G, located centrally near the north perimeter of the SFA, into the perimeter header where it drains to MH-J3. This piping section also collects and transports leachate and surface water from the Phase 2 Area.

Leachate collected from former Cell H drains to MH-D2 and then through 250 mm solid piping to the SFA pumping station. There is a hydraulic connection between former Cells H and J that was documented during construction of the Cell J underdrain system. The majority of leachate from the former Cell H drains directly into the former Cell J leachate collection system.

## 1.5 Cell 1 – West (A & B)

The leachate collection system for Cell 1 West is comprised of a perforated underdrain pipe and a stone drainage blanket on the base of the cell.

Leachate in Cell 1 – West A is directed via the underdrain pipe to manhole TDCO-A1 where it drains to the toe drain and subsequently the SFA pumping station. An isolation valve is located at TDCO-A1.

Leachate in Cell 1 – West B is similarly directed by the underdrain pipe to manhole MHT10-07. An isolation valve is located at this manhole. Solid pipe connects MHT10-07 to MHT9-94, from where leachate drains through the outside perimeter header, to MH-J3.

## 1.6 Groundwater Interceptor Trench

The groundwater interceptor trench is located between the fill area and Bensfort Road. The groundwater interceptor constructed of perforated pipe in a stone trench captures groundwater migrating laterally in the underlying till beneath former Cells A to D and Phase 1. This system is intended to act as a hydraulic barrier to capture potentially contaminated groundwater flowing beneath the landfill, and prevent its discharging to the intermittent stream, which flows across the southeast corner of the PCCWMF. Groundwater is intercepted and drains north from MH-1 to MH-4, and south from MH-6 to MH-4. MH-4 acts as a lift station, pumping collected groundwater to the SFA pumping station.

## 1.7 Cell 2 – NFA

The leachate collection system for Cell 2 in the NFA is comprised of perforated underdrain pipes and a stone drainage blanket on the base of the cell.

The leachate collection system directs leachate to MHL2. A 200 mm diameter HDPE solid pipe directs leachate from MHL2 to the NFA pumping station which conveys collected leachate through a meter chamber and ultimately discharges into the City sanitary sewer.

## 1.8 Cell 3 – NFA

The construction of a leachate collection system for Cell 3 in the NFA was completed in December 2015. Similar to Cell 2, the leachate collection system is comprised of perforated underdrain pipes and a stone drainage blanket on the base of the cell.

The leachate collection system directs leachate to MHL3 located in the southeast corner of Cell 3. A 200 mm diameter HDPE solid pipe directs leachate from MHL3 to MHL2 in Cell 2, which drains to the NFA pumping station.

## 1.9 Cell 4 – NFA

The construction of a leachate collection system for Cell 4 in the NFA was completed in December 2022. Similar to Cells 2 and 3, the leachate collection system is comprised of perforated underdrain pipes and a stone drainage blanket on the base of the cell.

The leachate collection system directs leachate to MHL4 located in the southeast corner of Cell 4. A 200 mm diameter HDPE solid pipe directs leachate from MHL4 to MHL3 in Cell 3, which drains to Cell 2 and then the NFA pumping station.

## 2.0 Water Balance Analysis

Table E.1 presents historical leachate/groundwater volumes discharged to the forcemain. These data were compared to environmental data to examine the overall water balance at the Site. 47,603 $m^3$ of leachate was collected at the site in 2022.

The volume of leachate produced at the Site is dependent on the area of the refuse areas, the proportion of the net surplus that infiltrates into the waste, and amount of groundwater inflow.

Table E.2 summarizes the interpreted volumes attributed to leachate production from precipitation and groundwater inflow, in 2022.

As shown in Table E.1, the total volume of leachate collected in 2022, 47,603 $m^3$, was 23.6% lower than the volume of 62,297 $m^3$ collected in 2021. The decrease in the volume of leachate is attributed to the progressive landfilling activities in Cells 2 and 3, and additional final cover placement in Cell 2 and 3 reducing precipitation filtration through the landfill. The precipitation received in 2022 was also 13.0% lower than the amount of precipitation received in 2021, for the Peterborough Airport climate station.

As shown in Table E.2, approximately 14% of the collected leachate within the SFA is attributed to precipitation infiltration through the landfill cap and refuse, with the remaining portion attributed to groundwater inflow at various locations surrounding the cell. It is interpreted that approximately 7,095 $m^3$ of groundwater inflow occurs within the NFA, based on the surrounding groundwater levels in 2022, which represents 31% of the total leachate collected from the NFA. The remaining 69% contribution for the leachate production in the NFA is attributed to precipitation infiltration through the refuse for Cells 2 and 3. Precipitation and infiltration represent a larger portion of the leachate production within the NFA since the cells are still operational. Leachate volumes in the NFA will begin to increase from December 2022 onward until waste elevations reach final contours and final cover placement begins in Cell 4.

Figure E.4 provides a comparison between the weekly precipitation and the volume of leachate discharged to the forcemain. As shown in the figure, leachate production within the NFA is noticeably influenced by precipitation events, which is not unexpected, since Cell 2 and 3 are partially under final cover and a portion of Cell 2 and all of Cell 3 is actively receiving waste. The volume of leachate produced within Cells 2 and 3 was expected to decrease until Cell 4 was constructed. Since the construction of Cell 4 in December 2022, volumes of leachate production are expected to increase in the NFA until waste elevation reach final contours and final cover placement begins.

City of Peterborough

LEACHATE SYSTEM INSPECTION/FORCEMAIN PRESSURE TEST
BENSFORT ROAD LANDFILL SITE

Forcemain Pressure Test Date:

In order to pressure test the entire length of the forcemain it is anticipated that the following procedure be followed.

1. All of the stem valves for the six forcemain air release valves should be in the closed position (see figure 2.4) turn both of the forcemain pumps off at the Holding Tank control panel.

2. Install a 150mm blind flange complete with mechanical fittings and HDPE piping to the flange of the 150mm swing check valve in MH#3 (see attached figure 1). MH#3 is located at the intersection of Neal Drive and Bensfort road.

3. Install 50mm pressure test piping "tree", complete with adaptation for pressure gauge and a independent pumping system and water source, at VC. #5 (see attached figures 2 and 2A).

4. Manually engage either of the forcemain pumps and monitor flow through the HDPE piping at MH #3. Close the valve after the line is free of any trapped air.

5. Open valves 2 and 4 (figure 2.4) and monitor pressure gauge at V.C.#5. Allow forcemain pump to bring forcemain line pressure to 50 psi. Close valve 3 (see figure 2.2) at meter chamber.

6. Slowly bring line pressure to 100 psi using piping configuration and independent water source at V.C.#5 (figure 2 and 2A), then close valve 2 (figure 2.4) at V.C. #%.

Following the original installation of the forcemain the pipe was pressure tested in accordance with OPSS standards. This pressure test procedure allows for a maximum loss of 2.22 litres per millimeter of pipe, over a distance of one kilometer, during a 24 hr period. The maximum allowable loss for the Bensfort Road forcemain was derived using the following formulation:

Allowable loss = 2.22 litres
Pipe length = 6,224 metres
Inside diameter of pipe = 0.136 metres

2.221 *0.136m * 6,224m = 1879.15 litres per day

Therefore the allowable loss for one hour is 78.29 litres (ie. 1879.15/24)

Monitoring the volume of water necessary to maintain a line pressure of 100 psi derives the volume loss for the Bensfort Road forcemain during a 20-minute-test period. Following each 30-minute interval over the total 120-minue test period a volume of water is added to maintain the test pressure. The volume of water that is added must not exceed the allowable volume loss as derived using the OPSS standard.

The following table gives the known quantities such as test pressure and allowable loss. The remainder of the information required to determine the actual volume loss must be recorded during the pressure test.

Date: September 8 / 2022

| Time Period (Minutes) | Test Pressure | Pressure Of Check Period | Pressure Decrease (psi) | Volume to Achieve Test Pressure (litres) | Total Loss (litres) | Total Allowable Loss (litres) |
|---|---|---|---|---|---|---|
| 0-30 | 100 | 93 | 7 | 34 | 34 | 39.1 |
| 30-60 | 100 | 95 | 5 | 18 | 52 | 78.2 |
| 60-90 | 100 | 95 | 5 | 18 | 70 | 117.3 |
| 90-120 | 100 | 96 | 4 | 14 | 84 | 156.4 |

Forcemain and Pumping Station Maintenance:

The protocol for maintenance of the leachate forcemain and pumping installation has been specifically addressed in Section 5.0 of the BRLS Design, Maintenance and Operations (DMO) Manual.

Leachate Removal from Holding Tank and Lift Stations:

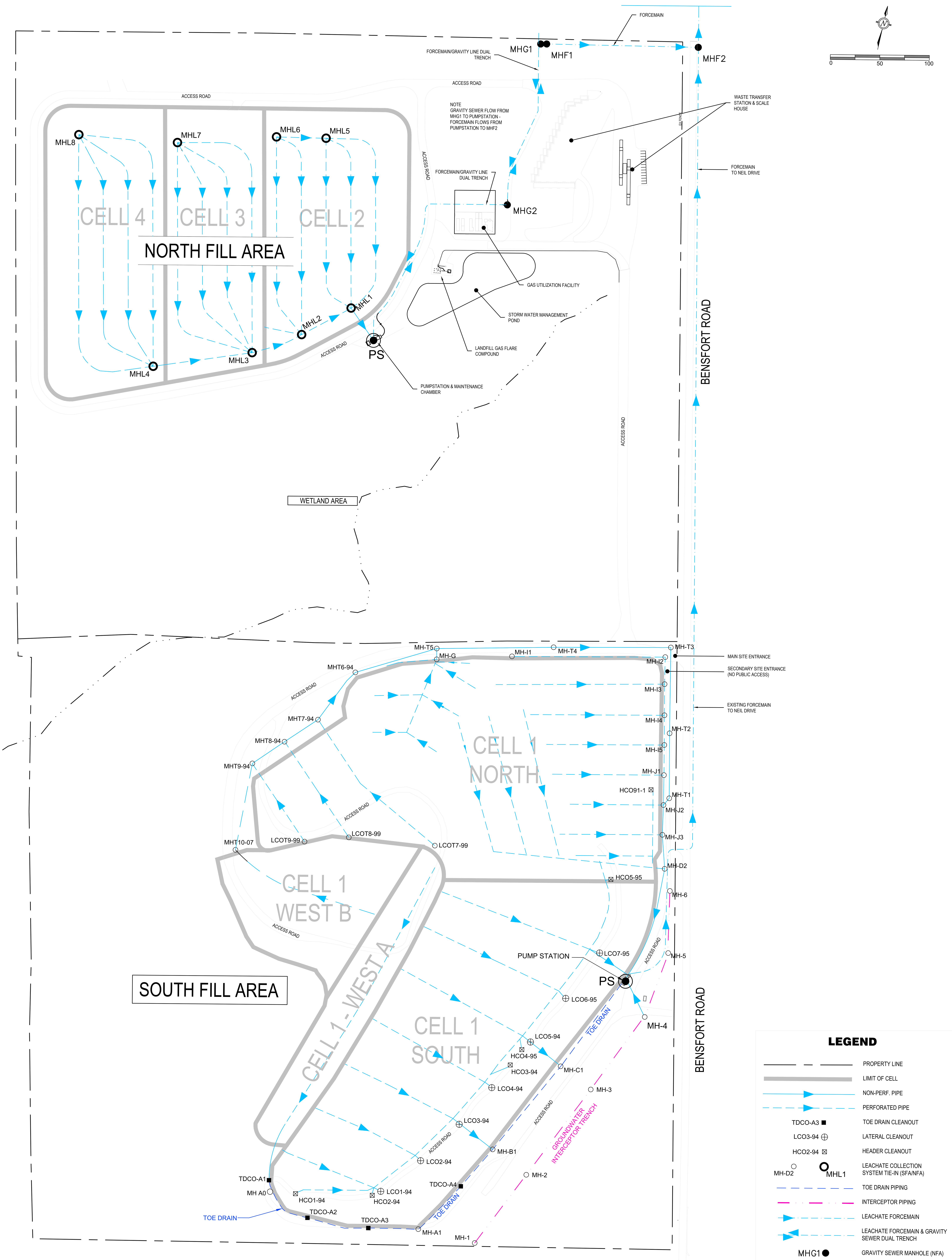
Prior to carrying out flushing of the leachate collection system, manually reduce the leachate levels at MH#4, MHJ3, and the Holding Tank. Turn all three pumps to the "off" position (see attached flushing and video inspection memo).

Holding Tank Sediment Removal:

Following the reduction of the leachate level in the holding tank, it may be necessary to remove the sediment so the incoming piping is not restricted during the flushing exercise.



8.3




## LEGEND

| | |
|---|---|
| | PROPERTY LINE |
| | LIMIT OF CELL |
| | NON-PERF. PIPE |
| | PERFORATED PIPE |
| TDCO-A3 | TOE DRAIN CLEANOUT |
| LCO3-94 | LATERAL CLEANOUT |
| HCO2-94 | HEADER CLEANOUT |
| MH-D2 / MHL1 | LEACHATE COLLECTION SYSTEM TIE-IN (SFA/NFA) |
| | TOE DRAIN PIPING |
| | INTERCEPTOR PIPING |
| | LEACHATE FORCEMAIN |
| | LEACHATE FORCEMAIN & GRAVITY SEWER DUAL TRENCH |
| MHG1 | GRAVITY SEWER MANHOLE (NFA) |
| MHF1 | FORCEMAIN SERVICE MANHOLE |
| PS | PUMPSTATION |

| D/M/Y | DESCRIPTION | BY | APPROVED |
|---|---|---|---|
| 15/03/2023 | 2022 ANNUAL MONITORING REPORT | JVC | PRM |

REVISION / ISSUE

FIGURE E.1

DWN BY: JVC DATE: MARCH 2023
CHK BY: PRM SCALE: SEE SCALE BAR

COUNTY OF PETERBOROUGH / CITY OF PETERBOROUGH

PROJECT NO. 111-53296-16

**LEACHATE COLLECTION SYSTEM**

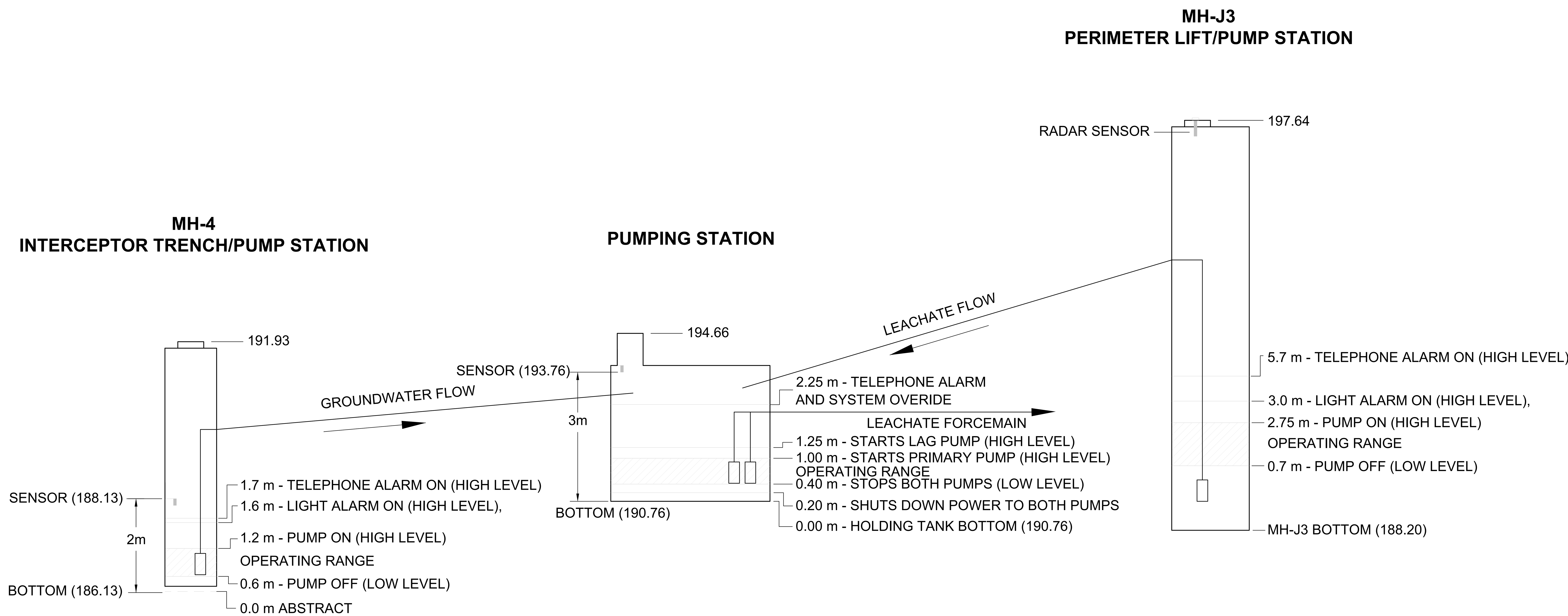
**2022 ANNUAL MONITORING REPORT**
**PETERBOROUGH COUNTY/CITY**
**WASTE MANAGEMENT FACILITY**



Peterborough County
peterborough

wsp
4 HUGHSON STREET SOUTH, SUITE 300
HAMILTON (ONTARIO) CANADA L8N 3Z1
TEL.: 905-529-4414 | FAX:905-521-2699 | WWW.WSP.COM

Plotted: Mar 03, 2023 - 10:13am File: C:\Users\Jaclyn.Craig\OneDrive - WSP O365\Desktop\2023 Work\AMR PCCWMF\CADD Drawings\11 - Figure E.1 - LCS.dwg




NOTES:
1. ONCE ALARM HAS BEEN ACTIVATED IT CAN ONLY BE DEACTIVATED BY RESETTING THE MILLTRONICS CONTROLLER.
2. MH4 AND PUMP STATION HAVE ULTRA SONIC LEVEL SENSORS. RADAR SENSOR INSTALLED IN MH-J3 IN JUNE 2007.
3. DRAWING BASED ON CRA 2007 ANNUAL MONITORING REPORT, FIGURE E.1.

| D/M/Y | DESCRIPTION | BY | APPROVED |
|---|---|---|---|
| | | | |
| | | | |
| 15/03/2023 | 2022 ANNUAL MONITORING REPORT | JVC | P R M |

REVISION / ISSUE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Peterborough County
peterborough



**AUTOMATED LEACHATE PUMPING SYSTEM DIAGRAM SFA**

**2022 ANNUAL MONITORING REPORT PETERBOROUGH COUNTY/CITY WASTE MANAGEMENT FACILITY**

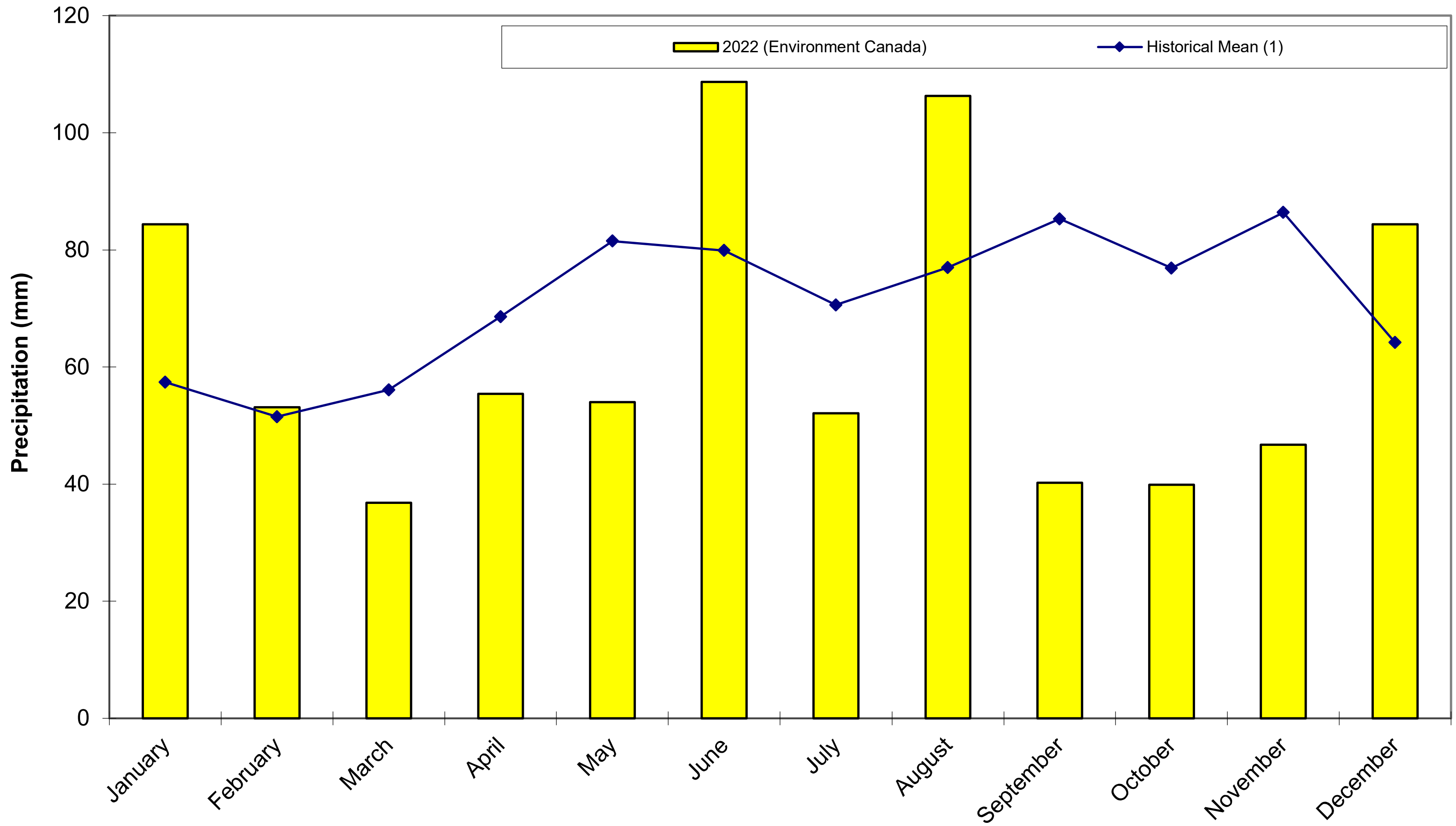
DWN BY: JVC
CHK BY: PRM
DATE: MARCH 2023
SCALE: NOT TO SCALE

**COUNTY OF PETERBOROUGH / CITY OF PETERBOROUGH**

PROJECT NO. 111-53296-16

FIGURE
E.2

**Figure E.3**
**Precipitation Comparison – Peterborough Airport (2022) vs. Historical Mean**
**2022 ANNUAL MONITORING REPORT**
**Peterborough County/City Waste Management Facility**




Notes:
[1] Historical monthly averages are obtained from Environment Canada, Canadian Climate Normals from 1981-2010 Peterborough Airport Station Data.

**FIGURE E.4**
**COMPARISON OF WEEKLY PRECIPITATION TO LEACHATE DISCHARGED TO FORCEMAIN**

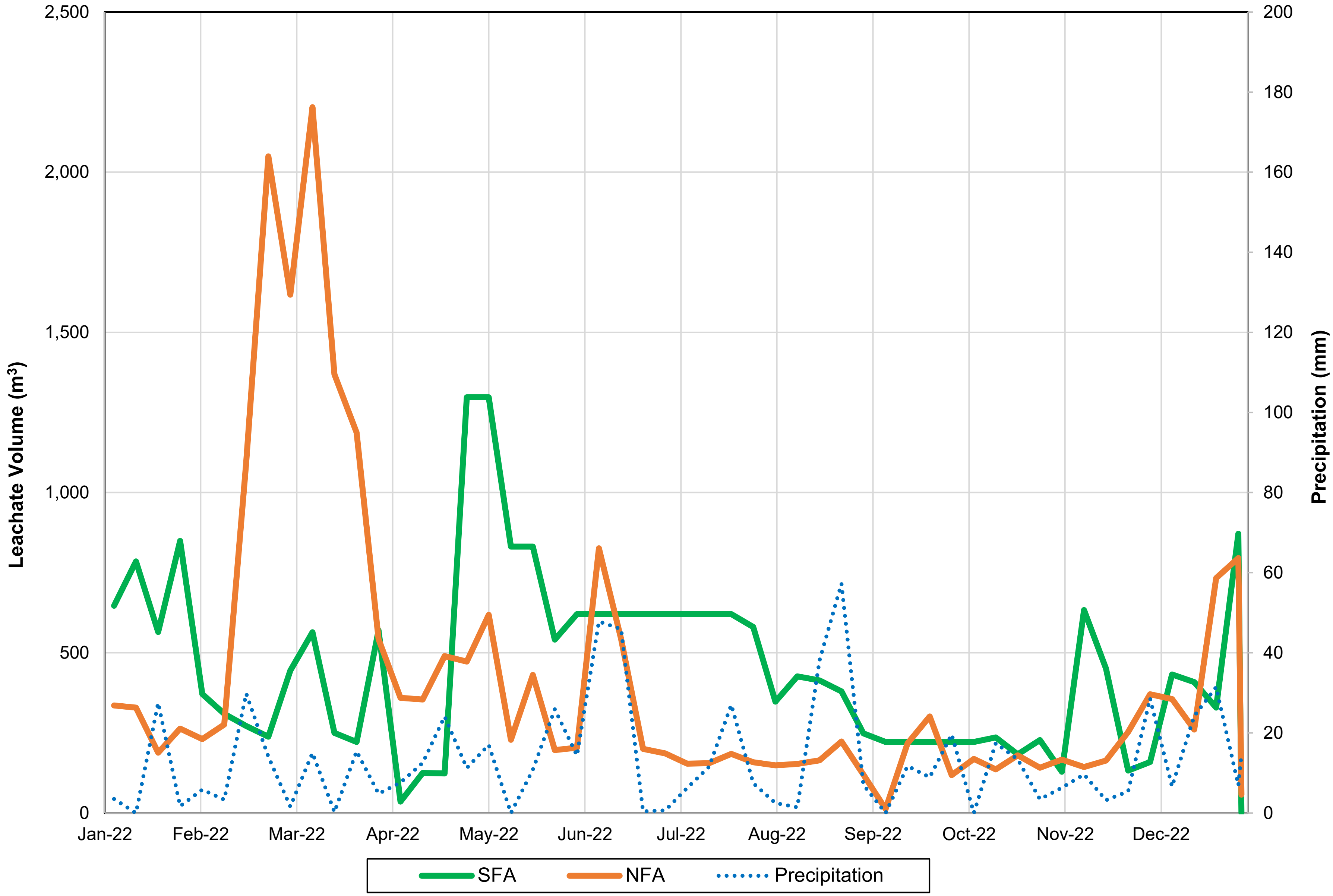


**TABLE E.1**
**Historical Leachate/Groundwater Volumes**
**2022 ANNUAL MONITORING REPORT**
**Peterborough County/City Waste Management Facility**

| Month | Averaged Annual Trucking Records[1] 1987 to 1990 ($m^3$) | Metered Truck Records 1991 ($m^3$) | 1992 ($m^3$) | Forcemain Records 1993 ($m^3$) | 1994 ($m^3$) | 1995 ($m^3$) | 1996 ($m^3$) | 1997 ($m^3$) | 1998 ($m^3$) | 1999 ($m^3$) | 2000 ($m^3$) | 2001 ($m^3$) | 2002 ($m^3$) | 2003 ($m^3$) | 2004 ($m^3$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **January** | 2,233 | 6,236 | 4,397 | 9,601 | 2,337 | 8,923 | 9,283 | 7,879 | 6,336 | 4,365 | 4,159 | 6,501 | 4,094 | 1,924 | 5,724 |
| **February** | 2,158 | 6,502 | 3,257 | 4,246 | 3,813 | 6,083 | 10,583 | 6,233 | 5,058 | 6,054 | 4,004 | 4,209 | 3,199 | 1,481 | 3,476 |
| **March** | 3,872 | 9,362 | 7,114 | 9,622 | 5,800 | 10,949 | 9,412 | 8,476 | 12,921 | 6,910 | 5,116 | 6,955 | 10,648 | 3,374 | 8,585 |
| **April** | 3,795 | 10,253 | 7,094 | 8,231 | 6,353 | 5,423 | 14,116 | 11,477 | 6,586 | 4,821 | 6,569 | 12,412 | 11,533 | 10,859 | 4,443 |
| **May** | 3,430 | 5,445 | 4,768 | 5,901 | 5,708 | 8,312 | 8,088 | 8,098 | 3,938 | 3,304 | 7,841 | 4,974 | 8,432 | 6,616 | 9,120 |
| **June** | 2,659 | 3,573 [2] | 3,502 | 6,162 [3] | 6,279 | 7,045 | 9,349 | 5,976 | 4,782 | 3,398 | 10,930 | 4,969 | 6,405 | 5,596 | 5,775 |
| **July** | 2,024 | 2,924 | 2,551 | 4,084 | 5,310 | 4,702 | 7,946 | 4,385 | 3,667 | 2,941 | 6,880 | 3,948 | 5,339 | 1,967 | 6,481 |
| **August** | 1,643 | 1,789 | 3,499 | 2,900 | 3,420 | 4,154 | 3,781 | 4,511 [5] | 3,788 | 2,477 | 4,362 | 2,372 | 5,238 | 3,702 | 6,185 |
| **September** | 1,798 | 1,469 | 4,463 | 2,174 | 4,135 | 9,062 | 6,447 | 4,066 | 4,133 | 3,215 | 5,800 | 951 | 2,688 | 3,220 | 7,489 |
| **October** | 3,766 | 1,693 | 3,944 | 3,018 [4] | 1,777 | 7,748 | 6,708 | 3,629 | 2,164 | 4,691 | 3,590 | 7,379 | 2,851 | 5,660 | 3,701 |
| **November** | 4,900 | 1,682 | 8,332 | 3,018 [4] | 3,820 | 11,483 | 4,583 | 4,383 | 2,145 | 9,257 | 3,240 | 3,465 | 4,974 | 3,087 | 3,849 |
| **December** | 4,135 | 3,273 | 6,330 | 5,303 | 7,330 | 8,866 | 7,789 | 4,777 | 5,703 | 6,760 | 4,602 | 11,111 | 5,057 | 10,281 | 7,617 |
| **Totals** | **36,413** | **54,201** | **59,251** | **64,260** | **56,081** | **92,750** | **98,085** | **73,890** | **61,221** | **58,193** | **67,093** | **69,246** | **70,455** | **57,766** | **72,443** |

| Month | Forcemain Records 2005 ($m^3$) | 2006 ($m^3$) | 2007 ($m^3$) | 2008[7] ($m^3$) | 2009 ($m^3$) | 2010 ($m^3$) | 2011 ($m^3$) | 2012 ($m^3$) | 2013 ($m^3$) | 2014 ($m^3$) | 2015 ($m^3$) | 2016 ($m^3$) | 2017 ($m^3$) | 2018 ($m^3$) | 2019 ($m^3$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **January** | 11,174 | 15,846 | 6,316 | 13,120 | 4,713 | 5,217 | 5,509 | 11,387 | 9,959 | 5,537 | 4,418 | 9,595 | 11,314 | 6,673 | 4,267 |
| **February** | 5,391 | 10,819 | 4,465 | 10,530 | 6,900 | 3,803 | 6,315 | 7,641 | 5,252 | 2,352 | 3,252 | 10,849 | 8,584 | 9,565 | 3,531 |
| **March** | 4,603 | 8,815 | 6,831 | 13,215 | 12,757 | 8,064 | 13,505 | 10,130 | 8,449 | 8,089 | 6,035 | 12,459 | 12,628 | 5,778 | 4,966 |
| **April** | 11,658 | 7,755 | 8,659 | 12,787 | 10,422 | 5,485 | 7,697 | 9,113 | 12,462 | 18,568 | 11,017 | 12,187 | 13,722 | 13,584 | 10,671 |
| **May** | 5,818 | 8,063 | 5,881 | 9,384 | 8,552 | 2,966 | 8,623 | 5,675 | 6,760 | 9,153 | 4,605 | 7,065 | 12,004 | 5,943 | 14,262 |
| **June** | 3,387 | 4,672 | 2,605 | 7,851 | 6,320 | 4,292 | 10,615 | 5,410 | 6,274 | 5,150 | 8,720 | 4,329 | 8,795 | 3,572 | 8,061 |
| **July** | 1,908 | 4,445 | 4,257 | 6,295 | 3,927 | 2,720 | 7,679 | 4,734 | 4,317 | 3,853 | 4,851 | 3,016 | 12,832 | 2,410 | 3,614 |
| **August** | 2,375 | 1,814 | 2,750 | 6,564 | 3,629 | 2,607 | 12,983 | 3,147 | 4,301 | 4,448 | 4,034 | 2,610 | 7,204 | 3,410 | 2,836 |
| **September** | 1,605 | 3454 [6] | 2,843 | 7,910 | 2,427 | 2,239 | 6,225 | 4,230 | 3,633 | 3,379 | 3,472 | 2,180 | 4,251 | 2,714 | 1,898 |
| **October** | 2,611 | 4249 [6] | 2,784 | 4,907 | 4,188 | 1,901 | 10,075 | 5,550 | 4,894 | 6,706 | 3,326 | 1,859 | 4,368 | 2,003 | 2,780 |
| **November** | 10,607 | 7475 [6] | 4,083 | 5,624 | 5,060 | 2,529 | 6,693 | 5,281 | 8,324 | 8,520 | 3,876 | 1,937 | 6,114 | 5,711 | 4,496 |
| **December** | 15,034 | 4555 [6] | 7,221 | 6,340 | 11,033 | 8,909 | 12,063 | 8,058 | 3,697 | 5,349 | 6,722 | 2,728 | 3,397 | 6,827 | 6,184 |
| **Totals** | **76,172** | **81,963** | **58,696** | **104,527** | **79,928** | **50,733** | **107,981** | **80,355** | **78,322** | **81,104** | **64,327** | **70,813** | **105,213** | **68,190** | **67,566** |

| | Forcemain Records | | |
|---|---|---|---|
| Month | 2020 (m³) | 2021 (m³) | 2022[8] (m³) |
| January | 10,205 | 4,983 | 4,340 |
| February | 5,731 | 2,738 | 5,730 |
| March | 12,540 | 6,661 | 7,690 |
| April | 8,558 | 6,302 | 7,585 |
| May | 5,979 | 4,623 | 3,728 |
| June | 3,739 | 2,700 | 4,369 |
| July | 2,851 | 3,822 | 1,911 |
| August | 2,927 | 2,824 | 1,706 |
| September | 2,537 | 6,523 | 1,997 |
| October | 2,382 | 6,331 | 2,321 |
| November | 2,577 | 5,471 | 1,744 |
| December | 7,341 | 9,319 | 4,483 |
| **Totals** | **67,366** | **62,297** | **47,603** |

Notes:
(1) Averaged monthly trucking records through 4 year period as measured by the truckload.
(2) Leachate trucking flowmeter installed at loading station.
(3) Leachate forcemain installation and commissioning.
(4) Leachate volumes for October and November were prorated over a two month period.
(5) Installation of replacement flow meter.
(6) Flow estimated due to broken flow meter (September 14, 2006).
(7) Flowmeter malfunction in November 2008, flow estimated by using the average from October and December 2008.
(8) Flow estimated in April and September 2022 in the SFA due to SCADA system malfunction. Volumes were estimated based on 3 year avergae from 2019-2021.

**FIGURE E.5**
**Historical Annual Leachate Volumes**
**2022 ANNUAL MONITORING REPORT**
**Peterborough County/City Waste Management Facility**

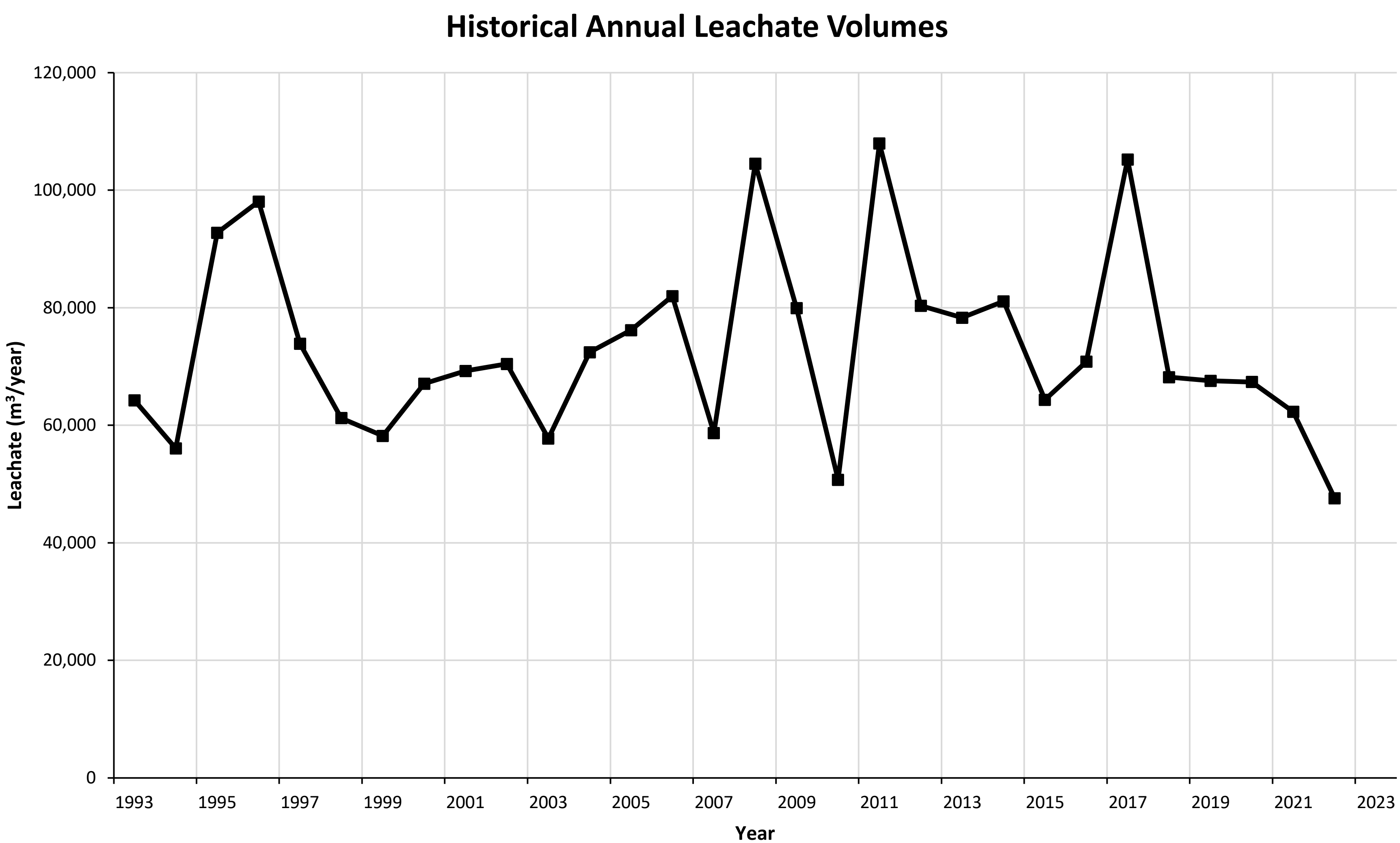


**Table E.2**
**Leachate Production Summary - 2022**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| Landfill Area ID | Area ($m^2$) | Leachate Produced From Infiltration ($m^3$) | Leachate Produced from Groundwater Inflow ($m^3$) | Total Leachate Production ($m^3$) |
|---|---|---|---|---|
| Cell 1 (SFA) | 181,759 | 3,500 | - | |
| Uphill Edge of Landfill (1) | - | - | 4,500 | |
| Influx of Groundwater (2) | - | - | 500 | 24,700 |
| Interceptor Trench (3) | - | - | 1,200 | |
| Interceptor Trench (4) | - | - | 15,000 | |
| Cell 2 (5) | 32,000 | | 4,296 | |
| Cell 3 (6) | 28,000 | 15,808 | 2,670 | 22,903 |
| Cell 4 (7) | 34,726 | | 129 | |
| **Totals** | **276,485** | **19,308** | **28,295** | **47,603** |

NOTES
(1) Includes horizontal flow into Cell 1-South and part of Cell 1-North.
(2) Includes upflow into former Cell I and J.
(3) Includes groundwater flow into the trench from bedrock.
(4) Includes groundwater flow into trench shortcircuiting from overburden unit and surface water.
(5) Areas of Cell 2 were placed under final cover in late 2015.
(6) Cell 3 became operational in December 2015.
(7) Cell 4 became operational on December 22, 2022.

**Table E.3**
**Leachate Chemical Results - Holding Tanks**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | BY-LAW [1] | SFA | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-17 | Oct-17 | Apr-18 | Oct-18 | Apr-19 | Oct-19 | Apr-20 | Oct-20 | Apr-21 | Sep-21 | Mar-22 | Oct-22 |
| Alkalinity | mg/L | | | 1590 | | 2210 | | 2110 | | 1720 | | 1720 | | 1860 |
| Biochemical Oxygen Demand | mg/L | 300 | 5.4 | 19.1 | 20.6 | 15.4 | 28.1 | 29.9 | 21.4 | 19.1 | 20.8 | 25.6 | 29.3 | 20.6 |
| Carbonaceous Biochemical Oxygen Demand | mg/L | | | 12.6 | | 17.8 | | 16.3 | | 11.8 | | 12.7 | | 9.7 |
| Bromide | mg/L | | | 2.1 | | 2.8 | | 2.8 | | 2.2 | | 2.0 | | 2.5 |
| Chloride | mg/L | 1500 | 252 | 484 | 314 | 635 | 230 | 581 | 336 | 495 | 247 | 348 | 290 | 557 |
| Chemical Oxygen Demand | mg/L | | 120 | 320 | 280 | 300 | 190 | 440 | 310 | 270 | 230 | 270 | 240 | 320 |
| Conductivity - field | µS/cm | | 2820 | 4490 | 4000 | 5820 | 3460 | 6040 | 4220 | 4430 | 3500 | 4100 | 3830 | 4940 |
| Fluoride | mg/L | 10 | <0.1 | <1 | <1 | <1 | <0.1 | <1 | <1 | <1 | <0.1 | <1 | 0.4 | <1 |
| Oxydation Reduction Potential | mV | | | | | | -27.6 | | | | | | | |
| pH | units | 6.0-10.5 | 6.77 | 7.09 | 6.63 | 7.19 | 6.72 | 7.24 | 6.82 | 6.72 | 6.76 | 7.1 | 6.71 | 7.1 |
| pH - field | units | | 6.63 | 6.77 | 6.43 | 7.06 | 6.65 | 6.99 | 6.72 | 6.75 | 6.76 | 6.25 | 6.56 | 6.83 |
| Sodium | mg/L | | | 359 | | 544 | | 485 | 6 | 5 | 5 | 3 | | 416 |
| Sulphate | mg/L | 1500 | 41.9 | 22.3 | 46.7 | 17.3 | 33.3 | 18.5 | 13.6 | 35.2 | 28.9 | 24.5 | 16.1 | 19.1 |
| Temperature - field | °C | | 9.2 | 13.9 | 9.9 | 12.8 | 9.2 | 13.7 | 10.1 | 11.6 | 9.2 | 14 | 8.3 | 14.1 |
| Total Kjeldahl Nitrogen | mg/L | 100 | 98 | 214 | 215 | 331 | 144 | 300 | 206 | 201 | 184 | 264 | 213 | 247 |
| Total Suspended Solids | mg/L | 350 | 30 | 31.6 | 40 | 25 | 30 | 36.7 | 30 | 31 | 33.3 | 29.3 | 46.7 | 32 |
| Aluminum | mg/L | 50 | 0.03 | 0.04 | 0.09 | 0.07 | 0.04 | 0.07 | 0.046 | 0.052 | 0.057 | 0.05 | 0.054 | 0.046 |
| Antimony | mg/L | 5 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Arsenic | mg/L | 1 | <0.01 | 0.007 | <0.005 | 0.008 | <0.005 | 0.007 | <0.005 | <0.005 | <0.005 | 0.009 | <0.005 | <0.005 |
| Bismuth | mg/L | 5 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Cadmium | mg/L | 0.7 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | 0.002 | <0.001 | <0.001 | <0.001 | <0.001 |
| Chromium | mg/L | 3 | 0.006 | 0.026 | 0.017 | 0.039 | 0.01 | 0.04 | 0.02 | 0.025 | 0.014 | 0.018 | 0.015 | 0.021 |
| Cobalt | mg/L | 5 | 0.005 | 0.009 | 0.007 | 0.013 | 0.005 | 0.013 | 0.007 | 0.007 | 0.006 | 0.007 | 0.006 | 0.009 |
| Copper | mg/L | 2 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Cyanide | mg/L | 2 | <0.005 | <0.01 | <0.01 | 0.02 | <0.01 | 0.01 | <0.01 | <0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Iron | mg/L | 50 | 14.4 | 11.1 | 13.1 | 6.87 | 16 | 11.7 | 17.9 | 10.7 | 18.3 | 10.6 | 16.9 | 9.79 |
| Lead | mg/L | 1 | 0.0049 | 0.0027 | 0.0041 | <0.01 | <0.01 | 0.02 | <0.01 | 0.02 | <0.01 | <0.01 | <0.01 | <0.01 |
| Manganese | mg/L | 5 | 0.677 | 0.539 | 0.647 | 0.425 | 0.75 | 0.499 | 0.696 | 0.452 | 0.677 | 0.6 | 0.662 | 0.396 |
| Mercury | µg/L | 10 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Molybdenum | mg/L | 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 |
| Nickel | mg/L | 3 | 0.02 | 0.037 | 0.024 | 0.047 | 0.016 | 0.051 | 0.027 | 0.033 | 0.023 | 0.025 | 0.024 | 0.038 |
| Phosphorus | mg/L | 10 | 0.44 | 1.08 | 0.86 | 1.67 | 0.86 | 1.65 | 1.46 | 0.9 | 1.05 | 0.98 | 0.99 | 0.85 |
| Potassium | mg/L | | | 99.9 | | 159 | | 160 | | 106 | | 97.2 | | 137 |
| Selenium | mg/L | 5 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Silver | mg/L | 5 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Strontium | mg/L | | | 0.76 | | 0.92 | | 0.88 | | 0.84 | | 0.77 | | 0.98 |
| Tin | mg/L | 5 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Titanium | mg/L | 5 | 0.008 | 0.028 | 0.018 | 0.041 | 0.009 | 0.036 | 0.022 | 0.022 | 0.019 | 0.018 | 0.007 | 0.019 |
| Vanadium | mg/L | 5 | <0.002 | 0.005 | 0.003 | 0.007 | 0.002 | 0.006 | 0.003 | 0.004 | 0.003 | 0.004 | <0.002 | 0.003 |
| Zinc | mg/L | 2 | <0.02 | 0.02 | 0.04 | 0.01 | 0.08 | <0.01 | 0.02 | 0.02 | 0.02 | <0.01 | <0.01 | 0.06 |
| Zirconium | mg/L | 5 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Oil & Grease - anim/veg | mg/L | 150 | <0.5 | <4 | <4 | <4 | <4 | <4 | <4 | <4 | < 4 | < 4 | < 4 | < 4 |
| Oil & grease - mineral | mg/L | 15 | <0.5 | <4 | <4 | <4 | <4 | <4 | <4 | <4 | < 4 | < 4 | < 4 | < 4 |
| Oil and Grease - total | mg/L | | <0.5 | | | | <2 | <2 | <2 | <2 | < 2 | < 2 | 4 | < 2 |

**Table E.3**
**Leachate Chemical Results - Holding Tanks**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | BY-LAW [1] | SFA | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-17 | Oct-17 | Apr-18 | Oct-18 | Apr-19 | Oct-19 | Apr-20 | Oct-20 | Apr-21 | Sep-21 | Mar-22 | Oct-22 |
| 1,1,1,2-Tetrachlorethane | µg/L | | <1 | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/L | | <0.5 | | | | | | | | | | | |
| 1,1,2,2-Tetrachlorethane | µg/L | | <1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,1,2-Trichlorethane | µg/L | | <1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,1-Dichloroethane | µg/L | | <0.5 | <0.5 | <0.5 | <0.5 | <1 | <0.5 | 0.8 | 1 | 0.5 | < 0.5 | 0.6 | < 0.5 |
| 1,1-Dichloroethylene | µg/L | 2 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,2-Dichlorobenzene | µg/L | | <1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,2-Dichloroethane | µg/L | | <1 | <0.5 | 0.6 | <0.5 | <0.5 | <0.5 | 0.8 | 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,2-Dichloroethylene | µg/L | | <0.5 | | | | | | | | | | | |
| 1,2-Dichlorpropane | µg/L | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,3-Dichlorobenzene | µg/L | | <1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,3-dichloropropene | µg/L | | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,3-Dichloropropene | µg/L | | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,4-Dichlorobenzene | µg/L | 80 | 2.8 | 4.1 | 5.7 | 5.9 | 6 | 4.8 | 7.2 | 7.5 | 5 | 4.1 | 6.7 | 4.2 |
| Acetone | µg/L | | <50 | | | | | | | | | | | |
| Benzene | µg/L | 10 | 1.1 | 1.6 | 6.5 | <0.5 | 5.8 | <0.5 | 7.7 | <0.5 | 0.7 | | | < 0.5 |
| Bromodichloromethane | µg/L | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Bromoform | µg/L | | <1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Bromomethane | µg/L | | <2.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Carbon Tetrachloride | µg/L | | <0.5 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | < 0.2 | < 0.2 | < 0.2 | < 0.2 |
| Chlorobenzene | µg/L | | 2.2 | 4.5 | 15.3 | 0.9 | 11.2 | <0.5 | | | 2.3 | 2 | 4.6 | 2 |
| Chloroethane | µg/L | | | <5 | <5 | <5 | <5 | <5 | <5 | <5 | < 5 | < 5 | < 5 | < 5 |
| Chloroform | µg/L | 40 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Chloromethane | µg/L | | | <5 | <5 | <5 | <5 | <5 | <5 | <5 | < 5 | < 5 | < 5 | < 5 |
| cis-1,2-Dichloroethylene | µg/L | 4000 | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | | | | | |
| cis-1,3-Dichloropropylene | µg/L | | <1 | | | | | | | | | | | |
| Dibromochloromethane | µg/L | | <1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Dichloromethane | µg/L | 1000 | <2.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Ethyl Benzene | µg/L | 160 | <0.5 | <0.5 | 7 | <0.5 | 11.7 | <0.5 | 5.2 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Ethylene dibromide | µg/L | | <1 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | < 0.2 | < 0.2 | < 0.2 | < 0.2 |
| m/p-Xylenes | µg/L | | 1.9 | 2.7 | 30.8 | <0.5 | 43.8 | <0.5 | 29.7 | 0.6 | 0.9 | 1 | 2.4 | < 0.5 |
| Methyl Ethyl Ketone | µg/L | | <25 | | | | | | | | | | | |
| Methyl Isobutyl Ketone | µg/L | | <25 | | | | | | | | | | | |
| Methyl t-Butyl Ether | µg/L | | <1 | | | | | | | | | | | |
| nonyl-Phenol ethoxylates | µg/L | 10 | <50 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | < 10 | < 10 | < 10 | < 10 |
| nonyl-Phenols | µg/L | 1 | 2 | 1.1 | 1.9 | 1.5 | 2.1 | 1.7 | <2 | <3 | 2.8 | < 3 | 3 | 2 |
| o-Xylene | µg/L | | 2.7 | 2 | 7.1 | 1.1 | 10 | <0.5 | 13.5 | 8.8 | 3 | 1.2 | 4.6 | < 0.5 |
| Phenols - total | µg/L | 1000 | 3 | 4 | 4 | 5 | 9 | 9 | 6 | 5 | 5 | 3 | 5 | 4 |
| Styrene | µg/L | | <1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Tetrachloroethylene | µg/L | 16 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Toluene | µg/L | 400 | <1 | <0.5 | 2.3 | <0.5 | 5.2 | <0.5 | 5.4 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| trans-1,2-Dichloroethylene | µg/L | 2 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | 0.6 | < 0.5 | < 0.5 |
| trans-1,3-Dichloropropylene | µg/L | | <1 | | | | | | | | | | | |
| Trichloroethylene | µg/L | 400 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Trichlorofluoromethane | µg/L | | <1 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | < 5 | < 5 | < 5 | < 5 |
| Vinyl Chloride | µg/L | 2 | <1 | <0.2 | 0.2 | <0.2 | 0.5 | <0.2 | 0.8 | 0.4 | < 0.2 | < 0.2 | < 0.2 | < 0.2 |
| Xylenes - total | µg/L | 1400 | 4.7 | 4.7 | 37.9 | 1.1 | 53.8 | <0.5 | 43.2 | 9.4 | 3.9 | 2.1 | 7 | < 0.5 |

NOTES:
1) By-law criteria is based on City of Peterborough By-law 15-075 to regulate discharge.
2) Blank indicates parameter not analysed.
3) SFA - South Fill Area Holding Tank
4) NFA - North Fill Area Holding Tank

**Table E.3**
**Leachate Chemical Results - Holding Tanks**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | BY-LAW[1] | NFA | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-17 | Oct-17 | Apr-18 | Oct-18 | Apr-19 | Oct-19 | Apr-20 | Oct-20 | Apr-21 | Sep-21 | Mar-22 | Oct-22 |
| Alkalinity | mg/L | | | 1540 | | 1590 | | 2320 | | 2450 | | 2250 | | 2900 |
| Biochemical Oxygen Demand | mg/L | 300 | 435 | 11.4 | 10 | 17.2 | 900 | 428 | 180 | 333 | 9.4 | 22.8 | 26.6 | 26 |
| Carbonaceous Biochemical Oxygen Demand | mg/L | | | 4.9 | | 8.1 | | 415 | | 304 | | 11.1 | | 19.1 |
| Bromide | mg/L | | | 2.0 | | 1.9 | | 2.6 | | 2.7 | | 2.0 | | 5.9 |
| Chloride | mg/L | 1500 | 541 | 503 | 418 | 737 | 540 | 852 | 653 | 778 | 563 | 718 | 514 | 1430 |
| Chemical Oxygen Demand | mg/L | | 920 | 300 | 150 | 1010 | 1510 | 1110 | 630 | 900 | 310 | 500 | 180 | 790 |
| Conductivity - field | μS/cm | | 5110 | 4600 | 3770 | 5640 | 5580 | 7510 | 5680 | 7260 | 5400 | 6460 | 4760 | 10600 |
| Fluoride | mg/L | 10 | 23.5 | <1 | <1 | <1 | 5.8 | <20 | 3.88 | 9.2 | <0.1 | <1 | 0.3 | <1 |
| Oxydation Reduction Potential | mV | | | | | | -313 | | | | | | | |
| pH | units | 6.0-10.5 | 7.17 | 7.64 | 7.52 | 7.79 | 7.73 | 7.81 | 7.86 | 7.89 | 7.8 | 7.9 | 7.96 | 8.15 |
| pH - field | units | | 6.97 | 7.32 | 7.48 | 7.57 | 7.64 | 7.49 | 7.75 | 7.99 | 7.72 | 7.68 | 7.74 | 7.86 |
| Sodium | mg/L | | | 399 | | 698 | | 882 | 171 | 46 | 6 | 9 | | 1130 |
| Sulphate | mg/L | 1500 | 91.4 | 336 | 438 | 554 | 130 | 492 | 210 | 293 | 373 | 222 | 292 | 581 |
| Temperature - field | °C | | 18.8 | 18.4 | 16 | 16.6 | 20.3 | 23.2 | 22.1 | 23.4 | 23 | 24.3 | 22.5 | 25.2 |
| Total Kjeldahl Nitrogen | mg/L | 100 | 112 | 148 | 89.2 | 182 | 62.1 | 259 | 196 | 262 | 187 | 377 | 191 | 467 |
| Total Suspended Solids | mg/L | 350 | 6 | 4.8 | 8 | 8.5 | 32 | 225 | 20 | 9 | 16.7 | 26.7 | 10 | 30 |
| Aluminum | mg/L | 50 | 0.15 | 0.06 | 0.06 | 0.13 | 0.4 | 3.01 | 0.333 | 0.257 | 0.116 | 0.319 | 0.102 | 0.211 |
| Antimony | mg/L | 5 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Arsenic | mg/L | 1 | 0.02 | 0.012 | 0.006 | 0.01 | 0.016 | 0.035 | 0.014 | 0.024 | 0.02 | 0.047 | 0.017 | 0.038 |
| Bismuth | mg/L | 5 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Cadmium | mg/L | 0.7 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Chromium | mg/L | 3 | 0.037 | 0.031 | 0.019 | 0.044 | 0.066 | 0.134 | 0.061 | 0.071 | 0.06 | 0.095 | 0.054 | 0.181 |
| Cobalt | mg/L | 5 | 0.004 | 0.005 | 0.005 | 0.009 | 0.009 | 0.015 | 0.008 | 0.011 | 0.009 | 0.012 | 0.009 | 0.024 |
| Copper | mg/L | 2 | 0.006 | <0.005 | 0.005 | <0.005 | 0.005 | 0.017 | 0.014 | 0.016 | 0.02 | 0.007 | 0.009 | 0.022 |
| Cyanide | mg/L | 2 | 0.0055 | <0.01 | <0.01 | 0.02 | <0.01 | 0.01 | <0.01 | 0.01 | < 0.01 | < 0.01 | < 0.01 | 0.02 |
| Iron | mg/L | 50 | 1.59 | 0.78 | 1.42 | 1.44 | 4.23 | 7.27 | 0.74 | 0.86 | 1.33 | 1.69 | 0.64 | 1.08 |
| Lead | mg/L | 1 | 0.0022 | <0.0015 | 0.0032 | <0.01 | <0.01 | 0.03 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Manganese | mg/L | 5 | 0.368 | 0.333 | 0.207 | 0.319 | 1.08 | 1.27 | 0.258 | 0.179 | 0.254 | 0.368 | 0.24 | 0.198 |
| Mercury | µg/L | 10 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Molybdenum | mg/L | 5 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.01 | 0.008 | 0.012 | 0.012 | <0.005 | <0.005 | 0.015 |
| Nickel | mg/L | 3 | 0.048 | 0.048 | 0.04 | 0.073 | 0.041 | 0.102 | 0.054 | 0.073 | 0.057 | 0.065 | 0.05 | 0.139 |
| Phosphorus | mg/L | 10 | 0.8 | 0.92 | 0.35 | 1.16 | 2.26 | 2.59 | 1.14 | 1.52 | 1.29 | 2.19 | 1.23 | 3.16 |
| Potassium | mg/L | | | 120 | | 196 | | 249 | | 265 | | 212 | | 392 |
| Selenium | mg/L | 5 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.03 | <0.02 | <0.02 | <0.02 |
| Silver | mg/L | 5 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Strontium | mg/L | | | 1.76 | | 1.66 | | 1.64 | | 1.23 | | 1.15 | | 1.41 |
| Tin | mg/L | 5 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Titanium | mg/L | 5 | 0.031 | 0.027 | 0.016 | 0.04 | 0.045 | 0.206 | 0.047 | 0.042 | 0.035 | 0.068 | 0.029 | 0.115 |
| Vanadium | mg/L | 5 | 0.031 | 0.018 | 0.006 | 0.018 | 0.016 | 0.038 | 0.016 | 0.014 | 0.012 | 0.023 | 0.011 | 0.036 |
| Zinc | mg/L | 2 | 0.03 | <0.02 | 0.03 | 0.02 | 0.26 | 0.17 | 0.05 | 0.18 | 0.07 | 0.03 | 0.03 | 0.07 |
| Zirconium | mg/L | 5 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.01 | <0.01 | 0.03 |
| Oil & Grease - anim/veg | mg/L | 150 | 4.3 | <4 | <4 | <4 | 7 | <4 | <4 | 5 | < 4 | < 4 | < 4 | < 4 |
| Oil & grease - mineral | mg/L | 15 | <0.5 | <4 | <4 | <4 | 6 | <4 | <4 | <4 | < 4 | < 4 | < 4 | < 4 |
| Oil and Grease - total | mg/L | | 4.3 | | | | 13 | 5 | <2 | 5 | < 2 | < 2 | 3 | < 2 |

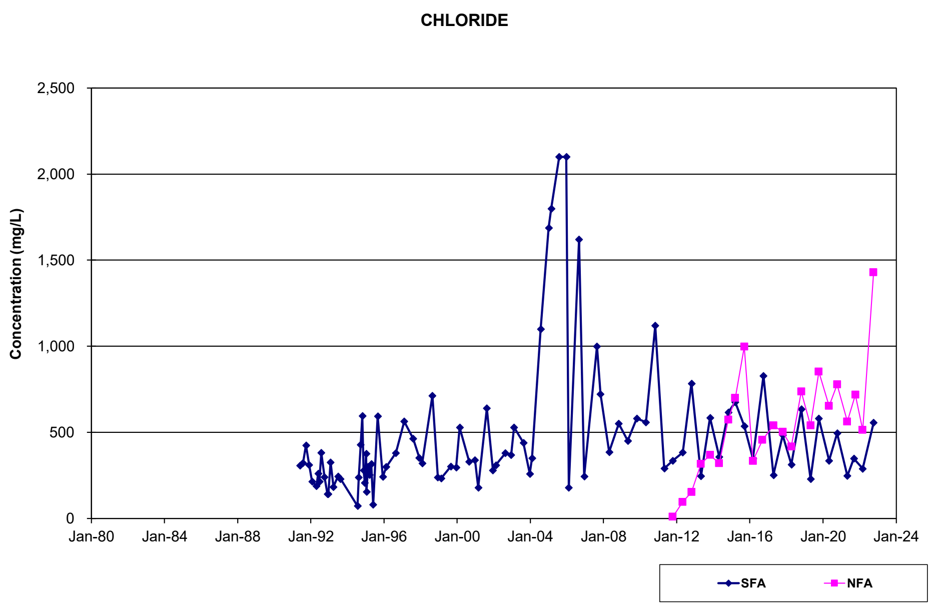
**Table E.3**
**Leachate Chemical Results - Holding Tanks**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

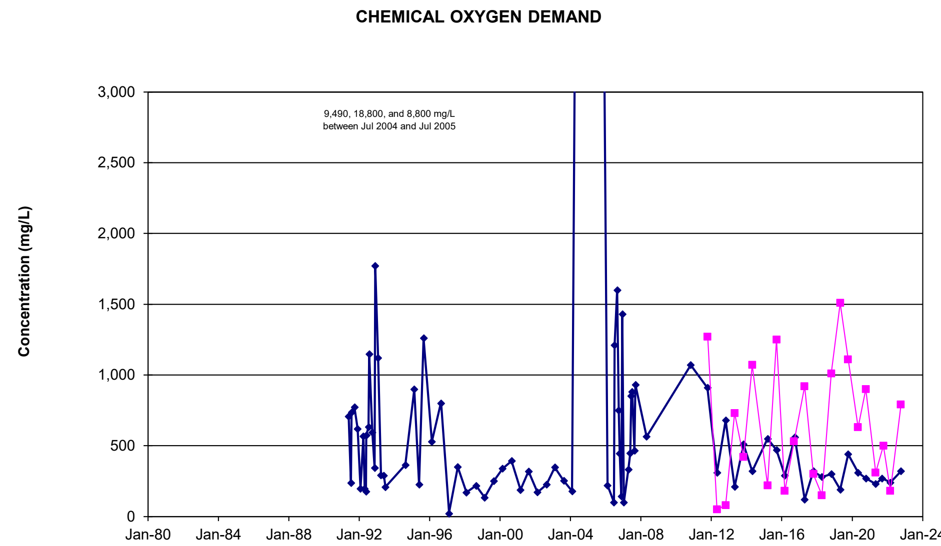
| PARAMETER | UNITS | BY-LAW [1] | NFA | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-17 | Oct-17 | Apr-18 | Oct-18 | Apr-19 | Oct-19 | Apr-20 | Oct-20 | Apr-21 | Sep-21 | Mar-22 | Oct-22 |
| 1,1,1,2-Tetrachlorethane | µg/L | | <1 | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/L | | <0.5 | | | | | | | | | | | |
| 1,1,2,2-Tetrachlorethane | µg/L | | <1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,1,2-Trichlorethane | µg/L | | <1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,1-Dichloroethane | µg/L | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,1-Dichloroethylene | µg/L | 2 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,2-Dichlorobenzene | µg/L | | <1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,2-Dichloroethane | µg/L | | 1.3 | <0.5 | <0.5 | <0.5 | 0.8 | <0.5 | <0.5 | 0.7 | 0.6 | < 0.5 | < 0.5 | < 0.5 |
| 1,2-Dichloroethylene | µg/L | | 0.51 | | | | | | | | | | | |
| 1,2-Dichlorpropane | µg/L | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,3-Dichlorobenzene | µg/L | | <1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,3-dichloropropene | µg/L | | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,3-Dichloropropene | µg/L | | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,4-Dichlorobenzene | µg/L | 80 | <1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 0.9 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Acetone | µg/L | | 750 | | | | | | | | | | | |
| Benzene | µg/L | 10 | 1.8 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 0.6 | 0.6 | < 0.5 | | | < 0.5 |
| Bromodichloromethane | µg/L | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Bromoform | µg/L | | <1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Bromomethane | µg/L | | <2.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Carbon Tetrachloride | µg/L | | <0.5 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | < 0.2 | < 0.2 | < 0.2 | < 0.2 |
| Chlorobenzene | µg/L | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | | | <0.5 | <0.5 | < 0.5 | < 0.5 |
| Chloroethane | µg/L | | | <5 | <5 | <5 | <5 | <5 | <5 | <5 | < 5 | < 5 | < 5 | < 5 |
| Chloroform | µg/L | 40 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Chloromethane | µg/L | | | <5 | <5 | <5 | <5 | <5 | <5 | <5 | < 5 | < 5 | < 5 | < 5 |
| cis-1,2-Dichloroethylene | µg/L | 4000 | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | | | | | |
| cis-1,3-Dichloropropylene | µg/L | | <1 | | | | | | | | | | | |
| Dibromochloromethane | µg/L | | <1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Dichloromethane | µg/L | 1000 | <2.5 | <0.5 | <0.5 | <0.5 | 0.6 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Ethyl Benzene | µg/L | 160 | 3 | <0.5 | <0.5 | <0.5 | 0.7 | <0.5 | 1 | 0.9 | < 0.5 | 0.7 | < 0.5 | < 0.5 |
| Ethylene dibromide | µg/L | | <1 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | < 0.2 | < 0.2 | < 0.2 | < 0.2 |
| m/p-Xylenes | µg/L | | 5.8 | <0.5 | <0.5 | <0.5 | 1.4 | 0.7 | 2.7 | 2.1 | < 0.5 | 1.4 | < 0.5 | 0.7 |
| Methyl Ethyl Ketone | µg/L | | 830 | | | | | | | | | | | |
| Methyl Isobutyl Ketone | µg/L | | <25 | | | | | | | | | | | |
| Methyl t-Butyl Ether | µg/L | | <1 | | | | | | | | | | | |
| nonyl-Phenol ethoxylates | µg/L | 10 | <50 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | < 10 | < 10 | < 10 | < 10 |
| nonyl-Phenols | µg/L | 1 | 6 | <1 | <1 | <1 | 3 | 1.6 | <2 | <3 | 1.2 | < 3 | 1 | 2 |
| o-Xylene | µg/L | | 2.2 | <0.5 | <0.5 | <0.5 | 0.7 | <0.5 | 1.4 | 1.2 | < 0.5 | 0.7 | < 0.5 | < 0.5 |
| Phenols - total | µg/L | 1000 | 828 | 14 | 1 | 3 | 130 | 74 | 171 | 46 | 6 | 9 | 9 | 9 |
| Styrene | µg/L | | <1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Tetrachloroethylene | µg/L | 16 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Toluene | µg/L | 400 | 5.3 | <0.5 | <0.5 | <0.5 | 2.5 | <0.5 | 1.6 | 2.3 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| trans-1,2-Dichloroethylene | µg/L | 2 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| trans-1,3-Dichloropropylene | µg/L | | <1 | | | | | | | | | | | |
| Trichloroethylene | µg/L | 400 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Trichlorofluoromethane | µg/L | | <1 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | < 5 | <5 | < 5 | < 5 |
| Vinyl Chloride | µg/L | 2 | <1 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | < 0.2 | < 0.2 | < 0.2 | < 0.2 |
| Xylenes - total | µg/L | 1400 | 8 | <0.5 | <0.5 | <0.5 | 2 | 1 | 4.1 | 3.3 | 0.8 | 2.1 | < 0.5 | 1 |

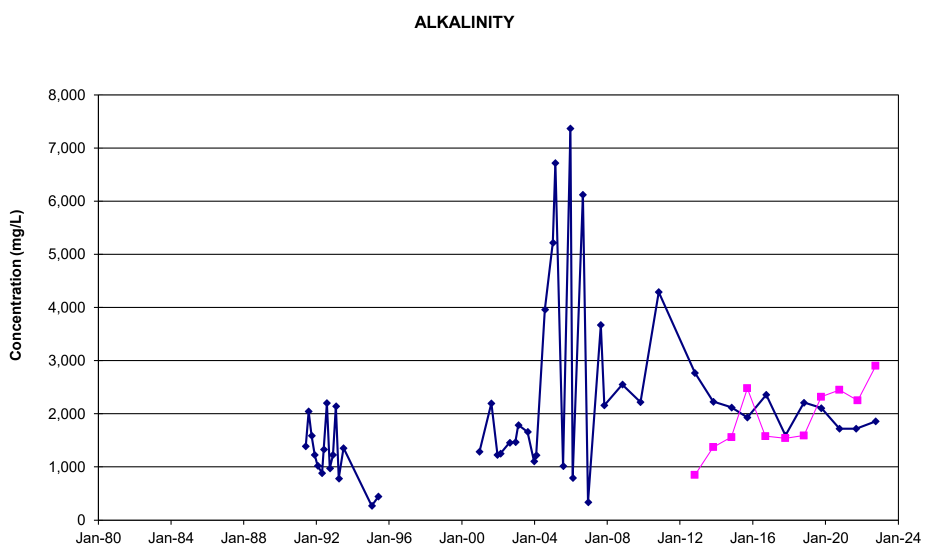
NOTES:
1) By-law criteria is based on City of Peterborough By-law 15-075 to regulate discharge.
2) Blank indicates parameter not analysed.
3) SFA - South Fill Area Holding Tank
4) NFA - North Fill Area Holding Tank

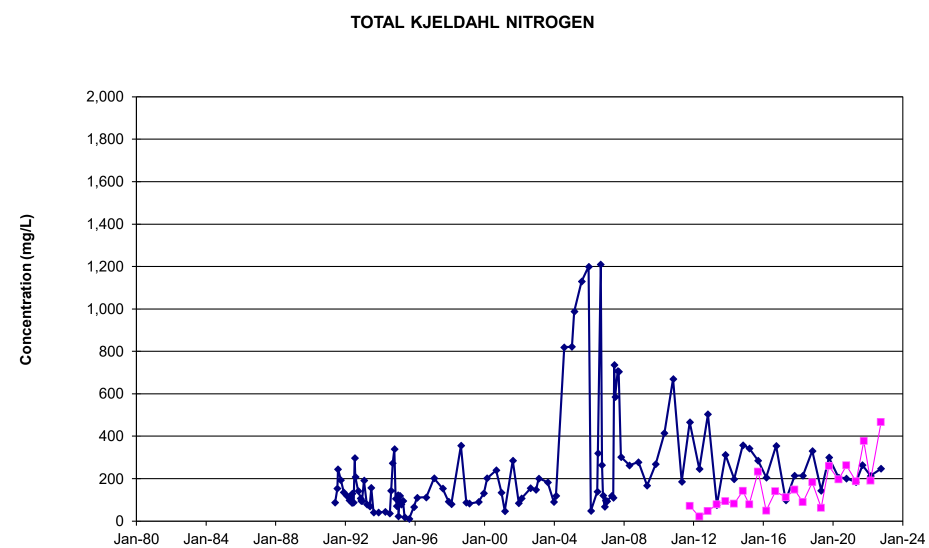
# Figure E.6

## Time Concentration Graphs - Holding Tanks



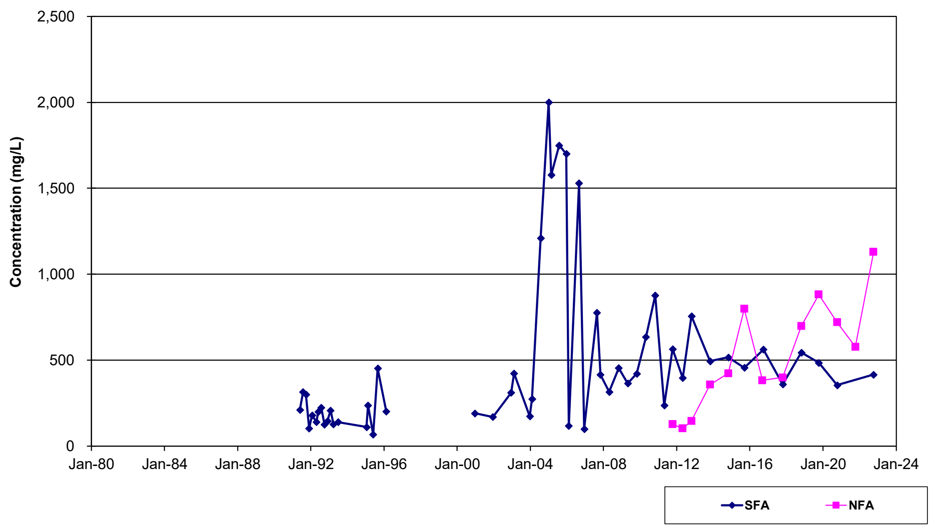



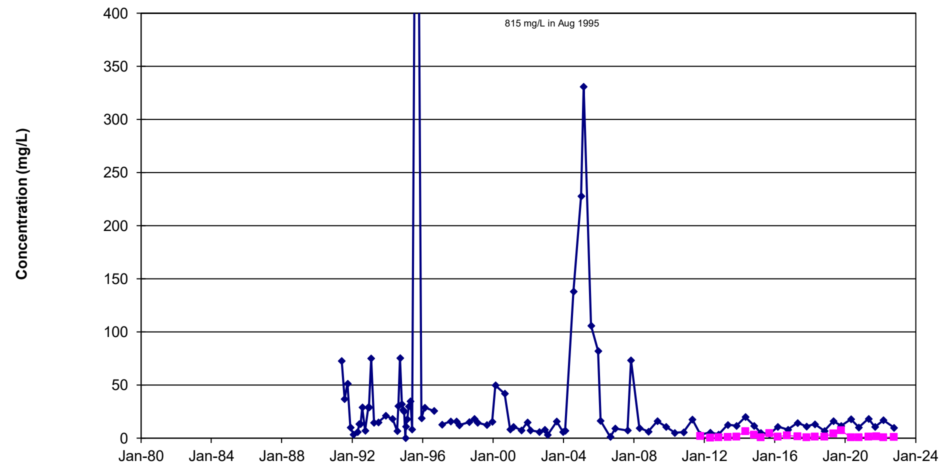
# Figure E.7

## Time Concentration Graphs - Holding Tanks

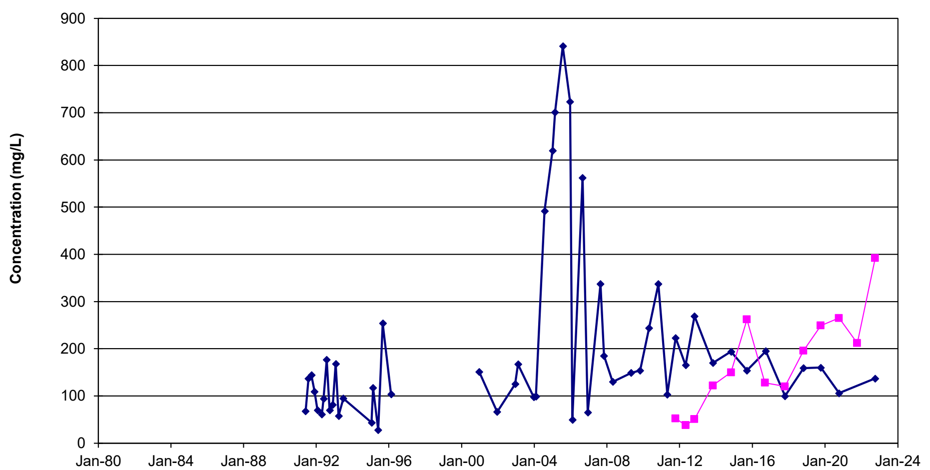
SODIUM




IRON




POTASSIUM




MAGNESIUM

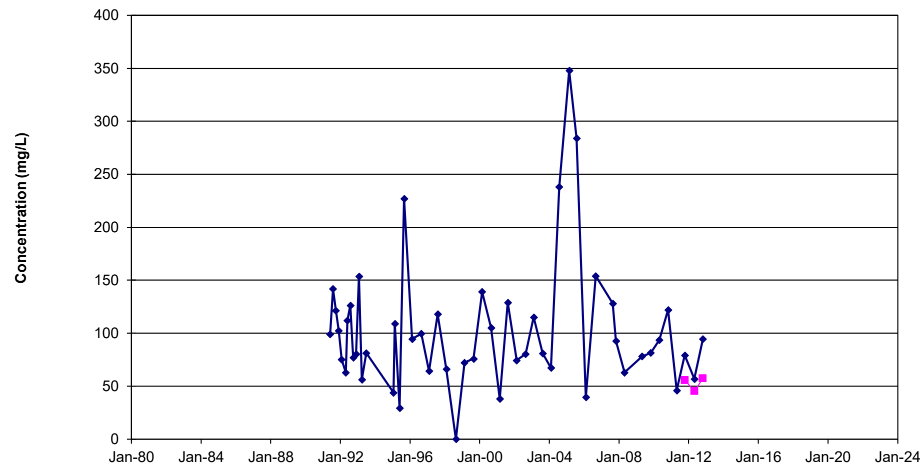


**Table E.4**
**Leachate Chemical Results - Maintenance Hole T6-94**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | Oct-17 | Oct-18 | Oct-19 | Oct-20 | Sep-21 | Oct-22 |
|---|---|---|---|---|---|---|---|
| Alkalinity | mg/L | 3640 | 3600 | 3290 | 2970 | 2610 | 2920 |
| Ammonia | mg/L | 539 | 602 | 493 | 414 | 368 | 414 |
| Biochemical Oxygen Demand | mg/L | 46.8 | 130 | 38.1 | 29.2 | 40.1 | 28 |
| Bromide | mg/L | 2.9 | 3.1 | 2.8 | 2.9 | <2.0 | 3.3 |
| Carbonaceous Biochemical Oxygen Demand | mg/L | 36.5 | 30.4 | 25.5 | 19.1 | 19.2 | 21.7 |
| Chloride | mg/L | 850 | 866 | 710 | 576 | 505 | 169 |
| Conductivity - field | µS/cm | 8820 | 8700 | 8320 | 6820 | 6160 | 7170 |
| Iron | mg/L | 5.97 | 5.22 | 7.73 | 6.17 | 10.4 | 12 |
| pH - field | units | 6.92 | 7.28 | 7.01 | 6.98 | 6.71 | 7.02 |
| Phenols - total | µg/L | 19 | 8 | 10 | 6 | 7 | 6 |
| Potassium | mg/L | <0.5 | 275 | 256 | 209 | 187 | 220 |
| Sodium | mg/L | 635 | 812 | 751 | 513 | 448 | 529 |
| Strontium | mg/L | 1.18 | 1.27 | 1.19 | 1.11 | 1.16 | 1.2 |
| Temperature - field | °C | 13.9 | 11.4 | 13.8 | 11.3 | 12.8 | 13.2 |
| Total Kjeldahl Nitrogen | mg/L | 643 | 579 | 490 | 409 | 457 | 437 |
| Total Suspended Solids | mg/L | 8.4 | 14 | 13.3 | <2.0 | 21 | 36 |

**Table E.5**
**Leachate Chemical Results - Refuse Monitoring 23 B**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | Apr-17 | Oct-17 | Apr-18 | Oct-18 | Apr-19 | Oct-19 |
|---|---|---|---|---|---|---|---|
| Alkalinity | mg/L | 787 | | 446 | | 809 | |
| Aluminum | mg/L | | 0.04 | | 0.03 | | 0.04 |
| Ammonia | mg/L | 79.5 | | 18.2 | | 74.3 | |
| Anion sum | meq/L | 19.6 | | 11.4 | | 18.8 | |
| Arsenic | mg/L | 0.0006 | | 0.007 | <0.005 | 0.0009 | |
| Barium | mg/L | | 0.504 | | 0.437 | | 0.545 |
| Beryllium | mg/L | | <0.001 | | <0.001 | | <0.001 |
| Bicarbonate | mg/L | 786 | | 445 | | 808 | |
| Boron | mg/L | | 1.57 | | 1.48 | | 1.52 |
| Cadmium | mg/L | | 0.005 | | 0.001 | | <0.001 |
| Calcium | mg/L | 120 | | 104 | 170 | 161 | |
| Carbonate | mg/L | <1 | | <1 | | <1 | |
| Cation sum | meq/L | 20.7 | | 11.1 | | 21.6 | |
| Chloride | mg/L | 125 | | 58.9 | | 95.3 | |
| Chromium | mg/L | | 0.003 | | 0.002 | | 0.001 |
| Cobalt | mg/L | | 0.009 | | 0.008 | | 0.007 |
| Chemical Oxygen Demand | mg/L | 60 | | 40 | | 50 | |
| Conductivity | µS/cm | 2000 | | 1120 | | 1900 | |
| Conductivity - field | µS/cm | 2020 | 5140 | 1050 | 4720 | 1970 | 4830 |
| Copper | mg/L | | <0.005 | | <0.005 | | 0.016 |
| Dissolved Organic Carbon | mg/L | 23.8 | | 12.8 | | 24 | |
| Dissolved Oxygen - field | mg/L | 3.23 | 2.39 | 4.89 | 1.96 | 1.58 | 1.34 |
| Hardness | mg/L | 486 | | 352 | | 574 | |
| Ion Percentage | % | 2.95 | | 1.35 | | 6.88 | |
| Iron | mg/L | 3.81 | | 3.02 | 30.3 | 9.56 | |
| Lead | mg/L | | 0.0037 | | <0.01 | | 0.01 |
| Magnesium | mg/L | 45.3 | | 22.4 | | 41.7 | |
| Manganese | mg/L | 0.125 | | 0.072 | 0.352 | 0.254 | |
| Molybdenum | mg/L | | <0.005 | | <0.005 | | <0.005 |
| Nickel | mg/L | | 0.033 | | 0.03 | | 0.035 |
| Nitrate | mg/L | 0.26 | | 9 | | <0.5 | |
| Nitrite | mg/L | 0.05 | | 0.6 | | <0.5 | |
| Oxydation Reduction Potential | mV | -28.3 | -124.8 | 42.6 | -102.2 | -46.2 | -104.6 |
| pH - field | units | 6.53 | 6.64 | 7.01 | 6.6 | 6.64 | 6.72 |
| pH | units | 7.04 | | 7.14 | | 6.94 | |
| Phenols - total | µg/L | 2 | | <1 | | 3 | |
| Phosphate | mg/L | 0.05 | | 0.02 | 0.45 | <0.02 | |
| Phosphorus | mg/L | 0.1 | | 0.04 | | 0.06 | |
| Potassium | mg/L | 54.1 | | 21.5 | | 37.3 | |
| Sodium | mg/L | 89.7 | | 50.5 | 224 | 86.7 | |
| Sulphate | mg/L | 37.7 | | 21.4 | | 21.6 | |
| Total Dissolved Solids | mg/L | 810 | | 580 | | 880 | |
| Temperature - field | °C | 11.7 | 12.4 | 9.5 | 12.5 | 11.3 | 13.1 |
| Total Kjeldahl Nitrogen | mg/L | 85.1 | | 31.6 | | 76.6 | |
| Zinc | mg/L | | <0.02 | | <0.01 | | <0.01 |

**Table E.5**

**Leachate Chemical Results - Refuse Monitoring 23 B**

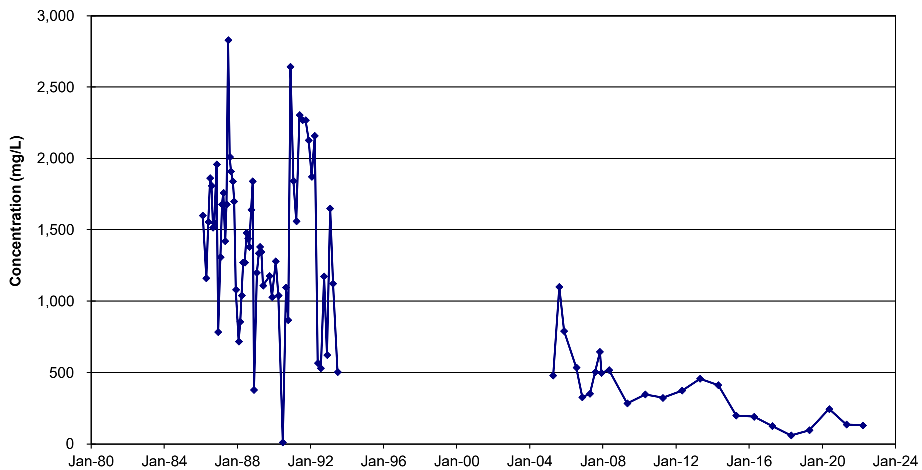
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | May-20 | Sep-20 | Apr-21 | Oct-21 | Mar-22 | Sep-22 |
|---|---|---|---|---|---|---|---|
| Alkalinity | mg/L | 1490 | | 1060 | | 1010 | |
| Aluminum | mg/L | | 0.032 | | <0.025 | | <0.025 |
| Ammonia | mg/L | 60.3 | | 78.1 | | 84.3 | |
| Anion sum | meq/L | 35.8 | | 24.7 | | 23.4 | |
| Arsenic | mg/L | 0.0011 | | 0.0008 | | 0.0006 | |
| Barium | mg/L | | 0.655 | | 0.414 | | 0.587 |
| Beryllium | mg/L | | <0.0005 | | <0.0005 | | <0.0005 |
| Bicarbonate | mg/L | 1490 | | 1060 | | 1010 | |
| Boron | mg/L | | 1.58 | | 1.05 | | 1.39 |
| Cadmium | mg/L | | <0.0001 | | <0.0001 | | <0.0001 |
| Calcium | mg/L | 180 | | 182 | | 133 | |
| Carbonate | mg/L | 1 | | <1 | | <1 | |
| Cation sum | meq/L | 32.4 | | 25.6 | | 22.7 | |
| Chloride | mg/L | 244 | | 136 | | 130 | |
| Chromium | mg/L | | 0.0059 | | 0.0031 | | 0.0045 |
| Cobalt | mg/L | | 0.0081 | | 0.0039 | | 0.0069 |
| Chemical Oxygen Demand | mg/L | 180 | | 100 | | 80 | |
| Conductivity | µS/cm | 4000 | | 2450 | | 2270 | |
| Conductivity - field | µS/cm | 3480 | | 2520 | 2660 | 2160 | 4320 |
| Copper | mg/L | | <0.0005 | | 0.0005 | | <0.0005 |
| Dissolved Organic Carbon | mg/L | 92.4 | | 28.3 | | 24.5 | |
| Dissolved Oxygen - field | mg/L | 1.39 | | 2.45 | 2.27 | 1.13 | 2.44 |
| Hardness | mg/L | 869 | | 706 | | 543 | |
| Ion Percentage | % | 4.93 | | 1.79 | | 1.56 | |
| Iron | mg/L | 27.9 | | 28.1 | 24.4 | 3.87 | |
| Lead | mg/L | | <0.0005 | | <0.0005 | | <0.0005 |
| Magnesium | mg/L | 102 | | 61.2 | | 51.3 | |
| Manganese | mg/L | 0.28 | | 0.48 | | 0.245 | |
| Molybdenum | mg/L | | 0.0007 | | <0.0005 | | <0.0005 |
| Nickel | mg/L | | 0.026 | | 0.014 | | 0.018 |
| Nitrate | mg/L | <0.5 | | <0.5 | | <0.5 | |
| Nitrite | mg/L | <0.5 | | <0.5 | | <0.5 | |
| Oxydation Reduction Potential | mV | -46.8 | | -85.3 | -62 | -2.4 | -108 |
| pH - field | units | 6.96 | | 6.47 | 6.56 | 6.56 | 6.60 |
| pH | units | 6.67 | | 6.78 | | 6.84 | |
| Phenols - total | µg/L | 4 | | 7 | | 2 | |
| Phosphate | mg/L | 0.15 | | 0.25 | | 0.03 | |
| Phosphorus | mg/L | 0.11 | | 0.19 | | 0.09 | |
| Potassium | mg/L | 99.7 | | 56.9 | | 53.4 | |
| Sodium | mg/L | 185 | | 99.7 | | 101 | |
| Sulphate | mg/L | 3.5 | | 16.2 | | 11 | |
| Total Dissolved Solids | mg/L | 1570 | | 1090 | | 960 | |
| Temperature - field | °C | 12.5 | | 12.2 | 13 | 11.8 | 13.4 |
| Total Kjeldahl Nitrogen | mg/L | 122 | | 85 | | | |
| Zinc | mg/L | | 0.0028 | | 0.0017 | | 0.002 |

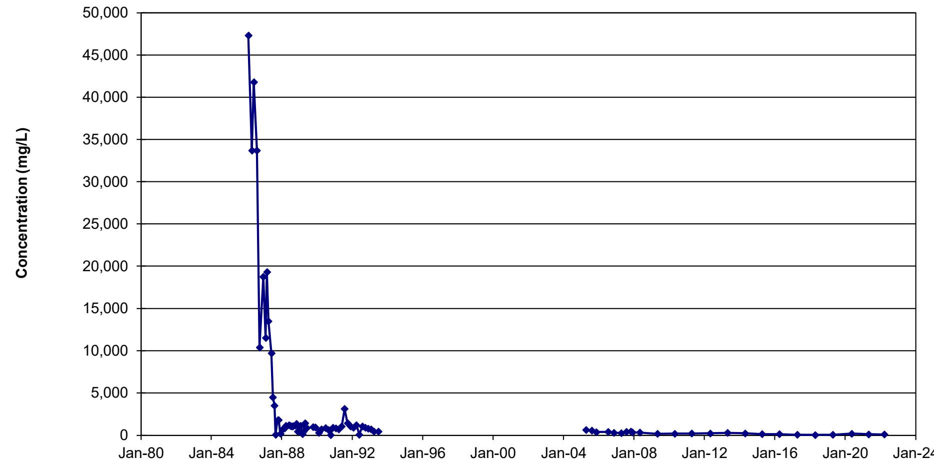
## Figure E.8

### Time Concentration Graphs - Refuse Monitor 23B

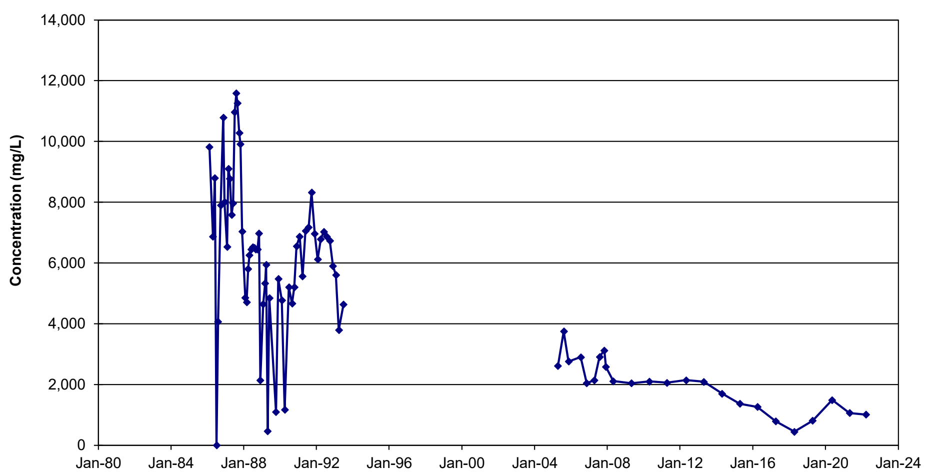
CHLORIDE



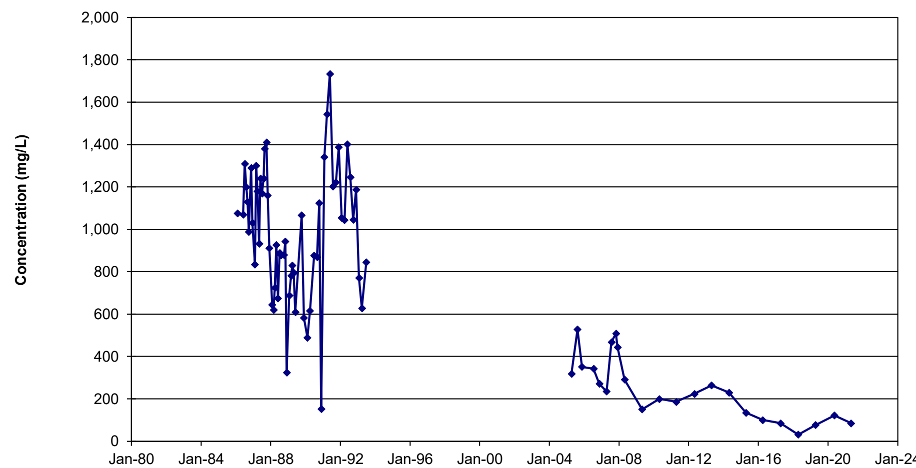

CHEMICAL OXYGEN DEMAND




ALKALINITY



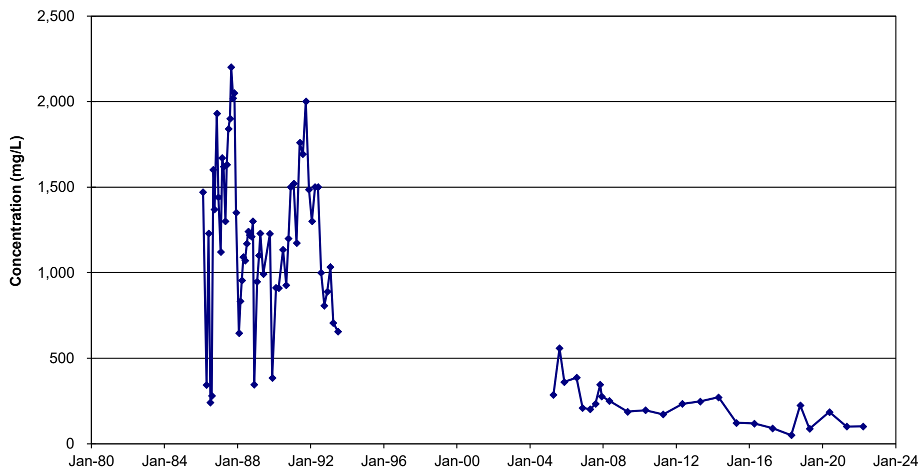

TOTAL KJELDAHL NITROGEN



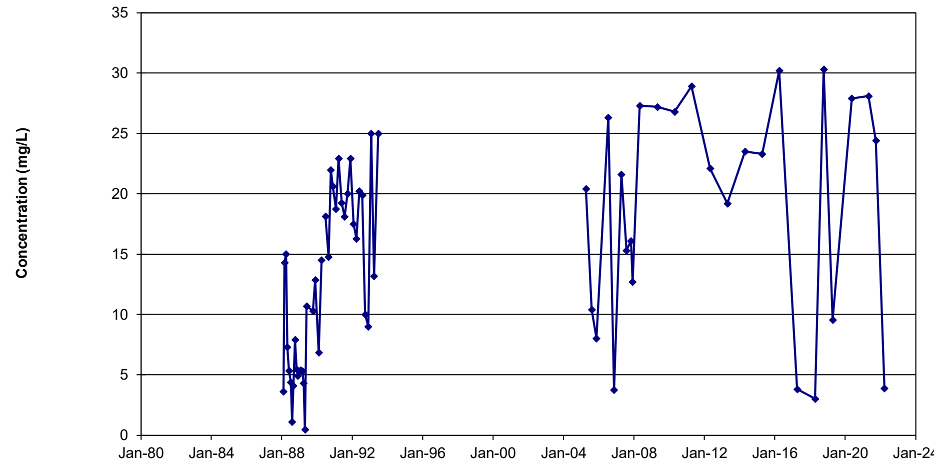
## Figure E.9

### Time Concentration Graphs - Refuse Monitor 23B

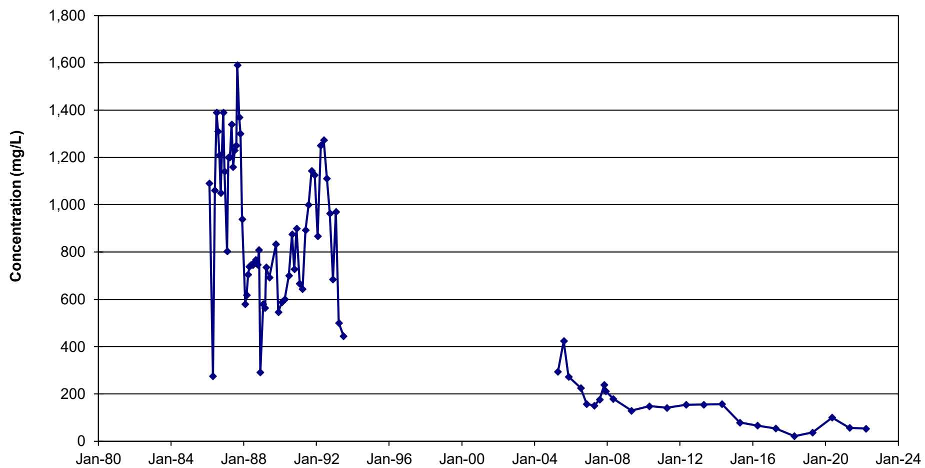
SODIUM




IRON




POTASSIUM




MAGNESIUM

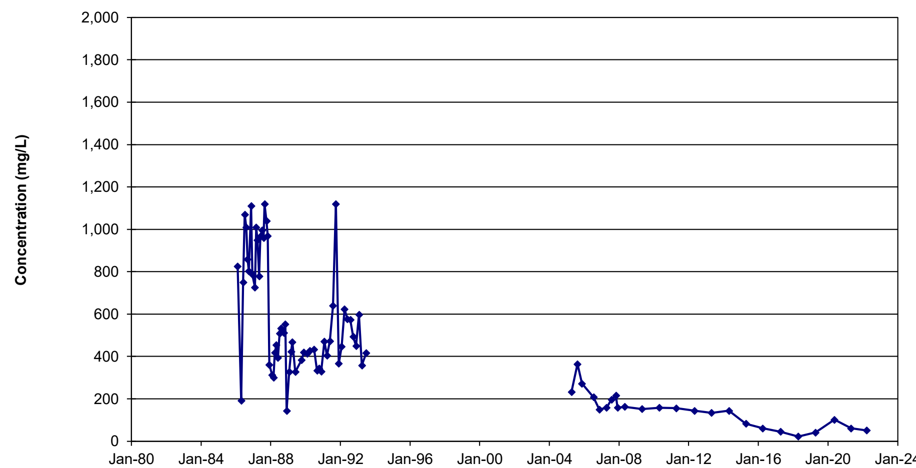
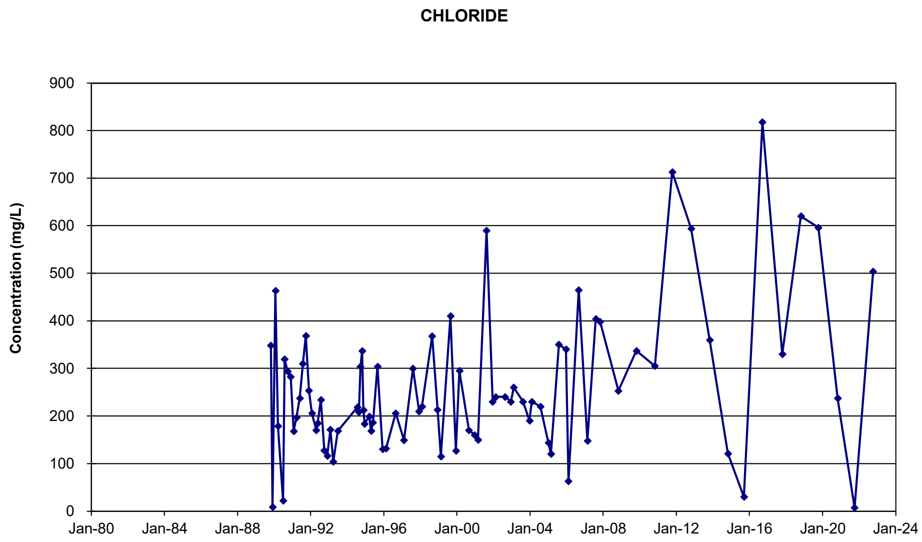


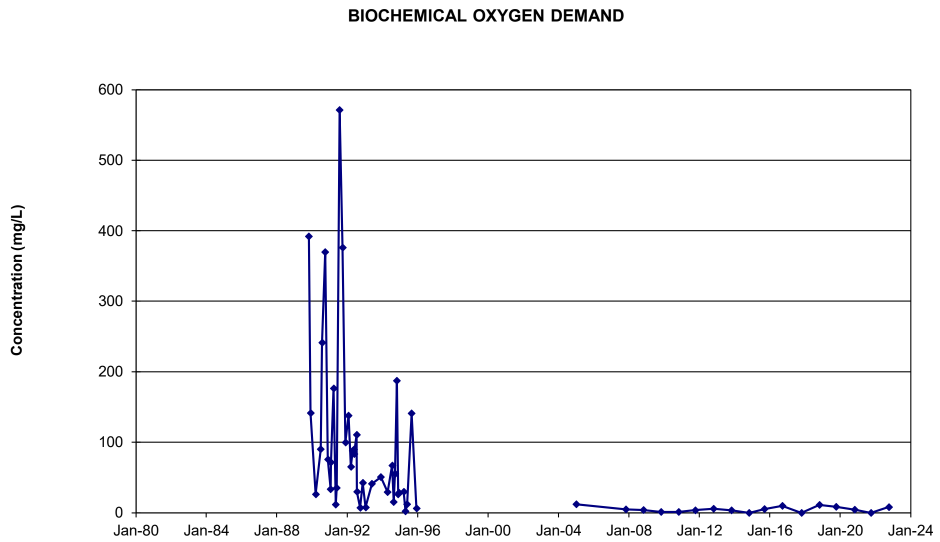
**Table E.6**
**Leachate Chemical Results - Maintenance Hole 4**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

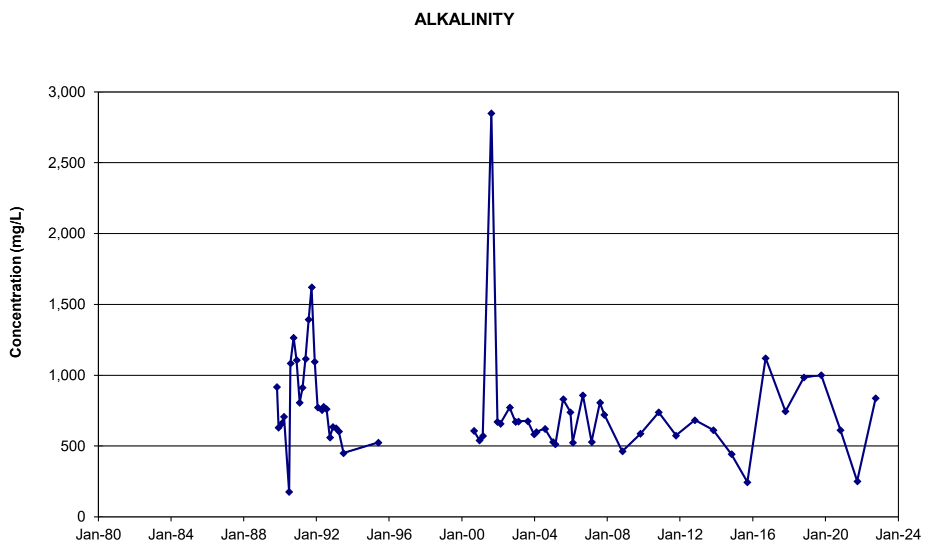
| PARAMETER | UNITS | Oct-17 | Oct-18 | Oct-19 | Oct-20 | Sep-21 | Oct-22 |
|---|---|---|---|---|---|---|---|
| Alkalinity | mg/L | 745 | 985 | 1000 | 611 | 251 | 838 |
| Ammonia | mg/L | 33 | 59.9 | 67.2 | 24 | 0.6 | 52.9 |
| Biochemical Oxygen Demand | mg/L | <2.3 | 11 | 8.4 | 4.2 | <2.0 | 8 |
| Bromide | mg/L | <2 | 2.1 | 2 | 1 | <2 | 2.2 |
| Carbonaceous Biochemical Oxygen Demand | mg/L | <3.0 | 4.3 | 4 | <2.0 | <2.0 | 3.9 |
| Chloride | mg/L | 330 | 620 | 596 | 237 | 7.3 | 504 |
| Conductivity - Field | µS/cm | 2330 | 3490 | 3840 | 1670 | 459 | 3120 |
| Iron | mg/L | 17.6 | 15.8 | 22.8 | 0.3 | 0.08 | 3.82 |
| pH - Field | units | 6.54 | 6.54 | 6.61 | 7 | 7.34 | 6.69 |
| Phenols - total | µg/L | 2 | 4 | 9 | <1 | <1 | 6 |
| Potassium | mg/L | 28.3 | 58.3 | 51.6 | 22.2 | 3.8 | 48.1 |
| Sodium | mg/L | 164 | 352 | 370 | 130 | 10 | 316 |
| Strontium | mg/L | 0.61 | 0.81 | 0.8 | 0.39 | 0.17 | 0.66 |
| Temperature - Field | °C | 12.8 | 12 | 12.4 | 10.9 | 15.5 | 13 |
| Total Kjeldahl Nitrogen | mg/L | 36 | 76.4 | 71.6 | 30.6 | 26 | 63.5 |
| Total Suspended Solids | mg/L | 10.4 | 36 | 33.3 | 2.4 | <2.0 | 16 |

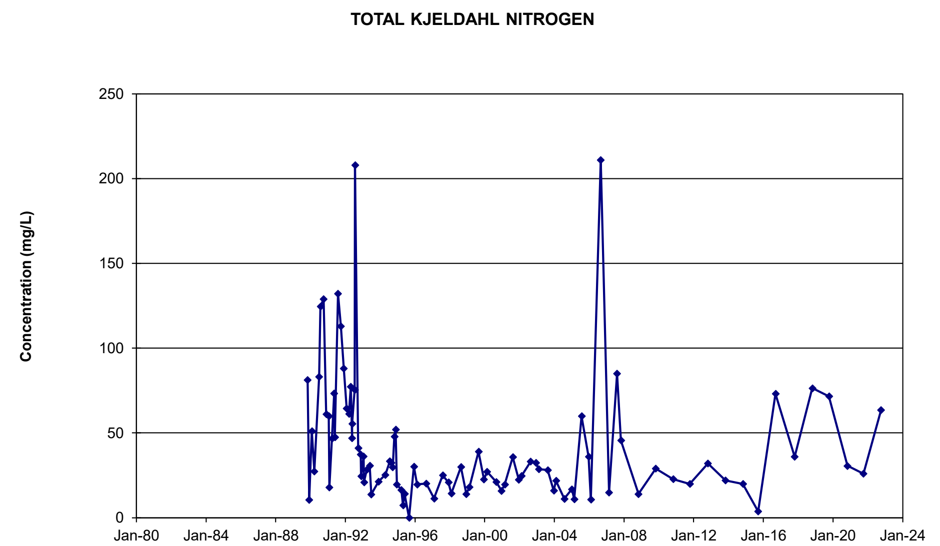
# Figure E.10

## Time Concentration Graphs - Interceptor Trench: MH4



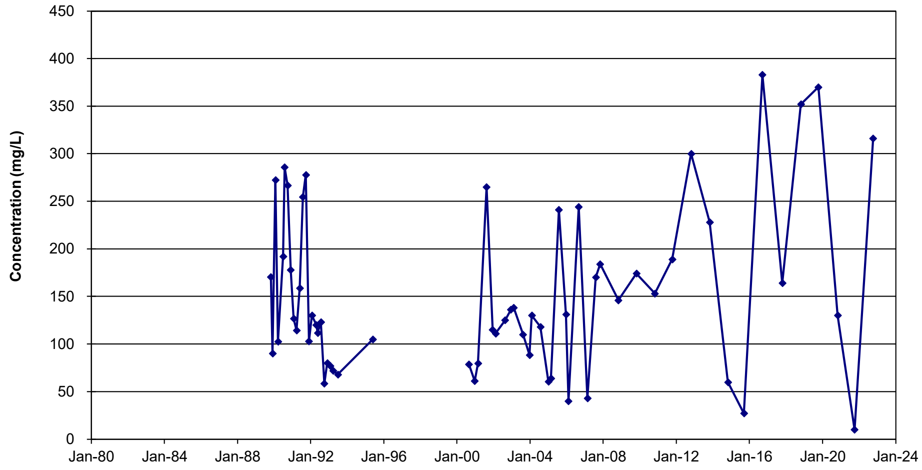



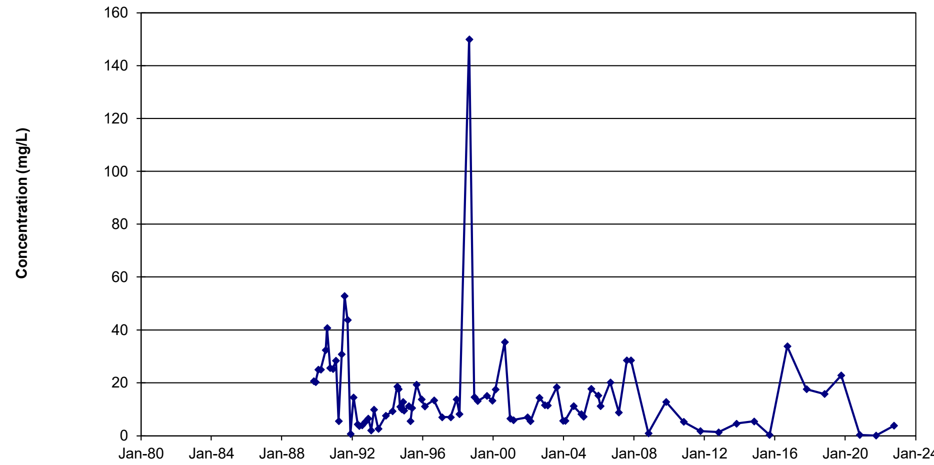
## Figure E.11

### Time Concentration Graphs - Interceptor Trench: MH4

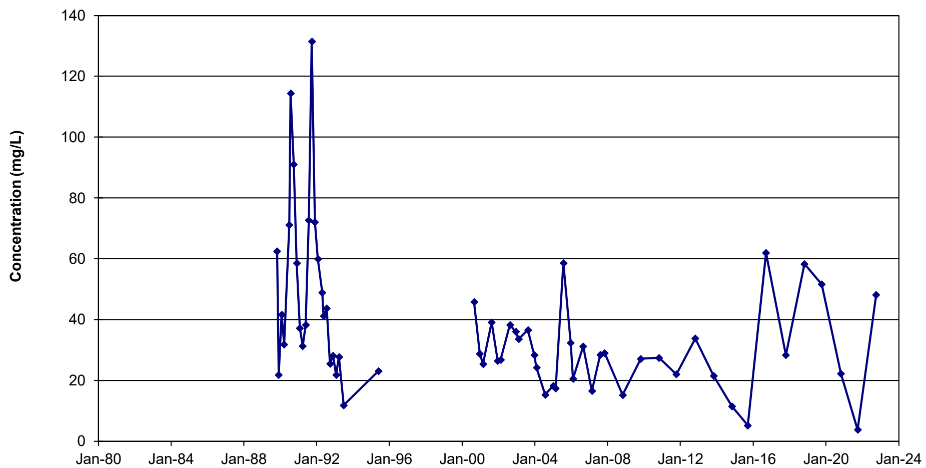
**SODIUM**



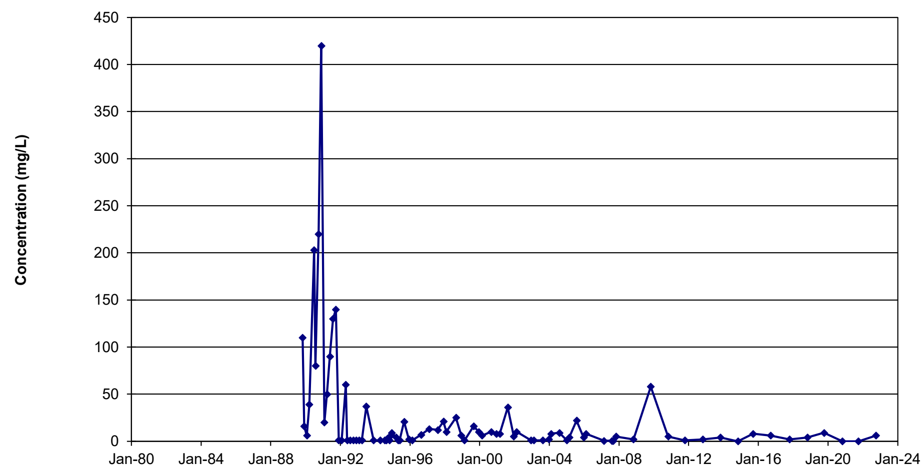

**IRON**




**POTASSIUM**




**PHENOLS**



# APPENDIX

# F

## IMPACT OF LEACHATE ON WASTE WATER TREATMENT PLANT

# IMPACT OF LEACHATE FROM PETERBOROUGH COUNTY/CITY WASTE MANAGEMENT FACILITY ON PETERBOROUGH WASTE WATER TREATMENT PLANT

## TABLE OF CONTENTS

## 1.0 Introduction

This Appendix was prepared to update the annual assessment of leachate quality from the South Fill Area (SFA) and North Fill Area (NFA) of the Peterborough County/City Waste Management Facility (PCCWMF), specifically with respect to its expected impact on the operation of the Peterborough Waste Water Treatment Plant (WWTP).

Leachate collected from the SFA and NFA flows to a respective pump station. From the pump stations, leachate is directed through 150 mm diameter forcemains to the City of Peterborough's (City) sanitary sewer at Neil Drive. Leachate and the raw wastewater collected in the municipal system subsequently drain by gravity to the WWTP.

The potential impact of the quantity and quality of leachate discharge from the landfill forcemain on the WWTP was assessed based on available data.

## 2.0 Data Reviewed

Totalizer readings from a flow meter on the leachate forcemain are recorded on a regular basis. Leachate quantities discharged to the City's sanitary sewer were based on records collected by City Staff.

The analytical data reviewed were based on leachate holding tank samples collected by the City's Environmental Sampling Crew. Collected samples were analyzed at the WWTP laboratory or sent to a third party Canadian Association of Environmental Analytical Laboratories (CAEAL) accredited laboratory for analysis.

All samples collected were grab samples. Samples were collected in March and October 2022 for analysis and comparison to select parameters in the City of Peterborough Sewer Use By-Law No.15-075 (By-Law).

## 3.0 Leachate Quantity Assessment

The 2022 monthly recorded leachate flow rates from the holding tank are presented in Table F.1. Based on these recorded readings the following was observed:

- April had the highest average daily flow of leachate with 192 cubic metres per day ($m^3/d$).
- August had the lowest average daily flow rate of leachate with 31 cubic metres per day ($m^3/d$).
- The average daily leachate flow rate in 2022 was 68 $m^3/d$. This was a 60% decrease from 2021.
- A historical low was reached in August 2022 for daily leachate flow from the PCCWMF to the WWTP, which was 31 $m^3/d$.

The 2022 average daily influent sewage flow to the Peterborough WWTP, from all sources, was 39,246 $m^3/d$ (compared to the average design capacity of 54,500 $m^3/d$). During 2022, the average influent volume from the PCCWMF to the WWTP was 0.17% of the total influent flow volume, which is considered insignificant in terms of hydraulic load. April 2022 had the highest fraction of influent leachate at the WWTP with leachate providing 0.40% of the total WWTP influent hydraulic load.

## 4.0 Leachate Quality Assessment

### 4.1 By-Law Criteria

The City of Peterborough regulates discharges to the sanitary sewer system under City By-Law 15-075. Analytical results for the 2022 leachate samples are compared with By-Law limits in Table E.3 (in Appendix E). The concentrations of general chemistry, metal, and VOC parameters for the 2022 samples were all below the By-Law criteria with the exceptions of:

- Total Kjeldahl Nitrogen (TKN) in the SFA and NFA holding tanks sampled both in March and October 2022.
- Nonyl-phenols in the SFA holding tank sampled in March and October 2022, and in the NFA holding tank sampled in October 2022.

### 4.2 Leachate Loading on the WWTP

The loading of leachate contaminants on the WWTP was reviewed for key parameters based on two sampling events in 2022 and the recorded leachate flow to the sanitary sewer for the months of the sampling events. The overall loading on the WWTP from all sources was estimated from available monthly flow data and influent concentrations. Table F.2 provides the leachate contaminant loadings on the WWTP for these key parameters.

Review of both the leachate discharge and the WWTP influent for both sample collection dates indicates that:

- Total Suspended Solids (TSS) from landfill leachate contributed 0.01% in March 2022 and 0.01% in October 2022 of the TSS loading treated by the WWTP;
- Phosphorus from landfill leachate contributed 0.04% in March 2022 and 0.05% in October 2022 of the phosphorus loading treated by the WWTP;
- Chemical Oxygen Demand (COD) from landfill leachate contributed 0.06% in March 2022 and 0.12% in October 2022 of the overall COD loading treated by the WWTP.
- Biochemical Oxygen Demand ($BOD_5$) from landfill leachate contributed 0.02% in March 2022 and 0.01% in October 2022 of the $BOD_5$ loading treated by the WWTP; and
- TKN from landfill leachate contributed 0.8% in March 2022 and 1.2% in October 2022 of the TKN loading treated by the WWTP;

Based on the above, the loading from the landfill leachate to the WWTP generally represents a small portion of the total contaminant loading.

In general, the range of leachate flows and organic loadings discharged to the WWTP represent only a small fraction of the plant’s total capacity. Considering that the WWTP is reportedly operating in compliance with its approvals criteria, leachate does not create any WWTP compliance issues. In accordance with the Environmental Compliance Approval for the Site, the potential impact of leachate on the City’s WWTP should continue to be evaluated.

## 5.0 Summary and Recommendations

Landfill leachate from the Site that is discharged via the forcemain along Bensfort Road to the City of Peterborough sanitary sewer system:

- Is considered insignificant with respect to leachate hydraulic loading on the WWTP, as even during the peak leachate discharge periods the leachate flow accounts for less than 1 percent of the overall average sewage flow;
- All leachate samples were below the By-Law criteria with the exceptions of TKN in the SFA and NFA holding tank sampling events in March and October 2022, nonyl-phenols in the SFA holding tank sampled in March and October 2022, and nonyl-phenols in the NFA holding tank sampled in October 2022.
- $BOD_5$, TSS, phosphorus and COD loads on the WWTP from landfill leachate are low and represent only a small portion of the WWTP capacity; and
- TKN load on the WWTP appears to be in the range of 0.8% and 1.2%, which is still considered significantly low.

The potential impact of landfill leachate on the WWTP should continue to be evaluated on an annual basis.

**TABLE F.1**
**2022 Leachate and Peterborough WWTP Flow Rates**
**2022 ANNUAL MONITORING REPORT**
**Peterborough County/City Waste Management Facility**

| Month | Monthly Leachate Volume to Sewer from PCCWMF | Average Daily Leachate Flow from PCCWMF | Total WWTP Influent Flow | % Leachate of WWTP Influent |
|---|---|---|---|---|
| | ($m^3$/month) | ($m^3$/d) | ($m^3$/d) | (%) |
| January | 3,110 | 100 | 36,699 | 0.27% |
| February | 1,148 | 41 | 40,047 | 0.10% |
| March | 1,906 | 61 | 56,531 | 0.11% |
| April | 5,764 | 192 | 47,559 | 0.40% |
| May | 2,159 | 70 | 41,989 | 0.17% |
| June | 2,556 | 85 | 42,030 | 0.20% |
| July | 1,172 | 38 | 34,919 | 0.11% |
| August | 946 | 31 | 33,952 | 0.09% |
| September | 1,328 | 44 | 33,116 | 0.13% |
| October | 1,477 | 48 | 32,699 | 0.15% |
| November | 1,044 | 35 | 33,250 | 0.10% |
| December | 2,091 | 67 | 38,165 | 0.18% |
| **Total Volume ($m^3$)** | 24,700 | | | |
| Maximium | 5,764 | 192 | 56,531 | 0.40% |
| Minimum | 946 | 31 | 32,699 | 0.09% |
| Average | 2,058 | 68 | 39,246 | 0.17% |
| **Historical Range (1990-2022)** | | 31-473 | | |

**Table F.2**
**Leachate Loading on WWTP 2022**
**2022 ANNUAL MONITORING REPORT**
**Peterborough County/City Waste Management Facility**

| | | March-22 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | WWTP | | | Leachate | | | Loading as a Percentage of WWTP loading | Sewer Use Bylaw Criteria (mg/L) |
| ANALYTE | UNIT | Conc. (mg/L) | Flow (ML/d) | Loading (kg/d) | Conc. (mg/L) | Flow (ML/d) | Loading (kg/d) | | |
| TSS | mg/L | 248 | 56.531 | 14,009 | 19.1 | 0.061 | 1.2 | 0.01% | 350 |
| Phosphorous | mg/L | 2.86 | 56.531 | 162 | 1.17 | 0.061 | 0.1 | 0.04% | 10 |
| COD | mg/L | 338 | 56.531 | 19,095 | 194.9 | 0.061 | 11.9 | 0.06% | |
| BOD-5 | mg/L | 154 | 56.531 | 8,697 | 27.3 | 0.061 | 1.7 | 0.02% | 300 |
| TKN | mg/L | 25.1 | 56.531 | 1,421 | *196.5 | 0.061 | 12.0 | 0.8% | 100 |

| | | October-22 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | WWTP | | | Leachate | | | Loading as a Percentage of WWTP loading | Sewer Use Bylaw Criteria (mg/L) |
| ANALYTE | UNIT | Conc. (mg/L) | Flow (ML/d) | Loading (kg/d) | Conc. (mg/L) | Flow (ML/d) | Loading (kg/d) | | |
| TSS | mg/L | *378 | 32.699 | 12,367 | 31.3 | 0.048 | 1.5 | 0.01% | 350 |
| Phosphorous | mg/L | 4.64 | 32.699 | 152 | 1.70 | 0.048 | 0.1 | 0.05% | 10 |
| COD | mg/L | 613 | 32.699 | 20,055 | 493.0 | 0.048 | 23.7 | 0.12% | |
| BOD-5 | mg/L | 270 | 32.699 | 8,841 | 22.6 | 0.048 | 1.1 | 0.01% | 300 |
| TKN | mg/L | 40.5 | 32.699 | 1,324 | *328.0 | 0.048 | 15.7 | 1.2% | 100 |

Notes: 1. WWTP loads based on flow and concentrations measured on or near specified date.
2. Leachate load based on quality sampling results from specified date and monthly average leachate flow rate.
3. Leachate data taken from NFA and SFA samples. Samples proportioned 24.8% SFA and 75.2% NFA for March 2022 and 63.2% SFA and 36.8% NFA for October 2022 based on leachate quantities pumped in 2022.
4. * indicates exceedances from the Sewer Use Bylaw Criteria.

# APPENDIX

# G

## HYDROGEOLOGIC DETAILS

**Table G.1**
**Groundwater Monitor Details**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| MONITOR | Borehole Diameter (mm) | Monitor Stick Up (m) | T.O.P. ELEVATION (mASL) | Ground Elevation (mASL) | Screen Bottom / Interval (mASL) | Filter Pack Interval (mASL) | Lower Seal Interval (mASL) | Surface Seal Interval (mASL) | Backfill Interval (mASL) | Monitor Type |
|---|---|---|---|---|---|---|---|---|---|---|
| 3-I | 185 | | 190.98 | 190.98 | 183.88 | 183.88 | 188.91 | | | bedrock piezometer |
| 3-II | 185 | 0.70 | 190.26 | 189.56 | 185.48 | 185.48 | 183.28 | | | overburden standpipe |
| 5-IV | 185 | 0.70 | 196.30 | 195.60 | 181.78-182.54 | 181.78-183.58 | 183.58-195.6 | | 181.58-181.78 | deep bedrock piezometer |
| 8-I | 95 | 1.12 | 199.90 | 198.78 | 183.81 | 183.81 | 197.23 | | | bedrock piezometer |
| 8-II | 185 | 1.09 | 199.87 | 198.78 | 191.85 | 191.85 | 190.4 | | | overburden piezometer |
| 8-III | 185 | 0.65 | 199.53 | 198.88 | 192.84-197.41 | 192.84-197.78 | 197.78-198.88 | | | overburden standpipe |
| 10-I | 185 | 0.25 | 231.23 | 230.98 | 213.28 | 213.28 | 230.43 | | | overburden piezometer |
| 10-II | 185 | 0.27 | 231.22 | 230.95 | 219.25 | 219.25 | 218.82 | | | overburden standpipe |
| 13 | 185 | 0.21 | 238.96 | 238.75 | 225.95 | 225.95 | 236.68 | | | perched sand standpipe |
| 15A | 185 | 0.44 | 189.78 | 189.34 | 184.86 | 184.86 | | | | overburden piezometer |
| 15B | 185 | 0.58 | 189.80 | 189.22 | 185.38 | 185.38 | | | | overburden standpipe |
| 15-I | 185 | 0.78 | 190.12 | 189.34 | 183.41-183.94 | 183.41-183.86 | 183.86-187.82 | | | bedrock piezometer |
| 16A | 94 | 0.95 | 196.78 | 195.83 | 184.95 | 184.95 | | | | bedrock piezometer |
| 16C | 185 | 0.78 | 196.64 | 195.97 | 186.08-193.7 | 186.08-193.7 | 193.7-195.97 | | | overburden standpipe |
| 17A | 94 | 0.77 | 193.31 | 192.54 | 183.88-184.34 | 183.88-184.94 | 184.94-186.34 | | | bedrock piezometer |
| 17B | 185 | 0.76 | 193.33 | 192.57 | 186.63-190.17 | 186.63-190.77 | 190.77-191.37 | | | overburden standpipe |
| 17-I | 185 | 0.75 | 193.17 | 192.42 | 179.1-179.86 | 179.1-180.47 | 180.47-192.42 | | 178.8-179.1 | deep bedrock piezometer |
| 18A | 94 | 0.58 | 189.86 | 189.28 | 183.82-184.08 | 183.82-184.68 | 184.68-186.28 | | | bedrock piezometer |
| 18B | 185 | 0.61 | 189.86 | 189.25 | 186.25-188.65 | 186.25-188.85 | 188.85-189.25 | | | overburden standpipe |
| 19A | 94 | 0.46 | 193.87 | 193.41 | 184.51-185.21 | 184.51-185.01 | 185.31-185.81 | | | bedrock piezometer |
| 19B | 185 | 0.54 | 193.84 | 193.30 | 186.56-190.1 | 186.56-190.1 | 190.1-191.6 | | | overburden standpipe |
| 20A | 94 | 0.61 | 190.95 | 190.34 | 183.85-184.14 | 183.85-185.14 | 185.14-186.14 | | | bedrock piezometer |
| 20B | 185 | 0.67 | 190.71 | 190.04 | 186.93-189.44 | 186.93-189.54 | 189.54-190.04 | | | overburden standpipe |
| 21A | 94 | 0.28 | 194.05 | 193.77 | 185.78 | 185.78 | | | | bedrock piezometer |
| 21B | 185 | 0.72 | 194.66 | 193.94 | 190.13 | 190.13 | | | | overburden standpipe |
| 21C | 185 | 0.12 | 193.94 | 193.82 | 188.03 | 188.03 | | | | overburden piezometer |
| 22 | | 0.66 | 207.47 | 206.81 | 193.4 | 193.4 | | | | refuse standpipe |
| 23A | 185 | 0.64 | 207.45 | 206.81 | 193.09-193.7 | 193.09-194.31 | 194.31-194.62 | | | overburden piezometer |
| 23B | 185 | 0.65 | 207.40 | 206.75 | 195.78-199.43 | 195.78-205.99 | 205.99-206.75 | | | refuse standpipe |
| 24A | 185 | 0.61 | 208.67 | 208.06 | 194.25-194.86 | 194.25-195.56 | 195.56-197.09 | | | overburden piezometer |
| 24B | 185 | 0.50 | 208.37 | 207.87 | 196.29-200.86 | 196.29-207.11 | 207.11-207.41 | | | refuse standpipe |
| 28 | 94 | 0.62 | 193.86 | 193.24 | 185.16-185.77 | 185.16-185.86 | 185.86-186.05 | | | bedrock piezometer |

**Table G.1**
**Groundwater Monitor Details**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| MONITOR | Borehole Diameter (mm) | Monitor Stick Up (m) | T.O.P. ELEVATION (mASL) | Ground Elevation (mASL) | Screen Bottom / Interval (mASL) | Filter Pack Interval (mASL) | Lower Seal Interval (mASL) | Surface Seal Interval (mASL) | Backfill Interval (mASL) | Monitor Type |
|---|---|---|---|---|---|---|---|---|---|---|
| 30-I | 94 | 0.72 | 190.26 | 189.54 | 182.32-183.02 | 182.32-184.88 | 184.88-185.24 | 186.49-189.54 | | bedrock piezometer |
| 30-II | 105 | 0.87 | 190.45 | 189.58 | 185.56-188.50 | 185.56-188.67 | 188.67-189.58 | | | overburden standpipe |
| 31-I | 94 | 0.89 | 190.29 | 189.40 | 175.90-176.64 | 175.90-178.70 | 178.70-189.40 | | | bedrock piezometer |
| 31-II | 105 | 1.02 | 190.42 | 189.40 | 184.85-187.68 | 184.85-188.8 | 188.8-189.4 | | | overburden standpipe |
| 33-I | 94 | 0.83 | 196.96 | 196.13 | 182.47-183.23 | 182.47-183.48 | 183.48-196.13 | | | deep bedrock piezometer |
| 33-II | 185 | 1.13 | 197.16 | 196.03 | 186.74-187.50 | 186.74-188.28 | 188.28-189.18 | 190.32-196.03 | | overburden piezometer |
| 33-III | 185 | 1.07 | 197.10 | 196.03 | 192.78-195.75 | 192.78-195.75 | 195.75-196.03 | | | overburden standpipe |
| 37-I | 94 | 0.97 | 195.88 | 194.92 | 181.12-181.92 | 181.12-184.18 | 184.22-194.92 | | | bedrock piezometer |
| 37-II | 185 | 0.92 | 195.97 | 195.04 | 191.64-194.24 | 191.64-194.24 | 194.24-195.04 | | 188.94-191.64 | overburden standpipe |
| 38-I | 94 | 0.68 | 198.33 | 197.65 | 180.60-181.04 | 180.60-181.04 | 181.04-191.55 | | | deep bedrock piezometer |
| 38-II | 185 | 0.96 | 198.74 | 197.78 | 187.52-188.28 | 187.52-189.71 | 189.71-192.45 | 193.21-197.78 | | overburden piezometer |
| 38-III | 185 | 0.99 | 198.77 | 197.78 | 193.21-196.26 | 193.21-196.88 | 196.88-197.78 | | | overburden standpipe |
| 40-I | 94 | 0.99 | 196.25 | 195.27 | 181.37-182.07 | 181.37-182.87 | 182.87-195.27 | | | bedrock piezometer |
| 40-II | 105 | 0.97 | 196.24 | 195.27 | 190.67-193.77 | 190.67-194.47 | 194.47-195.27 | | | overburden standpipe |
| 41-I | 94 | 0.79 | 198.05 | 197.27 | 179.90-180.66 | 179.90-181.27 | 181.27-192.39 | 196.66-197.27 | | deep bedrock piezometer |
| 41-II | 94 | 0.81 | 198.19 | 197.39 | 184.44-185.20 | 184.44-185.93 | 185.93-195.56 | 196.78-197.39 | | bedrock piezometer |
| 41-III | 185 | 0.81 | 198.08 | 197.27 | 192.76-195.81 | 192.76-196.66 | 196.66-197.27 | | | overburden standpipe |
| 42-I | 94 | 0.79 | 215.13 | 214.34 | 187.97-188.74 | 187.97-189.44 | 189.44-203.52 | 206.11-214.34 | 187.68-187.97 | overburden piezometer |
| 42-II | 185 | 0.87 | 215.20 | 214.33 | 204.3-204.76 | 204.3-205.64 | 205.64-213.11 | 214.03-214.33 | | overburden piezometer |
| 42-III | 185 | 0.77 | 215.12 | 214.35 | 206.27-209.32 | 206.27-211 | 211-214.35 | | | overburden standpipe |
| 43-I | 94 | 0.62 | 228.50 | 227.88 | 200.01-200.71 | 200.01-201.48 | 201.48-220.87 | 226.17-227.88 | 198.47-200.01 | overburden piezometer |
| 43-II | 85 | 0.48 | 228.76 | 228.28 | 208.77-209.44 | 208.77-209.87 | 209.87-215.48 | 225.28-228.28 | | overburden piezometer |
| 43-III | 185 | 0.63 | 228.51 | 227.88 | 221.05-225.56 | 221.05-226.17 | 226.17-226.97 | | | overburden standpipe |
| 44-I | 94 | 0.98 | 197.64 | 196.66 | 175.26-175.96 | 175.26-177.46 | 177.46-196.66 | | | deep bedrock piezometer |
| 44-II | 94 | 0.98 | 197.73 | 196.74 | 179.98-180.76 | 179.98-183.03 | 183.03-196.74 | | | bedrock piezometer |
| 44-III | 185 | 0.99 | 197.73 | 196.74 | 192.14-195.24 | 192.14-195.94 | 195.94-196.74 | | | overburden standpipe |
| 45 | 105 | 0.69 | 196.28 | 195.59 | 190.97-193.91 | 190.97-194.78 | 194.78-195.59 | | 190.56-190.97 | overburden standpipe |
| 46-I | 94 | 0.67 | 194.71 | 194.04 | 174.99-175.51 | 174.99-175.84 | 175.84-194.04 | | 174-174.99 | bedrock piezometer |
| 46-II | 185 | 0.56 | 194.86 | 194.30 | 186.89-187.48 | 186.89-187.6 | 187.6-194.3 | | | overburden piezometer |
| 46-III | 185 | 0.59 | 194.89 | 194.30 | 191.51-193.68 | 191.51-193.99 | 193.99-194.3 | | | overburden standpipe |
| 47 | 105 | 0.70 | 195.62 | 194.92 | 190.44-193.38 | 190.44-194.01 | 194.01-194.92 | | 190.02-190.44 | overburden standpipe |
| 48 | 105 | 0.76 | 196.59 | 195.83 | 191.17-194.11 | 191.17-194.92 | 194.92-195.83 | | | overburden standpipe |
| 49 | 105 | 0.74 | 197.31 | 196.57 | 192.04-194.98 | 192.04-195.75 | 195.75-196.57 | | | overburden standpipe |

**Table G.1**
**Groundwater Monitor Details**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| MONITOR | Borehole Diameter (mm) | Monitor Stick Up (m) | T.O.P. ELEVATION (mASL) | Ground Elevation (mASL) | Screen Bottom / Interval (mASL) | Filter Pack Interval (mASL) | Lower Seal Interval (mASL) | Surface Seal Interval (mASL) | Backfill Interval (mASL) | Monitor Type |
|---|---|---|---|---|---|---|---|---|---|---|
| 50-I | 94 | 0.59 | 194.58 | 193.99 | 182.62-183.17 | 182.62-183.68 | 183.68-193.99 | | 181.62-182.62 | bedrock piezometer |
| 50-II | 185 | 0.67 | 194.74 | 194.07 | 186.06-186.66 | 186.06-187.15 | 187.67-193.87 | | | overburden piezometer |
| 50-III | 185 | 0.56 | 194.48 | 193.92 | 187.7-193.48 | 187.7-193.52 | 193.52-193.92 | | 187.39-187.7 | overburden standpipe |
| 51-I | 91 | 0.67 | 190.27 | 189.60 | 181.54-182.13 | 181.54-182.45 | 182.45-189.6 | | | bedrock piezometer |
| 52-I | 94 | 0.68 | 189.95 | 189.27 | 181.84-182.36 | 181.84-182.69 | 182.69-189.27 | | 181.39-181.84 | bedrock piezometer |
| 52-II | 51 | 1.26 | 190.31 | 189.04 | 187.21-188.00 | 187.21-188.13 | 188.13-189.04 | 188.84-189.04 | | overburden standpipe |
| 53-I | 94 | 0.79 | 196.73 | 195.94 | 184.29-184.69 | 184.29-185.08 | 185.08-195.94 | | 182.4-184.29 | bedrock piezometer |
| 53-II | 185 | 0.74 | 196.78 | 196.04 | 189.15-194.93 | 189.15-195.29 | 195.29-196.04 | | | overburden standpipe |
| 54-I | 94 | 0.51 | 195.50 | 194.99 | 180.24-181.15 | 180.24-181.3 | 181.3-194.99 | | | deep bedrock piezometer |
| 54-II | 185 | 0.45 | 196.05 | 195.60 | 188.96-194.91 | 188.96-195.03 | 195.03-195.6 | | | overburden standpipe |
| 59-I | 185 | 0.90 | 201.44 | 200.54 | 192.36-193.11 | 192.36-193.5 | 193.5-200.54 | | | overburden piezometer |
| 59-II | 185 | 0.97 | 201.40 | 200.43 | 195.6-199.97 | 195.6-200.18 | 200.18-200.43 | | | overburden standpipe |
| 61-I | 96 | 0.81 | 195.60 | 194.79 | 173.02-173.78 | 173.02-174.37 | 174.37-194.79 | | | bedrock piezometer |
| 61-II | 205 | 0.81 | 195.76 | 194.95 | 181.18-181.94 | 181.18-182.25 | 182.25-194.95 | | | overburden piezometer |
| 61-III | 104 | 0.59 | 195.66 | 195.07 | 190.12-194.69 | 190.12-194.77 | 194.77-195.07 | | | overburden standpipe |
| 62-I | 96 | 0.83 | 191.95 | 191.12 | 183-183.76 | 183-184.24 | 184.24-191.12 | | | deep bedrock piezometer |
| 62-II | 205 | 0.79 | 192.01 | 191.22 | 186.88-190.69 | 186.88-190.82 | 190.82-191.22 | | | overburden standpipe |
| 63-I | 96 | 0.76 | 193.29 | 192.53 | 170.76-171.52 | 170.76-171.8 | 171.8-192.53 | | | deep bedrock piezometer |
| 63-II | 205 | 0.77 | 193.28 | 192.51 | 175.78-176.54 | 175.78-177.42 | 177.42-192.51 | | | overburden piezometer |
| 63-III | 104 | 0.48 | 192.98 | 192.50 | 187-191.57 | 187-192.2 | 192.2-192.5 | | | overburden standpipe |
| 64-I | 96 | 0.85 | 190.10 | 189.25 | 182.87-183.63 | 182.87-183.95 | 183.95-189.25 | | 182.7-182.87 | deep bedrock piezometer |
| 64-II | 205 | 0.80 | 190.16 | 189.36 | 185.8-188.85 | 185.8-188.96 | 188.96-189.36 | | | overburden piezometer |
| 65-I | 205 | 0.81 | 198.06 | 197.25 | 191.45-196.02 | 191.45-196.85 | 196.85-197.25 | | | overburden standpipe |
| 66-I | 96 | 0.69 | 199.06 | 198.37 | 184.54-185.3 | 184.54-185.54 | 185.54-198.37 | | 184.12-184.54 | deep bedrock piezometer |
| 66-II | 205 | 0.81 | 199.13 | 198.32 | 190.1-190.86 | 190.1-191.2 | 191.2-198.32 | | | overburden piezometer |
| 66-III | 104 | 0.76 | 198.92 | 198.16 | 193.39-197.2 | 193.39-197.66 | 197.66-198.16 | | 193.28-193.39 | overburden standpipe |
| 70-I | 96 | 0.86 | 195.05 | 194.19 | 172.83-173.59 | 172.83-174.07 | 174.07-194.19 | | 171.94-172.83 | bedrock piezometer |
| 70-II | 205 | 1.72 | 195.97 | 194.25 | 180.43-181.19 | 180.43-181.75 | 181.75-194.25 | | | overburden piezometer |
| 70-III | 104 | 0.63 | 194.91 | 194.28 | 189.4-193.98 | 189.4-194.08 | 194.08-194.28 | | | overburden standpipe |
| 71-I | 96 | 0.81 | 197.67 | 196.86 | 183.76-184.52 | 183.76-185.21 | 185.21-196.86 | | | bedrock piezometer |
| 71-II | 205 | 0.83 | 197.80 | 196.97 | 188.82-189.58 | 188.82-189.8 | 189.8-196.97 | | | overburden piezometer |
| 71-III | 104 | 0.87 | 197.91 | 197.04 | 192.77-196.58 | 192.77-196.74 | 196.74-197.04 | | | overburden standpipe |

**Table G.1**
**Groundwater Monitor Details**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| MONITOR | Borehole Diameter (mm) | Monitor Stick Up (m) | T.O.P. ELEVATION (mASL) | Ground Elevation (mASL) | Screen Bottom / Interval (mASL) | Filter Pack Interval (mASL) | Lower Seal Interval (mASL) | Surface Seal Interval (mASL) | Backfill Interval (mASL) | Monitor Type |
|---|---|---|---|---|---|---|---|---|---|---|
| 72-I | 96 | 0.76 | 196.56 | 195.80 | 167.31-168.07 | 167.31-168.86 | 168.86-195.8 | | 166.84-167.31 | bedrock piezometer |
| 72-II | 96 | 0.74 | 196.48 | 195.74 | 180.47-181.23 | 180.47-182.14 | 182.14-195.74 | | | overburden piezometer |
| 72-III | 104 | 0.75 | 196.51 | 195.76 | 191.19-195.76 | 191.19-195.46 | 195.46-195.76 | | 190.88-191.19 | overburden standpipe |
| 73-I | 96 | 0.81 | 195.04 | 194.23 | 177.11-177.87 | 177.11-178.76 | 178.76-194.23 | | 176.55-177.11 | bedrock piezometer |
| 73-II | 205 | 0.78 | 195.01 | 194.23 | 184.04-184.8 | 184.04-184.96 | 184.96-194.23 | | | overburden piezometer |
| 73-III | 104 | 0.72 | 194.99 | 194.27 | 188.94-193.51 | 188.94-193.97 | 193.97-194.27 | | | overburden standpipe |
| 74-I | 96 | 0.82 | 195.95 | 195.13 | 170.82-171.58 | 170.82-172.18 | 172.18-195.13 | | 170.64-170.82 | bedrock piezometer |
| 74-II | 205 | 0.78 | 195.91 | 195.13 | 181.38-182.14 | 181.38-182.5 | 182.5-195.13 | | 180.35-181.38 | overburden piezometer |
| 74-III | 104 | 0.78 | 195.99 | 195.21 | 190.12-194.69 | 190.12-194.91 | 194.91-195.21 | | | overburden standpipe |
| 75-I | 96 | 0.80 | 191.18 | 190.38 | 181.32-182.08 | 181.32-182.6 | 182.6-190.38 | | | bedrock piezometer |
| 75-II | 104 | 0.79 | 191.23 | 190.44 | 186.17-189.98 | 186.17-190.14 | 190.14-190.44 | | | overburden standpipe |
| 76-I | 185 | 0.76 | 190.49 | 189.83 | 171.08-172.43 | 171.08-173.03 | 173.03-189.83 | | | deep bedrock piezometer |
| 76-II | 185 | 0.58 | 190.41 | 189.83 | 177.31-178.07 | 177.31-178.73 | 178.73-189.83 | | | bedrock piezometer |
| 76-III | 185 | 0.43 | 190.26 | 189.83 | 183-183.75 | 183-184.33 | 184.33-189.83 | | | overburden piezometer |
| 76-IV | 185 | 0.40 | 190.23 | 189.83 | 185.31-188.36 | 185.31-188.77 | 188.77-189.83 | | | overburden standpipe |
| 77-I | 185 | 0.45 | 195.36 | 194.91 | 189.97-193.01 | 189.97-193.72 | 193.72-194.91 | | | overburden standpipe |
| 78-I | 185 | 0.58 | 195.84 | 195.26 | 191.02-193.31 | 191.02-194.16 | 194.16-195.26 | | | overburden standpipe |
| 81-I | 96 | 0.89 | 199.85 | 198.96 | 183.29-184.81 | 183.29-185.11 | 185.11-198.96 | | | bedrock piezometer |
| 81-II | 185 | 0.92 | 199.90 | 198.98 | 189.84-191.36 | 189.84-191.71 | 191.71-198.98 | | | overburden piezometer |
| 81-III | 185 | 0.96 | 200.00 | 199.04 | 193.68-198.25 | 193.68-198.62 | 198.62-199.04 | | | overburden standpipe |
| 82-I | 130 | 0.87 | 206.80 | 205.93 | 192.4-195.5 | no sand pack | 192.4-202.7 | 202.7-203.5 | | n/a |
| 83-I | 130 | 0.53 | 209.85 | 209.32 | 189.8-191.72 | 189.8-192.1 | 192.1-204.1 | 208.52-209.32 | | overburden piezometer |
| 83-II | 130 | 0.48 | 209.80 | 209.32 | 204.1-206.52 | 204.1-208.52 | | 208.52-209.32 | | overburden standpipe |
| 84-I | 130 | 0.69 | 202.17 | 201.48 | 184.4-186.1 | 184.4-186.3 | 186.3-201.48 | | | overburden piezometer |
| 84-II | 130 | 0.64 | 202.12 | 201.48 | 193.0-195.0 | 193.0-195.5 | 195.5-201.48 | | | overburden standpipe |
| 85-I | 130 | 0.65 | 198.80 | 198.15 | 184.3-186.3 | 184.3-186.6 | 186.6-196.6 | 197.8-198.15 | 196.6-197.8 | overburden piezometer |
| 85-II | 130 | 0.60 | 198.75 | 198.15 | 193.0-195.4 | 193.0-196.6 | | 197.8-198.15 | 196.6-197.8 | overburden standpipe |
| 86-I | 130 | 0.85 | 195.73 | 194.88 | 176.1-178.1 | 176.1-178.3 | 178.3-193.7 | 193.7-194.88 | | bedrock piezometer |
| 86-II | 130 | 0.81 | 195.69 | 194.88 | 185.9-187.7 | 185.9-187.9 | 187.9-193.9 | 193.9-194.88 | | overburden piezometer |
| 86-III | 130 | 0.87 | 195.75 | 194.88 | 190.3-193.3 | 190.3-193.5 | 193.5-193.9 | 193.9-194.88 | | overburden standpipe |
| 87-I | 130 | 0.86 | 200.35 | 199.49 | 182.3-184.1 | 182.3-185.2 | 185.2-198.5 | 198.5-199.49 | | bedrock piezometer |
| 87-II | 130 | 0.82 | 200.31 | 199.49 | 190.3-191.9 | 190.3-192.3 | 192.3-198.5 | 198.5-199.49 | | overburden piezometer |
| 87-III | 130 | 0.90 | 200.39 | 199.49 | 194.9-197.8 | 194.9-198.0 | 198.0-198.3 | 198.3-199.49 | | overburden standpipe |

**Table G.1**
**Groundwater Monitor Details**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| MONITOR | Borehole Diameter (mm) | Monitor Stick Up (m) | T.O.P. ELEVATION (mASL) | Ground Elevation (mASL) | Screen Bottom / Interval (mASL) | Filter Pack Interval (mASL) | Lower Seal Interval (mASL) | Surface Seal Interval (mASL) | Backfill Interval (mASL) | Monitor Type |
|---|---|---|---|---|---|---|---|---|---|---|
| 88-I | 130 | 0.91 | 207.52 | 206.61 | 186.3-187.8 | 186.3-188.4 | 188.4-205.6 | 205.6-206.61 | | bedrock piezometer |
| 88-II | 130 | 0.91 | 207.52 | 206.61 | 196.6-198.21 | 196.6-198.6 | 198.6-205.6 | 205.6-206.61 | | overburden piezometer |
| 88-III | 130 | 0.76 | 207.37 | 206.61 | 201.0-204.0 | 201.0-204.6 | 204.6-205.6 | 205.6-206.61 | | overburden standpipe |
| 89-I | 130 | 0.28 | 202.77 | 202.49 | 180.5-182.1 | 180.5-182.5 | 182.5-201.5 | 201.5-202.49 | | bedrock piezometer |
| 89-II | 130 | 0.65 | 203.14 | 202.49 | 188.7-190.4 | 188.7-190.7 | 190.7-201.5 | 201.5-202.49 | | overburden piezometer |
| 89-III | 130 | 0.73 | 203.22 | 202.49 | 195.7-198.9 | 195.7-199.7 | 199.7-201.5 | 201.5-202.49 | | overburden standpipe |
| 90-I | 130 | 0.93 | 204.38 | 203.45 | 188.0-189.5 | 188.0-189.9 | 189.9-203.0 | 203.0-203.45 | | bedrock piezometer |
| 90-II | 130 | 0.61 | 204.06 | 203.45 | 194.5-196.0 | 194.5-196.3 | 196.3-202.5 | 202.5-203.45 | | overburden piezometer |
| 90-III | 130 | 0.73 | 204.18 | 203.45 | 197.9-201.1 | 197.9-201.7 | 201.7-202.5 | 202.5-203.45 | | overburden standpipe |
| 91-I | 130 | 0.88 | 206.55 | 205.67 | 190.7-192.1 | 190.7-193.3 | 193.3-204.7 | 204.7-205.67 | | bedrock piezometer |
| 91-II | 130 | 0.89 | 206.56 | 205.67 | 196.5-198.1 | 196.5-199.6 | 199.6-204.7 | 204.7-205.67 | | overburden piezometer |
| 91-III | 130 | 1.02 | 206.69 | 205.67 | 200.1-203.5 | 200.1-203.7 | 203.7-204.7 | 204.7-205.67 | | overburden standpipe |
| 92-I | 130 | 0.86 | 200.46 | 199.60 | 183.6-185.2 | 183.6-185.6 | 185.6-198.6 | 198.6-199.60 | | bedrock piezometer |
| 92-II | 130 | 0.87 | 200.47 | 199.60 | 190.6-192.3 | 190.6-192.4 | 192.4-198.6 | 198.6-199.60 | | overburden piezometer |
| 92-III | 130 | 0.88 | 200.48 | 199.60 | 193.8-197.1 | 193.8-197.6 | 197.6-198.6 | 198.6-199.60 | | overburden standpipe |
| 93-I | 130 | 0.62 | 197.67 | 197.05 | 187.9-189.5 | 187.9-190.1 | 190.1-196.3 | 196.3-197.05 | | overburden piezometer |
| 93-II | 130 | 0.71 | 197.76 | 197.05 | 193.9-195.7 | 193.9-196.1 | 196.1-196.3 | 196.3-197.05 | | overburden standpipe |
| 94-I | 130 | 0.78 | 196.80 | 196.02 | 185.19-186.56 | 184.15-184.75 | 187.15-195.29 | | 195.29-196.02 | overburden piezometer |
| 94-II | 130 | 0.86 | 196.88 | 196.02 | 193.53-194.90 | 193.36-195.14 | 195.14-195.29 | | 195.29-196.02 | overburden standpipe |
| 95-I | 130 | 0.00 | 195.51 | 195.51 | 184.7-186.9 | 184.7-187.1 | 187.1-194.7 | 194.7-195.51 | | overburden piezometer |
| 95-II | 130 | -0.02 | 195.49 | 195.51 | 192.7-194.3 | 192.7-194.8 | | 194.8-195.51 | | overburden standpipe |
| 100-I | 96 | 0.73 | 200.35 | 199.62 | 184.32-185.84 | 184.32-186.36 | 185.84-199.62 | | | bedrock piezometer |
| 100-II | 200 | 0.68 | 200.41 | 199.73 | 190.83-192.35 | 190.83-193.02 | 193.02-199.73 | | | overburden piezometer |
| 100-III | 200 | 0.63 | 200.33 | 199.70 | 195.40-198.45 | 195.40-198.79 | 198.79-199.70 | | | overburden standpipe |
| 101-I | 96 | 0.53 | 219.70 | 219.17 | 184.60-186.27 | 184.60-186.57 | 186.57-219.17 | | | bedrock piezometer |
| 101-II | 200 | 0.59 | 219.64 | 219.04 | 202.54-204.07 | 202.54-204.84 | 204.84-219.04 | | | overburden piezometer |
| 101-III | 200 | 0.60 | 219.51 | 218.92 | 212.82-215.87 | 212.82-216.42 | 216.42-218.92 | | | overburden standpipe |
| 104-I | 130 | 0.89 | 205.53 | 204.64 | 183.9-185.1 | 183.9-185.6 | 185.6-203-6 | 203.6-204.64 | | bedrock piezometer |
| 104-II | 130 | 0.94 | 205.58 | 204.64 | 197.1-198.24 | 197.1-199.6 | 199.6-201.0 | 203.6-204.65 | 201.0-203.6 | overburden piezometer |
| 104-III | 130 | 0.89 | 205.53 | 204.64 | 201.0-203.2 | 201.0-204.0 | | 204.2-204.64 | 204.0-204.2 | overburden standpipe |
| 106-I | 130 | 0.95 | 199.80 | 198.85 | 182.4-183.7 | 182.4-184.1 | 184.1-197.9 | 197.9-198.85 | | bedrock piezometer |
| 106-II | 130 | 0.90 | 199.75 | 198.85 | 191.3-192.4 | 191.3-193.5 | 193.5-197.9 | 197.9-198.85 | 194.0-197.3 | overburden piezometer |
| 106-III | 130 | 0.86 | 199.71 | 198.85 | 195.3-198.1 | 195.3-198.3 | | 198.3-198.85 | | overburden standpipe |

**Table G.1**
**Groundwater Monitor Details**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| MONITOR | Borehole Diameter (mm) | Monitor Stick Up (m) | T.O.P. ELEVATION (mASL) | Ground Elevation (mASL) | Screen Bottom / Interval (mASL) | Filter Pack Interval (mASL) | Lower Seal Interval (mASL) | Surface Seal Interval (mASL) | Backfill Interval (mASL) | Monitor Type |
|---|---|---|---|---|---|---|---|---|---|---|
| 107-I | 130 | 0.70 | 195.99 | 195.29 | 179.8-181.1 | 179.8-181.7 | 181.7-190.9 | 190.9-195.29 | | bedrock piezometer |
| 107-II | 130 | 0.80 | 196.09 | 195.29 | 186.9-188.9 | 186.9-189.5 | 189.5-194.3 | 194.3-195.29 | | overburden piezometer |
| 107-III | 130 | 0.79 | 196.08 | 195.29 | 192.3-193.8 | 192.3-195.1 | | 195.1-195.29 | | overburden standpipe |
| 108-I | | 0.99 | 206.32 | 205.33 | 190.71 | | | | | overburden piezometer |
| 108-II | | 0.80 | 206.13 | 205.33 | 194.20 | | | | | overburden piezometer |
| 108-III | | 0.58 | 205.91 | 205.33 | 200.40 | | | | | overburden standpipe |
| 109-I | | 0.89 | 199.19 | 198.30 | 181.47 | | | | | overburden piezometer |
| 109-II (5) | 130 | 1.00 | 200.10 | 199.10 | 188.58-190.11 | 188.58-190.11 | 190.11-198.64 | 198.64-199.10 | | overburden piezometer |
| 109-III | | 0.78 | 199.04 | 198.26 | 193.24 | | | | | overburden standpipe |
| 110-I | | 0.81 | 202.55 | 201.73 | 184.87 | | | | | overburden piezometer |
| 110-II | | 0.89 | 202.73 | 201.84 | 192.10 | | | | | overburden piezometer |
| 110-III | | 0.65 | 202.55 | 201.90 | 196.95 | | | | | overburden standpipe |
| 111-I | 185 | 0.52 | 200.28 | 199.76 | 186.29-184.77 | 186.88-184.74 | | 199.76-186.88 | | overburden piezometer |
| 111-II | 185 | 0.59 | 200.29 | 199.71 | 188.19-186.67 | 188.79-186.64 | | 199.71-188.79 | | overburden piezometer |
| 111-III | 185 | 0.67 | 200.41 | 199.74 | 196.15-193.10 | 198.74-193.07 | | 199.74-198.74 | | overburden standpipe |
| 112-I | 185 | 0.81 | 208.59 | 207.78 | 190.85-189.33 | 191.45-189.30 | | 207.78-191.45 | | overburden piezometer |
| 112-II | 185 | 0.83 | 208.59 | 207.75 | 196.47-194.95 | 197.07-194.92 | | 207.75-197.07 | | overburden piezometer |
| 112-III | 185 | 0.88 | 208.60 | 207.72 | 203.95-200.90 | 206.72-200.88 | | 207.72-206.72 | | overburden standpipe |
| 113-I | 185 | 1.00 | 195.34 | 194.34 | 174.13-172.61 | 174.73-172.58 | | 194.34-174.73 | | bedrock piezometer |
| 113-II | 185 | 1.00 | 195.31 | 194.31 | 186.29-184.77 | 186.89-184.74 | | 194.31-186.89 | | overburden piezometer |
| 113-III | 185 | 0.85 | 195.25 | 194.41 | 190.57-189.05 | 193.41-189.03 | | 194.41-193.41 | | overburden standpipe |

**Table G.1**
**Groundwater Monitor Details**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| MONITOR | Borehole Diameter (mm) | Monitor Stick Up (m) | T.O.P. ELEVATION (mASL) | Ground Elevation (mASL) | Screen Bottom / Interval (mASL) | Filter Pack Interval (mASL) | Lower Seal Interval (mASL) | Surface Seal Interval (mASL) | Backfill Interval (mASL) | Monitor Type |
|---|---|---|---|---|---|---|---|---|---|---|
| SP17-96 | | 0.98 | 197.00 | 196.02 | | | | | | standpipe |
| SP20-92 | | 1.14 | 202.29 | 201.15 | | | | | | toe drain standpipe |
| T-1 | 185 | 0.81 | 192.24 | 191.43 | 187.92-190.52 | 187.92-190.83 | 190.83-191.43 | | | trench monitor |
| T-2 | 185 | 0.71 | 191.55 | 190.84 | 187.34-190.08 | 187.34-190.14 | 190.14-190.84 | | | trench monitor |
| T-4 | 185 | 0.61 | 191.19 | 190.58 | 186.45-190.11 | 186.45-190.18 | 190.18-190.58 | | 186.45-186.45 | trench monitor |
| T3-I | 185 | 0.94 | 191.59 | 190.65 | 185.19-185.95 | 185.19 | 186.41-190.65 | | 185.19-185.19 | trench monitor |
| T3-II | 185 | 0.80 | 191.49 | 190.69 | 187.18-189.93 | 187.18-189.99 | 189.99-190.69 | | | trench monitor |
| T5-I | 185 | 0.98 | 191.25 | 190.27 | 185.36-186.12 | 185.36-186.27 | 186.27-190.27 | | 185.36-185.36 | trench monitor |
| T5-II | 185 | 0.93 | 191.25 | 190.32 | 186.12-189.17 | 186.12-189.62 | 189.62-190.32 | | | trench monitor |

NOTES:
1) T.O.P. - Top Of Pipe
2) mASL - Metres Above Sea Level
3) Information presented in table is based on data provided in the 2007 Annual Monitoring Report prepared by Conestoga-Rovers & Associates, May 2008
4) Monitor information is not available for borehole locations 108, 109, and 110.
5) Monitoring well 109-II redrilled in September 2022 was a prepacked monitoring well screen.

**Table G.2**
**Groundwater Elevations**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| DATE | 5-IV | 5-V | 5-VI | 16A | 16C | 17A | 17B | 17-I | 18A | 18B | 19A | 19B | 20A | 20B | 23B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.O.P. -> | 196.30 | 187.98 | 194.05 | 196.64 | 196.64 | 193.31 | 193.33 | 193.17 | 190.00 | 189.71 | 193.87 | 193.84 | 190.95 | 190.79 | 207.41 |
| Mar-99 | 182.82 | | | 191.45 | 191.90 | 189.15 | 189.39 | 181.27 | 189.45 | | 189.38 | 189.27 | 189.64 | 189.64 | 200.39 |
| Jul-99 | 182.84 | | | 190.42 | 190.53 | 188.92 | 189.16 | 181.35 | 188.70 | 188.06 | 188.74 | 188.63 | 188.28 | 188.42 | 200.23 |
| Dec-99 | 182.92 | | | 191.28 | 191.69 | 189.03 | 189.21 | 180.71 | 189.14 | 188.64 | 189.71 | 189.53 | 189.49 | 189.54 | 199.70 |
| Apr-00 | 183.86 | | | 191.45 | 191.68 | 189.06 | 189.27 | 176.23 | 189.00 | 188.73 | 189.68 | 189.52 | 189.68 | 189.67 | 198.57 |
| Aug-00 | 184.71 | | | 191.13 | 191.41 | 188.78 | 188.89 | 183.55 | 188.95 | 188.26 | 189.09 | 188.95 | 188.72 | 188.75 | 198.50 |
| Nov-00 | 182.94 | | | 191.00 | 191.11 | 188.81 | 188.94 | 184.42 | 189.02 | 188.93 | 188.79 | 188.65 | 189.34 | 189.39 | |
| Apr-01 | 183.99 | | | 191.75 | 192.19 | 188.82 | 188.95 | 185.38 | 189.10 | 188.56 | 189.16 | 189.99 | 189.36 | 189.33 | |
| Jul-01 | 184.59 | | | 190.83 | 191.03 | 189.42 | 188.52 | 185.78 | 188.66 | 187.76 | 188.78 | 188.66 | 188.44 | 188.38 | |
| Dec-01 | 184.02 | | | 190.79 | 190.86 | 188.53 | 188.55 | 186.33 | 188.88 | 188.52 | 189.91 | 189.75 | 189.44 | 189.50 | |
| Feb-02 | | | | | | | | | | | | | | | |
| Mar-02 | | | | | | | | | | | | | | | |
| Apr-02 | 185.00 | | | 191.79 | 192.29 | 189.57 | 189.56 | 186.86 | 189.78 | 188.79 | 190.14 | 189.94 | 189.85 | 189.80 | |
| May-02 | | | | | | | | | | | | | | | |
| Jun-02 | | | | | | | | | | | | | | | |
| Jul-02 | | | | | | | | | | | | | | | |
| Aug-02 | 185.72 | | | 191.13 | 191.29 | 189.02 | 189.04 | 188.26 | 189.47 | 188.31 | 189.57 | 189.44 | 189.04 | 188.96 | |
| Sep-02 | | | | | | | | | | | | | | | |
| Oct-02 | | | | | | | | | | | | | | | |
| Nov-02 | 182.94 | | | 190.65 | 190.73 | 188.36 | 188.43 | 187.46 | 188.68 | 188.49 | 189.11 | 188.96 | 188.61 | 188.52 | |
| Jan-03 | | | | | | | | | | | | | | | |
| Mar-03 | 183.96 | | | 191.08 | 191.19 | 188.95 | 188.99 | 187.51 | 189.06 | 188.89 | 189.87 | 189.81 | 189.13 | 189.04 | |
| Jul-03 | 184.82 | | | 190.79 | 190.98 | 188.48 | 188.47 | 187.72 | 188.47 | 187.49 | 189.09 | 188.94 | 188.30 | 188.21 | |
| Nov-03 | 183.44 | | | 191.24 | 191.45 | 188.77 | 188.75 | 185.56 | 188.96 | 188.67 | 189.84 | 190.49 | 189.70 | 189.79 | 199.22 |
| Mar-04 | 184.48 | | | | 190.00 | 188.69 | 188.65 | 186.72 | 189.02 | | 189.50 | 190.15 | 189.37 | 189.43 | 199.93 |
| Jul-04 | 185.38 | | | 191.75 | 192.12 | 189.71 | 188.66 | 187.48 | 189.80 | 188.61 | 190.05 | 190.69 | 189.51 | 189.61 | 200.01 |
| Nov-04 | 183.12 | 183.82 | 190.00 | 191.27 | 191.44 | 188.42 | 188.41 | 183.72 | 188.79 | 188.71 | 189.02 | 189.68 | 188.99 | 189.04 | |
| Jan-05 | | | | | | | | | | | | | | | |
| Feb-05 | | | | | | | | | | | | | | | |
| Mar-05 | 184.63 | 185.27 | 191.67 | 191.34 | 191.44 | 188.82 | 188.71 | | 188.98 | | 189.19 | 189.82 | 189.18 | 189.20 | 199.96 |
| Apr-05 | | | | | | | | | | 188.65 | | | | | |
| May-05 | | | | | | | | | | | | | | | |
| Jun-05 | | | | | | | | | | | | | | | |
| Jul-05 | 185.61 | 183.12 | 189.09 | 190.90 | 190.98 | 188.93 | 188.92 | 186.97 | 189.04 | 187.42 | 189.50 | 190.17 | 188.26 | 188.10 | 199.48 |
| Nov-05 | 182.61 | 183.94 | 190.12 | 190.60 | 190.49 | 188.40 | 188.36 | 187.20 | 188.55 | 188.40 | 189.31 | 189.90 | 188.41 | 188.40 | 198.96 |
| Jan-06 | | | | | | | | | | | | | | | |
| Feb-06 | | | | | | | | | | | | | | | |
| Mar-06 | | 185.34 | 191.80 | 191.68 | 192.03 | 188.43 | 188.36 | 187.71 | 188.97 | | 189.73 | 190.39 | | | 199.97 |
| Apr-06 | | | | | | | | | | | | | | | |
| May-06 | | | | | | | | | | | | | | | |
| Jun-06 | | | | | | | | | | | | | | | |
| Jul-06 | | 184.78 | 190.95 | | 191.51 | 188.56 | 188.62 | 187.80 | 189.17 | 188.57 | 189.27 | | 188.86 | 188.70 | 199.94 |
| Aug-06 | 184.75 | | | 190.87 | | | | | | | | 189.02 | | | |
| Sep-06 | | | | | | | | | | | | | | | |
| Oct-06 | | | | | | | | | | | | | | | |
| Nov-06 | 182.19 | 184.42 | 190.59 | 191.36 | 192.00 | 188.56 | 188.42 | 187.95 | 189.00 | 188.69 | 190.05 | 189.87 | 189.77 | 189.71 | 200.09 |
| Dec-06 | | | | | | | | | | | | | | | |
| Jan-07 | | | | | | | | | | | | | | | |
| Feb-07 | | | | | | | | | | | | | | | |
| Mar-07 | | | | | | | | | | | | | | | |
| Apr-07 | 183.76 | 185.26 | 191.77 | 191.55 | 192.04 | 188.35 | 188.56 | 188.12 | 188.56 | 188.38 | 189.62 | 189.49 | 189.51 | 189.60 | 200.14 |
| May-07 | | | | | | | | | | | | | | | |
| Jun-07 | | | | | | | | | | | | | | | |
| Jul-07 | | | | | | 188.66 | 188.61 | | 189.00 | 187.97 | 189.24 | 189.15 | 188.62 | 188.36 | 199.90 |
| Aug-07 | 184.69 | 183.33 | 189.26 | 190.88 | 190.99 | | | 188.32 | | | | | | | |
| Sep-07 | | | | | | | | | | | | | | | |
| Oct-07 | | | | | | | | | | | | | | | |
| Nov-07 | 182.83 | 183.29 | 189.10 | | | 188.21 | 188.04 | 188.32 | | | 189.08 | 188.92 | 188.13 | 187.99 | |
| Dec-07 | | | | 190.67 | 190.64 | | | | 188.47 | 188.39 | | | | | 199.88 |

**Table G.2**
**Groundwater Elevations**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| DATE | 5-IV | 5-V | 5-VI | 16A | 16C | 17A | 17B | 17-I | 18A | 18B | 19A | 19B | 20A | 20B | 23B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.O.P. -> | 196.30 | 187.98 | 194.05 | 196.64 | 196.64 | 193.31 | 193.33 | 193.17 | 190.00 | 189.71 | 193.87 | 193.84 | 190.95 | 190.79 | 207.41 |
| Mar-08 | | | | 190.22 | 192.12 | | | | | | 188.87 | 189.15 | | | |
| Apr-08 | Dry | 185.76 | 192.14 | | | | | | 189.42 | 188.68 | | | 190.06 | 189.77 | |
| Sep-08 | 184.72 | 184.22 | 190.27 | 190.02 | 191.79 | | | | 188.82 | 188.42 | 188.42 | 188.73 | 189.35 | 189.04 | |
| Oct-08 | | | | | | | | | | | | | | | |
| Mar-09 | | | | 190.23 | 192.15 | | | | | | 188.80 | 189.09 | | | |
| Apr-09 | Dry | 185.89 | 192.32 | | | | | | flowing | 188.72 | | | 190.23 | 189.78 | 198.71 |
| Sep-09 | | 183.09 | Dry | | | | | | 189.07 | 188.03 | 188.20 | 188.50 | 188.94 | 188.55 | |
| Oct-09 | 184.15 | | | 189.58 | 190.99 | | | | | | | | | | 198.27 |
| Mar-10 | 184.65 | 184.95 | 191.27 | | | | | | | | 188.66 | 188.94 | | | |
| Apr-10 | | | | 190.05 | 191.87 | | | | 188.81 | 188.56 | | | 189.69 | 189.42 | |
| Sep-10 | | | | | | | | | 188.41 | 187.81 | | | 188.60 | 188.22 | |
| Oct-10 | 184.08 | 182.87 | 188.77 | 189.17 | 190.68 | | | | | | 187.90 | 188.20 | | | 198.30 |
| Dec-10 | | | | | | | | | | | | | | | |
| Mar-11 | | | | | | | | | | | | | | | |
| Apr-11 | 183.57 | 185.70 | 192.36 | 190.06 | 192.17 | | | | | 188.52 | 189.50 | 189.78 | 189.91 | 189.67 | 198.57 |
| Sep-11 | | | | | | | | | | | | | | | |
| Oct-11 | 183.84 | 183.70 | 189.69 | 190.10 | | | | | 189.11 | 188.49 | 188.44 | 188.68 | 189.66 | 189.33 | 198.32 |
| Mar-12 | | | | | | | | | | | | | | | |
| Apr-12 | 185.35 | 184.57 | 190.86 | 190.76 | | | | | 189.78 | 188.42 | 188.93 | 189.25 | 189.52 | 189.09 | 198.48 |
| Sep-12 | | | | | | | | | | | | | | | |
| Oct-12 | 185.11 | 182.74 | 188.68 | 189.77 | | | | | 187.90 | 187.28 | 187.75 | 187.99 | 188.39 | 188.17 | 198.64 |
| Mar-13 | 185.19 | 184.42 | 190.81 | | | | | | | | 188.54 | 188.82 | 189.57 | 189.30 | |
| Apr-13 | | | | 191.24 | | | | | flowing | 188.53 | | | | | 198.67 |
| Jun-13 | | | | | | | | | | | | | | | |
| Sep-13 | | | | | | | | | | | | | | | |
| Oct-13 | 185.46 | 183.27 | 188.99 | 191.28 | | | | | 188.41 | 188.41 | 187.89 | 188.16 | 188.97 | 188.63 | 198.35 |
| Dec-13 | | | | | | | | | | | | | | | |
| Mar-14 | | 184.11 | 190.23 | 191.75 | | | | | | | 188.57 | 188.80 | | | |
| Apr-14 | | | | | | | | | | | | | 190.29 | | |
| Jun-14 | | | | | | | | | | | | | | | |
| Sep-14 | 185.91 | 183.50 | 189.41 | | | | | | | | | | | | |
| Oct-14 | | | | 191.39 | | | | | 188.42 | 188.26 | 187.86 | 188.13 | 189.16 | 188.80 | 198.49 |
| Nov-14 | | | | | | | | | | | | | | | |
| Dec-14 | | | | | | | | | | | | | | | |
| Mar-15 | 192.68 | 185.44 | 191.85 | 191.60 | | | | | 188.84 | 188.45 | 188.84 | 189.09 | 190.11 | 189.81 | 198.85 |
| Jun-15 | | | | | | | | | | | | | | | |
| Sep-15 | 192.46 | 183.25 | 189.12 | 191.22 | | | | | 188.38 | 187.34 | 187.88 | 188.15 | 188.58 | 188.18 | 198.48 |
| Dec-15 | | | | | | | | | | | | | | | |
| Mar-16 | | | | | | | | | | | | | | | |
| Apr-16 | 192.31 | 185.15 | 191.60 | 192.25 | | | | | 189.40 | 188.48 | 189.22 | 189.52 | 189.67 | 189.35 | 198.44 |
| Jun-16 | | | | | | | | | | | | | | | |
| Jul-16 | | | | | | | | | | | | | | | |
| Sep-16 | 191.76 | 182.53 | 188.68 | 190.48 | | | | | 187.71 | 186.23 | 187.68 | 187.98 | 187.49 | 187.12 | 197.86 |
| Nov-16 | | | | | | | | | | | | | | | |
| Mar-17 | 191.53 | 184.47 | 190.79 | 192.02 | | | | | | | 188.60 | 188.86 | | | |
| Apr-17 | | | | | | | | | 189.16 | 188.45 | | | 190.18 | 189.78 | 198.31 |
| Jun-17 | | | | | | | | | | | | | | | |
| Sep-17 | | | | | | | | | | | | | | | |
| Oct-17 | 191.26 | 183.39 | 189.30 | 191.18 | | | | | 188.13 | 187.67 | 187.95 | 188.22 | 188.63 | 188.28 | 198.51 |
| Dec-17 | | | | | | | | | | | | | | | |

**Table G.2**
**Groundwater Elevations**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| DATE | 5-IV | 5-V | 5-VI | 16A | 16C | 17A | 17B | 17-I | 18A | 18B | 19A | 19B | 20A | 20B | 23B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.O.P. -> | 196.30 | 187.98 | 194.05 | 196.64 | 196.64 | 193.31 | 193.33 | 193.17 | 190.00 | 189.71 | 193.87 | 193.84 | 190.95 | 190.79 | 207.41 |
| Mar-18 | 191.34 | 184.95 | 191.34 | 191.95 | | | | | | | | | | 189.83 | |
| Apr-18 | | | | | | | | | flowing | 188.46 | 190.10 | 189.93 | 190.30 | | 198.71 |
| Jun-18 | | | | | | | | | | | | | | | |
| Sep-18 | 191.15 | 182.98 | 188.77 | 190.93 | | | | | 187.96 | 187.27 | 188.10 | 188.39 | 188.44 | 188.03 | 197.71 |
| Dec-18 | | | | | | | | | | | | | | | |
| Mar-19 | 191.09 | 184.56 | 190.79 | | | | | | | | 189.01 | 189.32 | | | |
| Apr-19 | | | | 191.81 | | | | | flowing | 188.41 | | | 189.98 | 189.13 | 199.00 |
| May-19 | | | | | | | | | | | | | | | |
| Aug-19 | 190.81 | 183.49 | 189.33 | 191.18 | | | | | 189.02 | 187.43 | 188.44 | 188.76 | 188.81 | 188.30 | |
| Oct-19 | | | | | | | | | | | | | | | 198.92 |
| Nov-19 | | | | | | | | | | | | | | | |
| Mar-20 | | | | | | | | | | | | | | | |
| Apr-20 | | | | | | | | | flowing | 188.37 | | | 190.13 | 189.71 | |
| May-20 | 190.81 | 184.85 | 191.08 | 192.17 | | | | | | | 189.44 | 190.75 | | | 198.79 |
| Jun-20 | | | | | | | | | | | | | | | |
| Aug-20 | 190.27 | 183.14 | 188.95 | 190.96 | | | | | 188.77 | 187.20 | 188.14 | 188.44 | 188.36 | 187.76 | 198.74 |
| Nov-20 | 190.16 | | | | | | | | | | | | | | |
| Mar-21 | 190.14 | 184.73 | 191.03 | 191.92 | | | | | flowing | 188.37 | 188.80 | 189.09 | 190.19 | 189.70 | |
| Apr-21 | | | | | | | | | | | | | | | 198.98 |
| May-21 | | | | | | | | | | | | | | | |
| Sep-21 | 189.95 | 183.45 | 189.21 | 191.25 | | | | | 189.03 | 188.09 | 188.19 | 188.52 | 189.02 | 188.61 | 198.37 |
| Nov-21 | | | | | | | | | | | | | | | |
| Mar-22 | 190.16 | 185.17 | 191.39 | 192.25 | | | | | | | | | | | 198.83 |
| Apr-22 | | | | | | | | | Flowing | 188.35 | 189.53 | 189.81 | 189.88 | 189.57 | |
| Sep-22 | 190.17 | 182.15 | 188.96 | 190.85 | | 188.92 | 188.77 | 189.09 | 188.66 | 187.00 | 188.10 | 188.38 | 188.29 | 187.76 | 200.70 |
| Oct-22 | | | | | | | | | | | | | | | |

NOTES: 1) Water level elevations are in metres Above Sea Level (mASL)
2) Blank indicates water level not measured.

**Table G.2**
**Groundwater Elevations**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| DATE | 33-II | 33-III | 40-II | 41-I | 41-II | 44-I | 44-II | 44-III | 46-I | 46-II | 46-III | 48 | 50-I | 50-II | 50-III |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.O.P. -> | 197.16 | 197.10 | 196.24 | 198.19 | 198.19 | 197.64 | 197.73 | 197.73 | 194.71 | 194.86 | 194.89 | 196.59 | 194.58 | 194.74 | 194.48 |
| Mar-99 | 196.43 | 196.06 | 194.69 | 197.56 | 197.35 | 190.29 | | 196.92 | 186.23 | 193.59 | 193.15 | 192.34 | 191.43 | 191.51 | 191.67 |
| Jul-99 | 195.88 | 195.64 | 194.56 | 197.50 | 196.46 | 192.84 | 197.23 | 196.16 | 187.76 | 192.70 | 192.69 | 191.47 | 190.18 | 190.14 | 190.06 |
| Dec-99 | 196.55 | 195.94 | 195.01 | 197.17 | 196.53 | 186.64 | 197.77 | 196.61 | 182.32 | 193.84 | 193.34 | 192.85 | 191.59 | 191.54 | 191.56 |
| Apr-00 | 196.71 | 195.95 | | 197.69 | 196.77 | 191.24 | 197.73 | 196.70 | 185.63 | 193.92 | 193.63 | 191.91 | 191.74 | 191.74 | 191.79 |
| Aug-00 | 196.44 | 195.92 | 194.88 | 197.32 | 197.59 | 193.64 | 197.73 | 196.63 | 187.49 | 193.10 | 192.83 | 191.75 | 191.08 | 191.34 | 190.81 |
| Nov-00 | 196.24 | 196.03 | 195.04 | 195.78 | 196.71 | 188.06 | 197.63 | 196.77 | 182.89 | 193.64 | 193.28 | 191.67 | 191.32 | 191.36 | 191.42 |
| Apr-01 | 196.94 | 196.00 | 195.05 | 197.55 | 198.52 | 192.07 | 197.86 | 196.88 | 186.50 | 193.74 | 193.19 | 192.95 | 191.92 | 191.95 | 192.11 |
| Jul-01 | 196.04 | 195.69 | 194.52 | 197.44 | 197.10 | 193.52 | 197.65 | 196.36 | 187.84 | 192.79 | 192.66 | 191.48 | 190.42 | 190.50 | 190.05 |
| Dec-01 | 196.26 | 195.82 | 194.90 | 194.06 | 197.04 | 188.38 | 197.35 | 196.57 | 182.21 | 193.17 | 193.26 | 192.22 | 190.96 | 190.97 | 191.10 |
| Feb-02 | | | | | | | | | | | | | | | |
| Mar-02 | | | | | | | | | | | | | | | |
| Apr-02 | 196.90 | 195.98 | 195.07 | 196.42 | 198.48 | 192.81 | 197.78 | 196.76 | 186.24 | 194.05 | 194.02 | 194.15 | 192.30 | 192.24 | 192.41 |
| May-02 | | | | | | | | | | | | | | | |
| Jun-02 | | | | | | | | | | | | | | | |
| Jul-02 | | | | | | | | | | | | | | | |
| Aug-02 | 196.26 | 195.75 | 195.76 | 197.64 | 197.40 | 194.52 | 197.68 | 196.42 | 187.94 | 193.22 | 192.95 | 192.29 | 190.95 | 190.92 | 190.86 |
| Sep-02 | | | | | | | | | | | | | | | |
| Oct-02 | | | | | | | | | | | | | | | |
| Nov-02 | 195.89 | 195.71 | 194.83 | 193.99 | 196.70 | 187.97 | 197.41 | 196.52 | 183.13 | 192.61 | 192.61 | 191.59 | 190.30 | 190.26 | 190.26 |
| Jan-03 | | | | | | | | | | | | | | | |
| Mar-03 | 196.28 | 196.01 | 195.09 | 196.65 | 197.08 | 191.87 | 197.68 | 196.75 | 186.79 | 193.49 | 193.73 | 192.10 | 190.92 | 190.87 | 190.88 |
| Jul-03 | 196.04 | 195.78 | 194.72 | 197.33 | 197.16 | 193.90 | 197.51 | 196.44 | 188.49 | 192.85 | 192.64 | 191.54 | 190.43 | 190.27 | 190.18 |
| Nov-03 | 196.48 | 196.05 | 195.05 | 195.20 | 197.65 | 188.45 | 197.65 | 196.76 | 183.95 | 193.88 | 193.70 | 192.53 | 191.41 | 191.74 | 191.60 |
| Mar-04 | 196.57 | 195.93 | 195.04 | 196.18 | | 192.24 | 197.73 | 196.77 | 186.89 | 193.72 | 193.45 | 192.13 | 192.33 | 191.44 | 191.42 |
| Jul-04 | 196.74 | 196.00 | 195.04 | 197.68 | 198.19 | 194.96 | 197.73 | 196.91 | 188.88 | 193.83 | 193.43 | 192.85 | 191.72 | 192.25 | 191.53 |
| Nov-04 | 196.35 | 195.93 | 195.05 | 197.00 | 197.49 | 195.14 | 196.84 | | 186.80 | 193.41 | 193.10 | 191.57 | 191.27 | 191.30 | 191.33 |
| Jan-05 | | | | | | | | | | | | | | | |
| Feb-05 | | | | | | | | | | | | | | | |
| Mar-05 | | 195.96 | 195.09 | 197.61 | 197.91 | 196.03 | | 196.82 | 189.18 | 193.54 | 193.22 | 191.99 | 191.32 | 191.35 | 191.39 |
| Apr-05 | 196.86 | | | | | | | | | | | | | | |
| May-05 | | | | | | | | | | | | | | | |
| Jun-05 | | | | | | | | | | | | | | | |
| Jul-05 | 195.71 | 195.59 | 194.54 | 197.58 | 196.91 | 196.54 | 197.33 | 196.26 | 190.30 | 192.38 | 192.32 | 191.34 | 190.15 | 190.00 | 189.92 |
| Nov-05 | 195.95 | 195.79 | 194.90 | 194.56 | 196.68 | 194.36 | 197.14 | 196.55 | 184.66 | 192.32 | 192.49 | 191.67 | 189.80 | 189.84 | 189.97 |
| Jan-06 | | | | | | | | | | | | | | | |
| Feb-06 | | | | | | | | | | | | | | | |
| Mar-06 | | 195.80 | 195.04 | 196.41 | | 195.49 | | 196.73 | 188.75 | 193.71 | 193.38 | 192.78 | 191.58 | 191.57 | 191.68 |
| Apr-06 | | | | | | | | | | | | | | | |
| May-06 | | | | | | | | | | | | | | | |
| Jun-06 | | | | | | | | | | | | | | | |
| Jul-06 | 196.20 | 195.75 | | | | | | | | | | 192.04 | | | |
| Aug-06 | | | 194.72 | 197.39 | 197.01 | 196.08 | 197.42 | 196.27 | 190.02 | 192.95 | 192.75 | | 190.63 | 190.55 | 190.47 |
| Sep-06 | | | | | | | | | | | | | | | |
| Oct-06 | | | | | | | | | | | | | | | |
| Nov-06 | 196.48 | 195.85 | | | | | | | 183.99 | 193.94 | 193.65 | 192.86 | 191.97 | 191.87 | 191.83 |
| Dec-06 | | | 195.07 | 195.06 | 198.13 | 189.87 | 197.73 | 196.90 | | | | | | | |
| Jan-07 | | | | | | | | | | | | | | | |
| Feb-07 | | | | | | | | | | | | | | | |
| Mar-07 | 196.30 | 195.75 | | | | | | | 187.61 | 193.66 | 193.36 | | 191.33 | 191.31 | 191.27 |
| Apr-07 | | | 195.08 | 196.73 | 198.19 | 193.82 | 197.73 | 196.76 | | | | 193.47 | | | |
| May-07 | | | | | | | | | | | | | | | |
| Jun-07 | | | | | | | | | | | | | | | |
| Jul-07 | 195.87 | 195.77 | | | | | | | | | | 191.75 | | | |
| Aug-07 | | | 194.37 | 197.11 | 196.47 | 195.12 | 197.12 | 196.17 | 189.39 | 192.44 | 192.39 | | 189.99 | 189.90 | 189.80 |
| Sep-07 | | | | | | | | | | | | | | | |
| Oct-07 | | | | | | | | | | | | | | | |
| Nov-07 | 195.59 | 195.70 | 194.71 | 192.68 | 196.04 | 189.55 | 197.04 | 196.47 | | | | 191.28 | | | |
| Dec-07 | | | | | | | | | 183.21 | 192.60 | 192.77 | | 189.76 | 189.84 | 189.99 |

**Table G.2**
**Groundwater Elevations**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| DATE | 33-II | 33-III | 40-II | 41-I | 41-II | 44-I | 44-II | 44-III | 46-I | 46-II | 46-III | 48 | 50-I | 50-II | 50-III |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.O.P. -> | 197.16 | 197.10 | 196.24 | 198.19 | 198.19 | 197.64 | 197.73 | 197.73 | 194.71 | 194.86 | 194.89 | 196.59 | 194.58 | 194.74 | 194.48 |
| Mar-08 | | 195.86 | | | | | | | 187.14 | 193.87 | | 192.36 | 191.96 | 191.97 | 192.10 |
| Apr-08 | 196.82 | | 195.07 | 195.54 | 198.19 | 194.15 | 197.73 | 196.74 | | | 193.30 | | | | |
| Sep-08 | 196.47 | 195.87 | 194.99 | 197.28 | 197.80 | 192.32 | 197.73 | 196.71 | 188.12 | 193.57 | 193.16 | 192.32 | 191.53 | 191.47 | 191.58 |
| Oct-08 | | | | | | | | | | | | | | | |
| Mar-09 | | | | | | | | | 190.69 | 193.64 | 193.42 | 192.65 | 191.72 | 191.80 | 192.08 |
| Apr-09 | 196.85 | 196.00 | 195.12 | 197.99 | flowing | 195.43 | flowing | 196.80 | | | | | | | |
| Sep-09 | 195.86 | 195.61 | 194.61 | 197.28 | 196.69 | 193.33 | 197.39 | 196.34 | 188.07 | 193.16 | 193.23 | 191.68 | 190.60 | 190.48 | |
| Oct-09 | | | | | | | | | | | | | | | 190.91 |
| Mar-10 | | | | | | | | | 190.93 | 194.15 | 193.86 | 192.39 | | | |
| Apr-10 | 196.55 | 195.95 | 195.05 | 197.49 | 198.14 | 195.48 | 197.73 | 196.68 | | | | | 191.58 | 191.46 | 191.37 |
| Sep-10 | 195.77 | 195.73 | 194.83 | 196.40 | 196.70 | 193.61 | 196.95 | 196.17 | | | | | | | |
| Oct-10 | | | | | | | | | 189.71 | 193.39 | 193.31 | 191.52 | 189.97 | 189.85 | 189.76 |
| Dec-10 | | | | | | | | | | | | | | | |
| Mar-11 | | | | | | | | | 192.99 | 194.13 | 193.65 | | 192.11 | 192.11 | 192.14 |
| Apr-11 | 196.43 | 196.03 | 195.11 | 197.29 | flowing | 195.63 | flowing | 196.82 | | | | 192.40 | | | |
| Sep-11 | | | | | | | | | | | | | | | |
| Oct-11 | 196.35 | 196.01 | 195.10 | 196.71 | 197.26 | 194.02 | 197.53 | 196.66 | 190.93 | 193.88 | 193.12 | 191.99 | 190.98 | 191.03 | 191.04 |
| Mar-12 | | | | | | | | | | | | | | | |
| Apr-12 | 196.57 | 195.89 | 195.06 | 197.71 | flowing | 195.74 | flowing | 196.64 | 193.18 | 193.74 | 193.11 | 192.08 | 191.51 | 191.54 | 191.72 |
| Sep-12 | | | | | | | | | | | | | | | |
| Oct-12 | 195.65 | 195.63 | 194.81 | 196.61 | 196.48 | 194.49 | 197.08 | 196.47 | 192.24 | 192.73 | 192.63 | 191.67 | 189.75 | 189.64 | 189.54 |
| Mar-13 | | | | | | | | | 193.06 | 194.05 | 193.70 | 192.37 | 191.51 | 191.53 | 191.67 |
| Apr-13 | 196.34 | 195.95 | 195.08 | 197.26 | 197.79 | 195.66 | flowing | 196.79 | | | | | | | |
| Jun-13 | | | | | | | | | | | | | | | |
| Sep-13 | | | | | | | | | | | | | | | |
| Oct-13 | 195.91 | 195.82 | 195.01 | 196.13 | 196.70 | 194.77 | 197.19 | 196.49 | 192.91 | 193.64 | 193.02 | 192.05 | 190.72 | 190.79 | 190.79 |
| Dec-13 | | | | | | | | | | | | | | | |
| Mar-14 | 196.23 | 195.91 | | | | | | | 193.37 | 193.74 | 193.37 | 192.80 | 192.02 | 192.04 | |
| Apr-14 | | | 195.14 | 197.24 | 198.19 | 196.14 | 197.73 | 196.81 | | | | | | | |
| Jun-14 | | | | | | | | | | | | | | | |
| Sep-14 | | | | | | | | | | | | | | | |
| Oct-14 | 196.05 | 195.81 | 194.99 | 196.29 | 196.95 | 195.24 | 197.30 | 196.60 | 193.20 | 193.64 | 193.06 | 192.05 | 190.99 | 191.00 | 190.95 |
| Nov-14 | | | | | | | | | | | | | | | |
| Dec-14 | | | | | | | | | | | | | | | |
| Mar-15 | 196.39 | 196.16 | 195.11 | 197.22 | 197.48 | 196.44 | flowing | 196.79 | 193.44 | 194.01 | 193.65 | 191.93 | 191.58 | 191.59 | 191.63 |
| Jun-15 | | | | | | | | | | | | | | | |
| Sep-15 | 195.75 | 195.57 | 194.77 | 196.38 | 196.93 | 193.71 | flowing | 196.79 | 193.07 | 193.17 | 192.88 | 191.62 | 190.21 | 190.08 | 189.99 |
| Dec-15 | | | | | | | | | | | | | | | |
| Mar-16 | | | | | | | | | | | | | | | |
| Apr-16 | 196.68 | 196.10 | 195.06 | 197.62 | 198.19 | 195.93 | flowing | 196.67 | 193.59 | 193.69 | 193.00 | 193.08 | 191.70 | 191.69 | 191.91 |
| Jun-16 | | | | | | | | | | | | | | | |
| Jul-16 | | | | | | | | | | | | | | | |
| Sep-16 | 195.02 | 195.00 | 193.82 | 196.53 | 196.03 | 193.47 | 196.85 | 195.87 | 192.83 | 192.03 | 191.51 | 191.17 | 189.17 | 189.10 | 189.02 |
| Nov-16 | | | | | | | | | | | | | | | |
| Mar-17 | 196.34 | 195.71 | | | | | | | | | | 192.13 | | | |
| Apr-17 | | | 195.07 | 196.90 | 198.19 | 195.48 | flowing | 196.61 | 193.17 | 193.96 | 193.44 | | 192.16 | 192.15 | 192.29 |
| Jun-17 | | | | | | | | | | | | | | | |
| Sep-17 | | | | | | | | | | | | | | | |
| Oct-17 | 195.77 | 195.52 | 194.60 | 196.26 | 196.80 | 194.28 | 197.40 | 196.45 | 193.10 | 193.17 | 192.66 | 191.57 | 190.59 | 190.48 | 190.37 |
| Dec-17 | | | | | | | | | | | | | | | |

**Table G.2**
**Groundwater Elevations**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| DATE | 33-II | 33-III | 40-II | 41-I | 41-II | 44-I | 44-II | 44-III | 46-I | 46-II | 46-III | 48 | 50-I | 50-II | 50-III |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.O.P. -> | 197.16 | 197.10 | 196.24 | 198.19 | 198.19 | 197.64 | 197.73 | 197.73 | 194.71 | 194.86 | 194.89 | 196.59 | 194.58 | 194.74 | 194.48 |
| Mar-18 | 196.43 | 195.69 | | | | | | | 193.39 | 193.84 | 193.24 | 192.72 | 191.68 | 191.68 | 191.71 |
| Apr-18 | | | 195.09 | 197.35 | 198.19 | 195.84 | flowing | 196.74 | | | | | | | |
| Jun-18 | | | | | | | | | | | | | | | |
| Sep-18 | 195.47 | 195.38 | 194.23 | 196.57 | 196.50 | 193.92 | 197.19 | 196.17 | 187.50 | 192.69 | 192.32 | 191.61 | 189.84 | 189.76 | 189.65 |
| Dec-18 | | | | | | | | | | | | | | | |
| Mar-19 | | | | | | | | | 189.45 | 193.61 | 193.15 | | | | |
| Apr-19 | 196.52 | 195.27 | 194.98 | 197.24 | 198.04 | 195.78 | flowing | 195.43 | | | | 192.24 | 191.89 | 191.91 | 192.18 |
| May-19 | | | | | | | | | | | | | | | |
| Aug-19 | 195.43 | 195.25 | 194.10 | 196.57 | 196.82 | 193.48 | 197.34 | 195.93 | 187.95 | 192.71 | 192.15 | 191.58 | 190.30 | 190.21 | 190.11 |
| Oct-19 | | | | | | | | | | | | | | | |
| Nov-19 | | | | | | | | | | | | | | | |
| Mar-20 | | | | | | | | | 189.90 | 194.11 | 193.47 | | | | |
| Apr-20 | 196.70 | 195.68 | | | | | | | | | | 193.00 | | | |
| May-20 | | | 195.11 | 197.69 | flowing | 196.04 | flowing | 196.46 | | | | | 191.82 | 191.75 | 191.97 |
| Jun-20 | | | | | | | | | | | | | | | |
| Aug-20 | 194.98 | 194.96 | 193.59 | 195.67 | 196.29 | 191.69 | 197.09 | 195.66 | 186.21 | 192.12 | 191.55 | 191.67 | 189.69 | 189.57 | 189.47 |
| Nov-20 | | | | | | | | | | | | | | | |
| Mar-21 | | | | | | | | | | | 193.24 | 192.38 | | | |
| Apr-21 | 196.45 | 195.60 | 195.00 | 197.20 | 198.11 | 195.20 | Flowing | 196.60 | 188.89 | 194.00 | | | 192.03 | 191.93 | 191.96 |
| May-21 | | | | | | | | | | | | | | | |
| Sep-21 | 195.80 | 195.50 | 194.52 | 195.97 | 196.72 | 193.32 | 197.31 | 196.25 | 187.67 | 193.22 | 192.64 | 191.91 | 190.76 | 190.77 | 190.73 |
| Nov-21 | | | | | | | | | 187.99 | | | | | | |
| Mar-22 | | | | | | | | | 189.61 | 193.73 | 193.12 | 193.00 | | | |
| Apr-22 | 196.72 | 195.79 | 195.11 | 197.05 | Flowing | 195.54 | Flowing | 196.58 | | | | | 191.89 | 192.62 | 192.08 |
| Sep-22 | 195.26 | 195.27 | 193.84 | 196.43 | 196.54 | 193.64 | 197.11 | 196.06 | 186.99 | 192.07 | 191.48 | 191.24 | 189.70 | 189.59 | 189.48 |
| Oct-22 | | | | | | | | | | | | | | | |

NOTES: 1) Water level elevations are in metres Above Sea Level (mASL)
2) Blank indicates water level not measured.

**Table G.2**
**Groundwater Elevations**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| DATE | 52-I | 52-II | 53-I | 54-II | 61-I | 61-II | 61-III | 62-I/IR | 62-II | 63-I | 63-II | 63-III | 64-I | 64-II |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.O.P. -> | 189.95 | 190.31 | 196.73 | 196.05 | 195.60 | 195.76 | 195.66 | 191.95 | 192.01 | 193.29 | 193.28 | 192.98 | 190.10 | 190.16 |
| Mar-99 | 189.49 | | 192.13 | 192.05 | 192.95 | 192.96 | 193.17 | 187.40 | 190.86 | 191.18 | 191.10 | 191.36 | 189.16 | 188.74 |
| Jul-99 | 188.52 | 188.56 | 190.90 | 191.38 | 192.22 | 192.50 | 192.72 | 188.30 | 189.27 | 190.22 | 190.07 | 190.24 | 188.60 | 187.70 |
| Dec-99 | 188.96 | 189.93 | 192.33 | 192.10 | 193.26 | 193.52 | 193.22 | 186.22 | 190.80 | 191.49 | 191.37 | 191.80 | 189.18 | 188.48 |
| Apr-00 | 189.43 | 189.48 | 191.95 | 192.47 | 193.26 | 193.33 | 192.26 | 187.75 | 190.83 | 191.53 | 191.45 | 191.85 | 188.70 | 189.26 |
| Aug-00 | 189.26 | 189.42 | 191.70 | 192.61 | 192.79 | 193.08 | 192.98 | 188.61 | 189.45 | 190.88 | 190.75 | 191.02 | 188.19 | 189.22 |
| Nov-00 | 189.37 | 189.49 | 191.13 | 191.50 | 192.70 | 192.80 | 193.02 | 185.93 | 190.85 | 190.95 | 190.96 | 191.11 | 188.91 | 188.61 |
| Apr-01 | 189.50 | 189.42 | 192.59 | 194.15 | 193.39 | 193.71 | 193.20 | 187.64 | 190.26 | 191.61 | 191.53 | 191.93 | 189.78 | 189.05 |
| Jul-01 | 188.88 | 188.59 | 190.87 | 192.17 | 192.37 | 192.65 | 192.69 | 188.23 | 189.13 | 190.41 | 190.24 | 190.45 | 188.95 | 188.11 |
| Dec-01 | 189.14 | 189.32 | 190.43 | 190.57 | 192.13 | 192.41 | 192.93 | 185.23 | 190.47 | 190.53 | 190.51 | 190.40 | 188.78 | 188.06 |
| Feb-02 | | | | | | | | | | | | | | |
| Mar-02 | | | | | | | | | | | | | | |
| Apr-02 | 189.05 | 190.04 | 192.63 | 194.07 | 193.58 | 193.85 | 193.93 | 187.42 | 190.99 | 191.86 | 191.80 | 192.28 | 189.30 | 189.23 |
| May-02 | | | | | | | | | | | | | | |
| Jun-02 | | | | | | | | | | | | | | |
| Jul-02 | | | | | | | | | | | | | | |
| Aug-02 | 188.98 | 189.22 | 191.47 | 192.51 | 192.80 | 193.18 | 193.04 | 188.39 | 189.90 | 190.90 | 190.74 | 191.05 | 188.98 | 188.22 |
| Sep-02 | | | | | | | | | | | | | | |
| Oct-02 | | | | | | | | | | | | | | |
| Nov-02 | 188.99 | 189.30 | 190.25 | 191.11 | 191.92 | 192.39 | 192.66 | 185.72 | 189.57 | 190.14 | 190.02 | 190.09 | 188.61 | 188.73 |
| Jan-03 | | | | | | | | | | | | | | |
| Mar-03 | 189.56 | 189.66 | 191.21 | 191.13 | 192.58 | 192.84 | 193.31 | 187.32 | 190.79 | 190.86 | 190.78 | 190.95 | 189.65 | 189.19 |
| Jul-03 | 188.54 | 188.42 | 190.99 | 192.06 | 192.39 | 192.79 | 192.78 | 188.20 | 189.13 | 190.42 | 190.26 | 190.52 | 188.74 | 188.00 |
| Nov-03 | 189.33 | 189.34 | 191.31 | 191.28 | 193.03 | 193.29 | 193.27 | 190.92 | 190.80 | 191.34 | 191.29 | 191.59 | 189.27 | 188.44 |
| Mar-04 | 189.53 | | 191.77 | | 193.13 | 193.29 | 193.28 | 189.89 | 190.64 | 191.45 | 191.34 | 191.75 | | 189.08 |
| Jul-04 | 189.56 | 189.51 | 192.42 | | 193.48 | 193.78 | 193.61 | 190.27 | 190.35 | 191.80 | 191.62 | 192.14 | 189.53 | 189.09 |
| Nov-04 | 189.40 | 189.43 | 191.63 | | 192.74 | 192.93 | 193.00 | 189.89 | 189.81 | | 190.90 | 191.03 | 189.07 | 188.61 |
| Jan-05 | | | | | | | | | | | | | | |
| Feb-05 | | | | | | | | | | | | | | |
| Mar-05 | 189.53 | 189.60 | 191.33 | | 192.82 | 193.11 | 193.16 | 190.47 | 190.41 | | 190.99 | 191.25 | | 189.33 |
| Apr-05 | | | | | | | | | | | | | | |
| May-05 | | | | | | | | | | | | | | |
| Jun-05 | | | | | | | | | | | | | | |
| Jul-05 | 188.25 | 188.26 | 190.96 | | 191.98 | 192.51 | 192.32 | 189.63 | 188.87 | | 189.92 | 190.21 | 188.85 | 188.04 |
| Nov-05 | 188.61 | 189.25 | 189.79 | | 191.40 | 191.01 | 192.63 | 190.55 | 190.46 | | 189.57 | 189.52 | 188.45 | 187.76 |
| Jan-06 | | | | | | | | | | | | | | |
| Feb-06 | | | | | | | | | | | | | | |
| Mar-06 | 189.42 | | 192.41 | | 193.18 | 193.54 | 193.22 | 190.10 | 190.13 | | 191.37 | 191.77 | 188.99 | 188.96 |
| Apr-06 | | | | | | | | | | | | | | |
| May-06 | | | | | | | | | | | | | | |
| Jun-06 | | | | | | | | | | | | | | |
| Jul-06 | | | | | | | | 190.18 | 190.15 | | | | 189.23 | 188.68 |
| Aug-06 | 188.81 | 188.81 | 190.95 | 191.83 | 192.44 | 192.77 | 192.87 | | | 190.44 | 190.31 | 190.53 | | |
| Sep-06 | | | | | | | | | | | | | | |
| Oct-06 | | | | | | | | | | | | | | |
| Nov-06 | 189.49 | 189.50 | 192.06 | 191.63 | 193.33 | 193.75 | 193.54 | 191.08 | 191.00 | 191.76 | 191.53 | 191.93 | 189.23 | 188.43 |
| Dec-06 | | | | | | | | | | | | | | |
| Jan-07 | | | | | | | | | | | | | | |
| Feb-07 | | | | | | | | | | | | | | |
| Mar-07 | | | | | 192.98 | 193.22 | 193.29 | | | 191.68 | 191.10 | 191.38 | | |
| Apr-07 | 189.50 | 189.45 | 192.43 | 193.07 | | | | 190.60 | 190.57 | | | | | 189.07 |
| May-07 | | | | | | | | | | | | | | |
| Jun-07 | | | | | | | | | | | | | | |
| Jul-07 | | | | | | | | 189.87 | 189.34 | | | | | |
| Aug-07 | 188.50 | 188.40 | 191.02 | 191.76 | 191.99 | 192.48 | 192.67 | | | 189.02 | 189.70 | 190.04 | 188.83 | 187.96 |
| Sep-07 | | | | | | | | | | | | | | |
| Oct-07 | | | | | | | | | | | | | | |
| Nov-07 | | | | | | | | | 189.01 | | | | 188.44 | 187.83 |
| Dec-07 | 188.80 | 189.22 | 190.21 | 190.25 | 191.53 | 192.13 | 192.80 | 188.62 | | 189.66 | 189.57 | 189.51 | | |

**Table G.2**
**Groundwater Elevations**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| DATE | 52-I | 52-II | 53-I | 54-II | 61-I | 61-II | 61-III | 62-I/IR | 62-II | 63-I | 63-II | 63-III | 64-I | 64-II |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.O.P. -> | 189.95 | 190.31 | 196.73 | 196.05 | 195.60 | 195.76 | 195.66 | 191.95 | 192.01 | 193.29 | 193.28 | 192.98 | 190.10 | 190.16 |
| Mar-08 | | | | | 193.26 | 193.60 | 193.26 | 191.20 | | | | | | |
| Apr-08 | 189.41 | 189.33 | 192.33 | 194.71 | | | | | 191.02 | | | | 189.85 | 189.28 |
| Sep-08 | 189.33 | 189.27 | 192.04 | 192.99 | 193.10 | 193.49 | 193.19 | 189.92 | 190.99 | | | | 189.35 | 188.72 |
| Oct-08 | | | | | | | | | | | | | | |
| Mar-09 | | | 192.42 | 193.35 | 193.04 | 193.39 | 193.29 | 190.40 | 190.41 | | | | | |
| Apr-09 | | 188.84 | | | | | | | | | | | 189.70 | 189.38 |
| Sep-09 | 188.98 | 188.43 | 190.87 | 191.24 | 192.39 | 192.99 | | | 189.31 | | | | 189.00 | 188.04 |
| Oct-09 | | | | | | | 193.46 | 189.89 | | | | | | |
| Mar-10 | | | | | 193.20 | 193.46 | 193.71 | | | | | | 189.39 | 189.07 |
| Apr-10 | 189.44 | 189.30 | 192.04 | 192.48 | | | | 190.05 | 190.09 | | | | | |
| Sep-10 | | | | | | | | | | | | | 188.70 | 187.88 |
| Oct-10 | 188.35 | 188.44 | 190.44 | 194.83 | 192.25 | 192.88 | 193.38 | 189.83 | 188.78 | | | | | |
| Dec-10 | | | | | | | | | | | | | | |
| Mar-11 | | | | | 193.32 | 193.75 | 193.53 | | | | | | | |
| Apr-11 | 189.60 | 189.45 | 192.49 | 194.74 | | | | 191.09 | 191.05 | | | | 189.29 | 189.13 |
| Sep-11 | | | | | | | | | | | | | | |
| Oct-11 | 189.49 | 189.11 | 191.79 | 191.91 | 193.15 | 193.41 | 193.30 | 190.27 | 190.25 | | | | 189.30 | 188.77 |
| Mar-12 | | | | | | | | | | | | | | |
| Apr-12 | 189.41 | 189.20 | 191.81 | 193.56 | 193.18 | 193.53 | 193.21 | 189.97 | 190.03 | | | | 189.46 | 188.83 |
| Sep-12 | | | | | | | | | | | | | | |
| Oct-12 | 188.30 | 188.60 | 190.03 | 190.27 | 191.78 | 192.49 | 192.98 | 189.86 | 189.25 | | | | 188.55 | 187.62 |
| Mar-13 | | | | | | | | 190.48 | 190.44 | | | | | |
| Apr-13 | 189.47 | 189.26 | 192.33 | 192.60 | 193.48 | 193.71 | 193.89 | | | | | | 189.23 | 189.17 |
| Jun-13 | | | | | | | | | | | | | | |
| Sep-13 | | | | | | | | | | | | | | |
| Oct-13 | 189.03 | 189.12 | 190.86 | 191.04 | 192.62 | 192.99 | 193.10 | 190.09 | 190.07 | | | | 188.98 | 188.11 |
| Dec-13 | | | | | | | | | | | | | | |
| Mar-14 | | | 192.03 | 191.95 | 192.92 | 193.34 | 193.21 | 183.37 | 190.84 | | | | 189.21 | 189.03 |
| Apr-14 | 189.59 | 189.39 | | | | | | | 189.69 | | | | | |
| Jun-14 | | | | | | | | | | | | | | |
| Sep-14 | | | | | | | | | | | | | | |
| Oct-14 | 189.19 | 189.04 | 191.39 | 191.37 | 192.82 | 193.13 | 193.10 | 185.62 | | 191.14 | 190.96 | 190.76 | 188.94 | 188.24 |
| Nov-14 | | | | | | | | | | | | | | |
| Dec-14 | | | | | | | | | | | | | | |
| Mar-15 | 189.46 | 189.18 | 191.66 | 191.46 | 193.07 | 193.39 | 193.32 | 184.87 | 190.73 | 191.55 | 191.39 | 191.29 | 188.94 | 189.28 |
| Jun-15 | | | | | | | | | | | | | | |
| Sep-15 | 188.47 | 188.64 | 190.97 | 191.21 | 192.28 | 192.71 | 193.03 | 184.90 | 188.99 | 190.60 | 190.20 | 190.16 | 188.75 | 188.02 |
| Dec-15 | | | | | | | | | | | | | | |
| Mar-16 | | | | | | | | | | | | | | |
| Apr-16 | 189.49 | 189.14 | 192.78 | 193.81 | 193.28 | 193.67 | 193.23 | 186.75 | 190.87 | 191.74 | 191.46 | 191.46 | 189.43 | 189.25 |
| Jun-16 | | | | | | | | | | | | | | |
| Jul-16 | | | | | | | | | | | | | | |
| Sep-16 | 186.70 | 187.54 | 189.75 | 189.82 | 191.33 | 191.58 | 191.64 | 184.98 | 187.86 | 189.51 | 189.24 | 189.20 | 188.46 | 187.23 |
| Nov-16 | | | | | | | | | | | | | | |
| Mar-17 | 189.50 | 189.18 | 192.55 | 191.77 | | | | 186.33 | 190.82 | 191.66 | 191.52 | 191.67 | 189.16 | 189.02 |
| Apr-17 | | | | | 193.39 | 193.97 | 193.75 | | | | | | | |
| Jun-17 | | | | | | | | | | | | | | |
| Sep-17 | | | | | | | | | | | | | | |
| Oct-17 | 188.38 | 188.43 | 191.08 | 191.40 | 192.47 | 192.94 | 192.97 | 185.78 | 189.29 | 190.90 | 190.66 | 190.59 | 188.93 | 187.95 |
| Dec-17 | | | | | | | | | | | | | | |

**Table G.2**
**Groundwater Elevations**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| DATE | 52-I | 52-II | 53-I | 54-II | 61-I | 61-II | 61-III | 62-I/IR | 62-II | 63-I | 63-II | 63-III | 64-I | 64-II |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.O.P. -> | 189.95 | 190.31 | 196.73 | 196.05 | 195.60 | 195.76 | 195.66 | 191.95 | 192.01 | 193.29 | 193.28 | 192.98 | 190.10 | 190.16 |
| Mar-18 | | | 192.52 | 191.83 | 193.13 | 193.63 | 193.33 | 187.15 | 190.44 | 191.63 | 191.43 | 191.41 | | |
| Apr-18 | 189.48 | 189.14 | | | | | | | | | | | 189.25 | 189.26 |
| Jun-18 | | | | | | | | | | | | | | |
| Sep-18 | 187.86 | 188.18 | 190.50 | 190.75 | 191.86 | 192.49 | 192.74 | 185.47 | 189.09 | 190.08 | 189.84 | 189.78 | 188.97 | 187.84 |
| Dec-18 | | | | | | | | | | | | | | |
| Mar-19 | | | | | | | | | | | | | | |
| Apr-19 | 189.49 | 189.11 | 192.17 | 191.49 | 193.12 | 193.35 | 193.42 | 187.07 | 191.14 | 191.59 | 191.62 | 191.58 | 189.07 | 189.25 |
| May-19 | | | | | | | | | | | | | | |
| Aug-19 | 188.04 | | 191.12 | 191.65 | 192.26 | 192.72 | 192.63 | 184.94 | 189.18 | 190.58 | 190.33 | 190.33 | 188.89 | 188.10 |
| Oct-19 | | | | | | | | | | | | | | |
| Nov-19 | | | | | | | | | | | | | | |
| Mar-20 | | | | | | | | | | | | | | |
| Apr-20 | | | | | 193.52 | 193.94 | 193.51 | 186.93 | 191.09 | 191.96 | 191.82 | 191.90 | | |
| May-20 | 189.38 | | 192.66 | 193.72 | | | | | | | | | 189.66 | 188.93 |
| Jun-20 | | | | | | | | | | | | | | |
| Aug-20 | 187.49 | | 190.65 | 191.04 | 191.70 | 192.15 | 192.05 | 185.33 | 188.67 | 189.96 | 189.71 | 189.74 | 188.86 | 187.94 |
| Nov-20 | | | | | | | | | | | | | | |
| Mar-21 | | | 192.41 | 191.87 | | | | 186.94 | 191.02 | 191.67 | 191.70 | 191.76 | 189.27 | 189.09 |
| Apr-21 | 189.39 | | | | 193.38 | 193.69 | 193.37 | | | | | | | |
| May-21 | | | | | | | | | | | | | | |
| Sep-21 | 188.64 | | 191.15 | 190.92 | 192.45 | 192.90 | 192.95 | 185.81 | 189.80 | 190.81 | 190.55 | 190.34 | 188.90 | 188.24 |
| Nov-21 | | | | | | | | | | | | | | |
| Mar-22 | | | 192.75 | 192.96 | 193.33 | 193.72 | 193.33 | 187.29 | 191.21 | 191.58 | 191.39 | 191.30 | 189.18 | 189.06 |
| Apr-22 | 189.49 | | | | | | | | | | | | | |
| Sep-22 | 187.78 | | 190.73 | 190.94 | 191.66 | 192.08 | 192.06 | 184.92 | 188.67 | 189.94 | 189.65 | 189.75 | 188.77 | 188.03 |
| Oct-22 | | 187.90 | | | | | | | | | | | | |

NOTES: 1) Water level elevations are in metres Above Sea Level (mASL)
2) Blank indicates water level not measured.

**Table G.2**
**Groundwater Elevations**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| DATE | 66-I | 66-II | 66-III | 70-I | 70-II | 70-III | 74-II | 74-III | 75-I | 75-II | 76-I | 77-I | 81-I | 81-II | 81-III |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.O.P. -> | 199.06 | 199.13 | 198.92 | 195.05 | 195.97 | 194.91 | 195.91 | 195.99 | 191.18 | 191.23 | 190.49 | 195.36 | 199.85 | 199.90 | 200.00 |
| Mar-99 | 188.73 | 196.74 | 196.95 | 194.90 | | 194.76 | 194.70 | 195.17 | 182.26 | 190.10 | 172.19 | | 192.44 | 194.13 | 194.70 |
| Jul-99 | 190.14 | 196.12 | 196.30 | 194.31 | 194.93 | 194.51 | 193.88 | 194.04 | 182.44 | 189.10 | 172.87 | | 192.10 | 193.54 | 193.84 |
| Dec-99 | 186.41 | 196.72 | 196.90 | 194.75 | 195.05 | 194.61 | 194.58 | 194.94 | 182.07 | 190.02 | 172.36 | 194.85 | 192.30 | 194.10 | 194.60 |
| Apr-00 | 186.59 | 196.76 | 196.94 | 195.15 | 195.20 | 194.68 | 194.56 | 194.95 | 182.39 | 189.99 | 173.09 | 194.85 | 192.19 | 193.93 | 194.72 |
| Aug-00 | 188.16 | 196.42 | 196.57 | 195.09 | 195.04 | 194.41 | 193.92 | 194.05 | 182.68 | 189.61 | 173.76 | 194.64 | 198.17 | 193.92 | 194.35 |
| Nov-00 | 187.06 | 196.50 | 196.74 | 195.05 | 195.24 | 194.63 | 194.40 | 194.84 | 181.82 | 190.05 | 172.27 | 194.85 | 192.02 | 193.31 | 193.52 |
| Apr-01 | 186.48 | 196.73 | 196.87 | 195.08 | 195.00 | 194.61 | 194.44 | 194.67 | 181.62 | 190.03 | 173.12 | 194.86 | 192.31 | 194.53 | 195.09 |
| Jul-01 | 187.46 | 196.11 | 196.30 | 194.82 | 194.98 | 194.21 | 193.21 | 193.27 | 181.45 | 189.26 | 173.64 | 194.25 | 191.99 | 193.58 | 193.94 |
| Dec-01 | 186.36 | 196.57 | 196.88 | 195.04 | 194.76 | 194.55 | 194.33 | 194.69 | 181.59 | 189.81 | 172.71 | 194.76 | 192.13 | 191.01 | 194.35 |
| Feb-02 | | | | | | | | | | | | | | | |
| Mar-02 | | | | | | | | | | | | | | | |
| Apr-02 | 188.20 | 196.96 | 197.12 | 195.03 | 195.32 | 194.57 | 194.72 | 195.11 | 181.57 | 190.11 | 173.79 | 194.82 | 192.81 | 194.67 | 195.22 |
| May-02 | | | | | | | | | | | | | | | |
| Jun-02 | | | | | | | | | | | | | | | |
| Jul-02 | | | | | | | | | | | | | | | |
| Aug-02 | 189.64 | 196.27 | 196.54 | 195.07 | 195.11 | 194.48 | 194.07 | 194.25 | 181.68 | 189.50 | 174.56 | 194.61 | 192.22 | 194.23 | 194.68 |
| Sep-02 | | | | | | | | | | | | | | | |
| Oct-02 | | | | | | | | | | | | | | | |
| Nov-02 | 186.32 | 196.21 | 196.46 | 194.79 | 194.96 | 194.20 | 193.46 | 193.67 | 181.52 | 189.39 | 173.85 | 194.67 | 191.99 | 193.60 | 193.75 |
| Jan-03 | | | | | | | | | | | | | | | |
| Mar-03 | 188.02 | 196.65 | 196.97 | | | 194.77 | 194.47 | 195.12 | 181.57 | 190.00 | 174.77 | | 192.11 | 193.84 | 194.62 |
| Jul-03 | 189.30 | 196.16 | 196.39 | 194.90 | 194.89 | 194.10 | 193.58 | 193.79 | | 189.18 | 175.51 | 194.26 | 192.01 | 193.82 | 194.25 |
| Nov-03 | 186.72 | 196.76 | 196.92 | 194.86 | 194.93 | 194.27 | 194.56 | 195.21 | 181.66 | 190.05 | 174.70 | 194.81 | 192.22 | 194.36 | 194.90 |
| Mar-04 | 188.08 | 196.68 | 196.91 | | | | 194.61 | 195.05 | 181.62 | 190.04 | 190.49 | | 192.31 | 194.39 | 194.90 |
| Jul-04 | 189.47 | 196.85 | 197.24 | | | | 194.46 | 194.72 | 181.72 | 190.07 | 176.31 | 194.85 | 192.43 | 194.73 | 195.07 |
| Nov-04 | 195.95 | 196.48 | 196.67 | | | 194.61 | 193.96 | 194.20 | 181.83 | 190.01 | 173.28 | 194.80 | 192.05 | 193.67 | 194.00 |
| Jan-05 | | | | | | | | | | | | | | | |
| Feb-05 | | | | | | | | | | | | | | | |
| Mar-05 | 196.41 | 196.58 | 196.80 | 195.04 | | | 194.42 | 195.09 | 181.85 | 190.05 | 174.34 | | 192.14 | 193.63 | 193.93 |
| Apr-05 | | | | | | | | | | | | 195.06 | | | |
| May-05 | | | | | | | | | | | | | | | |
| Jun-05 | | | | | | | | | | | | | | | |
| Jul-05 | 196.11 | 195.90 | 196.14 | 194.56 | 194.64 | 193.94 | 193.35 | 193.59 | | 188.92 | 175.29 | 194.01 | 191.94 | 193.48 | 193.77 |
| Nov-05 | 195.66 | 196.35 | 196.72 | 194.77 | | 194.13 | 193.80 | 194.24 | | 189.43 | 172.59 | 194.68 | 192.00 | 193.95 | 194.57 |
| Jan-06 | | | | | | | | | | | | | | | |
| Feb-06 | | | | | | | | | | | | | | | |
| Mar-06 | 196.31 | 196.70 | 196.88 | | | | 195.11 | 194.76 | | 189.98 | 173.86 | 194.96 | 192.31 | 194.41 | 194.89 |
| Apr-06 | | | | | | | | | | | | | | | |
| May-06 | | | | | | | | | | | | | | | |
| Jun-06 | | | | | | | | | | | | | | | |
| Jul-06 | 195.76 | 196.30 | 196.53 | | | | 194.33 | 194.71 | | | | | 192.23 | 193.98 | 194.38 |
| Aug-06 | | | | 194.91 | 194.93 | 194.75 | | | | 189.26 | 174.93 | 194.67 | | | |
| Sep-06 | | | | | | | | | | | | | | | |
| Oct-06 | | | | | | | | | | | | | | | |
| Nov-06 | 196.13 | 196.69 | 196.91 | 194.94 | 194.93 | 194.66 | | | | 190.06 | | | 192.37 | 194.56 | 195.09 |
| Dec-06 | | | | | | | 194.72 | | | | | 194.85 | | | |
| Jan-07 | | | | | | | | | | | | | | | |
| Feb-07 | | | | | | | | | | | | | | | |
| Mar-07 | 195.93 | 196.36 | 196.55 | | | | 194.01 | 194.23 | | 190.11 | | | 192.10 | 193.75 | 194.08 |
| Apr-07 | | | | flowing | 194.93 | 194.67 | | | 182.60 | | 172.85 | 194.78 | | | |
| May-07 | | | | | | | | | | | | | | | |
| Jun-07 | | | | | | | | | | | | | | | |
| Jul-07 | 195.70 | 196.06 | 196.31 | | 194.44 | | 193.74 | 193.91 | | | | | 192.13 | 193.67 | 193.98 |
| Aug-07 | | | | 194.43 | | 194.07 | | | | 188.68 | 173.79 | 193.83 | | | |
| Sep-07 | | | | | | | | | | | | | | | |
| Oct-07 | | | | | | | | | | | | | | | |
| Nov-07 | 195.36 | 195.99 | 196.30 | | | | | | | | | 194.59 | 191.84 | 193.16 | 193.47 |
| Dec-07 | | | | 194.79 | 194.80 | 194.41 | 193.28 | 193.58 | 182.96 | 189.26 | 171.80 | | | | |

**Table G.2**
**Groundwater Elevations**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| DATE | 66-I | 66-II | 66-III | 70-I | 70-II | 70-III | 74-II | 74-III | 75-I | 75-II | 76-I | 77-I | 81-I | 81-II | 81-III |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.O.P. -> | 199.06 | 199.13 | 198.92 | 195.05 | 195.97 | 194.91 | 195.91 | 195.99 | 191.18 | 191.23 | 190.49 | 195.36 | 199.85 | 199.90 | 200.00 |
| Mar-08 | 196.24 | 196.79 | 196.99 | | | | 194.75 | | | | | | 192.26 | 194.35 | 194.78 |
| Apr-08 | | | | flooded | flooded | flooded | | 195.40 | | | Dry | 195.09 | | | |
| Sep-08 | 196.19 | 196.69 | 197.00 | flooded | flooded | flooded | 194.70 | 195.21 | | | 172.20 | 195.11 | 192.29 | 194.13 | 194.46 |
| Oct-08 | | | | | | | | | | | | | | | |
| Mar-09 | | | | | | | 195.22 | 194.88 | | | | | | | |
| Apr-09 | 196.40 | 196.78 | 196.96 | | flowing | 194.79 | | | | | 174.12 | 194.90 | 192.55 | 194.68 | 195.24 |
| Sep-09 | 195.49 | 196.02 | 196.13 | 195.03 | flowing | 194.53 | 193.73 | | | | 173.70 | 194.65 | 192.02 | 193.47 | Dry |
| Oct-09 | | | | | | | | 194.72 | | | | | | | |
| Mar-10 | | | | | | | 194.66 | 195.12 | | | | | 192.37 | 194.58 | 195.08 |
| Apr-10 | 196.19 | 196.58 | 196.75 | 194.72 | flowing | 194.69 | | | | | 176.04 | 194.83 | | | |
| Sep-10 | | | | 194.77 | flowing | 194.65 | | | | | | | 191.82 | 193.20 | 193.48 |
| Oct-10 | 195.45 | 196.02 | 196.26 | | | | 193.59 | 193.94 | | | 174.87 | 194.78 | | | |
| Dec-10 | | | | | | | | | | | | | | | |
| Mar-11 | 196.47 | 196.93 | 197.29 | | | | 194.80 | 195.22 | | | | | 192.35 | 194.56 | 195.57 |
| Apr-11 | | | | flowing | flowing | 194.79 | | | | | 176.64 | 194.94 | | | |
| Sep-11 | | | | | | | | | | | | | | | |
| Oct-11 | 195.81 | 196.32 | 196.56 | flowing | flowing | 194.82 | 194.32 | | | | 173.87 | 194.72 | 192.11 | 193.57 | 193.83 |
| Mar-12 | | | | | | | | | | | | | | | |
| Apr-12 | 196.15 | 196.52 | 196.74 | flowing | flowing | 194.73 | 194.23 | | | | 175.77 | 194.88 | 192.23 | 193.96 | 194.48 |
| Sep-12 | | | | | | | | | | | | | | | |
| Oct-12 | 195.30 | 195.92 | 196.17 | 194.86 | flowing | 194.53 | 193.35 | | | | 175.98 | 194.78 | 191.77 | 193.07 | 193.45 |
| Mar-13 | | | | | | | 194.52 | | | | | | 192.20 | 193.98 | 194.22 |
| Apr-13 | 196.12 | 196.62 | 196.92 | flowing | flowing | flowing | | | | | 177.53 | 194.92 | | | |
| Jun-13 | | | | | | | | | | | | | | | |
| Sep-13 | | | | | | | | | | | | | | | |
| Oct-13 | 195.61 | 196.23 | 196.56 | 194.98 | flowing | 194.71 | 193.94 | 194.97 | | | 177.85 | 194.88 | 192.08 | 193.39 | 193.57 |
| Dec-13 | | | | | | | | | | | | | | | |
| Mar-14 | 196.00 | 196.53 | | | | | 194.56 | | | | | | | | |
| Apr-14 | | | | | | | | | | | 179.10 | | | | |
| Jun-14 | | | | | | | | | | | | | | | |
| Sep-14 | | | | | | | | | | | | | | | |
| Oct-14 | 195.68 | 196.19 | 196.44 | flowing | flowing | 194.73 | 194.13 | 194.50 | 186.64 | 189.80 | 179.09 | | 192.16 | 193.67 | 193.88 |
| Nov-14 | | | | | | | | | | | | | | | |
| Dec-14 | | | | | | | | | | | | | | | |
| Mar-15 | 196.04 | 196.63 | 197.02 | 194.79 | flowing | 194.83 | 194.41 | 195.04 | 184.37 | 189.98 | 180.29 | 194.85 | 192.32 | 193.95 | 197.08 |
| Jun-15 | | | | | | | | | | | | | | | |
| Sep-15 | 195.32 | 195.93 | 196.20 | 194.67 | flowing | 194.72 | 193.52 | 193.87 | 183.34 | 189.08 | 180.00 | 194.71 | 191.89 | 193.41 | 193.66 |
| Dec-15 | | | | | | | | | | | | | | | |
| Mar-16 | 196.25 | 196.87 | 197.22 | | | | 194.65 | 195.18 | | | | | | | |
| Apr-16 | | | | 194.79 | flowing | 194.81 | | | 183.28 | 189.95 | 181.30 | 194.86 | 192.34 | 194.43 | 195.34 |
| Jun-16 | | | | | | | | | | | | | | | |
| Jul-16 | | | | | | | | | | | | | | | |
| Sep-16 | 194.58 | 195.34 | 195.60 | | | | 192.30 | 192.14 | 183.52 | 187.78 | 181.03 | 193.68 | 191.48 | 192.62 | 193.45 |
| Nov-16 | | | | | | | | | | | | | | | |
| Mar-17 | | | | | | | | | 183.08 | 189.98 | 181.94 | | 192.14 | 194.12 | 195.45 |
| Apr-17 | 196.31 | 196.93 | 197.25 | | | | 194.66 | 195.25 | | | | 194.81 | | | |
| Jun-17 | | | | | | | | | | | | | | | |
| Sep-17 | | | | | | | | | | | | | | | |
| Oct-17 | 195.35 | 195.98 | 196.21 | | | | 193.49 | 193.85 | 183.50 | 189.34 | 181.84 | 194.52 | 191.87 | 193.37 | 193.92 |
| Dec-17 | | | | | | | | | | | | | | | |

**Table G.2**
**Groundwater Elevations**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| DATE | 66-I | 66-II | 66-III | 70-I | 70-II | 70-III | 74-II | 74-III | 75-I | 75-II | 76-I | 77-I | 81-I | 81-II | 81-III |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.O.P. -> | 199.06 | 199.13 | 198.92 | 195.05 | 195.97 | 194.91 | 195.91 | 195.99 | 191.18 | 191.23 | 190.49 | 195.36 | 199.85 | 199.90 | 200.00 |
| Mar-18 | 196.20 | 196.74 | 197.09 | | | | 194.56 | 195.04 | 182.78 | 190.00 | 182.45 | | | | |
| Apr-18 | | | | | | | | | | | | 194.84 | 192.36 | 194.43 | 195.49 |
| Jun-18 | | | | | | | | | | | | | | | |
| Sep-18 | 195.10 | 195.84 | 196.13 | | | | 193.19 | 193.48 | 182.47 | 188.56 | 182.29 | 194.08 | 191.81 | 193.16 | 193.62 |
| Dec-18 | | | | | | | | | | | | | | | |
| Mar-19 | 195.89 | 196.43 | 196.75 | | | | | | | | | | 192.27 | 193.60 | 195.48 |
| Apr-19 | | | | | | | 194.51 | 194.79 | 182.87 | 190.04 | 182.93 | 194.65 | | | |
| May-19 | | | | | | | | | | | | | | | |
| Aug-19 | 194.97 | 195.77 | 196.08 | | | | 193.22 | 193.49 | 182.88 | 188.80 | 182.58 | 193.72 | 191.92 | 193.44 | 194.02 |
| Oct-19 | | | | | | | | | | | | | | | |
| Nov-19 | | | | | | | | | | | | | | | |
| Mar-20 | | | | | | | | | | | | | | | |
| Apr-20 | 196.28 | 196.82 | 196.12 | | | | | | | | 183.55 | | 192.51 | 194.60 | 195.45 |
| May-20 | | | | | | | 194.38 | 195.00 | 182.49 | 190.07 | | | | | |
| Jun-20 | | | | | | | | | | | | | | | |
| Aug-20 | 194.52 | 195.45 | 195.73 | | | | 192.76 | 192.82 | 182.22 | 188.10 | 182.21 | 193.34 | 191.77 | 193.12 | 193.70 |
| Nov-20 | | | | | | | | | | | | | | | |
| Mar-21 | 195.99 | 196.50 | 196.82 | | | | | 194.96 | | | 182.87 | 194.80 | 192.16 | 193.78 | 194.75 |
| Apr-21 | | | | | | | | | 182.36 | 190.01 | | | | | |
| May-21 | | | | | | | | | | | | | | | |
| Sep-21 | 195.56 | 196.00 | 196.23 | | | | 193.69 | 194.07 | 182.21 | 189.42 | 182.70 | 194.60 | 192.47 | 193.32 | 193.73 |
| Nov-21 | | | | | | | | | | | | | | | |
| Mar-22 | 196.42 | 197.05 | 197.48 | | | | 194.66 | 195.10 | 182.37 | 190.10 | 183.51 | | 192.46 | 194.32 | 195.48 |
| Apr-22 | | | | | | | | | | | | 194.80 | | | |
| Sep-22 | 196.82 | 195.59 | 195.90 | | | | 192.86 | 192.96 | 182.02 | 188.18 | 183.26 | 193.53 | 191.63 | 192.99 | 193.62 |
| Oct-22 | | | | | | | | | | | | | | | |

NOTES: 1) Water level elevations are in metres Above Sea Level (mASL)
2) Blank indicates water level not measured.

**Table G.2**
**Groundwater Elevations**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| DATE | 84-I | 84-II | 85-I | 85-II | 86-I | 86-II | 86-III | 87-I | 87-II | 87-III | 88-I | 88-II | 88-III | 89-I | 89-II | 89-III |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.O.P. -> | 202.17 | 202.12 | 198.80 | 198.75 | 195.73 | 195.69 | 195.75 | 200.35 | 200.31 | 200.39 | 207.52 | 207.52 | 207.37 | 202.77 | 203.14 | 203.22 |
| Mar-99 | | | | | | | | | | | | | | | | |
| Jul-99 | | | | | | | | | | | | | | | | |
| Dec-99 | | | | | | | | | | | | | | | | |
| Apr-00 | | | | | | | | | | | | | | | | |
| Aug-00 | | | | | | | | | | | | | | | | |
| Nov-00 | 198.64 | 198.56 | | 197.92 | 195.38 | 194.49 | 194.41 | 199.36 | 199.16 | 198.84 | 206.33 | 206.52 | 206.50 | 198.32 | 198.29 | 198.47 |
| Apr-01 | | | | | | | | | | | | | | | | |
| Jul-01 | | | | | | | | | | | | | | | | |
| Dec-01 | | | | | | | | | | | | | | | | |
| Feb-02 | | | | | | | | | | | | | | | | |
| Mar-02 | | | | | | | | | | | | | | | | |
| Apr-02 | | | | | | | | | | | | | | | | |
| May-02 | | | | | | | | | | | | | | | | |
| Jun-02 | | | | | | | | | | | | | | | | |
| Jul-02 | | | | | | | | | | | | | | | | |
| Aug-02 | | | | | | | | | | | | | | | | |
| Sep-02 | | | | | | | | | | | | | | | | |
| Oct-02 | | | | | | | | | | | | | | | | |
| Nov-02 | | | | | | | | | | | | | | | | |
| Jan-03 | | | | | | | | | | | | | | | | |
| Mar-03 | | | | | | | | | | | | | | | | |
| Jul-03 | | | | | | | | | | | | | | | | |
| Nov-03 | | | | | | | | | | | | | | | | |
| Mar-04 | | | | | | | | | | | | | | | | |
| Jul-04 | | | | | | | | | | | | | | | | |
| Nov-04 | | | | | | | | | | | | | | | | |
| Jan-05 | 199.33 | 199.09 | | | | 194.40 | | 199.85 | 199.07 | 198.72 | | | 206.21 | 199.87 | 199.50 | 200.08 |
| Feb-05 | 197.72 | 197.54 | 198.04 | 197.86 | | | | | 199.09 | 198.76 | | | | 198.89 | 199.04 | 199.21 |
| Mar-05 | 198.99 | 198.94 | 198.07 | 197.96 | 194.96 | | | 199.71 | 199.34 | 199.05 | 206.86 | | | 199.18 | 199.22 | 199.64 |
| Apr-05 | 199.76 | 199.70 | 197.46 | 197.97 | 195.27 | 194.91 | 194.82 | 199.88 | 199.41 | 198.98 | 206.93 | 206.71 | 206.58 | 200.21 | 200.27 | 201.04 |
| May-05 | 199.19 | 198.93 | | 197.69 | 194.29 | 194.44 | 194.34 | 199.37 | 198.97 | 198.70 | 207.42 | 206.32 | 206.25 | 199.63 | 199.24 | 199.74 |
| Jun-05 | 198.62 | 198.42 | | 197.49 | 195.04 | 195.22 | 194.11 | 199.03 | 198.75 | 198.41 | 205.83 | 205.74 | 205.64 | 198.76 | 198.49 | 198.83 |
| Jul-05 | | | | | | | | | | | | | | | | |
| Nov-05 | | | | | | | | | | | | | | | | |
| Jan-06 | 199.55 | 199.50 | 198.63 | 197.65 | | | | 198.79 | 199.07 | 198.87 | 206.92 | 206.83 | 206.69 | 199.85 | 199.92 | 200.62 |
| Feb-06 | 199.47 | 199.27 | 198.68 | 197.79 | | | | 199.00 | 198.81 | 198.70 | | 206.47 | | 199.88 | 199.80 | 200.46 |
| Mar-06 | 199.44 | 199.22 | 198.67 | 197.79 | | | | 199.11 | 198.87 | 198.74 | 206.55 | 206.67 | 206.57 | 199.81 | 199.75 | 200.42 |
| Apr-06 | 199.29 | 199.08 | 198.70 | 197.92 | 195.41 | 194.84 | | 199.06 | 198.78 | 198.66 | 206.61 | 206.53 | 206.48 | 199.66 | 199.50 | 200.10 |
| May-06 | 199.48 | 199.20 | 198.67 | 197.82 | 195.38 | 194.86 | | 199.08 | 198.75 | 198.59 | 206.61 | 206.43 | 206.37 | 199.61 | 199.53 | 199.97 |
| Jun-06 | 199.07 | 198.79 | 198.67 | 197.30 | 195.31 | 195.06 | 194.88 | 197.91 | 198.57 | 198.13 | 206.19 | 206.06 | 205.98 | 199.22 | 198.89 | 199.29 |
| Jul-06 | 198.67 | 198.40 | 198.58 | 197.90 | 195.42 | 194.92 | 194.83 | 198.71 | 198.44 | 198.21 | 205.80 | 205.72 | 205.63 | 198.53 | 198.39 | 198.68 |
| Aug-06 | 198.37 | 198.15 | 198.36 | 197.63 | 195.09 | 194.56 | 194.46 | 198.36 | 197.99 | 197.75 | 205.26 | 205.18 | 205.10 | 198.21 | 198.05 | 198.34 |
| Sep-06 | 198.24 | 198.03 | 198.44 | 197.92 | 195.24 | 194.85 | 194.78 | 198.38 | 198.00 | 197.82 | 205.03 | 204.97 | 204.89 | 198.09 | 197.90 | 198.16 |
| Oct-06 | 198.67 | 198.58 | 198.65 | 198.05 | 195.43 | 194.97 | 194.88 | 198.97 | 198.72 | 198.75 | 206.19 | 206.40 | 206.41 | 198.09 | 198.06 | 198.07 |
| Nov-06 | 199.43 | 199.18 | 198.80 | 198.13 | 195.65 | 194.99 | 194.89 | 199.23 | 198.90 | 198.78 | 206.81 | 206.69 | 206.58 | 199.41 | 199.27 | 199.72 |
| Dec-06 | 199.63 | 199.40 | 198.80 | 198.10 | 195.73 | 194.91 | 194.86 | 199.26 | 198.92 | 198.78 | 206.84 | 206.66 | 206.55 | 199.94 | 199.93 | 200.60 |
| Jan-07 | 199.32 | 199.05 | 198.80 | 198.04 | | 194.81 | 194.72 | 199.01 | 198.70 | 198.56 | 206.50 | 206.40 | 206.34 | 199.71 | 199.54 | 200.00 |
| Feb-07 | 198.91 | 198.65 | | 197.93 | | 194.79 | 194.72 | 198.84 | 198.50 | 198.37 | 206.31 | 206.27 | 206.21 | 199.09 | 198.77 | 199.13 |
| Mar-07 | 199.18 | 199.03 | 198.80 | 198.03 | | 194.91 | | 199.14 | 198.87 | 198.83 | 206.75 | 206.62 | 206.61 | 199.17 | 199.24 | 199.79 |
| Apr-07 | 199.65 | 199.55 | 198.80 | 198.06 | 195.40 | 194.95 | 194.88 | 199.32 | 199.01 | 198.91 | 206.89 | 206.69 | 206.59 | 199.94 | 200.05 | 200.82 |
| May-07 | 199.30 | 199.04 | 198.80 | 198.07 | 195.24 | 194.86 | 194.77 | 199.12 | 198.78 | 198.65 | 206.54 | 206.44 | 206.39 | 199.67 | 199.49 | 200.12 |
| Jun-07 | 198.78 | 198.48 | 198.72 | 197.98 | 195.15 | 194.67 | 194.56 | 198.70 | 198.39 | 198.20 | 205.88 | 205.79 | 205.68 | 198.91 | 198.73 | 199.09 |
| Jul-07 | 198.44 | 198.22 | 198.50 | 197.76 | 194.91 | 194.49 | 194.40 | 198.39 | 197.99 | 197.80 | 205.36 | 205.29 | 205.20 | 198.54 | 198.30 | 198.66 |
| Aug-07 | 198.18 | 197.99 | 198.26 | 197.54 | 194.69 | 194.34 | 194.25 | 198.14 | 197.72 | 197.53 | 204.94 | 204.88 | 204.80 | 198.33 | 198.00 | 198.36 |
| Sep-07 | 197.88 | 197.70 | 198.17 | 197.64 | 194.55 | 194.33 | 194.30 | 197.88 | 197.45 | 197.28 | 204.34 | 204.28 | 204.18 | 198.02 | 197.69 | 198.04 |
| Oct-07 | 197.72 | 197.54 | 198.25 | 197.91 | 194.87 | 194.77 | 194.72 | 198.13 | 197.88 | 197.85 | 203.95 | 203.97 | 203.90 | 197.79 | 197.52 | 197.77 |
| Nov-07 | 197.78 | 197.71 | 198.37 | 197.96 | 195.08 | 194.92 | 194.88 | 198.44 | 198.26 | 198.27 | 204.20 | 204.44 | 204.43 | 197.77 | 197.55 | 197.67 |
| Dec-07 | 197.93 | 197.80 | 198.30 | 197.80 | 195.03 | 194.81 | 194.79 | 198.45 | 198.19 | 198.19 | 204.66 | 204.81 | 204.78 | 197.82 | 197.65 | 197.74 |

**Table G.2**
**Groundwater Elevations**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| DATE | 84-I | 84-II | 85-I | 85-II | 86-I | 86-II | 86-III | 87-I | 87-II | 87-III | 88-I | 88-II | 88-III | 89-I | 89-II | 89-III |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.O.P. -> | 202.17 | 202.12 | 198.80 | 198.75 | 195.73 | 195.69 | 195.75 | 200.35 | 200.31 | 200.39 | 207.52 | 207.52 | 207.37 | 202.77 | 203.14 | 203.22 |
| Mar-08 | | | 198.80 | 198.07 | 195.39 | 195.05 | 195.09 | | 199.33 | 198.91 | | | | | | |
| Apr-08 | 200.07 | 199.69 | | | | | | 199.64 | | | 206.36 | 206.45 | 206.47 | 200.53 | 200.36 | 201.21 |
| Sep-08 | 199.23 | 198.95 | | | | | | | | | | | | 199.54 | 199.23 | 199.73 |
| Oct-08 | | | flowing | 198.05 | 195.47 | 195.21 | 195.07 | 199.29 | 199.11 | 198.88 | 206.50 | 206.37 | 206.41 | | | |
| Mar-09 | | | | | | | | | | | | | | | | |
| Apr-09 | 199.77 | 199.44 | flowing | 198.31 | 195.46 | 194.98 | 194.88 | 199.38 | 199.20 | 198.83 | 206.71 | 206.52 | 206.55 | 200.26 | 200.17 | 201.00 |
| Sep-09 | | | | | 194.85 | 194.59 | 194.44 | 198.24 | 198.09 | 197.83 | | | | | | |
| Oct-09 | 198.22 | 198.11 | 198.51 | 198.17 | | | | | | | 205.56 | 205.64 | 205.67 | 198.40 | 198.03 | 198.27 |
| Mar-10 | | | 198.17 | 197.99 | 195.44 | 195.09 | 194.90 | 198.49 | 198.52 | 198.76 | | | | | | |
| Apr-10 | 196.74 | 195.47 | | | | | | | | | 206.69 | 206.52 | 206.54 | 199.91 | 199.78 | 200.49 |
| Sep-10 | 198.22 | 197.99 | | | 194.84 | 194.64 | 194.47 | 197.70 | 197.65 | 197.60 | 205.03 | 204.89 | 204.91 | 198.21 | 197.88 | 198.19 |
| Oct-10 | | | 197.84 | 197.47 | | | | | | | | | | | | |
| Dec-10 | | | | | | | | | | | | | | | | |
| Mar-11 | 198.97 | 199.03 | 198.29 | 198.10 | 195.51 | 195.23 | 195.06 | 198.73 | 198.80 | 199.07 | 206.00 | 206.59 | 206.37 | 200.27 | 200.29 | 201.10 |
| Apr-11 | | | | | | | | | | | | | | | | |
| Sep-11 | 198.32 | 198.15 | 198.02 | 197.50 | | | | | | | 205.45 | 205.76 | 205.73 | 198.51 | 198.18 | 198.46 |
| Oct-11 | | | | | 195.16 | 195.01 | 194.85 | 197.56 | 197.69 | 198.33 | | | | | | |
| Mar-12 | 199.46 | 199.23 | 198.49 | 197.94 | 195.60 | 195.09 | 194.90 | 198.67 | 198.65 | 198.69 | 206.49 | 206.45 | 206.52 | 200.16 | 199.98 | 200.65 |
| Apr-12 | | | | | | | | | | | | | | | | |
| Sep-12 | 197.93 | 197.69 | 197.77 | 197.44 | 194.96 | 194.80 | 194.65 | 197.67 | 197.64 | 197.64 | | | | 198.12 | 197.63 | 197.90 |
| Oct-12 | | | | | | | | | | | 204.76 | 205.32 | 205.39 | | | |
| Mar-13 | 198.74 | 198.54 | 198.47 | 198.10 | 195.36 | | 194.90 | 198.57 | 198.59 | 198.68 | 206.43 | 206.65 | 206.73 | 198.86 | 198.67 | 199.02 |
| Apr-13 | | | | | | 195.01 | | | | | | | | | | |
| Jun-13 | | | | | | | | | | | | | | | | |
| Sep-13 | 198.27 | 198.06 | 197.42 | 197.80 | 195.10 | 194.94 | 194.79 | 197.76 | 197.77 | 197.89 | 205.50 | 205.75 | 205.81 | 198.33 | 197.95 | 198.23 |
| Oct-13 | | | | | | | | | | | | | | | | |
| Dec-13 | | | | | | | | | | | | | | | | |
| Mar-14 | 198.78 | 198.63 | 198.37 | 198.04 | | | | 198.41 | 198.41 | 198.48 | 206.78 | | | 199.14 | 199.10 | 199.43 |
| Apr-14 | | | | | 195.23 | 195.16 | 194.97 | | | | | 206.68 | 206.69 | | | |
| Jun-14 | | | | | | | | | | | | | | | | |
| Sep-14 | 198.36 | 198.25 | 197.78 | 197.87 | 195.13 | 194.99 | 194.84 | 195.73 | 196.04 | 197.80 | 206.10 | 206.28 | 206.39 | 198.53 | 198.15 | 198.41 |
| Oct-14 | | | | | | | | | | | | | | | | |
| Nov-14 | | | | | | | | | | | | | | | | |
| Dec-14 | | | | | | | | | | | | | | | | |
| Mar-15 | 198.61 | 198.37 | 197.87 | 197.25 | 195.25 | 195.11 | 194.92 | 197.97 | 197.93 | 197.87 | 206.24 | 206.48 | 206.63 | 198.73 | 198.45 | 198.81 |
| Jun-15 | 198.87 | 198.99 | | | | | | | | | 206.45 | 206.49 | 206.57 | | | |
| Sep-15 | 198.10 | 198.07 | 197.82 | 197.49 | 195.02 | 194.89 | 194.70 | 197.33 | 197.33 | 197.73 | 205.09 | 205.56 | 205.67 | 198.60 | 198.17 | 198.46 |
| Dec-15 | 198.37 | 198.32 | 198.32 | 197.69 | 195.56 | 195.00 | 194.82 | 198.43 | 198.44 | 198.57 | 205.99 | 206.30 | 206.43 | 198.72 | 198.65 | 199.09 |
| Mar-16 | 198.97 | 199.03 | 198.51 | 198.10 | 195.40 | 195.12 | 194.94 | 198.49 | 198.50 | 198.65 | 206.45 | 206.55 | 206.61 | 200.22 | 200.41 | 201.36 |
| Apr-16 | | | | | | | | | | | | | | | | |
| Jun-16 | 198.38 | 198.26 | 198.13 | 197.51 | 195.23 | 194.79 | 194.58 | 198.09 | 198.08 | 198.16 | 205.62 | 205.78 | 205.83 | 199.11 | 198.64 | 199.06 |
| Jul-16 | 198.01 | 197.87 | 197.51 | 197.04 | 194.57 | 194.27 | 194.03 | 197.36 | 197.32 | 197.27 | 204.80 | 204.95 | 205.07 | 198.47 | 198.02 | 198.39 |
| Sep-16 | 197.69 | 197.58 | 197.15 | 196.89 | 194.54 | 194.37 | 194.20 | 196.56 | 196.59 | 196.82 | 204.21 | 204.56 | 204.77 | 198.05 | 197.66 | 197.96 |
| Nov-16 | 197.44 | 197.30 | 197.29 | 196.99 | 194.87 | 194.67 | 194.52 | 196.79 | 196.85 | 197.13 | 203.70 | 203.99 | 204.15 | 197.76 | 197.38 | 197.58 |
| Mar-17 | 198.87 | 198.83 | 198.46 | 198.19 | 195.33 | 195.09 | 194.88 | 198.50 | 198.55 | 198.84 | 206.45 | 206.55 | 206.61 | 199.66 | 199.58 | 200.25 |
| Apr-17 | | | | | | | | | | | | | | | | |
| Jun-17 | 199.08 | 199.19 | 198.64 | 198.34 | 195.35 | 195.08 | 194.85 | 198.70 | 198.73 | 198.96 | 206.53 | 206.57 | 206.61 | 200.31 | 200.57 | 201.59 |
| Sep-17 | 198.25 | 198.14 | 198.25 | 197.70 | 195.08 | 194.85 | 194.63 | 197.54 | 197.58 | 198.08 | 205.45 | 205.62 | 205.70 | 198.68 | 198.29 | 198.62 |
| Oct-17 | | | | | | | | | | | | | | | | |
| Dec-17 | 198.26 | 198.11 | 198.34 | 197.83 | 195.38 | 195.02 | 194.82 | 198.37 | 198.38 | 198.57 | 206.06 | 206.26 | 206.39 | 198.38 | 198.09 | 198.33 |

**Table G.2**
**Groundwater Elevations**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| DATE | 84-I | 84-II | 85-I | 85-II | 86-I | 86-II | 86-III | 87-I | 87-II | 87-III | 88-I | 88-II | 88-III | 89-I | 89-II | 89-III |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.O.P. -> | 202.17 | 202.12 | 198.80 | 198.75 | 195.73 | 195.69 | 195.75 | 200.35 | 200.31 | 200.39 | 207.52 | 207.52 | 207.37 | 202.77 | 203.14 | 203.22 |
| Mar-18 | 198.85 | 198.91 | 198.58 | 198.29 | 195.34 | | 194.91 | 198.66 | 198.70 | 198.89 | 206.42 | 206.54 | 206.64 | 199.85 | 199.90 | 200.71 |
| Apr-18 | | | | | | 195.12 | | | | | | | | | | |
| Jun-18 | 198.69 | 198.59 | 198.17 | 197.73 | 195.15 | 194.59 | 194.92 | 198.23 | 198.23 | 198.38 | 206.00 | 206.16 | 206.29 | 199.58 | 199.23 | 199.86 |
| Sep-18 | 198.04 | 197.93 | 197.70 | 197.26 | 194.67 | 194.52 | 194.31 | 197.38 | 197.41 | 197.62 | 204.89 | 205.21 | 205.33 | 198.54 | 198.02 | 198.34 |
| Dec-18 | 198.64 | 198.70 | 198.40 | 197.99 | 195.39 | 195.00 | 194.81 | 198.37 | 198.40 | 198.64 | 206.16 | 206.36 | 206.49 | 199.43 | 199.44 | 200.16 |
| Mar-19 | 198.44 | 198.26 | 198.32 | 198.17 | | | | 197.99 | 198.06 | 198.31 | 205.93 | 206.18 | 206.68 | 198.85 | 198.49 | 198.87 |
| Apr-19 | | | | | 195.39 | 194.95 | 194.96 | | | | | | | | | |
| May-19 | 199.26 | 199.21 | 198.61 | 198.18 | 195.47 | 195.04 | 194.81 | 198.55 | 198.57 | 198.75 | 206.48 | 206.48 | 206.55 | 200.43 | 200.51 | 201.47 |
| Aug-19 | 198.19 | 198.06 | 197.75 | 197.20 | 194.66 | 194.37 | 194.15 | 197.51 | 197.49 | 197.55 | 205.16 | 205.25 | 205.31 | 198.78 | 198.28 | 198.65 |
| Oct-19 | | | | | | | | | | | | | | | | |
| Nov-19 | 198.14 | 198.08 | 198.25 | 197.73 | 195.35 | 194.98 | 194.79 | 198.15 | 198.20 | 198.32 | 205.90 | 206.28 | 206.47 | 198.32 | 197.99 | 198.22 |
| Mar-20 | 198.94 | 198.15 | 198.62 | 198.29 | 195.59 | 195.26 | 195.02 | 198.53 | 198.56 | 198.91 | 206.63 | 206.58 | 206.60 | 200.55 | 200.71 | 201.62 |
| Apr-20 | | | | | | | | | | | | | | | | |
| May-20 | | | | | | | | | | | | | | | | |
| Jun-20 | 198.74 | 198.60 | 198.20 | 197.79 | 195.44 | 194.97 | 194.76 | 197.37 | 197.41 | 198.26 | 206.16 | 206.24 | 206.39 | 199.65 | 199.24 | 199.85 |
| Aug-20 | 197.98 | 197.81 | 197.52 | 197.60 | 194.49 | 194.20 | 193.95 | 197.05 | 197.04 | 197.13 | 204.75 | 204.87 | 204.94 | 198.54 | 197.97 | 198.32 |
| Nov-20 | 198.03 | 197.92 | 198.06 | 198.59 | 195.34 | 194.86 | 194.69 | 197.79 | 197.79 | 197.92 | 205.26 | 205.76 | 206.01 | 198.19 | 197.87 | 198.12 |
| Mar-21 | 198.53 | 198.48 | 198.37 | 198.01 | 195.37 | 195.09 | 194.87 | 198.42 | 198.45 | 198.67 | 206.40 | 206.63 | 206.62 | 198.94 | 198.74 | 199.16 |
| Apr-21 | | | | | | | | | | | | | | | | |
| May-21 | 198.72 | 198.57 | 197.93 | 197.51 | 195.16 | 194.77 | 194.55 | 197.43 | 197.49 | 198.10 | 205.91 | 205.96 | 206.03 | 199.53 | 199.17 | 199.75 |
| Sep-21 | 198.17 | 198.12 | 197.68 | 197.49 | 195.12 | 194.85 | 194.65 | 196.24 | 196.44 | 198.12 | 205.40 | 205.78 | 206.02 | 198.59 | 198.19 | 198.49 |
| Nov-21 | 198.85 | 198.80 | 198.44 | 197.90 | 195.70 | 195.03 | 194.82 | 198.45 | 198.48 | 198.69 | 206.47 | 206.49 | 206.56 | 199.78 | 199.72 | 200.45 |
| Mar-22 | 198.65 | 198.59 | 198.51 | 198.03 | 195.54 | 194.98 | 194.81 | 198.29 | 198.35 | 198.64 | 206.68 | 206.67 | 206.67 | 199.34 | 199.24 | 199.72 |
| Apr-22 | | | | | | | | | | | | | | | | |
| Sep-22 | 196.80 | 197.09 | 197.53 | 197.09 | 194.90 | 194.48 | 194.24 | 197.20 | 197.27 | 197.57 | 204.62 | 205.03 | 205.09 | 198.54 | 197.93 | 198.30 |
| Oct-22 | | | | | | | | | | | | | | | | |

NOTES: 1) Water level elevations are in metres Above Sea Level (mASL)
2) Blank indicates water level not measured.

**Table G.2**
**Groundwater Elevations**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| DATE | 90-I | 90-II | 90-III | 91-I | 91-II | 91-III | 92-I | 92-II | 92-III | 93-I | 93-II | 94-I | 94-II | 95-I | 95-II |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.O.P. -> | 204.38 | 204.06 | 204.18 | 206.55 | 206.56 | 206.69 | 200.46 | 200.47 | 200.43 | 197.67 | 197.76 | 196.80 | 196.88 | 195.51 | 195.49 |
| Mar-99 | | | | | | | | | | | | | | | |
| Jul-99 | | | | | | | | | | | | | | | |
| Dec-99 | | | | | | | | | | | | | | | |
| Apr-00 | | | | | | | | | | | | | | | |
| Aug-00 | | | | | | | | | | | | | | | |
| Nov-00 | 202.38 | 202.76 | 202.63 | 201.29 | 200.81 | 201.11 | 198.08 | 197.87 | 198.50 | 196.77 | 196.83 | | 195.68 | | 194.56 |
| Apr-01 | | | | | | | | | | | | | | | |
| Jul-01 | | | | | | | | | | | | | | | |
| Dec-01 | | | | | | | | | | | | | | | |
| Feb-02 | | | | | | | | | | | | | | | |
| Mar-02 | | | | | | | | | | | | | | | |
| Apr-02 | | | | | | | | | | | | | | | |
| May-02 | | | | | | | | | | | | | | | |
| Jun-02 | | | | | | | | | | | | | | | |
| Jul-02 | | | | | | | | | | | | | | | |
| Aug-02 | | | | | | | | | | | | | | | |
| Sep-02 | | | | | | | | | | | | | | | |
| Oct-02 | | | | | | | | | | | | | | | |
| Nov-02 | | | | | | | | | | | | | | | |
| Jan-03 | | | | | | | | | | | | | | | |
| Mar-03 | | | | | | | | | | | | | | | |
| Jul-03 | | | | | | | | | | | | | | | |
| Nov-03 | | | | | | | | | | | | | | | |
| Mar-04 | | | | | | | | | | | | | | | |
| Jul-04 | | | | | | | | | | | | | | | |
| Nov-04 | | | | | | | | | | | | | | | |
| Jan-05 | 202.24 | 202.20 | 202.37 | 202.52 | 202.25 | 203.92 | 198.25 | 197.77 | 198.14 | | 196.60 | | 195.41 | | |
| Feb-05 | 202.18 | 202.17 | 202.41 | 202.02 | 201.53 | 203.29 | 198.06 | 199.73 | 198.19 | | 195.78 | | 194.87 | | |
| Mar-05 | 202.34 | 202.43 | 202.90 | 201.77 | 201.12 | 202.02 | 198.15 | 198.00 | 198.73 | 197.10 | 196.89 | 196.70 | 195.99 | 195.45 | |
| Apr-05 | 203.08 | 202.97 | 203.18 | 201.38 | 201.13 | 204.91 | 198.86 | 198.42 | 199.17 | 196.97 | 196.85 | 196.57 | 195.77 | 194.68 | 194.39 |
| May-05 | 202.24 | 202.21 | 202.40 | 202.26 | 201.89 | 203.58 | 198.14 | 197.72 | 198.11 | 196.67 | 196.59 | 196.70 | 195.36 | | 194.29 |
| Jun-05 | 201.56 | 201.47 | 201.54 | 201.37 | 200.89 | 201.82 | 197.58 | 197.19 | 197.49 | 196.29 | 196.01 | 196.39 | 194.94 | 195.36 | 194.49 |
| Jul-05 | | | | | | | | | | | | | | | |
| Nov-05 | | | | | | | | | | | | | | | |
| Jan-06 | 203.12 | 203.10 | 203.33 | 199.90 | 199.45 | 200.57 | 197.80 | 197.53 | 198.92 | 197.16 | 196.93 | 195.84 | | | |
| Feb-06 | 202.65 | 202.62 | 202.62 | 199.81 | 199.44 | 200.51 | 197.52 | 196.53 | 198.18 | | 196.59 | | | 194.17 | |
| Mar-06 | 202.81 | 202.59 | | 199.79 | 199.44 | 200.56 | 198.20 | 197.67 | 197.62 | 195.90 | 196.66 | 195.64 | | 195.02 | |
| Apr-06 | 202.52 | 202.49 | 202.64 | 199.81 | 199.44 | 200.57 | 197.49 | 197.45 | 197.94 | 196.93 | 197.57 | 196.80 | 195.49 | | |
| May-06 | 202.64 | 202.57 | 202.72 | 200.00 | 199.58 | 201.47 | 198.04 | 197.52 | 197.58 | 196.67 | 197.01 | 196.80 | 195.40 | | |
| Jun-06 | 202.25 | 202.26 | 202.36 | 199.98 | 199.65 | 200.59 | 197.41 | 197.29 | 197.66 | 196.41 | 196.20 | 196.80 | 196.37 | 195.34 | 193.72 |
| Jul-06 | 201.85 | 201.88 | 201.95 | 199.68 | 199.40 | 200.47 | 197.25 | 197.15 | 197.50 | 196.27 | 195.89 | 196.53 | 194.94 | flowing | 194.67 |
| Aug-06 | 201.42 | 201.44 | 201.37 | 199.35 | 199.14 | 200.48 | 196.90 | 196.74 | 196.89 | 195.83 | 195.47 | 196.16 | 194.43 | 195.45 | 194.55 |
| Sep-06 | 201.25 | 201.28 | 201.05 | 199.36 | 199.07 | 200.48 | 196.96 | 196.74 | 196.84 | 195.90 | 195.45 | 196.17 | 194.59 | flowing | 194.49 |
| Oct-06 | 202.76 | 202.88 | 203.11 | 199.51 | 199.15 | 200.48 | 197.76 | 197.93 | 198.99 | 196.90 | 196.72 | 196.80 | 195.66 | flowing | 194.59 |
| Nov-06 | 202.82 | 202.70 | 202.99 | 200.21 | 200.05 | 203.35 | 197.76 | 197.77 | 198.70 | 196.90 | 196.66 | 196.80 | 195.66 | flowing | 194.54 |
| Dec-06 | 202.86 | 202.78 | 203.00 | 200.43 | 200.28 | 203.39 | 197.77 | 197.76 | 198.40 | 196.86 | 196.64 | 196.80 | 195.61 | flowing | 194.47 |
| Jan-07 | 202.45 | 202.41 | 202.55 | 200.35 | 200.18 | 202.54 | 197.56 | 197.46 | 197.88 | 196.66 | 196.49 | 196.80 | 195.40 | flowing | 194.34 |
| Feb-07 | 202.04 | 202.12 | 202.28 | 199.92 | 199.71 | 200.59 | 197.32 | 197.17 | 197.27 | 196.62 | 196.47 | 196.80 | 195.35 | flowing | 194.33 |
| Mar-07 | 202.53 | 202.56 | 202.83 | 199.94 | 199.71 | 200.59 | 197.57 | 197.56 | 198.09 | | 196.58 | 196.80 | 195.62 | | |
| Apr-07 | 203.01 | 202.95 | 203.13 | 200.38 | 200.00 | 203.22 | 197.84 | 197.87 | 198.76 | 196.67 | 196.62 | 196.80 | 195.66 | flowing | 194.44 |
| May-07 | 202.41 | 202.37 | 202.53 | 200.39 | 200.13 | 202.50 | 197.57 | 197.45 | 197.88 | 196.72 | 196.49 | 196.75 | 195.36 | flowing | 194.34 |
| Jun-07 | 201.80 | 201.79 | 201.85 | 199.92 | 199.76 | 200.60 | 197.20 | 197.02 | 197.20 | 196.28 | 195.88 | 196.41 | 194.88 | flowing | 194.06 |
| Jul-07 | 201.25 | 201.17 | 201.07 | 199.57 | 199.42 | 200.58 | 196.86 | 196.60 | 196.66 | 195.96 | 195.56 | 195.99 | 194.37 | 195.19 | 193.57 |
| Aug-07 | 200.87 | 200.78 | 200.55 | 199.28 | 199.10 | 200.58 | 196.61 | 196.36 | 196.49 | 195.59 | 195.19 | 195.70 | 193.93 | 194.90 | 193.33 |
| Sep-07 | 200.37 | 200.26 | 199.89 | 199.05 | 198.84 | 200.58 | 196.42 | 196.12 | 196.27 | 195.16 | 194.71 | 195.36 | 193.60 | 194.57 | 193.12 |
| Oct-07 | 199.99 | 199.89 | 199.60 | 199.02 | 198.70 | 200.58 | 196.70 | 196.40 | 196.62 | 195.82 | 195.36 | 195.70 | 194.22 | 195.07 | 194.02 |
| Nov-07 | 200.05 | 200.11 | 199.69 | 199.08 | 198.69 | 200.58 | 197.30 | 197.27 | 198.10 | 196.51 | 196.35 | 196.50 | 195.08 | flowing | 194.34 |
| Dec-07 | 201.00 | 201.33 | 201.97 | 199.16 | 198.78 | 200.58 | 197.28 | 197.32 | 198.05 | 196.54 | 196.42 | 196.54 | 195.30 | flowing | 194.43 |

**Table G.2**
**Groundwater Elevations**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| DATE | 90-I | 90-II | 90-III | 91-I | 91-II | 91-III | 92-I | 92-II | 92-III | 93-I | 93-II | 94-I | 94-II | 95-I | 95-II |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.O.P. -> | 204.38 | 204.06 | 204.18 | 206.55 | 206.56 | 206.69 | 200.46 | 200.47 | 200.43 | 197.67 | 197.76 | 196.80 | 196.88 | 195.51 | 195.49 |
| Mar-08 | | | | | | | | | | | | | | flowing | |
| Apr-08 | 203.32 | 203.17 | 203.24 | 201.05 | 201.01 | 204.75 | 198.16 | 198.11 | 199.02 | 196.79 | 196.51 | 196.80 | 195.71 | | 195.49 |
| Sep-08 | 202.56 | 202.48 | 202.61 | 200.32 | 199.98 | 201.86 | 197.95 | 197.96 | 198.97 | | | flowing | 195.31 | | |
| Oct-08 | | | | | | | | | | 196.74 | 196.47 | | | flowing | 194.93 |
| Mar-09 | | | | | | | | | | | | | | | |
| Apr-09 | 202.77 | 202.67 | 202.86 | 201.04 | 200.93 | 203.94 | 197.16 | 198.05 | 198.88 | 196.87 | 196.46 | flowing | 195.46 | flowing | 194.61 |
| Sep-09 | | | | | | | 197.05 | 196.78 | 197.08 | | | | | | |
| Oct-09 | 201.22 | 201.36 | 201.15 | 199.54 | 199.22 | Dry | | | | 196.32 | 196.01 | 196.41 | 194.79 | flowing | 194.24 |
| Mar-10 | | | | 199.37 | 199.01 | Dry | | | | | | | | | |
| Apr-10 | 202.72 | 202.70 | 202.64 | | | | 198.58 | 198.14 | 196.74 | 193.20 | 194.52 | 195.92 | 195.34 | flowing | 194.26 |
| Sep-10 | 201.42 | 201.66 | 202.07 | 198.50 | 198.00 | 200.58 | 197.95 | 196.51 | 196.27 | 195.80 | 195.12 | 194.66 | 195.11 | 195.28 | 194.06 |
| Oct-10 | | | | | | | | | | | | | | | |
| Dec-10 | | | | | | | | | | | | | | | |
| Mar-11 | 201.78 | 202.10 | 202.59 | 198.88 | 198.43 | 203.32 | 199.07 | 198.27 | 197.87 | 197.05 | 196.51 | 196.02 | 195.73 | | |
| Apr-11 | | | | | | | | | | | | | | flowing | 194.37 |
| Sep-11 | 201.46 | 201.82 | 202.06 | 198.79 | 198.35 | 200.57 | 198.62 | 197.93 | 197.18 | 196.16 | 195.50 | | | 195.44 | 194.07 |
| Oct-11 | | | | | | | | | | | | 195.74 | 195.67 | | |
| Mar-12 | 202.11 | 202.27 | 202.56 | 199.64 | 198.98 | 203.24 | 199.13 | 198.31 | 197.82 | 196.78 | 196.32 | 195.99 | | flowing | 194.29 |
| Apr-12 | | | | | | | | | | | | | 195.43 | | |
| Sep-12 | 201.16 | 201.62 | 202.08 | 198.53 | 197.98 | 200.58 | 198.51 | 197.72 | 196.82 | 195.73 | 194.99 | 195.05 | 194.13 | 195.42 | 193.80 |
| Oct-12 | | | | | | | | | | | | | | | |
| Mar-13 | 201.94 | 202.22 | 202.47 | 199.20 | 198.72 | 200.54 | 198.94 | 198.17 | 197.85 | 196.95 | 196.38 | 195.81 | 195.47 | flowing | 194.45 |
| Apr-13 | | | | | | | | | | | | | | | |
| Jun-13 | 202.13 | 202.38 | 202.69 | 199.36 | 198.74 | 200.59 | 199.04 | 198.27 | 197.98 | | | 195.75 | 195.27 | | |
| Sep-13 | 201.52 | 201.90 | 202.22 | 198.82 | 198.28 | 200.58 | 198.49 | 197.63 | 197.55 | 196.04 | 195.57 | 195.35 | 194.67 | 195.36 | 194.65 |
| Oct-13 | | | | | | | | | | | | | | | |
| Dec-13 | 202.21 | 202.49 | 202.69 | 199.34 | 198.81 | 200.58 | 199.03 | 198.05 | 198.04 | | | 195.76 | 195.39 | | |
| Mar-14 | 201.91 | 202.19 | 202.50 | 198.93 | 198.46 | 200.57 | 198.75 | 197.79 | 197.58 | | | | | | |
| Apr-14 | | | | | | | | | | 197.11 | 196.80 | 196.24 | 195.79 | 195.51 | 195.38 |
| Jun-14 | | | | 199.40 | 198.89 | 201.73 | 198.66 | 197.83 | 197.95 | | | 195.56 | 194.92 | | |
| Sep-14 | 201.96 | 202.34 | 202.69 | 199.01 | 198.47 | 200.58 | 198.59 | 197.93 | 198.08 | 196.42 | 196.30 | 195.72 | 195.07 | 194.98 | 194.68 |
| Oct-14 | | | | | | | | | | | | | | | |
| Nov-14 | | | | 199.17 | 198.69 | 200.57 | 198.92 | 197.92 | 197.90 | | | 195.92 | 195.48 | | |
| Dec-14 | | | | | | | | | | | | | | | |
| Mar-15 | 201.75 | 202.09 | 202.42 | 198.68 | 198.24 | 200.58 | 198.49 | 197.60 | 197.21 | 196.54 | 196.47 | 195.46 | 195.15 | 195.08 | 194.85 |
| Jun-15 | | | | 199.50 | 198.89 | 201.58 | 199.00 | 198.23 | 198.53 | 196.90 | 196.63 | 196.13 | 195.79 | | |
| Sep-15 | | | | 198.82 | 198.27 | 200.58 | 198.83 | 197.94 | 197.98 | 196.42 | 196.43 | 195.70 | 195.40 | 195.13 | 194.61 |
| Dec-15 | | | | 199.26 | 198.71 | 200.58 | 199.00 | 198.02 | 198.07 | 196.72 | 196.56 | 195.77 | 195.36 | 195.25 | 194.71 |
| Mar-16 | | | | 199.39 | 198.80 | 202.46 | 199.25 | 198.32 | 198.53 | 196.94 | 196.62 | 196.04 | 195.74 | 195.34 | 194.73 |
| Apr-16 | | | | | | | | | | | | | | | |
| Jun-16 | | | | 199.06 | 198.54 | 200.59 | 198.04 | 197.53 | 197.75 | 196.29 | 195.91 | 195.46 | 194.87 | 195.21 | 194.54 |
| Jul-16 | | | | 198.50 | 197.94 | 200.58 | 197.87 | 197.20 | 197.12 | 195.50 | 195.05 | 194.84 | 193.96 | 194.84 | 194.02 |
| Sep-16 | | | | 198.16 | 197.60 | 200.58 | 197.54 | 197.16 | 196.91 | 195.41 | 194.90 | 194.79 | 193.70 | 194.69 | 193.87 |
| Nov-16 | | | | 198.08 | 197.59 | 200.58 | 198.18 | 197.34 | 196.94 | 195.80 | 195.46 | 195.11 | 194.48 | 195.06 | 194.31 |
| Mar-17 | | | | 199.19 | 198.70 | 203.69 | 199.14 | 198.22 | 198.48 | 196.77 | 196.54 | 195.95 | 195.23 | 195.36 | 194.68 |
| Apr-17 | | | | | | | | | | | | | | | |
| Jun-17 | | | | 199.82 | 199.20 | 203.41 | 199.32 | 198.37 | 198.62 | 196.96 | 196.61 | 196.36 | 195.44 | flowing | 194.87 |
| Sep-17 | | | | 199.06 | 198.52 | 200.58 | 198.00 | 197.61 | 197.66 | 196.08 | 195.69 | 195.32 | 194.51 | 195.24 | 194.57 |
| Oct-17 | | | | | | | | | | | | | | | |
| Dec-17 | | | | 199.29 | 198.72 | 200.57 | 198.96 | 198.01 | 198.18 | 196.62 | 196.56 | 195.71 | 195.18 | 195.43 | 194.62 |

**Table G.2**
**Groundwater Elevations**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| DATE | 90-I | 90-II | 90-III | 91-I | 91-II | 91-III | 92-I | 92-II | 92-III | 93-I | 93-II | 94-I | 94-II | 95-I | 95-II |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.O.P. -> | 204.38 | 204.06 | 204.18 | 206.55 | 206.56 | 206.69 | 200.46 | 200.47 | 200.43 | 197.67 | 197.76 | 196.80 | 196.88 | 195.51 | 195.49 |
| Mar-18 | | | | 199.44 | 198.90 | 200.96 | 199.20 | 198.25 | 198.45 | 196.89 | 196.62 | 196.10 | 195.45 | 195.46 | 194.75 |
| Apr-18 | | | | | | | | | | | | | | | |
| Jun-18 | | | | 199.42 | 198.86 | 200.59 | 198.41 | 198.07 | 198.05 | 196.65 | 196.52 | 195.75 | 194.91 | 195.41 | 194.66 |
| Sep-18 | | | | 198.63 | 198.13 | 200.57 | 198.55 | 197.67 | 197.55 | 196.05 | 195.73 | 195.22 | 194.27 | 195.18 | 194.30 |
| Dec-18 | | | | 199.34 | 198.90 | 200.57 | 199.10 | 198.20 | 198.46 | 196.79 | 196.59 | 196.00 | 195.36 | flowing | 194.68 |
| Mar-19 | | | | 198.99 | 198.53 | 200.58 | 198.78 | 197.87 | 197.99 | 196.91 | 196.58 | 195.94 | 195.39 | flowing | 194.89 |
| Apr-19 | | | | | | | | | | | | | | | |
| May-19 | | | | 199.94 | 199.46 | 203.70 | 199.27 | 198.35 | 198.48 | 197.09 | 196.60 | 196.12 | 195.39 | flowing | 194.75 |
| Aug-19 | | | | 198.80 | 198.31 | 200.55 | 198.51 | 197.59 | 197.46 | 195.77 | 195.36 | 195.08 | 194.07 | 195.12 | 194.04 |
| Oct-19 | | | | | | | | | | | | | | | |
| Nov-19 | | | | 199.13 | 198.67 | 200.57 | 199.00 | 198.08 | 198.54 | 196.67 | 196.55 | 195.81 | 195.08 | flowing | 194.63 |
| Mar-20 | | | | 199.87 | 199.30 | 203.71 | 199.36 | 198.39 | 198.88 | 197.03 | 196.64 | 196.37 | 195.80 | flowing | 194.98 |
| Apr-20 | | | | | | | | | | | | | | | |
| May-20 | | | | | | | | | | | | | | | |
| Jun-20 | | | | 199.47 | 199.48 | 201.09 | 198.79 | 198.02 | 198.05 | 196.70 | 196.53 | 196.01 | 195.13 | 195.27 | 194.81 |
| Aug-20 | | | | 198.53 | 198.02 | 200.57 | 198.22 | 197.37 | 197.24 | 195.29 | 194.83 | 194.91 | 193.67 | 194.86 | 193.77 |
| Nov-20 | | | | 198.85 | 198.46 | 200.55 | 198.80 | 197.86 | 197.81 | 196.57 | 196.56 | 195.68 | 195.10 | 195.36 | 194.57 |
| Mar-21 | | | | 199.31 | 198.78 | 200.59 | 199.04 | 198.13 | 198.57 | 197.01 | 196.67 | 196.19 | 195.46 | 195.44 | 194.71 |
| Apr-21 | | | | | | 202.50 | | | | | | | | | |
| May-21 | | | | 199.32 | 198.82 | 201.78 | 198.70 | 197.89 | 197.87 | 196.45 | 196.27 | 195.72 | 194.93 | 195.27 | 194.44 |
| Sep-21 | | | | 198.89 | 198.40 | 202.83 | 198.51 | 197.89 | 197.88 | 196.40 | 196.41 | 195.63 | 194.65 | 195.42 | 194.55 |
| Nov-21 | | | | 199.51 | 198.92 | 203.12 | 199.13 | 198.23 | 198.38 | 196.84 | 196.57 | 196.10 | 195.40 | flowing | 194.84 |
| Mar-22 | | | | 199.55 | 199.01 | 204.02 | 199.15 | 198.24 | 198.66 | 196.73 | 196.57 | 195.85 | 195.67 | Flowing | 194.69 |
| Apr-22 | | | | | | | | | | | | | | | |
| Sep-22 | | | | 198.50 | 197.94 | 200.57 | 198.21 | 197.31 | 197.14 | 195.60 | 195.29 | 194.89 | 193.87 | 194.93 | 193.92 |
| Oct-22 | | | | | | | | | | | | | | | |

NOTES: 1) Water level elevations are in metres Above Sea Level (mASL)
2) Blank indicates water level not measured.

**Table G.2**
**Groundwater Elevations**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| DATE | 101-I | 101-II | 101-III | 104-I | 104-II | 104-III | 106-I | 106-II | 106-III | 107-I | 107-II | 107-III | 108-I | 108-II | 108-III |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.O.P. -> | 219.70 | 219.64 | 219.51 | 205.53 | 205.58 | 205.53 | 199.80 | 199.75 | 199.71 | 195.99 | 196.09 | 196.08 | 206.32 | 206.13 | 205.91 |
| Mar-99 | | | | | | | | | | | | | | | |
| Jul-99 | 204.07 | 213.25 | 212.78 | | | | | | | | | | | | |
| Dec-99 | 205.32 | 214.08 | 217.35 | | | | | | | | | | | | |
| Apr-00 | 205.11 | 213.62 | 217.45 | | | | | | | | | | | | |
| Aug-00 | 205.28 | 213.30 | 216.03 | | | | | | | | | | | | |
| Nov-00 | 204.33 | 212.55 | 215.03 | 202.94 | 204.47 | 204.46 | 199.47 | 199.72 | 198.93 | 194.89 | | 194.76 | | | |
| Apr-01 | 205.77 | 214.38 | 217.39 | | | | | | | | | | | | |
| Jul-01 | 205.18 | 212.94 | 215.73 | | | | | | | | | | | | |
| Dec-01 | 204.56 | 212.66 | | | | | | | | | | | | | |
| Feb-02 | | | | | | | | | | | | | | | |
| Mar-02 | | | | | | | | | | | | | | | |
| Apr-02 | 206.52 | 214.24 | 217.86 | | | | | | | | | | | | |
| May-02 | | | | | | | | | | | | | | | |
| Jun-02 | | | | | | | | | | | | | | | |
| Jul-02 | | | | | | | | | | | | | | | |
| Aug-02 | 205.90 | 213.05 | 215.83 | | | | | | | | | | | | |
| Sep-02 | | | | | | | | | | | | | | | |
| Oct-02 | | | | | | | | | | | | | | | |
| Nov-02 | 205.48 | 212.34 | 214.67 | | | | | | | | | | | | |
| Jan-03 | | | | | | | | | | | | | | | |
| Mar-03 | 205.12 | 212.85 | 215.50 | | | | | | | | | | | | |
| Jul-03 | 205.97 | 212.97 | 215.77 | | | | | | | | | | | | |
| Nov-03 | 206.09 | 213.35 | 217.19 | | | | | | | | | | | | |
| Mar-04 | 206.22 | 213.72 | 217.08 | | | | | | | | | | | | |
| Jul-04 | 206.43 | 214.16 | 217.19 | | | | | | | | | | | | |
| Nov-04 | 206.06 | 212.94 | 215.71 | | | | | | | | | | | | |
| Jan-05 | | | | 203.69 | 204.24 | | | | | | | 194.39 | | | |
| Feb-05 | | | | 203.80 | | | | | 198.46 | | | 194.54 | | | |
| Mar-05 | 206.19 | 213.25 | 215.85 | 204.23 | | | 199.72 | 199.53 | 198.55 | | | 194.97 | | | |
| Apr-05 | | | | 204.44 | 204.80 | 204.64 | 199.45 | 199.60 | 198.60 | 195.98 | 194.75 | 194.71 | | | |
| May-05 | | | | 203.94 | 204.27 | 204.10 | 199.46 | 199.41 | 198.55 | | | 194.39 | | | |
| Jun-05 | | | | 203.00 | 203.53 | 203.68 | 198.54 | 199.16 | 198.96 | 193.99 | 193.80 | | | | |
| Jul-05 | 205.37 | 212.24 | 215.19 | | | | | | | | | | | | |
| Nov-05 | 204.50 | 211.72 | 213.61 | | | | | | | | | | | | |
| Jan-06 | | | | 204.49 | 204.71 | 204.86 | 198.08 | 198.23 | 198.05 | | | 195.03 | | | |
| Feb-06 | | | | 204.30 | | | 197.92 | | | | | | | | |
| Mar-06 | 205.96 | 214.01 | 217.16 | 204.30 | 204.73 | 204.63 | | | | | | 194.91 | | | |
| Apr-06 | | | | 204.19 | 204.51 | 204.49 | 199.06 | 198.21 | 198.01 | | | 194.87 | | | |
| May-06 | | | | 204.12 | 204.40 | 204.28 | 199.08 | 198.22 | 198.02 | | | 194.87 | | | |
| Jun-06 | | | | 203.32 | 204.08 | 203.88 | 198.80 | 198.24 | 198.09 | 195.97 | flowing | 194.79 | | | |
| Jul-06 | | | | 203.65 | 203.72 | 203.75 | 198.71 | 198.22 | 198.08 | flowing | flowing | 194.63 | | | |
| Aug-06 | 204.95 | 212.72 | 215.58 | 203.10 | 203.21 | 203.14 | 198.37 | 197.65 | 197.87 | flowing | flowing | 194.16 | | | |
| Sep-06 | | | | 203.24 | 203.07 | 203.35 | 198.38 | 198.17 | 198.08 | flowing | flowing | 194.73 | | | |
| Oct-06 | | | | 204.30 | 204.39 | 204.36 | 198.98 | 198.35 | 198.24 | flowing | flowing | 194.84 | | | |
| Nov-06 | | | | 204.53 | 204.78 | 204.64 | 199.23 | 198.43 | 198.30 | flowing | flowing | 194.91 | | | |
| Dec-06 | 205.70 | 214.12 | 217.63 | 204.55 | 204.76 | 204.63 | 199.26 | 198.42 | 198.22 | flowing | flowing | 194.68 | | | |
| Jan-07 | | | | 204.12 | 204.33 | 204.18 | 199.04 | 198.33 | 198.13 | flowing | flowing | 194.44 | | | |
| Feb-07 | | | | 203.88 | 204.19 | 203.92 | 198.85 | 198.20 | 198.02 | | flowing | 194.53 | | | |
| Mar-07 | | | | 204.50 | | | | 198.40 | 198.21 | flowing | flowing | 194.62 | | | |
| Apr-07 | 205.91 | 213.98 | 217.26 | 204.55 | 204.78 | 204.63 | 199.14 | 198.47 | 198.29 | flowing | flowing | 194.64 | | | |
| May-07 | | | | 204.18 | 204.40 | 204.25 | 198.92 | 198.39 | 198.23 | flowing | flowing | 194.48 | | | |
| Jun-07 | | | | 203.64 | 203.91 | 203.67 | 198.70 | 198.28 | 198.12 | flowing | flowing | 194.28 | | | |
| Jul-07 | 204.94 | 212.20 | 215.54 | 203.07 | 203.33 | 203.10 | 198.39 | 198.12 | 197.94 | flowing | flowing | 193.89 | | | |
| Aug-07 | | | | 202.61 | 202.71 | 202.64 | 198.14 | 197.93 | 197.71 | flowing | flowing | 193.61 | | | |
| Sep-07 | | | | 201.85 | 201.84 | 202.06 | 197.89 | 197.90 | 197.72 | flowing | flowing | 193.53 | | | |
| Oct-07 | | | | 202.14 | 201.65 | 202.15 | 198.14 | 198.05 | 197.91 | flowing | flowing | 194.37 | | | |
| Nov-07 | 203.86 | 211.26 | 212.82 | 203.60 | 202.57 | 203.98 | 198.44 | 198.19 | 198.17 | flowing | flowing | 194.81 | | | |
| Dec-07 | | | | 203.71 | 203.85 | 203.41 | 198.45 | 198.05 | 197.89 | flowing | flowing | 194.60 | | | |

**Table G.2**
**Groundwater Elevations**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| DATE | 101-I | 101-II | 101-III | 104-I | 104-II | 104-III | 106-I | 106-II | 106-III | 107-I | 107-II | 107-III | 108-I | 108-II | 108-III |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.O.P. -> | 219.70 | 219.64 | 219.51 | 205.53 | 205.58 | 205.53 | 199.80 | 199.75 | 199.71 | 195.99 | 196.09 | 196.08 | 206.32 | 206.13 | 205.91 |
| Mar-08 | 205.23 | 213.36 | 217.13 | | | | | 198.47 | 198.22 | 195.71 | flowing | | | | |
| Apr-08 | | | | 204.60 | 204.92 | 204.67 | 199.66 | | | | | 194.73 | | | |
| Sep-08 | 205.20 | 212.84 | 216.15 | 204.07 | 204.41 | 204.15 | 199.31 | 198.50 | 198.51 | | | | | | |
| Oct-08 | | | | | | | | | | 194.58 | flowing | 194.76 | | | |
| Mar-09 | | | | | | | | | | | | | | | |
| Apr-09 | 206.20 | 213.89 | 217.14 | 204.52 | 204.79 | 204.64 | 199.50 | 198.65 | 198.55 | flowing | flowing | 194.64 | | | |
| Sep-09 | 205.05 | 212.02 | 214.96 | | | | | | | | | | | | |
| Oct-09 | | | | 203.86 | 203.69 | 203.75 | 198.42 | 198.20 | 198.25 | flowing | flowing | 194.69 | | | |
| Mar-10 | | | | 204.27 | 204.63 | 204.49 | 198.27 | 198.02 | 198.00 | flowing | 196.09 | 194.70 | | | |
| Apr-10 | 205.62 | 213.34 | 217.00 | | | | | | | | | | | | |
| Sep-10 | 204.80 | 211.92 | 214.98 | 203.02 | 203.28 | 203.48 | 197.75 | 197.75 | 197.80 | | | | | | |
| Oct-10 | | | | | | | | | | flowing | flowing | 194.31 | | | |
| Dec-10 | | | | | | | | | | | | | 200.44 | 201.33 | 204.31 |
| Mar-11 | | | | 204.51 | 204.68 | 204.79 | 198.58 | 198.11 | 198.10 | flowing | flowing | 194.67 | 200.39 | 202.39 | 204.39 |
| Apr-11 | 206.08 | 213.87 | 217.45 | | | | | | | | | | | | |
| Sep-11 | | | | 203.66 | 203.92 | 203.82 | 198.09 | 197.90 | 197.90 | 194.61 | flowing | 194.05 | 200.26 | 202.46 | 203.93 |
| Oct-11 | 205.11 | 212.46 | 215.50 | | | | | | | | | | | | |
| Mar-12 | | | | 204.52 | 204.86 | 204.74 | 198.74 | 198.29 | 198.22 | flowing | flowing | 194.51 | 201.26 | 202.88 | 204.45 |
| Apr-12 | 206.02 | 213.26 | 216.20 | | | | | | | | | | | | |
| Sep-12 | | | | 201.63 | 202.28 | 202.71 | 197.66 | 197.60 | 197.72 | | | | 200.16 | 202.32 | 204.08 |
| Oct-12 | 204.83 | 211.72 | 214.11 | | | | | | | 194.37 | flowing | 194.52 | | | |
| Mar-13 | 205.23 | 212.68 | 215.65 | 200.05 | 203.41 | 203.44 | 198.49 | 198.19 | 198.20 | 195.80 | flowing | 194.61 | 201.20 | 202.84 | 204.57 |
| Apr-13 | | | | | | | | | | | | | | | |
| Jun-13 | | | | 199.65 | 203.39 | 203.55 | | | | | | | 201.12 | 202.92 | 204.47 |
| Sep-13 | | | | 199.61 | 202.47 | 202.70 | 197.73 | 197.80 | 197.87 | 195.97 | flowing | 195.15 | 200.42 | 202.60 | 204.17 |
| Oct-13 | 204.78 | 211.97 | 214.60 | | | | | | | | | | | | |
| Dec-13 | | | | 199.28 | 203.46 | 203.45 | | | | | | | 201.57 | 203.14 | 204.54 |
| Mar-14 | | 212.51 | 215.34 | 199.92 | 203.51 | 203.58 | | | | | | | 201.43 | 203.02 | 204.40 |
| Apr-14 | | | | | | | | | | 195.99 | 196.09 | 195.55 | | | |
| Jun-14 | | | | 199.86 | 203.23 | 203.33 | | | | | | | 201.00 | 202.93 | 204.29 |
| Sep-14 | | | | 199.79 | 203.16 | 203.14 | 199.80 | 197.47 | 197.86 | 195.99 | 196.09 | 195.22 | 200.91 | 202.85 | 204.51 |
| Oct-14 | | 212.29 | 215.43 | | | | | | | | | | | | |
| Nov-14 | | | | 199.50 | 203.68 | 203.76 | | | | | | | 201.72 | 203.11 | 204.75 |
| Dec-14 | | | | | | | | | | | | | | | |
| Mar-15 | 204.92 | 212.42 | 215.17 | 199.95 | 202.87 | 202.79 | 197.61 | 197.52 | 197.47 | | | 195.40 | 200.96 | 202.55 | 203.92 |
| Jun-15 | | | | 200.57 | 203.64 | 203.72 | 199.80 | 199.75 | 199.71 | | | 196.08 | 201.22 | 202.94 | 204.63 |
| Sep-15 | 205.65 | 212.05 | 214.95 | 200.05 | 203.43 | 203.41 | 197.25 | 197.51 | 197.81 | | | 195.14 | 200.23 | 202.51 | 204.54 |
| Dec-15 | | | | 199.16 | 203.57 | 203.59 | 198.13 | 198.05 | 198.04 | | | 195.16 | 200.99 | 202.88 | 204.55 |
| Mar-16 | | | | 199.72 | 203.76 | 203.76 | 198.19 | 198.01 | 198.11 | flowing | flowing | 195.38 | 201.06 | 202.88 | 204.60 |
| Apr-16 | 206.42 | 213.35 | 216.42 | | | | | | | | | | | | |
| Jun-16 | | | | 199.53 | 203.26 | 203.28 | 197.79 | 197.88 | 197.92 | flowing | flowing | 195.03 | 200.50 | 202.61 | 204.40 |
| Jul-16 | | | | 199.29 | 202.55 | 202.58 | 197.06 | 197.35 | 197.33 | flowing | flowing | 194.42 | 200.05 | 202.08 | 203.78 |
| Sep-16 | 204.68 | 211.03 | 213.90 | 199.07 | 202.54 | 202.55 | 196.33 | 197.08 | 197.18 | flowing | flowing | 194.29 | 199.61 | 201.98 | 203.91 |
| Nov-16 | | | | 197.90 | 202.85 | 202.84 | 196.50 | 197.20 | 197.26 | flowing | flowing | 195.02 | 199.71 | 202.18 | 204.29 |
| Mar-17 | 205.50 | 213.07 | 216.49 | 198.74 | 203.80 | 203.82 | 198.20 | 198.13 | 198.14 | flowing | flowing | 195.17 | 201.13 | 202.87 | 204.57 |
| Apr-17 | | | | | | | | | | | | | | | |
| Jun-17 | | | | 199.48 | 203.93 | 203.95 | 198.39 | 198.27 | 198.25 | flowing | flowing | 195.38 | 201.40 | 202.96 | 204.61 |
| Sep-17 | | | | 199.63 | 203.45 | 203.46 | 198.01 | 197.96 | 198.02 | flowing | flowing | 194.97 | 200.61 | 202.70 | 204.41 |
| Oct-17 | 205.25 | 211.93 | 215.07 | | | | | | | | | | | | |
| Dec-17 | | | | 199.08 | 203.65 | 203.64 | 198.06 | 198.06 | 198.06 | flowing | flowing | 195.17 | 201.10 | 202.88 | 204.55 |

**Table G.2**
**Groundwater Elevations**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| DATE | 101-I | 101-II | 101-III | 104-I | 104-II | 104-III | 106-I | 106-II | 106-III | 107-I | 107-II | 107-III | 108-I | 108-II | 108-III |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.O.P. -> | 219.70 | 219.64 | 219.51 | 205.53 | 205.58 | 205.53 | 199.80 | 199.75 | 199.71 | 195.99 | 196.09 | 196.08 | 206.32 | 206.13 | 205.91 |
| Mar-18 | 205.88 | 213.14 | 216.29 | 199.80 | 204.00 | 204.01 | 198.38 | 198.26 | 198.20 | flowing | flowing | 195.23 | 201.28 | 203.02 | 204.63 |
| Apr-18 | | | | | | | | | | | | | | | |
| Jun-18 | | | | 199.66 | 203.65 | 203.62 | 197.70 | 197.89 | 197.97 | flowing | flowing | 195.06 | 201.02 | 202.84 | 204.48 |
| Sep-18 | 204.78 | 211.65 | 214.73 | 199.53 | 203.29 | 203.34 | 197.09 | 197.52 | 197.57 | flowing | flowing | 194.80 | 200.35 | 202.48 | 204.08 |
| Dec-18 | | | | 198.79 | 203.75 | 203.72 | 198.08 | 198.06 | 198.06 | flowing | flowing | 195.11 | 201.25 | 202.97 | 204.53 |
| Mar-19 | 205.33 | 212.51 | 215.45 | 203.24 | 203.53 | 203.56 | 197.71 | 197.85 | 197.87 | flowing | flowing | 195.41 | 201.01 | 202.87 | 204.32 |
| Apr-19 | | | | | | | | | | | | | | | |
| May-19 | | | | 203.55 | 203.96 | 203.98 | 198.25 | 198.20 | 198.12 | flowing | flowing | 195.28 | 201.34 | 203.19 | 204.62 |
| Aug-19 | 205.17 | 211.91 | 215.13 | 202.23 | 202.97 | 202.93 | 197.22 | 197.56 | 197.56 | flowing | flowing | 194.65 | 200.41 | 202.56 | 203.97 |
| Oct-19 | | | | | | | | | | | | | | | |
| Nov-19 | | | | 200.56 | 203.66 | 203.66 | 197.88 | 197.97 | 198.01 | flowing | flowing | 195.16 | 201.13 | 203.04 | 204.64 |
| Mar-20 | | | | 203.36 | 203.82 | 203.81 | 198.24 | 198.19 | 198.14 | flowing | flowing | 195.42 | 201.59 | 203.23 | 204.73 |
| Apr-20 | 206.53 | 213.58 | 216.74 | | | | | | | | | | | | |
| May-20 | | | | | | | | | | | | | | | |
| Jun-20 | | | | 202.86 | 203.62 | 203.60 | 197.32 | 197.73 | 197.93 | flowing | flowing | 195.04 | 201.02 | 203.02 | 204.57 |
| Aug-20 | 204.80 | 211.52 | 214.87 | 201.74 | 202.53 | 202.57 | 196.77 | 197.35 | 197.31 | flowing | flowing | 194.42 | 200.08 | 202.30 | 203.78 |
| Nov-20 | | | | 200.32 | 203.34 | 203.42 | 197.50 | 197.78 | 197.82 | flowing | flowing | 195.17 | 200.57 | 202.85 | 204.31 |
| Mar-21 | 205.39 | 212.69 | 215.67 | 200.76 | 203.72 | 203.72 | 198.14 | 198.09 | 198.06 | flowing | flowing | 195.44 | 201.39 | 203.03 | 204.77 |
| Apr-21 | | | | | | | | | | | | | | | |
| May-21 | | | | 203.17 | 203.46 | 203.46 | 197.24 | 197.69 | 197.81 | flowing | flowing | 194.86 | 200.89 | 202.92 | 204.32 |
| Sep-21 | 204.88 | 211.92 | 214.89 | 202.99 | 203.43 | 203.44 | 196.62 | 197.48 | 197.79 | flowing | flowing | 195.25 | 200.59 | 202.81 | 204.53 |
| Nov-21 | | | | 203.24 | 203.64 | 203.61 | 198.15 | 198.10 | 198.09 | flowing | flowing | 195.29 | 201.36 | 203.19 | 204.67 |
| Mar-22 | 205.74 | 213.07 | 216.33 | 203.54 | 203.56 | 203.70 | 198.04 | 198.00 | 197.95 | Flowing | Flowing | 195.40 | 201.24 | 203.14 | 204.68 |
| Apr-22 | | | | | | | | | | | | | | | |
| Sep-22 | 204.83 | 211.63 | 214.91 | 202.72 | 203.31 | 203.16 | 196.96 | 197.40 | 197.41 | Flowing | Flowing | 194.57 | 200.44 | 202.66 | 204.24 |
| Oct-22 | | | | | | | | | | | | | | | |

NOTES: 1) Water level elevations are in metres Above Sea Level (mASL)
2) Blank indicates water level not measured.

**Table G.2**
**Groundwater Elevations**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| DATE | 109-I | 109-II | 109-III | 110-I | 110-II | 110-III | 111-I | 111-II | 111-III | 112-I | 112-II | 112-III | 113-I | 113-II | 113-III |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.O.P. -> | 199.19 | 200.10 | 199.04 | 202.55 | 202.73 | 202.55 | 200.28 | 200.29 | 200.41 | 208.59 | 208.59 | 208.60 | 195.34 | 195.31 | 195.25 |
| Mar-99 | | | | | | | | | | | | | | | |
| Jul-99 | | | | | | | | | | | | | | | |
| Dec-99 | | | | | | | | | | | | | | | |
| Apr-00 | | | | | | | | | | | | | | | |
| Aug-00 | | | | | | | | | | | | | | | |
| Nov-00 | | | | | | | | | | | | | | | |
| Apr-01 | | | | | | | | | | | | | | | |
| Jul-01 | | | | | | | | | | | | | | | |
| Dec-01 | | | | | | | | | | | | | | | |
| Feb-02 | | | | | | | | | | | | | | | |
| Mar-02 | | | | | | | | | | | | | | | |
| Apr-02 | | | | | | | | | | | | | | | |
| May-02 | | | | | | | | | | | | | | | |
| Jun-02 | | | | | | | | | | | | | | | |
| Jul-02 | | | | | | | | | | | | | | | |
| Aug-02 | | | | | | | | | | | | | | | |
| Sep-02 | | | | | | | | | | | | | | | |
| Oct-02 | | | | | | | | | | | | | | | |
| Nov-02 | | | | | | | | | | | | | | | |
| Jan-03 | | | | | | | | | | | | | | | |
| Mar-03 | | | | | | | | | | | | | | | |
| Jul-03 | | | | | | | | | | | | | | | |
| Nov-03 | | | | | | | | | | | | | | | |
| Mar-04 | | | | | | | | | | | | | | | |
| Jul-04 | | | | | | | | | | | | | | | |
| Nov-04 | | | | | | | | | | | | | | | |
| Jan-05 | | | | | | | | | | | | | | | |
| Feb-05 | | | | | | | | | | | | | | | |
| Mar-05 | | | | | | | | | | | | | | | |
| Apr-05 | | | | | | | | | | | | | | | |
| May-05 | | | | | | | | | | | | | | | |
| Jun-05 | | | | | | | | | | | | | | | |
| Jul-05 | | | | | | | | | | | | | | | |
| Nov-05 | | | | | | | | | | | | | | | |
| Jan-06 | | | | | | | | | | | | | | | |
| Feb-06 | | | | | | | | | | | | | | | |
| Mar-06 | | | | | | | | | | | | | | | |
| Apr-06 | | | | | | | | | | | | | | | |
| May-06 | | | | | | | | | | | | | | | |
| Jun-06 | | | | | | | | | | | | | | | |
| Jul-06 | | | | | | | | | | | | | | | |
| Aug-06 | | | | | | | | | | | | | | | |
| Sep-06 | | | | | | | | | | | | | | | |
| Oct-06 | | | | | | | | | | | | | | | |
| Nov-06 | | | | | | | | | | | | | | | |
| Dec-06 | | | | | | | | | | | | | | | |
| Jan-07 | | | | | | | | | | | | | | | |
| Feb-07 | | | | | | | | | | | | | | | |
| Mar-07 | | | | | | | | | | | | | | | |
| Apr-07 | | | | | | | | | | | | | | | |
| May-07 | | | | | | | | | | | | | | | |
| Jun-07 | | | | | | | | | | | | | | | |
| Jul-07 | | | | | | | | | | | | | | | |
| Aug-07 | | | | | | | | | | | | | | | |
| Sep-07 | | | | | | | | | | | | | | | |
| Oct-07 | | | | | | | | | | | | | | | |
| Nov-07 | | | | | | | | | | | | | | | |
| Dec-07 | | | | | | | | | | | | | | | |

**Table G.2**
**Groundwater Elevations**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| DATE | 109-I | 109-II | 109-III | 110-I | 110-II | 110-III | 111-I | 111-II | 111-III | 112-I | 112-II | 112-III | 113-I | 113-II | 113-III |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.O.P. -> | 199.19 | 200.10 | 199.04 | 202.55 | 202.73 | 202.55 | 200.28 | 200.29 | 200.41 | 208.59 | 208.59 | 208.60 | 195.34 | 195.31 | 195.25 |
| Mar-08 | | | | | | | | | | | | | | | |
| Apr-08 | | | | | | | | | | | | | | | |
| Sep-08 | | | | | | | | | | | | | | | |
| Oct-08 | | | | | | | | | | | | | | | |
| Mar-09 | | | | | | | | | | | | | | | |
| Apr-09 | | | | | | | | | | | | | | | |
| Sep-09 | | | | | | | | | | | | | | | |
| Oct-09 | | | | | | | | | | | | | | | |
| Mar-10 | | | | | | | | | | | | | | | |
| Apr-10 | | | | | | | | | | | | | | | |
| Sep-10 | | | | | | | | | | | | | | | |
| Oct-10 | | | | | | | | | | | | | | | |
| Dec-10 | 196.06 | 196.11 | 196.27 | 197.44 | 197.58 | 197.75 | | | | | | | | | |
| Mar-11 | 195.86 | 195.87 | 195.89 | 197.57 | 197.62 | 197.97 | | | | | | | | | |
| Apr-11 | | | | | | | | | | | | | | | |
| Sep-11 | 195.46 | 195.44 | 195.28 | 198.25 | 197.96 | 198.29 | | | | | | | | | |
| Oct-11 | | | | | | | | | | | | | | | |
| Mar-12 | 195.79 | 195.78 | 195.74 | 198.58 | 198.43 | 199.27 | | | | | | | | | |
| Apr-12 | | | | | | | | | | | | | | | |
| Sep-12 | 195.10 | 195.06 | 194.88 | 197.81 | 197.67 | 197.70 | | | | | | | | | |
| Oct-12 | | | | | | | | | | | | | | | |
| Mar-13 | 195.74 | 195.75 | 195.73 | 198.45 | 198.32 | 199.10 | | | | | | | | | |
| Apr-13 | | | | | | | | | | | | | | | |
| Jun-13 | 195.75 | 195.74 | 195.71 | 198.56 | 198.38 | 199.28 | | | | | | | | | |
| Sep-13 | 195.30 | 195.27 | 195.10 | 198.13 | 197.94 | 198.19 | | | | | | | | | |
| Oct-13 | | | | | | | | | | | | | | | |
| Dec-13 | 195.76 | 195.74 | 195.62 | 198.65 | 198.47 | 199.54 | | | | | | | | | |
| Mar-14 | 195.64 | 195.63 | 195.51 | 198.28 | 198.11 | 198.84 | | | | | | | | | |
| Apr-14 | | | | | | | | | | | | | | | |
| Jun-14 | 195.60 | 195.58 | 195.47 | 198.66 | 198.46 | 199.42 | | | | | | | | | |
| Sep-14 | 195.52 | 195.48 | 195.30 | 198.33 | 198.12 | 198.31 | | | | | | | | | |
| Oct-14 | | | | | | | | | | | | | | | |
| Nov-14 | 195.95 | 195.95 | 196.07 | 198.50 | 198.31 | 198.75 | | | | | | | | | |
| Dec-14 | | | | | | | | | | | | | | | |
| Mar-15 | 195.47 | 195.44 | 195.28 | 198.11 | 197.93 | 198.84 | | | | | | | | | |
| Jun-15 | 196.11 | 196.14 | 196.26 | 198.68 | 198.50 | 199.66 | | | | | | | | | |
| Sep-15 | 195.70 | 195.69 | 195.58 | 198.08 | 197.94 | 198.92 | | | | | | | | | |
| Dec-15 | 195.74 | 195.74 | 195.68 | 198.48 | 198.34 | 199.86 | | | | | | | | | |
| Mar-16 | 196.25 | 196.28 | 196.47 | 198.60 | 198.44 | 199.92 | | | | | | | | | |
| Apr-16 | | | | | | | | | | | | | | | |
| Jun-16 | 195.43 | 195.41 | 195.27 | 198.21 | 198.05 | 199.02 | | | | | | | | | |
| Jul-16 | 194.97 | 194.94 | 194.79 | 197.71 | 197.54 | 198.28 | | | | | | | | | |
| Sep-16 | 194.94 | 194.92 | 194.96 | 197.52 | 197.35 | 197.79 | | | | | | | | | |
| Nov-16 | 195.15 | 195.13 | 195.03 | 197.49 | 197.35 | 197.61 | | | | | | | | | |
| Mar-17 | 195.95 | 195.94 | 195.99 | 198.53 | 198.40 | 199.97 | 195.64 | 195.67 | 196.87 | 204.38 | 205.34 | 205.84 | | | |
| Apr-17 | | | | | | | | | | | | | flowing | flowing | 194.63 |
| Jun-17 | 196.46 | 196.48 | 196.75 | 199.03 | 198.87 | 200.08 | 196.77 | 196.72 | 197.39 | 204.93 | 206.04 | 206.60 | | | |
| Sep-17 | 195.37 | 195.34 | 195.23 | 198.34 | 198.19 | 199.23 | 195.61 | 195.14 | 196.39 | 203.83 | 204.71 | 205.42 | | | |
| Oct-17 | | | | | | | | | | | | | 195.06 | 194.80 | 194.30 |
| Dec-17 | 195.73 | 195.71 | 195.72 | 198.53 | 198.39 | 199.87 | 195.78 | 195.42 | 196.70 | 204.15 | 204.80 | 205.27 | | | |

**Table G.2**
**Groundwater Elevations**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| DATE | 109-I | 109-II | 109-III | 110-I | 110-II | 110-III | 111-I | 111-II | 111-III | 112-I | 112-II | 112-III | 113-I | 113-II | 113-III |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.O.P. -> | 199.19 | 200.10 | 199.04 | 202.55 | 202.73 | 202.55 | 200.28 | 200.29 | 200.41 | 208.59 | 208.59 | 208.60 | 195.34 | 195.31 | 195.25 |
| Mar-18 | 196.12 | 196.13 | 196.27 | 198.74 | 198.60 | 200.40 | 196.36 | 195.87 | 197.65 | 204.88 | 205.89 | 206.50 | | | |
| Apr-18 | | | | | | | | | | | | | flowing | flowing | 194.64 |
| Jun-18 | 195.82 | 195.80 | 195.94 | 198.67 | 198.52 | 199.52 | 196.00 | 195.59 | 196.83 | 204.33 | 205.21 | 206.10 | | | |
| Sep-18 | 195.35 | 195.32 | 195.25 | 198.04 | 197.89 | 198.68 | 195.58 | 195.26 | 196.27 | 203.18 | 203.91 | 204.95 | 194.80 | 194.52 | 193.84 |
| Dec-18 | 195.98 | 195.98 | 196.07 | 198.69 | 198.56 | 200.04 | 196.02 | 195.67 | 196.94 | 204.19 | 204.69 | 205.27 | | | |
| Mar-19 | 195.66 | 195.63 | 195.70 | 198.32 | 198.15 | 199.02 | 195.84 | 195.46 | 196.58 | 204.16 | 204.89 | 205.63 | | | |
| Apr-19 | | | | | | | | | | | | | flowing | flowing | 194.94 |
| May-19 | 196.18 | 196.17 | 196.42 | 199.18 | 199.02 | 200.39 | 196.22 | 195.85 | 197.26 | 205.10 | 206.11 | 206.86 | | | |
| Aug-19 | 195.23 | 195.21 | 195.13 | 198.19 | 198.01 | 198.73 | 195.61 | 195.29 | 196.25 | 203.60 | 204.46 | 205.39 | 194.73 | 194.38 | 193.60 |
| Oct-19 | | | | | | | | | | | | | | | |
| Nov-19 | 195.86 | 195.82 | 195.90 | 198.53 | 198.42 | 199.94 | 196.01 | 195.64 | 196.82 | 203.88 | 204.44 | 205.20 | | | |
| Mar-20 | 196.27 | 196.44 | 196.68 | 198.99 | 198.82 | 201.55 | 196.41 | 196.04 | 197.59 | 204.99 | 205.94 | 206.76 | | | |
| Apr-20 | | | | | | | | | | | | | | | |
| May-20 | | | | | | | | | | | | | flowing | flowing | |
| Jun-20 | 195.94 | 196.00 | 196.19 | 198.71 | 198.54 | 199.60 | 196.10 | 196.14 | 196.91 | 204.49 | 205.50 | 206.42 | | | |
| Aug-20 | 195.13 | 195.35 | 195.61 | 197.90 | 197.69 | 198.10 | 195.35 | 195.17 | 196.07 | 203.20 | 204.05 | 205.13 | 194.31 | 193.97 | 193.05 |
| Nov-20 | 195.69 | 195.70 | 195.85 | 198.23 | 198.15 | 199.38 | 195.70 | 195.43 | 196.59 | 203.47 | 203.89 | 204.76 | | | |
| Mar-21 | 196.15 | 196.12 | 197.28 | 198.63 | 198.46 | 199.81 | 195.92 | 195.70 | 197.08 | 204.67 | 205.34 | 206.08 | | | |
| Apr-21 | | | | | | | | | | | | | flowing | flowing | 194.58 |
| May-21 | 195.76 | 195.69 | 195.87 | 198.63 | 198.43 | 199.55 | 196.01 | 195.56 | 196.80 | 204.44 | 206.35 | 206.32 | | | |
| Sep-21 | 195.76 | 195.70 | 196.30 | 198.26 | 198.09 | 198.74 | 195.80 | 195.42 | 198.22 | 203.50 | 204.28 | 205.30 | 195.17 | 195.02 | 194.46 |
| Nov-21 | 196.12 | 196.10 | 196.81 | 198.83 | 198.64 | 200.29 | 196.24 | 195.80 | 197.15 | 204.92 | 205.79 | 206.55 | | | |
| Mar-22 | 196.21 | 197.02 | 196.95 | 198.71 | 198.51 | 200.45 | 196.20 | 195.71 | 197.16 | 204.91 | 205.89 | 206.80 | | | |
| Apr-22 | | | | | | | | | | | | | Flowing | Flowing | 194.39 |
| Sep-22 | 195.05 | 195.80 | 195.05 | 197.85 | 198.63 | 198.20 | 195.25 | 194.95 | 195.90 | 203.26 | 204.00 | 205.18 | 194.56 | 194.19 | 193.30 |
| Oct-22 | | 194.90 | | | | | | | | | | | | | |

NOTES: 1) Water level elevations are in metres Above Sea Level (mASL)
2) Blank indicates water level not measured.

**Table G.2**
**Groundwater Elevations**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| DATE | T-1 | T-2 | T-3I | T-3II | T-4 | T-5I | T-5II |
|---|---|---|---|---|---|---|---|
| T.O.P. -> | 192.24 | 191.55 | 191.59 | 191.49 | 191.19 | 191.25 | 191.25 |
| Mar-99 | 189.38 | 188.70 | 187.75 | 187.51 | 186.91 | 188.26 | 188.19 |
| Jul-99 | 187.90 | 187.29 | 187.60 | | 186.84 | 187.64 | 187.25 |
| Dec-99 | 188.49 | 187.37 | 187.80 | 187.29 | 186.69 | 187.94 | 187.63 |
| Apr-00 | 188.88 | 187.60 | 188.09 | 187.29 | 186.95 | 188.24 | 187.97 |
| Aug-00 | | 187.39 | 187.77 | 187.28 | 186.91 | 187.88 | 187.48 |
| Nov-00 | 189.52 | 187.73 | 188.00 | 187.46 | 186.97 | 188.22 | 188.03 |
| Apr-01 | 188.16 | 187.55 | 187.91 | 187.29 | 186.93 | 188.24 | 187.89 |
| Jul-01 | 187.91 | 187.35 | 187.67 | 187.27 | 186.89 | 187.76 | 187.36 |
| Dec-01 | | | | | | | |
| Feb-02 | | | | | | | |
| Mar-02 | | | | | | | |
| Apr-02 | | | | | | | |
| May-02 | | | | | | | |
| Jun-02 | | | | | | | |
| Jul-02 | | | | | | | |
| Aug-02 | | | | | | | |
| Sep-02 | | | | | | | |
| Oct-02 | | | | | | | |
| Nov-02 | | | | | | | |
| Jan-03 | | | | | | | |
| Mar-03 | | 187.61 | 187.79 | 187.46 | 186.92 | 188.17 | 187.87 |
| Jul-03 | | | | | | | |
| Nov-03 | | | | | | | |
| Mar-04 | | 187.49 | 187.79 | | 186.93 | 188.11 | 187.79 |
| Jul-04 | 189.52 | 189.31 | 189.24 | 188.66 | 188.35 | 189.33 | 188.91 |
| Nov-04 | | 187.37 | 187.61 | | 186.88 | 187.85 | |
| Jan-05 | | | | | | | |
| Feb-05 | | | | | | | |
| Mar-05 | | 187.47 | 187.73 | | 186.92 | 188.08 | 187.77 |
| Apr-05 | | | | | | | |
| May-05 | | | | | | | |
| Jun-05 | | | | | | | |
| Jul-05 | 188.28 | 188.43 | 188.61 | 188.30 | 188.03 | 188.62 | 188.13 |
| Nov-05 | | 187.30 | 187.42 | | 186.51 | 187.76 | 187.51 |
| Jan-06 | | | | | | | |
| Feb-06 | | | | | | | |
| Mar-06 | | 187.44 | 187.73 | | 186.87 | 188.07 | 187.48 |
| Apr-06 | | | | | | | |
| May-06 | | | | | | | |
| Jun-06 | | | | | | | |
| Jul-06 | 187.98 | 188.10 | 188.10 | | | | |
| Aug-06 | | | | | | | |
| Sep-06 | | | | | | | |
| Oct-06 | | | | | | | |
| Nov-06 | | | | | | | |
| Dec-06 | | | | | | | |
| Jan-07 | | | | | | | |
| Feb-07 | | | | | | | |
| Mar-07 | | | | | | | |
| Apr-07 | 188.29 | 187.57 | | | 186.97 | | |
| May-07 | | | | | | | |
| Jun-07 | | | | | | | |
| Jul-07 | 188.47 | 188.21 | | | | | |
| Aug-07 | | | | | | | |
| Sep-07 | | | | | | | |
| Oct-07 | | | | | | | |
| Nov-07 | 188.00 | 187.46 | | | 186.91 | | |
| Dec-07 | | | | | | | |

**Table G.2**
**Groundwater Elevations**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| DATE | T-1 | T-2 | T-3I | T-3II | T-4 | T-5I | T-5II |
|---|---|---|---|---|---|---|---|
| T.O.P. -> | 192.24 | 191.55 | 191.59 | 191.49 | 191.19 | 191.25 | 191.25 |
| Mar-08 | | | | | | | |
| Apr-08 | | | | | | | |
| Sep-08 | | | | | | | |
| Oct-08 | | | | | | | |
| Mar-09 | | | | | | | |
| Apr-09 | | | | | | | |
| Sep-09 | | | | | | | |
| Oct-09 | | | | | | | |
| Mar-10 | | | | | | | |
| Apr-10 | | | | | | | |
| Sep-10 | | | | | | | |
| Oct-10 | | | | | | | |
| Dec-10 | | | | | | | |
| Mar-11 | | | | | | | |
| Apr-11 | | | | | | | |
| Sep-11 | | | | | | | |
| Oct-11 | | | | | | | |
| Mar-12 | | | | | | | |
| Apr-12 | | | | | | | |
| Sep-12 | | | | | | | |
| Oct-12 | | | | | | | |
| Mar-13 | | | | | | | |
| Apr-13 | | | | | | | |
| Jun-13 | | | | | | | |
| Sep-13 | | | | | | | |
| Oct-13 | | | | | | | |
| Dec-13 | | | | | | | |
| Mar-14 | | | | | | | |
| Apr-14 | | | | | | | |
| Jun-14 | | | | | | | |
| Sep-14 | | | | | | | |
| Oct-14 | | | | | | | |
| Nov-14 | | | | | | | |
| Dec-14 | | | | | | | |
| Mar-15 | | | | | | | |
| Jun-15 | | | | | | | |
| Sep-15 | | | | | | | |
| Dec-15 | | | | | | | |
| Mar-16 | | | | | | | |
| Apr-16 | | | | | | | |
| Jun-16 | | | | | | | |
| Jul-16 | | | | | | | |
| Sep-16 | | | | | | | |
| Nov-16 | | | | | | | |
| Mar-17 | | | | | | | |
| Apr-17 | | | | | | | |
| Jun-17 | | | | | | | |
| Sep-17 | | | | | | | |
| Oct-17 | | | | | | | |
| Dec-17 | | | | | | | |

**Table G.2**
**Groundwater Elevations**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| DATE | T-1 | T-2 | T-3I | T-3II | T-4 | T-5I | T-5II |
|---|---|---|---|---|---|---|---|
| T.O.P. -> | 192.24 | 191.55 | 191.59 | 191.49 | 191.19 | 191.25 | 191.25 |
| Mar-18 | | | | | | | |
| Apr-18 | | | | | | | |
| Jun-18 | | | | | | | |
| Sep-18 | | | | | | | |
| Dec-18 | | | | | | | |
| Mar-19 | | | | | | | |
| Apr-19 | | | | | | | |
| May-19 | | | | | | | |
| Aug-19 | | | | | | | |
| Oct-19 | | | | | | | |
| Nov-19 | | | | | | | |
| Mar-20 | | | | | | | |
| Apr-20 | | | | | | | |
| May-20 | | | | | | | |
| Jun-20 | | | | | | | |
| Aug-20 | | | | | | | |
| Nov-20 | | | | | | | |
| Mar-21 | | | | | | | |
| Apr-21 | 189.87 | | | | 189.20 | | |
| May-21 | | | | | | | |
| Sep-21 | 188.90 | | | | 188.90 | | |
| Nov-21 | | | | | | | |
| Mar-22 | | | | | | | |
| Apr-22 | 190.16 | | | | 189.40 | | |
| Sep-22 | 188.48 | | 188.45 | 188.34 | | 188.68 | 188.34 |
| Oct-22 | | 188.45 | | | 187.75 | | |

NOTES: 1) Water level elevations are in metres Above Sea Level (mASL)
2) Blank indicates water level not measured.

**Figure G.1**
**Water Level Hydrograph: BH16**

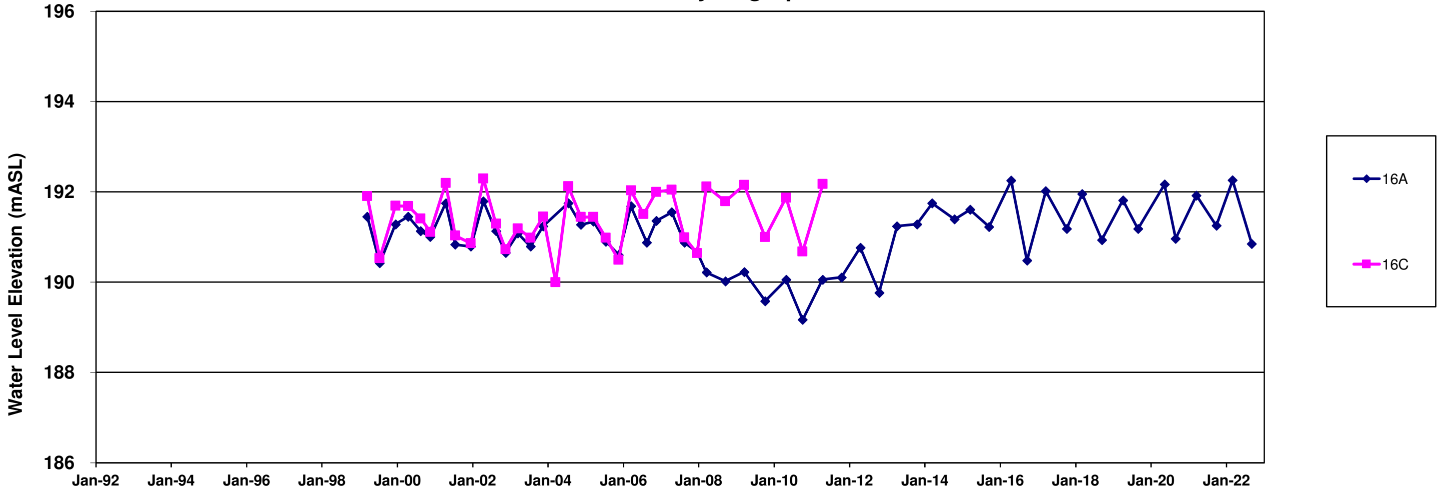



**Figure G.2**
**Water Level Hydrograph: BH18**

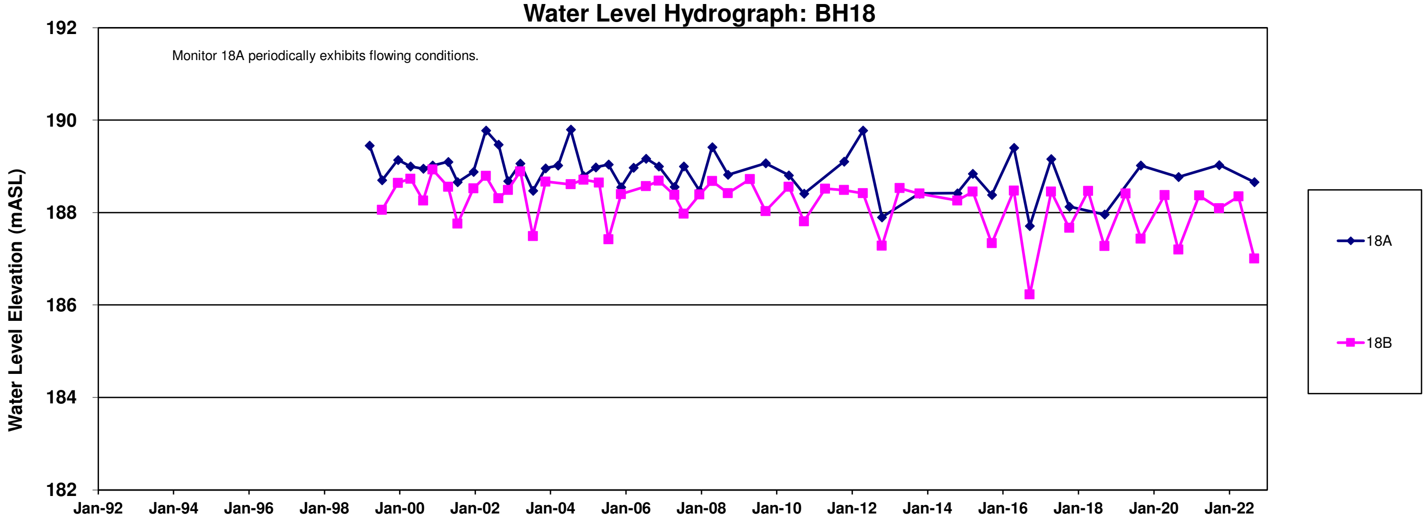
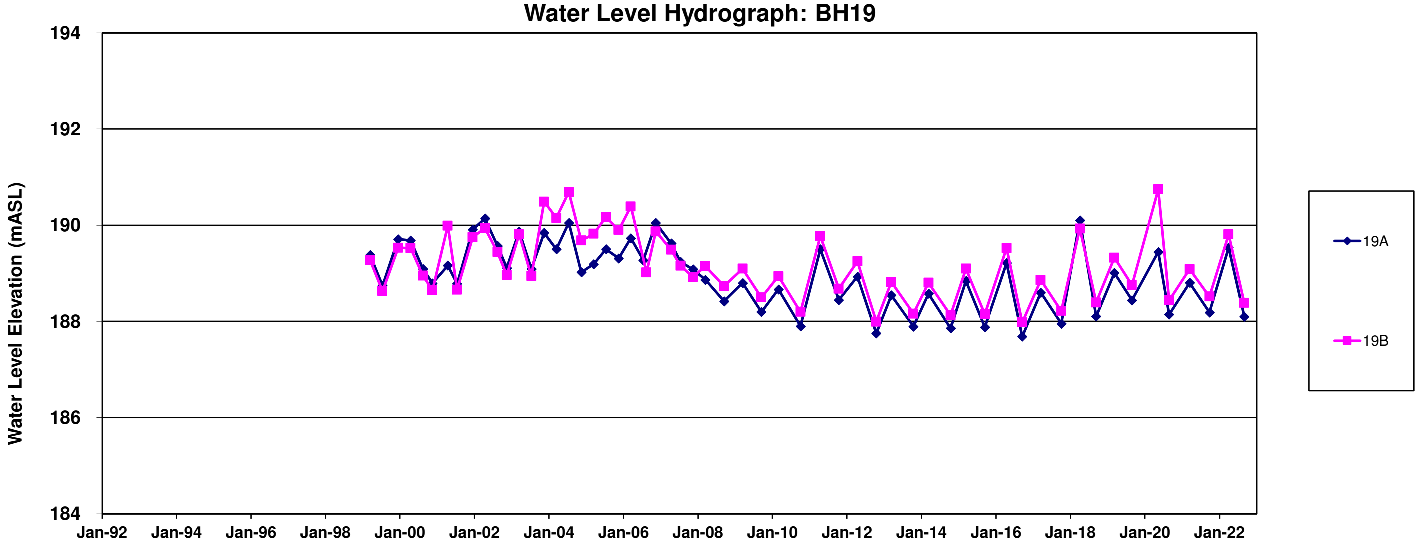
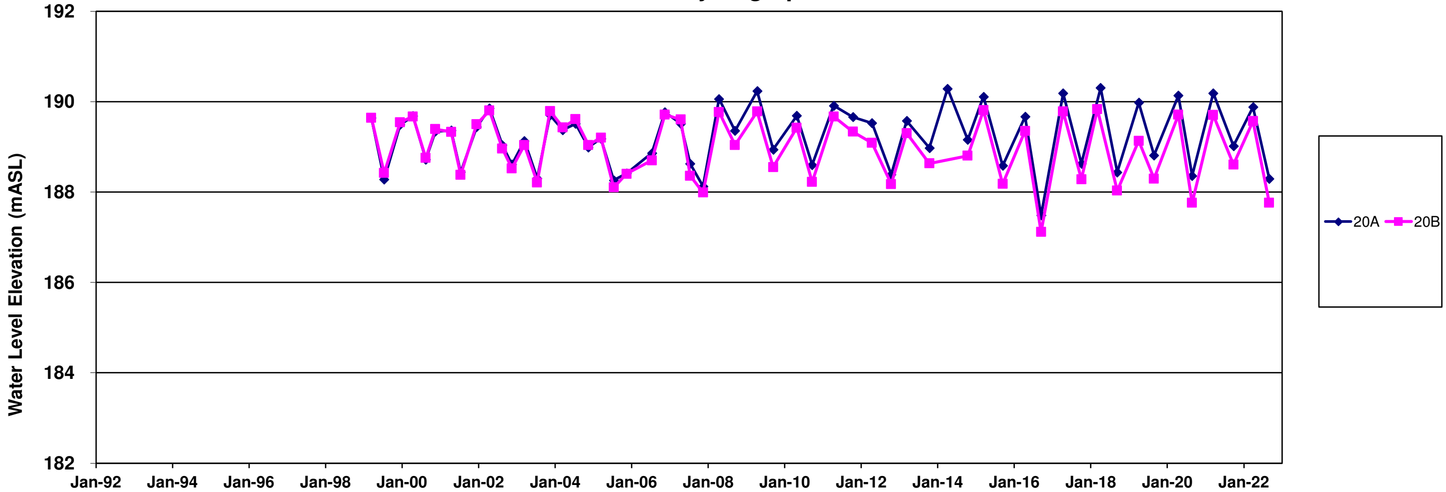


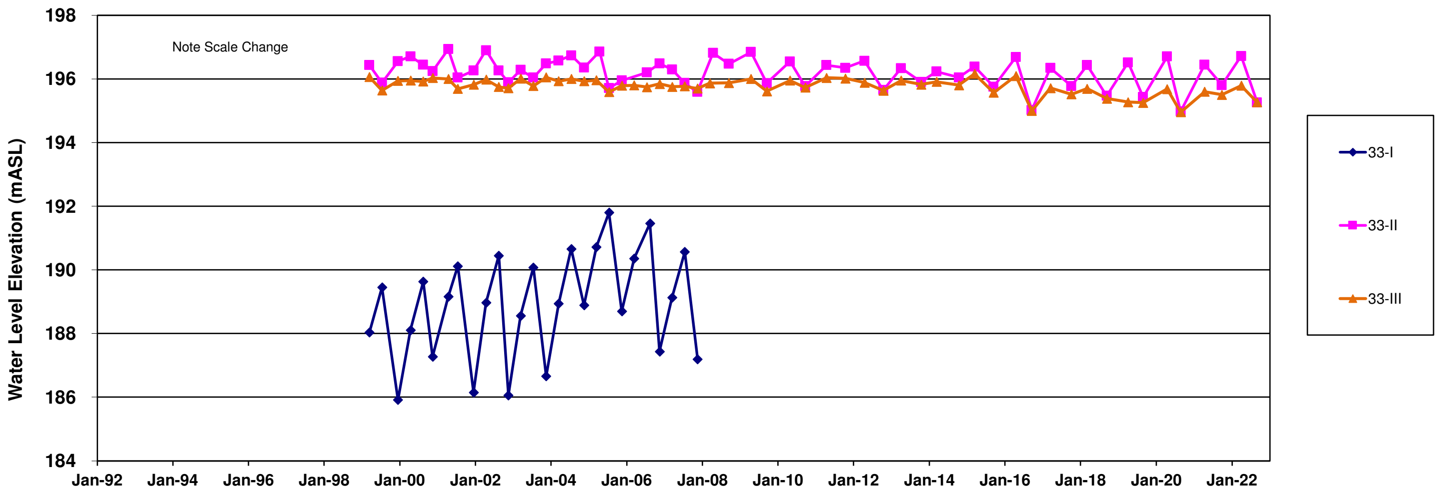

**Figure G.3**
**Water Level Hydrograph: BH19**



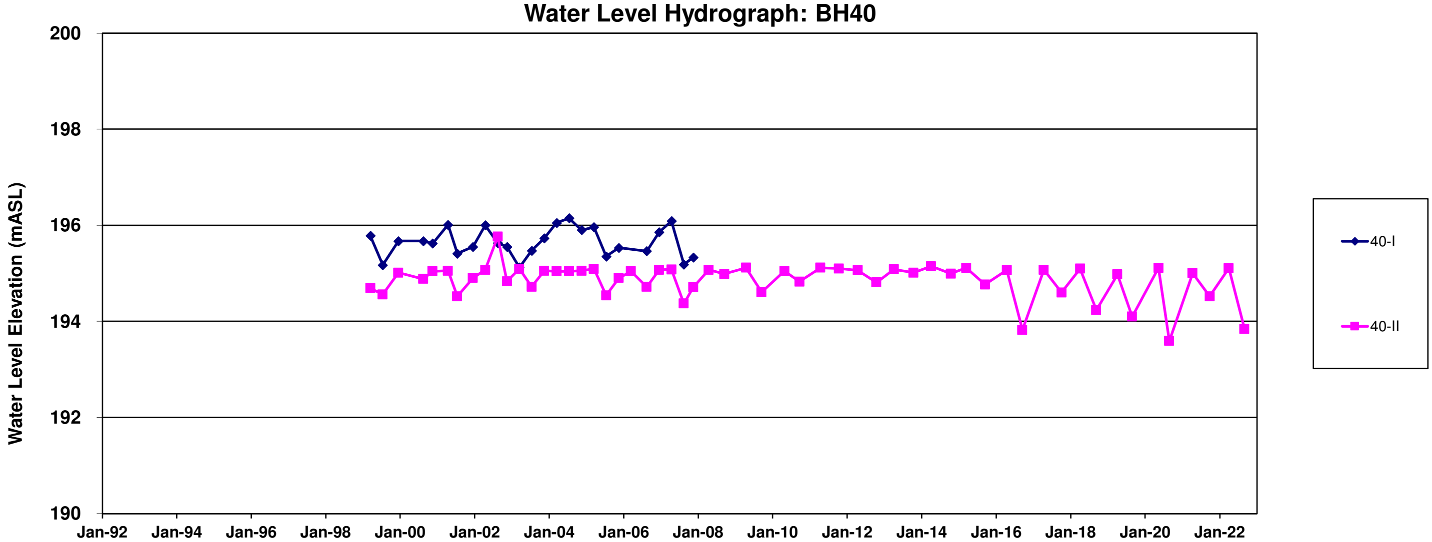
## Figure G.4
### Water Level Hydrograph: BH20



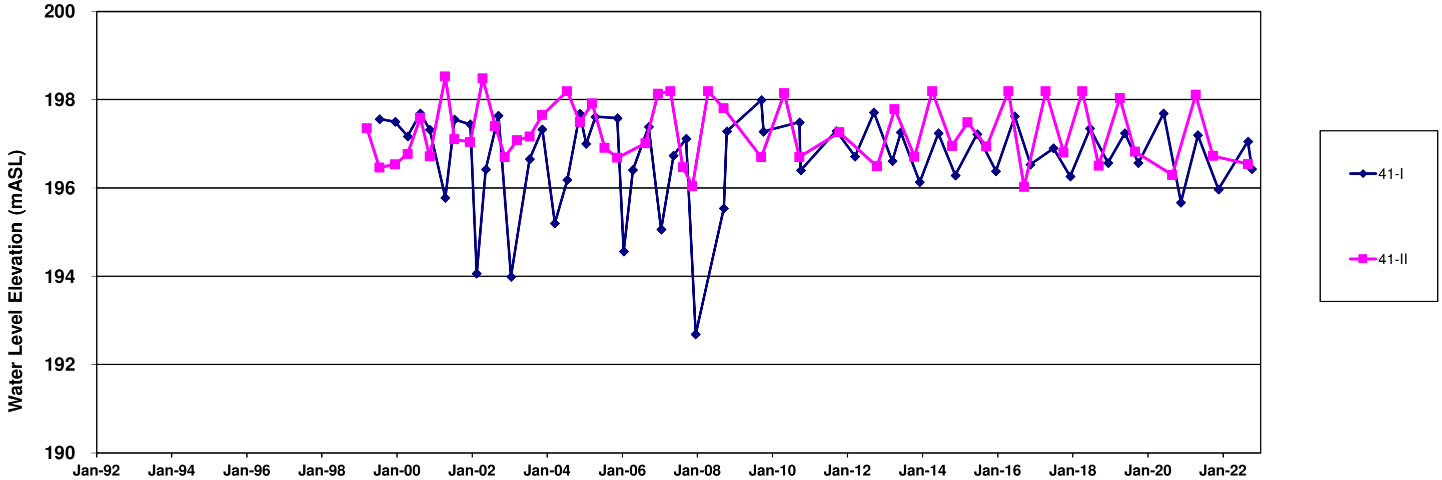

## Figure G.5
### Water Level Hydrograph: BH33



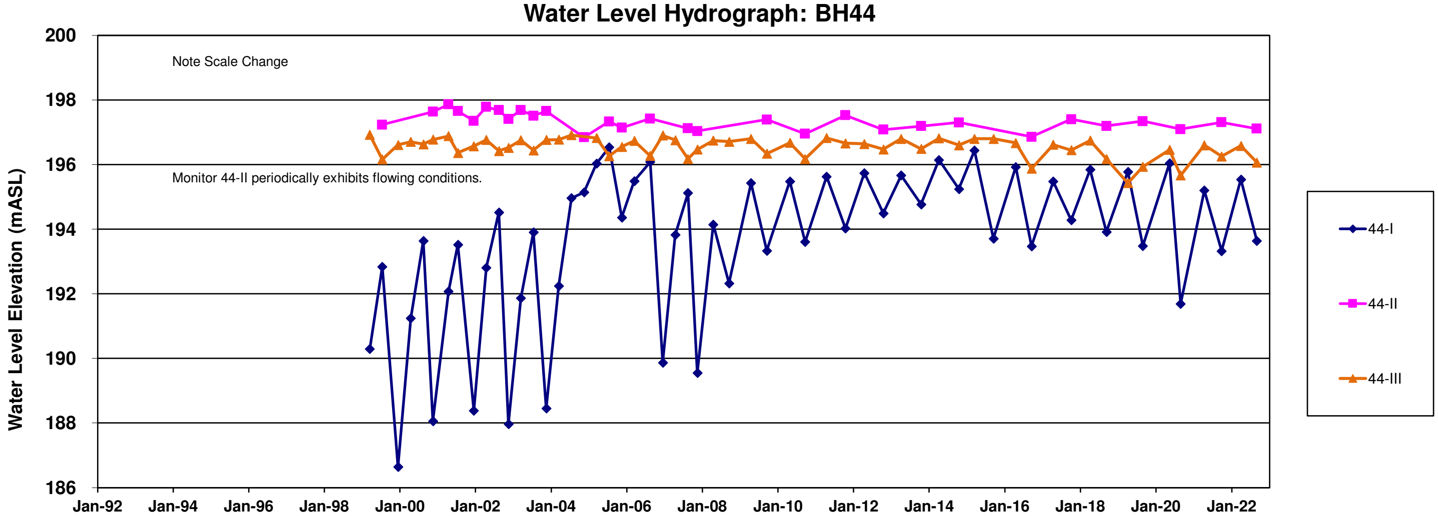

## Figure G.6
### Water Level Hydrograph: BH40



# Figure G.7
## Water Level Hydrograph: BH41




# Figure G.8
## Water Level Hydrograph: BH44




# Figure G.9
## Water Level Hydrograph: BH46

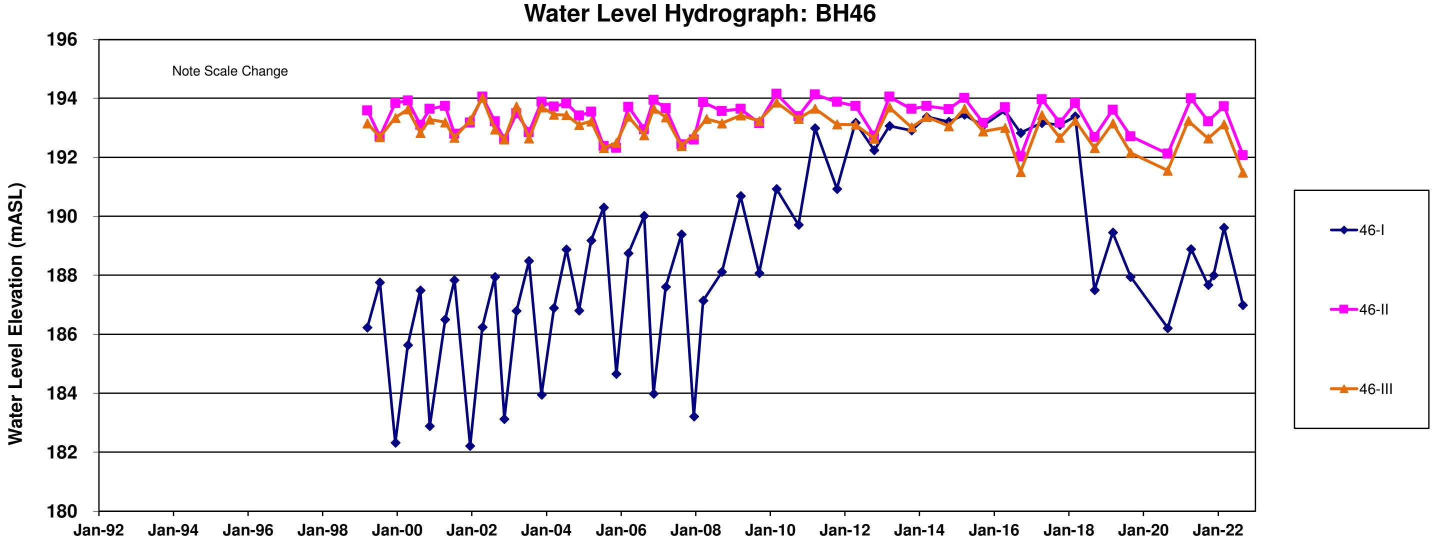


**Figure G.10**
**Water Level Hydrograph: BH48**

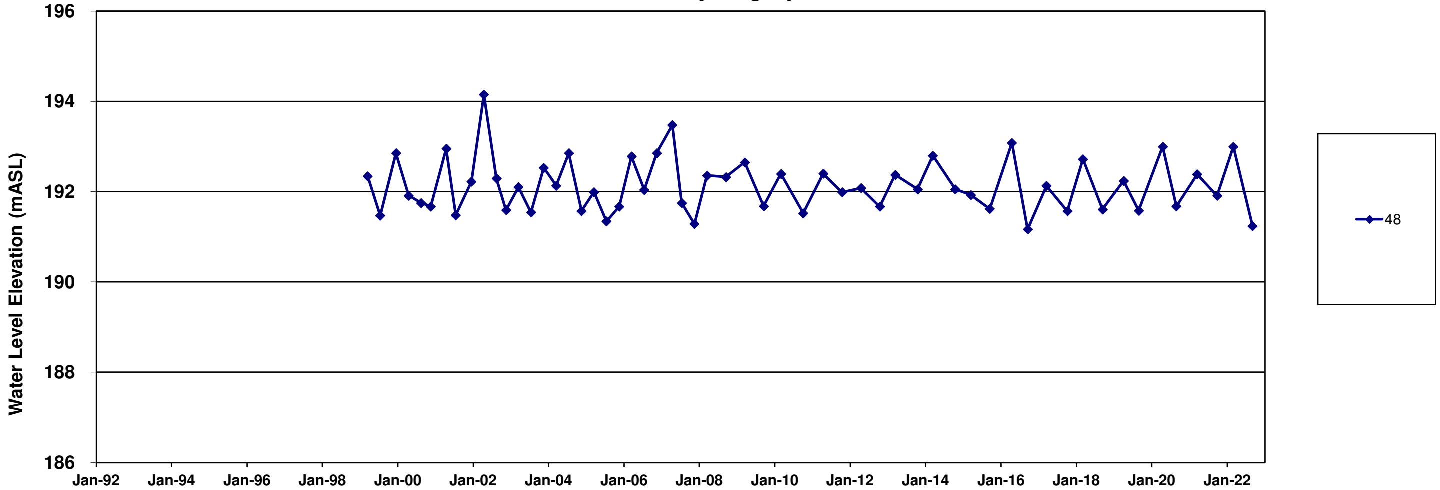



**Figure G.11**
**Water Level Hydrograph: BH50**

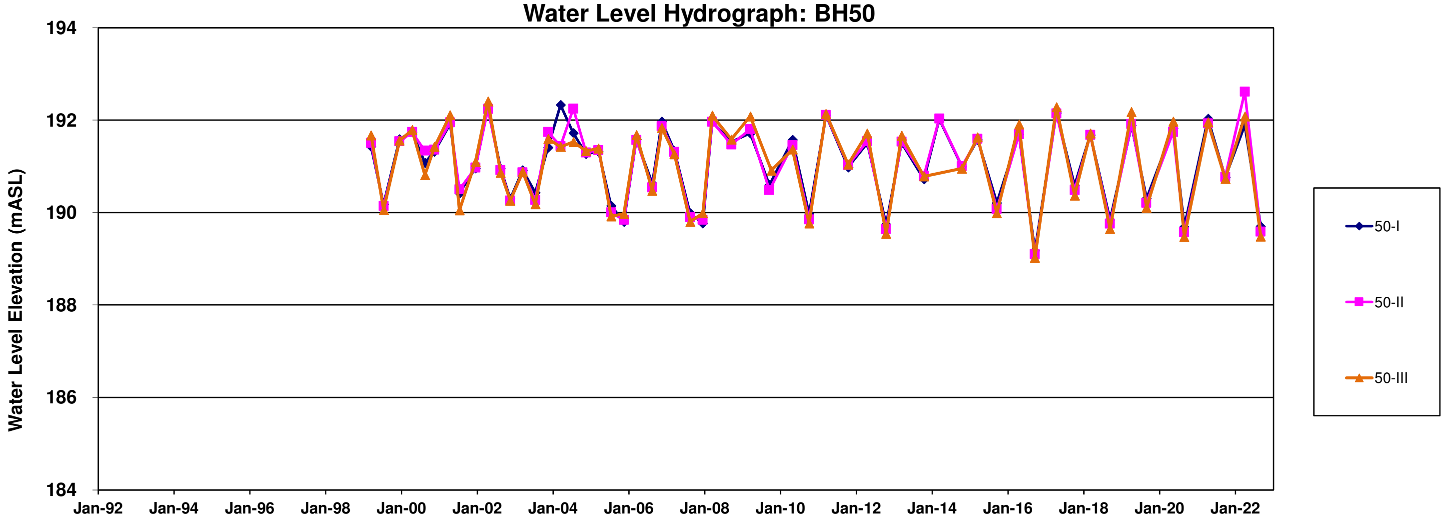



**Figure G.12**
**Water Level Hydrograph: BH52**

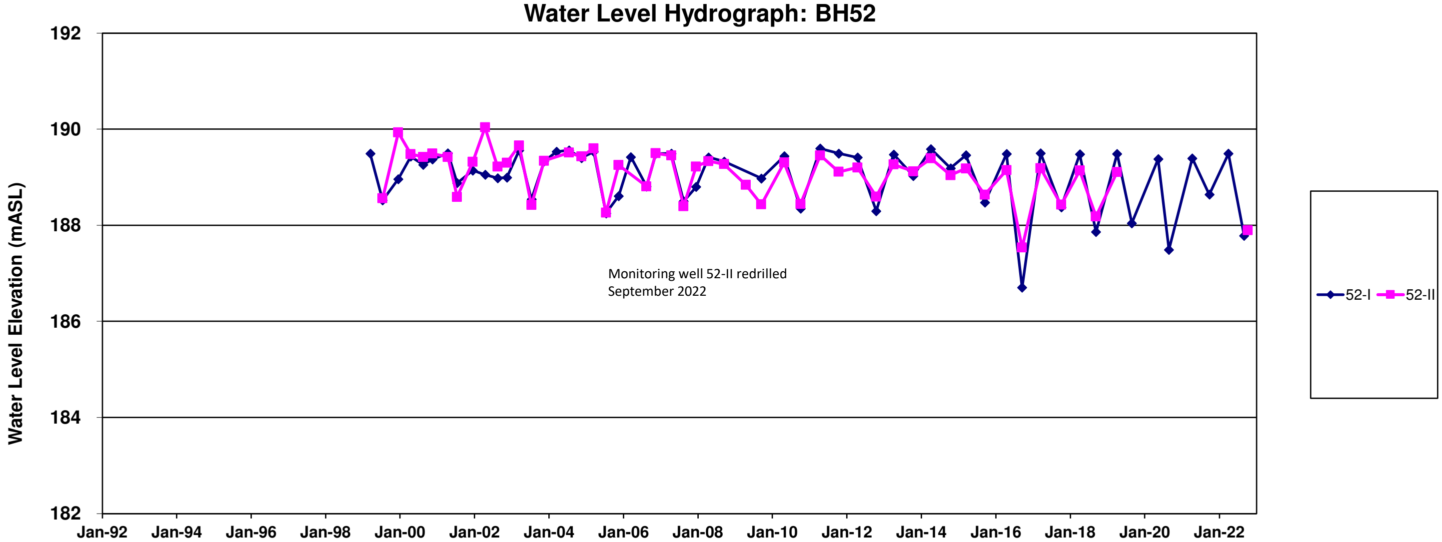


**Figure G.13**
**Water Level Hydrograph: BH53**

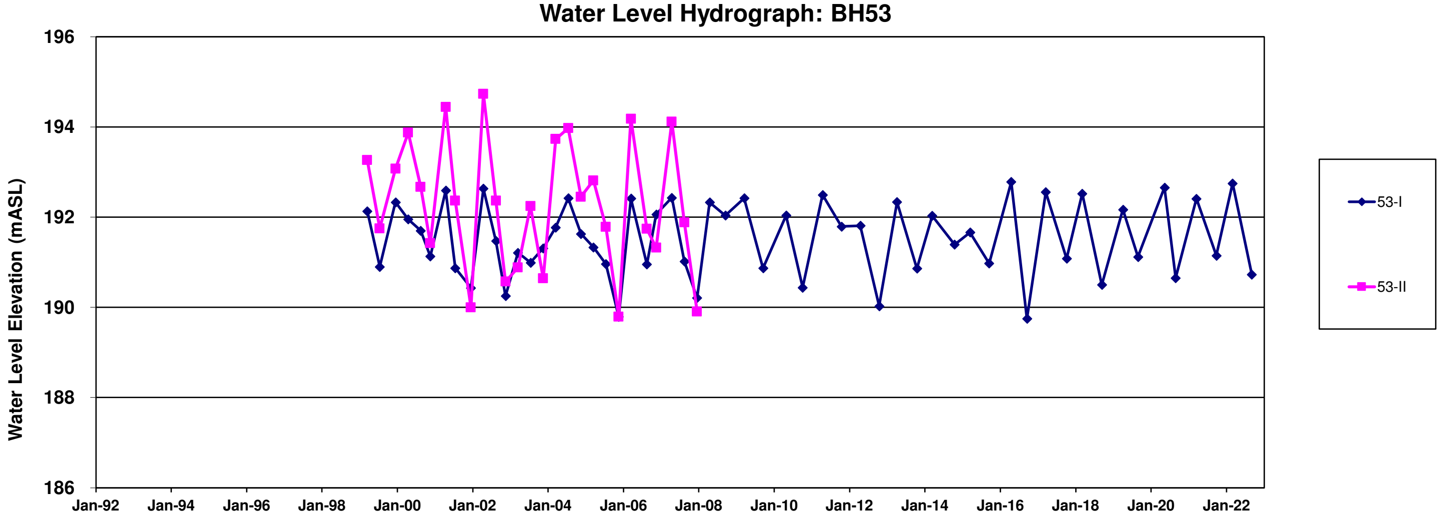



**Figure G.14**
**Water Level Hydrograph: BH54**

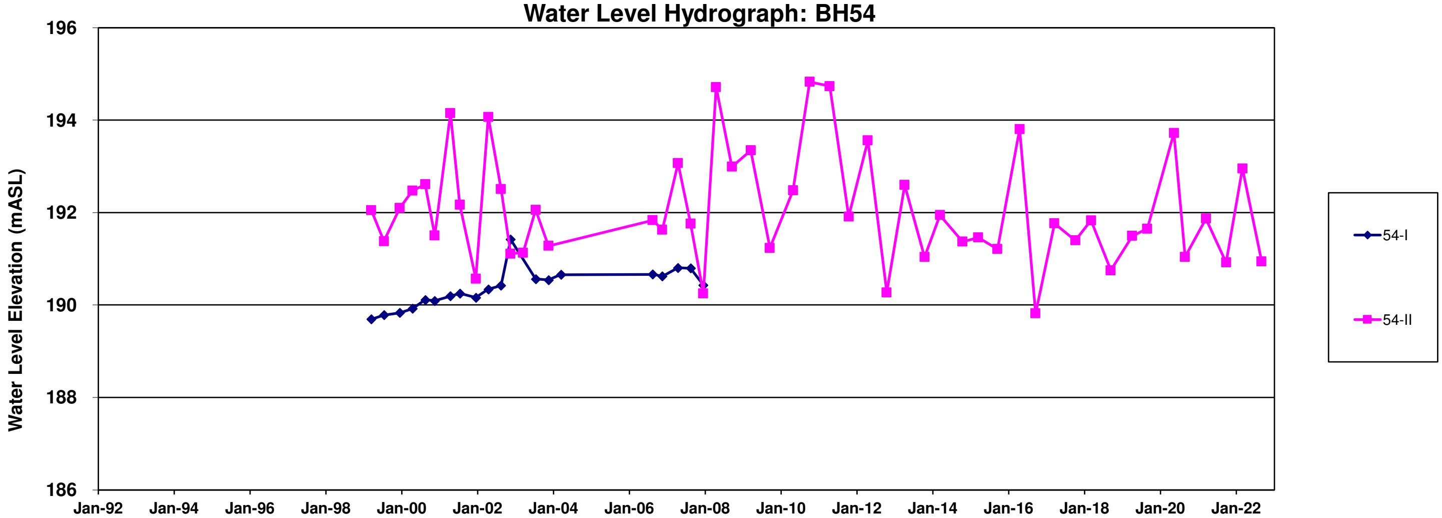



**Figure G.15**
**Water Level Hydrograph: BH5**

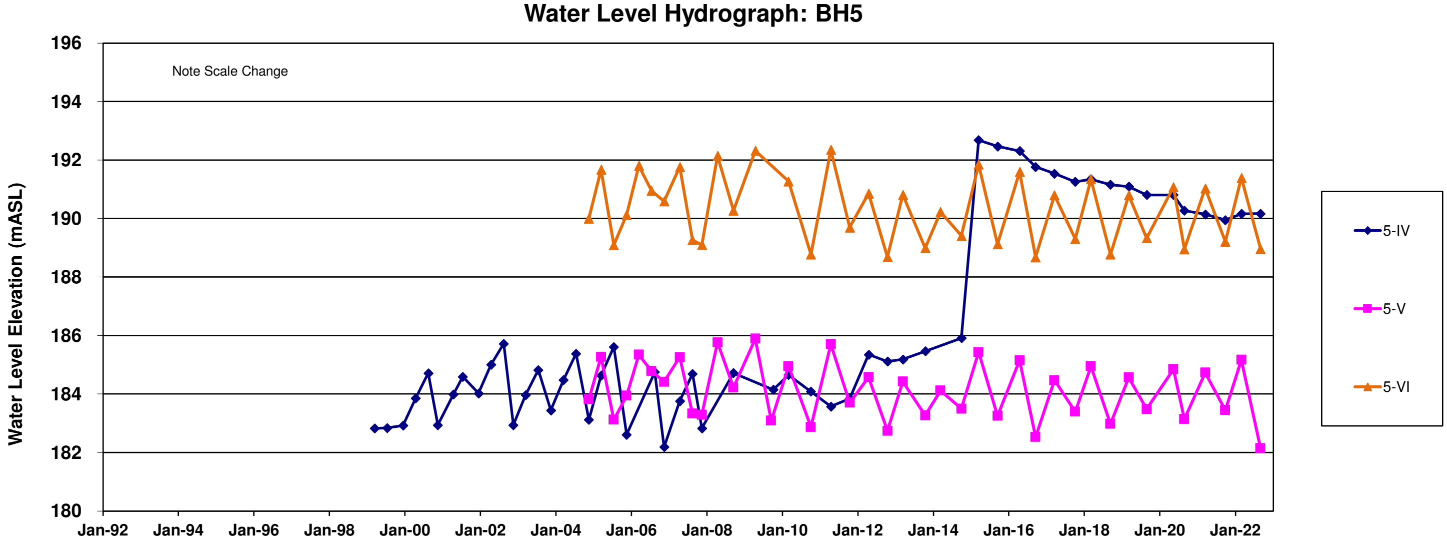


**Figure G.16**
**Water Level Hydrograph: BH61**

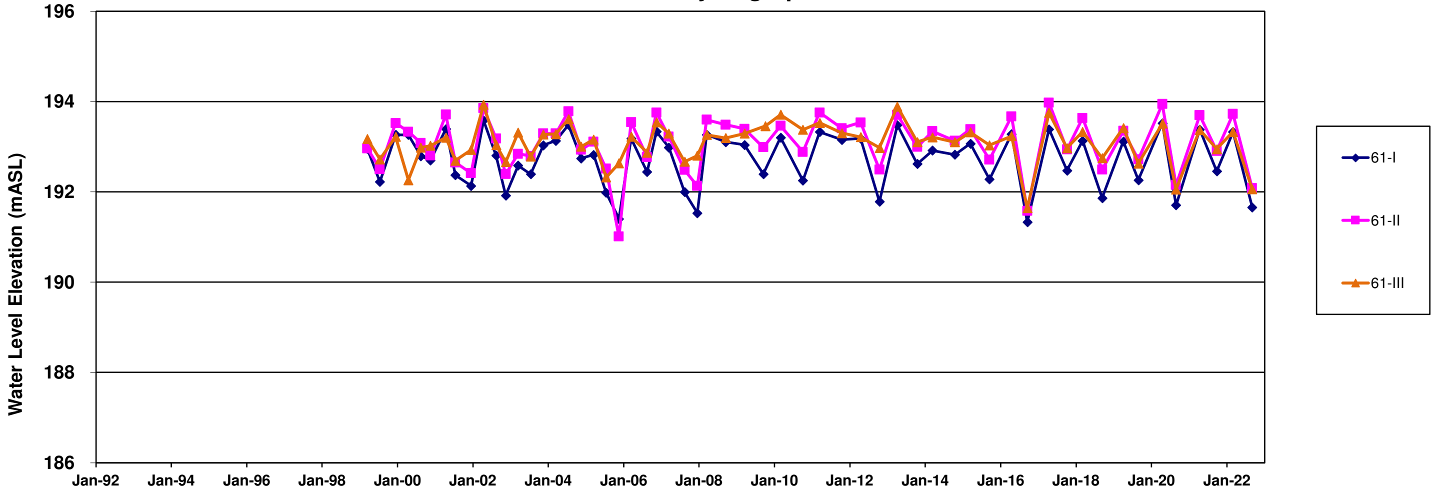



**Figure G.17**
**Water Level Hydrograph: BH62**

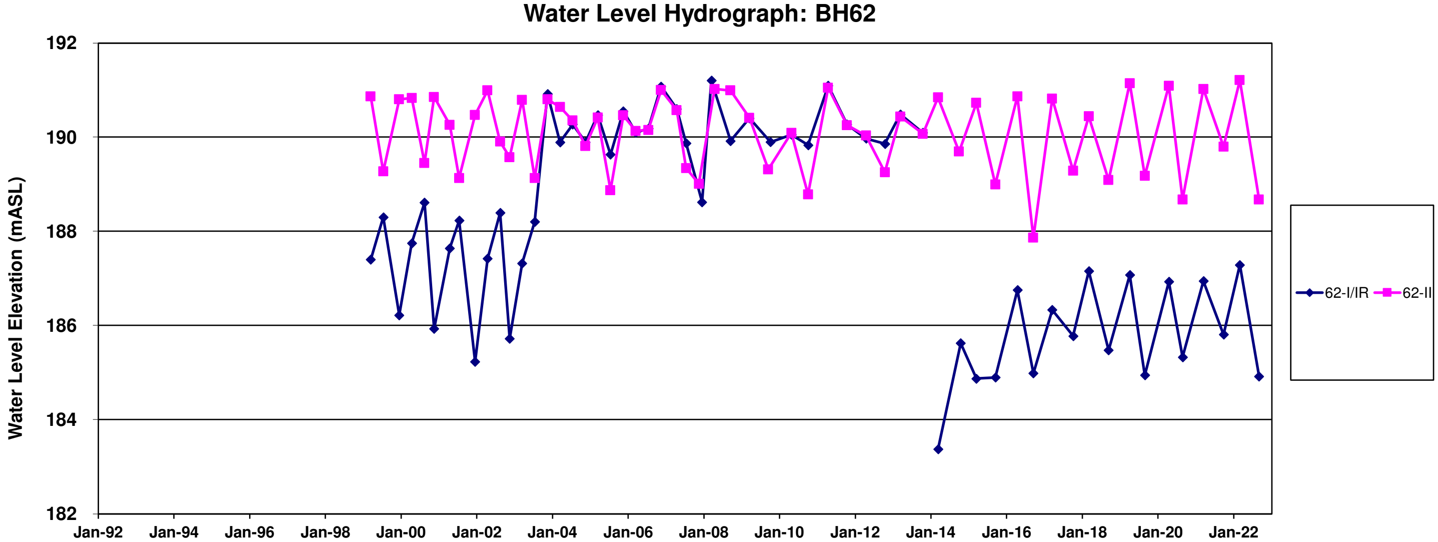



**Figure G.18**
**Water Level Hydrograph: BH63**

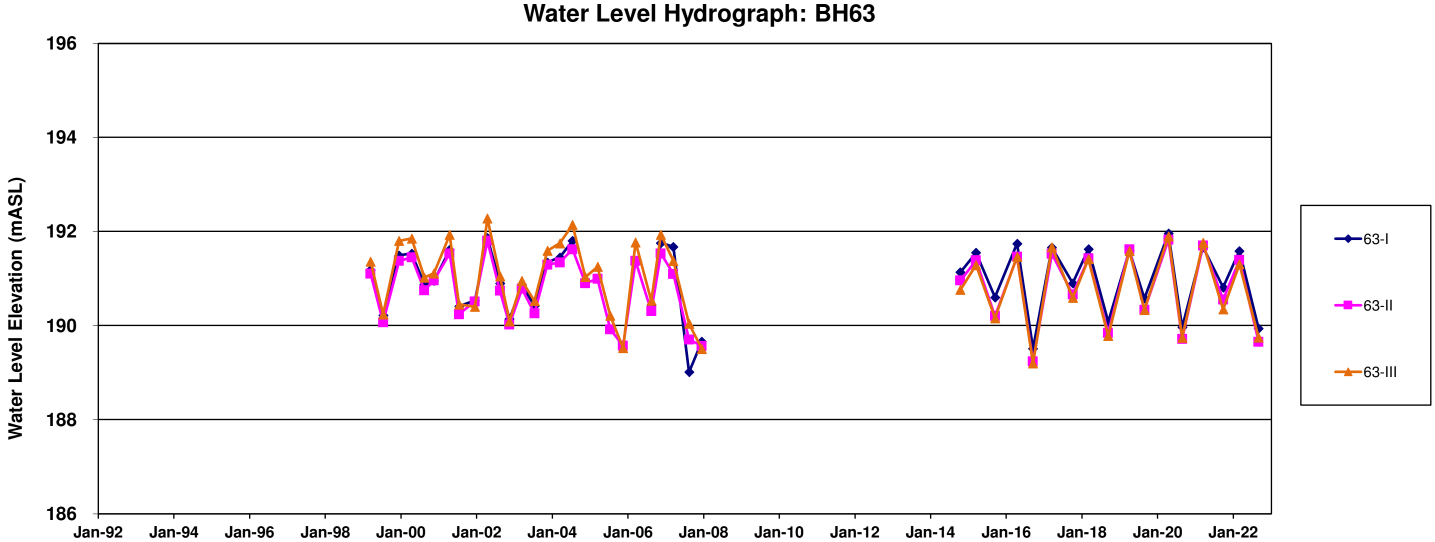


**Figure G.19**
**Water Level Hydrograph: BH64**

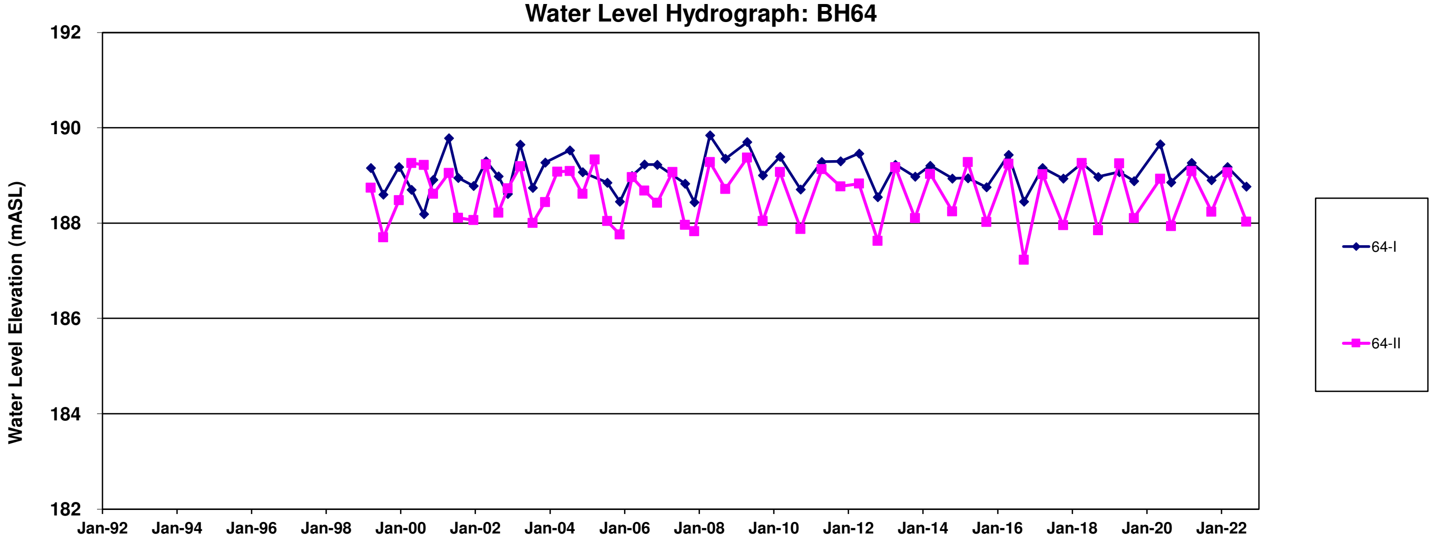



**Figure G.20**
**Water Level Hydrograph: BH66**

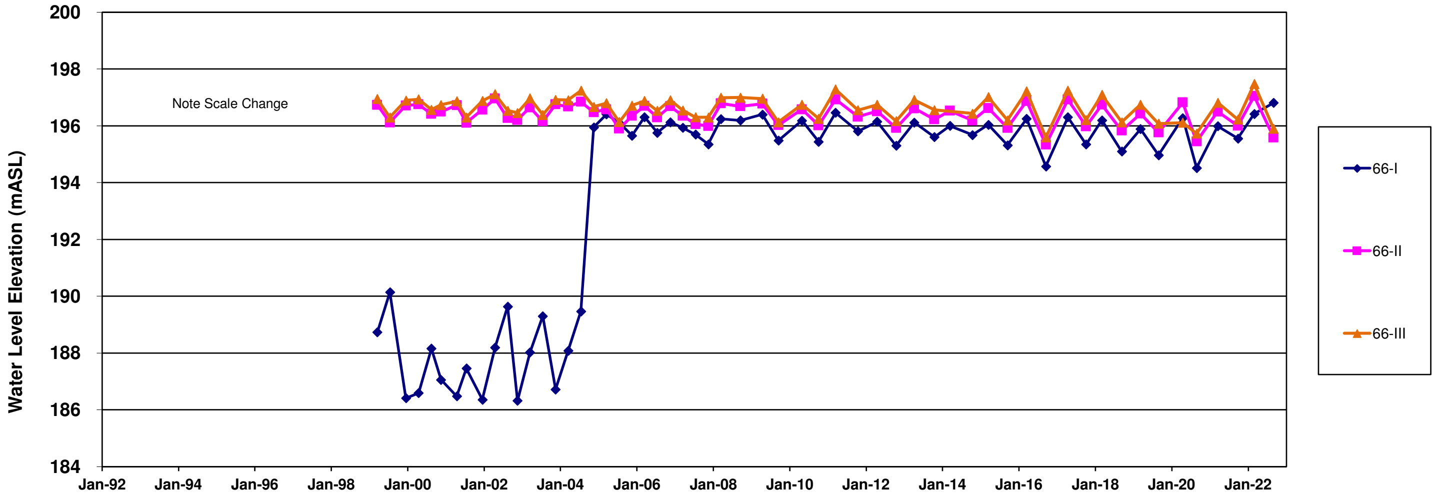
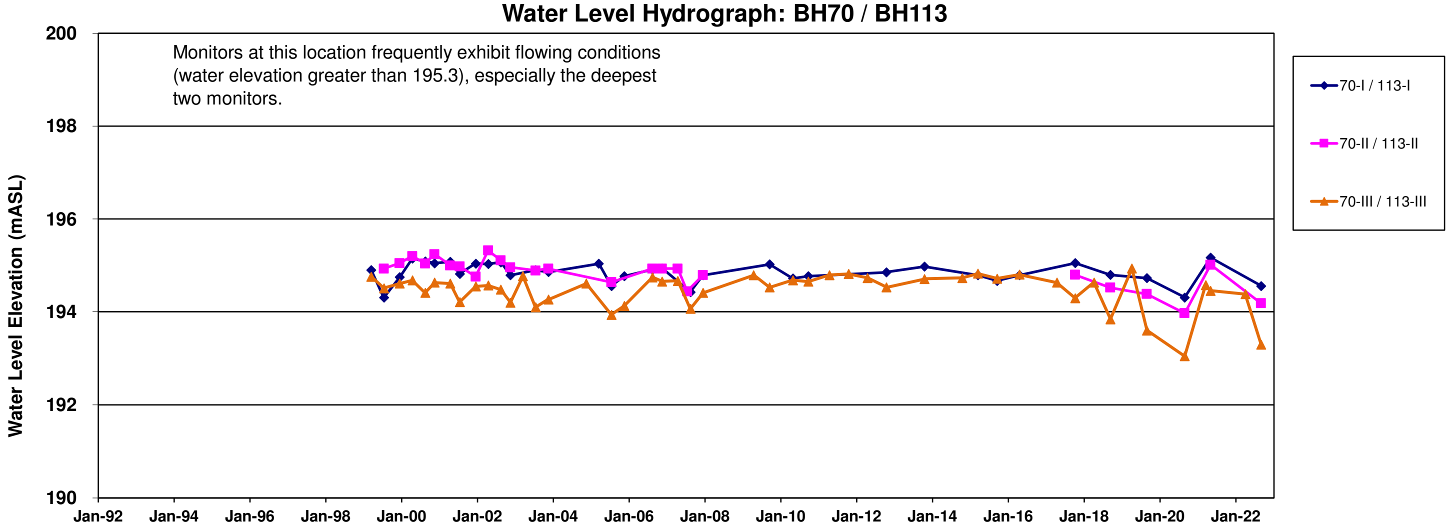
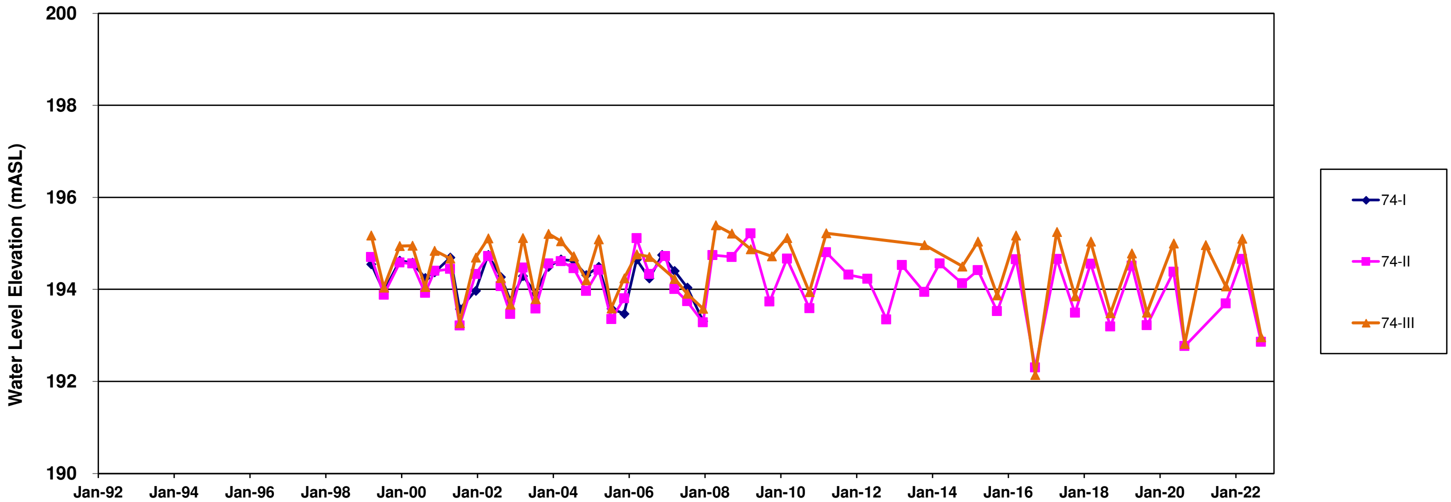


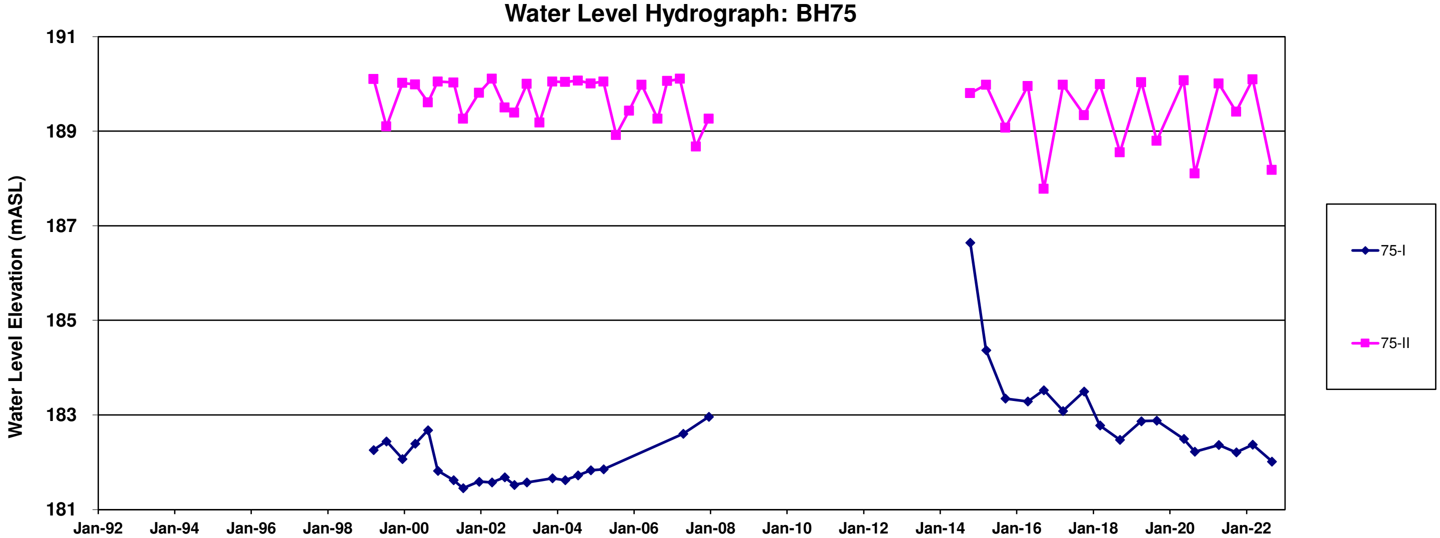

**Figure G.21**
**Water Level Hydrograph: BH70 / BH113**



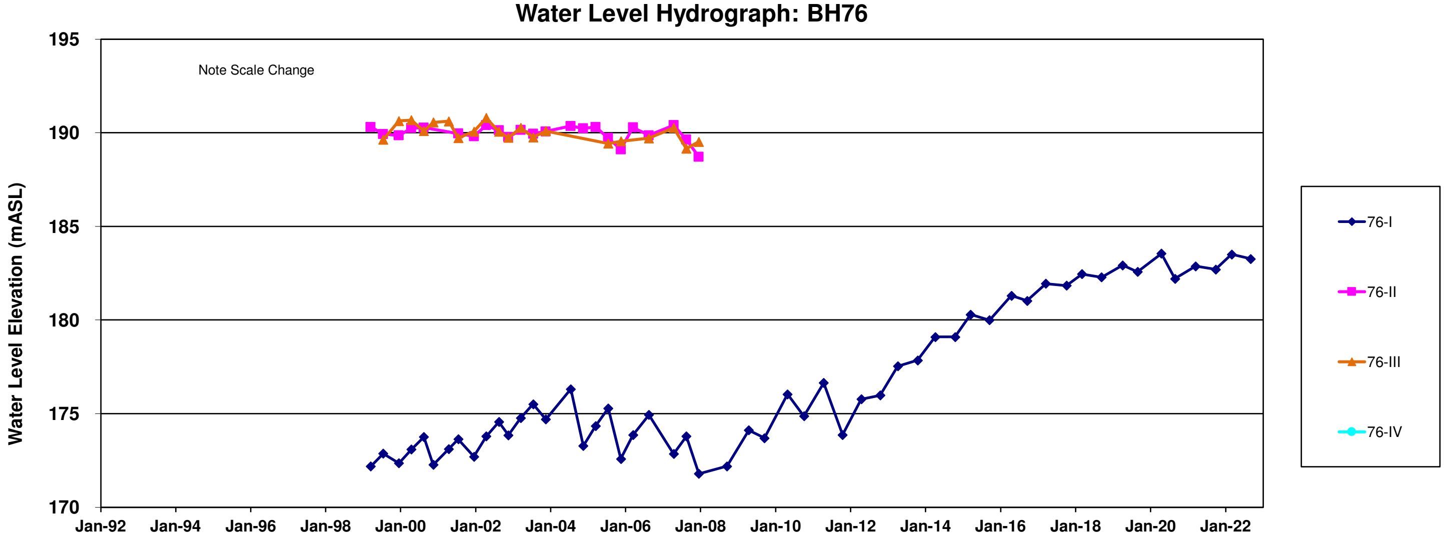
## Figure G.22
### Water Level Hydrograph: BH74



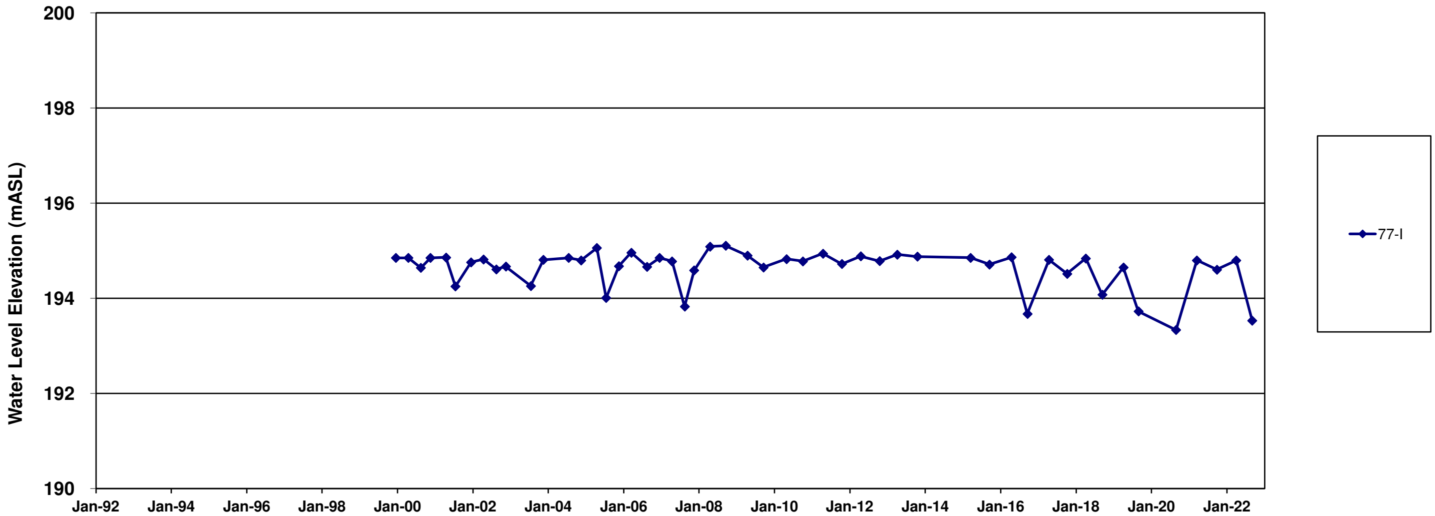

## Figure G.23
### Water Level Hydrograph: BH75



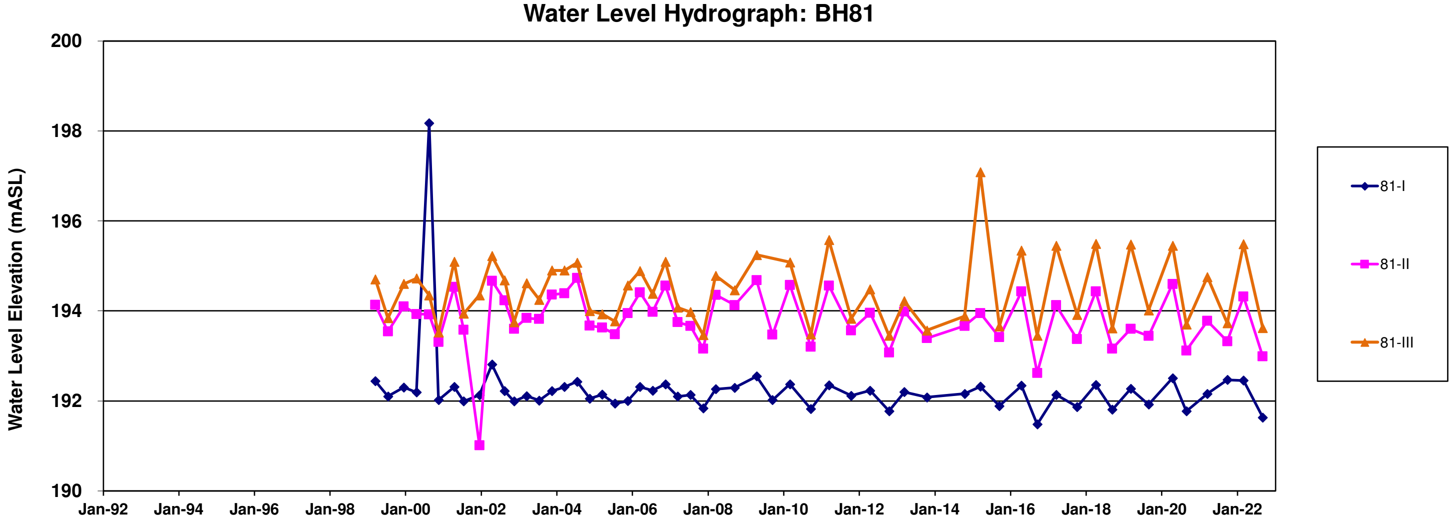

## Figure G.24
### Water Level Hydrograph: BH76



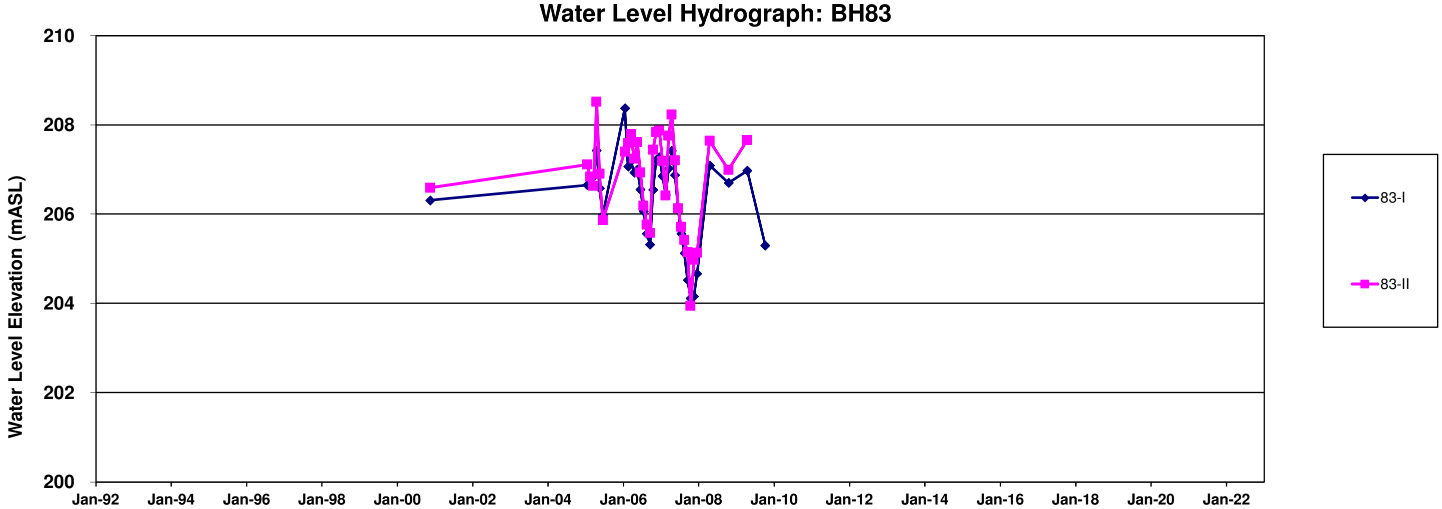
## Figure G.25
### Water Level Hydrograph: BH77



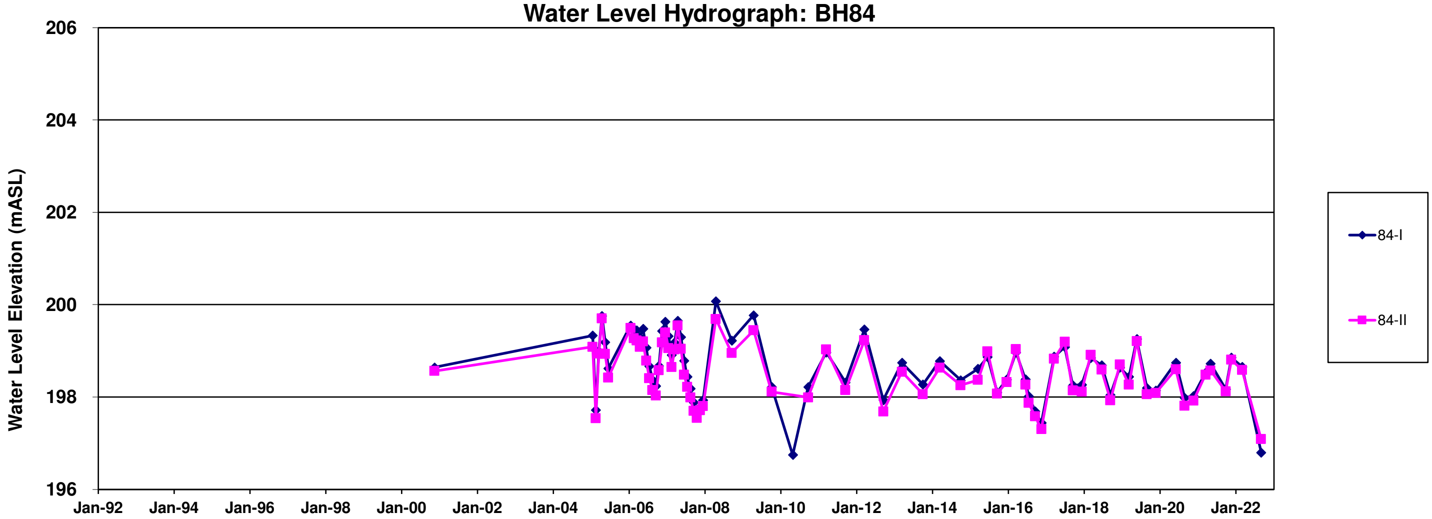

## Figure G.26
### Water Level Hydrograph: BH81



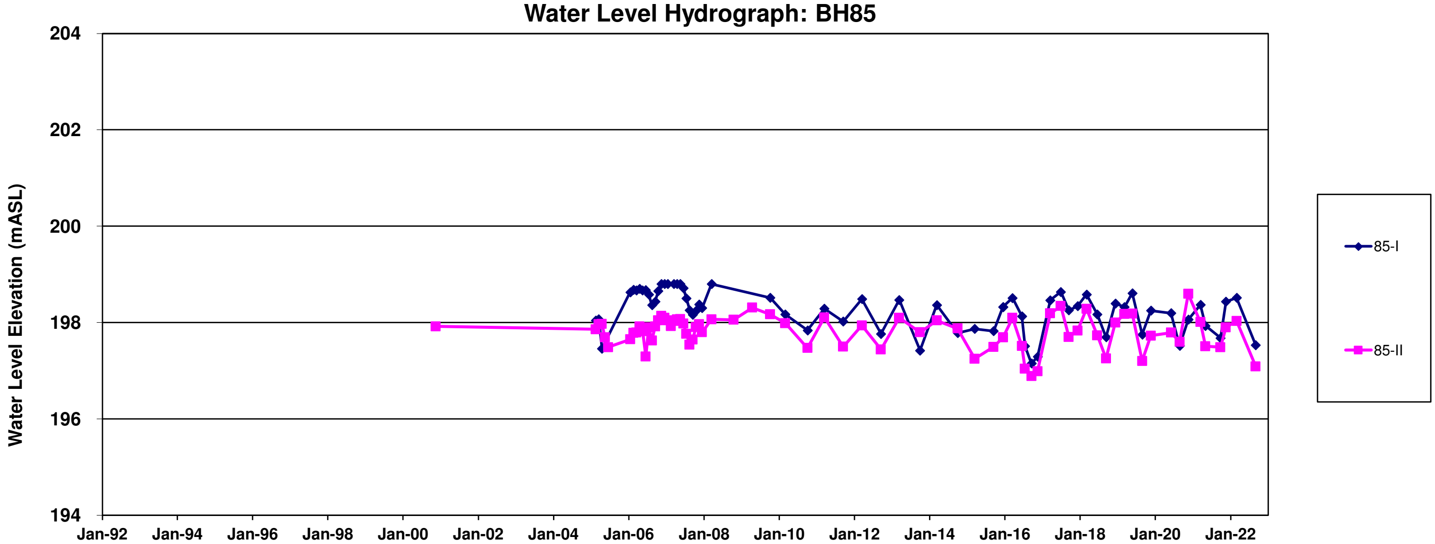

## Figure G.27
### Water Level Hydrograph: BH83



## Figure G.28
### Water Level Hydrograph: BH84




## Figure G.29
### Water Level Hydrograph: BH85




## Figure G.30
### Water Level Hydrograph: BH86

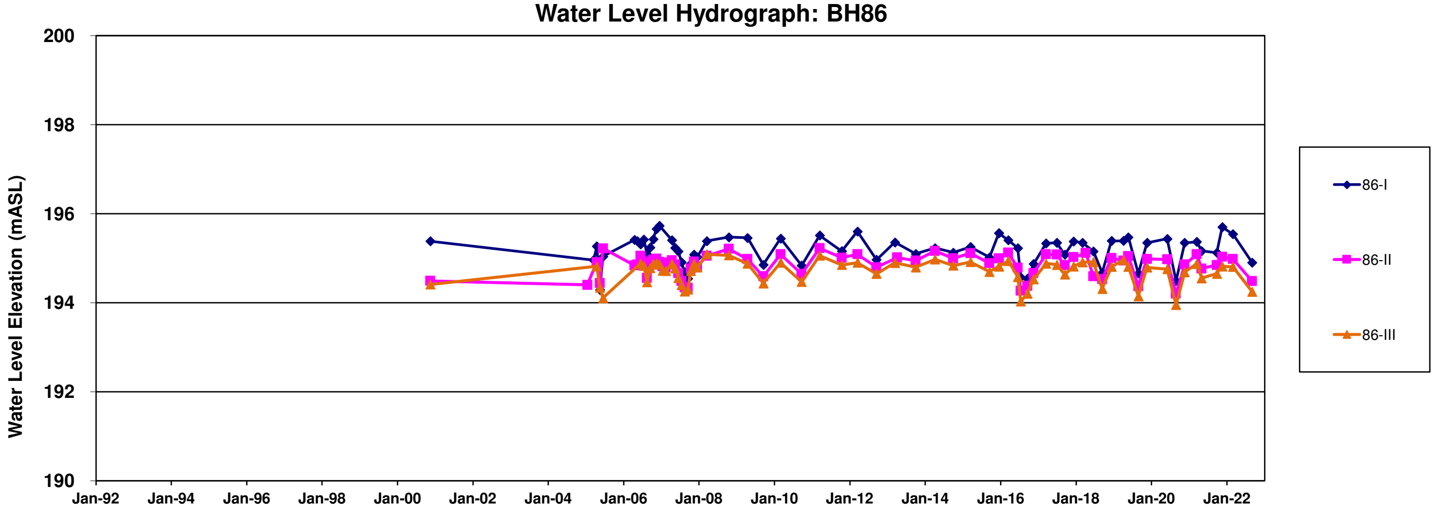


**Figure G.31**
**Water Level Hydrograph: BH87**

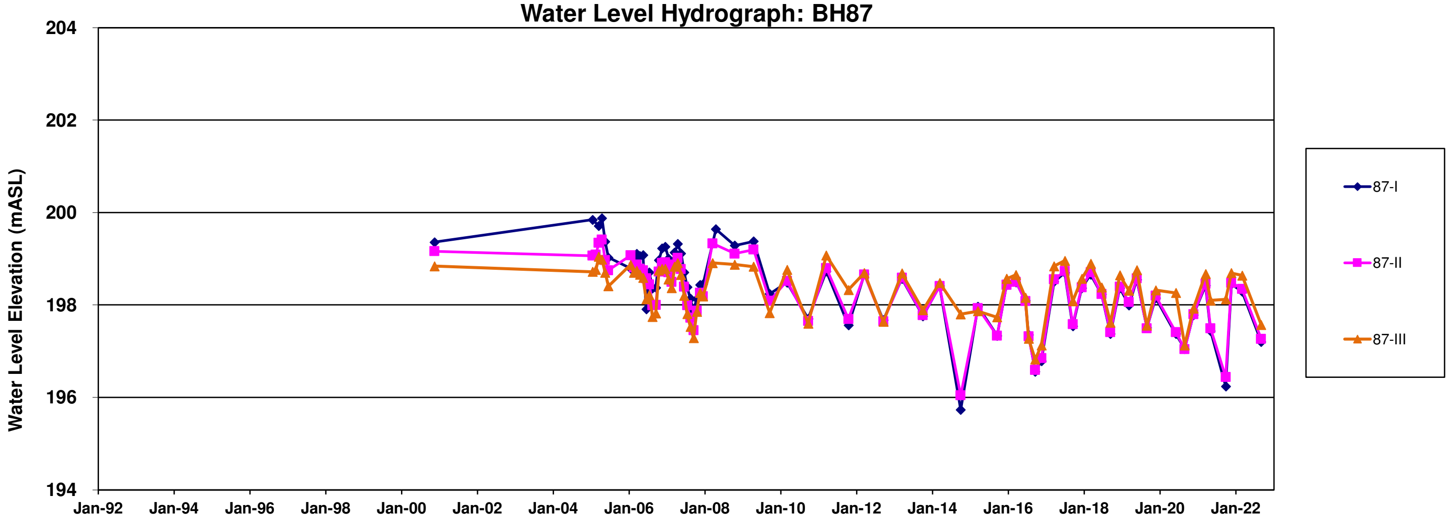



**Figure G.32**
**Water Level Hydrograph: BH88**

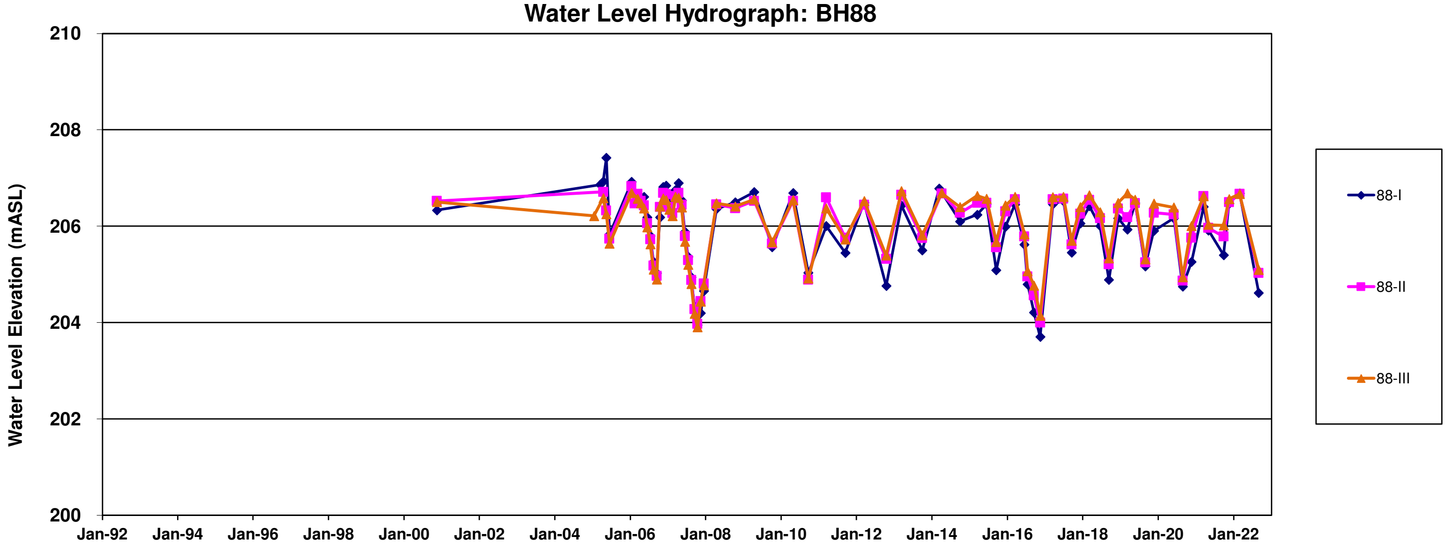
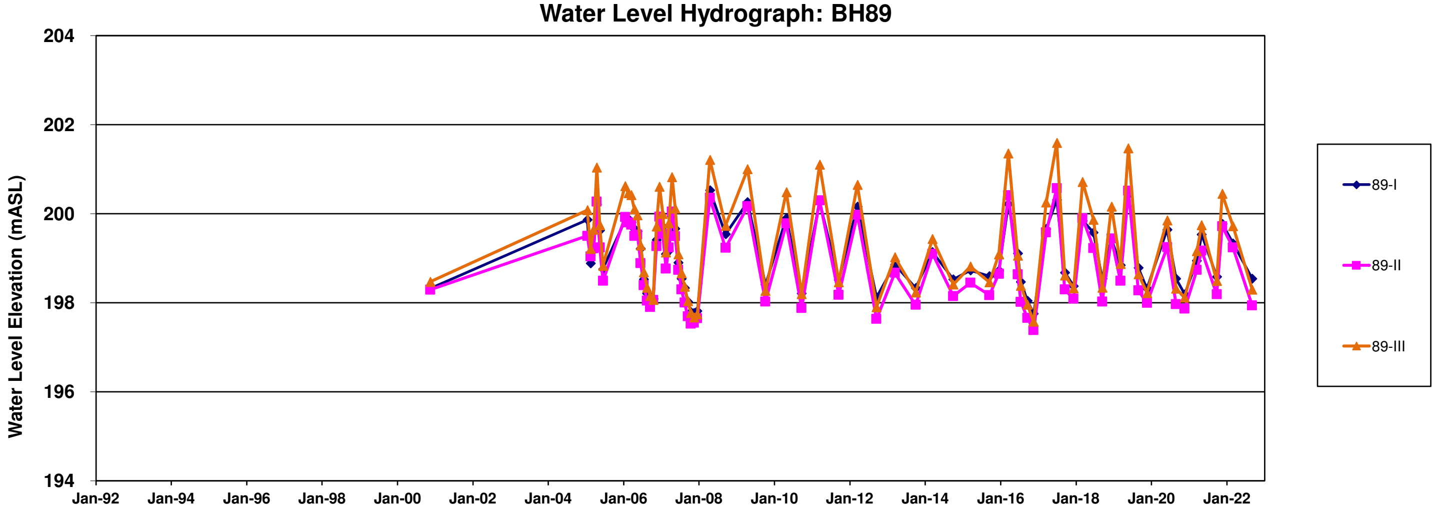
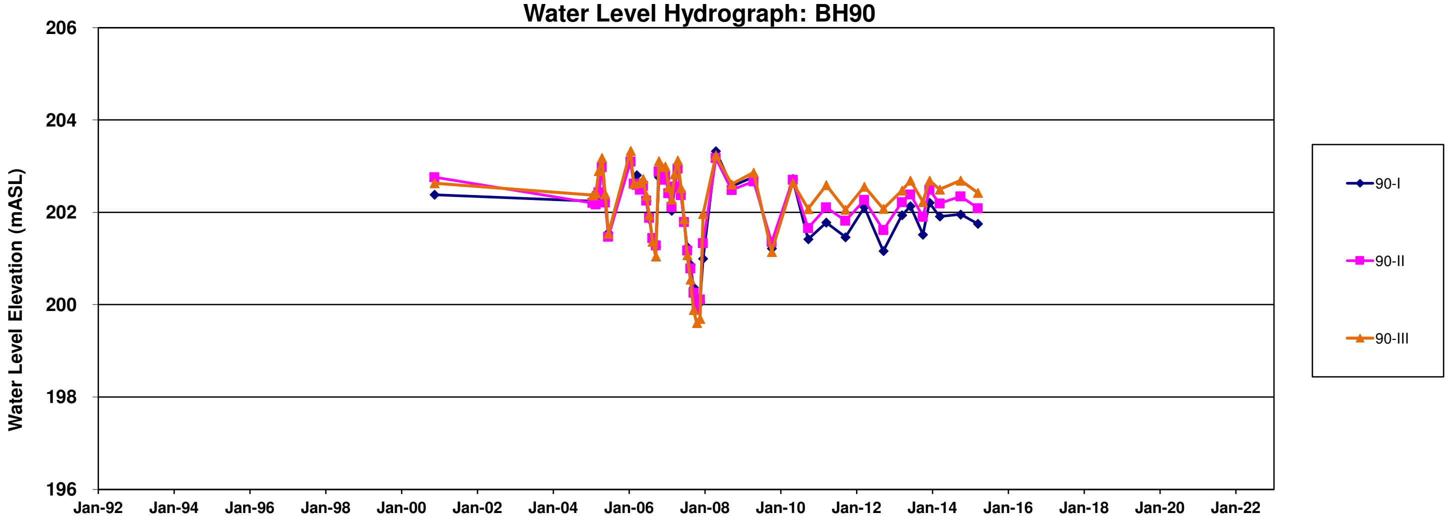


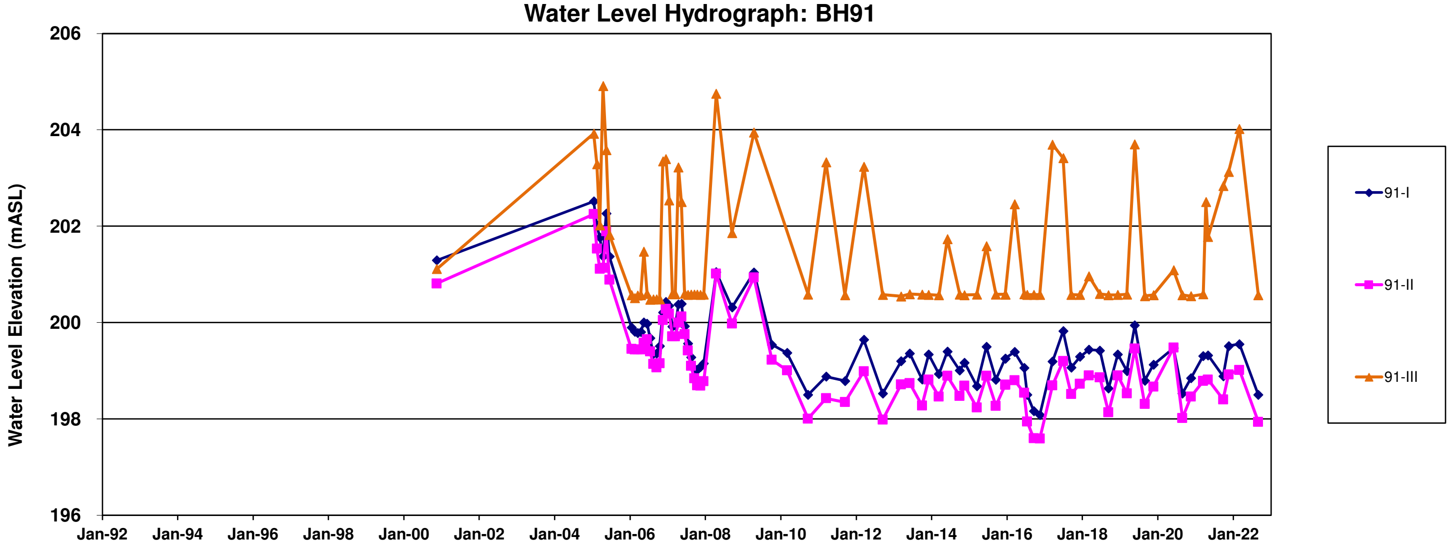

**Figure G.33**
**Water Level Hydrograph: BH89**



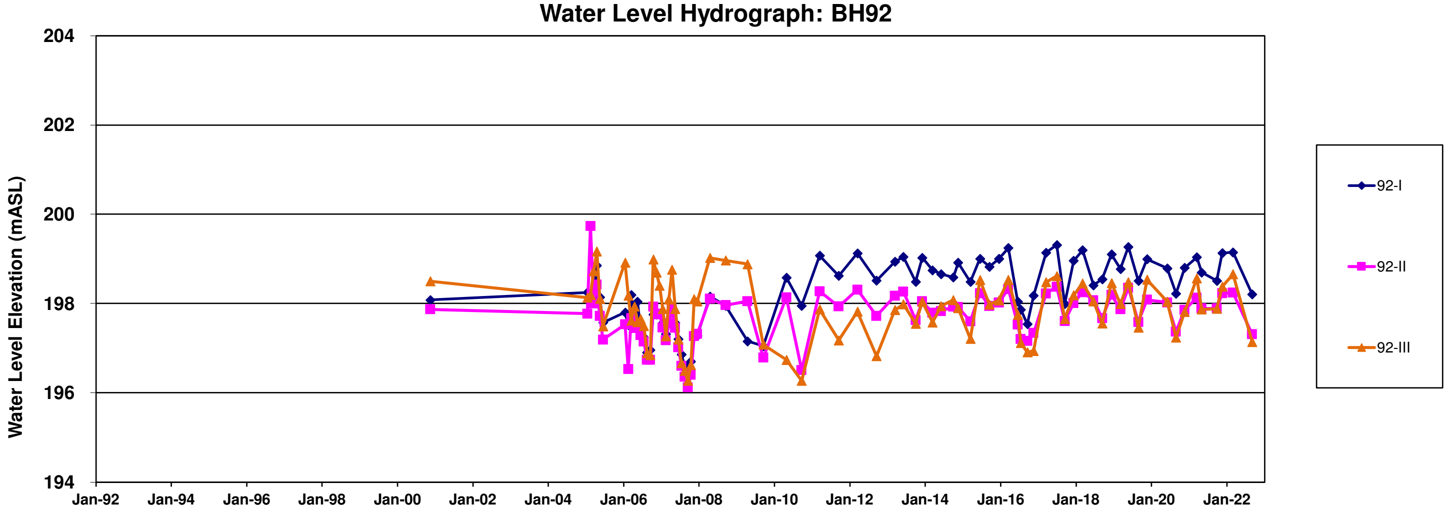
## Figure G.34
### Water Level Hydrograph: BH90



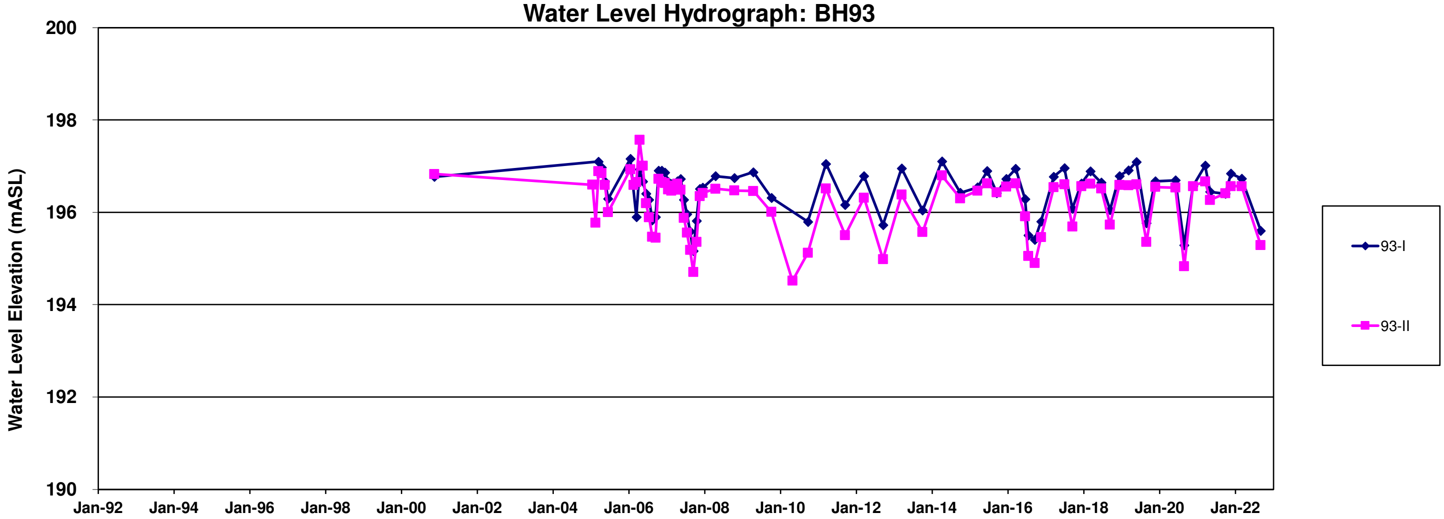

## Figure G.35
### Water Level Hydrograph: BH91



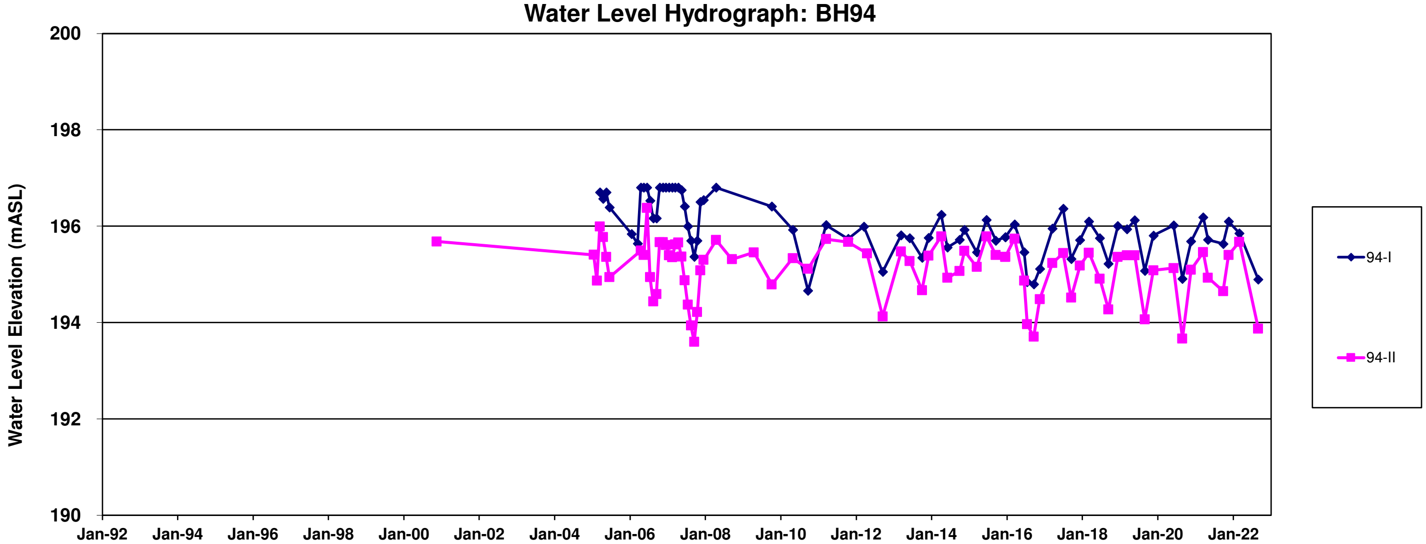

## Figure G.36
### Water Level Hydrograph: BH92



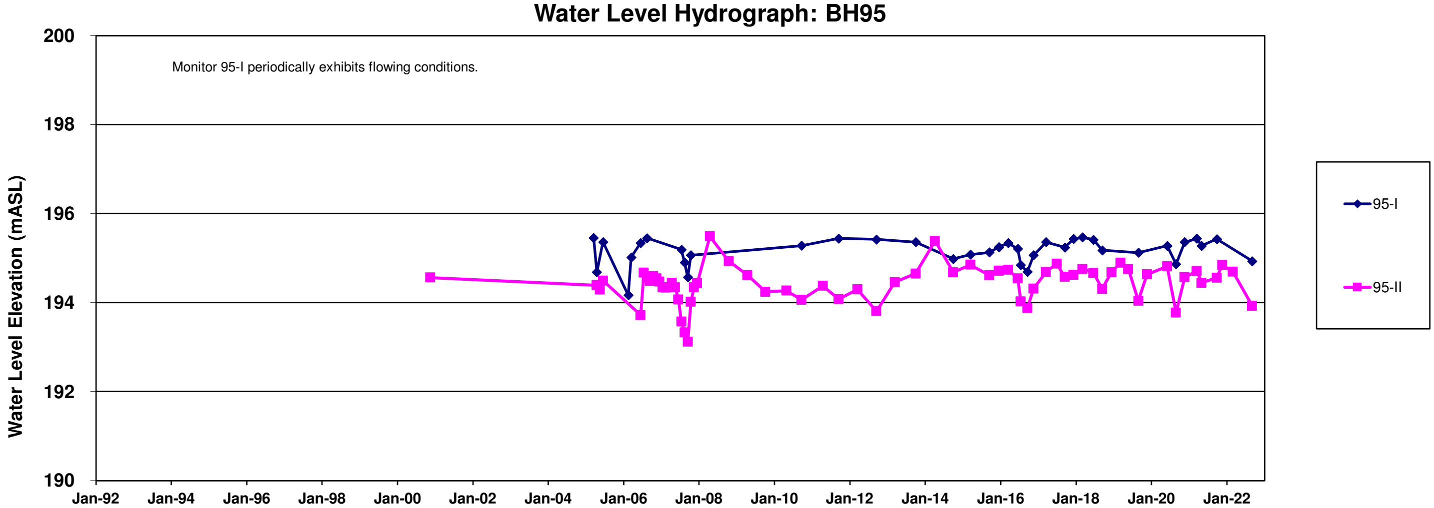
## Figure G.37
### Water Level Hydrograph: BH93



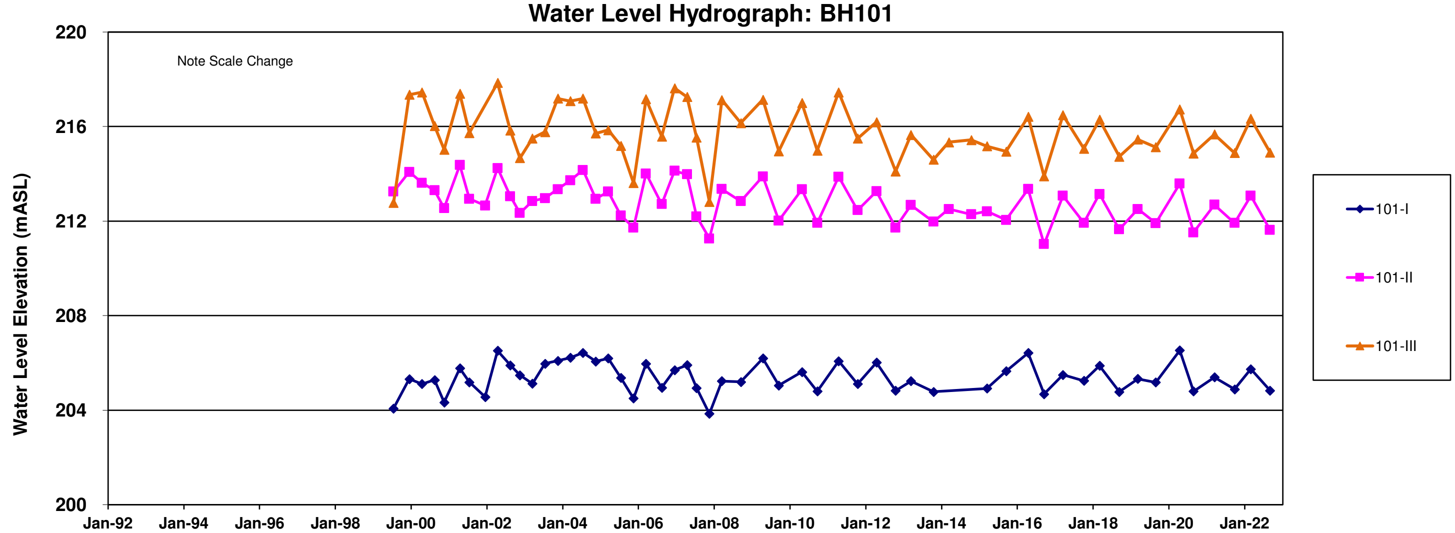

## Figure G.38
### Water Level Hydrograph: BH94



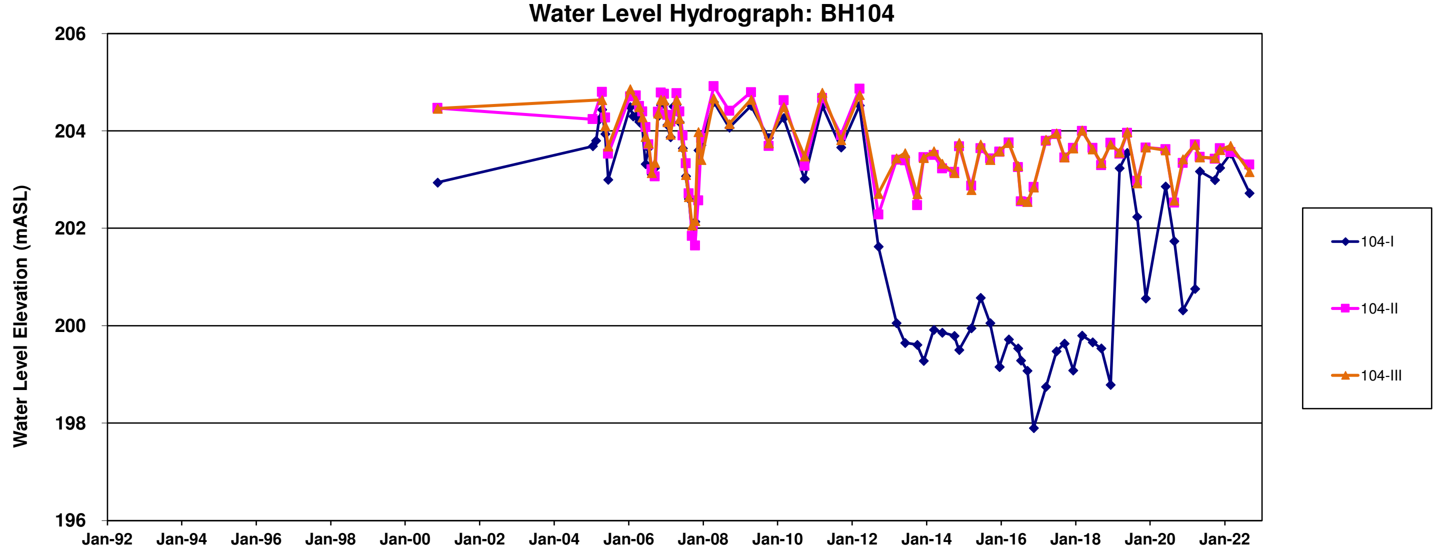

## Figure G.39
### Water Level Hydrograph: BH95



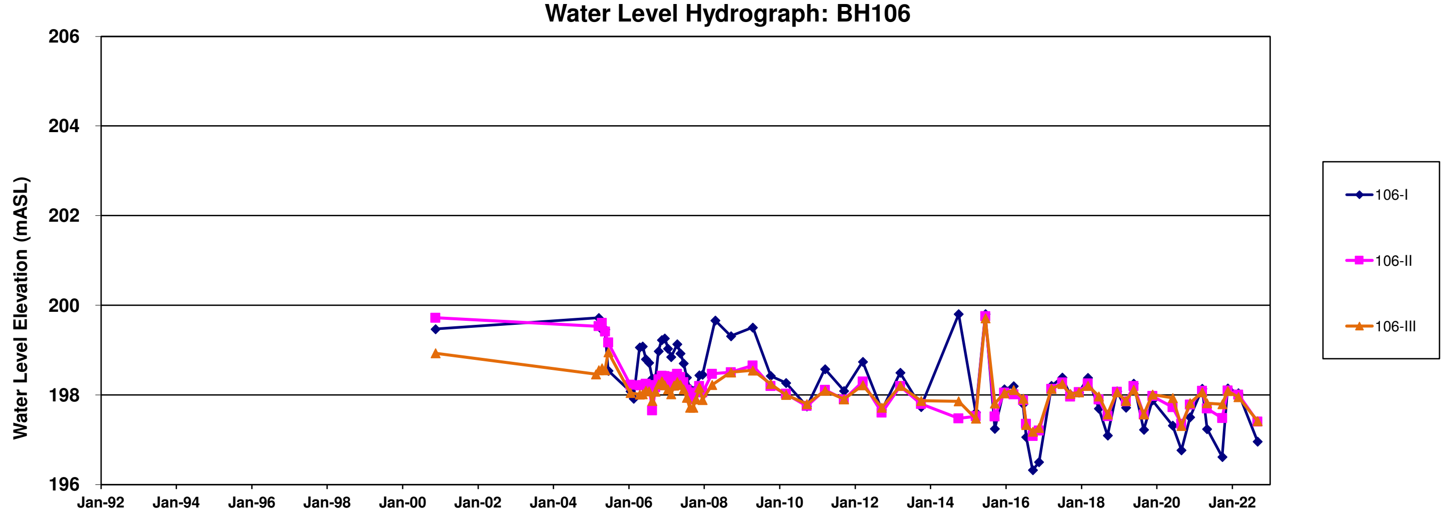
## Figure G.40
Water Level Hydrograph: BH101



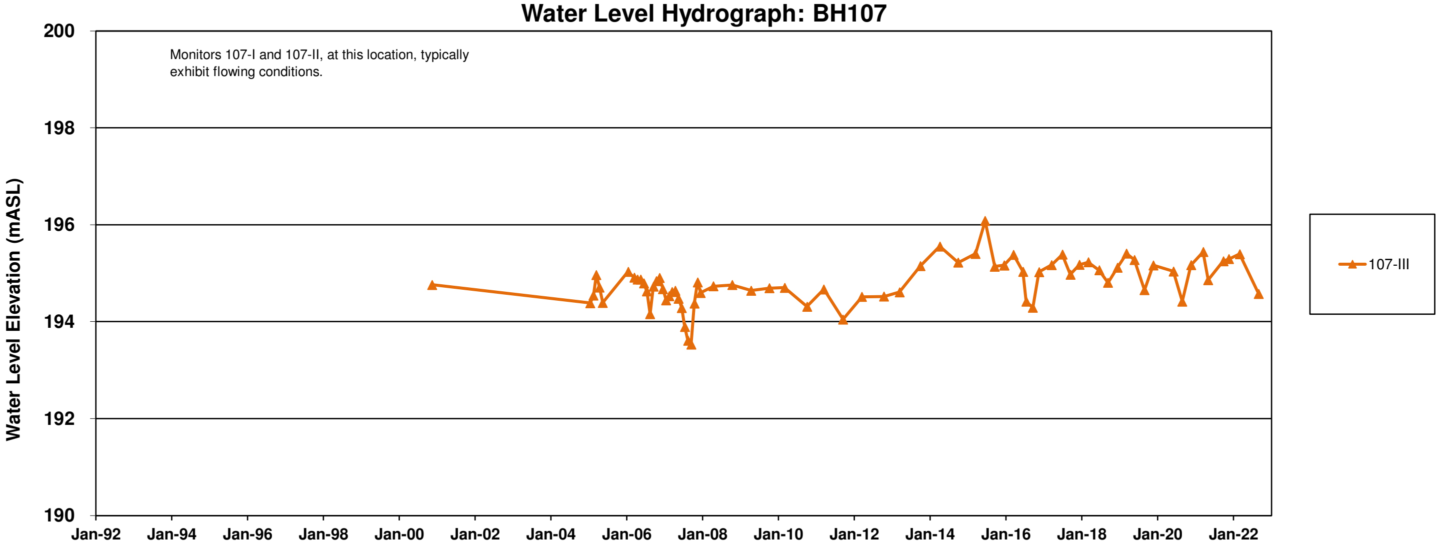

## Figure G.41
Water Level Hydrograph: BH104



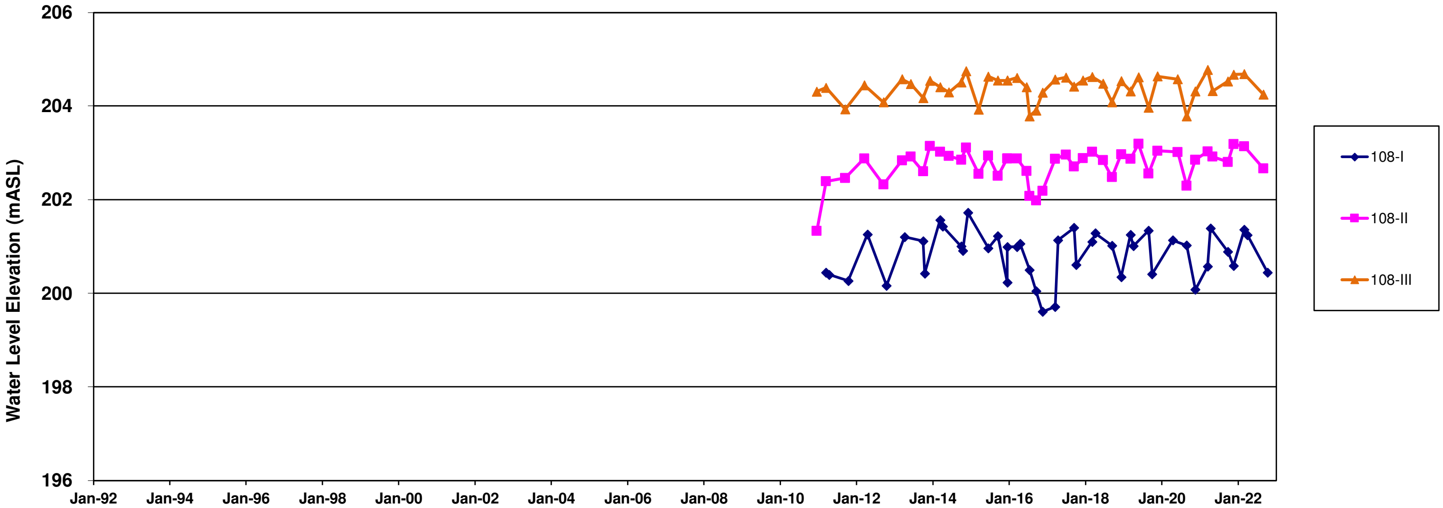

## Figure G.42
Water Level Hydrograph: BH106



## Figure G.43
### Water Level Hydrograph: BH107




## Figure G.44
### Water Level Hydrograph: BH108




## Figure G.45
### Water Level Hydrograph: BH109

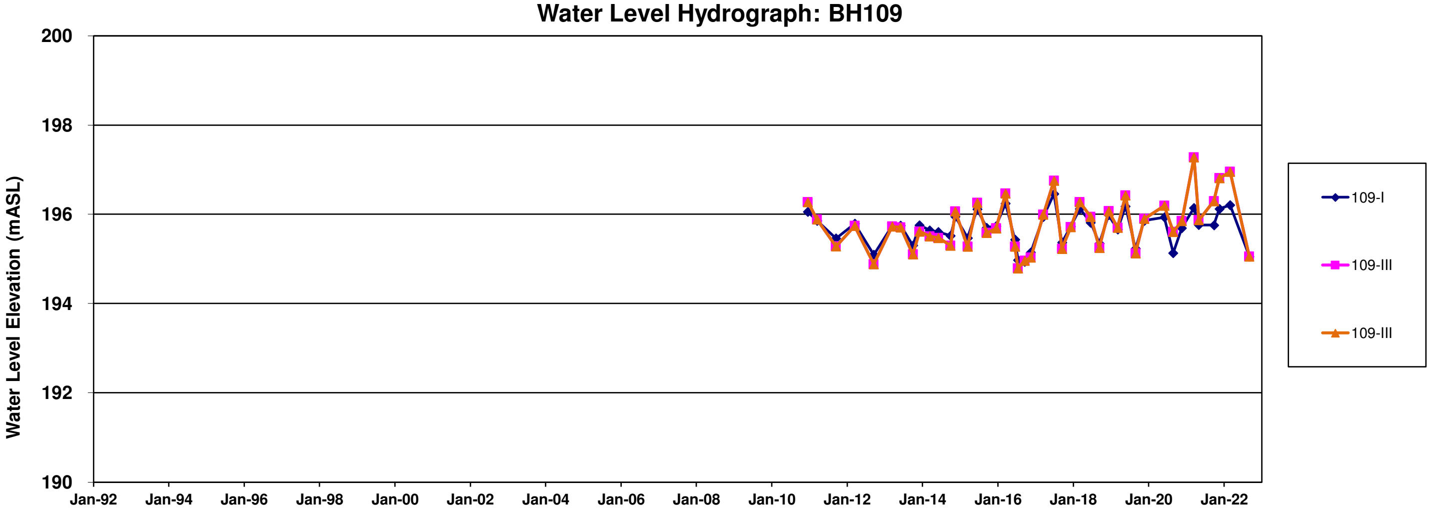


**Figure G.46**
**Water Level Hydrograph: BH110**

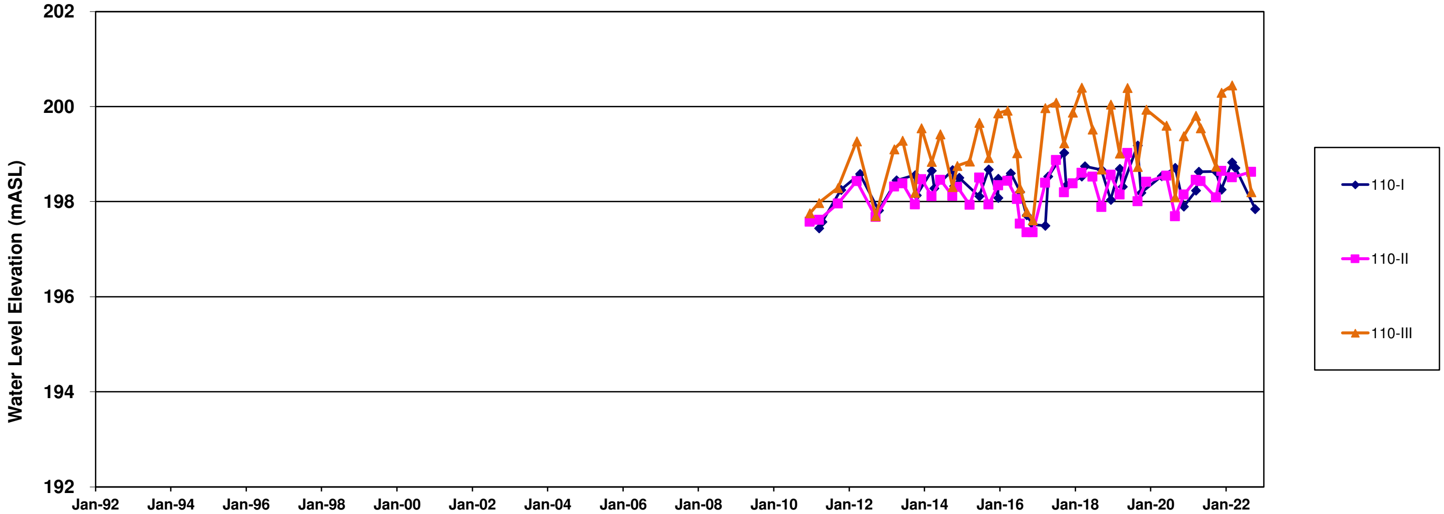



**Figure G.47**
**Water Level Hydrograph: BH111**

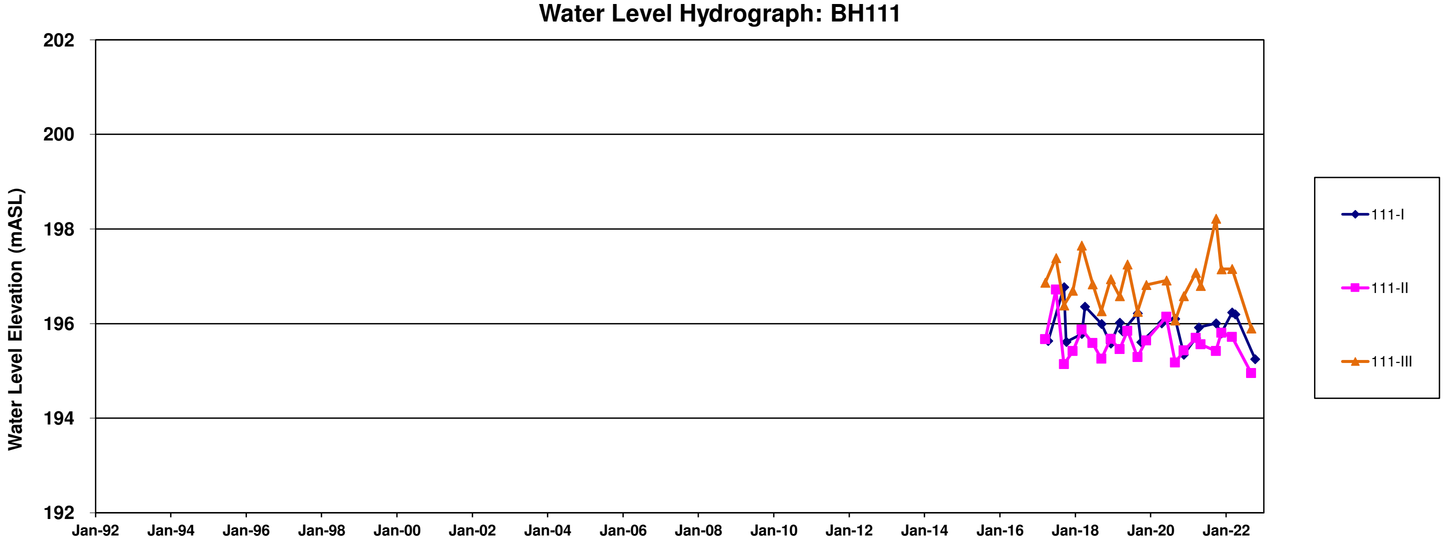



**Figure G.48**
**Water Level Hydrograph: BH112**

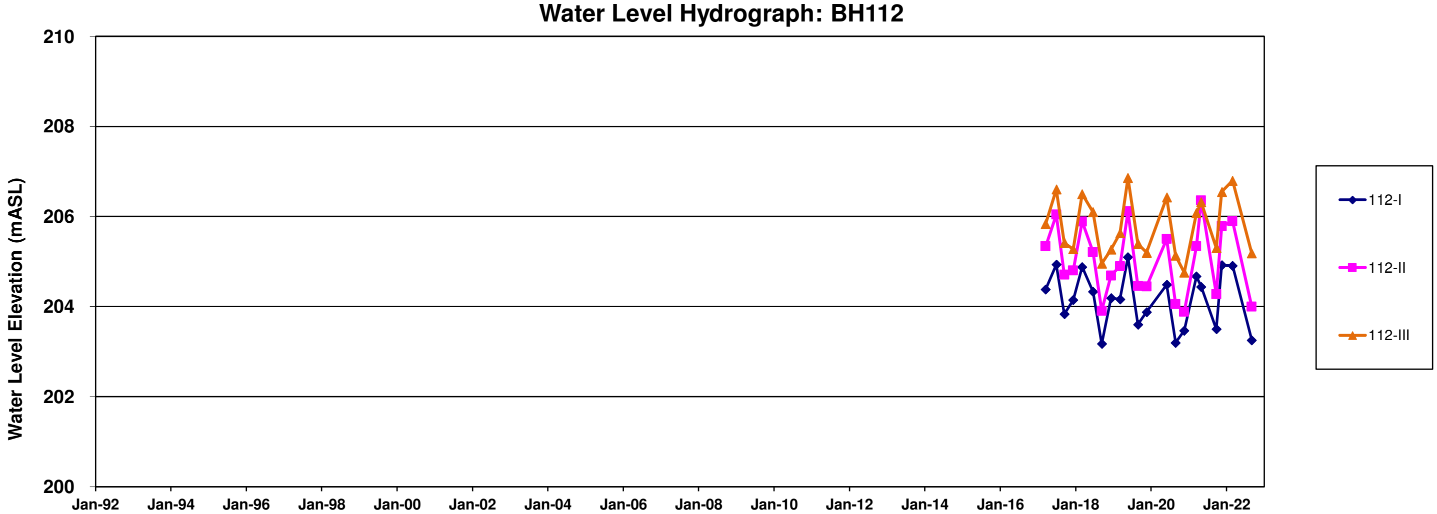


**Figure G.49**
**Liquid Level Hydrographs: BH23**

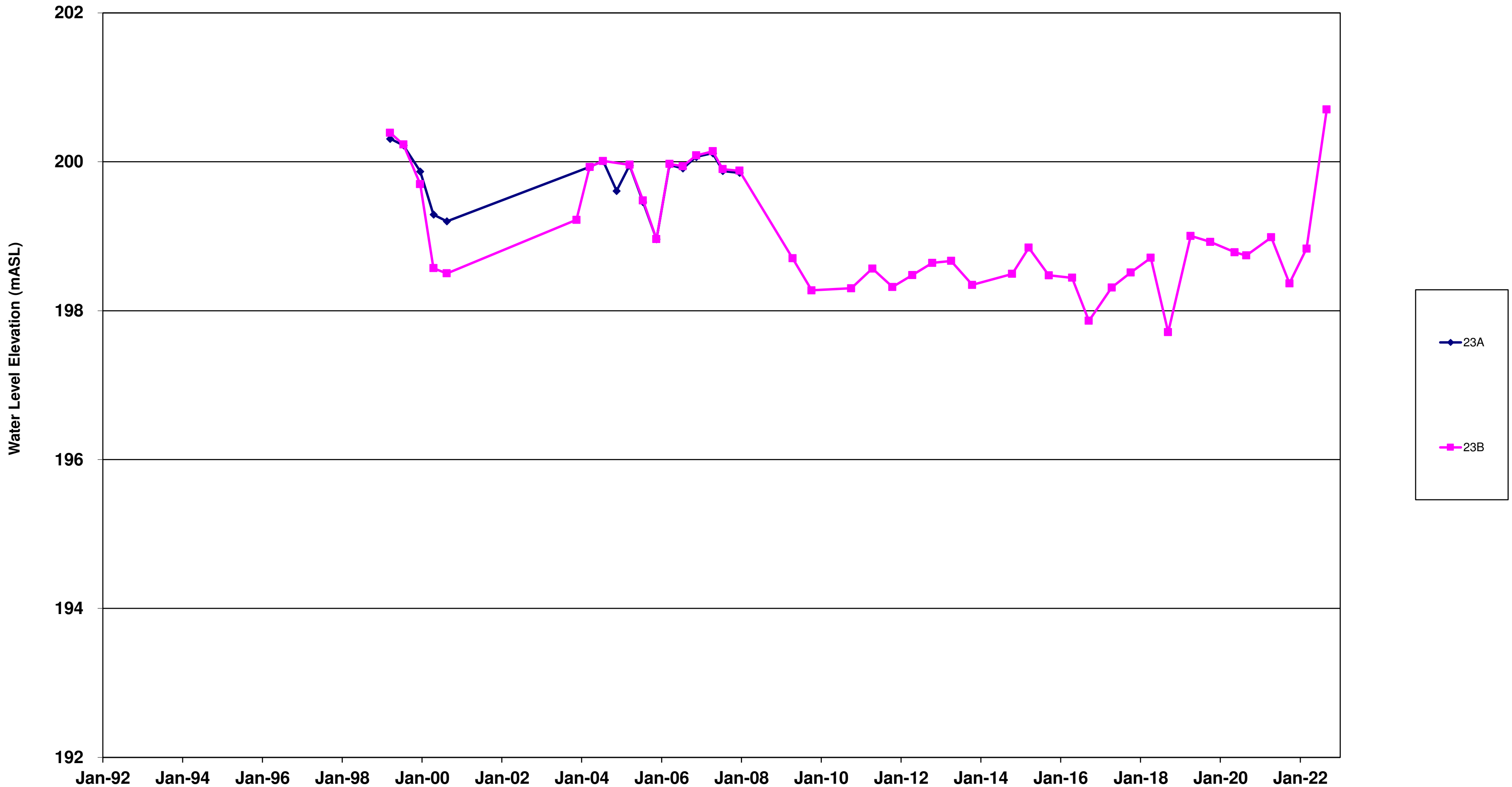


**Figure G.50**
**Water Level Hydrograph: SOUTHEAST - BH92 vs Cell 2 Liner**

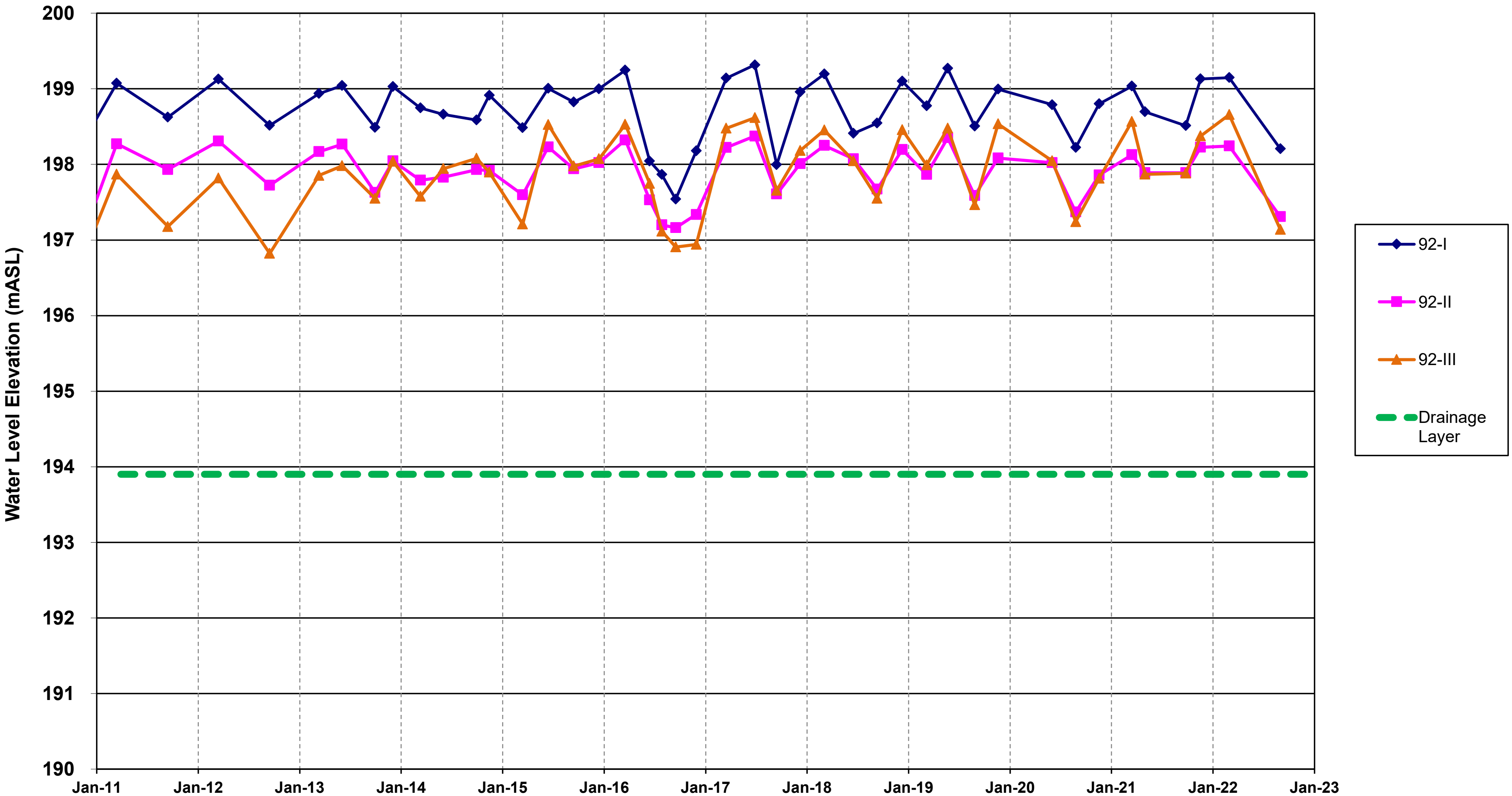


**Figure G.51**
**Water Level Hydrograph: NORTH - BH108 vs Cell 2 Liner**

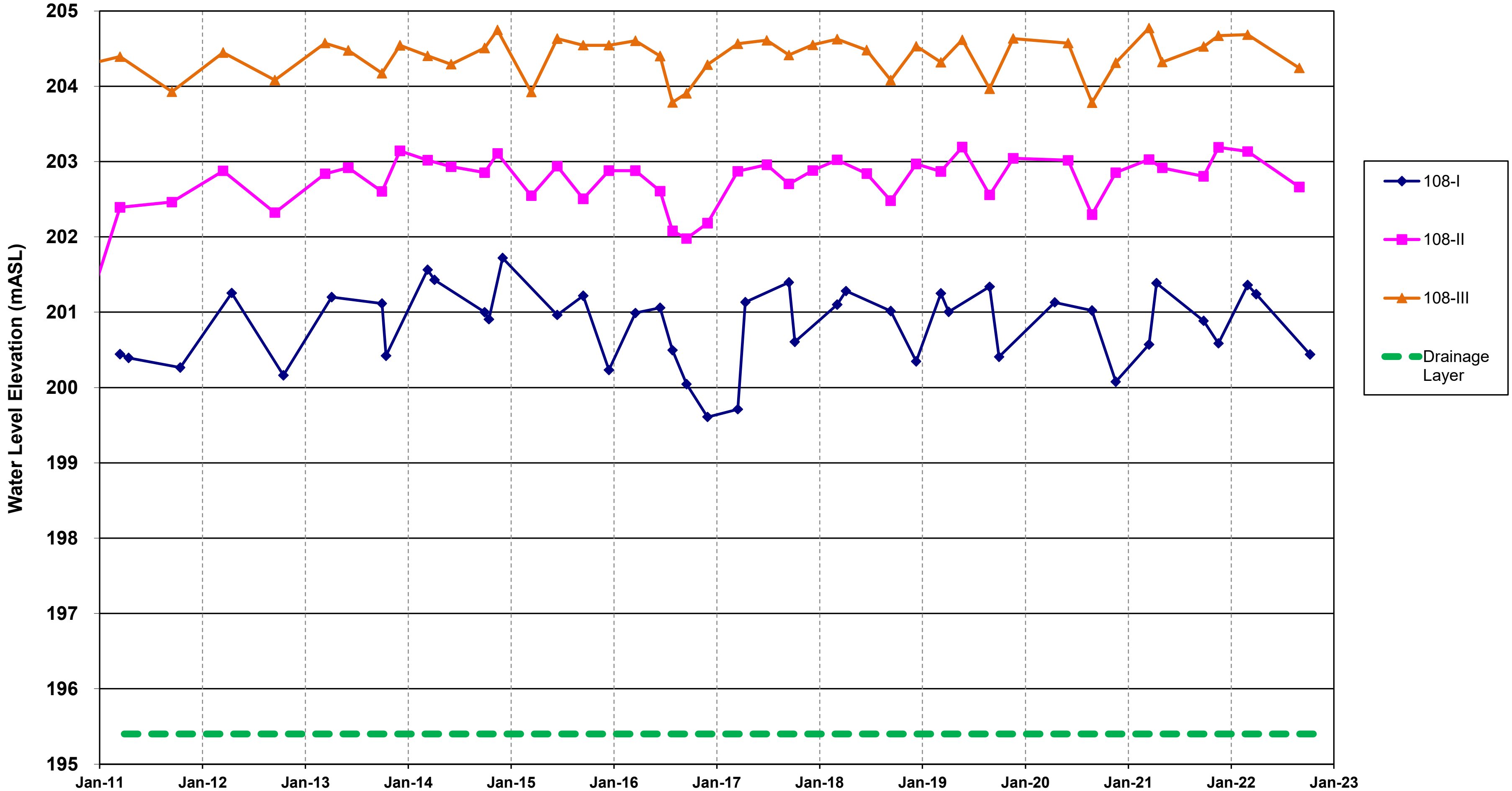


**Figure G.52**
**Water Level Hydrograph: SOUTH - BH109 vs Cell 2 Liner**

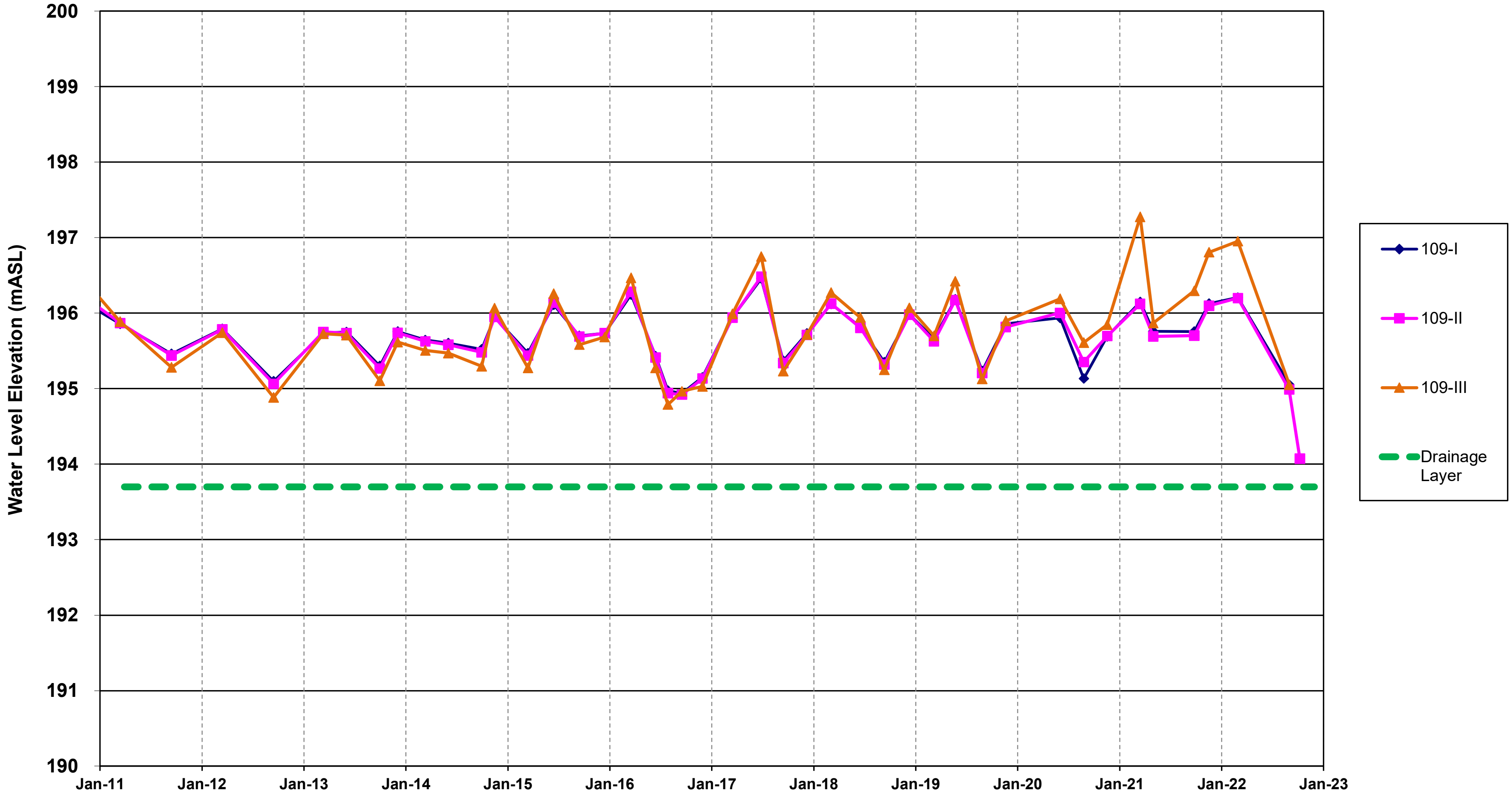


**Figure G.53**
**Water Level Hydrograph: EAST - BH110 vs Cell 2 Liner**

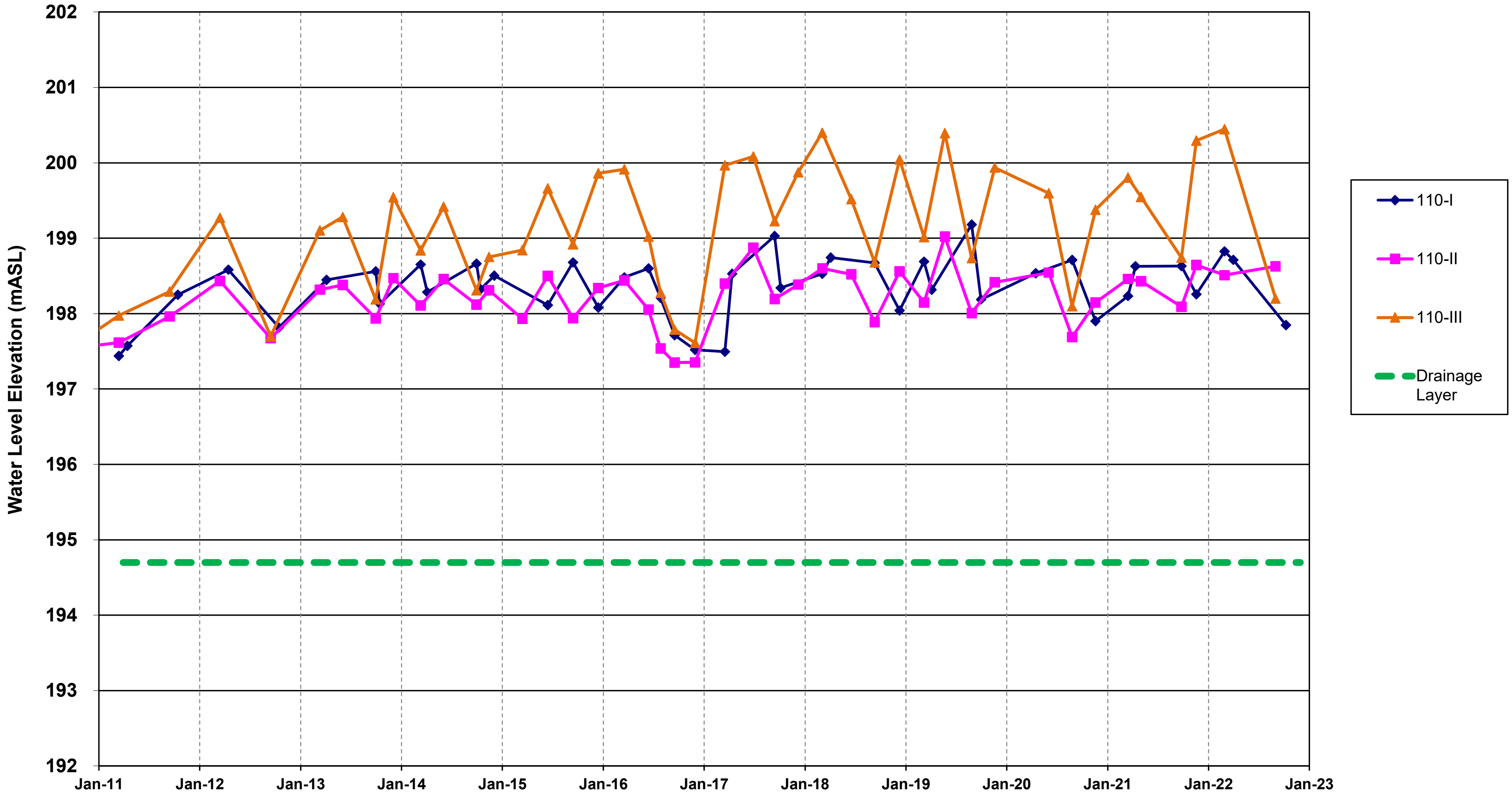
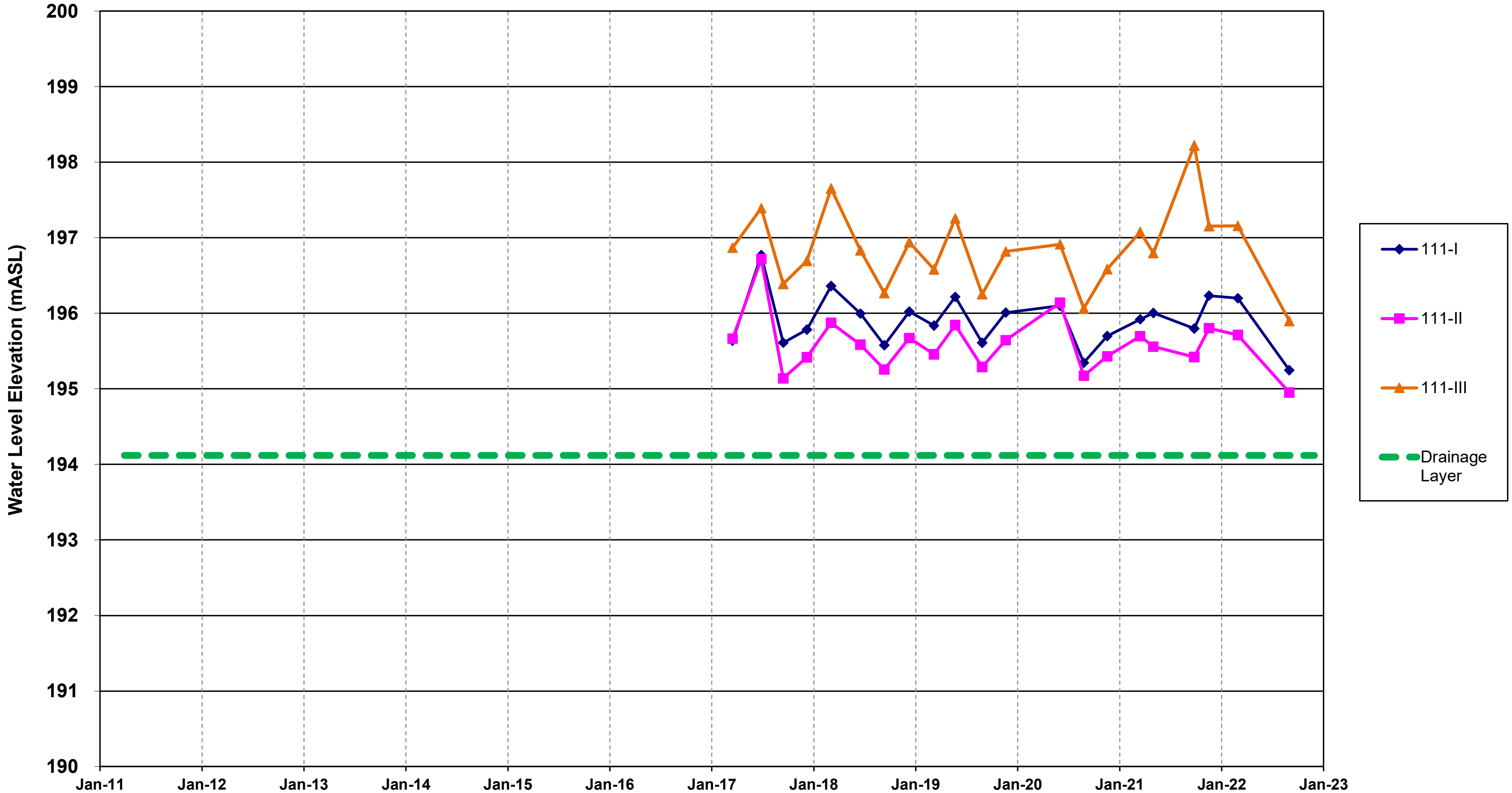


**Figure G.54**

**Water Level Hydrograph: SOUTH - BH111 vs Cell 3 Liner**



## Figure G.55

**Water Level Hydrograph: NORTH - BH112 vs Cell 3 Liner**

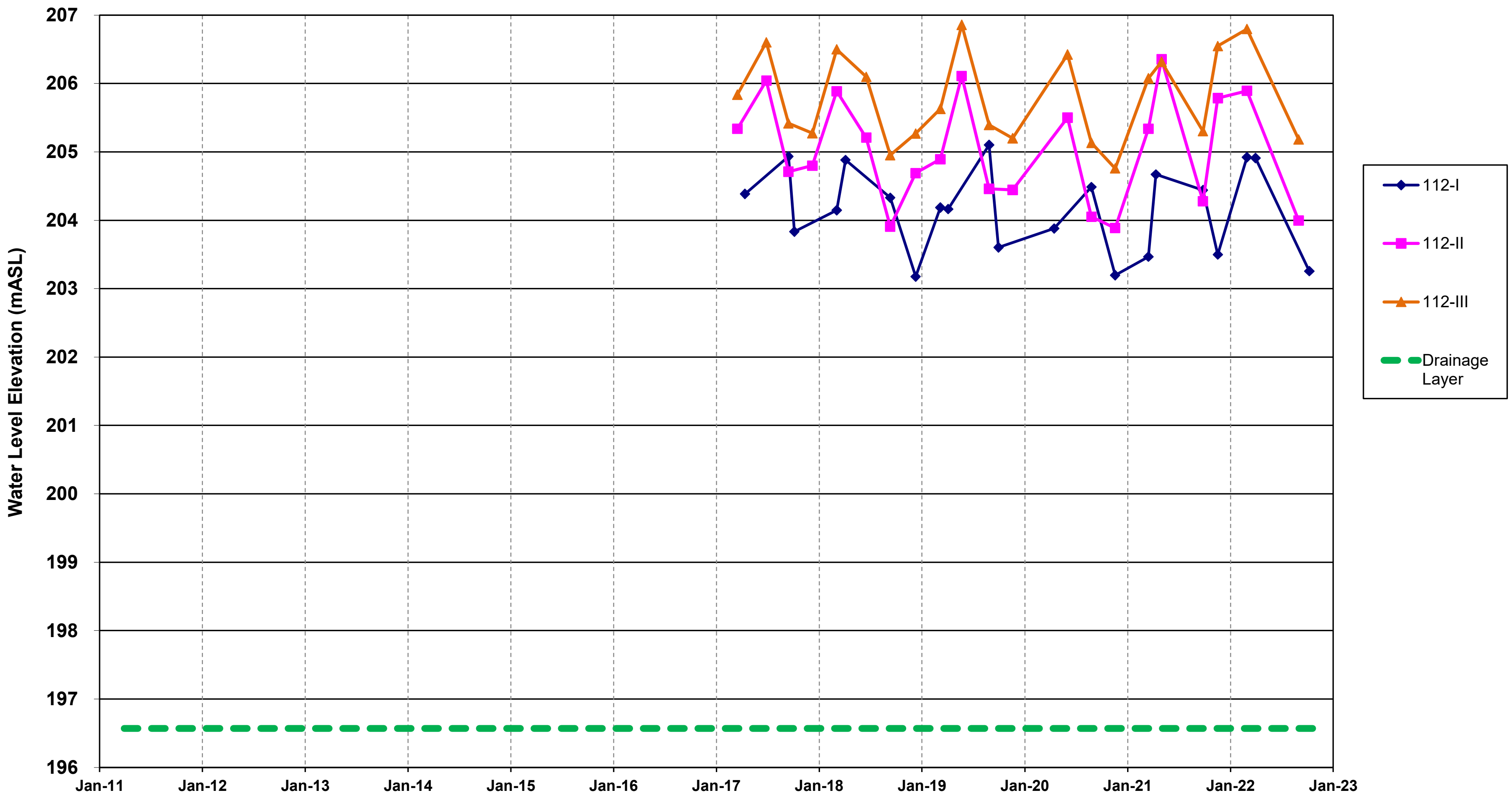


**Table G.3**
**Vertical Standpipe Measurements**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PHASE 1 | | Feb-22 | Apr-22 | May-22 | Aug-22 | Oct-22 | Nov-22 | |
|---|---|---|---|---|---|---|---|---|
| Location | Length of Pipe (m) | Level (m) | Level (m) | Level (m) | Level (m) | Level (m) | Level (m) | COMMENTS |
| SP1-90 | 2.94 | 2.90 / dry | 2.87 / dry | 2.87 / dry | 2.89 / dry | 2.90 / dry | 2.90 / dry | Dry - none to strong LCH odour, ok repair |
| SP2-90 | 3.67 | 3.57 / dry | 3.54 / dry | 3.55 / dry | 3.56 / dry | 3.58 / dry | 3.55 / dry | Dry - none to moderate LCH odour, slight south or downhill lean but ok repair |
| SP3-90 | 2.99 | 2.98 / dry | 2.97 / dry | 2.97 / dry | 2.98 / dry | 2.99 / dry | 2.97 / dry | Dry - none to low LCH odour, good repair |
| SP4-90 | 3.78 | 3.78 / dry | 3.76 / dry | 3.77 / dry | 3.76 / dry | 3.78 / dry | 3.77 / dry | Dry - none to low LCH odour, good repair |
| SP6-90 | 4.62 | 3.19 | 4.38 / dry | 4.14 | 4.43 / dry | 4.44 / dry | 4.46 / dry | Dry - none to moderate LCH odour, good repair. Slightly elevated level |
| SP7-90 | 4.20 | 2.62 | 4.04 / dry | 3.60 | 4.05 / dry | 3.80 | 4.11 / dry | Dry - none to moderate LCH odour, good repair. Slightly elevated level |
| SP8-90 | 5.25 | 3.36 | 4.97 / dry | 4.32 | 4.97 / dry | 5.00 / dry | 4.86 | Dry - none to strong LCH odour, SP loose at ground surface coupling but still usable. Slightly elevated level |
| SP10-94 | 5.70 | 4.17 | 5.63 / dry | 5.11 | 5.63 / dry | 5.66 / dry | 5.63 / dry | Dry - none to strong LCH odour, good repair. Slightly elevated level |
| SP11-94 | 7.15 | 5.87 | 7.05 / dry | 6.78 | 7.07 / dry | 7.15 / dry | 7.14 / dry | Dry - none to strong LCH odour, good repair. Slightly elevated level |
| SP14-94 | 4.83 | 2.17 | 3.60 | 3.12 | 3.87 | 3.95 | 3.67 | Dry - none to strong LCH odour, good repair. Slightly elevated level |
| SP15-91 | 3.95 | 3.23 | 3.94 / dry | 3.94 / dry | 3.94 / dry | 3.95 / dry | 3.94 / dry | Dry - none to low LCH odour, good repair |
| SP16-91 | 4.11 | 3.97 / dry | 3.93 / dry | 3.94 / dry | 3.97 / dry | 4.08 / dry | 4.09 / dry | Dry - none to strong LCH odour, good repair |
| SP18-96 | 3.71 | 3.63 / dry | 3.71 / dry | 3.71 / dry | 3.70 / dry | 3.71 / dry | 3.71 / dry | Dry - none to moderate LCH odour, good repair |
| SP19-96 | 4.54 | 4.52 / dry | 4.44 / dry | 4.46 / dry | 4.53 / dry | 4.54 / dry | 4.53 / dry | Dry - none to moderate LCH odour. Slight downhill (north) lean to SP but OK repair overall |
| SP20-96 | 5.98 | 5.92 / dry | 5.83 / dry | 5.87 / dry | 5.85 / dry | 5.88 / dry | 5.88 / dry | Dry - none to strong LCH odour, ok repair |

NOTE: If standpipe has less than 0.3 m of standing water in it, it is considered dry.

**Table G.4**
**Inclined Standpipe Measurements**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| Location | Measured Length of Pipe (m) | Feb-22 Level (m) | Apr-22 Level (m) | May-22 Level (m) | Aug-22 Level (m) | Oct-22 Level (m) | Dec-22 Level (m) | COMMENTS |
|---|---|---|---|---|---|---|---|---|
| ISP7-95 | 10.69 | 8.51 | 8.51 | 8.43 | 8.54 | 8.64 | 8.56 | Light to moderate LCH odour. Standpipe in ok repair (corroded casing) |
| ISP8 | 11.80 | N/A | N/A | N/A | N/A | N/A | N/A | ISP 8 decommissioned August 05, 2020. Stand Pipe to be replaced in the near future. |
| ISP9 | 13.53 | N/A | N/A | N/A | N/A | N/A | N/A | ISP 9 decommissioned August 05, 2020. Stand Pipe to be replaced in the near future. |
| ISP11 | 38.12 * | 36.91 | 37.94 / dry | 37.46 | 37.52 | 37.94 / dry | 37.48 | Dry - strong LCH odour and black sludge on level tape. Small pocket of water in incline from 2-4.5 m below ground - water clears and does not reappear until LCH level near bottom of standpipe - usually only seen in the spring. Partial blockage present at approx. 25 m making it difficult to feed line further than that point - no water or debris around casing |
| ISP12 | 34.45 | 34.45 / dry | 34.16 | 34.26 / dry | 34.34 / dry | 34.45 / dry | 34.05 | Dry - very strong LCH odour. Casing very corroded but secured with zip tie. Black sludge on tape - level recorded at first beep. No liquid until end of incline pipe. Ponded SW to direct west as is typical for spring events. No water present during summer and fall events |
| ISP13 | 35.88 | 34.39 | 35.48 | 35.26 | 35.88 / dry | 35.88 / dry | 35.88 / dry | Nearly dry to dry - very strong LCH odour. Casing very corroded but secure with zip ties. Black sludge on tape - level recorded at first beep. Ponded SW to direct west as is typical for spring events. No water present in adjacent ditch (west) during summer and fall events |
| ISP14 | 21.56 | 20.20 | 20.03 | 20.26 | 20.43 | 20.36 | 20.38 | None to moderate LCH odour. Small turbid water streams mixed with mud/sediment flowing overland (spring runoff) near incline and down access road. Drainage ditch west feeding towards SW 24 also flowing (spring) - incline not secure - lid broken. No water near incline SP during monitoring events |
| ISP15 (NFA) | 21.44 | 16.30 | 16.46 | 16.37 | 15.59 | 20.25 | 17.61 | Moderate to strong sour gas like LCH odour - soil and sludge on end of tape after incline measurement - orange and brown. Partial blockages along length of incline continue - incline should be replaced. Litter, mud and some standing water (3-7 cm of water) in storm ditch to direct south of incline during spring event. No pooled water present during summer and fall events. Able to get tape past 15 m blockage during fall monitoring event. Blockage observed at 17.61m during December monitoring event. Incline should be replaced to achieve more accurate results. |
| ISP16 (NFA) | 19.23 | 19.21 / dry | 19.23 / dry | 19.20 / dry | 17.22 | 19.21 / dry | 19.22 / dry | Dry - light to strong LCH odour. Shallow turbid runoff, silty light brown sediment and litter (plastic primarily) in storm ditch to direct south of incline which is typical for spring event. Large diameter incline pipe in good condition - no casing. Collapsed pipe or blockage possible. No pooled water, some litter in ditch south of incline during summer and fall events. Was able to pass the 17 m blockage during fall monitoring event. |
| ISPL-1-91 | 12.76 | 12.76 / dry | 12.74 / dry | 12.72 / dry | 12.75 / dry | 12.76 / dry | 12.75 / dry | Dry - none to strong LCH odour, none to small amount of standing water in ditch to direct east and casing very corroded but secure with zip tie |
| ISPL-2-91 | 12.62 | 12.34 / dry | 12.38 / dry | 12.33 / dry | 12.40 / dry | 12.43 / dry | 12.49 / dry | Dry - none to strong LCH odour, none to small amount of water in ditch to direct east and casing very corroded but secure with zip tie |
| ISPL2-1-91 | 12.79 | 12.79 / dry | 12.79 / dry | 12.78 / dry | 12.79 / dry | 12.79 / dry | 12.77 / dry | Dry - none to strong LCH odour, none to small amount of standing water in ditch to direct east, casing lid broken/rusted off but secure with zip tie . |
| ISPL2-2-91 | 12.65 | 12.65 / dry | 12.63 / dry | 12.62 / dry | 12.65 / dry | 12.65 / dry | 12.65 / dry | Dry - none to strong LCH odour, none to small amount of standing water in ditch to direct east and very corroded but casing secure with zip tie. |

NOTES: 1) If standpipe has less than 0.3 m of standing water in it, it is considered dry.
2) * - Indicates length is installation length, instead of measured length as current length cannot be measured.

# APPENDIX

# H

## GROUNDWATER QUALITY DATA

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 5-IV | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-17 | Oct-17 | Mar-18 | Oct-18 | Apr-19 | Oct-19 | May-20 | Sep-20 | Mar-21 | Oct-21 | Mar-22 | Sep-22 |
| Alkalinity | mg/L | 30-500 | 239 | | 244 | | 234 | | 216 | | 223 | | 214 | |
| Aluminum | mg/L | 0.1 | | | | | | | | | | | | |
| Ammonia (as N) | mg/L | | 4.7 | | 7.4 | | 6.1 | | 9.2 | | 6.6 | | 8.8 | |
| Anion sum | meq/L | | 343 | | 280 | | 245 | | 232 | | 255 | | 356 | |
| Arsenic | mg/L | 0.025 | 0.0018 | | <0.005 | | 0.001 | | 0.0005 | | 0.0008 | | 0.0006 | |
| Barium | mg/L | 1 * | | | | | | | | | | | | |
| Beryllium | mg/L | | | | | | | | | | | | | |
| Bicarbonate | mg/L | | 239 | | 244 | | 234 | | 216 | | 223 | | 214 | |
| Boron | mg/L | 5 * | | | | | | | | | | | | |
| Cadmium | mg/L | 0.005 * | | | | | | | | | | | | |
| Calcium | mg/L | | 1500 | | 1330 | | 1030 | | 922 | | 984 | | 1140 | |
| Carbonate | mg/L | | <1 | | <1 | | <1 | | <1 | | <1 | | <1 | |
| Cation sum | meq/L | | 352 | | 304 | | 240 | | 215 | | 242 | | 273 | |
| Chloride | mg/L | 250 | 12000 | | 9760 | | 8530 | | 8070 | | 8900 | | 12500 | |
| Chromium | mg/L | 0.05 * | | | | | | | | | | | | |
| Cobalt | mg/L | | | | | | | | | | | | | |
| Chemical Oxygen Demand | mg/L | | 160 | | 240 | | 300 | | 240 | | 190 | | 90 | |
| Conductivity | µS/cm | | 35300 | | 35400 | | 29000 | | 26200 | | 28100 | | 40000 | |
| Conductivity - field | µS/cm | | 28800 | 32400 | 34100 | 27100 | 35400 | 26400 | 32300 | 24000 | 31700 | 27900 | 34700 | 20400 |
| Copper | mg/L | 1 | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 5 | 5.4 | | 6.4 | | 6.6 | | 3.2 | | 5.7 | | 5.1 | |
| Dissolved Oxygen - field | mg/L | | 0.75 | 0.95 | 0.85 | 1.17 | 1.39 | 0.88 | 0.84 | 0.18 | 0.89 | 1.61 | 0.3 | 0.84 |
| Hardness | mg/L | 80-100 | 7820 | | 6970 | | 5440 | | 4910 | | 5310 | | 6140 | |
| Ion Percentage | % | | 1.38 | | 4.15 | | 1.18 | | 3.65 | | 2.66 | | 13.3 | |
| Iron | mg/L | 0.3 | 5.23 | | 4.46 | | 3.34 | | 2.59 | | 3.16 | | 4.19 | |
| Lead | mg/L | 0.01 * | | | | | | | | | | | | |
| Magnesium | mg/L | | 989 | | 885 | | 696 | | 634 | | 692 | | 799 | |
| Manganese | mg/L | 0.05 | 0.103 | | 0.078 | | 0.075 | | 0.0647 | | 0.0697 | | 0.081 | |
| Molybdenum | mg/L | | | | | | | | | | | | | |
| Nickel | mg/L | | | | | | | | | | | | | |
| Nitrate | mg/L | 10.0 * | <5.0 | | <10 | | <5.0 | | <5 | | 0.8 | | <5 | |
| Nitrite | mg/L | 1.0* | <5.0 | | <10 | | <5.0 | | <5 | | <0.5 | | <5 | |
| Oxydation Reduction Potential | mV | | -49.4 | -137 | -32.8 | -83.7 | -71.2 | -189.4 | -153.8 | -182.3 | -87.1 | -81.6 | -56.5 | -146.1 |
| pH | units | | 6.86 | | 6.85 | | 7.13 | | 7.14 | | 6.98 | | 6.85 | |
| pH - field | units | | 6.67 | 6.48 | 6.46 | 6.22 | 6.57 | 6.78 | 6.52 | 6.7 | 6.86 | 6.56 | 6.42 | 6.76 |
| Phosphate | mg/L | | <0.02 | | 0.11 | | 0.1 | | 0.07 | | 0.06 | | 0.05 | |
| Phosphorus | mg/L | | 0.24 | | 0.2 | | 0.13 | | 0.36 | | 0.06 | | 0.06 | |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 90.7 | | 69.7 | | 59 | | 49.7 | | 57 | | 75.3 | |
| Sodium | mg/L | 200 | 4420 | | 3710 | | 2950 | | 2630 | | 3060 | | 3370 | |
| Sulphate | mg/L | 500 | <20.0 | | <40 | | 30.8 | | <20 | | <20 | | <20 | |
| Total Dissolved Solids | mg/L | 500 | 20800 | | 18900 | | 15200 | | 16700 | | 14100 | | 20200 | |
| Temperature - field | °C | | 9.4 | 8.3 | 8 | 8.5 | 6.5 | 9.3 | 10.4 | 9 | 8 | 10.6 | 8.4 | 11.4 |
| Total Kjeldahl Nitrogen | mg/L | | 10.7 | | 8.3 | | 8 | | 13.3 | | 9.3 | | 8.8 | |
| Zinc | mg/L | 5 | | | | | | | | | | | | |
| Phenols | µg/L | | 2 | | 2 | | 3 | | 10 | | 5 | | 3 | |
| 1,1,2,2-Tetrachlorethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1,2-Trichlorethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1-Dichloroethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1-Dichloroethylene | µg/L | 14 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichlorpropane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichlorobenzene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichloropropene(E) | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Benzene | µg/L | 1 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromodichloromethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromoform | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromomethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Carbon Tetrachloride | µg/L | 5 * | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 |
| Chlorobenzene | µg/L | 30 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Chloroethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| Chloroform | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Chloromethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| cis-1,2-Dichloroethylene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Dibromochloromethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Dichloromethane | µg/L | 50 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Ethyl Benzene | µg/L | 1.6 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Ethylene dibromide | µg/L | | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 |
| m/p-Xylenes | µg/L | 20 ** | | 0.7 | | 0.6 | | <0.5 | | 0.7 | | 0.6 | | < 0.5 |
| o-Xylene | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Styrene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Tetrachloroethylene | µg/L | 30 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Toluene | µg/L | 24 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| trans-1,2-Dichloroethylene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Trichloroethylene | µg/L | 5 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Trichlorofluoromethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| Vinyl Chloride | µg/L | 1 * | | <0.2 | | <0.2 | | <0.2 | | 0.2 | | < 0.2 | | < 0.2 |
| Xylenes - total | µg/L | 20 ** | | 1 | | 0.8 | | 0.6 | | 0.9 | | 0.8 | | < 0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 5-V | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-17 | Oct-17 | Mar-18 | Oct-18 | Apr-19 | Oct-19 | May-20 | Sep-20 | Mar-21 | Oct-21 | Mar-22 | Sep-22 |
| Alkalinity | mg/L | 30-500 | 236 | 242 | 242 | 228 | 216 | 400 | 208 | 208 | 222 | 227 | 218 | 224 |
| Aluminum | mg/L | 0.1 | | | | | | | | | | | | |
| Ammonia (as N) | mg/L | | 0.2 | 0.2 | 0.1 | 0.2 | <0.1 | 0.4 | 0.2 | 0.1 | 0.1 | 0.3 | 0.2 | 0.5 |
| Anion sum | meq/L | | 5.05 | 5.1 | 5.13 | 4.82 | 4.6 | 8.17 | 4.48 | 4.47 | 4.73 | 4.84 | 4.65 | 4.8 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.005 | <0.005 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0007 |
| Barium | mg/L | 1 * | | | | | | | | | | | | |
| Beryllium | mg/L | | | | | | | | | | | | | |
| Bicarbonate | mg/L | | 235 | 241 | 241 | 227 | 214 | 398 | 206 | 207 | 221 | 226 | 216 | 222 |
| Boron | mg/L | 5 * | | | | | | | | | | | | |
| Cadmium | mg/L | 0.005 * | | | | | | | | | | | | |
| Calcium | mg/L | | 56.3 | 49.8 | 48.4 | 47.5 | 47.8 | 46 | 49.9 | 47.2 | 48.4 | 46.9 | 45.2 | 46.5 |
| Carbonate | mg/L | | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 1 |
| Cation sum | meq/L | | 5.6 | 5.22 | 5.04 | 5.01 | 4.99 | 4.92 | 5.24 | 4.99 | 5.02 | 4.86 | 4.71 | 4.88 |
| Chloride | mg/L | 250 | 11.2 | 8.6 | 8.9 | 8.4 | 6.8 | 7.9 | 8.8 | 8.4 | 7.4 | 7 | 8.2 | 8.4 |
| Chromium | mg/L | 0.05 * | | | | | | | | | | | | |
| Cobalt | mg/L | | | | | | | | | | | | | |
| Chemical Oxygen Demand | mg/L | | 20 | 20 | 20 | 20 | <10 | <10 | 30 | 20 | 20 | <10 | 10 | <10 |
| Conductivity | µS/cm | | 501 | 485 | 480 | 475 | 460 | 455 | 454 | 454 | 454 | 475 | 467 | 439 |
| Conductivity - field | µS/cm | | 509 | 494 | 618 | 500 | 443 | 465 | 506 | 452 | 513 | 491 | 743 | 477 |
| Copper | mg/L | 1 | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 5 | 2.1 | 2.9 | 2.8 | 2.9 | 3 | 1.6 | 2 | 1.6 | <1.0 | 11.1 | 1.2 | 1.6 |
| Dissolved Oxygen - field | mg/L | | 2.3 | 2.87 | 3.65 | 1.1 | 3.92 | 1.75 | 3.31 | 0.63 | 2.94 | 1.83 | 3.83 | 1.79 |
| Hardness | mg/L | 80-100 | 248 | 232 | 222 | 224 | 225 | 221 | 235 | 225 | 225 | 219 | 210 | 219 |
| Ion Percentage | % | | 5.13 | 1.15 | 0.9 | 1.97 | 4.1 | 24.8 | 7.78 | 5.45 | 2.94 | 0.17 | 0.58 | 0.8 |
| Iron | mg/L | 0.3 | 0.037 | 0.09 | <0.05 | 0.33 | 0.011 | 0.3 | 0.028 | 0.337 | 0.016 | 0.356 | 0.007 | 0.297 |
| Lead | mg/L | 0.01 * | | | | | | | | | | | | |
| Magnesium | mg/L | | 26 | 26.2 | 24.6 | 25.5 | 25.7 | 25.7 | 26.7 | 25.9 | 25.2 | 24.7 | 23.6 | 24.9 |
| Manganese | mg/L | 0.05 | 0.0108 | 0.012 | 0.002 | 0.016 | 0.0017 | 0.012 | 0.0021 | 0.0133 | 0.0019 | 0.0178 | 0.001 | 0.0248 |
| Molybdenum | mg/L | | | | | | | | | | | | | |
| Nickel | mg/L | | | | | | | | | | | | | |
| Nitrate | mg/L | 10.0 * | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 |
| Nitrite | mg/L | 1.0* | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 |
| Oxydation Reduction Potential | mV | | 15.7 | -64.2 | -11.8 | -124.8 | -63.2 | -157.8 | 36.4 | -126.9 | -19.4 | -67.8 | -94.1 | -90 |
| pH | units | | 7.74 | 7.67 | 7.75 | 7.76 | 8.03 | 7.81 | 8.03 | 7.87 | 7.69 | 7.83 | 7.87 | 7.85 |
| pH - field | units | | 7.62 | 7.51 | 7.63 | 7.92 | 7.84 | 7.74 | 7.83 | 7.76 | 8.26 | 7.27 | 7.85 | 7.5 |
| Phosphate | mg/L | | <0.02 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | 0.04 | 0.02 | 0.05 | <0.02 | <0.02 | <0.02 | <0.01 | 0.02 | 0.02 | 0.01 | <0.02 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 2.2 | 2.1 | 2.2 | 2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.1 | 2.2 | 2.1 |
| Sodium | mg/L | 200 | 12.5 | 11.1 | 11.6 | 10.3 | 9.3 | 9 | 10.3 | 9.4 | 9.9 | 8.7 | 9.4 | 8.9 |
| Sulphate | mg/L | 500 | 8.1 | 8.7 | 9.5 | 8.3 | 11 | 10 | 10.1 | 10.3 | 10.9 | 12.1 | 9.8 | 11 |
| Total Dissolved Solids | mg/L | 500 | 490 | 280 | 280 | 190 | 350 | 260 | 280 | 290 | 320 | 280 | 640 | 290 |
| Temperature - field | °C | | 8.7 | 10.6 | 7.3 | 8.6 | 6 | 11.4 | 9 | 8.8 | 7.1 | 11.4 | 7.7 | 9.6 |
| Total Kjeldahl Nitrogen | mg/L | | 0.1 | <0.1 | 2.1 | <0.1 | 3.5 | <1 | 2.6 | <2.0 | 2.7 | 0.1 | <2.0 | 2.4 |
| Zinc | mg/L | 5 | | | | | | | | | | | | |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | <1 | 2 | 1 | <1 | 1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | | | | | | | | | | | |
| 1,1,2-Trichlorethane | µg/L | | | | | | | | | | | | | |
| 1,1-Dichloroethane | µg/L | | | | | | | | | | | | | |
| 1,1-Dichloroethylene | µg/L | 14 * | | | | | | | | | | | | |
| 1,2-Dichlorobenzene | µg/L | 3 | | | | | | | | | | | | |
| 1,2-Dichloroethane | µg/L | 5 * | | | | | | | | | | | | |
| 1,2-Dichlorpropane | µg/L | | | | | | | | | | | | | |
| 1,3-Dichlorobenzene | µg/L | | | | | | | | | | | | | |
| 1,3-Dichloropropene(E) | µg/L | | | | | | | | | | | | | |
| 1,3-Dichloropropene(Z) | µg/L | | | | | | | | | | | | | |
| 1,4-Dichlorobenzene | µg/L | 1 | | | | | | | | | | | | |
| Benzene | µg/L | 1 * | | | | | | | | | | | | |
| Bromodichloromethane | µg/L | | | | | | | | | | | | | |
| Bromoform | µg/L | | | | | | | | | | | | | |
| Bromomethane | µg/L | | | | | | | | | | | | | |
| Carbon Tetrachloride | µg/L | 5 * | | | | | | | | | | | | |
| Chlorobenzene | µg/L | 30 | | | | | | | | | | | | |
| Chloroethane | µg/L | | | | | | | | | | | | | |
| Chloroform | µg/L | | | | | | | | | | | | | |
| Chloromethane | µg/L | | | | | | | | | | | | | |
| cis-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | |
| Dibromochloromethane | µg/L | | | | | | | | | | | | | |
| Dichloromethane | µg/L | 50 * | | | | | | | | | | | | |
| Ethyl Benzene | µg/L | 1.6 | | | | | | | | | | | | |
| Ethylene dibromide | µg/L | | | | | | | | | | | | | |
| m/p-Xylenes | µg/L | 20 ** | | | | | | | | | | | | |
| o-Xylene | µg/L | 20 ** | | | | | | | | | | | | |
| Styrene | µg/L | | | | | | | | | | | | | |
| Tetrachloroethylene | µg/L | 30 * | | | | | | | | | | | | |
| Toluene | µg/L | 24 | | | | | | | | | | | | |
| trans-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | |
| Trichloroethylene | µg/L | 5 * | | | | | | | | | | | | |
| Trichlorofluoromethane | µg/L | | | | | | | | | | | | | |
| Vinyl Chloride | µg/L | 1 * | | | | | | | | | | | | |
| Xylenes - total | µg/L | 20 ** | | | | | | | | | | | | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 5-VI | | | | | | | | 16A | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-17 | Oct-17 | Mar-18 | Apr-19 | May-20 | Mar-21 | Oct-21 | Mar-22 | Apr-17 | Mar-18 | Apr-19 | May-20 |
| Alkalinity | mg/L | 30-500 | 313 | 366 | 316 | 349 | 296 | 300 | 364 | 297 | 259 | 304 | 295 | 256 |
| Aluminum | mg/L | 0.1 | | | | | | | | | | | | |
| Ammonia (as N) | mg/L | | 0.2 | 0.1 | 0.1 | <0.1 | 0.2 | 0.1 | 0.2 | 0.2 | 0.2 | 0.1 | 0.2 | <0.1 |
| Anion sum | meq/L | | 6.44 | 7.53 | 6.37 | 6.99 | 6 | 6.03 | 7.3 | 6.04 | 8.32 | 8.81 | 10.7 | 6.91 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.005 | <0.005 | 0.0008 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.005 | <0.0005 | <0.0005 |
| Barium | mg/L | 1 * | | | | | | | | | | | | |
| Beryllium | mg/L | | | | | | | | | | | | | |
| Bicarbonate | mg/L | | 312 | 365 | 315 | 348 | 295 | 299 | 363 | 296 | 257 | 303 | 294 | 255 |
| Boron | mg/L | 5 * | | | | | | | | | | | | |
| Cadmium | mg/L | 0.005 * | | | | | | | | | | | | |
| Calcium | mg/L | | 118 | 130 | 102 | 124 | 121 | 107 | 126 | 106 | 103 | 105 | 124 | 100 |
| Carbonate | mg/L | | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | 2 | <1 | <1 | <1 |
| Cation sum | meq/L | | 6.86 | 7.57 | 5.91 | 7.21 | 7.03 | 6.17 | 7.25 | 6.1 | 7.85 | 8.31 | 10.1 | 6.99 |
| Chloride | mg/L | 250 | 3.4 | 2.8 | 2.6 | 1.3 | 2.6 | 1.8 | 1.3 | 6.1 | 105 | 89.3 | 157 | 54.3 |
| Chromium | mg/L | 0.05 * | | | | | | | | | | | | |
| Cobalt | mg/L | | | | | | | | | | | | | |
| Chemical Oxygen Demand | mg/L | | 10 | 20 | <10 | <10 | 10 | <10 | <10 | <10 | <10 | <10 | <10 | 10 |
| Conductivity | µS/cm | | 605 | 689 | 583 | 679 | 612 | 565 | 714 | 592 | 826 | 804 | 1050 | 684 |
| Conductivity - field | µS/cm | | 591 | 698 | 561 | 685 | 598 | 595 | 712 | 550 | 795 | 825 | 1100 | 752 |
| Copper | mg/L | 1 | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 5 | 1.2 | 2.5 | 1.4 | 3.3 | 1 | 2 | 1.6 | 1.2 | 1.6 | 1.7 | 2.7 | 1.1 |
| Dissolved Oxygen - field | mg/L | | 7.49 | 7.62 | 9.14 | 4.46 | 10.3 | 9.37 | 5.13 | 7.41 | 8.21 | 9.34 | 5.73 | 9.7 |
| Hardness | mg/L | 80-100 | 335 | 369 | 288 | 354 | 343 | 302 | 355 | 299 | 302 | 323 | 411 | 298 |
| Ion Percentage | % | | 3.2 | 0.27 | 3.75 | 1.51 | 7.95 | 1.15 | 0.38 | 0.5 | 2.91 | 2.96 | 2.77 | 0.59 |
| Iron | mg/L | 0.3 | 0.002 | 0.32 | <0.05 | 0.706 | 0.005 | 0.008 | 0.012 | 0.035 | 0.016 | <0.05 | <0.001 | <0.005 |
| Lead | mg/L | 0.01 * | | | | | | | | | | | | |
| Magnesium | mg/L | | 9.82 | 10.7 | 8.18 | 10.7 | 10 | 8.5 | 9.87 | 8.32 | 10.9 | 14.7 | 24.7 | 11.7 |
| Manganese | mg/L | 0.05 | <0.0005 | 0.627 | <0.001 | 0.361 | 0.0772 | 0.0013 | 0.0648 | 0.0713 | 0.0006 | 0.001 | 0.0064 | <0.0005 |
| Molybdenum | mg/L | | | | | | | | | | | | | |
| Nickel | mg/L | | | | | | | | | | | | | |
| Nitrate | mg/L | 10.0 * | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 0.84 | 1.05 | 1.5 | 2.9 |
| Nitrite | mg/L | 1.0* | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | 53.5 | 46.3 | 90.5 | -17.1 | 64.8 | 66.3 | 83 | -1.2 | 139 | 119.2 | 76.5 | 48.9 |
| pH | units | | 7.31 | 7.48 | 7.3 | 7.42 | 7.38 | 7.34 | 7.24 | 7.38 | 7.87 | 7.5 | 7.46 | 7.56 |
| pH - field | units | | 7.11 | 6.91 | 7.04 | 7.14 | 7.32 | 7.41 | 6.88 | 7.08 | 7.31 | 7.23 | 7.29 | 7.38 |
| Phosphate | mg/L | | <0.02 | <0.01 | <0.02 | <0.02 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | 0.04 | <0.02 | 0.01 | 0.02 | <0.01 | <0.02 | <0.02 | 0.05 | <0.02 | 0.01 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | <0.5 | 1.1 | <0.5 | 0.5 | 0.6 | <0.5 | 0.6 | <0.5 | 1.3 | 1.2 | 1.5 | 1.5 |
| Sodium | mg/L | 200 | 3 | 3.2 | 2.8 | 2.4 | 2.7 | 2.4 | 2.2 | 2.2 | 40.2 | 41.3 | 41.1 | 22.5 |
| Sulphate | mg/L | 500 | 13.8 | 17.6 | 8.9 | 9.9 | 9.4 | 8.4 | 10.8 | 6 | 14.2 | 16.5 | 21 | 10.6 |
| Total Dissolved Solids | mg/L | 500 | 370 | 410 | 340 | 310 | 470 | 310 | 400 | 310 | 450 | 480 | 610 | 380 |
| Temperature - field | °C | | 5.4 | 11.6 | 4.7 | 4.7 | 5.9 | 4.5 | 12.4 | 4.2 | 8.3 | 7.9 | 7.9 | 7.2 |
| Total Kjeldahl Nitrogen | mg/L | | 0.1 | <0.1 | <0.1 | <0.1 | 0.1 | <0.1 | 0.1 | <0.1 | 0.1 | <0.1 | 0.5 | <0.5 |
| Zinc | mg/L | 5 | | | | | | | | | | | | |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | 1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | | | | | | | | | | | |
| 1,1,2-Trichlorethane | µg/L | | | | | | | | | | | | | |
| 1,1-Dichloroethane | µg/L | | | | | | | | | | | | | |
| 1,1-Dichloroethylene | µg/L | 14 * | | | | | | | | | | | | |
| 1,2-Dichlorobenzene | µg/L | 3 | | | | | | | | | | | | |
| 1,2-Dichloroethane | µg/L | 5 * | | | | | | | | | | | | |
| 1,2-Dichlorpropane | µg/L | | | | | | | | | | | | | |
| 1,3-Dichlorobenzene | µg/L | | | | | | | | | | | | | |
| 1,3-Dichloropropene(E) | µg/L | | | | | | | | | | | | | |
| 1,3-Dichloropropene(Z) | µg/L | | | | | | | | | | | | | |
| 1,4-Dichlorobenzene | µg/L | 1 | | | | | | | | | | | | |
| Benzene | µg/L | 1 * | | | | | | | | | | | | |
| Bromodichloromethane | µg/L | | | | | | | | | | | | | |
| Bromoform | µg/L | | | | | | | | | | | | | |
| Bromomethane | µg/L | | | | | | | | | | | | | |
| Carbon Tetrachloride | µg/L | 5 * | | | | | | | | | | | | |
| Chlorobenzene | µg/L | 30 | | | | | | | | | | | | |
| Chloroethane | µg/L | | | | | | | | | | | | | |
| Chloroform | µg/L | | | | | | | | | | | | | |
| Chloromethane | µg/L | | | | | | | | | | | | | |
| cis-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | |
| Dibromochloromethane | µg/L | | | | | | | | | | | | | |
| Dichloromethane | µg/L | 50 * | | | | | | | | | | | | |
| Ethyl Benzene | µg/L | 1.6 | | | | | | | | | | | | |
| Ethylene dibromide | µg/L | | | | | | | | | | | | | |
| m/p-Xylenes | µg/L | 20 ** | | | | | | | | | | | | |
| o-Xylene | µg/L | 20 ** | | | | | | | | | | | | |
| Styrene | µg/L | | | | | | | | | | | | | |
| Tetrachloroethylene | µg/L | 30 * | | | | | | | | | | | | |
| Toluene | µg/L | 24 | | | | | | | | | | | | |
| trans-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | |
| Trichloroethylene | µg/L | 5 * | | | | | | | | | | | | |
| Trichlorofluoromethane | µg/L | | | | | | | | | | | | | |
| Vinyl Chloride | µg/L | 1 * | | | | | | | | | | | | |
| Xylenes - total | µg/L | 20 ** | | | | | | | | | | | | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 16A | | 18A | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-21 | Mar-22 | Apr-17 | Oct-17 | Apr-18 | Oct-18 | Apr-19 | Oct-19 | Apr-20 | Sep-20 | Apr-21 | Oct-21 |
| Alkalinity | mg/L | 30-500 | 254 | 239 | 244 | 264 | 566 | 271 | 554 | 255 | 567 | 249 | 260 | 246 |
| Aluminum | mg/L | 0.1 | | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | |
| Ammonia (as N) | mg/L | | 0.1 | 0.1 | 0.8 | 1 | 2.9 | 0.8 | 3.8 | 1 | 6.1 | 1 | 1.2 | 9.3 |
| Anion sum | meq/L | | 6.33 | 5.46 | 9.27 | 9.32 | 14.2 | 9.08 | 15.8 | 9.37 | 15.3 | 9.26 | 8.45 | 8.37 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.0005 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Barium | mg/L | 1 * | | | 0.252 | | 0.38 | | 0.492 | | 0.64 | | 0.286 | |
| Beryllium | mg/L | | | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Bicarbonate | mg/L | | 253 | 238 | 242 | 263 | 565 | 270 | 553 | 254 | 566 | 248 | 259 | 245 |
| Boron | mg/L | 5 * | | | 0.173 | | 0.22 | | 0.284 | | 0.296 | | 0.112 | |
| Cadmium | mg/L | 0.005 * | | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | |
| Calcium | mg/L | | 89.4 | 82.9 | 79.3 | 72.7 | 142 | 83.2 | 152 | 73.3 | 162 | 92.9 | 90.7 | 79.8 |
| Carbonate | mg/L | | <1 | 1 | 2 | 1 | <1 | 1 | <1 | 1 | <1 | <1 | <1 | 1 |
| Cation sum | meq/L | | 6.39 | 5.45 | 9.31 | 9.29 | 14.1 | 8.8 | 15.3 | 10.8 | 17.5 | 11.4 | 9.02 | 8.71 |
| Chloride | mg/L | 250 | 39 | 24.1 | 118 | 117 | 106 | 97.1 | 174 | 125 | 151 | 124 | 76.2 | 85.3 |
| Chromium | mg/L | 0.05 * | | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Cobalt | mg/L | | | | <0.0001 | | 0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Chemical Oxygen Demand | mg/L | | 30 | <10 | <10 | <10 | 40 | 20 | 30 | <10 | 50 | <10 | <10 | <10 |
| Conductivity | µS/cm | | 641 | 543 | 897 | 952 | 1320 | 900 | 1560 | 990 | 1560 | 989 | 842 | 854 |
| Conductivity - field | µS/cm | | 689 | 530 | 894 | 938 | 1290 | 914 | 1600 | 1030 | 1540 | 996 | 850 | 821 |
| Copper | mg/L | 1 | | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Dissolved Organic Carbon | mg/L | 5 | 1.6 | 1.4 | <1.0 | <1.0 | 7.6 | 1.8 | 11.1 | 1.4 | 8.8 | 1.4 | 1.9 | 1 |
| Dissolved Oxygen - field | mg/L | | 9.37 | 11.7 | 1.3 | 1.63 | 1.84 | 1.33 | 1.55 | 1.6 | 1.24 | 0.58 | 2.16 | 2.25 |
| Hardness | mg/L | 80-100 | 262 | 235 | 328 | 317 | 525 | 334 | 562 | 337 | 620 | 395 | 358 | 317 |
| Ion Percentage | % | | 0.43 | 0.13 | 0.19 | 0.18 | 0.35 | 1.54 | 1.59 | 7.11 | 6.83 | 10.3 | 3.25 | 2.01 |
| Iron | mg/L | 0.3 | 0.005 | 0.007 | 0.092 | 0.06 | 6.12 | 0.35 | 10.3 | 0.3 | 9.16 | 0.368 | 0.722 | 0.342 |
| Lead | mg/L | 0.01 * | | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Magnesium | mg/L | | 9.5 | 6.86 | 31.6 | 32.9 | 41.3 | 30.7 | 44.4 | 37.5 | 52.3 | 39.7 | 32 | 28.5 |
| Manganese | mg/L | 0.05 | <0.0005 | <0.0005 | 0.0053 | 0.006 | 0.213 | 0.02 | 0.265 | 0.013 | 0.215 | 0.0189 | 0.0347 | 0.0165 |
| Molybdenum | mg/L | | | | <0.0005 | | <0.0005 | | 0.0006 | | <0.0005 | | 0.0005 | |
| Nickel | mg/L | | | | <0.002 | | 0.002 | | 0.007 | | 0.006 | | <0.002 | |
| Nitrate | mg/L | 10.0 * | 2.2 | 1.16 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | 141.1 | 84.2 | -224.8 | -270.3 | -176.8 | -217.7 | -156 | -223 | -49.2 | -219.1 | -197.2 | -197 |
| pH | units | | 7.54 | 7.69 | 7.83 | 7.71 | 7.12 | 7.63 | 7.18 | 7.72 | 7.17 | 7.62 | 7.52 | 7.68 |
| pH - field | units | | 7.58 | 7.31 | 7.48 | 7.5 | 6.93 | 7.59 | 6.98 | 7.35 | 6.92 | 7.6 | 7.32 | 7.39 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | 0.01 | <0.02 | <0.02 | 0.02 | 0.01 | <0.02 | <0.02 | <0.02 | 0.02 | <0.01 | 0.02 | <0.01 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.2 | 1.2 | 5.7 | 6 | 7.2 | 4.7 | 8.6 | 7.9 | 11.1 | 6.6 | 4.8 | 4.4 |
| Sodium | mg/L | 200 | 25 | 16 | 57.6 | 61.8 | 71.8 | 43.9 | 80.9 | 86.1 | 100 | 73.7 | 37 | 36.1 |
| Sulphate | mg/L | 500 | 7.8 | 3.8 | 58.9 | 44.1 | 10.5 | 52.9 | 8.9 | 44.1 | 3.1 | 45.7 | 61.2 | 57.9 |
| Total Dissolved Solids | mg/L | 500 | 290 | 320 | 520 | 500 | 730 | 480 | 910 | 530 | 880 | 560 | 470 | 530 |
| Temperature - field | °C | | 7.6 | 7 | 6.5 | 10.1 | 6.7 | 9.9 | 6.6 | 10.3 | 6.6 | 9.7 | 7.2 | 11 |
| Total Kjeldahl Nitrogen | mg/L | | <0.1 | <0.1 | 0.5 | 0.8 | 2.5 | 0.2 | 4.3 | 0.9 | 7.4 | <2.0 | 2.9 | 15.1 |
| Zinc | mg/L | 5 | | | 0.0006 | | <0.0005 | | 0.0011 | | 0.0005 | | <0.0005 | |
| Phenols | µg/L | | 1 | <1 | <1 | <1 | <1 | <1 | 2 | <1 | <1 | 2 | 1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,1,2-Trichlorethane | µg/L | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,1-Dichloroethane | µg/L | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,2-Dichlorpropane | µg/L | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,3-Dichlorobenzene | µg/L | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Benzene | µg/L | 1 * | | | <0.5 | | <0.5 | | 0.5 | | 0.7 | | < 0.5 | |
| Bromodichloromethane | µg/L | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Bromoform | µg/L | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Bromomethane | µg/L | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | |
| Chlorobenzene | µg/L | 30 | | | <0.5 | | <0.5 | | <0.5 | | 1.1 | | < 0.5 | |
| Chloroethane | µg/L | | | | <5 | | <5 | | <5 | | <5 | | < 5 | |
| Chloroform | µg/L | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Chloromethane | µg/L | | | | <5 | | <5 | | <5 | | <5 | | < 5 | |
| cis-1,2-Dichloroethylene | µg/L | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Dibromochloromethane | µg/L | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Dichloromethane | µg/L | 50 * | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Ethyl Benzene | µg/L | 1.6 | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Ethylene dibromide | µg/L | | | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | |
| m/p-Xylenes | µg/L | 20 ** | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| o-Xylene | µg/L | 20 ** | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Styrene | µg/L | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Tetrachloroethylene | µg/L | 30 * | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Toluene | µg/L | 24 | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Trichloroethylene | µg/L | 5 * | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Trichlorofluoromethane | µg/L | | | | <5 | | <5 | | <5 | | <5 | | < 5 | |
| Vinyl Chloride | µg/L | 1 * | | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | |
| Xylenes - total | µg/L | 20 ** | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 18A | | 18B | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-22 | Sep-22 | Apr-17 | Oct-17 | Apr-18 | Oct-18 | Apr-19 | Oct-19 | Apr-20 | Sep-20 | Apr-21 | Oct-21 |
| Alkalinity | mg/L | 30-500 | 469 | 257 | 191 | 404 | 377 | 445 | 422 | 480 | 509 | 495 | 380 | 530 |
| Aluminum | mg/L | 0.1 | <0.025 | | 0.074 | | <0.025 | | <0.025 | | 1.69 | | <0.025 | |
| Ammonia (as N) | mg/L | | 4.5 | 1.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.2 | 0.9 | 0.6 | 0.3 | 0.4 | 0.5 |
| Anion sum | meq/L | | 14.3 | 9.93 | 5.01 | 11 | 8.88 | 11.2 | 10.7 | 11.9 | 12.7 | 12.9 | 9.43 | 12.7 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.0005 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Barium | mg/L | 1 * | 0.5 | | 0.029 | | 0.073 | | 0.102 | | 0.193 | | 0.096 | |
| Beryllium | mg/L | | <0.0005 | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Bicarbonate | mg/L | | 468 | 256 | 190 | 403 | 376 | 444 | 421 | 479 | 508 | 494 | 379 | 529 |
| Boron | mg/L | 5 * | 0.26 | | 0.0098 | | 0.02 | | 0.0519 | | 0.138 | | 0.0695 | |
| Cadmium | mg/L | 0.005 * | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | |
| Calcium | mg/L | | 135 | 82.9 | 78.8 | 170 | 145 | 174 | 146 | 177 | 218 | 197 | 150 | 186 |
| Carbonate | mg/L | | <1 | <1 | 1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Cation sum | meq/L | | 15.6 | 9.61 | 5.12 | 11 | 9.34 | 11.5 | 10 | 12.4 | 16.1 | 15.2 | 10.6 | 12.7 |
| Chloride | mg/L | 250 | 178 | 138 | 19.4 | 67.7 | 29.1 | 49.2 | 70.2 | 60.5 | 88.4 | 99.2 | 62.4 | 75.7 |
| Chromium | mg/L | 0.05 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | 0.0016 | | <0.0005 | |
| Cobalt | mg/L | | <0.0005 | | <0.0001 | | 0.0001 | | <0.0005 | | 0.0022 | | 0.001 | |
| Chemical Oxygen Demand | mg/L | | 20 | <10 | <10 | 20 | <10 | 30 | <10 | <10 | 10 | <10 | <10 | 20 |
| Conductivity | µS/cm | | 1480 | 876 | 497 | 1020 | 757 | 1070 | 1040 | 1130 | 1240 | 1250 | 920 | 1240 |
| Conductivity - field | µS/cm | | 1410 | 1010 | 486 | 1040 | 845 | 1100 | 1110 | 1150 | 1090 | 1290 | 939 | 1240 |
| Copper | mg/L | 1 | <0.0005 | | 0.0011 | | <0.0005 | | 0.0015 | | 0.003 | | 0.0014 | |
| Dissolved Organic Carbon | mg/L | 5 | 5.6 | 1.6 | 3.4 | 3.7 | 2.7 | 3.8 | 6.5 | 4.9 | 8.2 | 5.1 | 3.7 | 4.1 |
| Dissolved Oxygen - field | mg/L | | 1.26 | 1.93 | 2.2 | 4.05 | 1.97 | 1.78 | 3.23 | 5.56 | 3.21 | 3.09 | 2.61 | 2.11 |
| Hardness | mg/L | 80-100 | 536 | 344 | 226 | 490 | 421 | 516 | 440 | 538 | 671 | 615 | 457 | 555 |
| Ion Percentage | % | | 4.6 | 1.63 | 1.02 | 0.05 | 2.52 | 1.67 | 3.07 | 2.35 | 12.1 | 8.18 | 5.96 | 0.04 |
| Iron | mg/L | 0.3 | 5.36 | 0.261 | 0.08 | <0.05 | 0.013 | 0.18 | 0.068 | 0.39 | 1.99 | 0.392 | 1.14 | 1.65 |
| Lead | mg/L | 0.01 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | 0.0008 | | <0.0005 | |
| Magnesium | mg/L | | 48.4 | 33.3 | 7.12 | 15.9 | 14.4 | 19.7 | 18.2 | 23.3 | 30.8 | 30 | 20.1 | 22 |
| Manganese | mg/L | 0.05 | 0.142 | 0.0161 | 0.0112 | 0.05 | 0.0431 | 0.125 | 0.108 | 0.161 | 0.318 | 0.224 | 0.237 | 0.286 |
| Molybdenum | mg/L | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Nickel | mg/L | | 0.005 | | <0.002 | | <0.002 | | 0.003 | | 0.008 | | 0.004 | |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | -146.4 | -222.6 | -98.3 | -151.6 | -64.7 | -106.6 | -42.2 | -23.5 | 39.9 | -74.1 | -81.5 | -87.2 |
| pH | units | | 7.11 | 7.56 | 7.89 | 7.51 | 7.31 | 7.24 | 7.25 | 7.12 | 7.18 | 7.06 | 7.22 | 7.11 |
| pH - field | units | | 6.84 | 7.48 | 7.61 | 7.1 | 7.07 | 7.06 | 7.06 | 6.99 | 6.94 | 7.16 | 7.02 | 6.83 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | 0.05 | <0.02 | 0.02 | 0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | 0.03 | 0.02 | 0.01 | <0.02 | <0.02 | <0.02 | 0.01 | <0.01 | 0.07 | 0.01 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 10.4 | 5.6 | <0.5 | 0.6 | 0.6 | 1.1 | 0.8 | 1.4 | 2.9 | 2.5 | 1.5 | 1.6 |
| Sodium | mg/L | 200 | 98.4 | 56.6 | 13.1 | 25.2 | 19.8 | 26.6 | 27.4 | 35.5 | 58.9 | 63.4 | 31.9 | 33.5 |
| Sulphate | mg/L | 500 | 8.9 | 51.4 | 37.1 | 59.5 | 36.9 | 55.7 | 25.8 | 42 | 15.6 | 25.2 | 15.6 | 14 |
| Total Dissolved Solids | mg/L | 500 | 780 | 590 | 300 | 590 | 460 | 590 | 620 | 650 | 720 | 770 | 530 | 730 |
| Temperature - field | °C | | 7.4 | 10.4 | 3.1 | 12.5 | 3.9 | 12.1 | 2.1 | 13 | 4.5 | 14.6 | 4 | 13.3 |
| Total Kjeldahl Nitrogen | mg/L | | 4.2 | 2.6 | 0.2 | 0.2 | 0.2 | 0.1 | 0.4 | <1 | 0.8 | <1.0 | 0.3 | 2 |
| Zinc | mg/L | 5 | <0.0005 | | 0.0007 | | <0.0005 | | 0.0015 | | 0.0057 | | 0.0006 | |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 2 | 1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,1,2-Trichlorethane | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,1-Dichloroethane | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,2-Dichlorpropane | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,3-Dichlorobenzene | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Benzene | µg/L | 1 * | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Bromodichloromethane | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Bromoform | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Bromomethane | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | < 0.2 | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | |
| Chlorobenzene | µg/L | 30 | 0.8 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Chloroethane | µg/L | | < 5 | | <5 | | <5 | | <5 | | <5 | | < 5 | |
| Chloroform | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Chloromethane | µg/L | | < 5 | | <5 | | <5 | | <5 | | <5 | | < 5 | |
| cis-1,2-Dichloroethylene | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Dibromochloromethane | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Dichloromethane | µg/L | 50 * | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Ethyl Benzene | µg/L | 1.6 | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Ethylene dibromide | µg/L | | < 0.2 | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | |
| m/p-Xylenes | µg/L | 20 ** | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| o-Xylene | µg/L | 20 ** | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Styrene | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Tetrachloroethylene | µg/L | 30 * | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Toluene | µg/L | 24 | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Trichloroethylene | µg/L | 5 * | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Trichlorofluoromethane | µg/L | | < 5 | | <5 | | <5 | | <5 | | <5 | | < 5 | |
| Vinyl Chloride | µg/L | 1 * | < 0.2 | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | |
| Xylenes - total | µg/L | 20 ** | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 18B | | 19A | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-22 | Oct-22 | Mar-17 | Oct-17 | Apr-18 | Oct-18 | Apr-19 | Sep-19 | May-20 | Sep-20 | Mar-21 | Oct-21 |
| Alkalinity | mg/L | 30-500 | 455 | 482 | 627 | 599 | 593 | 550 | 596 | 572 | 532 | 522 | 562 | 551 |
| Aluminum | mg/L | 0.1 | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | |
| Ammonia (as N) | mg/L | | 0.3 | 0.3 | 2.5 | 3.6 | 3.3 | 3.7 | 3.4 | 3.2 | 3.1 | 3.4 | 2.6 | 3.4 |
| Anion sum | meq/L | | 11.3 | 12.8 | 37.3 | 51.6 | 46.2 | 65.4 | 50.4 | 75 | 36.6 | 56.9 | 44.8 | 42.6 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.0005 | 0.0027 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.010 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Barium | mg/L | 1 * | 0.104 | | 2.21 | | 3.5 | | 3.78 | | 3.4 | | 3.72 | |
| Beryllium | mg/L | | <0.0005 | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Bicarbonate | mg/L | | 454 | 481 | 627 | 598 | 593 | 550 | 596 | 572 | 532 | 522 | 561 | 551 |
| Boron | mg/L | 5 * | 0.0489 | | 0.163 | | 0.158 | | 0.225 | | 0.267 | | 0.279 | |
| Cadmium | mg/L | 0.005 * | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | |
| Calcium | mg/L | | 170 | 178 | 263 | 308 | 287 | 335 | 269 | 313 | 237 | 291 | 262 | 253 |
| Carbonate | mg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Cation sum | meq/L | | 11.9 | 12.9 | 30.9 | 50.2 | 40.5 | 62.1 | 42.9 | 59.3 | 41.8 | 53.4 | 51 | 40.9 |
| Chloride | mg/L | 250 | 72.1 | 94.2 | 871 | 1420 | 1230 | 1940 | 1373 | 2270 | 935 | 1660 | 1200 | 1130 |
| Chromium | mg/L | 0.05 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Cobalt | mg/L | | 0.0013 | | 0.0017 | | 0.0013 | | 0.0013 | | 0.001 | | 0.0009 | |
| Chemical Oxygen Demand | mg/L | | <10 | 10 | 40 | 90 | 60 | 120 | 100 | 90 | 80 | 130 | 80 | 70 |
| Conductivity | µS/cm | | 1120 | 1120 | 3120 | 5500 | 5040 | 7050 | 5120 | 7070 | 4990 | 6460 | 5160 | 4740 |
| Conductivity - field | µS/cm | | 1010 | 1250 | 3090 | 6060 | 4460 | 6890 | 5080 | 6240 | 4350 | 5840 | 4790 | 4710 |
| Copper | mg/L | 1 | 0.0007 | | <0.0005 | | <0.0005 | | <0.0005 | | 0.0007 | | <0.0005 | |
| Dissolved Organic Carbon | mg/L | 5 | 4.2 | 4.5 | 20.2 | 12.7 | 9.3 | 14.3 | 12.5 | 14.9 | 12.8 | 16.1 | 13.3 | 17 |
| Dissolved Oxygen - field | mg/L | | 4.14 | 4.87 | 2.47 | 2.47 | 1.62 | 1.33 | 5.39 | 1.96 | 1.38 | 2.39 | 0.91 | 1.68 |
| Hardness | mg/L | 80-100 | 516 | 533 | 1010 | 1360 | 1210 | 1550 | 1160 | 1450 | 1050 | 1330 | 1200 | 1080 |
| Ion Percentage | % | | 2.87 | 0.51 | 9.46 | 1.46 | 6.53 | 2.55 | 8.06 | 11.7 | 6.59 | 3.09 | 6.52 | 2.02 |
| Iron | mg/L | 0.3 | 1.8 | 0.336 | 14.8 | 17.5 | 16.7 | 19.3 | 18.8 | 13.7 | 12.7 | 18.4 | 12 | 17.9 |
| Lead | mg/L | 0.01 * | <0.0005 | | <0.0005 | | 0.0016 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Magnesium | mg/L | | 22.3 | 23.8 | 84.7 | 144 | 119 | 173 | 119 | 162 | 112 | 147 | 133 | 109 |
| Manganese | mg/L | 0.05 | 0.262 | 0.0325 | 0.456 | 0.193 | 0.3 | 0.203 | 0.315 | 0.215 | 0.182 | 0.166 | 0.166 | 0.224 |
| Molybdenum | mg/L | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Nickel | mg/L | | 0.003 | | 0.008 | | 0.013 | | 0.018 | | 0.018 | | 0.024 | |
| Nitrate | mg/L | 10.0 * | <0.5 | 0.14 | <0.5 | <0.5 | <0.5 | <0.5 | <5.0 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <5.0 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | -48.7 | 38.6 | -30.9 | -86.5 | -46.2 | -68.5 | -69.4 | -79.9 | -47.1 | -51.3 | -66.4 | -70.5 |
| pH | units | | 7.13 | 7.24 | 6.82 | 6.95 | 6.89 | 6.85 | 6.92 | 6.9 | 6.95 | 6.97 | 7.02 | 6.88 |
| pH - field | units | | 6.93 | 6.85 | 6.47 | 6.64 | 6.52 | 6.64 | 6.66 | 6.76 | 6.76 | 6.8 | 6.74 | 6.74 |
| Phosphate | mg/L | | <0.02 | <0.02 | 0.03 | 0.06 | 0.02 | 0.04 | <0.02 | 0.07 | 0.03 | 0.05 | 0.03 | 0.04 |
| Phosphorus | mg/L | | <0.02 | <0.02 | 0.02 | 0.05 | 0.05 | 0.04 | 0.02 | 0.03 | 0.04 | 0.04 | 0.02 | 0.05 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.3 | 1.9 | 9.2 | 12.3 | 13.1 | 13.6 | 12 | 13.8 | 11.9 | 14 | 11.4 | 11.1 |
| Sodium | mg/L | 200 | 34.8 | 44.3 | 236 | 510 | 361 | 698 | 437 | 681 | 462 | 599 | 606 | 429 |
| Sulphate | mg/L | 500 | 20.6 | 36.6 | 32.5 | 2.3 | 3.9 | 4.1 | 11.4 | 0.5 | <2 | <2 | 4.4 | 5.4 |
| Total Dissolved Solids | mg/L | 500 | 640 | 750 | 1940 | 3320 | 2800 | 3690 | 2770 | 3790 | 2600 | 3710 | 2800 | 3210 |
| Temperature - field | °C | | 4.5 | 15.1 | 9.6 | 11.5 | 9.1 | 10.8 | 9.4 | 11 | 9 | 12.2 | 10.2 | 12.2 |
| Total Kjeldahl Nitrogen | mg/L | | 0.4 | 6.5 | 6.1 | 4.8 | 5.2 | 7 | 6.8 | 9.1 | 4.6 | 4.9 | 6.4 | 3.8 |
| Zinc | mg/L | 5 | 0.0008 | | 0.0011 | | 0.0017 | | 0.0017 | | 0.0015 | | 0.0015 | |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | <1 | 2 | <1 | 1 | 2 | 3 | 2 |
| 1,1,2,2-Tetrachlorethane | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,1,2-Trichlorethane | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,1-Dichloroethane | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,2-Dichlorpropane | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,3-Dichlorobenzene | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Benzene | µg/L | 1 * | < 0.5 | | 0.9 | | <0.5 | | 0.8 | | 0.6 | | < 0.5 | |
| Bromodichloromethane | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Bromoform | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Bromomethane | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | < 0.2 | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | |
| Chlorobenzene | µg/L | 30 | < 0.5 | | 0.8 | | <0.5 | | 0.7 | | <0.5 | | < 0.5 | |
| Chloroethane | µg/L | | < 5 | | <5 | | <5 | | <5 | | <5 | | < 5 | |
| Chloroform | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Chloromethane | µg/L | | < 5 | | <5 | | <5 | | <5 | | <5 | | < 5 | |
| cis-1,2-Dichloroethylene | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Dibromochloromethane | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Dichloromethane | µg/L | 50 * | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Ethyl Benzene | µg/L | 1.6 | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Ethylene dibromide | µg/L | | < 0.2 | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | |
| m/p-Xylenes | µg/L | 20 ** | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| o-Xylene | µg/L | 20 ** | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Styrene | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Tetrachloroethylene | µg/L | 30 * | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Toluene | µg/L | 24 | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Trichloroethylene | µg/L | 5 * | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Trichlorofluoromethane | µg/L | | < 5 | | <5 | | <5 | | <5 | | <5 | | < 5 | |
| Vinyl Chloride | µg/L | 1 * | < 0.2 | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | |
| Xylenes - total | µg/L | 20 ** | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 19A | | 19B | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-22 | Sep-22 | Mar-17 | Oct-17 | Apr-18 | Oct-18 | Apr-19 | Sep-19 | May-20 | Sep-20 | Mar-21 | Oct-21 |
| Alkalinity | mg/L | 30-500 | 622 | 580 | 802 | 709 | 631 | 587 | 551 | 744 | 565 | 531 | 595 | 574 |
| Aluminum | mg/L | 0.1 | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | |
| Ammonia (as N) | mg/L | | 2.4 | 3.5 | 0.9 | 3 | 3.5 | 4.4 | 4.4 | 2.8 | 1.4 | 3.6 | 4 | 4.1 |
| Anion sum | meq/L | | 35.5 | 68.1 | 18.8 | 28.4 | 37.6 | 41.5 | 50.9 | 21.1 | 24.4 | 51.1 | 39.4 | 37 |
| Arsenic | mg/L | 0.025 | 0.0005 | <0.0005 | 0.0007 | <0.005 | 0.0008 | <0.005 | <0.0005 | <0.010 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Barium | mg/L | 1 * | 2.72 | | 0.127 | | 2.3 | | 3.75 | | 1.21 | | 2.6 | |
| Beryllium | mg/L | | <0.0005 | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Bicarbonate | mg/L | | 621 | 579 | 802 | 709 | 631 | 587 | 550 | 744 | 565 | 531 | 594 | 574 |
| Boron | mg/L | 5 * | 0.22 | | 0.112 | | 0.162 | | 0.259 | | 0.193 | | 0.238 | |
| Cadmium | mg/L | 0.005 * | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | |
| Calcium | mg/L | | 201 | 268 | 276 | 260 | 276 | 284 | 277 | 238 | 222 | 280 | 240 | 243 |
| Carbonate | mg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Cation sum | meq/L | | 35.2 | 51.9 | 16.8 | 25.9 | 36 | 43.9 | 46.7 | 20.7 | 24.2 | 47.9 | 40.2 | 38.7 |
| Chloride | mg/L | 250 | 829 | 2020 | 104 | 523 | 894 | 1070 | 1430 | 239 | 469 | 1450 | 989 | 912 |
| Chromium | mg/L | 0.05 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Cobalt | mg/L | | 0.0013 | | 0.0002 | | 0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Chemical Oxygen Demand | mg/L | | 60 | 100 | <10 | 30 | 50 | 110 | 100 | 10 | 40 | 90 | 50 | <10 |
| Conductivity | µS/cm | | 3940 | 6240 | 1470 | 2560 | 4300 | 5250 | 5580 | 2690 | 2740 | 5520 | 4620 | 4700 |
| Conductivity - field | µS/cm | | 3600 | 6230 | 1620 | 3000 | 4060 | 4890 | 5400 | 4160 | 3070 | 5040 | 4350 | 4670 |
| Copper | mg/L | 1 | 0.0006 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Dissolved Organic Carbon | mg/L | 5 | 11.4 | 13.7 | 6.4 | 11.1 | 9 | 13.7 | 11.6 | 9.2 | 7.4 | 15.3 | 11.5 | 9.1 |
| Dissolved Oxygen - field | mg/L | | 3.42 | 1.81 | 2.21 | 3.24 | 1.05 | 1.47 | 1.42 | 1.29 | 2.06 | 1.25 | 1.32 | 2.18 |
| Hardness | mg/L | 80-100 | 875 | 1240 | 769 | 902 | 1090 | 1270 | 1230 | 756 | 783 | 1220 | 1060 | 1040 |
| Ion Percentage | % | | 0.43 | 13.5 | 5.58 | 4.6 | 2.12 | 2.8 | 4.35 | 0.96 | 0.3 | 3.28 | 1.06 | 2.26 |
| Iron | mg/L | 0.3 | 9.19 | 17.2 | 46.6 | 26.9 | 17.3 | 20.2 | 13.8 | 32.6 | 22 | 18 | 13.8 | 14.8 |
| Lead | mg/L | 0.01 * | <0.0005 | | <0.0005 | | 0.0008 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Magnesium | mg/L | | 90.5 | 140 | 19.4 | 61.3 | 97.5 | 135 | 130 | 39.3 | 55.6 | 127 | 111 | 106 |
| Manganese | mg/L | 0.05 | 0.137 | 0.132 | 1.02 | 0.439 | 0.516 | 0.297 | 0.275 | 0.532 | 0.627 | 0.291 | 0.229 | 0.255 |
| Molybdenum | mg/L | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Nickel | mg/L | | 0.016 | | 0.002 | | 0.01 | | 0.021 | | 0.008 | | 0.018 | |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 2.8 |
| Oxydation Reduction Potential | mV | | -69 | -49.4 | -40.2 | -74 | -36.1 | -60.9 | -67.9 | -62.8 | -42.8 | -59.1 | -67.3 | -77.5 |
| pH | units | | 6.94 | 7.03 | 6.54 | 6.7 | 6.8 | 6.62 | 7.02 | 6.56 | 6.74 | 6.91 | 6.99 | 6.87 |
| pH - field | units | | 6.69 | 6.56 | 6.26 | 6.46 | 6.46 | 6.55 | 6.6 | 6.49 | 6.6 | 6.78 | 6.67 | 6.68 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | 0.02 | <0.02 | <0.02 | <0.02 | 0.03 | <0.02 | 0.04 | <0.02 | 0.04 |
| Phosphorus | mg/L | | <0.02 | <0.02 | <0.02 | 0.04 | 0.03 | 0.04 | 0.06 | 0.03 | 0.01 | 0.05 | 0.02 | 0.03 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 10.1 | 12.4 | 2 | 7.3 | 12 | 12.5 | 13.7 | 6.7 | 6.4 | 13.2 | 12.8 | 12 |
| Sodium | mg/L | 200 | 394 | 604 | 30.4 | 171 | 311 | 410 | 491 | 119 | 189 | 522 | 422 | 394 |
| Sulphate | mg/L | 500 | 3.5 | <2.0 | 19.4 | <2 | 8.5 | 0.9 | <2 | <0.2 | 10.6 | <2 | <0.2 | 0.3 |
| Total Dissolved Solids | mg/L | 500 | 2080 | 4460 | 920 | 1510 | 2280 | 2740 | 3090 | 1080 | 1380 | 3220 | 2400 | 2900 |
| Temperature - field | °C | | 9.6 | 11 | 9.5 | 13.2 | 7.8 | 11.9 | 6.5 | 12.2 | 8 | 13.9 | 10.7 | 13.6 |
| Total Kjeldahl Nitrogen | mg/L | | 5.1 | 6.3 | 4.6 | 3.2 | 5.2 | 7.4 | 7.5 | 8 | 2.7 | 5.2 | 7.4 | 4.4 |
| Zinc | mg/L | 5 | 0.0016 | | 0.0005 | | 0.002 | | 0.0016 | | 0.0014 | | 0.0014 | |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | <1 | 1 | <1 | <1 | 2 | <1 | 2 |
| 1,1,2,2-Tetrachlorethane | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,1,2-Trichlorethane | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,1-Dichloroethane | µg/L | | < 0.5 | | 0.9 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,2-Dichlorpropane | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,3-Dichlorobenzene | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | < 0.5 | | 0.8 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Benzene | µg/L | 1 * | < 0.5 | | 6.1 | | 0.5 | | <0.5 | | <0.5 | | 0.7 | |
| Bromodichloromethane | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Bromoform | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Bromomethane | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | < 0.2 | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | |
| Chlorobenzene | µg/L | 30 | < 0.5 | | 7.3 | | 1 | | 0.6 | | <0.5 | | 0.7 | |
| Chloroethane | µg/L | | < 5 | | 9.3 | | <5 | | <5 | | <5 | | < 5 | |
| Chloroform | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Chloromethane | µg/L | | < 5 | | <5 | | <5 | | <5 | | <5 | | < 5 | |
| cis-1,2-Dichloroethylene | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Dibromochloromethane | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Dichloromethane | µg/L | 50 * | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Ethyl Benzene | µg/L | 1.6 | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Ethylene dibromide | µg/L | | < 0.2 | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | |
| m/p-Xylenes | µg/L | 20 ** | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| o-Xylene | µg/L | 20 ** | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Styrene | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Tetrachloroethylene | µg/L | 30 * | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Toluene | µg/L | 24 | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Trichloroethylene | µg/L | 5 * | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |
| Trichlorofluoromethane | µg/L | | < 5 | | <5 | | <5 | | <5 | | <5 | | < 5 | |
| Vinyl Chloride | µg/L | 1 * | < 0.2 | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | |
| Xylenes - total | µg/L | 20 ** | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 19B | | 20A | | | | | | | 20B | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-22 | Sep-22 | 16-Apr | Apr-17 | Apr-18 | Apr-19 | Apr-20 | Mar-21 | Apr-22 | Apr-17 | Oct-17 | Apr-18 |
| Alkalinity | mg/L | 30-500 | 633 | 604 | 343 | 329 | 348 | 315 | 299 | 297 | 299 | 205 | 331 | 296 |
| Aluminum | mg/L | 0.1 | <0.025 | | | | | | | | | <0.025 | | <0.025 |
| Ammonia (as N) | mg/L | | 3.5 | 4.2 | 1 | 1.2 | 0.7 | 0.3 | 0.7 | 0.8 | 0.9 | 0.2 | 0.1 | 0.3 |
| Anion sum | meq/L | | 32 | 42.1 | 14.9 | 14 | 10.5 | 12.5 | 9.7 | 10.7 | 11 | 4.57 | 7.11 | 6.34 |
| Arsenic | mg/L | 0.025 | <0.0005 | 0.0005 | <0.0005 | <0.0005 | <0.005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.005 | <0.0005 |
| Barium | mg/L | 1 * | 1.97 | | | | | | | | | 0.024 | | 0.028 |
| Beryllium | mg/L | | <0.0005 | | | | | | | | | <0.0001 | | <0.0001 |
| Bicarbonate | mg/L | | 633 | 604 | 341 | 327 | 346 | 313 | 297 | 296 | 298 | 204 | 330 | 295 |
| Boron | mg/L | 5 * | 0.2 | | | | | | | | | 0.0207 | | 0.0108 |
| Cadmium | mg/L | 0.005 * | <0.0001 | | | | | | | | | <0.0001 | | <0.0001 |
| Calcium | mg/L | | 195 | 232 | 78.1 | 83.1 | 76.3 | 70.7 | 66.9 | 94.8 | 71 | 79.5 | 120 | 110 |
| Carbonate | mg/L | | <1 | <1 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | <1 |
| Cation sum | meq/L | | 31.6 | 38.4 | 10.9 | 14.6 | 11.2 | 8.62 | 8.49 | 16.2 | 9.98 | 4.75 | 7.24 | 6.55 |
| Chloride | mg/L | 250 | 701 | 1080 | 287 | 264 | 128 | 224 | 136 | 171 | 183 | 7.8 | 6.7 | 6.4 |
| Chromium | mg/L | 0.05 * | <0.0005 | | | | | | | | | <0.0005 | | <0.0005 |
| Cobalt | mg/L | | <0.0005 | | | | | | | | | 0.0001 | | <0.0001 |
| Chemical Oxygen Demand | mg/L | | 50 | 80 | <10 | <10 | 30 | <10 | 30 | <10 | 10 | <10 | 30 | <10 |
| Conductivity | µS/cm | | 3570 | 4350 | 1470 | 1430 | 1040 | 1320 | 1050 | 1120 | 1200 | 464 | 647 | 592 |
| Conductivity - field | µS/cm | | 3190 | 4320 | 1760 | 1430 | 1080 | 1040 | 1090 | 1440 | 1130 | 472 | 674 | 591 |
| Copper | mg/L | 1 | <0.0005 | | | | | | | | | 0.0013 | | 0.0006 |
| Dissolved Organic Carbon | mg/L | 5 | 10.6 | 12.2 | 1.9 | 1.8 | 2.6 | 4.4 | 2.2 | 1.7 | 2.4 | 8.4 | 5 | 3.9 |
| Dissolved Oxygen - field | mg/L | | 2.05 | 1.28 | 6.18 | 6.13 | 3.01 | 2.25 | 4.56 | 0.9 | 8.81 | 6.7 | 2.83 | 3.1 |
| Hardness | mg/L | 80-100 | 832 | 1000 | 365 | 403 | 363 | 330 | 313 | 454 | 338 | 222 | 333 | 303 |
| Ion Percentage | % | | 0.58 | 4.64 | 15.4 | 2.28 | 3.06 | 18.4 | 6.65 | 20.3 | 4.88 | 1.99 | 0.93 | 1.58 |
| Iron | mg/L | 0.3 | 4.48 | 17.6 | 1.74 | 1.95 | 1.98 | 0.473 | 1.84 | 3.04 | 1.73 | 0.036 | 0.13 | 0.01 |
| Lead | mg/L | 0.01 * | <0.0005 | | | | | | | | | <0.0005 | | <0.0005 |
| Magnesium | mg/L | | 83.8 | 103 | 41.2 | 47.4 | 42 | 37.2 | 35.4 | 52.7 | 39 | 5.63 | 8.01 | 6.76 |
| Manganese | mg/L | 0.05 | 0.174 | 0.233 | 0.0856 | 0.0861 | 0.08 | 0.0829 | 0.0688 | 0.115 | 0.081 | 0.004 | 0.144 | 0.0058 |
| Molybdenum | mg/L | | <0.0005 | | | | | | | | | <0.0005 | | <0.0005 |
| Nickel | mg/L | | 0.014 | | | | | | | | | <0.002 | | <0.002 |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.05 | 0.06 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 0.1 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | -19.1 | -37.6 | -123.8 | -87.9 | -59.6 | -95.6 | -10.2 | -109.6 | -79.8 | 21.6 | 66.9 | 14.7 |
| pH | units | | 6.92 | 6.9 | 7.86 | 7.77 | 7.74 | 7.78 | 7.88 | 7.65 | 7.71 | 7.88 | 7.54 | 7.52 |
| pH - field | units | | 6.49 | 6.46 | 7.32 | 7.34 | 7.38 | 7.56 | 7.52 | 7.47 | 7.32 | 7.53 | 7.21 | 7.43 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.01 | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | 0.06 | <0.02 | 0.05 | <0.02 | 0.01 | 0.02 | <0.02 | 0.04 | 0.02 | 0.01 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 11.4 | 11 | 5.9 | 7.7 | 6.9 | 4.5 | 4.9 | 7.9 | 6.1 | 2 | 0.5 | <0.5 |
| Sodium | mg/L | 200 | 330 | 405 | 76.6 | 144 | 83.6 | 42.5 | 46.5 | 156 | 68 | 5.6 | 12.8 | 10.6 |
| Sulphate | mg/L | 500 | <0.2 | <2.0 | 7.3 | 9.2 | 8.4 | 4.6 | 4.2 | 7.6 | 3 | 18 | 24.9 | 20.9 |
| Total Dissolved Solids | mg/L | 500 | 1900 | 2640 | 780 | 720 | 550 | 730 | 580 | 550 | 590 | 300 | 380 | 350 |
| Temperature - field | °C | | 9.1 | 12 | 7.8 | 6.3 | 6 | 5.1 | 6.2 | 7.5 | 8.5 | 4.5 | 14.6 | 5.5 |
| Total Kjeldahl Nitrogen | mg/L | | 5.4 | 7.3 | 1 | 1.6 | 0.6 | 0.3 | 0.7 | 3.8 | 0.8 | 0.5 | 0.2 | 0.4 |
| Zinc | mg/L | 5 | 0.0012 | | | | | | | | | 0.0012 | | 0.0007 |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 2 | <1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | < 0.5 | | | | | | | | | <0.5 | | <0.5 |
| 1,1,2-Trichlorethane | µg/L | | < 0.5 | | | | | | | | | <0.5 | | <0.5 |
| 1,1-Dichloroethane | µg/L | | < 0.5 | | | | | | | | | <0.5 | | <0.5 |
| 1,1-Dichloroethylene | µg/L | 14 * | < 0.5 | | | | | | | | | <0.5 | | <0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | < 0.5 | | | | | | | | | <0.5 | | <0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | < 0.5 | | | | | | | | | <0.5 | | <0.5 |
| 1,2-Dichlorpropane | µg/L | | < 0.5 | | | | | | | | | <0.5 | | <0.5 |
| 1,3-Dichlorobenzene | µg/L | | < 0.5 | | | | | | | | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(E) | µg/L | | < 0.5 | | | | | | | | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | < 0.5 | | | | | | | | | <0.5 | | <0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | < 0.5 | | | | | | | | | <0.5 | | <0.5 |
| Benzene | µg/L | 1 * | < 0.5 | | | | | | | | | <0.5 | | <0.5 |
| Bromodichloromethane | µg/L | | < 0.5 | | | | | | | | | <0.5 | | <0.5 |
| Bromoform | µg/L | | < 0.5 | | | | | | | | | <0.5 | | <0.5 |
| Bromomethane | µg/L | | < 0.5 | | | | | | | | | <0.5 | | <0.5 |
| Carbon Tetrachloride | µg/L | 5 * | < 0.2 | | | | | | | | | <0.2 | | <0.2 |
| Chlorobenzene | µg/L | 30 | < 0.5 | | | | | | | | | <0.5 | | <0.5 |
| Chloroethane | µg/L | | < 5 | | | | | | | | | <5 | | <5 |
| Chloroform | µg/L | | < 0.5 | | | | | | | | | <0.5 | | <0.5 |
| Chloromethane | µg/L | | < 5 | | | | | | | | | <5 | | <5 |
| cis-1,2-Dichloroethylene | µg/L | | < 0.5 | | | | | | | | | <0.5 | | <0.5 |
| Dibromochloromethane | µg/L | | < 0.5 | | | | | | | | | <0.5 | | <0.5 |
| Dichloromethane | µg/L | 50 * | < 0.5 | | | | | | | | | <0.5 | | <0.5 |
| Ethyl Benzene | µg/L | 1.6 | < 0.5 | | | | | | | | | <0.5 | | <0.5 |
| Ethylene dibromide | µg/L | | < 0.2 | | | | | | | | | <0.2 | | <0.2 |
| m/p-Xylenes | µg/L | 20 ** | < 0.5 | | | | | | | | | <0.5 | | <0.5 |
| o-Xylene | µg/L | 20 ** | < 0.5 | | | | | | | | | <0.5 | | <0.5 |
| Styrene | µg/L | | < 0.5 | | | | | | | | | <0.5 | | <0.5 |
| Tetrachloroethylene | µg/L | 30 * | < 0.5 | | | | | | | | | <0.5 | | <0.5 |
| Toluene | µg/L | 24 | < 0.5 | | | | | | | | | <0.5 | | <0.5 |
| trans-1,2-Dichloroethylene | µg/L | | < 0.5 | | | | | | | | | <0.5 | | <0.5 |
| Trichloroethylene | µg/L | 5 * | < 0.5 | | | | | | | | | <0.5 | | <0.5 |
| Trichlorofluoromethane | µg/L | | < 5 | | | | | | | | | <5 | | <5 |
| Vinyl Chloride | µg/L | 1 * | < 0.2 | | | | | | | | | <0.2 | | <0.2 |
| Xylenes - total | µg/L | 20 ** | < 0.5 | | | | | | | | | <0.5 | | <0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 20B | | | | | | | | | 23B | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Oct-18 | Apr-19 | Oct-19 | Apr-20 | Sep-20 | Mar-21 | Oct-21 | Apr-22 | Oct-22 | Apr-17 | Oct-17 | Apr-18 |
| Alkalinity | mg/L | 30-500 | 316 | 281 | 324 | 285 | 293 | 299 | 339 | 361 | 344 | 787 | | 446 |
| Aluminum | mg/L | 0.1 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | | 0.04 | |
| Ammonia (as N) | mg/L | | 0.1 | 0.2 | 0.7 | <0.1 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 79.5 | | 18.2 |
| Anion sum | meq/L | | 6.82 | 5.95 | 6.97 | 6.09 | 6.38 | 6.31 | 7.12 | 7.52 | 7.45 | 19.6 | | 11.4 |
| Arsenic | mg/L | 0.025 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.005 | 0.0006 | | 0.007 |
| Barium | mg/L | 1 * | | 0.027 | | 0.028 | | 0.029 | | 0.035 | | | 0.504 | |
| Beryllium | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | | <0.001 | |
| Bicarbonate | mg/L | | 315 | 280 | 323 | 283 | 292 | 298 | 338 | 360 | 343 | 786 | | 445 |
| Boron | mg/L | 5 * | | 0.009 | | 0.0111 | | 0.0064 | | 0.0072 | | | 1.57 | |
| Cadmium | mg/L | 0.005 * | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | | 0.005 | |
| Calcium | mg/L | | 118 | 94.1 | 119 | 116 | 121 | 111 | 114 | 135 | 124 | 120 | | 104 |
| Carbonate | mg/L | | 1 | 1 | <1 | 2 | 1 | <1 | <1 | <1 | <1 | <1 | | <1 |
| Cation sum | meq/L | | 7.13 | 5.59 | 7.27 | 6.91 | 7.33 | 6.56 | 6.82 | 8.01 | 7.51 | 20.7 | | 11.1 |
| Chloride | mg/L | 250 | 7.7 | 5.3 | 7.5 | 6.4 | 8.9 | 6.5 | 5.6 | 7 | 11.2 | 125 | | 58.9 |
| Chromium | mg/L | 0.05 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | | 0.003 | |
| Cobalt | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | | 0.009 | |
| Chemical Oxygen Demand | mg/L | | 20 | 20 | 20 | 30 | <10 | 20 | 30 | 20 | 20 | 60 | | 40 |
| Conductivity | µS/cm | | 673 | 551 | 673 | 611 | 572 | 597 | 684 | 656 | 650 | 2000 | | 1120 |
| Conductivity - field | µS/cm | | 653 | 551 | 679 | 600 | 667 | 637 | 685 | 688 | 730 | 2020 | 5140 | 1050 |
| Copper | mg/L | 1 | | 0.0022 | | 0.0007 | | 0.0012 | | 0.0007 | | | <0.005 | |
| Dissolved Organic Carbon | mg/L | 5 | 3.4 | 5.6 | 1.8 | 2.3 | 3.1 | 4.3 | 3.4 | 2.1 | 2 | 23.8 | | 12.8 |
| Dissolved Oxygen - field | mg/L | | 3.76 | 4.03 | 5.19 | 2.91 | 2.98 | 6.25 | 3.7 | 3.04 | 4.32 | 3.23 | 2.39 | 4.89 |
| Hardness | mg/L | 80-100 | 329 | 261 | 335 | 321 | 339 | 307 | 316 | 376 | 358 | 486 | | 352 |
| Ion Percentage | % | | 2.24 | 3.05 | 2.09 | 6.32 | 6.95 | 1.88 | 2.19 | 3.15 | 0.35 | 2.95 | | 1.35 |
| Iron | mg/L | 0.3 | 0.05 | 0.011 | 0.17 | <0.005 | 0.03 | 0.013 | 0.008 | <0.005 | 0.13 | 3.81 | | 3.02 |
| Lead | mg/L | 0.01 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | | 0.0037 | |
| Magnesium | mg/L | | 8.36 | 6.42 | 9.29 | 7.53 | 8.93 | 7.21 | 7.72 | 9.36 | 9.38 | 45.3 | | 22.4 |
| Manganese | mg/L | 0.05 | 0.21 | 0.0079 | 0.041 | 0.0046 | 0.0912 | 0.0019 | 0.0014 | 0.0025 | 0.069 | 0.125 | | 0.072 |
| Molybdenum | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | | <0.005 | |
| Nickel | mg/L | | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | | 0.033 | |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 0.36 | 0.26 | | 9 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | 0.05 | | 0.6 |
| Oxydation Reduction Potential | mV | | -66.8 | 73.3 | 16.1 | 43.2 | 15.8 | 39.1 | 0.2 | 224.5 | 263.5 | -28.3 | -124.8 | 42.6 |
| pH | units | | 7.61 | 7.74 | 7.49 | 7.76 | 7.65 | 7.55 | 7.44 | 7.39 | 7.35 | 7.04 | | 7.14 |
| pH - field | units | | 7.34 | 7.56 | 7.38 | 7.43 | 7.38 | 7.48 | 7.28 | 7.06 | 7.04 | 6.53 | 6.64 | 7.01 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.05 | | 0.02 |
| Phosphorus | mg/L | | <0.02 | 0.05 | <0.02 | <0.01 | 0.01 | 0.03 | <0.01 | <0.02 | <0.02 | 0.1 | | 0.04 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 0.5 | 54.1 | | 21.5 |
| Sodium | mg/L | 200 | 11.8 | 7.8 | 11.4 | 11 | 12.1 | 9 | 10.6 | 10.9 | 11.6 | 89.7 | | 50.5 |
| Sulphate | mg/L | 500 | 23.4 | 17.3 | 23.7 | 18.8 | 22.2 | 16.7 | 19.6 | 16.4 | 22 | 37.7 | | 21.4 |
| Total Dissolved Solids | mg/L | 500 | 390 | 350 | 380 | 370 | 380 | 330 | 410 | 430 | 400 | 810 | | 580 |
| Temperature - field | °C | | 13.5 | 3.2 | 12.2 | 5 | 15.1 | 4.1 | 13.9 | 4.6 | 11.9 | 11.7 | 12.4 | 9.5 |
| Total Kjeldahl Nitrogen | mg/L | | 0.3 | 0.2 | <1 | 4.7 | <2.0 | 3 | 0.3 | <2.0 | 0.2 | 85.1 | | 31.6 |
| Zinc | mg/L | 5 | | 0.0017 | | 0.0006 | | <0.0005 | | <0.0005 | | | <0.02 | |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | 1 | 1 | <1 | 2 | 2 | | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| 1,1,2-Trichlorethane | µg/L | | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| 1,1-Dichloroethane | µg/L | | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| 1,1-Dichloroethylene | µg/L | 14 * | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| 1,2-Dichlorobenzene | µg/L | 3 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| 1,2-Dichloroethane | µg/L | 5 * | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| 1,2-Dichlorpropane | µg/L | | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| 1,3-Dichlorobenzene | µg/L | | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| 1,3-Dichloropropene(E) | µg/L | | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| 1,3-Dichloropropene(Z) | µg/L | | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| 1,4-Dichlorobenzene | µg/L | 1 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| Benzene | µg/L | 1 * | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| Bromodichloromethane | µg/L | | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| Bromoform | µg/L | | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| Bromomethane | µg/L | | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| Carbon Tetrachloride | µg/L | 5 * | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | | | | |
| Chlorobenzene | µg/L | 30 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| Chloroethane | µg/L | | | <5 | | <5 | | < 5 | | < 5 | | | | |
| Chloroform | µg/L | | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| Chloromethane | µg/L | | | <5 | | <5 | | < 5 | | < 5 | | | | |
| cis-1,2-Dichloroethylene | µg/L | | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| Dibromochloromethane | µg/L | | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| Dichloromethane | µg/L | 50 * | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| Ethyl Benzene | µg/L | 1.6 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| Ethylene dibromide | µg/L | | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | | | | |
| m/p-Xylenes | µg/L | 20 ** | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| o-Xylene | µg/L | 20 ** | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| Styrene | µg/L | | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| Tetrachloroethylene | µg/L | 30 * | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| Toluene | µg/L | 24 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| trans-1,2-Dichloroethylene | µg/L | | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| Trichloroethylene | µg/L | 5 * | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| Trichlorofluoromethane | µg/L | | | <5 | | <5 | | < 5 | | < 5 | | | | |
| Vinyl Chloride | µg/L | 1 * | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | | | | |
| Xylenes - total | µg/L | 20 ** | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 23B | | | | | | | | | 33-II | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Oct-18 | Apr-19 | Oct-19 | May-20 | Sep-20 | Mar-21 | Oct-21 | Mar-22 | Sep-22 | Mar-17 | Mar-18 | Apr-19 |
| Alkalinity | mg/L | 30-500 | | 809 | | 1490 | | 1060 | | 1010 | | 352 | 384 | 356 |
| Aluminum | mg/L | 0.1 | 0.03 | | 0.04 | | 0.032 | | <0.025 | | <0.025 | | | |
| Ammonia (as N) | mg/L | | | 74.3 | | 60.3 | | 78.1 | | 84.3 | | 0.1 | 0.1 | 0.1 |
| Anion sum | meq/L | | | 18.8 | | 35.8 | | 24.7 | | 23.4 | | 13 | 12.4 | 11.5 |
| Arsenic | mg/L | 0.025 | <0.005 | 0.0009 | | 0.0011 | | 0.0008 | | 0.0006 | | <0.0005 | <0.005 | <0.0005 |
| Barium | mg/L | 1 * | 0.437 | | 0.545 | | 0.655 | | 0.414 | | 0.587 | | | |
| Beryllium | mg/L | | <0.001 | | <0.001 | | <0.0005 | | <0.0005 | | <0.0005 | | | |
| Bicarbonate | mg/L | | | 808 | | 1490 | | 1060 | | 1010 | | 351 | 383 | 355 |
| Boron | mg/L | 5 * | 1.48 | | 1.52 | | 1.58 | | 1.05 | | 1.39 | | | |
| Cadmium | mg/L | 0.005 * | 0.001 | | <0.001 | | <0.0001 | | <0.0001 | | <0.0001 | | | |
| Calcium | mg/L | | 170 | 161 | | 180 | | 182 | | 133 | | 154 | 151 | 149 |
| Carbonate | mg/L | | | <1 | | 1 | | <1 | | <1 | | <1 | 1 | <1 |
| Cation sum | meq/L | | | 21.6 | | 32.4 | | 25.6 | | 22.7 | | 12.4 | 12.2 | 12.1 |
| Chloride | mg/L | 250 | | 95.3 | | 244 | | 136 | | 130 | | 150 | 110 | 98.1 |
| Chromium | mg/L | 0.05 * | 0.002 | | 0.001 | | 0.0059 | | 0.0031 | | 0.0045 | | | |
| Cobalt | mg/L | | 0.008 | | 0.007 | | 0.0081 | | 0.0039 | | 0.0069 | | | |
| Chemical Oxygen Demand | mg/L | | | 50 | | 180 | | 100 | | 80 | | <10 | <10 | <10 |
| Conductivity | µS/cm | | | 1900 | | 4000 | | 2450 | | 2270 | | 1210 | 1200 | 1120 |
| Conductivity - field | µS/cm | | 4720 | 1970 | 4830 | 3480 | | 2520 | 2660 | 2160 | 4320 | 1220 | 1160 | 1140 |
| Copper | mg/L | 1 | <0.005 | | 0.016 | | <0.0005 | | 0.0005 | | <0.0005 | | | |
| Dissolved Organic Carbon | mg/L | 5 | | 24 | | 92.4 | | 28.3 | | 24.5 | | 2.8 | 4.5 | 5.4 |
| Dissolved Oxygen - field | mg/L | | 1.96 | 1.58 | 1.34 | 1.39 | | 2.45 | 2.27 | 1.13 | 2.44 | 1.67 | 3.11 | 0.95 |
| Hardness | mg/L | 80-100 | | 574 | | 869 | | 706 | | 543 | | 478 | 461 | 459 |
| Ion Percentage | % | | | 6.88 | | 4.93 | | 1.79 | | 1.56 | | 2.46 | 0.58 | 2.38 |
| Iron | mg/L | 0.3 | 30.3 | 9.56 | | 27.9 | | 28.1 | 24.4 | 3.87 | | 0.016 | <0.05 | 0.142 |
| Lead | mg/L | 0.01 * | <0.01 | | 0.01 | | <0.0005 | | <0.0005 | | <0.0005 | | | |
| Magnesium | mg/L | | | 41.7 | | 102 | | 61.2 | | 51.3 | | 22.6 | 20.3 | 21.1 |
| Manganese | mg/L | 0.05 | 0.352 | 0.254 | | 0.28 | | 0.48 | | 0.245 | | 0.006 | 0.008 | 0.0129 |
| Molybdenum | mg/L | | <0.005 | | <0.005 | | 0.0007 | | <0.0005 | | <0.0005 | | | |
| Nickel | mg/L | | 0.03 | | 0.035 | | 0.026 | | 0.014 | | 0.018 | | | |
| Nitrate | mg/L | 10.0 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | 0.22 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.05 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | -102.2 | -46.2 | -104.6 | -46.8 | | -85.3 | -62 | -2.4 | -108 | 216.9 | 133.2 | 96.3 |
| pH | units | | | 6.94 | | 6.96 | | 6.78 | | 6.84 | | 7.38 | 7.45 | 7.45 |
| pH - field | units | | 6.6 | 6.64 | 6.72 | 6.67 | | 6.47 | 6.56 | 6.56 | 6.6 | 7 | 6.98 | 7.13 |
| Phosphate | mg/L | | 0.45 | <0.02 | | 0.15 | | 0.25 | | 0.03 | | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | | 0.06 | | 0.11 | | 0.19 | | 0.09 | | <0.02 | 0.03 | <0.010 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | | 37.3 | | 99.7 | | 56.9 | | 53.4 | | 1.3 | 1.3 | 1.4 |
| Sodium | mg/L | 200 | 224 | 86.7 | | 185 | | 99.7 | | 101 | | 63.3 | 68 | 64.7 |
| Sulphate | mg/L | 500 | | 21.6 | | 3.5 | | 16.2 | | 11 | | 93.6 | 89 | 89 |
| Total Dissolved Solids | mg/L | 500 | | 880 | | 1570 | | 1090 | | 960 | | 700 | 720 | 660 |
| Temperature - field | °C | | 12.5 | 11.3 | 13.1 | 12.5 | | 12.2 | | 11.8 | 13.4 | 8.2 | 7.4 | 8.2 |
| Total Kjeldahl Nitrogen | mg/L | | | 76.6 | | 122 | | 85 | | | | 0.2 | 0.2 | 0.3 |
| Zinc | mg/L | 5 | <0.01 | | <0.01 | | 0.0028 | | | | 0.002 | | | |
| Phenols | µg/L | | | 3 | | 4 | | 7 | | 2 | | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | | | | | | | | | | | |
| 1,1,2-Trichlorethane | µg/L | | | | | | | | | | | | | |
| 1,1-Dichloroethane | µg/L | | | | | | | | | | | | | |
| 1,1-Dichloroethylene | µg/L | 14 * | | | | | | | | | | | | |
| 1,2-Dichlorobenzene | µg/L | 3 | | | | | | | | | | | | |
| 1,2-Dichloroethane | µg/L | 5 * | | | | | | | | | | | | |
| 1,2-Dichlorpropane | µg/L | | | | | | | | | | | | | |
| 1,3-Dichlorobenzene | µg/L | | | | | | | | | | | | | |
| 1,3-Dichloropropene(E) | µg/L | | | | | | | | | | | | | |
| 1,3-Dichloropropene(Z) | µg/L | | | | | | | | | | | | | |
| 1,4-Dichlorobenzene | µg/L | 1 | | | | | | | | | | | | |
| Benzene | µg/L | 1 * | | | | | | | | | | | | |
| Bromodichloromethane | µg/L | | | | | | | | | | | | | |
| Bromoform | µg/L | | | | | | | | | | | | | |
| Bromomethane | µg/L | | | | | | | | | | | | | |
| Carbon Tetrachloride | µg/L | 5 * | | | | | | | | | | | | |
| Chlorobenzene | µg/L | 30 | | | | | | | | | | | | |
| Chloroethane | µg/L | | | | | | | | | | | | | |
| Chloroform | µg/L | | | | | | | | | | | | | |
| Chloromethane | µg/L | | | | | | | | | | | | | |
| cis-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | |
| Dibromochloromethane | µg/L | | | | | | | | | | | | | |
| Dichloromethane | µg/L | 50 * | | | | | | | | | | | | |
| Ethyl Benzene | µg/L | 1.6 | | | | | | | | | | | | |
| Ethylene dibromide | µg/L | | | | | | | | | | | | | |
| m/p-Xylenes | µg/L | 20 ** | | | | | | | | | | | | |
| o-Xylene | µg/L | 20 ** | | | | | | | | | | | | |
| Styrene | µg/L | | | | | | | | | | | | | |
| Tetrachloroethylene | µg/L | 30 * | | | | | | | | | | | | |
| Toluene | µg/L | 24 | | | | | | | | | | | | |
| trans-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | |
| Trichloroethylene | µg/L | 5 * | | | | | | | | | | | | |
| Trichlorofluoromethane | µg/L | | | | | | | | | | | | | |
| Vinyl Chloride | µg/L | 1 * | | | | | | | | | | | | |
| Xylenes - total | µg/L | 20 ** | | | | | | | | | | | | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 33-II | | | 33-III | | | | | | 40-II | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-20 | Apr-21 | Apr-22 | Mar-17 | Mar-18 | Apr-19 | Apr-20 | Apr-21 | Apr-22 | Apr-17 | Apr-18 | Apr-19 |
| Alkalinity | mg/L | 30-500 | 349 | 369 | 295 | 405 | 427 | 372 | 375.39 | 396 | 317 | 236 | 249 | 236 |
| Aluminum | mg/L | 0.1 | | | | | | | | | | | | |
| Ammonia (as N) | mg/L | | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.1 | 0.2 | 0.2 | 0.1 |
| Anion sum | meq/L | | 10.5 | 10.6 | 8.83 | 14 | 13.2 | 11.3 | 11.1 | 10.9 | 9.14 | 5.33 | 5.6 | 5.28 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0005 | <0.005 | <0.0005 |
| Barium | mg/L | 1 * | | | | | | | | | | | | |
| Beryllium | mg/L | | | | | | | | | | | | | |
| Bicarbonate | mg/L | | 348 | 368 | 295 | 404 | 426 | 371 | 375 | 395 | 317 | 234 | 248 | 235 |
| Boron | mg/L | 5 * | | | | | | | | | | | | |
| Cadmium | mg/L | 0.005 * | | | | | | | | | | | | |
| Calcium | mg/L | | 139 | 134 | 135 | 178 | 176 | 162 | 163 | 155 | 153 | 65.2 | 72.4 | 64.1 |
| Carbonate | mg/L | | <1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 | 2 | 1 | <1 |
| Cation sum | meq/L | | 11.4 | 10.8 | 10.8 | 13.4 | 13 | 12 | 12 | 11.2 | 11.1 | 5.61 | 6.19 | 5.4 |
| Chloride | mg/L | 250 | 66.8 | 56.7 | 47.9 | 126 | 97.8 | 71.2 | 59.6 | 43.2 | 41.3 | 6.4 | 5.7 | 4.2 |
| Chromium | mg/L | 0.05 * | | | | | | | | | | | | |
| Cobalt | mg/L | | | | | | | | | | | | | |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | 20 | <10 | 40 | <10 | 20 | <10 | <10 | <10 | 10 | <10 |
| Conductivity | µS/cm | | 1050 | 1020 | 967 | 1280 | 1260 | 1080 | 1100 | 1010 | 934 | 517 | 514 | 501 |
| Conductivity - field | µS/cm | | 1030 | 1010 | 939 | 1280 | 1210 | 1120 | 1080 | 1020 | 958 | 528 | 521 | 531 |
| Copper | mg/L | 1 | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 5 | 5.5 | 4.5 | 4.1 | 5 | 5.5 | 7.2 | 5.8 | 5.2 | 4.3 | 1.5 | 1.4 | 1.5 |
| Dissolved Oxygen - field | mg/L | | 1.32 | 1.76 | 3.36 | 2.26 | 6.39 | 3.43 | 3.43 | 9.71 | 3.77 | 2.24 | 2.72 | 2.78 |
| Hardness | mg/L | 80-100 | 429 | 412 | 414 | 514 | 508 | 468 | 475 | 450 | 444 | 254 | 281 | 246 |
| Ion Percentage | % | | 4.07 | 0.97 | 10.1 | 2.21 | 0.83 | 3.05 | 3.76 | 1.51 | 9.52 | 2.57 | 5 | 1.14 |
| Iron | mg/L | 0.3 | 0.017 | 0.029 | 0.033 | 0.005 | 0.09 | 0.348 | 0.13 | 0.008 | 0.01 | 0.013 | <0.05 | 0.04 |
| Lead | mg/L | 0.01 * | | | | | | | | | | | | |
| Magnesium | mg/L | | 19.8 | 18.9 | 18.7 | 17 | 16.7 | 15.4 | 16.5 | 15.3 | 15 | 22.2 | 24.3 | 20.9 |
| Manganese | mg/L | 0.05 | 0.0077 | 0.0117 | 0.0088 | 0.0085 | 0.018 | 0.067 | 0.0931 | 0.011 | 0.0299 | 0.0327 | 0.043 | 0.0264 |
| Molybdenum | mg/L | | | | | | | | | | | | | |
| Nickel | mg/L | | | | | | | | | | | | | |
| Nitrate | mg/L | 10.0 * | 0.5 | <0.5 | <0.5 | 0.35 | <0.5 | <0.5 | 0.8 | 0.8 | 0.6 | <0.05 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | 31.7 | 77.3 | 90.8 | 228.7 | 154.9 | 130.7 | 12.1 | 88.8 | 116.7 | 132.2 | 19.8 | 66.9 |
| pH | units | | 7.4 | 7.33 | 7.2 | 7.32 | 7.41 | 7.39 | 7.36 | 7.37 | 7.21 | 7.89 | 7.65 | 7.65 |
| pH - field | units | | 7.1 | 7.14 | 7.15 | 6.97 | 6.92 | 7.23 | 7.13 | 7.14 | 7.08 | 7.51 | 7.37 | 7.6 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.01 | 0.02 | <0.02 | <0.02 | 0.05 | 0.02 | <0.01 | 0.03 | <0.02 | 0.09 | 0.03 | 0.01 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.3 | 1.4 | 1.4 | 1 | 1.1 | 2.1 | 1.1 | 1.2 | 1 | 1.8 | 1.8 | 1.6 |
| Sodium | mg/L | 200 | 62.1 | 56.4 | 56.6 | 69.4 | 64.4 | 58.1 | 54.7 | 49.6 | 49 | 10.1 | 11.2 | 9.4 |
| Sulphate | mg/L | 500 | 86 | 88.1 | 85.1 | 123 | 107 | 98.9 | 100 | 94 | 86.5 | 28 | 30 | 28.7 |
| Total Dissolved Solids | mg/L | 500 | 640 | 580 | 610 | 780 | 750 | 650 | 680 | 610 | 600 | 290 | 310 | 300 |
| Temperature - field | °C | | 8.1 | 8.2 | 8.2 | 5.3 | 4.9 | 4.8 | 5.5 | 5.2 | 4.9 | 5 | 4.2 | 4.8 |
| Total Kjeldahl Nitrogen | mg/L | | 1.1 | <0.1 | 0.2 | 0.2 | 0.2 | 0.5 | 0.9 | <0.1 | 0.2 | <0.1 | <0.1 | <0.1 |
| Zinc | mg/L | 5 | | | | | | | | | | | | |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 | 1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | | | | | | | | | | | |
| 1,1,2-Trichlorethane | µg/L | | | | | | | | | | | | | |
| 1,1-Dichloroethane | µg/L | | | | | | | | | | | | | |
| 1,1-Dichloroethylene | µg/L | 14 * | | | | | | | | | | | | |
| 1,2-Dichlorobenzene | µg/L | 3 | | | | | | | | | | | | |
| 1,2-Dichloroethane | µg/L | 5 * | | | | | | | | | | | | |
| 1,2-Dichlorpropane | µg/L | | | | | | | | | | | | | |
| 1,3-Dichlorobenzene | µg/L | | | | | | | | | | | | | |
| 1,3-Dichloropropene(E) | µg/L | | | | | | | | | | | | | |
| 1,3-Dichloropropene(Z) | µg/L | | | | | | | | | | | | | |
| 1,4-Dichlorobenzene | µg/L | 1 | | | | | | | | | | | | |
| Benzene | µg/L | 1 * | | | | | | | | | | | | |
| Bromodichloromethane | µg/L | | | | | | | | | | | | | |
| Bromoform | µg/L | | | | | | | | | | | | | |
| Bromomethane | µg/L | | | | | | | | | | | | | |
| Carbon Tetrachloride | µg/L | 5 * | | | | | | | | | | | | |
| Chlorobenzene | µg/L | 30 | | | | | | | | | | | | |
| Chloroethane | µg/L | | | | | | | | | | | | | |
| Chloroform | µg/L | | | | | | | | | | | | | |
| Chloromethane | µg/L | | | | | | | | | | | | | |
| cis-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | |
| Dibromochloromethane | µg/L | | | | | | | | | | | | | |
| Dichloromethane | µg/L | 50 * | | | | | | | | | | | | |
| Ethyl Benzene | µg/L | 1.6 | | | | | | | | | | | | |
| Ethylene dibromide | µg/L | | | | | | | | | | | | | |
| m/p-Xylenes | µg/L | 20 ** | | | | | | | | | | | | |
| o-Xylene | µg/L | 20 ** | | | | | | | | | | | | |
| Styrene | µg/L | | | | | | | | | | | | | |
| Tetrachloroethylene | µg/L | 30 * | | | | | | | | | | | | |
| Toluene | µg/L | 24 | | | | | | | | | | | | |
| trans-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | |
| Trichloroethylene | µg/L | 5 * | | | | | | | | | | | | |
| Trichlorofluoromethane | µg/L | | | | | | | | | | | | | |
| Vinyl Chloride | µg/L | 1 * | | | | | | | | | | | | |
| Xylenes - total | µg/L | 20 ** | | | | | | | | | | | | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 40-II | | | 41-I | | | | | | 41-II | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | May-20 | Apr-21 | Apr-22 | Apr-17 | Apr-18 | Apr-19 | May-20 | Apr-21 | Apr-22 | Apr-17 | Apr-18 | Apr-19 |
| Alkalinity | mg/L | 30-500 | 246 | 235 | 250 | 211 | 236 | 197 | 193 | 209 | 218 | 251 | 270 | 260 |
| Aluminum | mg/L | 0.1 | | | | | | | | | | | | |
| Ammonia (as N) | mg/L | | <0.1 | 0.2 | 0.1 | 7.6 | 11.2 | 8.4 | 7.3 | 7.7 | 8.9 | 0.2 | 0.3 | 0.1 |
| Anion sum | meq/L | | 5.62 | 5.27 | 5.64 | 100 | 108 | 111 | 121 | 132 | 107 | 5.83 | 6.2 | 6 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.0005 | 0.0005 | <0.0005 | <0.005 | <0.0005 | 0.0006 | <0.0005 | <0.0005 | <0.0005 | <0.005 | <0.0005 |
| Barium | mg/L | 1 * | | | | | | | | | | | | |
| Beryllium | mg/L | | | | | | | | | | | | | |
| Bicarbonate | mg/L | | 245 | 234 | 249 | 210 | 235 | 196 | 193 | 208 | 217 | 250 | 269 | 259 |
| Boron | mg/L | 5 * | | | | | | | | | | | | |
| Cadmium | mg/L | 0.005 * | | | | | | | | | | | | |
| Calcium | mg/L | | 72.5 | 63.1 | 68.8 | 316 | 441 | 317 | 498 | 396 | 453 | 81.5 | 91.2 | 77.8 |
| Carbonate | mg/L | | 1 | 1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 | 1 | <1 | <1 |
| Cation sum | meq/L | | 5.92 | 5.49 | 5.85 | 87.5 | 110 | 96.6 | 136 | 111 | 113 | 6.13 | 7.13 | 5.83 |
| Chloride | mg/L | 250 | 7.2 | 4.2 | 5.7 | 3410 | 3670 | 3810 | 4160 | 4540 | 3640 | 4.6 | 4.2 | 2.8 |
| Chromium | mg/L | 0.05 * | | | | | | | | | | | | |
| Cobalt | mg/L | | | | | | | | | | | | | |
| Chemical Oxygen Demand | mg/L | | 20 | <10 | <10 | 80 | 290 | 130 | 120 | 100 | 20 | <10 | <10 | <10 |
| Conductivity | µS/cm | | 548 | 507 | 543 | 10400 | 13400 | 12800 | 14300 | 12800 | 12600 | 572 | 563 | 573 |
| Conductivity - field | µS/cm | | 531 | 498 | 511 | 10200 | 11300 | 11300 | 10000 | 12800 | 9540 | 578 | 560 | 575 |
| Copper | mg/L | 1 | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 5 | 1.3 | <1.0 | 1.1 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.1 | 1.1 | 2.1 |
| Dissolved Oxygen - field | mg/L | | 3.29 | 1.66 | 1.9 | 1.73 | 1.06 | 1.57 | 1.19 | 1.33 | 1.5 | 1.2 | 1.7 | 1.34 |
| Hardness | mg/L | 80-100 | 272 | 253 | 268 | 1720 | 2290 | 1750 | 2690 | 2190 | 2420 | 293 | 329 | 277 |
| Ion Percentage | % | | 2.63 | 2.06 | 1.84 | 6.75 | 0.94 | 7 | 5.73 | 8.52 | 3 | 2.51 | 6.99 | 1.48 |
| Iron | mg/L | 0.3 | 0.025 | 0.015 | 0.038 | 0.969 | 9.23 | 2.08 | 6.14 | 3.65 | 6.32 | 0.397 | 0.44 | 0.695 |
| Lead | mg/L | 0.01 * | | | | | | | | | | | | |
| Magnesium | mg/L | | 22.1 | 23.1 | 23.4 | 226 | 288 | 232 | 352 | 291 | 314 | 21.7 | 24.6 | 20.1 |
| Manganese | mg/L | 0.05 | 0.0378 | 0.0272 | 0.0333 | 0.0546 | 0.075 | 0.0636 | 0.0733 | 0.0768 | 0.0665 | 0.0084 | 0.01 | 0.01 |
| Molybdenum | mg/L | | | | | | | | | | | | | |
| Nickel | mg/L | | | | | | | | | | | | | |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | -3.1 | 137.7 | 42.8 | -19.7 | -114.8 | -96.6 | -54 | -86.8 | 2.4 | -15.6 | -82.2 | -50.3 |
| pH | units | | 7.68 | 7.74 | 7.58 | 7.76 | 7.4 | 7.44 | 7.41 | 7.56 | 7.42 | 7.69 | 7.57 | 7.57 |
| pH - field | units | | 7.71 | 7.54 | 7.6 | 7.41 | 7.19 | 7.45 | 7.48 | 7.42 | 7.3 | 7.4 | 7.33 | 7.49 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.01 | <0.01 | <0.02 | 0.75 | 0.49 | 0.02 | 0.23 | <0.01 | <0.02 | <0.02 | 0.03 | <0.01 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.7 | 1.6 | 1.7 | 38.5 | 55 | 48.3 | 50.8 | 37.7 | 50.1 | 1.8 | 2 | 1.8 |
| Sodium | mg/L | 200 | 9.4 | 8.1 | 9.5 | 1180 | 1420 | 1370 | 1830 | 1510 | 1440 | 4.2 | 10.2 | 4.8 |
| Sulphate | mg/L | 500 | 31.4 | 28.9 | 31 | <2.0 | <2 | <2 | <2 | <0.2 | <2 | 40.4 | 41 | 42.9 |
| Total Dissolved Solids | mg/L | 500 | 330 | 290 | 290 | 6120 | 6710 | 6950 | 7750 | 6650 | 7140 | 440 | 380 | 390 |
| Temperature - field | °C | | 6 | 5.5 | 4.4 | 7.6 | 7.4 | 7 | 7.3 | 8.3 | 7.7 | 7.9 | 7.4 | 7.8 |
| Total Kjeldahl Nitrogen | mg/L | | <0.2 | <0.1 | <0.2 | 8.8 | 12.3 | 13.9 | 8.8 | 10.9 | 9.8 | 0.2 | <0.1 | <0.2 |
| Zinc | mg/L | 5 | | | | | | | | | | | | |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | 3 | 2 | 3 | 4 | <1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | | | | | | | | | | | |
| 1,1,2-Trichlorethane | µg/L | | | | | | | | | | | | | |
| 1,1-Dichloroethane | µg/L | | | | | | | | | | | | | |
| 1,1-Dichloroethylene | µg/L | 14 * | | | | | | | | | | | | |
| 1,2-Dichlorobenzene | µg/L | 3 | | | | | | | | | | | | |
| 1,2-Dichloroethane | µg/L | 5 * | | | | | | | | | | | | |
| 1,2-Dichlorpropane | µg/L | | | | | | | | | | | | | |
| 1,3-Dichlorobenzene | µg/L | | | | | | | | | | | | | |
| 1,3-Dichloropropene(E) | µg/L | | | | | | | | | | | | | |
| 1,3-Dichloropropene(Z) | µg/L | | | | | | | | | | | | | |
| 1,4-Dichlorobenzene | µg/L | 1 | | | | | | | | | | | | |
| Benzene | µg/L | 1 * | | | | | | | | | | | | |
| Bromodichloromethane | µg/L | | | | | | | | | | | | | |
| Bromoform | µg/L | | | | | | | | | | | | | |
| Bromomethane | µg/L | | | | | | | | | | | | | |
| Carbon Tetrachloride | µg/L | 5 * | | | | | | | | | | | | |
| Chlorobenzene | µg/L | 30 | | | | | | | | | | | | |
| Chloroethane | µg/L | | | | | | | | | | | | | |
| Chloroform | µg/L | | | | | | | | | | | | | |
| Chloromethane | µg/L | | | | | | | | | | | | | |
| cis-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | |
| Dibromochloromethane | µg/L | | | | | | | | | | | | | |
| Dichloromethane | µg/L | 50 * | | | | | | | | | | | | |
| Ethyl Benzene | µg/L | 1.6 | | | | | | | | | | | | |
| Ethylene dibromide | µg/L | | | | | | | | | | | | | |
| m/p-Xylenes | µg/L | 20 ** | | | | | | | | | | | | |
| o-Xylene | µg/L | 20 ** | | | | | | | | | | | | |
| Styrene | µg/L | | | | | | | | | | | | | |
| Tetrachloroethylene | µg/L | 30 * | | | | | | | | | | | | |
| Toluene | µg/L | 24 | | | | | | | | | | | | |
| trans-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | |
| Trichloroethylene | µg/L | 5 * | | | | | | | | | | | | |
| Trichlorofluoromethane | µg/L | | | | | | | | | | | | | |
| Vinyl Chloride | µg/L | 1 * | | | | | | | | | | | | |
| Xylenes - total | µg/L | 20 ** | | | | | | | | | | | | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 41-II | | | 44-I | | | | | | 44-II | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | May-20 | Apr-21 | Apr-22 | Apr-17 | Apr-18 | Apr-19 | May-20 | Apr-21 | Apr-22 | Apr-17 | Apr-18 | Apr-19 |
| Alkalinity | mg/L | 30-500 | 240 | 263 | 255 | 158 | 160 | 136 | 139 | 154 | 165 | 196 | 204 | 200 |
| Aluminum | mg/L | 0.1 | | | | | | | | | | | | |
| Ammonia (as N) | mg/L | | 0.1 | 0.2 | 0.2 | 20.2 | 21.8 | 26.4 | 21.4 | 11.5 | 23.4 | 0.9 | 0.8 | 0.7 |
| Anion sum | meq/L | | 5.67 | 6.09 | 5.94 | 576 | 454 | 539 | 451 | 417 | 474 | 5.42 | 5.86 | 4.98 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.0005 | <0.0005 | 0.0018 | <0.005 | 0.0016 | 0.0011 | 0.0018 | 0.0006 | <0.0005 | <0.005 | <0.0005 |
| Barium | mg/L | 1 * | | | | | | | | | | | | |
| Beryllium | mg/L | | | | | | | | | | | | | |
| Bicarbonate | mg/L | | 239 | 262 | 254 | 158 | 160 | 136 | 139 | 154 | 165 | 194 | 203 | 199 |
| Boron | mg/L | 5 * | | | | | | | | | | | | |
| Cadmium | mg/L | 0.005 * | | | | | | | | | | | | |
| Calcium | mg/L | | 79.2 | 86.1 | 79.5 | 1650 | 1870 | 1740 | 1760 | 1790 | 1560 | 56.2 | 54.8 | 51.3 |
| Carbonate | mg/L | | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 2 | 1 | 1 |
| Cation sum | meq/L | | 6.31 | 6.44 | 6.29 | 422 | 442 | 438 | 431 | 442 | 413 | 5.5 | 5.88 | 4.79 |
| Chloride | mg/L | 250 | 9 | 4.6 | 7.2 | 20300 | 16000 | 19000 | 15900 | 14700 | 16600 | 36.7 | 46.2 | 15.1 |
| Chromium | mg/L | 0.05 * | | | | | | | | | | | | |
| Cobalt | mg/L | | | | | | | | | | | | | |
| Chemical Oxygen Demand | mg/L | | <10 | 10 | <10 | <10 | 780 | 40 | 360 | 310 | 110 | 20 | <10 | <10 |
| Conductivity | µS/cm | | 571 | 584 | 583 | 51000 | 54600 | 55500 | 55700 | 51600 | 56000 | 542 | 569 | 499 |
| Conductivity - field | µS/cm | | 564 | 579 | 734 | 41600 | 41200 | 44600 | 42100 | 41900 | 40100 | 558 | 606 | 581 |
| Copper | mg/L | 1 | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 5 | <1.0 | 1.3 | 1.7 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 2.6 |
| Dissolved Oxygen - field | mg/L | | 1.83 | 1.41 | 1.62 | 1.74 | 1.28 | 1.96 | 1.87 | 3.06 | 1.09 | 1.51 | 1.12 | 1.6 |
| Hardness | mg/L | 80-100 | 289 | 307 | 294 | 8610 | 9730 | 9080 | 9380 | 9370 | 8550 | 225 | 220 | 205 |
| Ion Percentage | % | | 5.3 | 2.77 | 2.93 | 15.4 | 1.3 | 10.4 | 2.2 | 2.96 | 6.83 | 0.72 | 0.15 | 1.94 |
| Iron | mg/L | 0.3 | 0.253 | 0.497 | 0.338 | 1.73 | 1.98 | 1.32 | 1.12 | 1.72 | 0.836 | 0.619 | 0.74 | 0.637 |
| Lead | mg/L | 0.01 * | | | | | | | | | | | | |
| Magnesium | mg/L | | 22.2 | 22.3 | 23.3 | 1090 | 1230 | 1150 | 1210 | 1190 | 1130 | 20.6 | 20.2 | 18.7 |
| Manganese | mg/L | 0.05 | 0.0074 | 0.01 | 0.008 | 0.1 | 0.133 | 0.111 | 0.113 | 0.116 | 0.12 | 0.0091 | 0.011 | 0.0098 |
| Molybdenum | mg/L | | | | | | | | | | | | | |
| Nickel | mg/L | | | | | | | | | | | | | |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <5.0 | <5 | <5.0 | 39 | <0.05 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <5.0 | <5 | <5.0 | <5.0 | <0.05 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | -61.7 | -52.7 | -62.3 | -90.9 | 82.6 | 102.1 | 98 | 7.2 | 53.5 | -165.9 | -107.9 | -118.6 |
| pH | units | | 7.61 | 7.66 | 7.52 | 7.34 | 7.21 | 7.43 | 7.56 | 7.31 | 7.19 | 7.94 | 7.76 | 7.89 |
| pH - field | units | | 7.65 | 7.53 | 7.58 | 7.11 | 6.99 | 6.99 | 7.19 | 7.25 | 7.12 | 7.85 | 7.91 | 7.7 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | 0.03 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.01 | 0.01 | <0.02 | 0.03 | 0.9 | 0.41 | 0.35 | <0.01 | <0.02 | <0.02 | 0.04 | 0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 2.1 | 1.8 | 1.8 | 94.7 | 146 | 92.4 | 99.2 | 100 | 105 | 3.4 | 3.9 | 3 |
| Sodium | mg/L | 200 | 10 | 5 | 7.3 | 5640 | 5540 | 5760 | 5480 | 5760 | 5440 | 18.9 | 29.8 | 12.5 |
| Sulphate | mg/L | 500 | 37.2 | 42.1 | 38.4 | 37.9 | 0.9 | 46.2 | <20 | <20.0 | <20 | 28.6 | 29.3 | 33.1 |
| Total Dissolved Solids | mg/L | 500 | 380 | 390 | 420 | 24300 | 26300 | 29600 | 30400 | 27200 | 28300 | 360 | 480 | 480 |
| Temperature - field | °C | | 8 | 8 | 8.1 | 8 | 6.8 | 8 | 8.4 | 7.8 | 8 | 8.3 | 6.9 | 8 |
| Total Kjeldahl Nitrogen | mg/L | | <0.2 | <0.1 | <0.2 | 18.5 | 21.2 | 26 | 21.3 | 22.8 | 24.9 | <2.0 | 0.7 | 0.6 |
| Zinc | mg/L | 5 | | | | | | | | | | | | |
| Phenols | µg/L | | <1 | 1 | <1 | 4 | 7 | 13 | 11 | 8 | 7 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | | | | | | | | | | | |
| 1,1,2-Trichlorethane | µg/L | | | | | | | | | | | | | |
| 1,1-Dichloroethane | µg/L | | | | | | | | | | | | | |
| 1,1-Dichloroethylene | µg/L | 14 * | | | | | | | | | | | | |
| 1,2-Dichlorobenzene | µg/L | 3 | | | | | | | | | | | | |
| 1,2-Dichloroethane | µg/L | 5 * | | | | | | | | | | | | |
| 1,2-Dichlorpropane | µg/L | | | | | | | | | | | | | |
| 1,3-Dichlorobenzene | µg/L | | | | | | | | | | | | | |
| 1,3-Dichloropropene(E) | µg/L | | | | | | | | | | | | | |
| 1,3-Dichloropropene(Z) | µg/L | | | | | | | | | | | | | |
| 1,4-Dichlorobenzene | µg/L | 1 | | | | | | | | | | | | |
| Benzene | µg/L | 1 * | | | | | | | | | | | | |
| Bromodichloromethane | µg/L | | | | | | | | | | | | | |
| Bromoform | µg/L | | | | | | | | | | | | | |
| Bromomethane | µg/L | | | | | | | | | | | | | |
| Carbon Tetrachloride | µg/L | 5 * | | | | | | | | | | | | |
| Chlorobenzene | µg/L | 30 | | | | | | | | | | | | |
| Chloroethane | µg/L | | | | | | | | | | | | | |
| Chloroform | µg/L | | | | | | | | | | | | | |
| Chloromethane | µg/L | | | | | | | | | | | | | |
| cis-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | |
| Dibromochloromethane | µg/L | | | | | | | | | | | | | |
| Dichloromethane | µg/L | 50 * | | | | | | | | | | | | |
| Ethyl Benzene | µg/L | 1.6 | | | | | | | | | | | | |
| Ethylene dibromide | µg/L | | | | | | | | | | | | | |
| m/p-Xylenes | µg/L | 20 ** | | | | | | | | | | | | |
| o-Xylene | µg/L | 20 ** | | | | | | | | | | | | |
| Styrene | µg/L | | | | | | | | | | | | | |
| Tetrachloroethylene | µg/L | 30 * | | | | | | | | | | | | |
| Toluene | µg/L | 24 | | | | | | | | | | | | |
| trans-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | |
| Trichloroethylene | µg/L | 5 * | | | | | | | | | | | | |
| Trichlorofluoromethane | µg/L | | | | | | | | | | | | | |
| Vinyl Chloride | µg/L | 1 * | | | | | | | | | | | | |
| Xylenes - total | µg/L | 20 ** | | | | | | | | | | | | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 44-II | | | 44-III | | | | | | 46-I | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | May-20 | Apr-21 | Apr-22 | Apr-17 | Apr-18 | Apr-19 | May-20 | Apr-21 | Apr-22 | Apr-17 | Mar-18 | Mar-19 |
| Alkalinity | mg/L | 30-500 | 175 | 196 | 184 | 196 | 204 | 215 | 238 | 242 | 228 | 316 | 368 | 295 |
| Aluminum | mg/L | 0.1 | | | | | | | | | | | | |
| Ammonia (as N) | mg/L | | 0.9 | 0.9 | 1.1 | 0.2 | 0.1 | 0.1 | <0.1 | 0.1 | 0.2 | 3.5 | 20.4 | 4.9 |
| Anion sum | meq/L | | 5 | 5.42 | 5.15 | 5.4 | 5.36 | 5.44 | 6.45 | 6.49 | 6.25 | 44.4 | 33.2 | 43.2 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.005 | <0.0005 |
| Barium | mg/L | 1 * | | | | | | | | | | | | |
| Beryllium | mg/L | | | | | | | | | | | | | |
| Bicarbonate | mg/L | | 173 | 195 | 183 | 194 | 202 | 213 | 236 | 241 | 227 | 315 | 367 | 294 |
| Boron | mg/L | 5 * | | | | | | | | | | | | |
| Cadmium | mg/L | 0.005 * | | | | | | | | | | | | |
| Calcium | mg/L | | 46.7 | 58.2 | 47.6 | 55.9 | 56 | 68.1 | 101 | 93.7 | 81.8 | 92.8 | 82.8 | 110 |
| Carbonate | mg/L | | 2 | 1 | 1 | 1 | 2 | 2 | 1 | <1 | <1 | <1 | <1 | 1 |
| Cation sum | meq/L | | 5.43 | 5.71 | 5.59 | 5.36 | 5.39 | 5.37 | 7.15 | 6.89 | 6.37 | 35.6 | 33.5 | 42.1 |
| Chloride | mg/L | 250 | 45.9 | 35.7 | 40.1 | 33.2 | 26.2 | 6.1 | 7.1 | 11.9 | 11.3 | 1360 | 925.25 | 1320 |
| Chromium | mg/L | 0.05 * | | | | | | | | | | | | |
| Cobalt | mg/L | | | | | | | | | | | | | |
| Chemical Oxygen Demand | mg/L | | 20 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | 60 | 80 | 50 |
| Conductivity | µS/cm | | 538 | 559 | 543 | 535 | 513 | 527 | 631 | 593 | 638 | 4410 | 3770 | 5000 |
| Conductivity - field | µS/cm | | 533 | 568 | 517 | 544 | 497 | 523 | 627 | 596 | 594 | 4690 | 3550 | 4810 |
| Copper | mg/L | 1 | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 5 | <1.0 | <1.0 | <1.0 | <1.0 | 1.3 | 2.8 | <1.0 | 1.3 | <1.0 | <1.0 | 8.8 | 1.6 |
| Dissolved Oxygen - field | mg/L | | 1.09 | 0.89 | 6.49 | 7.09 | 8.67 | 9.13 | 5.62 | 3.89 | 2.74 | 1.13 | 1.05 | 0.46 |
| Hardness | mg/L | 80-100 | 202 | 231 | 205 | 224 | 229 | 248 | 339 | 320 | 289 | 455 | 389 | 540 |
| Ion Percentage | % | | 4.1 | 2.64 | 4.13 | 0.42 | 0.3 | 0.72 | 5.18 | 3.05 | 0.97 | 11 | 0.5 | 1.3 |
| Iron | mg/L | 0.3 | 0.389 | 0.591 | 0.406 | 0.014 | <0.05 | 0.161 | 0.033 | 0.023 | 0.005 | 0.602 | 1.27 | 0.894 |
| Lead | mg/L | 0.01 * | | | | | | | | | | | | |
| Magnesium | mg/L | | 20.7 | 20.7 | 20.9 | 20.4 | 21.7 | 18.9 | 21.1 | 20.9 | 20.5 | 54.1 | 44.2 | 64.5 |
| Manganese | mg/L | 0.05 | 0.0063 | 0.0089 | 0.0069 | 0.0016 | 0.011 | 0.0465 | 0.0056 | 0.0068 | 0.0019 | 0.0238 | 0.118 | 0.0125 |
| Molybdenum | mg/L | | | | | | | | | | | | | |
| Nickel | mg/L | | | | | | | | | | | | | |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | 0.66 | 0.6 | 0.6 | 0.8 | 1.76 | 0.8 | <0.05 | <1.25 | <1.25 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <1.25 | <1.25 |
| Oxydation Reduction Potential | mV | | -74.4 | -154.4 | -82.1 | -87.4 | 54.9 | 3.9 | 39.1 | 18.3 | -8 | -121.7 | -105.6 | -93.6 |
| pH | units | | 8.03 | 7.82 | 7.78 | 7.91 | 7.96 | 7.98 | 7.82 | 7.62 | 7.54 | 7.47 | 7.17 | 7.56 |
| pH - field | units | | 7.87 | 7.9 | 7.93 | 7.79 | 8 | 7.81 | 7.63 | 7.65 | 7.58 | 7.24 | 6.91 | 7.37 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.05 | 2.5 | 0.16 |
| Phosphorus | mg/L | | 0.01 | 0.02 | <0.02 | <0.02 | 0.03 | <0.02 | 0.01 | 0.03 | <0.02 | 0.07 | 2.35 | 0.14 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 4 | 3.9 | 4.3 | 3.4 | 3.2 | 1.9 | 1.5 | 2 | 2.2 | 20.7 | 20.9 | 22.7 |
| Sodium | mg/L | 200 | 27.6 | 21 | 29.5 | 17.5 | 16 | 7.6 | 7 | 9.4 | 11.6 | 591 | 545 | 697 |
| Sulphate | mg/L | 500 | 15.4 | 29.8 | 22.1 | 30.2 | 30.4 | 51.4 | 76.1 | 64.5 | 70.3 | 0.2 | <5.0 | 16 |
| Total Dissolved Solids | mg/L | 500 | 600 | 570 | 310 | 360 | 310 | 330 | 420 | 310 | 360 | 2190 | 1830 | 2570 |
| Temperature - field | °C | | 7.9 | 7.9 | 7.9 | 5.9 | 4.2 | 5 | 6.2 | 5.9 | 5.3 | 9.8 | 8.8 | 9.7 |
| Total Kjeldahl Nitrogen | mg/L | | 0.9 | 0.4 | 0.8 | <0.1 | 0.1 | <0.1 | <0.2 | <0.1 | <0.2 | 5.9 | 22.7 | 10.7 |
| Zinc | mg/L | 5 | | | | | | | | | | | | |
| Phenols | µg/L | | 2 | <1 | <1 | <1 | <1 | <1 | 2 | <1 | <1 | <1 | 2 | 2 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | | | | | | | | | | | |
| 1,1,2-Trichlorethane | µg/L | | | | | | | | | | | | | |
| 1,1-Dichloroethane | µg/L | | | | | | | | | | | | | |
| 1,1-Dichloroethylene | µg/L | 14 * | | | | | | | | | | | | |
| 1,2-Dichlorobenzene | µg/L | 3 | | | | | | | | | | | | |
| 1,2-Dichloroethane | µg/L | 5 * | | | | | | | | | | | | |
| 1,2-Dichlorpropane | µg/L | | | | | | | | | | | | | |
| 1,3-Dichlorobenzene | µg/L | | | | | | | | | | | | | |
| 1,3-Dichloropropene(E) | µg/L | | | | | | | | | | | | | |
| 1,3-Dichloropropene(Z) | µg/L | | | | | | | | | | | | | |
| 1,4-Dichlorobenzene | µg/L | 1 | | | | | | | | | | | | |
| Benzene | µg/L | 1 * | | | | | | | | | | | | |
| Bromodichloromethane | µg/L | | | | | | | | | | | | | |
| Bromoform | µg/L | | | | | | | | | | | | | |
| Bromomethane | µg/L | | | | | | | | | | | | | |
| Carbon Tetrachloride | µg/L | 5 * | | | | | | | | | | | | |
| Chlorobenzene | µg/L | 30 | | | | | | | | | | | | |
| Chloroethane | µg/L | | | | | | | | | | | | | |
| Chloroform | µg/L | | | | | | | | | | | | | |
| Chloromethane | µg/L | | | | | | | | | | | | | |
| cis-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | |
| Dibromochloromethane | µg/L | | | | | | | | | | | | | |
| Dichloromethane | µg/L | 50 * | | | | | | | | | | | | |
| Ethyl Benzene | µg/L | 1.6 | | | | | | | | | | | | |
| Ethylene dibromide | µg/L | | | | | | | | | | | | | |
| m/p-Xylenes | µg/L | 20 ** | | | | | | | | | | | | |
| o-Xylene | µg/L | 20 ** | | | | | | | | | | | | |
| Styrene | µg/L | | | | | | | | | | | | | |
| Tetrachloroethylene | µg/L | 30 * | | | | | | | | | | | | |
| Toluene | µg/L | 24 | | | | | | | | | | | | |
| trans-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | |
| Trichloroethylene | µg/L | 5 * | | | | | | | | | | | | |
| Trichlorofluoromethane | µg/L | | | | | | | | | | | | | |
| Vinyl Chloride | µg/L | 1 * | | | | | | | | | | | | |
| Xylenes - total | µg/L | 20 ** | | | | | | | | | | | | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 46-I | | | 46-II | | | | | | 46-III | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-20 | Mar-21 | Mar-22 | Apr-17 | Mar-18 | Mar-19 | Mar-20 | Mar-21 | Mar-22 | Apr-17 | Mar-18 | Mar-19 |
| Alkalinity | mg/L | 30-500 | 303 | 300 | 296 | 302 | 320 | 272 | 275 | 286 | 284 | 215 | 300 | 259 |
| Aluminum | mg/L | 0.1 | | | | | | | | | | | | |
| Ammonia (as N) | mg/L | | 8.7 | 4.8 | 5.5 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | <0.1 |
| Anion sum | meq/L | | 38 | 44.2 | 45.2 | 7 | 7.1 | 7.53 | 6.79 | 6.95 | 6.66 | 5.57 | 7.1 | 7.19 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.0005 | <0.0005 | 0.0014 | <0.005 | 0.0013 | 0.0017 | 0.0014 | 0.0018 | <0.0005 | <0.005 | <0.0005 |
| Barium | mg/L | 1 * | | | | | | | | | | | | |
| Beryllium | mg/L | | | | | | | | | | | | | |
| Bicarbonate | mg/L | | 301 | 299 | 295 | 301 | 319 | 271 | 274 | 285 | 283 | 214 | 299 | 258 |
| Boron | mg/L | 5 * | | | | | | | | | | | | |
| Cadmium | mg/L | 0.005 * | | | | | | | | | | | | |
| Calcium | mg/L | | 99.7 | 98.9 | 109 | 87.8 | 92.2 | 96.4 | 93.3 | 84.5 | 92.7 | 97.2 | 129 | 136 |
| Carbonate | mg/L | | 2 | 1 | 1 | <1 | <1 | 1 | 1 | 1 | 1 | <1 | <1 | <1 |
| Cation sum | meq/L | | 36.3 | 42 | 39.9 | 7.04 | 7.35 | 7.91 | 7.12 | 6.94 | 7.25 | 5.46 | 7.25 | 7.65 |
| Chloride | mg/L | 250 | 1140 | 1350 | 1400 | 24.9 | 16.1 | 61.6 | 33.1 | 28.4 | 17.7 | 14.8 | 13.6 | 24.2 |
| Chromium | mg/L | 0.05 * | | | | | | | | | | | | |
| Cobalt | mg/L | | | | | | | | | | | | | |
| Chemical Oxygen Demand | mg/L | | 70 | 20 | 30 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Conductivity | µS/cm | | 4360 | 4840 | 4460 | 666 | 647 | 760 | 658 | 673 | 662 | 558 | 678 | 742 |
| Conductivity - field | µS/cm | | 4330 | 4720 | 4300 | 677 | 637 | 762 | 639 | 687 | 621 | 571 | 667 | 755 |
| Copper | mg/L | 1 | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 5 | 2.1 | <1.0 | <1.0 | 1.4 | 1.7 | 2.2 | 1.3 | 1.7 | 1.4 | 3 | 2.7 | 2.9 |
| Dissolved Oxygen - field | mg/L | | 0.45 | 0.24 | 1.04 | 2.53 | 2.17 | 1.89 | 1.66 | 1.85 | 1.34 | 4.3 | 3.87 | 2.26 |
| Hardness | mg/L | 80-100 | 463 | 504 | 539 | 330 | 346 | 357 | 334 | 321 | 339 | 261 | 347 | 368 |
| Ion Percentage | % | | 2.26 | 2.5 | 6.16 | 0.32 | 1.74 | 2.48 | 2.39 | 0.04 | 4.25 | 1.04 | 1.06 | 3.09 |
| Iron | mg/L | 0.3 | 0.104 | 0.57 | 0.825 | 0.221 | 0.09 | 0.061 | 0.396 | 0.08 | 0.154 | 0.377 | <0.5 | 0.083 |
| Lead | mg/L | 0.01 * | | | | | | | | | | | | |
| Magnesium | mg/L | | 52 | 62.3 | 64.7 | 26.9 | 28.1 | 28.3 | 24.6 | 26.7 | 26.2 | 4.54 | 6.13 | 6.81 |
| Manganese | mg/L | 0.05 | 0.0545 | 0.0131 | 0.0173 | 0.0221 | 0.026 | 0.0192 | 0.0269 | 0.0161 | 0.0226 | 0.0288 | 0.01 | 0.0214 |
| Molybdenum | mg/L | | | | | | | | | | | | | |
| Nickel | mg/L | | | | | | | | | | | | | |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 9.65 | 8.85 | 16.3 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | 8.7 | -88.5 | -74.1 | -54.9 | -29.3 | 5 | 54.1 | -11.6 | 35.1 | -60.1 | 5.4 | 31.5 |
| pH | units | | 7.8 | 7.64 | 7.63 | 7.53 | 7.47 | 7.68 | 7.7 | 7.68 | 7.67 | 7.54 | 7.26 | 7.55 |
| pH - field | units | | 7.29 | 7.35 | 7.24 | 7.32 | 7.18 | 7.43 | 7.35 | 7.39 | 7.23 | 7.32 | 6.94 | 7.29 |
| Phosphate | mg/L | | 0.94 | 0.15 | 0.2 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | 1.04 | 0.18 | 0.17 | <0.02 | 0.03 | 0.04 | <0.02 | 0.01 | <0.02 | <0.02 | 0.03 | 0.05 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 19.3 | 20.1 | 25 | 2 | 2.3 | 2.6 | 2.1 | 2.2 | 2.8 | <0.5 | <0.5 | 0.5 |
| Sodium | mg/L | 200 | 595 | 714 | 645 | 7.9 | 7.4 | 15.1 | 7.9 | 9.9 | 7.9 | 4.7 | 6.4 | 6.1 |
| Sulphate | mg/L | 500 | 0.6 | 17.2 | <2 | 21.7 | 21.7 | 25.4 | 25.7 | 29.6 | 31.9 | 14.7 | 13.6 | 15.9 |
| Total Dissolved Solids | mg/L | 500 | 2200 | 2300 | 2350 | 310 | 370 | 430 | 390 | 400 | 390 | 380 | 380 | 460 |
| Temperature - field | °C | | 9 | 9.6 | 8.1 | 8.5 | 8.7 | 8.5 | 8.1 | 9 | 8.4 | 5.1 | 3.8 | 4 |
| Total Kjeldahl Nitrogen | mg/L | | 11 | 9.1 | 6.9 | 0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | 0.8 | <0.1 | <0.1 |
| Zinc | mg/L | 5 | | | | | | | | | | | | |
| Phenols | µg/L | | <1 | 2 | <1 | <1 | <1 | 1 | <1 | 3 | <1 | <1 | <1 | 2 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | | | | | | | | | | | |
| 1,1,2-Trichlorethane | µg/L | | | | | | | | | | | | | |
| 1,1-Dichloroethane | µg/L | | | | | | | | | | | | | |
| 1,1-Dichloroethylene | µg/L | 14 * | | | | | | | | | | | | |
| 1,2-Dichlorobenzene | µg/L | 3 | | | | | | | | | | | | |
| 1,2-Dichloroethane | µg/L | 5 * | | | | | | | | | | | | |
| 1,2-Dichlorpropane | µg/L | | | | | | | | | | | | | |
| 1,3-Dichlorobenzene | µg/L | | | | | | | | | | | | | |
| 1,3-Dichloropropene(E) | µg/L | | | | | | | | | | | | | |
| 1,3-Dichloropropene(Z) | µg/L | | | | | | | | | | | | | |
| 1,4-Dichlorobenzene | µg/L | 1 | | | | | | | | | | | | |
| Benzene | µg/L | 1 * | | | | | | | | | | | | |
| Bromodichloromethane | µg/L | | | | | | | | | | | | | |
| Bromoform | µg/L | | | | | | | | | | | | | |
| Bromomethane | µg/L | | | | | | | | | | | | | |
| Carbon Tetrachloride | µg/L | 5 * | | | | | | | | | | | | |
| Chlorobenzene | µg/L | 30 | | | | | | | | | | | | |
| Chloroethane | µg/L | | | | | | | | | | | | | |
| Chloroform | µg/L | | | | | | | | | | | | | |
| Chloromethane | µg/L | | | | | | | | | | | | | |
| cis-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | |
| Dibromochloromethane | µg/L | | | | | | | | | | | | | |
| Dichloromethane | µg/L | 50 * | | | | | | | | | | | | |
| Ethyl Benzene | µg/L | 1.6 | | | | | | | | | | | | |
| Ethylene dibromide | µg/L | | | | | | | | | | | | | |
| m/p-Xylenes | µg/L | 20 ** | | | | | | | | | | | | |
| o-Xylene | µg/L | 20 ** | | | | | | | | | | | | |
| Styrene | µg/L | | | | | | | | | | | | | |
| Tetrachloroethylene | µg/L | 30 * | | | | | | | | | | | | |
| Toluene | µg/L | 24 | | | | | | | | | | | | |
| trans-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | |
| Trichloroethylene | µg/L | 5 * | | | | | | | | | | | | |
| Trichlorofluoromethane | µg/L | | | | | | | | | | | | | |
| Vinyl Chloride | µg/L | 1 * | | | | | | | | | | | | |
| Xylenes - total | µg/L | 20 ** | | | | | | | | | | | | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 46-III | | | 48 | | | | | | | | 50-I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-20 | Mar-21 | Mar-22 | Mar-17 | Oct-17 | Apr-18 | Apr-19 | Apr-20 | Mar-21 | Oct-21 | Mar-22 | Apr-17 |
| Alkalinity | mg/L | 30-500 | 232 | 257 | 286 | 689 | 693 | 917 | 712 | 787 | 704 | 689 | 774 | 200 |
| Aluminum | mg/L | 0.1 | | | | <0.025 | | <0.025 | <0.025 | <0.025 | <0.025 | | <0.025 | |
| Ammonia (as N) | mg/L | | <0.1 | 0.1 | 0.2 | 1 | 1 | 2 | 0.8 | 0.8 | 0.9 | 1.4 | 1.1 | 1.3 |
| Anion sum | meq/L | | 5.85 | 6.42 | 6.83 | 22 | 21.1 | 20.8 | 23.5 | 17.8 | 21.4 | 15.9 | 17.2 | 8.01 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.005 | 0.0021 | 0.0025 | 0.0017 | 0.0006 | 0.0007 | 0.0017 | <0.0005 |
| Barium | mg/L | 1 * | | | | 0.298 | | 0.26 | 0.298 | 0.226 | 0.269 | | 0.206 | |
| Beryllium | mg/L | | | | | <0.0001 | | <0.0001 | <0.0005 | <0.0005 | <0.0005 | | <0.0005 | |
| Bicarbonate | mg/L | | 231 | 256 | 285 | 689 | 693 | 917 | 712 | 787 | 704 | 689 | 774 | 198 |
| Boron | mg/L | 5 * | | | | 0.0161 | | 0.0157 | 0.0138 | 0.0159 | 0.0179 | | 0.0123 | |
| Cadmium | mg/L | 0.005 * | | | | <0.0001 | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | | <0.0001 | |
| Calcium | mg/L | | 115 | 110 | 131 | 288 | 230 | 288 | 248 | 275 | 274 | 225 | 275 | 36.2 |
| Carbonate | mg/L | | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 2 |
| Cation sum | meq/L | | 6.37 | 6.23 | 7.35 | 23 | 19.1 | 18.6 | 19.8 | 18.1 | 21.6 | 15.7 | 20 | 7.44 |
| Chloride | mg/L | 250 | 15.6 | 16.3 | 13.8 | 300 | 265 | 93.3 | 335 | 75.9 | 264 | 83.4 | 68.8 | 133 |
| Chromium | mg/L | 0.05 * | | | | <0.0005 | | <0.0005 | <0.0005 | <0.0005 | <0.0005 | | <0.0005 | |
| Cobalt | mg/L | | | | | 0.0001 | | 0.0029 | <0.0005 | 0.0022 | <0.0005 | | 0.0008 | |
| Chemical Oxygen Demand | mg/L | | 30 | 10 | <10 | 20 | 40 | 30 | 20 | 20 | <10 | 20 | 10 | <10 |
| Conductivity | µS/cm | | 604 | 635 | 696 | 2070 | 1920 | 1650 | 2060 | 1580 | 2070 | 1520 | 1510 | 827 |
| Conductivity - field | µS/cm | | 590 | 653 | 664 | 2150 | 1980 | 1730 | 2180 | 1660 | 2170 | 1530 | 1520 | 842 |
| Copper | mg/L | 1 | | | | <0.0005 | | <0.0005 | <0.0005 | 0.0007 | <0.0005 | | <0.0005 | |
| Dissolved Organic Carbon | mg/L | 5 | 3.4 | 3.2 | 2.3 | 4.3 | 3.2 | 8.1 | 4 | 5.1 | 3.6 | 5.9 | 5.2 | 3 |
| Dissolved Oxygen - field | mg/L | | 4.38 | 3.54 | 3.02 | 3.81 | 3.6 | 2.06 | 2.03 | 2.49 | 3.49 | 2.76 | 1.67 | 2.25 |
| Hardness | mg/L | 80-100 | 306 | 297 | 353 | 817 | 688 | 851 | 736 | 813 | 804 | 649 | 815 | 179 |
| Ion Percentage | % | | 4.28 | 1.48 | 3.65 | 2.38 | 5 | 5.61 | 8.56 | 0.64 | 0.48 | 0.62 | 7.42 | 3.7 |
| Iron | mg/L | 0.3 | 0.273 | <0.005 | <0.005 | 32.7 | 19.3 | 35 | 27.8 | 37.5 | 33.5 | 23.5 | 34.2 | 0.082 |
| Lead | mg/L | 0.01 * | | | | <0.0005 | | <0.0005 | <0.0005 | <0.0005 | <0.0005 | | <0.0005 | |
| Magnesium | mg/L | | 4.66 | 5.33 | 6.19 | 23.7 | 27.5 | 32 | 28.4 | 30.6 | 29.2 | 21.1 | 31.1 | 21.6 |
| Manganese | mg/L | 0.05 | 0.0103 | 0.0083 | 0.0015 | 1.04 | 0.84 | 0.908 | 0.991 | 1.04 | 0.964 | 0.697 | 0.68 | 0.0059 |
| Molybdenum | mg/L | | | | | <0.0005 | | <0.0005 | <0.0005 | <0.0005 | <0.0005 | | <0.0005 | |
| Nickel | mg/L | | | | | <0.002 | | <0.002 | <0.002 | 0.003 | <0.002 | | <0.002 | |
| Nitrate | mg/L | 10.0 * | 8.8 | 10.1 | 8.94 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 |
| Oxydation Reduction Potential | mV | | 76.7 | 44.8 | 84.9 | -67.8 | -62.1 | -82.1 | -57.8 | -14.4 | -67.6 | -84.6 | -132.6 | -20.6 |
| pH | units | | 7.67 | 7.59 | 7.56 | 6.8 | 6.86 | 6.51 | 6.66 | 6.59 | 6.58 | 6.66 | 6.66 | 7.92 |
| pH - field | units | | 7.36 | 7.37 | 7.11 | 6.4 | 6.37 | 6.23 | 6.24 | 6.43 | 6.65 | 6.36 | 6.35 | 7.53 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | 0.03 | <0.02 | 0.03 | 0.04 | 0.04 | <0.02 | <0.02 | 0.02 | 0.02 | <0.02 | 0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | <0.5 | <0.5 | <0.5 | 2.4 | 2.3 | 1.7 | 2.2 | 1.4 | 2 | 1.7 | 1.9 | 7.2 |
| Sodium | mg/L | 200 | 5.4 | 6.4 | 6.2 | 150 | 119 | 31.5 | 113 | 38.7 | 123 | 59.3 | 80.2 | 81.6 |
| Sulphate | mg/L | 500 | 14.1 | 12.7 | 13.1 | 8.7 | 11.4 | 22.5 | 14 | 23.2 | 16.1 | 12 | 13.8 | 18.8 |
| Total Dissolved Solids | mg/L | 500 | 380 | 390 | 420 | 1180 | 1150 | 1010 | 1250 | 970 | 1140 | 890 | 890 | 370 |
| Temperature - field | °C | | 3.5 | 4.7 | 3.6 | 7.7 | 9.5 | 6.9 | 8.2 | 8.6 | 6.6 | 14.4 | 7.5 | 8.6 |
| Total Kjeldahl Nitrogen | mg/L | | <1 | 1.9 | <2.0 | 1 | 1 | 2 | 1 | 0.8 | 0.1 | 1.3 | 1 | 1 |
| Zinc | mg/L | 5 | | | | 0.001 | | 0.0006 | 0.0016 | 0.0014 | 0.0009 | | 0.0008 | |
| Phenols | µg/L | | <1 | 2 | <1 | <1 | 2 | 2 | <1 | <1 | <1 | 1 | <1 | 1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | |
| 1,1,2-Trichlorethane | µg/L | | | | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethane | µg/L | | | | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | | | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | | | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | | | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | |
| 1,2-Dichlorpropane | µg/L | | | | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | |
| 1,3-Dichlorobenzene | µg/L | | | | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | | | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | | | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | | | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | |
| Benzene | µg/L | 1 * | | | | 1.8 | | 1.6 | 1.2 | 2.5 | 2 | | 1.6 | |
| Bromodichloromethane | µg/L | | | | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | |
| Bromoform | µg/L | | | | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | |
| Bromomethane | µg/L | | | | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | | | | <0.2 | | <0.2 | <0.2 | <0.2 | < 0.2 | | < 0.2 | |
| Chlorobenzene | µg/L | 30 | | | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | |
| Chloroethane | µg/L | | | | | 9.2 | | 13.9 | 9 | 11 | 8.4 | | 6.2 | |
| Chloroform | µg/L | | | | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | |
| Chloromethane | µg/L | | | | | <5 | | <5 | <5 | <5 | < 5 | | < 5 | |
| cis-1,2-Dichloroethylene | µg/L | | | | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | |
| Dibromochloromethane | µg/L | | | | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | |
| Dichloromethane | µg/L | 50 * | | | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | |
| Ethyl Benzene | µg/L | 1.6 | | | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | |
| Ethylene dibromide | µg/L | | | | | <0.2 | | <0.2 | <0.2 | <0.2 | < 0.2 | | < 0.2 | |
| m/p-Xylenes | µg/L | 20 ** | | | | <0.5 | | 0.5 | <0.5 | 0.5 | < 0.5 | | < 0.5 | |
| o-Xylene | µg/L | 20 ** | | | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | |
| Styrene | µg/L | | | | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | |
| Tetrachloroethylene | µg/L | 30 * | | | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | |
| Toluene | µg/L | 24 | | | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | | | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | |
| Trichloroethylene | µg/L | 5 * | | | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | |
| Trichlorofluoromethane | µg/L | | | | | <5 | | <5 | <5 | <5 | < 5 | | < 5 | |
| Vinyl Chloride | µg/L | 1 * | | | | <0.2 | | <0.2 | <0.2 | <0.2 | < 0.2 | | < 0.2 | |
| Xylenes - total | µg/L | 20 ** | | | | <0.5 | | 0.5 | <0.5 | 0.5 | < 0.5 | | < 0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 50-I | | | | | 50-II | | | | | | 50-III |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-18 | Apr-19 | May-20 | Apr-21 | Apr-22 | Apr-17 | Apr-18 | Apr-19 | May-20 | Apr-21 | Apr-22 | Apr-17 |
| Alkalinity | mg/L | 30-500 | 214 | 202 | 214 | 226 | 227 | 286 | 338 | 293 | 279 | 307 | 266 | 205 |
| Aluminum | mg/L | 0.1 | | | | | | | | | | | | |
| Ammonia (as N) | mg/L | | 1.3 | 1.2 | 0.3 | 0.6 | 0.1 | 0.2 | 0.3 | 0.2 | <0.1 | 0.3 | 0.2 | 0.2 |
| Anion sum | meq/L | | 7.33 | 7.15 | 6.74 | 8.23 | 6.79 | 13.4 | 12.1 | 13.1 | 11.9 | 13.8 | 12.9 | 7.33 |
| Arsenic | mg/L | 0.025 | <0.005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0009 | <0.005 | 0.0009 | 0.0008 | <0.0005 | 0.0007 | <0.0005 |
| Barium | mg/L | 1 * | | | | | | | | | | | | |
| Beryllium | mg/L | | | | | | | | | | | | | |
| Bicarbonate | mg/L | | 213 | 200 | 212 | 225 | 226 | 285 | 337 | 292 | 278 | 306 | 265 | 204 |
| Boron | mg/L | 5 * | | | | | | | | | | | | |
| Cadmium | mg/L | 0.005 * | | | | | | | | | | | | |
| Calcium | mg/L | | 41.9 | 34.2 | 81.3 | 74 | 76.3 | 92.4 | 105 | 109 | 115 | 124 | 130 | 89.5 |
| Carbonate | mg/L | | <1 | 2 | 2 | <1 | <1 | 1 | <1 | 1 | 1 | <1 | <1 | 1 |
| Cation sum | meq/L | | 7.61 | 7.08 | 7.33 | 8.38 | 7.2 | 12.3 | 12.3 | 12.3 | 12.8 | 13.4 | 14 | 7.07 |
| Chloride | mg/L | 250 | 106 | 110 | 74.6 | 116 | 71.1 | 252 | 171 | 236 | 200 | 245 | 240 | 88.8 |
| Chromium | mg/L | 0.05 * | | | | | | | | | | | | |
| Cobalt | mg/L | | | | | | | | | | | | | |
| Chemical Oxygen Demand | mg/L | | 40 | <10 | 30 | 30 | 10 | <10 | 30 | <10 | <10 | <10 | <10 | <10 |
| Conductivity | µS/cm | | 777 | 790 | 722 | 857 | 720 | 1310 | 1210 | 1280 | 1270 | 1410 | 1440 | 738 |
| Conductivity - field | µS/cm | | 761 | 583 | 712 | 869 | 681 | 1320 | 1190 | 1390 | 1250 | 1390 | 1330 | 744 |
| Copper | mg/L | 1 | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 5 | 3.3 | 2.7 | 6.8 | 4.8 | 5.7 | 2.4 | 2.3 | 2.4 | 2.8 | 1.9 | 1.8 | 6.7 |
| Dissolved Oxygen - field | mg/L | | 1.4 | 1.88 | 2.11 | 1.32 | 2.5 | 2.53 | 2.41 | 2.08 | 2.74 | 3.42 | 6.61 | 5.32 |
| Hardness | mg/L | 80-100 | 196 | 169 | 271 | 272 | 256 | 372 | 407 | 425 | 441 | 472 | 486 | 258 |
| Ion Percentage | % | | 1.9 | 0.47 | 4.19 | 0.9 | 2.99 | 4.25 | 1.1 | 3.25 | 3.77 | 1.55 | 4.21 | 1.81 |
| Iron | mg/L | 0.3 | 0.05 | 0.012 | 0.142 | 0.115 | 0.009 | 0.879 | 0.22 | 1.03 | 0.953 | 0.213 | 0.776 | 0.002 |
| Lead | mg/L | 0.01 * | | | | | | | | | | | | |
| Magnesium | mg/L | | 22.2 | 20.2 | 16.5 | 21.3 | 15.9 | 34.3 | 35.1 | 37 | 37.4 | 39.4 | 39.2 | 8.37 |
| Manganese | mg/L | 0.05 | 0.008 | 0.0056 | 0.0137 | 0.014 | 0.004 | 0.0242 | 0.013 | 0.0262 | 0.0266 | 0.0161 | 0.0249 | <0.0005 |
| Molybdenum | mg/L | | | | | | | | | | | | | |
| Nickel | mg/L | | | | | | | | | | | | | |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 |
| Oxydation Reduction Potential | mV | | -138.4 | -47.2 | 112 | -86.8 | 240.7 | -52.4 | -55.7 | -83.1 | 6.4 | -10.1 | 110.6 | 26.3 |
| pH | units | | 7.66 | 7.94 | 7.91 | 7.64 | 7.52 | 7.71 | 7.45 | 7.59 | 7.69 | 7.46 | 7.32 | 7.75 |
| pH - field | units | | 7.6 | 7.76 | 7.83 | 7.69 | 7.35 | 7.29 | 7.2 | 7.32 | 7.37 | 7.39 | 7.3 | 7.34 |
| Phosphate | mg/L | | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | <0.01 | 0.03 | <0.02 | <0.02 | <0.02 | <0.02 | <0.01 | 0.03 | <0.02 | 0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 7.1 | 6.5 | 3.9 | 5.9 | 4.4 | 2.9 | 3.1 | 2.8 | 2.8 | 3.1 | 3.4 | 2 |
| Sodium | mg/L | 200 | 78 | 79.1 | 40.6 | 62.4 | 44.7 | 108 | 93.1 | 84.4 | 89 | 87.3 | 94.9 | 42.1 |
| Sulphate | mg/L | 500 | 9.7 | 7 | 23.8 | 28.5 | 18.8 | 34.6 | 33.6 | 38.4 | 40.6 | 46.1 | 45.9 | 41.4 |
| Total Dissolved Solids | mg/L | 500 | 410 | 420 | 440 | 490 | 350 | 650 | 650 | 740 | 710 | 760 | 730 | 430 |
| Temperature - field | °C | | 7.3 | 9.3 | 9.7 | 9.4 | 7.2 | 7.8 | 7 | 8.1 | 8 | 6.4 | 6.5 | 5.7 |
| Total Kjeldahl Nitrogen | mg/L | | 1.7 | 0.8 | 0.3 | 0.2 | 0.3 | 0.2 | 0.7 | 0.2 | <0.2 | <0.1 | <0.2 | 0.2 |
| Zinc | mg/L | 5 | | | | | | | | | | | | |
| Phenols | µg/L | | 1 | <1 | <1 | 2 | <1 | <1 | 1 | <1 | 1 | 2 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | | | | | | | | | | | |
| 1,1,2-Trichlorethane | µg/L | | | | | | | | | | | | | |
| 1,1-Dichloroethane | µg/L | | | | | | | | | | | | | |
| 1,1-Dichloroethylene | µg/L | 14 * | | | | | | | | | | | | |
| 1,2-Dichlorobenzene | µg/L | 3 | | | | | | | | | | | | |
| 1,2-Dichloroethane | µg/L | 5 * | | | | | | | | | | | | |
| 1,2-Dichlorpropane | µg/L | | | | | | | | | | | | | |
| 1,3-Dichlorobenzene | µg/L | | | | | | | | | | | | | |
| 1,3-Dichloropropene(E) | µg/L | | | | | | | | | | | | | |
| 1,3-Dichloropropene(Z) | µg/L | | | | | | | | | | | | | |
| 1,4-Dichlorobenzene | µg/L | 1 | | | | | | | | | | | | |
| Benzene | µg/L | 1 * | | | | | | | | | | | | |
| Bromodichloromethane | µg/L | | | | | | | | | | | | | |
| Bromoform | µg/L | | | | | | | | | | | | | |
| Bromomethane | µg/L | | | | | | | | | | | | | |
| Carbon Tetrachloride | µg/L | 5 * | | | | | | | | | | | | |
| Chlorobenzene | µg/L | 30 | | | | | | | | | | | | |
| Chloroethane | µg/L | | | | | | | | | | | | | |
| Chloroform | µg/L | | | | | | | | | | | | | |
| Chloromethane | µg/L | | | | | | | | | | | | | |
| cis-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | |
| Dibromochloromethane | µg/L | | | | | | | | | | | | | |
| Dichloromethane | µg/L | 50 * | | | | | | | | | | | | |
| Ethyl Benzene | µg/L | 1.6 | | | | | | | | | | | | |
| Ethylene dibromide | µg/L | | | | | | | | | | | | | |
| m/p-Xylenes | µg/L | 20 ** | | | | | | | | | | | | |
| o-Xylene | µg/L | 20 ** | | | | | | | | | | | | |
| Styrene | µg/L | | | | | | | | | | | | | |
| Tetrachloroethylene | µg/L | 30 * | | | | | | | | | | | | |
| Toluene | µg/L | 24 | | | | | | | | | | | | |
| trans-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | |
| Trichloroethylene | µg/L | 5 * | | | | | | | | | | | | |
| Trichlorofluoromethane | µg/L | | | | | | | | | | | | | |
| Vinyl Chloride | µg/L | 1 * | | | | | | | | | | | | |
| Xylenes - total | µg/L | 20 ** | | | | | | | | | | | | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 50-III | | | | | | | | | | | 52-I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Oct-17 | Apr-18 | Oct-18 | Apr-19 | Oct-19 | May-20 | Sep-20 | Apr-21 | Oct-21 | Apr-22 | Sep-22 | Apr-17 |
| Alkalinity | mg/L | 30-500 | 350 | 248 | | 180 | | 251 | | 260 | | 232 | | 254 |
| Aluminum | mg/L | 0.1 | <0.01 | | | | | | | | | | | |
| Ammonia (as N) | mg/L | | 0.2 | 0.2 | | 0.2 | | <0.1 | | 0.2 | | 0.1 | | 2.7 |
| Anion sum | meq/L | | 12.2 | 8.37 | | 5.3 | | 7.68 | | 8.67 | | 6.72 | | 66.3 |
| Arsenic | mg/L | 0.025 | <0.005 | <0.005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Barium | mg/L | 1 * | 0.054 | | | | | | | | | | | |
| Beryllium | mg/L | | <0.001 | | | | | | | | | | | |
| Bicarbonate | mg/L | | 349 | 247 | | 179 | | 250 | | 259 | | 231 | | 253 |
| Boron | mg/L | 5 * | 0.04 | | | | | | | | | | | 0.54 |
| Cadmium | mg/L | 0.005 * | <0.001 | | | | | | | | | | | |
| Calcium | mg/L | | 145 | 112 | | 59.6 | | 109 | | 107 | | 93.8 | | 179 |
| Carbonate | mg/L | | <1 | <1 | | 1 | | 1 | | <1 | | <1 | | 1 |
| Cation sum | meq/L | | 11.1 | 8.48 | | 4.96 | | 8.22 | | 8.48 | | 7 | | 43.9 |
| Chloride | mg/L | 250 | 149 | 106 | | 52 | | 85.2 | | 101 | | 67.5 | | 2180 |
| Chromium | mg/L | 0.05 * | <0.001 | | | | | | | | | | | |
| Cobalt | mg/L | | <0.002 | | | | | | | | | | | |
| Chemical Oxygen Demand | mg/L | | 10 | 20 | | <10 | | 10 | | 30 | | <10 | | 20 |
| Conductivity | μS/cm | | 1140 | 837 | | 533 | | 811 | | 880 | | 697 | | 4860 |
| Conductivity - field | μS/cm | | 1160 | 822 | 1070 | 548 | 881 | 799 | 1140 | 880 | 749 | 659 | 954 | 4630 |
| Copper | mg/L | 1 | <0.005 | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 5 | 7 | 5.4 | | 6.3 | | 7.6 | | 5 | | 5.1 | | <1.0 |
| Dissolved Oxygen - field | mg/L | | 4.9 | 5.54 | 3.17 | 3.98 | 2.25 | 2.6 | 4.42 | 7.69 | 4.98 | 4.62 | 4.9 | 2.21 |
| Hardness | mg/L | 80-100 | 418 | 320 | | 170 | | 310 | | 307 | | 270 | | 912 |
| Ion Percentage | % | | 4.68 | 0.67 | | 3.32 | | 3.41 | | 1.12 | | 2.03 | | 20.3 |
| Iron | mg/L | 0.3 | <0.05 | <0.05 | | <0.001 | | 0.027 | | <0.005 | | 0.012 | | 0.615 |
| Lead | mg/L | 0.01 * | 0.0032 | | | | | | | | | | | |
| Magnesium | mg/L | | 13.6 | 9.7 | | 5.08 | | 9.09 | | 9.71 | | 8.58 | | 113 |
| Manganese | mg/L | 0.05 | 0.002 | <0.001 | | 0.0016 | | 0.0184 | | 0.0018 | | 0.0035 | | 0.0849 |
| Molybdenum | mg/L | | <0.005 | | | | | | | | | | | |
| Nickel | mg/L | | <0.005 | | | | | | | | | | | |
| Nitrate | mg/L | 10.0 * | 1.36 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Oxydation Reduction Potential | mV | | 41.9 | 31.1 | 28.4 | 23.2 | -45.7 | 82.9 | 48.5 | 46.7 | 58.2 | 319.4 | 174.6 | -125.9 |
| pH | units | | 7.24 | 7.49 | | 7.86 | | 7.77 | | 7.53 | | 7.45 | | 7.69 |
| pH - field | units | | 6.99 | 7.25 | 7.17 | 7.69 | 7.64 | 7.45 | 7.39 | 7.42 | 7.2 | 7.46 | 6.98 | 7.31 |
| Phosphate | mg/L | | <0.01 | <0.01 | | <0.02 | | <0.02 | | <0.02 | | <0.02 | | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | | 0.04 | | 0.02 | | 0.04 | | <0.02 | | 0.03 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 2.6 | 1.6 | | 1.5 | | 2.6 | | 1.9 | | 2.1 | | 19.5 |
| Sodium | mg/L | 200 | 59.9 | 46.4 | | 34.5 | | 44.8 | | 51.9 | | 35.3 | | 572 |
| Sulphate | mg/L | 500 | 52.3 | 28.1 | | 16.8 | | 20.4 | | 38.2 | | 16 | | <2.0 |
| Total Dissolved Solids | mg/L | 500 | 730 | 480 | | 300 | | 500 | | 490 | | 360 | | 3450 |
| Temperature - field | °C | | 13.6 | 2.7 | 12.9 | 2.8 | 12.3 | 7.9 | 13.2 | 3.6 | 15.2 | 2.5 | 13.8 | 7.4 |
| Total Kjeldahl Nitrogen | mg/L | | 0.4 | 2.8 | | 0.3 | | 0.3 | | <0.1 | | 0.2 | | 2.1 |
| Zinc | mg/L | 5 | <0.02 | | | | | | | | | | | |
| Phenols | μg/L | | 1 | 1 | | 1 | | <1 | | <1 | | <1 | | <1 |
| 1,1,2,2-Tetrachlorethane | μg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1,2-Trichlorethane | μg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethane | μg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethylene | μg/L | 14 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorobenzene | μg/L | 3 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichloroethane | μg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorpropane | μg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichlorobenzene | μg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(E) | μg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(Z) | μg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,4-Dichlorobenzene | μg/L | 1 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Benzene | μg/L | 1 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromodichloromethane | μg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromoform | μg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromomethane | μg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Carbon Tetrachloride | μg/L | 5 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Chlorobenzene | μg/L | 30 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloroethane | μg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Chloroform | μg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloromethane | μg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| cis-1,2-Dichloroethylene | μg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dibromochloromethane | μg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dichloromethane | μg/L | 50 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethyl Benzene | μg/L | 1.6 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethylene dibromide | μg/L | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| m/p-Xylenes | μg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| o-Xylene | μg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Styrene | μg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Tetrachloroethylene | μg/L | 30 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Toluene | μg/L | 24 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| trans-1,2-Dichloroethylene | μg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichloroethylene | μg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichlorofluoromethane | μg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Vinyl Chloride | μg/L | 1 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Xylenes - total | μg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 52-I | | | | | 52-II | | | | | 53-I | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-18 | Apr-19 | May-20 | Apr-21 | Apr-22 | Apr-15 | Apr-16 | Apr-17 | Apr-18 | Apr-19 | Apr-17 | Apr-18 |
| Alkalinity | mg/L | 30-500 | 354 | 253 | 253 | 260 | 253 | 431 | 432 | 268 | 365 | 322 | 308 | 275 |
| Aluminum | mg/L | 0.1 | | | | | | | | | | | | |
| Ammonia (as N) | mg/L | | 2.7 | 3.3 | 2.1 | 3 | 3.3 | <0.1 | 0.2 | 0.2 | 0.3 | 0.2 | 0.2 | 0.2 |
| Anion sum | meq/L | | 40.1 | 81.2 | 76.3 | 41.4 | 81.2 | 18.7 | 18.4 | 20.5 | 17.7 | 18.1 | 7.31 | 6.46 |
| Arsenic | mg/L | 0.025 | <0.005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0005 | <0.005 | <0.0005 | <0.0005 | <0.005 |
| Barium | mg/L | 1 * | | | | | | | | | | | | |
| Beryllium | mg/L | | | | | | | | | | | | | |
| Bicarbonate | mg/L | | 352 | 253 | 252 | 259 | 253 | 430 | 431 | 266 | 364 | 321 | 307 | 274 |
| Boron | mg/L | 5 * | | | | | | | | | | | | |
| Cadmium | mg/L | 0.005 * | | | | | | | | | | | | |
| Calcium | mg/L | | 200 | 228 | 241 | 172 | 228 | 224 | 242 | 232 | 287 | 247 | 98.4 | 105 |
| Carbonate | mg/L | | 2 | <1 | 1 | <1 | <1 | <1 | 1 | 2 | <1 | <1 | 1 | <1 |
| Cation sum | meq/L | | 51.7 | 53.3 | 61.1 | 40.4 | 53.3 | 15.9 | 17.1 | 16.4 | 20.6 | 18.1 | 7.61 | 8.12 |
| Chloride | mg/L | 250 | 1180 | 2710 | 2530 | 1290 | 2710 | 211 | 200 | 382 | 240 | 281 | 3.9 | 2.7 |
| Chromium | mg/L | 0.05 * | | | | | | | | | | | | |
| Cobalt | mg/L | | | | | | | | | | | | | |
| Chemical Oxygen Demand | mg/L | | 60 | 30 | 40 | 40 | 30 | <10 | <10 | 20 | 30 | <10 | <10 | 40 |
| Conductivity | µS/cm | | 4740 | 9250 | 6140 | 5040 | 9250 | 1630 | 1690 | 1630 | 1700 | 1760 | 680 | 644 |
| Conductivity - field | µS/cm | | 3890 | 4090 | 5650 | 4670 | 4090 | 1520 | 1650 | 1650 | 1760 | 1890 | 678 | 660 |
| Copper | mg/L | 1 | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 5 | 1.2 | <1.0 | <1.0 | <1.0 | <1.0 | 4.4 | 6 | 7.9 | 5.1 | 3.9 | 2 | 2 |
| Dissolved Oxygen - field | mg/L | | 1.61 | 0.82 | 5.74 | 1.93 | 0.82 | 3.06 | 1.77 | 2.46 | 3.22 | 2.87 | 1.06 | 1.75 |
| Hardness | mg/L | 80-100 | 1060 | 1210 | 1310 | 882 | 1210 | 728 | 776 | 698 | 912 | 807 | 363 | 384 |
| Ion Percentage | % | | 12.6 | 20.8 | 11.1 | 1.19 | 20.8 | 8.15 | 3.58 | 11.1 | 7.58 | 0.02 | 2.06 | 11.4 |
| Iron | mg/L | 0.3 | 1.9 | 4.73 | 3.38 | 0.992 | 4.73 | 0.13 | 0.054 | 0.07 | 0.59 | 0.28 | 1.17 | 1.25 |
| Lead | mg/L | 0.01 * | | | | | | | | | | | | |
| Magnesium | mg/L | | 135 | 156 | 173 | 110 | 156 | 40.9 | 41.8 | 28.9 | 47.4 | 46.1 | 28.6 | 29.7 |
| Manganese | mg/L | 0.05 | 0.069 | 0.108 | 0.0672 | 0.0518 | 0.108 | 0.0897 | 0.0621 | 0.135 | 0.226 | 0.128 | 0.0189 | 0.02 |
| Molybdenum | mg/L | | | | | | | | | | | | | |
| Nickel | mg/L | | | | | | | | | | | | | |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.05 | <0.5 | <0.5 | <0.05 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.05 | <0.5 | <0.5 | <0.05 | <0.5 |
| Oxydation Reduction Potential | mV | | 51.7 | -113.5 | -87.3 | -108.1 | -113.5 | 25.5 | 15.5 | -51.2 | 68.5 | -5.2 | -85.2 | 5.7 |
| pH | units | | 7.76 | 7.22 | 7.71 | 7.6 | 7.22 | 7.32 | 7.52 | 7.79 | 7.23 | 7.37 | 7.61 | 7.34 |
| pH - field | units | | 7.48 | 7.52 | 7.51 | 7.66 | 7.52 | 6.88 | 7.05 | 7.21 | 6.91 | 7.15 | 7.16 | 7 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | 0.04 | <0.02 | 0.04 | 0.12 | <0.02 | 0.04 | 0.04 | 0.04 | 0.03 | 0.01 | <0.02 | 0.03 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 22.7 | 24.4 | 23.6 | 18.1 | 24.4 | 1.1 | 1.2 | 0.8 | 1.2 | 1.3 | 1.7 | 1.7 |
| Sodium | mg/L | 200 | 682 | 644 | 779 | 506 | 644 | 28.6 | 34.2 | 54.5 | 52.2 | 42.2 | 5.8 | 7.7 |
| Sulphate | mg/L | 500 | <2 | <2 | 5.3 | 2.5 | <2 | 212 | 211 | 220 | 187 | 189 | 59.4 | 51.2 |
| Total Dissolved Solids | mg/L | 500 | 2370 | 5180 | 4230 | 2770 | 5180 | 990 | 1120 | 1320 | 1190 | 1260 | 420 | 410 |
| Temperature - field | °C | | 6.4 | 6.8 | 9.7 | 7.9 | 6.8 | 3.3 | 6.2 | 4.7 | 4.5 | 5 | 8.4 | 8 |
| Total Kjeldahl Nitrogen | mg/L | | 2 | 5.3 | 4.7 | 5.9 | 5.3 | 0.2 | 0.1 | 0.6 | 0.2 | 0.2 | 0.1 | <0.1 |
| Zinc | mg/L | 5 | | | | | | | | | | | | |
| Phenols | µg/L | | <1 | <1 | 2 | <1 | <1 | <1 | 8 | <1 | <1 | <1 | <1 | 2 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | | | | | | | | | | | |
| 1,1,2-Trichlorethane | µg/L | | | | | | | | | | | | | |
| 1,1-Dichloroethane | µg/L | | | | | | | | | | | | | |
| 1,1-Dichloroethylene | µg/L | 14 * | | | | | | | | | | | | |
| 1,2-Dichlorobenzene | µg/L | 3 | | | | | | | | | | | | |
| 1,2-Dichloroethane | µg/L | 5 * | | | | | | | | | | | | |
| 1,2-Dichlorpropane | µg/L | | | | | | | | | | | | | |
| 1,3-Dichlorobenzene | µg/L | | | | | | | | | | | | | |
| 1,3-Dichloropropene(E) | µg/L | | | | | | | | | | | | | |
| 1,3-Dichloropropene(Z) | µg/L | | | | | | | | | | | | | |
| 1,4-Dichlorobenzene | µg/L | 1 | | | | | | | | | | | | |
| Benzene | µg/L | 1 * | | | | | | | | | | | | |
| Bromodichloromethane | µg/L | | | | | | | | | | | | | |
| Bromoform | µg/L | | | | | | | | | | | | | |
| Bromomethane | µg/L | | | | | | | | | | | | | |
| Carbon Tetrachloride | µg/L | 5 * | | | | | | | | | | | | |
| Chlorobenzene | µg/L | 30 | | | | | | | | | | | | |
| Chloroethane | µg/L | | | | | | | | | | | | | |
| Chloroform | µg/L | | | | | | | | | | | | | |
| Chloromethane | µg/L | | | | | | | | | | | | | |
| cis-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | |
| Dibromochloromethane | µg/L | | | | | | | | | | | | | |
| Dichloromethane | µg/L | 50 * | | | | | | | | | | | | |
| Ethyl Benzene | µg/L | 1.6 | | | | | | | | | | | | |
| Ethylene dibromide | µg/L | | | | | | | | | | | | | |
| m/p-Xylenes | µg/L | 20 ** | | | | | | | | | | | | |
| o-Xylene | µg/L | 20 ** | | | | | | | | | | | | |
| Styrene | µg/L | | | | | | | | | | | | | |
| Tetrachloroethylene | µg/L | 30 * | | | | | | | | | | | | |
| Toluene | µg/L | 24 | | | | | | | | | | | | |
| trans-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | |
| Trichloroethylene | µg/L | 5 * | | | | | | | | | | | | |
| Trichlorofluoromethane | µg/L | | | | | | | | | | | | | |
| Vinyl Chloride | µg/L | 1 * | | | | | | | | | | | | |
| Xylenes - total | µg/L | 20 ** | | | | | | | | | | | | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 53-I | | | | 54-II | | | | | | 61-I | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-19 | May-20 | Mar-21 | Mar-22 | Apr-17 | Apr-18 | Apr-19 | May-20 | Mar-21 | Mar-22 | Apr-17 | Mar-18 |
| Alkalinity | mg/L | 30-500 | 315 | 310 | 314 | 348 | 318 | 324 | 315 | 290 | 347 | 311 | 172 | 179 |
| Aluminum | mg/L | 0.1 | | | | | | | | | | | | |
| Ammonia (as N) | mg/L | | 0.2 | <0.1 | 0.1 | 0.7 | 0.2 | 0.2 | 0.2 | <0.1 | 0.1 | 0.2 | 0.6 | 0.3 |
| Anion sum | meq/L | | 7.17 | 6.98 | 7.08 | 7.43 | 7.97 | 8.34 | 8.59 | 6.68 | 8.41 | 6.63 | 4.6 | 4.24 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.0005 | <0.0005 | 0.0035 | <0.0005 | <0.005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.005 |
| Barium | mg/L | 1 * | | | | | | | | | | | | |
| Beryllium | mg/L | | | | | | | | | | | | | |
| Bicarbonate | mg/L | | 314 | 309 | 313 | 347 | 317 | 324 | 313 | 289 | 346 | 310 | 170 | 177 |
| Boron | mg/L | 5 * | | | | | | | | | | | | |
| Cadmium | mg/L | 0.005 * | | | | | | | | | | | | |
| Calcium | mg/L | | 91.4 | 96.4 | 88.9 | 117 | 140 | 150 | 140 | 121 | 139 | 125 | 20.4 | 18.6 |
| Carbonate | mg/L | | <1 | <1 | <1 | <1 | 1 | <1 | 2 | <1 | <1 | <1 | 2 | 2 |
| Cation sum | meq/L | | 7.14 | 7.53 | 7.09 | 8.45 | 8.36 | 8.93 | 8.4 | 7.19 | 8.5 | 7.47 | 4.41 | 4.37 |
| Chloride | mg/L | 250 | 1.7 | 2 | 1.4 | 1.1 | 35.8 | 46.8 | 50.4 | 15.4 | 28.2 | 10.2 | 13.8 | 8.2 |
| Chromium | mg/L | 0.05 * | | | | | | | | | | | | |
| Cobalt | mg/L | | | | | | | | | | | | | |
| Chemical Oxygen Demand | mg/L | | <10 | 20 | <10 | <10 | <10 | 30 | <10 | <10 | 30 | <10 | <10 | <10 |
| Conductivity | µS/cm | | 681 | 681 | 658 | 681 | 775 | 843 | 736 | 674 | 822 | 606 | 458 | 415 |
| Conductivity - field | µS/cm | | 697 | 674 | 675 | 675 | 770 | 827 | 875 | 652 | 844 | 634 | 468 | 418 |
| Copper | mg/L | 1 | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 5 | 1.3 | 1.5 | 2.1 | 2.6 | 2.8 | 4.7 | 5.5 | 3.8 | 4 | 2.7 | <1.0 | 2 |
| Dissolved Oxygen - field | mg/L | | 1.48 | 1.32 | 1.29 | 2.85 | 5.28 | 2.43 | 3.72 | 6.38 | 2.77 | 5.6 | 1.28 | 2.74 |
| Hardness | mg/L | 80-100 | 341 | 359 | 339 | 404 | 390 | 414 | 387 | 321 | 384 | 346 | 118 | 144 |
| Ion Percentage | % | | 0.16 | 3.82 | 0.12 | 6.45 | 2.42 | 3.44 | 1.15 | 3.68 | 0.53 | 5.91 | 2.11 | 1.52 |
| Iron | mg/L | 0.3 | 1.14 | 1.13 | 1.05 | 0.629 | 0.038 | <0.05 | 0.039 | 0.056 | 0.016 | 0.082 | 0.004 | <0.05 |
| Lead | mg/L | 0.01 * | | | | | | | | | | | | |
| Magnesium | mg/L | | 27.5 | 28.8 | 28.4 | 27.2 | 9.9 | 9.56 | 8.98 | 4.51 | 8.86 | 8.13 | 16.2 | 23.6 |
| Manganese | mg/L | 0.05 | 0.0192 | 0.0181 | 0.0188 | 0.021 | 0.0055 | 0.006 | 0.0072 | 0.0072 | 0.0016 | 0.0284 | 0.0119 | 0.001 |
| Molybdenum | mg/L | | | | | | | | | | | | | |
| Nickel | mg/L | | | | | | | | | | | | | |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | <0.5 | 0.47 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 |
| Oxydation Reduction Potential | mV | | -85.7 | -42.2 | -22.9 | 22.2 | 6.1 | 105.6 | 21 | 58.2 | 76.2 | -52.2 | -246.3 | -185.7 |
| pH | units | | 7.38 | 7.34 | 7.37 | 7.35 | 7.54 | 7.2 | 7.75 | 7.36 | 7.24 | 7.28 | 8.17 | 8.06 |
| pH - field | units | | 7.2 | 7.2 | 7.4 | 7.15 | 7.07 | 6.9 | 7.14 | 7.27 | 7.27 | 7.08 | 8 | 7.94 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.08 | 0.41 |
| Phosphorus | mg/L | | <0.02 | <0.01 | 0.02 | <0.02 | 0.02 | 0.03 | <0.02 | 0.01 | 0.02 | <0.02 | 0.15 | 0.38 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.6 | 1.9 | 1.6 | 1.9 | 0.9 | 0.9 | 0.8 | <0.5 | 0.7 | <0.5 | 3.6 | 2.9 |
| Sodium | mg/L | 200 | 5.2 | 6.1 | 5.4 | 5.5 | 11.5 | 13.7 | 14.1 | 17.6 | 18.1 | 12.1 | 43.7 | 31.6 |
| Sulphate | mg/L | 500 | 49.2 | 44.5 | 46.3 | 32 | 37.1 | 36 | 51.8 | 30.6 | 43.4 | 15.9 | 42.2 | 26 |
| Total Dissolved Solids | mg/L | 500 | 410 | 390 | 330 | 410 | 460 | 510 | 510 | 390 | 440 | 340 | 200 | 230 |
| Temperature - field | °C | | 8.8 | 8.6 | 8.3 | 8.1 | 7.6 | 6.9 | 7.5 | 6.2 | 6.8 | 7 | 9.1 | 9 |
| Total Kjeldahl Nitrogen | mg/L | | <0.1 | <0.2 | <0.1 | 2 | 0.2 | 0.2 | 0.3 | <0.2 | <0.1 | 0.2 | 0.3 | 0.3 |
| Zinc | mg/L | 5 | | | | | | | | | | | | |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | <1 | 2 | <1 | <1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | | | | | | | | | | | |
| 1,1,2-Trichlorethane | µg/L | | | | | | | | | | | | | |
| 1,1-Dichloroethane | µg/L | | | | | | | | | | | | | |
| 1,1-Dichloroethylene | µg/L | 14 * | | | | | | | | | | | | |
| 1,2-Dichlorobenzene | µg/L | 3 | | | | | | | | | | | | |
| 1,2-Dichloroethane | µg/L | 5 * | | | | | | | | | | | | |
| 1,2-Dichlorpropane | µg/L | | | | | | | | | | | | | |
| 1,3-Dichlorobenzene | µg/L | | | | | | | | | | | | | |
| 1,3-Dichloropropene(E) | µg/L | | | | | | | | | | | | | |
| 1,3-Dichloropropene(Z) | µg/L | | | | | | | | | | | | | |
| 1,4-Dichlorobenzene | µg/L | 1 | | | | | | | | | | | | |
| Benzene | µg/L | 1 * | | | | | | | | | | | | |
| Bromodichloromethane | µg/L | | | | | | | | | | | | | |
| Bromoform | µg/L | | | | | | | | | | | | | |
| Bromomethane | µg/L | | | | | | | | | | | | | |
| Carbon Tetrachloride | µg/L | 5 * | | | | | | | | | | | | |
| Chlorobenzene | µg/L | 30 | | | | | | | | | | | | |
| Chloroethane | µg/L | | | | | | | | | | | | | |
| Chloroform | µg/L | | | | | | | | | | | | | |
| Chloromethane | µg/L | | | | | | | | | | | | | |
| cis-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | |
| Dibromochloromethane | µg/L | | | | | | | | | | | | | |
| Dichloromethane | µg/L | 50 * | | | | | | | | | | | | |
| Ethyl Benzene | µg/L | 1.6 | | | | | | | | | | | | |
| Ethylene dibromide | µg/L | | | | | | | | | | | | | |
| m/p-Xylenes | µg/L | 20 ** | | | | | | | | | | | | |
| o-Xylene | µg/L | 20 ** | | | | | | | | | | | | |
| Styrene | µg/L | | | | | | | | | | | | | |
| Tetrachloroethylene | µg/L | 30 * | | | | | | | | | | | | |
| Toluene | µg/L | 24 | | | | | | | | | | | | |
| trans-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | |
| Trichloroethylene | µg/L | 5 * | | | | | | | | | | | | |
| Trichlorofluoromethane | µg/L | | | | | | | | | | | | | |
| Vinyl Chloride | µg/L | 1 * | | | | | | | | | | | | |
| Xylenes - total | µg/L | 20 ** | | | | | | | | | | | | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 61-I | | | | 61-II | | | | | | 61-III | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-19 | Apr-20 | Apr-21 | Mar-22 | Apr-17 | Mar-18 | Apr-19 | Apr-20 | Apr-21 | Mar-22 | Apr-17 | Mar-18 |
| Alkalinity | mg/L | 30-500 | 172 | 164 | 173 | 168 | 187 | 196 | 225 | 179 | 182 | 181 | 327 | 279 |
| Aluminum | mg/L | 0.1 | | | | | | | | | | | | |
| Ammonia (as N) | mg/L | | 0.4 | 0.5 | 0.7 | 0.4 | 0.2 | 0.1 | 2.9 | 0.3 | 0.1 | 0.1 | 0.2 | 0.2 |
| Anion sum | meq/L | | 4.35 | 4.27 | 4.49 | 4.38 | 5.01 | 5.14 | 5.58 | 4.95 | 5.07 | 5.07 | 7.15 | 8.31 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0019 | <0.005 | 0.0024 | 0.0016 | 0.0016 | 0.0016 | <0.0005 | <0.005 |
| Barium | mg/L | 1 * | | | | | | | | | | | | |
| Beryllium | mg/L | | | | | | | | | | | | | |
| Bicarbonate | mg/L | | 169 | 163 | 171 | 167 | 184 | 193 | 221 | 177 | 180 | 178 | 326 | 278 |
| Boron | mg/L | 5 * | | | | | | | | | | | | |
| Cadmium | mg/L | 0.005 * | | | | | | | | | | | | |
| Calcium | mg/L | | 19.2 | 22.6 | 23.2 | 24.9 | 19.7 | 21.3 | 20 | 25.9 | 25.4 | 28.4 | 113 | 108 |
| Carbonate | mg/L | | 2 | 1 | 2 | 1 | 3 | 3 | 4 | 2 | 2 | 3 | <1 | <1 |
| Cation sum | meq/L | | 4.1 | 4.39 | 4.79 | 5.31 | 5.04 | 5.53 | 5.3 | 5.26 | 5.49 | 6.2 | 7.11 | 8.39 |
| Chloride | mg/L | 250 | 11.3 | 13.4 | 16.7 | 15.5 | 36.3 | 34.4 | 35.3 | 38.8 | 40.3 | 42.1 | 19.3 | 92.7 |
| Chromium | mg/L | 0.05 * | | | | | | | | | | | | |
| Cobalt | mg/L | | | | | | | | | | | | | |
| Chemical Oxygen Demand | mg/L | | 20 | <10 | 10 | <10 | <10 | <10 | 20 | <10 | <10 | <10 | <10 | <10 |
| Conductivity | µS/cm | | 449 | 458 | 468 | 465 | 507 | 509 | 546 | 527 | 533 | 533 | 680 | 811 |
| Conductivity - field | µS/cm | | 450 | 453 | 460 | 446 | 512 | 493 | 560 | 533 | 522 | 509 | 689 | 784 |
| Copper | mg/L | 1 | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 5 | <1.0 | 1.1 | 1.4 | 1.7 | 1 | 1.5 | 5.6 | 1.1 | 1.3 | 1.6 | 3.2 | 2.5 |
| Dissolved Oxygen - field | mg/L | | 3.76 | 1.1 | 1.92 | 1.95 | 4.58 | 7.24 | 7.71 | 5.24 | 6.46 | 8.03 | 9.33 | 7.38 |
| Hardness | mg/L | 80-100 | 120 | 107 | 125 | 151 | 138 | 151 | 134 | 155 | 170 | 193 | 328 | 373 |
| Ion Percentage | % | | 2.99 | 1.32 | 3.23 | 9.61 | 0.33 | 3.66 | 2.57 | 2.97 | 3.93 | 10.1 | 0.28 | 0.47 |
| Iron | mg/L | 0.3 | <0.001 | 0.01 | <0.005 | <0.005 | 0.003 | <0.05 | 0.039 | 0.084 | <0.005 | 0.006 | 0.001 | <005 |
| Lead | mg/L | 0.01 * | | | | | | | | | | | | |
| Magnesium | mg/L | | 17.4 | 12.2 | 16.2 | 21.6 | 21.5 | 23.8 | 20.4 | 22 | 26 | 29.6 | 11.2 | 25 |
| Manganese | mg/L | 0.05 | 0.0047 | 0.0113 | 0.0046 | 0.0027 | <0.0005 | 0.01 | 0.085 | 0.0399 | <0.0005 | 0.0011 | <0.0005 | <0.001 |
| Molybdenum | mg/L | | | | | | | | | | | | | |
| Nickel | mg/L | | | | | | | | | | | | | |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | 0.08 | 0.08 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 1.34 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 |
| Oxydation Reduction Potential | mV | | -206 | -211.5 | -233.3 | -249.9 | -122.1 | -77.4 | -6.9 | 46.8 | 22.4 | 176.3 | 39.2 | 7 |
| pH | units | | 8.19 | 7.95 | 8.04 | 7.96 | 8.23 | 8.18 | 8.31 | 8.06 | 8.06 | 8.19 | 7.42 | 7.48 |
| pH - field | units | | 8.18 | 8.08 | 8.04 | 7.95 | 8.07 | 8.01 | 7.93 | 7.87 | 7.93 | 7.99 | 7.21 | 7.28 |
| Phosphate | mg/L | | 0.24 | 0.06 | 0.08 | 0.22 | 0.77 | 0.75 | 0.92 | 0.46 | 0.46 | 0.47 | <0.02 | <0.02 |
| Phosphorus | mg/L | | 0.17 | 0.06 | 0.08 | 0.17 | 0.76 | 0.73 | 1.09 | 0.28 | 0.54 | 0.43 | <0.02 | 0.03 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 3.3 | 3.5 | 4.3 | 4.4 | 1.8 | 1.9 | 2.3 | 1.9 | 2.2 | 2.4 | <0.5 | 1.2 |
| Sodium | mg/L | 200 | 36.2 | 48.7 | 48.7 | 48.8 | 50.7 | 55.8 | 53.6 | 47.3 | 45.7 | 51.7 | 11.8 | 19.9 |
| Sulphate | mg/L | 500 | 33.8 | 34.8 | 32.2 | 32.9 | 17.4 | 18.2 | 11 | 19 | 20 | 18.2 | 8.9 | 14.7 |
| Total Dissolved Solids | mg/L | 500 | 260 | 270 | 308 | 260 | 240 | 270 | 290 | 290 | 270 | 280 | 390 | 450 |
| Temperature - field | °C | | 8.1 | 9.1 | 8.7 | 9.5 | 9.1 | 8.4 | 6.7 | 11.7 | 8.2 | 8.5 | 6.6 | 6.8 |
| Total Kjeldahl Nitrogen | mg/L | | 0.3 | 0.7 | 2.5 | 0.3 | <0.1 | 0.1 | 3.3 | 0.2 | <2.0 | <0.1 | 0.3 | 0.3 |
| Zinc | mg/L | 5 | | | | | | | | | | | | |
| Phenols | µg/L | | <1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | | | | | | | | | | | |
| 1,1,2-Trichlorethane | µg/L | | | | | | | | | | | | | |
| 1,1-Dichloroethane | µg/L | | | | | | | | | | | | | |
| 1,1-Dichloroethylene | µg/L | 14 * | | | | | | | | | | | | |
| 1,2-Dichlorobenzene | µg/L | 3 | | | | | | | | | | | | |
| 1,2-Dichloroethane | µg/L | 5 * | | | | | | | | | | | | |
| 1,2-Dichlorpropane | µg/L | | | | | | | | | | | | | |
| 1,3-Dichlorobenzene | µg/L | | | | | | | | | | | | | |
| 1,3-Dichloropropene(E) | µg/L | | | | | | | | | | | | | |
| 1,3-Dichloropropene(Z) | µg/L | | | | | | | | | | | | | |
| 1,4-Dichlorobenzene | µg/L | 1 | | | | | | | | | | | | |
| Benzene | µg/L | 1 * | | | | | | | | | | | | |
| Bromodichloromethane | µg/L | | | | | | | | | | | | | |
| Bromoform | µg/L | | | | | | | | | | | | | |
| Bromomethane | µg/L | | | | | | | | | | | | | |
| Carbon Tetrachloride | µg/L | 5 * | | | | | | | | | | | | |
| Chlorobenzene | µg/L | 30 | | | | | | | | | | | | |
| Chloroethane | µg/L | | | | | | | | | | | | | |
| Chloroform | µg/L | | | | | | | | | | | | | |
| Chloromethane | µg/L | | | | | | | | | | | | | |
| cis-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | |
| Dibromochloromethane | µg/L | | | | | | | | | | | | | |
| Dichloromethane | µg/L | 50 * | | | | | | | | | | | | |
| Ethyl Benzene | µg/L | 1.6 | | | | | | | | | | | | |
| Ethylene dibromide | µg/L | | | | | | | | | | | | | |
| m/p-Xylenes | µg/L | 20 ** | | | | | | | | | | | | |
| o-Xylene | µg/L | 20 ** | | | | | | | | | | | | |
| Styrene | µg/L | | | | | | | | | | | | | |
| Tetrachloroethylene | µg/L | 30 * | | | | | | | | | | | | |
| Toluene | µg/L | 24 | | | | | | | | | | | | |
| trans-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | |
| Trichloroethylene | µg/L | 5 * | | | | | | | | | | | | |
| Trichlorofluoromethane | µg/L | | | | | | | | | | | | | |
| Vinyl Chloride | µg/L | 1 * | | | | | | | | | | | | |
| Xylenes - total | µg/L | 20 ** | | | | | | | | | | | | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 61-III | | | | 62-IR | | | | | | 62-II | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-19 | Apr-20 | Apr-21 | Mar-22 | Mar-17 | Mar-18 | Apr-19 | Apr-20 | Mar-21 | Mar-22 | Mar-17 | Oct-17 |
| Alkalinity | mg/L | 30-500 | 252 | 292 | 278 | 278 | 277 | 262 | 237 | 253 | 247 | 238 | 285 | 406 |
| Aluminum | mg/L | 0.1 | | | | | | | | | | | | |
| Ammonia (as N) | mg/L | | <0.1 | <0.1 | 0.1 | 0.1 | 4.8 | 5 | 5.2 | 5.1 | 5.2 | 5.6 | 0.2 | 0.1 |
| Anion sum | meq/L | | 9.17 | 6.16 | 7.66 | 8.42 | 81.3 | 72.6 | 78.7 | 72.3 | 75.9 | 77 | 7.23 | 9.88 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.005 | 0.0007 | <0.0005 | <0.0005 | 0.001 | <0.0005 | <0.005 |
| Barium | mg/L | 1 * | | | | | | | | | | | | |
| Beryllium | mg/L | | | | | | | | | | | | | |
| Bicarbonate | mg/L | | 250 | 291 | 277 | 277 | 276 | 261 | 236 | 251 | 246 | 238 | 284 | 405 |
| Boron | mg/L | 5 * | | | | | | | | | | | | |
| Cadmium | mg/L | 0.005 * | | | | | | | | | | | | |
| Calcium | mg/L | | 101 | 112 | 112 | 131 | 230 | 205 | 192 | 235 | 197 | 191 | 131 | 165 |
| Carbonate | mg/L | | 2 | <1 | <1 | <1 | <1 | <1 | 1 | 2 | <1 | <1 | <1 | <1 |
| Cation sum | meq/L | | 8.75 | 6.87 | 8.57 | 11 | 75.2 | 74.9 | 69.5 | 76.4 | 75.9 | 63.5 | 7.65 | 10.1 |
| Chloride | mg/L | 250 | 141 | 13.9 | 72.3 | 99.6 | 2680 | 2390 | 2630 | 2380 | 2520 | 2570 | 27.2 | 31.6 |
| Chromium | mg/L | 0.05 * | | | | | | | | | | | | |
| Cobalt | mg/L | | | | | | | | | | | | | |
| Chemical Oxygen Demand | mg/L | | 30 | <10 | 10 | <10 | 70 | 50 | 50 | 220 | 60 | 30 | 20 | <10 |
| Conductivity | µS/cm | | 940 | 565 | 788 | 899 | 8240 | 8530 | 8920 | 9160 | 9150 | 9100 | 695 | 916 |
| Conductivity - field | µS/cm | | 878 | 625 | 749 | 779 | 7990 | 7770 | 8340 | 8130 | 8220 | 7780 | 686 | 935 |
| Copper | mg/L | 1 | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 5 | 2.1 | 2 | 2 | 1.8 | <1.0 | 1.1 | <1.0 | 1.7 | <1.0 | <1.0 | 5.2 | 4.7 |
| Dissolved Oxygen - field | mg/L | | 3.81 | 10.1 | 9.51 | 7.85 | 4.83 | 1.48 | 2.36 | 1.96 | 6.46 | 2.72 | 6.27 | 3.49 |
| Hardness | mg/L | 80-100 | 398 | 320 | 393 | 497 | 1180 | 1090 | 1050 | 1250 | 1120 | 1050 | 348 | 456 |
| Ion Percentage | % | | 2.32 | 5.45 | 5.63 | 13.5 | 3.89 | 1.58 | 6.23 | 2.77 | 0.03 | 9.64 | 2.82 | 1.04 |
| Iron | mg/L | 0.3 | <0.001 | 0.016 | 0.085 | 0.006 | 0.251 | 0.6 | 1.01 | 0.492 | 0.229 | 1.75 | 0.032 | <0.05 |
| Lead | mg/L | 0.01 * | | | | | | | | | | | | |
| Magnesium | mg/L | | 35.5 | 9.87 | 27.5 | 41.3 | 148 | 141 | 139 | 160 | 153 | 138 | 5.17 | 10.6 |
| Manganese | mg/L | 0.05 | 0.0016 | <0.0005 | 0.0108 | <0.0005 | 0.0418 | 0.029 | 0.0262 | 0.0284 | 0.021 | 0.0182 | 0.0061 | 0.003 |
| Molybdenum | mg/L | | | | | | | | | | | | | |
| Nickel | mg/L | | | | | | | | | | | | | |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | 0.54 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 0.96 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 |
| Oxydation Reduction Potential | mV | | 101.5 | 52.6 | 77.2 | 207 | -13.9 | -57.8 | -78.1 | 70.5 | 44.8 | 3.1 | 41.3 | 75.8 |
| pH | units | | 7.83 | 7.48 | 7.54 | 7.46 | 7.53 | 7.51 | 7.69 | 7.91 | 7.63 | 7.34 | 7.46 | 7.39 |
| pH - field | units | | 7.37 | 7.34 | 7.34 | 7.19 | 7.27 | 7.18 | 7.35 | 7.35 | 7.33 | 7.16 | 7.23 | 6.92 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.01 |
| Phosphorus | mg/L | | 0.02 | <0.02 | 0.03 | <0.02 | 0.16 | 0.06 | 0.1 | 0.13 | 0.03 | <0.02 | <0.02 | 0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.4 | <0.5 | 1.2 | 1.7 | 39.3 | 31 | 38 | 36.9 | 30.7 | 31.9 | <0.5 | 1 |
| Sodium | mg/L | 200 | 16.3 | 10.2 | 14.7 | 23 | 1150 | 1190 | 1080 | 1150 | 1200 | 948 | 15.1 | 21.2 |
| Sulphate | mg/L | 500 | 15.5 | 5.6 | 9.7 | 11.5 | 20.3 | 8.1 | 2.5 | 16.6 | 5.7 | 1.3 | 42.4 | 54.5 |
| Total Dissolved Solids | mg/L | 500 | 540 | 340 | 350 | 520 | 4830 | 4580 | 4860 | 4850 | 4230 | 5500 | 460 | 550 |
| Temperature - field | °C | | 5.8 | 6.5 | 6.2 | 6.9 | 10 | 8.8 | 8.2 | 7.9 | 11.3 | 10 | 4.9 | 13 |
| Total Kjeldahl Nitrogen | mg/L | | 0.1 | 0.2 | 2.1 | <0.1 | 10 | 6.6 | 3.2 | 8.1 | 8.9 | 6.4 | 0.3 | 0.2 |
| Zinc | mg/L | 5 | | | | | | | | | | | | |
| Phenols | µg/L | | 1 | <1 | 2 | <1 | <1 | <1 | 2 | <1 | <1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | | | | | | | | | | | |
| 1,1,2-Trichlorethane | µg/L | | | | | | | | | | | | | |
| 1,1-Dichloroethane | µg/L | | | | | | | | | | | | | |
| 1,1-Dichloroethylene | µg/L | 14 * | | | | | | | | | | | | |
| 1,2-Dichlorobenzene | µg/L | 3 | | | | | | | | | | | | |
| 1,2-Dichloroethane | µg/L | 5 * | | | | | | | | | | | | |
| 1,2-Dichlorpropane | µg/L | | | | | | | | | | | | | |
| 1,3-Dichlorobenzene | µg/L | | | | | | | | | | | | | |
| 1,3-Dichloropropene(E) | µg/L | | | | | | | | | | | | | |
| 1,3-Dichloropropene(Z) | µg/L | | | | | | | | | | | | | |
| 1,4-Dichlorobenzene | µg/L | 1 | | | | | | | | | | | | |
| Benzene | µg/L | 1 * | | | | | | | | | | | | |
| Bromodichloromethane | µg/L | | | | | | | | | | | | | |
| Bromoform | µg/L | | | | | | | | | | | | | |
| Bromomethane | µg/L | | | | | | | | | | | | | |
| Carbon Tetrachloride | µg/L | 5 * | | | | | | | | | | | | |
| Chlorobenzene | µg/L | 30 | | | | | | | | | | | | |
| Chloroethane | µg/L | | | | | | | | | | | | | |
| Chloroform | µg/L | | | | | | | | | | | | | |
| Chloromethane | µg/L | | | | | | | | | | | | | |
| cis-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | |
| Dibromochloromethane | µg/L | | | | | | | | | | | | | |
| Dichloromethane | µg/L | 50 * | | | | | | | | | | | | |
| Ethyl Benzene | µg/L | 1.6 | | | | | | | | | | | | |
| Ethylene dibromide | µg/L | | | | | | | | | | | | | |
| m/p-Xylenes | µg/L | 20 ** | | | | | | | | | | | | |
| o-Xylene | µg/L | 20 ** | | | | | | | | | | | | |
| Styrene | µg/L | | | | | | | | | | | | | |
| Tetrachloroethylene | µg/L | 30 * | | | | | | | | | | | | |
| Toluene | µg/L | 24 | | | | | | | | | | | | |
| trans-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | |
| Trichloroethylene | µg/L | 5 * | | | | | | | | | | | | |
| Trichlorofluoromethane | µg/L | | | | | | | | | | | | | |
| Vinyl Chloride | µg/L | 1 * | | | | | | | | | | | | |
| Xylenes - total | µg/L | 20 ** | | | | | | | | | | | | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 62-II | | | | | | | | | | 63-I | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-18 | Oct-18 | Apr-19 | Sep-19 | Apr-20 | Sep-20 | Mar-21 | Oct-21 | Mar-22 | Sep-22 | Apr-17 | Oct-17 |
| Alkalinity | mg/L | 30-500 | 361 | 383 | 330 | 418 | 330 | 349 | 325 | 412 | 425 | 427 | 217 | 236 |
| Aluminum | mg/L | 0.1 | | | | | | | | | | | <0.025 | |
| Ammonia (as N) | mg/L | | 0.1 | <0.1 | 0.2 | <0.1 | <0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.5 | 0.5 | 10.8 |
| Anion sum | meq/L | | 8.37 | 9.27 | 7.68 | 9.8 | 8.13 | 8.88 | 8.24 | 9.81 | 9.91 | 10.6 | 6.17 | 5.88 |
| Arsenic | mg/L | 0.025 | <0.005 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.005 |
| Barium | mg/L | 1 * | | | | | | | | | | | 0.06 | |
| Beryllium | mg/L | | | | | | | | | | | | <0.0001 | |
| Bicarbonate | mg/L | | 360 | 382 | 329 | 417 | 329 | 348 | 324 | 411 | 424 | 426 | 214 | 234 |
| Boron | mg/L | 5 * | | | | | | | | | | | 0.379 | |
| Cadmium | mg/L | 0.005 * | | | | | | | | | | | <0.0001 | |
| Calcium | mg/L | | 138 | 154 | 125 | 165 | 150 | 158 | 128 | 153 | 162 | 163 | 10.5 | 12.5 |
| Carbonate | mg/L | | <1 | <1 | 1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 | 3 | 2 |
| Cation sum | meq/L | | 8.2 | 9.68 | 7.47 | 10.1 | 9.05 | 10.3 | 7.89 | 9.53 | 9.78 | 10.6 | 5.17 | 6.1 |
| Chloride | mg/L | 250 | 19.7 | 27.1 | 17.5 | 25.4 | 22.4 | 24.6 | 28.1 | 22.6 | 28.2 | 35.5 | 54.6 | 40.2 |
| Chromium | mg/L | 0.05 * | | | | | | | | | | | <0.0005 | |
| Cobalt | mg/L | | | | | | | | | | | | <0.0001 | |
| Chemical Oxygen Demand | mg/L | | <10 | 10 | <10 | <10 | 20 | <10 | 20 | 10 | 20 | 20 | <10 | 30 |
| Conductivity | µS/cm | | 773 | 904 | 738 | 936 | 812 | 874 | 795 | 940 | 947 | 1020 | 643 | 603 |
| Conductivity - field | µS/cm | | 765 | 905 | 768 | 944 | 782 | 877 | 821 | 934 | 902 | 1020 | 713 | 491 |
| Copper | mg/L | 1 | | | | | | | | | | | <0.0005 | |
| Dissolved Organic Carbon | mg/L | 5 | 4.5 | 4.8 | 7.3 | 7.7 | 4.7 | 4.2 | 4.7 | 4.8 | 4.9 | 4 | 2.2 | 9 |
| Dissolved Oxygen - field | mg/L | | 6.24 | 5.64 | 4.24 | 2.44 | 6.77 | 4.8 | 1.95 | 6.3 | 2.88 | 4.03 | 0.88 | 1.79 |
| Hardness | mg/L | 80-100 | 373 | 431 | 340 | 461 | 405 | 446 | 346 | 421 | 441 | 466 | 32.4 | 37.2 |
| Ion Percentage | % | | 1.05 | 2.18 | 1.37 | 1.56 | 5.36 | 7.63 | 2.14 | 1.44 | 0.68 | 0.4 | 8.88 | 1.78 |
| Iron | mg/L | 0.3 | <0.05 | <0.05 | 0.008 | 1.05 | 0.028 | 0.009 | 0.009 | 0.153 | 0.016 | 0.045 | 0.04 | 1.05 |
| Lead | mg/L | 0.01 * | | | | | | | | | | | <0.0005 | |
| Magnesium | mg/L | | 6.95 | 11.3 | 6.74 | 11.9 | 7.38 | 12.6 | 6.5 | 9.49 | 8.78 | 14 | 1.51 | 1.45 |
| Manganese | mg/L | 0.05 | <0.001 | 0.004 | 0.0126 | 0.235 | 0.135 | 0.001 | 0.0085 | 0.0143 | 0.112 | 0.0153 | 0.0494 | 0.226 |
| Molybdenum | mg/L | | | | | | | | | | | | <0.0005 | |
| Nickel | mg/L | | | | | | | | | | | | <0.002 | |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 0.6 | <0.05 | 1.31 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | 0.14 | <0.5 |
| Oxydation Reduction Potential | mV | | 78.6 | 72 | 55.6 | -42.2 | 81.3 | 17.2 | 81.7 | 48.3 | 95.8 | 214.8 | -23.8 | -175.6 |
| pH | units | | 7.29 | 7.33 | 7.56 | 7.25 | 7.66 | 7.26 | 7.42 | 7.34 | 7.14 | 7.34 | 8.19 | 7.94 |
| pH - field | units | | 7.06 | 7.07 | 7.33 | 7.07 | 7.32 | 7.12 | 7.21 | 7.07 | 7 | 6.89 | 8.22 | 7.28 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.02 | <0.02 | <0.02 | 0.06 | 0.06 |
| Phosphorus | mg/L | | 0.03 | <0.02 | 0.03 | <0.02 | 0.01 | 0.01 | 0.02 | 0.01 | <0.02 | <0.02 | 0.08 | 0.06 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | <0.5 | 1.1 | <0.5 | 1.1 | <0.5 | 1.1 | <0.5 | 0.8 | 0.5 | 1.2 | 6.4 | 7.3 |
| Sodium | mg/L | 200 | 16.4 | 23.2 | 14.9 | 19.4 | 21.5 | 31.2 | 21.7 | 24.2 | 21.2 | 26.8 | 99.3 | 101 |
| Sulphate | mg/L | 500 | 40.1 | 52.5 | 38.6 | 48.1 | 53.5 | 68.7 | 55.6 | 57.6 | 41.1 | 65.9 | 16.1 | 8.9 |
| Total Dissolved Solids | mg/L | 500 | 490 | 530 | 490 | 570 | 530 | 570 | 500 | 550 | 630 | 600 | 360 | 290 |
| Temperature - field | °C | | 5.7 | 13.4 | 5.4 | 12.3 | 5.6 | 12.8 | 4.9 | 14.6 | 5.1 | 13.4 | 8.8 | 10.3 |
| Total Kjeldahl Nitrogen | mg/L | | 0.1 | 0.4 | 0.3 | 0.2 | <0.1 | <1.0 | <0.1 | 2.1 | 0.4 | 2.5 | 0.5 | 10.6 |
| Zinc | mg/L | 5 | | | | | | | | | | | <0.0005 | |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | 1 | <1 | 2 | <1 | <1 | <1 | 63 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | | | | | | | | | | <0.5 | |
| 1,1,2-Trichlorethane | µg/L | | | | | | | | | | | | <0.5 | |
| 1,1-Dichloroethane | µg/L | | | | | | | | | | | | <0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | | | | | | | | | | | <0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | | | | | | | | | | | <0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | | | | | | | | | | | <0.5 | |
| 1,2-Dichlorpropane | µg/L | | | | | | | | | | | | <0.5 | |
| 1,3-Dichlorobenzene | µg/L | | | | | | | | | | | | <0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | | | | | | | | | | | <0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | | | | | | | | | | | <0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | | | | | | | | | | | <0.5 | |
| Benzene | µg/L | 1 * | | | | | | | | | | | <0.5 | |
| Bromodichloromethane | µg/L | | | | | | | | | | | | <0.5 | |
| Bromoform | µg/L | | | | | | | | | | | | <0.5 | |
| Bromomethane | µg/L | | | | | | | | | | | | <0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | | | | | | | | | | | <0.2 | |
| Chlorobenzene | µg/L | 30 | | | | | | | | | | | <0.5 | |
| Chloroethane | µg/L | | | | | | | | | | | | <5 | |
| Chloroform | µg/L | | | | | | | | | | | | <0.5 | |
| Chloromethane | µg/L | | | | | | | | | | | | <5 | |
| cis-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | <0.5 | |
| Dibromochloromethane | µg/L | | | | | | | | | | | | <0.5 | |
| Dichloromethane | µg/L | 50 * | | | | | | | | | | | <0.5 | |
| Ethyl Benzene | µg/L | 1.6 | | | | | | | | | | | <0.5 | |
| Ethylene dibromide | µg/L | | | | | | | | | | | | <0.2 | |
| m/p-Xylenes | µg/L | 20 ** | | | | | | | | | | | <0.5 | |
| o-Xylene | µg/L | 20 ** | | | | | | | | | | | <0.5 | |
| Styrene | µg/L | | | | | | | | | | | | <0.5 | |
| Tetrachloroethylene | µg/L | 30 * | | | | | | | | | | | <0.5 | |
| Toluene | µg/L | 24 | | | | | | | | | | | <0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | <0.5 | |
| Trichloroethylene | µg/L | 5 * | | | | | | | | | | | <0.5 | |
| Trichlorofluoromethane | µg/L | | | | | | | | | | | | <5 | |
| Vinyl Chloride | µg/L | 1 * | | | | | | | | | | | <0.2 | |
| Xylenes - total | µg/L | 20 ** | | | | | | | | | | | <0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 63-I | | | | | | | | | | 63-II | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-18 | Oct-18 | Apr-19 | Oct-19 | Apr-20 | Sep-20 | Mar-21 | Oct-21 | Mar-22 | Sep-22 | Apr-17 | Oct-17 |
| Alkalinity | mg/L | 30-500 | 199 | 234 | 163 | 302 | 291 | 289 | 275 | 276 | 278 | 286 | 209 | 222 |
| Aluminum | mg/L | 0.1 | <0.025 | | 2.84 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | |
| Ammonia (as N) | mg/L | | 10.5 | 7.4 | 2 | 11 | 8.1 | 9.5 | 0.1 | 0.6 | 0.2 | 0.4 | 0.2 | 0.1 |
| Anion sum | meq/L | | 4.69 | 6.13 | 4.05 | 7.62 | 7.39 | 7.48 | 7.71 | 7.69 | 7.67 | 7.92 | 5.06 | 5.34 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0029 | <0.005 |
| Barium | mg/L | 1 * | 0.074 | | 0.077 | | 0.081 | | 0.098 | | 0.084 | | 0.097 | |
| Beryllium | mg/L | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | 0.0001 | |
| Bicarbonate | mg/L | | 198 | 231 | 161 | 300 | 289 | 286 | 273 | 270 | 274 | 280 | 207 | 220 |
| Boron | mg/L | 5 * | 0.453 | | 0.266 | | 0.474 | | 0.66 | | 0.6 | | 0.0226 | |
| Cadmium | mg/L | 0.005 * | <0.0001 | | 0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | |
| Calcium | mg/L | | 10 | 10.6 | 10.9 | 12 | 10.7 | 10.3 | 7.8 | 6.3 | 8.1 | 6.7 | 54.3 | 52.2 |
| Carbonate | mg/L | | <1 | 3 | 2 | 2 | 2 | 3 | 2 | 6 | 4 | 6 | 2 | 2 |
| Cation sum | meq/L | | 8.22 | 5.78 | 4 | 6.86 | 7.39 | 8.13 | 8.3 | 6.7 | 9.25 | 7.85 | 5.14 | 4.93 |
| Chloride | mg/L | 250 | 26.1 | 48.4 | 20.6 | 54.8 | 54.8 | 57.3 | 64.4 | 65.3 | 64.1 | 66.5 | 9.6 | 9.7 |
| Chromium | mg/L | 0.05 * | <0.0005 | | 0.0007 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Cobalt | mg/L | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | 0.0012 | |
| Chemical Oxygen Demand | mg/L | | <10 | 20 | 30 | 30 | <10 | 20 | <10 | <10 | <10 | <10 | <10 | 30 |
| Conductivity | µS/cm | | 496 | 659 | 420 | 822 | 819 | 812 | 797 | 817 | 824 | 726 | 494 | 489 |
| Conductivity - field | µS/cm | | 560 | 483 | 409 | 849 | 808 | 810 | 811 | 796 | 779 | 827 | 500 | 497 |
| Copper | mg/L | 1 | <0.0005 | | 0.0016 | | 0.0016 | | 0.0014 | | <0.0005 | | <0.0005 | |
| Dissolved Organic Carbon | mg/L | 5 | 1.1 | 2.7 | 4.5 | 12.6 | 2.9 | 2.3 | 2.5 | 1.5 | 1.4 | 2 | 1.5 | <1.0 |
| Dissolved Oxygen - field | mg/L | | 1.11 | 0.9 | 2.92 | 1.1 | 0.55 | 2.01 | 2.16 | 1.83 | 5.79 | 2.46 | 2.25 | 2.6 |
| Hardness | mg/L | 80-100 | 31.1 | 32.4 | 34.5 | 37.7 | 34.7 | 33.5 | 26.7 | 21.5 | 27.8 | 23.2 | 238 | 228 |
| Ion Percentage | % | | 27.3 | 2.88 | 0.69 | 5.24 | 0.02 | 4.23 | 3.73 | 6.88 | 9.37 | 0.44 | 0.73 | 3.97 |
| Iron | mg/L | 0.3 | 0.203 | 0.88 | 1.94 | 3.75 | 1.57 | 0.51 | 0.055 | 0.215 | 0.024 | 0.08 | 0.448 | 0.4 |
| Lead | mg/L | 0.01 * | <0.0005 | | 0.0019 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Magnesium | mg/L | | 1.5 | 1.44 | 1.78 | 1.88 | 1.93 | 1.9 | 1.76 | 1.4 | 1.83 | 1.57 | 24.9 | 23.8 |
| Manganese | mg/L | 0.05 | 0.0977 | 0.117 | 0.0842 | 0.543 | 0.335 | 0.171 | 0.0075 | 0.0309 | 0.0043 | 0.0125 | 0.012 | 0.014 |
| Molybdenum | mg/L | | <0.0005 | | 0.0006 | | <0.0005 | | <0.0005 | | <0.0005 | | 0.0009 | |
| Nickel | mg/L | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 1.1 | <0.5 | <0.5 | 0.08 | 0.1 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 |
| Oxydation Reduction Potential | mV | | -194.3 | -190.5 | -97.2 | -156 | -142.1 | -149.4 | -46.4 | -148 | 215.7 | -38.9 | -20.4 | -143.1 |
| pH | units | | 7.67 | 8.17 | 8.2 | 7.88 | 7.89 | 8.03 | 7.88 | 8.34 | 8.21 | 8.34 | 7.93 | 7.99 |
| pH - field | units | | 7.62 | 7.73 | 7.99 | 7.46 | 7.79 | 7.9 | 7.61 | 7.93 | 8.14 | 8.01 | 7.63 | 7.49 |
| Phosphate | mg/L | | 0.06 | 0.06 | 0.09 | 0.14 | 0.03 | <0.02 | <0.02 | 0.03 | 0.03 | 0.02 | <0.02 | <0.01 |
| Phosphorus | mg/L | | 0.05 | 0.07 | 0.12 | 0.09 | 0.04 | 0.03 | 0.02 | 0.03 | 0.03 | 0.02 | 0.02 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 5.7 | 6.6 | 7.7 | 9 | 7.9 | 6.8 | 4.2 | 3.6 | 4.6 | 3.8 | 2.1 | 2 |
| Sodium | mg/L | 200 | 154 | 102 | 68.2 | 117 | 136 | 152 | 176 | 141 | 197 | 167 | 6.4 | 6.5 |
| Sulphate | mg/L | 500 | 5.2 | 11.3 | 15.4 | 11.2 | 10.3 | 13 | 23.7 | 24.4 | 23.3 | 24.5 | 35.6 | 37.2 |
| Total Dissolved Solids | mg/L | 500 | 210 | 350 | 250 | 380 | 440 | 410 | 470 | 450 | 460 | 470 | 310 | 310 |
| Temperature - field | °C | | 8.1 | 10.4 | 8.1 | 9.8 | 8.6 | 10.6 | 8.4 | 11.8 | 7.8 | 9.5 | 8.7 | 9.7 |
| Total Kjeldahl Nitrogen | mg/L | | 10.2 | 9 | 2.8 | 15.8 | 9.6 | 10.6 | <0.5 | 0.6 | <0.2 | 2 | 0.1 | <0.1 |
| Zinc | mg/L | 5 | <0.0005 | | 0.0062 | | 0.0018 | | 0.0012 | | <0.0005 | | <0.0005 | |
| Phenols | µg/L | | 1 | <1 | <1 | 49 | <1 | 1 | <1 | 1 | <1 | <1 | <1 | 2 |
| 1,1,2,2-Tetrachlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| 1,1,2-Trichlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| 1,1-Dichloroethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| 1,2-Dichlorpropane | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| 1,3-Dichlorobenzene | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Benzene | µg/L | 1 * | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Bromodichloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Bromoform | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Bromomethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | |
| Chlorobenzene | µg/L | 30 | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Chloroethane | µg/L | | <5 | | <5 | | <5 | | < 5 | | < 5 | | <5 | |
| Chloroform | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Chloromethane | µg/L | | <5 | | <5 | | <5 | | < 5 | | < 5 | | <5 | |
| cis-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Dibromochloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Dichloromethane | µg/L | 50 * | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Ethyl Benzene | µg/L | 1.6 | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Ethylene dibromide | µg/L | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | |
| m/p-Xylenes | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| o-Xylene | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Styrene | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Tetrachloroethylene | µg/L | 30 * | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Toluene | µg/L | 24 | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Trichloroethylene | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Trichlorofluoromethane | µg/L | | <5 | | <5 | | <5 | | < 5 | | < 5 | | <5 | |
| Vinyl Chloride | µg/L | 1 * | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | |
| Xylenes - total | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 63-II | | | | | | | | | | 63-III | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-18 | Oct-18 | Apr-19 | Oct-19 | Apr-20 | Sep-20 | Mar-21 | Oct-21 | Mar-22 | Sep-22 | Apr-17 | Oct-17 |
| Alkalinity | mg/L | 30-500 | 223 | 207 | 218 | 209 | 203 | 203 | 214 | 245 | 208 | 214 | 229 | 240 |
| Aluminum | mg/L | 0.1 | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | |
| Ammonia (as N) | mg/L | | 0.3 | 0.2 | 0.1 | 0.2 | <0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.3 | 0.2 | <0.1 |
| Anion sum | meq/L | | 5.36 | 4.97 | 5.17 | 5.02 | 4.94 | 4.91 | 5.1 | 5.83 | 4.99 | 5.16 | 6.81 | 6.95 |
| Arsenic | mg/L | 0.025 | 0.0029 | <0.005 | 0.0034 | <0.005 | 0.0031 | 0.0031 | 0.0031 | 0.0024 | 0.0045 | 0.0036 | <0.0005 | <0.005 |
| Barium | mg/L | 1 * | 0.102 | | 0.111 | | 0.107 | | 0.116 | | 0.105 | | 0.027 | |
| Beryllium | mg/L | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0001 | |
| Bicarbonate | mg/L | | 222 | 206 | 216 | 208 | 201 | 202 | 212 | 244 | 207 | 212 | 228 | 238 |
| Boron | mg/L | 5 * | 0.0231 | | 0.0173 | | 0.0185 | | 0.0174 | | 0.0175 | | 0.0082 | |
| Cadmium | mg/L | 0.005 * | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | |
| Calcium | mg/L | | 57.3 | 56.2 | 53.3 | 56.5 | 58.2 | 58.4 | 57.8 | 74.1 | 64.7 | 55.7 | 120 | 111 |
| Carbonate | mg/L | | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 1 | 2 | 1 | 1 |
| Cation sum | meq/L | | 5.27 | 5.26 | 5 | 5.24 | 5.41 | 5.44 | 5.46 | 5.39 | 6 | 5.22 | 6.59 | 6.19 |
| Chloride | mg/L | 250 | 9.4 | 8.5 | 7.5 | 8.8 | 9 | 9.4 | 8.3 | 6.8 | 8.5 | 9.9 | 24.8 | 18.4 |
| Chromium | mg/L | 0.05 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Cobalt | mg/L | | 0.0016 | | 0.0012 | | 0.0015 | | 0.0016 | | 0.0013 | | <0.0001 | |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | 20 | <10 | <10 | <10 | <10 | 40 | <10 | <10 | <10 | <10 |
| Conductivity | µS/cm | | 491 | 494 | 492 | 494 | 493 | 489 | 493 | 576 | 501 | 437 | 701 | 671 |
| Conductivity - field | µS/cm | | 485 | 497 | 499 | 503 | 490 | 484 | 503 | 576 | 476 | 500 | 708 | 682 |
| Copper | mg/L | 1 | <0.0005 | | <0.0005 | | <0.0005 | | 0.001 | | <0.0005 | | 0.0016 | |
| Dissolved Organic Carbon | mg/L | 5 | 1 | 1.4 | <1.0 | 2.4 | <1.0 | <1.0 | 2 | 2.3 | 1.1 | 2 | 2.3 | 1.6 |
| Dissolved Oxygen - field | mg/L | | 0.99 | 0.83 | 0.99 | 0.98 | 0.87 | 0.42 | 0.93 | 1.42 | 1.23 | 0.94 | 11.9 | 9.3 |
| Hardness | mg/L | 80-100 | 244 | 243 | 232 | 243 | 252 | 252 | 253 | 255 | 278 | 242 | 322 | 302 |
| Ion Percentage | % | | 0.92 | 2.88 | 1.67 | 2.16 | 4.53 | 5.1 | 3.32 | 3.95 | 9.11 | 0.61 | 1.59 | 5.77 |
| Iron | mg/L | 0.3 | 0.389 | 0.52 | 0.538 | 0.41 | 0.454 | 0.51 | 0.438 | 0.011 | 0.143 | 0.225 | 0.003 | <0.05 |
| Lead | mg/L | 0.01 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Magnesium | mg/L | | 24.6 | 25 | 24 | 24.8 | 25.8 | 25.7 | 26.4 | 17 | 28.2 | 24.9 | 5.45 | 5.99 |
| Manganese | mg/L | 0.05 | 0.0123 | 0.012 | 0.0126 | 0.018 | 0.0131 | 0.012 | 0.0137 | 0.011 | 0.0127 | 0.0124 | <0.0005 | <0.001 |
| Molybdenum | mg/L | | 0.0007 | | 0.0007 | | 0.0008 | | 0.0008 | | 0.0008 | | <0.0005 | |
| Nickel | mg/L | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 3.8 | <0.5 | <0.05 | 19.2 | 19.1 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 |
| Oxydation Reduction Potential | mV | | -124.7 | -120.1 | -119.8 | -73.2 | -24.5 | -81.6 | -75.4 | 45.7 | 85 | -46.8 | 58.1 | 15.2 |
| pH | units | | 7.77 | 7.85 | 7.96 | 7.78 | 7.93 | 7.82 | 7.88 | 7.77 | 7.73 | 7.99 | 7.72 | 7.82 |
| pH - field | units | | 7.55 | 7.6 | 7.6 | 7.57 | 7.65 | 7.73 | 7.6 | 7.36 | 7.58 | 7.44 | 7.37 | 7.24 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.01 |
| Phosphorus | mg/L | | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | 0.01 | 0.02 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 2 | 2.1 | 2 | 1.9 | 2.1 | 2.2 | 2.1 | 1.7 | 2.4 | 2 | <0.5 | <0.5 |
| Sodium | mg/L | 200 | 6.4 | 6.9 | 6.4 | 6.5 | 6.8 | 7.2 | 7 | 4.8 | 7.7 | 6.6 | 2.9 | 3.2 |
| Sulphate | mg/L | 500 | 37.7 | 34.7 | 35.7 | 34.8 | 36.5 | 34.5 | 35.1 | 30.2 | 35.1 | 35.4 | 14.8 | 20.2 |
| Total Dissolved Solids | mg/L | 500 | 300 | 290 | 300 | 290 | 320 | 300 | 320 | 370 | 290 | 300 | 450 | 480 |
| Temperature - field | °C | | 8.6 | 10.7 | 8.5 | 9.4 | 8.9 | 9.3 | 8.4 | 10.4 | 8.4 | 9.8 | 5.3 | 12.7 |
| Total Kjeldahl Nitrogen | mg/L | | <2.0 | <0.1 | 0.1 | <0.1 | 0.3 | <1.0 | <0.5 | <2.0 | <0.2 | <2.0 | 1 | 0.2 |
| Zinc | mg/L | 5 | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | 0.0013 | |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | 1 | <1 | 1 | <1 | <1 | <1 | 2 |
| 1,1,2,2-Tetrachlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| 1,1,2-Trichlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| 1,1-Dichloroethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| 1,2-Dichlorpropane | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| 1,3-Dichlorobenzene | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Benzene | µg/L | 1 * | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Bromodichloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Bromoform | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Bromomethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | |
| Chlorobenzene | µg/L | 30 | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Chloroethane | µg/L | | <5 | | <5 | | <5 | | < 5 | | < 5 | | <5 | |
| Chloroform | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Chloromethane | µg/L | | <5 | | <5 | | <5 | | < 5 | | < 5 | | <5 | |
| cis-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Dibromochloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Dichloromethane | µg/L | 50 * | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Ethyl Benzene | µg/L | 1.6 | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Ethylene dibromide | µg/L | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | |
| m/p-Xylenes | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| o-Xylene | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Styrene | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Tetrachloroethylene | µg/L | 30 * | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Toluene | µg/L | 24 | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Trichloroethylene | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Trichlorofluoromethane | µg/L | | <5 | | <5 | | <5 | | < 5 | | < 5 | | <5 | |
| Vinyl Chloride | µg/L | 1 * | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | |
| Xylenes - total | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 63-III | | | | | | | | | 64-I | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-18 | Oct-18 | Apr-19 | Oct-19 | Apr-20 | Sep-20 | Mar-21 | Mar-22 | Sep-22 | Mar-17 | Apr-18 | Apr-19 |
| Alkalinity | mg/L | 30-500 | 260 | 240 | 242 | 235 | 216 | 221 | 209 | 219 | 238 | 234 | 243 | 237 |
| Aluminum | mg/L | 0.1 | <0.025 | | <0.025 | | <0.025 | | <0.025 | <0.025 | | | | |
| Ammonia (as N) | mg/L | | 0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | 0.1 | 0.2 | 0.2 | 0.4 | 0.2 |
| Anion sum | meq/L | | 6.58 | 6.66 | 6.41 | 6.38 | 5.96 | 5.89 | 6.14 | 6.49 | 6.84 | 8.31 | 8.41 | 8.37 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.005 | <0.0005 |
| Barium | mg/L | 1 * | 0.028 | | 0.034 | | 0.033 | | 0.031 | 0.029 | | | | |
| Beryllium | mg/L | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | <0.0005 | | | | |
| Bicarbonate | mg/L | | 259 | 239 | 240 | 234 | 215 | 220 | 208 | 218 | 236 | 232 | 241 | 234 |
| Boron | mg/L | 5 * | 0.0084 | | 0.0032 | | 0.0039 | | 0.0017 | 0.0044 | | | | |
| Cadmium | mg/L | 0.005 * | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | <0.0001 | | | | |
| Calcium | mg/L | | 116 | 118 | 110 | 114 | 113 | 118 | 115 | 138 | 119 | 54.8 | 56.9 | 54.9 |
| Carbonate | mg/L | | 1 | 1 | 2 | <1 | 1 | <1 | 1 | <1 | 2 | 2 | 2 | 3 |
| Cation sum | meq/L | | 6.33 | 6.68 | 6.04 | 6.4 | 6.27 | 6.65 | 6.3 | 7.5 | 6.78 | 8.75 | 9.13 | 8.98 |
| Chloride | mg/L | 250 | 11.9 | 13.1 | 6.2 | 7.4 | 11.2 | 13.4 | 12.7 | 10.6 | 13.7 | 92.3 | 96.3 | 101 |
| Chromium | mg/L | 0.05 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | <0.0005 | | | | |
| Cobalt | mg/L | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | <0.0005 | | | | |
| Chemical Oxygen Demand | mg/L | | <10 | 20 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | 30 | 60 | <10 |
| Conductivity | µS/cm | | 613 | 670 | 587 | 644 | 615 | 604 | 629 | 679 | 559 | 825 | 834 | 877 |
| Conductivity - field | µS/cm | | 608 | 665 | 640 | 657 | 608 | 609 | 639 | 647 | 673 | 817 | 835 | 884 |
| Copper | mg/L | 1 | 0.0006 | | 0.001 | | <0.0005 | | 0.0021 | <0.0005 | | | | |
| Dissolved Organic Carbon | mg/L | 5 | 3 | 1.4 | 3 | 2.2 | 1.3 | 1.8 | 2.2 | 1.8 | 1.9 | <1.0 | 1.7 | 7.1 |
| Dissolved Oxygen - field | mg/L | | 10.5 | 9.21 | 11.9 | 8.78 | 10.8 | 8.99 | 9.1 | 11.7 | 8.41 | 8.3 | 2.03 | 3.78 |
| Hardness | mg/L | 80-100 | 310 | 325 | 296 | 312 | 307 | 324 | 308 | 367 | 328 | 249 | 275 | 268 |
| Ion Percentage | % | | 1.94 | 0.19 | 2.94 | 0.21 | 2.48 | 6.02 | 1.29 | 7.26 | 0.49 | 2.57 | 4.15 | 3.5 |
| Iron | mg/L | 0.3 | 0.03 | 0.07 | 0.003 | <0.05 | <0.005 | 0.199 | 0.019 | 0.006 | 0.215 | 0.003 | <0.05 | 0.059 |
| Lead | mg/L | 0.01 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | <0.0005 | | | | |
| Magnesium | mg/L | | 4.86 | 7.48 | 5.15 | 6.76 | 5.93 | 7.09 | 5.09 | 5.47 | 7.85 | 27.3 | 32.2 | 31.7 |
| Manganese | mg/L | 0.05 | <0.0005 | 0.001 | <0.0005 | <0.001 | <0.0005 | 0.0099 | 0.0008 | <0.0005 | 0.007 | <0.0005 | 0.008 | 0.0018 |
| Molybdenum | mg/L | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | <0.0005 | | | | |
| Nickel | mg/L | | <0.002 | | <0.002 | | <0.002 | | <0.002 | <0.002 | | | | |
| Nitrate | mg/L | 10.0 * | 12.7 | 18.4 | 17 | 18 | 16.3 | 13.2 | 20.5 | 23.1 | 21.8 | 0.81 | <0.5 | 0.7 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | 7.2 | 53.3 | 103.8 | 35.8 | 60.1 | 31.8 | 71.4 | 119.5 | 90.7 | 127.2 | 5.5 | 10.9 |
| pH | units | | 7.71 | 7.68 | 7.83 | 7.57 | 7.74 | 7.61 | 7.76 | 7.56 | 7.85 | 7.88 | 7.82 | 8.1 |
| pH - field | units | | 7.43 | 7.43 | 7.49 | 7.38 | 7.51 | 7.57 | 7.5 | 7.48 | 7.3 | 7.77 | 7.53 | 7.81 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | 0.02 | 0.01 | <0.02 | <0.02 | <0.02 | 0.03 | <0.01 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | <0.5 | 0.6 | <0.5 | <0.5 | <0.5 | 0.6 | <0.5 | <0.5 | 0.7 | 7.6 | 9.3 | 8 |
| Sodium | mg/L | 200 | 2.6 | 3.3 | 2.6 | 3.2 | 2.8 | 3.2 | 2.9 | 3.2 | 3.2 | 81 | 76.8 | 77.5 |
| Sulphate | mg/L | 500 | 14.6 | 15.9 | 16.2 | 16.1 | 14.6 | 14.2 | 13.2 | 14.5 | 14.2 | 53.9 | 47.7 | 42.7 |
| Total Dissolved Solids | mg/L | 500 | 380 | 460 | 380 | 410 | 390 | 380 | 460 | 450 | 480 | 460 | 460 | 480 |
| Temperature - field | °C | | 4.7 | 14.5 | 3.4 | 12 | 5.4 | 13.8 | 4.3 | 4 | 12.9 | 5.8 | 5.2 | 5.7 |
| Total Kjeldahl Nitrogen | mg/L | | <2.0 | <0.1 | 1.6 | 1 | 0.3 | <1.0 | 2.9 | 2.4 | <2.0 | <0.1 | 0.3 | 0.4 |
| Zinc | mg/L | 5 | 0.0007 | | 0.0007 | | <0.0005 | | 0.0012 | <0.0005 | | | | |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | 1 | <1 | 1 | <1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | | | | |
| 1,1,2-Trichlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | | | | |
| 1,1-Dichloroethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | | | | |
| 1,1-Dichloroethylene | µg/L | 14 * | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | | | | |
| 1,2-Dichlorobenzene | µg/L | 3 | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | | | | |
| 1,2-Dichloroethane | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | | | | |
| 1,2-Dichlorpropane | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | | | | |
| 1,3-Dichlorobenzene | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | | | | |
| 1,3-Dichloropropene(E) | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | | | | |
| 1,3-Dichloropropene(Z) | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | | | | |
| 1,4-Dichlorobenzene | µg/L | 1 | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | | | | |
| Benzene | µg/L | 1 * | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | | | | |
| Bromodichloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | | | | |
| Bromoform | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | | | | |
| Bromomethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | | | | |
| Carbon Tetrachloride | µg/L | 5 * | <0.2 | | <0.2 | | <0.2 | | < 0.2 | < 0.2 | | | | |
| Chlorobenzene | µg/L | 30 | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | | | | |
| Chloroethane | µg/L | | <5 | | <5 | | <5 | | < 5 | < 5 | | | | |
| Chloroform | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | | | | |
| Chloromethane | µg/L | | <5 | | <5 | | <5 | | < 5 | < 5 | | | | |
| cis-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | | | | |
| Dibromochloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | | | | |
| Dichloromethane | µg/L | 50 * | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | | | | |
| Ethyl Benzene | µg/L | 1.6 | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | | | | |
| Ethylene dibromide | µg/L | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | < 0.2 | | | | |
| m/p-Xylenes | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | | | | |
| o-Xylene | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | | | | |
| Styrene | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | | | | |
| Tetrachloroethylene | µg/L | 30 * | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | | | | |
| Toluene | µg/L | 24 | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | | | | |
| trans-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | | | | |
| Trichloroethylene | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | | | | |
| Trichlorofluoromethane | µg/L | | <5 | | <5 | | <5 | | < 5 | < 5 | | | | |
| Vinyl Chloride | µg/L | 1 * | <0.2 | | <0.2 | | <0.2 | | < 0.2 | < 0.2 | | | | |
| Xylenes - total | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | | | | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 64-I | | | 64-II | | | | | | 66-I | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | May-20 | Apr-21 | Apr-22 | Mar-17 | Apr-18 | Apr-19 | May-20 | Apr-21 | Apr-22 | Apr-17 | Mar-18 | Mar-19 |
| Alkalinity | mg/L | 30-500 | 223 | 236 | 247 | 227 | 274 | 274 | 261 | 266 | 313 | 386 | 410 | 365 |
| Aluminum | mg/L | 0.1 | | | | | | | | | | | | |
| Ammonia (as N) | mg/L | | 0.2 | 0.3 | 0.1 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.5 | 0.7 | 0.3 |
| Anion sum | meq/L | | 7.99 | 7.81 | 8.12 | 4.81 | 5.55 | 5.53 | 5.26 | 5.36 | 6.33 | 9.72 | 10.1 | 9.02 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.005 | 0.0013 |
| Barium | mg/L | 1 * | | | | | | | | | | | | |
| Beryllium | mg/L | | | | | | | | | | | | | |
| Bicarbonate | mg/L | | 221 | 235 | 246 | 226 | 273 | 273 | 260 | 265 | 312 | 385 | 409 | 364 |
| Boron | mg/L | 5 * | | | | | | | | | | | | |
| Cadmium | mg/L | 0.005 * | | | | | | | | | | | | |
| Calcium | mg/L | | 52 | 53.6 | 48.4 | 94.2 | 107 | 104 | 106 | 91.3 | 115 | 69.1 | 94.6 | 67.3 |
| Carbonate | mg/L | | 2 | 1 | 1 | <1 | <1 | 1 | 1 | <1 | <1 | <1 | <1 | <1 |
| Cation sum | meq/L | | 8.5 | 8.51 | 7.88 | 5.37 | 6.15 | 5.9 | 6.4 | 5.18 | 6.56 | 9.99 | 12.7 | 9.76 |
| Chloride | mg/L | 250 | 99.7 | 79.3 | 75.6 | 4.4 | 2.6 | 1.9 | 2.2 | 2.4 | 2.8 | 75 | 70.2 | 65.1 |
| Chromium | mg/L | 0.05 * | | | | | | | | | | | | |
| Cobalt | mg/L | | | | | | | | | | | | | |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | <10 | <10 | <10 | <10 | 10 | 20 | <10 | 10 | 30 | 30 |
| Conductivity | µS/cm | | 848 | 799 | 848 | 466 | 510 | 537 | 526 | 505 | 627 | 955 | 955 | 909 |
| Conductivity - field | µS/cm | | 837 | 820 | 792 | 464 | 500 | 518 | 534 | 505 | 571 | 936 | 1020 | 1020 |
| Copper | mg/L | 1 | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 5 | 1.8 | 1.3 | 1.1 | 1.7 | 2 | 2.8 | 1.2 | 1.8 | 2 | 7.5 | 11.2 | 8.5 |
| Dissolved Oxygen - field | mg/L | | 3.46 | 12.1 | 7.5 | 8.86 | 6.51 | 4.83 | 4.51 | 5.7 | 4.49 | 1.24 | 2.06 | 2.46 |
| Hardness | mg/L | 80-100 | 260 | 264 | 243 | 263 | 300 | 289 | 312 | 254 | 321 | 299 | 402 | 292 |
| Ion Percentage | % | | 3.12 | 4.28 | 1.49 | 5.56 | 5.07 | 3.24 | 9.81 | 1.71 | 1.82 | 1.37 | 11.7 | 3.91 |
| Iron | mg/L | 0.3 | 0.017 | <0.005 | 0.009 | 0.003 | <0.05 | 0.335 | 0.353 | 0.084 | 0.016 | 1.17 | 4.41 | 1.65 |
| Lead | mg/L | 0.01 * | | | | | | | | | | | | |
| Magnesium | mg/L | | 31.7 | 31.6 | 29.6 | 6.66 | 7.9 | 7.13 | 11.4 | 6.37 | 8.33 | 30.6 | 40.2 | 30.2 |
| Manganese | mg/L | 0.05 | 0.0069 | 0.0013 | <0.0005 | 0.0096 | 0.008 | 0.0315 | 0.372 | 0.0117 | 0.0564 | 0.0414 | 0.055 | 0.0212 |
| Molybdenum | mg/L | | | | | | | | | | | | | |
| Nickel | mg/L | | | | | | | | | | | | | |
| Nitrate | mg/L | 10.0 * | <0.5 | 0.6 | 0.8 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | 44.7 | 13.7 | 174.4 | 116.5 | 54.6 | 55.2 | 89.8 | 46.3 | 112.1 | -68.8 | -55 | -82.7 |
| pH | units | | 8 | 7.75 | 7.72 | 7.53 | 7.46 | 7.64 | 7.65 | 7.47 | 7.24 | 7.26 | 7.25 | 7.25 |
| pH - field | units | | 7.66 | 7.56 | 7.57 | 7.34 | 7.21 | 7.44 | 7.27 | 7.4 | 7.14 | 6.91 | 6.77 | 6.9 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.07 | 0.15 | 0.06 |
| Phosphorus | mg/L | | <0.01 | 0.02 | <0.02 | <0.02 | 0.03 | 0.01 | <0.01 | <0.01 | <0.02 | 0.07 | 0.14 | 0.09 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 7.2 | 8 | 7.7 | <0.5 | <0.5 | <0.5 | 0.6 | <0.5 | <0.5 | 4.2 | 4.7 | 4.1 |
| Sodium | mg/L | 200 | 70.4 | 68.3 | 64.1 | 2.2 | 2.9 | 2.2 | 3 | 1.8 | 2.6 | 88.3 | 103 | 86.2 |
| Sulphate | mg/L | 500 | 41.5 | 46.5 | 55.3 | 14.1 | 8.7 | 8.3 | 7.1 | 7.1 | 9.4 | 6.6 | 6.9 | 6.1 |
| Total Dissolved Solids | mg/L | 500 | 490 | 420 | 450 | 280 | 260 | 300 | 330 | 290 | 350 | 540 | 540 | 510 |
| Temperature - field | °C | | 7.5 | 5.3 | 5.9 | 3.2 | 2.9 | 2.5 | 5.3 | 3.5 | 3.6 | 8.9 | 9 | 8.8 |
| Total Kjeldahl Nitrogen | mg/L | | <0.2 | <0.1 | <0.2 | <0.1 | <0.1 | <0.1 | <0.2 | <0.1 | <0.2 | 0.8 | 1.1 | 0.6 |
| Zinc | mg/L | 5 | | | | | | | | | | | | |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | 1 | 1 | 3 | <1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | | | | | | | | | | | |
| 1,1,2-Trichlorethane | µg/L | | | | | | | | | | | | | |
| 1,1-Dichloroethane | µg/L | | | | | | | | | | | | | |
| 1,1-Dichloroethylene | µg/L | 14 * | | | | | | | | | | | | |
| 1,2-Dichlorobenzene | µg/L | 3 | | | | | | | | | | | | |
| 1,2-Dichloroethane | µg/L | 5 * | | | | | | | | | | | | |
| 1,2-Dichlorpropane | µg/L | | | | | | | | | | | | | |
| 1,3-Dichlorobenzene | µg/L | | | | | | | | | | | | | |
| 1,3-Dichloropropene(E) | µg/L | | | | | | | | | | | | | |
| 1,3-Dichloropropene(Z) | µg/L | | | | | | | | | | | | | |
| 1,4-Dichlorobenzene | µg/L | 1 | | | | | | | | | | | | |
| Benzene | µg/L | 1 * | | | | | | | | | | | | |
| Bromodichloromethane | µg/L | | | | | | | | | | | | | |
| Bromoform | µg/L | | | | | | | | | | | | | |
| Bromomethane | µg/L | | | | | | | | | | | | | |
| Carbon Tetrachloride | µg/L | 5 * | | | | | | | | | | | | |
| Chlorobenzene | µg/L | 30 | | | | | | | | | | | | |
| Chloroethane | µg/L | | | | | | | | | | | | | |
| Chloroform | µg/L | | | | | | | | | | | | | |
| Chloromethane | µg/L | | | | | | | | | | | | | |
| cis-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | |
| Dibromochloromethane | µg/L | | | | | | | | | | | | | |
| Dichloromethane | µg/L | 50 * | | | | | | | | | | | | |
| Ethyl Benzene | µg/L | 1.6 | | | | | | | | | | | | |
| Ethylene dibromide | µg/L | | | | | | | | | | | | | |
| m/p-Xylenes | µg/L | 20 ** | | | | | | | | | | | | |
| o-Xylene | µg/L | 20 ** | | | | | | | | | | | | |
| Styrene | µg/L | | | | | | | | | | | | | |
| Tetrachloroethylene | µg/L | 30 * | | | | | | | | | | | | |
| Toluene | µg/L | 24 | | | | | | | | | | | | |
| trans-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | |
| Trichloroethylene | µg/L | 5 * | | | | | | | | | | | | |
| Trichlorofluoromethane | µg/L | | | | | | | | | | | | | |
| Vinyl Chloride | µg/L | 1 * | | | | | | | | | | | | |
| Xylenes - total | µg/L | 20 ** | | | | | | | | | | | | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 66-I | | | 66-II | | | | | | 66-III | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-20 | Mar-21 | Mar-22 | Apr-17 | Mar-18 | Mar-19 | Apr-20 | Mar-21 | Mar-22 | Apr-17 | Oct-17 | Apr-18 |
| Alkalinity | mg/L | 30-500 | 482 | 807 | 601 | 1140 | 1000 | 1140 | 1060 | 1060 | 1160 | 625 | 1190 | 732 |
| Aluminum | mg/L | 0.1 | | | | | | | | | | <0.025 | | <0.025 |
| Ammonia (as N) | mg/L | | 0.7 | 1.3 | 0.6 | 21.4 | 21.7 | 23 | 19.5 | 13.6 | 23.9 | 15.3 | 29.2 | 12 |
| Anion sum | meq/L | | 12.1 | 19.6 | 14.4 | 28.3 | 22.2 | 26.9 | 25.6 | 25.3 | 27.4 | 20 | 28 | 17.9 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.0005 | 0.0013 | 0.0085 | <0.005 | 0.0102 | 0.0075 | 0.0074 | 0.0064 | 0.0109 | <0.005 | 0.0047 |
| Barium | mg/L | 1 * | | | | | | | | | | 0.339 | | 0.285 |
| Beryllium | mg/L | | | | | | | | | | | <0.0001 | | <0.0001 |
| Bicarbonate | mg/L | | 481 | 806 | 600 | 1140 | 1000 | 1140 | 1060 | 1060 | 1160 | 625 | 1190 | 732 |
| Boron | mg/L | 5 * | | | | | | | | | | 0.321 | | 1.21 |
| Cadmium | mg/L | 0.005 * | | | | | | | | | | <0.0001 | | <0.0001 |
| Calcium | mg/L | | 94.8 | 157 | 115 | 212 | 195 | 235 | 270 | 229 | 258 | 225 | 277 | 212 |
| Carbonate | mg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Cation sum | meq/L | | 12.9 | 19.2 | 15.1 | 23.5 | 20.8 | 26.2 | 29.2 | 24.7 | 29.7 | 19.5 | 24.8 | 17.6 |
| Chloride | mg/L | 250 | 95.2 | 137 | 93 | 215 | 100 | 168 | 175 | 139 | 171 | 274 | 176 | 124 |
| Chromium | mg/L | 0.05 * | | | | | | | | | | <0.0005 | | 0.0006 |
| Cobalt | mg/L | | | | | | | | | | | 0.0029 | | 0.004 |
| Chemical Oxygen Demand | mg/L | | 30 | 50 | 20 | 70 | 60 | 100 | 90 | 90 | 90 | 30 | 110 | 80 |
| Conductivity | µS/cm | | 1230 | 1820 | 1350 | 2300 | 1840 | 2410 | 2590 | 2310 | 2480 | 1860 | 2280 | 1580 |
| Conductivity - field | µS/cm | | 1250 | 1910 | 1260 | 2400 | 1930 | 2340 | 2420 | 2390 | 2360 | 1980 | 2490 | 1730 |
| Copper | mg/L | 1 | | | | | | | | | | <0.0005 | | <0.0005 |
| Dissolved Organic Carbon | mg/L | 5 | 10.2 | 17.8 | 10.1 | 27.3 | 20.3 | 24.8 | 30 | 26.8 | 27.8 | 9.1 | 27.1 | 18.7 |
| Dissolved Oxygen - field | mg/L | | 2.17 | 1.31 | 0.86 | 3.19 | 2.01 | 3.51 | 2.53 | 2.19 | 2.05 | 2.47 | 3.62 | 2.2 |
| Hardness | mg/L | 80-100 | 410 | 659 | 486 | 736 | 656 | 831 | 962 | 810 | 934 | 652 | 811 | 609 |
| Ion Percentage | % | | 2.92 | 1 | 2.43 | 9.3 | 3.35 | 1.22 | 6.73 | 1.18 | 4.14 | 1.41 | 5.96 | 0.92 |
| Iron | mg/L | 0.3 | 3.12 | 9.62 | 2.38 | 24.5 | 19.4 | 24.5 | 23 | 23.6 | 22.4 | 35 | 49.2 | 34.5 |
| Lead | mg/L | 0.01 * | | | | | | | | | | <0.0005 | | <0.0005 |
| Magnesium | mg/L | | 42.2 | 64.9 | 48.3 | 50.1 | 41 | 59.2 | 70 | 57.8 | 70.4 | 21.8 | 29 | 19.3 |
| Manganese | mg/L | 0.05 | 0.0676 | 0.107 | 0.0585 | 0.217 | 0.2 | 0.268 | 0.208 | 0.226 | 0.17 | 0.686 | 0.665 | 0.557 |
| Molybdenum | mg/L | | | | | | | | | | | <0.0005 | | <0.0005 |
| Nickel | mg/L | | | | | | | | | | | 0.003 | | 0.009 |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.05 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.05 |
| Oxydation Reduction Potential | mV | | -69 | -93.7 | -45.1 | -101.7 | -50 | -52.2 | -41.2 | -48.1 | -41.8 | -105.9 | -84 | -59.4 |
| pH | units | | 7.23 | 6.88 | 6.98 | 6.76 | 6.66 | 6.81 | 6.79 | 6.71 | 6.63 | 6.81 | 6.8 | 6.64 |
| pH - field | units | | 6.91 | 6.57 | 6.72 | 6.47 | 6.46 | 6.75 | 6.51 | 5.91 | 6.6 | 6.48 | 6.36 | 6.42 |
| Phosphate | mg/L | | 0.12 | 0.19 | 0.06 | 0.2 | 0.07 | 0.14 | 0.21 | 0.08 | 0.07 | <0.02 | 0.05 | <0.02 |
| Phosphorus | mg/L | | 0.04 | 0.22 | 0.05 | 0.2 | 0.08 | 0.05 | 0.04 | 0.05 | 0.04 | <0.02 | 0.03 | 0.03 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 4.9 | 6.2 | 5.7 | 24.8 | 24.7 | 25.4 | 21.8 | 33.6 | 27.5 | 17.7 | 28.9 | 11.7 |
| Sodium | mg/L | 200 | 102 | 131 | 118 | 150 | 125 | 167 | 183 | 151 | 197 | 112 | 132 | 96.6 |
| Sulphate | mg/L | 500 | 6.3 | 6 | 6.3 | 7.8 | 3.1 | 4.8 | 5.8 | 40 | 6 | 11.2 | <2 | 11.4 |
| Total Dissolved Solids | mg/L | 500 | 700 | 1070 | 750 | 1310 | 1100 | 1400 | 1390 | 1270 | 1390 | 1040 | 1220 | 870 |
| Temperature - field | °C | | 8.9 | 9.2 | 8.5 | 7.9 | 8.1 | 8.3 | 8.6 | 8.4 | 7.6 | 6.6 | 13.3 | 5.6 |
| Total Kjeldahl Nitrogen | mg/L | | 1.6 | 1.9 | 0.8 | 23.7 | 23.3 | 24.4 | 20.8 | 36.3 | 24.7 | 15.6 | 32.2 | 16 |
| Zinc | mg/L | 5 | | | | | | | | | | <0.0005 | | 0.0007 |
| Phenols | µg/L | | <1 | 1 | <1 | 1 | <1 | 2 | 3 | 2 | <1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | | | | | | | | | <0.5 | | <0.5 |
| 1,1,2-Trichlorethane | µg/L | | | | | | | | | | | <0.5 | | <0.5 |
| 1,1-Dichloroethane | µg/L | | | | | | | | | | | <0.5 | | <0.5 |
| 1,1-Dichloroethylene | µg/L | 14 * | | | | | | | | | | <0.5 | | <0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | | | | | | | | | | <0.5 | | <0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | | | | | | | | | | <0.5 | | <0.5 |
| 1,2-Dichlorpropane | µg/L | | | | | | | | | | | <0.5 | | <0.5 |
| 1,3-Dichlorobenzene | µg/L | | | | | | | | | | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(E) | µg/L | | | | | | | | | | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | | | | | | | | | | <0.5 | | <0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | | | | | | | | | | <0.5 | | <0.5 |
| Benzene | µg/L | 1 * | | | | | | | | | | 2.5 | | 4.5 |
| Bromodichloromethane | µg/L | | | | | | | | | | | <0.5 | | <0.5 |
| Bromoform | µg/L | | | | | | | | | | | <0.5 | | <0.5 |
| Bromomethane | µg/L | | | | | | | | | | | <0.5 | | <0.5 |
| Carbon Tetrachloride | µg/L | 5 * | | | | | | | | | | <0.2 | | <0.2 |
| Chlorobenzene | µg/L | 30 | | | | | | | | | | <0.5 | | 0.8 |
| Chloroethane | µg/L | | | | | | | | | | | <5 | | <5 |
| Chloroform | µg/L | | | | | | | | | | | <0.5 | | <0.5 |
| Chloromethane | µg/L | | | | | | | | | | | <5 | | <5 |
| cis-1,2-Dichloroethylene | µg/L | | | | | | | | | | | <0.5 | | <0.5 |
| Dibromochloromethane | µg/L | | | | | | | | | | | <0.5 | | <0.5 |
| Dichloromethane | µg/L | 50 * | | | | | | | | | | <0.5 | | <0.5 |
| Ethyl Benzene | µg/L | 1.6 | | | | | | | | | | <0.5 | | <0.5 |
| Ethylene dibromide | µg/L | | | | | | | | | | | <0.2 | | <0.2 |
| m/p-Xylenes | µg/L | 20 ** | | | | | | | | | | <0.5 | | <0.5 |
| o-Xylene | µg/L | 20 ** | | | | | | | | | | <0.5 | | <0.5 |
| Styrene | µg/L | | | | | | | | | | | <0.5 | | <0.5 |
| Tetrachloroethylene | µg/L | 30 * | | | | | | | | | | <0.5 | | <0.5 |
| Toluene | µg/L | 24 | | | | | | | | | | <0.5 | | <0.5 |
| trans-1,2-Dichloroethylene | µg/L | | | | | | | | | | | <0.5 | | <0.5 |
| Trichloroethylene | µg/L | 5 * | | | | | | | | | | <0.5 | | <0.5 |
| Trichlorofluoromethane | µg/L | | | | | | | | | | | <5 | | <5 |
| Vinyl Chloride | µg/L | 1 * | | | | | | | | | | <0.2 | | <0.2 |
| Xylenes - total | µg/L | 20 ** | | | | | | | | | | <0.5 | | <0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 66-III | | | | | | | | | 70-I | 113-I | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Oct-18 | Mar-19 | Oct-19 | Apr-20 | Sep-20 | Mar-21 | Oct-21 | Mar-22 | Sep-22 | Apr-17 | Apr-18 | Apr-19 |
| Alkalinity | mg/L | 30-500 | 1220 | 876 | 1290 | 1100 | 651 | 724 | 623 | 796 | 1290 | 164 | 284 | 164 |
| Aluminum | mg/L | 0.1 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | | | |
| Ammonia (as N) | mg/L | | 41.6 | 14.9 | 42.9 | 44.4 | 9.2 | 10.8 | 8.1 | 35.6 | 47.7 | 0.7 | 0.8 | 0.9 |
| Anion sum | meq/L | | 27.5 | 20.5 | 30.1 | 25.8 | 14.1 | 18.1 | 14.7 | 17.3 | 38.2 | 3.59 | 5.9 | 3.56 |
| Arsenic | mg/L | 0.025 | <0.005 | 0.0767 | <0.025 | 0.0586 | 0.0034 | 0.0029 | 0.0661 | 0.0113 | 0.0175 | <0.0005 | <0.005 | <0.0005 |
| Barium | mg/L | 1 * | | 0.476 | | 0.675 | | 0.254 | | 0.366 | | | | |
| Beryllium | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | | | |
| Bicarbonate | mg/L | | 1220 | 876 | 1290 | 1100 | 651 | 724 | 623 | 796 | 1290 | 160 | 277 | 160 |
| Boron | mg/L | 5 * | | 1.51 | | 3.46 | | 0.616 | | 1.1 | | | | |
| Cadmium | mg/L | 0.005 * | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | | | |
| Calcium | mg/L | | 255 | 264 | 257 | 267 | 222 | 220 | 197 | 193 | 237 | 22 | 26.7 | 23.2 |
| Carbonate | mg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 4 | 7 | 4 |
| Cation sum | meq/L | | 26.7 | 21.5 | 28.6 | 28.1 | 17.2 | 16.3 | 15.1 | 19.1 | 29.4 | 3.63 | 4.51 | 3.85 |
| Chloride | mg/L | 250 | 139 | 118 | 181 | 162 | 34.2 | 139 | 74.5 | 54.7 | 469 | 8 | 8.1 | 8 |
| Chromium | mg/L | 0.05 * | | 0.0008 | | 0.0013 | | 0.0005 | | 0.0007 | | | | |
| Cobalt | mg/L | | | 0.0083 | | 0.0071 | | 0.0018 | | 0.0033 | | | | |
| Chemical Oxygen Demand | mg/L | | 90 | 60 | 120 | 110 | 20 | 50 | 20 | 60 | 120 | <10 | 20 | <10 |
| Conductivity | µS/cm | | 2450 | 1950 | 2750 | 2650 | 1360 | 1640 | 1420 | 1560 | 2670 | 360 | 371 | 367 |
| Conductivity - field | µS/cm | | 2530 | 2070 | 2850 | 2620 | 1450 | 1650 | 1470 | 1540 | 2800 | 367 | 358 | 373 |
| Copper | mg/L | 1 | | 0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | | | |
| Dissolved Organic Carbon | mg/L | 5 | 29.9 | 20.1 | 40.2 | 33 | 11.3 | 10.3 | 10.5 | 14.2 | 41.3 | 3 | 2 | 2.6 |
| Dissolved Oxygen - field | mg/L | | 2.11 | 3.63 | 1.72 | 6.13 | 2.1 | 2.5 | 5.09 | 3.06 | 3.16 | 0.77 | 0.85 | 1.42 |
| Hardness | mg/L | 80-100 | 801 | 765 | 836 | 855 | 622 | 619 | 552 | 594 | 846 | 81.7 | 106 | 86.3 |
| Ion Percentage | % | | 1.43 | 2.43 | 2.5 | 4.14 | 9.96 | 5.31 | 1.41 | 4.92 | 13.1 | 0.56 | 13.4 | 3.81 |
| Iron | mg/L | 0.3 | 42.3 | 43.2 | 42.4 | 35.1 | 25.4 | 34.8 | 22.8 | 33.7 | 33.9 | 0.005 | <0.05 | 0.398 |
| Lead | mg/L | 0.01 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | | | |
| Magnesium | mg/L | | 40 | 25.7 | 47.2 | 45.8 | 16.4 | 17 | 14.7 | 27.2 | 61.7 | 6.51 | 9.51 | 6.9 |
| Manganese | mg/L | 0.05 | 0.476 | 1.01 | 0.389 | 0.432 | 0.84 | 0.962 | 0.806 | 0.583 | 0.332 | 0.0033 | 0.004 | 0.0095 |
| Molybdenum | mg/L | | | 0.0035 | | 0.002 | | <0.0005 | | <0.0005 | | | | |
| Nickel | mg/L | | | 0.02 | | 0.025 | | 0.005 | | 0.01 | | | | |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | -80.4 | -65.5 | -69.4 | -39.1 | -58.5 | -70.7 | -64.5 | -65.3 | -44.2 | -236.8 | -252.4 | -227.7 |
| pH | units | | 6.6 | 6.68 | 6.62 | 6.8 | 6.6 | 6.69 | 6.63 | 6.77 | 6.88 | 8.41 | 8.44 | 8.44 |
| pH - field | units | | 6.51 | 6.5 | 6.52 | 6.61 | 6.5 | 6.51 | 6.47 | 6.57 | 6.47 | 7.94 | 8 | 7.95 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | 0.03 | 0.07 | 0.03 | 0.04 | 0.01 | 0.01 | 0.04 | <0.02 | <0.02 | <0.02 | 0.05 | 0.01 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 36.8 | 16.9 | 42.4 | 32.1 | 10.1 | 7.9 | 9.5 | 23.4 | 38.9 | 5 | 5.8 | 4.9 |
| Sodium | mg/L | 200 | 155 | 107 | 176 | 159 | 88.8 | 66.1 | 74.5 | 92.9 | 183 | 41.7 | 50 | 44.2 |
| Sulphate | mg/L | 500 | <2 | 9.8 | <0.2 | <2 | 27 | 8 | 27.2 | 17.7 | 0.5 | 9.4 | 8.5 | 8 |
| Total Dissolved Solids | mg/L | 500 | 1260 | 1120 | 1410 | 1350 | 810 | 950 | 810 | 770 | 1490 | 250 | 230 | 210 |
| Temperature - field | °C | | 13.9 | 6.5 | 13.3 | 7.4 | 13.4 | 6.9 | 14.1 | 5.2 | 11.7 | 8.4 | 8.1 | 8.6 |
| Total Kjeldahl Nitrogen | mg/L | | 43.4 | 25.3 | 52 | 45.5 | 9.8 | 11.8 | 9.7 | 36.2 | 48.7 | 0.8 | 0.3 | 0.1 |
| Zinc | mg/L | 5 | | 0.0017 | | 0.0018 | | 0.0009 | | <0.0005 | | | | |
| Phenols | µg/L | | <1 | 2 | 3 | 4 | 2 | <1 | 1 | 1 | 2 | <1 | <1 | 3 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| 1,1,2-Trichlorethane | µg/L | | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| 1,1-Dichloroethane | µg/L | | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| 1,1-Dichloroethylene | µg/L | 14 * | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| 1,2-Dichlorobenzene | µg/L | 3 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| 1,2-Dichloroethane | µg/L | 5 * | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| 1,2-Dichlorpropane | µg/L | | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| 1,3-Dichlorobenzene | µg/L | | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| 1,3-Dichloropropene(E) | µg/L | | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| 1,3-Dichloropropene(Z) | µg/L | | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| 1,4-Dichlorobenzene | µg/L | 1 | | 0.6 | | 1.3 | | < 0.5 | | 0.9 | | | | |
| Benzene | µg/L | 1 * | | 4.9 | | 2.7 | | 3.7 | | 4.4 | | | | |
| Bromodichloromethane | µg/L | | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| Bromoform | µg/L | | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| Bromomethane | µg/L | | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| Carbon Tetrachloride | µg/L | 5 * | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | | | | |
| Chlorobenzene | µg/L | 30 | | 0.7 | | 1 | | < 0.5 | | 1.4 | | | | |
| Chloroethane | µg/L | | | <5 | | <5 | | < 5 | | < 5 | | | | |
| Chloroform | µg/L | | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| Chloromethane | µg/L | | | <5 | | <5 | | < 5 | | < 5 | | | | |
| cis-1,2-Dichloroethylene | µg/L | | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| Dibromochloromethane | µg/L | | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| Dichloromethane | µg/L | 50 * | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| Ethyl Benzene | µg/L | 1.6 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| Ethylene dibromide | µg/L | | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | | | | |
| m/p-Xylenes | µg/L | 20 ** | | <0.5 | | 0.5 | | < 0.5 | | < 0.5 | | | | |
| o-Xylene | µg/L | 20 ** | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| Styrene | µg/L | | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| Tetrachloroethylene | µg/L | 30 * | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| Toluene | µg/L | 24 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| trans-1,2-Dichloroethylene | µg/L | | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| Trichloroethylene | µg/L | 5 * | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | | | |
| Trichlorofluoromethane | µg/L | | | <5 | | <5 | | < 5 | | < 5 | | | | |
| Vinyl Chloride | µg/L | 1 * | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | | | | |
| Xylenes - total | µg/L | 20 ** | | <0.5 | | 0.5 | | < 0.5 | | < 0.5 | | | | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 113-I | | | 70-II | 113-II | | | | | 70-III | 113-III | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | May-20 | Apr-21 | Apr-22 | Apr-17 | Apr-18 | Apr-19 | May-20 | Apr-21 | Apr-22 | Apr-17 | Apr-18 | Apr-19 |
| Alkalinity | mg/L | 30-500 | 154 | 164 | 149 | 273 | 170 | 256 | 252 | 279 | 215 | 274 | 276 | 282 |
| Aluminum | mg/L | 0.1 | | | | | | | | | | | | |
| Ammonia (as N) | mg/L | | 0.8 | 0.8 | 0.8 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.3 | 0.2 |
| Anion sum | meq/L | | 3.39 | 3.64 | 3.32 | 10.3 | 7.76 | 9.24 | 9.14 | 10.2 | 8.21 | 6.54 | 6.58 | 6.84 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.0005 | <0.0005 | 0.0007 | <0.005 | 0.0007 | 0.0006 | <0.0005 | <0.0005 | 0.0007 | <0.005 | 0.0007 |
| Barium | mg/L | 1 * | | | | | | | | | | | | |
| Beryllium | mg/L | | | | | | | | | | | | | |
| Bicarbonate | mg/L | | 150 | 161 | 146 | 272 | 170 | 255 | 251 | 278 | 214 | 273 | 275 | 281 |
| Boron | mg/L | 5 * | | | | | | | | | | | | |
| Cadmium | mg/L | 0.005 * | | | | | | | | | | | | |
| Calcium | mg/L | | 37.1 | 22.8 | 22.6 | 118 | 137 | 124 | 123 | 126 | 118 | 74.7 | 82.4 | 81 |
| Carbonate | mg/L | | 4 | 3 | 3 | <1 | <1 | <1 | 1 | <1 | <1 | 1 | 1 | 1 |
| Cation sum | meq/L | | 4.67 | 3.78 | 3.79 | 9.73 | 11.1 | 9.99 | 9.99 | 10.2 | 9.52 | 6.52 | 7.33 | 7.22 |
| Chloride | mg/L | 250 | 8.8 | 10.6 | 9.7 | 129 | 112 | 109 | 111 | 123 | 103 | 18.3 | 19.8 | 21.8 |
| Chromium | mg/L | 0.05 * | | | | | | | | | | | | |
| Cobalt | mg/L | | | | | | | | | | | | | |
| Chemical Oxygen Demand | mg/L | | 20 | 10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | 10 | <10 |
| Conductivity | µS/cm | | 370 | 379 | 381 | 1000 | 987 | 936 | 954 | 1000 | 932 | 624 | 616 | 554 |
| Conductivity - field | µS/cm | | 363 | 368 | 351 | 1010 | 969 | 988 | 935 | 990 | 894 | 634 | 607 | 690 |
| Copper | mg/L | 1 | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 5 | 2.4 | 1.6 | 1.4 | 1.3 | 2.5 | 1.2 | 1.7 | 1.8 | 1.7 | 2 | 1.9 | 2.4 |
| Dissolved Oxygen - field | mg/L | | 1.35 | 0.87 | 4.1 | 1.26 | 1.38 | 1.02 | 0.98 | 10.1 | 0.84 | 2.16 | 1.84 | 1.62 |
| Hardness | mg/L | 80-100 | 124 | 85.4 | 84.7 | 395 | 454 | 411 | 413 | 418 | 393 | 291 | 326 | 318 |
| Ion Percentage | % | | 15.9 | 1.9 | 6.67 | 2.65 | 17.6 | 3.93 | 4.43 | 0.06 | 7.4 | 0.16 | 5.39 | 2.68 |
| Iron | mg/L | 0.3 | 0.497 | 0.008 | 0.006 | 1.27 | 1.58 | 0.674 | 1.4 | 1.37 | 1.38 | 0.02 | 0.34 | 0.168 |
| Lead | mg/L | 0.01 * | | | | | | | | | | | | |
| Magnesium | mg/L | | 7.61 | 6.92 | 6.87 | 24.3 | 27.1 | 24.7 | 25.6 | 25 | 23.9 | 25.4 | 29.3 | 28.2 |
| Manganese | mg/L | 0.05 | 0.0209 | 0.0037 | 0.0033 | 0.0258 | 0.024 | 0.0228 | 0.0205 | 0.0209 | 0.0223 | 0.0372 | 0.046 | 0.0504 |
| Molybdenum | mg/L | | | | | | | | | | | | | |
| Nickel | mg/L | | | | | | | | | | | | | |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | -187.2 | -252.6 | -183 | -146.4 | -101.4 | -73.2 | -60.2 | -80 | -85 | -90.9 | -75.2 | -9.3 |
| pH | units | | 8.44 | 8.35 | 8.36 | 7.57 | 7.47 | 7.45 | 7.67 | 7.51 | 7.4 | 7.62 | 7.62 | 7.58 |
| pH - field | units | | 8.12 | 8.25 | 8.12 | 7.22 | 7.22 | 7.32 | 7.31 | 7.46 | 7.23 | 7.39 | 7.35 | 7.44 |
| Phosphate | mg/L | | 0.04 | <0.02 | <0.02 | 0.03 | <0.02 | <0.02 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | 0.01 | 0.02 | <0.02 | <0.02 | 0.03 | <0.01 | <0.01 | 0.02 | <0.02 | <0.02 | 0.03 | 0.01 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 5.3 | 5.1 | 5 | 2.3 | 2.5 | 2.4 | 2.3 | 2.4 | 2.2 | 1.7 | 1.8 | 1.6 |
| Sodium | mg/L | 200 | 45.8 | 43.1 | 43.8 | 40 | 43.1 | 38.1 | 37.6 | 39.6 | 35.9 | 14.2 | 16.1 | 17.6 |
| Sulphate | mg/L | 500 | 7.9 | 8 | 7.8 | 64.6 | 63 | 58.2 | 54.8 | 62.7 | 55.2 | 34.8 | 32.8 | 37.2 |
| Total Dissolved Solids | mg/L | 500 | 200 | 220 | 200 | 620 | 570 | 570 | 570 | 510 | 510 | 400 | 360 | 410 |
| Temperature - field | °C | | 9.1 | 9 | 8.7 | 8.6 | 8.1 | 9.1 | 9.2 | 9.2 | 9.1 | 6.3 | 5.6 | 6 |
| Total Kjeldahl Nitrogen | mg/L | | 0.7 | <2.0 | 0.6 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | 0.2 | <0.1 | 0.1 | <0.1 |
| Zinc | mg/L | 5 | | | | | | | | | | | | |
| Phenols | µg/L | | <1 | 1 | <1 | 3 | <1 | <1 | 1 | 2 | <1 | <1 | <1 | 1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | | | | | | | | | | | |
| 1,1,2-Trichlorethane | µg/L | | | | | | | | | | | | | |
| 1,1-Dichloroethane | µg/L | | | | | | | | | | | | | |
| 1,1-Dichloroethylene | µg/L | 14 * | | | | | | | | | | | | |
| 1,2-Dichlorobenzene | µg/L | 3 | | | | | | | | | | | | |
| 1,2-Dichloroethane | µg/L | 5 * | | | | | | | | | | | | |
| 1,2-Dichlorpropane | µg/L | | | | | | | | | | | | | |
| 1,3-Dichlorobenzene | µg/L | | | | | | | | | | | | | |
| 1,3-Dichloropropene(E) | µg/L | | | | | | | | | | | | | |
| 1,3-Dichloropropene(Z) | µg/L | | | | | | | | | | | | | |
| 1,4-Dichlorobenzene | µg/L | 1 | | | | | | | | | | | | |
| Benzene | µg/L | 1 * | | | | | | | | | | | | |
| Bromodichloromethane | µg/L | | | | | | | | | | | | | |
| Bromoform | µg/L | | | | | | | | | | | | | |
| Bromomethane | µg/L | | | | | | | | | | | | | |
| Carbon Tetrachloride | µg/L | 5 * | | | | | | | | | | | | |
| Chlorobenzene | µg/L | 30 | | | | | | | | | | | | |
| Chloroethane | µg/L | | | | | | | | | | | | | |
| Chloroform | µg/L | | | | | | | | | | | | | |
| Chloromethane | µg/L | | | | | | | | | | | | | |
| cis-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | |
| Dibromochloromethane | µg/L | | | | | | | | | | | | | |
| Dichloromethane | µg/L | 50 * | | | | | | | | | | | | |
| Ethyl Benzene | µg/L | 1.6 | | | | | | | | | | | | |
| Ethylene dibromide | µg/L | | | | | | | | | | | | | |
| m/p-Xylenes | µg/L | 20 ** | | | | | | | | | | | | |
| o-Xylene | µg/L | 20 ** | | | | | | | | | | | | |
| Styrene | µg/L | | | | | | | | | | | | | |
| Tetrachloroethylene | µg/L | 30 * | | | | | | | | | | | | |
| Toluene | µg/L | 24 | | | | | | | | | | | | |
| trans-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | |
| Trichloroethylene | µg/L | 5 * | | | | | | | | | | | | |
| Trichlorofluoromethane | µg/L | | | | | | | | | | | | | |
| Vinyl Chloride | µg/L | 1 * | | | | | | | | | | | | |
| Xylenes - total | µg/L | 20 ** | | | | | | | | | | | | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

## Table H.1
## Groundwater Chemical Results
## Peterborough County/City Waste Management Facility - 2022 Monitoring Program

| PARAMETER | UNITS | ODWQS | 113-III | | | 74-II | | | | | | 74-III | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | May-20 | Apr-21 | Apr-22 | Apr-17 | Mar-18 | Apr-19 | May-20 | Mar-21 | Mar-22 | Apr-17 | Oct-17 | Mar-18 |
| Alkalinity | mg/L | 30-500 | 280 | 284 | 311 | 170 | 183 | 172 | 135 | 171 | 165 | 239 | | 298 |
| Aluminum | mg/L | 0.1 | | | | | | | | | | | | |
| Ammonia (as N) | mg/L | | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 | | 0.1 |
| Anion sum | meq/L | | 7.06 | 7.15 | 8 | 4.85 | 4.89 | 4.79 | 4.59 | 4.81 | 4.63 | 4.87 | | 5.97 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.0005 | <0.0005 | 0.0009 | <0.005 | 0.0009 | 0.0011 | 0.0008 | 0.0008 | <0.0005 | | <0.005 |
| Barium | mg/L | 1 * | | | | | | | | | | | | |
| Beryllium | mg/L | | | | | | | | | | | | | |
| Bicarbonate | mg/L | | 279 | 283 | 310 | 168 | 181 | 170 | 132 | 169 | 163 | 237 | | 297 |
| Boron | mg/L | 5 * | | | | | | | | | | | | |
| Cadmium | mg/L | 0.005 * | | | | | | | | | | | | |
| Calcium | mg/L | | 96.2 | 85.2 | 105 | 33.9 | 37.6 | 30.7 | 31.9 | 38.7 | 40 | 86.5 | | 95.8 |
| Carbonate | mg/L | | 1 | 1 | <1 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | | <1 |
| Cation sum | meq/L | | 8.1 | 7.37 | 8.36 | 5.07 | 4.68 | 4.67 | 5.11 | 4.82 | 5.27 | 5.06 | | 5.74 |
| Chloride | mg/L | 250 | 25.1 | 24.1 | 30.5 | 23.5 | 22 | 20 | 21.3 | 19.8 | 19.1 | 5 | | 3.2 |
| Chromium | mg/L | 0.05 * | | | | | | | | | | | | |
| Cobalt | mg/L | | | | | | | | | | | | | |
| Chemical Oxygen Demand | mg/L | | <10 | 10 | <10 | <10 | <10 | <10 | 10 | <10 | <10 | <10 | | <10 |
| Conductivity | µS/cm | | 703 | 695 | 799 | 488 | 473 | 479 | 486 | 483 | 491 | 477 | | 550 |
| Conductivity - field | µS/cm | | 691 | 693 | 745 | 493 | 454 | 480 | 501 | 490 | 466 | 485 | 653 | 530 |
| Copper | mg/L | 1 | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 5 | 3.1 | 2.2 | 7.7 | 1 | 2.3 | 3.9 | 1.2 | 1.7 | 1.5 | 2.3 | | 2.3 |
| Dissolved Oxygen - field | mg/L | | 1.4 | 1.37 | 2.83 | 7.59 | 7.51 | 7.44 | 3.74 | 7.84 | 7.81 | 3.94 | 2.4 | 2.93 |
| Hardness | mg/L | 80-100 | 363 | 327 | 375 | 152 | 175 | 137 | 145 | 171 | 179 | 242 | | 277 |
| Ion Percentage | % | | 6.86 | 1.54 | 2.22 | 2.22 | 2.19 | 1.27 | 5.31 | 0.09 | 6.49 | 1.86 | | 1.9 |
| Iron | mg/L | 0.3 | 0.038 | 0.036 | 0.019 | 0.016 | <0.05 | 0.01 | 0.188 | <0.005 | 0.01 | 0.007 | | <0.05 |
| Lead | mg/L | 0.01 * | | | | | | | | | | | | |
| Magnesium | mg/L | | 29.8 | 27.7 | 27.3 | 16.3 | 19.7 | 14.7 | 15.8 | 18.1 | 19.2 | 6.32 | | 9.11 |
| Manganese | mg/L | 0.05 | 0.0492 | 0.0332 | 0.0535 | 0.006 | 0.002 | 0.0207 | 0.0126 | 0.0007 | 0.0034 | 0.0099 | | 0.039 |
| Molybdenum | mg/L | | | | | | | | | | | | | |
| Nickel | mg/L | | | | | | | | | | | | | |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | 0.09 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 0.07 | | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | | <0.5 |
| Oxydation Reduction Potential | mV | | 14.9 | -30.5 | 28.6 | 84.7 | 57.1 | 212 | 45.8 | 82.9 | 308.7 | 112.9 | -49.7 | 28.8 |
| pH | units | | 7.68 | 7.63 | 7.36 | 8.18 | 8.11 | 8.16 | 8.41 | 8.15 | 8.08 | 7.84 | | 7.53 |
| pH - field | units | | 7.37 | 7.49 | 7.31 | 7.94 | 7.93 | 8.03 | 8.14 | 8.03 | 7.83 | 7.47 | 7.04 | 7.23 |
| Phosphate | mg/L | | <0.01 | <0.02 | <0.02 | 0.09 | 0.13 | 0.06 | 0.09 | 0.1 | 0.13 | <0.02 | | <0.02 |
| Phosphorus | mg/L | | <0.01 | 0.02 | <0.02 | 0.15 | 0.18 | 0.13 | 0.08 | 0.15 | 0.13 | 0.08 | | 0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.5 | 1.5 | 1.2 | 2 | 1.8 | 1.8 | 1.6 | 1.8 | 2 | 1 | | <0.5 |
| Sodium | mg/L | 200 | 17.3 | 17.3 | 18.2 | 45.1 | 25.5 | 42.8 | 49.4 | 30.4 | 36.9 | 4 | | 4.3 |
| Sulphate | mg/L | 500 | 44.9 | 46.9 | 53.9 | 43 | 35.2 | 43.4 | 66.3 | 45.3 | 43.1 | 5 | | 5.3 |
| Total Dissolved Solids | mg/L | 500 | 430 | 380 | 440 | 260 | 280 | 300 | 310 | 230 | 280 | 240 | | 310 |
| Temperature - field | °C | | 8.1 | 6.7 | 6.3 | 8.4 | 8.9 | 7.7 | 9.8 | 9 | 7.2 | 4.5 | 12 | 5.8 |
| Total Kjeldahl Nitrogen | mg/L | | 2.9 | 3 | 2.8 | 0.1 | <0.1 | <0.2 | <0.2 | <0.1 | <0.1 | 0.2 | | <0.1 |
| Zinc | mg/L | 5 | | | | | | | | | | | | |
| Phenols | µg/L | | 1 | 2 | <1 | <1 | <1 | 1 | 1 | <1 | <1 | <1 | | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | | | | | | | | | | <0.5 | |
| 1,1,2-Trichlorethane | µg/L | | | | | | | | | | | | <0.5 | |
| 1,1-Dichloroethane | µg/L | | | | | | | | | | | | <0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | | | | | | | | | | | <0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | | | | | | | | | | | <0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | | | | | | | | | | | <0.5 | |
| 1,2-Dichlorpropane | µg/L | | | | | | | | | | | | <0.5 | |
| 1,3-Dichlorobenzene | µg/L | | | | | | | | | | | | <0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | | | | | | | | | | | <0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | | | | | | | | | | | <0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | | | | | | | | | | | <0.5 | |
| Benzene | µg/L | 1 * | | | | | | | | | | | <0.5 | |
| Bromodichloromethane | µg/L | | | | | | | | | | | | <0.5 | |
| Bromoform | µg/L | | | | | | | | | | | | <0.5 | |
| Bromomethane | µg/L | | | | | | | | | | | | <0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | | | | | | | | | | | <0.2 | |
| Chlorobenzene | µg/L | 30 | | | | | | | | | | | <0.5 | |
| Chloroethane | µg/L | | | | | | | | | | | | <5 | |
| Chloroform | µg/L | | | | | | | | | | | | <0.5 | |
| Chloromethane | µg/L | | | | | | | | | | | | <5 | |
| cis-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | <0.5 | |
| Dibromochloromethane | µg/L | | | | | | | | | | | | <0.5 | |
| Dichloromethane | µg/L | 50 * | | | | | | | | | | | <0.5 | |
| Ethyl Benzene | µg/L | 1.6 | | | | | | | | | | | <0.5 | |
| Ethylene dibromide | µg/L | | | | | | | | | | | | <0.2 | |
| m/p-Xylenes | µg/L | 20 ** | | | | | | | | | | | <0.5 | |
| o-Xylene | µg/L | 20 ** | | | | | | | | | | | <0.5 | |
| Styrene | µg/L | | | | | | | | | | | | <0.5 | |
| Tetrachloroethylene | µg/L | 30 * | | | | | | | | | | | <0.5 | |
| Toluene | µg/L | 24 | | | | | | | | | | | <0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | <0.5 | |
| Trichloroethylene | µg/L | 5 * | | | | | | | | | | | <0.5 | |
| Trichlorofluoromethane | µg/L | | | | | | | | | | | | <5 | |
| Vinyl Chloride | µg/L | 1 * | | | | | | | | | | | <0.2 | |
| Xylenes - total | µg/L | 20 ** | | | | | | | | | | | <0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 74-III | | | | | | | | | 75-I | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Oct-18 | Apr-19 | Oct-19 | May-20 | Sep-20 | Mar-21 | Oct-21 | Mar-22 | Sep-22 | Oct-17 | Apr-18 | Oct-19 |
| Alkalinity | mg/L | 30-500 | | 280 | | 269 | | 269 | | 329 | | 469 | 463 | 436 |
| Aluminum | mg/L | 0.1 | | | | | | | | | | | <0.025 | |
| Ammonia (as N) | mg/L | | | 0.1 | | 0.1 | | 0.1 | | 0.2 | | 0.8 | 0.6 | 1.1 |
| Anion sum | meq/L | | | 5.62 | | 5.4 | | 5.37 | | 6.5 | | 12.4 | 11.7 | 11.2 |
| Arsenic | mg/L | 0.025 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.005 | 0.0006 | <0.005 |
| Barium | mg/L | 1 * | | | | | | | | | | | 0.303 | |
| Beryllium | mg/L | | | | | | | | | | | | <0.0001 | |
| Bicarbonate | mg/L | | | 279 | | 268 | | 268 | | 328 | | 464 | 458 | 432 |
| Boron | mg/L | 5 * | | | | | | | | | | | 1.45 | |
| Cadmium | mg/L | 0.005 * | | | | | | | | | | | <0.0001 | |
| Calcium | mg/L | | | 85.6 | | 102 | | 87.6 | | 124 | | 21 | 22.7 | 22.5 |
| Carbonate | mg/L | | | 1 | | 1 | | <1 | | <1 | | 5 | 5 | 4 |
| Cation sum | meq/L | | | 5.08 | | 6.14 | | 5.29 | | 7.31 | | 11.4 | 12.2 | 11.5 |
| Chloride | mg/L | 250 | | 3.4 | | 3.5 | | 3.5 | | 2.1 | | 115 | 97.1 | 97.7 |
| Chromium | mg/L | 0.05 * | | | | | | | | | | | <0.0005 | |
| Cobalt | mg/L | | | | | | | | | | | | <0.0001 | |
| Chemical Oxygen Demand | mg/L | | | <10 | | <10 | | <10 | | <10 | | <10 | 20 | 30 |
| Conductivity | µS/cm | | | 537 | | 550 | | 513 | | 619 | | 1170 | 1170 | 1160 |
| Conductivity - field | µS/cm | | 591 | 532 | 649 | 565 | 555 | 513 | 614 | 616 | 674 | 1190 | 1090 | 1160 |
| Copper | mg/L | 1 | | | | | | | | | | | <0.0005 | |
| Dissolved Organic Carbon | mg/L | 5 | | 3.8 | | 1.3 | | 1.9 | | 1.7 | | 4.7 | 2.9 | 4.2 |
| Dissolved Oxygen - field | mg/L | | 3.81 | 7.99 | 5.64 | 3.93 | 9.7 | 1.73 | 5.75 | 4.19 | 4.66 | 1.41 | 1.42 | 1.85 |
| Hardness | mg/L | 80-100 | | 243 | | 296 | | 254 | | 354 | | 104 | 111 | 110 |
| Ion Percentage | % | | | 5.03 | | 6.41 | | 0.8 | | 5.85 | | 3.92 | 1.84 | 1.34 |
| Iron | mg/L | 0.3 | | 0.216 | | 0.073 | | 0.082 | | 0.034 | | 0.11 | 0.044 | 0.09 |
| Lead | mg/L | 0.01 * | | | | | | | | | | | <0.0005 | |
| Magnesium | mg/L | | | 7.19 | | 10.1 | | 8.51 | | 10.7 | | 12.5 | 13.2 | 13.1 |
| Manganese | mg/L | 0.05 | | 0.078 | | 0.0319 | | 0.0242 | | 0.0745 | | 0.004 | 0.0026 | 0.006 |
| Molybdenum | mg/L | | | | | | | | | | | | 0.0005 | |
| Nickel | mg/L | | | | | | | | | | | | <0.002 | |
| Nitrate | mg/L | 10.0 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | <0.05 | <0.5 |
| Nitrite | mg/L | 1.0* | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | <0.05 | <0.5 |
| Oxydation Reduction Potential | mV | | -21.2 | 206.9 | -114.9 | -17.1 | 61 | -24.4 | -51.4 | 122.9 | -160.4 | -192.7 | -109.7 | -125.2 |
| pH | units | | | 7.62 | | 7.74 | | 7.57 | | 7.48 | | 8.08 | 8.02 | 7.95 |
| pH - field | units | | 7.36 | 7.54 | 7.54 | 7.35 | 7.41 | 7.32 | 7.21 | 7.11 | 7.07 | 7.55 | 7.79 | 7.95 |
| Phosphate | mg/L | | | <0.02 | | <0.02 | | <0.02 | | <0.02 | | 0.04 | 0.02 | <0.02 |
| Phosphorus | mg/L | | | 0.02 | | 0.01 | | 0.02 | | <0.02 | | 0.08 | 0.07 | 0.05 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | | 1.1 | | <0.5 | | 0.5 | | <0.5 | | 7.7 | 8.3 | 7.6 |
| Sodium | mg/L | 200 | | 3.9 | | 4.5 | | 4.1 | | 4.6 | | 209 | 223 | 207 |
| Sulphate | mg/L | 500 | | 5.3 | | 4.9 | | 3.4 | | 3.6 | | 2.6 | 2.6 | <2 |
| Total Dissolved Solids | mg/L | 500 | | 320 | | 330 | | 280 | | 330 | | 670 | 650 | 640 |
| Temperature - field | °C | | 12.3 | 5.4 | 11.5 | 7.5 | 12 | 5.9 | 13.7 | 4 | 12 | 9.7 | 9.7 | 10.3 |
| Total Kjeldahl Nitrogen | mg/L | | | <0.2 | | <0.2 | | <0.1 | | <0.1 | | 1 | 0.6 | <1.5 |
| Zinc | mg/L | 5 | | | | | | | | | | | 0.0036 | |
| Phenols | µg/L | | | <1 | | <1 | | 2 | | <1 | | 3 | <1 | 2 |
| 1,1,2,2-Tetrachlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| 1,1,2-Trichlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| 1,1-Dichloroethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| 1,2-Dichlorpropane | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| 1,3-Dichlorobenzene | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Benzene | µg/L | 1 * | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Bromodichloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Bromoform | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Bromomethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | |
| Chlorobenzene | µg/L | 30 | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Chloroethane | µg/L | | <5 | | <5 | | <5 | | < 5 | | < 5 | | <5 | |
| Chloroform | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Chloromethane | µg/L | | <5 | | <5 | | <5 | | < 5 | | < 5 | | <5 | |
| cis-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Dibromochloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Dichloromethane | µg/L | 50 * | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Ethyl Benzene | µg/L | 1.6 | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Ethylene dibromide | µg/L | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | |
| m/p-Xylenes | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| o-Xylene | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Styrene | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Tetrachloroethylene | µg/L | 30 * | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Toluene | µg/L | 24 | <0.5 | | 34 | | <0.5 | | < 0.5 | | 48.8 | | <0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Trichloroethylene | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |
| Trichlorofluoromethane | µg/L | | <5 | | <5 | | <5 | | < 5 | | < 5 | | <5 | |
| Vinyl Chloride | µg/L | 1 * | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | |
| Xylenes - total | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 75-I | | | | | 75-II | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | May-20 | Sep-20 | Apr-21 | Oct-21 | Mar-22 | Apr-17 | Oct-17 | Apr-18 | Oct-18 | Apr-19 | Oct-19 | May-20 |
| Alkalinity | mg/L | 30-500 | 428 | 447 | 490 | 496 | 482 | 233 | 299 | 263 | 282 | 338 | 274 | 266 |
| Aluminum | mg/L | 0.1 | <0.025 | | <0.025 | | <0.025 | <0.025 | | <0.025 | | <0.025 | | 1.05 |
| Ammonia (as N) | mg/L | | 0.8 | 0.4 | 0.9 | 0.8 | 0.8 | 0.2 | <0.1 | 0.1 | 0.2 | 0.1 | 0.6 | <0.1 |
| Anion sum | meq/L | | 11.1 | 11.7 | 10.8 | 13.2 | 12.6 | 5.33 | 8.15 | 5.71 | 8 | 7.9 | 7.67 | 6.54 |
| Arsenic | mg/L | 0.025 | 0.0008 | 0.0008 | 0.0006 | 0.0007 | 0.0006 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 |
| Barium | mg/L | 1 * | 0.315 | | 0.358 | | 0.334 | 0.022 | | 0.025 | | 0.044 | | 0.058 |
| Beryllium | mg/L | | <0.0005 | | <0.0005 | | <0.0005 | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 |
| Bicarbonate | mg/L | | 420 | 442 | 487 | 492 | 479 | 232 | 297 | 262 | 281 | 337 | 273 | 265 |
| Boron | mg/L | 5 * | 1.28 | | 1.49 | | 1.72 | 0.0173 | | 0.0045 | | 0.003 | | 0.0119 |
| Cadmium | mg/L | 0.005 * | <0.0001 | | <0.0001 | | <0.0001 | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 |
| Calcium | mg/L | | 24.7 | 26.5 | 28.6 | 27 | 30.6 | 87.7 | 106 | 93.1 | 118 | 121 | 112 | 149 |
| Carbonate | mg/L | | 8 | 5 | 3 | 4 | 3 | 1 | 2 | <1 | <1 | 1 | <1 | <1 |
| Cation sum | meq/L | | 12.2 | 12.5 | 13.6 | 11.6 | 14.1 | 5.28 | 7.4 | 5.64 | 8.27 | 7.39 | 7.97 | 9.02 |
| Chloride | mg/L | 250 | 95.2 | 98.6 | 38.2 | 106 | 95.4 | 21.4 | 66.4 | 16.2 | 74.8 | 39.1 | 68.3 | 40.7 |
| Chromium | mg/L | 0.05 * | <0.0005 | | <0.0005 | | <0.0005 | <0.0005 | | <0.0005 | | <0.0005 | | 0.0011 |
| Cobalt | mg/L | | <0.0005 | | <0.0005 | | <0.0005 | <0.0001 | | <0.0001 | | <0.0005 | | 0.001 |
| Chemical Oxygen Demand | mg/L | | 20 | 50 | 20 | 30 | 10 | <10 | 20 | <10 | 30 | 30 | <10 | <10 |
| Conductivity | µS/cm | | 1180 | 1210 | 1280 | 1310 | 1300 | 524 | 737 | 495 | 808 | 764 | 794 | 682 |
| Conductivity - field | µS/cm | | 1170 | - | - | - | - | 533 | 780 | 525 | 808 | 774 | 803 | 672 |
| Copper | mg/L | 1 | 0.0021 | | 0.0009 | | 0.0005 | 0.0005 | | <0.0005 | | 0.0009 | | 0.002 |
| Dissolved Organic Carbon | mg/L | 5 | 4.7 | 8.2 | 3.2 | 6.3 | 1.6 | 3.4 | 2 | 1.2 | 2.5 | 3.6 | 4 | 1.7 |
| Dissolved Oxygen - field | mg/L | | 6.48 | - | - | - | - | 5.56 | 2.42 | 2.33 | 1.57 | 2.47 | 2.36 | 2.88 |
| Hardness | mg/L | 80-100 | 121 | 130 | 141 | 131 | 150 | 239 | 307 | 253 | 340 | 333 | 326 | 415 |
| Ion Percentage | % | | 4.77 | 3.48 | 11.5 | 6.64 | 5.51 | 0.46 | 4.83 | 0.63 | 1.67 | 3.33 | 1.97 | 15.9 |
| Iron | mg/L | 0.3 | 0.022 | 0.116 | 0.015 | 0.09 | 0.08 | 0.005 | <0.05 | 0.012 | <0.05 | 0.039 | <0.05 | 1.51 |
| Lead | mg/L | 0.01 * | <0.0005 | | <0.0005 | | <0.0005 | <0.0005 | | <0.0005 | | <0.0005 | | 0.0007 |
| Magnesium | mg/L | | 14.4 | 15.4 | 16.9 | 15.5 | 17.9 | 4.75 | 10.2 | 5.02 | 11.1 | 7.52 | 11.2 | 10.4 |
| Manganese | mg/L | 0.05 | <0.0005 | 0.0062 | 0.0064 | 0.0068 | 0.0054 | 0.001 | 0.01 | 0.0045 | 0.001 | 0.0123 | 0.002 | 0.116 |
| Molybdenum | mg/L | | <0.0005 | | <0.0005 | | <0.0005 | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Nickel | mg/L | | <0.002 | | <0.002 | | <0.002 | <0.002 | | <0.002 | | <0.002 | | <0.002 |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.05 | 0.12 | <0.5 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | 82.9 | - | - | - | - | 159 | 2 | 3.2 | 114 | 38.4 | 32.7 | 98.5 |
| pH | units | | 8.3 | 8.1 | 7.87 | 7.97 | 7.87 | 7.7 | 7.77 | 7.52 | 7.46 | 7.53 | 7.52 | 7.6 |
| pH - field | units | | 8.06 | - | - | - | - | 7.42 | 7.12 | 7.27 | 7.16 | 7.26 | 7.35 | 7.31 |
| Phosphate | mg/L | | 0.03 | 0.02 | 0.06 | <0.02 | 0.06 | <0.02 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | 0.09 |
| Phosphorus | mg/L | | 0.03 | 0.07 | 0.12 | 0.03 | 0.1 | 0.03 | <0.02 | 0.01 | <0.02 | <0.02 | <0.02 | <0.01 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 7.9 | 8.7 | 9.1 | 8.2 | 9.9 | <0.5 | 1.1 | <0.5 | 1.2 | <0.5 | 1.1 | 0.7 |
| Sodium | mg/L | 200 | 219 | 222 | 241 | 199 | 247 | 11.2 | 28 | 12.8 | 32.3 | 16.3 | 31.5 | 15.8 |
| Sulphate | mg/L | 500 | 6.9 | 11.8 | 12 | 30 | 28.3 | 10.6 | 23.6 | 7.9 | 20.7 | 12.6 | 21.2 | 11.9 |
| Total Dissolved Solids | mg/L | 500 | 700 | 710 | 720 | 760 | 700 | 310 | 440 | 270 | 460 | 430 | 410 | 400 |
| Temperature - field | °C | | 10.3 | - | - | - | - | 3.4 | 12 | 4.4 | 12.7 | 2.4 | 11.5 | 5.8 |
| Total Kjeldahl Nitrogen | mg/L | | 0.8 | <1.0 | 0.4 | 1 | 1.1 | 0.2 | <0.1 | 0.1 | 0.2 | 0.1 | <1 | <0.2 |
| Zinc | mg/L | 5 | 0.0045 | | 0.0059 | | 0.0016 | <0.0005 | | <0.0005 | | 0.0008 | | 0.0032 |
| Phenols | µg/L | | <1 | 2 | <1 | 1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 | 1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1,2-Trichlorethane | µg/L | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethane | µg/L | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethylene | µg/L | 14 * | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorpropane | µg/L | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichlorobenzene | µg/L | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(E) | µg/L | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Benzene | µg/L | 1 * | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromodichloromethane | µg/L | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromoform | µg/L | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromomethane | µg/L | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Carbon Tetrachloride | µg/L | 5 * | <0.2 | | < 0.2 | | < 0.2 | <0.2 | | <0.2 | | <0.2 | | <0.2 |
| Chlorobenzene | µg/L | 30 | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Chloroethane | µg/L | | <5 | | < 5 | | < 5 | <5 | | <5 | | <5 | | <5 |
| Chloroform | µg/L | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Chloromethane | µg/L | | <5 | | < 5 | | < 5 | <5 | | <5 | | <5 | | <5 |
| cis-1,2-Dichloroethylene | µg/L | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Dibromochloromethane | µg/L | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Dichloromethane | µg/L | 50 * | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Ethyl Benzene | µg/L | 1.6 | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Ethylene dibromide | µg/L | | <0.2 | | < 0.2 | | < 0.2 | <0.2 | | <0.2 | | <0.2 | | <0.2 |
| m/p-Xylenes | µg/L | 20 ** | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| o-Xylene | µg/L | 20 ** | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Styrene | µg/L | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Tetrachloroethylene | µg/L | 30 * | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Toluene | µg/L | 24 | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| trans-1,2-Dichloroethylene | µg/L | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Trichloroethylene | µg/L | 5 * | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Trichlorofluoromethane | µg/L | | <5 | | < 5 | | < 5 | <5 | | <5 | | <5 | | <5 |
| Vinyl Chloride | µg/L | 1 * | <0.2 | | < 0.2 | | < 0.2 | <0.2 | | <0.2 | | <0.2 | | <0.2 |
| Xylenes - total | µg/L | 20 ** | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 75-II | | | | | 76-I | | | | | | 77-I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sep-20 | Apr-21 | Oct-21 | Mar-22 | Sep-22 | Apr-17 | Apr-18 | Apr-19 | May-20 | Apr-21 | Apr-22 | Apr-17 |
| Alkalinity | mg/L | 30-500 | 261 | 287 | 315 | 297 | 286 | 202 | 218 | 216 | 227 | 187 | 170 | 224 |
| Aluminum | mg/L | 0.1 | | <0.025 | | <0.025 | | | | | | | | |
| Ammonia (as N) | mg/L | | 0.9 | 0.6 | 0.2 | 0.2 | 0.6 | 23.4 | 19 | 20.2 | 20.2 | 25.8 | 27.1 | 0.2 |
| Anion sum | meq/L | | 7.22 | 6.39 | 8.1 | 5.85 | 8.3 | 948 | 649 | 712 | 416 | 672 | 752 | 7.98 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0108 | <0.005 | 0.0096 | 0.0058 | 0.008 | 0.0063 | 0.0006 |
| Barium | mg/L | 1 * | | 0.046 | | 0.038 | | | | | | | | |
| Beryllium | mg/L | | | <0.0005 | | <0.0005 | | | | | | | | |
| Bicarbonate | mg/L | | 260 | 286 | 314 | 296 | 285 | 202 | 218 | 216 | 227 | 187 | 170 | 223 |
| Boron | mg/L | 5 * | | 0.0113 | | 0.0067 | | | | | | | | |
| Cadmium | mg/L | 0.005 * | | <0.0001 | | <0.0001 | | | | | | | | |
| Calcium | mg/L | | 111 | 121 | 119 | 125 | 116 | 3530 | 3490 | 2410 | 1420 | 2830 | 3530 | 98.6 |
| Carbonate | mg/L | | <1 | <1 | 1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Cation sum | meq/L | | 7.86 | 7.33 | 7.56 | 7.59 | 8.34 | 715 | 654 | 530 | 364 | 605 | 726 | 7.14 |
| Chloride | mg/L | 250 | 61.2 | 2.3 | 59.4 | 3.1 | 83.5 | 33500 | 22900 | 25100 | 14600 | 23700 | 26500 | 101 |
| Chromium | mg/L | 0.05 * | | <0.0005 | | <0.0005 | | | | | | | | |
| Cobalt | mg/L | | | <0.0005 | | <0.0005 | | | | | | | | |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | <10 | <10 | <10 | 760 | 1370 | 220 | 400 | 460 | 140 | <10 |
| Conductivity | µS/cm | | 714 | 632 | 805 | 649 | 705 | 89400 | 82000 | 65600 | 46400 | 71900 | 84600 | 773 |
| Conductivity - field | µS/cm | | 735 | 680 | 791 | 642 | 845 | 69000 | 111000 | 91700 | 35500 | 85000 | 89100 | 770 |
| Copper | mg/L | 1 | | 0.0006 | | 0.0006 | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 5 | 2.1 | 2.3 | 3 | 2.2 | 5 | 1.4 | 1.6 | 2.4 | 2.8 | 1.2 | 1.6 | <1.0 |
| Dissolved Oxygen - field | mg/L | | 1.49 | 2.69 | 3.3 | 4.82 | 5.63 | 0.69 | 1.08 | 0.5 | 0.79 | 0.64 | 1.49 | 2.84 |
| Hardness | mg/L | 80-100 | 322 | 331 | 332 | 342 | 339 | 17500 | 15800 | 11500 | 7020 | 13400 | 16700 | 328 |
| Ion Percentage | % | | 4.24 | 6.81 | 3.43 | 13 | 0.28 | 14 | 0.37 | 14.6 | 6.58 | 5.28 | 1.79 | 5.58 |
| Iron | mg/L | 0.3 | 0.014 | 0.019 | 0.035 | 0.011 | 0.149 | 6.49 | 4.52 | 4.14 | 1.36 | 6.16 | 8.4 | 0.555 |
| Lead | mg/L | 0.01 * | | <0.0005 | | <0.0005 | | | | | | | | |
| Magnesium | mg/L | | 10.8 | 6.91 | 8.38 | 7.3 | 12.1 | 2120 | 1710 | 1340 | 843 | 1530 | 1920 | 19.9 |
| Manganese | mg/L | 0.05 | 0.0044 | 0.0193 | 0.0178 | 0.0075 | 0.0075 | 0.156 | 0.138 | 0.144 | 0.124 | 0.177 | 0.188 | 0.0209 |
| Molybdenum | mg/L | | | <0.0005 | | <0.0005 | | | | | | | | |
| Nickel | mg/L | | | <0.002 | | <0.002 | | | | | | | | |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | <0.5 | 0.1 | <5.0 | <0.5 | <5.0 | <0.5 | <5.0 | <5.0 | <0.05 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <5.0 | <0.5 | <5.0 | <0.5 | <5.0 | <5.0 | <0.05 |
| Oxydation Reduction Potential | mV | | 79.1 | 92.3 | 142.9 | 133 | 24.5 | -31.2 | -17.1 | -59.1 | -71.4 | -67.9 | -57.1 | -102.9 |
| pH | units | | 7.48 | 7.37 | 7.54 | 7.3 | 7.61 | 7.13 | 7.1 | 7.04 | 7.21 | 6.82 | 6.69 | 7.66 |
| pH - field | units | | 7.3 | 7.45 | 7.07 | 7.2 | 7.23 | 6.82 | 6.25 | 6.66 | 7.15 | 6.5 | 6.55 | 7.33 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.04 | 0.02 | 0.06 | <0.02 | 0.04 | 0.07 | <0.02 |
| Phosphorus | mg/L | | 0.01 | 0.02 | 0.01 | <0.02 | <0.02 | 0.54 | 0.86 | 0.11 | 0.34 | 0.07 | 0.06 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.2 | <0.5 | 0.6 | <0.5 | 1.2 | 164 | 160 | 139 | 131 | 161 | 160 | 1.5 |
| Sodium | mg/L | 200 | 30.2 | 15.1 | 20.4 | 16.5 | 33.6 | 8180 | 7630 | 6740 | 5020 | 7590 | 8810 | 11.5 |
| Sulphate | mg/L | 500 | 21.4 | 37.2 | 16.1 | 0.8 | 19.4 | <20 | 3.4 | 22.2 | <2 | 57.2 | 109 | 38.7 |
| Total Dissolved Solids | mg/L | 500 | 450 | 350 | 470 | 390 | 460 | 48000 | 41100 | 33900 | 24500 | 35800 | 43300 | 520 |
| Temperature - field | °C | | 11.7 | 5.6 | 13.3 | 3.3 | 11.3 | 9.6 | 4.9 | 9.4 | 9.2 | 8.8 | 9.1 | 5.9 |
| Total Kjeldahl Nitrogen | mg/L | | <2.0 | <0.1 | 0.3 | <0.2 | 2.1 | 25.3 | 21 | 20.6 | 25.33 | 25.6 | 27.1 | <0.1 |
| Zinc | mg/L | 5 | | 0.0008 | | 0.0034 | | | | | | | | |
| Phenols | µg/L | | 2 | <1 | 1 | <1 | <1 | 14 | 8 | 10 | 9 | 28 | 28 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | < 0.5 | | < 0.5 | | | | | | | | |
| 1,1,2-Trichlorethane | µg/L | | | < 0.5 | | < 0.5 | | | | | | | | |
| 1,1-Dichloroethane | µg/L | | | < 0.5 | | < 0.5 | | | | | | | | |
| 1,1-Dichloroethylene | µg/L | 14 * | | < 0.5 | | < 0.5 | | | | | | | | |
| 1,2-Dichlorobenzene | µg/L | 3 | | < 0.5 | | < 0.5 | | | | | | | | |
| 1,2-Dichloroethane | µg/L | 5 * | | < 0.5 | | < 0.5 | | | | | | | | |
| 1,2-Dichlorpropane | µg/L | | | < 0.5 | | < 0.5 | | | | | | | | |
| 1,3-Dichlorobenzene | µg/L | | | < 0.5 | | < 0.5 | | | | | | | | |
| 1,3-Dichloropropene(E) | µg/L | | | < 0.5 | | < 0.5 | | | | | | | | |
| 1,3-Dichloropropene(Z) | µg/L | | | < 0.5 | | < 0.5 | | | | | | | | |
| 1,4-Dichlorobenzene | µg/L | 1 | | < 0.5 | | < 0.5 | | | | | | | | |
| Benzene | µg/L | 1 * | | < 0.5 | | < 0.5 | | | | | | | | |
| Bromodichloromethane | µg/L | | | < 0.5 | | < 0.5 | | | | | | | | |
| Bromoform | µg/L | | | < 0.5 | | < 0.5 | | | | | | | | |
| Bromomethane | µg/L | | | < 0.5 | | < 0.5 | | | | | | | | |
| Carbon Tetrachloride | µg/L | 5 * | | < 0.2 | | < 0.2 | | | | | | | | |
| Chlorobenzene | µg/L | 30 | | < 0.5 | | < 0.5 | | | | | | | | |
| Chloroethane | µg/L | | | < 5 | | < 5 | | | | | | | | |
| Chloroform | µg/L | | | < 0.5 | | < 0.5 | | | | | | | | |
| Chloromethane | µg/L | | | < 5 | | < 5 | | | | | | | | |
| cis-1,2-Dichloroethylene | µg/L | | | < 0.5 | | < 0.5 | | | | | | | | |
| Dibromochloromethane | µg/L | | | < 0.5 | | < 0.5 | | | | | | | | |
| Dichloromethane | µg/L | 50 * | | < 0.5 | | < 0.5 | | | | | | | | |
| Ethyl Benzene | µg/L | 1.6 | | < 0.5 | | < 0.5 | | | | | | | | |
| Ethylene dibromide | µg/L | | | < 0.2 | | < 0.2 | | | | | | | | |
| m/p-Xylenes | µg/L | 20 ** | | < 0.5 | | < 0.5 | | | | | | | | |
| o-Xylene | µg/L | 20 ** | | < 0.5 | | < 0.5 | | | | | | | | |
| Styrene | µg/L | | | < 0.5 | | < 0.5 | | | | | | | | |
| Tetrachloroethylene | µg/L | 30 * | | < 0.5 | | < 0.5 | | | | | | | | |
| Toluene | µg/L | 24 | | < 0.5 | | < 0.5 | | | | | | | | |
| trans-1,2-Dichloroethylene | µg/L | | | < 0.5 | | < 0.5 | | | | | | | | |
| Trichloroethylene | µg/L | 5 * | | < 0.5 | | < 0.5 | | | | | | | | |
| Trichlorofluoromethane | µg/L | | | < 5 | | < 5 | | | | | | | | |
| Vinyl Chloride | µg/L | 1 * | | < 0.2 | | < 0.2 | | | | | | | | |
| Xylenes - total | µg/L | 20 ** | | < 0.5 | | < 0.5 | | | | | | | | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 77-I | | | | | 81-I | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-18 | Apr-19 | May-20 | Apr-21 | Apr-22 | Apr-17 | Oct-17 | Apr-18 | Oct-18 | Apr-19 | Sep-19 | Apr-20 |
| Alkalinity | mg/L | 30-500 | 235 | 218 | 208 | 229 | 225 | 375 | 379 | 459 | 388 | 440 | 342 | 448 |
| Aluminum | mg/L | 0.1 | | | | | | <0.025 | | <0.025 | | <0.025 | | <0.025 |
| Ammonia (as N) | mg/L | | 0.2 | 0.2 | 0.1 | 0.2 | 0.3 | 0.6 | 0.3 | 0.5 | 0.3 | 0.5 | 0.1 | 0.3 |
| Anion sum | meq/L | | 8.13 | 7.45 | 7.51 | 8.14 | 8.08 | 12.3 | 11.8 | 12.7 | 11.7 | 12.5 | 10.8 | 12.8 |
| Arsenic | mg/L | 0.025 | <0.005 | 0.0006 | 0.0006 | <0.0005 | <0.0005 | 0.0005 | <0.005 | 0.0007 | <0.005 | 0.0005 | <0.005 | 0.0008 |
| Barium | mg/L | 1 * | | | | | | 2.11 | | 2.18 | | 2.31 | | 2.06 |
| Beryllium | mg/L | | | | | | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 |
| Bicarbonate | mg/L | | 234 | 217 | 207 | 228 | 224 | 373 | 378 | 458 | 387 | 439 | 341 | 446 |
| Boron | mg/L | 5 * | | | | | | 0.436 | | 0.332 | | 0.359 | | 0.238 |
| Cadmium | mg/L | 0.005 * | | | | | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 |
| Calcium | mg/L | | 115 | 97.2 | 108 | 125 | 112 | 72.3 | 70.5 | 74.8 | 70.5 | 72.9 | 69.2 | 78.1 |
| Carbonate | mg/L | | <1 | <1 | 1 | <1 | <1 | 2 | 1 | 1 | <1 | 1 | <1 | 2 |
| Cation sum | meq/L | | 8.28 | 7.02 | 7.81 | 9.55 | 8.53 | 12.3 | 11.8 | 12.8 | 12.1 | 13 | 11.4 | 13.9 |
| Chloride | mg/L | 250 | 96.2 | 88.2 | 95.9 | 99.5 | 98.6 | 170 | 152 | 134 | 140 | 127 | 138 | 134 |
| Chromium | mg/L | 0.05 * | | | | | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Cobalt | mg/L | | | | | | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | 10 | 10 | <10 | <10 | 30 | 40 | 60 | 30 | 90 | 50 |
| Conductivity | µS/cm | | 792 | 745 | 783 | 834 | 837 | 1190 | 1140 | 1220 | 1180 | 1220 | 1110 | 1240 |
| Conductivity - field | µS/cm | | 794 | 753 | 785 | 801 | 782 | 1210 | 1210 | 1190 | 1220 | 1220 | 1180 | 1230 |
| Copper | mg/L | 1 | | | | | | <0.0005 | | <0.0005 | | <0.0005 | | 0.0008 |
| Dissolved Organic Carbon | mg/L | 5 | 1.3 | 1.3 | 1.4 | 1.6 | 2.1 | 5.4 | 9 | 6.1 | 8.9 | 6.1 | 13.8 | 8.2 |
| Dissolved Oxygen - field | mg/L | | 2.29 | 2.44 | 4.94 | 4.34 | 1.99 | 1.48 | 2.12 | 1.13 | 0.85 | 1.41 | 1.68 | 1.49 |
| Hardness | mg/L | 80-100 | 378 | 323 | 362 | 412 | 371 | 529 | 517 | 550 | 526 | 560 | 492 | 596 |
| Ion Percentage | % | | 0.91 | 2.96 | 2 | 8 | 2.71 | 0.05 | 0.05 | 0.49 | 1.51 | 2.27 | 2.64 | 4.24 |
| Iron | mg/L | 0.3 | 0.88 | 0.668 | 0.413 | 1.23 | 1.05 | 0.223 | 0.31 | 0.409 | 0.32 | 0.145 | 0.2 | 0.44 |
| Lead | mg/L | 0.01 * | | | | | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Magnesium | mg/L | | 22 | 19.4 | 22.4 | 24.3 | 22.3 | 84.5 | 82.7 | 88.2 | 85.1 | 91.7 | 77.5 | 97.4 |
| Manganese | mg/L | 0.05 | 0.022 | 0.0258 | 0.0209 | 0.0209 | 0.0211 | 0.0162 | 0.017 | 0.0165 | 0.016 | 0.0163 | 0.011 | 0.0166 |
| Molybdenum | mg/L | | | | | | | 0.0006 | | 0.0007 | | 0.0005 | | 0.0006 |
| Nickel | mg/L | | | | | | | <0.002 | | <0.002 | | <0.002 | | <0.002 |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | -68.6 | -29.4 | -23.6 | -23.2 | -52.1 | -31.2 | -141.7 | -119.1 | -165.4 | -83.1 | -163 | 29.2 |
| pH | units | | 7.58 | 7.59 | 7.79 | 7.62 | 7.64 | 7.73 | 7.48 | 7.48 | 7.41 | 7.51 | 7.23 | 7.63 |
| pH - field | units | | 7.28 | 7.46 | 7.43 | 7.37 | 7.29 | 7.27 | 7.24 | 7.25 | 7.43 | 7.3 | 6.84 | 7.3 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.01 | <0.02 | <0.02 | <0.02 | 0.01 | <0.02 | <0.02 | <0.02 | <0.02 | 0.02 |
| Phosphorus | mg/L | | 0.03 | <0.01 | <0.01 | 0.02 | <0.02 | 0.04 | <0.02 | 0.02 | <0.02 | 0.06 | <0.02 | 0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.7 | 1.6 | 1.7 | 1.9 | 1.6 | 7.5 | 6.2 | 7.5 | 6.2 | 7.2 | 5.6 | 6.7 |
| Sodium | mg/L | 200 | 14.7 | 11.2 | 11.4 | 27.9 | 23.1 | 31.5 | 28.9 | 34.4 | 29.1 | 35.3 | 29.8 | 39.1 |
| Sulphate | mg/L | 500 | 42 | 35.8 | 37.5 | 43.4 | 45.4 | 11.1 | 11 | 1.7 | 12.2 | 18 | 13.3 | 16.4 |
| Total Dissolved Solids | mg/L | 500 | 480 | 450 | 590 | 340 | 469 | 690 | 650 | 710 | 650 | 690 | 680 | 690 |
| Temperature - field | °C | | 5.3 | 5 | 7 | 5.8 | 6.2 | 11.4 | 12.8 | 9.6 | 11.4 | 8.3 | 12.6 | 9.2 |
| Total Kjeldahl Nitrogen | mg/L | | <0.1 | <0.2 | <0.1 | <2.0 | <0.2 | 0.4 | 0.4 | 0.5 | 0.1 | 4.3 | <0.1 | 0.4 |
| Zinc | mg/L | 5 | | | | | | 0.0005 | | 0.0011 | | 0.0016 | | 0.0026 |
| Phenols | µg/L | | <1 | 2 | <1 | 2 | <1 | <1 | <1 | <1 | <1 | 1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1,2-Trichlorethane | µg/L | | | | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethane | µg/L | | | | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethylene | µg/L | 14 * | | | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | | | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | | | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorpropane | µg/L | | | | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichlorobenzene | µg/L | | | | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(E) | µg/L | | | | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | | | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | | | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Benzene | µg/L | 1 * | | | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromodichloromethane | µg/L | | | | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromoform | µg/L | | | | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromomethane | µg/L | | | | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Carbon Tetrachloride | µg/L | 5 * | | | | | | <0.2 | | <0.2 | | <0.2 | | <0.2 |
| Chlorobenzene | µg/L | 30 | | | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Chloroethane | µg/L | | | | | | | <5 | | <5 | | <5 | | <5 |
| Chloroform | µg/L | | | | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Chloromethane | µg/L | | | | | | | <5 | | <5 | | <5 | | <5 |
| cis-1,2-Dichloroethylene | µg/L | | | | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Dibromochloromethane | µg/L | | | | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Dichloromethane | µg/L | 50 * | | | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Ethyl Benzene | µg/L | 1.6 | | | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Ethylene dibromide | µg/L | | | | | | | <0.2 | | <0.2 | | <0.2 | | <0.2 |
| m/p-Xylenes | µg/L | 20 ** | | | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| o-Xylene | µg/L | 20 ** | | | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Styrene | µg/L | | | | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Tetrachloroethylene | µg/L | 30 * | | | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Toluene | µg/L | 24 | | | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| trans-1,2-Dichloroethylene | µg/L | | | | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Trichloroethylene | µg/L | 5 * | | | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Trichlorofluoromethane | µg/L | | | | | | | <5 | | <5 | | <5 | | <5 |
| Vinyl Chloride | µg/L | 1 * | | | | | | <0.2 | | 0.2 | | 0.2 | | <0.2 |
| Xylenes - total | µg/L | 20 ** | | | | | | <0.5 | | <0.5 | | <0.5 | | <0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 81-I | | | | | 81-II | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sep-20 | Mar-21 | Oct-21 | Mar-22 | Sep-22 | Apr-17 | Oct-17 | Apr-18 | Oct-18 | Apr-19 | Sep-19 | Apr-20 |
| Alkalinity | mg/L | 30-500 | 415 | 491 | 511 | 510 | 457 | 813 | 821 | 829 | 809 | 805 | 831 | 790 |
| Aluminum | mg/L | 0.1 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 |
| Ammonia (as N) | mg/L | | 0.4 | 0.4 | 0.8 | 0.5 | 0.6 | 0.3 | 0.4 | 0.2 | 0.3 | 0.2 | 0.3 | 0.3 |
| Anion sum | meq/L | | 11.9 | 13.2 | 13.2 | 13.3 | 12.6 | 17.7 | 17.5 | 17.6 | 17.2 | 17.3 | 17.5 | 16.8 |
| Arsenic | mg/L | 0.025 | <0.0005 | 0.0008 | 0.0006 | 0.0008 | 0.0005 | 0.0009 | <0.005 | 0.0009 | <0.005 | 0.0024 | <0.02 | 0.0016 |
| Barium | mg/L | 1 * | | 1.87 | | 1.9 | | 0.094 | | 0.146 | | 0.157 | | 0.177 |
| Beryllium | mg/L | | | <0.0005 | | <0.0005 | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 |
| Bicarbonate | mg/L | | 414 | 489 | 509 | 509 | 456 | 812 | 820 | 828 | 809 | 804 | 831 | 789 |
| Boron | mg/L | 5 * | | 0.286 | | 0.288 | | 0.0835 | | 0.0487 | | 0.0494 | | 0.0452 |
| Cadmium | mg/L | 0.005 * | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 |
| Calcium | mg/L | | 78 | 73.2 | 75.6 | 67.7 | 68.4 | 202 | 200 | 211 | 202 | 199 | 206 | 221 |
| Carbonate | mg/L | | 1 | 2 | 2 | 1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Cation sum | meq/L | | 14.4 | 14.1 | 13.7 | 13.2 | 12.7 | 18.5 | 17.7 | 18.5 | 18 | 18.1 | 17.8 | 19.4 |
| Chloride | mg/L | 250 | 126 | 118 | 107 | 108 | 121 | 42.1 | 34.2 | 31.7 | 32 | 33.4 | 28.2 | 31.3 |
| Chromium | mg/L | 0.05 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Cobalt | mg/L | | | <0.0005 | | <0.0005 | | 0.0007 | | 0.0006 | | 0.0008 | | 0.0008 |
| Chemical Oxygen Demand | mg/L | | 20 | 20 | 60 | 10 | 30 | <10 | 30 | 20 | 50 | 30 | 20 | 30 |
| Conductivity | µS/cm | | 1200 | 1270 | 1300 | 1300 | 1100 | 1600 | 1510 | 1530 | 1550 | 1590 | 1550 | 1570 |
| Conductivity - field | µS/cm | | 1220 | 1310 | 1280 | 1270 | 1310 | 1670 | 1620 | 1500 | 1650 | 1510 | 1590 | 1530 |
| Copper | mg/L | 1 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | 0.0007 |
| Dissolved Organic Carbon | mg/L | 5 | 5.6 | 6.2 | 4.4 | 4.7 | 5.2 | 7.3 | 7 | 7.2 | 8 | 6.8 | 6.8 | 6.7 |
| Dissolved Oxygen - field | mg/L | | 0.35 | 9.79 | 1.2 | 2.17 | 1.57 | 1.88 | 1.81 | 1.73 | 1.38 | 1.89 | 1.19 | 1.57 |
| Hardness | mg/L | 80-100 | 619 | 599 | 590 | 560 | 546 | 791 | 767 | 791 | 792 | 784 | 774 | 834 |
| Ion Percentage | % | | 9.67 | 3.17 | 1.7 | 0.22 | 0.59 | 2.42 | 0.58 | 2.58 | 2.24 | 2.49 | 0.97 | 7.14 |
| Iron | mg/L | 0.3 | 0.195 | 0.242 | 0.165 | 0.182 | 0.078 | 1.18 | 2.94 | 0.816 | 12.4 | 4.78 | 13.3 | 4.34 |
| Lead | mg/L | 0.01 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Magnesium | mg/L | | 103 | 101 | 97.5 | 95 | 91.2 | 69.5 | 65 | 64.2 | 69.8 | 69.8 | 63.1 | 68.4 |
| Manganese | mg/L | 0.05 | 0.0164 | 0.0168 | 0.0176 | 0.0151 | 0.0121 | 0.0526 | 0.064 | 0.0608 | 0.068 | 0.0655 | 0.067 | 0.0644 |
| Molybdenum | mg/L | | | 0.0005 | | 0.0005 | | 0.0011 | | 0.0013 | | 0.0011 | | 0.0011 |
| Nickel | mg/L | | | <0.002 | | <0.002 | | 0.003 | | 0.003 | | 0.003 | | 0.003 |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | -135.4 | -149.8 | -131.6 | -51 | -155.6 | -30.9 | -71.6 | -61.1 | -82.3 | -39.9 | -113.5 | 43 |
| pH | units | | 7.42 | 7.61 | 7.61 | 7.43 | 7.51 | 7 | 6.91 | 6.99 | 6.76 | 6.88 | 6.73 | 7.03 |
| pH - field | units | | 7.38 | 7.3 | 7.13 | 7.15 | 7.3 | 6.6 | 6.52 | 6.59 | 6.72 | 6.56 | 6.52 | 6.64 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.01 | <0.02 | <0.02 | <0.02 | 0.03 | <0.02 |
| Phosphorus | mg/L | | <0.01 | 0.03 | 0.02 | 0.03 | <0.02 | 0.02 | <0.02 | 0.02 | <0.02 | 0.03 | 0.04 | <0.01 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 6.8 | 7.2 | 7 | 6.8 | 5.9 | 5.8 | 5 | 5.5 | 4.7 | 5 | 4.9 | 5.2 |
| Sodium | mg/L | 200 | 39.7 | 40.7 | 35.1 | 39.7 | 35.2 | 56.8 | 49.2 | 56.6 | 45.2 | 51.3 | 49.3 | 57.9 |
| Sulphate | mg/L | 500 | 14.1 | 17.9 | 15 | 18.7 | 16.6 | 35.6 | 31.8 | 31.5 | 32.8 | 35.7 | 30.5 | 32.1 |
| Total Dissolved Solids | mg/L | 500 | 680 | 710 | 770 | 720 | 710 | 990 | 900 | 960 | 870 | 980 | 910 | 970 |
| Temperature - field | °C | | 13.2 | 7.8 | 13.5 | 10.6 | 12.3 | 11.6 | 13 | 10.5 | 11.9 | 8.2 | 12.3 | 8.7 |
| Total Kjeldahl Nitrogen | mg/L | | <1.0 | <0.5 | 0.6 | 0.5 | <2.0 | 0.4 | 0.5 | 0.4 | 0.2 | 0.4 | 0.2 | 0.4 |
| Zinc | mg/L | 5 | | 0.0014 | | 0.001 | | <0.0005 | | 0.0017 | | 0.0054 | | 0.0016 |
| Phenols | µg/L | | 1 | <1 | 2 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1,2-Trichlorethane | µg/L | | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethane | µg/L | | | < 0.5 | | < 0.5 | | 1.5 | | 1.1 | | 1.2 | | 1.3 |
| 1,1-Dichloroethylene | µg/L | 14 * | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorpropane | µg/L | | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichlorobenzene | µg/L | | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(E) | µg/L | | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Benzene | µg/L | 1 * | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | 0.7 |
| Bromodichloromethane | µg/L | | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromoform | µg/L | | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromomethane | µg/L | | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Carbon Tetrachloride | µg/L | 5 * | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 | | <0.2 |
| Chlorobenzene | µg/L | 30 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Chloroethane | µg/L | | | < 5 | | < 5 | | <5 | | <5 | | <5 | | <5 |
| Chloroform | µg/L | | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Chloromethane | µg/L | | | < 5 | | < 5 | | <5 | | <5 | | <5 | | <5 |
| cis-1,2-Dichloroethylene | µg/L | | | < 0.5 | | < 0.5 | | 2 | | 1.6 | | 1.8 | | 2.3 |
| Dibromochloromethane | µg/L | | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Dichloromethane | µg/L | 50 * | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Ethyl Benzene | µg/L | 1.6 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Ethylene dibromide | µg/L | | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 | | <0.2 |
| m/p-Xylenes | µg/L | 20 ** | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| o-Xylene | µg/L | 20 ** | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Styrene | µg/L | | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Tetrachloroethylene | µg/L | 30 * | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Toluene | µg/L | 24 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| trans-1,2-Dichloroethylene | µg/L | | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Trichloroethylene | µg/L | 5 * | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 |
| Trichlorofluoromethane | µg/L | | | < 5 | | < 5 | | <5 | | <5 | | <5 | | <5 |
| Vinyl Chloride | µg/L | 1 * | | < 0.2 | | 0.2 | | <0.2 | | <0.2 | | <0.2 | | <0.2 |
| Xylenes - total | µg/L | 20 ** | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 81-II | | | | | 81-III | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sep-20 | Mar-21 | Oct-21 | Mar-22 | Sep-22 | Apr-17 | Oct-17 | Apr-18 | Apr-19 | Apr-20 | Mar-21 | Oct-21 |
| Alkalinity | mg/L | 30-500 | 784 | 812 | 861 | 806 | 790 | 583 | 791 | 430 | 766 | 446 | 666 | 568 |
| Aluminum | mg/L | 0.1 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | <0.025 | <0.025 | <0.025 | |
| Ammonia (as N) | mg/L | | 0.3 | 0.2 | 0.5 | 0.2 | 0.7 | 2.9 | 4.9 | 1.8 | 5.4 | 3 | 2.8 | 0.6 |
| Anion sum | meq/L | | 16.6 | 17.2 | 18.2 | 17 | 16.6 | 11.8 | 15.4 | 8.74 | 15.1 | 8.92 | 14 | 12.1 |
| Arsenic | mg/L | 0.025 | 0.0031 | 0.0007 | 0.0074 | 0.0017 | 0.0057 | 0.0007 | <0.005 | 0.0006 | 0.0014 | 0.0009 | 0.0008 | 0.0093 |
| Barium | mg/L | 1 * | | 0.176 | | 0.159 | | 0.134 | | 0.141 | 0.235 | 0.131 | 0.183 | |
| Beryllium | mg/L | | | <0.0005 | | <0.0005 | | <0.0001 | | <0.0001 | <0.0005 | <0.0005 | <0.0005 | |
| Bicarbonate | mg/L | | 784 | 811 | 860 | 806 | 790 | 583 | 790 | 430 | 766 | 446 | 666 | 568 |
| Boron | mg/L | 5 * | | 0.0483 | | 0.0557 | | 0.0409 | | 0.0162 | 0.0265 | 0.0245 | 0.0167 | |
| Cadmium | mg/L | 0.005 * | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | |
| Calcium | mg/L | | 222 | 217 | 216 | 192 | 194 | 215 | 253 | 204 | 260 | 182 | 248 | 183 |
| Carbonate | mg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Cation sum | meq/L | | 20.2 | 19.3 | 19.2 | 17.2 | 16.9 | 12.7 | 14.8 | 11.8 | 15.2 | 10.7 | 14.3 | 10.4 |
| Chloride | mg/L | 250 | 28.5 | 28.6 | 28.4 | 26.8 | 22.9 | 14.6 | 4.8 | 7.5 | 10.1 | 6.6 | 12.5 | 5.4 |
| Chromium | mg/L | 0.05 * | | <0.0005 | | <0.0005 | | 0.0006 | | <0.0005 | 0.001 | 0.0006 | 0.0006 | |
| Cobalt | mg/L | | | 0.0006 | | 0.0006 | | 0.0003 | | 0.0001 | <0.0005 | <0.0005 | <0.0005 | |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | 20 | <10 | 20 | <10 | 60 | 30 | 140 | 30 | 20 | 240 |
| Conductivity | µS/cm | | 1550 | 1540 | 1600 | 1560 | 1290 | 1170 | 1260 | 773 | 1350 | 863 | 1220 | 1110 |
| Conductivity - field | µS/cm | | 1570 | 1600 | 1640 | 1570 | 1580 | 1200 | 1360 | 682 | 1460 | 878 | 1260 | 1140 |
| Copper | mg/L | 1 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | 0.001 | <0.0005 | 0.0007 | |
| Dissolved Organic Carbon | mg/L | 5 | 6.2 | 5.9 | 5.4 | 5.4 | 4.8 | 11.4 | 13.1 | 6.7 | 29.9 | 6.6 | 7.7 | 58.8 |
| Dissolved Oxygen - field | mg/L | | 0.85 | 0.87 | 1.62 | 1.05 | 1.56 | 2.44 | 3.94 | 1.92 | 3.53 | 1.69 | 2.06 | 2.62 |
| Hardness | mg/L | 80-100 | 864 | 827 | 832 | 732 | 722 | 606 | 704 | 567 | 723 | 505 | 685 | 502 |
| Ion Percentage | % | | 9.62 | 5.8 | 2.48 | 0.48 | 0.98 | 3.56 | 2.02 | 15 | 0.48 | 8.86 | 1.04 | 7.74 |
| Iron | mg/L | 0.3 | 7.34 | 0.721 | 13.8 | 1.88 | 17.1 | 28.5 | 36 | 24 | 39.4 | 19.8 | 22.9 | 35 |
| Lead | mg/L | 0.01 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | <0.0005 | <0.0005 | <0.0005 | |
| Magnesium | mg/L | | 75.1 | 69.3 | 71 | 61.4 | 57.6 | 16.7 | 17.6 | 13.9 | 17.9 | 12.2 | 15.9 | 10.9 |
| Manganese | mg/L | 0.05 | 0.0611 | 0.0664 | 0.0673 | 0.0616 | 0.0613 | 1.43 | 1.75 | 1.52 | 1.76 | 1.21 | 0.737 | 0.803 |
| Molybdenum | mg/L | | | 0.0012 | | 0.001 | | <0.0005 | | <0.0005 | <0.0005 | <0.0005 | <0.0005 | |
| Nickel | mg/L | | | 0.004 | | 0.003 | | <0.002 | | <0.002 | <0.002 | <0.002 | <0.002 | |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | -62.5 | -31.5 | -64.1 | -9 | -100.4 | -17.8 | -95.3 | -71.6 | -73 | -19.6 | -104.9 | -53.5 |
| pH | units | | 6.71 | 7.04 | 6.82 | 6.8 | 6.79 | 6.63 | 6.9 | 6.82 | 6.63 | 6.97 | 6.64 | 6.54 |
| pH - field | units | | 6.67 | 6.6 | 6.48 | 6.47 | 6.6 | 6.34 | 6.4 | 6.61 | 6.32 | 6.63 | 6.27 | 6.26 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.03 | 0.03 | 0.03 | <0.02 | 0.09 | 0.06 | <0.02 |
| Phosphorus | mg/L | | 0.02 | 0.01 | 0.03 | <0.02 | <0.02 | 0.16 | 0.07 | 0.05 | 0.25 | 0.09 | 0.11 | 0.13 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 5.3 | 5.3 | 4.8 | 4.8 | 4.8 | 1.8 | 2.4 | 1.9 | 2.3 | 1.9 | 1.7 | 1.1 |
| Sodium | mg/L | 200 | 60.8 | 58.3 | 52.4 | 54.1 | 51 | 6.1 | 6.8 | 6.7 | 7.2 | 6.4 | 7.8 | 5.8 |
| Sulphate | mg/L | 500 | 31.3 | 32.7 | 37 | 33.4 | 30.5 | 4.8 | <2 | 10.2 | <2 | 5.3 | 37.4 | 47.2 |
| Total Dissolved Solids | mg/L | 500 | 960 | 930 | 940 | 920 | 910 | 680 | 750 | 460 | 870 | 490 | 750 | 790 |
| Temperature - field | °C | | 14 | 8.3 | 13 | 9.9 | 12.8 | 10.1 | 15.5 | 6.1 | 8.7 | 7.5 | 7.6 | 14.7 |
| Total Kjeldahl Nitrogen | mg/L | | <1.0 | <0.1 | 0.4 | 0.4 | 4.6 | 5.6 | 5.7 | 1.7 | 5.2 | 3.4 | 2.1 | 3.1 |
| Zinc | mg/L | 5 | | 0.0017 | | 0.0011 | | <0.0005 | | 0.0008 | 0.0025 | 0.0008 | 0.0018 | |
| Phenols | µg/L | | <1 | <1 | 2 | <1 | <1 | <1 | <1 | <1 | 7 | <1 | <1 | 22 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | |
| 1,1,2-Trichlorethane | µg/L | | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | |
| 1,1-Dichloroethane | µg/L | | | 1.2 | | 0.9 | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | 0.8 | <0.5 | 0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | |
| 1,2-Dichlorpropane | µg/L | | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | |
| 1,3-Dichlorobenzene | µg/L | | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | | < 0.5 | | < 0.5 | | 11.5 | | 11.6 | 13.3 | 6.7 | 12.4 | |
| Benzene | µg/L | 1 * | | < 0.5 | | < 0.5 | | 2.9 | | <0.5 | 6 | 1.1 | 4.7 | |
| Bromodichloromethane | µg/L | | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | |
| Bromoform | µg/L | | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | |
| Bromomethane | µg/L | | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | <0.2 | <0.2 | < 0.2 | |
| Chlorobenzene | µg/L | 30 | | < 0.5 | | < 0.5 | | 2.9 | | <0.5 | 4.7 | 1.5 | 3.3 | |
| Chloroethane | µg/L | | | < 5 | | < 5 | | <5 | | <5 | <5 | <5 | < 5 | |
| Chloroform | µg/L | | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | |
| Chloromethane | µg/L | | | < 5 | | < 5 | | <5 | | <5 | <5 | <5 | < 5 | |
| cis-1,2-Dichloroethylene | µg/L | | | 1.8 | | 1.4 | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | |
| Dibromochloromethane | µg/L | | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | |
| Dichloromethane | µg/L | 50 * | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | |
| Ethyl Benzene | µg/L | 1.6 | | < 0.5 | | < 0.5 | | 3.5 | | 0.7 | 4 | <0.5 | 0.8 | |
| Ethylene dibromide | µg/L | | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | <0.2 | <0.2 | < 0.2 | |
| m/p-Xylenes | µg/L | 20 ** | | < 0.5 | | < 0.5 | | 14.3 | | 3.4 | 36.2 | 1.7 | 2.3 | |
| o-Xylene | µg/L | 20 ** | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | 0.6 | <0.5 | < 0.5 | |
| Styrene | µg/L | | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | |
| Tetrachloroethylene | µg/L | 30 * | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | |
| Toluene | µg/L | 24 | | < 0.5 | | < 0.5 | | 0.7 | | <0.5 | <0.5 | <0.5 | < 0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | |
| Trichloroethylene | µg/L | 5 * | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | <0.5 | <0.5 | < 0.5 | |
| Trichlorofluoromethane | µg/L | | | < 5 | | < 5 | | <5 | | <5 | <5 | <5 | < 5 | |
| Vinyl Chloride | µg/L | 1 * | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | <0.2 | <0.2 | < 0.2 | |
| Xylenes - total | µg/L | 20 ** | | < 0.5 | | < 0.5 | | 14.6 | | 3.6 | 36.8 | 1.7 | 2.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 81-III | 84-I | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-22 | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Oct-21 | Mar-22 |
| Alkalinity | mg/L | 30-500 | 563 | 136 | 140 | 143 | 130 | 128 | 134 | 128 | 124 | 130 | 129 | 127 |
| Aluminum | mg/L | 0.1 | <0.025 | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 |
| Ammonia (as N) | mg/L | | 1.6 | 0.3 | 0.3 | 0.2 | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.4 | 0.3 |
| Anion sum | meq/L | | 11.2 | 6.28 | 5.95 | 6.1 | 5.96 | 5.69 | 6.1 | 5.98 | 5.89 | 6.54 | 6.22 | 6.09 |
| Arsenic | mg/L | 0.025 | 0.0018 | 0.0007 | <0.005 | 0.0007 | <0.005 | 0.0006 | <0.005 | 0.0005 | 0.0007 | <0.0005 | 0.0007 | <0.0005 |
| Barium | mg/L | 1 * | 0.136 | 0.082 | | 0.096 | | 0.096 | | 0.092 | | 0.098 | | 0.096 |
| Beryllium | mg/L | | <0.0005 | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Bicarbonate | mg/L | | 563 | 135 | 139 | 142 | 128 | 127 | 133 | 127 | 123 | 129 | 128 | 126 |
| Boron | mg/L | 5 * | 0.0122 | 0.438 | | 0.392 | | 0.449 | | 0.455 | | 0.485 | | 0.536 |
| Cadmium | mg/L | 0.005 * | <0.0001 | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 |
| Calcium | mg/L | | 200 | 21.3 | 23.3 | 23.1 | 22.5 | 22 | 22.8 | 21.8 | 23.1 | 18.8 | 23.0 | 22.6 |
| Carbonate | mg/L | | <1 | <1 | 1 | <1 | 1 | <1 | 1 | <1 | <1 | <1 | 1 | <1 |
| Cation sum | meq/L | | 11.3 | 6.25 | 6.26 | 6.53 | 6.34 | 6.28 | 6.27 | 6.22 | 6.47 | 5.47 | 5.84 | 6.44 |
| Chloride | mg/L | 250 | 8.3 | 129 | 115 | 118 | 122 | 114 | 124 | 124 | 124 | 143 | 132 | 129 |
| Chromium | mg/L | 0.05 * | <0.0005 | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Cobalt | mg/L | | <0.0005 | 0.0002 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Chemical Oxygen Demand | mg/L | | 20 | <10 | 40 | 20 | 40 | 30 | 20 | 30 | 20 | <10 | <10 | <10 |
| Conductivity | µS/cm | | 1040 | 671 | 667 | 679 | 681 | 677 | 683 | 689 | 691 | 694 | 707 | 716 |
| Conductivity - field | µS/cm | | 1050 | 689 | 687 | 673 | 692 | 667 | 686 | 699 | 699 | 686 | 699 | 684 |
| Copper | mg/L | 1 | <0.0005 | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | 0.0009 |
| Dissolved Organic Carbon | mg/L | 5 | 4.8 | 4.2 | 5 | 4.8 | 4.6 | 4.7 | 5.3 | 5.9 | 5.4 | 4.1 | 4.1 | 2.7 |
| Dissolved Oxygen - field | mg/L | | 1.41 | 1.03 | 1.33 | 1.4 | 0.94 | 2.65 | 1.4 | 1.47 | 0.55 | 9.67 | 1.93 | 1.80 |
| Hardness | mg/L | 80-100 | 545 | 104 | 105 | 105 | 104 | 105 | 105 | 103 | 107 | 88.9 | 106 | 104 |
| Ion Percentage | % | | 0.43 | 0.18 | 2.55 | 3.34 | 3.08 | 4.98 | 1.38 | 1.95 | 4.66 | 8.89 | 3.13 | 2.81 |
| Iron | mg/L | 0.3 | 14.6 | 0.072 | 0.16 | 0.118 | 0.27 | 0.037 | 0.28 | 0.038 | 0.188 | 0.021 | 0.111 | 0.072 |
| Lead | mg/L | 0.01 * | <0.0005 | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Magnesium | mg/L | | 11 | 12.3 | 11.3 | 11.6 | 11.5 | 12.2 | 11.6 | 11.9 | 11.9 | 10.2 | 11.7 | 11.6 |
| Manganese | mg/L | 0.05 | 0.831 | 0.0043 | 0.006 | 0.0053 | 0.006 | 0.0049 | 0.005 | 0.0047 | 0.0057 | 0.0045 | 0.0043 | 0.0051 |
| Molybdenum | mg/L | | <0.0005 | 0.006 | | 0.0066 | | 0.0071 | | 0.0065 | | 0.0075 | | 0.0083 |
| Nickel | mg/L | | <0.002 | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | -107 | -57.7 | -197.3 | -144.2 | -151.9 | -23.9 | -112.2 | -122.9 | -143 | -27.7 | -146.6 | -76.0 |
| pH | units | | 6.62 | 7.84 | 7.9 | 7.8 | 8.08 | 7.86 | 7.96 | 7.81 | 7.88 | 7.81 | 7.98 | 7.84 |
| pH - field | units | | 6.31 | 7.77 | 7.78 | 7.96 | 7.87 | 7.85 | 7.31 | 7.98 | 8.05 | 8.01 | 7.70 | 7.78 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.01 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | 0.05 | <0.02 | 0.02 | 0.02 | 0.1 | 0.06 | <0.02 | <0.02 | 0.01 | 0.03 | 0.01 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.2 | 2.1 | 1.9 | 2.2 | 2 | 2.2 | 2.1 | 2.1 | 2.3 | 1.8 | 2.0 | 2.3 |
| Sodium | mg/L | 200 | 5.6 | 94 | 93.9 | 99.7 | 96.3 | 94.2 | 94.1 | 93.6 | 97.7 | 83.2 | 83.7 | 98.1 |
| Sulphate | mg/L | 500 | 4 | 0.5 | <2 | 0.7 | 0.6 | <2 | 0.5 | 0.6 | <2 | <2 | 0.4 | <0.2 |
| Total Dissolved Solids | mg/L | 500 | 620 | 370 | 350 | 340 | 390 | 350 | 380 | 370 | 380 | 310 | 360 | 350 |
| Temperature - field | °C | | 8.3 | 8.7 | 14.5 | 8.6 | 11.8 | 6.5 | 12 | 8.1 | 13.6 | 7.7 | 11.4 | 8.3 |
| Total Kjeldahl Nitrogen | mg/L | | 2.1 | <0.1 | 0.2 | 0.2 | <2.0 | 0.2 | 0.2 | 0.2 | <1.0 | 0.3 | 0.4 | 0.3 |
| Zinc | mg/L | 5 | <0.0005 | 0.001 | | 0.0006 | | 0.0013 | | 0.0023 | | <0.0005 | | 0.0018 |
| Phenols | µg/L | | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1,2-Trichlorethane | µg/L | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1-Dichloroethane | µg/L | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1-Dichloroethylene | µg/L | 14 * | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichlorpropane | µg/L | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichlorobenzene | µg/L | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichloropropene(E) | µg/L | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | 6.6 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Benzene | µg/L | 1 * | 1.7 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromodichloromethane | µg/L | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromoform | µg/L | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromomethane | µg/L | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Carbon Tetrachloride | µg/L | 5 * | < 0.2 | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 |
| Chlorobenzene | µg/L | 30 | 1.8 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Chloroethane | µg/L | | < 5 | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| Chloroform | µg/L | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Chloromethane | µg/L | | < 5 | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| cis-1,2-Dichloroethylene | µg/L | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Dibromochloromethane | µg/L | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Dichloromethane | µg/L | 50 * | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Ethyl Benzene | µg/L | 1.6 | 0.7 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Ethylene dibromide | µg/L | | < 0.2 | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 |
| m/p-Xylenes | µg/L | 20 ** | 17.8 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| o-Xylene | µg/L | 20 ** | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Styrene | µg/L | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Tetrachloroethylene | µg/L | 30 * | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Toluene | µg/L | 24 | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| trans-1,2-Dichloroethylene | µg/L | | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Trichloroethylene | µg/L | 5 * | < 0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Trichlorofluoromethane | µg/L | | < 5 | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| Vinyl Chloride | µg/L | 1 * | < 0.2 | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 |
| Xylenes - total | µg/L | 20 ** | 18 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 84-I | 84-II | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sep-22 | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Oct-21 | Mar-22 |
| Alkalinity | mg/L | 30-500 | 130 | 207 | 211 | 227 | 202 | 200 | 200 | 197 | 196 | 215 | 211 | 208 |
| Aluminum | mg/L | 0.1 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | 0 |
| Ammonia (as N) | mg/L | | 0.4 | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 |
| Anion sum | meq/L | | 6.12 | 5.54 | 5.54 | 5.91 | 5.35 | 5.18 | 5.11 | 5.04 | 4.99 | 5.39 | 5.41 | 5.57 |
| Arsenic | mg/L | 0.025 | 0.0005 | 0.001 | <0.005 | 0.0014 | <0.005 | 0.0018 | <0.005 | 0.0018 | 0.0023 | 0.0021 | 0.0022 | 0.0021 |
| Barium | mg/L | 1 * | | 0.215 | | 0.213 | | 0.185 | | 0.189 | | 0.191 | | 0.194 |
| Beryllium | mg/L | | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Bicarbonate | mg/L | | 128 | 206 | 209 | 226 | 200 | 199 | 198 | 195 | 195 | 213 | 210 | 207 |
| Boron | mg/L | 5 * | | 0.0498 | | 0.0353 | | 0.0473 | | 0.0522 | | 0.0514 | | 0.0508 |
| Cadmium | mg/L | 0.005 * | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 |
| Calcium | mg/L | | 23.6 | 54.8 | 54 | 59.5 | 51.7 | 57.8 | 63.4 | 49.4 | 52.2 | 43.0 | 59.1 | 54.4 |
| Carbonate | mg/L | | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 2 | 1 | 2 | 1 | 1 |
| Cation sum | meq/L | | 6.49 | 6.11 | 5.54 | 5.9 | 5.3 | 5.63 | 5.71 | 5.24 | 5.28 | 4.45 | 5.45 | 5.40 |
| Chloride | mg/L | 250 | 128 | 8.8 | 7.7 | 8.6 | 8.1 | 6.7 | 7.4 | 6.9 | 6.7 | 6.4 | 6.6 | 16.1 |
| Chromium | mg/L | 0.05 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Cobalt | mg/L | | | 0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Chemical Oxygen Demand | mg/L | | 10 | 30 | <10 | 40 | <10 | <10 | <10 | 40 | <10 | 20 | <10 | <10 |
| Conductivity | µS/cm | | 713 | 538 | 513 | 1.1 | 524 | 515 | 497 | 486 | 490 | 500 | 520 | 514 |
| Conductivity - field | µS/cm | | 706 | 550 | 560 | 516 | 513 | 483 | 472 | 487 | 503 | 518 | 513 | 491 |
| Copper | mg/L | 1 | | 0.0005 | | <0.0005 | | 0.0011 | | 0.0008 | | 0.0018 | | <0.0005 |
| Dissolved Organic Carbon | mg/L | 5 | 2.2 | <1.0 | 1.1 | 1.3 | <1.0 | 2.6 | 1.5 | 2.3 | 1.3 | 1.7 | 2.0 | <1.0 |
| Dissolved Oxygen - field | mg/L | | 1.63 | 2.66 | 3.22 | 1.88 | 2 | 2.94 | 2.19 | 5.19 | 1.47 | 8.07 | 3.84 | 1.23 |
| Hardness | mg/L | 80-100 | 108 | 271 | 244 | 265 | 233 | 252 | 260 | 231 | 232 | 196 | 250 | 242 |
| Ion Percentage | % | | 2.94 | 4.87 | 0.01 | 0.1 | 0.54 | 4.16 | 5.59 | 1.88 | 2.85 | 9.55 | 0.38 | 1.52 |
| Iron | mg/L | 0.3 | 0.097 | 0.046 | 0.12 | 0.225 | 0.28 | 0.241 | 0.31 | 0.076 | 0.301 | 0.253 | 0.300 | 0.240 |
| Lead | mg/L | 0.01 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Magnesium | mg/L | | 12.0 | 32.5 | 26.5 | 28.3 | 25.2 | 26.2 | 24.7 | 26.1 | 24.8 | 21.5 | 24.9 | 25.8 |
| Manganese | mg/L | 0.05 | 0.0060 | 0.0152 | 0.016 | 0.0179 | 0.017 | 0.0195 | 0.017 | 0.0134 | 0.0185 | 0.0174 | 0.0170 | 0.0151 |
| Molybdenum | mg/L | | | 0.0011 | | 0.0009 | | 0.0011 | | 0.001 | | 0.0011 | | 0.0011 |
| Nickel | mg/L | | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 |
| Nitrate | mg/L | 10.0 * | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | 26.3 | -36.6 | -44.9 | -104.6 | -97.2 | -13.3 | -51.3 | -29.9 | -68.7 | 0.6 | -83.9 | -76.8 |
| pH | units | | 8.09 | 7.84 | 7.97 | 7.78 | 8.03 | 7.88 | 7.97 | 7.93 | 7.88 | 7.90 | 7.87 | 7.78 |
| pH - field | units | | 7.36 | 7.66 | 7.53 | 7.6 | 7.68 | 7.71 | 7.73 | 7.72 | 7.81 | 7.82 | 7.45 | 7.51 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.01 | <0.01 | <0.02 | 0.03 | 0.04 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | 0.03 | <0.02 | 0.02 | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.02 | 0.02 | 0.01 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 2.2 | 1.2 | 1 | 1.2 | 1.2 | 1.4 | 1.4 | 1.2 | 1.3 | 1.1 | 1.2 | 1.2 |
| Sodium | mg/L | 200 | 97.2 | 14 | 13.6 | 12 | 13 | 11.7 | 10 | 12.6 | 12.8 | 10.7 | 8.6 | 11.0 |
| Sulphate | mg/L | 500 | <0.2 | 61.9 | 59.5 | 61.4 | 58.4 | 54 | 49.5 | 49.9 | 48.4 | 50.4 | 54.7 | 52.3 |
| Total Dissolved Solids | mg/L | 500 | 370 | 350 | 310 | 310 | 370 | 310 | 300 | 290 | 300 | 240 | 320 | 280 |
| Temperature - field | °C | | 13.4 | 9.1 | 13.2 | 9.2 | 12 | 8.5 | 11.7 | 7.8 | 12.1 | 8.3 | 12.7 | 9.4 |
| Total Kjeldahl Nitrogen | mg/L | | 3.0 | <0.1 | <0.1 | <0.1 | <2.0 | <0.1 | 0.2 | <0.1 | <1.0 | <0.1 | 0.2 | 0.2 |
| Zinc | mg/L | 5 | | 0.0006 | | 0.0006 | | 0.002 | | 0.0006 | | 0.0011 | | <0.0005 |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1,2-Trichlorethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1-Dichloroethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1-Dichloroethylene | µg/L | 14 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichlorpropane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichlorobenzene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichloropropene(E) | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Benzene | µg/L | 1 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromodichloromethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromoform | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromomethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Carbon Tetrachloride | µg/L | 5 * | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 |
| Chlorobenzene | µg/L | 30 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Chloroethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| Chloroform | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Chloromethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| cis-1,2-Dichloroethylene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Dibromochloromethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Dichloromethane | µg/L | 50 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Ethyl Benzene | µg/L | 1.6 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Ethylene dibromide | µg/L | | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 |
| m/p-Xylenes | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| o-Xylene | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Styrene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Tetrachloroethylene | µg/L | 30 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Toluene | µg/L | 24 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| trans-1,2-Dichloroethylene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Trichloroethylene | µg/L | 5 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Trichlorofluoromethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| Vinyl Chloride | µg/L | 1 * | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 |
| Xylenes - total | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 84-II | 85-I | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sep-22 | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Sep-21 | Mar-22 |
| Alkalinity | mg/L | 30-500 | 311 | 230 | 247 | 234 | 227 | 67 | 237 | 234 | 217 | 234 | 233 | 225 |
| Aluminum | mg/L | 0.1 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | 0.051 | | <0.025 |
| Ammonia (as N) | mg/L | | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | <0.1 | 0.1 | <0.1 | 0.4 | 0.1 | 0.2 | 0.2 |
| Anion sum | meq/L | | 7.37 | 10 | 11.7 | 9.76 | 10.7 | 7.84 | 12.6 | 12.7 | 13.2 | 13.4 | 15.3 | 16.1 |
| Arsenic | mg/L | 0.025 | 0.0012 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Barium | mg/L | 1 * | | 0.143 | | 0.187 | | 0.18 | | 0.225 | | 0.226 | | 0.258 |
| Beryllium | mg/L | | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Bicarbonate | mg/L | | 309 | 228 | 246 | 233 | 226 | 67 | 236 | 233 | 216 | 233 | 232 | 224 |
| Boron | mg/L | 5 * | | 0.0136 | | 0.0126 | | 0.0137 | | 0.0135 | | 0.0132 | | 0.0172 |
| Cadmium | mg/L | 0.005 * | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 |
| Calcium | mg/L | | 68.6 | 135 | 156 | 152 | 152 | 156 | 172 | 169 | 185 | 180 | 197 | 196 |
| Carbonate | mg/L | | 2 | 2 | 1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Cation sum | meq/L | | 6.49 | 9.58 | 11.4 | 11 | 11.1 | 11.4 | 13 | 12.7 | 14.7 | 13.5 | 15.8 | 15.7 |
| Chloride | mg/L | 250 | 10.5 | 142 | 195 | 126 | 167 | 169 | 223 | 226 | 256 | 253 | 317 | 349 |
| Chromium | mg/L | 0.05 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Cobalt | mg/L | | | 0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | <10 | <10 | 30 | <10 | <10 | 10 | <10 | 20 | <10 | <10 |
| Conductivity | µS/cm | | 572 | 1010 | 1200 | 1010 | 1120 | 1070 | 1320 | 1310 | 1450 | 1440 | 1630 | 1680 |
| Conductivity - field | µS/cm | | 594 | 946 | 1230 | 1070 | 1120 | 1140 | 1250 | 1340 | 1420 | 1340 | 1560 | 1610 |
| Copper | mg/L | 1 | | 0.0007 | | <0.0005 | | 0.0013 | | 0.0008 | | 0.0007 | | 0.0005 |
| Dissolved Organic Carbon | mg/L | 5 | 1.3 | 1.4 | 1.3 | 1.4 | <1.0 | 3.1 | 3.2 | 2.5 | 1 | 3.0 | 1.4 | <1.0 |
| Dissolved Oxygen - field | mg/L | | 2.51 | 2.5 | 1.89 | 2.71 | 0.83 | 1.58 | 1.36 | 0.88 | 1.32 | 1.01 | 3.52 | 1.91 |
| Hardness | mg/L | 80-100 | 302 | 426 | 481 | 471 | 466 | 482 | 531 | 518 | 563 | 551 | 598 | 599 |
| Ion Percentage | % | | 6.37 | 2.13 | 1.63 | 6.14 | 1.61 | 18.3 | 1.62 | 0.14 | 5.43 | 0.51 | 1.69 | 1.09 |
| Iron | mg/L | 0.3 | 0.011 | <0.001 | <0.05 | 0.002 | <0.05 | 0.001 | <0.05 | 0.009 | 0.005 | 0.059 | 0.013 | <0.005 |
| Lead | mg/L | 0.01 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Magnesium | mg/L | | 31.9 | 21.6 | 22.3 | 22.3 | 20.9 | 22.5 | 24.6 | 23.3 | 24.5 | 24.6 | 25.7 | 26.6 |
| Manganese | mg/L | 0.05 | 0.0105 | 0.0115 | 0.01 | 0.0131 | 0.007 | 0.0108 | 0.008 | 0.0033 | 0.0063 | 0.0149 | 0.0103 | 0.0115 |
| Molybdenum | mg/L | | | <0.0005 | | <0.0005 | | 0.0007 | | <0.0005 | | <0.0005 | | <0.0005 |
| Nickel | mg/L | | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 |
| Nitrate | mg/L | 10.0 * | 2.76 | 3.83 | 4.7 | 3.96 | 4 | 3.55 | 4.1 | 3.8 | 3.8 | 3.5 | 3.8 | 3.6 |
| Nitrite | mg/L | 1.0* | <0.05 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | 202.9 | 170.9 | 104.2 | 70 | 202.5 | 184.8 | 105 | 203.1 | 56.2 | 50.2 | 55.3 | 42.7 |
| pH | units | | 7.85 | 7.91 | 7.71 | 7.56 | 7.72 | 7.35 | 7.58 | 7.44 | 7.53 | 7.53 | 7.50 | 7.39 |
| pH - field | units | | 7.41 | 7.37 | 7.27 | 7.23 | 7.23 | 7.29 | 7.31 | 7.27 | 7.54 | 7.28 | 7.27 | 7.16 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | 0.06 | <0.02 | <0.02 | 0.03 | 0.07 | 0.03 | <0.02 | <0.02 | <0.01 | 0.01 | <0.03 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.6 | 7 | 7.9 | 6.9 | 6.7 | 7 | 8 | 8.3 | 10.7 | 7.0 | 8.2 | 9.2 |
| Sodium | mg/L | 200 | 7.9 | 19.4 | 34.2 | 32.2 | 35.9 | 34.8 | 49.1 | 47.9 | 71.2 | 52.7 | 82.7 | 79.1 |
| Sulphate | mg/L | 500 | 41.3 | 61.2 | 54 | 67.5 | 64.8 | 73.6 | 68.3 | 74.8 | 71.8 | 71.4 | 75.7 | 77.4 |
| Total Dissolved Solids | mg/L | 500 | 410 | 640 | 1190 | 590 | 880 | 540 | 1080 | 850 | 970 | 740 | 1280 | 1220 |
| Temperature - field | °C | | 11.7 | 9 | 10.5 | 8.6 | 10.6 | 8.5 | 10.3 | 10.9 | 10.8 | 9.2 | 11.3 | 9.6 |
| Total Kjeldahl Nitrogen | mg/L | | 2.3 | <0.1 | 0.1 | <0.1 | <2.0 | <0.1 | 0.2 | <0.5 | <1.0 | <0.5 | <0.1 | <0.1 |
| Zinc | mg/L | 5 | | <0.0005 | | 0.0005 | | 0.0011 | | 0.0007 | | <0.0005 | | <0.0005 |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1,2-Trichlorethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1-Dichloroethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1-Dichloroethylene | µg/L | 14 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichlorpropane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichlorobenzene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichloropropene(E) | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Benzene | µg/L | 1 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromodichloromethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromoform | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromomethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Carbon Tetrachloride | µg/L | 5 * | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 |
| Chlorobenzene | µg/L | 30 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Chloroethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| Chloroform | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Chloromethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| cis-1,2-Dichloroethylene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Dibromochloromethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Dichloromethane | µg/L | 50 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Ethyl Benzene | µg/L | 1.6 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Ethylene dibromide | µg/L | | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 |
| m/p-Xylenes | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| o-Xylene | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Styrene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Tetrachloroethylene | µg/L | 30 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Toluene | µg/L | 24 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| trans-1,2-Dichloroethylene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Trichloroethylene | µg/L | 5 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Trichlorofluoromethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| Vinyl Chloride | µg/L | 1 * | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 |
| Xylenes - total | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 85-I | 85-II | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sep-22 | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Sep-21 | Mar-22 |
| Alkalinity | mg/L | 30-500 | 227 | 222 | 297 | 234 | 235 | 256 | 229 | 298 | 301 | 257 | 245 | 245 |
| Aluminum | mg/L | 0.1 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 |
| Ammonia (as N) | mg/L | | 0.2 | 0.2 | 0.4 | 0.4 | 0.4 | 0.1 | 0.2 | 0.2 | 0.4 | 0.4 | 0.3 | 0.3 |
| Anion sum | meq/L | | 16.8 | 16.5 | 11.5 | 32.5 | 13.2 | 19.4 | 13 | 21.3 | 21.8 | 15.6 | 17.8 | 17.8 |
| Arsenic | mg/L | 0.025 | <0.0005 | 0.0008 | <0.005 | 0.0006 | <0.005 | <0.0005 | <0.005 | 0.0006 | 0.0008 | 0.0008 | 0.0007 | 0.0006 |
| Barium | mg/L | 1 * | | 0.062 | | 0.154 | | 0.084 | | 0.088 | | 0.071 | | 0.078 |
| Beryllium | mg/L | | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Bicarbonate | mg/L | | 226 | 220 | 296 | 234 | 234 | 255 | 228 | 297 | 300 | 256 | 244 | 245 |
| Boron | mg/L | 5 * | | 0.182 | | 0.244 | | 0.316 | | 0.358 | | 0.240 | | 0.205 |
| Cadmium | mg/L | 0.005 * | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 |
| Calcium | mg/L | | 216 | 135 | 132 | 319 | 172 | 199 | 173 | 197 | 230 | 185 | 218 | 202 |
| Carbonate | mg/L | | <1 | 2 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Cation sum | meq/L | | 18.4 | 14.6 | 11.4 | 32.6 | 14.2 | 19.8 | 14.2 | 20.4 | 21.1 | 15.5 | 18.6 | 17.2 |
| Chloride | mg/L | 250 | 373 | 329 | 124 | 783 | 236 | 296 | 233 | 386 | 304 | 259 | 376 | 384 |
| Chromium | mg/L | 0.05 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Cobalt | mg/L | | | 0.0005 | | 0.0007 | | 0.0008 | | 0.0008 | | 0.0006 | | 0.0007 |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | <10 | 30 | 20 | 20 | <10 | 30 | <10 | 20 | <10 | <10 |
| Conductivity | µS/cm | | 1820 | 1680 | 1140 | 3260 | 1340 | 1980 | 1390 | 2260 | 2160 | 1640 | 1850 | 1900 |
| Conductivity - field | µS/cm | | 1980 | 1700 | 1150 | 3240 | 1390 | 1970 | 1320 | 2040 | 2120 | 1650 | 1990 | 1830 |
| Copper | mg/L | 1 | | 0.0006 | | <0.0005 | | 0.0034 | | 0.0015 | | 0.0009 | | 0.0006 |
| Dissolved Organic Carbon | mg/L | 5 | 1.1 | 5 | 4.7 | 2.9 | 2.2 | 7.2 | 6.2 | 5.6 | 7.5 | 6.6 | 2.3 | 2.4 |
| Dissolved Oxygen - field | mg/L | | 2.30 | 1.65 | 1.2 | 1.61 | 0.82 | 1.26 | 2.11 | 1.17 | 1.67 | 1.18 | 1.68 | 4.18 |
| Hardness | mg/L | 80-100 | 665 | 381 | 388 | 895 | 523 | 564 | 543 | 567 | 661 | 560 | 685 | 636 |
| Ion Percentage | % | | 4.70 | 6.23 | 0.69 | 0.29 | 3.51 | 1.1 | 4.55 | 2.21 | 1.83 | 0.27 | 2.04 | 1.53 |
| Iron | mg/L | 0.3 | <0.005 | 0.555 | 2 | 1.27 | 0.99 | 0.389 | 0.72 | 1.64 | 1.38 | 2.11 | 1.86 | 0.51 |
| Lead | mg/L | 0.01 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Magnesium | mg/L | | 30.6 | 10.7 | 14.3 | 24 | 22.7 | 16.3 | 26.9 | 18.2 | 21 | 23.7 | 34.1 | 32.0 |
| Manganese | mg/L | 0.05 | 0.0080 | 0.188 | 0.285 | 0.455 | 0.23 | 0.269 | 0.205 | 0.335 | 0.378 | 0.338 | 0.291 | 0.243 |
| Molybdenum | mg/L | | | 0.0008 | | 0.0006 | | 0.0007 | | 0.0007 | | 0.0009 | | 0.0009 |
| Nickel | mg/L | | | <0.002 | | <0.002 | | 0.002 | | 0.003 | | <0.002 | | <0.002 |
| Nitrate | mg/L | 10.0 * | 3.7 | <0.05 | 0.15 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.05 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | 87.1 | -6.7 | -103.2 | -15.7 | -109.5 | -27.2 | -63.1 | -21.5 | -104.2 | -52.8 | -79.2 | -17.6 |
| pH | units | | 7.55 | 7.93 | 7.6 | 7.3 | 7.61 | 7.45 | 7.47 | 7.26 | 7.25 | 7.40 | 7.39 | 7.31 |
| pH - field | units | | 7.39 | 7.3 | 7.19 | 6.95 | 7.14 | 7.16 | 7.26 | 7.08 | 7.18 | 7.00 | 7.13 | 7.06 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | 0.02 | <0.02 | <0.02 | 0.03 | <0.02 | 0.03 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | 0.02 | 0.04 | 0.14 | 0.09 | <0.02 | <0.02 | 0.02 | 0.02 | 0.04 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 9.6 | 11.7 | 9.4 | 15.8 | 7.4 | 11.5 | 7.7 | 10.3 | 11.8 | 8.0 | 7.0 | 6.8 |
| Sodium | mg/L | 200 | 111.0 | 152 | 76.4 | 328 | 79.6 | 189 | 71.6 | 201 | 172 | 92.4 | 106 | 99 |
| Sulphate | mg/L | 500 | 77.7 | 141 | 110 | 282 | 96.8 | 293 | 95.3 | 224 | 358 | 158 | 119 | 107 |
| Total Dissolved Solids | mg/L | 500 | 1520 | 1000 | 710 | 1890 | 1020 | 1230 | 1100 | 1260 | 1450 | 830 | 1430 | 1370 |
| Temperature - field | °C | | 10.8 | 7.7 | 12.2 | 7.5 | 12.7 | 6.9 | 12.2 | 8.3 | 13.2 | 7.1 | 13.4 | 7.8 |
| Total Kjeldahl Nitrogen | mg/L | | 2.2 | 0.3 | 0.8 | 0.4 | <2.0 | 0.5 | 0.3 | 0.4 | <1.0 | 0.7 | 0.6 | 0.6 |
| Zinc | mg/L | 5 | | 0.0016 | | 0.0026 | | 0.0053 | | 0.0012 | | 0.0019 | | 0.0016 |
| Phenols | µg/L | | <1 | 1 | <1 | <1 | <1 | 2 | <1 | <1 | <1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1,2-Trichlorethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1-Dichloroethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1-Dichloroethylene | µg/L | 14 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichlorpropane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichlorobenzene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichloropropene(E) | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Benzene | µg/L | 1 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromodichloromethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromoform | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromomethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Carbon Tetrachloride | µg/L | 5 * | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 |
| Chlorobenzene | µg/L | 30 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Chloroethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| Chloroform | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Chloromethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| cis-1,2-Dichloroethylene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Dibromochloromethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Dichloromethane | µg/L | 50 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Ethyl Benzene | µg/L | 1.6 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Ethylene dibromide | µg/L | | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 |
| m/p-Xylenes | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| o-Xylene | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Styrene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Tetrachloroethylene | µg/L | 30 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Toluene | µg/L | 24 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| trans-1,2-Dichloroethylene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Trichloroethylene | µg/L | 5 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Trichlorofluoromethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| Vinyl Chloride | µg/L | 1 * | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 |
| Xylenes - total | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 85-II | 86-I | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sep-22 | Apr-17 | Sep-17 | Apr-18 | Sep-18 | Apr-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Sep-21 | Apr-22 |
| Alkalinity | mg/L | 30-500 | 217 | 266 | 297 | 260 | 238 | 243 | 252 | 242 | 239 | 259 | 252 | 271 |
| Aluminum | mg/L | 0.1 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 |
| Ammonia (as N) | mg/L | | 0.3 | 1.8 | 1.8 | 1.7 | 1.8 | 1.6 | 1.7 | 1.6 | 1.9 | 2 | 2.2 | 1.8 |
| Anion sum | meq/L | | 20.1 | 22.8 | 20.8 | 18 | 18 | 16.5 | 20.8 | 16.8 | 18.1 | 16.2 | 16.7 | 23.8 |
| Arsenic | mg/L | 0.025 | 0.0005 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Barium | mg/L | 1 * | | 0.019 | | 0.02 | | 0.019 | | 0.018 | | 0.018 | | 0.024 |
| Beryllium | mg/L | | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Bicarbonate | mg/L | | 216 | 264 | 295 | 259 | 237 | 242 | 251 | 241 | 238 | 258 | 250 | 270 |
| Boron | mg/L | 5 * | | 0.57 | | 0.38 | | 0.357 | | 0.415 | | 0.446 | | 0.526 |
| Cadmium | mg/L | 0.005 * | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 |
| Calcium | mg/L | | 239 | 65.2 | 60.9 | 82 | 73.3 | 68.7 | 79.4 | 71.6 | 80.7 | 72.2 | 81.6 | 89.5 |
| Carbonate | mg/L | | <1 | 2 | 2 | <1 | 1 | 1 | <1 | 1 | 1 | <1 | 2 | 1 |
| Cation sum | meq/L | | 20.2 | 19.7 | 20.6 | 17.9 | 17.7 | 15.4 | 20.7 | 16.3 | 18.4 | 17.2 | 15.8 | 25.5 |
| Chloride | mg/L | 250 | 508 | 597 | 508 | 424 | 445 | 378 | 537 | 394 | 447 | 361 | 383 | 636 |
| Chromium | mg/L | 0.05 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Cobalt | mg/L | | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Chemical Oxygen Demand | mg/L | | 10 | <10 | 30 | 40 | 40 | 30 | 30 | 20 | 10 | 20 | <10 | <10 |
| Conductivity | µS/cm | | 2390 | 2170 | 2310 | 2070 | 2010 | 1800 | 2420 | 1800 | 2090 | 3630 | 1860 | 2640 |
| Conductivity - field | µS/cm | | 2110 | 3020 | 2790 | 3550 | 3690 | - | 3650 | 3800 | 2350 | 3490 | 3280 | 3850 |
| Copper | mg/L | 1 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Dissolved Organic Carbon | mg/L | 5 | 1.4 | 1.1 | <1.0 | <1.0 | <1.0 | <1.0 | 1.2 | 1.8 | 1 | 1.1 | 1.2 | 1.0 |
| Dissolved Oxygen - field | mg/L | | 9.16 | 2.11 | 1.68 | 1.02 | 0.79 | - | 1.61 | 1.96 | 0.86 | 0.88 | 1.74 | 0.32 |
| Hardness | mg/L | 80-100 | 783 | 338 | 331 | 417 | 377 | 358 | 417 | 377 | 421 | 376 | 415 | 473 |
| Ion Percentage | % | | 0.38 | 7.2 | 0.46 | 0.14 | 0.98 | 3.47 | 0.29 | 1.49 | 1.05 | 3.21 | 2.79 | 3.29 |
| Iron | mg/L | 0.3 | 0.67 | 0.013 | <0.05 | 0.026 | <0.05 | 0.016 | <0.05 | 0.016 | 0.048 | 0.024 | 0.026 | 0.037 |
| Lead | mg/L | 0.01 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Magnesium | mg/L | | 45.2 | 42.6 | 43.4 | 51.6 | 47.2 | 45.3 | 53 | 48.1 | 53.2 | 47.6 | 51.4 | 60.5 |
| Manganese | mg/L | 0.05 | 0.273 | 0.0017 | 0.002 | 0.0022 | 0.003 | 0.0021 | 0.002 | 0.0019 | 0.0027 | 0.002 | 0.0022 | 0.0022 |
| Molybdenum | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Nickel | mg/L | | | 0.003 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 |
| Nitrate | mg/L | 10.0 * | 0.73 | <0.05 | <0.1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | 0.11 | <0.05 | <0.1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | -58.9 | -128.5 | -158.9 | -132.1 | -134.2 | - | -178.5 | -123.6 | -107.1 | -208.9 | -110.4 | -55.1 |
| pH | units | | 7.42 | 7.87 | 7.82 | 7.6 | 7.73 | 7.65 | 7.59 | 7.75 | 7.66 | 7.6 | 7.81 | 7.60 |
| pH - field | units | | 7.18 | 7.46 | 7.55 | 7.34 | 7.57 | - | 7.59 | 7.36 | 7.51 | 7.36 | 7.28 | 7.23 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | <0.02 | 0.65 | <0.02 | <0.02 | <0.02 | <0.02 | <0.01 | 0.02 | <0.01 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 6.4 | 11.7 | 11.8 | 9.9 | 10.7 | 9.7 | 11.3 | 9.5 | 10.7 | 10.1 | 9.5 | 14.9 |
| Sodium | mg/L | 200 | 100 | 287 | 310 | 210 | 223 | 179 | 274 | 193 | 220 | 213 | 162 | 355 |
| Sulphate | mg/L | 500 | 73 | 39.1 | 34 | 47.1 | 43.6 | 53.4 | 39.8 | 50.5 | 40.5 | 47.4 | 50.5 | 32.8 |
| Total Dissolved Solids | mg/L | 500 | 1890 | 1170 | 1260 | 1010 | 1080 | 960 | 1310 | 970 | 1060 | 960 | 990 | 1410 |
| Temperature - field | °C | | 12.4 | 9.4 | 11.9 | 7 | 11 | - | 12.5 | 8 | 11 | 10.1 | 11.2 | 8.2 |
| Total Kjeldahl Nitrogen | mg/L | | 2.3 | 4.4 | 2.2 | 3.4 | 1.6 | 4.5 | 0.8 | 1.2 | 2.9 | 1.4 | 1.7 | 3.7 |
| Zinc | mg/L | 5 | | 0.0006 | | 0.0006 | | <0.0005 | | 0.0008 | | <0.0005 | | 0.0008 |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | 3 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1,2-Trichlorethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1-Dichloroethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1-Dichloroethylene | µg/L | 14 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichlorpropane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichlorobenzene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichloropropene(E) | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Benzene | µg/L | 1 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromodichloromethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromoform | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromomethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Carbon Tetrachloride | µg/L | 5 * | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 |
| Chlorobenzene | µg/L | 30 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Chloroethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| Chloroform | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Chloromethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| cis-1,2-Dichloroethylene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Dibromochloromethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Dichloromethane | µg/L | 50 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Ethyl Benzene | µg/L | 1.6 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Ethylene dibromide | µg/L | | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 |
| m/p-Xylenes | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| o-Xylene | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Styrene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Tetrachloroethylene | µg/L | 30 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Toluene | µg/L | 24 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| trans-1,2-Dichloroethylene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Trichloroethylene | µg/L | 5 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Trichlorofluoromethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| Vinyl Chloride | µg/L | 1 * | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 |
| Xylenes - total | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 86-I | 86-II | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sep-22 | Apr-17 | Sep-17 | Apr-18 | Sep-18 | Apr-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Sep-21 | Apr-22 |
| Alkalinity | mg/L | 30-500 | 250 | 199 | 201 | 199 | 182 | 185 | 191 | 187 | 182 | 193 | 193 | 187 |
| Aluminum | mg/L | 0.1 | | 0.249 | | <0.025 | | 0.132 | | <0.025 | | <0.025 | | <0.025 |
| Ammonia (as N) | mg/L | | 1.8 | 0.3 | 0.3 | 0.2 | 0.3 | 0.2 | 0.2 | 0.1 | 0.1 | 0.2 | 0.3 | 0.1 |
| Anion sum | meq/L | | 14.7 | 4.38 | 4.4 | 4.46 | 4.09 | 4.14 | 4.23 | 4.22 | 4.06 | 4.29 | 4.27 | 4.15 |
| Arsenic | mg/L | 0.025 | <0.0005 | 0.0056 | <0.005 | 0.002 | 0.008 | 0.0022 | 0.006 | 0.0023 | 0.005 | 0.0025 | 0.0038 | 0.0020 |
| Barium | mg/L | 1 * | | 0.214 | | 0.275 | | 0.221 | | 0.232 | | 0.252 | | 0.242 |
| Beryllium | mg/L | | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Bicarbonate | mg/L | | 249 | 197 | 199 | 197 | 180 | 183 | 189 | 185 | 180 | 192 | 191 | 185 |
| Boron | mg/L | 5 * | | 0.0709 | | 0.0591 | | 0.0647 | | 0.0616 | | 0.0654 | | 0.0506 |
| Cadmium | mg/L | 0.005 * | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 |
| Calcium | mg/L | | 72.9 | 27.9 | 24.8 | 25.5 | 24.8 | 23.7 | 24.8 | 24 | 25.1 | 25.4 | 23.5 | 27.2 |
| Carbonate | mg/L | | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 2 |
| Cation sum | meq/L | | 15.2 | 4.75 | 4.5 | 4.49 | 4.38 | 4.19 | 4.48 | 4.44 | 4.54 | 4.65 | 4.26 | 4.94 |
| Chloride | mg/L | 250 | 312 | 17.5 | 15 | 15.6 | 15.9 | 14.3 | 15.7 | 16.5 | 15.6 | 15.3 | 16.7 | 15.2 |
| Chromium | mg/L | 0.05 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Cobalt | mg/L | | | <0.0001 | | 0.0002 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | <10 | <10 | 30 | <10 | <10 | 30 | <10 | 10 | <10 | <10 |
| Conductivity | µS/cm | | 1640 | 437 | 424 | 426 | 424 | 419 | 421 | 420 | 418 | 425 | 421 | 419 |
| Conductivity - field | µS/cm | | 3040 | 440 | 435 | 420 | 421 | 417 | 434 | 422 | 411 | 466 | 446 | 402 |
| Copper | mg/L | 1 | | <0.0005 | | <0.0005 | | <0.0005 | | 0.0006 | | 0.0005 | | <0.0005 |
| Dissolved Organic Carbon | mg/L | 5 | <1.0 | 3.6 | 1.6 | 1.7 | 2.4 | 1.4 | 1.5 | 3.3 | 2.2 | 1.7 | 2.7 | 1.4 |
| Dissolved Oxygen - field | mg/L | | 5.81 | 2.38 | 1.37 | 2.3 | 0.86 | 2.38 | 2.15 | 2.41 | 1.1 | 2.12 | 2.06 | 1.67 |
| Hardness | mg/L | 80-100 | 378 | 194 | 188 | 186 | 182 | 170 | 183 | 181 | 184 | 188 | 172 | 203 |
| Ion Percentage | % | | 1.60 | 4.05 | 1.14 | 0.36 | 3.49 | 0.54 | 2.95 | 2.61 | 5.67 | 3.97 | 0.04 | 8.67 |
| Iron | mg/L | 0.3 | 0.023 | 0.406 | 0.14 | 0.192 | 0.45 | 0.057 | 0.11 | 0.008 | 0.358 | 0.013 | 0.053 | 0.050 |
| Lead | mg/L | 0.01 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Magnesium | mg/L | | 47.6 | 30.2 | 30.6 | 29.8 | 29.1 | 27 | 29.4 | 29.3 | 29.5 | 30.3 | 27.6 | 32.7 |
| Manganese | mg/L | 0.05 | 0.0020 | 0.0188 | 0.013 | 0.014 | 0.013 | 0.0115 | 0.015 | 0.0008 | 0.0154 | 0.0007 | 0.0158 | <0.0005 |
| Molybdenum | mg/L | | | 0.0012 | | 0.0016 | | 0.0013 | | 0.0012 | | 0.0014 | | 0.0012 |
| Nickel | mg/L | | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 |
| Nitrate | mg/L | 10.0 * | <0.05 | <0.05 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.05 | <0.05 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | -179.3 | -162.5 | -175 | 178.1 | -187.6 | 115.8 | -169.7 | 60.7 | -129.2 | 29.2 | -197.1 | 154.9 |
| pH | units | | 7.71 | 7.93 | 8.02 | 7.99 | 7.94 | 7.94 | 7.95 | 8.01 | 7.95 | 7.88 | 8.06 | 7.95 |
| pH - field | units | | 7.51 | 7.69 | 7.85 | 7.67 | 8.01 | 7.8 | 7.94 | 7.82 | 7.77 | 8.03 | 7.90 | 7.77 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | 0.06 | 0.03 | 0.02 | <0.02 | 0.03 | <0.02 | 0.04 | 0.02 | 0.04 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 9.1 | 2 | 1.9 | 2.1 | 1.8 | 1.8 | 1.9 | 1.9 | 2.1 | 2.2 | 1.9 | 2.3 |
| Sodium | mg/L | 200 | 166 | 17.7 | 14.7 | 15.2 | 14.9 | 15.9 | 16.8 | 17.1 | 17.7 | 18 | 16.5 | 18.2 |
| Sulphate | mg/L | 500 | 52.2 | 2 | 4.2 | 8 | 5.6 | 7.7 | 4.3 | 6.4 | 4.6 | 6.2 | 3.0 | 5.2 |
| Total Dissolved Solids | mg/L | 500 | 890 | 230 | 250 | 240 | 240 | 240 | 220 | 240 | 240 | 240 | 240 | 250 |
| Temperature - field | °C | | 11.5 | 8.8 | 11.4 | 9.4 | 10.8 | 7.3 | 12.4 | 6.9 | 10.7 | 9.4 | 11.3 | 7.6 |
| Total Kjeldahl Nitrogen | mg/L | | 3.5 | 0.3 | 0.4 | 0.2 | <1.0 | 0.1 | 0.1 | <0.1 | <1.0 | <0.1 | 0.3 | 0.4 |
| Zinc | mg/L | 5 | | 0.0009 | | 0.0007 | | 0.0028 | | 0.0052 | | 0.0025 | | 0.0013 |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 3 | 2 | 1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1,2-Trichlorethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1-Dichloroethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1-Dichloroethylene | µg/L | 14 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichlorpropane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichlorobenzene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichloropropene(E) | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Benzene | µg/L | 1 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromodichloromethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromoform | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromomethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Carbon Tetrachloride | µg/L | 5 * | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 |
| Chlorobenzene | µg/L | 30 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Chloroethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| Chloroform | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Chloromethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| cis-1,2-Dichloroethylene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Dibromochloromethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Dichloromethane | µg/L | 50 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Ethyl Benzene | µg/L | 1.6 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Ethylene dibromide | µg/L | | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 |
| m/p-Xylenes | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| o-Xylene | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Styrene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Tetrachloroethylene | µg/L | 30 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Toluene | µg/L | 24 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| trans-1,2-Dichloroethylene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Trichloroethylene | µg/L | 5 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Trichlorofluoromethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| Vinyl Chloride | µg/L | 1 * | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 |
| Xylenes - total | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 86-II | 86-III | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sep-22 | Apr-17 | Sep-17 | Apr-18 | Sep-18 | Apr-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Sep-21 | Apr-22 |
| Alkalinity | mg/L | 30-500 | 188 | 380 | 311 | 297 | 277 | 272 | 271 | 290 | 320 | 298 | 312 | 266 |
| Aluminum | mg/L | 0.1 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 |
| Ammonia (as N) | mg/L | | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.1 |
| Anion sum | meq/L | | 4.15 | 15.8 | 10.4 | 9.09 | 9.43 | 9.66 | 8.96 | 10.2 | 15.5 | 12.1 | 12.5 | 8.5 |
| Arsenic | mg/L | 0.025 | 0.0032 | <0.0005 | <0.005 | 0.0006 | 0.007 | 0.0008 | <0.005 | 0.0005 | 0.0013 | <0.0005 | 0.0007 | <0.0005 |
| Barium | mg/L | 1 * | | 0.579 | | 0.303 | | 0.388 | | 0.329 | | 0.436 | | 0.352 |
| Beryllium | mg/L | | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Bicarbonate | mg/L | | 186 | 379 | 309 | 296 | 276 | 271 | 270 | 289 | 319 | 297 | 311 | 265 |
| Boron | mg/L | 5 * | | 0.077 | | 0.12 | | 0.147 | | 0.199 | | 0.163 | | 0.24 |
| Cadmium | mg/L | 0.005 * | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 |
| Calcium | mg/L | | 24.6 | 118 | 64.3 | 61.2 | 67.6 | 68.7 | 63.2 | 64.6 | 116 | 83.6 | 83.5 | 74.6 |
| Carbonate | mg/L | | 2 | 1 | 2 | 1 | 1 | 1 | <1 | 1 | <1 | <1 | 1 | 1 |
| Cation sum | meq/L | | 4.43 | 18 | 10.4 | 8.78 | 9.83 | 9.92 | 9.13 | 9.3 | 15.8 | 12.2 | 11.7 | 10.4 |
| Chloride | mg/L | 250 | 15.4 | 273 | 141 | 105 | 129 | 143 | 120 | 147 | 312 | 212 | 217 | 107 |
| Chromium | mg/L | 0.05 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Cobalt | mg/L | | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | <10 | 20 | 10 | <10 | <10 | 30 | <10 | 20 | <10 | <10 |
| Conductivity | µS/cm | | 416 | 1830 | 1040 | 905 | 993 | 998 | 947 | 1050 | 1610 | 1270 | 1280 | 895 |
| Conductivity - field | µS/cm | | 445 | 1800 | 1010 | 827 | 999 | 1100 | 967 | 966 | 1600 | 1210 | 1330 | 843 |
| Copper | mg/L | 1 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | 0.0017 | | <0.0005 |
| Dissolved Organic Carbon | mg/L | 5 | 1.1 | 1.6 | 1.3 | <1.0 | <1.0 | <1.0 | 3.1 | 2.6 | 1.8 | 1.5 | 1.4 | 1.5 |
| Dissolved Oxygen - field | mg/L | | 3.92 | 3 | 2.15 | 3.94 | 1.39 | 2.25 | 1.62 | 2.55 | 1.55 | 1.75 | 3.28 | 2.18 |
| Hardness | mg/L | 80-100 | 182 | 588 | 360 | 322 | 352 | 345 | 329 | 331 | 509 | 408 | 379 | 358 |
| Ion Percentage | % | | 3.28 | 6.4 | 0.2 | 1.73 | 2.07 | 1.37 | 0.93 | 4.37 | 1.03 | 0.13 | 3.54 | 10.00 |
| Iron | mg/L | 0.3 | 0.313 | 0.019 | 0.06 | 0.018 | 0.11 | 0.015 | <0.05 | 0.022 | 0.359 | 0.012 | 0.030 | 0.033 |
| Lead | mg/L | 0.01 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Magnesium | mg/L | | 29.3 | 71.2 | 48.4 | 41.2 | 44.4 | 42.2 | 41.5 | 41.1 | 53.3 | 48.3 | 41.4 | 41.6 |
| Manganese | mg/L | 0.05 | 0.0131 | 0.0071 | 0.04 | 0.011 | 0.052 | 0.0366 | 0.038 | 0.0214 | 0.0441 | 0.0143 | 0.0266 | 0.0175 |
| Molybdenum | mg/L | | | <0.0005 | | 0.0007 | | 0.0007 | | 0.0006 | | 0.0006 | | 0.0007 |
| Nickel | mg/L | | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 |
| Nitrate | mg/L | 10.0 * | <0.05 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.05 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | -86.4 | -23.6 | -5.3 | -4.3 | -62.8 | 117.7 | -37.5 | 79.3 | 2.6 | 89.2 | 22.4 | 67.6 |
| pH | units | | 8.02 | 7.56 | 7.79 | 7.58 | 7.68 | 7.62 | 7.58 | 7.71 | 7.41 | 7.44 | 7.62 | 7.61 |
| pH - field | units | | 7.72 | 7.13 | 7.37 | 7.4 | 7.44 | 7.32 | 7.47 | 7.39 | 7.22 | 7.41 | 7.18 | 7.33 |
| Phosphate | mg/L | | 0.03 | <0.02 | <0.02 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | 0.02 | 0.04 | <0.02 | <0.02 | <0.02 | <0.02 | 0.01 | 0.03 | 0.01 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 2.0 | 3.1 | 2.7 | 2.2 | 2.5 | 2.3 | 2.5 | 2.1 | 3.3 | 2.5 | 2.7 | 2.4 |
| Sodium | mg/L | 200 | 15.7 | 139 | 71.2 | 51 | 61.4 | 66.7 | 56.1 | 59.5 | 125 | 89.3 | 91.6 | 71.0 |
| Sulphate | mg/L | 500 | 3.6 | 36.8 | 19.1 | 18.6 | 21 | 17.6 | 16.2 | 19.3 | 22.8 | 19.1 | 19.2 | 14.9 |
| Total Dissolved Solids | mg/L | 500 | 240 | 1070 | 610 | 480 | 550 | 540 | 560 | 580 | 880 | 600 | 670 | 480 |
| Temperature - field | °C | | 11.0 | 5.3 | 12.5 | 5 | 13.2 | 5 | 12.7 | 5.3 | 12.4 | 5.7 | 13.3 | 5.4 |
| Total Kjeldahl Nitrogen | mg/L | | 2.2 | 0.1 | 0.2 | 0.3 | <1.0 | <0.1 | <0.1 | <0.1 | <1.0 | <0.1 | 0.2 | <0.2 |
| Zinc | mg/L | 5 | | 0.0009 | | 0.0013 | | <0.0005 | | <0.0005 | | 0.002 | | <0.0005 |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1,2-Trichlorethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1-Dichloroethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1-Dichloroethylene | µg/L | 14 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichlorpropane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichlorobenzene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichloropropene(E) | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Benzene | µg/L | 1 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromodichloromethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromoform | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromomethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Carbon Tetrachloride | µg/L | 5 * | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 |
| Chlorobenzene | µg/L | 30 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Chloroethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| Chloroform | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Chloromethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| cis-1,2-Dichloroethylene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Dibromochloromethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Dichloromethane | µg/L | 50 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Ethyl Benzene | µg/L | 1.6 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Ethylene dibromide | µg/L | | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 |
| m/p-Xylenes | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| o-Xylene | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Styrene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Tetrachloroethylene | µg/L | 30 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Toluene | µg/L | 24 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| trans-1,2-Dichloroethylene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Trichloroethylene | µg/L | 5 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Trichlorofluoromethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| Vinyl Chloride | µg/L | 1 * | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 |
| Xylenes - total | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 86-III | 87-I | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sep-22 | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Sep-21 | Mar-22 |
| Alkalinity | mg/L | 30-500 | 333 | 186 | 185 | 177 | 171 | 179 | 190 | 182 | 175 | 187 | 195 | 184 |
| Aluminum | mg/L | 0.1 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 |
| Ammonia (as N) | mg/L | | 0.2 | 0.5 | 0.3 | 0.4 | 0.3 | 0.4 | 0.4 | 0.5 | 0.4 | 0.4 | 0.5 | 0.5 |
| Anion sum | meq/L | | 16.3 | 4.35 | 4.34 | 4.22 | 4.26 | 4.2 | 4.35 | 4.2 | 4.31 | 4.30 | 5.25 | 4.28 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.0005 | <0.005 | 0.003 | <0.005 | <0.0005 | <0.005 | <0.0005 | 0.0007 | <0.0005 | 0.0013 | <0.0005 |
| Barium | mg/L | 1 * | | 0.149 | | 0.091 | | 0.153 | | 0.167 | | 0.162 | | 0.155 |
| Beryllium | mg/L | | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Bicarbonate | mg/L | | 332 | 183 | 183 | 175 | 169 | 177 | 188 | 180 | 173 | 185 | 193 | 182 |
| Boron | mg/L | 5 * | | 0.0543 | | 0.178 | | 0.0599 | | 0.0634 | | 0.0646 | | 0.0523 |
| Cadmium | mg/L | 0.005 * | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 |
| Calcium | mg/L | | 124.0 | 31.7 | 27.3 | 20.4 | 30.3 | 30.8 | 29.6 | 28.2 | 32.6 | 28.4 | 32.2 | 31.4 |
| Carbonate | mg/L | | <1 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cation sum | meq/L | | 17.1 | 4.87 | 4.48 | 5.71 | 4.58 | 4.69 | 4.84 | 4.38 | 4.83 | 4.30 | 4.92 | 4.64 |
| Chloride | mg/L | 250 | 333 | 6.3 | 7 | 6.4 | 7.4 | 5.4 | 6.5 | 5.3 | 8.8 | 5.6 | 20.6 | 5.2 |
| Chromium | mg/L | 0.05 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Cobalt | mg/L | | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | 20 | <10 | 30 | <10 | 10 | 30 | <10 | <10 | <10 | <10 |
| Conductivity | µS/cm | | 1730 | 432 | 419 | 419 | 427 | 420 | 426 | 416 | 443 | 422 | 507 | 429 |
| Conductivity - field | µS/cm | | 1510 | 432 | 428 | 411 | 418 | 418 | 427 | 416 | 442 | 419 | 528 | 416 |
| Copper | mg/L | 1 | | <0.0005 | | <0.0005 | | <0.0005 | | 0.0016 | | <0.0005 | | <0.0005 |
| Dissolved Organic Carbon | mg/L | 5 | 1.1 | 1.7 | 1.6 | 2.1 | 1.7 | 3 | 1 | <1.0 | <1.0 | 2.3 | 1.5 | 1.4 |
| Dissolved Oxygen - field | mg/L | | 2.74 | 1.71 | 1.47 | 2.69 | 0.76 | 1.28 | 1.04 | 1.74 | 1.26 | 1.77 | 0.12 | 2.97 |
| Hardness | mg/L | 80-100 | 538 | 212 | 193 | 130 | 198 | 200 | 211 | 191 | 208 | 184 | 193 | 203 |
| Ion Percentage | % | | 2.50 | 5.59 | 1.59 | 15 | 3.64 | 5.53 | 5.36 | 2.13 | 5.71 | 0.04 | 3.30 | 4.01 |
| Iron | mg/L | 0.3 | 0.051 | 0.024 | 0.06 | 0.045 | 0.07 | 0.085 | <0.05 | 0.021 | 0.088 | 0.065 | 0.120 | 0.040 |
| Lead | mg/L | 0.01 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Magnesium | mg/L | | 55.4 | 32.3 | 30.4 | 19.1 | 29.7 | 29.8 | 33.4 | 29.3 | 30.7 | 27.4 | 27.3 | 30.3 |
| Manganese | mg/L | 0.05 | 0.0254 | 0.0044 | 0.005 | 0.0042 | 0.005 | 0.0051 | 0.006 | 0.0052 | 0.0067 | 0.0056 | 0.0073 | 0.0062 |
| Molybdenum | mg/L | | | 0.0008 | | 0.0009 | | 0.0013 | | 0.0016 | | 0.0014 | | 0.0008 |
| Nickel | mg/L | | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 |
| Nitrate | mg/L | 10.0 * | <0.05 | <0.05 | <0.05 | <0.5 | <0.05 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.05 | <0.05 | <0.05 | <0.5 | <0.05 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | -26.0 | -65.1 | -75.5 | 29.4 | -71 | -113.6 | -93.6 | -30.4 | -137.4 | -53.3 | -140.9 | -111.0 |
| pH | units | | 7.38 | 8.26 | 8.1 | 7.97 | 8.07 | 8.05 | 8.06 | 8.07 | 8.07 | 7.99 | 8.02 | 7.98 |
| pH - field | units | | 7.28 | 7.88 | 7.79 | 7.77 | 8.05 | 7.95 | 7.92 | 7.93 | 8.08 | 7.87 | 7.81 | 7.71 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | 0.03 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | 0.02 | <0.02 | 0.06 | 0.05 | <0.02 | <0.02 | <0.02 | <0.01 | 0.02 | 0.04 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 3.2 | 1.9 | 1.6 | 3.8 | 1.2 | 1.8 | 1.9 | 1.9 | 1.7 | 1.8 | 1.8 | 1.9 |
| Sodium | mg/L | 200 | 143.0 | 11.6 | 11.9 | 68.3 | 12.3 | 13.6 | 11.5 | 10.3 | 13.1 | 12.0 | 21.9 | 10.5 |
| Sulphate | mg/L | 500 | 22.7 | 27.6 | 27 | 29.4 | 35.5 | 28 | 23.5 | 25.5 | 32.4 | 25.0 | 43.3 | 27.5 |
| Total Dissolved Solids | mg/L | 500 | 990 | 260 | 270 | 240 | 250 | 230 | 260 | 210 | 270 | 160 | 310 | 260 |
| Temperature - field | °C | | 13.4 | 9.4 | 10 | 8.1 | 11.6 | 8.7 | 9.9 | 7.8 | 11.1 | 9.1 | 10.9 | 8.6 |
| Total Kjeldahl Nitrogen | mg/L | | 2.1 | 0.8 | 0.4 | 0.3 | <2.0 | 0.1 | <0.1 | 0.3 | <1.0 | 0.3 | 0.4 | 0.4 |
| Zinc | mg/L | 5 | | <0.0005 | | <0.0005 | | 0.0005 | | 0.0012 | | <0.0005 | | <0.0005 |
| Phenols | µg/L | | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1,2-Trichlorethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1-Dichloroethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1-Dichloroethylene | µg/L | 14 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichlorpropane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichlorobenzene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichloropropene(E) | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Benzene | µg/L | 1 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromodichloromethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromoform | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromomethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Carbon Tetrachloride | µg/L | 5 * | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 |
| Chlorobenzene | µg/L | 30 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Chloroethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| Chloroform | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Chloromethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| cis-1,2-Dichloroethylene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Dibromochloromethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Dichloromethane | µg/L | 50 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Ethyl Benzene | µg/L | 1.6 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Ethylene dibromide | µg/L | | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 |
| m/p-Xylenes | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| o-Xylene | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Styrene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Tetrachloroethylene | µg/L | 30 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Toluene | µg/L | 24 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| trans-1,2-Dichloroethylene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Trichloroethylene | µg/L | 5 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Trichlorofluoromethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| Vinyl Chloride | µg/L | 1 * | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 |
| Xylenes - total | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 87-I | 87-II | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sep-22 | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Sep-21 | Mar-22 |
| Alkalinity | mg/L | 30-500 | 191 | 188 | 200 | 198 | 239 | 221 | 213 | 206 | 235 | 240 | 258 | 235 |
| Aluminum | mg/L | 0.1 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 |
| Ammonia (as N) | mg/L | | 0.6 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.2 | 0.2 | 0.2 |
| Anion sum | meq/L | | 4.67 | 4.85 | 5.04 | 5.07 | 6 | 5.53 | 5.33 | 5.24 | 5.83 | 5.88 | 6.32 | 5.78 |
| Arsenic | mg/L | 0.025 | 0.0007 | <0.0005 | <0.005 | 0.0006 | 0.006 | 0.0007 | <0.005 | 0.0008 | 0.0005 | 0.0006 | 0.0006 | 0.0005 |
| Barium | mg/L | 1 * | | 0.11 | | 0.138 | | 0.133 | | 0.132 | | 0.131 | | 0.112 |
| Beryllium | mg/L | | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Bicarbonate | mg/L | | 189 | 186 | 198 | 197 | 238 | 220 | 212 | 205 | 234 | 239 | 257 | 234 |
| Boron | mg/L | 5 * | | 0.0432 | | 0.0421 | | 0.0322 | | 0.0428 | | 0.0318 | | 0.0279 |
| Cadmium | mg/L | 0.005 * | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 |
| Calcium | mg/L | | 34.8 | 48.9 | 45 | 56 | 72.3 | 66.1 | 58.6 | 52 | 70.8 | 66.0 | 80.8 | 70.6 |
| Carbonate | mg/L | | 2 | 2 | 2 | <1 | <1 | 1 | 1 | 1 | 1 | 1 | 1 | <1 |
| Cation sum | meq/L | | 4.95 | 5.18 | 5.05 | 5.62 | 6.34 | 6.06 | 5.74 | 5.38 | 6.43 | 5.77 | 6.39 | 6.58 |
| Chloride | mg/L | 250 | 8.2 | 10.3 | 8.4 | 9.7 | 12.8 | 9.5 | 9.8 | 10 | 10.7 | 9.9 | 11.4 | 8.7 |
| Chromium | mg/L | 0.05 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Cobalt | mg/L | | | 0.0001 | | 0.0002 | | <0.0005 | | <0.0005 | | 0.0007 | | <0.0005 |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | 20 | 20 | 20 | <10 | <10 | 40 | <10 | 30 | <10 | <10 |
| Conductivity | µS/cm | | 456 | 484 | 480 | 502 | 587 | 542 | 517 | 510 | 568 | 557 | 606 | 566 |
| Conductivity - field | µS/cm | | 458 | 486 | 485 | 492 | 564 | 552 | 494 | 508 | 560 | 540 | 583 | 549 |
| Copper | mg/L | 1 | | <0.0005 | | <0.0005 | | 0.0013 | | <0.0005 | | <0.0005 | | <0.0005 |
| Dissolved Organic Carbon | mg/L | 5 | 1.5 | 1.6 | 1 | 2.1 | 1.7 | 3.2 | 1.8 | <1.0 | 1.4 | 2.2 | 1.7 | 1.4 |
| Dissolved Oxygen - field | mg/L | | 2.46 | 2.3 | 1.19 | 1.97 | 1.24 | 1.93 | 1.42 | 1.15 | 0.73 | 1.59 | 0.95 | 1.12 |
| Hardness | mg/L | 80-100 | 217 | 235 | 227 | 256 | 296 | 280 | 265 | 247 | 299 | 269 | 301 | 306 |
| Ion Percentage | % | | 2.99 | 3.2 | 0.02 | 5.07 | 2.78 | 4.51 | 3.69 | 1.27 | 4.88 | 0.87 | 0.52 | 6.46 |
| Iron | mg/L | 0.3 | 0.118 | 0.086 | 0.2 | 0.124 | 0.33 | 0.29 | 0.4 | 0.23 | 0.348 | 0.182 | 0.350 | 0.218 |
| Lead | mg/L | 0.01 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Magnesium | mg/L | | 31.6 | 27.3 | 27.9 | 28.3 | 28 | 28 | 28.7 | 28.4 | 29.6 | 25.4 | 24.2 | 31.6 |
| Manganese | mg/L | 0.05 | 0.0064 | 0.0118 | 0.014 | 0.0171 | 0.021 | 0.0207 | 0.018 | 0.0177 | 0.0179 | 0.0252 | 0.0223 | 0.0189 |
| Molybdenum | mg/L | | | 0.0007 | | 0.0007 | | 0.0008 | | 0.0008 | | 0.0008 | | 0.0006 |
| Nickel | mg/L | | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 |
| Nitrate | mg/L | 10.0 * | <0.05 | <0.05 | <0.05 | <0.5 | <0.05 | <0.5 | 0.16 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.05 | <0.05 | <0.05 | <0.5 | <0.05 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | -97.1 | -26.3 | -89.6 | 50.8 | -70.9 | -71.3 | -87.9 | -28.5 | -89.1 | -17.6 | -67.5 | -41.3 |
| pH | units | | 7.99 | 8.1 | 7.96 | 7.73 | 7.65 | 7.75 | 7.78 | 7.86 | 7.67 | 7.66 | 7.65 | 7.64 |
| pH - field | units | | 7.57 | 7.7 | 7.65 | 7.53 | 7.57 | 7.54 | 7.59 | 7.58 | 7.63 | 7.46 | 7.36 | 7.32 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | 0.02 | <0.02 | 0.03 | 0.03 | <0.02 | <0.02 | <0.02 | <0.01 | 0.01 | <0.03 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.6 | 1.7 | 1.5 | 1.7 | 1.8 | 1.8 | 1.5 | 1.6 | 1.9 | 1.7 | 1.6 | 1.8 |
| Sodium | mg/L | 200 | 11.4 | 9.14 | 9.6 | 9.2 | 7.6 | 8.2 | 8.5 | 8 | 8.2 | 6.9 | 6.3 | 8.1 |
| Sulphate | mg/L | 500 | 35.5 | 44.5 | 45 | 46.6 | 48.6 | 47.5 | 44.5 | 46.8 | 47.4 | 45.8 | 48.4 | 47.4 |
| Total Dissolved Solids | mg/L | 500 | 260 | 300 | 330 | 290 | 350 | 300 | 340 | 280 | 390 | 360 | 400 | 340 |
| Temperature - field | °C | | 9.8 | 9.6 | 10.2 | 8.4 | 11.6 | 8.6 | 11 | 8.9 | 10.6 | 9.0 | 10.8 | 8.7 |
| Total Kjeldahl Nitrogen | mg/L | | 2.4 | <0.1 | 0.3 | 0.1 | <2.0 | 0.1 | <0.1 | 0.1 | <1.0 | 0.1 | 0.2 | 0.1 |
| Zinc | mg/L | 5 | | 0.0072 | | 0.0045 | | 0.0016 | | 0.0018 | | <0.0005 | | 0.0007 |
| Phenols | µg/L | | <1 | 2 | <1 | <1 | <1 | 2 | <1 | <1 | <1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1,2-Trichlorethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1-Dichloroethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1-Dichloroethylene | µg/L | 14 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichlorpropane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichlorobenzene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichloropropene(E) | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Benzene | µg/L | 1 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromodichloromethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromoform | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromomethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Carbon Tetrachloride | µg/L | 5 * | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 |
| Chlorobenzene | µg/L | 30 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Chloroethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| Chloroform | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Chloromethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| cis-1,2-Dichloroethylene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Dibromochloromethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Dichloromethane | µg/L | 50 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Ethyl Benzene | µg/L | 1.6 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Ethylene dibromide | µg/L | | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 |
| m/p-Xylenes | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| o-Xylene | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Styrene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Tetrachloroethylene | µg/L | 30 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Toluene | µg/L | 24 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| trans-1,2-Dichloroethylene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Trichloroethylene | µg/L | 5 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Trichlorofluoromethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| Vinyl Chloride | µg/L | 1 * | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 |
| Xylenes - total | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 87-II | 87-III | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sep-22 | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Sep-21 | Mar-22 |
| Alkalinity | mg/L | 30-500 | 255 | 289 | 415 | 373 | 385 | 384 | 370 | 292 | 361 | 354 | 401 | 321 |
| Aluminum | mg/L | 0.1 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 |
| Ammonia (as N) | mg/L | | 0.3 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.2 | 0.2 |
| Anion sum | meq/L | | 6.29 | 6.41 | 9.28 | 8.54 | 8.88 | 8.51 | 8.63 | 6.11 | 8.29 | 7.59 | 8.97 | 6.64 |
| Arsenic | mg/L | 0.025 | 0.0006 | <0.0005 | <0.005 | <0.0005 | <0.005 | 0.0025 | <0.005 | <0.0005 | <0.0005 | <0.0005 | 0.0029 | <0.0005 |
| Barium | mg/L | 1 * | | 0.047 | | 0.111 | | 0.092 | | 0.066 | | 0.084 | | 0.07 |
| Beryllium | mg/L | | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Bicarbonate | mg/L | | 254 | 287 | 414 | 372 | 384 | 383 | 369 | 291 | 360 | 353 | 400 | 320 |
| Boron | mg/L | 5 * | | 0.0085 | | 0.0087 | | 0.0076 | | 0.0069 | | 0.0076 | | 0.0061 |
| Cadmium | mg/L | 0.005 * | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 |
| Calcium | mg/L | | 70.4 | 110 | 143 | 146 | 147 | 145 | 147 | 106 | 145 | 116 | 141 | 130 |
| Carbonate | mg/L | | 1 | 2 | <1 | <1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 |
| Cation sum | meq/L | | 6.30 | 6.55 | 9.21 | 9.36 | 9.42 | 9.31 | 9.5 | 6.55 | 9.29 | 7.28 | 9.05 | 7.83 |
| Chloride | mg/L | 250 | 10.6 | 22.3 | 20.6 | 20.8 | 24.6 | 18.8 | 20.8 | 9.3 | 21.6 | 13.5 | 25.5 | 10.1 |
| Chromium | mg/L | 0.05 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Cobalt | mg/L | | | <0.0001 | | <0.0001 | | 0.0008 | | <0.0005 | | <0.0005 | | <0.0005 |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | <10 | <10 | 30 | <10 | <10 | 30 | <10 | 20 | <10 | <10 |
| Conductivity | µS/cm | | 564 | 636 | 864 | 832 | 869 | 830 | 840 | 599 | 823 | 661 | 791 | 651 |
| Conductivity - field | µS/cm | | 589 | 634 | 879 | 814 | 855 | 839 | 840 | 652 | 831 | 725 | 842 | 657 |
| Copper | mg/L | 1 | | 0.0008 | | 0.0007 | | 0.0024 | | 0.0012 | | <0.0005 | | <0.0005 |
| Dissolved Organic Carbon | mg/L | 5 | 1.5 | 2.9 | 2.7 | 3.1 | 3 | 3.9 | 3.1 | 1.9 | 2.6 | 2.9 | 3.4 | 1.9 |
| Dissolved Oxygen - field | mg/L | | 1.25 | 7.5 | 1.73 | 2.3 | 1.79 | 2.32 | 1.41 | 3.16 | 1.85 | 2.39 | 0.43 | 3.44 |
| Hardness | mg/L | 80-100 | 295 | 309 | 444 | 453 | 453 | 447 | 457 | 311 | 443 | 347 | 428 | 372 |
| Ion Percentage | % | | 0.11 | 1.08 | 0.42 | 4.62 | 2.94 | 4.47 | 4.78 | 3.52 | 5.65 | 2.13 | 0.46 | 8.22 |
| Iron | mg/L | 0.3 | 0.407 | 0.002 | 0.08 | 0.003 | <0.05 | 3.16 | 0.07 | 0.005 | <0.005 | 0.142 | 0.856 | 0.065 |
| Lead | mg/L | 0.01 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Magnesium | mg/L | | 29.0 | 8.27 | 21.2 | 21.5 | 20.9 | 20.6 | 21.8 | 11.3 | 19.6 | 13.9 | 18.5 | 11.5 |
| Manganese | mg/L | 0.05 | 0.0192 | <0.0005 | 0.006 | 0.0043 | 0.016 | 0.126 | 0.073 | 0.0048 | 0.0054 | 0.0221 | 0.0632 | 0.0240 |
| Molybdenum | mg/L | | | <0.0005 | | 0.0008 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Nickel | mg/L | | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 |
| Nitrate | mg/L | 10.0 * | <0.05 | 0.06 | 2.5 | 1.89 | 2.52 | 1.5 | 1.04 | <0.5 | 1.6 | 0.8 | 0.7 | <0.5 |
| Nitrite | mg/L | 1.0* | 1.08 | <0.05 | <0.05 | <0.5 | 0.08 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | -72.7 | 28.2 | 109.5 | 113.6 | 50 | -47.9 | 27.1 | 79.4 | 35.7 | 65.5 | -121.1 | 29.1 |
| pH | units | | 7.63 | 7.84 | 7.36 | 7.3 | 7.28 | 7.32 | 7.31 | 7.62 | 7.32 | 7.34 | 7.26 | 7.42 |
| pH - field | units | | 7.34 | 7.4 | 6.99 | 6.99 | 7.32 | 7.13 | 7.03 | 7.17 | 7.34 | 7.11 | 6.98 | 7.05 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | 0.02 | 0.03 | 0.1 | <0.02 | <0.02 | <0.02 | <0.01 | 0.01 | 0.03 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.6 | 0.6 | 1 | 0.8 | 1.1 | 0.9 | 1.1 | 0.6 | 1.2 | 0.6 | 1.0 | <0.5 |
| Sodium | mg/L | 200 | 7.0 | 7.84 | 5.9 | 5.6 | 6.7 | 7.1 | 6.9 | 6.5 | 8.4 | 6.8 | 9.6 | 8.2 |
| Sulphate | mg/L | 500 | 47.1 | 9.1 | 23.9 | 28.8 | 26.6 | 21.3 | 39.2 | 9.5 | 28.2 | 14.8 | 21.2 | 7.0 |
| Total Dissolved Solids | mg/L | 500 | 360 | 380 | 550 | 480 | 530 | 470 | 520 | 330 | 530 | 420 | 530 | 380 |
| Temperature - field | °C | | 10.1 | 4.8 | 13.6 | 4.6 | 15.4 | 4.6 | 14.3 | 4.8 | 14.2 | 5.5 | 15.2 | 4.0 |
| Total Kjeldahl Nitrogen | mg/L | | 2.3 | <0.1 | 0.4 | <0.1 | <2.0 | 0.2 | 0.1 | 0.1 | <1.0 | 0.8 | 0.3 | 0.1 |
| Zinc | mg/L | 5 | | <0.0005 | | 0.0019 | | 0.0037 | | 0.0012 | | 0.0009 | | 0.0006 |
| Phenols | µg/L | | <1 | 1 | <1 | <1 | <1 | 2 | <1 | <1 | <1 | <1 | <1 | 2 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1,2-Trichlorethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1-Dichloroethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,1-Dichloroethylene | µg/L | 14 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,2-Dichlorpropane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichlorobenzene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichloropropene(E) | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Benzene | µg/L | 1 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromodichloromethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromoform | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Bromomethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Carbon Tetrachloride | µg/L | 5 * | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 |
| Chlorobenzene | µg/L | 30 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Chloroethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| Chloroform | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Chloromethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| cis-1,2-Dichloroethylene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Dibromochloromethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Dichloromethane | µg/L | 50 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Ethyl Benzene | µg/L | 1.6 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Ethylene dibromide | µg/L | | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 |
| m/p-Xylenes | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| o-Xylene | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Styrene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Tetrachloroethylene | µg/L | 30 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Toluene | µg/L | 24 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| trans-1,2-Dichloroethylene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Trichloroethylene | µg/L | 5 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |
| Trichlorofluoromethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 |
| Vinyl Chloride | µg/L | 1 * | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 |
| Xylenes - total | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 87-III | 88-I | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sep-22 | Apr-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Sep-21 | Mar-22 | Sep-22 |
| Alkalinity | mg/L | 30-500 | 398 | 208 | 219 | 221 | 237 | 208 | 205 | 210 | 198 | 211 | 205 | 210 |
| Aluminum | mg/L | 0.1 | | <0.025 | | <0.025 | | <0.025 | | 0.193 | | | <0.025 | |
| Ammonia (as N) | mg/L | | 0.2 | 0.3 | 0.2 | <0.1 | 0.2 | 0.3 | 0.1 | 0.3 | 0.2 | 0.4 | 0.1 | 0.2 |
| Anion sum | meq/L | | 8.80 | 4.4 | 4.59 | 4.63 | 4.96 | 4.39 | 4.34 | 4.5 | 4.24 | 4.49 | 4.40 | 4.55 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Barium | mg/L | 1 * | | 0.139 | | 0.142 | | 0.142 | | 0.157 | | | 0.152 | |
| Beryllium | mg/L | | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | | <0.0005 | |
| Bicarbonate | mg/L | | 397 | 206 | 217 | 219 | 235 | 206 | 204 | 209 | 196 | 209 | 203 | 209 |
| Boron | mg/L | 5 * | | 0.121 | | 0.117 | | 0.126 | | 0.113 | | | 0.0997 | |
| Cadmium | mg/L | 0.005 * | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | | <0.0001 | |
| Calcium | mg/L | | 144 | 40.6 | 38.5 | 39.4 | 39.7 | 41 | 40.8 | 42.2 | 39.9 | 42.2 | 45.3 | 40.6 |
| Carbonate | mg/L | | <1 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 1 |
| Cation sum | meq/L | | 9.29 | 4.72 | 4.58 | 4.67 | 4.66 | 4.82 | 4.94 | 4.63 | 4.63 | 4.85 | 5.33 | 4.92 |
| Chloride | mg/L | 250 | 16.7 | 2.5 | 2.4 | 2.5 | 2.7 | 2 | 2.9 | 3 | 3.2 | 2.6 | 2.7 | 3.7 |
| Chromium | mg/L | 0.05 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | | <0.0005 | |
| Cobalt | mg/L | | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | | <0.0005 | |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | <10 | 50 | <10 | <10 | 20 | <10 | <10 | <10 | <10 | <10 |
| Conductivity | µS/cm | | 699 | 430 | 433 | 418 | 428 | 436 | 430 | 435 | 435 | 436 | 440 | 443 |
| Conductivity - field | µS/cm | | 836 | 428 | 437 | 411 | 426 | 439 | 421 | 434 | 430 | 430 | 421 | 446 |
| Copper | mg/L | 1 | | <0.0005 | | <0.0005 | | <0.0005 | | 0.0013 | | | <0.0005 | |
| Dissolved Organic Carbon | mg/L | 5 | 2.4 | 1 | 1.5 | 1.8 | 1.1 | 1.4 | 4.1 | 2.3 | 1.2 | 1.4 | 1.9 | 1.2 |
| Dissolved Oxygen - field | mg/L | | 8.21 | 4.22 | 0.82 | 5.81 | 1.37 | 1.17 | 1.3 | 1.86 | 2.53 | 0.52 | 4.96 | 1.44 |
| Hardness | mg/L | 80-100 | 438 | 195 | 189 | 196 | 194 | 200 | 198 | 195 | 191 | 201 | 221 | 207 |
| Ion Percentage | % | | 2.68 | 3.48 | 0.06 | 0.46 | 3.1 | 4.68 | 6.45 | 1.42 | 4.47 | 3.90 | 9.62 | 3.97 |
| Iron | mg/L | 0.3 | 0.030 | 0.06 | 0.11 | 0.05 | <0.05 | 0.161 | 0.22 | 0.342 | 0.039 | 0.130 | 0.288 | 0.061 |
| Lead | mg/L | 0.01 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | | <0.0005 | |
| Magnesium | mg/L | | 19.0 | 22.8 | 22.6 | 23.6 | 23.1 | 23.6 | 23.3 | 21.7 | 22.3 | 23.2 | 26.2 | 25.7 |
| Manganese | mg/L | 0.05 | 0.0019 | 0.0023 | 0.008 | 0.0039 | 0.002 | 0.0095 | 0.01 | 0.0128 | 0.0025 | 0.0066 | 0.0100 | 0.0025 |
| Molybdenum | mg/L | | | <0.0005 | | <0.0005 | | 0.0007 | | <0.0005 | | | <0.0005 | |
| Nickel | mg/L | | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | | 0.003 | |
| Nitrate | mg/L | 10.0 * | 1.1 | 0.17 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | 78.8 | -75.9 | -123.6 | 18.2 | -20.1 | -103.8 | -66.1 | -9.5 | -31.4 | -1.3 | 135.3 | 5.3 |
| pH | units | | 7.26 | 8.06 | 7.92 | 7.97 | 7.84 | 8.05 | 7.84 | 7.84 | 7.94 | 7.99 | 8.02 | 7.83 |
| pH - field | units | | 7.04 | 7.8 | 7.58 | 7.72 | 7.62 | 7.67 | 7.78 | 7.8 | 7.96 | 7.68 | 7.77 | 7.52 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.01 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | <0.02 | 0.03 | <0.02 | <0.02 | <0.02 | <0.02 | 0.01 | 0.01 | <0.02 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.0 | 3 | 2.8 | 2.8 | 3 | 3 | 3.4 | 2.7 | 3.4 | 3.4 | 3.4 | 3.0 |
| Sodium | mg/L | 200 | 10.7 | 15.8 | 15.8 | 15.3 | 15.2 | 16.3 | 19.8 | 14.2 | 15.6 | 16.0 | 18.2 | 15.2 |
| Sulphate | mg/L | 500 | 26.8 | 14 | 13.6 | 13.7 | 14.4 | 15 | 14 | 16.8 | 15.2 | 16.1 | 17.1 | 18.3 |
| Total Dissolved Solids | mg/L | 500 | 510 | 260 | 240 | 230 | 230 | 240 | 250 | 250 | 260 | 190 | 210 | 250 |
| Temperature - field | °C | | 14.0 | 8.5 | 10.1 | 8.7 | 9.2 | 8.1 | 9.7 | 8.7 | 9.9 | 10.0 | 8.1 | 9.8 |
| Total Kjeldahl Nitrogen | mg/L | | 2.2 | <0.1 | 0.3 | <0.1 | <1.0 | 0.3 | 0.2 | <0.1 | <1.0 | 0.3 | <0.2 | 2.8 |
| Zinc | mg/L | 5 | | 0.0006 | | 0.0015 | | 0.0015 | | 0.0016 | | | <0.0005 | |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | | < 0.5 | |
| 1,1,2-Trichlorethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | | < 0.5 | |
| 1,1-Dichloroethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | | < 0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | | < 0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | | < 0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | | < 0.5 | |
| 1,2-Dichlorpropane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | | < 0.5 | |
| 1,3-Dichlorobenzene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | | < 0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | | < 0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | | < 0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | | < 0.5 | |
| Benzene | µg/L | 1 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | | < 0.5 | |
| Bromodichloromethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | | < 0.5 | |
| Bromoform | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | | < 0.5 | |
| Bromomethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | | < 0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | | < 0.2 | |
| Chlorobenzene | µg/L | 30 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | | < 0.5 | |
| Chloroethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | | < 5 | |
| Chloroform | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | | < 0.5 | |
| Chloromethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | | < 5 | |
| cis-1,2-Dichloroethylene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | | < 0.5 | |
| Dibromochloromethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | | < 0.5 | |
| Dichloromethane | µg/L | 50 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | | < 0.5 | |
| Ethyl Benzene | µg/L | 1.6 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | | < 0.5 | |
| Ethylene dibromide | µg/L | | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | | < 0.2 | |
| m/p-Xylenes | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | | < 0.5 | |
| o-Xylene | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | | < 0.5 | |
| Styrene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | | < 0.5 | |
| Tetrachloroethylene | µg/L | 30 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | | < 0.5 | |
| Toluene | µg/L | 24 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | | < 0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | | < 0.5 | |
| Trichloroethylene | µg/L | 5 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | | < 0.5 | |
| Trichlorofluoromethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | | < 5 | |
| Vinyl Chloride | µg/L | 1 * | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | | < 0.2 | |
| Xylenes - total | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | | < 0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 88-II | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Sep-21 | Mar-22 | Sep-22 |
| Alkalinity | mg/L | 30-500 | 208 | 223 | 228 | 227 | 225 | 226 | 237 | 231 | 245 | 251 | 238 | 246 |
| Aluminum | mg/L | 0.1 | <0.025 | | <0.025 | | <0.025 | | 0.11 | | <0.025 | | <0.025 | |
| Ammonia (as N) | mg/L | | 0.2 | 0.2 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 | 0.2 | 0.2 | 0.3 |
| Anion sum | meq/L | | 5.48 | 5.59 | 5.67 | 5.54 | 5.51 | 5.54 | 5.79 | 5.65 | 6.14 | 7.47 | 6.37 | 7.55 |
| Arsenic | mg/L | 0.025 | 0.0007 | <0.005 | 0.0008 | <0.005 | <0.0005 | <0.005 | 0.0009 | 0.0009 | 0.0007 | 0.0010 | 0.0009 | 0.0009 |
| Barium | mg/L | 1 * | 0.068 | | 0.07 | | 0.071 | | 0.078 | | 0.083 | | 0.082 | |
| Beryllium | mg/L | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Bicarbonate | mg/L | | 206 | 222 | 227 | 226 | 223 | 225 | 236 | 230 | 244 | 250 | 237 | 245 |
| Boron | mg/L | 5 * | 0.23 | | 0.289 | | 0.23 | | 0.198 | | 0.208 | | 0.2 | |
| Cadmium | mg/L | 0.005 * | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | |
| Calcium | mg/L | | 63.7 | 61.1 | 62.1 | 65.5 | 68.1 | 65.4 | 67.5 | 66.3 | 68.2 | 94.5 | 82.0 | 86.6 |
| Carbonate | mg/L | | 1 | 1 | <1 | <1 | 2 | 1 | <1 | 1 | 1 | 1 | <1 | <1 |
| Cation sum | meq/L | | 5.77 | 5.6 | 5.69 | 5.95 | 6.14 | 6.12 | 5.99 | 5.94 | 6.24 | 8.16 | 7.48 | 7.98 |
| Chloride | mg/L | 250 | 12.3 | 9.5 | 9.2 | 7.2 | 5.2 | 6.8 | 6.2 | 5.3 | 4.9 | 4.0 | 5.3 | 5.2 |
| Chromium | mg/L | 0.05 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Cobalt | mg/L | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | 40 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | 10 |
| Conductivity | µS/cm | | 532 | 529 | 530 | 540 | 551 | 543 | 549 | 565 | 582 | 685 | 625 | 707 |
| Conductivity - field | µS/cm | | 531 | 538 | 522 | 539 | 549 | 534 | 545 | 564 | 587 | 671 | 569 | 698 |
| Copper | mg/L | 1 | <0.0005 | | <0.0005 | | 0.0024 | | <0.0005 | | <0.0005 | | 0.0021 | |
| Dissolved Organic Carbon | mg/L | 5 | <1.0 | <1.0 | 1.8 | 1.2 | 4.1 | 3.7 | 2.2 | 1.2 | 1.4 | 1.8 | 1.5 | 1.4 |
| Dissolved Oxygen - field | mg/L | | 1.69 | 1.26 | 1.51 | 1.48 | 2.27 | 1.17 | 1.84 | 0.65 | 1.92 | <0.05 | 2.87 | 1.56 |
| Hardness | mg/L | 80-100 | 262 | 255 | 256 | 272 | 280 | 272 | 272 | 269 | 282 | 378 | 339 | 368 |
| Ion Percentage | % | | 2.59 | 0.09 | 0.23 | 3.62 | 5.42 | 4.93 | 1.66 | 2.52 | 0.83 | 4.45 | 8.02 | 2.76 |
| Iron | mg/L | 0.3 | 0.587 | 0.86 | 0.671 | 1.15 | 0.324 | 1.08 | 0.577 | 0.75 | 0.135 | 1.68 | 0.85 | 1.80 |
| Lead | mg/L | 0.01 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Magnesium | mg/L | | 25.1 | 24.8 | 24.6 | 26.3 | 26.7 | 26.4 | 25.2 | 25.1 | 27.1 | 34.5 | 32.5 | 36.8 |
| Manganese | mg/L | 0.05 | 0.0179 | 0.024 | 0.0187 | 0.019 | 0.0152 | 0.026 | 0.0236 | 0.0215 | 0.0128 | 0.0239 | 0.0237 | 0.0231 |
| Molybdenum | mg/L | | 0.001 | | 0.0012 | | 0.0011 | | 0.001 | | 0.001 | | 0.001 | |
| Nickel | mg/L | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | |
| Nitrate | mg/L | 10.0 * | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | -117.9 | -156.8 | -38 | -93.8 | -87 | -95.8 | -8.3 | -72.1 | -4.6 | -82.4 | 15.6 | -95.3 |
| pH | units | | 7.88 | 7.78 | 7.62 | 7.66 | 7.88 | 7.68 | 7.64 | 7.73 | 7.67 | 7.63 | 7.46 | 7.51 |
| pH - field | units | | 7.5 | 7.49 | 7.39 | 7.45 | 7.53 | 7.54 | 7.65 | 7.69 | 7.44 | 7.36 | 7.37 | 7.20 |
| Phosphate | mg/L | | <0.02 | <0.01 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | 0.03 | 0.02 | <0.02 | <0.02 | <0.02 | <0.01 | 0.01 | 0.01 | <0.02 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 2.5 | 2.4 | 2.5 | 2.5 | 2.6 | 3 | 2.5 | 2.9 | 2.7 | 3.3 | 3.3 | 2.9 |
| Sodium | mg/L | 200 | 9.6 | 9.2 | 10.7 | 9.4 | 10.1 | 13 | 10.1 | 10.3 | 11.5 | 10.7 | 13.2 | 11.2 |
| Sulphate | mg/L | 500 | 53.3 | 48.3 | 47.8 | 45.3 | 48.6 | 47.1 | 49.5 | 49.6 | 60.7 | 120 | 78 | 127 |
| Total Dissolved Solids | mg/L | 500 | 300 | 320 | 320 | 330 | 350 | 330 | 320 | 390 | 370 | 390 | 370 | 490 |
| Temperature - field | °C | | 8.2 | 10.7 | 8.5 | 10 | 7.1 | 9.6 | 8.4 | 9.3 | 8.8 | 10.7 | 7.3 | 10.4 |
| Total Kjeldahl Nitrogen | mg/L | | 0.1 | <0.1 | <0.1 | <1.0 | <0.1 | <0.1 | <0.1 | <1.0 | <0.5 | 0.1 | <0.2 | 2.9 |
| Zinc | mg/L | 5 | 0.0006 | | 0.001 | | 0.0028 | | 0.0014 | | <0.0005 | | 0.0016 | |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1,2-Trichlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorpropane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichlorobenzene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Benzene | µg/L | 1 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromodichloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromoform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromomethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Chlorobenzene | µg/L | 30 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloroethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Chloroform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| cis-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dibromochloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dichloromethane | µg/L | 50 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethyl Benzene | µg/L | 1.6 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethylene dibromide | µg/L | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| m/p-Xylenes | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| o-Xylene | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Styrene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Tetrachloroethylene | µg/L | 30 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Toluene | µg/L | 24 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichloroethylene | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichlorofluoromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Vinyl Chloride | µg/L | 1 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Xylenes - total | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 88-III | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Sep-21 | Mar-22 | Sep-22 |
| Alkalinity | mg/L | 30-500 | 218 | 228 | 230 | 221 | 230 | 218 | 224 | 218 | 229 | 240 | 226 | 235 |
| Aluminum | mg/L | 0.1 | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | |
| Ammonia (as N) | mg/L | | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.2 | 0.3 |
| Anion sum | meq/L | | 6.02 | 5.89 | 5.91 | 5.76 | 6.45 | 5.64 | 5.82 | 5.6 | 5.95 | 6.83 | 5.88 | 6.49 |
| Arsenic | mg/L | 0.025 | 0.0008 | <0.005 | 0.0011 | <0.005 | 0.0006 | <0.005 | 0.0008 | 0.001 | 0.0008 | 0.0010 | 0.0010 | 0.0013 |
| Barium | mg/L | 1 * | 0.069 | | 0.07 | | 0.075 | | 0.052 | | 0.058 | | 0.045 | |
| Beryllium | mg/L | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Bicarbonate | mg/L | | 216 | 226 | 229 | 220 | 228 | 217 | 223 | 217 | 228 | 239 | 225 | 234 |
| Boron | mg/L | 5 * | 0.069 | | 0.0313 | | 0.0579 | | 0.0357 | | 0.0221 | | 0.0291 | |
| Cadmium | mg/L | 0.005 * | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | |
| Calcium | mg/L | | 65.2 | 63.1 | 63.3 | 63.9 | 69.4 | 64.2 | 65.3 | 64 | 65.6 | 73.2 | 73.9 | 72.3 |
| Carbonate | mg/L | | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | <1 | <1 |
| Cation sum | meq/L | | 6.22 | 5.99 | 6.09 | 6.14 | 6.96 | 6.13 | 5.95 | 5.88 | 6.15 | 6.91 | 6.75 | 6.78 |
| Chloride | mg/L | 250 | 10 | 10.9 | 10.9 | 8.6 | 4.2 | 7.7 | 7 | 5.9 | 4.9 | 2.8 | 5.2 | 5.5 |
| Chromium | mg/L | 0.05 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Cobalt | mg/L | | <0.0001 | | 0.0002 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Chemical Oxygen Demand | mg/L | | <10 | 20 | 20 | <10 | <10 | 10 | 20 | <10 | 50 | <10 | <10 | <10 |
| Conductivity | µS/cm | | 567 | 549 | 542 | 559 | 614 | 543 | 547 | 555 | 563 | 643 | 571 | 610 |
| Conductivity - field | µS/cm | | 565 | 557 | 539 | 554 | 609 | 519 | 546 | 550 | 570 | 629 | 544 | 602 |
| Copper | mg/L | 1 | 0.0018 | | <0.0005 | | 0.0026 | | 0.0007 | | 0.0005 | | 0.001 | |
| Dissolved Organic Carbon | mg/L | 5 | <1.0 | <1.0 | 1.8 | 1.4 | 2.7 | 1.4 | 2.2 | 1.2 | 19.9 | 1.7 | 1.0 | 1.4 |
| Dissolved Oxygen - field | mg/L | | 1.43 | 1.68 | 1.7 | 2.44 | 4.73 | 2.02 | 1.59 | 1.16 | 0.98 | 1.24 | 4.56 | 2.91 |
| Hardness | mg/L | 80-100 | 289 | 282 | 288 | 287 | 323 | 288 | 281 | 275 | 290 | 322 | 318 | 320 |
| Ion Percentage | % | | 1.56 | 0.86 | 1.54 | 3.22 | 3.81 | 4.18 | 1.12 | 2.46 | 1.69 | 0.60 | 6.95 | 2.17 |
| Iron | mg/L | 0.3 | 0.034 | 0.12 | 0.034 | <0.05 | 0.008 | <0.05 | 0.008 | 0.027 | 0.009 | 0.018 | 0.020 | 0.086 |
| Lead | mg/L | 0.01 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Magnesium | mg/L | | 30.6 | 30.3 | 31.5 | 30.9 | 36.3 | 31 | 28.6 | 28 | 30.7 | 33.9 | 32.5 | 33.8 |
| Manganese | mg/L | 0.05 | 0.023 | 0.009 | 0.0101 | 0.013 | 0.0011 | 0.009 | 0.0105 | 0.0114 | 0.0181 | 0.0013 | 0.0198 | 0.0182 |
| Molybdenum | mg/L | | 0.0009 | | 0.0007 | | 0.0009 | | 0.0006 | | 0.0006 | | 0.0005 | |
| Nickel | mg/L | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | |
| Nitrate | mg/L | 10.0 * | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | -42.6 | -89 | 8.3 | 22.1 | 58.1 | -8.3 | 52.5 | -13.7 | 37.2 | 38.7 | 101.8 | -9.2 |
| pH | units | | 7.89 | 7.84 | 7.69 | 7.7 | 7.89 | 7.71 | 7.69 | 7.8 | 7.72 | 7.75 | 7.65 | 7.61 |
| pH - field | units | | 7.49 | 7.52 | 7.43 | 7.52 | 7.59 | 7.57 | 7.56 | 7.73 | 7.41 | 7.50 | 7.48 | 7.33 |
| Phosphate | mg/L | | <0.02 | <0.01 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | 0.02 | 0.03 | <0.02 | <0.02 | <0.02 | <0.02 | 0.01 | 0.04 | 0.02 | <0.02 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 2.7 | 2.5 | 2.4 | 2.8 | 2.4 | 2.7 | 2.3 | 2.8 | 2.5 | 3.0 | 2.6 | 2.7 |
| Sodium | mg/L | 200 | 7.4 | 5.3 | 5.4 | 6.8 | 9.1 | 6.1 | 5.4 | 6.1 | 5.6 | 7.8 | 6.2 | 5.9 |
| Sulphate | mg/L | 500 | 73.2 | 56.1 | 55.3 | 59.7 | 90.3 | 58 | 61.8 | 58.5 | 66.3 | 101 | 65 | 86 |
| Total Dissolved Solids | mg/L | 500 | 340 | 340 | 330 | 340 | 380 | 350 | 330 | 320 | 380 | 420 | 350 | 410 |
| Temperature - field | °C | | 6.2 | 11.6 | 6.6 | 11.6 | 5.6 | 11.3 | 6.6 | 12 | 6.8 | 12.6 | 5.8 | 12.4 |
| Total Kjeldahl Nitrogen | mg/L | | 0.1 | <0.1 | <0.1 | <1.0 | 0.1 | <0.1 | <0.1 | <1.0 | <0.5 | 0.1 | <0.2 | 3.1 |
| Zinc | mg/L | 5 | 0.0014 | | 0.0017 | | 0.003 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | 2 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1,2-Trichlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorpropane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichlorobenzene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Benzene | µg/L | 1 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromodichloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromoform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromomethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Chlorobenzene | µg/L | 30 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloroethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Chloroform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| cis-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dibromochloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dichloromethane | µg/L | 50 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethyl Benzene | µg/L | 1.6 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethylene dibromide | µg/L | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| m/p-Xylenes | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| o-Xylene | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Styrene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Tetrachloroethylene | µg/L | 30 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Toluene | µg/L | 24 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichloroethylene | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichlorofluoromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Vinyl Chloride | µg/L | 1 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Xylenes - total | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 89-I | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-17 | Sep-17 | Apr-18 | Sep-18 | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Oct-21 | Mar-22 | Sep-22 |
| Alkalinity | mg/L | 30-500 | 310 | 297 | 370 | 298 | 298 | 294 | 283 | 277 | 297 | 296 | 289 | 299 |
| Aluminum | mg/L | 0.1 | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | |
| Ammonia (as N) | mg/L | | 1.6 | 0.8 | 1.2 | 1 | 0.9 | 0.9 | 1.2 | 1.2 | 1.1 | 1.3 | 1.1 | 1.1 |
| Anion sum | meq/L | | 22 | 13.2 | 16.2 | 13.2 | 14.3 | 13.2 | 13.3 | 14.7 | 12.9 | 13.3 | 12.1 | 12.4 |
| Arsenic | mg/L | 0.025 | 0.0033 | <0.005 | 0.0025 | <0.005 | 0.0021 | 0.006 | 0.002 | 0.0022 | 0.0019 | 0.0022 | 0.0019 | 0.0015 |
| Barium | mg/L | 1 * | 0.139 | | 0.1 | | 0.085 | | 0.083 | | 0.079 | | 0.077 | |
| Beryllium | mg/L | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Bicarbonate | mg/L | | 308 | 295 | 367 | 296 | 295 | 292 | 281 | 275 | 294 | 293 | 288 | 297 |
| Boron | mg/L | 5 * | 0.88 | | 0.84 | | 0.88 | | 0.82 | | 0.803 | | 0.983 | |
| Cadmium | mg/L | 0.005 * | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | |
| Calcium | mg/L | | 32.2 | 21.1 | 29.7 | 21.1 | 25.5 | 21.3 | 22.2 | 22.3 | 20.0 | 21.7 | 21.2 | 21.0 |
| Carbonate | mg/L | | 2 | 2 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 3 | 1 | 2 |
| Cation sum | meq/L | | 19.1 | 13.1 | 14.7 | 13.5 | 15.5 | 12.7 | 13.4 | 13 | 12.3 | 11.4 | 12.6 | 12.9 |
| Chloride | mg/L | 250 | 566 | 261 | 321 | 261 | 304 | 267 | 274 | 249 | 254 | 267 | 229 | 234 |
| Chromium | mg/L | 0.05 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Cobalt | mg/L | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Chemical Oxygen Demand | mg/L | | <10 | 80 | 50 | 60 | 40 | 40 | 40 | 20 | 50 | 40 | 30 | 40 |
| Conductivity | µS/cm | | 2120 | 1430 | 1670 | 1470 | 1660 | 1440 | 1410 | 1390 | 1400 | 1410 | 1380 | 1340 |
| Conductivity - field | µS/cm | | 1760 | 1510 | 2130 | 1620 | 2170 | 1470 | 1400 | 1430 | 1460 | 1440 | 1360 | 1360 |
| Copper | mg/L | 1 | <0.0005 | | <0.0005 | | <0.0005 | | 0.0006 | | <0.0005 | | <0.0005 | |
| Dissolved Organic Carbon | mg/L | 5 | 2 | 14 | 6.3 | 12.1 | 10.8 | 11.4 | 9.3 | 10.8 | 9.6 | 9.1 | 7.0 | 6.0 |
| Dissolved Oxygen - field | mg/L | | 1.69 | 0.95 | 0.95 | 0.68 | 1.96 | 1.89 | 1.29 | 0.7 | 0.92 | 1.42 | 1.09 | 1.23 |
| Hardness | mg/L | 80-100 | 167 | 98.4 | 139 | 103 | 128 | 104 | 108 | 108 | 97.3 | 104 | 102 | 107 |
| Ion Percentage | % | | 7.03 | 0.28 | 4.97 | 1.3 | 3.92 | 2.02 | 0.41 | 6.06 | 2.71 | 7.37 | 1.90 | 2.15 |
| Iron | mg/L | 0.3 | 0.605 | 0.11 | 0.179 | 0.36 | 0.069 | 0.19 | 0.036 | 0.241 | 0.253 | 0.234 | 0.167 | 0.108 |
| Lead | mg/L | 0.01 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Magnesium | mg/L | | 21.1 | 11.1 | 15.7 | 12.1 | 15.5 | 12.3 | 12.7 | 12.7 | 11.5 | 12.1 | 12.0 | 13.3 |
| Manganese | mg/L | 0.05 | 0.0127 | 0.01 | 0.0118 | 0.011 | 0.0119 | 0.011 | 0.0118 | 0.0105 | 0.0091 | 0.0099 | 0.0086 | 0.0079 |
| Molybdenum | mg/L | | 0.0052 | | 0.004 | | 0.003 | | 0.0025 | | 0.0027 | | 0.0027 | |
| Nickel | mg/L | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | |
| Nitrate | mg/L | 10.0 * | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 |
| Nitrite | mg/L | 1.0* | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 |
| Oxydation Reduction Potential | mV | | -14 | -208.1 | -147.7 | -160.8 | -52.9 | -160.1 | -50 | -115 | -140.5 | -167.6 | -116.2 | -123.6 |
| pH | units | | 7.9 | 7.94 | 7.93 | 7.82 | 7.96 | 7.91 | 7.81 | 7.9 | 8.04 | 8.00 | 7.71 | 7.80 |
| pH - field | units | | 7.58 | 7.62 | 7.59 | 7.9 | 7.59 | 8.04 | 7.76 | 7.93 | 7.80 | 7.59 | 7.74 | 7.58 |
| Phosphate | mg/L | | <0.02 | 0.01 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | 0.03 | 0.05 | 0.03 | 0.16 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.05 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 9.9 | 6.8 | 7.7 | 7.6 | 8.4 | 7 | 7.7 | 7.8 | 7.1 | 6.8 | 7.4 | 7.1 |
| Sodium | mg/L | 200 | 353 | 250 | 267 | 257 | 291 | 239 | 251 | 243 | 231 | 209 | 235 | 242 |
| Sulphate | mg/L | 500 | 1.4 | 2.8 | 1.1 | 1.9 | <2 | 2 | 3 | 112 | 2.2 | 1.1 | 1.8 | 1.0 |
| Total Dissolved Solids | mg/L | 500 | 1090 | 790 | 870 | 770 | 890 | 790 | 770 | 760 | 440 | 750 | 700 | 790 |
| Temperature - field | °C | | 9.7 | 12.8 | 7.5 | 9.2 | 6 | 11 | 6.8 | 11 | 7.8 | 10.5 | 7.3 | 10.9 |
| Total Kjeldahl Nitrogen | mg/L | | 1.7 | 0.8 | 2.1 | 0.9 | 1.1 | <1 | 1.2 | 1.1 | 1.1 | 1.3 | 1.3 | 3.4 |
| Zinc | mg/L | 5 | 0.0009 | | 0.0019 | | 0.001 | | 0.0034 | | 0.0009 | | <0.0005 | |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | 1 | <1 | 48 | <1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1,2-Trichlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorpropane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichlorobenzene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Benzene | µg/L | 1 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromodichloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromoform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromomethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Chlorobenzene | µg/L | 30 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloroethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Chloroform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| cis-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dibromochloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dichloromethane | µg/L | 50 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethyl Benzene | µg/L | 1.6 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethylene dibromide | µg/L | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| m/p-Xylenes | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| o-Xylene | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Styrene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Tetrachloroethylene | µg/L | 30 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Toluene | µg/L | 24 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichloroethylene | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichlorofluoromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Vinyl Chloride | µg/L | 1 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Xylenes - total | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 89-II | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-17 | Sep-17 | Apr-18 | Sep-18 | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Oct-21 | Mar-22 | Sep-22 |
| Alkalinity | mg/L | 30-500 | 103 | 107 | 105 | 102 | 97.5 | 101 | 99.6 | 97 | 103 | 103 | 101 | 100 |
| Aluminum | mg/L | 0.1 | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | 0 | |
| Ammonia (as N) | mg/L | | 0.2 | 0.2 | 0.1 | 0.2 | <0.1 | 0.1 | <0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 |
| Anion sum | meq/L | | 2.28 | 2.31 | 2.26 | 2.21 | 2.08 | 2.19 | 2.18 | 2.11 | 2.21 | 2.21 | 2.17 | 2.18 |
| Arsenic | mg/L | 0.025 | 0.0024 | <0.005 | 0.0022 | <0.005 | 0.0024 | <0.005 | 0.0027 | 0.0024 | 0.0022 | 0.0025 | 0.0022 | 0.0024 |
| Barium | mg/L | 1 * | 0.04 | | 0.038 | | 0.039 | | 0.043 | | 0.042 | | 0.041 | |
| Beryllium | mg/L | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Bicarbonate | mg/L | | 102 | 106 | 104 | 101 | 96 | 100 | 98 | 96 | 102 | 101 | 100 | 99 |
| Boron | mg/L | 5 * | 0.116 | | 0.1 | | 0.106 | | 0.0866 | | 0.104 | | 0.106 | |
| Cadmium | mg/L | 0.005 * | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | |
| Calcium | mg/L | | 8.4 | 8.9 | 10.3 | 8.8 | 8.7 | 8.4 | 8.8 | 9.1 | 8.6 | 8.9 | 9.0 | 8.5 |
| Carbonate | mg/L | | <1 | 1 | <1 | <1 | 1 | 1 | 1 | 1 | 1 | 2 | <1 | 1 |
| Cation sum | meq/L | | 2.38 | 2.33 | 2.45 | 2.39 | 2.34 | 2.24 | 2.36 | 2.41 | 2.28 | 2.13 | 2.34 | 2.40 |
| Chloride | mg/L | 250 | 9.9 | 8 | 8.1 | 8.4 | 7 | 8 | 8 | 7.7 | 7.8 | 7.8 | 7.7 | 8.5 |
| Chromium | mg/L | 0.05 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Cobalt | mg/L | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Chemical Oxygen Demand | mg/L | | <10 | 40 | 30 | 20 | <10 | <10 | 10 | <10 | <10 | <10 | <10 | <10 |
| Conductivity | µS/cm | | 232 | 229 | 229 | 229 | 228 | 227 | 226 | 227 | 225 | 227 | 229 | 224 |
| Conductivity - field | µS/cm | | 232 | 233 | 224 | 254 | 232 | 231 | 233 | 223 | 234 | 234 | 224 | 232 |
| Copper | mg/L | 1 | 0.0006 | | <0.0005 | | <0.0005 | | 0.0006 | | <0.0005 | | <0.0005 | |
| Dissolved Organic Carbon | mg/L | 5 | 2.3 | 3.4 | 2.2 | 2.7 | 2.7 | 3.6 | 3.5 | 3.1 | 3.2 | 2.1 | 1.0 | 1.4 |
| Dissolved Oxygen - field | mg/L | | 1.72 | 1.19 | 2.92 | 1.09 | 3.6 | 1.92 | 2.01 | 0.6 | 1.80 | 1.78 | 3.12 | 1.25 |
| Hardness | mg/L | 80-100 | 39.1 | 39.2 | 42.3 | 39.4 | 39.1 | 37.7 | 38.9 | 39.4 | 37.5 | 38.4 | 38.2 | 38.5 |
| Ion Percentage | % | | 1.97 | 0.34 | 4.02 | 3.98 | 5.78 | 1.06 | 4.09 | 6.63 | 1.40 | 1.97 | 3.85 | 4.84 |
| Iron | mg/L | 0.3 | 0.009 | 0.05 | 0.007 | 0.05 | 0.005 | 0.07 | 0.019 | 0.103 | <0.005 | 0.065 | 0.024 | 0.038 |
| Lead | mg/L | 0.01 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Magnesium | mg/L | | 4.41 | 4.13 | 4.02 | 4.22 | 4.22 | 4.05 | 4.11 | 4.06 | 3.90 | 3.94 | 3.83 | 4.17 |
| Manganese | mg/L | 0.05 | 0.0006 | 0.003 | <0.0005 | 0.002 | <0.0005 | 0.003 | 0.008 | 0.003 | <0.0005 | 0.0027 | <0.0005 | 0.0018 |
| Molybdenum | mg/L | | 0.0037 | | 0.0035 | | 0.0033 | | 0.0039 | | 0.0035 | | 0.0032 | |
| Nickel | mg/L | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | |
| Nitrate | mg/L | 10.0 * | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 |
| Nitrite | mg/L | 1.0* | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 |
| Oxydation Reduction Potential | mV | | 5.4 | -171.3 | -34.9 | -146.1 | 53.1 | -156 | 7.1 | -53 | -16.3 | -162.7 | 28.0 | -114.7 |
| pH | units | | 8.01 | 8.15 | 7.96 | 8.01 | 8.06 | 8.16 | 8.08 | 8.12 | 8.11 | 8.21 | 7.83 | 8.13 |
| pH - field | units | | 7.87 | 8.01 | 7.9 | 8.48 | 8.23 | 8.43 | 8.23 | 8.39 | 8.07 | 8.05 | 8.06 | 8.05 |
| Phosphate | mg/L | | <0.02 | <0.01 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | 0.02 | 0.02 | <0.02 | <0.02 | 0.02 | <0.02 | 0.01 | 0.03 | 0.02 | <0.02 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 0.6 | <0.5 | <0.5 | <0.5 | <0.5 |
| Sodium | mg/L | 200 | 36.2 | 35.1 | 36.6 | 36.5 | 35.7 | 33.9 | 35.8 | 36.6 | 34.8 | 30.8 | 35.9 | 37.2 |
| Sulphate | mg/L | 500 | 0.6 | 0.9 | <2.0 | <2 | <2 | 0.6 | 1.1 | 0.7 | <2 | <0.2 | <0.2 | 0.4 |
| Total Dissolved Solids | mg/L | 500 | 180 | 150 | 150 | 140 | 140 | 140 | 110 | 140 | 110 | 150 | 80 | 210 |
| Temperature - field | °C | | 8.3 | 12.4 | 6.7 | 8.8 | 6.8 | 10.6 | 6.7 | 10.1 | 7.3 | 9.7 | 7.3 | 10.0 |
| Total Kjeldahl Nitrogen | mg/L | | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <1.0 | <0.1 | 0.2 | <0.1 | 2.5 |
| Zinc | mg/L | 5 | 0.0012 | | 0.0016 | | 0.0017 | | 0.0028 | | 0.0006 | | 0.0016 | |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | 2 | <1 | 2 | <1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1,2-Trichlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorpropane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichlorobenzene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Benzene | µg/L | 1 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromodichloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromoform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromomethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Chlorobenzene | µg/L | 30 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloroethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Chloroform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| cis-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dibromochloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dichloromethane | µg/L | 50 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethyl Benzene | µg/L | 1.6 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethylene dibromide | µg/L | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| m/p-Xylenes | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| o-Xylene | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Styrene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Tetrachloroethylene | µg/L | 30 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Toluene | µg/L | 24 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichloroethylene | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichlorofluoromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Vinyl Chloride | µg/L | 1 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Xylenes - total | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 89-III | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-17 | Sep-17 | Apr-18 | Sep-18 | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Oct-21 | Mar-22 | Sep-22 |
| Alkalinity | mg/L | 30-500 | 314 | 320 | 273 | 287 | 291 | 274 | 232 | 232 | 285 | 361 | 294 | 282 |
| Aluminum | mg/L | 0.1 | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | |
| Ammonia (as N) | mg/L | | 0.1 | 0.1 | 0.1 | 0.1 | <0.1 | <0.1 | <0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 |
| Anion sum | meq/L | | 6.85 | 6.91 | 5.84 | 6.22 | 6.23 | 5.93 | 5.09 | 5.13 | 6.20 | 7.91 | 6.49 | 6.56 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Barium | mg/L | 1 * | 0.04 | | 0.031 | | 0.043 | | 0.025 | | 0.038 | | 0.032 | |
| Beryllium | mg/L | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Bicarbonate | mg/L | | 313 | 319 | 272 | 286 | 290 | 273 | 231 | 231 | 284 | 360 | 294 | 281 |
| Boron | mg/L | 5 * | 0.0167 | | 0.0107 | | 0.0146 | | 0.0061 | | 0.0105 | | 0.0082 | |
| Cadmium | mg/L | 0.005 * | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | |
| Calcium | mg/L | | 137 | 129 | 107 | 116 | 121 | 106 | 100 | 111 | 117 | 150 | 126 | 118 |
| Carbonate | mg/L | | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 |
| Cation sum | meq/L | | 7.44 | 7.1 | 5.9 | 6.64 | 6.85 | 5.98 | 5.43 | 6.2 | 6.49 | 8.23 | 6.80 | 6.76 |
| Chloride | mg/L | 250 | 9.2 | 6.2 | 6.9 | 7 | 6.6 | 5.1 | 4.6 | 5.3 | 6.1 | 6.6 | 7.2 | 7.7 |
| Chromium | mg/L | 0.05 * | <0.0005 | | <0.0005 | | 0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Cobalt | mg/L | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | 20 | 10 | <10 | <10 | 30 | <10 | <10 | <10 | <10 | <10 |
| Conductivity | µS/cm | | 648 | 645 | 543 | 609 | 631 | 582 | 503 | 553 | 596 | 738 | 567 | 649 |
| Conductivity - field | µS/cm | | 657 | 654 | 543 | 601 | 612 | 581 | 530 | 546 | 608 | 713 | 616 | 651 |
| Copper | mg/L | 1 | <0.0005 | | 0.0006 | | 0.0034 | | 0.0016 | | 0.0019 | | 0.0007 | |
| Dissolved Organic Carbon | mg/L | 5 | 2 | 2.1 | 1.9 | 1.3 | 4.2 | 4.1 | 2.8 | 1.8 | 3.2 | 2.3 | 1.6 | 1.8 |
| Dissolved Oxygen - field | mg/L | | 8.98 | 5.1 | 8.63 | 5.76 | 8.24 | 5.38 | 7.74 | 5.7 | 5.97 | 9.10 | 4.51 | 5.81 |
| Hardness | mg/L | 80-100 | 361 | 346 | 284 | 322 | 333 | 290 | 264 | 301 | 316 | 400 | 330 | 328 |
| Ion Percentage | % | | 4.13 | 1.39 | 0.53 | 3.25 | 4.69 | 0.44 | 3.29 | 9.4 | 2.29 | 1.98 | 2.33 | 1.51 |
| Iron | mg/L | 0.3 | <0.001 | <0.05 | 0.005 | <0.05 | 0.004 | <0.05 | <0.005 | <0.005 | 0.008 | <0.005 | 0.005 | 0.008 |
| Lead | mg/L | 0.01 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Magnesium | mg/L | | 4.68 | 5.69 | 3.98 | 7.77 | 7.5 | 6.25 | 3.47 | 5.67 | 5.70 | 6.06 | 3.80 | 7.94 |
| Manganese | mg/L | 0.05 | <0.0005 | <0.001 | <0.0005 | <0.001 | <0.0005 | <0.001 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Molybdenum | mg/L | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Nickel | mg/L | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | |
| Nitrate | mg/L | 10.0 * | 0.39 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 0.6 | 0.7 | 0.8 | 1.4 | 3.6 | 6.3 |
| Nitrite | mg/L | 1.0* | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 |
| Oxydation Reduction Potential | mV | | 73.4 | 43.8 | 86.8 | 24.3 | 101.3 | 49.5 | 82.6 | 171.3 | 64.3 | 73 | 146 | 90 |
| pH | units | | 7.31 | 7.64 | 7.57 | 7.49 | 7.5 | 7.55 | 7.47 | 7.52 | 7.61 | 7.25 | 7.14 | 7.30 |
| pH - field | units | | 7.03 | 7.03 | 7.03 | 7.32 | 7.16 | 7.36 | 7.3 | 7.49 | 7.20 | 6.88 | 7.08 | 7.15 |
| Phosphate | mg/L | | <0.02 | <0.01 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.01 | 0.02 | <0.01 | <0.02 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 0.5 | 0.7 | <0.5 | 0.7 | 0.8 | 0.6 | <0.5 | 0.7 | 0.6 | 0.6 | <0.5 | 0.7 |
| Sodium | mg/L | 200 | 4.2 | 3.5 | 4.8 | 3.9 | 3.5 | 3.4 | 3 | 3.4 | 3.3 | 4.4 | 3.8 | 3.8 |
| Sulphate | mg/L | 500 | 23.6 | 26 | 17.3 | 22.8 | 20.1 | 23.4 | 20.5 | 21.3 | 22.0 | 30.6 | 16.3 | 20.9 |
| Total Dissolved Solids | mg/L | 500 | 420 | 380 | 330 | 360 | 360 | 350 | 290 | 330 | 230 | 440 | 350 | 440 |
| Temperature - field | °C | | 6.2 | 11.3 | 5 | 9.6 | 6.8 | 10 | 3.9 | 9 | 6.6 | 11.7 | 5.3 | 9.2 |
| Total Kjeldahl Nitrogen | mg/L | | <0.1 | 0.2 | <0.1 | <0.1 | <0.1 | 0.2 | <0.1 | <1.0 | <0.5 | <2.0 | <0.5 | 2.7 |
| Zinc | mg/L | 5 | <0.0005 | | 0.0018 | | 0.0044 | | <0.0005 | | 0.0008 | | <0.0005 | |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1,2-Trichlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorpropane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichlorobenzene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Benzene | µg/L | 1 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromodichloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromoform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromomethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Chlorobenzene | µg/L | 30 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloroethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Chloroform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| cis-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dibromochloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dichloromethane | µg/L | 50 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethyl Benzene | µg/L | 1.6 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethylene dibromide | µg/L | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| m/p-Xylenes | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| o-Xylene | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Styrene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Tetrachloroethylene | µg/L | 30 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Toluene | µg/L | 24 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichloroethylene | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichlorofluoromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Vinyl Chloride | µg/L | 1 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Xylenes - total | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 90-I | | | | | | | | | 90-II | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-11 | Sep-11 | Apr-12 | Sep-12 | Mar-13 | Sep-13 | Mar-14 | Sep-14 | Mar-15 | Mar-11 | Sep-11 | Apr-12 |
| Alkalinity | mg/L | 30-500 | 140 | 132 | 131 | 119 | 127 | 118 | 118 | 117 | 119 | 177 | 157 | 167 |
| Aluminum | mg/L | 0.1 | <0.02 | | <0.02 | | <0.02 | | <0.02 | | <0.025 | 0.12 | | <0.02 |
| Ammonia (as N) | mg/L | | 0.3 | <0.1 | <0.1 | 0.2 | 0.2 | 0.1 | <0.1 | 0.1 | <0.1 | 0.8 | <0.1 | <0.1 |
| Anion sum | meq/L | | 2.99 | 2.88 | 2.89 | 2.75 | 2.94 | 2.82 | 2.91 | 2.86 | 2.95 | 3.77 | 3.36 | 3.51 |
| Arsenic | mg/L | 0.025 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.0022 | <0.01 | <0.01 | <0.01 |
| Barium | mg/L | 1 * | 0.08 | | 0.041 | | 0.033 | | 0.045 | | 0.032 | 0.122 | | 0.121 |
| Beryllium | mg/L | | <0.001 | | <0.001 | | <0.001 | | <0.001 | | <0.0001 | <0.001 | | <0.001 |
| Bicarbonate | mg/L | | 138 | 131 | 130 | 118 | 126 | 117 | 117 | 116 | 118 | 174 | 156 | 166 |
| Boron | mg/L | 5 * | 0.19 | | 0.21 | | 0.18 | | 0.2 | | 0.164 | 0.06 | | 0.07 |
| Cadmium | mg/L | 0.005 * | <0.001 | | <0.0003 | | <0.001 | | <0.001 | | <0.0001 | <0.001 | | <0.0003 |
| Calcium | mg/L | | 13.1 | 14.9 | 15.8 | 14.7 | 14.6 | 14.3 | 13.6 | 12.7 | 12.4 | 20.6 | 18.9 | 18.8 |
| Carbonate | mg/L | | 2 | <1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 | 2 | 1 | 1 |
| Cation sum | meq/L | | 2.46 | 2.73 | 2.87 | 2.96 | 2.95 | 3.1 | 2.89 | 2.95 | 2.8 | 3.53 | 3.63 | 3.63 |
| Chloride | mg/L | 250 | 1.1 | 1.6 | 1.7 | 1.8 | 2.5 | 3 | 2.7 | 3.2 | 3.4 | 0.6 | 0.7 | 0.6 |
| Chromium | mg/L | 0.05 * | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.0005 | <0.002 | | <0.002 |
| Cobalt | mg/L | | | | | | <0.002 | | <0.002 | | <0.0001 | | | |
| Chemical Oxygen Demand | mg/L | | <20 | <20 | <20 | <20 | 30 | 40 | 20 | 10 | 30 | <20 | <20 | <20 |
| Conductivity | µS/cm | | 274 | 288 | 293 | 293 | 297 | 299 | 290 | 301 | 303 | 335 | 339 | 345 |
| Conductivity - field | µS/cm | | 273 | 280 | 256 | 273 | 276 | 294 | 297 | 268 | 298 | 333 | 340 | 303 |
| Copper | mg/L | 1 | <0.005 | | <0.005 | | <0.005 | | <0.005 | | <0.0005 | <0.005 | | <0.005 |
| Dissolved Organic Carbon | mg/L | 5 | 2.6 | 1.2 | 1.6 | 1.6 | 4.5 | 5 | 4.3 | 4.6 | 9.6 | 2.8 | <1.0 | 1.3 |
| Dissolved Oxygen - field | mg/L | | | | 3.5 | 6.1 | 5.48 | 4.09 | 1.79 | 1.75 | 2.1 | | | 7.4 |
| Hardness | mg/L | 80-100 | 62.8 | 67.5 | 69.9 | 68.1 | 66.6 | 65.5 | 60.8 | 61.3 | 54.8 | 145 | 148 | 147 |
| Ion Percentage | % | | 9.65 | 2.69 | 0.22 | 3.65 | 0.27 | 4.8 | 0.3 | 1.63 | 2.58 | 3.27 | 3.86 | 1.67 |
| Iron | mg/L | 0.3 | <0.05 | <0.05 | <0.05 | 0.0018 | <0.05 | 0.09 | 0.09 | 0.1 | 0.035 | 0.13 | <0.05 | <0.05 |
| Lead | mg/L | 0.01 * | <0.02 | | <0.0015 | | <0.01 | | <0.01 | | <0.0005 | <0.02 | | <0.0015 |
| Magnesium | mg/L | | 7.3 | 7.35 | 7.4 | 7.63 | 7.33 | 7.23 | 6.52 | 7.19 | 5.78 | 22.7 | 24.4 | 24.2 |
| Manganese | mg/L | 0.05 | 0.005 | 0.005 | 0.008 | 0.007 | 0.008 | 0.011 | 0.007 | 0.012 | 0.0042 | 0.006 | 0.002 | <0.001 |
| Molybdenum | mg/L | | <0.005 | | 0.012 | | 0.01 | | 0.012 | | 0.009 | 0.006 | | <0.005 |
| Nickel | mg/L | | <0.005 | | <0.005 | | <0.005 | | <0.005 | | <0.002 | <0.005 | | <0.005 |
| Nitrate | mg/L | 10.0 * | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.08 | 0.12 | 0.07 |
| Nitrite | mg/L | 1.0* | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Oxydation Reduction Potential | mV | | | | 88.6 | -163.5 | -161.3 | -162 | -170.4 | -99.2 | -167.5 | | | 115.3 |
| pH | units | | 8.23 | 7.82 | 7.91 | 7.84 | 7.99 | 7.88 | 7.81 | 7.77 | 7.66 | 8.18 | 7.92 | 7.92 |
| pH - field | units | | 8.15 | 8.1 | 8.04 | 7.64 | 7.84 | 7.57 | 7.21 | 7.41 | 7.9 | 8.07 | 8.15 | 8.26 |
| Phosphate | mg/L | | <0.02 | <0.02 | 0.09 | <0.02 | <0.02 | <0.02 | <0.02 | 0.03 | | 0.03 | <0.02 | 0.03 |
| Phosphorus | mg/L | | 0.04 | 0.04 | <0.01 | <0.01 | 0.02 | <0.02 | <0.02 | <0.02 | 0.02 | <0.02 | 0.03 | 0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | <0.02 | | | |
| Potassium | mg/L | | 1.46 | 1.51 | 1.58 | 1.36 | 1.3 | 1.3 | 1.3 | 1.2 | 1.09 | 1.17 | 1.37 | 1.42 |
| Sodium | mg/L | 200 | 26.2 | 30.7 | 32.8 | 35.5 | 36 | 40.1 | 37.6 | 38.6 | 38.5 | 12.1 | 14.1 | 14.7 |
| Sulphate | mg/L | 500 | 11.9 | 13.6 | 14.6 | 19.3 | 19.7 | 21.6 | 26.4 | 24.1 | 26.6 | 15.7 | 14 | 12.5 |
| Total Dissolved Solids | mg/L | 500 | 170 | 180 | 160 | 170 | 170 | 320 | 160 | 190 | 180 | 198 | 190 | 160 |
| Temperature - field | °C | | 7.7 | 11.2 | 9 | 12.7 | 8.7 | 13.4 | 7.3 | 13.6 | 7.7 | 6.2 | 12.5 | 8.3 |
| Total Kjeldahl Nitrogen | mg/L | | 0.2 | 0.1 | <0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.1 | <0.1 | <0.1 | <0.1 |
| Zinc | mg/L | 5 | <0.03 | | <0.03 | | <0.01 | | <0.03 | | 0.0014 | <0.03 | | <0.03 |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 |
| 1,1,2-Trichlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 |
| 1,1-Dichloroethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 |
| 1,1-Dichloroethylene | µg/L | 14 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 |
| 1,2-Dichlorpropane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 |
| 1,3-Dichlorobenzene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 |
| 1,3-Dichloropropene(E) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 |
| Benzene | µg/L | 1 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 |
| Bromodichloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 |
| Bromoform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 |
| Bromomethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 |
| Carbon Tetrachloride | µg/L | 5 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | <0.2 | <0.2 | | <0.2 |
| Chlorobenzene | µg/L | 30 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 |
| Chloroethane | µg/L | | <5 | | <5 | | <5 | | <5 | | <5 | <5 | | <5 |
| Chloroform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 |
| Chloromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | <5 | <5 | | <5 |
| cis-1,2-Dichloroethylene | µg/L | | | | | | | | | | <0.5 | | | |
| Dibromochloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 |
| Dichloromethane | µg/L | 50 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 |
| Ethyl Benzene | µg/L | 1.6 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 |
| Ethylene dibromide | µg/L | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | <0.2 | <0.2 | | <0.2 |
| m/p-Xylenes | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 |
| o-Xylene | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 |
| Styrene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 |
| Tetrachloroethylene | µg/L | 30 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 |
| Toluene | µg/L | 24 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 |
| trans-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 |
| Trichloroethylene | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 |
| Trichlorofluoromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | <5 | <5 | | <5 |
| Vinyl Chloride | µg/L | 1 * | <0.5 | | <0.2 | | <0.2 | | <0.2 | | <0.2 | <0.5 | | <0.2 |
| Xylenes - total | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 90-II | | | | | | 90-III | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sep-12 | Mar-13 | Sep-13 | Mar-14 | Sep-14 | Mar-15 | Mar-11 | Sep-11 | Apr-12 | Sep-12 | Mar-13 | Sep-13 |
| Alkalinity | mg/L | 30-500 | 154 | 167 | 148 | 156 | 146 | 161 | 269 | 244 | 243 | 239 | 258 | 232 |
| Aluminum | mg/L | 0.1 | | <0.02 | | <0.02 | | <0.025 | <0.02 | | <0.02 | | <0.02 | |
| Ammonia (as N) | mg/L | | 0.2 | 0.2 | 0.2 | <0.1 | 0.1 | <0.1 | 0.1 | <0.1 | <0.1 | 0.1 | 0.2 | 0.1 |
| Anion sum | meq/L | | 3.31 | 3.57 | 3.23 | 3.4 | 3.21 | 3.52 | 6.51 | 6.13 | 5.83 | 5.99 | 6.27 | 5.85 |
| Arsenic | mg/L | 0.025 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.0035 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Barium | mg/L | 1 * | | 0.124 | | 0.122 | | 0.113 | 0.061 | | 0.067 | | 0.066 | |
| Beryllium | mg/L | | | <0.001 | | <0.001 | | <0.0001 | <0.001 | | <0.001 | | <0.001 | |
| Bicarbonate | mg/L | | 152 | 165 | 146 | 153 | 144 | 159 | 267 | 242 | 241 | 237 | 256 | 230 |
| Boron | mg/L | 5 * | | 0.05 | | 0.07 | | 0.0504 | <0.03 | | <0.03 | | <0.02 | |
| Cadmium | mg/L | 0.005 * | | <0.001 | | <0.001 | | <0.0001 | <0.001 | | <0.0003 | | <0.001 | |
| Calcium | mg/L | | 18.1 | 19 | 18.4 | 19 | 17.2 | 28.6 | 50 | 57.9 | 54.6 | 54.5 | 57.7 | 60.1 |
| Carbonate | mg/L | | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cation sum | meq/L | | 3.7 | 3.78 | 3.71 | 3.7 | 3.75 | 3.97 | 6.12 | 6.83 | 6.55 | 6.75 | 6.59 | 6.91 |
| Chloride | mg/L | 250 | 0.8 | 0.8 | 1.2 | 0.7 | 1.4 | 1.8 | 7.4 | 9.9 | 10.1 | 9.8 | 10.1 | 11.4 |
| Chromium | mg/L | 0.05 * | | <0.002 | | <0.002 | | <0.0005 | <0.002 | | <0.002 | | <0.002 | |
| Cobalt | mg/L | | | <0.002 | | <0.002 | | <0.0001 | | | | | <0.002 | |
| Chemical Oxygen Demand | mg/L | | <20 | <20 | <20 | <10 | <10 | <10 | <20 | <20 | <20 | <20 | <20 | <20 |
| Conductivity | µS/cm | | 340 | 342 | 342 | 332 | 340 | 346 | 566 | 623 | 593 | 603 | 578 | 601 |
| Conductivity - field | µS/cm | | 323 | 315 | 336 | 316 | 299 | 335 | 576 | 629 | 555 | 639 | 571 | 638 |
| Copper | mg/L | 1 | | <0.005 | | <0.005 | | <0.0005 | <0.005 | | <0.005 | | <0.005 | |
| Dissolved Organic Carbon | mg/L | 5 | <1.0 | 3.5 | 1.7 | 1.2 | 2.2 | 5 | 2.3 | <1.0 | 1.4 | <1.0 | 3.4 | 2 |
| Dissolved Oxygen - field | mg/L | | 5.83 | 7.16 | 3.83 | 4.98 | 4.35 | 2.44 | | | 10.1 | 6.29 | 6.67 | 5.93 |
| Hardness | mg/L | 80-100 | 149 | 150 | 147 | 147 | 151 | 163 | 258 | 277 | 280 | 276 | 282 | 292 |
| Ion Percentage | % | | 5.57 | 2.88 | 6.89 | 4.32 | 7.73 | 5.91 | 3.13 | 5.43 | 5.84 | 6.03 | 2.44 | 8.27 |
| Iron | mg/L | 0.3 | <0.0004 | <0.05 | 0.07 | <0.05 | <0.05 | 0.002 | <0.05 | <0.05 | <0.05 | <0.0004 | <0.05 | <0.05 |
| Lead | mg/L | 0.01 * | | <0.01 | | <0.01 | | <0.0005 | <0.02 | | <0.0015 | | <0.01 | |
| Magnesium | mg/L | | 25.3 | 25 | 24.6 | 24.2 | 26.2 | 22.2 | 32.3 | 32.2 | 34.8 | 34 | 33.5 | 34.4 |
| Manganese | mg/L | 0.05 | 0.004 | <0.001 | 0.032 | <0.001 | 0.003 | <0.0005 | 0.003 | <0.001 | <0.001 | <0.001 | <0.001 | 0.003 |
| Molybdenum | mg/L | | | <0.005 | | <0.005 | | 0.002 | 0.011 | | 0.011 | | 0.009 | |
| Nickel | mg/L | | | <0.005 | | <0.005 | | <0.002 | <0.005 | | <0.005 | | <0.005 | |
| Nitrate | mg/L | 10.0 * | <0.05 | 0.08 | <0.05 | <0.05 | 0.08 | 0.05 | 0.21 | 1.35 | 0.55 | 1.52 | 0.59 | 1.38 |
| Nitrite | mg/L | 1.0* | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Oxydation Reduction Potential | mV | | -10.8 | -7.2 | -126.5 | 47.3 | -44.1 | 65.6 | | | 81.4 | 54.9 | 56.3 | 7.9 |
| pH | units | | 8.07 | 8.19 | 8.21 | 8.24 | 8.1 | 8.04 | 7.89 | 7.85 | 7.88 | 7.83 | 7.94 | 7.98 |
| pH - field | units | | 7.59 | 7.83 | 7.53 | 7 | 7.4 | 8.04 | 7.82 | 7.54 | 7.81 | 7.16 | 7.53 | 7.1 |
| Phosphate | mg/L | | <0.02 | <0.02 | 0.03 | <0.02 | 0.02 | | <0.02 | <0.02 | 0.04 | 0.08 | 0.02 | <0.02 |
| Phosphorus | mg/L | | 0.01 | 0.03 | <0.02 | <0.02 | <0.02 | <0.02 | 0.02 | 0.03 | 0.04 | 0.07 | 0.04 | 0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | <0.02 | | | | | | |
| Potassium | mg/L | | 1.3 | 1.29 | 1.3 | 1.3 | 1.2 | 1.14 | 2.67 | 3.23 | 2.99 | 3.15 | 2.73 | 3.1 |
| Sodium | mg/L | 200 | 14.7 | 16.1 | 16 | 16.2 | 15.3 | 15.1 | 19.6 | 26.9 | 19.5 | 25.5 | 19 | 21.8 |
| Sulphate | mg/L | 500 | 14.8 | 14.9 | 16.2 | 17.3 | 16.3 | 17 | 52.2 | 49.5 | 38.7 | 47 | 45.9 | 45.3 |
| Total Dissolved Solids | mg/L | 500 | 200 | 190 | 190 | 190 | 170 | 190 | 348 | 360 | 310 | 350 | 320 | 360 |
| Temperature - field | °C | | 12.5 | 9.2 | 13.1 | 6.4 | 14 | 7.5 | 6.5 | 13.7 | 7.8 | 14.5 | 7.9 | 14.7 |
| Total Kjeldahl Nitrogen | mg/L | | <0.1 | <0.1 | 0.2 | <0.1 | <0.1 | <0.1 | 0.1 | <0.1 | <0.1 | 1.7 | <0.1 | 0.1 |
| Zinc | mg/L | 5 | | <0.01 | | <0.03 | | 0.002 | <0.03 | | <0.03 | | <0.01 | |
| Phenols | µg/L | | <1 | <1 | <1 | 1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | |
| 1,1,2-Trichlorethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | |
| 1,1-Dichloroethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | |
| 1,2-Dichlorpropane | µg/L | | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | |
| 1,3-Dichlorobenzene | µg/L | | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | |
| Benzene | µg/L | 1 * | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | |
| Bromodichloromethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | |
| Bromoform | µg/L | | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | |
| Bromomethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | | <0.2 | | <0.2 | | <0.2 | <0.2 | | <0.2 | | <0.2 | |
| Chlorobenzene | µg/L | 30 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | |
| Chloroethane | µg/L | | | <5 | | <5 | | <5 | <5 | | <5 | | <5 | |
| Chloroform | µg/L | | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | |
| Chloromethane | µg/L | | | <5 | | <5 | | <5 | <5 | | <5 | | <5 | |
| cis-1,2-Dichloroethylene | µg/L | | | | | | | <0.5 | | | | | | |
| Dibromochloromethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | |
| Dichloromethane | µg/L | 50 * | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | |
| Ethyl Benzene | µg/L | 1.6 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | |
| Ethylene dibromide | µg/L | | | <0.2 | | <0.2 | | <0.2 | <0.2 | | <0.2 | | <0.2 | |
| m/p-Xylenes | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | |
| o-Xylene | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | |
| Styrene | µg/L | | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | |
| Tetrachloroethylene | µg/L | 30 * | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | |
| Toluene | µg/L | 24 | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | |
| Trichloroethylene | µg/L | 5 * | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | |
| Trichlorofluoromethane | µg/L | | | <5 | | <5 | | <5 | <5 | | <5 | | <5 | |
| Vinyl Chloride | µg/L | 1 * | | <0.2 | | <0.2 | | <0.2 | <0.5 | | <0.2 | | <0.2 | |
| Xylenes - total | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 90-III | | | 91-I | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-14 | Sep-14 | Mar-15 | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 |
| Alkalinity | mg/L | 30-500 | 238 | 238 | 247 | 174 | 181 | 181 | 167 | 167 | 169 | 177 | 160 | 177 |
| Aluminum | mg/L | 0.1 | <0.02 | | <0.025 | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 |
| Ammonia (as N) | mg/L | | <0.1 | 0.1 | <0.1 | 0.2 | 0.1 | 0.2 | 0.1 | 0.1 | <0.1 | <0.1 | 0.1 | <0.1 |
| Anion sum | meq/L | | 5.9 | 5.88 | 6.11 | 4.7 | 4.93 | 4.88 | 4.69 | 4.64 | 4.58 | 4.88 | 4.61 | 4.78 |
| Arsenic | mg/L | 0.025 | <0.01 | <0.01 | <0.0005 | 0.0011 | <0.005 | 0.0008 | <0.005 | 0.001 | <0.005 | 0.0008 | 0.0012 | 0.0008 |
| Barium | mg/L | 1 * | 0.066 | | 0.06 | 0.073 | | 0.085 | | 0.081 | | 0.083 | | 0.085 |
| Beryllium | mg/L | | <0.001 | | <0.0001 | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 |
| Bicarbonate | mg/L | | 236 | 237 | 246 | 172 | 180 | 180 | 166 | 165 | 167 | 176 | 159 | 175 |
| Boron | mg/L | 5 * | <0.03 | | 0.0175 | 0.0206 | | 0.0154 | | 0.0266 | | 0.0247 | | 0.0238 |
| Cadmium | mg/L | 0.005 * | <0.001 | | <0.0001 | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 |
| Calcium | mg/L | | 55.5 | 52.5 | 45.4 | 48.5 | 48.8 | 52 | 49.7 | 51 | 52.3 | 50.9 | 50 | 52.1 |
| Carbonate | mg/L | | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | <1 | 2 |
| Cation sum | meq/L | | 6.51 | 6.29 | 5.65 | 4.93 | 4.89 | 5.12 | 4.88 | 5.08 | 5.08 | 4.79 | 5.03 | 5.19 |
| Chloride | mg/L | 250 | 10.2 | 11.3 | 12.2 | 12.8 | 12.4 | 11.9 | 13.6 | 12.4 | 14.5 | 14 | 15.6 | 13.1 |
| Chromium | mg/L | 0.05 * | <0.002 | | <0.0005 | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Cobalt | mg/L | | <0.002 | | <0.0001 | 0.0002 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | <10 | <10 | <10 | 30 | 20 | <10 | 20 | 20 | <10 | <10 |
| Conductivity | µS/cm | | 558 | 589 | 579 | 470 | 468 | 470 | 475 | 474 | 475 | 472 | 478 | 472 |
| Conductivity - field | µS/cm | | 589 | 562 | 564 | 472 | 477 | 461 | 470 | 470 | 480 | 479 | 471 | 489 |
| Copper | mg/L | 1 | <0.005 | | <0.0005 | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Dissolved Organic Carbon | mg/L | 5 | 1.4 | 1.8 | 1.6 | 2.4 | 2.5 | 1.4 | 1.1 | 2 | 1.5 | 2.7 | 1.2 | 1.4 |
| Dissolved Oxygen - field | mg/L | | 6.97 | 4.98 | 6.92 | 1.94 | 1.98 | 2.41 | 1.15 | 4.88 | 1.18 | 2.03 | NR | 2.07 |
| Hardness | mg/L | 80-100 | 281 | 271 | 243 | 222 | 221 | 231 | 220 | 229 | 229 | 217 | 227 | 235 |
| Ion Percentage | % | | 4.98 | 3.37 | 3.96 | 2.35 | 0.5 | 2.38 | 1.98 | 4.51 | 5.2 | 0.95 | 4.36 | 4.04 |
| Iron | mg/L | 0.3 | <0.05 | <0.05 | 0.002 | 0.055 | <0.05 | 0.031 | <0.05 | 0.012 | 0.06 | 0.025 | 0.143 | 0.055 |
| Lead | mg/L | 0.01 * | <0.01 | | <0.0005 | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Magnesium | mg/L | | 34.5 | 34 | 31.5 | 24.4 | 24.1 | 24.5 | 23.4 | 24.7 | 23.9 | 21.9 | 24.9 | 25.4 |
| Manganese | mg/L | 0.05 | <0.001 | <0.001 | <0.0005 | 0.0085 | <0.001 | 0.0016 | 0.022 | 0.0006 | 0.044 | 0.0045 | 0.0244 | 0.0062 |
| Molybdenum | mg/L | | 0.008 | | 0.0061 | 0.001 | | 0.0011 | | 0.0012 | | 0.0011 | | 0.0012 |
| Nickel | mg/L | | <0.005 | | <0.002 | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 |
| Nitrate | mg/L | 10.0 * | 0.67 | 1.04 | 0.9 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.05 | <0.05 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | 112.4 | 13.2 | 137.3 | -32.7 | 197.9 | 162.4 | -48.3 | 185.8 | -41.6 | 75.1 | 27.9 | 75.1 |
| pH | units | | 7.9 | 7.7 | 7.8 | 8.13 | 7.82 | 7.79 | 7.89 | 8 | 8.03 | 7.83 | 7.82 | 8.01 |
| pH - field | units | | 6.72 | 7.07 | 7.76 | 7.78 | 7.59 | 7.55 | 7.79 | 7.72 | 7.77 | 7.88 | 7.47 | 7.75 |
| Phosphate | mg/L | | 0.03 | 0.04 | | <0.02 | <0.01 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | 0.02 | <0.02 | 0.02 | <0.02 | <0.02 | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.01 | 0.01 |
| Phosphorus - dissolved | mg/L | | | | <0.02 | | | | | | | | | |
| Potassium | mg/L | | 2.8 | 2.8 | 2.46 | 1.6 | 1.5 | 1.5 | 1.4 | 1.6 | 1.6 | 1.4 | 1.5 | 1.7 |
| Sodium | mg/L | 200 | 18.2 | 17.2 | 15.8 | 9.58 | 9 | 9.7 | 9.2 | 9.7 | 10 | 8.9 | 9.4 | 9.7 |
| Sulphate | mg/L | 500 | 45.9 | 42.2 | 44.4 | 46.9 | 52 | 50 | 51.6 | 50.9 | 43.3 | 51.2 | 51.6 | 47.6 |
| Total Dissolved Solids | mg/L | 500 | 320 | 330 | 310 | 310 | 360 | 280 | 290 | 270 | 340 | 290 | 320 | 300 |
| Temperature - field | °C | | 6.1 | 14.5 | 5.8 | 8.9 | 13.5 | 7.9 | 11.6 | 7.5 | 12.5 | 10.8 | 13 | 6.9 |
| Total Kjeldahl Nitrogen | mg/L | | <0.1 | <0.1 | 0.8 | <0.1 | 0.1 | <0.1 | <1.0 | <0.1 | <0.1 | <0.1 | <1.0 | <0.5 |
| Zinc | mg/L | 5 | <0.03 | | <0.0005 | 0.0006 | | 0.0016 | | 0.0018 | | 0.0022 | | 0.0013 |
| Phenols | µg/L | | 2 | <1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| 1,1,2-Trichlorethane | µg/L | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| 1,1-Dichloroethane | µg/L | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| 1,1-Dichloroethylene | µg/L | 14 * | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| 1,2-Dichlorpropane | µg/L | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| 1,3-Dichlorobenzene | µg/L | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| 1,3-Dichloropropene(E) | µg/L | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| Benzene | µg/L | 1 * | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| Bromodichloromethane | µg/L | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| Bromoform | µg/L | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| Bromomethane | µg/L | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| Carbon Tetrachloride | µg/L | 5 * | <0.2 | | <0.2 | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 |
| Chlorobenzene | µg/L | 30 | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| Chloroethane | µg/L | | <5 | | <5 | <5 | | <5 | | <5 | | <5 | | < 5 |
| Chloroform | µg/L | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| Chloromethane | µg/L | | <5 | | <5 | <5 | | <5 | | <5 | | <5 | | < 5 |
| cis-1,2-Dichloroethylene | µg/L | | | | <0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| Dibromochloromethane | µg/L | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| Dichloromethane | µg/L | 50 * | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| Ethyl Benzene | µg/L | 1.6 | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| Ethylene dibromide | µg/L | | <0.2 | | <0.2 | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 |
| m/p-Xylenes | µg/L | 20 ** | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| o-Xylene | µg/L | 20 ** | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| Styrene | µg/L | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| Tetrachloroethylene | µg/L | 30 * | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| Toluene | µg/L | 24 | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| trans-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| Trichloroethylene | µg/L | 5 * | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| Trichlorofluoromethane | µg/L | | <5 | | <5 | <5 | | <5 | | <5 | | <5 | | < 5 |
| Vinyl Chloride | µg/L | 1 * | <0.2 | | <0.2 | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 |
| Xylenes - total | µg/L | 20 ** | <0.5 | | <0.5 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 91-I | | | 91-II | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sep-21 | Mar-22 | Sep-22 | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 |
| Alkalinity | mg/L | 30-500 | 173 | 173 | 171 | 216 | 235 | 238 | 286 | 320 | 386 | 407 | 341 | 452 |
| Aluminum | mg/L | 0.1 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 |
| Ammonia (as N) | mg/L | | 0.2 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | <0.1 | <0.1 | 0.1 | 0.1 |
| Anion sum | meq/L | | 4.96 | 4.75 | 4.86 | 5.55 | 5.05 | 5.53 | 7.01 | 7.28 | 8.75 | 9.64 | 9.33 | 11.9 |
| Arsenic | mg/L | 0.025 | 0.0006 | 0.0010 | 0.0008 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.005 | 0.001 | 0.0009 | 0.0006 |
| Barium | mg/L | 1 * | | 0.085 | | 0.052 | | 0.06 | | 0.079 | | 0.104 | | 0.131 |
| Beryllium | mg/L | | | <0.0005 | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 |
| Bicarbonate | mg/L | | 171 | 172 | 170 | 214 | 234 | 237 | 285 | 319 | 385 | 406 | 340 | 451 |
| Boron | mg/L | 5 * | | 0.0302 | | 0.0827 | | 0.0088 | | 0.0224 | | 0.0176 | | 0.0318 |
| Cadmium | mg/L | 0.005 * | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 |
| Calcium | mg/L | | 51.2 | 49.4 | 48.6 | 85.3 | 79 | 98.7 | 124 | 128 | 157 | 163 | 158 | 195 |
| Carbonate | mg/L | | 1 | 1 | 1 | 2 | 1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 |
| Cation sum | meq/L | | 5.03 | 4.82 | 4.83 | 5.87 | 4.89 | 6.2 | 7.85 | 8.06 | 9.72 | 10 | 10.5 | 12.6 |
| Chloride | mg/L | 250 | 18.0 | 13.3 | 16.2 | 17.6 | 5 | 11.4 | 30.7 | 20.1 | 21.8 | 31.2 | 44.2 | 53.8 |
| Chromium | mg/L | 0.05 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Cobalt | mg/L | | | <0.0005 | | 0.0003 | | <0.0001 | | <0.0005 | | 0.0006 | | 0.0012 |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | <10 | <10 | <10 | <10 | 50 | <10 | <10 | 20 | <10 | <10 |
| Conductivity | µS/cm | | 487 | 482 | 510 | 562 | 478 | 456 | 673 | 735 | 723 | 928 | 791 | 958 |
| Conductivity - field | µS/cm | | 485 | 477 | 499 | 567 | 480 | 563 | NV | 741 | 857 | 1030 | 861 | 1260 |
| Copper | mg/L | 1 | | <0.0005 | | 0.0014 | | 0.0023 | | 0.001 | | 0.0011 | | 0.001 |
| Dissolved Organic Carbon | mg/L | 5 | 1.8 | <1.0 | 1.5 | 4.1 | 1.3 | 1.2 | 3.9 | 1.9 | 2.8 | 4 | 2.1 | 2.6 |
| Dissolved Oxygen - field | mg/L | | 1.93 | 2.27 | 2.77 | 4.84 | 6.81 | 6.47 | NV | 3.39 | 2.79 | 1.61 | 4.15 | 1.4 |
| Hardness | mg/L | 80-100 | 227 | 219 | 219 | 270 | 234 | 289 | 364 | 382 | 459 | 479 | 483 | 583 |
| Ion Percentage | % | | 0.77 | 0.80 | 0.34 | 2.81 | 1.7 | 5.72 | 5.66 | 5.1 | 5.24 | 2.08 | 6.02 | 2.86 |
| Iron | mg/L | 0.3 | 0.014 | 0.177 | 0.087 | 0.03 | <0.05 | 0.007 | <0.05 | 0.033 | 0.1 | 0.007 | 0.065 | 0.013 |
| Lead | mg/L | 0.01 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Magnesium | mg/L | | 24.1 | 23.2 | 23.6 | 13.8 | 8.84 | 10.4 | 13.2 | 15.2 | 16.2 | 17.4 | 21.4 | 23.3 |
| Manganese | mg/L | 0.05 | 0.0122 | 0.0091 | 0.0059 | 0.0018 | <0.001 | <0.0005 | 0.003 | 0.0022 | 0.008 | 0.0758 | 0.0463 | 0.12 |
| Molybdenum | mg/L | | | 0.0011 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Nickel | mg/L | | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.05 | 1.34 | 1.39 | 2.63 | 1.3 | <0.5 | 0.8 | <0.5 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | 0.8 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | 75.3 | 170.1 | 139.0 | 123 | 205.4 | 174.7 | NV | 200.3 | 60.7 | 99.7 | 41.6 | 120.6 |
| pH | units | | 7.96 | 7.82 | 7.93 | 7.92 | 7.74 | 7.5 | 7.53 | 7.42 | 7.61 | 7.21 | 7.42 | 7.27 |
| pH - field | units | | 7.70 | 7.60 | 7.44 | 7.53 | 7.3 | 7.47 | NV | 7.19 | 7.42 | 7.05 | 7.22 | 6.88 |
| Phosphate | mg/L | | <0.02 | <0.02 | 0.03 | <0.02 | <0.01 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.01 | <0.02 | <0.02 | <0.02 | 0.03 | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.01 | 0.03 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.6 | 1.5 | 1.4 | 1.2 | 0.7 | 0.7 | 0.8 | 1 | 1.1 | 0.9 | 1.2 | 1.2 |
| Sodium | mg/L | 200 | 9.4 | 8.6 | 8.8 | 9.59 | 4 | 8.6 | 12 | 8.4 | 11.3 | 9.9 | 18.4 | 21.2 |
| Sulphate | mg/L | 500 | 52.9 | 49.2 | 52.7 | 37.4 | 12.9 | 20 | 24.9 | 25.2 | 26.7 | 42.8 | 71.3 | 81 |
| Total Dissolved Solids | mg/L | 500 | 330 | 300 | 290 | 350 | 300 | 330 | 430 | 390 | 560 | 540 | 460 | 700 |
| Temperature - field | °C | | 12.9 | 10.4 | 12.7 | 9.4 | 12.4 | 7.7 | NV | 6.5 | 11.5 | 10.8 | 14.7 | 7.5 |
| Total Kjeldahl Nitrogen | mg/L | | 0.1 | <0.1 | 2.6 | <0.1 | <0.1 | <0.1 | <1.0 | <0.1 | <0.2 | <0.1 | <1.0 | <0.5 |
| Zinc | mg/L | 5 | | 0.0007 | | 0.0042 | | 0.0011 | | 0.0025 | | 0.0028 | | 0.0016 |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 2 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| 1,1,2-Trichlorethane | µg/L | | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| 1,1-Dichloroethane | µg/L | | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| 1,1-Dichloroethylene | µg/L | 14 * | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| 1,2-Dichlorpropane | µg/L | | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| 1,3-Dichlorobenzene | µg/L | | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| 1,3-Dichloropropene(E) | µg/L | | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| Benzene | µg/L | 1 * | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| Bromodichloromethane | µg/L | | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| Bromoform | µg/L | | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| Bromomethane | µg/L | | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| Carbon Tetrachloride | µg/L | 5 * | | < 0.2 | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 |
| Chlorobenzene | µg/L | 30 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| Chloroethane | µg/L | | | < 5 | | <5 | | <5 | | <5 | | <5 | | < 5 |
| Chloroform | µg/L | | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| Chloromethane | µg/L | | | < 5 | | <5 | | <5 | | <5 | | <5 | | < 5 |
| cis-1,2-Dichloroethylene | µg/L | | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| Dibromochloromethane | µg/L | | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| Dichloromethane | µg/L | 50 * | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| Ethyl Benzene | µg/L | 1.6 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| Ethylene dibromide | µg/L | | | < 0.2 | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 |
| m/p-Xylenes | µg/L | 20 ** | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| o-Xylene | µg/L | 20 ** | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| Styrene | µg/L | | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| Tetrachloroethylene | µg/L | 30 * | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| Toluene | µg/L | 24 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| trans-1,2-Dichloroethylene | µg/L | | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| Trichloroethylene | µg/L | 5 * | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |
| Trichlorofluoromethane | µg/L | | | < 5 | | <5 | | <5 | | <5 | | <5 | | < 5 |
| Vinyl Chloride | µg/L | 1 * | | < 0.2 | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 |
| Xylenes - total | µg/L | 20 ** | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 91-II | | 91-III | | | | | 92-I | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sep-21 | Mar-22 | Mar-17 | Mar-20 | Apr-21 | Sep-21 | Mar-22 | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 |
| Alkalinity | mg/L | 30-500 | 460 | 430 | 217 | 222 | 235 | 241 | 212 | 188 | 201 | 206 | 193 | 187 |
| Aluminum | mg/L | 0.1 | | <0.025 | <0.025 | <0.025 | 0.06 | | 0 | <0.025 | | <0.025 | | <0.025 |
| Ammonia (as N) | mg/L | | 0.2 | 0.1 | 0.1 | <0.1 | 0.7 | 0.2 | 0.1 | 0.2 | 0.2 | 0.1 | 0.2 | 0.1 |
| Anion sum | meq/L | | 12.6 | 10.6 | 4.54 | 5.22 | 5.4 | 5.04 | 4.47 | 4.43 | 4.76 | 6.16 | 4.63 | 4.4 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0011 | <0.005 | 0.0007 | <0.005 | 0.0012 |
| Barium | mg/L | 1 * | | 0.12 | 0.02 | 0.026 | 0.036 | | 0.023 | 0.087 | | 0.095 | | 0.096 |
| Beryllium | mg/L | | | <0.0005 | <0.0001 | <0.0005 | <0.0005 | | <0.0005 | <0.0001 | | <0.0001 | | <0.0005 |
| Bicarbonate | mg/L | | 459 | 429 | 215 | 221 | 234 | 240 | 211 | 187 | 199 | 205 | 192 | 185 |
| Boron | mg/L | 5 * | | 0.0517 | 0.0041 | 0.004 | 0.0092 | | 0.0063 | 0.0298 | | 0.0365 | | 0.0378 |
| Cadmium | mg/L | 0.005 * | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | | <0.0001 | <0.0001 | | <0.0001 | | <0.0001 |
| Calcium | mg/L | | 189 | 166 | 74.2 | 100 | 103 | 85.8 | 80.3 | 43.6 | 45.2 | 57.3 | 46.9 | 43 |
| Carbonate | mg/L | | <1 | <1 | 2 | <1 | <1 | 1 | <1 | 1 | 2 | 1 | 1 | 2 |
| Cation sum | meq/L | | 12.6 | 10.8 | 4.71 | 5.41 | 5.7 | 5.26 | 4.51 | 4.84 | 4.85 | 6.36 | 5.01 | 4.87 |
| Chloride | mg/L | 250 | 61.1 | 34.6 | 6.3 | 2.9 | 1.9 | 4.8 | 7.0 | 4.7 | 4.7 | 48.2 | 5.7 | 3.9 |
| Chromium | mg/L | 0.05 * | | <0.0005 | <0.0005 | 0.0005 | 0.0005 | | <0.0005 | <0.0005 | | <0.0005 | | <0.0005 |
| Cobalt | mg/L | | | 0.0011 | 0.0001 | <0.0005 | <0.0005 | | <0.0005 | <0.0001 | | <0.0001 | | <0.0005 |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | <10 | 30 | <10 | <10 | <10 | <10 | 10 | 10 | <10 | <10 |
| Conductivity | µS/cm | | 1180 | 950 | 463 | 507 | 524 | 495 | 441 | 445 | 450 | 611 | 455 | 444 |
| Conductivity - field | µS/cm | | 1180 | 1210 | 462 | 501 | 526 | 505 | 460 | 452 | 461 | 610 | 458 | 444 |
| Copper | mg/L | 1 | | 0.0012 | 0.0012 | 0.0011 | 0.0015 | | <0.0005 | <0.0005 | | <0.0005 | | <0.0005 |
| Dissolved Organic Carbon | mg/L | 5 | 4.1 | 1.2 | 2.3 | 3.4 | 2 | 2.1 | 1.0 | 2.9 | 2.2 | 2.5 | 1.1 | 1.5 |
| Dissolved Oxygen - field | mg/L | | 2.61 | 2.77 | 10 | 9.42 | 8.99 | 8.03 | 9.45 | 2.28 | 0.66 | 1.94 | 1.38 | 1.89 |
| Hardness | mg/L | 80-100 | 567 | 497 | 194 | 260 | 275 | 221 | 207 | 220 | 220 | 240 | 227 | 219 |
| Ion Percentage | % | | 0.27 | 0.74 | 1.86 | 1.85 | 2.75 | 2.17 | 0.52 | 4.46 | 0.88 | 1.6 | 3.87 | 5.09 |
| Iron | mg/L | 0.3 | 0.019 | <0.005 | 0.005 | 0.009 | 0.057 | <0.005 | 0.044 | 0.125 | 0.07 | 0.067 | 0.19 | 0.012 |
| Lead | mg/L | 0.01 * | | <0.0005 | <0.0005 | <0.0005 | <0.0005 | | <0.0005 | <0.0005 | | <0.0005 | | <0.0005 |
| Magnesium | mg/L | | 23.2 | 20.1 | 2.05 | 2.42 | 4.34 | 1.69 | 1.62 | 26.9 | 26.1 | 23.5 | 26.8 | 27 |
| Manganese | mg/L | 0.05 | 0.188 | 0.145 | <0.0005 | <0.0005 | 0.0014 | <0.0005 | 0.0008 | 0.007 | 0.011 | 0.0088 | 0.02 | 0.0036 |
| Molybdenum | mg/L | | | <0.0005 | <0.0005 | <0.0005 | <0.0005 | | 0.0008 | 0.0012 | | 0.0008 | | 0.001 |
| Nickel | mg/L | | | <0.002 | <0.002 | 0.002 | <0.002 | | <0.002 | <0.002 | | <0.002 | | <0.002 |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | 0.17 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | 80.2 | 240.9 | 154.7 | 138.7 | 131 | 97.5 | 238.1 | -34.9 | -159.4 | 33.7 | -152.6 | 114.7 |
| pH | units | | 7.24 | 7.15 | 8.06 | 7.65 | 7.58 | 7.72 | 7.64 | 7.92 | 7.93 | 7.75 | 7.81 | 8.05 |
| pH - field | units | | 6.86 | 6.80 | 7.58 | 7.53 | 7.55 | 7.30 | 7.39 | 7.7 | 7.57 | 7.63 | 7.81 | 7.87 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.01 | <0.01 | <0.02 | <0.02 |
| Phosphorus | mg/L | | 0.01 | <0.02 | <0.02 | <0.02 | <0.01 | 0.05 | <0.02 | 0.03 | 0.02 | 0.03 | <0.02 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.2 | 1.1 | 0.5 | <0.5 | <0.5 | 0.6 | <0.5 | 1.9 | 1.7 | 2.4 | 1.9 | 2 |
| Sodium | mg/L | 200 | 25.7 | 17.5 | 18.7 | 4.9 | 3.2 | 18.5 | 8.2 | 8.2 | 8.2 | 33.7 | 8.4 | 9.4 |
| Sulphate | mg/L | 500 | 95.7 | 63.4 | 7.4 | 40.4 | 38.2 | 11.7 | 8.1 | 31.6 | 35.7 | 39.1 | 35.5 | 32.1 |
| Total Dissolved Solids | mg/L | 500 | 700 | 600 | 270 | 310 | 300 | 270 | 260 | 270 | 260 | 350 | 260 | 70 |
| Temperature - field | °C | | 12.4 | 10.1 | 7.1 | 8.1 | 7.9 | 14.8 | 7.6 | 7.7 | 15 | 9.4 | 12.1 | 8.7 |
| Total Kjeldahl Nitrogen | mg/L | | 0.2 | 0.2 | <0.1 | <0.1 | <0.1 | 0.2 | 0.2 | <0.1 | 0.1 | <0.1 | <1.0 | <0.1 |
| Zinc | mg/L | 5 | | 0.003 | 0.0012 | 0.0039 | 0.0019 | | <0.0005 | 0.0008 | | 0.0012 | | 0.0011 |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 2 | <1 | <1 | <1 | 1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | < 0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| 1,1,2-Trichlorethane | µg/L | | | < 0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethane | µg/L | | | < 0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethylene | µg/L | 14 * | | < 0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | | < 0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | | < 0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorpropane | µg/L | | | < 0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichlorobenzene | µg/L | | | < 0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(E) | µg/L | | | < 0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | | < 0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | | < 0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| Benzene | µg/L | 1 * | | < 0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| Bromodichloromethane | µg/L | | | < 0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| Bromoform | µg/L | | | < 0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| Bromomethane | µg/L | | | < 0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| Carbon Tetrachloride | µg/L | 5 * | | < 0.2 | <0.2 | <0.2 | < 0.2 | | < 0.2 | <0.2 | | <0.2 | | <0.2 |
| Chlorobenzene | µg/L | 30 | | < 0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| Chloroethane | µg/L | | | < 5 | <5 | <5 | < 5 | | < 5 | <5 | | <5 | | <5 |
| Chloroform | µg/L | | | < 0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| Chloromethane | µg/L | | | < 5 | <5 | <5 | < 5 | | < 5 | <5 | | <5 | | <5 |
| cis-1,2-Dichloroethylene | µg/L | | | < 0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| Dibromochloromethane | µg/L | | | < 0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| Dichloromethane | µg/L | 50 * | | < 0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| Ethyl Benzene | µg/L | 1.6 | | < 0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| Ethylene dibromide | µg/L | | | < 0.2 | <0.2 | <0.2 | < 0.2 | | < 0.2 | <0.2 | | <0.2 | | <0.2 |
| m/p-Xylenes | µg/L | 20 ** | | < 0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| o-Xylene | µg/L | 20 ** | | < 0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| Styrene | µg/L | | | < 0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| Tetrachloroethylene | µg/L | 30 * | | < 0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| Toluene | µg/L | 24 | | < 0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| trans-1,2-Dichloroethylene | µg/L | | | < 0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| Trichloroethylene | µg/L | 5 * | | < 0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| Trichlorofluoromethane | µg/L | | | < 5 | <5 | <5 | < 5 | | < 5 | <5 | | <5 | | <5 |
| Vinyl Chloride | µg/L | 1 * | | < 0.2 | <0.2 | <0.2 | < 0.2 | | < 0.2 | <0.2 | | <0.2 | | <0.2 |
| Xylenes - total | µg/L | 20 ** | | < 0.5 | <0.5 | <0.5 | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 92-I | | | | | | | 92-II | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Oct-21 | Mar-22 | Sep-22 | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 |
| Alkalinity | mg/L | 30-500 | 196 | 247 | 281 | 223 | 303 | 238 | 225 | 208 | 218 | 216 | 205 | 202 |
| Aluminum | mg/L | 0.1 | | <0.025 | | <0.025 | | 0.087 | | <0.025 | | <0.025 | | <0.025 |
| Ammonia (as N) | mg/L | | 0.1 | 0.1 | 0.1 | 0.3 | 0.2 | 0.2 | 3.5 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 |
| Anion sum | meq/L | | 4.68 | 6.1 | 6.54 | 5.41 | 9.19 | 5.88 | 5.4 | 4.92 | 5.1 | 5.1 | 4.88 | 4.8 |
| Arsenic | mg/L | 0.025 | 0.007 | <0.0005 | 0.0007 | 0.0018 | <0.0005 | 0.0007 | 0.0051 | 0.0011 | <0.005 | 0.0012 | <0.005 | 0.0014 |
| Barium | mg/L | 1 * | | 0.028 | | 0.101 | | 0.057 | | 0.111 | | 0.121 | | 0.124 |
| Beryllium | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0001 | | <0.0001 | | <0.0005 |
| Bicarbonate | mg/L | | 194 | 246 | 280 | 221 | 303 | 237 | 224 | 206 | 216 | 215 | 204 | 200 |
| Boron | mg/L | 5 * | | 0.0392 | | 0.0408 | | 0.0402 | | 0.482 | | 0.433 | | 0.436 |
| Cadmium | mg/L | 0.005 * | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 |
| Calcium | mg/L | | 51.6 | 96.4 | 114 | 64.3 | 154 | 97.2 | 63.7 | 44.2 | 44.3 | 46 | 46.1 | 45.9 |
| Carbonate | mg/L | | 1 | <1 | <1 | 2 | <1 | <1 | <1 | 2 | 2 | 1 | 1 | 2 |
| Cation sum | meq/L | | 5.18 | 6.31 | 7.55 | 5.51 | 9.16 | 6.24 | 5.81 | 5.25 | 5.12 | 5.25 | 5.32 | 5.3 |
| Chloride | mg/L | 250 | 6.1 | 39.3 | 17.8 | 12.1 | 108 | 20.2 | 11.7 | 11.3 | 9.6 | 10.4 | 10.9 | 9.8 |
| Chromium | mg/L | 0.05 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Cobalt | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0001 | | <0.0001 | | <0.0005 |
| Chemical Oxygen Demand | mg/L | | <10 | 40 | <10 | 20 | <10 | <10 | 40 | <10 | <10 | <10 | 20 | <10 |
| Conductivity | µS/cm | | 464 | 617 | 669 | 526 | 935 | 603 | 539 | 482 | 483 | 482 | 483 | 485 |
| Conductivity - field | µS/cm | | 469 | 694 | 657 | 534 | 936 | 355 | 583 | 486 | 490 | 472 | 482 | 478 |
| Copper | mg/L | 1 | | 0.0013 | | <0.0005 | | 0.0011 | | <0.0005 | | <0.0005 | | <0.0005 |
| Dissolved Organic Carbon | mg/L | 5 | 1.2 | 4.3 | 5.3 | 3.8 | 5.8 | 2.3 | 9 | 1.9 | 2.3 | 1.4 | <1.0 | 1.6 |
| Dissolved Oxygen - field | mg/L | | 1.77 | 6.06 | 3.19 | 2.08 | 5.48 | 6.24 | 1.09 | 3.1 | 1.09 | 1.73 | 1.52 | 2.88 |
| Hardness | mg/L | 80-100 | 235 | 262 | 323 | 244 | 419 | 284 | 250 | 224 | 218 | 222 | 226 | 227 |
| Ion Percentage | % | | 5.07 | 1.71 | 7.15 | 0.88 | 0.19 | 2.98 | 3.65 | 3.21 | 0.15 | 1.44 | 4.32 | 4.97 |
| Iron | mg/L | 0.3 | 0.25 | 0.014 | 0.006 | <0.005 | 0.03 | 0.116 | 0.238 | 0.011 | 0.34 | 0.079 | 0.09 | 0.066 |
| Lead | mg/L | 0.01 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Magnesium | mg/L | | 25.7 | 5.09 | 9.39 | 20.3 | 8.39 | 10 | 22.2 | 27.7 | 26 | 26 | 27 | 27.2 |
| Manganese | mg/L | 0.05 | 0.101 | 0.0021 | 0.0013 | 0.0011 | 0.0152 | 0.0177 | 0.113 | 0.0015 | 0.013 | 0.0016 | 0.013 | 0.0035 |
| Molybdenum | mg/L | | | <0.0005 | | 0.0009 | | <0.0005 | | 0.0026 | | 0.0024 | | 0.0025 |
| Nickel | mg/L | | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 3 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | -135.2 | 193.4 | -28 | 163.8 | 65.3 | 193.7 | -214.8 | 127.9 | -145.2 | 52.9 | -101.2 | 152.4 |
| pH | units | | 7.91 | 7.51 | 7.45 | 7.90 | 7.21 | 7.48 | 7.58 | 7.9 | 7.92 | 7.77 | 7.84 | 8.02 |
| pH - field | units | | 7.68 | 7.26 | 7.32 | 7.59 | 6.69 | 7.39 | 7.29 | 7.73 | 7.54 | 7.64 | 7.75 | 7.87 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.35 | <0.02 | <0.01 | <0.01 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | <0.01 | 0.01 | 0.01 | <0.02 | 0.34 | <0.02 | 0.02 | 0.03 | <0.02 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.9 | 0.5 | 1.7 | 1.8 | 1 | 1 | 2.6 | 2.3 | 2.1 | 2.2 | 2.3 | 2.3 |
| Sodium | mg/L | 200 | 9.2 | 24.1 | 23.4 | 12.3 | 16.5 | 11.7 | 10.5 | 15.2 | 15.4 | 16.5 | 16 | 15.4 |
| Sulphate | mg/L | 500 | 34.3 | 10.3 | 29.1 | 36.4 | 13.8 | 23.7 | 34.4 | 27.7 | 29.6 | 30.1 | 29 | 29.4 |
| Total Dissolved Solids | mg/L | 500 | 290 | 350 | 400 | 160 | 720 | 330 | 350 | 280 | 280 | 280 | 280 | 200 |
| Temperature - field | °C | | 15.3 | 8.4 | 14.3 | 11.2 | 14.7 | 10.6 | 15.8 | 8.6 | 16.2 | 8.6 | 13.6 | 9.5 |
| Total Kjeldahl Nitrogen | mg/L | | 0.1 | 0.2 | <1.0 | 0.6 | 0.6 | <0.1 | 5.8 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Zinc | mg/L | 5 | | 0.0045 | | <0.0005 | | 0.0028 | | 0.0011 | | 0.0011 | | 0.0015 |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | 2 | 2 | 75 | 1 | <1 | <1 | <1 | 1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1,2-Trichlorethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethylene | µg/L | 14 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorpropane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichlorobenzene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(E) | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Benzene | µg/L | 1 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromodichloromethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromoform | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromomethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Carbon Tetrachloride | µg/L | 5 * | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| Chlorobenzene | µg/L | 30 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Chloroethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| Chloroform | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Chloromethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| cis-1,2-Dichloroethylene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Dibromochloromethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Dichloromethane | µg/L | 50 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Ethyl Benzene | µg/L | 1.6 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Ethylene dibromide | µg/L | | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| m/p-Xylenes | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| o-Xylene | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Styrene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Tetrachloroethylene | µg/L | 30 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Toluene | µg/L | 24 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| trans-1,2-Dichloroethylene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Trichloroethylene | µg/L | 5 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Trichlorofluoromethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| Vinyl Chloride | µg/L | 1 * | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| Xylenes - total | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 92-II | | | | | | | 92-III | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Oct-21 | Mar-22 | Sep-22 | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 |
| Alkalinity | mg/L | 30-500 | 202 | 203 | 198 | 210 | 209 | 208 | 210 | 401 | 446 | 491 | 468 | 385 |
| Aluminum | mg/L | 0.1 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 |
| Ammonia (as N) | mg/L | | 0.1 | 0.1 | 0.1 | 0.1 | 0.3 | 0.2 | 0.2 | 8.1 | 3.8 | 1.3 | 1.8 | 1.2 |
| Anion sum | meq/L | | 4.75 | 5 | 4.83 | 5.05 | 5.04 | 5.09 | 5.13 | 22 | 15.5 | 22.5 | 14.6 | 14.4 |
| Arsenic | mg/L | 0.025 | 0.006 | 0.0012 | 0.0028 | 0.0015 | 0.0024 | 0.0017 | 0.0028 | 0.0053 | <0.005 | 0.003 | 0.006 | 0.0026 |
| Barium | mg/L | 1 * | | 0.117 | | 0.128 | | 0.138 | | 0.134 | | 0.211 | | 0.106 |
| Beryllium | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0001 | | <0.0001 | | <0.0005 |
| Bicarbonate | mg/L | | 200 | 201 | 197 | 208 | 208 | 207 | 209 | 401 | 445 | 491 | 468 | 384 |
| Boron | mg/L | 5 * | | 0.667 | | 0.629 | | 0.851 | | 0.552 | | 0.274 | | 0.23 |
| Cadmium | mg/L | 0.005 * | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 |
| Calcium | mg/L | | 48.1 | 45.9 | 48.6 | 45.6 | 49.6 | 47.8 | 47.3 | 239 | 199 | 263 | 191 | 170 |
| Carbonate | mg/L | | 2 | 2 | 1 | 2 | 1 | 1 | 1 | <1 | <1 | <1 | <1 | <1 |
| Cation sum | meq/L | | 5.35 | 5.29 | 5.52 | 5.11 | 5.44 | 5.52 | 5.49 | 21.4 | 15.8 | 22.8 | 15.3 | 15.4 |
| Chloride | mg/L | 250 | 11.8 | 14.6 | 13.4 | 13.0 | 13.2 | 14.5 | 14.3 | 165 | 101 | 133 | 70.6 | 93.2 |
| Chromium | mg/L | 0.05 * | | <0.0005 | | <0.0005 | | <0.0005 | | 0.0007 | | <0.0005 | | <0.0005 |
| Cobalt | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | 0.0023 | | 0.0017 | | <0.0005 |
| Chemical Oxygen Demand | mg/L | | <10 | 20 | <10 | 10 | <10 | <10 | <10 | 70 | 30 | 40 | 30 | <10 |
| Conductivity | µS/cm | | 486 | 499 | 497 | 496 | 508 | 511 | 499 | 2100 | 1420 | 1950 | 1340 | 1410 |
| Conductivity - field | µS/cm | | 490 | 510 | 496 | 504 | 508 | 490 | 514 | 2180 | 1510 | 1930 | 1370 | 1430 |
| Copper | mg/L | 1 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | 0.0011 | | <0.0005 |
| Dissolved Organic Carbon | mg/L | 5 | <1.0 | 2.9 | 1.7 | 2.7 | 1 | <1.0 | 1.1 | 22.2 | 15.3 | 19.2 | 11 | 10.2 |
| Dissolved Oxygen - field | mg/L | | 1.05 | 2.16 | 0.64 | 1.14 | 2.71 | 2.47 | 1.5 | 3.38 | 1.59 | 1.96 | 1.05 | 1.27 |
| Hardness | mg/L | 80-100 | 229 | 223 | 233 | 217 | 232 | 231 | 232 | 799 | 619 | 885 | 622 | 590 |
| Ion Percentage | % | | 5.96 | 2.73 | 6.63 | 0.60 | 3.75 | 3.99 | 3.42 | 1.3 | 0.86 | 0.68 | 2.4 | 3.3 |
| Iron | mg/L | 0.3 | <0.05 | 0.019 | 0.171 | 0.057 | 0.16 | 0.121 | 0.152 | 30.1 | 13.9 | 10.7 | 12.1 | 8.37 |
| Lead | mg/L | 0.01 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Magnesium | mg/L | | 26.4 | 26.2 | 27 | 25.0 | 26.3 | 27 | 27.6 | 49.2 | 29.7 | 55.5 | 35.2 | 40.2 |
| Manganese | mg/L | 0.05 | 0.039 | 0.0045 | 0.0863 | 0.0009 | 0.0304 | 0.0014 | 0.0297 | 2.38 | 1.31 | 2.03 | 1.72 | 1.062 |
| Molybdenum | mg/L | | | 0.0024 | | 0.0026 | | 0.0026 | | 0.0008 | | <0.0005 | | <0.0005 |
| Nickel | mg/L | | | <0.002 | | <0.002 | | <0.002 | | 0.008 | | 0.005 | | 0.003 |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | -127.6 | 189.3 | -132.1 | 167.1 | -93.6 | 197.1 | -84.2 | -65.3 | -128.6 | -66 | -98.6 | -55.1 |
| pH | units | | 7.95 | 7.92 | 7.86 | 7.98 | 7.81 | 7.75 | 7.73 | 7.1 | 7.11 | 7 | 6.96 | 7.32 |
| pH - field | units | | 7.69 | 7.69 | 7.91 | 7.68 | 7.51 | 7.59 | 7.52 | 6.85 | 6.67 | 6.85 | 6.84 | 6.96 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.01 | 0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | <0.01 | 0.01 | <0.01 | <0.02 | <0.02 | 0.02 | 0.02 | 0.04 | <0.02 | 0.05 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 2.4 | 2.4 | 2.6 | 2.3 | 2.4 | 2.5 | 2.5 | 10.6 | 8.1 | 17.8 | 16.9 | 21.5 |
| Sodium | mg/L | 200 | 15.5 | 17 | 17.6 | 15.7 | 15.7 | 18.4 | 17.2 | 104 | 66.2 | 104 | 51.4 | 67.8 |
| Sulphate | mg/L | 500 | 24.3 | 32 | 30 | 29.9 | 30.2 | 31.8 | 31.8 | 460 | 194 | 446 | 169 | 210 |
| Total Dissolved Solids | mg/L | 500 | 300 | 300 | 300 | 250 | 320 | 270 | 310 | 1460 | 930 | 1320 | 850 | 890 |
| Temperature - field | °C | | 16.2 | 11.5 | 15.1 | 13.6 | 18 | 12.4 | 17 | 9 | 17.1 | 8.4 | 19.3 | 9.4 |
| Total Kjeldahl Nitrogen | mg/L | | 0.1 | <0.1 | <1.0 | <0.1 | 0.1 | <0.1 | 2.4 | 13.6 | 15.2 | 5.2 | 2 | 1.3 |
| Zinc | mg/L | 5 | | 0.0013 | | <0.0005 | | <0.0005 | | 0.001 | | 0.0011 | | 0.002 |
| Phenols | µg/L | | <1 | <1 | 1 | <1 | 2 | <1 | <1 | 1 | <1 | <1 | <1 | 2 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1,2-Trichlorethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethylene | µg/L | 14 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorpropane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichlorobenzene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(E) | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Benzene | µg/L | 1 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromodichloromethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromoform | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromomethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Carbon Tetrachloride | µg/L | 5 * | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| Chlorobenzene | µg/L | 30 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Chloroethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| Chloroform | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Chloromethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| cis-1,2-Dichloroethylene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Dibromochloromethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Dichloromethane | µg/L | 50 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Ethyl Benzene | µg/L | 1.6 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Ethylene dibromide | µg/L | | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| m/p-Xylenes | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| o-Xylene | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Styrene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Tetrachloroethylene | µg/L | 30 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Toluene | µg/L | 24 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| trans-1,2-Dichloroethylene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Trichloroethylene | µg/L | 5 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Trichlorofluoromethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| Vinyl Chloride | µg/L | 1 * | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| Xylenes - total | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 92-III | | | | | | | 93-I | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Oct-21 | Mar-22 | Sep-22 | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 |
| Alkalinity | mg/L | 30-500 | 426 | 403 | 370 | 345 | 420 | 350 | 406 | 187 | 196 | 197 | 183 | 191 |
| Aluminum | mg/L | 0.1 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 |
| Ammonia (as N) | mg/L | | 1.1 | 0.7 | 1.2 | 0.3 | 0.6 | 0.2 | 0.5 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 |
| Anion sum | meq/L | | 12.9 | 13.6 | 18.7 | 16.8 | 18.8 | 12.1 | 13.8 | 4.69 | 4.99 | 4.99 | 4.72 | 4.83 |
| Arsenic | mg/L | 0.025 | <0.005 | 0.0019 | 0.0042 | 0.0012 | 0.0034 | 0.0008 | 0.0023 | 0.0007 | <0.005 | 0.0009 | 0.005 | 0.0008 |
| Barium | mg/L | 1 * | | 0.088 | | 0.099 | | 0.096 | | 0.209 | | 0.247 | | 0.225 |
| Beryllium | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0001 | | <0.0001 | | <0.0005 |
| Bicarbonate | mg/L | | 425 | 402 | 370 | 344 | 420 | 349 | 406 | 186 | 194 | 196 | 181 | 190 |
| Boron | mg/L | 5 * | | 0.292 | | 0.239 | | 0.254 | | 0.0265 | | 0.0265 | | 0.0265 |
| Cadmium | mg/L | 0.005 * | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 |
| Calcium | mg/L | | 170 | 172 | 273 | 195 | 253 | 154 | 172 | 58.6 | 62 | 60.3 | 60.2 | 60.6 |
| Carbonate | mg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | 2 | 1 | 1 | 1 |
| Cation sum | meq/L | | 13.4 | 14.2 | 20.7 | 15.6 | 18.7 | 12.8 | 14 | 5 | 5.02 | 5.05 | 4.98 | 5.01 |
| Chloride | mg/L | 250 | 41.5 | 42.3 | 64 | 70.6 | 80.5 | 53.6 | 62.7 | 10.2 | 10.4 | 10 | 10.4 | 8.9 |
| Chromium | mg/L | 0.05 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Cobalt | mg/L | | | <0.0005 | | 0.0010 | | 0.0029 | | <0.0001 | | <0.0001 | | <0.0005 |
| Chemical Oxygen Demand | mg/L | | 20 | 40 | 20 | 20 | 40 | <10 | 20 | <10 | 20 | 20 | 10 | 10 |
| Conductivity | µS/cm | | 1180 | 1270 | 1680 | 1440 | 1640 | 1170 | 1240 | 469 | 471 | 448 | 470 | 472 |
| Conductivity - field | µS/cm | | 1220 | 1300 | 1660 | 1460 | 1640 | 1120 | 1270 | 470 | 479 | 463 | 465 | 473 |
| Copper | mg/L | 1 | | <0.0005 | | <0.0005 | | 0.0007 | | <0.0005 | | <0.0005 | | <0.0005 |
| Dissolved Organic Carbon | mg/L | 5 | 8.1 | 12.1 | 15.8 | 12.0 | 14.6 | 8.6 | 8.1 | <1.0 | 1.7 | 1.4 | 1 | 1.6 |
| Dissolved Oxygen - field | mg/L | | 1.31 | 1.6 | 0.57 | 1.11 | 2.02 | 2.21 | 1.06 | 1.53 | 1.23 | 1.6 | 1.18 | 1.09 |
| Hardness | mg/L | 80-100 | 556 | 95.6 | 865 | 635 | 790 | 499 | 564 | 228 | 230 | 231 | 228 | 229 |
| Ion Percentage | % | | 1.92 | 2.06 | 5.02 | 3.96 | 0.21 | 2.88 | 0.61 | 3.11 | 0.27 | 0.59 | 2.61 | 1.78 |
| Iron | mg/L | 0.3 | 8.16 | 5.42 | 8.49 | 1.94 | 6.5 | 0.871 | 4.55 | 0.317 | 0.6 | 0.491 | 0.56 | 0.407 |
| Lead | mg/L | 0.01 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Magnesium | mg/L | | 32 | 36.8 | 44.4 | 36.0 | 38.5 | 27.9 | 32.8 | 19.9 | 18.3 | 19.5 | 18.8 | 18.8 |
| Manganese | mg/L | 0.05 | 0.962 | 0.675 | 1.15 | 0.569 | 0.804 | 0.368 | 0.454 | 0.0129 | 0.011 | 0.0122 | 0.012 | 0.0122 |
| Molybdenum | mg/L | | | <0.0005 | | 0.0009 | | 0.0015 | | <0.0005 | | <0.0005 | | <0.0005 |
| Nickel | mg/L | | | 0.002 | | 0.006 | | 0.005 | | <0.002 | | <0.002 | | <0.002 |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 0.7 | <0.05 | <0.05 | <0.5 | <0.5 | <0.05 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 | <0.05 | <0.5 |
| Oxydation Reduction Potential | mV | | -92.1 | -64.6 | -70.8 | -109.9 | -71.8 | -4.3 | -109.7 | -94.5 | -147.7 | -59.5 | -89.1 | -64.4 |
| pH | units | | 7.18 | 7.2 | 7.09 | 7.32 | 7.07 | 7.2 | 7.06 | 7.83 | 8.01 | 7.81 | 7.94 | 7.85 |
| pH - field | units | | 6.95 | 6.93 | 6.87 | 7.01 | 6.74 | 6.96 | 6.8 | 7.63 | 7.54 | 7.5 | 7.79 | 7.59 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.01 | <0.01 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | 0.01 | 0.02 | 0.01 | <0.02 | <0.02 | <0.02 | <0.02 | 0.02 | 0.05 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 24.3 | 23.4 | 31.5 | 20.3 | 24.6 | 18.3 | 20.8 | 1.1 | 1.1 | 1.1 | 1.1 | 1.2 |
| Sodium | mg/L | 200 | 35.1 | 43 | 55.7 | 51.9 | 49.6 | 52.1 | 48.7 | 8.4 | 8 | 8.4 | 8.2 | 8.6 |
| Sulphate | mg/L | 500 | 167 | 222 | 467 | 392 | 402 | 179 | 203 | 37.9 | 43.4 | 43 | 42.7 | 42.6 |
| Total Dissolved Solids | mg/L | 500 | 800 | 830 | 1270 | 410 | 1160 | 680 | 790 | 320 | 280 | 280 | 280 | 210 |
| Temperature - field | °C | | 19.3 | 8.5 | 19.6 | 10.8 | 20.6 | 9.6 | 20.2 | 7.5 | 9.2 | 7 | 9.1 | 7.8 |
| Total Kjeldahl Nitrogen | mg/L | | 9.4 | 0.9 | 1.3 | 0.7 | 1.3 | 4.8 | 3.1 | <0.1 | <0.1 | <0.1 | <2.0 | <0.1 |
| Zinc | mg/L | 5 | | 0.0006 | | 0.0005 | | 0.0011 | | 0.0009 | | 0.0009 | | <0.0005 |
| Phenols | µg/L | | <1 | <1 | 1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 | 1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1,2-Trichlorethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethylene | µg/L | 14 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorpropane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichlorobenzene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(E) | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Benzene | µg/L | 1 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromodichloromethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromoform | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromomethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Carbon Tetrachloride | µg/L | 5 * | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| Chlorobenzene | µg/L | 30 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Chloroethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| Chloroform | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Chloromethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| cis-1,2-Dichloroethylene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Dibromochloromethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Dichloromethane | µg/L | 50 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Ethyl Benzene | µg/L | 1.6 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Ethylene dibromide | µg/L | | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| m/p-Xylenes | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| o-Xylene | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Styrene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Tetrachloroethylene | µg/L | 30 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Toluene | µg/L | 24 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| trans-1,2-Dichloroethylene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Trichloroethylene | µg/L | 5 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Trichlorofluoromethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| Vinyl Chloride | µg/L | 1 * | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| Xylenes - total | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 93-I | | | | | | | 93-II | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Sep-21 | Mar-22 | Sep-22 | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 |
| Alkalinity | mg/L | 30-500 | 192 | 180 | 182 | 196 | 188 | 190 | 194 | 270 | 341 | 321 | 274 | 317 |
| Aluminum | mg/L | 0.1 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 |
| Ammonia (as N) | mg/L | | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.2 | <0.1 |
| Anion sum | meq/L | | 4.89 | 4.67 | 4.71 | 4.96 | 4.93 | 4.88 | 4.97 | 6.19 | 7.46 | 7.04 | 6.19 | 6.89 |
| Arsenic | mg/L | 0.025 | <0.005 | 0.0009 | 0.0009 | 0.0007 | 0.0009 | 0.0009 | 0.0009 | <0.0005 | <0.005 | <0.0005 | 0.008 | <0.0005 |
| Barium | mg/L | 1 * | | 0.227 | | 0.244 | | 0.23 | | 0.044 | | 0.053 | | 0.063 |
| Beryllium | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0001 | | <0.0001 | | <0.0005 |
| Bicarbonate | mg/L | | 191 | 179 | 181 | 195 | 187 | 189 | 193 | 269 | 339 | 320 | 273 | 316 |
| Boron | mg/L | 5 * | | 0.0243 | | 0.0252 | | 0.0221 | | 0.0073 | | 0.0057 | | 0.0056 |
| Cadmium | mg/L | 0.005 * | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 |
| Calcium | mg/L | | 63.3 | 61.8 | 61.3 | 60.7 | 61.6 | 69.1 | 60.9 | 87.8 | 113 | 115 | 103 | 122 |
| Carbonate | mg/L | | 1 | 1 | <1 | 1 | 1 | 1 | <1 | 1 | 2 | <1 | <1 | <1 |
| Cation sum | meq/L | | 5.27 | 5.1 | 5.09 | 4.97 | 5.04 | 5.75 | 5.02 | 6.21 | 7.72 | 7.15 | 6.68 | 7.51 |
| Chloride | mg/L | 250 | 9.7 | 10.2 | 9.6 | 9.2 | 11.4 | 9.4 | 9.6 | 8 | 5.8 | 5.6 | 5.6 | 5 |
| Chromium | mg/L | 0.05 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Cobalt | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0001 | | <0.0001 | | <0.0005 |
| Chemical Oxygen Demand | mg/L | | 20 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | 30 | 30 | 20 | <10 |
| Conductivity | µS/cm | | 475 | 470 | 455 | 475 | 456 | 483 | 482 | 557 | 681 | 633 | 602 | 666 |
| Conductivity - field | µS/cm | | 465 | 487 | 466 | 482 | 468 | 456 | 480 | 591 | 703 | 644 | 597 | 671 |
| Copper | mg/L | 1 | | 0.0005 | | 0.0006 | | <0.0005 | | 0.0007 | | 0.0008 | | 0.0006 |
| Dissolved Organic Carbon | mg/L | 5 | 2.4 | 2.3 | 1.4 | 1.6 | 1.5 | <1.0 | 1.3 | 1.4 | 2.2 | 2.4 | 2.9 | 2.6 |
| Dissolved Oxygen - field | mg/L | | 7.73 | 1.89 | 0.73 | 1.19 | 2.16 | 1.01 | 1.4 | 8.77 | 3.98 | 5.94 | 6.2 | 5.39 |
| Hardness | mg/L | 80-100 | 242 | 234 | 234 | 228 | 231 | 263 | 231 | 273 | 355 | 338 | 311 | 358 |
| Ion Percentage | % | | 3.79 | 4.32 | 3.95 | 0.08 | 1.13 | 8.12 | 0.56 | 0.17 | 1.74 | 0.78 | 3.79 | 4.31 |
| Iron | mg/L | 0.3 | 0.63 | 0.503 | 0.628 | 0.289 | 0.634 | 0.534 | 0.629 | 0.001 | <0.05 | 0.002 | <0.05 | 0.005 |
| Lead | mg/L | 0.01 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Magnesium | mg/L | | 20.4 | 19.3 | 19.7 | 18.6 | 18.8 | 22 | 19.1 | 13 | 17.7 | 12.4 | 13.1 | 13 |
| Manganese | mg/L | 0.05 | 0.012 | 0.0117 | 0.012 | 0.0119 | 0.0119 | 0.0124 | 0.0116 | <0.0005 | 0.001 | <0.0005 | <0.001 | <0.0005 |
| Molybdenum | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | 0.0006 | | <0.0005 | | <0.0005 |
| Nickel | mg/L | | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | 0.58 | <0.5 | <0.5 | 0.19 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 | <0.05 | <0.5 |
| Oxydation Reduction Potential | mV | | -103.4 | -10.4 | -60.2 | -12.3 | -65.6 | -89.4 | -7 | 9.6 | 17.1 | 23.5 | 51.2 | 203.2 |
| pH | units | | 7.82 | 7.82 | 7.71 | 7.80 | 7.89 | 7.89 | 7.45 | 7.67 | 7.82 | 7.42 | 7.48 | 7.5 |
| pH - field | units | | 7.65 | 7.62 | 7.55 | 7.56 | 7.59 | 7.51 | 7.44 | 7.43 | 7.11 | 7.1 | 7.4 | 7.12 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.01 | <0.01 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | <0.01 | 0.01 | 0.01 | <0.02 | <0.02 | 0.02 | 0.02 | 0.03 | <0.02 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.2 | 1.2 | 1.2 | 1.2 | 1.1 | 1.4 | 1.1 | 0.8 | 1.4 | 0.6 | 1.2 | 0.9 |
| Sodium | mg/L | 200 | 8.5 | 8.1 | 8 | 7.8 | 8.1 | 9.4 | 7.9 | 16.2 | 12.8 | 8 | 9 | 7 |
| Sulphate | mg/L | 500 | 43.2 | 43.4 | 43.9 | 43.7 | 46.6 | 45.3 | 45.3 | 33.7 | 33.6 | 32.4 | 34.5 | 29.6 |
| Total Dissolved Solids | mg/L | 500 | 310 | 290 | 270 | 270 | 250 | 290 | 250 | 380 | 390 | 380 | 350 | 390 |
| Temperature - field | °C | | 8.3 | 7.6 | 9.1 | 7.5 | 8.8 | 7.3 | 8.7 | 3.6 | 13.2 | 3 | 14 | 3.5 |
| Total Kjeldahl Nitrogen | mg/L | | <0.1 | <0.1 | <1.0 | <0.1 | 0.1 | <0.2 | <2.0 | <0.1 | 0.1 | 0.2 | <2.0 | 0.2 |
| Zinc | mg/L | 5 | | <0.0005 | | <0.0005 | | <0.0005 | | 0.0006 | | 0.0019 | | 0.0023 |
| Phenols | µg/L | | <1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1,2-Trichlorethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethylene | µg/L | 14 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorpropane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichlorobenzene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(E) | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Benzene | µg/L | 1 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromodichloromethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromoform | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromomethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Carbon Tetrachloride | µg/L | 5 * | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| Chlorobenzene | µg/L | 30 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Chloroethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| Chloroform | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Chloromethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| cis-1,2-Dichloroethylene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Dibromochloromethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Dichloromethane | µg/L | 50 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Ethyl Benzene | µg/L | 1.6 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Ethylene dibromide | µg/L | | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| m/p-Xylenes | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| o-Xylene | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Styrene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Tetrachloroethylene | µg/L | 30 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Toluene | µg/L | 24 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| trans-1,2-Dichloroethylene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Trichloroethylene | µg/L | 5 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Trichlorofluoromethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| Vinyl Chloride | µg/L | 1 * | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| Xylenes - total | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 93-II | | | | | | | 94-I | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Sep-21 | Mar-22 | Sep-22 | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 |
| Alkalinity | mg/L | 30-500 | 319 | 279 | 332 | 339 | 374 | 332 | 258 | 187 | 194 | 185 | 185 | 185 |
| Aluminum | mg/L | 0.1 | | 0.061 | | <0.025 | | <0.025 | | 0.049 | | <0.025 | | <0.025 |
| Ammonia (as N) | mg/L | | 0.1 | 0.2 | <0.1 | 0.1 | 0.1 | 0.2 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 |
| Anion sum | meq/L | | 7 | 6.33 | 7.53 | 7.69 | 8.65 | 7.47 | 10.2 | 5.17 | 5.41 | 5.68 | 5.15 | 5.1 |
| Arsenic | mg/L | 0.025 | <0.005 | <0.0005 | 0.0006 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0016 | <0.005 | 0.0018 | <0.005 | 0.002 |
| Barium | mg/L | 1 * | | 0.073 | | 0.055 | | 0.075 | | 0.055 | | 0.062 | | 0.06 |
| Beryllium | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0001 | | <0.0001 | | <0.0005 |
| Bicarbonate | mg/L | | 318 | 278 | 331 | 338 | 373 | 331 | 257 | 186 | 193 | 184 | 184 | 184 |
| Boron | mg/L | 5 * | | 0.0064 | | 0.0027 | | 0.0057 | | 0.0309 | | 0.0246 | | 0.027 |
| Cadmium | mg/L | 0.005 * | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 |
| Calcium | mg/L | | 113 | 106 | 137 | 138 | 151 | 144 | 170 | 62.5 | 56.9 | 62.9 | 60.2 | 59.6 |
| Carbonate | mg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | 1 | 1 | 1 | 1 |
| Cation sum | meq/L | | 7.57 | 6.94 | 8.23 | 8.07 | 8.97 | 8.92 | 10.1 | 5.67 | 5.14 | 5.49 | 5.35 | 5.33 |
| Chloride | mg/L | 250 | 6 | 6.8 | 8.4 | 10.6 | 9.5 | 9.2 | 19.7 | 14 | 14.6 | 14.4 | 13.1 | 11.5 |
| Chromium | mg/L | 0.05 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Cobalt | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0001 | | <0.0001 | | <0.0005 |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | <10 | <10 | <10 | <10 | 20 | <10 | <10 | <10 | 10 | 20 |
| Conductivity | µS/cm | | 665 | 618 | 746 | 735 | 817 | 723 | 912 | 516 | 506 | 510 | 504 | 501 |
| Conductivity - field | µS/cm | | 651 | 639 | 725 | 748 | 797 | 684 | 916 | 517 | 515 | 496 | 498 | 501 |
| Copper | mg/L | 1 | | 0.001 | | 0.0009 | | 0.0008 | | <0.0005 | | <0.0005 | | <0.0005 |
| Dissolved Organic Carbon | mg/L | 5 | 14.5 | 2.9 | 3.9 | 2.8 | 3.7 | 2 | 4.3 | <1.0 | 1.2 | 1.2 | 1 | 1.1 |
| Dissolved Oxygen - field | mg/L | | 5.86 | 5.1 | 3.98 | 6.39 | 5.09 | 7.51 | 6.45 | 1.19 | 1.46 | 1.78 | 0.7 | 1.65 |
| Hardness | mg/L | 80-100 | 356 | 329 | 393 | 391 | 431 | 429 | 485 | 261 | 236 | 252 | 247 | 245 |
| Ion Percentage | % | | 3.88 | 4.55 | 4.43 | 2.41 | 1.83 | 8.84 | 0.74 | 4.58 | 2.52 | 1.75 | 1.85 | 2.17 |
| Iron | mg/L | 0.3 | <0.05 | 0.042 | 0.01 | 0.006 | 0.06 | <0.005 | 0.014 | 0.353 | 0.46 | 0.353 | 0.48 | 0.362 |
| Lead | mg/L | 0.01 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Magnesium | mg/L | | 18 | 15.7 | 12.4 | 11.2 | 13 | 16.9 | 14.8 | 25.6 | 22.9 | 23.1 | 23.4 | 23.4 |
| Manganese | mg/L | 0.05 | 0.009 | 0.0028 | 0.0096 | 0.0012 | 0.0031 | <0.0005 | 0.0009 | 0.014 | 0.01 | 0.0105 | 0.011 | 0.0107 |
| Molybdenum | mg/L | | | 0.0007 | | <0.0005 | | <0.0005 | | 0.001 | | 0.0011 | | 0.001 |
| Nickel | mg/L | | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 0.19 | <0.05 | <0.5 | 3.97 | <0.05 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 | <0.05 | <0.5 |
| Oxydation Reduction Potential | mV | | 58.2 | 91.5 | 35.3 | 81.7 | 105.4 | 104.9 | 156.8 | -85.1 | -108.1 | -46.7 | -87.1 | -60.1 |
| pH | units | | 7.5 | 7.48 | 7.24 | 7.33 | 7.35 | 7.46 | 7.51 | 7.85 | 7.89 | 7.85 | 7.87 | 7.87 |
| pH - field | units | | 7.3 | 7.35 | 7.25 | 7.05 | 7.05 | 7.09 | 7.13 | 7.63 | 7.54 | 7.54 | 7.73 | 7.7 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.01 | <0.01 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | <0.01 | 0.02 | 0.01 | <0.02 | <0.02 | 0.02 | <0.02 | 0.02 | <0.02 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.6 | 1.1 | 1.4 | 0.9 | 1.8 | 1.4 | 1.9 | 1.3 | 1.3 | 1.3 | 1.2 | 1.3 |
| Sodium | mg/L | 200 | 8.5 | 6.6 | 7.1 | 4.8 | 6.5 | 5.9 | 6.6 | 8.4 | 7.8 | 8.5 | 7.9 | 8.3 |
| Sulphate | mg/L | 500 | 31.8 | 35.8 | 41.8 | 40.1 | 54.9 | 37.7 | 224 | 55.8 | 59.6 | 67.9 | 57.9 | 57.7 |
| Total Dissolved Solids | mg/L | 500 | 400 | 370 | 500 | 270 | 420 | 410 | 580 | 350 | 360 | 300 | 300 | 290 |
| Temperature - field | °C | | 12.1 | 3.6 | 13.5 | 3.1 | 13.4 | 3.6 | 13.6 | 8 | 8.7 | 7.7 | 9 | 7.5 |
| Total Kjeldahl Nitrogen | mg/L | | <0.1 | 0.1 | <1.0 | 0.2 | 0.3 | <0.2 | 3.4 | <0.1 | <0.1 | <0.1 | <2.0 | <0.1 |
| Zinc | mg/L | 5 | | 0.0007 | | 0.0014 | | <0.0005 | | 0.0009 | | 0.0008 | | <0.0005 |
| Phenols | µg/L | | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1,2-Trichlorethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethylene | µg/L | 14 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorpropane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichlorobenzene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(E) | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Benzene | µg/L | 1 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromodichloromethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromoform | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromomethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Carbon Tetrachloride | µg/L | 5 * | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| Chlorobenzene | µg/L | 30 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Chloroethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| Chloroform | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Chloromethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| cis-1,2-Dichloroethylene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Dibromochloromethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Dichloromethane | µg/L | 50 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Ethyl Benzene | µg/L | 1.6 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Ethylene dibromide | µg/L | | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| m/p-Xylenes | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| o-Xylene | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Styrene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Tetrachloroethylene | µg/L | 30 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Toluene | µg/L | 24 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| trans-1,2-Dichloroethylene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Trichloroethylene | µg/L | 5 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Trichlorofluoromethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| Vinyl Chloride | µg/L | 1 * | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| Xylenes - total | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 94-I | | | | | | | 94-II | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Sep-21 | Mar-22 | Sep-22 | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 |
| Alkalinity | mg/L | 30-500 | 187 | 186 | 183 | 189 | 194 | 191 | 189 | 300 | 313 | 289 | 299 | 297 |
| Aluminum | mg/L | 0.1 | | 0.082 | | <0.025 | | <0.025 | | 0.041 | | <0.025 | | <0.025 |
| Ammonia (as N) | mg/L | | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.2 | 0.1 |
| Anion sum | meq/L | | 5.14 | 5.23 | 5.07 | 5.19 | 5.40 | 5.24 | 5.20 | 9.11 | 9.01 | 8.28 | 8.56 | 8.62 |
| Arsenic | mg/L | 0.025 | <0.005 | 0.0019 | 0.002 | 0.0016 | 0.0022 | <0.0005 | 0.0021 | <0.0005 | <0.005 | <0.0005 | 0.006 | <0.0005 |
| Barium | mg/L | 1 * | | 0.059 | | 0.06 | | 0.214 | | 0.131 | | 0.14 | | 0.152 |
| Beryllium | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0001 | | <0.0001 | | <0.0005 |
| Bicarbonate | mg/L | | 186 | 185 | 182 | 187 | 192 | 190 | 188 | 299 | 312 | 288 | 298 | 296 |
| Boron | mg/L | 5 * | | 0.0249 | | 0.0272 | | 0.0225 | | 0.0125 | | 0.0094 | | 0.0131 |
| Cadmium | mg/L | 0.005 * | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 |
| Calcium | mg/L | | 61.3 | 62.9 | 64.7 | 60.1 | 60.3 | 64.3 | 59.8 | 134 | 133 | 141 | 139 | 139 |
| Carbonate | mg/L | | 1 | 1 | <1 | 2 | 2 | 1 | 1 | <1 | <1 | <1 | <1 | <1 |
| Cation sum | meq/L | | 5.54 | 5.55 | 5.66 | 5.42 | 5.33 | 5.72 | 5.34 | 9.02 | 8.69 | 9.14 | 9 | 9.09 |
| Chloride | mg/L | 250 | 12.3 | 13.7 | 12.6 | 12.1 | 13.7 | 12.1 | 11.7 | 52.3 | 27.5 | 17.8 | 27.3 | 22.9 |
| Chromium | mg/L | 0.05 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Cobalt | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | 0.0003 | | <0.0001 | | <0.0005 |
| Chemical Oxygen Demand | mg/L | | <10 | 40 | <10 | 20 | <10 | <10 | <10 | <10 | 10 | 20 | <10 | <10 |
| Conductivity | µS/cm | | 504 | 512 | 503 | 506 | 510 | 517 | 505 | 792 | 812 | 798 | 828 | 808 |
| Conductivity - field | µS/cm | | 493 | 511 | 492 | 516 | 499 | 490 | 504 | 869 | 830 | 790 | 810 | 830 |
| Copper | mg/L | 1 | | <0.0005 | | <0.0005 | | <0.0005 | | 0.0006 | | 0.0011 | | <0.0005 |
| Dissolved Organic Carbon | mg/L | 5 | 3.4 | 2.2 | 1.4 | <1.0 | 1.5 | <1.0 | 1.2 | <1.0 | 1.6 | 1.2 | 1.8 | 2.2 |
| Dissolved Oxygen - field | mg/L | | 0.94 | 1.31 | 0.57 | 1.11 | 2.00 | 1.89 | 1.75 | 2.15 | 2.95 | 2.96 | 3.26 | 3.26 |
| Hardness | mg/L | 80-100 | 256 | 257 | 262 | 251 | 246 | 264 | 247 | 433 | 417 | 441 | 432 | 436 |
| Ion Percentage | % | | 3.77 | 2.99 | 5.49 | 2.2 | 0.66 | 4.42 | 1.38 | 0.51 | 1.77 | 4.94 | 2.53 | 2.66 |
| Iron | mg/L | 0.3 | 0.48 | 0.484 | 0.416 | 0.227 | 0.523 | 0.019 | 0.476 | 0.318 | 0.24 | 0.053 | 0.58 | 0.061 |
| Lead | mg/L | 0.01 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Magnesium | mg/L | | 25 | 24.3 | 24.4 | 24.4 | 23.1 | 25.1 | 23.6 | 23.9 | 20.5 | 21.5 | 20.6 | 21.6 |
| Manganese | mg/L | 0.05 | 0.012 | 0.0138 | 0.0178 | 0.0105 | 0.0114 | 0.0017 | 0.0108 | 0.0237 | 0.02 | 0.0034 | 0.013 | 0.0044 |
| Molybdenum | mg/L | | | 0.001 | | 0.0012 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Nickel | mg/L | | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | 0.43 | 0.44 | <0.5 | 0.6 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 | <0.05 | <0.5 |
| Oxydation Reduction Potential | mV | | -102.7 | -56.6 | -76.1 | -6.1 | -77.8 | -84.1 | -22.8 | -16.8 | -42.4 | 15.7 | -22.1 | 73.2 |
| pH | units | | 7.83 | 7.89 | 7.74 | 7.93 | 7.92 | 7.89 | 7.89 | 7.49 | 7.47 | 7.51 | 7.49 | 7.51 |
| pH - field | units | | 7.64 | 7.59 | 7.67 | 7.57 | 7.55 | 7.50 | 7.55 | 7.21 | 7.14 | 7.11 | 7.26 | 7.31 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.01 | <0.01 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | <0.01 | 0.01 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | 0.03 | 0.12 | 0.03 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.4 | 1.3 | 1.4 | 1.3 | 1.3 | 1.4 | 1.3 | 1.1 | 1.4 | 1 | 1.3 | 1.1 |
| Sodium | mg/L | 200 | 8.1 | 7.9 | 8 | 7.9 | 7.8 | 8.4 | 7.8 | 6.6 | 6.7 | 6.1 | 6.6 | 7 |
| Sulphate | mg/L | 500 | 56.5 | 59.9 | 56.4 | 57.2 | 60.4 | 57.7 | 58.2 | 86.7 | 103 | 105 | 94.1 | 107 |
| Total Dissolved Solids | mg/L | 500 | 350 | 320 | 330 | 330 | 180 | 310 | 310 | 520 | 540 | 500 | 500 | 460 |
| Temperature - field | °C | | 8.5 | 7.7 | 8.4 | 7.2 | 8.8 | 7.8 | 9.1 | 3.9 | 12.2 | 3.7 | 13.7 | 3.3 |
| Total Kjeldahl Nitrogen | mg/L | | <0.1 | <0.1 | <1.0 | <0.5 | 0.1 | <0.2 | 2.1 | <0.1 | 0.4 | <0.3 | <2.0 | 0.2 |
| Zinc | mg/L | 5 | | <0.0005 | | <0.0005 | | <0.0005 | | 0.0006 | | 0.0017 | | 0.0008 |
| Phenols | µg/L | | <1 | <1 | 1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1,2-Trichlorethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethylene | µg/L | 14 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorpropane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichlorobenzene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(E) | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Benzene | µg/L | 1 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromodichloromethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromoform | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromomethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Carbon Tetrachloride | µg/L | 5 * | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| Chlorobenzene | µg/L | 30 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Chloroethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| Chloroform | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Chloromethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| cis-1,2-Dichloroethylene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Dibromochloromethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Dichloromethane | µg/L | 50 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Ethyl Benzene | µg/L | 1.6 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Ethylene dibromide | µg/L | | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| m/p-Xylenes | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| o-Xylene | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Styrene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Tetrachloroethylene | µg/L | 30 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Toluene | µg/L | 24 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| trans-1,2-Dichloroethylene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Trichloroethylene | µg/L | 5 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Trichlorofluoromethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| Vinyl Chloride | µg/L | 1 * | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| Xylenes - total | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 94-II | | | | | | | 95-I | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Sep-21 | Mar-22 | Sep-22 | Mar-17 | Sep-17 | Apr-18 | Sep-18 | Mar-19 |
| Alkalinity | mg/L | 30-500 | 325 | 304 | 297 | 293 | 337 | 334 | 351 | 203 | 210 | 213 | 201 | 199 |
| Aluminum | mg/L | 0.1 | | 0.105 | | <0.025 | | <0.025 | | 0.028 | | <0.025 | | <0.025 |
| Ammonia (as N) | mg/L | | 0.2 | 0.1 | 0.1 | <0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.2 | 0.1 | 0.1 |
| Anion sum | meq/L | | 8.72 | 8.43 | 8.12 | 7.88 | 9.72 | 8.59 | 8.97 | 6.09 | 6.26 | 6.22 | 6.09 | 5.98 |
| Arsenic | mg/L | 0.025 | <0.005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 |
| Barium | mg/L | 1 * | | 0.122 | | 0.121 | | 0.142 | | 0.059 | | 0.054 | | 0.056 |
| Beryllium | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0001 | | <0.0001 | | <0.0005 |
| Bicarbonate | mg/L | | 324 | 303 | 296 | 292 | 336 | 333 | 350 | 202 | 209 | 212 | 200 | 198 |
| Boron | mg/L | 5 * | | 0.0104 | | 0.0099 | | 0.0125 | | 0.0123 | | 0.0161 | | 0.011 |
| Cadmium | mg/L | 0.005 * | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 |
| Calcium | mg/L | | 145 | 127 | 133 | 122 | 146 | 148 | 140 | 89.5 | 82.8 | 89.5 | 88 | 89.2 |
| Carbonate | mg/L | | <1 | <1 | <1 | <1 | <1 | <1 | 1 | <1 | 1 | <1 | <1 | 1 |
| Cation sum | meq/L | | 9.5 | 8.35 | 8.82 | 7.95 | 9.60 | 9.86 | 9.39 | 6.14 | 5.99 | 6.35 | 6.27 | 6.39 |
| Chloride | mg/L | 250 | 22.3 | 19 | 22.6 | 18.6 | 40.7 | 18.9 | 21.1 | 17.2 | 18.2 | 16.4 | 18.3 | 16 |
| Chromium | mg/L | 0.05 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Cobalt | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | 0.0002 | | 0.0001 | | <0.0005 |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | 20 | <10 | <10 | 20 |
| Conductivity | µS/cm | | 831 | 794 | 750 | 749 | 916 | 786 | 900 | 583 | 582 | 583 | 589 | 563 |
| Conductivity - field | µS/cm | | 813 | 796 | 777 | 773 | 891 | 802 | 851 | 586 | 591 | 568 | 591 | 589 |
| Copper | mg/L | 1 | | <0.0005 | | 0.0011 | | 0.0007 | | 0.0006 | | 0.0009 | | 0.0005 |
| Dissolved Organic Carbon | mg/L | 5 | 2.3 | 2.5 | 2 | 1.9 | 2.2 | 1.4 | 2.0 | <1.0 | <1.0 | <1.0 | <1.0 | 2 |
| Dissolved Oxygen - field | mg/L | | 5.88 | 3.55 | 1.73 | 3.64 | 3.60 | 1.77 | 6.77 | 1.51 | 1.12 | 1.34 | 1.82 | 1.26 |
| Hardness | mg/L | 80-100 | 455 | 401 | 421 | 382 | 458 | 471 | 445 | 291 | 286 | 303 | 300 | 305 |
| Ion Percentage | % | | 4.3 | 0.5 | 4.15 | 0.46 | 0.64 | 6.84 | 2.29 | 0.41 | 2.21 | 1.04 | 1.45 | 3.31 |
| Iron | mg/L | 0.3 | 0.37 | 0.087 | 0.139 | 0.040 | 0.234 | 0.054 | 0.306 | 0.222 | 0.15 | 0.196 | 0.16 | 0.189 |
| Lead | mg/L | 0.01 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Magnesium | mg/L | | 22.5 | 20.4 | 21.5 | 18.7 | 22.6 | 24.6 | 22.9 | 16.5 | 19.3 | 19.4 | 19.4 | 20 |
| Manganese | mg/L | 0.05 | 0.038 | 0.0026 | 0.0122 | 0.0029 | 0.0153 | 0.0078 | 0.0186 | 0.0199 | 0.019 | 0.0176 | 0.021 | 0.0191 |
| Molybdenum | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | 0.0006 | | 0.0006 | | 0.0005 |
| Nickel | mg/L | | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | 0.5 | <0.5 | <0.5 | <0.5 | 0.78 | <0.05 | 0.05 | <0.5 | <0.05 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 | <0.05 | <0.5 |
| Oxydation Reduction Potential | mV | | -23.1 | 92 | 26.5 | 113 | 95.8 | 67.6 | 39.4 | 19.5 | -37 | -40.1 | 118.5 | -22 |
| pH | units | | 7.44 | 7.53 | 7.36 | 7.51 | 7.39 | 7.46 | 7.52 | 7.64 | 7.78 | 7.57 | 7.71 | 7.75 |
| pH - field | units | | 7.26 | 7.16 | 7.26 | 7.19 | 7.10 | 7.04 | 7.16 | 7.43 | 7.35 | 7.36 | 7.49 | 7.54 |
| Phosphate | mg/L | | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.01 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | <0.01 | 0.02 | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.03 | 0.12 | 0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.4 | 1 | 1.2 | 1.0 | 1.3 | 1.2 | 1.4 | 1.8 | 1.5 | 1.5 | 1.5 | 1.8 |
| Sodium | mg/L | 200 | 7.5 | 6.1 | 7.8 | 6.1 | 8.4 | 8.3 | 9.9 | 5.2 | 4.5 | 4.7 | 4.7 | 4.9 |
| Sulphate | mg/L | 500 | 86.5 | 96.8 | 81.5 | 80.9 | 98.6 | 76.8 | 73.4 | 80.4 | 80.7 | 78.5 | 80.8 | 80.8 |
| Total Dissolved Solids | mg/L | 500 | 550 | 510 | 520 | 230 | 500 | 490 | 520 | 370 | 370 | 350 | 350 | 370 |
| Temperature - field | °C | | 11.9 | 3.7 | 12.7 | 3.1 | 12.7 | 3.3 | 13.6 | 8.4 | 9 | 8.3 | 9 | 8.4 |
| Total Kjeldahl Nitrogen | mg/L | | 0.4 | 0.3 | <1.0 | 0.2 | 0.3 | <0.2 | <2.0 | <0.1 | 0.2 | <0.1 | <2.0 | <0.1 |
| Zinc | mg/L | 5 | | 0.0011 | | 0.0011 | | 0.0009 | | 0.002 | | 0.0016 | | 0.0014 |
| Phenols | µg/L | | <1 | <1 | 2 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1,2-Trichlorethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethylene | µg/L | 14 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorpropane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichlorobenzene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(E) | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Benzene | µg/L | 1 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromodichloromethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromoform | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromomethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Carbon Tetrachloride | µg/L | 5 * | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| Chlorobenzene | µg/L | 30 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Chloroethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| Chloroform | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Chloromethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| cis-1,2-Dichloroethylene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Dibromochloromethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Dichloromethane | µg/L | 50 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Ethyl Benzene | µg/L | 1.6 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Ethylene dibromide | µg/L | | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| m/p-Xylenes | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| o-Xylene | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Styrene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Tetrachloroethylene | µg/L | 30 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Toluene | µg/L | 24 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| trans-1,2-Dichloroethylene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Trichloroethylene | µg/L | 5 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Trichlorofluoromethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| Vinyl Chloride | µg/L | 1 * | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| Xylenes - total | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 95-I | | | | | | | 95-II | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Sep-21 | Apr-22 | Sep-22 | Mar-17 | Sep-17 | Apr-18 | Sep-18 | Mar-19 |
| Alkalinity | mg/L | 30-500 | 207 | 196 | 196 | 205 | 204 | 199 | 206 | 230 | 274 | 247 | 218 | 227 |
| Aluminum | mg/L | 0.1 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 |
| Ammonia (as N) | mg/L | | 0.1 | <0.1 | 0.1 | 0.1 | 0.2 | 0.1 | 0.2 | 0.2 | 0.2 | 0.3 | 0.2 | <0.1 |
| Anion sum | meq/L | | 6.15 | 5.91 | 5.89 | 6.08 | 6.15 | 5.96 | 6.13 | 7.85 | 7.87 | 7.32 | 6.68 | 7.38 |
| Arsenic | mg/L | 0.025 | <0.005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.005 | 0.0007 | 0.006 | 0.0008 |
| Barium | mg/L | 1 * | | 0.06 | | 0.059 | | 0.055 | | 0.089 | | 0.092 | | 0.11 |
| Beryllium | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0001 | | <0.0001 | | <0.0005 |
| Bicarbonate | mg/L | | 206 | 195 | 195 | 204 | 203 | 198 | 205 | 229 | 273 | 246 | 217 | 226 |
| Boron | mg/L | 5 * | | 0.0124 | | 0.0187 | | 0.0092 | | 0.0091 | | 0.0111 | | 0.0079 |
| Cadmium | mg/L | 0.005 * | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 |
| Calcium | mg/L | | 91.4 | 87.3 | 88.3 | 84.7 | 82.9 | 95.5 | 87.9 | 114 | 105 | 104 | 98.7 | 97.8 |
| Carbonate | mg/L | | <1 | 1 | <1 | 1 | 1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 |
| Cation sum | meq/L | | 6.57 | 6.24 | 6.45 | 6.13 | 5.95 | 6.87 | 6.33 | 7.55 | 7.27 | 7.39 | 6.93 | 7.4 |
| Chloride | mg/L | 250 | 18.1 | 17.1 | 17.4 | 16.9 | 18.9 | 17.5 | 19.2 | 59.3 | 39.2 | 45.3 | 26.1 | 71.2 |
| Chromium | mg/L | 0.05 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Cobalt | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | 0.0001 | | 0.0002 | | <0.0005 |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | 20 | 30 | 20 |
| Conductivity | µS/cm | | 600 | 583 | 587 | 586 | 552 | 595 | 601 | 745 | 734 | 703 | 652 | 753 |
| Conductivity - field | µS/cm | | 588 | 575 | 578 | 593 | 578 | 563 | 597 | 743 | 802 | 691 | 652 | 714 |
| Copper | mg/L | 1 | | 0.0016 | | 0.0011 | | 0.0006 | | 0.0011 | | <0.0005 | | 0.0013 |
| Dissolved Organic Carbon | mg/L | 5 | 2.6 | <1.0 | <1.0 | 1.6 | 1.4 | 1.6 | 1.2 | 1.8 | 2.2 | 2.1 | 1.2 | 4 |
| Dissolved Oxygen - field | mg/L | | 1.45 | 1.45 | 0.59 | 1.05 | 2.62 | 1.60 | 1.20 | 3.04 | 2.45 | 2.3 | 5.22 | 1.42 |
| Hardness | mg/L | 80-100 | 314 | 298 | 307 | 293 | 283 | 327 | 301 | 352 | 344 | 342 | 326 | 318 |
| Ion Percentage | % | | 3.32 | 2.67 | 4.53 | 0.41 | 1.68 | 7.10 | 1.68 | 1.94 | 3.93 | 0.44 | 1.81 | 0.18 |
| Iron | mg/L | 0.3 | 0.16 | 0.249 | 0.223 | 0.269 | 0.255 | 0.261 | 0.262 | 0.011 | 0.22 | 0.234 | 0.36 | 0.137 |
| Lead | mg/L | 0.01 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Magnesium | mg/L | | 20.8 | 19.5 | 21 | 19.7 | 18.5 | 21.6 | 19.9 | 16.3 | 19.9 | 20.1 | 19.3 | 18 |
| Manganese | mg/L | 0.05 | 0.024 | 0.0192 | 0.021 | 0.0198 | 0.0213 | 0.0197 | 0.0232 | 0.0793 | 0.172 | 0.193 | 0.116 | 0.198 |
| Molybdenum | mg/L | | | 0.0007 | | 0.0007 | | 0.0006 | | 0.0009 | | 0.0007 | | 0.0007 |
| Nickel | mg/L | | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 | <0.05 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.05 | <0.5 | <0.05 | <0.5 |
| Oxydation Reduction Potential | mV | | -32.4 | 44.3 | -25 | -24.5 | -10.6 | -7.1 | -42.3 | 56 | -54.1 | -28.1 | 76.3 | -2.8 |
| pH | units | | 7.63 | 7.76 | 7.65 | 7.72 | 7.73 | 7.69 | 7.70 | 7.51 | 7.67 | 7.48 | 7.66 | 7.65 |
| pH - field | units | | 7.51 | 7.5 | 7.6 | 7.43 | 7.39 | 7.41 | 7.42 | 7.27 | 7.15 | 7.24 | 7.43 | 7.02 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.01 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | <0.01 | 0.01 | 0.02 | <0.02 | <0.02 | 0.03 | 0.02 | 0.05 | 0.11 | 0.05 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.7 | 1.6 | 1.7 | 1.6 | 1.6 | 1.9 | 1.6 | 1.4 | 1.6 | 1.5 | 1.9 | 1.4 |
| Sodium | mg/L | 200 | 5 | 4.8 | 5.3 | 4.7 | 4.8 | 5.5 | 5.2 | 10.1 | 7.1 | 10.4 | 7.4 | 22.5 |
| Sulphate | mg/L | 500 | 78.5 | 78.8 | 77.1 | 78.6 | 80.4 | 77.6 | 76.8 | 82.9 | 70.2 | 60.9 | 83 | 47.1 |
| Total Dissolved Solids | mg/L | 500 | 400 | 390 | 360 | 350 | 240 | 390 | 380 | 430 | 450 | 400 | 390 | 450 |
| Temperature - field | °C | | 9.4 | 8.5 | 8.8 | 9 | 8.8 | 8.6 | 9.1 | 3.6 | 12.5 | 3.3 | 14.3 | 2 |
| Total Kjeldahl Nitrogen | mg/L | | <0.1 | <0.1 | <1.0 | <0.1 | 0.2 | <0.2 | <2.0 | <0.1 | 0.2 | <0.1 | <2.0 | 0.2 |
| Zinc | mg/L | 5 | | 0.002 | | 0.0018 | | 0.0011 | | 0.0009 | | 0.0013 | | 0.0031 |
| Phenols | µg/L | | <1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1,2-Trichlorethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethylene | µg/L | 14 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorpropane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichlorobenzene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(E) | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Benzene | µg/L | 1 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromodichloromethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromoform | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromomethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Carbon Tetrachloride | µg/L | 5 * | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| Chlorobenzene | µg/L | 30 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Chloroethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| Chloroform | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Chloromethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| cis-1,2-Dichloroethylene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Dibromochloromethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Dichloromethane | µg/L | 50 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Ethyl Benzene | µg/L | 1.6 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Ethylene dibromide | µg/L | | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| m/p-Xylenes | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| o-Xylene | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Styrene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Tetrachloroethylene | µg/L | 30 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Toluene | µg/L | 24 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| trans-1,2-Dichloroethylene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Trichloroethylene | µg/L | 5 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Trichlorofluoromethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| Vinyl Chloride | µg/L | 1 * | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| Xylenes - total | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 95-II | | | | | | | 101-I | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Sep-21 | Apr-22 | Sep-22 | Mar-17 | Mar-18 | Mar-19 | Apr-20 | Mar-21 |
| Alkalinity | mg/L | 30-500 | 222 | 269 | 231 | 258 | 293 | 268 | 230 | 167 | 168 | 158 | 150 | 171 |
| Aluminum | mg/L | 0.1 | | <0.025 | | <0.025 | | <0.025 | | | | | | |
| Ammonia (as N) | mg/L | | 0.2 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| Anion sum | meq/L | | 6.48 | 8.62 | 8.09 | 7.95 | 8.44 | 7.93 | 6.71 | 4.36 | 4.55 | 4.54 | 4.34 | 4.67 |
| Arsenic | mg/L | 0.025 | <0.005 | 0.0008 | <0.0005 | <0.0005 | 0.0013 | 0.0010 | 0.0015 | 0.0009 | <0.005 | 0.0012 | 0.0008 | 0.0014 |
| Barium | mg/L | 1 * | | 0.121 | | 0.111 | | 0.131 | | | | | | |
| Beryllium | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | | | | | |
| Bicarbonate | mg/L | | 221 | 268 | 230 | 257 | 292 | 267 | 229 | 166 | 167 | 157 | 149 | 169 |
| Boron | mg/L | 5 * | | 0.0233 | | 0.0131 | | 0.005 | | 0.96 | | | | |
| Cadmium | mg/L | 0.005 * | | <0.0001 | | <0.0001 | | <0.0001 | | | | | | |
| Calcium | mg/L | | 98.1 | 119 | 125 | 112 | 118 | 127 | 98 | 14.3 | 16 | 19.3 | 19.4 | 22.5 |
| Carbonate | mg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 | 2 |
| Cation sum | meq/L | | 6.98 | 9.24 | 9.04 | 7.96 | 8.39 | 9.20 | 6.93 | 4.31 | 4.42 | 4.89 | 4.65 | 5.11 |
| Chloride | mg/L | 250 | 21.5 | 89.2 | 68 | 63.1 | 59.5 | 66.5 | 25.0 | 7.1 | 5.5 | 4.1 | 3.8 | 4 |
| Chromium | mg/L | 0.05 * | | <0.0005 | | <0.0005 | | <0.0005 | | | | | | |
| Cobalt | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | | | | | |
| Chemical Oxygen Demand | mg/L | | <10 | 40 | <10 | 20 | <10 | <10 | <10 | 40 | <10 | 20 | <10 | <10 |
| Conductivity | µS/cm | | 637 | 881 | 819 | 788 | 827 | 820 | 659 | 431 | 447 | 463 | 463 | 469 |
| Conductivity - field | µS/cm | | 626 | 767 | 812 | 804 | 762 | 779 | 652 | 434 | 447 | 473 | 453 | 484 |
| Copper | mg/L | 1 | | 0.0006 | | 0.0006 | | 0.0011 | | | | | | |
| Dissolved Organic Carbon | mg/L | 5 | 5.4 | 5.9 | 2.7 | 2.5 | 3.8 | 3.6 | 1.7 | 7 | 5.4 | 5.3 | 6.8 | 2.3 |
| Dissolved Oxygen - field | mg/L | | 2.43 | 1.91 | 1.53 | 2.29 | 4.98 | 2.42 | 6.54 | 1.44 | 3.73 | 1.86 | 1.6 | 2.63 |
| Hardness | mg/L | 80-100 | 328 | 369 | 413 | 364 | 380 | 409 | 325 | 64.3 | 70.4 | 85.7 | 88 | 101 |
| Ion Percentage | % | | 3.66 | 3.47 | 5.53 | 0.02 | 0.34 | 7.39 | 1.62 | 0.47 | 1.55 | 3.73 | 3.46 | 4.43 |
| Iron | mg/L | 0.3 | 0.86 | 0.637 | 0.077 | 0.186 | 0.452 | 2.110 | 0.339 | 0.056 | <0.05 | 0.054 | 0.013 | 0.033 |
| Lead | mg/L | 0.01 * | | <0.0005 | | <0.0005 | | <0.0005 | | | | | | |
| Magnesium | mg/L | | 20.2 | 17.4 | 24.5 | 20.6 | 20.8 | 22.3 | 19.6 | 6.94 | 7.39 | 9.11 | 9.61 | 10.9 |
| Manganese | mg/L | 0.05 | 0.155 | 0.496 | 0.0734 | 0.216 | 0.187 | 0.287 | 0.117 | 0.0145 | 0.013 | 0.0061 | 0.0095 | 0.0068 |
| Molybdenum | mg/L | | | 0.0006 | | 0.0006 | | <0.0005 | | | | | | |
| Nickel | mg/L | | | <0.002 | | <0.002 | | <0.002 | | | | | | |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | -77.8 | 21.7 | 18.8 | -1.6 | -48.7 | -69.7 | -54.4 | -32.3 | -22.5 | -40.3 | 33.9 | -83.5 |
| pH | units | | 7.6 | 7.49 | 7.46 | 7.57 | 7.50 | 7.45 | 7.65 | 7.88 | 7.8 | 7.69 | 7.74 | 7.98 |
| pH - field | units | | 7.42 | 7.29 | 7.36 | 7 | 7.22 | 7.15 | 7.35 | 7.61 | 7.72 | 7.94 | 7.83 | 7.79 |
| Phosphate | mg/L | | <0.02 | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | 0.03 | 0.01 | 0.01 | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.01 | 0.06 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 2 | 2.4 | 2.1 | 1.4 | 2.0 | 1.8 | 2.0 | 3.5 | 3.5 | 4.3 | 4.6 | 4.4 |
| Sodium | mg/L | 200 | 7.4 | 40.8 | 15.7 | 13.7 | 15.8 | 21.4 | 7.8 | 67.1 | 66.6 | 69.9 | 63.2 | 67.8 |
| Sulphate | mg/L | 500 | 76 | 43.5 | 81.8 | 56.8 | 52.8 | 42.0 | 74.6 | 44.4 | 55.2 | 65.5 | 63.9 | 60.2 |
| Total Dissolved Solids | mg/L | 500 | 400 | 470 | 500 | 450 | 360 | 470 | 380 | 280 | 270 | 290 | 280 | 300 |
| Temperature - field | °C | | 13.3 | 5.4 | 13.9 | 4.1 | 13.3 | 4.4 | 14.5 | 9 | 8.7 | 7.9 | 9.5 | 6 |
| Total Kjeldahl Nitrogen | mg/L | | <0.1 | 0.1 | <1.0 | <0.1 | 0.3 | <0.2 | <2.0 | 0.2 | 0.2 | 0.2 | 0.6 | 2.8 |
| Zinc | mg/L | 5 | | 0.0015 | | 0.0011 | | 0.0007 | | | | | | |
| Phenols | µg/L | | <1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | | | | | |
| 1,1,2-Trichlorethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | | | | | |
| 1,1-Dichloroethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | | | | | |
| 1,1-Dichloroethylene | µg/L | 14 * | | <0.5 | | < 0.5 | | < 0.5 | | | | | | |
| 1,2-Dichlorobenzene | µg/L | 3 | | <0.5 | | < 0.5 | | < 0.5 | | | | | | |
| 1,2-Dichloroethane | µg/L | 5 * | | <0.5 | | < 0.5 | | < 0.5 | | | | | | |
| 1,2-Dichlorpropane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | | | | | |
| 1,3-Dichlorobenzene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | | | | | |
| 1,3-Dichloropropene(E) | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | | | | | |
| 1,3-Dichloropropene(Z) | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | | | | | |
| 1,4-Dichlorobenzene | µg/L | 1 | | <0.5 | | < 0.5 | | < 0.5 | | | | | | |
| Benzene | µg/L | 1 * | | <0.5 | | < 0.5 | | < 0.5 | | | | | | |
| Bromodichloromethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | | | | | |
| Bromoform | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | | | | | |
| Bromomethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | | | | | |
| Carbon Tetrachloride | µg/L | 5 * | | <0.2 | | < 0.2 | | < 0.2 | | | | | | |
| Chlorobenzene | µg/L | 30 | | <0.5 | | < 0.5 | | < 0.5 | | | | | | |
| Chloroethane | µg/L | | | <5 | | < 5 | | < 5 | | | | | | |
| Chloroform | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | | | | | |
| Chloromethane | µg/L | | | <5 | | < 5 | | < 5 | | | | | | |
| cis-1,2-Dichloroethylene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | | | | | |
| Dibromochloromethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | | | | | |
| Dichloromethane | µg/L | 50 * | | <0.5 | | < 0.5 | | < 0.5 | | | | | | |
| Ethyl Benzene | µg/L | 1.6 | | <0.5 | | < 0.5 | | < 0.5 | | | | | | |
| Ethylene dibromide | µg/L | | | <0.2 | | < 0.2 | | < 0.2 | | | | | | |
| m/p-Xylenes | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | | | | | |
| o-Xylene | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | | | | | |
| Styrene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | | | | | |
| Tetrachloroethylene | µg/L | 30 * | | <0.5 | | < 0.5 | | < 0.5 | | | | | | |
| Toluene | µg/L | 24 | | <0.5 | | < 0.5 | | < 0.5 | | | | | | |
| trans-1,2-Dichloroethylene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | | | | | |
| Trichloroethylene | µg/L | 5 * | | <0.5 | | < 0.5 | | < 0.5 | | | | | | |
| Trichlorofluoromethane | µg/L | | | <5 | | < 5 | | < 5 | | | | | | |
| Vinyl Chloride | µg/L | 1 * | | <0.2 | | < 0.2 | | < 0.2 | | | | | | |
| Xylenes - total | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | | | | | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

## Table H.1
## Groundwater Chemical Results
## Peterborough County/City Waste Management Facility - 2022 Monitoring Program

| PARAMETER | UNITS | ODWQS | 101-I | 101-II | | | | | | 101-III | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-22 | Mar-17 | Mar-18 | Mar-19 | Apr-20 | Mar-21 | Mar-22 | Mar-17 | Mar-18 | Mar-19 | Apr-20 | Mar-21 |
| Alkalinity | mg/L | 30-500 | 163 | 129 | 131 | 122 | 117 | 126 | 126 | 418 | 444 | 405 | 362 | 414 |
| Aluminum | mg/L | 0.1 | | | | | | | | | | | | |
| Ammonia (as N) | mg/L | | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | <0.1 | 0.2 | 0.1 |
| Anion sum | meq/L | | | 3.56 | 3.48 | 3.28 | 3.17 | 3.33 | 3.35 | 9.02 | 9.36 | 8.43 | 7.42 | 8.45 |
| Arsenic | mg/L | 0.025 | <0.0005 | 0.0006 | <0.005 | 0.0007 | 0.0007 | 0.0008 | 0.0011 | <0.0005 | <0.005 | <0.0005 | <0.0005 | <0.0005 |
| Barium | mg/L | 1 * | | | | | | | | | | | | |
| Beryllium | mg/L | | | | | | | | | | | | | |
| Bicarbonate | mg/L | | | 127 | 129 | 120 | 115 | 124 | 124 | 417 | 443 | 404 | 361 | 413 |
| Boron | mg/L | 5 * | | | | | | | | | | | | |
| Cadmium | mg/L | 0.005 * | | | | | | | | | | | | |
| Calcium | mg/L | | 148 | 14 | 13 | 13.2 | 13 | 13.7 | 21.3 | 141 | 141 | 138 | 129 | 144 |
| Carbonate | mg/L | | | 2 | 2 | 2 | 2 | 2 | 2 | <1 | <1 | <1 | 1 | 1 |
| Cation sum | meq/L | | | 3.59 | 3.49 | 3.55 | 3.55 | 3.72 | 4.52 | 9.06 | 9.19 | 9.11 | 8.31 | 9.28 |
| Chloride | mg/L | 250 | 3.3 | 14.8 | 12 | 11.2 | 11.3 | 10.8 | 11.3 | 2.1 | 2.6 | <2.5 | 1 | 1 |
| Chromium | mg/L | 0.05 * | | | | | | | | | | | | |
| Cobalt | mg/L | | | | | | | | | | | | | |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | <10 | 20 | 30 | <10 | <10 | <10 | <10 | 30 | <10 | <10 |
| Conductivity | µS/cm | | 464 | 355 | 350 | 347 | 346 | 344 | 352 | 832 | 841 | 755 | 736 | 707 |
| Conductivity - field | µS/cm | | 466 | 355 | 335 | 350 | 342 | 352 | 340 | 831 | 807 | 816 | 724 | 792 |
| Copper | mg/L | 1 | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | 5 | 2 | 1.8 | 2.6 | 3.1 | 3.3 | <1.0 | 1.1 | 1.6 | 2 | 2.1 | 2.2 | <1.0 |
| Dissolved Oxygen - field | mg/L | | 4.48 | 3.54 | 4.4 | 5.01 | 3.65 | 3.05 | 1.74 | 7.78 | 4.67 | 5.47 | 5.88 | 4.28 |
| Hardness | mg/L | 80-100 | | 84.4 | 81.1 | 84.4 | 83.1 | 86.9 | 94.8 | 425 | 430 | 427 | 390 | 439 |
| Ion Percentage | % | | | 0.43 | 0.18 | 3.93 | 5.66 | 5.57 | 14.8 | 0.21 | 0.9 | 3.84 | 5.71 | 4.67 |
| Iron | mg/L | 0.3 | 0.076 | 0.007 | <0.05 | 0.004 | <0.005 | <0.005 | 0.016 | 0.022 | <0.05 | 0.033 | 0.039 | 0.005 |
| Lead | mg/L | 0.01 * | | | | | | | | | | | | |
| Magnesium | mg/L | | 18.4 | 12 | 11.8 | 12.5 | 12.3 | 12.8 | 10.1 | 17.7 | 18.9 | 20.1 | 16.5 | 19.4 |
| Manganese | mg/L | 0.05 | 0.0027 | 0.0006 | <0.001 | <0.0005 | <0.0005 | 0.0006 | <0.0005 | 0.0023 | 0.002 | 0.0031 | 0.0024 | 0.0012 |
| Molybdenum | mg/L | | | | | | | | | | | | | |
| Nickel | mg/L | | | | | | | | | | | | | |
| Nitrate | mg/L | 10.0 * | <0.5 | 0.19 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 0.06 | <0.5 | <0.5 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | -48.8 | 153.9 | 93 | 48.9 | 30.6 | -16.1 | -31.4 | 202.4 | 154.3 | 91.2 | 52.1 | 58.5 |
| pH | units | | 7.74 | 8.16 | 8.2 | 8.24 | 8.24 | 8.21 | 8.15 | 7.39 | 7.34 | 7.3 | 7.54 | 7.47 |
| pH - field | units | | 7.83 | 8.02 | 7.94 | 8.24 | 8.11 | 8.15 | 8.03 | 6.95 | 6.95 | 7.27 | 7.26 | 7.05 |
| Phosphate | mg/L | | <0.02 | <0.02 | 0.02 | <0.02 | <0.02 | <0.02 | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | 0.03 | <0.02 | 0.02 | <0.02 | 0.02 | 0.02 | 0.02 | <0.02 | 0.02 | <0.02 | <0.01 | 0.06 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 2.2 | 1.7 | 1.6 | 1.6 | 1.5 | 1.7 | 4.2 | 2 | 2.3 | 2.2 | 1.9 | 2.3 |
| Sodium | mg/L | 200 | 8 | 42.4 | 41.5 | 41.3 | 42 | 44.1 | 57.4 | 10.9 | 11.3 | 10.9 | 9.8 | 9.1 |
| Sulphate | mg/L | 500 | 62.1 | 30.6 | 29.2 | 28.9 | 28.1 | 28.1 | 28.5 | 41.8 | 33.3 | 28.7 | 18.5 | 19.9 |
| Total Dissolved Solids | mg/L | 500 | 300 | 210 | 190 | 160 | 170 | 210 | 210 | 510 | 480 | 470 | 400 | 470 |
| Temperature - field | °C | | 7.7 | 8.6 | 8.5 | 7.9 | 9.1 | 6.3 | 7.8 | 7.4 | 6.9 | 6.7 | 7.2 | 5.3 |
| Total Kjeldahl Nitrogen | mg/L | | 0.1 | <0.1 | <0.1 | 0.1 | 0.6 | <0.1 | 0.2 | <0.1 | <0.1 | <0.1 | 0.5 | <0.5 |
| Zinc | mg/L | 5 | | | | | | | | | | | | |
| Phenols | µg/L | | <1 | <1 | <1 | 1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | | | | | | | | | | | |
| 1,1,2-Trichlorethane | µg/L | | | | | | | | | | | | | |
| 1,1-Dichloroethane | µg/L | | | | | | | | | | | | | |
| 1,1-Dichloroethylene | µg/L | 14 * | | | | | | | | | | | | |
| 1,2-Dichlorobenzene | µg/L | 3 | | | | | | | | | | | | |
| 1,2-Dichloroethane | µg/L | 5 * | | | | | | | | | | | | |
| 1,2-Dichlorpropane | µg/L | | | | | | | | | | | | | |
| 1,3-Dichlorobenzene | µg/L | | | | | | | | | | | | | |
| 1,3-Dichloropropene(E) | µg/L | | | | | | | | | | | | | |
| 1,3-Dichloropropene(Z) | µg/L | | | | | | | | | | | | | |
| 1,4-Dichlorobenzene | µg/L | 1 | | | | | | | | | | | | |
| Benzene | µg/L | 1 * | | | | | | | | | | | | |
| Bromodichloromethane | µg/L | | | | | | | | | | | | | |
| Bromoform | µg/L | | | | | | | | | | | | | |
| Bromomethane | µg/L | | | | | | | | | | | | | |
| Carbon Tetrachloride | µg/L | 5 * | | | | | | | | | | | | |
| Chlorobenzene | µg/L | 30 | | | | | | | | | | | | |
| Chloroethane | µg/L | | | | | | | | | | | | | |
| Chloroform | µg/L | | | | | | | | | | | | | |
| Chloromethane | µg/L | | | | | | | | | | | | | |
| cis-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | |
| Dibromochloromethane | µg/L | | | | | | | | | | | | | |
| Dichloromethane | µg/L | 50 * | | | | | | | | | | | | |
| Ethyl Benzene | µg/L | 1.6 | | | | | | | | | | | | |
| Ethylene dibromide | µg/L | | | | | | | | | | | | | |
| m/p-Xylenes | µg/L | 20 ** | | | | | | | | | | | | |
| o-Xylene | µg/L | 20 ** | | | | | | | | | | | | |
| Styrene | µg/L | | | | | | | | | | | | | |
| Tetrachloroethylene | µg/L | 30 * | | | | | | | | | | | | |
| Toluene | µg/L | 24 | | | | | | | | | | | | |
| trans-1,2-Dichloroethylene | µg/L | | | | | | | | | | | | | |
| Trichloroethylene | µg/L | 5 * | | | | | | | | | | | | |
| Trichlorofluoromethane | µg/L | | | | | | | | | | | | | |
| Vinyl Chloride | µg/L | 1 * | | | | | | | | | | | | |
| Xylenes - total | µg/L | 20 ** | | | | | | | | | | | | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 101-III | 104-I | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-22 | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Mar-22 | Sep-22 |
| Alkalinity | mg/L | 30-500 | 450 | 309 | 310 | 310 | 288 | 286 | 296 | 283 | 277 | 299 | 282 | 285 |
| Aluminum | mg/L | 0.1 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | <0.025 | |
| Ammonia (as N) | mg/L | | 0.2 | 0.2 | 0.3 | 0.2 | 0.3 | 0.2 | 0.2 | 0.3 | 0.2 | 0.3 | 0.2 | 0.2 |
| Anion sum | meq/L | | 9.28 | 6.77 | 6.84 | 6.82 | 6.43 | 6.46 | 6.73 | 6.47 | 6.39 | 6.73 | 6.74 | 7.01 |
| Arsenic | mg/L | 0.025 | 0.0007 | 0.0043 | 0.005 | 0.0035 | <0.005 | 0.0012 | <0.005 | 0.0017 | 0.0015 | 0.0015 | 0.0037 | <0.0005 |
| Barium | mg/L | 1 * | | 0.112 | | 0.152 | | 0.183 | | 0.155 | | 0.168 | 0.089 | |
| Beryllium | mg/L | | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | <0.0005 | |
| Bicarbonate | mg/L | | 449 | 306 | 308 | 309 | 286 | 284 | 294 | 282 | 276 | 298 | 281 | 284 |
| Boron | mg/L | 5 * | | 0.72 | | 0.716 | | 0.6 | | 0.553 | | 0.452 | 0.067 | |
| Cadmium | mg/L | 0.005 * | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | <0.0001 | |
| Calcium | mg/L | | 12.7 | 64.1 | 58.8 | 60.8 | 57.1 | 67.6 | 70.5 | 69.9 | 75.5 | 65.3 | 82.1 | 85.2 |
| Carbonate | mg/L | | <1 | 3 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | <1 | 1 |
| Cation sum | meq/L | | 3.39 | 7.14 | 6.89 | 7.02 | 6.74 | 7.29 | 7.25 | 7.11 | 7.31 | 6.46 | 7.30 | 7.57 |
| Chloride | mg/L | 250 | 7.2 | 26.6 | 28 | 27.2 | 28.5 | 22.1 | 25 | 20.8 | 18.8 | 17.8 | 14.6 | 13.7 |
| Chromium | mg/L | 0.05 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | <0.0005 | |
| Cobalt | mg/L | | | 0.0002 | | <0.0001 | | <0.0005 | | 0.0006 | | <0.0005 | <0.0005 | |
| Chemical Oxygen Demand | mg/L | | <10 | 40 | 30 | 40 | 70 | 20 | 10 | 70 | 20 | 40 | <10 | 10 |
| Conductivity | µS/cm | | 668 | 660 | 647 | 648 | 649 | 665 | 653 | 645 | 653 | 652 | 672 | 685 |
| Conductivity - field | µS/cm | | 831 | 662 | 659 | 629 | 640 | 652 | 670 | 656 | 642 | 650 | 645 | 692 |
| Copper | mg/L | 1 | | <0.0005 | | <0.0005 | | 0.0008 | | 0.0006 | | <0.0005 | 0.0006 | |
| Dissolved Organic Carbon | mg/L | 5 | 1 | 8.1 | 8.6 | 7.6 | 9.7 | 7.4 | 6.8 | 7.7 | 6.8 | 6.1 | 3.2 | 2.4 |
| Dissolved Oxygen - field | mg/L | | 3.26 | 0.88 | 0.92 | 1.28 | 0.79 | 2.05 | 1.69 | 0.92 | 0.92 | 1.84 | 3.03 | 1.49 |
| Hardness | mg/L | 80-100 | 79.1 | 285 | 264 | 263 | 251 | 290 | 292 | 285 | 298 | 261 | 312 | 327 |
| Ion Percentage | % | | 46.5 | 2.67 | 0.32 | 1.46 | 2.35 | 6.03 | 3.72 | 4.68 | 6.76 | 2.06 | 3.94 | 3.85 |
| Iron | mg/L | 0.3 | 0.014 | 0.139 | 0.34 | 0.195 | 0.23 | 0.043 | 0.71 | 0.385 | 0.831 | 0.184 | 0.027 | 0.075 |
| Lead | mg/L | 0.01 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | <0.0005 | |
| Magnesium | mg/L | | 11.5 | 30.3 | 28.5 | 27 | 26.4 | 29.4 | 28.2 | 26.9 | 26.7 | 23.9 | 26.1 | 27.7 |
| Manganese | mg/L | 0.05 | 0.0014 | 0.0278 | 0.028 | 0.0258 | 0.025 | 0.02 | 0.032 | 0.0976 | 0.0485 | 0.0538 | 0.0047 | 0.0840 |
| Molybdenum | mg/L | | | <0.0005 | | 0.0007 | | 0.0022 | | 0.0011 | | 0.0008 | 0.0020 | |
| Nickel | mg/L | | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | <0.002 | |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 |
| Oxydation Reduction Potential | mV | | 93.4 | -40.1 | -180 | -38.4 | -167.6 | -39.1 | -162.8 | -106.1 | -94.7 | -143.8 | 155.8 | 51.2 |
| pH | units | | 7.13 | 8.01 | 7.83 | 7.66 | 7.82 | 7.78 | 7.76 | 7.62 | 7.65 | 7.63 | 7.39 | 7.65 |
| pH - field | units | | 6.86 | 7.6 | 7.46 | 7.6 | 7.69 | 7.54 | 7.75 | 7.39 | 7.39 | 7.60 | 7.28 | 7.06 |
| Phosphate | mg/L | | 0.03 | 0.02 | 0.02 | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | 0.09 | 0.06 | 0.05 | <0.02 | 0.04 | 0.03 | <0.02 | 0.02 | 0.05 | <0.02 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.6 | 5.6 | 5.4 | 5.5 | 5.2 | 5 | 4.6 | 4.7 | 4.9 | 4.3 | 4.1 | 4.1 |
| Sodium | mg/L | 200 | 40.1 | 28.9 | 32.5 | 36.2 | 35.1 | 30.3 | 28.6 | 28.3 | 27 | 24.6 | 20.6 | 20.4 |
| Sulphate | mg/L | 500 | 17.8 | 2.2 | 2.8 | 2.6 | 2.5 | 14.7 | 14.4 | 19.8 | 24 | 21.3 | 42.0 | 53.5 |
| Total Dissolved Solids | mg/L | 500 | 500 | 400 | 390 | 360 | 370 | 380 | 390 | 370 | 410 | 340 | 370 | 390 |
| Temperature - field | °C | | 6.7 | 8.6 | 12.5 | 7.2 | 11.1 | 6.3 | 12.2 | 7.3 | 12.2 | 8.4 | 7.3 | 12.8 |
| Total Kjeldahl Nitrogen | mg/L | | <0.1 | <0.1 | 0.4 | 0.1 | 1.5 | 0.2 | 0.2 | 0.4 | <1.0 | 0.2 | 0.1 | 2.7 |
| Zinc | mg/L | 5 | | 0.0006 | | 0.0011 | | 0.003 | | 0.004 | | <0.0005 | 0.0008 | |
| Phenols | µg/L | | <1 | 1 | <1 | <1 | <1 | <1 | <1 | 3 | <1 | <1 | 2 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | |
| 1,1,2-Trichlorethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | |
| 1,1-Dichloroethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | |
| 1,2-Dichlorpropane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | |
| 1,3-Dichlorobenzene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | |
| Benzene | µg/L | 1 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | |
| Bromodichloromethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | |
| Bromoform | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | |
| Bromomethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | < 0.2 | |
| Chlorobenzene | µg/L | 30 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | |
| Chloroethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | < 5 | |
| Chloroform | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | |
| Chloromethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | < 5 | |
| cis-1,2-Dichloroethylene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | |
| Dibromochloromethane | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | |
| Dichloromethane | µg/L | 50 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | |
| Ethyl Benzene | µg/L | 1.6 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | |
| Ethylene dibromide | µg/L | | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | < 0.2 | |
| m/p-Xylenes | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | |
| o-Xylene | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | |
| Styrene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | |
| Tetrachloroethylene | µg/L | 30 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | |
| Toluene | µg/L | 24 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | |
| Trichloroethylene | µg/L | 5 * | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | |
| Trichlorofluoromethane | µg/L | | | <5 | | <5 | | <5 | | <5 | | < 5 | < 5 | |
| Vinyl Chloride | µg/L | 1 * | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | < 0.2 | |
| Xylenes - total | µg/L | 20 ** | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | < 0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 104-II | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Sep-21 | Mar-22 | Sep-22 |
| Alkalinity | mg/L | 30-500 | 278 | 294 | 290 | 277 | 271 | 282 | 275 | 274 | 289 | 293 | 283 | 295 |
| Aluminum | mg/L | 0.1 | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | 1 | |
| Ammonia (as N) | mg/L | | 0.1 | 0.1 | 0.1 | 0.1 | <0.1 | <0.1 | 0.2 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 |
| Anion sum | meq/L | | 7.05 | 7.6 | 7.37 | 7.15 | 6.89 | 7.12 | 7.02 | 6.8 | 7.12 | 7.15 | 7.11 | 7.24 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Barium | mg/L | 1 * | 0.037 | | 0.048 | | 0.05 | | 0.052 | | 0.052 | | 0.056 | |
| Beryllium | mg/L | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Bicarbonate | mg/L | | 275 | 293 | 289 | 276 | 269 | 281 | 273 | 273 | 287 | 292 | 282 | 294 |
| Boron | mg/L | 5 * | 0.0145 | | 0.0106 | | 0.0104 | | 0.0109 | | 0.0114 | | 0.0106 | |
| Cadmium | mg/L | 0.005 * | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | |
| Calcium | mg/L | | 88.8 | 89.3 | 93.7 | 90.4 | 91.9 | 97.5 | 92.1 | 95 | 85.0 | 94.0 | 99.5 | 95.1 |
| Carbonate | mg/L | | 3 | 1 | 1 | 1 | 2 | 1 | 2 | <1 | 2 | 1 | 1 | 1 |
| Cation sum | meq/L | | 7.43 | 7.39 | 7.49 | 7.29 | 7.54 | 7.81 | 7.53 | 7.59 | 6.92 | 7.50 | 7.92 | 7.71 |
| Chloride | mg/L | 250 | 10.4 | 9.7 | 8.5 | 8.4 | 6.5 | 7.6 | 8.2 | 6.9 | 6.9 | 6.3 | 7.9 | 7.5 |
| Chromium | mg/L | 0.05 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | 0.001 | |
| Cobalt | mg/L | | 0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Chemical Oxygen Demand | mg/L | | <10 | 20 | <10 | 50 | <10 | <10 | 20 | <10 | <10 | <10 | <10 | <10 |
| Conductivity | µS/cm | | 685 | 702 | 661 | 687 | 681 | 689 | 672 | 684 | 672 | 676 | 679 | 700 |
| Conductivity - field | µS/cm | | 656 | 712 | 662 | 672 | 665 | 690 | 674 | 672 | 630 | 669 | 648 | 707 |
| Copper | mg/L | 1 | <0.0005 | | <0.0005 | | 0.0013 | | 0.0011 | | 0.0009 | | 0.0013 | |
| Dissolved Organic Carbon | mg/L | 5 | 2.7 | 4.3 | 2.9 | 3.5 | 3.4 | 3.7 | 2.4 | 2.2 | 1.9 | 2.3 | 1.2 | 1.3 |
| Dissolved Oxygen - field | mg/L | | 4.81 | 1.41 | 6 | 1.66 | 5.16 | 1.27 | 5.21 | 0.59 | 5.93 | 4.37 | 5.42 | 1.97 |
| Hardness | mg/L | 80-100 | 352 | 350 | 354 | 347 | 358 | 371 | 357 | 362 | 330 | 358 | 375 | 369 |
| Ion Percentage | % | | 2.67 | 1.39 | 0.81 | 1 | 4.52 | 4.57 | 3.51 | 5.46 | 1.39 | 2.35 | 5.41 | 3.19 |
| Iron | mg/L | 0.3 | 0.003 | <0.05 | 0.002 | <0.05 | 0.031 | <0.05 | 0.051 | <0.005 | 0.007 | 0.007 | 0.470 | 0.038 |
| Lead | mg/L | 0.01 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Magnesium | mg/L | | 31.6 | 30.9 | 29.2 | 29.4 | 31.3 | 30.9 | 30.9 | 30.2 | 28.5 | 29.9 | 30.7 | 31.9 |
| Manganese | mg/L | 0.05 | <0.0005 | 0.014 | <0.0005 | 0.003 | <0.0005 | 0.011 | 0.0018 | 0.0037 | 0.0006 | 0.0018 | 0.0115 | 0.0014 |
| Molybdenum | mg/L | | 0.0016 | | 0.0018 | | 0.002 | | 0.0018 | | 0.0018 | | 0.0017 | |
| Nickel | mg/L | | 0.002 | | <0.002 | | 0.003 | | 0.004 | | <0.002 | | 0.002 | |
| Nitrate | mg/L | 10.0 * | 1.31 | 1.34 | 1.75 | 2.2 | 2 | 1.5 | 2.5 | 2.4 | 2.3 | 2.9 | 3.3 | 4.1 |
| Nitrite | mg/L | 1.0* | <0.05 | 0.23 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 |
| Oxydation Reduction Potential | mV | | 115.5 | 21.5 | 90.3 | -43.3 | 28.6 | 14.7 | -12.1 | 36.1 | 35.3 | 30.3 | 187.9 | 117.3 |
| pH | units | | 8.09 | 7.72 | 7.71 | 7.59 | 7.78 | 7.64 | 7.84 | 7.57 | 7.82 | 7.58 | 7.62 | 7.61 |
| pH - field | units | | 7.65 | 7.25 | 7.63 | 7.49 | 7.56 | 7.51 | 7.54 | 7.48 | 7.71 | 7.40 | 7.47 | 7.10 |
| Phosphate | mg/L | | <0.02 | <0.01 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | 0.02 | <0.02 | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.01 | 0.02 | <0.01 | <0.02 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 3 | 2.9 | 2.9 | 2.6 | 3 | 2.9 | 2.9 | 2.9 | 2.7 | 2.8 | 3.1 | 2.5 |
| Sodium | mg/L | 200 | 6.3 | 6.2 | 6.7 | 5.7 | 6 | 6.5 | 6 | 5.5 | 5.1 | 5.0 | 6.8 | 5.1 |
| Sulphate | mg/L | 500 | 61.5 | 73.3 | 67 | 67 | 63.4 | 64.7 | 61.9 | 54.5 | 56.1 | 52.7 | 56.5 | 49.4 |
| Total Dissolved Solids | mg/L | 500 | 420 | 490 | 400 | 410 | 410 | 450 | 430 | 420 | 370 | 310 | 410 | 460 |
| Temperature - field | °C | | 8.2 | 14.1 | 6.3 | 12.3 | 5.8 | 12.6 | 7 | 12.5 | 8.0 | 13.4 | 7.3 | 12.1 |
| Total Kjeldahl Nitrogen | mg/L | | <0.1 | 0.2 | <0.1 | <1.0 | <0.1 | <0.2 | <0.1 | <1.0 | <0.1 | 3.2 | <0.1 | 2.9 |
| Zinc | mg/L | 5 | 0.0038 | | 0.0021 | | 0.0052 | | 0.0066 | | 0.0016 | | 0.0096 | |
| Phenols | µg/L | | 1 | 1 | <1 | <1 | <1 | <1 | <1 | 1 | <1 | <1 | 2 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1,2-Trichlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 5 | | < 0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorpropane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichlorobenzene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Benzene | µg/L | 1 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromodichloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromoform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromomethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Chlorobenzene | µg/L | 30 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloroethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 0.5 | | < 5 | |
| Chloroform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| cis-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dibromochloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dichloromethane | µg/L | 50 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethyl Benzene | µg/L | 1.6 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethylene dibromide | µg/L | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| m/p-Xylenes | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| o-Xylene | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Styrene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Tetrachloroethylene | µg/L | 30 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Toluene | µg/L | 24 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichloroethylene | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichlorofluoromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Vinyl Chloride | µg/L | 1 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Xylenes - total | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 104-III | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Sep-21 | Mar-22 | Sep-22 |
| Alkalinity | mg/L | 30-500 | 292 | 513 | 318 | 382 | 294 | 419 | 281 | 371 | 319 | 380 | 291 | 393 |
| Aluminum | mg/L | 0.1 | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | |
| Ammonia (as N) | mg/L | | 0.2 | 0.5 | 0.1 | 0.2 | 0.1 | 0.3 | 0.2 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 |
| Anion sum | meq/L | | 7.72 | 10.5 | 7.65 | 9.31 | 6.91 | 9.02 | 8.7 | 10.7 | 9.16 | 9.89 | 10.40 | 12.10 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.005 | <0.0005 | 0.009 | <0.0005 | <0.005 | <0.0005 | <0.0005 | <0.0005 | 0.0008 | <0.0005 | <0.0005 |
| Barium | mg/L | 1 * | 0.08 | | 0.084 | | 0.075 | | 0.076 | | 0.085 | | 0.101 | |
| Beryllium | mg/L | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Bicarbonate | mg/L | | 290 | 512 | 318 | 381 | 293 | 418 | 280 | 371 | 318 | 379 | 291 | 392 |
| Boron | mg/L | 5 * | 0.0907 | | 0.0584 | | 0.0433 | | 0.0816 | | 0.0478 | | 0.048 | |
| Cadmium | mg/L | 0.005 * | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | |
| Calcium | mg/L | | 121 | 168 | 133 | 163 | 128 | 167 | 138 | 205 | 153 | 174 | 184 | 207 |
| Carbonate | mg/L | | 2 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Cation sum | meq/L | | 7.56 | 10.1 | 7.9 | 9.54 | 7.43 | 9.77 | 8.08 | 11.9 | 8.82 | 10.2 | 10.5 | 12.0 |
| Chloride | mg/L | 250 | 8.2 | 3.6 | 11.4 | 4.3 | 5.1 | 3.1 | 9.6 | 3.2 | 4.2 | 6.0 | 12.4 | 5.2 |
| Chromium | mg/L | 0.05 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Cobalt | mg/L | | 0.0001 | | 0.0004 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Chemical Oxygen Demand | mg/L | | <10 | 30 | <10 | 20 | <10 | 10 | 50 | <10 | 20 | 10 | <10 | 10 |
| Conductivity | µS/cm | | 756 | 952 | 704 | 874 | 680 | 870 | 725 | 1020 | 848 | 925 | 960 | 1070 |
| Conductivity - field | µS/cm | | 745 | 970 | 692 | 879 | 665 | 882 | 695 | 1020 | 840 | 903 | 909 | 1070 |
| Copper | mg/L | 1 | 0.0027 | | 0.0018 | | 0.0014 | | 0.0021 | | 0.0021 | | 0.0013 | |
| Dissolved Organic Carbon | mg/L | 5 | 6.6 | 7.9 | 6.3 | 6.1 | 4.3 | 7.1 | 6.3 | 6.7 | 5.6 | 10.8 | 4.7 | 5.5 |
| Dissolved Oxygen - field | mg/L | | 2.54 | 1.35 | 1.78 | 1.38 | 1.91 | 1.61 | 2.52 | 1.39 | 2.31 | 1.26 | 1.39 | 2.52 |
| Hardness | mg/L | 80-100 | 346 | 473 | 371 | 452 | 355 | 462 | 384 | 565 | 423 | 480 | 505 | 571 |
| Ion Percentage | % | | 1.07 | 2.09 | 1.65 | 1.22 | 3.64 | 4.02 | 3.64 | 5.37 | 1.86 | 1.38 | 0.80 | 0.59 |
| Iron | mg/L | 0.3 | 0.009 | 0.76 | 0.162 | <0.05 | 0.043 | 0.82 | 0.01 | 0.171 | 0.125 | 0.069 | 0.026 | 0.049 |
| Lead | mg/L | 0.01 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Magnesium | mg/L | | 10.7 | 13.1 | 9.4 | 11 | 8.62 | 10.9 | 9.54 | 12.9 | 9.88 | 11.1 | 11.0 | 13.4 |
| Manganese | mg/L | 0.05 | 0.0155 | 1.28 | 0.288 | 0.641 | 0.0979 | 0.894 | 0.0169 | 0.194 | 0.0526 | 0.0678 | 0.0482 | 0.1260 |
| Molybdenum | mg/L | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Nickel | mg/L | | <0.002 | | <0.002 | | 0.003 | | <0.002 | | <0.002 | | <0.002 | |
| Nitrate | mg/L | 10.0 * | 0.87 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | 1.6 | 2.1 | 1.1 | <0.5 | 1.2 | 1.81 |
| Nitrite | mg/L | 1.0* | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | 138.3 | -12.6 | 66.6 | 23.3 | 58.4 | 4.3 | 188.6 | 76.2 | 49.6 | 47.9 | 153.8 | 70.9 |
| pH | units | | 7.77 | 7.25 | 7.2 | 7.19 | 7.37 | 7.25 | 7.31 | 7.14 | 7.27 | 7.21 | 7.10 | 7.19 |
| pH - field | units | | 7.15 | 6.77 | 7.03 | 7.03 | 7.06 | 6.96 | 7.05 | 7 | 7.07 | 6.90 | 6.92 | 6.69 |
| Phosphate | mg/L | | <0.02 | <0.01 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | 0.03 | 0.02 | 0.03 | <0.02 | <0.02 | <0.02 | <0.02 | 0.02 | 0.02 | 0.04 | <0.02 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 14.7 | 15.3 | 9.6 | 9.8 | 6.2 | 11.7 | 8 | 11.8 | 6.3 | 11.1 | 6.3 | 8.0 |
| Sodium | mg/L | 200 | 5.25 | 4.5 | 5 | 4.7 | 3.3 | 4.4 | 3.9 | 5.6 | 4.2 | 5.7 | 5.8 | 6.9 |
| Sulphate | mg/L | 500 | 85.6 | 25.1 | 56.4 | 86.2 | 51.6 | 39.5 | 138 | 156 | 134 | 114 | 207 | 204 |
| Total Dissolved Solids | mg/L | 500 | 490 | 580 | 420 | 550 | 410 | 550 | 470 | 700 | 520 | 570 | 610 | 740 |
| Temperature - field | °C | | 5.9 | 14.7 | 5.4 | 14 | 3.9 | 13.8 | 5.2 | 14.3 | 5.6 | 15.4 | 4.3 | 14.3 |
| Total Kjeldahl Nitrogen | mg/L | | 0.1 | 1 | 0.2 | <1.0 | 0.2 | 0.5 | 0.2 | <1.0 | <0.5 | 0.9 | <0.1 | 3.1 |
| Zinc | mg/L | 5 | <0.0005 | | 0.0007 | | 0.0007 | | 0.0005 | | <0.0005 | | <0.0005 | |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 2 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1,2-Trichlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorpropane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichlorobenzene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Benzene | µg/L | 1 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromodichloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromoform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromomethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Chlorobenzene | µg/L | 30 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloroethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Chloroform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| cis-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dibromochloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dichloromethane | µg/L | 50 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethyl Benzene | µg/L | 1.6 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethylene dibromide | µg/L | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| m/p-Xylenes | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| o-Xylene | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Styrene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Tetrachloroethylene | µg/L | 30 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Toluene | µg/L | 24 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichloroethylene | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichlorofluoromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Vinyl Chloride | µg/L | 1 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Xylenes - total | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 106-I | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Sep-21 | Mar-22 | Sep-22 |
| Alkalinity | mg/L | 30-500 | 165 | 227 | 159 | 214 | 155 | 219 | 156 | 213 | 173 | 224 | 149 | 226 |
| Aluminum | mg/L | 0.1 | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | |
| Ammonia (as N) | mg/L | | 0.1 | 0.1 | 0.2 | 0.2 | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| Anion sum | meq/L | | 4.11 | 7.98 | 4.02 | 8.69 | 4.15 | 9.19 | 4.05 | 9.08 | 4.60 | 10.3 | 3.9 | 10.8 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Barium | mg/L | 1 * | 0.051 | | 0.061 | | 0.09 | | 0.074 | | 0.052 | | 0.041 | |
| Beryllium | mg/L | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Bicarbonate | mg/L | | 163 | 226 | 158 | 213 | 154 | 218 | 154 | 212 | 172 | 223 | 148 | 225 |
| Boron | mg/L | 5 * | 0.0398 | | 0.0769 | | 0.051 | | 0.0685 | | 0.0667 | | 0.0694 | |
| Cadmium | mg/L | 0.005 * | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | |
| Calcium | mg/L | | 53.3 | 103 | 45 | 118 | 74.9 | 123 | 68.4 | 126 | 50.2 | 125 | 45 | 132 |
| Carbonate | mg/L | | 2 | 1 | 1 | <1 | 1 | <1 | 2 | <1 | 1 | <1 | 1 | <1 |
| Cation sum | meq/L | | 4.45 | 7.9 | 4.3 | 9.07 | 6.08 | 9.78 | 5.66 | 9.88 | 4.33 | 9.96 | 4.26 | 11.20 |
| Chloride | mg/L | 250 | 16.9 | 74.9 | 13.2 | 102 | 18.3 | 120 | 12.2 | 121 | 20.3 | 154 | 16 | 172 |
| Chromium | mg/L | 0.05 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Cobalt | mg/L | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | <10 | <10 | <10 | <10 | 10 | <10 | <10 | <10 | <10 | <10 |
| Conductivity | µS/cm | | 429 | 797 | 420 | 900 | 437 | 953 | 416 | 958 | 471 | 1070 | 412 | 1140 |
| Conductivity - field | µS/cm | | 435 | 811 | 393 | 873 | 445 | 955 | 420 | 954 | 504 | 1000 | 398 | 1140 |
| Copper | mg/L | 1 | <0.0005 | | 0.0006 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Dissolved Organic Carbon | mg/L | 5 | 1.3 | <1.0 | 2.6 | 1.6 | 1.3 | <1.0 | 1.4 | 1.2 | 1.8 | 1.3 | 1.2 | 1.5 |
| Dissolved Oxygen - field | mg/L | | 1.23 | 1.11 | 1.13 | 0.7 | 0.9 | 0.77 | 0.49 | 0.89 | 2.06 | 3.15 | 0.60 | 1.17 |
| Hardness | mg/L | 80-100 | 186 | 358 | 172 | 400 | 260 | 424 | 239 | 423 | 174 | 418 | 163 | 449 |
| Ion Percentage | % | | 3.94 | 0.55 | 3.36 | 2.18 | 18.9 | 3.14 | 16.6 | 4.26 | 2.99 | 1.53 | 4.54 | 1.58 |
| Iron | mg/L | 0.3 | 0.04 | <0.05 | 0.022 | 0.05 | 1.36 | <0.05 | 0.27 | 0.106 | 0.067 | 0.142 | 0.060 | 0.907 |
| Lead | mg/L | 0.01 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Magnesium | mg/L | | 12.9 | 24.5 | 14.5 | 25.7 | 17.6 | 28.5 | 16.6 | 26.2 | 11.9 | 25.8 | 12.4 | 28.9 |
| Manganese | mg/L | 0.05 | 0.0226 | 0.01 | 0.0311 | 0.012 | 0.0256 | 0.013 | 0.0108 | 0.0192 | 0.0118 | 0.0202 | 0.0149 | 0.0262 |
| Molybdenum | mg/L | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Nickel | mg/L | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | |
| Nitrate | mg/L | 10.0 * | <0.05 | <0.05 | <0.5 | <0.05 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 |
| Nitrite | mg/L | 1.0* | <0.05 | <0.05 | <0.5 | <0.05 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 |
| Oxydation Reduction Potential | mV | | -227 | -57 | -155.5 | -46.2 | -225.3 | -26.2 | -192.3 | 3 | -212.4 | -12.5 | -241.7 | -45.6 |
| pH | units | | 8.19 | 7.68 | 7.97 | 7.64 | 7.86 | 7.51 | 8.03 | 7.6 | 7.86 | 7.58 | 7.96 | 7.53 |
| pH - field | units | | 7.75 | 7.35 | 7.76 | 7.43 | 7.36 | 7.36 | 7.72 | 7.51 | 7.61 | 7.41 | 7.66 | 7.27 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | 0.03 | 0.1 | 0.09 | <0.02 | <0.02 | <0.01 | 0.02 | 0.03 | <0.02 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.6 | 1.8 | 1.4 | 2 | 2 | 2.1 | 1.7 | 2.7 | 1.5 | 2.3 | 1.5 | 2.7 |
| Sodium | mg/L | 200 | 15.2 | 15 | 18.3 | 22.2 | 18.2 | 27.4 | 18.4 | 30.3 | 17.8 | 34.1 | 21.3 | 47.4 |
| Sulphate | mg/L | 500 | 21.3 | 71.2 | 27.7 | 80.3 | 30.3 | 75.5 | 33 | 74.3 | 32.5 | 76.5 | 27.5 | 76.3 |
| Total Dissolved Solids | mg/L | 500 | 260 | 520 | 240 | 580 | 240 | 710 | 250 | 720 | 280 | 710 | 250 | 850 |
| Temperature - field | °C | | 9.7 | 11.5 | 9.4 | 11.5 | 9.5 | 10.9 | 9.1 | 12.8 | 9.8 | 12.8 | 8.8 | 10.7 |
| Total Kjeldahl Nitrogen | mg/L | | <0.1 | 0.2 | <0.1 | <2.0 | 0.4 | <0.1 | <0.1 | <1.0 | <0.1 | 0.2 | <0.1 | <2.0 |
| Zinc | mg/L | 5 | <0.0005 | | 0.0027 | | 0.0008 | | 0.0005 | | <0.0005 | | <0.0005 | |
| Phenols | µg/L | | 1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 | 2 | 2 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1,2-Trichlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorpropane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichlorobenzene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Benzene | µg/L | 1 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromodichloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromoform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromomethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Chlorobenzene | µg/L | 30 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloroethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Chloroform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| cis-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dibromochloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dichloromethane | µg/L | 50 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethyl Benzene | µg/L | 1.6 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethylene dibromide | µg/L | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| m/p-Xylenes | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| o-Xylene | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Styrene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Tetrachloroethylene | µg/L | 30 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Toluene | µg/L | 24 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichloroethylene | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichlorofluoromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Vinyl Chloride | µg/L | 1 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Xylenes - total | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 106-II | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Sep-21 | Mar-22 | Sep-22 |
| Alkalinity | mg/L | 30-500 | 187 | 196 | 204 | 207 | 229 | 211 | 242 | 235 | 257 | 253 | 261 | 251 |
| Aluminum | mg/L | 0.1 | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | |
| Ammonia (as N) | mg/L | | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.1 | 0.2 | 0.2 | 0.2 |
| Anion sum | meq/L | | 18.1 | 17.7 | 20.1 | 19.1 | 20 | 18.8 | 19.4 | 18.9 | 20.6 | 20.9 | 20.6 | 19.8 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.005 | 0.0006 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Barium | mg/L | 1 * | 0.099 | | 0.138 | | 0.122 | | 0.118 | | 0.119 | | 0.104 | |
| Beryllium | mg/L | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Bicarbonate | mg/L | | 186 | 195 | 204 | 206 | 228 | 210 | 241 | 234 | 256 | 252 | 260 | 250 |
| Boron | mg/L | 5 * | 0.0313 | | 0.0326 | | 0.029 | | 0.0292 | | 0.0253 | | 0.0243 | |
| Cadmium | mg/L | 0.005 * | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | |
| Calcium | mg/L | | 191 | 210 | 225 | 196 | 202 | 195 | 178 | 187 | 160 | 170 | 174 | 164 |
| Carbonate | mg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Cation sum | meq/L | | 15.9 | 17.5 | 19.8 | 17.9 | 21 | 19.8 | 20.4 | 20.4 | 18.6 | 18.9 | 20.7 | 19.4 |
| Chloride | mg/L | 250 | 466 | 447 | 523 | 485 | 504 | 472 | 472 | 461 | 465 | 514 | 499 | 478 |
| Chromium | mg/L | 0.05 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Cobalt | mg/L | | 0.0004 | | 0.0002 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | <10 | <10 | <10 | 10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Conductivity | µS/cm | | 1850 | 1900 | 2080 | 2000 | 2220 | 2110 | 2160 | 2180 | 2170 | 2180 | 2170 | 2250 |
| Conductivity - field | µS/cm | | 1790 | 1890 | 2030 | 1960 | 2210 | 2070 | 2140 | 2100 | 2150 | 2110 | 2100 | 2120 |
| Copper | mg/L | 1 | <0.0005 | | <0.0005 | | 0.0024 | | 0.0005 | | 0.0016 | | 0.0008 | |
| Dissolved Organic Carbon | mg/L | 5 | 1.1 | 1.5 | 2.1 | 1.2 | 1.6 | 2.2 | 1.6 | <1.0 | 1.9 | <1.0 | <1.0 | 1 |
| Dissolved Oxygen - field | mg/L | | 3.58 | 2.3 | 3.32 | 0.96 | 4.07 | 1.83 | 3.06 | 1.13 | 1.70 | 0.49 | 2.07 | 4.26 |
| Hardness | mg/L | 80-100 | 668 | 711 | 749 | 655 | 678 | 667 | 601 | 620 | 536 | 555 | 581 | 550 |
| Ion Percentage | % | | 6.47 | 0.57 | 0.68 | 3.2 | 2.43 | 2.73 | 2.36 | 3.96 | 5.09 | 4.93 | 0.11 | 1.19 |
| Iron | mg/L | 0.3 | 0.382 | 0.76 | 0.439 | 0.42 | 0.235 | 0.35 | 1.09 | 0.295 | 0.540 | 1.09 | 0.26 | 0.78 |
| Lead | mg/L | 0.01 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Magnesium | mg/L | | 46.3 | 45.3 | 45.5 | 40.3 | 42.1 | 43.8 | 37.9 | 37.2 | 33.1 | 31.7 | 35.6 | 34.1 |
| Manganese | mg/L | 0.05 | 0.0286 | 0.034 | 0.0401 | 0.017 | 0.0196 | 0.015 | 0.0307 | 0.0337 | 0.0264 | 0.0304 | 0.0218 | 0.0261 |
| Molybdenum | mg/L | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Nickel | mg/L | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | |
| Nitrate | mg/L | 10.0 * | <0.05 | <0.05 | <0.5 | <0.05 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 |
| Nitrite | mg/L | 1.0* | <0.05 | <0.05 | <0.5 | <0.05 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 |
| Oxydation Reduction Potential | mV | | -94.1 | -24.5 | -49.5 | -53.6 | -3.8 | 14.1 | -3.4 | -36.6 | -32.1 | -33.7 | -36.9 | -32.2 |
| pH | units | | 7.71 | 7.6 | 7.4 | 7.49 | 7.38 | 7.43 | 7.53 | 7.43 | 7.42 | 7.49 | 7.36 | 7.44 |
| pH - field | units | | 7.31 | 7.17 | 7.07 | 7.23 | 7.19 | 7.17 | 7.17 | 7.36 | 7.22 | 7.33 | 7.12 | 7.26 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | 0.03 | 0.08 | 0.06 | <0.02 | <0.02 | <0.01 | 0.02 | <0.03 | <0.02 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 3.4 | 3.4 | 3.4 | 3.4 | 3.6 | 3.4 | 3.5 | 4 | 3.3 | 3.2 | 3.6 | 3.5 |
| Sodium | mg/L | 200 | 54.5 | 71.9 | 108 | 107 | 167 | 146 | 189 | 181 | 179 | 177 | 205 | 189 |
| Sulphate | mg/L | 500 | 63.6 | 63 | 68.8 | 68.2 | 64.6 | 67.6 | 70.3 | 64.6 | 123 | 73.2 | 73.7 | 72.4 |
| Total Dissolved Solids | mg/L | 500 | 1000 | 1770 | 1160 | 1350 | 1110 | 1820 | 1580 | 1770 | 1260 | 1410 | 1310 | 1420 |
| Temperature - field | °C | | 8.1 | 13.2 | 7.2 | 13.7 | 8.2 | 13.8 | 8 | 12.7 | 8.4 | 13.9 | 8.7 | 12.2 |
| Total Kjeldahl Nitrogen | mg/L | | <0.1 | 0.1 | <0.1 | <2.0 | <0.1 | <0.1 | <0.1 | <1.0 | <0.1 | 0.1 | <0.1 | 2.1 |
| Zinc | mg/L | 5 | 0.0013 | | 0.0024 | | 0.0027 | | 0.0012 | | 0.0011 | | 0.0012 | |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | 1 | 1 | <1 | <1 | <1 | <1 | 1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1,2-Trichlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorpropane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichlorobenzene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Benzene | µg/L | 1 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromodichloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromoform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromomethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Chlorobenzene | µg/L | 30 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloroethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Chloroform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| cis-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dibromochloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dichloromethane | µg/L | 50 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethyl Benzene | µg/L | 1.6 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethylene dibromide | µg/L | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| m/p-Xylenes | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| o-Xylene | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Styrene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Tetrachloroethylene | µg/L | 30 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Toluene | µg/L | 24 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichloroethylene | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichlorofluoromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Vinyl Chloride | µg/L | 1 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Xylenes - total | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 106-III | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Sep-21 | Mar-22 | Sep-22 |
| Alkalinity | mg/L | 30-500 | 232 | 359 | 220 | 259 | 272 | 234 | 201 | 280 | 262 | 307 | 208 | 253 |
| Aluminum | mg/L | 0.1 | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | |
| Ammonia (as N) | mg/L | | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.1 | 0.2 | 0.1 | 0.2 |
| Anion sum | meq/L | | 23.9 | 12.1 | 26.2 | 18.2 | 18.2 | 21 | 28 | 8.82 | 18.6 | 10.7 | 21.1 | 27.2 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.005 | <0.0005 | 0.007 | <0.0005 | <0.005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Barium | mg/L | 1 * | 0.28 | | 0.318 | | 0.207 | | 0.329 | | 0.363 | | 0.237 | |
| Beryllium | mg/L | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Bicarbonate | mg/L | | 231 | 357 | 220 | 258 | 271 | 234 | 201 | 279 | 261 | 306 | 208 | 253 |
| Boron | mg/L | 5 * | 0.0226 | | 0.0193 | | 0.0201 | | 0.0208 | | 0.0212 | | 0.0182 | |
| Cadmium | mg/L | 0.005 * | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | |
| Calcium | mg/L | | 232 | 97.4 | 277 | 180 | 206 | 230 | 280 | 58.3 | 240 | 102 | 210 | 250 |
| Carbonate | mg/L | | 1 | 2 | <1 | <1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 |
| Cation sum | meq/L | | 23 | 11.6 | 26.4 | 18.3 | 20.8 | 22.7 | 26.4 | 9.73 | 24.3 | 11.3 | 22.0 | 27.7 |
| Chloride | mg/L | 250 | 657 | 162 | 747 | 418 | 431 | 548 | 825 | 104 | 462 | 158 | 576 | 743 |
| Chromium | mg/L | 0.05 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Cobalt | mg/L | | 0.0002 | | <0.0001 | | 0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | 20 | <10 | <10 | <10 | 20 | 20 | <10 | <10 | <10 | <10 |
| Conductivity | µS/cm | | 2440 | 1230 | 2820 | 1930 | 2040 | 2320 | 3220 | 947 | 1960 | 1120 | 2370 | 3110 |
| Conductivity - field | µS/cm | | 2500 | 1140 | 2810 | 2120 | 2140 | 2440 | 2950 | 899 | 2190 | 1280 | 2380 | 2800 |
| Copper | mg/L | 1 | 0.0007 | | 0.0009 | | 0.0009 | | 0.0012 | | 0.0014 | | 0.0009 | |
| Dissolved Organic Carbon | mg/L | 5 | 1.2 | 3.1 | 1 | 2 | 1.7 | 2.8 | 1.6 | 7.4 | 1.7 | 3.4 | 1.4 | 1.1 |
| Dissolved Oxygen - field | mg/L | | 5.98 | 2.56 | 2.16 | 1.35 | 1.6 | 1.49 | 4.26 | 3.1 | 4.75 | 1.78 | 7.09 | 2.24 |
| Hardness | mg/L | 80-100 | 776 | 281 | 823 | 538 | 628 | 727 | 842 | 162 | 764 | 293 | 640 | 793 |
| Ion Percentage | % | | 1.98 | 2.02 | 0.34 | 0.24 | 6.55 | 3.95 | 2.98 | 4.92 | 13.4 | 2.57 | 1.90 | 0.77 |
| Iron | mg/L | 0.3 | 0.003 | 0.14 | 0.004 | 0.96 | 0.412 | 0.85 | 0.016 | 0.029 | 0.012 | 0.141 | 0.008 | 0.012 |
| Lead | mg/L | 0.01 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Magnesium | mg/L | | 47.7 | 9.08 | 32 | 21.4 | 27.7 | 37 | 34.6 | 4.1 | 39.9 | 9.33 | 28.20 | 41.10 |
| Manganese | mg/L | 0.05 | 0.0007 | 0.063 | 0.0013 | 0.141 | 0.0229 | 0.044 | 0.0009 | 0.0025 | 0.0097 | 0.0111 | 0.0007 | 0.0203 |
| Molybdenum | mg/L | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Nickel | mg/L | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | |
| Nitrate | mg/L | 10.0 * | 1.336 | 0.41 | 0.95 | 0.46 | 0.6 | 1.36 | 1.1 | <0.5 | 0.6 | <0.5 | 1.4 | 2.43 |
| Nitrite | mg/L | 1.0* | <0.05 | <0.05 | <0.5 | <0.05 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 0.06 |
| Oxydation Reduction Potential | mV | | -17.4 | -36.1 | -17.7 | -39.3 | -37.3 | -37.3 | 53.4 | 5.5 | 41.4 | 25.5 | 38.9 | -10.4 |
| pH | units | | 7.75 | 7.67 | 7.29 | 7.38 | 7.36 | 7.32 | 7.41 | 7.68 | 7.48 | 7.51 | 7.35 | 7.31 |
| pH - field | units | | 7.26 | 7.13 | 6.99 | 7.24 | 7.12 | 7.05 | 7.14 | 7.66 | 7.28 | 7.26 | 7.13 | 7.05 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | 0.03 | 0.04 | 0.1 | 0.06 | <0.02 | 0.03 | 0.07 | 0.02 | 0.08 | 0.02 | 0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 3.4 | 1.3 | 2 | 2.3 | 1.9 | 3.3 | 2.2 | 1 | 3.0 | 1.1 | 2.2 | 4.5 |
| Sodium | mg/L | 200 | 169 | 136 | 226 | 171 | 186 | 185 | 217 | 148 | 205 | 123 | 208 | 267 |
| Sulphate | mg/L | 500 | 41.2 | 25 | 41.2 | 66.2 | 36.3 | 44.7 | 38.6 | 22.7 | 22.3 | 15.1 | 37.9 | 59.5 |
| Total Dissolved Solids | mg/L | 500 | 1330 | 700 | 1470 | 1270 | 1170 | 1930 | 2470 | 600 | 1080 | 610 | 1610 | 2140 |
| Temperature - field | °C | | 5.2 | 17 | 4.1 | 18.5 | 3.4 | 17.3 | 5.1 | 19 | 4.6 | 18.3 | 4.5 | 16.8 |
| Total Kjeldahl Nitrogen | mg/L | | <0.1 | 0.4 | <0.1 | <2.0 | 0.4 | <0.1 | 0.3 | <1.0 | <0.5 | 0.4 | 0.1 | 2.1 |
| Zinc | mg/L | 5 | 0.0014 | | 0.0022 | | 0.0017 | | 0.0017 | | 0.0013 | | 0.0009 | |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 2 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1,2-Trichlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorpropane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichlorobenzene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Benzene | µg/L | 1 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromodichloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromoform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromomethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Chlorobenzene | µg/L | 30 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloroethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Chloroform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| cis-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dibromochloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dichloromethane | µg/L | 50 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethyl Benzene | µg/L | 1.6 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethylene dibromide | µg/L | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| m/p-Xylenes | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| o-Xylene | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Styrene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Tetrachloroethylene | µg/L | 30 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Toluene | µg/L | 24 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichloroethylene | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichlorofluoromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Vinyl Chloride | µg/L | 1 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Xylenes - total | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 107-I | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-17 | Sep-17 | Apr-18 | Sep-18 | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Oct-21 | Apr-22 | Sep-22 |
| Alkalinity | mg/L | 30-500 | 273 | 286 | 281 | 258 | 269 | 256 | 252 | 235 | 275 | 256 | 255 | 278 |
| Aluminum | mg/L | 0.1 | 0.091 | | 0.035 | | 0.052 | | <0.025 | | 0.175 | | <0.025 | |
| Ammonia (as N) | mg/L | | 1.4 | 1.2 | 1.7 | 0.9 | 1.3 | 0.7 | 0.8 | 0.3 | 0.2 | 0.6 | 0.8 | 1.1 |
| Anion sum | meq/L | | 14.2 | 12.3 | 13.9 | 10.2 | 13.1 | 9.8 | 9.53 | 7.24 | 10.2 | 8.18 | 8.57 | 9.44 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.005 | 0.0006 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Barium | mg/L | 1 * | 0.129 | | 0.148 | | 0.161 | | 0.119 | | 0.108 | | 0.083 | |
| Beryllium | mg/L | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Bicarbonate | mg/L | | 272 | 284 | 279 | 256 | 267 | 254 | 250 | 234 | 274 | 255 | 253 | 276 |
| Boron | mg/L | 5 * | 1.32 | | 1.33 | | 1.37 | | 0.572 | | 0.524 | | 0.303 | |
| Cadmium | mg/L | 0.005 * | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | |
| Calcium | mg/L | | 70.7 | 66.4 | 69.3 | 76.2 | 63.7 | 88.2 | 79.6 | 99.7 | 86.2 | 97.8 | 64.9 | 83.4 |
| Carbonate | mg/L | | 1 | 2 | 2 | 2 | 2 | 1 | 2 | <1 | 1 | 1 | 1 | 2 |
| Cation sum | meq/L | | 14.8 | 11.7 | 13.7 | 10.9 | 12.9 | 10.2 | 10.2 | 8.2 | 9.87 | 8.48 | 7.41 | 10.20 |
| Chloride | mg/L | 250 | 309 | 225 | 292 | 159 | 266 | 138 | 135 | 48.8 | 136 | 70.1 | 87.8 | 121.0 |
| Chromium | mg/L | 0.05 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Cobalt | mg/L | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Chemical Oxygen Demand | mg/L | | 40 | <10 | 20 | 30 | 10 | 20 | 30 | <10 | 20 | <10 | <10 | <10 |
| Conductivity | µS/cm | | 1430 | 1260 | 1500 | 1120 | 1400 | 1030 | 1020 | 742 | 1010 | 812 | 887 | 1000 |
| Conductivity - field | µS/cm | | 1510 | 1420 | 1740 | 1240 | 1760 | 1020 | 1150 | 729 | 1170 | 1050 | 1060 | 1270 |
| Copper | mg/L | 1 | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | 0.0005 | | <0.0005 | |
| Dissolved Organic Carbon | mg/L | 5 | 4.8 | 2.9 | 3.1 | 1.9 | 2.6 | 1.7 | <1.0 | 2.1 | 1.3 | 1.9 | 1.9 | 1.6 |
| Dissolved Oxygen - field | mg/L | | 0.88 | 0.85 | 0.58 | 1.03 | 0.96 | 1.86 | 1.51 | 0.67 | 1.23 | 1.43 | 1.03 | 0.70 |
| Hardness | mg/L | 80-100 | 278 | 265 | 284 | 285 | 263 | 314 | 292 | 334 | 312 | 333 | 251 | 300 |
| Ion Percentage | % | | 2.24 | 2.34 | 0.72 | 3.38 | 0.69 | 2.12 | 3.28 | 6.19 | 1.66 | 1.84 | 7.26 | 3.96 |
| Iron | mg/L | 0.3 | 0.337 | 0.17 | 0.134 | 0.25 | 0.155 | 0.13 | 0.042 | 0.057 | 0.214 | 0.314 | <0.005 | 0.485 |
| Lead | mg/L | 0.01 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Magnesium | mg/L | | 24.6 | 24.1 | 27 | 22.9 | 25.2 | 22.8 | 22.7 | 20.6 | 23.4 | 21.5 | 21.5 | 22.3 |
| Manganese | mg/L | 0.05 | 0.0136 | 0.01 | 0.0113 | 0.011 | 0.01 | 0.021 | 0.0134 | 0.0178 | 0.0119 | 0.0143 | 0.0012 | 0.0353 |
| Molybdenum | mg/L | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Nickel | mg/L | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | |
| Nitrate | mg/L | 10.0 * | <0.05 | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 |
| Nitrite | mg/L | 1.0* | <0.05 | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 |
| Oxydation Reduction Potential | mV | | -104.9 | -223.7 | -135.4 | -172.2 | -139.4 | -125.9 | 25.6 | -37.5 | -171.6 | -170.4 | -163.1 | -209.8 |
| pH | units | | 7.72 | 7.85 | 7.9 | 7.8 | 7.9 | 7.79 | 7.82 | 7.65 | 7.74 | 7.76 | 7.79 | 7.84 |
| pH - field | units | | 7.49 | 7.41 | 7.27 | 7.63 | 7.54 | 7.57 | 7.52 | 7.42 | 7.56 | 7.35 | 7.44 | 7.58 |
| Phosphate | mg/L | | 0.03 | <0.02 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.02 | <0.02 | 0.07 |
| Phosphorus | mg/L | | <0.02 | 0.02 | 0.05 | 0.14 | 0.07 | <0.02 | 0.02 | <0.01 | 0.01 | 0.01 | <0.02 | 0.05 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 9.8 | 8.4 | 9.9 | 6.9 | 9.4 | 5.6 | 6.4 | 3.3 | 5.8 | 4.0 | 4.5 | 6.8 |
| Sodium | mg/L | 200 | 204 | 140 | 175 | 114 | 167 | 85.7 | 93.8 | 32 | 79.2 | 38.1 | 50.7 | 90.5 |
| Sulphate | mg/L | 500 | 8.3 | 19.5 | 11.3 | 35.2 | 17.4 | 46.3 | 40.7 | 63.5 | 50.3 | 60.0 | 56.1 | 31.3 |
| Total Dissolved Solids | mg/L | 500 | 750 | 670 | 770 | 590 | 750 | 590 | 570 | 460 | 560 | 480 | 500 | 560 |
| Temperature - field | °C | | 9.1 | 12.4 | 7.5 | 13 | 7 | 13.4 | 8.1 | 10.6 | 10.5 | 11.8 | 8.9 | 12.6 |
| Total Kjeldahl Nitrogen | mg/L | | 0.9 | 1.2 | 1.6 | <2.0 | 1.2 | 0.7 | 1.8 | <1.0 | <0.5 | 0.6 | 0.6 | 2.8 |
| Zinc | mg/L | 5 | 0.003 | | 0.0019 | | 0.0017 | | 0.0034 | | 0.0021 | | <0.0005 | |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | 1 | <1 | <1 | 2 | 49 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1,2-Trichlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorpropane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichlorobenzene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Benzene | µg/L | 1 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromodichloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromoform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromomethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Chlorobenzene | µg/L | 30 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloroethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Chloroform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| cis-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dibromochloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dichloromethane | µg/L | 50 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethyl Benzene | µg/L | 1.6 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethylene dibromide | µg/L | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| m/p-Xylenes | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| o-Xylene | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Styrene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Tetrachloroethylene | µg/L | 30 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Toluene | µg/L | 24 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichloroethylene | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichlorofluoromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Vinyl Chloride | µg/L | 1 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Xylenes - total | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 107-II | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-17 | Sep-17 | Apr-18 | Sep-18 | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Oct-21 | Apr-22 | Sep-22 |
| Alkalinity | mg/L | 30-500 | 235 | 240 | 247 | 235 | 239 | 244 | 236 | 238 | 260 | 264 | 267 | 279 |
| Aluminum | mg/L | 0.1 | <0.025 | | <0.025 | | <0.025 | | 0.426 | | 0.058 | | <0.025 | |
| Ammonia (as N) | mg/L | | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | <0.1 | 0.3 | <0.1 | 0.2 | 0.1 | 0.2 |
| Anion sum | meq/L | | 6.78 | 7.32 | 7.72 | 7.53 | 7.12 | 7.24 | 7.05 | 6.94 | 7.26 | 7.54 | 7.39 | 7.56 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Barium | mg/L | 1 * | 0.069 | | 0.077 | | 0.072 | | 0.078 | | 0.078 | | 0.077 | |
| Beryllium | mg/L | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Bicarbonate | mg/L | | 234 | 239 | 246 | 234 | 238 | 243 | 235 | 237 | 259 | 263 | 266 | 278 |
| Boron | mg/L | 5 * | 0.0138 | | 0.022 | | 0.0164 | | 0.0168 | | 0.0144 | | 0.0105 | |
| Cadmium | mg/L | 0.005 * | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | |
| Calcium | mg/L | | 110 | 107 | 122 | 120 | 106 | 115 | 121 | 116 | 111 | 128 | 121 | 118 |
| Carbonate | mg/L | | <1 | 1 | <1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cation sum | meq/L | | 6.96 | 7 | 8.11 | 7.99 | 7.23 | 7.8 | 8.01 | 7.83 | 7.53 | 8.34 | 8.18 | 7.92 |
| Chloride | mg/L | 250 | 21.5 | 37.1 | 41.6 | 41.6 | 30.2 | 38.5 | 35.2 | 35.5 | 31.0 | 36.3 | 32.9 | 34.2 |
| Chromium | mg/L | 0.05 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Cobalt | mg/L | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | 30 | 10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Conductivity | µS/cm | | 634 | 657 | 696 | 752 | 669 | 709 | 706 | 661 | 705 | 731 | 732 | 648 |
| Conductivity - field | µS/cm | | 653 | 701 | 731 | 750 | 703 | 701 | 696 | 693 | 710 | 717 | 703 | 744 |
| Copper | mg/L | 1 | 0.0007 | | 0.0006 | | 0.0005 | | 0.0011 | | 0.0014 | | <0.0005 | |
| Dissolved Organic Carbon | mg/L | 5 | 1 | 2 | 2.1 | 1.3 | 2 | 5.3 | <1.0 | 1.4 | <1.0 | 1.7 | 1.6 | 1.4 |
| Dissolved Oxygen - field | mg/L | | 3.99 | 3.14 | 3.41 | 2.91 | 3.29 | 3.47 | 2.55 | 2.84 | 2.12 | 2.75 | 1.21 | 1.49 |
| Hardness | mg/L | 80-100 | 330 | 332 | 375 | 367 | 332 | 355 | 369 | 355 | 346 | 389 | 375 | 361 |
| Ion Percentage | % | | 1.29 | 2.19 | 2.48 | 2.96 | 0.76 | 3.72 | 6.41 | 5.98 | 1.79 | 5.02 | 5.06 | 2.34 |
| Iron | mg/L | 0.3 | 0.001 | <0.05 | 0.003 | <0.05 | 0.002 | <0.05 | 0.333 | <0.005 | 0.048 | 0.391 | 0.007 | 0.163 |
| Lead | mg/L | 0.01 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Magnesium | mg/L | | 13.4 | 15.8 | 17.2 | 16.3 | 16.3 | 16.4 | 16.2 | 15.9 | 16.6 | 16.8 | 17.7 | 16.0 |
| Manganese | mg/L | 0.05 | <0.0005 | <0.001 | <0.0005 | <0.001 | 0.0006 | <0.001 | 0.0114 | 0.0012 | 0.0023 | 0.0143 | 0.0009 | 0.0063 |
| Molybdenum | mg/L | | 0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Nickel | mg/L | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | |
| Nitrate | mg/L | 10.0 * | 1.86 | 1.72 | 1.38 | 1.55 | 1.5 | 1.6 | 1.5 | 1.6 | 1.4 | 1.7 | 1.2 | 1.2 |
| Nitrite | mg/L | 1.0* | <0.05 | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 |
| Oxydation Reduction Potential | mV | | 102.7 | 51.3 | 53.5 | -48 | 18 | 63.1 | 103.6 | 36.7 | 133.5 | 13.2 | 100.7 | -10.9 |
| pH | units | | 7.55 | 7.77 | 7.5 | 7.66 | 7.73 | 7.7 | 7.71 | 7.66 | 7.64 | 7.66 | 7.65 | 7.62 |
| pH - field | units | | 7.39 | 7.29 | 7.3 | 7.44 | 7.44 | 7.42 | 7.41 | 7.5 | 7.33 | 7.20 | 7.25 | 7.30 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | 0.02 | 0.11 | 0.03 | <0.02 | <0.02 | <0.01 | 0.02 | <0.01 | <0.02 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.5 | 1.3 | 1.4 | 1.4 | 1.4 | 1.6 | 1.6 | 1.6 | 1.5 | 1.6 | 1.6 | 1.6 |
| Sodium | mg/L | 200 | 6.9 | 6.8 | 12.1 | 13.6 | 12.1 | 14.6 | 13.1 | 14.7 | 12.8 | 11.2 | 14.0 | 14.6 |
| Sulphate | mg/L | 500 | 72 | 72.3 | 80.1 | 81.8 | 73.8 | 63.4 | 66.3 | 58.8 | 60.5 | 62.1 | 58.4 | 53.6 |
| Total Dissolved Solids | mg/L | 500 | 420 | 430 | 440 | 430 | 420 | 450 | 430 | 410 | 250 | 440 | 400 | 450 |
| Temperature - field | °C | | 8.7 | 10 | 7.7 | 9.8 | 7.9 | 9.9 | 8.2 | 9.1 | 8.2 | 10.0 | 8.4 | 11.0 |
| Total Kjeldahl Nitrogen | mg/L | | 0.2 | 0.2 | <0.1 | <2.0 | 0.2 | <0.1 | 0.4 | <1.0 | <0.5 | 3.9 | <0.2 | 3.6 |
| Zinc | mg/L | 5 | 0.001 | | 0.0017 | | 0.0009 | | 0.0014 | | 0.0010 | | <0.0005 | |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1,2-Trichlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorpropane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichlorobenzene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Benzene | µg/L | 1 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromodichloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromoform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromomethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Chlorobenzene | µg/L | 30 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloroethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Chloroform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| cis-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dibromochloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dichloromethane | µg/L | 50 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethyl Benzene | µg/L | 1.6 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethylene dibromide | µg/L | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| m/p-Xylenes | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| o-Xylene | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Styrene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Tetrachloroethylene | µg/L | 30 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Toluene | µg/L | 24 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichloroethylene | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichlorofluoromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Vinyl Chloride | µg/L | 1 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Xylenes - total | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 107-III | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-17 | Sep-17 | Apr-18 | Sep-18 | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Oct-21 | Apr-22 | Sep-22 |
| Alkalinity | mg/L | 30-500 | 225 | 315 | 248 | 279 | 245 | 284 | 230 | 264 | 283 | 281 | 222 | 270 |
| Aluminum | mg/L | 0.1 | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | |
| Ammonia (as N) | mg/L | | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | <0.1 | 0.3 | 0.1 | 0.2 | 0.1 | 0.2 |
| Anion sum | meq/L | | 6.57 | 9.24 | 7.32 | 9.2 | 8.42 | 8.31 | 6.86 | 7.63 | 8.01 | 7.87 | 6.30 | 8.19 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Barium | mg/L | 1 * | 0.061 | | 0.078 | | 0.089 | | 0.079 | | 0.086 | | 0.062 | |
| Beryllium | mg/L | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Bicarbonate | mg/L | | 224 | 314 | 247 | 278 | 244 | 283 | 229 | 263 | 282 | 280 | 221 | 269 |
| Boron | mg/L | 5 * | 0.009 | | 0.0184 | | 0.0134 | | 0.0161 | | 0.0129 | | 0.0086 | |
| Cadmium | mg/L | 0.005 * | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | 0.0001 | | <0.0001 | |
| Calcium | mg/L | | 108 | 130 | 111 | 135 | 123 | 127 | 109 | 125 | 124 | 123 | 102 | 117 |
| Carbonate | mg/L | | <1 | <1 | <1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 | 1 |
| Cation sum | meq/L | | 6.75 | 8.88 | 7.34 | 9.61 | 8.41 | 9.09 | 7.33 | 8.57 | 8.40 | 8.59 | 7.13 | 8.48 |
| Chloride | mg/L | 250 | 22.9 | 70 | 35.1 | 87.3 | 83.2 | 54 | 36.7 | 45.1 | 50.1 | 47.3 | 29.9 | 66.1 |
| Chromium | mg/L | 0.05 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Cobalt | mg/L | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | 20 | 10 | <10 | <10 | 10 | <10 | <10 | <10 | <10 | <10 |
| Conductivity | µS/cm | | 637 | 871 | 700 | 922 | 856 | 833 | 692 | 775 | 789 | 790 | 650 | 812 |
| Conductivity - field | µS/cm | | 642 | 888 | 706 | 923 | 677 | 835 | 685 | 746 | 808 | 777 | 626 | 810 |
| Copper | mg/L | 1 | 0.0006 | | <0.0005 | | 0.0016 | | 0.0009 | | 0.0023 | | 0.0007 | |
| Dissolved Organic Carbon | mg/L | 5 | <1.0 | 2.5 | 2.2 | 2.4 | 3 | 5.3 | 1 | 2.6 | 2.3 | 2.8 | 2.4 | 2.2 |
| Dissolved Oxygen - field | mg/L | | 6.89 | 1.66 | 2.05 | 1.45 | 4.73 | 2.41 | 1.63 | 1.38 | 1.89 | 2.85 | 4.65 | 3.97 |
| Hardness | mg/L | 80-100 | 316 | 391 | 345 | 403 | 370 | 389 | 331 | 378 | 380 | 369 | 323 | 358 |
| Ion Percentage | % | | 1.4 | 1.99 | 0.08 | 2.2 | 0.06 | 4.46 | 3.28 | 5.79 | 2.33 | 4.34 | 6.17 | 1.74 |
| Iron | mg/L | 0.3 | 0.007 | 0.58 | 0.019 | 0.09 | 0.009 | 0.25 | 0.024 | 0.032 | 0.377 | 0.025 | 0.028 | 0.031 |
| Lead | mg/L | 0.01 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Magnesium | mg/L | | 11.3 | 16.1 | 16.5 | 16 | 15.2 | 17.4 | 14.2 | 15.9 | 17.1 | 15.1 | 16.5 | 16.0 |
| Manganese | mg/L | 0.05 | 0.0017 | 0.032 | 0.0103 | 0.018 | 0.005 | 0.011 | 0.0194 | 0.0059 | 0.230 | 0.0090 | 0.0391 | 0.0084 |
| Molybdenum | mg/L | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Nickel | mg/L | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | |
| Nitrate | mg/L | 10.0 * | 0.83 | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | 0.5 | <0.5 | <0.5 | <0.5 | <0.05 |
| Nitrite | mg/L | 1.0* | <0.05 | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 |
| Oxydation Reduction Potential | mV | | 114.7 | -51.1 | 61.7 | -38.4 | 49.6 | -12.4 | 106.1 | 14.8 | 39.6 | 20.4 | 43.2 | -9.3 |
| pH | units | | 7.42 | 7.47 | 7.4 | 7.4 | 7.56 | 7.4 | 7.68 | 7.52 | 7.44 | 7.40 | 7.65 | 7.61 |
| pH - field | units | | 7.26 | 6.93 | 7.16 | 7.12 | 7.38 | 7.17 | 7.34 | 7.31 | 7.03 | 7.05 | 7.34 | 7.21 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | 0.04 | 0.09 | 0.04 | <0.02 | <0.02 | <0.01 | 0.02 | 0.01 | <0.02 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 0.7 | 1.2 | 1.2 | 1.2 | 1 | 1.4 | 1.4 | 1.6 | 1.1 | 1.4 | 1.6 | 1.3 |
| Sodium | mg/L | 200 | 8.9 | 22.9 | 8.4 | 34.3 | 22.2 | 28.7 | 15.2 | 21.4 | 16.9 | 26.0 | 14.0 | 28.8 |
| Sulphate | mg/L | 500 | 72.5 | 56.2 | 73.8 | 64.4 | 64.4 | 62.4 | 66.3 | 58.4 | 54.1 | 53.1 | 56.0 | 53.2 |
| Total Dissolved Solids | mg/L | 500 | 390 | 530 | 410 | 510 | 500 | 510 | 410 | 460 | 390 | 450 | 360 | 440 |
| Temperature - field | °C | | 3.5 | 13 | 3.7 | 14.7 | 3 | 13.9 | 4.4 | 14.3 | 2.5 | 13.6 | 4.2 | 14.3 |
| Total Kjeldahl Nitrogen | mg/L | | <0.1 | 0.2 | 0.2 | <2.0 | 0.4 | <0.1 | 0.2 | <1.0 | 0.2 | 0.4 | <0.2 | <2.0 |
| Zinc | mg/L | 5 | 0.0023 | | <0.0005 | | 0.0017 | | 0.001 | | 0.0042 | | <0.0005 | |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1,2-Trichlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorpropane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichlorobenzene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Benzene | µg/L | 1 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromodichloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromoform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromomethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Chlorobenzene | µg/L | 30 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloroethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Chloroform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| cis-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dibromochloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dichloromethane | µg/L | 50 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethyl Benzene | µg/L | 1.6 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethylene dibromide | µg/L | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| m/p-Xylenes | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| o-Xylene | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Styrene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Tetrachloroethylene | µg/L | 30 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Toluene | µg/L | 24 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichloroethylene | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichlorofluoromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Vinyl Chloride | µg/L | 1 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Xylenes - total | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 108-I | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Sep-21 | 09-Mar-22 | Sep-22 |
| Alkalinity | mg/L | 30-500 | 183 | 205 | 208 | 190 | 194 | 192 | 187 | 190 | 204 | 201 | 198 | 197 |
| Aluminum | mg/L | 0.1 | <0.025 | | <0.025 | | <0.025 | | 0.783 | | <0.025 | | 0.06 | |
| Ammonia (as N) | mg/L | | 0.2 | 0.2 | 0.3 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 |
| Anion sum | meq/L | | 4.31 | 4.79 | 4.73 | 4.46 | 4.52 | 4.51 | 4.51 | 4.5 | 4.79 | 4.91 | 4.72 | 4.72 |
| Arsenic | mg/L | 0.025 | 0.0015 | <0.005 | 0.002 | <0.005 | 0.0017 | <0.005 | 0.0018 | 0.0017 | 0.0023 | 0.0016 | 0.0016 | 0.0017 |
| Barium | mg/L | 1 * | 0.095 | | 0.124 | | 0.113 | | 0.12 | | 0.141 | | 0.112 | |
| Beryllium | mg/L | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Bicarbonate | mg/L | | 180 | 202 | 206 | 187 | 191 | 190 | 184 | 187 | 202 | 198 | 196 | 195 |
| Boron | mg/L | 5 * | 0.0817 | | 0.0628 | | 0.0763 | | 0.0756 | | 0.0774 | | 0.0684 | |
| Cadmium | mg/L | 0.005 * | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | 0.0001 | |
| Calcium | mg/L | | 21.2 | 20.2 | 22 | 20.7 | 22.1 | 20.8 | 34.1 | 23.5 | 20.9 | 23.9 | 26 | 22.7 |
| Carbonate | mg/L | | 3 | 3 | 2 | 3 | 3 | 2 | 3 | 3 | 2 | 3 | 2 | 2 |
| Cation sum | meq/L | | 4.75 | 4.63 | 4.75 | 4.53 | 4.87 | 4.66 | 5.61 | 5 | 4.47 | 5.03 | 5.38 | 5.15 |
| Chloride | mg/L | 250 | 6.1 | 6.7 | 4.5 | 5.4 | 4.8 | 5.8 | 7.9 | 6.3 | 5.9 | 9.1 | 6.8 | 6.7 |
| Chromium | mg/L | 0.05 * | <0.0005 | | <0.0005 | | <0.0005 | | 0.001 | | <0.0005 | | <0.0005 | |
| Cobalt | mg/L | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Chemical Oxygen Demand | mg/L | | <10 | 20 | <10 | 30 | <10 | 20 | <10 | <10 | 10 | <10 | <10 | <10 |
| Conductivity | µS/cm | | 422 | 428 | 441 | 433 | 438 | 434 | 434 | 440 | 447 | 464 | 459 | 455 |
| Conductivity - field | µS/cm | | 424 | 427 | 415 | 425 | 432 | 433 | 438 | 430 | 441 | 451 | 439 | 448 |
| Copper | mg/L | 1 | 0.0009 | | <0.0005 | | 0.0009 | | 0.0009 | | 0.0024 | | <0.0005 | |
| Dissolved Organic Carbon | mg/L | 5 | 1.2 | 1.1 | 2 | 1.4 | 3.1 | 3.6 | 3.3 | <1.0 | 1.6 | 1.4 | 1.1 | 1.4 |
| Dissolved Oxygen - field | mg/L | | 3.14 | 1.38 | 1.81 | 0.68 | 1.62 | 0.77 | 1.01 | 0.83 | 0.64 | 1.13 | 0.84 | 2.40 |
| Hardness | mg/L | 80-100 | 205 | 200 | 204 | 195 | 212 | 201 | 247 | 216 | 192 | 212 | 235 | 224 |
| Ion Percentage | % | | 4.84 | 1.69 | 0.26 | 0.8 | 3.73 | 1.68 | 10.8 | 5.18 | 3.50 | 1.23 | 6.51 | 4.36 |
| Iron | mg/L | 0.3 | 0.048 | 0.06 | 0.068 | 0.08 | 0.083 | 0.06 | 0.54 | 0.064 | 0.092 | 0.056 | 0.145 | 0.113 |
| Lead | mg/L | 0.01 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Magnesium | mg/L | | 36.9 | 36.2 | 36.2 | 34.8 | 38 | 36.3 | 39.2 | 38.2 | 34.0 | 36.9 | 41.4 | 40.6 |
| Manganese | mg/L | 0.05 | 0.0041 | 0.004 | 0.0041 | 0.005 | 0.0045 | 0.004 | 0.0221 | 0.0055 | 0.0069 | 0.0048 | 0.0092 | 0.0065 |
| Molybdenum | mg/L | | 0.0021 | | 0.0016 | | 0.0016 | | 0.0016 | | 0.0020 | | 0.0015 | |
| Nickel | mg/L | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | |
| Nitrate | mg/L | 10.0 * | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 0.05 |
| Nitrite | mg/L | 1.0* | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 |
| Oxydation Reduction Potential | mV | | 148.1 | -86 | 79 | -102.3 | 83.1 | -81.7 | -10.4 | -64.2 | -48.2 | -46.8 | 56.5 | 223.0 |
| pH | units | | 8.18 | 8.2 | 8.08 | 8.2 | 8.18 | 8.11 | 8.21 | 8.16 | 8.09 | 8.19 | 8.07 | 8.12 |
| pH - field | units | | 7.95 | 7.87 | 7.93 | 8.07 | 8 | 8.06 | 7.99 | 8.11 | 8.09 | 7.84 | 7.86 | 7.90 |
| Phosphate | mg/L | | <0.02 | <0.01 | <0.01 | <0.02 | <0.02 | <0.02 | 0.03 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | 0.02 | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.01 | 0.02 | 0.01 | 0.09 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.9 | 1.9 | 1.9 | 1.8 | 2 | 1.8 | 2.4 | 2.2 | 1.9 | 2.0 | 2.1 | 2.0 |
| Sodium | mg/L | 200 | 12.7 | 12.4 | 13 | 12.3 | 12.3 | 12.3 | 12.7 | 12.9 | 11.9 | 15.9 | 12.8 | 12.6 |
| Sulphate | mg/L | 500 | 28.8 | 30.4 | 27.7 | 30.3 | 30.4 | 30.2 | 32.4 | 31.3 | 32.5 | 36.8 | 33.7 | 34.2 |
| Total Dissolved Solids | mg/L | 500 | 250 | 250 | 230 | 250 | 240 | 260 | 260 | 250 | 200 | 230 | 270 | 280 |
| Temperature - field | °C | | 9.8 | 12.5 | 10.3 | 11.1 | 10.6 | 11.8 | 10.4 | 10.7 | 10.4 | 12.2 | 10.5 | 11.4 |
| Total Kjeldahl Nitrogen | mg/L | | <0.1 | 0.2 | <0.1 | 1.2 | <0.1 | <0.1 | 0.1 | <1.0 | 0.1 | 0.2 | 0.2 | 2.8 |
| Zinc | mg/L | 5 | 0.0015 | | <0.0005 | | 0.001 | | 0.0039 | | 0.0015 | | 0.0007 | |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 2 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1,2-Trichlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorpropane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichlorobenzene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Benzene | µg/L | 1 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromodichloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromoform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromomethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Chlorobenzene | µg/L | 30 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloroethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Chloroform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| cis-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dibromochloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dichloromethane | µg/L | 50 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethyl Benzene | µg/L | 1.6 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethylene dibromide | µg/L | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| m/p-Xylenes | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| o-Xylene | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Styrene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Tetrachloroethylene | µg/L | 30 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Toluene | µg/L | 24 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichloroethylene | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichlorofluoromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Vinyl Chloride | µg/L | 1 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Xylenes - total | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 108-II | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Sep-21 | Mar-22 | Sep-22 |
| Alkalinity | mg/L | 30-500 | 159 | 166 | 165 | 155 | 157 | 170 | 169 | 167 | 177 | 179 | 172 | 178 |
| Aluminum | mg/L | 0.1 | 0.026 | | <0.025 | | <0.025 | | 0.068 | | 0.038 | | 0 | |
| Ammonia (as N) | mg/L | | 0.1 | 0.2 | 0.1 | 0.2 | 0.1 | 0.1 | 0.2 | 0.3 | 0.1 | 0.2 | 0.2 | 0.3 |
| Anion sum | meq/L | | 4.1 | 4.29 | 4.33 | 4.16 | 4.18 | 4.53 | 4.56 | 4.51 | 4.66 | 4.73 | 3.39 | 4.72 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Barium | mg/L | 1 * | 0.06 | | 0.07 | | 0.069 | | 0.072 | | 0.080 | | 0.075 | |
| Beryllium | mg/L | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Bicarbonate | mg/L | | 157 | 164 | 164 | 154 | 155 | 169 | 167 | 165 | 175 | 177 | 170 | 176 |
| Boron | mg/L | 5 * | 0.118 | | 0.099 | | 0.126 | | 0.113 | | 0.128 | | 0.106 | |
| Cadmium | mg/L | 0.005 * | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | |
| Calcium | mg/L | | 33.6 | 29.2 | 32 | 30.7 | 32.2 | 33.5 | 36.5 | 38.1 | 32.5 | 35.7 | 36.3 | 36.8 |
| Carbonate | mg/L | | 2 | 2 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cation sum | meq/L | | 4.5 | 4.19 | 4.5 | 4.29 | 4.56 | 4.7 | 5.05 | 5.17 | 4.56 | 4.92 | 5.11 | 5.25 |
| Chloride | mg/L | 250 | 12.3 | 12.5 | 11.9 | 12.1 | 11 | 13.2 | 14 | 13.9 | 12.5 | 13.2 | 2.1 | 12.3 |
| Chromium | mg/L | 0.05 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Cobalt | mg/L | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | 10 | 50 | <10 | 10 | <10 | <10 | 20 | <10 | <10 | <10 |
| Conductivity | µS/cm | | 417 | 411 | 424 | 426 | 429 | 457 | 453 | 463 | 459 | 469 | 463 | 459 |
| Conductivity - field | µS/cm | | 402 | 415 | 407 | 420 | 424 | 457 | 451 | 451 | 447 | 460 | 442 | 469 |
| Copper | mg/L | 1 | <0.0005 | | <0.0005 | | 0.0009 | | 0.001 | | 0.0007 | | 0.0016 | |
| Dissolved Organic Carbon | mg/L | 5 | 3 | 3 | 2.6 | 3.1 | 2.1 | 2.5 | 3.3 | 1.7 | 2.4 | 2.5 | 1.4 | 2.4 |
| Dissolved Oxygen - field | mg/L | | 3.43 | 1.01 | 3.77 | 0.64 | 3.9 | 1.47 | 3.59 | 0.68 | 4.26 | 4.38 | 4.60 | 1.84 |
| Hardness | mg/L | 80-100 | 177 | 160 | 173 | 165 | 177 | 189 | 202 | 207 | 182 | 197 | 203 | 211 |
| Ion Percentage | % | | 4.68 | 1.2 | 1.92 | 1.46 | 4.29 | 1.86 | 5.09 | 6.82 | 1.17 | 2.00 | 20.30 | 5.31 |
| Iron | mg/L | 0.3 | 0.037 | 0.08 | 0.004 | 0.08 | 0.014 | <0.05 | 0.092 | 0.066 | 0.074 | 0.067 | 0.070 | 0.074 |
| Lead | mg/L | 0.01 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Magnesium | mg/L | | 22.5 | 21.1 | 22.6 | 21.4 | 23.5 | 25.7 | 26.9 | 27.2 | 24.4 | 26.1 | 27.2 | 28.9 |
| Manganese | mg/L | 0.05 | 0.0027 | 0.031 | <0.0005 | 0.127 | 0.0006 | 0.14 | 0.0046 | 0.0927 | 0.0046 | 0.126 | 0.005 | 0.089 |
| Molybdenum | mg/L | | 0.0045 | | 0.0044 | | 0.0043 | | 0.0037 | | 0.0039 | | 0.0035 | |
| Nickel | mg/L | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | |
| Nitrate | mg/L | 10.0 * | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 |
| Nitrite | mg/L | 1.0* | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 |
| Oxydation Reduction Potential | mV | | 190.6 | -176 | 105.7 | -131.4 | 116.6 | -149.9 | 69.7 | -46.5 | 57.9 | 5 | 101 | 237 |
| pH | units | | 8.04 | 8.02 | 7.88 | 7.93 | 8.11 | 7.96 | 8.11 | 8.05 | 8.03 | 8.04 | 7.99 | 8.02 |
| pH - field | units | | 7.95 | 7.83 | 7.92 | 8 | 7.98 | 7.94 | 7.98 | 8.04 | 8.04 | 7.94 | 7.85 | 7.81 |
| Phosphate | mg/L | | <0.02 | <0.01 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.01 | 0.02 | 0.01 | 0.02 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 2.2 | 2 | 2 | 1.8 | 2.1 | 1.9 | 2.2 | 2.3 | 2.0 | 2.1 | 2.2 | 2.1 |
| Sodium | mg/L | 200 | 20.2 | 20.9 | 22.1 | 20.9 | 21.3 | 19 | 21 | 21 | 19.3 | 20.6 | 22.1 | 21.2 |
| Sulphate | mg/L | 500 | 32.3 | 35.1 | 38.7 | 39.6 | 40 | 41.6 | 43.1 | 42.4 | 42.6 | 43.0 | <0.2 | 44.5 |
| Total Dissolved Solids | mg/L | 500 | 240 | 260 | 220 | 260 | 230 | 290 | 270 | 260 | 270 | 230 | 280 | 280 |
| Temperature - field | °C | | 7.3 | 15.2 | 9.7 | 12.2 | 9 | 12.8 | 9.1 | 11.2 | 8.4 | 15.3 | 8.1 | 13.7 |
| Total Kjeldahl Nitrogen | mg/L | | <0.1 | 0.1 | <0.1 | <1.0 | <0.1 | <0.1 | 0.1 | <1.0 | <0.1 | 0.1 | <0.1 | 3.1 |
| Zinc | mg/L | 5 | 0.0017 | | 0.0015 | | 0.0015 | | 0.0036 | | <0.0005 | | 0.0043 | |
| Phenols | µg/L | | 4 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 2 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1,2-Trichlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorpropane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 5 | | < 0.5 | |
| 1,3-Dichlorobenzene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Benzene | µg/L | 1 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromodichloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromoform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromomethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Chlorobenzene | µg/L | 30 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloroethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 0.5 | | < 5 | |
| Chloroform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| cis-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dibromochloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dichloromethane | µg/L | 50 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethyl Benzene | µg/L | 1.6 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethylene dibromide | µg/L | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| m/p-Xylenes | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| o-Xylene | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Styrene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Tetrachloroethylene | µg/L | 30 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Toluene | µg/L | 24 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichloroethylene | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichlorofluoromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Vinyl Chloride | µg/L | 1 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Xylenes - total | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 108-III | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Sep-21 | Mar-22 | Sep-22 |
| Alkalinity | mg/L | 30-500 | 447 | 500 | 478 | 433 | 447 | 453 | 519 | 413 | 532 | 502 | 486 | 483 |
| Aluminum | mg/L | 0.1 | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | |
| Ammonia (as N) | mg/L | | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 | <0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 |
| Anion sum | meq/L | | 10.3 | 11.8 | 11.3 | 10.2 | 10.4 | 10.5 | 12.1 | 9.73 | 12.0 | 11.5 | 11.4 | 11.4 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.005 | <0.0005 | 0.006 | <0.0005 | <0.005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Barium | mg/L | 1 * | 0.101 | | 0.129 | | 0.117 | | 0.139 | | 0.132 | | 0.121 | |
| Beryllium | mg/L | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Bicarbonate | mg/L | | 446 | 499 | 477 | 432 | 446 | 452 | 518 | 412 | 531 | 501 | 485 | 482 |
| Boron | mg/L | 5 * | 0.013 | | 0.0078 | | 0.012 | | 0.0121 | | 0.0129 | | 0.0121 | |
| Cadmium | mg/L | 0.005 * | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | |
| Calcium | mg/L | | 144 | 170 | 191 | 152 | 159 | 153 | 202 | 190 | 167 | 179 | 186 | 191 |
| Carbonate | mg/L | | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Cation sum | meq/L | | 10.2 | 11.3 | 12.2 | 10.6 | 11 | 10.8 | 12.9 | 12.5 | 10.9 | 11.8 | 12.1 | 12.2 |
| Chloride | mg/L | 250 | 18.2 | 26 | 19.9 | 16.9 | 13.2 | 15.6 | 18.2 | 13.2 | 11.7 | 15.2 | 19.7 | 20.1 |
| Chromium | mg/L | 0.05 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Cobalt | mg/L | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | 10 | 20 | <10 | <10 | 40 | <10 | 30 | <10 | <10 | <10 |
| Conductivity | µS/cm | | 891 | 976 | 889 | 831 | 931 | 984 | 1110 | 900 | 1020 | 1080 | 975 | 1090 |
| Conductivity - field | µS/cm | | 1010 | 1120 | 1020 | 1010 | 961 | 998 | 1100 | 1040 | 1020 | 1030 | 1040 | 1070 |
| Copper | mg/L | 1 | 0.0008 | | 0.0006 | | 0.0021 | | 0.0016 | | 0.0202 | | <0.0005 | |
| Dissolved Organic Carbon | mg/L | 5 | 2.2 | 2.3 | 3.5 | 2.1 | 3.6 | 4.6 | 3.8 | 2.3 | 2.9 | 3.2 | 2.0 | 3.1 |
| Dissolved Oxygen - field | mg/L | | 4.59 | 2.15 | 1.88 | 1.32 | 2.03 | 1.51 | 2.94 | 1.08 | 3.31 | <0.05 | 2.49 | 2.59 |
| Hardness | mg/L | 80-100 | 493 | 546 | 593 | 510 | 534 | 520 | 622 | 601 | 529 | 566 | 586 | 587 |
| Ion Percentage | % | | 0.64 | 2.15 | 4.12 | 1.66 | 3.13 | 0.94 | 2.94 | 12.3 | 4.68 | 1.01 | 2.91 | 3.49 |
| Iron | mg/L | 0.3 | 0.004 | <0.05 | 0.002 | <0.05 | 0.004 | <0.05 | 0.009 | 0.012 | 0.028 | <0.005 | 0.02 | 0.013 |
| Lead | mg/L | 0.01 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Magnesium | mg/L | | 32.5 | 29.4 | 28.2 | 31.6 | 33.3 | 33.5 | 28.5 | 30.7 | 27.1 | 28.8 | 29.4 | 26.5 |
| Manganese | mg/L | 0.05 | 0.0023 | 0.009 | 0.0089 | 0.014 | 0.0025 | 0.012 | 0.0109 | 0.0194 | 0.0086 | 0.0307 | 0.0096 | 0.0284 |
| Molybdenum | mg/L | | 0.0008 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Nickel | mg/L | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | 0.014 | | <0.002 | |
| Nitrate | mg/L | 10.0 * | 1.66 | 1.37 | 1.33 | 1.8 | 1.4 | 1.2 | <0.5 | 0.5 | <0.5 | <0.5 | 0.5 | 0.85 |
| Nitrite | mg/L | 1.0* | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 |
| Oxydation Reduction Potential | mV | | 217.4 | 71.2 | 128.6 | 42.3 | 162 | 50 | 137.9 | 59.3 | 103.1 | 92.5 | 136.3 | 270.0 |
| pH | units | | 7.21 | 7.5 | 7.08 | 7.13 | 7.31 | 7.19 | 7.16 | 7.26 | 7.16 | 7.13 | 7.06 | 7.11 |
| pH - field | units | | 6.95 | 6.76 | 6.84 | 6.97 | 6.97 | 6.97 | 6.89 | 6.92 | 7.06 | 6.75 | 6.84 | 6.78 |
| Phosphate | mg/L | | <0.02 | <0.01 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | 0.03 | <0.02 | <0.02 | <0.02 | <0.02 | <0.01 | 0.02 | 0.01 | <0.02 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.3 | 1.5 | 1 | 1.6 | 1.4 | 1.6 | 1.1 | 1.7 | 1.1 | 1.6 | 1.2 | 1.2 |
| Sodium | mg/L | 200 | 5.8 | 6.8 | 7.3 | 6.3 | 5.8 | 6.1 | 8.3 | 8.2 | 6.6 | 8.1 | 7.7 | 8.5 |
| Sulphate | mg/L | 500 | 50.6 | 61.7 | 66.2 | 59.4 | 59.2 | 60.5 | 76.3 | 64.2 | 66.4 | 66.1 | 69.7 | 66.3 |
| Total Dissolved Solids | mg/L | 500 | 610 | 670 | 630 | 590 | 560 | 610 | 700 | 620 | 650 | 620 | 650 | 660 |
| Temperature - field | °C | | 5.8 | 15 | 5.7 | 15.6 | 5.2 | 15.5 | 6.1 | 14.6 | 6.4 | 16.0 | 6.4 | 15.3 |
| Total Kjeldahl Nitrogen | mg/L | | 0.2 | <0.1 | <0.1 | <1.0 | <0.1 | <0.2 | 0.4 | <1.0 | 0.5 | 0.2 | 0.1 | 2.9 |
| Zinc | mg/L | 5 | 0.0014 | | 0.0013 | | 0.0026 | | 0.0009 | | 0.0058 | | <0.0005 | |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1,2-Trichlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorpropane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichlorobenzene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Benzene | µg/L | 1 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromodichloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromoform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromomethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Chlorobenzene | µg/L | 30 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloroethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Chloroform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| cis-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dibromochloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dichloromethane | µg/L | 50 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethyl Benzene | µg/L | 1.6 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethylene dibromide | µg/L | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| m/p-Xylenes | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| o-Xylene | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Styrene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Tetrachloroethylene | µg/L | 30 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Toluene | µg/L | 24 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichloroethylene | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichlorofluoromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Vinyl Chloride | µg/L | 1 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Xylenes - total | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 109-I | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Oct-21 | Mar-22 | Sep-22 |
| Alkalinity | mg/L | 30-500 | 144 | 151 | 144 | 142 | 144 | 141 | 142 | 138 | 150 | 149 | 144 | 140 |
| Aluminum | mg/L | 0.1 | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | |
| Ammonia (as N) | mg/L | | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.2 | 0.2 | 0.3 | 0.3 |
| Anion sum | meq/L | | 3.29 | 3.47 | 3.32 | 3.3 | 3.29 | 3.29 | 3.3 | 3.2 | 3.43 | 3.44 | 3.37 | 3.27 |
| Arsenic | mg/L | 0.025 | 0.0032 | <0.005 | 0.0035 | 0.006 | 0.0039 | <0.005 | 0.0043 | 0.0038 | 0.0038 | 0.0039 | 0.0038 | 0.0037 |
| Barium | mg/L | 1 * | 0.082 | | 0.097 | | 0.091 | | 0.099 | | 0.093 | | 0.095 | |
| Beryllium | mg/L | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Bicarbonate | mg/L | | 141 | 149 | 142 | 140 | 141 | 138 | 140 | 136 | 147 | 146 | 143 | 137 |
| Boron | mg/L | 5 * | 0.0675 | | 0.0537 | | 0.0737 | | 0.0668 | | 0.0704 | | 0.0816 | |
| Cadmium | mg/L | 0.005 * | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | |
| Calcium | mg/L | | 17.9 | 20 | 18 | 18.7 | 19.4 | 16.4 | 20.4 | 20.6 | 18.9 | 19.9 | 19.1 | 18.5 |
| Carbonate | mg/L | | 3 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 3 | 3 | 1 | 3 |
| Cation sum | meq/L | | 3.54 | 3.52 | 3.27 | 3.45 | 3.53 | 3.16 | 3.5 | 3.49 | 3.51 | 3.39 | 3.45 | 3.47 |
| Chloride | mg/L | 250 | 1.3 | 1.1 | 1.4 | 1.4 | <1 | 1.9 | 1.6 | 1.2 | 1.1 | 1.2 | 1.8 | 1.2 |
| Chromium | mg/L | 0.05 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Cobalt | mg/L | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | <10 | 20 | <10 | <10 | <10 | <10 | <10 | <10 | 30 | <10 |
| Conductivity | µS/cm | | 325 | 322 | 326 | 319 | 323 | 318 | 322 | 318 | 321 | 324 | 326 | 358 |
| Conductivity - field | µS/cm | | 322 | 327 | 313 | 315 | 325 | 311 | 337 | 316 | 326 | 316 | 314 | 322 |
| Copper | mg/L | 1 | <0.0005 | | 0.0015 | | 0.0017 | | <0.0005 | | 0.0043 | | 0.0005 | |
| Dissolved Organic Carbon | mg/L | 5 | <1.0 | 1.2 | 1.3 | 1.1 | 3.9 | 3.7 | 2.8 | 1.2 | 1.4 | 2.1 | <1.0 | 1.5 |
| Dissolved Oxygen - field | mg/L | | 2.58 | 3.88 | 2.61 | 0.81 | 1.24 | 1.05 | 2.08 | 0.71 | 1.89 | 2.02 | 1.92 | 2.74 |
| Hardness | mg/L | 80-100 | 134 | 132 | 122 | 127 | 132 | 118 | 131 | 128 | 131 | 130 | 128 | 128 |
| Ion Percentage | % | | 3.77 | 0.7 | 0.83 | 2.21 | 3.53 | 1.95 | 2.95 | 4.35 | 1.08 | 0.77 | 1.21 | 3.08 |
| Iron | mg/L | 0.3 | 0.015 | <0.05 | 0.011 | <0.05 | 0.006 | <0.05 | 0.006 | 0.09 | 0.008 | 0.008 | 0.028 | 0.008 |
| Lead | mg/L | 0.01 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Magnesium | mg/L | | 21.7 | 20 | 18.7 | 19.6 | 20.3 | 18.8 | 19.5 | 18.7 | 20.4 | 19.6 | 19.4 | 19.9 |
| Manganese | mg/L | 0.05 | 0.0035 | 0.004 | 0.0036 | 0.003 | 0.0039 | 0.003 | 0.0035 | 0.0066 | 0.0036 | 0.0036 | 0.0048 | 0.0027 |
| Molybdenum | mg/L | | 0.0023 | | 0.002 | | 0.0021 | | 0.0025 | | 0.0022 | | 0.0022 | |
| Nickel | mg/L | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | |
| Nitrate | mg/L | 10.0 * | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 |
| Nitrite | mg/L | 1.0* | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 |
| Oxydation Reduction Potential | mV | | 172.2 | -6.8 | 6.5 | -26.8 | -21.8 | 149.6 | 117.5 | 113.4 | 63.6 | 27.6 | 266.5 | 266.6 |
| pH | units | | 8.34 | 8.21 | 8.22 | 8.24 | 8.3 | 8.32 | 8.22 | 8.26 | 8.26 | 8.32 | 7.98 | 8.29 |
| pH - field | units | | 8.17 | 8.04 | 8.08 | 8.31 | 8.24 | 8.12 | 8.18 | 8.36 | 8.19 | 7.95 | 8.02 | 8.08 |
| Phosphate | mg/L | | <0.02 | <0.01 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | 0.02 | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.01 | 0.02 | 0.01 | <0.02 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.1 | 1 | 1.1 | 1.2 | 1.2 | 1.1 | 1.2 | 1.5 | 1.3 | 1.2 | 1.3 | 1.2 |
| Sodium | mg/L | 200 | 18.2 | 18.6 | 17.7 | 19.2 | 18.9 | 16.8 | 18.6 | 19.7 | 18.8 | 16.5 | 18.9 | 19.3 |
| Sulphate | mg/L | 500 | 22.3 | 24.7 | 24 | 24.6 | 24.1 | 24.2 | 24.3 | 23.8 | 24.1 | 25.3 | 25.4 | 25.2 |
| Total Dissolved Solids | mg/L | 500 | 230 | 190 | 190 | 190 | 200 | 200 | 170 | 190 | 210 | 190 | 160 | 200 |
| Temperature - field | °C | | 10.4 | 12.8 | 10.3 | 11.9 | 11 | 13.3 | 10.8 | 13.3 | 12 | 13.2 | 11.5 | 13.1 |
| Total Kjeldahl Nitrogen | mg/L | | <0.1 | 0.1 | 0.2 | 0.1 | 0.2 | <0.1 | <0.1 | <1.0 | <0.5 | 0.2 | 0.1 | 2.4 |
| Zinc | mg/L | 5 | <0.0005 | | 0.0023 | | 0.0021 | | <0.0005 | | 0.0006 | | <0.0005 | |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | 1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1,2-Trichlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorpropane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichlorobenzene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Benzene | µg/L | 1 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromodichloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromoform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromomethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Chlorobenzene | µg/L | 30 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloroethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Chloroform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| cis-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dibromochloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Dichloromethane | µg/L | 50 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethyl Benzene | µg/L | 1.6 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethylene dibromide | µg/L | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| m/p-Xylenes | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| o-Xylene | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Styrene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Tetrachloroethylene | µg/L | 30 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Toluene | µg/L | 24 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichloroethylene | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichlorofluoromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | < 5 | | < 5 | |
| Vinyl Chloride | µg/L | 1 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | |
| Xylenes - total | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 109-II | | | | | | | | 109-III | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 | Sep-19 | Mar-20 | Sep-22 | Mar-17 | Sep-17 | Mar-18 | Sep-18 |
| Alkalinity | mg/L | 30-500 | 229 | 227 | 225 | 217 | 216 | 218 | 343 | 213 | 292 | 326 | 321 | 373 |
| Aluminum | mg/L | 0.1 | <0.025 | | <0.025 | | <0.025 | | 0.131 | | <0.025 | | <0.025 | |
| Ammonia (as N) | mg/L | | 0.2 | 0.1 | 0.1 | 0.1 | 0.3 | 0.1 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 |
| Anion sum | meq/L | | 6.26 | 6.05 | 6.19 | 5.65 | 5.64 | 5.64 | 12.5 | 6.22 | 10.6 | 11.3 | 10.8 | 11.1 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 | 0.0005 | <0.0005 | <0.005 | <0.0005 | <0.005 |
| Barium | mg/L | 1 * | 0.102 | | 0.117 | | 0.108 | | 0.094 | | 0.098 | | 0.115 | |
| Beryllium | mg/L | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | <0.0001 | | <0.0001 | |
| Bicarbonate | mg/L | | 228 | 226 | 224 | 216 | 215 | 217 | 342 | 212 | 291 | 325 | 320 | 372 |
| Boron | mg/L | 5 * | 0.015 | | 0.0124 | | 0.0189 | | 0.0264 | | 0.0291 | | 0.03 | |
| Cadmium | mg/L | 0.005 * | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | |
| Calcium | mg/L | | 88.4 | 86.5 | 89.3 | 75.9 | 79.6 | 69.7 | 189 | 79.4 | 162 | 183 | 182 | 183 |
| Carbonate | mg/L | | 1 | 1 | 1 | 1 | 1 | 1 | <1 | 1 | <1 | 1 | <1 | <1 |
| Cation sum | meq/L | | 6.44 | 6.23 | 6.61 | 5.84 | 6.08 | 5.45 | 12.8 | 6.33 | 10.7 | 11.7 | 11.7 | 11.8 |
| Chloride | mg/L | 250 | 11.8 | 10.9 | 11.9 | 10.2 | 9 | 9.8 | 27.7 | 18.1 | 33.1 | 22.7 | 20.5 | 13.2 |
| Chromium | mg/L | 0.05 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Cobalt | mg/L | | <0.0001 | | <0.0001 | | <0.0005 | | <0.0005 | | 0.0001 | | <0.0001 | |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | 10 |
| Conductivity | µS/cm | | 608 | 563 | 531 | 545 | 547 | 544 | 971 | 638 | 994 | 1010 | 896 | 1030 |
| Conductivity - field | µS/cm | | 621 | 569 | 581 | 541 | 548 | 533 | 931 | 623 | 1010 | 1010 | 998 | 1020 |
| Copper | mg/L | 1 | <0.0005 | | 0.0006 | | <0.0005 | | 0.0013 | | <0.0005 | | 0.0009 | |
| Dissolved Organic Carbon | mg/L | 5 | <1.0 | <1.0 | 1.3 | <1.0 | 4.6 | 2 | 4.7 | 2.2 | <1.0 | 1.8 | 2.3 | 2.9 |
| Dissolved Oxygen - field | mg/L | | 1.37 | 1.41 | 1.62 | 1.06 | 1.18 | 1.03 | 5.01 | 4.32 | 8.13 | 6.15 | 4.2 | 4.48 |
| Hardness | mg/L | 80-100 | 308 | 295 | 314 | 276 | 286 | 258 | 615 | 288 | 498 | 540 | 541 | 548 |
| Ion Percentage | % | | 1.38 | 1.46 | 3.3 | 1.64 | 3.77 | 1.79 | 1.18 | 0.95 | 0.72 | 1.74 | 4.19 | 3.01 |
| Iron | mg/L | 0.3 | 0.001 | <0.05 | 0.005 | <0.05 | 0.002 | <0.05 | 0.112 | 0.082 | 0.001 | <0.05 | 0.008 | <0.05 |
| Lead | mg/L | 0.01 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Magnesium | mg/L | | 21.2 | 19.2 | 22.2 | 20.9 | 21.3 | 20.3 | 34.7 | 21.7 | 22.8 | 20.2 | 20.9 | 22.2 |
| Manganese | mg/L | 0.05 | 0.0005 | 0.002 | 0.0014 | 0.002 | 0.0043 | 0.01 | 0.0336 | 0.0185 | <0.0005 | <0.001 | 0.0009 | <0.001 |
| Molybdenum | mg/L | | 0.001 | | 0.0007 | | 0.0008 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Nickel | mg/L | | <0.002 | | <0.002 | | <0.002 | | 0.003 | | <0.002 | | 0.002 | |
| Nitrate | mg/L | 10.0 * | 1.44 | <0.5 | 0.65 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | 0.93 | 0.5 | 0.51 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | 188.1 | 73.8 | 41.9 | 19.5 | 31.6 | 163.2 | 145.1 | -113.7 | 199.9 | 97.4 | 69.5 | 50.9 |
| pH | units | | 7.76 | 7.76 | 7.7 | 7.74 | 7.76 | 7.73 | 7.44 | 7.82 | 7.42 | 7.54 | 7.4 | 7.28 |
| pH - field | units | | 7.34 | 7.33 | 7.34 | 7.6 | 7.53 | 7.52 | 7.2 | 7.56 | 7.12 | 7.01 | 6.99 | 7.19 |
| Phosphate | mg/L | | <0.02 | <0.01 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.01 | <0.01 | <0.02 |
| Phosphorus | mg/L | | 0.02 | <0.02 | 0.03 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.03 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.2 | 1.1 | 1.4 | 1.4 | 1.4 | 1.2 | 1.4 | 4.7 | 0.8 | 0.9 | 0.8 | 1.2 |
| Sodium | mg/L | 200 | 4.7 | 6.1 | 5.8 | 6 | 6.2 | 5.3 | 9.8 | 9.7 | 15.7 | 20.1 | 19.7 | 18 |
| Sulphate | mg/L | 500 | 67 | 64.7 | 69.8 | 56 | 58 | 55.2 | 245 | 76.1 | 188 | 209 | 190 | 170 |
| Total Dissolved Solids | mg/L | 500 | 390 | 370 | 370 | 330 | 330 | 350 | 740 | 370 | 690 | 700 | 660 | 670 |
| Temperature - field | °C | | 11.3 | 13.1 | 11.2 | 13 | 11.8 | 14.4 | 6.4 | 13.9 | 7.7 | 15.1 | 7.5 | 15.2 |
| Total Kjeldahl Nitrogen | mg/L | | 0.2 | <0.1 | <0.1 | 3.3 | <0.1 | <0.1 | 0.4 | 2.4 | <0.1 | 0.2 | 0.3 | <0.1 |
| Zinc | mg/L | 5 | <0.0005 | | 0.0012 | | 0.0007 | | 0.0025 | | <0.0005 | | 0.0011 | |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | |
| 1,1,2-Trichlorethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | |
| 1,1-Dichloroethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | |
| 1,2-Dichlorpropane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | |
| 1,3-Dichlorobenzene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | |
| Benzene | µg/L | 1 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | |
| Bromodichloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | |
| Bromoform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | |
| Bromomethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | <0.2 | |
| Chlorobenzene | µg/L | 30 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | |
| Chloroethane | µg/L | | <5 | | <5 | | <5 | | <5 | | <5 | | <5 | |
| Chloroform | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | |
| Chloromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | <5 | | <5 | |
| cis-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | |
| Dibromochloromethane | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | |
| Dichloromethane | µg/L | 50 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | |
| Ethyl Benzene | µg/L | 1.6 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | |
| Ethylene dibromide | µg/L | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | <0.2 | |
| m/p-Xylenes | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | |
| o-Xylene | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | |
| Styrene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | |
| Tetrachloroethylene | µg/L | 30 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | |
| Toluene | µg/L | 24 | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | |
| Trichloroethylene | µg/L | 5 * | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | |
| Trichlorofluoromethane | µg/L | | <5 | | <5 | | <5 | | <5 | | <5 | | <5 | |
| Vinyl Chloride | µg/L | 1 * | <0.2 | | <0.2 | | <0.2 | | <0.2 | | <0.2 | | <0.2 | |
| Xylenes - total | µg/L | 20 ** | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 109-III | | | | | | | | 110-I | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Oct-21 | Mar-22 | Sep-22 | Mar-17 | Sep-17 | Mar-18 | Sep-18 |
| Alkalinity | mg/L | 30-500 | 400 | 417 | 381 | 399 | 468 | 455 | 471 | 485 | 177 | 186 | 190 | 182 |
| Aluminum | mg/L | 0.1 | <0.025 | <0.025 | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | |
| Ammonia (as N) | mg/L | | <0.1 | 0.1 | 0.3 | 0.1 | 0.2 | 0.9 | 1.8 | 0.4 | 0.2 | 0.2 | 0.2 | 0.3 |
| Anion sum | meq/L | | 11.1 | 10.7 | 12.2 | 12.3 | 14.2 | 14.1 | 14.8 | 14.5 | 5.09 | 5.43 | 5.44 | 5.32 |
| Arsenic | mg/L | 0.025 | 0.0007 | <0.005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0024 | <0.005 | 0.0024 | 0.006 |
| Barium | mg/L | 1 * | 0.12 | 0.129 | 0.133 | | 0.171 | | 0.219 | | 0.071 | | 0.079 | |
| Beryllium | mg/L | | <0.0005 | <0.0005 | <0.0005 | | <0.0005 | | <0.0005 | | <0.0001 | | <0.0001 | |
| Bicarbonate | mg/L | | 399 | 416 | 380 | 399 | 467 | 455 | 471 | 484 | 175 | 184 | 189 | 181 |
| Boron | mg/L | 5 * | 0.0508 | 0.0918 | 0.061 | | 0.0993 | | 0.223 | | 0.0272 | | 0.0229 | |
| Cadmium | mg/L | 0.005 * | <0.0001 | <0.0001 | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | |
| Calcium | mg/L | | 185 | 155 | 196 | 194 | 216 | 219 | 223 | 210 | 49.3 | 49.7 | 53.5 | 54.1 |
| Carbonate | mg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 2 | 2 | 1 | 1 |
| Cation sum | meq/L | | 11.7 | 10.3 | 12.6 | 12.9 | 14.6 | 14.5 | 15.4 | 14.4 | 5.36 | 5.24 | 5.51 | 5.62 |
| Chloride | mg/L | 250 | 22.8 | 22.2 | 56.2 | 49.5 | 41.1 | 24.8 | 35.5 | 44.6 | 14.5 | 14.6 | 13.3 | 13.3 |
| Chromium | mg/L | 0.05 * | <0.0005 | <0.0005 | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Cobalt | mg/L | | 0.0039 | 0.0011 | 0.0019 | | 0.0034 | | 0.0048 | | <0.0001 | | <0.0001 | |
| Chemical Oxygen Demand | mg/L | | 30 | <10 | <10 | <10 | 10 | <10 | <10 | 10 | <10 | <10 | 20 | 20 |
| Conductivity | µS/cm | | 1040 | 1000 | 1120 | 1170 | 1270 | 1250 | 1370 | 1300 | 507 | 509 | 511 | 519 |
| Conductivity - field | µS/cm | | 1040 | 997 | 1180 | 1180 | 1280 | 1220 | 1290 | 1270 | 517 | 519 | 502 | 514 |
| Copper | mg/L | 1 | 0.002 | 0.0028 | 0.0012 | | 0.0018 | | 0.0013 | | 0.0007 | | <0.0005 | |
| Dissolved Organic Carbon | mg/L | 5 | 7.8 | 7.1 | 4.5 | 3.6 | 5 | 5.7 | 5.4 | 4.2 | 1.6 | 1.4 | 2.2 | 1.6 |
| Dissolved Oxygen - field | mg/L | | 1.45 | 6.38 | 2.2 | 1.15 | 3.08 | 3.55 | 2.89 | 6.40 | 2.53 | 1.54 | 1.64 | 0.98 |
| Hardness | mg/L | 80-100 | 553 | 471 | 579 | 571 | 646 | 644 | 663 | 624 | 243 | 237 | 250 | 255 |
| Ion Percentage | % | | 2.62 | 1.86 | 1.69 | 2.54 | 1.46 | 1.27 | 1.99 | 0.06 | 2.6 | 1.84 | 0.72 | 2.72 |
| Iron | mg/L | 0.3 | 0.425 | <0.05 | 0.024 | 0.157 | 0.334 | 0.179 | 0.197 | 0.074 | 0.309 | 0.23 | 0.327 | 0.42 |
| Lead | mg/L | 0.01 * | <0.0005 | <0.0005 | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Magnesium | mg/L | | 22.1 | 20.5 | 21.8 | 21 | 25.8 | 23.7 | 25.8 | 24.1 | 29.2 | 27.4 | 28.2 | 29.2 |
| Manganese | mg/L | 0.05 | 0.668 | 0.018 | 0.396 | 0.468 | 0.678 | 0.870 | 0.850 | 0.436 | 0.0091 | 0.008 | 0.0106 | 0.012 |
| Molybdenum | mg/L | | <0.0005 | <0.0005 | <0.0005 | | <0.0005 | | <0.0005 | | 0.0013 | | 0.0011 | |
| Nickel | mg/L | | 0.005 | 0.005 | 0.008 | | 0.005 | | 0.008 | | <0.002 | | <0.002 | |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | 0.9 | 0.7 | <0.5 | 0.8 | 0.9 | 0.9 | <0.05 | <0.5 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | -22.1 | 165.6 | 143.1 | 51 | 55.7 | 49.9 | 64.5 | 246.2 | -20.9 | -110.2 | -16.1 | -85.7 |
| pH | units | | 7.33 | 7.31 | 7.14 | 7.07 | 7.24 | 7.01 | 6.88 | 7.04 | 7.96 | 8.04 | 7.84 | 7.85 |
| pH - field | units | | 7.05 | 7.02 | 6.99 | 7 | 6.86 | 6.70 | 6.73 | 6.86 | 7.67 | 7.59 | 7.64 | 7.73 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.02 | <0.02 | <0.01 | <0.01 | <0.02 |
| Phosphorus | mg/L | | 0.07 | <0.02 | <0.02 | <0.01 | 0.02 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | 0.03 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 0.9 | 1.1 | 1 | 1.9 | 1.5 | 3.0 | 3.5 | 2.9 | 1.5 | 1.4 | 1.4 | 1.5 |
| Sodium | mg/L | 200 | 12.6 | 19.5 | 21.1 | 32.7 | 37 | 33.1 | 43.3 | 41.9 | 9.4 | 9.6 | 10.1 | 9.6 |
| Sulphate | mg/L | 500 | 129 | 98 | 151 | 150 | 191 | 220 | 222 | 180 | 60.3 | 68.3 | 66.5 | 68.3 |
| Total Dissolved Solids | mg/L | 500 | 680 | 640 | 690 | 780 | 830 | 840 | 820 | 820 | 320 | 370 | 310 | 310 |
| Temperature - field | °C | | 8 | 16.6 | 6.8 | 18 | 8.4 | 16.5 | 8.4 | 17.6 | 10 | 12.6 | 10.2 | 12 |
| Total Kjeldahl Nitrogen | mg/L | | 0.5 | 0.4 | 0.9 | <1.0 | <0.5 | 2.3 | 2.0 | 2.3 | <0.1 | 0.2 | <0.1 | 1.2 |
| Zinc | mg/L | 5 | 0.0036 | 0.0024 | <0.0005 | | 0.0006 | | 0.0007 | | 0.0009 | | 0.0008 | |
| Phenols | µg/L | | 3 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| 1,1,2-Trichlorethane | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| 1,1-Dichloroethane | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| 1,2-Dichlorpropane | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| 1,3-Dichlorobenzene | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Benzene | µg/L | 1 * | <0.5 | | <0.5 | | < 0.5 | | 0.5 | | <0.5 | | <0.5 | |
| Bromodichloromethane | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Bromoform | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Bromomethane | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | |
| Chlorobenzene | µg/L | 30 | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Chloroethane | µg/L | | <5 | | <5 | | < 5 | | < 5 | | <5 | | <5 | |
| Chloroform | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Chloromethane | µg/L | | <5 | | <5 | | < 5 | | < 5 | | <5 | | <5 | |
| cis-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Dibromochloromethane | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Dichloromethane | µg/L | 50 * | 1.1 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Ethyl Benzene | µg/L | 1.6 | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Ethylene dibromide | µg/L | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | |
| m/p-Xylenes | µg/L | 20 ** | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| o-Xylene | µg/L | 20 ** | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Styrene | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Tetrachloroethylene | µg/L | 30 * | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Toluene | µg/L | 24 | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Trichloroethylene | µg/L | 5 * | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Trichlorofluoromethane | µg/L | | <5 | | <5 | | < 5 | | < 5 | | <5 | | <5 | |
| Vinyl Chloride | µg/L | 1 * | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | |
| Xylenes - total | µg/L | 20 ** | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 110-I | | | | | | | | 110-II | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Oct-21 | Mar-22 | Sep-22 | Mar-17 | Sep-17 | Mar-18 | Sep-18 |
| Alkalinity | mg/L | 30-500 | 184 | 182 | 181 | 177 | 188 | 187 | 189 | 189 | 212 | 221 | 232 | 222 |
| Aluminum | mg/L | 0.1 | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | |
| Ammonia (as N) | mg/L | | 0.2 | 0.2 | 0.3 | 0.2 | 0.2 | 0.5 | 0.3 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 |
| Anion sum | meq/L | | 5.31 | 5.27 | 5.42 | 5.12 | 5.32 | 5.34 | 5.39 | 5.5 | 6.76 | 7.13 | 7.33 | 7.33 |
| Arsenic | mg/L | 0.025 | 0.0023 | <0.005 | 0.0023 | 0.0024 | 0.0017 | 0.0021 | 0.0027 | 0.0022 | 0.0005 | <0.005 | <0.0005 | <0.005 |
| Barium | mg/L | 1 * | 0.077 | | 0.069 | | 0.073 | | 0.071 | | 0.037 | | 0.044 | |
| Beryllium | mg/L | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0001 | | <0.0001 | |
| Bicarbonate | mg/L | | 182 | 180 | 179 | 176 | 186 | 186 | 188 | 188 | 211 | 219 | 231 | 221 |
| Boron | mg/L | 5 * | 0.0327 | | 0.0296 | | 0.0340 | | 0.0309 | | 0.0109 | | 0.008 | |
| Cadmium | mg/L | 0.005 * | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | |
| Calcium | mg/L | | 53.8 | 49.1 | 54.1 | 51.9 | 53.0 | 55.2 | 50.5 | 53.6 | 86.4 | 87.2 | 96.5 | 97.6 |
| Carbonate | mg/L | | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | <1 | 2 | <1 | <1 |
| Cation sum | meq/L | | 5.59 | 5.22 | 5.51 | 5.34 | 5.35 | 5.51 | 5.21 | 5.54 | 6.84 | 6.82 | 7.28 | 7.58 |
| Chloride | mg/L | 250 | 11.9 | 12.8 | 13.6 | 11.8 | 12.0 | 11.7 | 12.1 | 13.9 | 44.9 | 50.2 | 46.5 | 51.2 |
| Chromium | mg/L | 0.05 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Cobalt | mg/L | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | 0.0002 | | 0.0002 | |
| Chemical Oxygen Demand | mg/L | | <10 | 20 | 30 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Conductivity | µS/cm | | 516 | 519 | 512 | 513 | 517 | 519 | 523 | 523 | 646 | 679 | 605 | 727 |
| Conductivity - field | µS/cm | | 509 | 511 | 511 | 506 | 521 | 512 | 504 | 525 | 680 | 721 | 662 | 685 |
| Copper | mg/L | 1 | <0.0005 | | 0.0008 | | 0.0017 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Dissolved Organic Carbon | mg/L | 5 | 1.2 | 3.4 | 2.2 | <1.0 | 2.4 | 1 | <1.0 | 1.4 | 1.6 | 1.8 | 2.1 | <1.0 |
| Dissolved Oxygen - field | mg/L | | 4.45 | 1.44 | 1.84 | 1.36 | 3.12 | 2.59 | 1.57 | 9.16 | 2.25 | 1.06 | 2 | 1.08 |
| Hardness | mg/L | 80-100 | 254 | 239 | 250 | 242 | 243 | 252 | 236 | 252 | 327 | 324 | 345 | 359 |
| Ion Percentage | % | | 2.56 | 0.44 | 0.82 | 2.12 | 0.23 | 1.54 | 1.73 | 0.4 | 0.59 | 2.18 | 0.33 | 1.69 |
| Iron | mg/L | 0.3 | 0.217 | 0.28 | 0.218 | 0.336 | 0.058 | 0.312 | 0.385 | 0.302 | 0.043 | 0.11 | 0.036 | 0.14 |
| Lead | mg/L | 0.01 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Magnesium | mg/L | | 29 | 28.3 | 27.8 | 27.2 | 26.8 | 27.7 | 26.7 | 28.6 | 27 | 25.9 | 25.3 | 28 |
| Manganese | mg/L | 0.05 | 0.0108 | 0.01 | 0.0113 | 0.0104 | 0.0128 | 0.0094 | 0.0121 | 0.0088 | 0.0111 | 0.016 | 0.0157 | 0.024 |
| Molybdenum | mg/L | | 0.0011 | | 0.001 | | 0.0012 | | 0.0011 | | 0.0007 | | 0.0006 | |
| Nickel | mg/L | | <0.002 | | <0.002 | | 0.002 | | <0.002 | | <0.002 | | <0.002 | |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | 44.3 | -95.2 | -11.8 | -63.8 | -46.1 | -85.7 | -5.6 | 129.7 | 68.4 | -21.3 | 53.1 | -33.7 |
| pH | units | | 8.04 | 8 | 8.02 | 7.85 | 8.06 | 7.88 | 7.79 | 7.87 | 7.64 | 7.89 | 7.57 | 7.58 |
| pH - field | units | | 7.81 | 7.73 | 7.78 | 7.8 | 7.77 | 7.59 | 7.52 | 7.56 | 7.37 | 7.3 | 7.35 | 7.43 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.01 | <0.01 | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | <0.02 | <0.01 | 0.02 | 0.01 | 0.02 | <0.02 | <0.02 | <0.02 | 0.03 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.6 | 1.4 | 1.5 | 1.5 | 1.5 | 1.4 | 1.4 | 1.4 | 2.1 | 2 | 1.9 | 2.1 |
| Sodium | mg/L | 200 | 9.8 | 8.3 | 9.9 | 9.9 | 9.5 | 8.5 | 9.3 | 9.8 | 4.8 | 5.7 | 6.7 | 7 |
| Sulphate | mg/L | 500 | 67.9 | 66.7 | 73.8 | 65.6 | 64.8 | 67 | 67.1 | 69.5 | 66.9 | 69.1 | 73.5 | 76.3 |
| Total Dissolved Solids | mg/L | 500 | 280 | 340 | 320 | 310 | 349 | 390 | 270 | 290 | 410 | 450 | 390 | 440 |
| Temperature - field | °C | | 9.5 | 13.2 | 10.3 | 12.4 | 10.7 | 12.4 | 10.6 | 11.7 | 10.5 | 12.5 | 9.8 | 12.3 |
| Total Kjeldahl Nitrogen | mg/L | | <0.1 | 0.1 | 0.2 | <1.0 | 0.2 | 0.5 | 0.2 | <2.0 | <0.1 | <0.1 | <0.1 | <1.0 |
| Zinc | mg/L | 5 | 0.0018 | | 0.0007 | | 0.0012 | | <0.0005 | | 0.0056 | | <0.0005 | |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| 1,1,2-Trichlorethane | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| 1,1-Dichloroethane | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| 1,2-Dichlorpropane | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| 1,3-Dichlorobenzene | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Benzene | µg/L | 1 * | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Bromodichloromethane | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Bromoform | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Bromomethane | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | |
| Chlorobenzene | µg/L | 30 | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Chloroethane | µg/L | | <5 | | <5 | | < 5 | | < 5 | | <5 | | <5 | |
| Chloroform | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Chloromethane | µg/L | | <5 | | <5 | | < 5 | | < 5 | | <5 | | <5 | |
| cis-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Dibromochloromethane | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Dichloromethane | µg/L | 50 * | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Ethyl Benzene | µg/L | 1.6 | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Ethylene dibromide | µg/L | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | |
| m/p-Xylenes | µg/L | 20 ** | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| o-Xylene | µg/L | 20 ** | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Styrene | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Tetrachloroethylene | µg/L | 30 * | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Toluene | µg/L | 24 | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Trichloroethylene | µg/L | 5 * | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Trichlorofluoromethane | µg/L | | <5 | | <5 | | < 5 | | < 5 | | <5 | | <5 | |
| Vinyl Chloride | µg/L | 1 * | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | |
| Xylenes - total | µg/L | 20 ** | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 110-II | | | | | | | | 110-III | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Oct-21 | Mar-22 | Sep-22 | Mar-17 | Sep-17 | Mar-18 | Sep-18 |
| Alkalinity | mg/L | 30-500 | 228 | 239 | 261 | 275 | 270 | 278 | 274 | 244 | 314 | 305 | 320 | 311 |
| Aluminum | mg/L | 0.1 | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | |
| Ammonia (as N) | mg/L | | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.3 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 |
| Anion sum | meq/L | | 7.38 | 7.78 | 8.34 | 8.84 | 8.57 | 9.05 | 8.86 | 8.76 | 7.89 | 7.91 | 8.89 | 8.72 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.005 | 0.0014 | 0.0006 | 0.0011 | 0.001 | 0.0006 | 0.0009 | <0.0005 | <0.005 | <0.0005 | <0.005 |
| Barium | mg/L | 1 * | 0.046 | | 0.056 | | 0.051 | | 0.056 | | 0.088 | | 0.098 | |
| Beryllium | mg/L | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0001 | | <0.0001 | |
| Bicarbonate | mg/L | | 227 | 238 | 260 | 274 | 269 | 277 | 273 | 243 | 313 | 304 | 319 | 310 |
| Boron | mg/L | 5 * | 0.0126 | | 0.0179 | | 0.0185 | | 0.0218 | | 0.0101 | | 0.0072 | |
| Cadmium | mg/L | 0.005 * | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | |
| Calcium | mg/L | | 101 | 99.4 | 96.3 | 111 | 102 | 116 | 113 | 105 | 108 | 105 | 123 | 125 |
| Carbonate | mg/L | | <1 | 1 | 1 | <1 | 1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 |
| Cation sum | meq/L | | 7.77 | 7.83 | 7.88 | 8.78 | 8.13 | 9.06 | 8.71 | 8.07 | 8.01 | 7.56 | 9.1 | 9.26 |
| Chloride | mg/L | 250 | 46.9 | 54.4 | 51.4 | 60.3 | 56.5 | 68.2 | 60.7 | 83.6 | 8.6 | 6.5 | 6.8 | 5.4 |
| Chromium | mg/L | 0.05 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Cobalt | mg/L | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | 0.0001 | | <0.0001 | |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | 30 | <10 | <10 | <10 | 20 | <10 | <10 | <10 | 30 | <10 |
| Conductivity | µS/cm | | 741 | 771 | 802 | 840 | 827 | 880 | 879 | 877 | 763 | 725 | 697 | 817 |
| Conductivity - field | µS/cm | | 725 | 780 | 810 | 858 | 839 | 884 | 852 | 865 | 770 | 741 | 788 | 810 |
| Copper | mg/L | 1 | 0.0037 | | 0.0012 | | 0.0006 | | <0.0005 | | 0.0006 | | <0.0005 | |
| Dissolved Organic Carbon | mg/L | 5 | 3.9 | 1.7 | 2.7 | <1.0 | 3.2 | 2.7 | 1.5 | 1.6 | 2.5 | 2.8 | 2.6 | 2.2 |
| Dissolved Oxygen - field | mg/L | | 1.34 | 1.15 | 1.49 | 0.79 | 1.55 | 2.58 | 1.65 | 2.79 | 3.73 | 1.36 | 3.72 | 3.91 |
| Hardness | mg/L | 80-100 | 366 | 369 | 369 | 410 | 381 | 426 | 407 | 376 | 381 | 358 | 419 | 428 |
| Ion Percentage | % | | 2.56 | 0.32 | 2.85 | 0.36 | 2.60 | 0.08 | 0.84 | 4.13 | 0.75 | 2.23 | 1.16 | 2.99 |
| Iron | mg/L | 0.3 | 0.022 | 0.1 | 0.22 | 0.297 | 0.320 | 0.429 | 0.361 | 0.574 | 0.002 | <0.05 | 0.002 | <0.05 |
| Lead | mg/L | 0.01 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | |
| Magnesium | mg/L | | 27.7 | 29.4 | 31.1 | 32.2 | 30.6 | 33.2 | 30.4 | 27.5 | 27 | 23.2 | 27.2 | 28.2 |
| Manganese | mg/L | 0.05 | 0.014 | 0.075 | 0.0256 | 0.0267 | 0.0200 | 0.0221 | 0.0209 | 0.0159 | 0.0055 | 0.023 | 0.0035 | 0.022 |
| Molybdenum | mg/L | | 0.0005 | | 0.0008 | | 0.0006 | | <0.0005 | | <0.0005 | | 0.0007 | |
| Nickel | mg/L | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | 6.71 | 4.11 | 3.93 | 2.2 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | 0.13 | 0.56 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | 80.6 | -18 | 22.5 | -9.9 | -25.3 | -32.5 | 30.2 | 14.8 | 137.9 | 62.8 | 80.4 | 47.3 |
| pH | units | | 7.66 | 7.66 | 7.62 | 7.41 | 7.67 | 7.51 | 7.33 | 7.55 | 7.61 | 7.54 | 7.45 | 7.42 |
| pH - field | units | | 7.35 | 7.3 | 7.24 | 7.3 | 7.28 | 7.11 | 7.08 | 7.19 | 7.36 | 7.23 | 7.36 | 7.23 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.01 | <0.01 | <0.02 |
| Phosphorus | mg/L | | 0.05 | <0.02 | <0.02 | <0.01 | 0.02 | <0.01 | <0.02 | <0.02 | <0.02 | <0.02 | 0.03 | 0.17 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 2 | 2 | 2 | 2.2 | 2.0 | 2.1 | 2 | 2.2 | 1.9 | 1.9 | 1.8 | 2.2 |
| Sodium | mg/L | 200 | 8.1 | 8 | 9.4 | 11.1 | 9.8 | 9.7 | 10.6 | 10.5 | 6.9 | 7.4 | 14.5 | 13.7 |
| Sulphate | mg/L | 500 | 79.2 | 77.8 | 88.6 | 87.6 | 84.2 | 84 | 88.7 | 81.1 | 51.9 | 71.5 | 107 | 115 |
| Total Dissolved Solids | mg/L | 500 | 370 | 480 | 460 | 510 | 410 | 540 | 470 | 440 | 470 | 500 | 490 | 510 |
| Temperature - field | °C | | 10.2 | 12.6 | 10.2 | 12.2 | 10.6 | 12.9 | 9.9 | 12 | 5.7 | 16.4 | 6.3 | 15 |
| Total Kjeldahl Nitrogen | mg/L | | <0.1 | <0.1 | 0.2 | <1.0 | <0.1 | 0.2 | <0.1 | <2.0 | 1.1 | <0.1 | <0.1 | <1.0 |
| Zinc | mg/L | 5 | 0.0046 | | 0.0009 | | <0.0005 | | <0.0005 | | 0.0028 | | 0.0012 | |
| Phenols | µg/L | | 1 | <1 | <1 | <1 | <1 | 2 | <1 | <1 | 1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| 1,1,2-Trichlorethane | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| 1,1-Dichloroethane | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| 1,2-Dichlorpropane | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| 1,3-Dichlorobenzene | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Benzene | µg/L | 1 * | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Bromodichloromethane | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Bromoform | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Bromomethane | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | |
| Chlorobenzene | µg/L | 30 | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Chloroethane | µg/L | | <5 | | <5 | | < 5 | | < 5 | | <5 | | <5 | |
| Chloroform | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Chloromethane | µg/L | | <5 | | <5 | | < 5 | | < 5 | | <5 | | <5 | |
| cis-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Dibromochloromethane | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Dichloromethane | µg/L | 50 * | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Ethyl Benzene | µg/L | 1.6 | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Ethylene dibromide | µg/L | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | |
| m/p-Xylenes | µg/L | 20 ** | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| o-Xylene | µg/L | 20 ** | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Styrene | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Tetrachloroethylene | µg/L | 30 * | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Toluene | µg/L | 24 | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Trichloroethylene | µg/L | 5 * | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |
| Trichlorofluoromethane | µg/L | | <5 | | <5 | | < 5 | | < 5 | | <5 | | <5 | |
| Vinyl Chloride | µg/L | 1 * | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | |
| Xylenes - total | µg/L | 20 ** | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 110-III | | | | | | | 111-I | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Oct-21 | Mar-22 | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 |
| Alkalinity | mg/L | 30-500 | 321 | 358 | 371 | 398 | 431 | 476 | 500 | 206 | 249 | 240 | 218 | 213 |
| Aluminum | mg/L | 0.1 | <0.025 | | 0.038 | | <0.025 | | 0.044 | <0.025 | | 0.239 | | <0.025 |
| Ammonia (as N) | mg/L | | 0.1 | 0.1 | 0.3 | 0.1 | 0.1 | 0.2 | 0.1 | 0.9 | 0.6 | 0.6 | 0.7 | 0.6 |
| Anion sum | meq/L | | 9.39 | 10.6 | 11.1 | 12.2 | 13.5 | 15.2 | 17.7 | 6.89 | 6.41 | 5.83 | 5.34 | 5.09 |
| Arsenic | mg/L | 0.025 | <0.0005 | <0.005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0009 | <0.005 | <0.0005 | <0.005 | <0.0005 |
| Barium | mg/L | 1 * | 0.104 | | 0.108 | | 0.145 | | 0.163 | 0.498 | | 1.15 | | 0.814 |
| Beryllium | mg/L | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | <0.0001 | | <0.0001 | | <0.0005 |
| Bicarbonate | mg/L | | 320 | 357 | 370 | 397 | 430 | 475 | 499 | 195 | 236 | 230 | 212 | 204 |
| Boron | mg/L | 5 * | 0.0112 | | 0.0121 | | 0.0103 | | 0.0178 | 0.325 | | 0.361 | | 0.405 |
| Cadmium | mg/L | 0.005 * | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | <0.0001 | | <0.0001 | | <0.0001 |
| Calcium | mg/L | | 132 | 129 | 148 | 164 | 176 | 201 | 211 | 17.6 | 17 | 17.9 | 14 | 13 |
| Carbonate | mg/L | | 1 | <1 | 1 | <1 | 1 | <1 | <1 | 10 | 12 | 9 | 6 | 9 |
| Cation sum | meq/L | | 9.96 | 10 | 11.5 | 12.8 | 13.7 | 15.6 | 17.2 | 7.54 | 6.67 | 6.23 | 5.46 | 5.15 |
| Chloride | mg/L | 250 | 5.3 | 8.6 | 14.7 | 20.6 | 37.1 | 63 | 93.1 | 56.4 | 50.7 | 36.2 | 29 | 22.4 |
| Chromium | mg/L | 0.05 * | 0.0007 | | 0.0008 | | 0.0007 | | <0.0005 | <0.0005 | | <0.0005 | | <0.0005 |
| Cobalt | mg/L | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | <0.0001 | | <0.0001 | | <0.0005 |
| Chemical Oxygen Demand | mg/L | | <10 | <10 | <10 | 20 | <10 | 10 | <10 | 460 | 70 | 30 | 20 | 20 |
| Conductivity | µS/cm | | 880 | 969 | 1020 | 1040 | 1210 | 1420 | 1560 | 761 | 650 | 587 | 540 | 515 |
| Conductivity - field | µS/cm | | 871 | 950 | 1030 | 1100 | 1220 | 1390 | 1580 | 770 | 669 | 579 | 537 | 503 |
| Copper | mg/L | 1 | <0.0005 | | 0.002 | | 0.0020 | | 0.001 | <0.0005 | | <0.0005 | | 0.0012 |
| Dissolved Organic Carbon | mg/L | 5 | 2.6 | 5.6 | 3.5 | 1.2 | 4.4 | 3.4 | 3.9 | 104 | 19.7 | 6.3 | 1.6 | 5.1 |
| Dissolved Oxygen - field | mg/L | | 4.78 | 3.25 | 4.85 | 6.66 | 5.28 | 5.31 | 8.08 | 0.86 | 2.13 | 0.98 | 0.91 | 0.72 |
| Hardness | mg/L | 80-100 | 456 | 457 | 515 | 562 | 602 | 688 | 728 | 82.2 | 77.7 | 77 | 64.7 | 59.5 |
| Ion Percentage | % | | 2.93 | 2.67 | 1.98 | 2.53 | 0.80 | 1.24 | 1.4 | 4.55 | 2 | 3.31 | 1.12 | 0.61 |
| Iron | mg/L | 0.3 | 0.002 | <0.05 | 0.031 | 0.137 | 0.017 | <0.005 | 0.037 | 0.01 | <0.05 | 0.178 | <0.05 | 0.014 |
| Lead | mg/L | 0.01 * | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | <0.0005 | | <0.0005 | | <0.0005 |
| Magnesium | mg/L | | 30.7 | 32.8 | 35.3 | 37.1 | 39.4 | 45.2 | 48.8 | 9.29 | 8.57 | 7.84 | 7.23 | 6.56 |
| Manganese | mg/L | 0.05 | <0.0005 | 0.001 | 0.0015 | 0.0104 | 0.0006 | 0.0021 | 0.0014 | 0.0023 | 0.003 | 0.0076 | 0.004 | 0.0045 |
| Molybdenum | mg/L | | 0.0007 | | 0.0005 | | <0.0005 | | <0.0005 | 0.0023 | | <0.0005 | | <0.0005 |
| Nickel | mg/L | | <0.002 | | <0.002 | | <0.002 | | <0.002 | <0.002 | | <0.002 | | <0.002 |
| Nitrate | mg/L | 10.0 * | 3.4 | 2.6 | 2.4 | 1.4 | 1.0 | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | 97.8 | 39.4 | 71.9 | 44.3 | 80.7 | 73.1 | 110.1 | -218.3 | -313.1 | -299.4 | -268.8 | -270.5 |
| pH | units | | 7.61 | 7.46 | 7.58 | 7.29 | 7.54 | 7.19 | 7.14 | 8.75 | 8.75 | 8.64 | 8.49 | 8.65 |
| pH - field | units | | 7.23 | 7.19 | 7.14 | 7.12 | 7.20 | 6.85 | 6.88 | 8.3 | 8.18 | 8.08 | 8.33 | 8.31 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.03 | <0.02 | <0.01 | 0.01 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | <0.02 | <0.01 | 0.02 | <0.01 | <0.02 | <0.02 | 0.02 | 0.04 | 0.03 | 0.18 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.8 | 2 | 2.1 | 2.5 | 2.1 | 2.4 | 2.2 | 6.8 | 4.1 | 4.4 | 3.8 | 3.6 |
| Sodium | mg/L | 200 | 17.2 | 17.7 | 25.4 | 33.1 | 35.6 | 39.6 | 58.5 | 130 | 114 | 104 | 92.2 | 87.8 |
| Sulphate | mg/L | 500 | 134 | 154 | 159 | 182 | 193 | 204 | 260 | 63.1 | 7.8 | 7.9 | 14.6 | 16.1 |
| Total Dissolved Solids | mg/L | 500 | 540 | 660 | 680 | 730 | 520 | 980 | 1010 | 490 | 420 | 340 | 300 | 310 |
| Temperature - field | °C | | 7 | 14.9 | 6.9 | 14.8 | 7.3 | 14.6 | 6.6 | 9 | 10.6 | 8.7 | 10.2 | 9.1 |
| Total Kjeldahl Nitrogen | mg/L | | <0.1 | 0.2 | <0.1 | <1.0 | <0.5 | <2.0 | 0.4 | 3.9 | 1.2 | 0.7 | 0.2 | 0.6 |
| Zinc | mg/L | 5 | 0.0018 | | 0.0018 | | 0.0011 | | 0.0011 | 0.0007 | | 0.0018 | | 0.004 |
| Phenols | µg/L | | 2 | <1 | <1 | <1 | <1 | 2 | <1 | 3 | <1 | <1 | <1 | 1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| 1,1,2-Trichlorethane | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethane | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethylene | µg/L | 14 * | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorpropane | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichlorobenzene | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(E) | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| Benzene | µg/L | 1 * | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | 0.8 | | <0.5 | | <0.5 |
| Bromodichloromethane | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| Bromoform | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| Bromomethane | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| Carbon Tetrachloride | µg/L | 5 * | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | <0.2 | | <0.2 | | <0.2 |
| Chlorobenzene | µg/L | 30 | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| Chloroethane | µg/L | | <5 | | <5 | | < 5 | | < 5 | <5 | | <5 | | <5 |
| Chloroform | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| Chloromethane | µg/L | | <5 | | <5 | | < 5 | | < 5 | <5 | | <5 | | <5 |
| cis-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| Dibromochloromethane | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| Dichloromethane | µg/L | 50 * | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| Ethyl Benzene | µg/L | 1.6 | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| Ethylene dibromide | µg/L | | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | <0.2 | | <0.2 | | <0.2 |
| m/p-Xylenes | µg/L | 20 ** | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | 1 | | <0.5 | | <0.5 |
| o-Xylene | µg/L | 20 ** | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| Styrene | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| Tetrachloroethylene | µg/L | 30 * | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| Toluene | µg/L | 24 | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | 1.6 | | <0.5 | | <0.5 |
| trans-1,2-Dichloroethylene | µg/L | | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| Trichloroethylene | µg/L | 5 * | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | <0.5 | | <0.5 | | <0.5 |
| Trichlorofluoromethane | µg/L | | <5 | | <5 | | < 5 | | < 5 | <5 | | <5 | | <5 |
| Vinyl Chloride | µg/L | 1 * | <0.2 | | <0.2 | | < 0.2 | | < 0.2 | <0.2 | | <0.2 | | <0.2 |
| Xylenes - total | µg/L | 20 ** | <0.5 | | <0.5 | | < 0.5 | | < 0.5 | 1.4 | | <0.5 | | <0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 111-I | | | | | | | 111-II | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Sep-21 | Mar-22 | Sep-22 | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 |
| Alkalinity | mg/L | 30-500 | 218 | 203 | 186 | 211 | 211 | 208 | 203 | 174 | 163 | 174 | 162 | 162 |
| Aluminum | mg/L | 0.1 | | <0.025 | | <0.025 | | 0 | | 0.057 | | <0.025 | | <0.025 |
| Ammonia (as N) | mg/L | | 0.7 | 0.6 | 0.7 | 0.7 | 0.8 | 0.8 | 0.8 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 |
| Anion sum | meq/L | | 5.23 | 4.87 | 4.5 | 4.90 | 4.93 | 4.73 | 4.95 | 4.42 | 3.82 | 4.08 | 3.85 | 3.86 |
| Arsenic | mg/L | 0.025 | <0.005 | <0.0005 | 0.0018 | <0.0005 | <0.0005 | 0.0007 | <0.0005 | 0.0018 | <0.005 | 0.0026 | <0.005 | 0.002 |
| Barium | mg/L | 1 * | | 0.615 | | 0.666 | | 0.666 | | 0.099 | | 0.232 | | 0.67 |
| Beryllium | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0001 | | <0.0001 | | <0.0005 |
| Bicarbonate | mg/L | | 206 | 193 | 179 | 201 | 202 | 199 | 197 | 171 | 160 | 172 | 160 | 160 |
| Boron | mg/L | 5 * | | 0.391 | | 0.438 | | 0.37 | | 0.0859 | | 0.0604 | | 0.0769 |
| Cadmium | mg/L | 0.005 * | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 |
| Calcium | mg/L | | 11.9 | 10.3 | 14.6 | 10.7 | 11.5 | 12.1 | 12.4 | 20.9 | 24.2 | 26.6 | 25.5 | 27.9 |
| Carbonate | mg/L | | 11 | 9 | 6 | 9 | 9 | 8 | 5 | 3 | 2 | 2 | 2 | 2 |
| Cation sum | meq/L | | 5.1 | 4.51 | 5.11 | 4.55 | 4.97 | 4.81 | 5.06 | 4.32 | 3.84 | 4.12 | 4.05 | 4.12 |
| Chloride | mg/L | 250 | 22.2 | 19.2 | 21.7 | 19.8 | 19.7 | 16.0 | 23.3 | 9.3 | 4.8 | 4.6 | 4.8 | 4.2 |
| Chromium | mg/L | 0.05 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Cobalt | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0001 | | <0.0001 | | <0.0005 |
| Chemical Oxygen Demand | mg/L | | 20 | 20 | <10 | <10 | 30 | <10 | 20 | 30 | <10 | 10 | <10 | <10 |
| Conductivity | µS/cm | | 494 | 459 | 482 | 475 | 476 | 448 | 485 | 424 | 359 | 377 | 373 | 382 |
| Conductivity - field | µS/cm | | 483 | 451 | 472 | 469 | 468 | 424 | 488 | 403 | 363 | 366 | 368 | 380 |
| Copper | mg/L | 1 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | 0.002 |
| Dissolved Organic Carbon | mg/L | 5 | 4 | 3 | 2 | 3.9 | 2.2 | 1.2 | 3.1 | 6.7 | 3 | 2.3 | 1.6 | 4.7 |
| Dissolved Oxygen - field | mg/L | | 1.04 | 1.62 | 4.89 | 0.86 | <0.05 | 0.53 | 1.86 | 0.78 | 0.87 | 0.76 | 0.89 | 3.21 |
| Hardness | mg/L | 80-100 | 55 | 47.5 | 61.2 | 48.0 | 50.7 | 51.8 | 55.6 | 115 | 130 | 153 | 151 | 155 |
| Ion Percentage | % | | 1.23 | 3.77 | 6.4 | 3.71 | 0.38 | 0.84 | 1.04 | 1.1 | 0.25 | 0.51 | 2.52 | 3.18 |
| Iron | mg/L | 0.3 | <0.05 | 0.016 | 0.467 | 0.008 | 0.007 | 0.100 | 0.042 | 0.047 | 0.11 | 0.134 | 0.1 | 0.149 |
| Lead | mg/L | 0.01 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Magnesium | mg/L | | 6.15 | 5.29 | 6.01 | 5.18 | 5.35 | 5.24 | 6.00 | 15.3 | 16.8 | 21 | 21.2 | 20.8 |
| Manganese | mg/L | 0.05 | 0.004 | 0.0046 | 0.0096 | 0.0051 | 0.0055 | 0.0079 | 0.0054 | 0.0042 | 0.007 | 0.0065 | 0.005 | 0.0094 |
| Molybdenum | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | 0.0045 | | 0.0021 | | 0.0024 |
| Nickel | mg/L | | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | -260.7 | -225.5 | -217.5 | -261.4 | -218.6 | -245.4 | -238.0 | -171.6 | -244.3 | -212.4 | -185.1 | -92.9 |
| pH | units | | 8.77 | 8.71 | 8.58 | 8.69 | 8.67 | 8.65 | 8.47 | 8.32 | 8.22 | 8.17 | 8.08 | 8.2 |
| pH - field | units | | 8.31 | 8.46 | 8.57 | 8.40 | 8.13 | 8.40 | 8.09 | 8.31 | 8.1 | 8.09 | 8.16 | 8.1 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.03 | <0.01 | <0.01 | <0.02 | <0.02 |
| Phosphorus | mg/L | | 0.04 | 0.03 | 0.03 | 0.04 | 0.08 | 0.03 | 0.02 | <0.02 | 0.02 | 0.03 | <0.02 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 3.8 | 3.3 | 4.5 | 3.3 | 4.0 | 3.5 | 3.6 | 2.8 | 1.4 | 1.2 | 1.1 | 1.8 |
| Sodium | mg/L | 200 | 88.4 | 78.9 | 85.5 | 79.3 | 87.1 | 83.4 | 87.1 | 44 | 27.2 | 22.9 | 22.1 | 21.5 |
| Sulphate | mg/L | 500 | 18.4 | 19.2 | 13.9 | 12.5 | 14.1 | 12.5 | 17.7 | 37.8 | 25.7 | 28 | 27.7 | 29.3 |
| Total Dissolved Solids | mg/L | 500 | 300 | 260 | 290 | 210 | 230 | 290 | 340 | 290 | 220 | 220 | 210 | 230 |
| Temperature - field | °C | | 11.3 | 9.1 | 13.5 | 9.5 | 13.6 | 10.1 | 11.3 | 9 | 11.3 | 8.7 | 10 | 9.1 |
| Total Kjeldahl Nitrogen | mg/L | | 0.6 | 0.2 | <1.0 | 0.5 | 0.6 | 0.6 | 2.6 | <0.1 | 0.1 | 0.2 | 0.1 | 0.1 |
| Zinc | mg/L | 5 | | 0.0009 | | <0.0005 | | 0.0017 | | 0.0032 | | 0.0006 | | 0.0034 |
| Phenols | µg/L | | <1 | <1 | 2 | <1 | <1 | 2 | <1 | 1 | <1 | <1 | <1 | 1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1,2-Trichlorethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethylene | µg/L | 14 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorpropane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichlorobenzene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(E) | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Benzene | µg/L | 1 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromodichloromethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromoform | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromomethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Carbon Tetrachloride | µg/L | 5 * | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| Chlorobenzene | µg/L | 30 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Chloroethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| Chloroform | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Chloromethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| cis-1,2-Dichloroethylene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Dibromochloromethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Dichloromethane | µg/L | 50 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Ethyl Benzene | µg/L | 1.6 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Ethylene dibromide | µg/L | | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| m/p-Xylenes | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| o-Xylene | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Styrene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Tetrachloroethylene | µg/L | 30 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Toluene | µg/L | 24 | | <0.5 | | < 0.5 | | < 0.5 | | 0.5 | | <0.5 | | <0.5 |
| trans-1,2-Dichloroethylene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Trichloroethylene | µg/L | 5 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Trichlorofluoromethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| Vinyl Chloride | µg/L | 1 * | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| Xylenes - total | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 111-II | | | | | | | 111-III | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Sep-21 | Mar-22 | Sep-22 | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 |
| Alkalinity | mg/L | 30-500 | 169 | 171 | 166 | 170 | 169 | 169 | 167 | 330 | 356 | 376 | 365 | 351 |
| Aluminum | mg/L | 0.1 | | <0.025 | | <0.025 | | <0.025 | | 0.028 | | <0.025 | | <0.025 |
| Ammonia (as N) | mg/L | | 0.3 | 0.2 | 0.2 | 0.2 | 0.3 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | <0.1 |
| Anion sum | meq/L | | 4.04 | 4.17 | 4.04 | 4.10 | 4.09 | 4.08 | 4.05 | 7.94 | 8.47 | 10.4 | 11.2 | 10.6 |
| Arsenic | mg/L | 0.025 | <0.005 | 0.0029 | 0.002 | 0.0015 | 0.0017 | 0.0033 | 0.0013 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 |
| Barium | mg/L | 1 * | | 0.481 | | 0.111 | | 0.126 | | 0.08 | | 0.114 | | 0.138 |
| Beryllium | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0001 | | <0.0001 | | <0.0005 |
| Bicarbonate | mg/L | | 166 | 169 | 164 | 168 | 167 | 167 | 165 | 329 | 355 | 375 | 364 | 350 |
| Boron | mg/L | 5 * | | 0.0722 | | 0.0807 | | 0.0706 | | 0.013 | | 0.0104 | | 0.0157 |
| Cadmium | mg/L | 0.005 * | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 |
| Calcium | mg/L | | 30.4 | 30.1 | 31.1 | 29.0 | 37.6 | 28.7 | 27.9 | 135 | 150 | 196 | 191 | 190 |
| Carbonate | mg/L | | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | <1 | <1 | <1 |
| Cation sum | meq/L | | 4.38 | 4.26 | 4.32 | 4.02 | 4.66 | 4.15 | 4.24 | 8.24 | 8.88 | 11.5 | 11.4 | 11.4 |
| Chloride | mg/L | 250 | 5.2 | 6 | 5.9 | 5.2 | 5.1 | 5.4 | 5.8 | 4.3 | 6.4 | 27.7 | 16.8 | 14.4 |
| Chromium | mg/L | 0.05 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Cobalt | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0001 | | <0.0001 | | <0.0005 |
| Chemical Oxygen Demand | mg/L | | <10 | 10 | <10 | <10 | 20 | <10 | <10 | <10 | 20 | 20 | <10 | <10 |
| Conductivity | μS/cm | | 393 | 402 | 401 | 394 | 393 | 392 | 391 | 705 | 763 | 706 | 1010 | 824 |
| Conductivity - field | μS/cm | | 386 | 401 | 396 | 395 | 382 | 376 | 391 | 759 | 782 | 986 | 996 | 987 |
| Copper | mg/L | 1 | | 0.0009 | | <0.0005 | | 0.0007 | | 0.0006 | | <0.0005 | | 0.0005 |
| Dissolved Organic Carbon | mg/L | 5 | 2.1 | 2.4 | 1.1 | 3.1 | 2.3 | <1.0 | 1.2 | 1.1 | 2.4 | 2.9 | 2.2 | 2.3 |
| Dissolved Oxygen - field | mg/L | | 0.95 | 3.42 | 0.26 | 11.2 | 0.42 | 1.70 | 1.52 | 3.56 | 2.13 | 2.57 | 2.72 | 3.14 |
| Hardness | mg/L | 80-100 | 171 | 169 | 170 | 159 | 185 | 161 | 165 | 401 | 433 | 562 | 550 | 550 |
| Ion Percentage | % | | 4.01 | 1.08 | 3.39 | 0.94 | 6.51 | 0.90 | 2.30 | 1.88 | 2.33 | 5.22 | 1.31 | 3.69 |
| Iron | mg/L | 0.3 | 0.25 | 0.098 | 0.282 | 0.025 | 0.448 | 0.077 | 0.226 | 0.035 | <0.05 | 0.002 | <0.05 | 0.001 |
| Lead | mg/L | 0.01 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Magnesium | mg/L | | 23 | 22.8 | 22.5 | 21.0 | 22.2 | 21.7 | 23.1 | 15.5 | 14.1 | 17.7 | 17.7 | 18.3 |
| Manganese | mg/L | 0.05 | 0.009 | 0.0107 | 0.0084 | 0.0183 | 0.0174 | 0.0095 | 0.0069 | 0.0038 | <0.001 | 0.0019 | 0.003 | <0.0005 |
| Molybdenum | mg/L | | | 0.0025 | | 0.0022 | | 0.0022 | | 0.0012 | | <0.0005 | | <0.0005 |
| Nickel | mg/L | | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 0.06 | 1.49 | 1.64 | 0.52 | 0.5 | 0.7 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | -129.7 | -86.7 | -142.4 | -120.3 | -100.3 | -105.1 | -107.7 | -39.2 | -90.7 | -159.4 | -43 | 13 |
| pH | units | | 8.21 | 8.14 | 8.07 | 8.11 | 8.14 | 8.06 | 8.01 | 7.53 | 7.59 | 7.3 | 7.28 | 7.43 |
| pH - field | units | | 7.97 | 7.94 | 8.09 | 8.08 | 7.88 | 7.83 | 7.80 | 7.19 | 7.12 | 7.01 | 7.15 | 7.18 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | 0.02 | <0.02 | <0.02 | <0.02 | <0.01 | <0.01 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | <0.01 | 0.02 | 0.05 | <0.02 | <0.02 | <0.02 | 0.02 | 0.02 | <0.02 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.4 | 1.4 | 1.4 | 1.2 | 1.5 | 1.2 | 1.2 | 1.2 | 1.1 | 1 | 1.3 | 1.2 |
| Sodium | mg/L | 200 | 20.4 | 18.5 | 19.3 | 17.8 | 19.9 | 19.8 | 20.1 | 3.6 | 3.8 | 5 | 8.8 | 7.7 |
| Sulphate | mg/L | 500 | 30.1 | 33.2 | 31.6 | 31.7 | 32.3 | 31.4 | 31.2 | 63.7 | 61.8 | 110 | 172 | 160 |
| Total Dissolved Solids | mg/L | 500 | 240 | 240 | 260 | 220 | 220 | 220 | 280 | 490 | 470 | 620 | 490 | 530 |
| Temperature - field | °C | | 11.8 | 9.4 | 11.5 | 9.6 | 13.0 | 10.4 | 11.7 | 7.6 | 12.4 | 7.1 | 12.6 | 7.4 |
| Total Kjeldahl Nitrogen | mg/L | | <0.1 | 0.1 | <1.0 | <0.1 | 0.2 | <0.1 | 2.5 | <0.1 | <0.1 | 0.2 | <0.1 | 0.1 |
| Zinc | mg/L | 5 | | 0.0009 | | 0.0016 | | 0.0009 | | 0.0008 | | 0.0005 | | 0.0011 |
| Phenols | μg/L | | <1 | <1 | 1 | <1 | <1 | 3 | <1 | 1 | <1 | <1 | <1 | 2 |
| 1,1,2,2-Tetrachlorethane | μg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1,2-Trichlorethane | μg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethane | μg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethylene | μg/L | 14 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorobenzene | μg/L | 3 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichloroethane | μg/L | 5 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorpropane | μg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichlorobenzene | μg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(E) | μg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(Z) | μg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,4-Dichlorobenzene | μg/L | 1 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Benzene | μg/L | 1 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromodichloromethane | μg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromoform | μg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromomethane | μg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Carbon Tetrachloride | μg/L | 5 * | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| Chlorobenzene | μg/L | 30 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Chloroethane | μg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| Chloroform | μg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Chloromethane | μg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| cis-1,2-Dichloroethylene | μg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Dibromochloromethane | μg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Dichloromethane | μg/L | 50 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Ethyl Benzene | μg/L | 1.6 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Ethylene dibromide | μg/L | | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| m/p-Xylenes | μg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| o-Xylene | μg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Styrene | μg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Tetrachloroethylene | μg/L | 30 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Toluene | μg/L | 24 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| trans-1,2-Dichloroethylene | μg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Trichloroethylene | μg/L | 5 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Trichlorofluoromethane | μg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| Vinyl Chloride | μg/L | 1 * | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| Xylenes - total | μg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 111-III | | | | | | | 112-I | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Sep-21 | Mar-22 | Sep-22 | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 |
| Alkalinity | mg/L | 30-500 | 359 | 399 | 404 | 424 | 398 | 383 | 392 | 137 | 159 | 180 | 176 | 193 |
| Aluminum | mg/L | 0.1 | | <0.025 | | <0.025 | | 0 | | <0.025 | | <0.025 | | <0.025 |
| Ammonia (as N) | mg/L | | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.3 | 0.2 | <0.1 | 0.2 | 0.1 |
| Anion sum | meq/L | | 11.5 | 12.7 | 14.1 | 14.8 | 13.3 | 10.9 | 11.0 | 3.87 | 4.18 | 4.6 | 4.52 | 4.85 |
| Arsenic | mg/L | 0.025 | <0.005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.005 | 0.0006 | 0.005 | 0.0019 |
| Barium | mg/L | 1 * | | 0.136 | | 0.142 | | 0.122 | | 0.109 | | 0.11 | | 0.143 |
| Beryllium | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0001 | | <0.0001 | | <0.0005 |
| Bicarbonate | mg/L | | 358 | 398 | 403 | 423 | 397 | 382 | 391 | 135 | 157 | 179 | 175 | 191 |
| Boron | mg/L | 5 * | | 0.0239 | | 0.0333 | | 0.0309 | | 0.0751 | | 0.0424 | | 0.0393 |
| Cadmium | mg/L | 0.005 * | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 |
| Calcium | mg/L | | 203 | 194 | 249 | 242 | 229 | 187 | 186 | 34.6 | 34.5 | 42.2 | 45.9 | 53.6 |
| Carbonate | mg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 2 | 2 | 1 | 1 | 2 |
| Cation sum | meq/L | | 12.2 | 12 | 15.2 | 14.7 | 14.2 | 11.9 | 11.9 | 4.14 | 4.03 | 4.48 | 4.67 | 5.23 |
| Chloride | mg/L | 250 | 16.3 | 24.6 | 40 | 46.7 | 51.4 | 47.6 | 41.3 | 18.6 | 14.3 | 12 | 11.1 | 8.8 |
| Chromium | mg/L | 0.05 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Cobalt | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0001 | | <0.0001 | | <0.0005 |
| Chemical Oxygen Demand | mg/L | | 10 | 30 | <10 | 20 | <10 | <10 | <10 | <10 | <10 | <10 | 20 | <10 |
| Conductivity | µS/cm | | 1040 | 1120 | 1220 | 1320 | 1030 | 937 | 1040 | 394 | 405 | 435 | 452 | 483 |
| Conductivity - field | µS/cm | | 1020 | 1160 | 1310 | 1320 | 1190 | 1040 | 1030 | 391 | 406 | 423 | 449 | 488 |
| Copper | mg/L | 1 | | 0.001 | | 0.0014 | | 0.0011 | | <0.0005 | | <0.0005 | | 0.0041 |
| Dissolved Organic Carbon | mg/L | 5 | 5.4 | 3.5 | 2.7 | 5.3 | 3.0 | 1.7 | 2.1 | 1.2 | 1.9 | 1.6 | 1.5 | 3.8 |
| Dissolved Oxygen - field | mg/L | | 2.33 | 3.86 | 0.59 | 2.69 | 1.02 | 1.51 | 6.78 | 4.09 | 1.86 | 4.43 | 2.19 | 0.69 |
| Hardness | mg/L | 80-100 | 583 | 562 | 706 | 687 | 649 | 528 | 528 | 156 | 162 | 191 | 204 | 236 |
| Ion Percentage | % | | 3.24 | 2.54 | 3.49 | 0.48 | 3.16 | 4.20 | 3.88 | 3.37 | 1.8 | 1.39 | 1.62 | 3.85 |
| Iron | mg/L | 0.3 | <0.05 | 0.011 | <0.005 | <0.005 | <0.005 | 0.066 | 0.434 | 0.057 | 0.11 | 0.172 | 0.11 | 0.211 |
| Lead | mg/L | 0.01 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Magnesium | mg/L | | 18.5 | 18.9 | 20.5 | 20.1 | 18.7 | 14.8 | 15.3 | 17 | 18.5 | 20.9 | 21.8 | 24.7 |
| Manganese | mg/L | 0.05 | 0.005 | 0.0024 | 0.0077 | 0.0017 | 0.0344 | 0.0125 | 0.0592 | 0.0039 | 0.005 | 0.0042 | 0.005 | 0.005 |
| Molybdenum | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | 0.0117 | | 0.0034 | | 0.002 |
| Nickel | mg/L | | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 |
| Nitrate | mg/L | 10.0 * | 0.5 | <0.5 | 0.8 | 0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | 15 | 15.7 | -1.7 | 28.1 | 50.9 | 9.9 | 72.6 | 132.8 | -106.5 | 22.3 | -87.3 | -118.9 |
| pH | units | | 7.35 | 7.36 | 7.13 | 7.30 | 7.30 | 7.23 | 7.22 | 8.08 | 8.05 | 7.89 | 7.91 | 8.09 |
| pH - field | units | | 7.07 | 7 | 7.03 | 6.98 | 7.07 | 6.93 | 7.00 | 7.91 | 7.74 | 7.56 | 7.83 | 7.73 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.04 | <0.02 | <0.01 | <0.01 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | <0.01 | 0.01 | <0.03 | <0.02 | <0.02 | 0.02 | <0.02 | 0.03 | <0.02 | <0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.3 | 1.2 | 1.6 | 1.3 | 1.6 | 1.3 | 1.6 | 7.9 | 7.1 | 5.5 | 4.7 | 3.8 |
| Sodium | mg/L | 200 | 11.9 | 16.6 | 22.1 | 19.5 | 25.9 | 29.1 | 29.9 | 17.7 | 13.1 | 11.1 | 9.7 | 9 |
| Sulphate | mg/L | 500 | 194 | 204 | 247 | 252 | 200 | 105 | 110 | 33.4 | 33.7 | 37.5 | 38.5 | 41.5 |
| Total Dissolved Solids | mg/L | 500 | 720 | 760 | 880 | 840 | 710 | 610 | 640 | 250 | 270 | 260 | 280 | 290 |
| Temperature - field | °C | | 12.8 | 7.5 | 13.2 | 8.0 | 13.8 | 8.4 | 13.1 | 9.4 | 11.5 | 8.9 | 10.8 | 9.3 |
| Total Kjeldahl Nitrogen | mg/L | | 0.5 | 0.2 | <1.0 | <0.5 | 0.2 | <0.1 | 3.1 | 0.1 | 0.3 | <0.1 | <1.0 | 0.1 |
| Zinc | mg/L | 5 | | 0.0006 | | 0.0010 | | 0.0019 | | 0.0032 | | 0.0018 | | 0.0071 |
| Phenols | µg/L | | <1 | <1 | 1 | <1 | 1 | 3 | <1 | <1 | <1 | <1 | <1 | 1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1,2-Trichlorethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethylene | µg/L | 14 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorpropane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichlorobenzene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(E) | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Benzene | µg/L | 1 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromodichloromethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromoform | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromomethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Carbon Tetrachloride | µg/L | 5 * | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| Chlorobenzene | µg/L | 30 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Chloroethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| Chloroform | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Chloromethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| cis-1,2-Dichloroethylene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Dibromochloromethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Dichloromethane | µg/L | 50 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Ethyl Benzene | µg/L | 1.6 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Ethylene dibromide | µg/L | | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| m/p-Xylenes | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| o-Xylene | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Styrene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Tetrachloroethylene | µg/L | 30 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Toluene | µg/L | 24 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| trans-1,2-Dichloroethylene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Trichloroethylene | µg/L | 5 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Trichlorofluoromethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| Vinyl Chloride | µg/L | 1 * | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| Xylenes - total | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 112-I | | | | | | | 112-II | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Sep-21 | Mar-22 | Sep-22 | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 |
| Alkalinity | mg/L | 30-500 | 211 | 196 | 204 | 217 | 214 | 203 | 215 | 236 | 239 | 255 | 267 | 270 |
| Aluminum | mg/L | 0.1 | | 0.037 | | <0.025 | | <0.025 | | 0.342 | | <0.025 | | <0.025 |
| Ammonia (as N) | mg/L | | 0.2 | 0.2 | 0.2 | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | <0.1 | 0.3 | 0.1 |
| Anion sum | meq/L | | 5.32 | 5.12 | 5.44 | 5.81 | 5.66 | 5.47 | 5.67 | 7.48 | 8.75 | 10.7 | 11.5 | 11.3 |
| Arsenic | mg/L | 0.025 | <0.005 | 0.0046 | 0.0038 | 0.0023 | 0.0041 | 0.0034 | 0.0028 | <0.0005 | <0.005 | <0.0005 | <0.005 | <0.0005 |
| Barium | mg/L | 1 * | | 0.155 | | 0.132 | | 0.115 | | 0.123 | | 0.166 | | 0.143 |
| Beryllium | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0001 | | <0.0001 | | <0.0005 |
| Bicarbonate | mg/L | | 209 | 194 | 202 | 216 | 212 | 201 | 213 | 235 | 238 | 254 | 266 | 269 |
| Boron | mg/L | 5 * | | 0.0264 | | 0.0228 | | 0.0205 | | 0.0105 | | 0.0106 | | 0.0161 |
| Cadmium | mg/L | 0.005 * | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 |
| Calcium | mg/L | | 61 | 54.9 | 60.5 | 51.6 | 66.4 | 62.6 | 60.1 | 139 | 129 | 180 | 189 | 196 |
| Carbonate | mg/L | | 2 | 2 | 1 | 1 | 2 | 1 | 1 | <1 | 1 | <1 | <1 | <1 |
| Cation sum | meq/L | | 5.73 | 5.4 | 5.55 | 4.79 | 6.00 | 5.76 | 5.84 | 8.56 | 7.95 | 11 | 11.6 | 12.1 |
| Chloride | mg/L | 250 | 11.6 | 13.3 | 16.7 | 18.3 | 16.2 | 16.9 | 16.9 | 24.9 | 56.1 | 95 | 105 | 96.6 |
| Chromium | mg/L | 0.05 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Cobalt | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | 0.0005 | | 0.0001 | | <0.0005 |
| Chemical Oxygen Demand | mg/L | | <10 | 10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | 10 | 30 | 30 |
| Conductivity | µS/cm | | 509 | 501 | 548 | 541 | 521 | 529 | 542 | 729 | 820 | 954 | 1060 | 1110 |
| Conductivity - field | µS/cm | | 497 | 499 | 515 | 557 | 529 | 527 | 543 | 705 | 789 | 991 | 1120 | 1160 |
| Copper | mg/L | 1 | | <0.0005 | | 0.0010 | | <0.0005 | | 0.0013 | | 0.0012 | | 0.0033 |
| Dissolved Organic Carbon | mg/L | 5 | 4.5 | 3.8 | 2.2 | 2.3 | 2.6 | 1.9 | 2.2 | 2.6 | 4.3 | 9.3 | 10.4 | 12.7 |
| Dissolved Oxygen - field | mg/L | | 0.75 | 3.41 | 2.97 | 1.36 | 0.85 | 2.39 | 4.98 | 3.16 | 1.91 | 4.17 | 0.93 | 1.49 |
| Hardness | mg/L | 80-100 | 264 | 249 | 254 | 221 | 278 | 267 | 271 | 412 | 384 | 531 | 555 | 579 |
| Ion Percentage | % | | 3.7 | 2.65 | 0.93 | 9.58 | 2.98 | 2.58 | 1.48 | 6.72 | 4.82 | 1.17 | 0.42 | 3.28 |
| Iron | mg/L | 0.3 | 0.72 | 0.047 | 0.351 | 0.122 | 0.472 | 0.303 | 0.169 | 0.327 | <0.05 | 0.002 | <0.05 | 0.014 |
| Lead | mg/L | 0.01 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Magnesium | mg/L | | 27.1 | 27.2 | 25.1 | 22.4 | 27.3 | 26.9 | 29.4 | 15.8 | 15 | 19.7 | 20.2 | 21.8 |
| Manganese | mg/L | 0.05 | 0.011 | 0.0075 | 0.0081 | 0.0065 | 0.0108 | 0.0079 | 0.0049 | 0.02 | 0.001 | 0.0019 | 0.007 | 0.0037 |
| Molybdenum | mg/L | | | 0.0051 | | 0.0012 | | 0.0009 | | 0.0009 | | <0.0005 | | <0.0005 |
| Nickel | mg/L | | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 2.97 | 4.45 | 5.23 | 6.2 | 4.8 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | -119.5 | 41.4 | -54.1 | -69.5 | -66 | -60 | -66 | 164.6 | 41.2 | 78.1 | 30.9 | 50.8 |
| pH | units | | 7.94 | 8.05 | 7.89 | 7.83 | 7.89 | 7.89 | 7.87 | 7.51 | 7.74 | 7.36 | 7.35 | 7.58 |
| pH - field | units | | 7.6 | 7.8 | 7.94 | 7.62 | 7.62 | 7.53 | 7.54 | 7.26 | 7.28 | 7.1 | 7.18 | 7.2 |
| Phosphate | mg/L | | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.02 | <0.01 | <0.01 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | <0.01 | 0.01 | 0.04 | <0.02 | <0.02 | 0.02 | <0.02 | 0.04 | 0.08 | 0.05 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 2.5 | 3.2 | 2.8 | 2.0 | 2.5 | 2.2 | 2.2 | 1.4 | 1.2 | 1.2 | 1.3 | 1.5 |
| Sodium | mg/L | 200 | 7.9 | 6.8 | 7.9 | 6.3 | 7.6 | 7.3 | 7.2 | 5.5 | 4.8 | 7.2 | 8.5 | 10.5 |
| Sulphate | mg/L | 500 | 43.8 | 46 | 49.3 | 52.6 | 50.9 | 51.2 | 49.6 | 96 | 107 | 132 | 139 | 147 |
| Total Dissolved Solids | mg/L | 500 | 350 | 310 | 330 | 260 | 320 | 340 | 380 | 470 | 630 | 660 | 800 | 830 |
| Temperature - field | °C | | 11.7 | 9.6 | 11.8 | 9.5 | 12.7 | 10.4 | 11.6 | 8.9 | 11.9 | 8.7 | 11.1 | 9.4 |
| Total Kjeldahl Nitrogen | mg/L | | <0.1 | 0.2 | <1.0 | 0.2 | 0.2 | 0.1 | 3.2 | 3.4 | 0.3 | <0.1 | <1.0 | 0.4 |
| Zinc | mg/L | 5 | | 0.0031 | | <0.0005 | | <0.0005 | | 0.002 | | 0.0009 | | 0.0032 |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1,2-Trichlorethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethylene | µg/L | 14 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorpropane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichlorobenzene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(E) | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Benzene | µg/L | 1 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromodichloromethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromoform | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromomethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Carbon Tetrachloride | µg/L | 5 * | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| Chlorobenzene | µg/L | 30 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Chloroethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| Chloroform | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Chloromethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| cis-1,2-Dichloroethylene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Dibromochloromethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Dichloromethane | µg/L | 50 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Ethyl Benzene | µg/L | 1.6 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Ethylene dibromide | µg/L | | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| m/p-Xylenes | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| o-Xylene | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Styrene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Tetrachloroethylene | µg/L | 30 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Toluene | µg/L | 24 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| trans-1,2-Dichloroethylene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Trichloroethylene | µg/L | 5 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Trichlorofluoromethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| Vinyl Chloride | µg/L | 1 * | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| Xylenes - total | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 112-II | | | | | | | 112-III | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Sep-21 | Mar-22 | Sep-22 | Mar-17 | Sep-17 | Mar-18 | Sep-18 | Mar-19 |
| Alkalinity | mg/L | 30-500 | 292 | 290 | 280 | 294 | 311 | 302 | 340 | 163 | 221 | 219 | 196 | 208 |
| Aluminum | mg/L | 0.1 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 | | <0.025 |
| Ammonia (as N) | mg/L | | 0.1 | 0.2 | 0.2 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | <0.1 | 0.2 | 0.1 |
| Anion sum | meq/L | | 11.9 | 12.4 | 11.5 | 11.6 | 11.5 | 11.1 | 11.5 | 4.57 | 6.22 | 6.83 | 6.42 | 7.53 |
| Arsenic | mg/L | 0.025 | <0.005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.001 | <0.005 | <0.0005 | <0.005 | <0.0005 |
| Barium | mg/L | 1 * | | 0.103 | | 0.158 | | 0.117 | | 0.095 | | 0.113 | | 0.112 |
| Beryllium | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0001 | | <0.0001 | | <0.0005 |
| Bicarbonate | mg/L | | 291 | 289 | 279 | 293 | 310 | 301 | 339 | 161 | 218 | 218 | 195 | 206 |
| Boron | mg/L | 5 * | | 0.0198 | | 0.0241 | | 0.0258 | | 0.0829 | | 0.0595 | | 0.0519 |
| Cadmium | mg/L | 0.005 * | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 | | <0.0001 |
| Calcium | mg/L | | 208 | 192 | 191 | 146 | 193 | 180 | 175 | 49.1 | 56.7 | 73.4 | 79.1 | 87.3 |
| Carbonate | mg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 2 | 3 | 1 | 1 | 2 |
| Cation sum | meq/L | | 12.8 | 12 | 11.9 | 9.26 | 12.1 | 11.5 | 11.3 | 5 | 5.57 | 6.9 | 7.2 | 8.09 |
| Chloride | mg/L | 250 | 99.2 | 97.9 | 80.7 | 72.6 | 65.5 | 56.1 | 48.8 | 11.4 | 19.5 | 33.9 | 40.9 | 51.2 |
| Chromium | mg/L | 0.05 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Cobalt | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0001 | | <0.0001 | | <0.0005 |
| Chemical Oxygen Demand | mg/L | | 30 | 40 | 20 | 20 | 10 | <10 | 20 | <10 | <10 | 20 | <10 | <10 |
| Conductivity | µS/cm | | 1180 | 1170 | 1110 | 1080 | 1010 | 974 | 1060 | 458 | 582 | 652 | 646 | 754 |
| Conductivity - field | µS/cm | | 1140 | 1160 | 1090 | 1110 | 1060 | 1020 | 1040 | 455 | 579 | 641 | 701 | 752 |
| Copper | mg/L | 1 | | 0.0021 | | 0.0018 | | 0.0011 | | 0.0012 | | <0.0005 | | 0.0014 |
| Dissolved Organic Carbon | mg/L | 5 | 12.7 | 12.4 | 10.7 | 10.2 | 9.9 | 7.6 | 7.4 | <1.0 | 2.1 | 3.8 | 5.3 | 6 |
| Dissolved Oxygen - field | mg/L | | 1.65 | 2.73 | 1.29 | 1.74 | 3.32 | 1.88 | 1.38 | 4.14 | 2.88 | 3.04 | 2.22 | 6.16 |
| Hardness | mg/L | 80-100 | 612 | 571 | 562 | 435 | 569 | 537 | 531 | 208 | 247 | 317 | 332 | 375 |
| Ion Percentage | % | | 3.88 | 1.33 | 1.69 | 11.3 | 2.47 | 1.78 | 0.86 | 4.42 | 5.56 | 0.47 | 5.7 | 3.56 |
| Iron | mg/L | 0.3 | <0.05 | <0.005 | <0.005 | <0.005 | 0.022 | 0.012 | 0.008 | 0.002 | <0.05 | 0.001 | 0.05 | 0.002 |
| Lead | mg/L | 0.01 * | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 | | <0.0005 |
| Magnesium | mg/L | | 22.5 | 22.2 | 20.7 | 17.1 | 21.1 | 21.3 | 22.8 | 20.8 | 25.7 | 32.4 | 32.6 | 38.1 |
| Manganese | mg/L | 0.05 | 0.005 | 0.0075 | 0.0054 | 0.0021 | 0.0078 | 0.0063 | 0.0060 | 0.0103 | 0.006 | 0.0011 | 0.023 | 0.0015 |
| Molybdenum | mg/L | | | <0.0005 | | 0.0006 | | <0.0005 | | 0.0145 | | 0.0063 | | 0.0051 |
| Nickel | mg/L | | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 | | <0.002 |
| Nitrate | mg/L | 10.0 * | 4.6 | 5.6 | 5.5 | 5.3 | 4.8 | 5.1 | 4.8 | 0.1 | 0.16 | <0.5 | 0.6 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | 27.6 | 103.4 | 33 | 96.1 | 66.3 | 90.1 | 84.7 | 180.6 | 48.5 | 81.5 | -68.1 | 69.4 |
| pH | units | | 7.42 | 7.51 | 7.37 | 7.40 | 7.39 | 7.32 | 7.25 | 8.04 | 8.09 | 7.83 | 7.82 | 8.05 |
| pH - field | units | | 7.09 | 7.1 | 7.34 | 7.09 | 7.32 | 7.05 | 6.84 | 7.86 | 7.64 | 7.48 | 7.65 | 7.71 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.01 | 0.01 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | <0.01 | 0.01 | 0.04 | 0.30 | 0.03 | 0.02 | 0.02 | 0.04 | 0.06 | 0.05 |
| Phosphorus - dissolved | mg/L | | | | | | | | | | | | | |
| Potassium | mg/L | | 1.5 | 1.6 | 1.7 | 1.1 | 1.6 | 1.5 | 1.4 | 5 | 4.7 | 3.6 | 3.7 | 3.6 |
| Sodium | mg/L | 200 | 11.8 | 12 | 13.4 | 11.5 | 15.3 | 15.5 | 14.5 | 15.3 | 10.5 | 10 | 9.6 | 10.4 |
| Sulphate | mg/L | 500 | 149 | 172 | 165 | 168 | 160 | 159 | 155 | 52.4 | 66.6 | 78.8 | 68.9 | 99.3 |
| Total Dissolved Solids | mg/L | 500 | 970 | 780 | 930 | 700 | 710 | 700 | 670 | 280 | 410 | 390 | 390 | 470 |
| Temperature - field | °C | | 12 | 9.8 | 12.1 | 9.5 | 13.3 | 10.0 | 13.4 | 8 | 14.5 | 6.6 | 14 | 6.8 |
| Total Kjeldahl Nitrogen | mg/L | | 0.7 | 0.3 | <1.0 | <1 | 3.2 | <0.1 | 2.7 | <0.1 | 0.4 | <0.1 | <1.0 | 0.3 |
| Zinc | mg/L | 5 | | 0.0006 | | <0.0005 | | 0.0006 | | 0.0009 | | 0.0007 | | 0.0013 |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1,2-Trichlorethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,1-Dichloroethylene | µg/L | 14 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorobenzene | µg/L | 3 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichloroethane | µg/L | 5 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,2-Dichlorpropane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichlorobenzene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(E) | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,3-Dichloropropene(Z) | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| 1,4-Dichlorobenzene | µg/L | 1 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Benzene | µg/L | 1 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromodichloromethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromoform | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Bromomethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Carbon Tetrachloride | µg/L | 5 * | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| Chlorobenzene | µg/L | 30 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Chloroethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| Chloroform | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Chloromethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| cis-1,2-Dichloroethylene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Dibromochloromethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Dichloromethane | µg/L | 50 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Ethyl Benzene | µg/L | 1.6 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Ethylene dibromide | µg/L | | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| m/p-Xylenes | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| o-Xylene | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Styrene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Tetrachloroethylene | µg/L | 30 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Toluene | µg/L | 24 | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| trans-1,2-Dichloroethylene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Trichloroethylene | µg/L | 5 * | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |
| Trichlorofluoromethane | µg/L | | | <5 | | < 5 | | < 5 | | <5 | | <5 | | <5 |
| Vinyl Chloride | µg/L | 1 * | | <0.2 | | < 0.2 | | < 0.2 | | <0.2 | | <0.2 | | <0.2 |
| Xylenes - total | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.1**
**Groundwater Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | ODWQS | 112-III | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Sep-19 | Mar-20 | Sep-20 | Mar-21 | Sep-21 | Mar-22 | Sep-22 |
| Alkalinity | mg/L | 30-500 | 224 | 224 | 223 | 230 | 232 | 238 | 265 |
| Aluminum | mg/L | 0.1 | | 0.048 | | <0.025 | | <0.025 | |
| Ammonia (as N) | mg/L | | 0.1 | 0.2 | 0.2 | 0.1 | 0.2 | 0.1 | 0.2 |
| Anion sum | meq/L | | 7.98 | 8.55 | 8.28 | 8.60 | 8.77 | 9.02 | 9.12 |
| Arsenic | mg/L | 0.025 | <0.005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Barium | mg/L | 1 * | | 0.106 | | 0.091 | | 0.08 | |
| Beryllium | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | |
| Bicarbonate | mg/L | | 223 | 222 | 222 | 228 | 231 | 228 | 264 |
| Boron | mg/L | 5 * | | 0.0552 | | 0.0543 | | 0.0422 | |
| Cadmium | mg/L | 0.005 * | | <0.0001 | | <0.0001 | | <0.0001 | |
| Calcium | mg/L | | 94 | 95.6 | 95.2 | 92.3 | 100 | 107 | 105 |
| Carbonate | mg/L | | 1 | 2 | 1 | 1 | 1 | 10 | <1 |
| Cation sum | meq/L | | 8.55 | 8.75 | 8.5 | 8.30 | 8.90 | 9.46 | 9.58 |
| Chloride | mg/L | 250 | 61.1 | 67 | 67 | 64.5 | 66.8 | 62.8 | 57.5 |
| Chromium | mg/L | 0.05 * | | <0.0005 | | <0.0005 | | <0.0005 | |
| Cobalt | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | |
| Chemical Oxygen Demand | mg/L | | 20 | 20 | <10 | 20 | <10 | <10 | 20 |
| Conductivity | µS/cm | | 797 | 823 | 837 | 834 | 786 | 873 | 882 |
| Conductivity - field | µS/cm | | 781 | 835 | 831 | 841 | 815 | 854 | 874 |
| Copper | mg/L | 1 | | 0.0012 | | 0.0018 | | 0.0014 | |
| Dissolved Organic Carbon | mg/L | 5 | 15.4 | 7.2 | 5.8 | 5.8 | 6.2 | 5.0 | 5.5 |
| Dissolved Oxygen - field | mg/L | | 7.68 | 4.15 | 6.45 | 6.40 | 2.15 | 6.94 | 3.79 |
| Hardness | mg/L | 80-100 | 399 | 410 | 395 | 388 | 416 | 444 | 450 |
| Ion Percentage | % | | 3.46 | 1.15 | 1.3 | 1.74 | 0.78 | 2.40 | 2.47 |
| Iron | mg/L | 0.3 | <0.05 | 0.04 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Lead | mg/L | 0.01 * | | <0.0005 | | <0.0005 | | <0.0005 | |
| Magnesium | mg/L | | 39.9 | 41.5 | 38.3 | 38.2 | 40.3 | 42.9 | 45.4 |
| Manganese | mg/L | 0.05 | 0.004 | 0.0032 | 0.0023 | 0.0006 | 0.0011 | 0.0018 | 0.0050 |
| Molybdenum | mg/L | | | 0.0033 | | 0.0034 | | 0.0023 | |
| Nickel | mg/L | | | <0.002 | | <0.002 | | <0.002 | |
| Nitrate | mg/L | 10.0 * | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Nitrite | mg/L | 1.0* | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Oxydation Reduction Potential | mV | | 25 | 82.3 | 40.9 | 104.7 | 68.1 | 100.6 | 94.6 |
| pH | units | | 7.81 | 7.95 | 7.71 | 7.84 | 7.79 | 8.67 | 7.57 |
| pH - field | units | | 7.46 | 7.55 | 7.75 | 7.66 | 7.57 | 7.39 | 7.24 |
| Phosphate | mg/L | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphorus | mg/L | | <0.02 | <0.02 | <0.01 | 0.01 | 0.04 | <0.02 | 0.02 |
| Phosphorus - dissolved | mg/L | | | | | | | | |
| Potassium | mg/L | | 3.6 | 3.4 | 3.7 | 3.2 | 3.6 | 3.2 | 3.1 |
| Sodium | mg/L | 200 | 9.8 | 9.5 | 10 | 9.6 | 10.1 | 10.3 | 10.5 |
| Sulphate | mg/L | 500 | 92.4 | 112 | 99.7 | 112 | 115 | 127 | 114 |
| Total Dissolved Solids | mg/L | 500 | 490 | 500 | 560 | 440 | 530 | 550 | 720 |
| Temperature - field | °C | | 15.5 | 7.5 | 17 | 6.9 | 17.2 | 7.6 | 14.8 |
| Total Kjeldahl Nitrogen | mg/L | | 0.4 | 0.5 | <1.0 | 0.4 | 0.3 | 0.3 | 2.5 |
| Zinc | mg/L | 5 | | 0.0011 | | 0.0011 | | 0.0013 | |
| Phenols | µg/L | | <1 | <1 | <1 | <1 | <1 | 2 | <1 |
| 1,1,2,2-Tetrachlorethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1,2-Trichlorethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,1-Dichloroethylene | µg/L | 14 * | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorobenzene | µg/L | 3 | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichloroethane | µg/L | 5 * | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,2-Dichlorpropane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichlorobenzene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(E) | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | |
| 1,4-Dichlorobenzene | µg/L | 1 | | <0.5 | | < 0.5 | | < 0.5 | |
| Benzene | µg/L | 1 * | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromodichloromethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromoform | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | |
| Bromomethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | |
| Carbon Tetrachloride | µg/L | 5 * | | <0.2 | | < 0.2 | | < 0.2 | |
| Chlorobenzene | µg/L | 30 | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloroethane | µg/L | | | <5 | | < 5 | | < 5 | |
| Chloroform | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | |
| Chloromethane | µg/L | | | <5 | | < 5 | | < 5 | |
| cis-1,2-Dichloroethylene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | |
| Dibromochloromethane | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | |
| Dichloromethane | µg/L | 50 * | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethyl Benzene | µg/L | 1.6 | | <0.5 | | < 0.5 | | < 0.5 | |
| Ethylene dibromide | µg/L | | | <0.2 | | < 0.2 | | < 0.2 | |
| m/p-Xylenes | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | |
| o-Xylene | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | |
| Styrene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | |
| Tetrachloroethylene | µg/L | 30 * | | <0.5 | | < 0.5 | | < 0.5 | |
| Toluene | µg/L | 24 | | <0.5 | | < 0.5 | | < 0.5 | |
| trans-1,2-Dichloroethylene | µg/L | | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichloroethylene | µg/L | 5 * | | <0.5 | | < 0.5 | | < 0.5 | |
| Trichlorofluoromethane | µg/L | | | <5 | | < 5 | | < 5 | |
| Vinyl Chloride | µg/L | 1 * | | <0.2 | | < 0.2 | | < 0.2 | |
| Xylenes - total | µg/L | 20 ** | | <0.5 | | < 0.5 | | < 0.5 | |

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006).
2) * - Indicates health related drinking water standard.
3)** - Drinking water objective is total concentration of all xylenes.
4) Blank indicates parameter not analyzed.

**Table H.2**
**2022 Groundwater Performance Monitoring Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| | *Alkalinity* | *Chloride* | *Potassium* | *Sodium* | *Alk/Cl* | *K/Na* |
|---|---|---|---|---|---|---|
| | *mg/L* | *mg/L* | *mg/L* | *mg/L* | *mg/L* | *mg/L* |
| ***5-V*** | | | | | | |
| AVG | 286 | 42 | 3.88 | 16 | 9.30 | 0.26 |
| AVGSTD | 314 | 64 | 6.52 | 22 | 15.13 | 0.42 |
| AVG2STD | 342 | 87 | 9.16 | 29 | 20.96 | 0.58 |
| MIN | 241 | 16 | 1.42 | 7 | 4.21 | 0.13 |
| MAX | 317 | 69 | 9.27 | 25 | 19.81 | 0.50 |
| Mar-22 | 218 | 8.2 | 2.2 | 9.4 | 26.59 | 0.23 |
| Sep-22 | 224 | 8.4 | 2.1 | 8.9 | 26.67 | 0.24 |
| ***16A*** | | | | | | |
| AVG | 219 | 58 | 2.29 | 6 | 4.61 | 0.40 |
| AVGSTD | 254 | 74 | 3.6 | 8 | 9.19 | 0.62 |
| AVG2STD | 289 | 91 | 4.91 | 11 | 13.78 | 0.84 |
| MIN | 106 | 7 | 0.77 | 2 | 1.56 | 0.16 |
| MAX | 423 | 110 | 12.57 | 16 | 36.23 | 1.58 |
| Mar-22 | 239 | 24.1 | 1.2 | 16 | 9.92 | 0.08 |
| ***16C*** | | | | | | |
| AVG | 274 | 62 | 1.63 | 20 | 5.37 | 0.10 |
| AVGSTD | 314 | 86 | 2.08 | 32 | 8.56 | 0.16 |
| AVG2STD | 353 | 110 | 2.53 | 44 | 11.75 | 0.23 |
| MIN | 196 | 18 | 1.06 | 8 | 2.35 | 0.02 |
| MAX | 416 | 110 | 3.11 | 74 | 16.44 | 0.24 |

| | *Alkalinity* | *Chloride* | *Potassium* | *Sodium* | *Alk/Cl* | *K/Na* |
|---|---|---|---|---|---|---|
| | *mg/L* | *mg/L* | *mg/L* | *mg/L* | *mg/L* | *mg/L* |
| ***18A*** | | | | | | |
| AVG | 267 | 72 | 5.16 | 46 | 4.58 | 0.14 |
| AVGSTD | 413 | 121 | 11.45 | 83 | 7.40 | 0.23 |
| AVG2STD | 559 | 169 | 17.74 | 119 | 10.22 | 0.32 |
| MIN | 121 | 24 | 1.15 | 5 | 1.36 | 0.02 |
| MAX | 1340 | 374 | 56.1 | 230 | 26.63 | 0.47 |
| Apr-22 | 469 | 178 | 10.4 | 98.4 | 2.63 | 0.11 |
| Oct-22 | 257 | 138 | 5.6 | 56.6 | 1.86 | 0.10 |
| ***18B*** | | | | | | |
| AVG | 448 | 92 | 1.41 | 54 | 10.37 | 0.04 |
| AVGSTD | 617 | 166 | 2.66 | 80 | 22.20 | 0.08 |
| AVG2STD | 786 | 239 | 3.91 | 106 | 34.02 | 0.12 |
| MIN | 166 | 3 | 0.19 | 5 | 0.77 | 0.00 |
| MAX | 1090 | 331 | 10.61 | 145 | 69.41 | 0.27 |
| Apr-22 | 455 | 72.1 | 1.3 | 34.8 | 6.31 | 0.04 |
| Oct-22 | 482 | 94.2 | 1.9 | 44.3 | 5.12 | 0.04 |
| ***19A*** | | | | | | |
| AVG | 1272 | 475 | 77.6 | 283 | 3.55 | 0.29 |
| AVGSTD | 1713 | 766 | 120.15 | 446 | 5.70 | 0.43 |
| AVG2STD | 2154 | 1057 | 162.69 | 610 | 7.85 | 0.57 |
| MIN | 419 | 52 | 1.1 | 35 | 0.80 | 0.03 |
| MAX | 2226 | 1379 | 200 | 765 | 15.86 | 0.91 |
| Apr-22 | 622 | 829 | 10.1 | 394 | 0.75 | 0.03 |
| Sep-22 | 580 | 2020 | 12.4 | 604 | 0.29 | 0.02 |

Historical Averages and Standard Deviation
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**Table H.2**
**2022 Groundwater Performance Monitoring Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| | *Alkalinity* | *Chloride* | *Potassium* | *Sodium* | *Alk/Cl* | *K/Na* |
|---|---|---|---|---|---|---|
| | *mg/L* | *mg/L* | *mg/L* | *mg/L* | *mg/L* | *mg/L* |
| ***20A*** | | | | | | |
| AVG | 303 | 212 | 5.73 | 91 | 2.64 | 0.09 |
| AVGSTD | 407 | 385 | 8.44 | 159 | 4.78 | 0.14 |
| AVG2STD | 510 | 558 | 11.14 | 227 | 6.92 | 0.20 |
| MIN | 198 | 27 | 0.71 | 18 | 0.30 | 0.02 |
| MAX | 1242 | 860 | 14.37 | 310 | 10.38 | 0.31 |
| ***40-II*** | | | | | | |
| AVG | 271 | 19 | 2.29 | 28 | 15.79 | 0.11 |
| AVGSTD | 293 | 26 | 3 | 52 | 21.61 | 0.15 |
| AVG2STD | 316 | 32 | 3.71 | 76 | 27.43 | 0.19 |
| MIN | 246 | 8 | 1.47 | 10 | 8.00 | 0.03 |
| MAX | 351 | 35 | 4.13 | 117 | 35.14 | 0.18 |
| Apr-22 | 250 | 5.7 | 1.7 | 9.5 | 43.86 | 0.18 |
| ***41-I*** | | | | | | |
| AVG | 186 | 5741 | 73.64 | 2144 | 0.06 | 0.04 |
| AVGSTD | 222 | 9222 | 115.76 | 3089 | 0.13 | 0.05 |
| AVG2STD | 258 | 12703 | 157.87 | 4034 | 0.20 | 0.07 |
| MIN | 105 | 778 | 40.3 | 1301 | 0.01 | 0.02 |
| MAX | 218 | 13300 | 150 | 4320 | 0.26 | 0.06 |
| Apr-22 | 218 | 3640 | 50.1 | 1440 | 0.06 | 0.03 |

| | *Alkalinity* | *Chloride* | *Potassium* | *Sodium* | *Alk/Cl* | *K/Na* |
|---|---|---|---|---|---|---|
| | *mg/L* | *mg/L* | *mg/L* | *mg/L* | *mg/L* | *mg/L* |
| ***19B*** | | | | | | |
| AVG | 1096 | 373 | 62.63 | 219 | 9.75 | 0.34 |
| AVGSTD | 1536 | 677 | 116.44 | 417 | 29.40 | 0.58 |
| AVG2STD | 1977 | 981 | 170.25 | 616 | 49.05 | 0.81 |
| MIN | 279 | 6 | 1.5 | 6 | 0.36 | 0.01 |
| MAX | 2377 | 1128 | 264 | 996 | 132.20 | 1.47 |
| Apr-22 | 633 | 701 | 11.4 | 330 | 0.90 | 0.03 |
| Sep-22 | 604 | 1080 | 11 | 405 | 0.56 | 0.03 |
| ***33-II*** | | | | | | |
| AVG | 272 | 105 | 1.71 | 31 | 13.65 | 0.10 |
| AVGSTD | 301 | 173 | 3.17 | 50 | 36.89 | 0.26 |
| AVG2STD | 329 | 241 | 4.63 | 70 | 60.13 | 0.42 |
| MIN | 143 | 3 | 0.28 | 6 | 1.45 | 0.02 |
| MAX | 310 | 200 | 10.56 | 71 | 84.88 | 1.00 |
| Apr-22 | 295 | 47.9 | 1.4 | 56.6 | 6.16 | 0.02 |
| ***33-III*** | | | | | | |
| AVG | 296 | 98 | 1.47 | 29 | 5.18 | 0.07 |
| AVGSTD | 349 | 149 | 1.97 | 44 | 10.13 | 0.12 |
| AVG2STD | 402 | 200 | 2.48 | 59 | 15.08 | 0.16 |
| MIN | 155 | 9 | 0.8 | 9 | 1.51 | 0.02 |
| MAX | 398 | 190 | 3.07 | 66 | 22.71 | 0.23 |
| Apr-22 | 317 | 41.3 | 1 | 49 | 7.68 | 0.02 |

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**Table H.2**
**2022 Groundwater Performance Monitoring Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| | *Alkalinity* | *Chloride* | *Potassium* | *Sodium* | *Alk/Cl* | *K/Na* |
|---|---|---|---|---|---|---|
| | *mg/L* | *mg/L* | *mg/L* | *mg/L* | *mg/L* | *mg/L* |
| ***41-II*** | | | | | | |
| AVG | 254 | 5 | 1.66 | 5 | 79.05 | 0.37 |
| AVGSTD | 264 | 13 | 1.89 | 8 | 105.84 | 0.47 |
| AVG2STD | 273 | 21 | 2.12 | 11 | 132.64 | 0.57 |
| MIN | 238 | 2 | 1.11 | 3 | 6.64 | 0.07 |
| MAX | 273 | 36 | 2.13 | 17 | 119.05 | 0.49 |
| Apr-22 | 255 | 7.2 | 1.8 | 7.3 | 35.42 | 0.25 |
| ***46-II*** | | | | | | |
| AVG | 274 | 25 | 2.31 | 8 | 18.50 | 0.30 |
| AVGSTD | 330 | 36 | 3.23 | 10 | 37.25 | 0.44 |
| AVG2STD | 387 | 48 | 4.15 | 13 | 55.99 | 0.58 |
| MIN | 220 | 5 | 1 | 3 | 5.40 | 0.10 |
| MAX | 494 | 45 | 4.68 | 11 | 77.20 | 0.66 |
| Mar-22 | 284 | 17.7 | 2.8 | 7.9 | 16.05 | 0.35 |
| ***46-III*** | | | | | | |
| AVG | 314 | 11 | 0.85 | 8 | 83.52 | 0.13 |
| AVGSTD | 356 | 28 | 1.34 | 15 | 158.19 | 0.19 |
| AVG2STD | 397 | 44 | 1.84 | 23 | 232.86 | 0.26 |
| MIN | 170 | 1 | 0.28 | 3 | 3.40 | 0.03 |
| MAX | 384 | 110 | 2.65 | 61 | 309.00 | 0.34 |
| Mar-22 | 286 | 13.8 | <0.5 | 6.2 | 20.72 | 0.08 |

| | *Alkalinity* | *Chloride* | *Potassium* | *Sodium* | *Alk/Cl* | *K/Na* |
|---|---|---|---|---|---|---|
| | *mg/L* | *mg/L* | *mg/L* | *mg/L* | *mg/L* | *mg/L* |
| ***44-I*** | | | | | | |
| AVG | 143 | 18866 | 144.15 | 5665 | 0.01 | 0.04 |
| AVGSTD | 176 | 27352 | 218.84 | 7114 | 0.01 | 0.16 |
| AVG2STD | 209 | 35838 | | 8562 | 0.02 | 0.27 |
| MIN | 52 | 8470 | 65.2 | 656 | 0.00 | 0.02 |
| MAX | 196 | 60509 | 432.43 | 8182 | 0.02 | 0.66 |
| Apr-22 | 165 | 16600 | 105 | 5440 | 0.01 | 0.02 |
| ***44-II*** | | | | | | |
| AVG | 209 | 26 | 2.61 | 16 | 18.01 | 0.26 |
| AVGSTD | 221 | 68 | 3.67 | 32 | 29.84 | 0.61 |
| AVG2STD | 232 | 111 | 4.73 | 48 | 41.67 | 0.97 |
| MIN | 180 | 4 | 1.07 | 1 | 0.99 | 0.03 |
| MAX | 241 | 207 | 6.25 | 80 | 46.14 | 2.29 |
| Apr-22 | 184 | 40.1 | 4.3 | 29.5 | 4.59 | 0.15 |
| ***44-III*** | | | | | | |
| AVG | 220 | 8 | 2.03 | 10 | 31.25 | 0.25 |
| AVGSTD | 240 | 12 | 2.58 | 18 | 42.75 | 0.34 |
| AVG2STD | 259 | 15 | 3.13 | 26 | 54.25 | 0.43 |
| MIN | 170 | 4 | 0.54 | 4 | 10.56 | 0.05 |
| MAX | 260 | 20 | 3.14 | 56 | 64.47 | 0.47 |
| Apr-22 | 228 | 11.3 | 2.2 | 11.6 | 20.18 | 0.19 |

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**Table H.2**
**2022 Groundwater Performance Monitoring Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| | Alkalinity | Chloride | Potassium | Sodium | Alk/Cl | K/Na |
|---|---|---|---|---|---|---|
| | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| ***48*** | | | | | | |
| AVG | 601 | 1224 | 1.99 | 58 | 20.92 | 0.08 |
| AVGSTD | 804 | 9198 | 3.13 | 117 | 44.29 | 0.25 |
| AVG2STD | 1008 | 17172 | 4.27 | 177 | 67.67 | 0.41 |
| MIN | 70 | 3 | 0.38 | 4 | 0.00 | 0.00 |
| MAX | 973 | 55900 | 7.03 | 408 | 126.92 | 1.12 |
| Mar-22 | 774 | 68.8 | 1.9 | 20.2 | 11.25 | 0.09 |
| ***50-I*** | | | | | | |
| AVG | 227 | 28 | 5.72 | 48 | 15.60 | 0.13 |
| AVGSTD | 262 | 51 | 7.49 | 63 | 29.68 | 0.18 |
| AVG2STD | 298 | 75 | 9.27 | 77 | 43.75 | 0.23 |
| MIN | 202 | 5 | 2.22 | 25 | 2.04 | 0.05 |
| MAX | 427 | 106 | 9.81 | 98 | 65.56 | 0.26 |
| Apr-22 | 227 | 71.1 | 4.4 | 44.7 | 3.19 | 0.10 |
| ***50-II*** | | | | | | |
| AVG | 268 | 147 | 3.28 | 29 | 2.07 | 0.21 |
| AVGSTD | 318 | 202 | 4.62 | 53 | 2.93 | 0.37 |
| AVG2STD | 368 | 257 | 5.96 | 77 | 3.79 | 0.54 |
| MIN | 188 | 54 | 1.11 | 7 | 0.81 | 0.04 |
| MAX | 437 | 260 | 7.89 | 88 | 5.45 | 0.79 |
| Apr-22 | 266 | 240 | 3.4 | 94.9 | 1.11 | 0.04 |

| | Alkalinity | Chloride | Potassium | Sodium | Alk/Cl | K/Na |
|---|---|---|---|---|---|---|
| | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| ***50-III*** | | | | | | |
| AVG | 262 | 78 | 1.4 | 26 | 4.17 | 0.06 |
| AVGSTD | 339 | 141 | 2.08 | 49 | 5.76 | 0.10 |
| AVG2STD | 416 | 204 | 2.77 | 72 | 7.36 | 0.13 |
| MIN | 183 | 28 | 0.3 | 8 | 0.93 | 0.01 |
| MAX | 786 | 455 | 4.44 | 179 | 8.71 | 0.19 |
| Apr-22 | 232 | 67.5 | 2.1 | 35.3 | 3.44 | 0.06 |
| ***52-I*** | | | | | | |
| AVG | 261 | 1976 | 23.82 | 694 | 0.15 | 0.04 |
| AVGSTD | 309 | 2690 | 33.37 | 911 | 0.23 | 0.05 |
| AVG2STD | 357 | 3404 | 42.92 | 1128 | 0.30 | 0.06 |
| MIN | 172 | 480 | 11.15 | 257 | 0.06 | 0.02 |
| MAX | 506 | 3900 | 50.5 | 1179 | 0.48 | 0.07 |
| Apr-22 | 253 | 2710 | 24.4 | 644 | 0.09 | 0.04 |
| ***52-II*** | | | | | | |
| AVG | 344 | 160 | 2.26 | 29 | 2.39 | 0.09 |
| AVGSTD | 427 | 209 | 3.52 | 39 | 3.59 | 0.15 |
| AVG2STD | 511 | 257 | 4.77 | 50 | 4.79 | 0.22 |
| MIN | 211 | 72 | 0.99 | 16 | 1.05 | 0.03 |
| MAX | 666 | 300 | 7.14 | 84 | 7.55 | 0.43 |

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**2022 Groundwater Performance Monitoring Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| | *Alkalinity* | *Chloride* | *Potassium* | *Sodium* | *Alk/Cl* | *K/Na* |
|---|---|---|---|---|---|---|
| | *mg/L* | *mg/L* | *mg/L* | *mg/L* | *mg/L* | *mg/L* |
| ***54-II*** | | | | | | |
| AVG | 283 | 7 | 1.55 | 5 | 50.25 | 0.31 |
| AVGSTD | 361 | 10 | 2.78 | 6 | 70.74 | 0.57 |
| AVG2STD | 439 | 13 | 4.02 | 7 | 91.22 | 0.82 |
| MIN | 136 | 3 | 0.45 | 3 | 14.19 | 0.08 |
| MAX | 579 | 17 | 6.63 | 8 | 93.42 | 1.46 |
| Mar-22 | 311 | 10.2 | <0.5 | 12.1 | 30.49 | 0.04 |
| ***61-I*** | | | | | | |
| AVG | 179 | 31 | 4.85 | 59 | 7.44 | 0.08 |
| AVGSTD | 188 | 47 | 6.16 | 72 | 11.13 | 0.11 |
| AVG2STD | 197 | 63 | 7.47 | 85 | 14.82 | 0.13 |
| MIN | 166 | 12 | 3.05 | 36 | 2.66 | 0.06 |
| MAX | 197 | 65 | 9.44 | 77 | 14.58 | 0.16 |
| Mar-22 | 168 | 15.5 | 4.4 | 48.8 | 10.84 | 0.09 |
| ***61-II*** | | | | | | |
| AVG | 192 | 19 | 2.99 | 35 | 10.67 | 0.09 |
| AVGSTD | 209 | 25 | 4.1 | 42 | 14.31 | 0.13 |
| AVG2STD | 227 | 31 | 5.21 | 48 | 17.95 | 0.16 |
| MIN | 157 | 6 | 1.56 | 20 | 3.60 | 0.05 |
| MAX | 236 | 45 | 7.78 | 51 | 31.19 | 0.20 |
| Mar-22 | 181 | 42.1 | 2.4 | 51.7 | 4.30 | 0.05 |

| | *Alkalinity* | *Chloride* | *Potassium* | *Sodium* | *Alk/Cl* | *K/Na* |
|---|---|---|---|---|---|---|
| | *mg/L* | *mg/L* | *mg/L* | *mg/L* | *mg/L* | *mg/L* |
| ***53-I*** | | | | | | |
| AVG | 238 | 11 | 1.83 | 6 | 27.39 | 0.31 |
| AVGSTD | 280 | 17 | 2.29 | 7 | 39.87 | 0.40 |
| AVG2STD | 323 | 22 | 2.75 | 9 | 52.35 | 0.48 |
| MIN | 207 | 4 | 1.05 | 3 | 10.65 | 0.11 |
| MAX | 460 | 21 | 3.2 | 9 | 52.93 | 0.52 |
| Mar-22 | 348 | 1.1 | 1.9 | 5.5 | 316.36 | 0.35 |
| ***62-I*** | | | | | | |
| AVG | 292 | 1860 | 26.67 | 839 | 0.84 | 0.03 |
| AVGSTD | 338 | 2673 | 38.77 | 1189 | 2.95 | 0.04 |
| AVG2STD | 385 | 3487 | 50.88 | 1539 | 5.07 | 0.05 |
| MIN | 214 | 45 | 0.83 | 25 | 0.10 | 0.02 |
| MAX | 422 | 3200 | 50.1 | 1333 | 7.96 | 0.06 |
| Mar-22 | 238 | 2570 | 31.9 | 948 | 0.09 | 0.03 |
| ***62-II*** | | | | | | |
| AVG | 387 | 44 | 2.11 | 31 | 19.13 | 0.08 |
| AVGSTD | 451 | 100 | 3.6 | 60 | 32.53 | 0.11 |
| AVG2STD | 514 | 156 | 5.09 | 89 | 45.93 | 0.15 |
| MIN | 272 | 6 | 0.58 | 8 | 1.21 | 0.02 |
| MAX | 577 | 341 | 7.14 | 143 | 72.68 | 0.18 |
| Mar-22 | 425 | 28.2 | 0.5 | 21.2 | 15.07 | 0.02 |

Historical Averages and Standard Deviation
levels are based on values provided in the
2007 Annual Monitoring Report prepared by
Conestoga-Rovers Associates,
dated May 2008

**Table H.2**
**2022 Groundwater Performance Monitoring Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| | Alkalinity | Chloride | Potassium | Sodium | Alk/Cl | K/Na |
|---|---|---|---|---|---|---|
| | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| **61-III** | | | | | | |
| AVG | 315 | 63 | 1.72 | 22 | 7.79 | 0.08 |
| AVGSTD | 359 | 94 | 2.64 | 30 | 14.89 | 0.13 |
| AVG2STD | 402 | 126 | 3.55 | 37 | 21.99 | 0.19 |
| MIN | 218 | 12 | 0.53 | 12 | 1.79 | 0.03 |
| MAX | 436 | 125 | 6.67 | 47 | 31.00 | 0.36 |
| Mar-22 | 278 | 99.6 | 1.7 | 23 | 2.79 | 0.07 |
| **66-I** | | | | | | |
| AVG | 360 | 79 | 6.96 | 112 | 4.71 | 0.06 |
| AVGSTD | 507 | 110 | 10.08 | 137 | 5.82 | 0.09 |
| AVG2STD | 654 | 140 | 13.21 | 161 | 6.93 | 0.11 |
| MIN | 167 | 29 | 1.89 | 48 | 2.14 | 0.04 |
| MAX | 853 | 190 | 16.2 | 170 | 7.79 | 0.13 |
| Mar-22 | 601 | 93 | 5.7 | 118 | 6.46 | 0.05 |
| **66-II** | | | | | | |
| AVG | 656 | 139 | 10.67 | 110 | 16.78 | 0.11 |
| AVGSTD | 1111 | 262 | 20.71 | 195 | 35.62 | 0.18 |
| AVG2STD | 1566 | 384 | 30.75 | 281 | 54.46 | 0.25 |
| MIN | 223 | 3 | 1.29 | 14 | 2.47 | 0.01 |
| MAX | 2000 | 300 | 29.7 | 239 | 68.61 | 0.29 |
| Mar-22 | 1160 | 171 | 27.5 | 197 | 6.78 | 0.14 |

| | Alkalinity | Chloride | Potassium | Sodium | Alk/Cl | K/Na |
|---|---|---|---|---|---|---|
| | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| **64-I** | | | | | | |
| AVG | 238 | 162 | 8.88 | 87 | 5.92 | 0.11 |
| AVGSTD | 262 | 270 | 11.49 | 115 | 25.79 | 0.15 |
| AVG2STD | 286 | 378 | 14.11 | 143 | 45.66 | 0.18 |
| MIN | 179 | 2 | 1.28 | 6 | 0.42 | 0.08 |
| MAX | 264 | 454 | 13.89 | 156 | 103.18 | 0.22 |
| Apr-22 | 247 | 75.6 | 7.7 | 64.1 | 3.27 | 0.12 |
| **64-II** | | | | | | |
| AVG | 286 | 4 | 1.01 | 5 | 107.69 | 0.21 |
| AVGSTD | 325 | 9 | 1.9 | 9 | 150.35 | 0.35 |
| AVG2STD | 365 | 14 | 2.8 | 14 | 193.01 | 0.49 |
| MIN | 197 | 2 | 0.15 | 1 | 10.06 | 0.05 |
| MAX | 414 | 33 | 5.56 | 22 | 203.33 | 0.74 |
| Apr-22 | 313 | 2.8 | <0.5 | 2.6 | 111.79 | 0.19 |
| **74-II** | | | | | | |
| AVG | 97 | 21 | 2.07 | 76 | 5.13 | 0.03 |
| AVGSTD | 129 | 24 | 3.06 | 91 | 7.89 | 0.05 |
| AVG2STD | 160 | 28 | 4.05 | 106 | 10.64 | 0.07 |
| MIN | 70 | 13 | 1 | 28 | 2.67 | 0.01 |
| MAX | 171 | 28 | 5 | 94 | 13.08 | 0.12 |
| Mar-22 | 165 | 19.1 | 2 | 36.9 | 8.64 | 0.05 |

Historical Averages and Standard Deviation
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dated May 2008

**Table H.2**
**2022 Groundwater Performance Monitoring Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| | *Alkalinity* | *Chloride* | *Potassium* | *Sodium* | *Alk/Cl* | *K/Na* |
|---|---|---|---|---|---|---|
| | *mg/L* | *mg/L* | *mg/L* | *mg/L* | *mg/L* | *mg/L* |
| ***66-III*** | | | | | | |
| AVG | 849 | 333 | 16.46 | 170 | 3.83 | 0.10 |
| AVGSTD | 1083 | 609 | 38.27 | 232 | 6.34 | 0.23 |
| AVG2STD | 1317 | 886 | 60.09 | 294 | 8.86 | 0.36 |
| MIN | 230 | 46 | 1.1 | 48 | 0.12 | 0.01 |
| MAX | 1430 | 1961 | 94.1 | 431 | 11.05 | 0.58 |
| Mar-22 | 796 | 54.7 | 23.4 | 92.9 | 14.55 | 0.25 |
| Sep-22 | 1290 | 469 | 38.9 | 183 | 2.75 | 0.21 |
| ***74-III*** | | | | | | |
| AVG | 243 | 35 | 1.48 | 9 | 8.57 | 0.17 |
| AVGSTD | 275 | 47 | 1.96 | 11 | 13.39 | 0.22 |
| AVG2STD | 307 | 59 | 2.44 | 12 | 18.21 | 0.27 |
| MIN | 181 | 12 | 0.61 | 5 | 4.24 | 0.08 |
| MAX | 299 | 53 | 2.38 | 12 | 21.97 | 0.26 |
| Mar-22 | 165 | 19.1 | 2 | 36.9 | 8.64 | 0.05 |
| ***77-I*** | | | | | | |
| AVG | 230 | 43 | 1.67 | 8 | 25.31 | 0.22 |
| AVGSTD | 244 | 69 | 2.04 | 9 | 71.56 | 0.28 |
| AVG2STD | 257 | 96 | 2.41 | 11 | 117.80 | 0.33 |
| MIN | 184 | 2 | 0.88 | 5 | 2.52 | 0.11 |
| MAX | 261 | 97 | 2.56 | 14 | 148.50 | 0.40 |
| Apr-22 | 225 | 98.6 | 1.6 | 23.1 | 2.28 | 0.07 |

| | *Alkalinity* | *Chloride* | *Potassium* | *Sodium* | *Alk/Cl* | *K/Na* |
|---|---|---|---|---|---|---|
| | *mg/L* | *mg/L* | *mg/L* | *mg/L* | *mg/L* | *mg/L* |
| ***81-II*** | | | | | | |
| AVG | 907 | 95 | 6.99 | 67 | 16.81 | 0.12 |
| AVGSTD | 989 | 157 | 8.65 | 86 | 31.20 | 0.18 |
| AVG2STD | 1072 | 218 | 10.3 | 105 | 45.59 | 0.23 |
| MIN | 682 | 13 | 4.3 | 28 | 3.28 | 0.05 |
| MAX | 1020 | 208 | 9.76 | 106 | 62.48 | 0.30 |
| Mar-22 | 806 | 26.8 | 4.8 | 54.1 | 30.07 | 0.09 |
| Sep-22 | 790 | 22.9 | 4.8 | 51 | 34.50 | 0.09 |
| ***81-III*** | | | | | | |
| AVG | 774 | 41 | 3.96 | 41 | 40.93 | 0.10 |
| AVGSTD | 839 | 78 | 5.73 | 60 | 76.02 | 0.13 |
| AVG2STD | 903 | 114 | 7.49 | 79 | 111.11 | 0.16 |
| MIN | 678 | 5 | 2.26 | 17 | 6.86 | 0.06 |
| MAX | 902 | 115 | 8.07 | 85 | 144.26 | 0.16 |
| Mar-22 | 563 | 8.3 | 1.2 | 5.6 | 67.83 | 0.21 |
| ***101-I*** | | | | | | |
| AVG | 130 | 13 | 3.61 | 56 | 18.16 | 0.07 |
| AVGSTD | 170 | 40 | 5.33 | 65 | 26.30 | 0.12 |
| AVG2STD | 210 | 66 | 7.05 | 74 | 34.45 | 0.17 |
| MIN | 80 | 3 | 1.69 | 30 | 2.30 | 0.03 |
| MAX | 299 | 130 | 6.93 | 70 | 35.63 | 0.21 |
| Mar-22 | 163 | 3.3 | 2.2 | 8 | 49.39 | 0.28 |

Historical Averages and Standard Deviation
levels are based on values provided in the
2007 Annual Monitoring Report prepared by
Conestoga-Rovers Associates,
dated May 2008

**Table H.2**
**2022 Groundwater Performance Monitoring Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| | Alkalinity | Chloride | Potassium | Sodium | Alk/Cl | K/Na |
|---|---|---|---|---|---|---|
| | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| ***81-I*** | | | | | | |
| AVG | 311 | 99 | 4.25 | 20 | 3.23 | 0.23 |
| AVGSTD | 367 | 120 | 5.13 | 25 | 3.96 | 0.31 |
| AVG2STD | 424 | 140 | 6 | 31 | 4.70 | 0.38 |
| MIN | 237 | 56 | 2.52 | 12 | 2.20 | 0.11 |
| MAX | 421 | 130 | 6.38 | 34 | 4.57 | 0.41 |
| Mar-22 | 510 | 108 | 6.8 | 39.7 | 4.72 | 0.17 |
| Sep-22 | 457 | 121 | 5.9 | 35.2 | 3.78 | 0.17 |

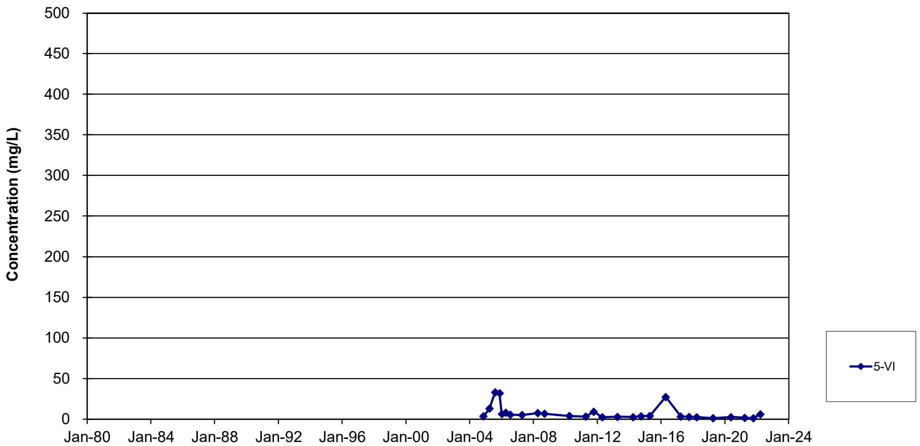
| | Alkalinity | Chloride | Potassium | Sodium | Alk/Cl | K/Na |
|---|---|---|---|---|---|---|
| | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| ***101-II*** | | | | | | |
| AVG | 119 | 5 | 4.18 | 42 | 32.56 | 0.11 |
| AVGSTD | 144 | 10 | 6.62 | 54 | 47.71 | 0.21 |
| AVG2STD | 168 | 15 | 9.07 | 67 | 62.86 | 0.30 |
| MIN | 76 | 2 | 2.31 | 25 | 4.08 | 0.06 |
| MAX | 177 | 21 | 11.8 | 74 | 57.10 | 0.46 |
| Mar-22 | 126 | 11.3 | 4.2 | 57.4 | 11.15 | 0.07 |
| ***101-III*** | | | | | | |
| AVG | 487 | 7 | 6.53 | 110 | 195.62 | 0.07 |
| AVGSTD | 539 | 19 | 12.27 | 167 | 307.44 | 0.15 |
| AVG2STD | 590 | 31 | 18 | 224 | 419.26 | 0.23 |
| MIN | 360 | 1 | 2.16 | 37 | 6.67 | 0.02 |
| MAX | 590 | 54 | 25.1 | 292 | 337.69 | 0.40 |
| Mar-22 | 450 | 7.2 | 1.6 | 40.1 | 62.50 | 0.04 |

Historical Averages and Standard Deviation
levels are based on values provided in the
2007 Annual Monitoring Report prepared by
Conestoga-Rovers Associates,
dated May 2008

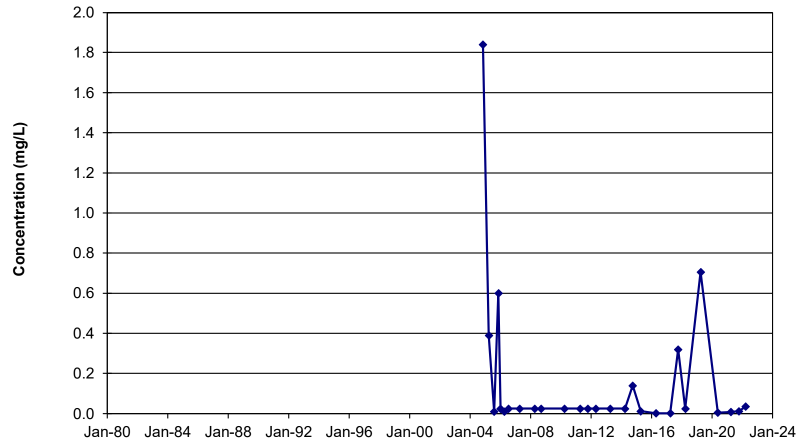
# Figure H.1

## Time Concentration Graphs - Groundwater: Overburden

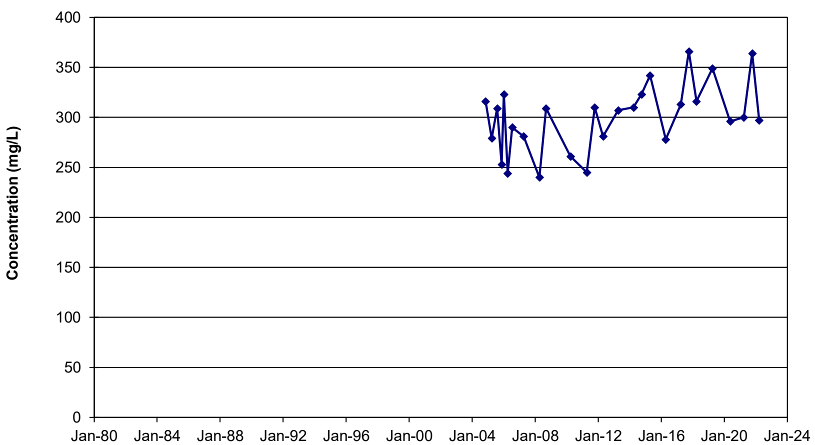
CHLORIDE



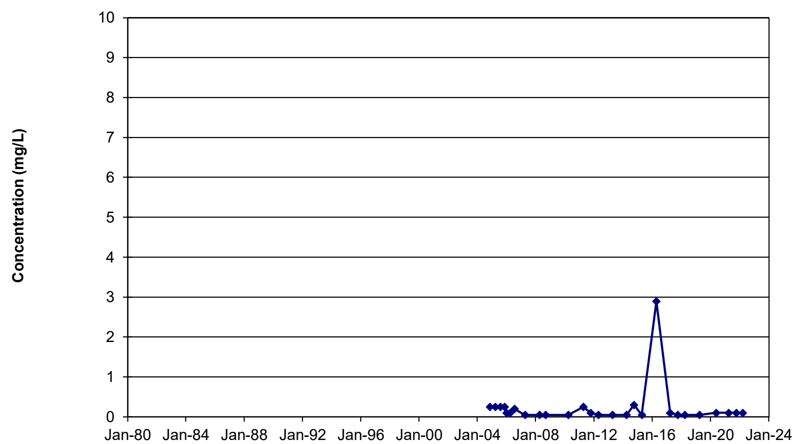

IRON




ALKALINITY

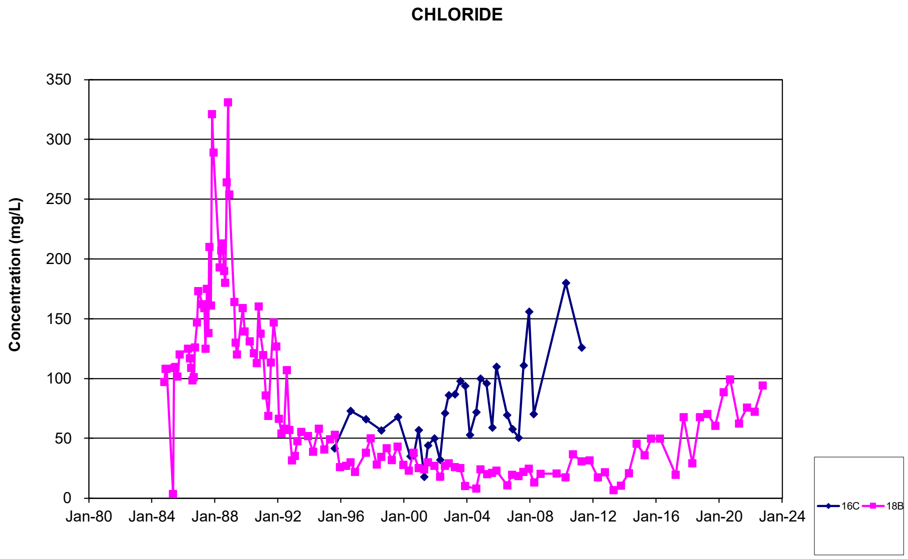


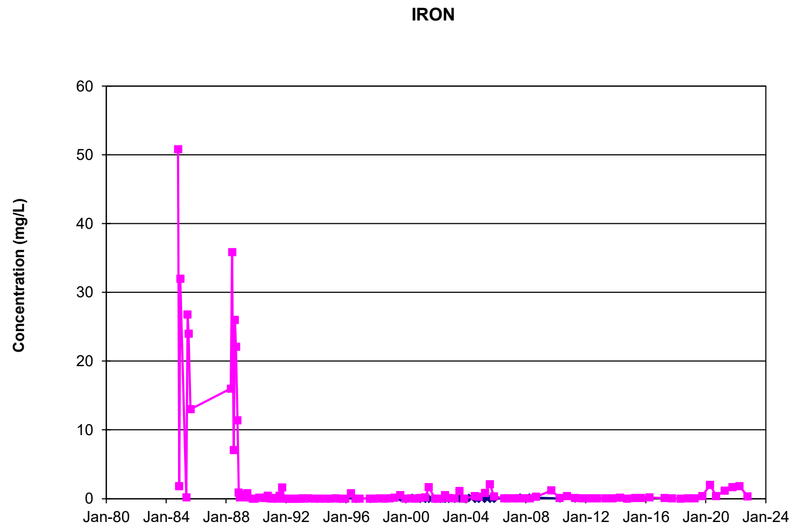

TOTAL KJELDAHL NITROGEN

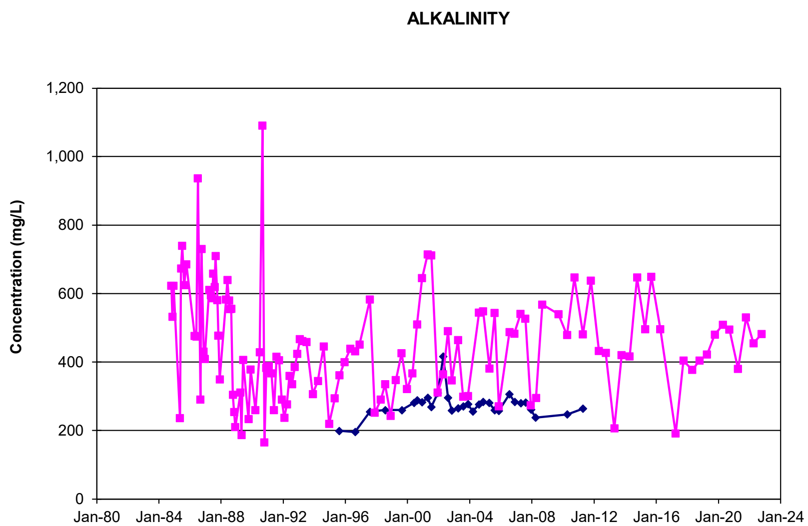


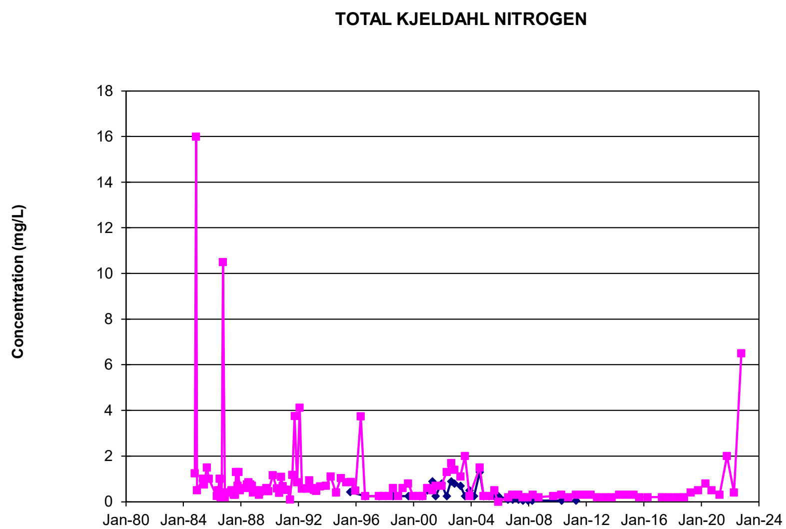
# Figure H.2

## Time Concentration Graphs - Groundwater: Overburden



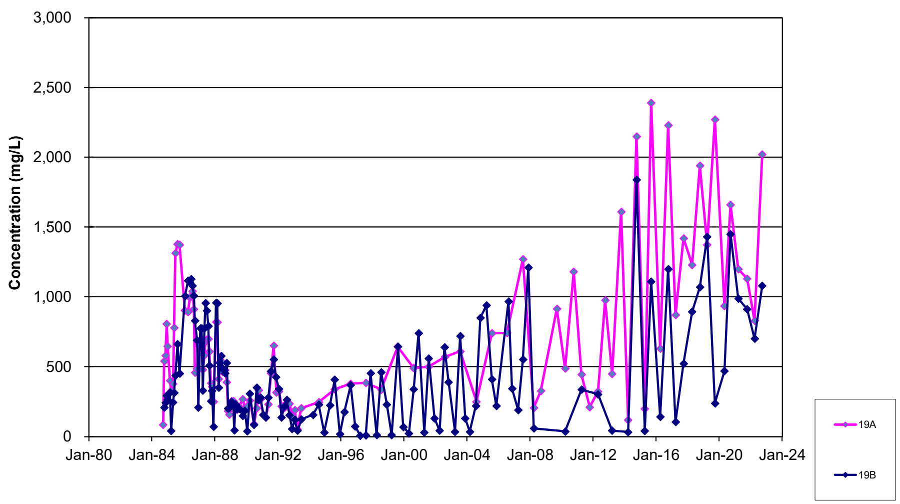



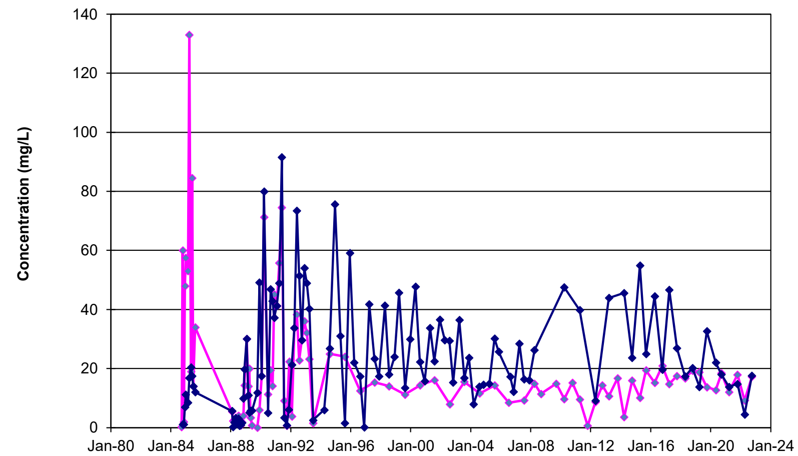
# Figure H.3

## Time Concentration Graphs - Groundwater: Overburden

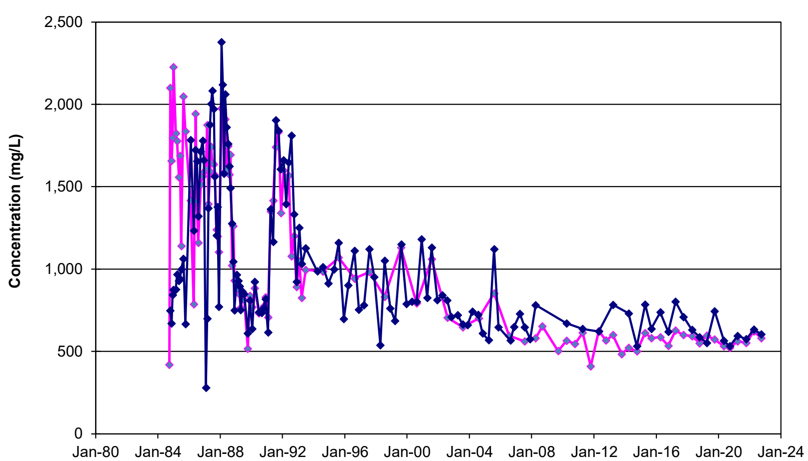
### CHLORIDE



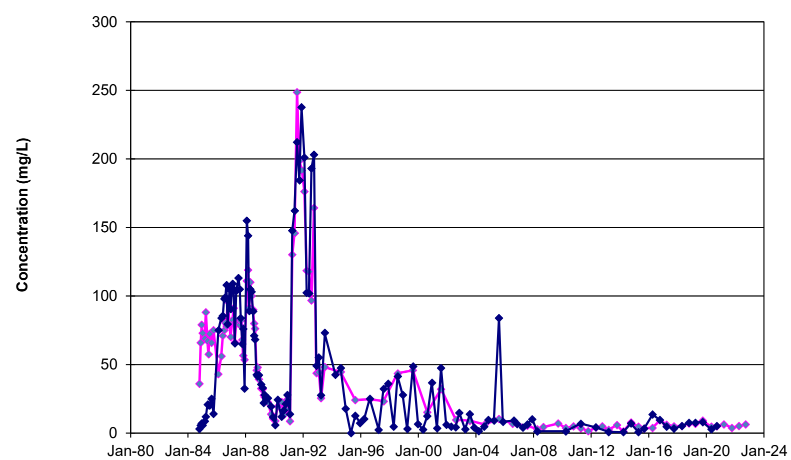

### IRON




### ALKALINITY

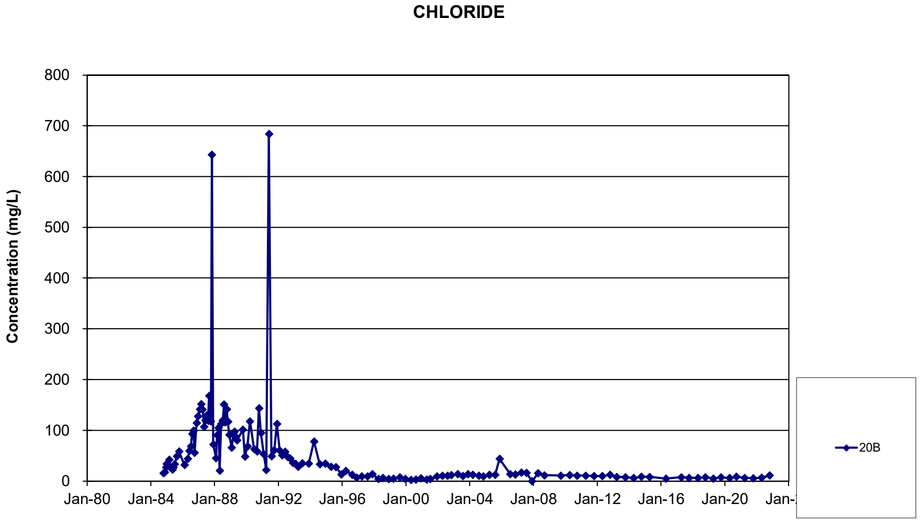


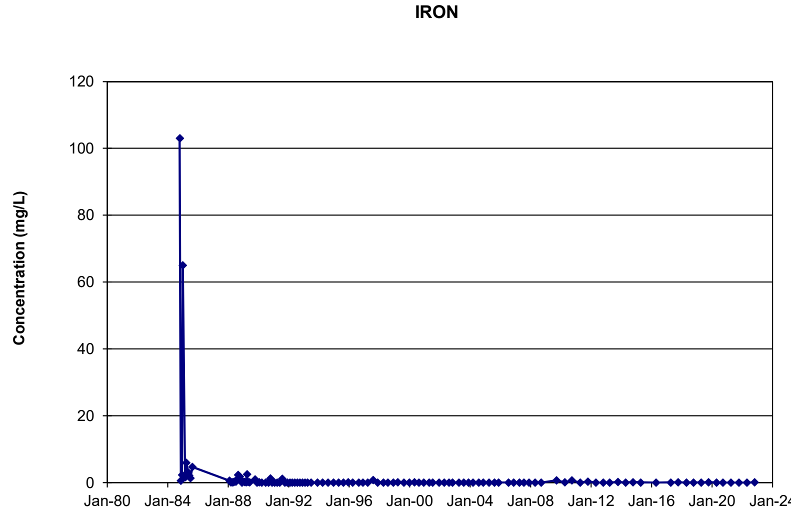

### TOTAL KJELDAHL NITROGEN

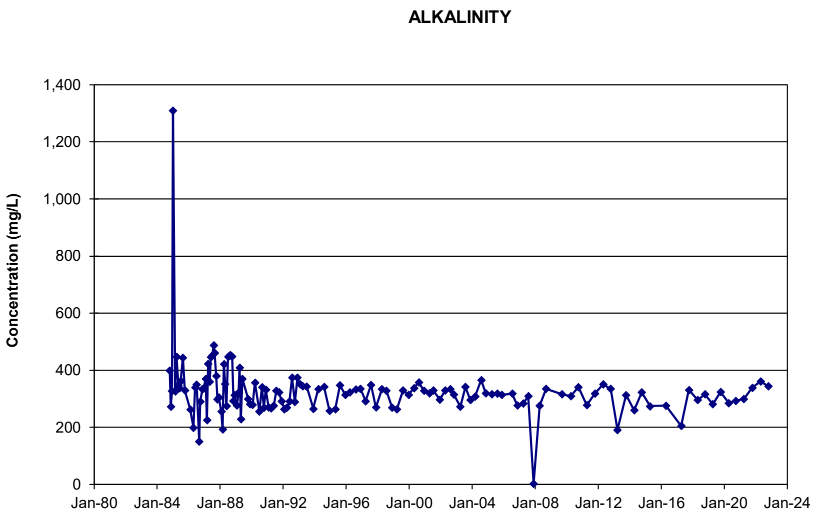


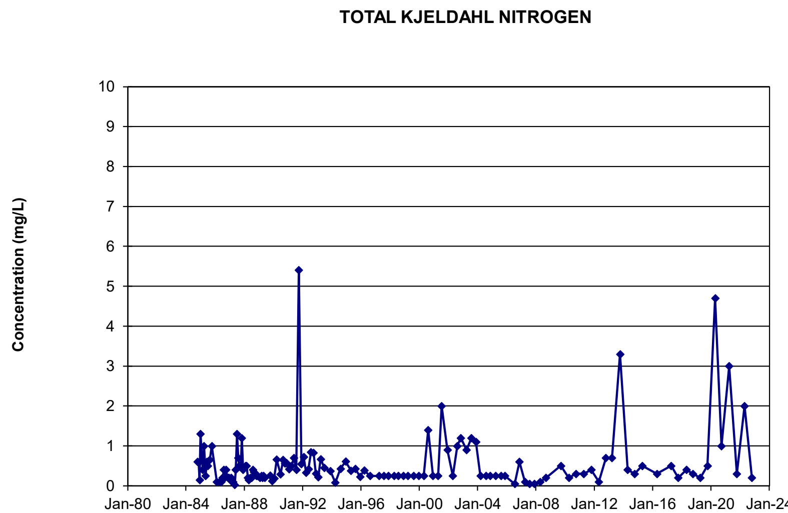
# Figure H.4

## Time Concentration Graphs - Groundwater: Overburden



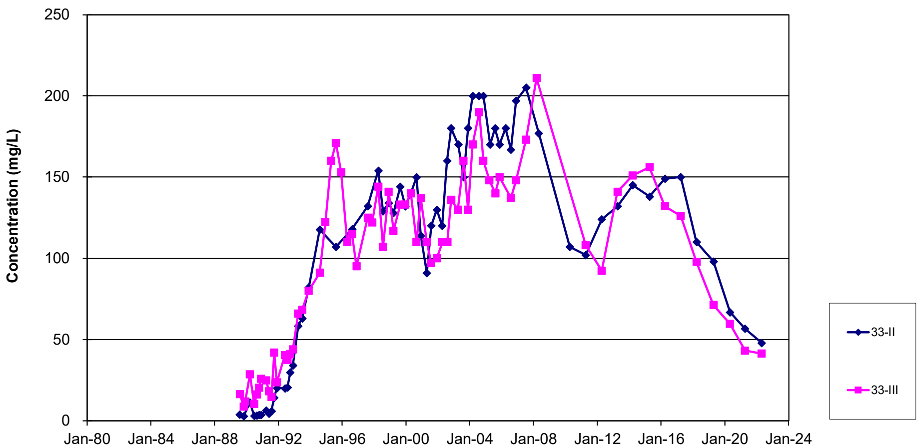



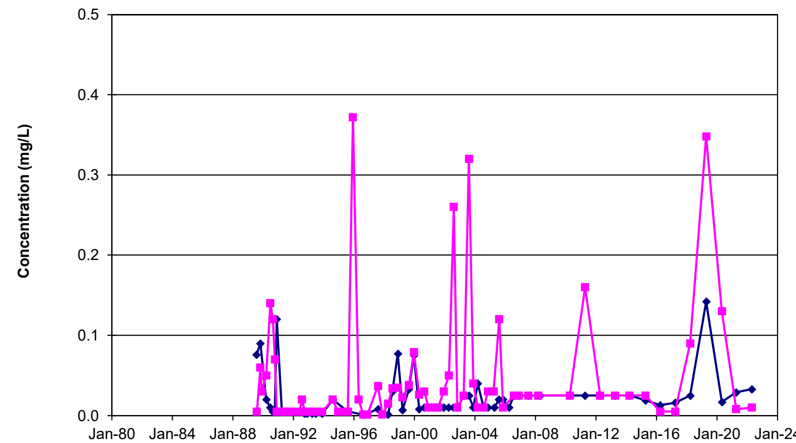
## Figure H.5

### Time Concentration Graphs - Groundwater: Overburden

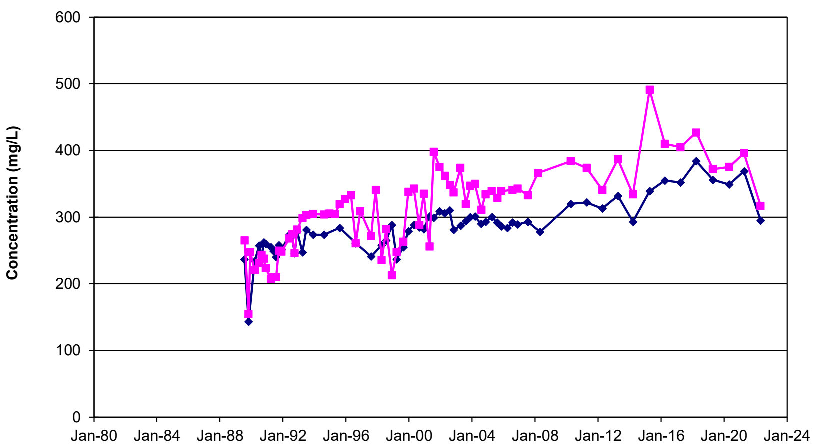
CHLORIDE



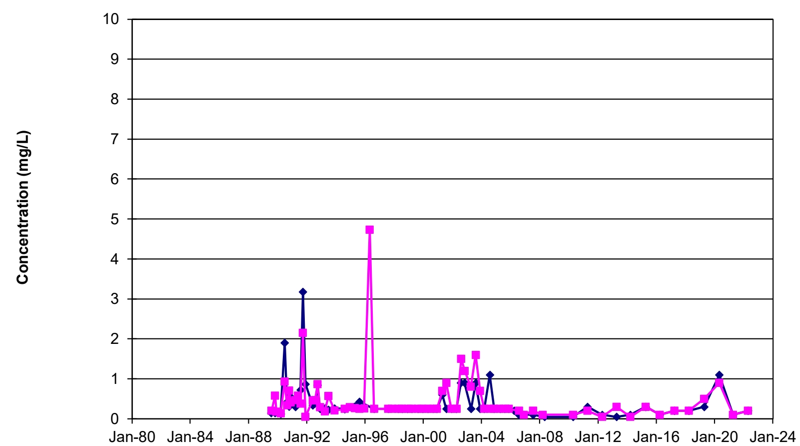

IRON




ALKALINITY



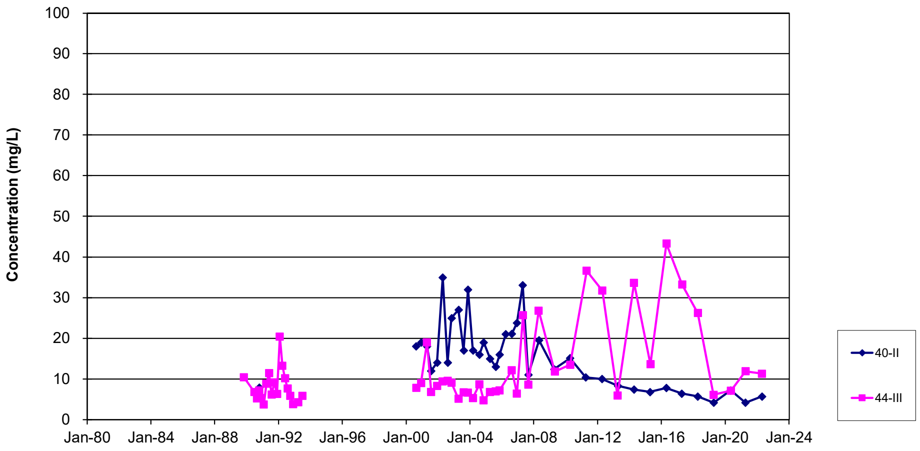

TOTAL KJELDAHL NITROGEN



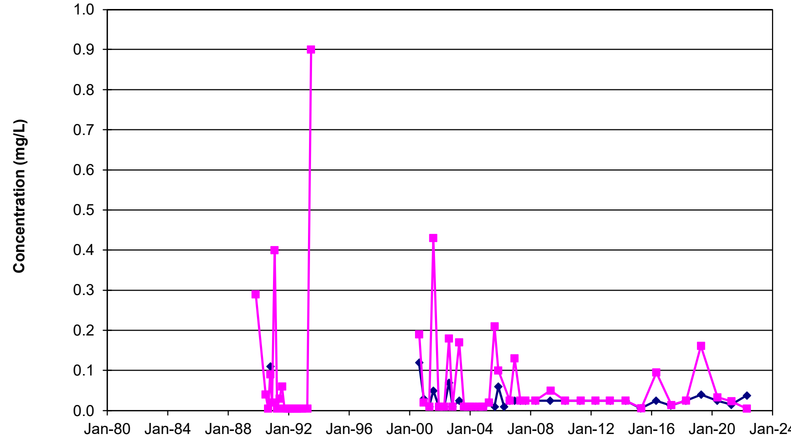
# Figure H.6

## Time Concentration Graphs - Groundwater: Overburden

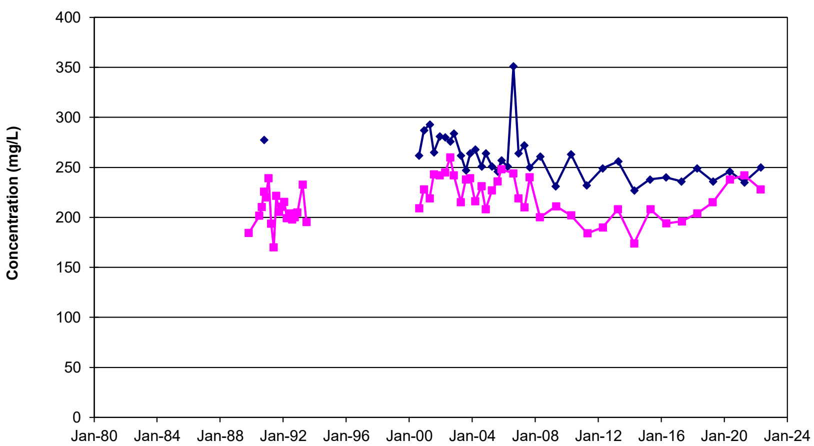
### CHLORIDE



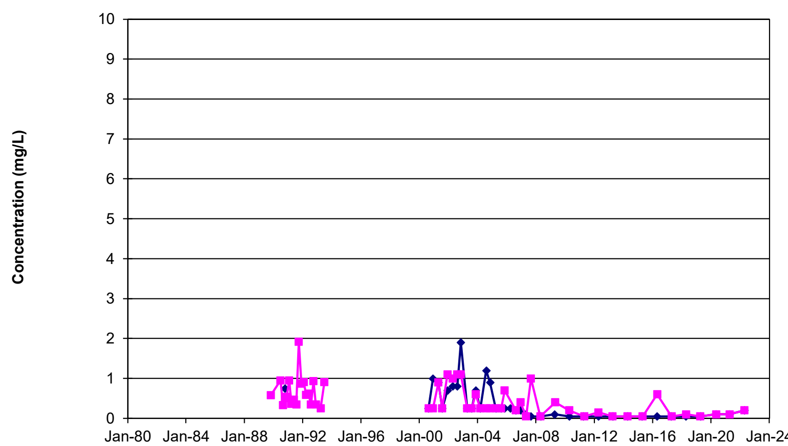

### IRON




### ALKALINITY

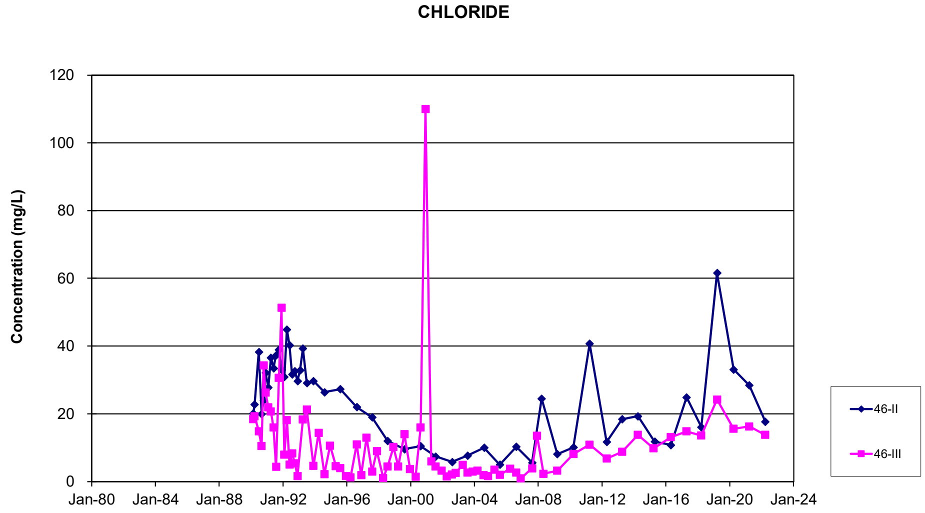


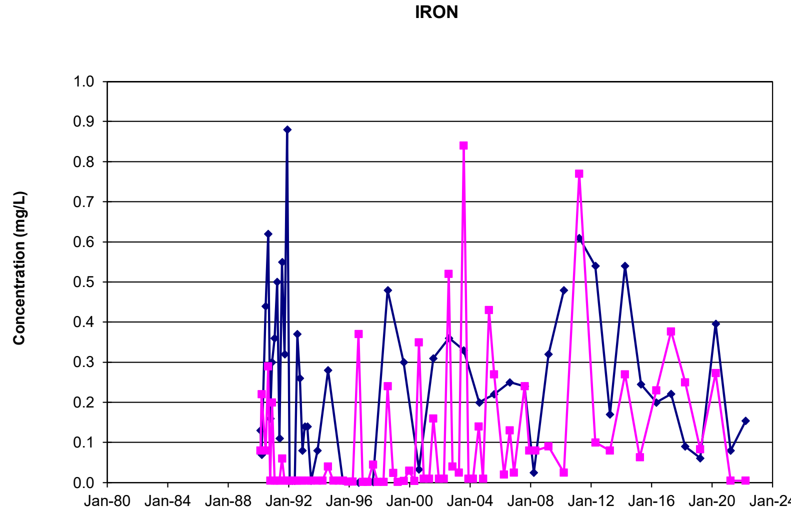

### TOTAL KJELDAHL NITROGEN

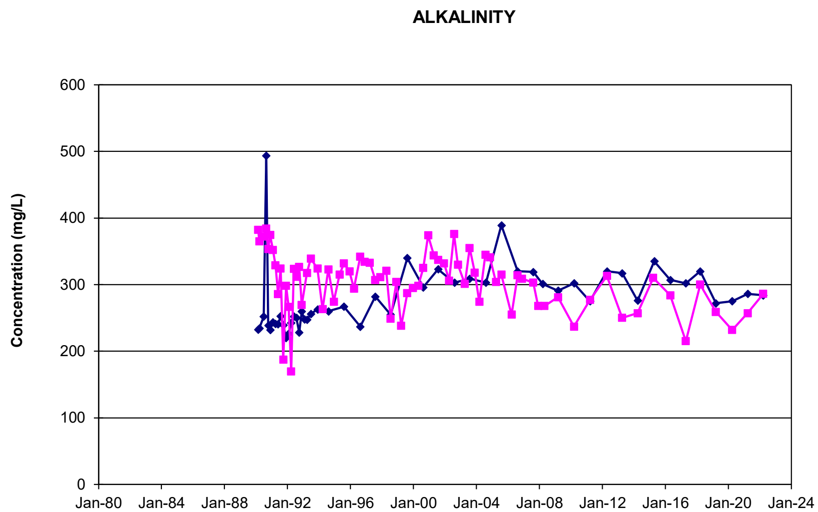


# Figure H.7

## Time Concentration Graphs - Groundwater: Overburden



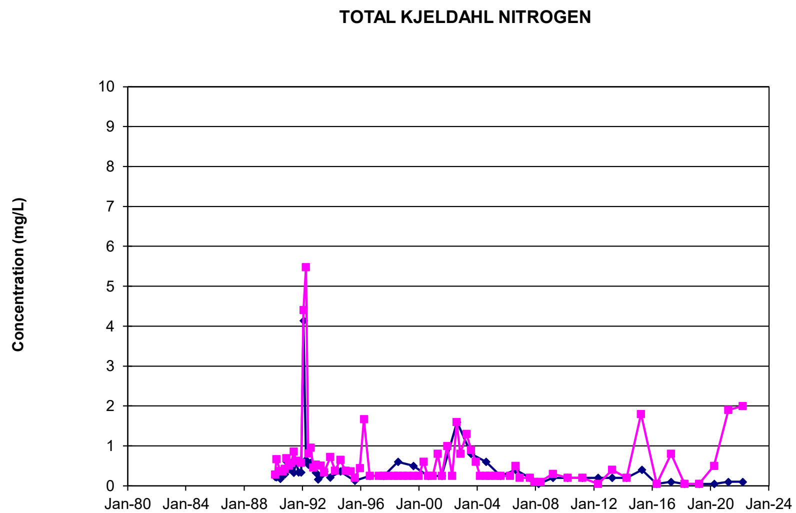
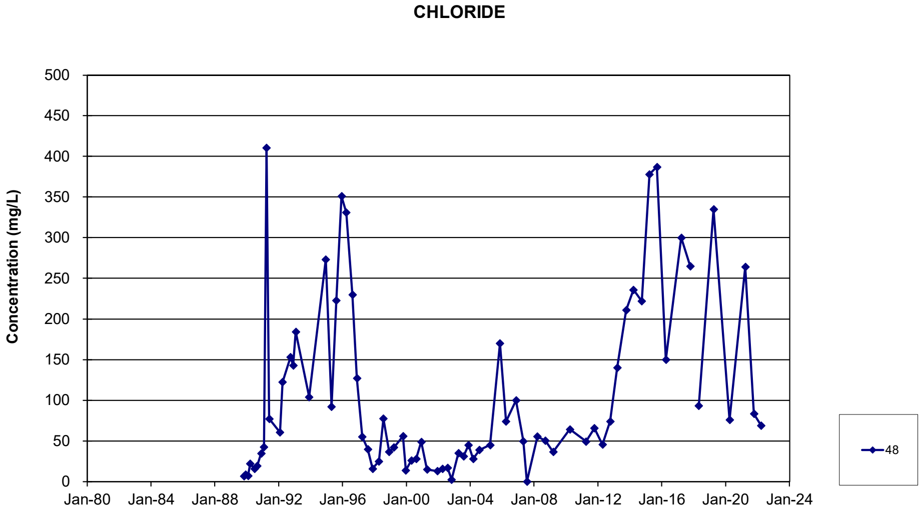
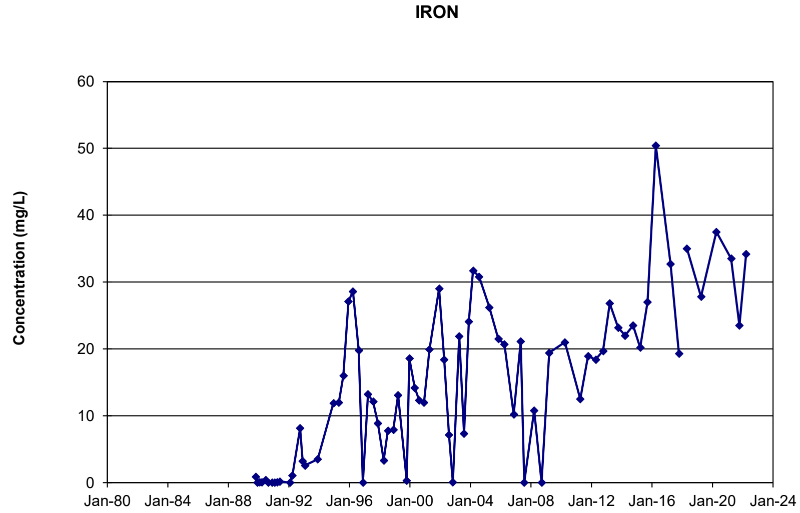
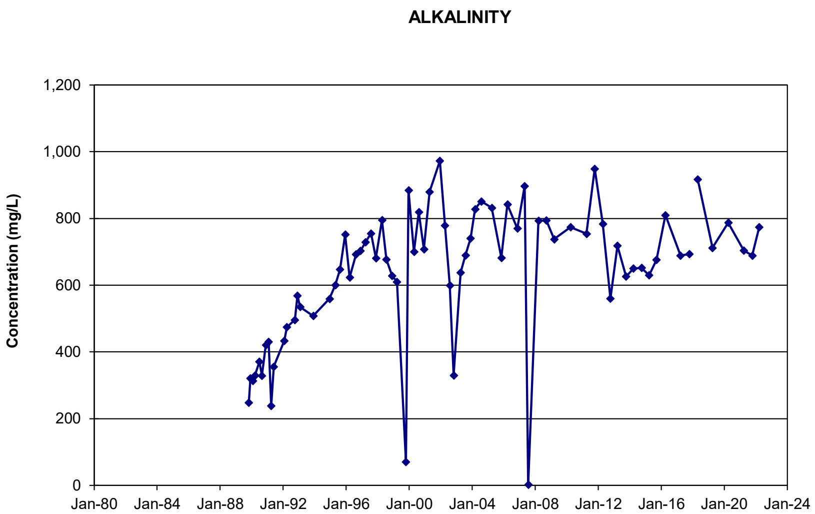



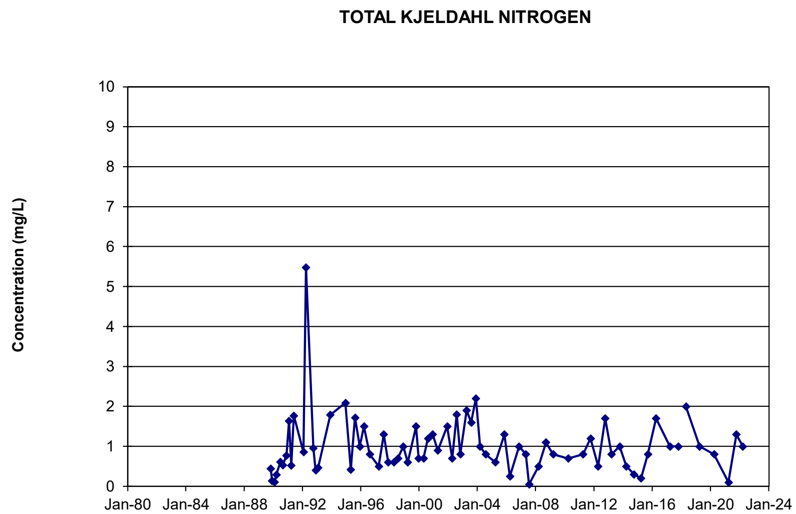
**Figure H.8**

**Time Concentration Graphs - Groundwater: Overburden**



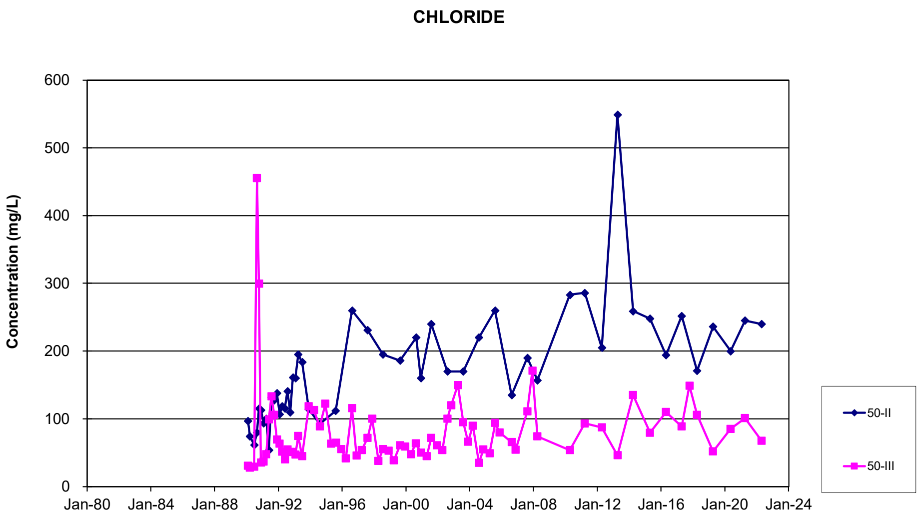



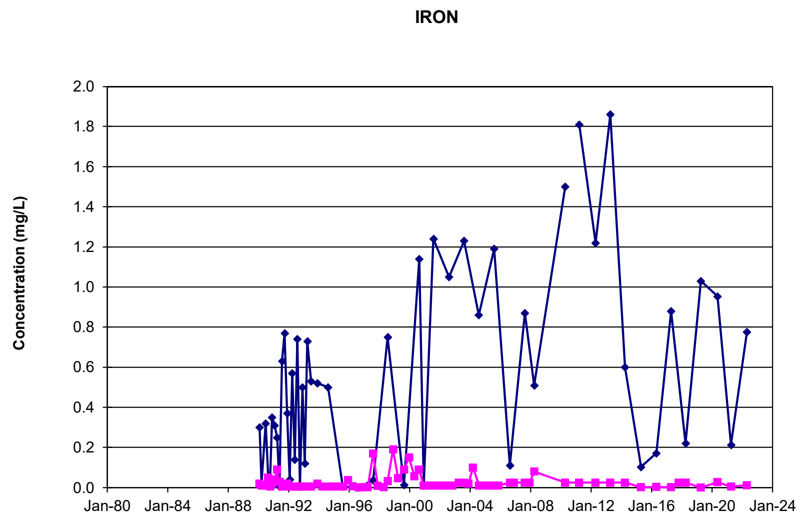



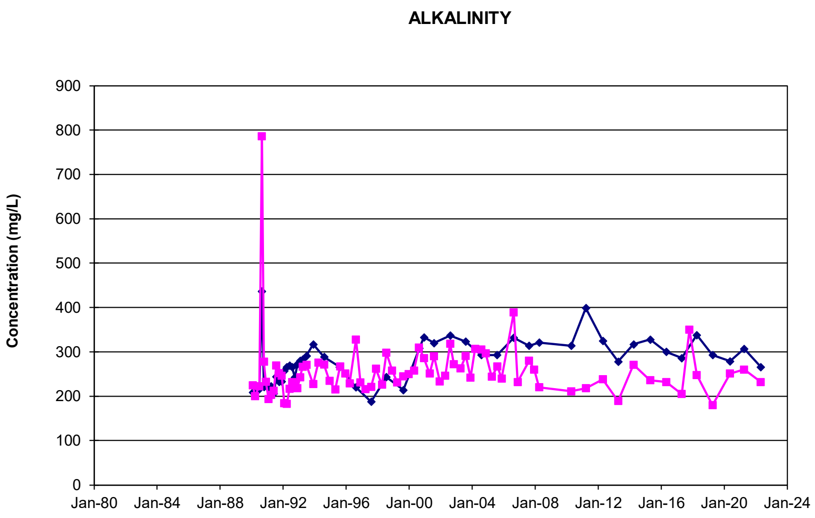



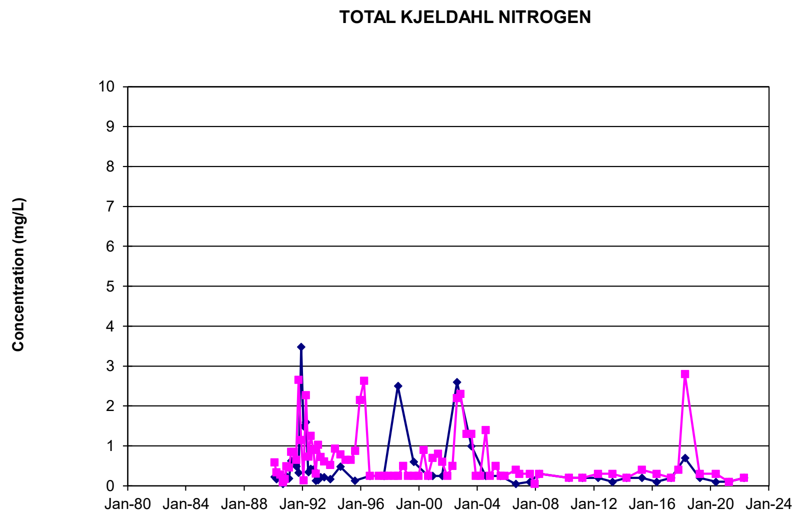
## Figure H.9

### Time Concentration Graphs - Groundwater: Overburden



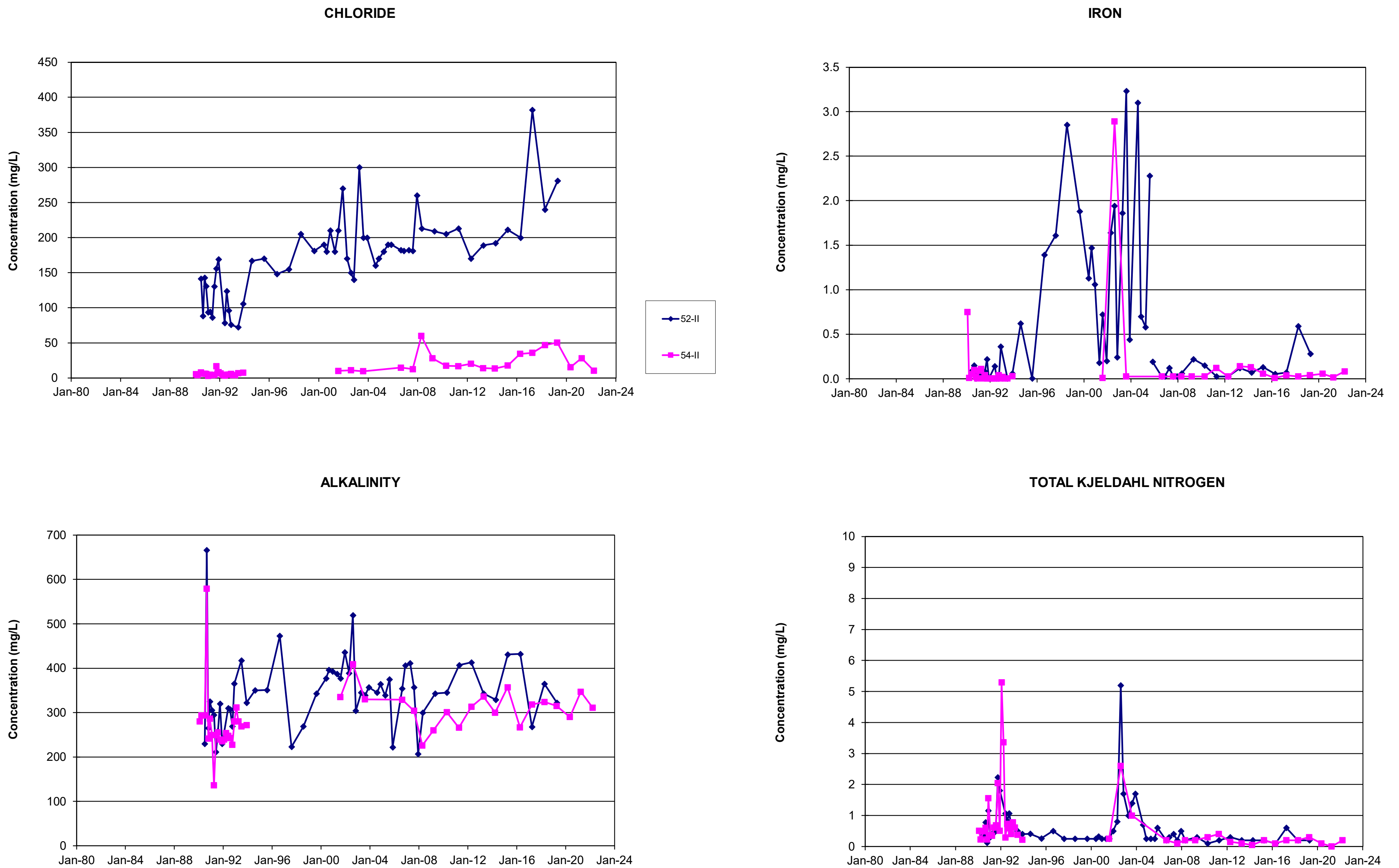



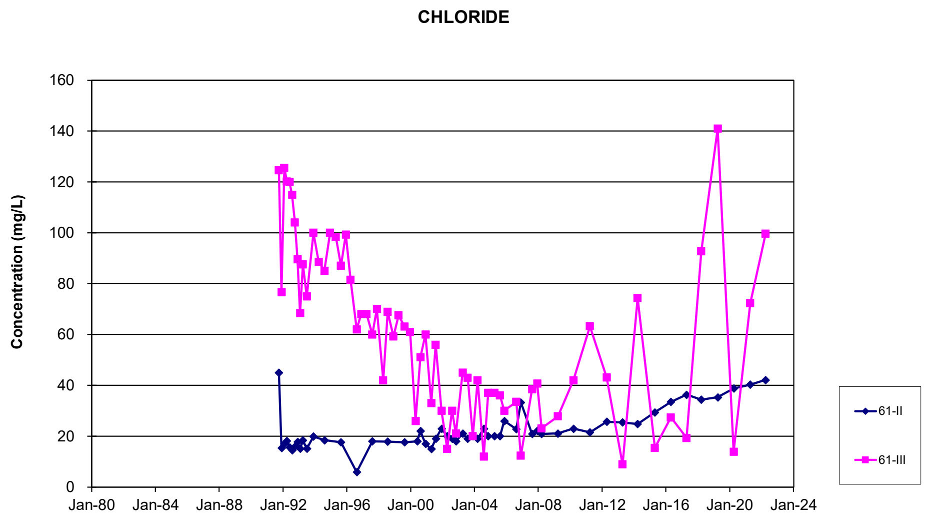
## Figure H.10

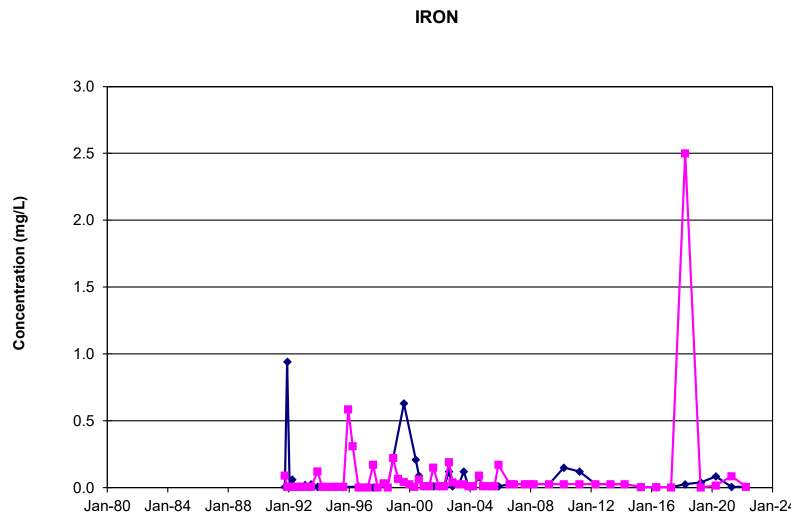
### Time Concentration Graphs - Groundwater: Overburden

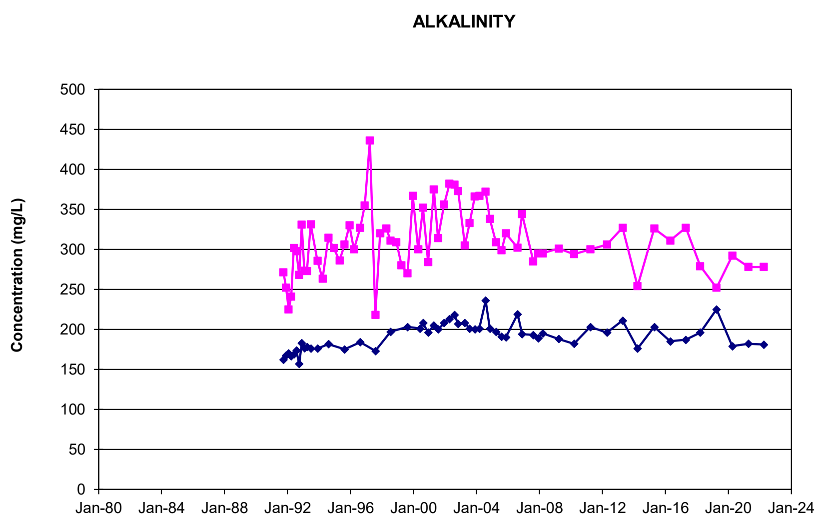


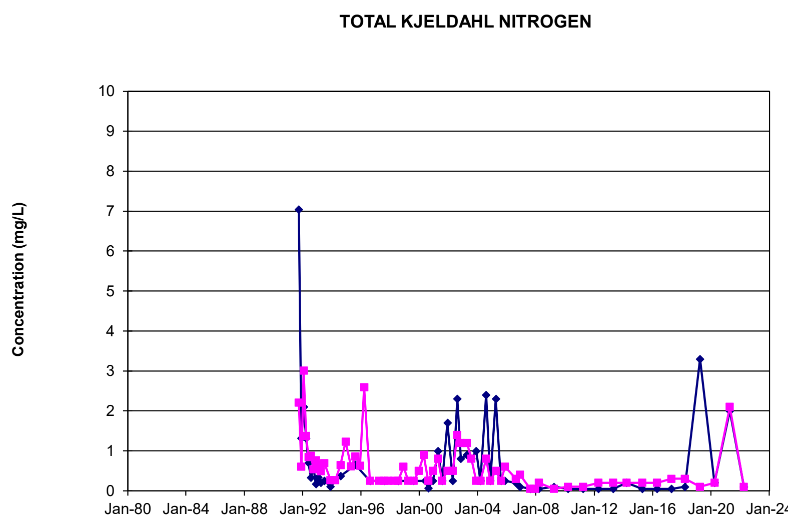
# Figure H.11

## Time Concentration Graphs - Groundwater: Overburden



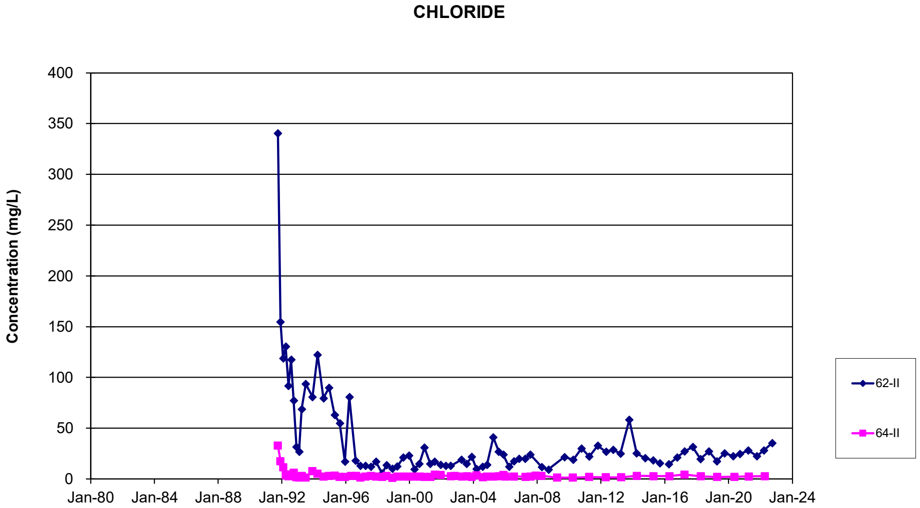



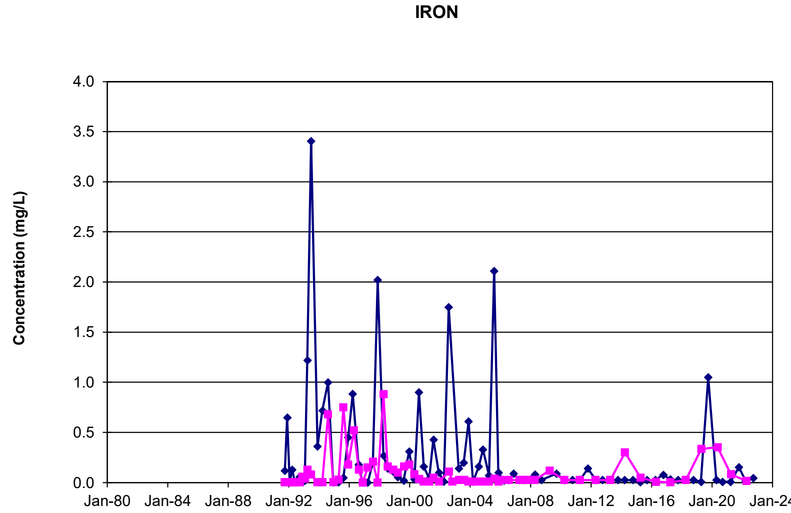



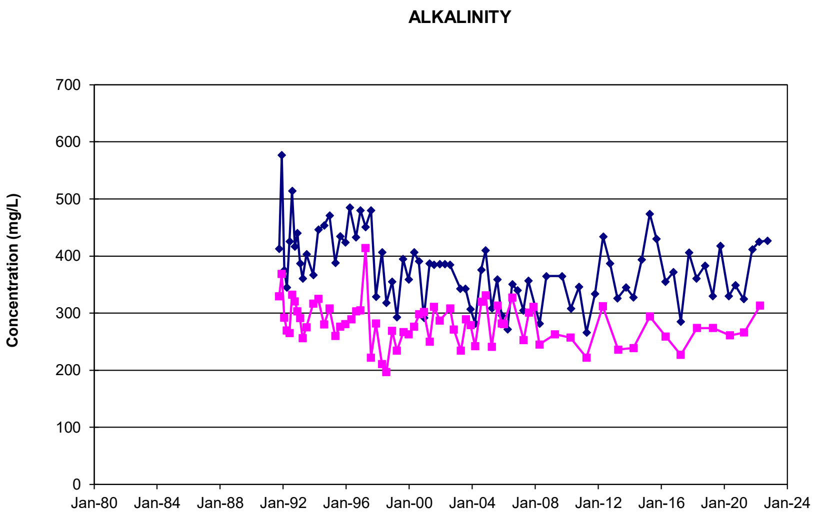



# Figure H.12

## Time Concentration Graphs - Groundwater: Overburden



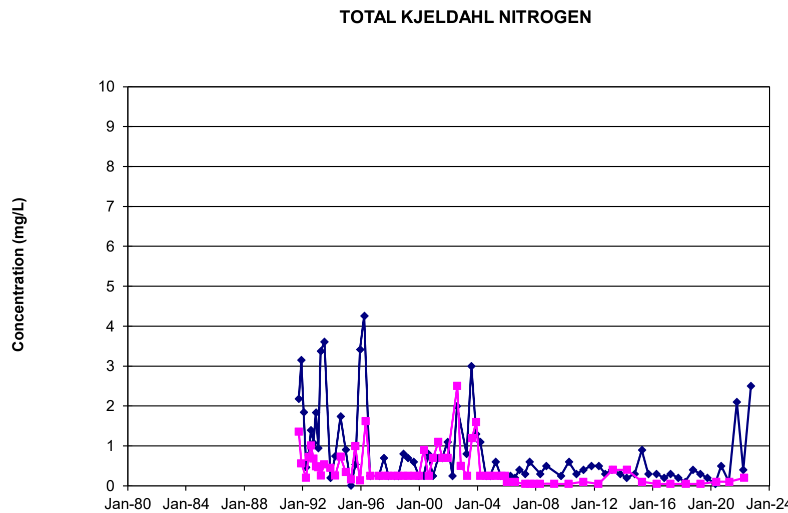
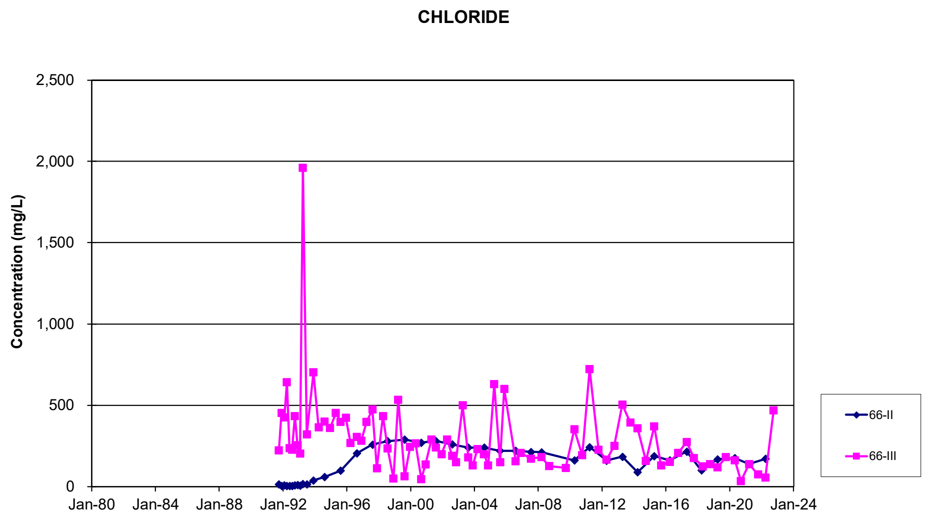
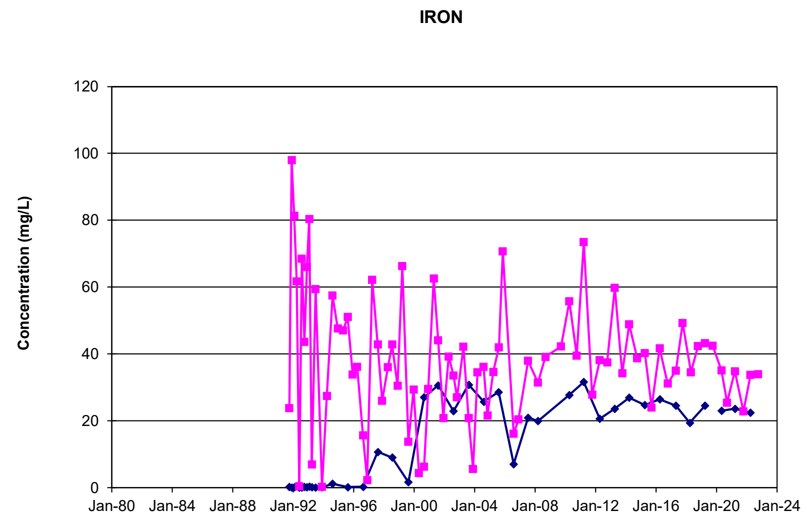
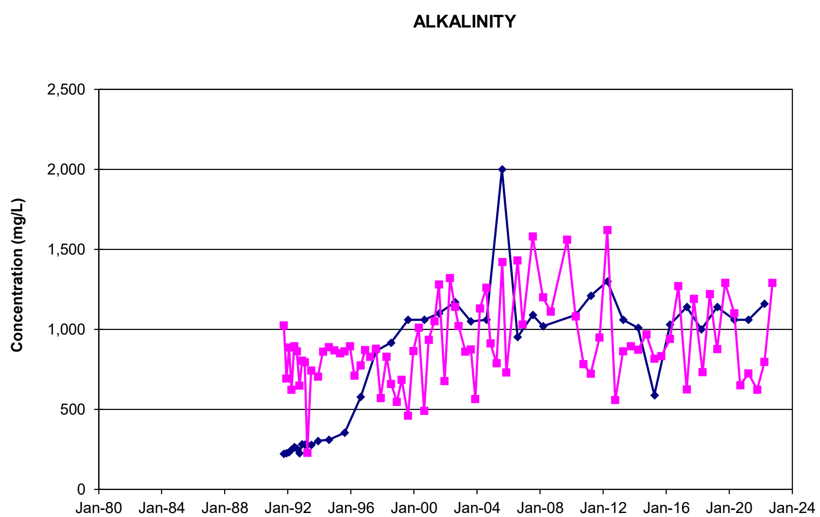



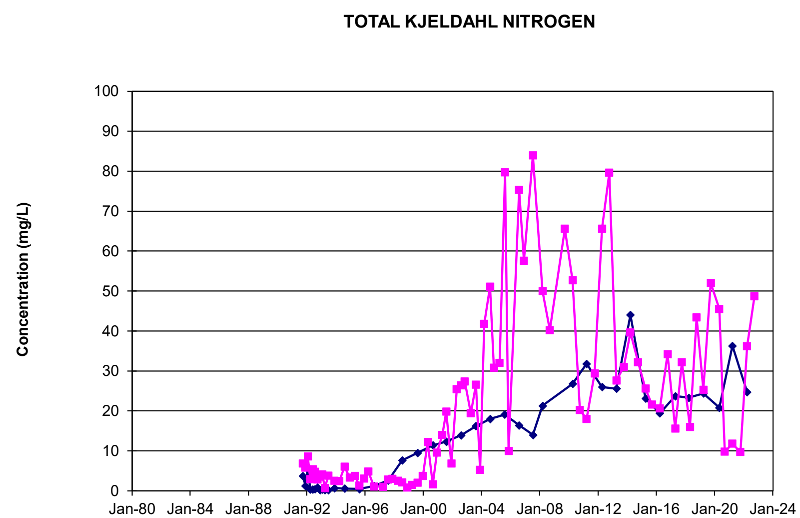
**Figure H.13**

**Time Concentration Graphs - Groundwater: Overburden**



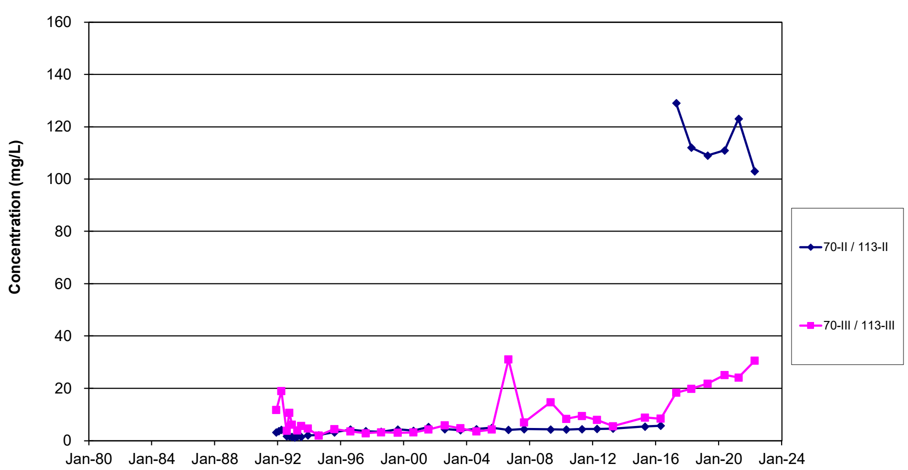



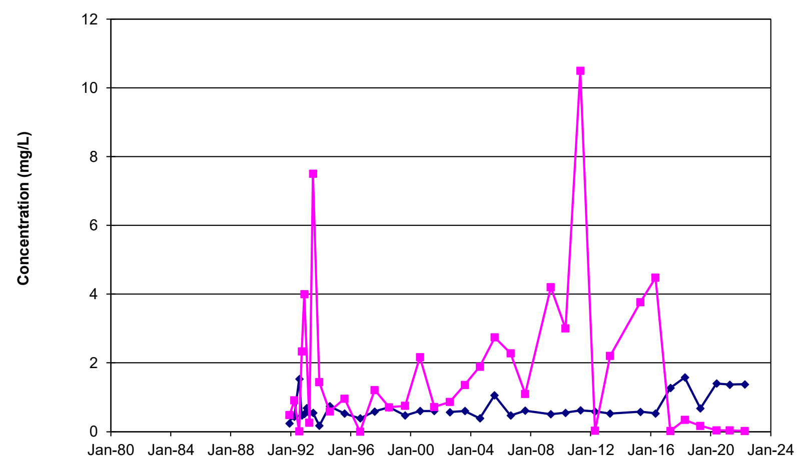
# Figure H.14

## Time Concentration Graphs - Groundwater: Overburden

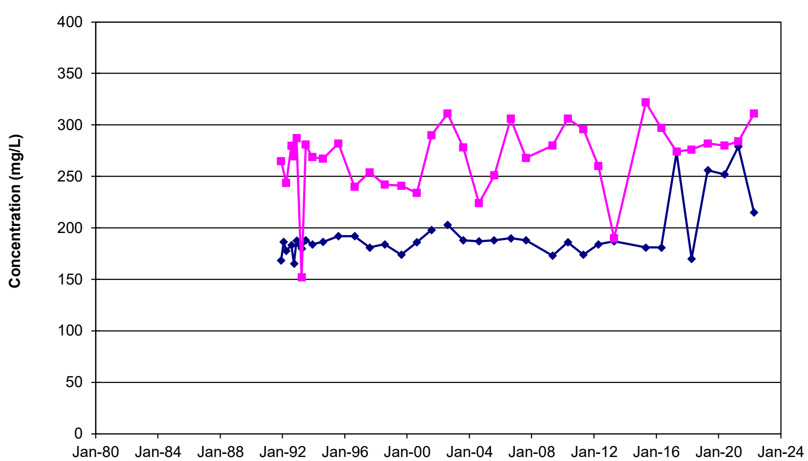
### CHLORIDE




### IRON




### ALKALINITY




### TOTAL KJELDAHL NITROGEN

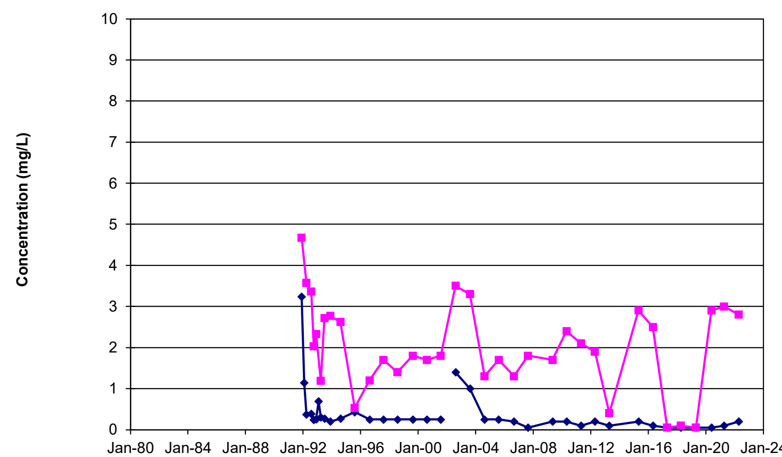
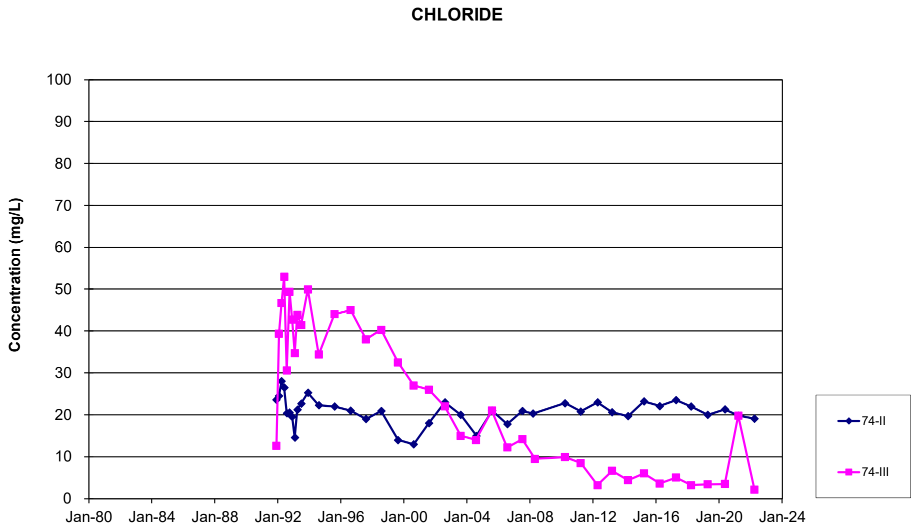
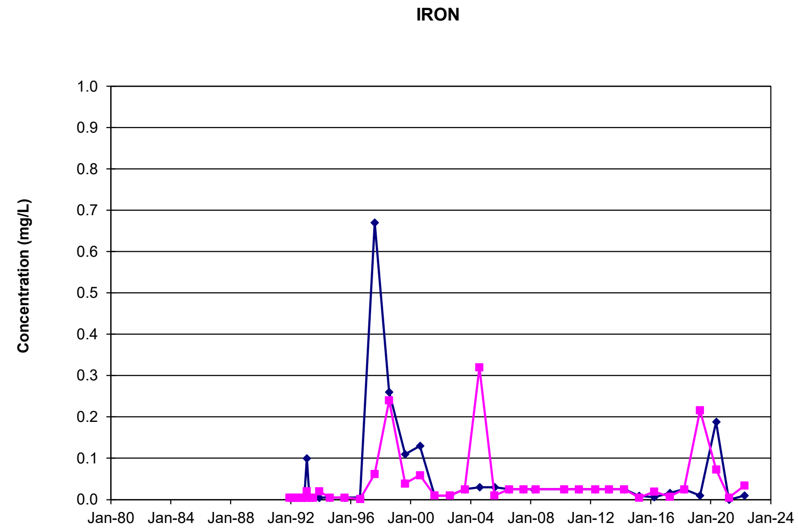
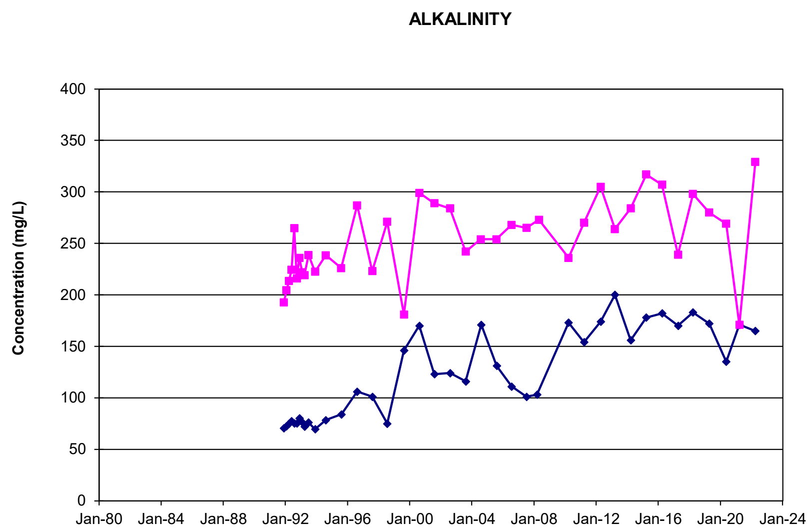


**Figure H.15**

**Time Concentration Graphs - Groundwater: Overburden**



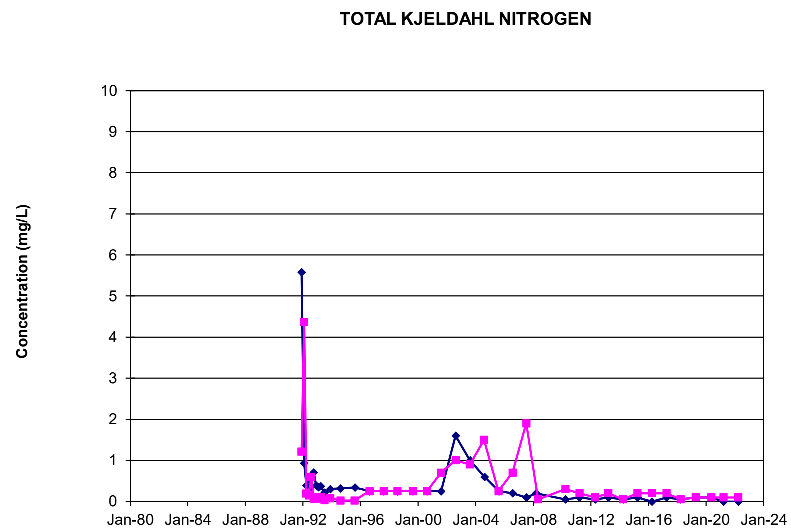
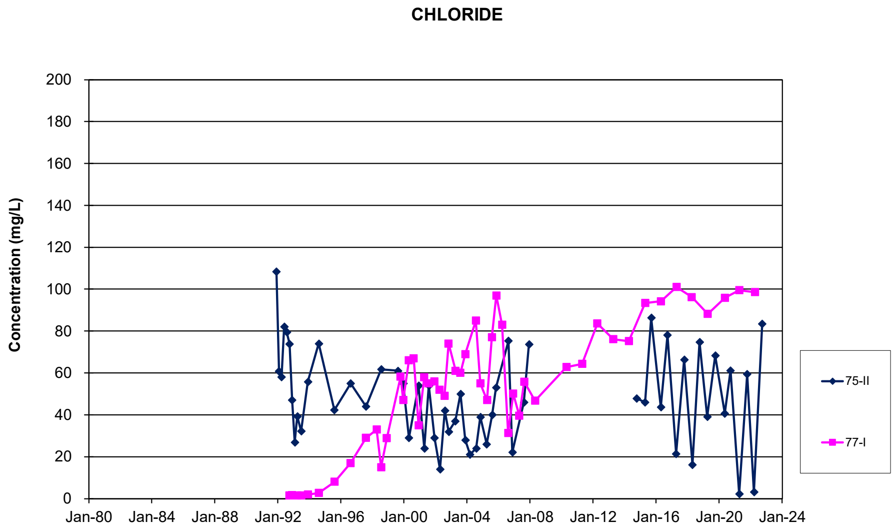
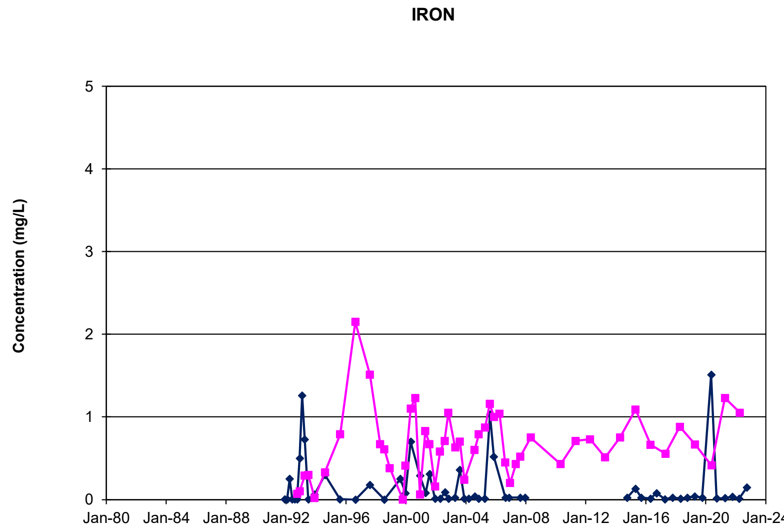
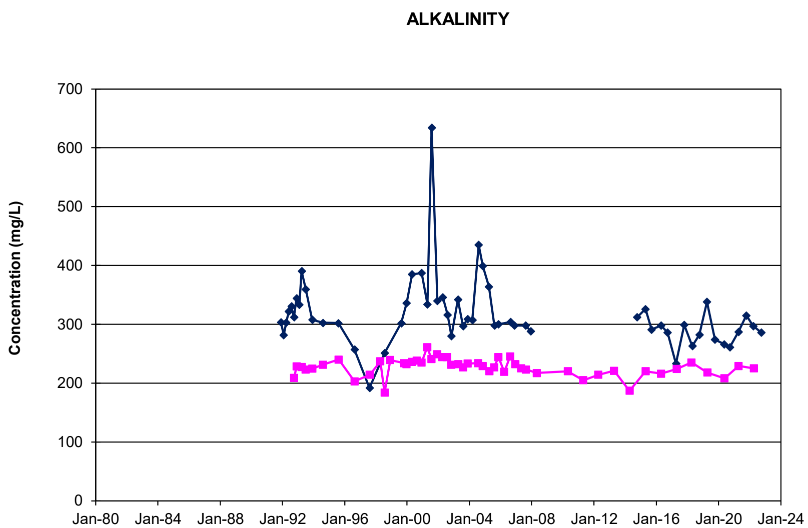



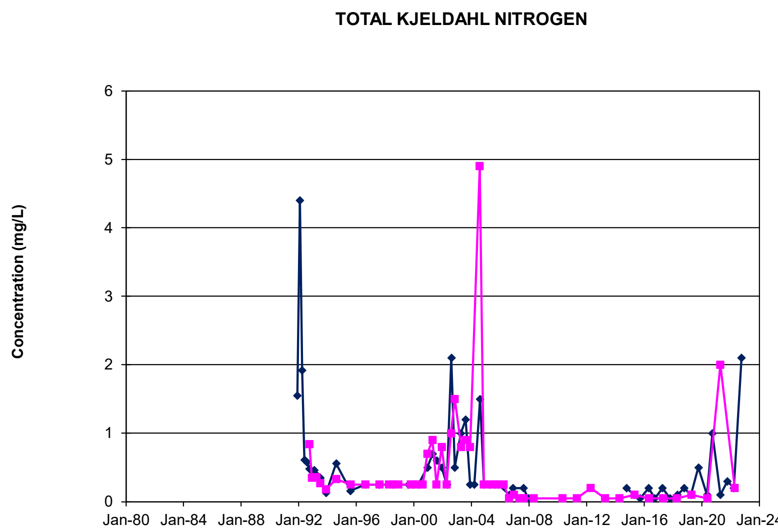
**Figure H.16**

**Time Concentration Graphs - Groundwater: Overburden**



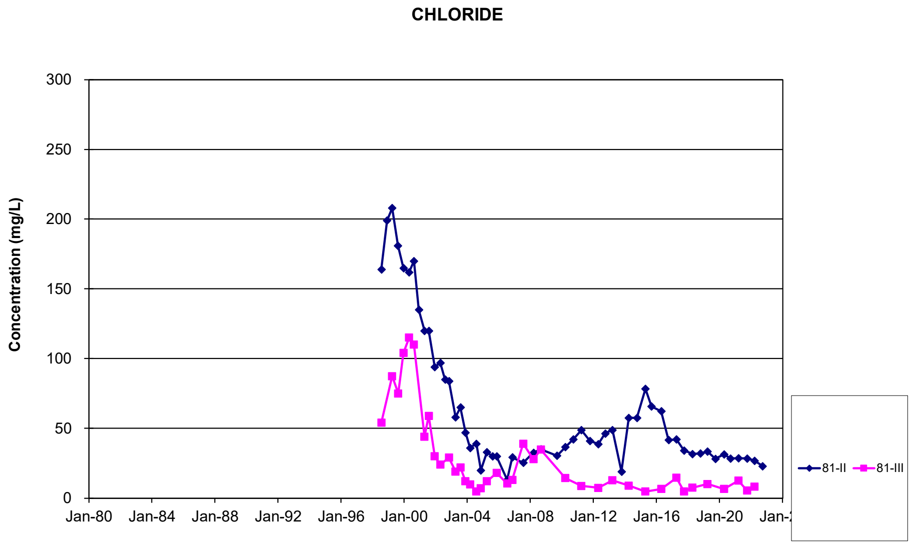



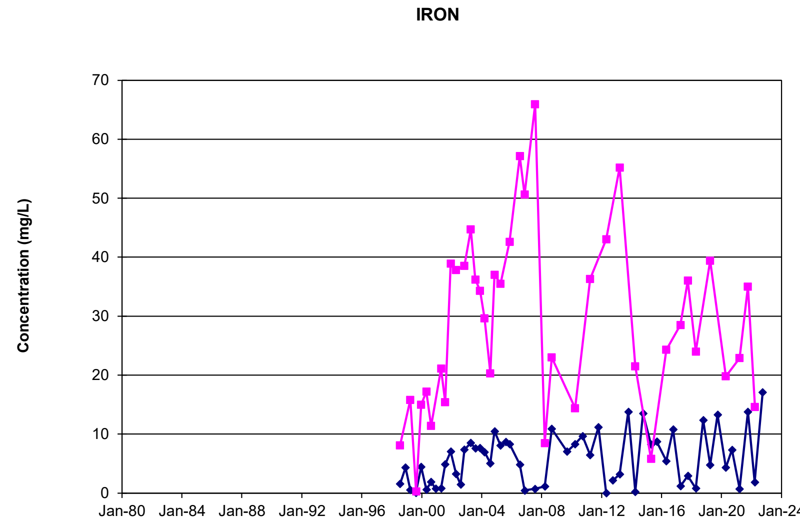



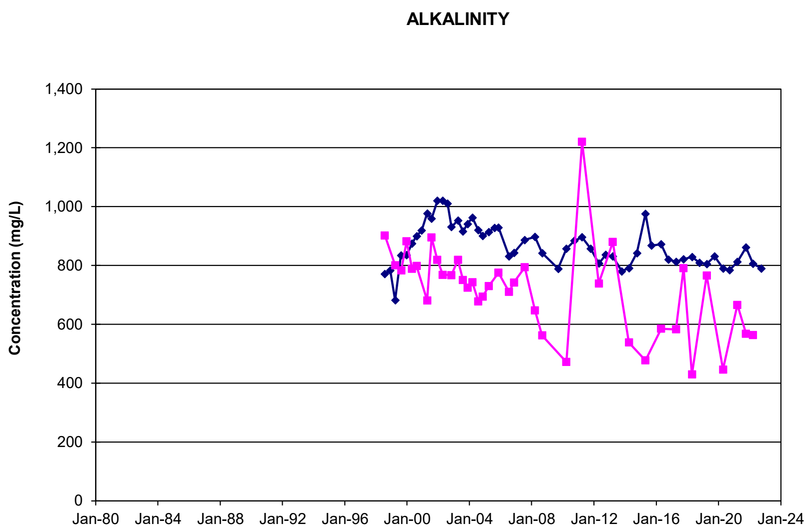



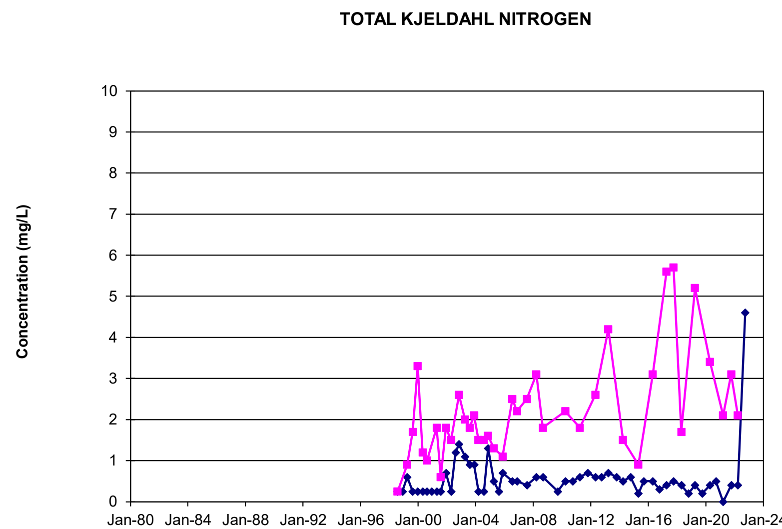
# Figure H.17

## Time Concentration Graphs - Groundwater: Overburden



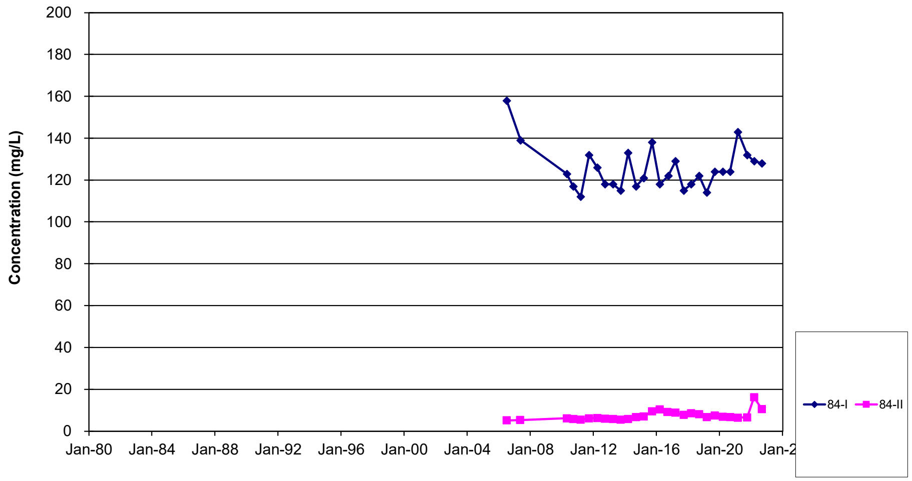



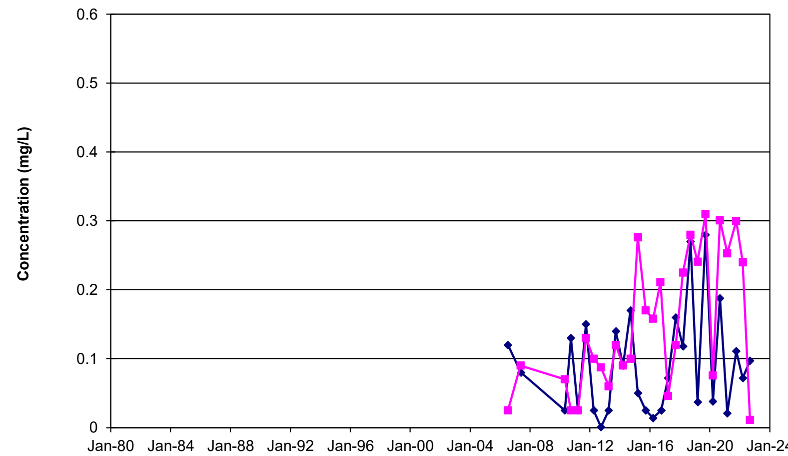
# Figure H.18

## Time Concentration Graphs - Groundwater: Overburden

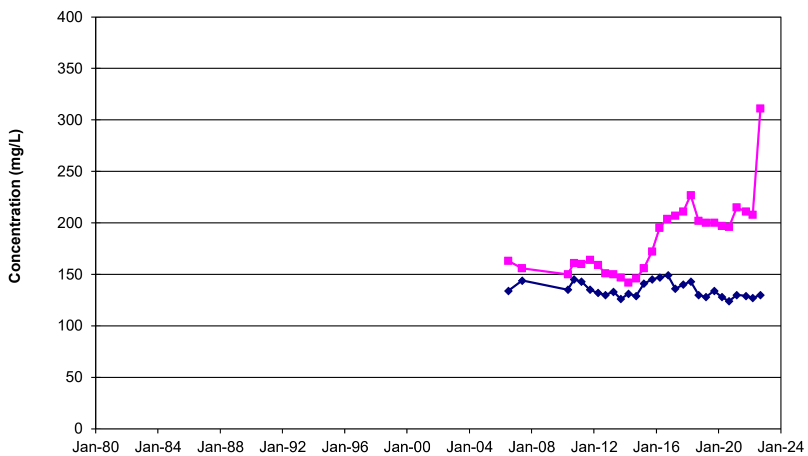
### CHLORIDE



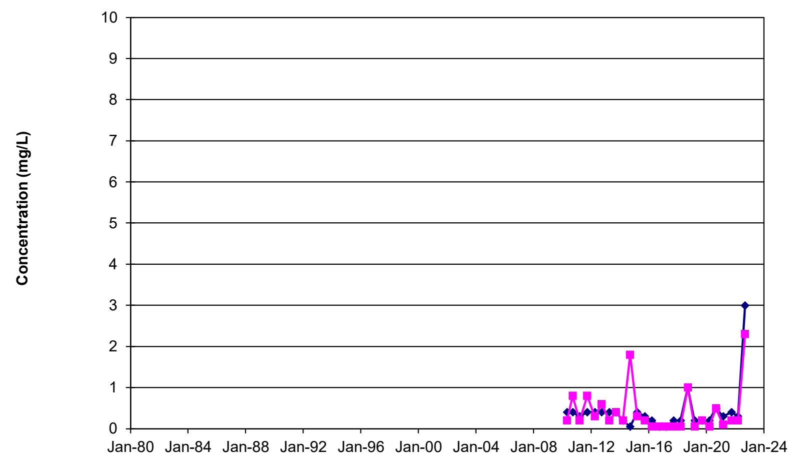

### IRON




### ALKALINITY

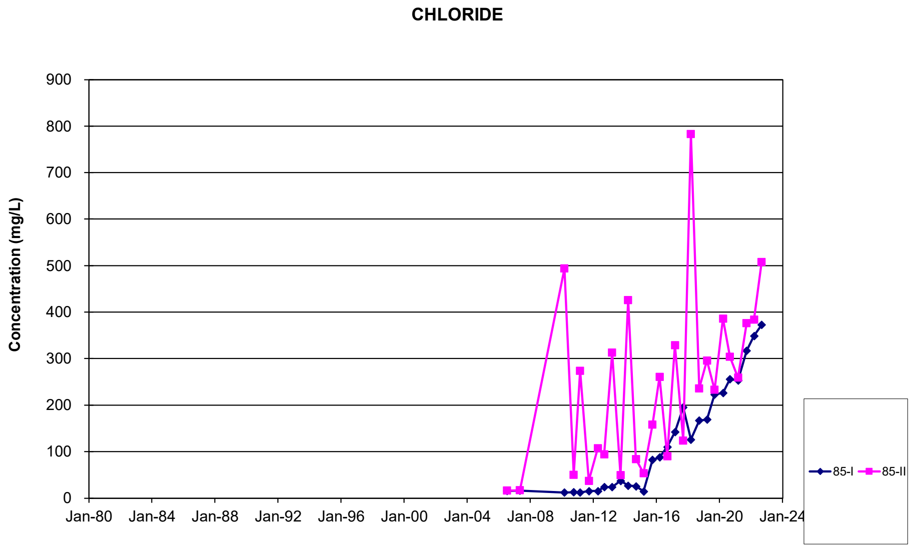


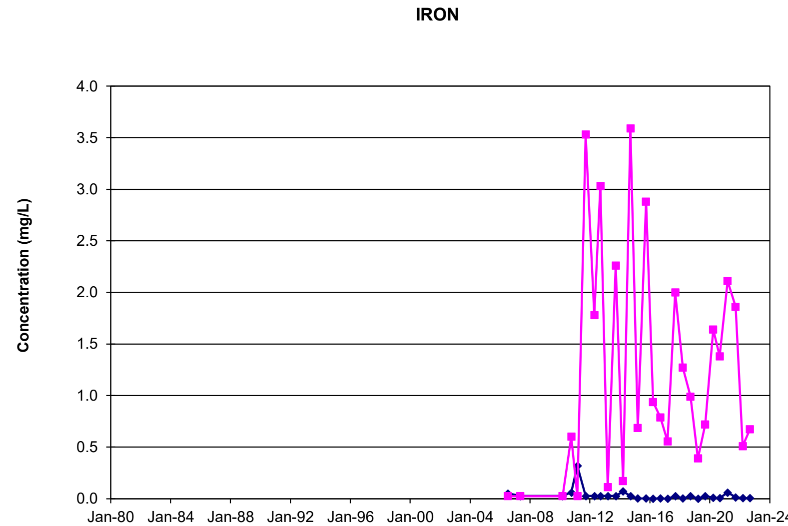

### TOTAL KJELDAHL NITROGEN

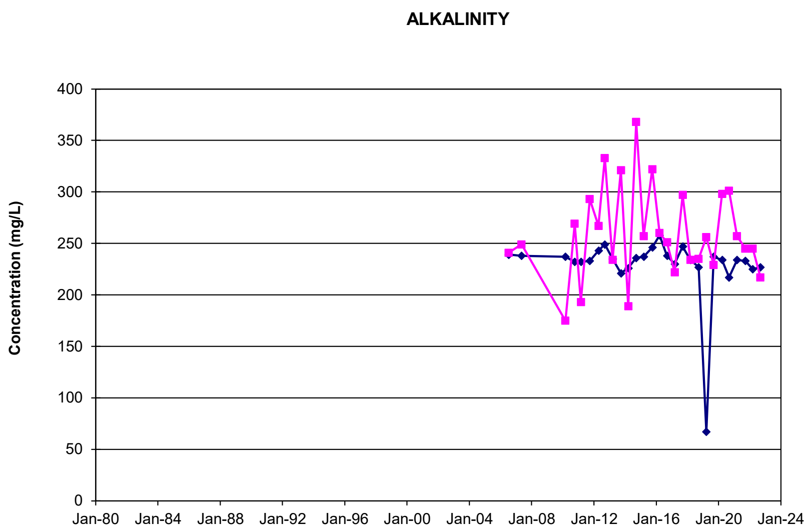


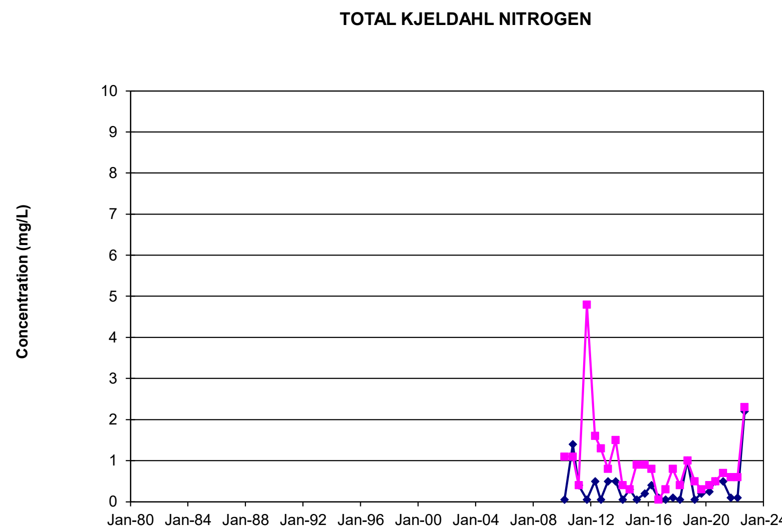
# Figure H.19

## Time Concentration Graphs - Groundwater: Overburden



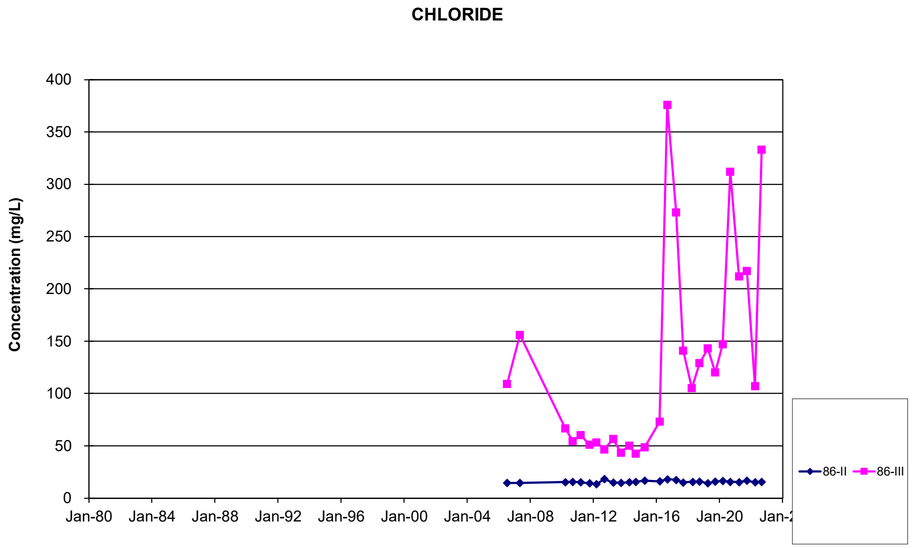



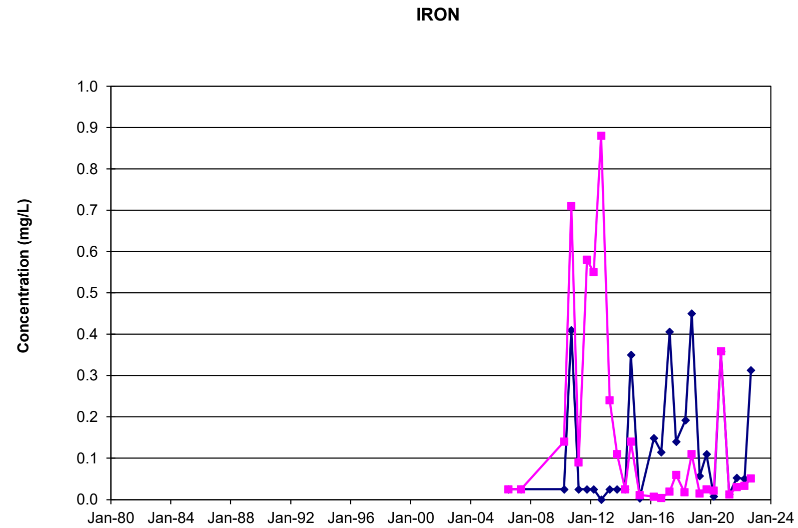



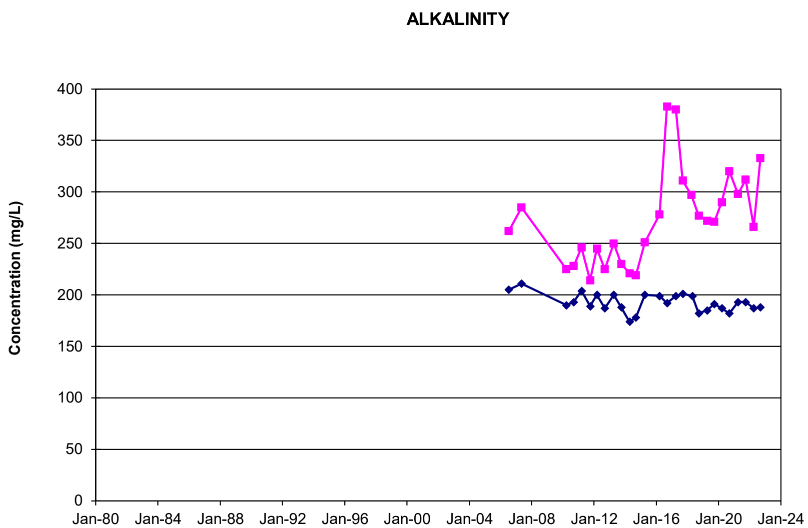



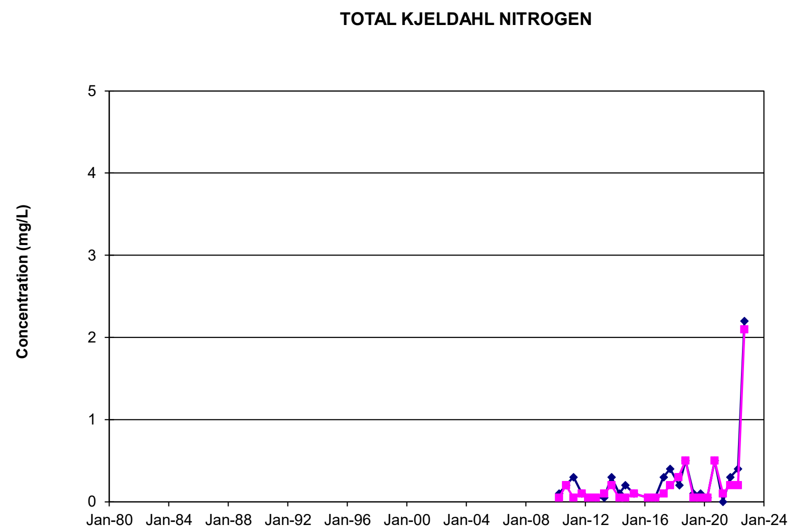
## Figure H.20

### Time Concentration Graphs - Groundwater: Overburden



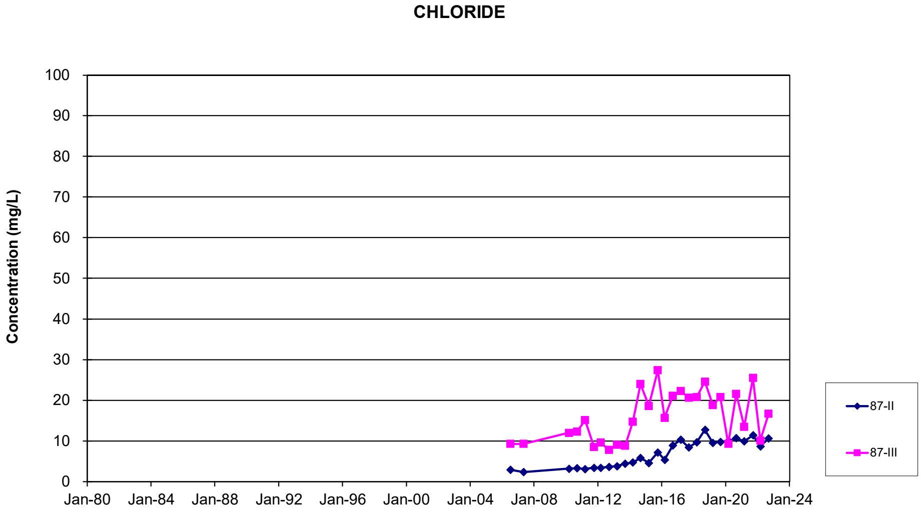



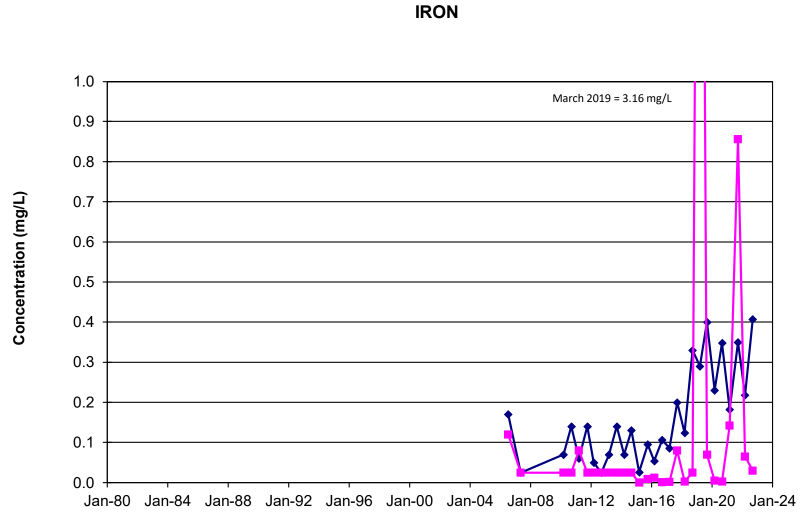



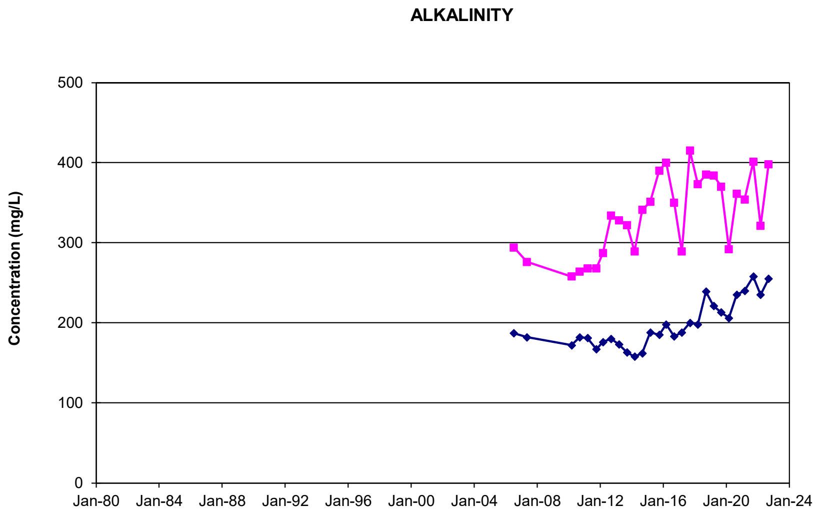



# Figure H.21

## Time Concentration Graphs - Groundwater: Overburden



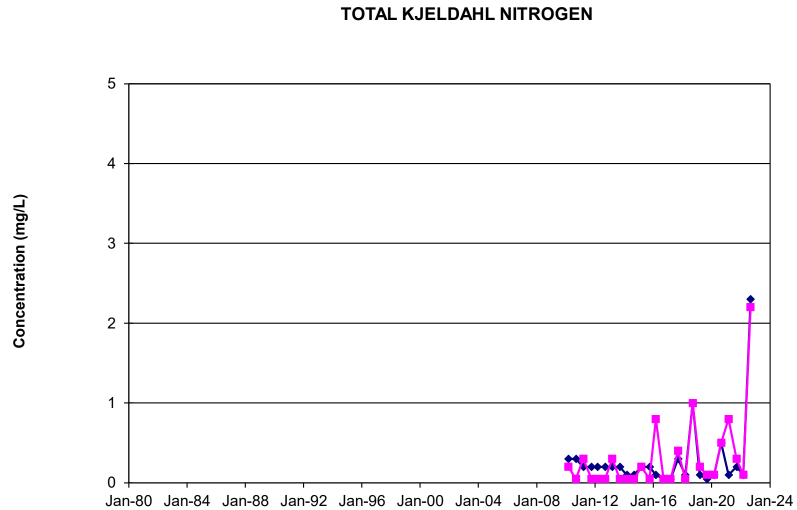
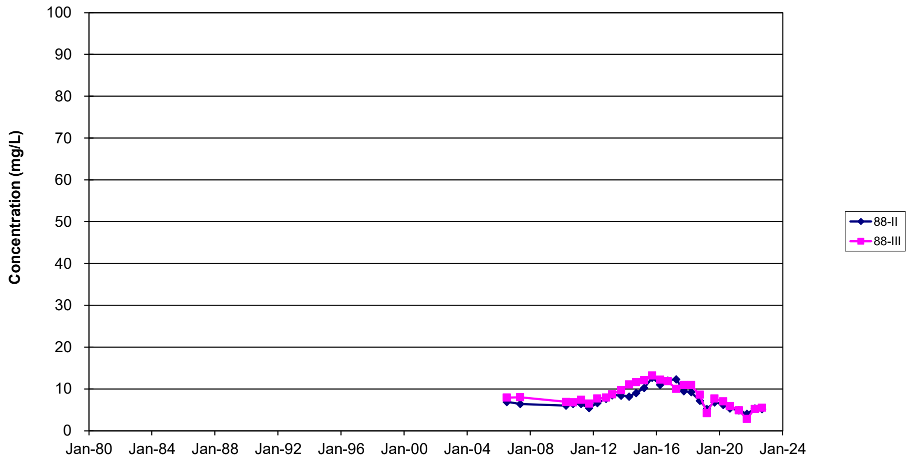



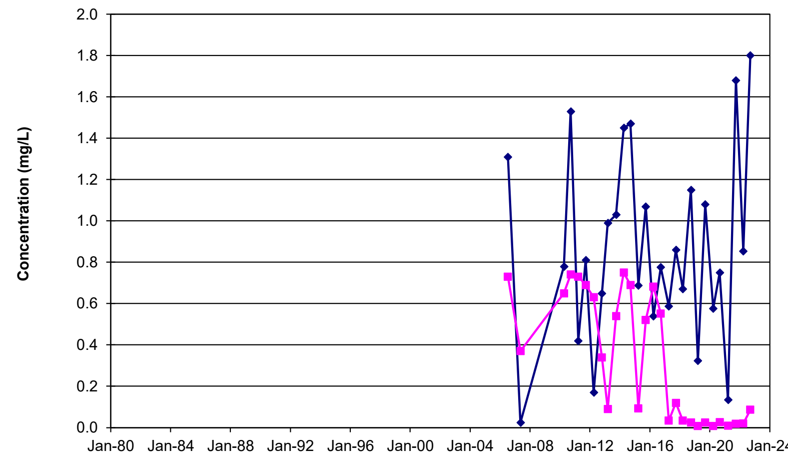
**Figure H.22**

**Time Concentration Graphs - Groundwater: Overburden**

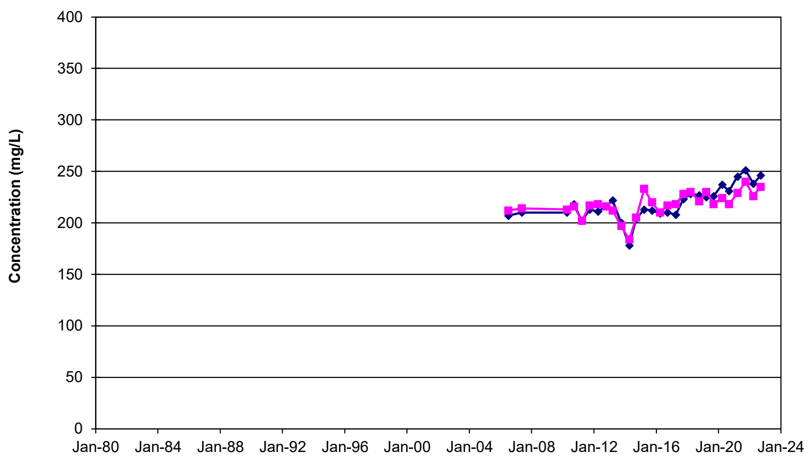
**CHLORIDE**



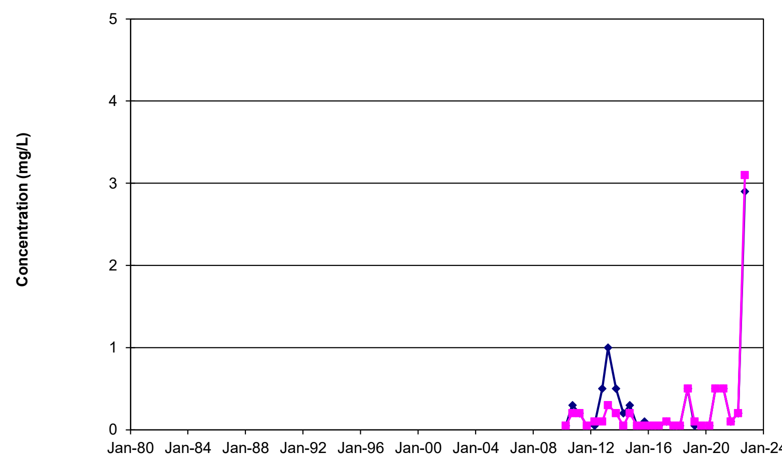

**IRON**




**ALKALINITY**



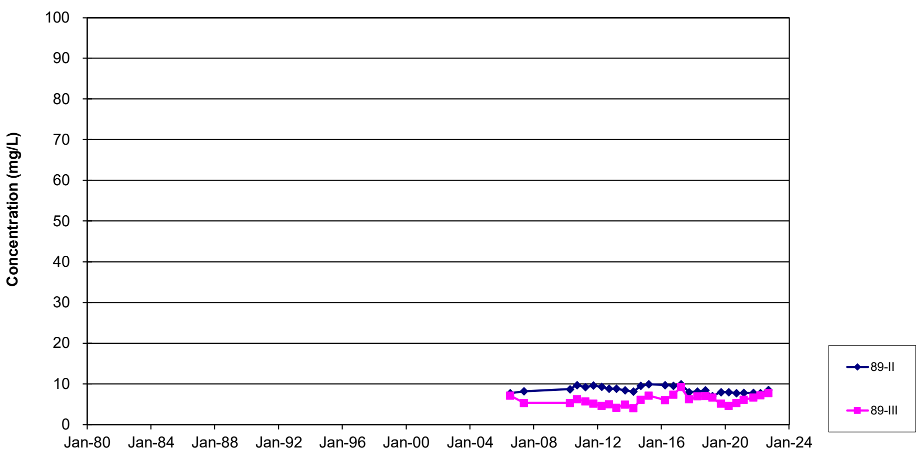

**TOTAL KJELDAHL NITROGEN**



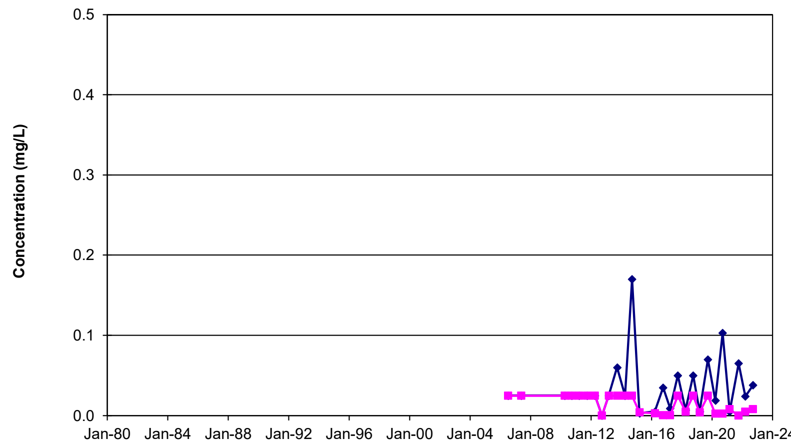
## Figure H.23

### Time Concentration Graphs - Groundwater: Overburden

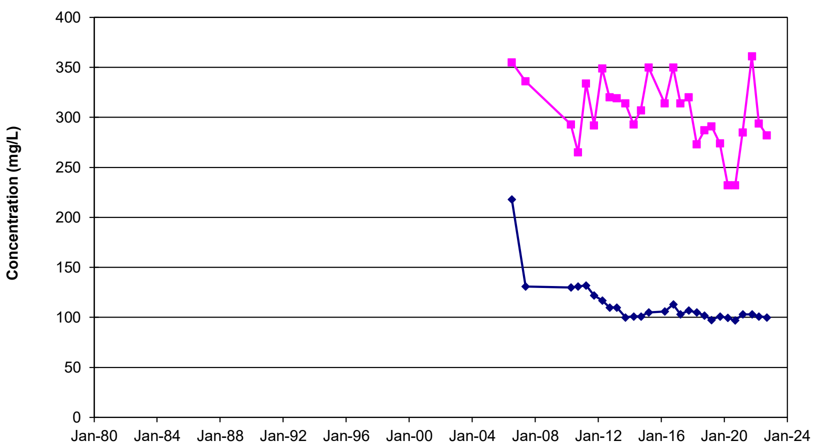
#### CHLORIDE



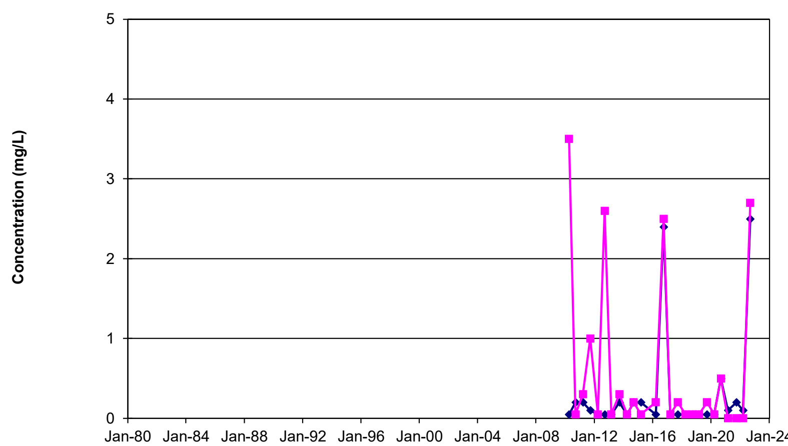

#### IRON




#### ALKALINITY

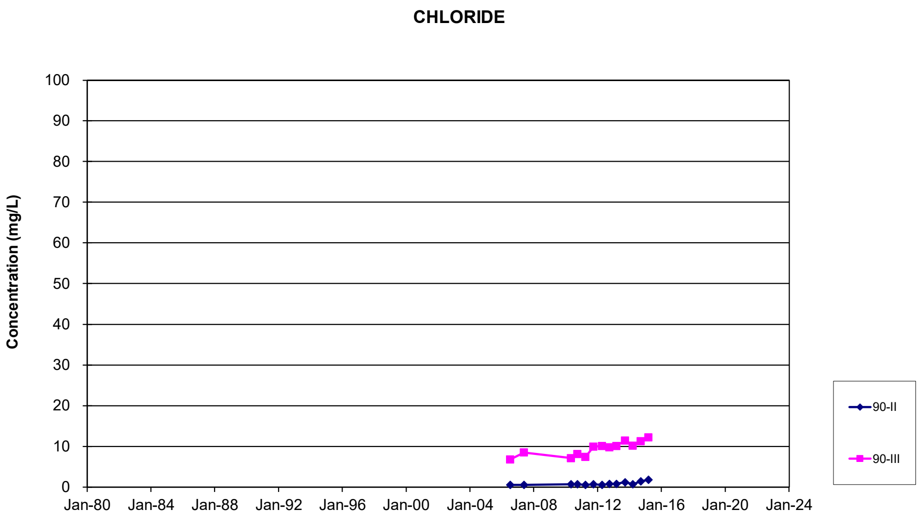


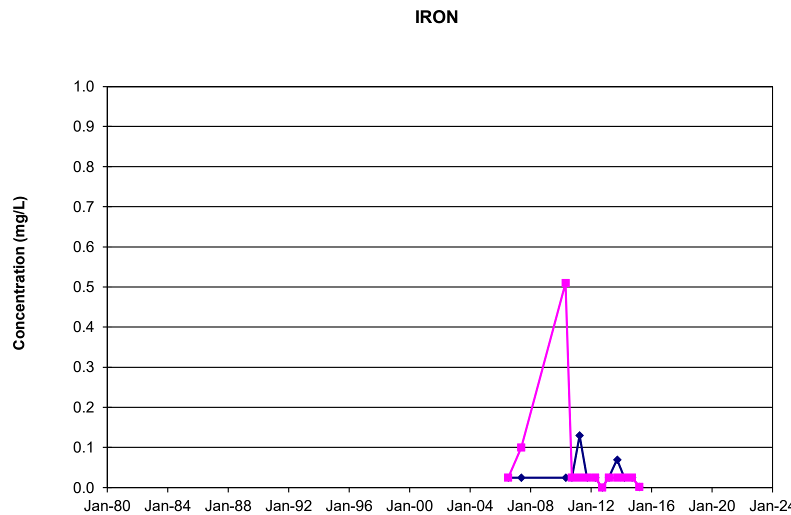

#### TOTAL KJELDAHL NITROGEN

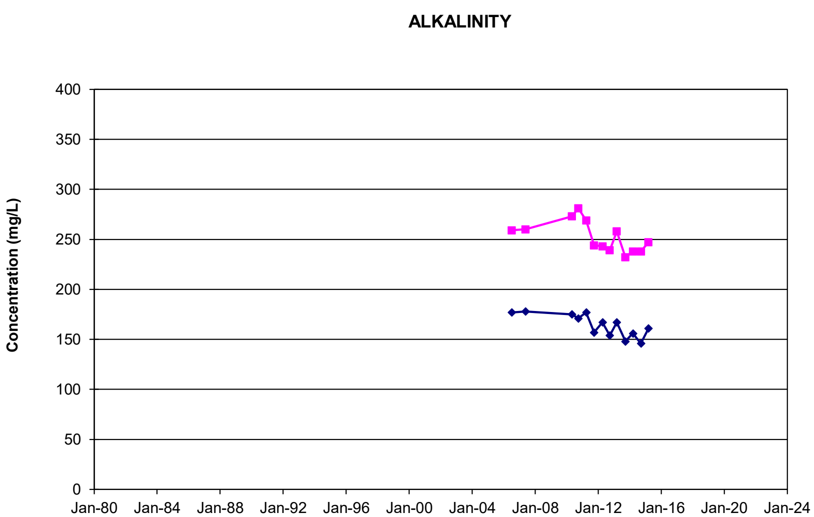


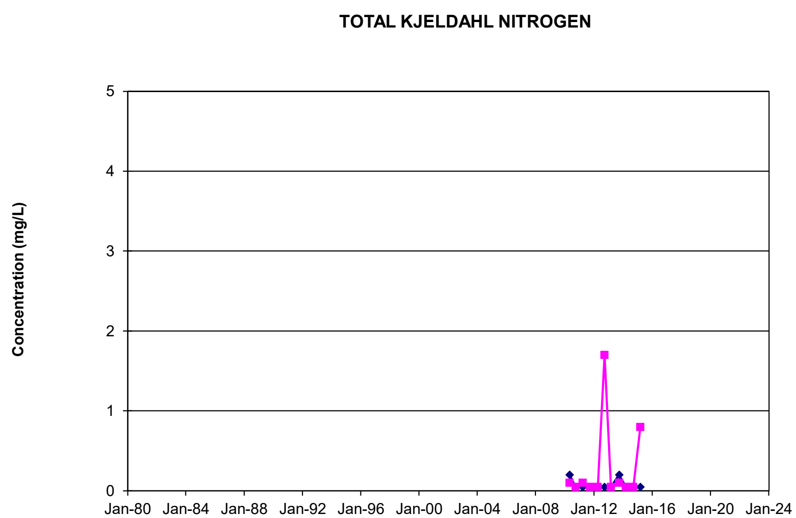
# Figure H.24

## Time Concentration Graphs - Groundwater: Overburden



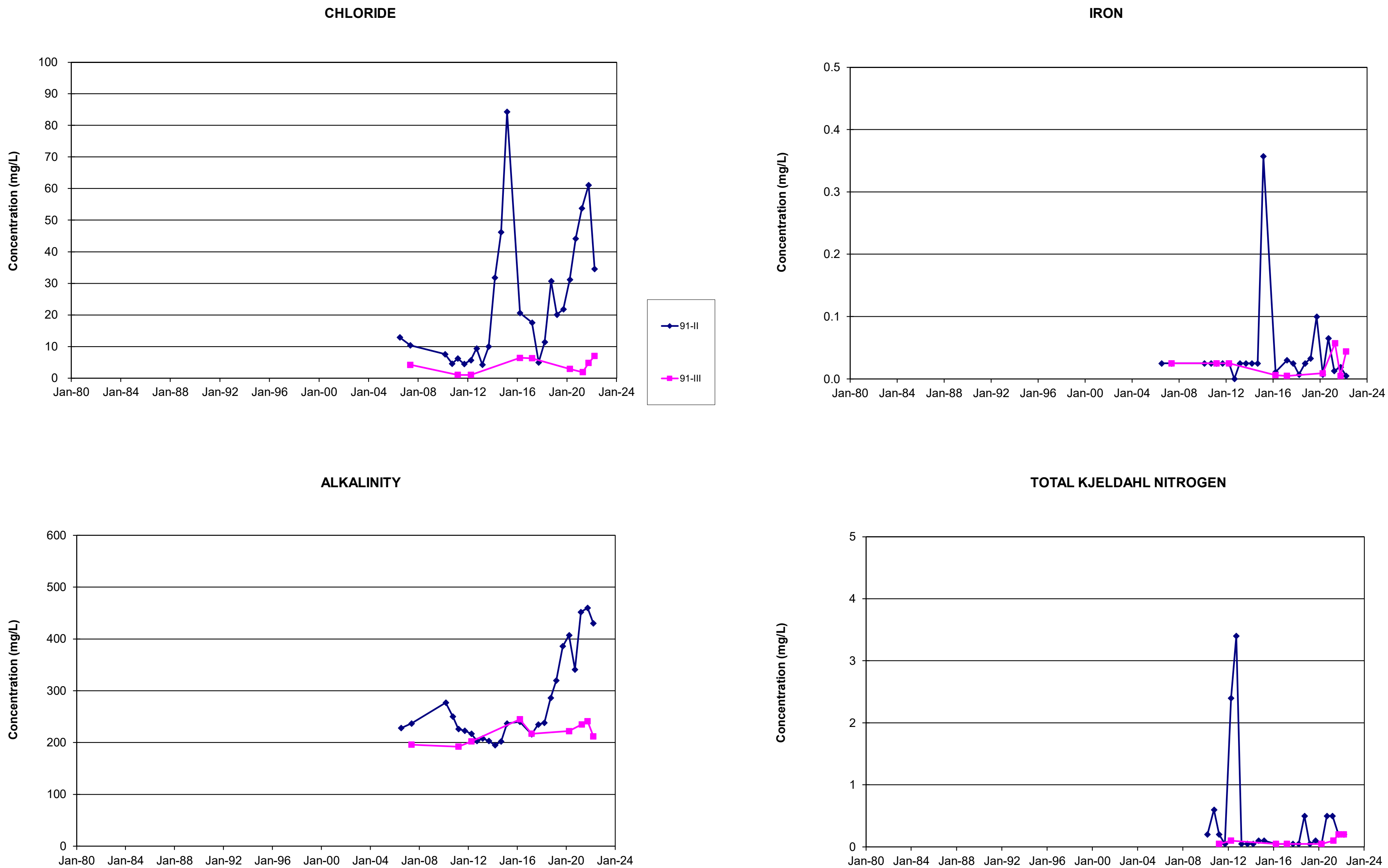



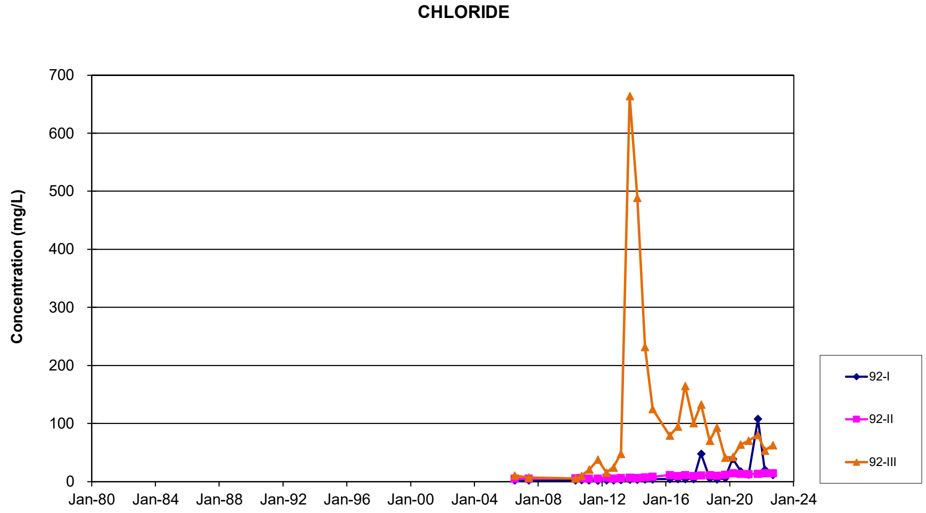
## Figure H.25

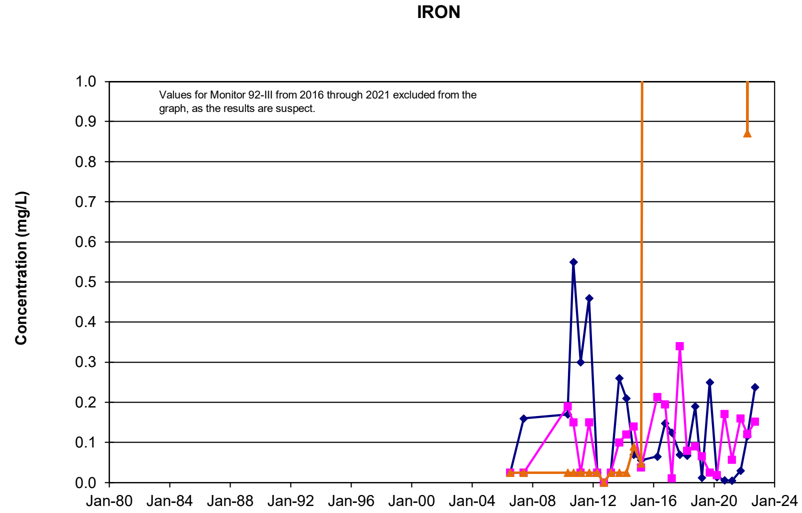
### Time Concentration Graphs - Groundwater: Overburden

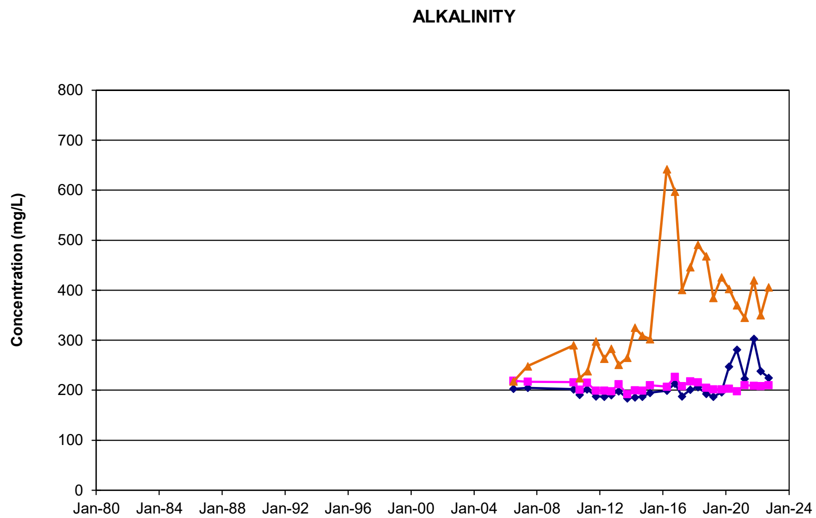


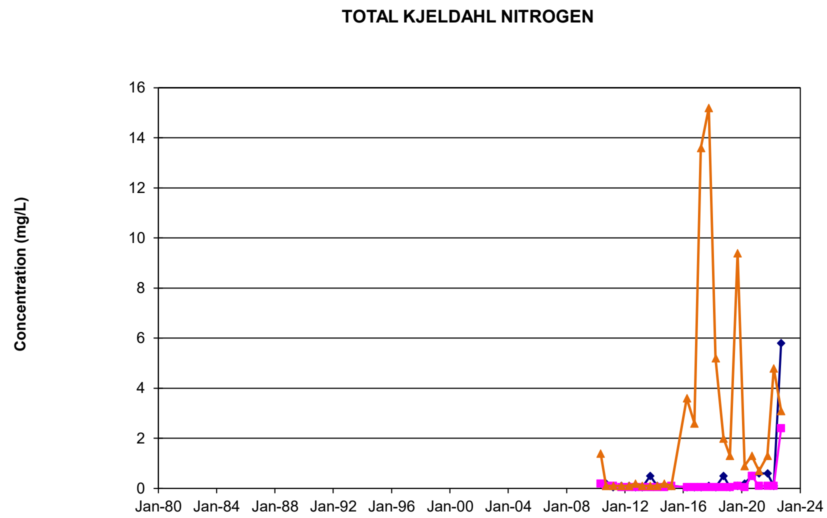
# Figure H.26

## Time Concentration Graphs - Groundwater: Overburden



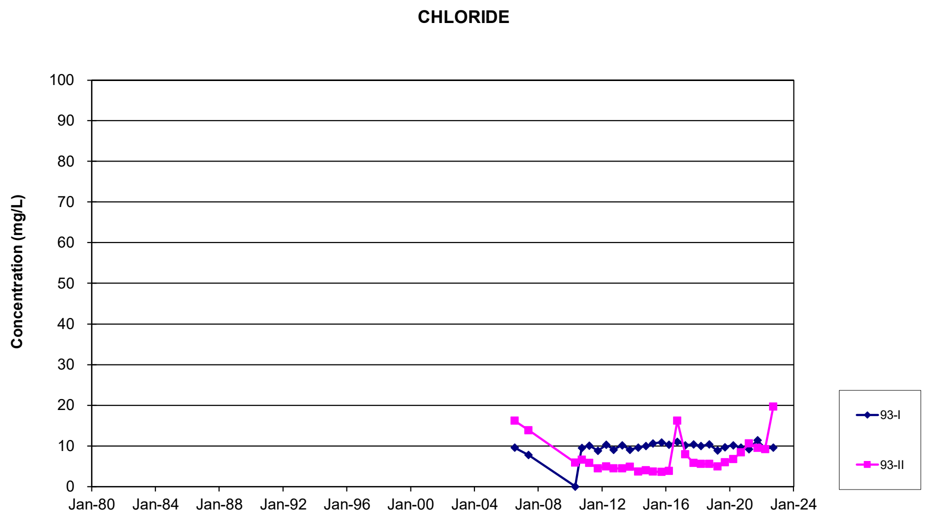



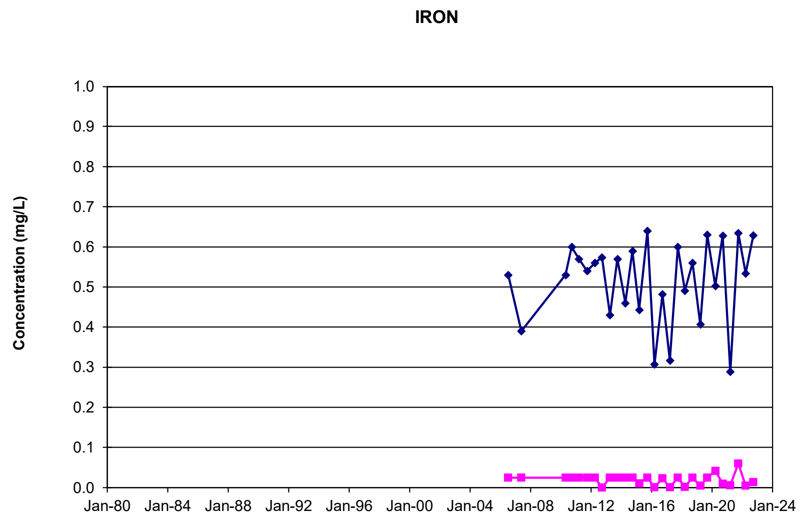



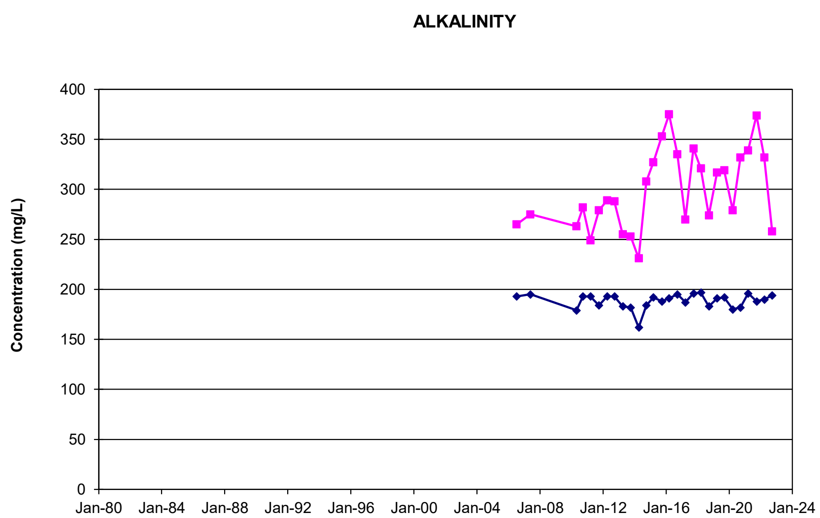



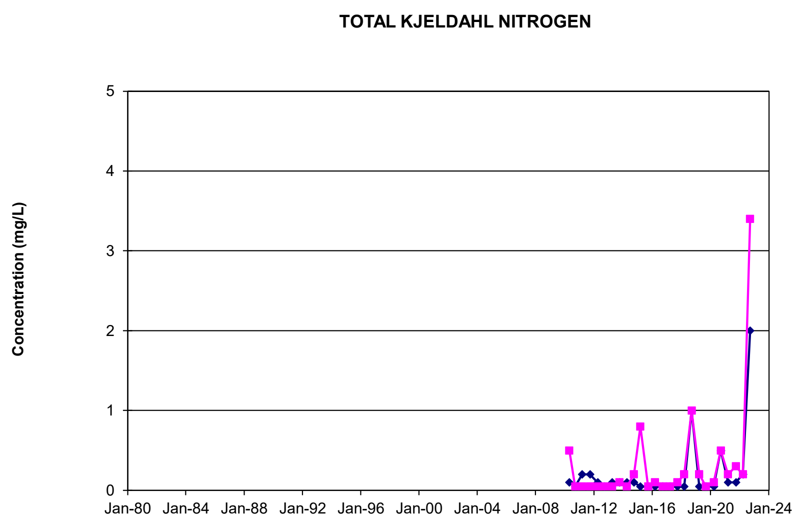
## Figure H.27

### Time Concentration Graphs - Groundwater: Overburden



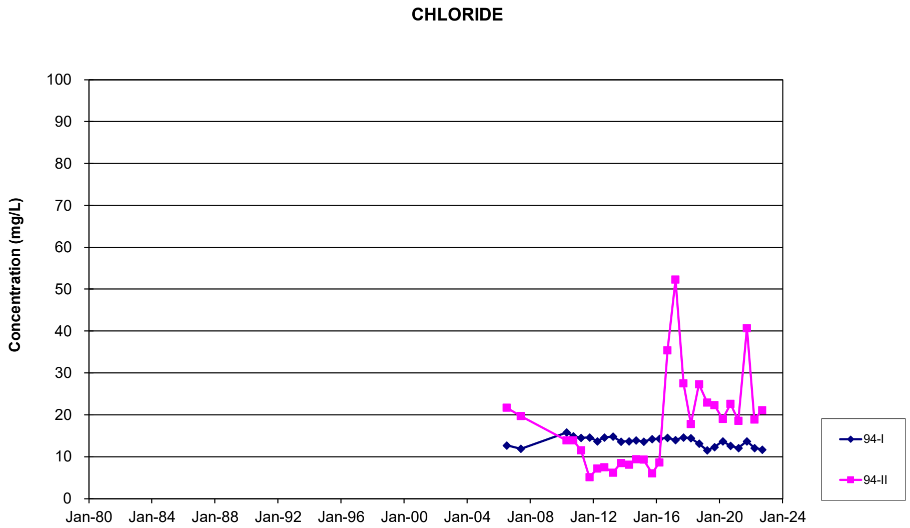



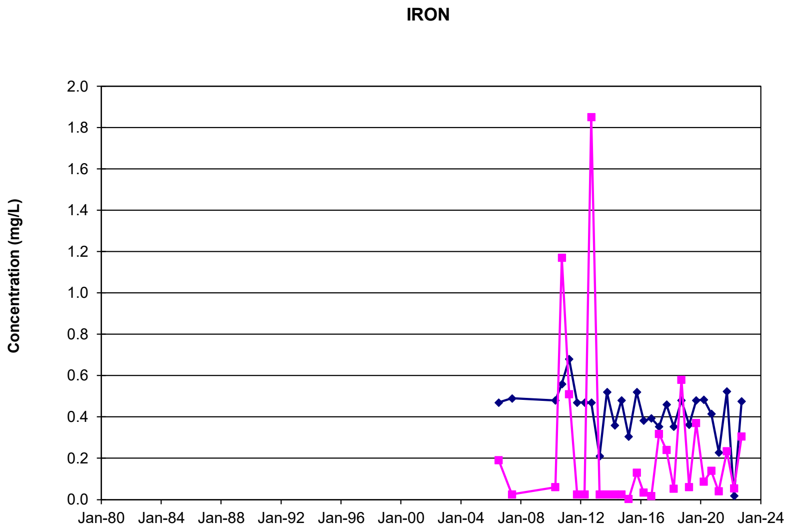



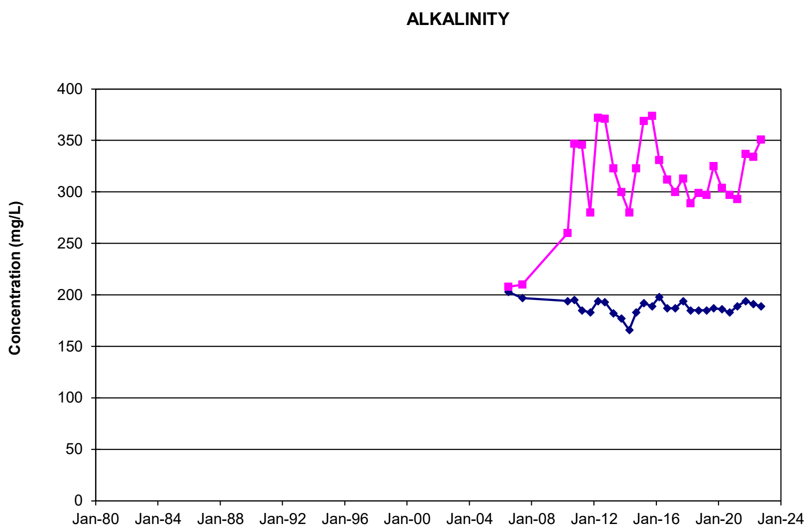



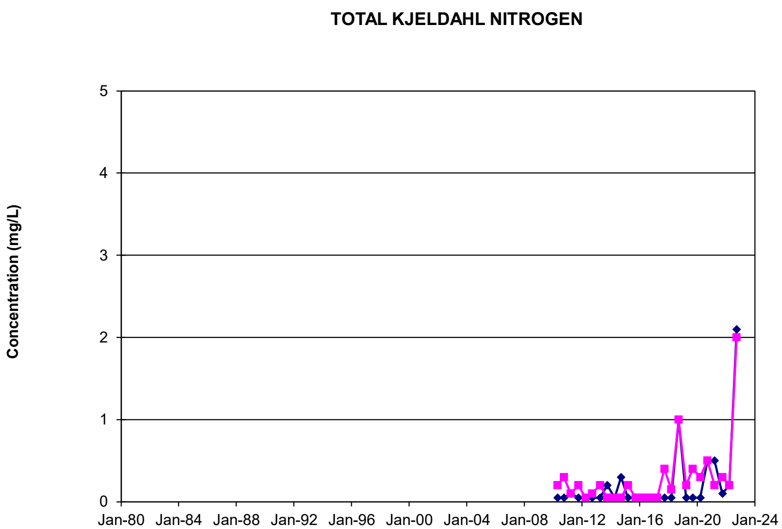
## Figure H.28

### Time Concentration Graphs - Groundwater: Overburden



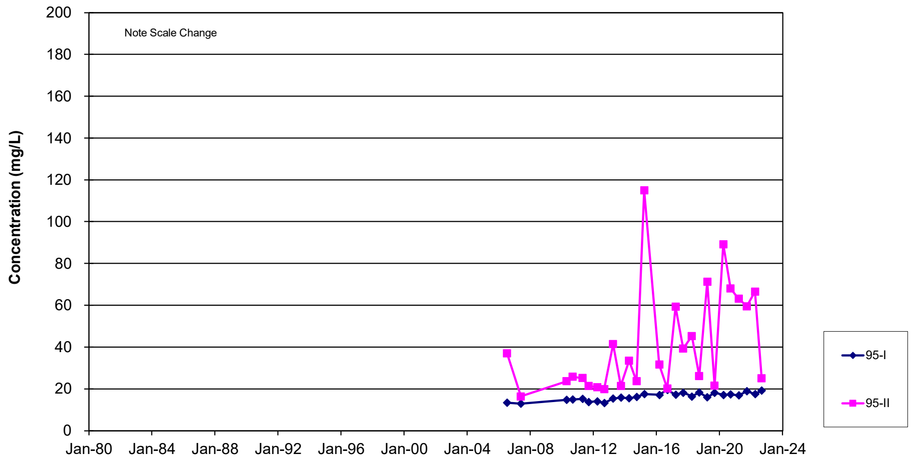



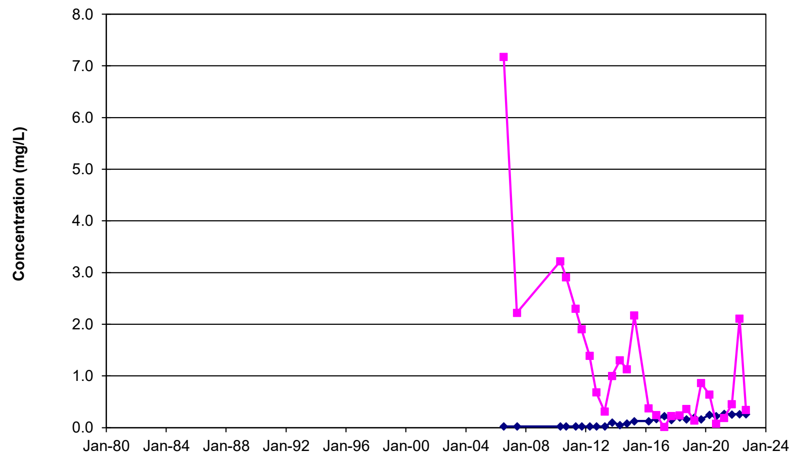
# Figure H.29

## Time Concentration Graphs - Groundwater: Overburden

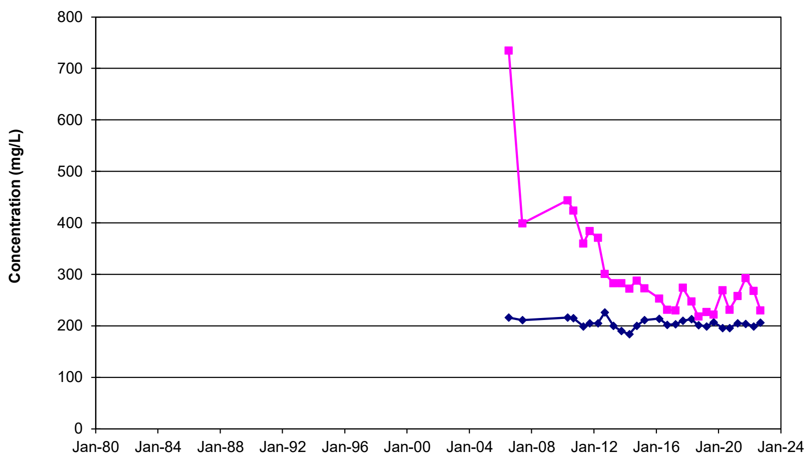
### CHLORIDE



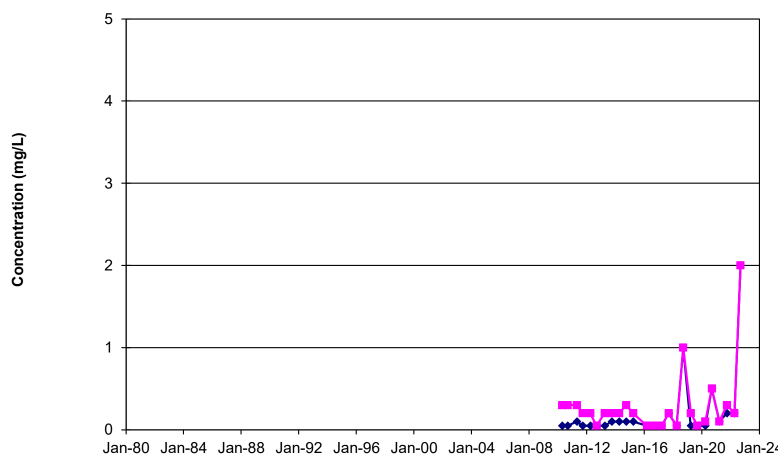

### IRON




### ALKALINITY



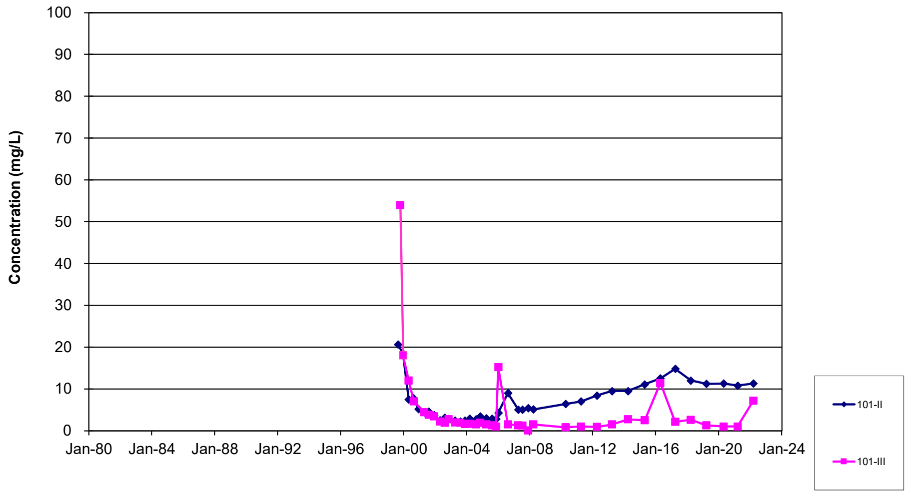

### TOTAL KJELDAHL NITROGEN



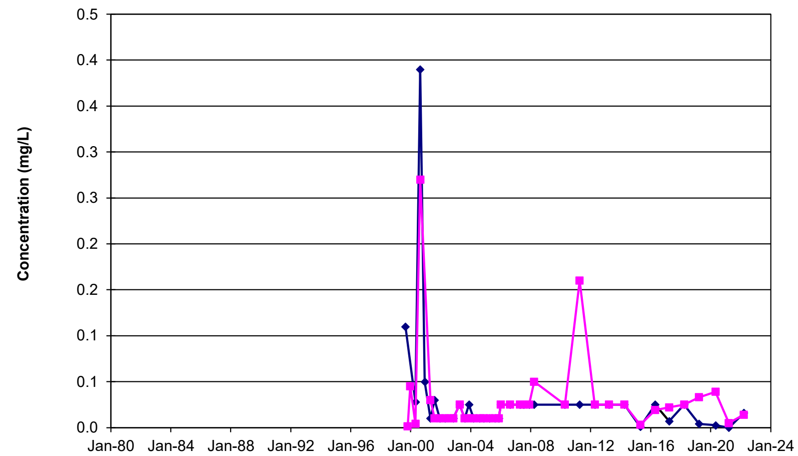
# Figure H.30

## Time Concentration Graphs - Groundwater: Overburden

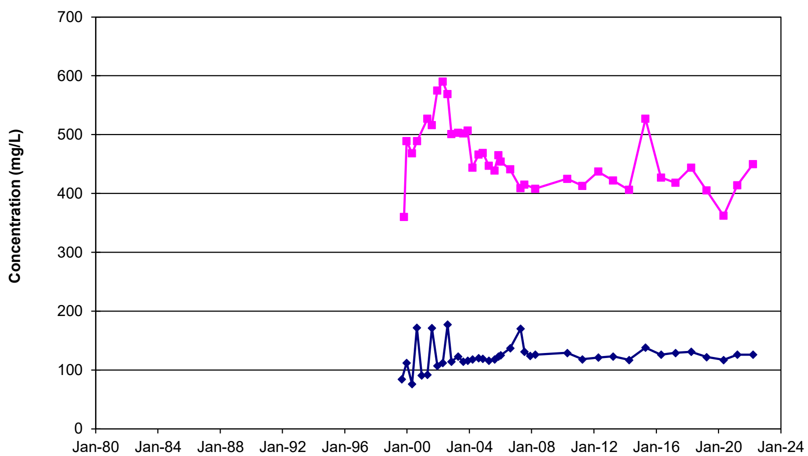
### CHLORIDE




### IRON




### ALKALINITY




### TOTAL KJELDAHL NITROGEN

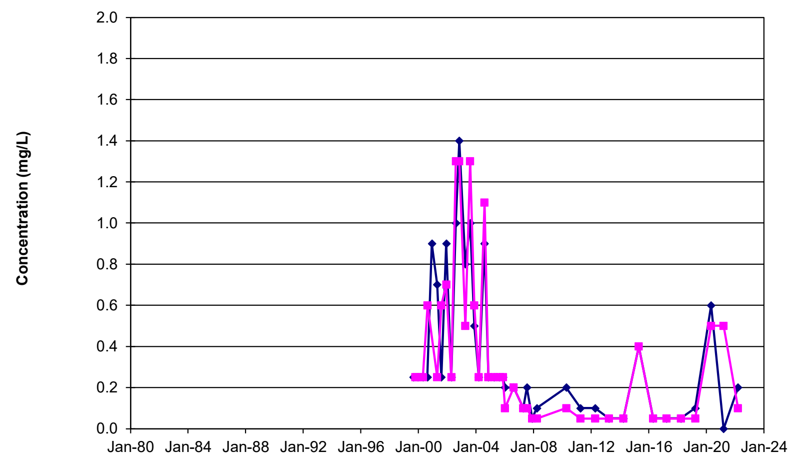
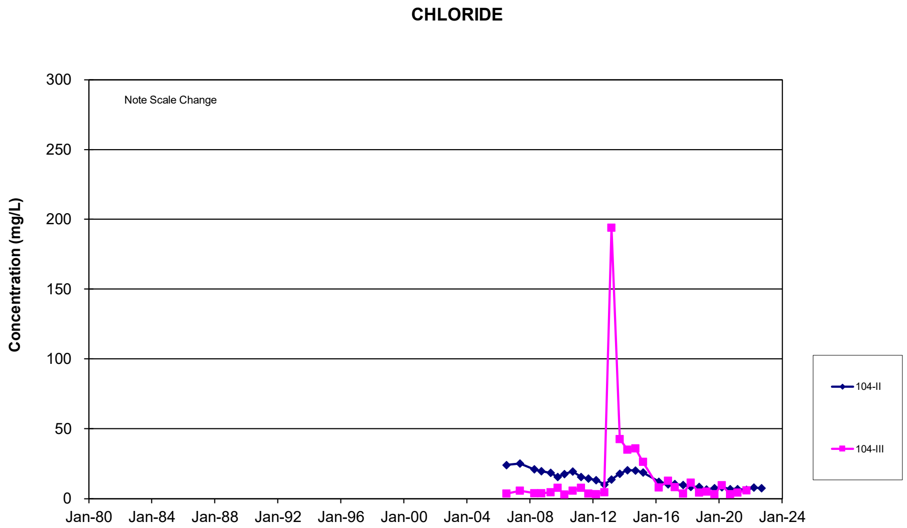
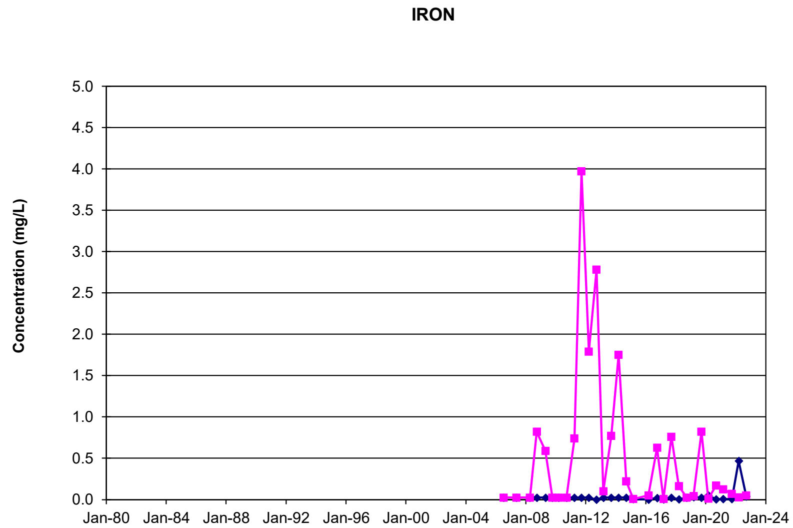
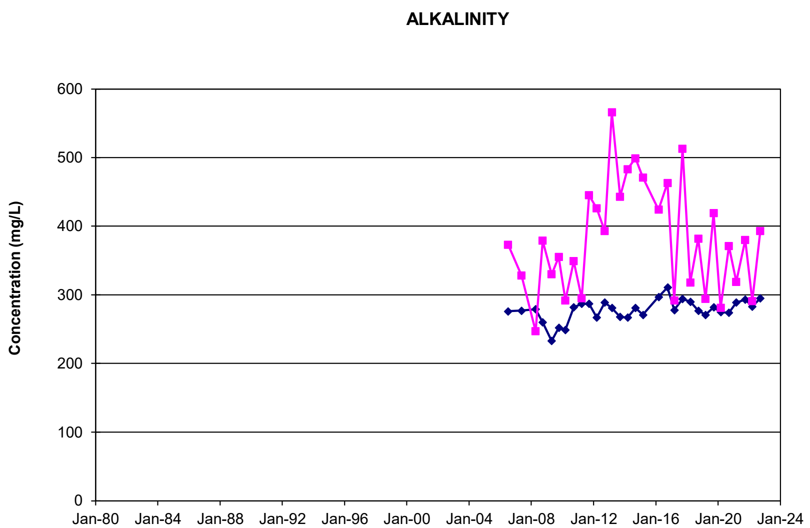


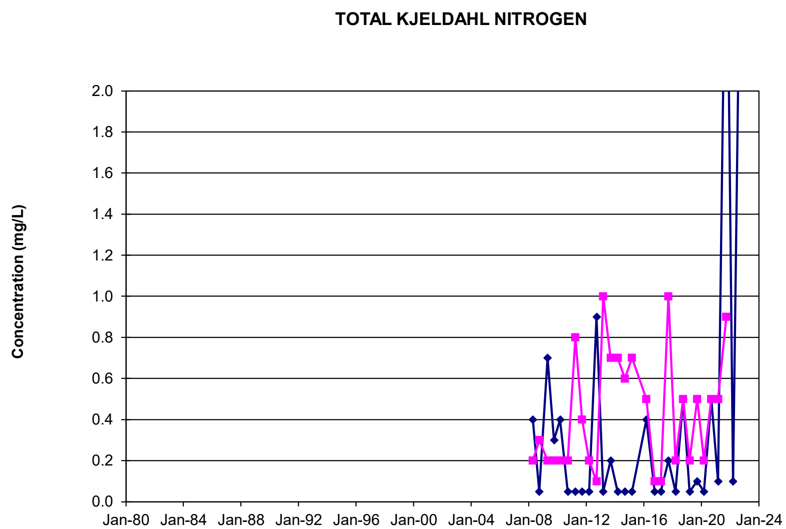
**Figure H.31**

**Time Concentration Graphs - Groundwater: Overburden**



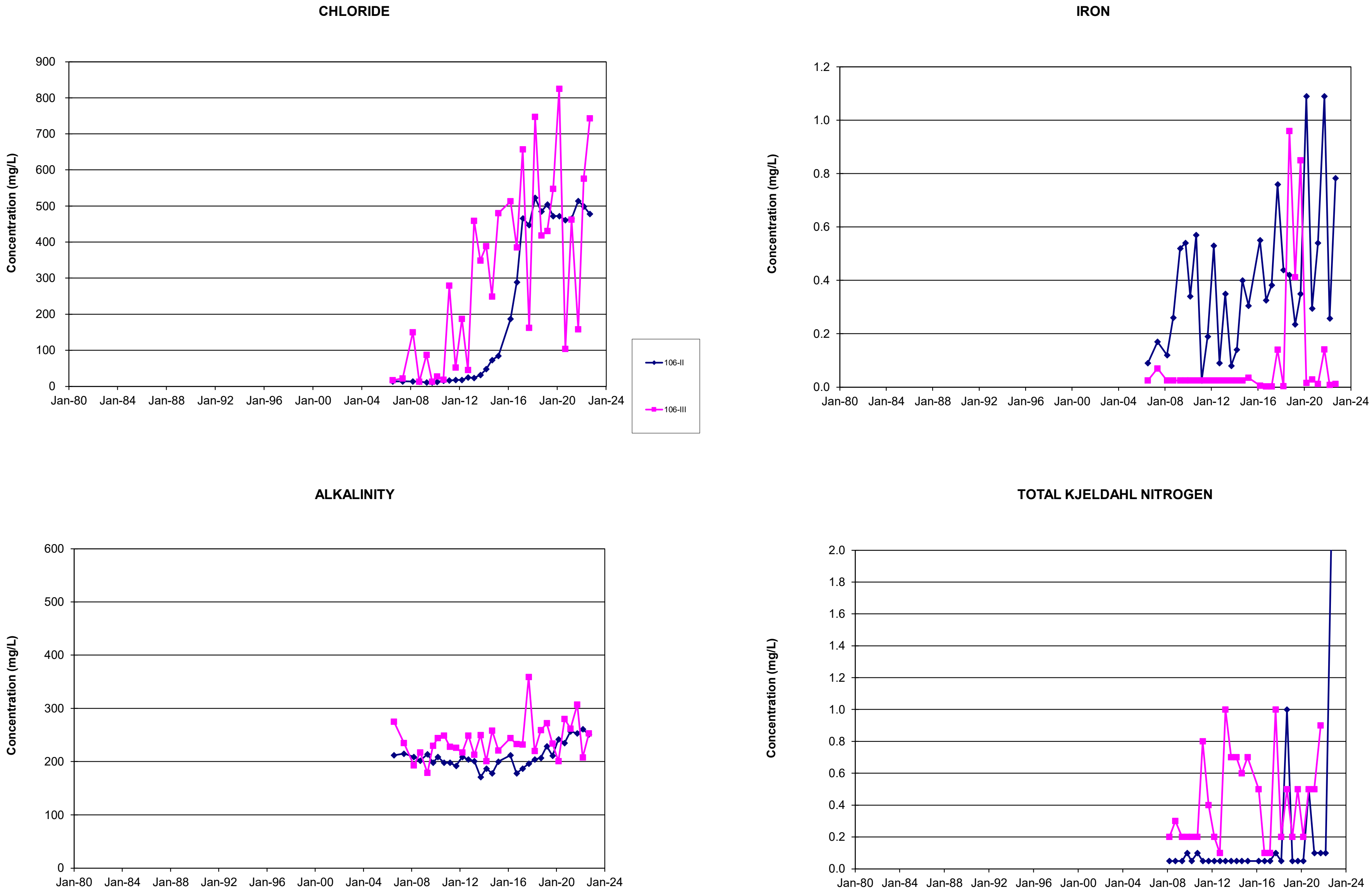



## Figure H.32

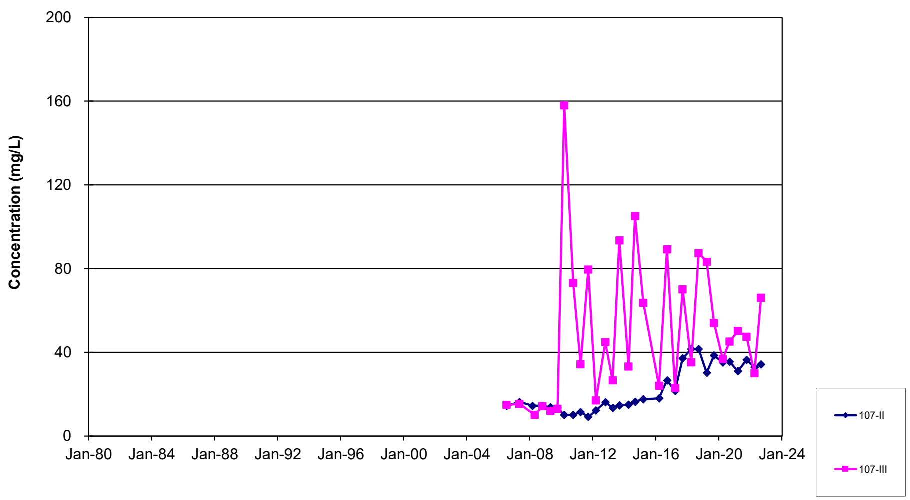
### Time Concentration Graphs - Groundwater: Overburden



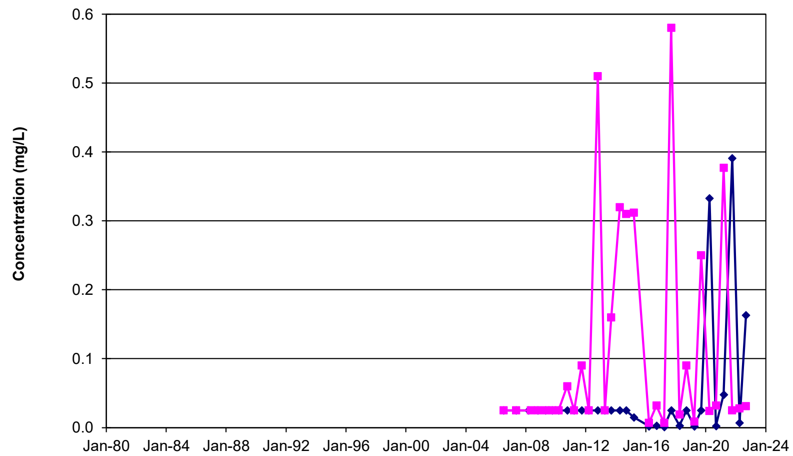
## Figure H.33

### Time Concentration Graphs - Groundwater: Overburden

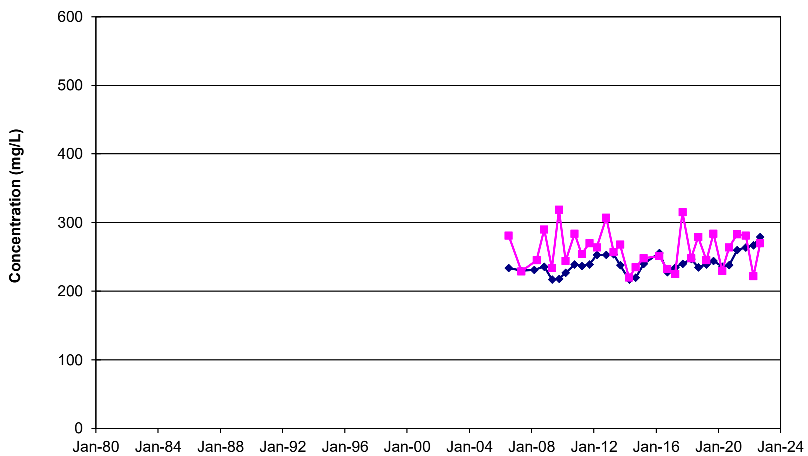
CHLORIDE



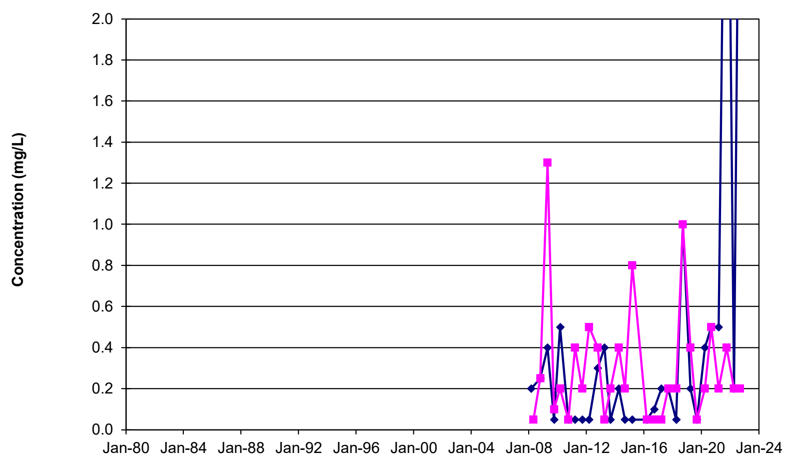

IRON




ALKALINITY



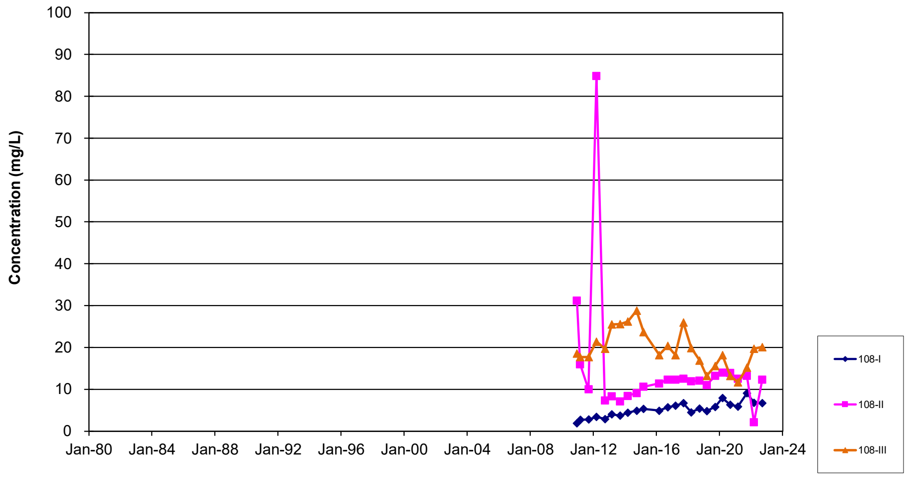

TOTAL KJELDAHL NITROGEN



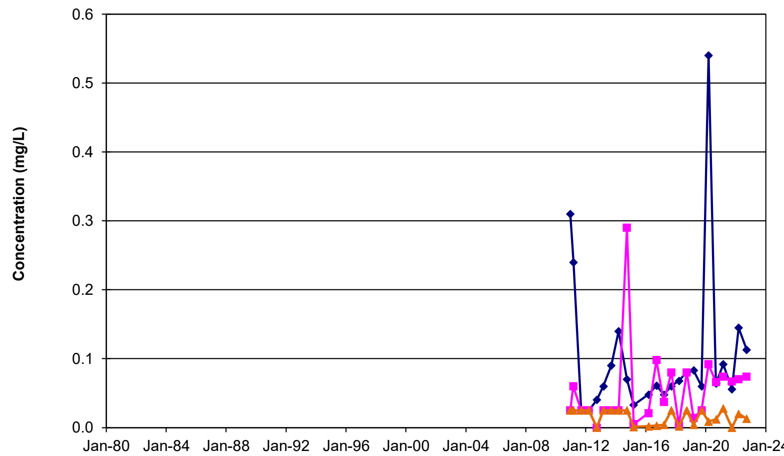
# Figure H.34

## Time Concentration Graphs - Groundwater: Overburden

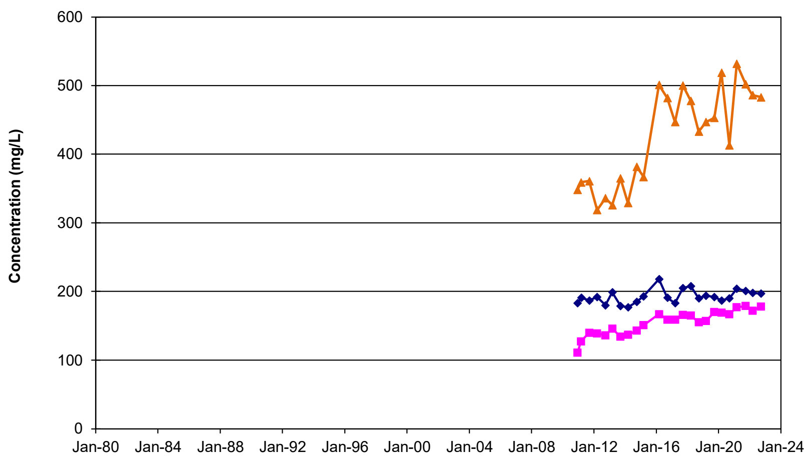
### CHLORIDE



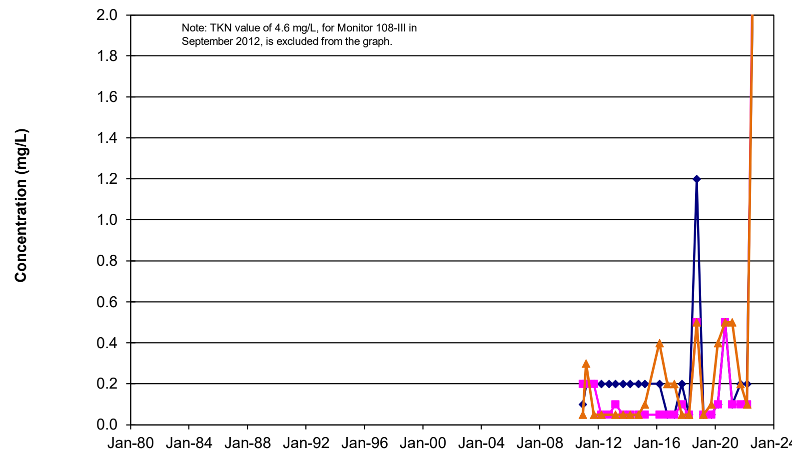

### IRON




### ALKALINITY

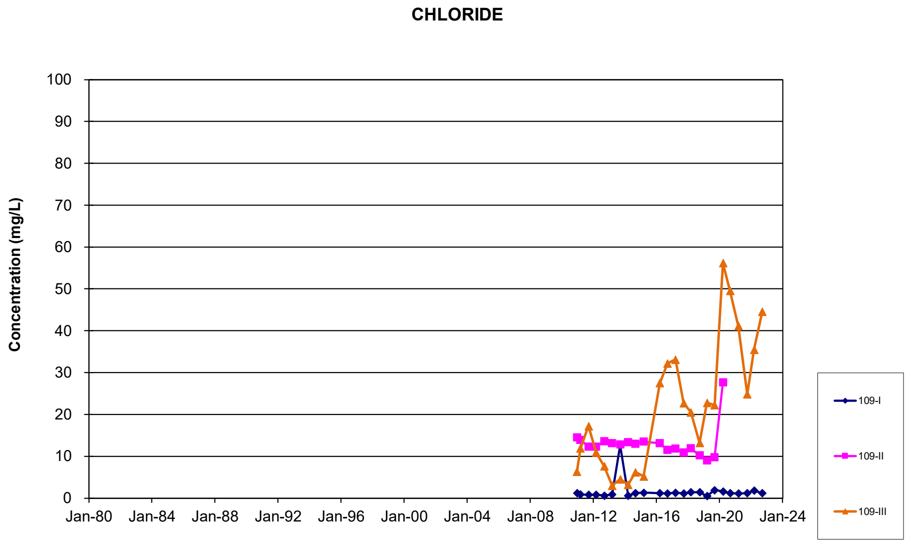


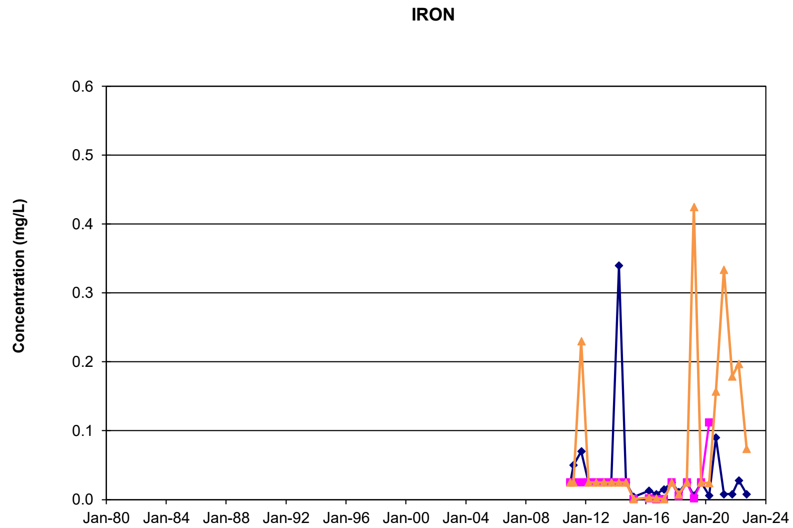

### TOTAL KJELDAHL NITROGEN

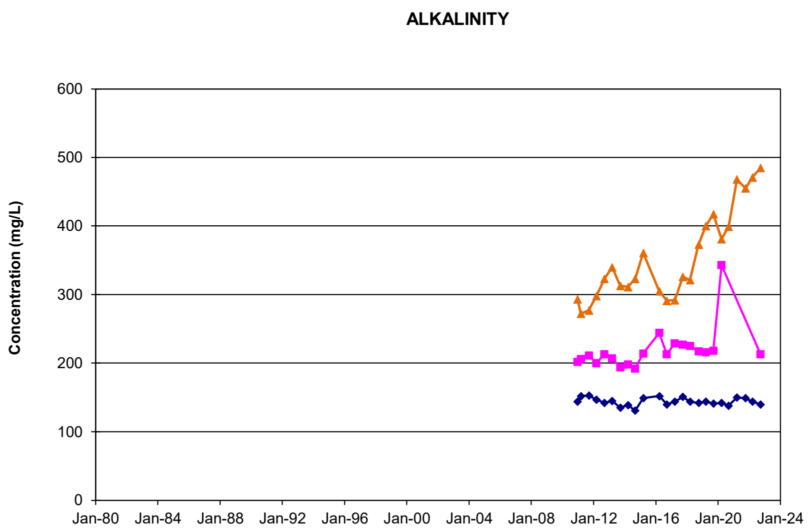


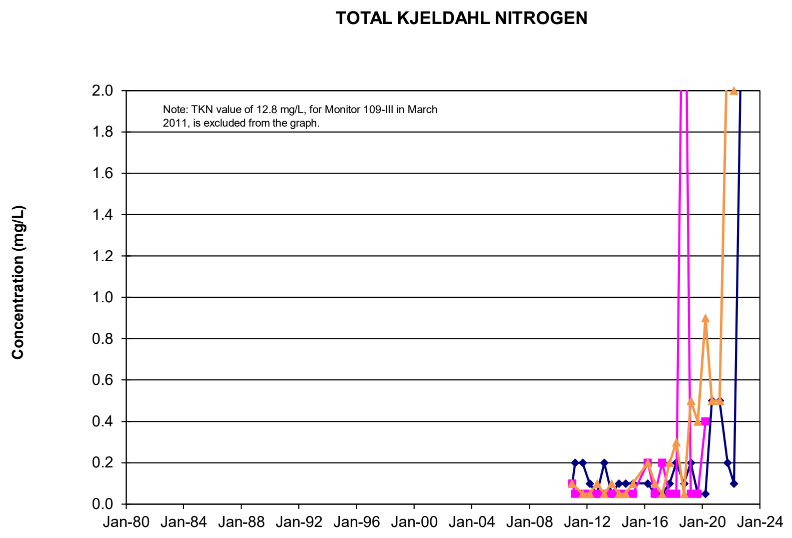
## Figure H.35

### Time Concentration Graphs - Groundwater: Overburden



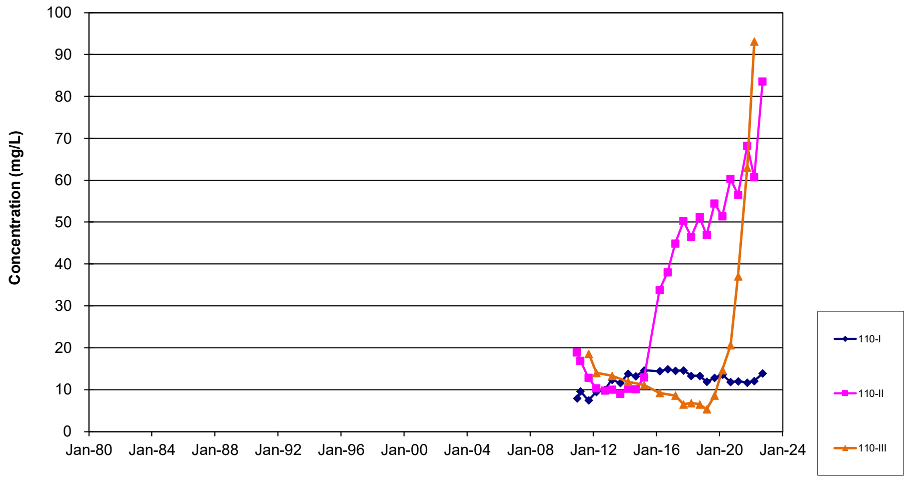



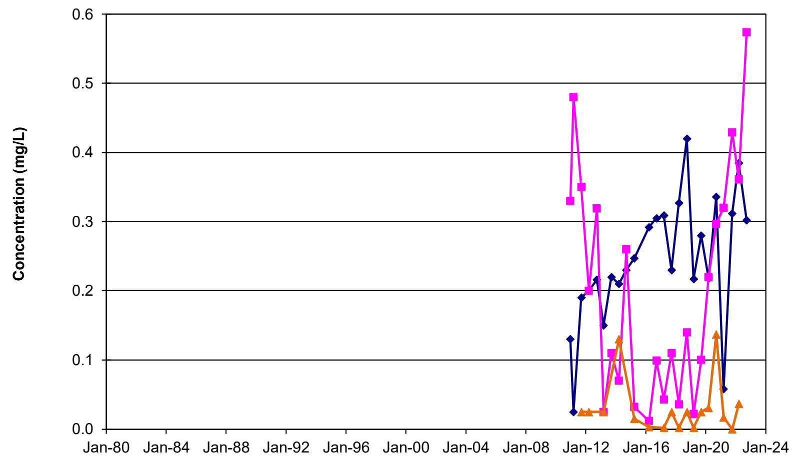
## Figure H.36

### Time Concentration Graphs - Groundwater: Overburden

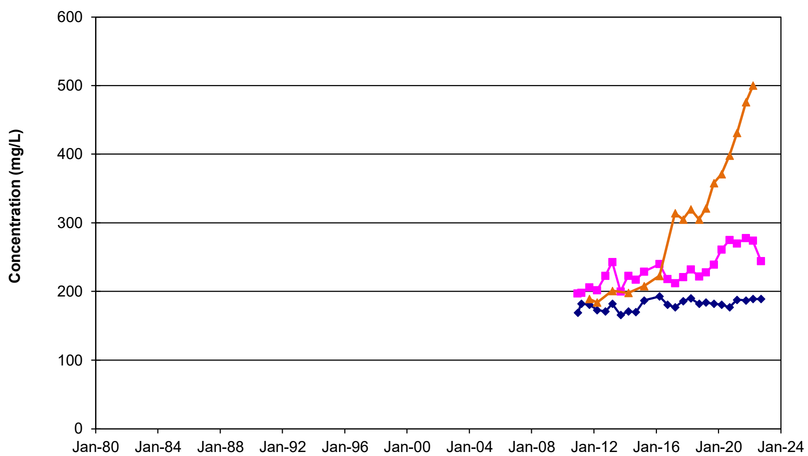
CHLORIDE



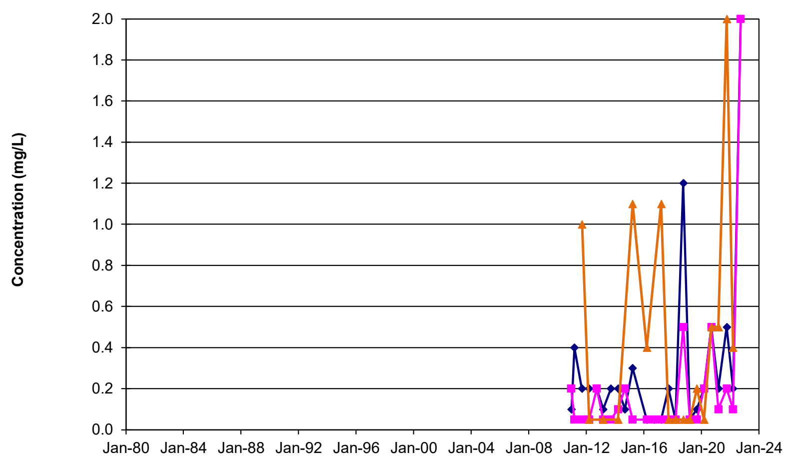

IRON




ALKALINITY

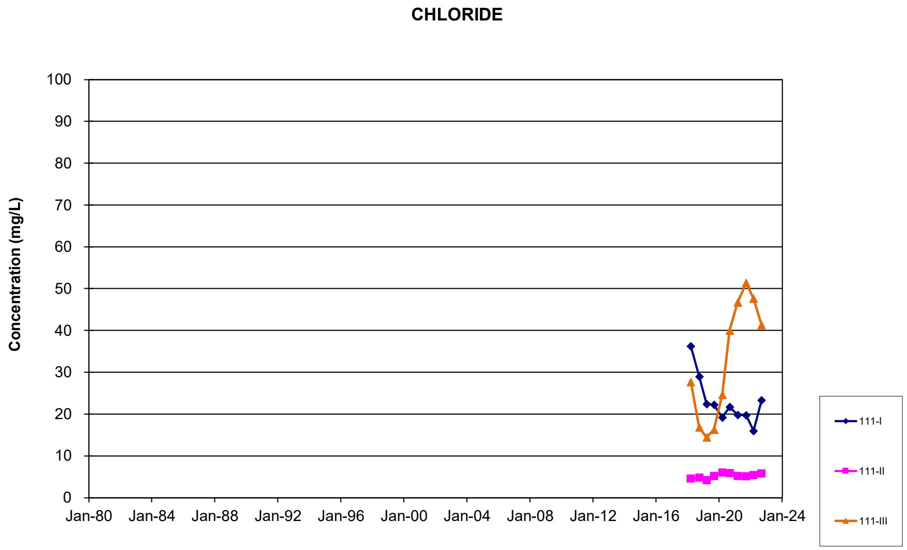


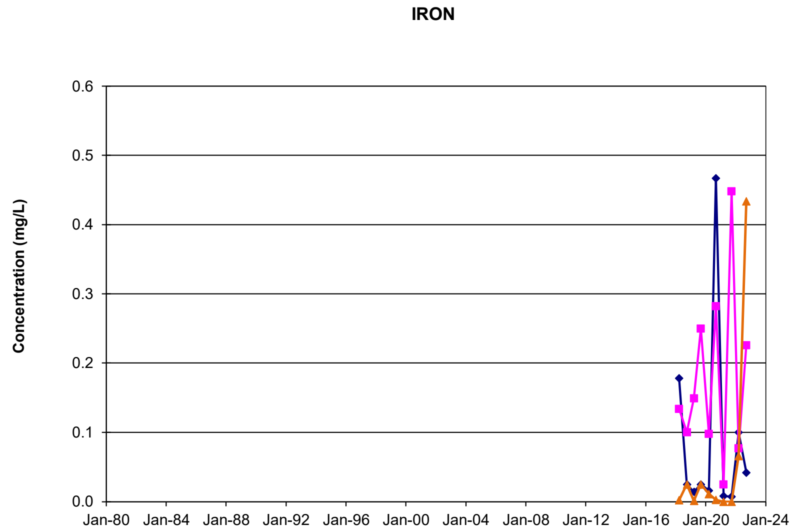

TOTAL KJELDAHL NITROGEN

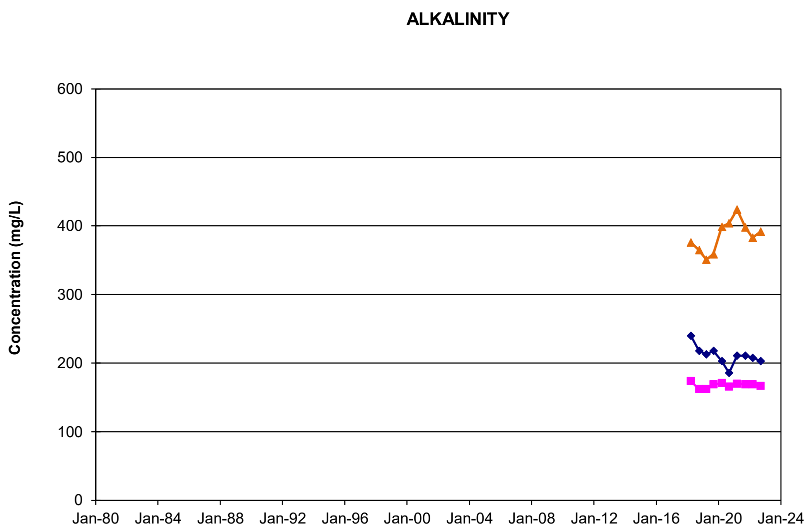


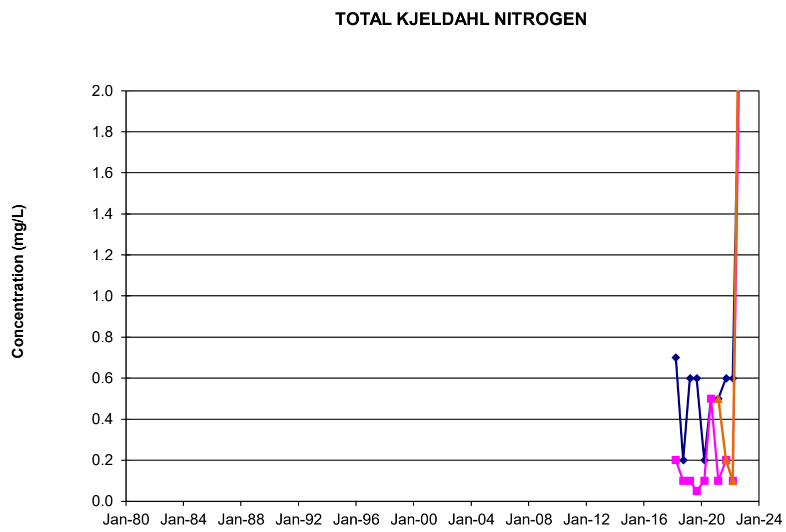
# Figure H.37

## Time Concentration Graphs - Groundwater: Overburden



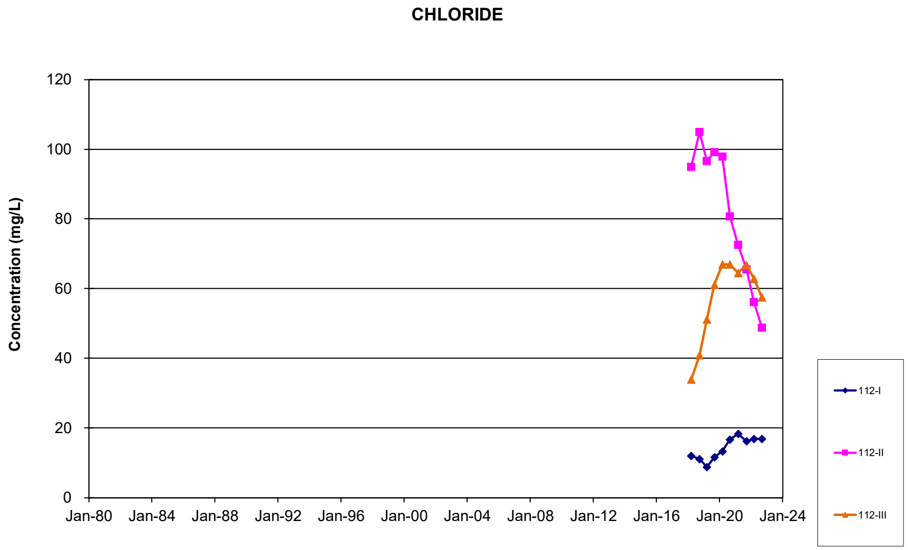



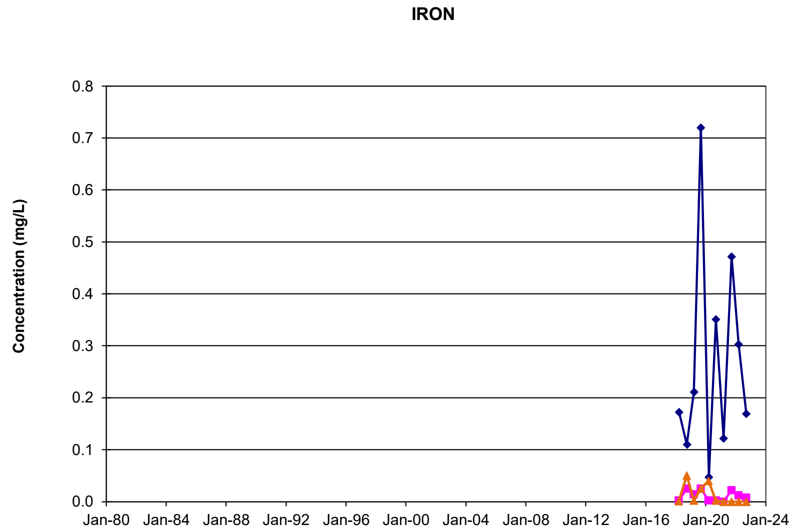



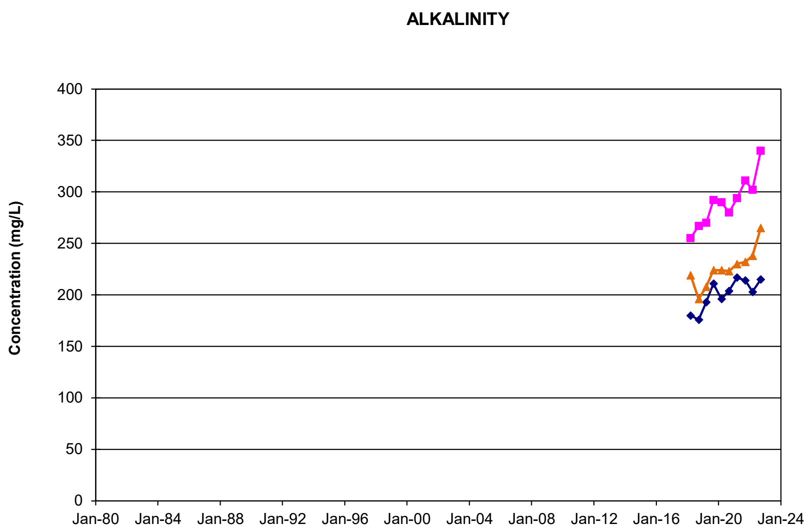



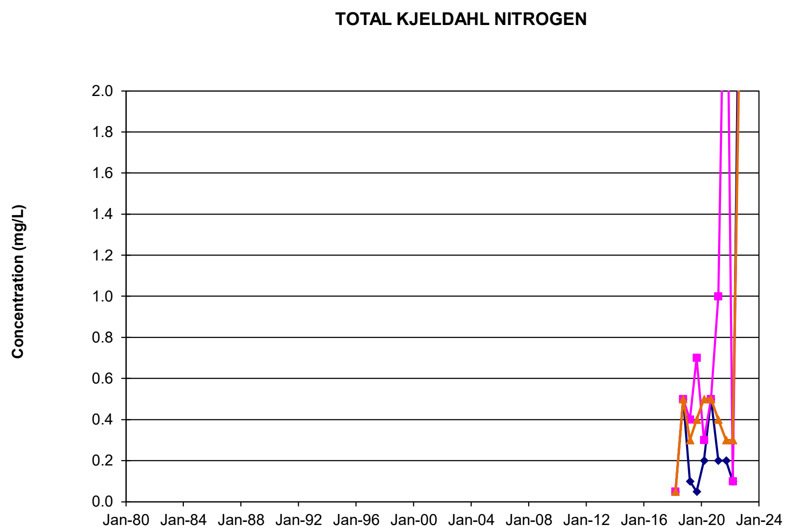
## Figure H.38

### Time Concentration Graphs - Groundwater: Overburden



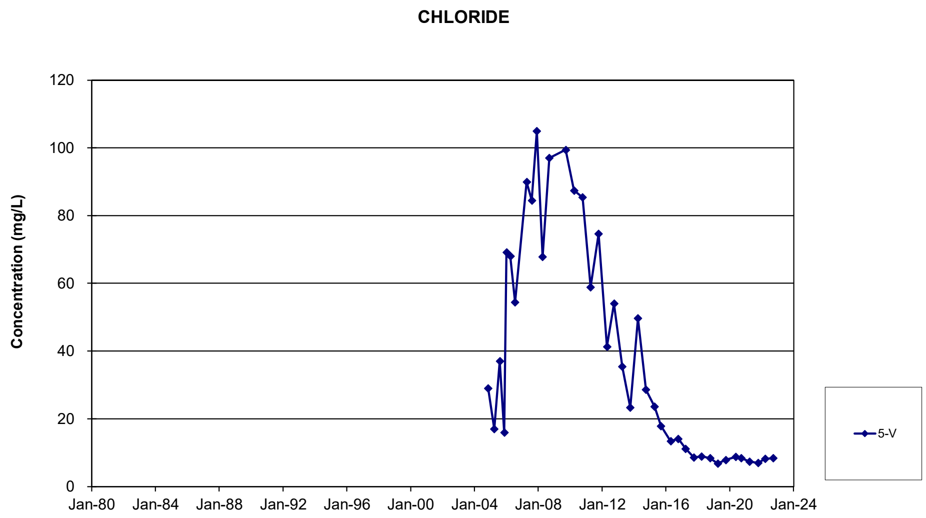



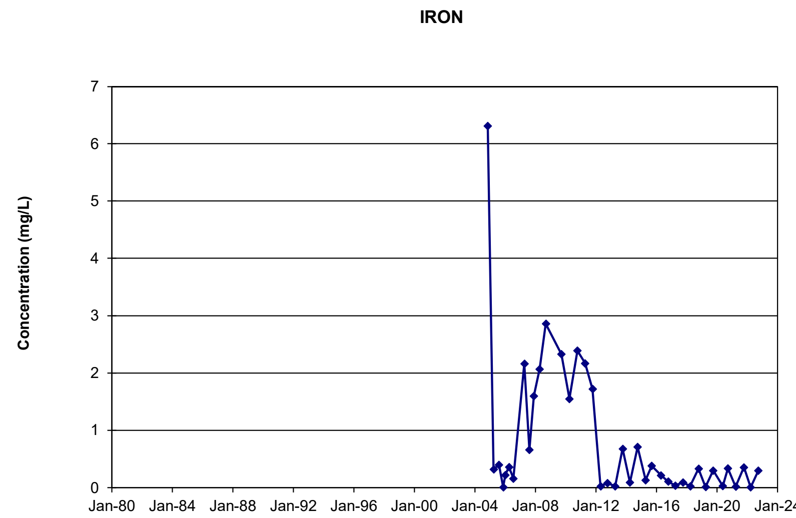



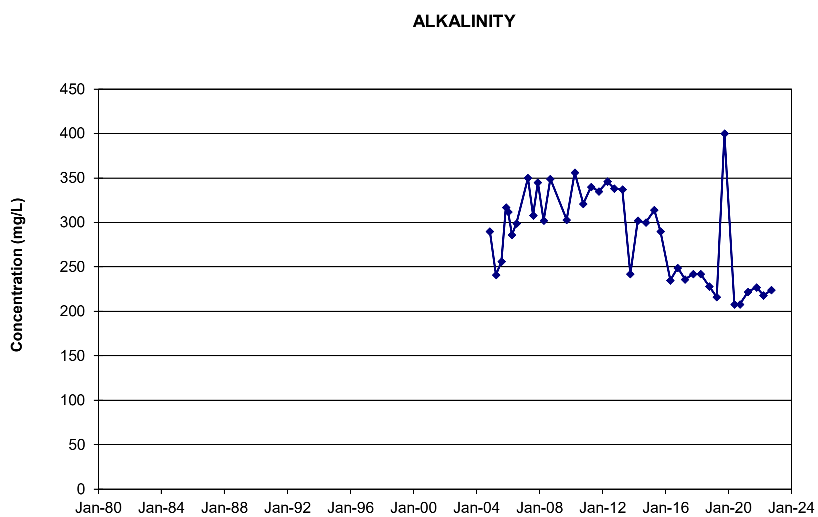



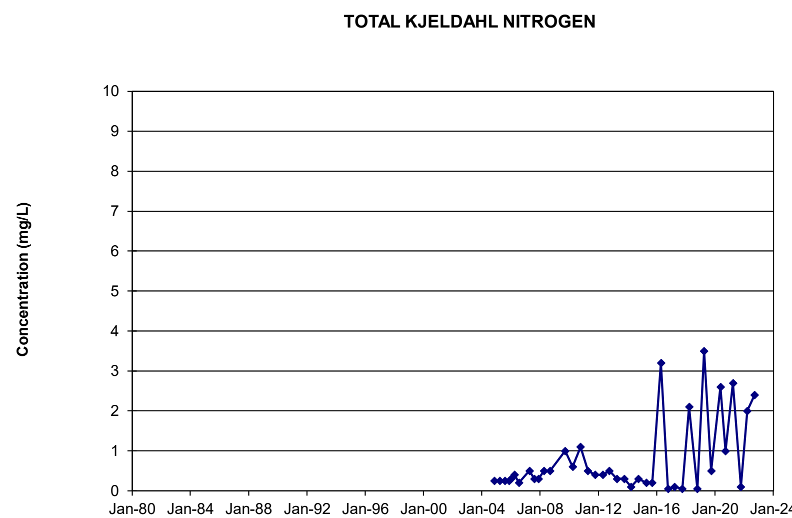
# Figure H.39

## Time Concentration Graphs - Groundwater: Shallow Bedrock



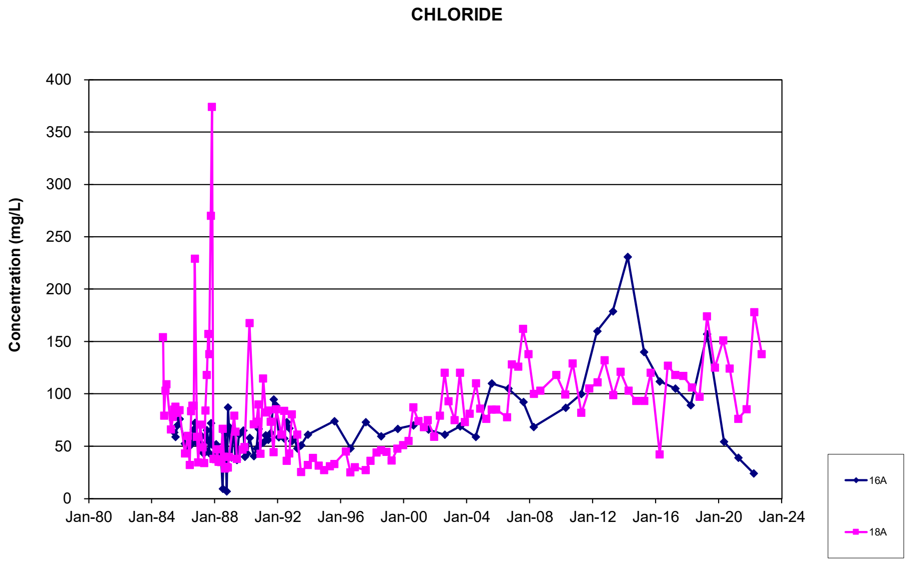



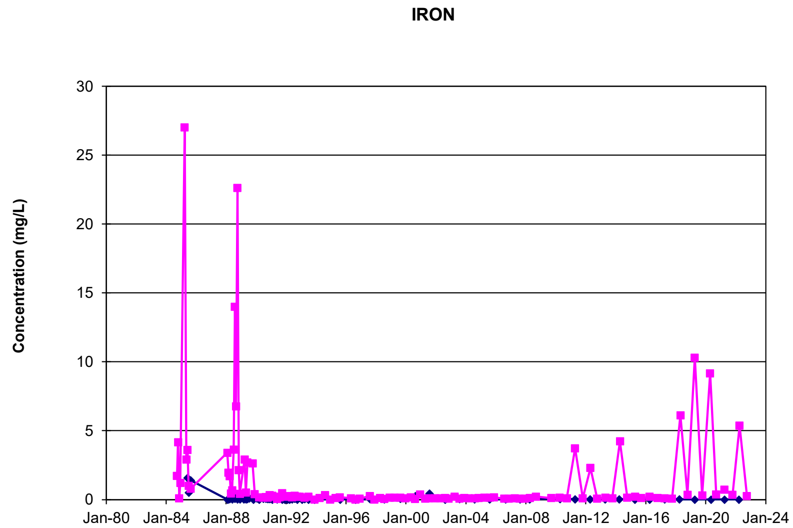



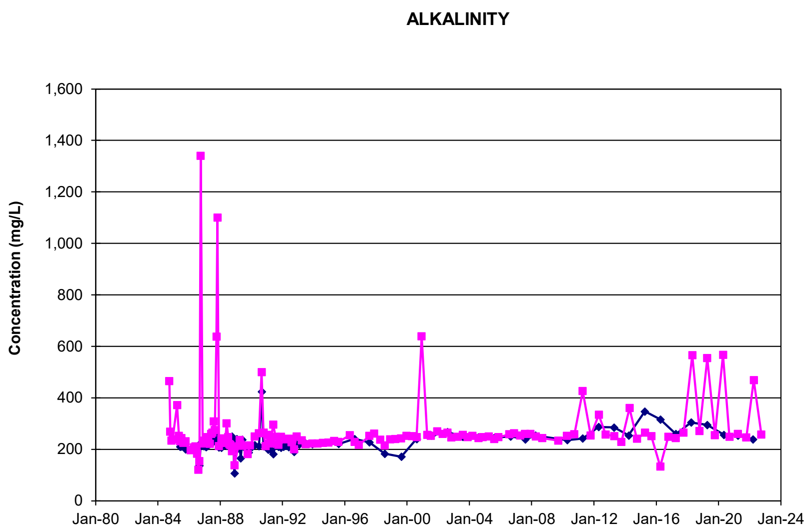



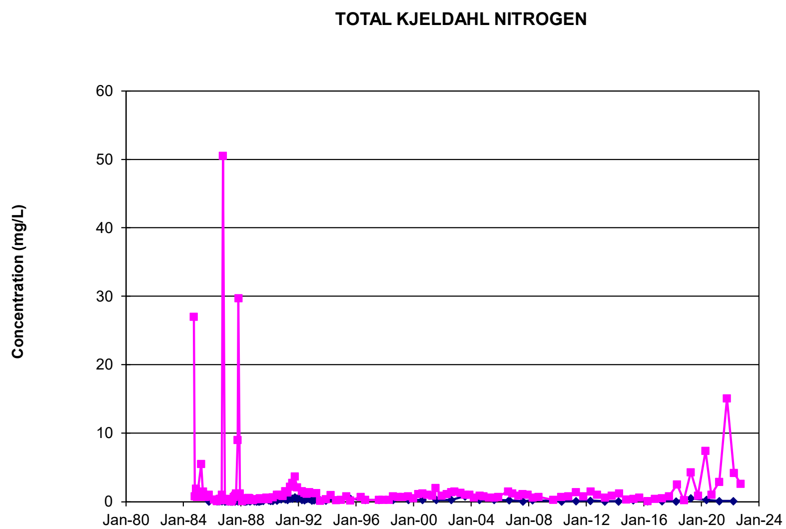
## Figure H.40

### Time Concentration Graphs - Groundwater: Shallow Bedrock



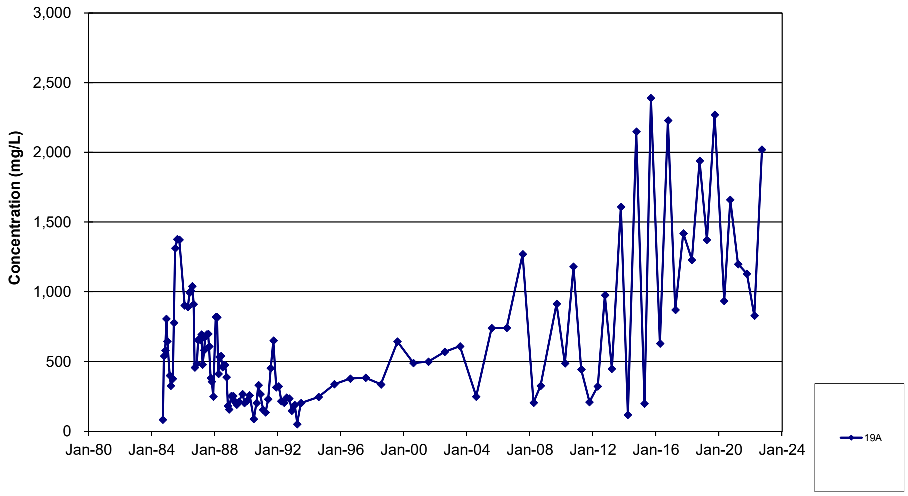



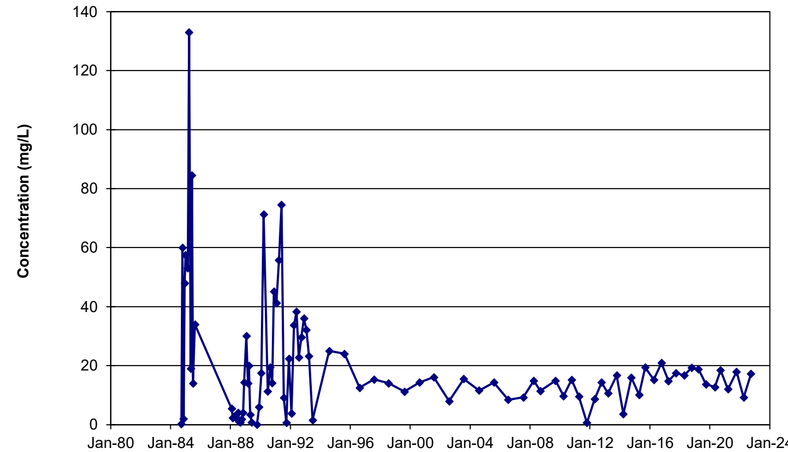
# Figure H.41

## Time Concentration Graphs - Groundwater: Shallow Bedrock

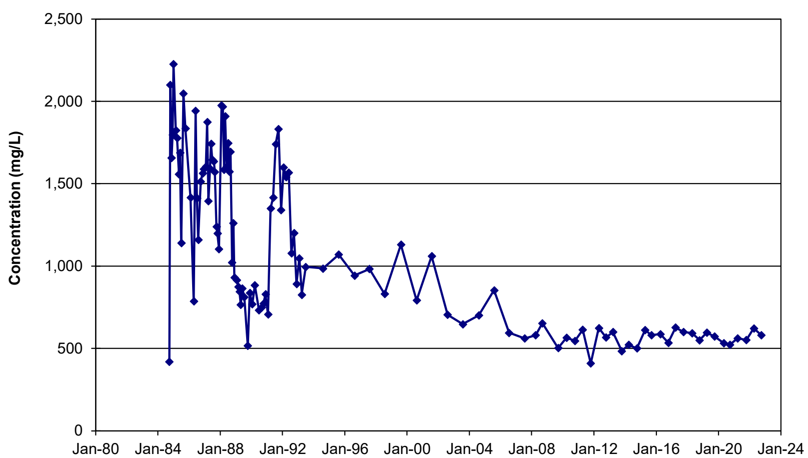
CHLORIDE



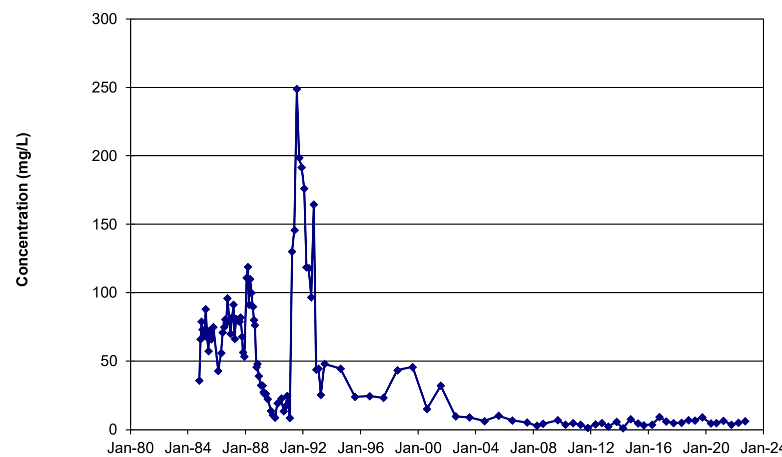

IRON




ALKALINITY



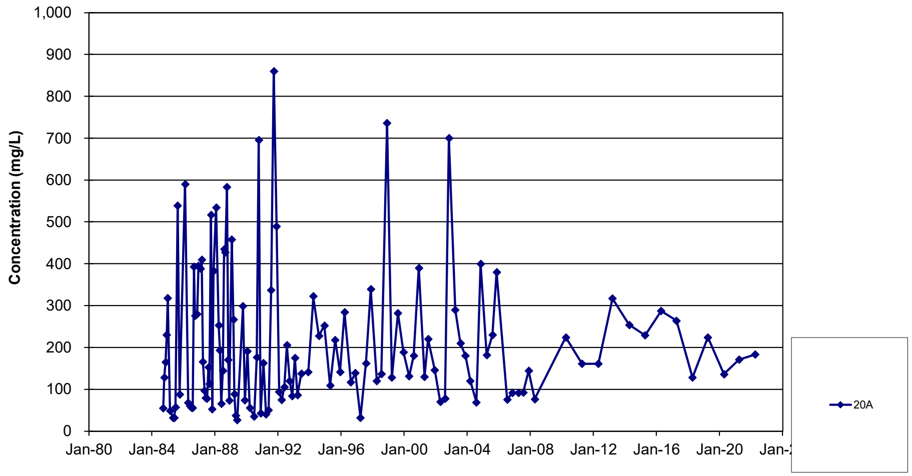

TOTAL KJELDAHL NITROGEN



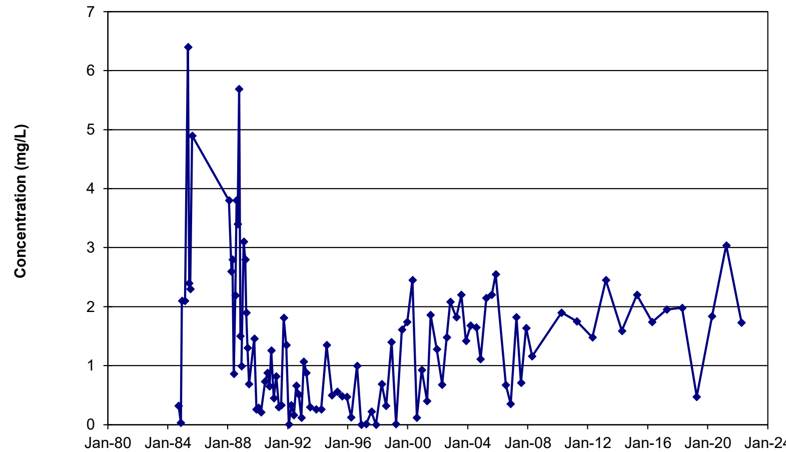
## Figure H.42

### Time Concentration Graphs - Groundwater: Shallow Bedrock

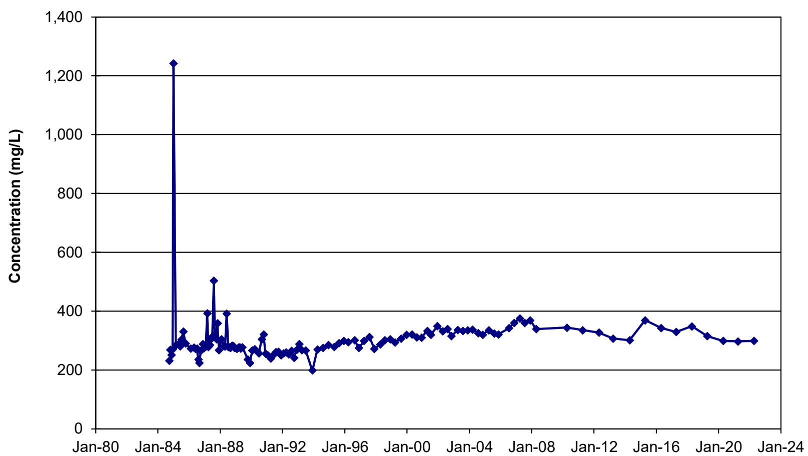
CHLORIDE



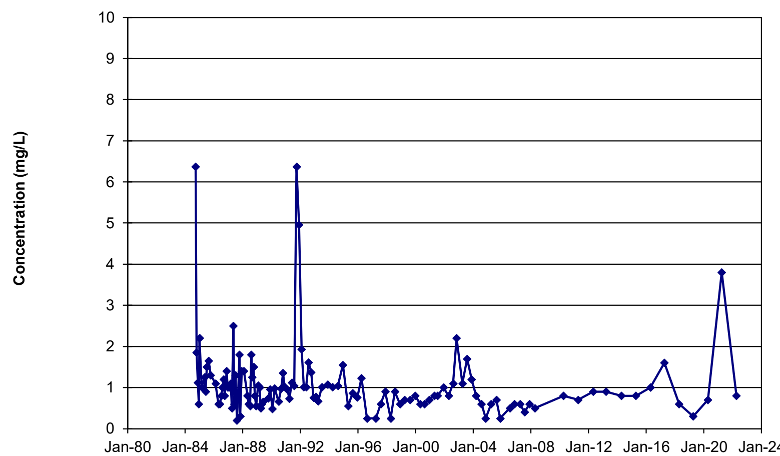

IRON




ALKALINITY



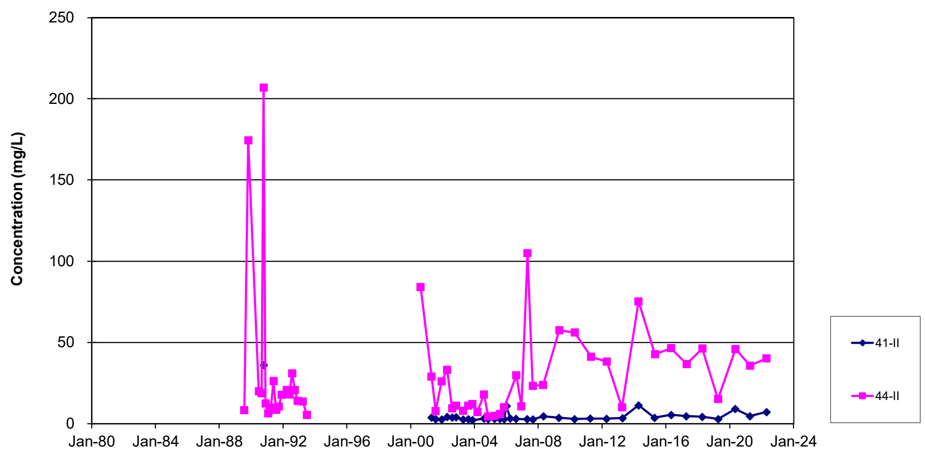

TOTAL KJELDAHL NITROGEN



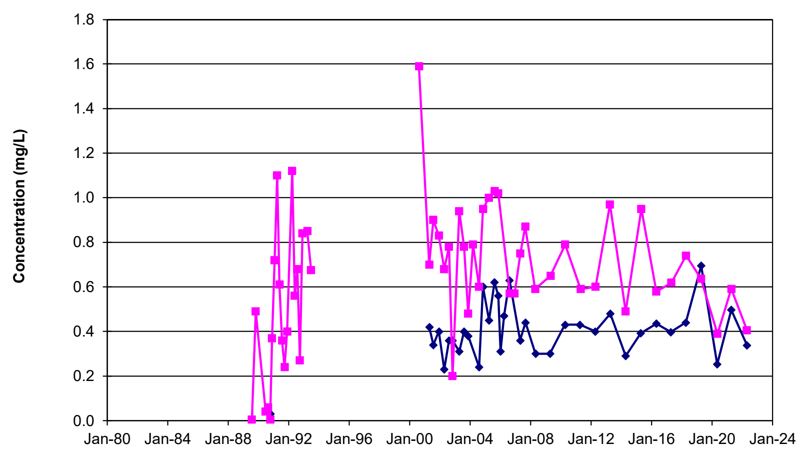
## Figure H.43

### Time Concentration Graphs - Groundwater: Shallow Bedrock

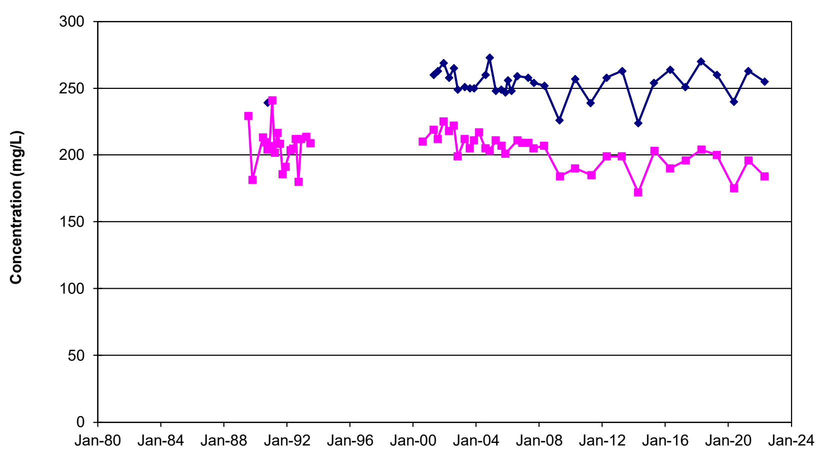
CHLORIDE



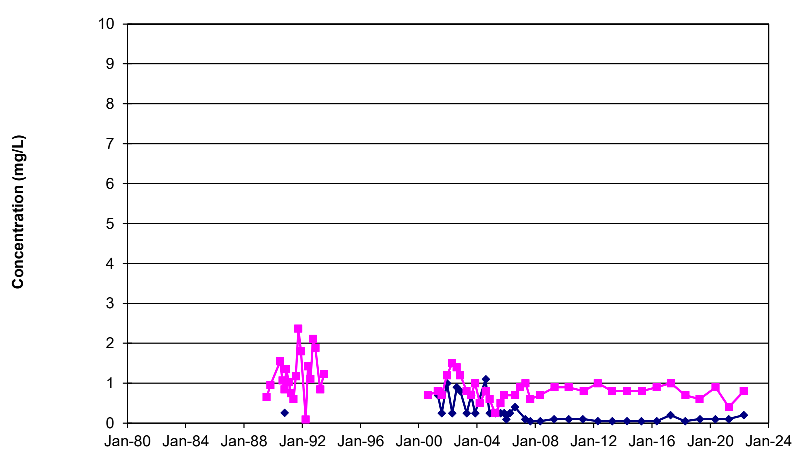

IRON




ALKALINITY

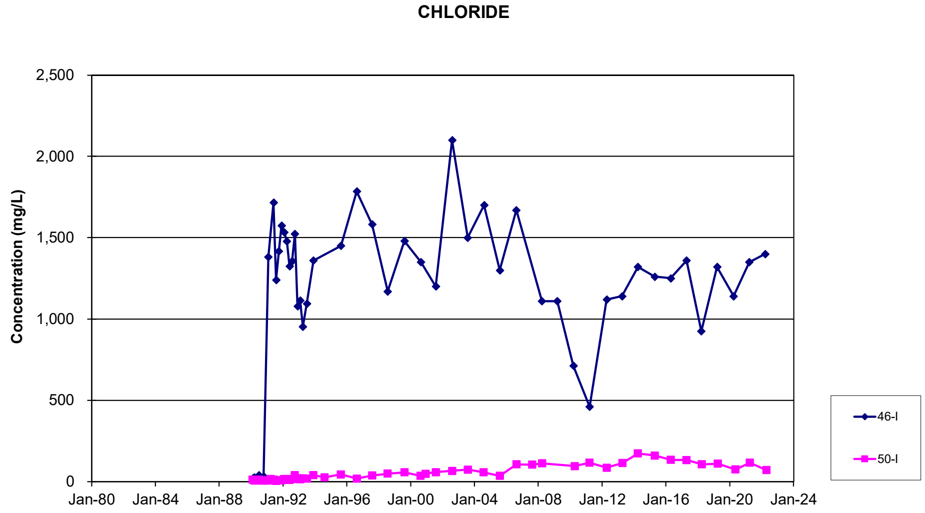


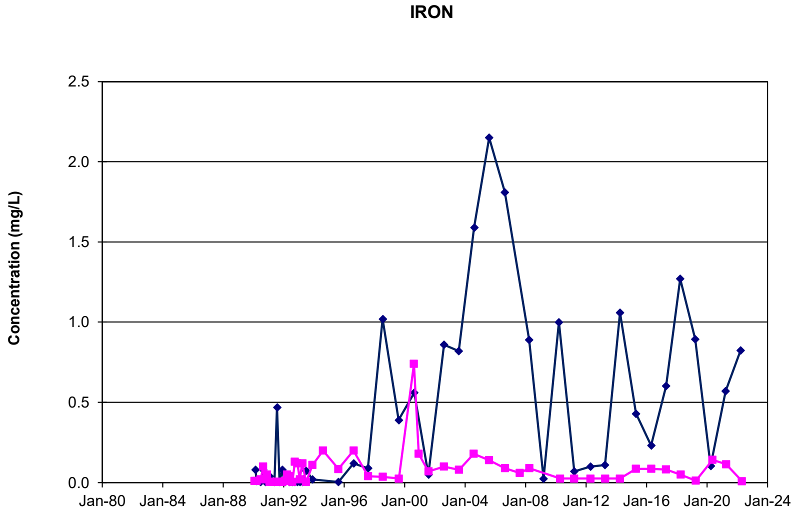

TOTAL KJELDAHL NITROGEN

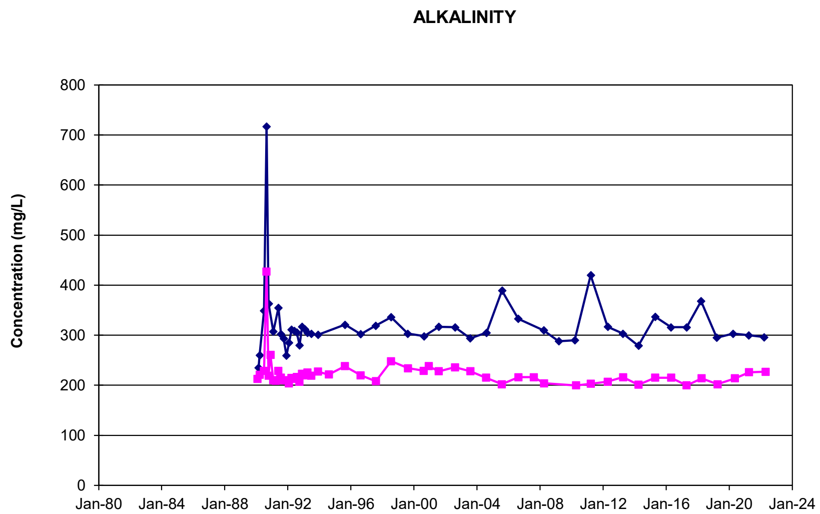


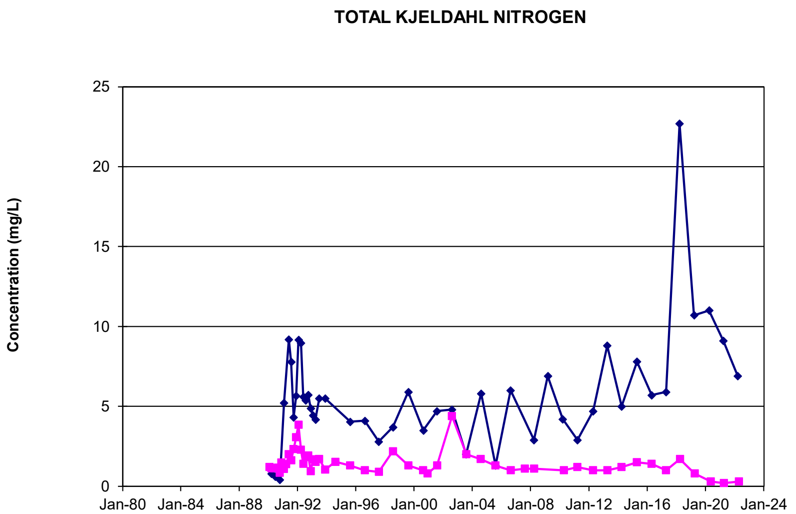
## Figure H.44

### Time Concentration Graphs - Groundwater: Shallow Bedrock



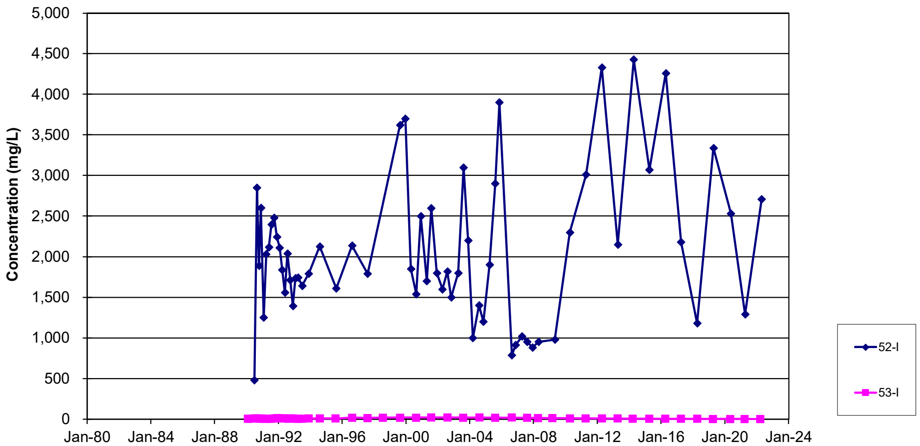



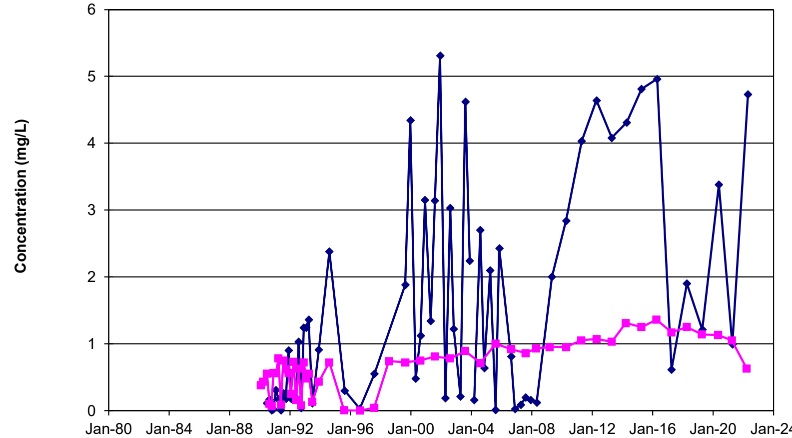
# Figure H.45

## Time Concentration Graphs - Groundwater: Shallow Bedrock

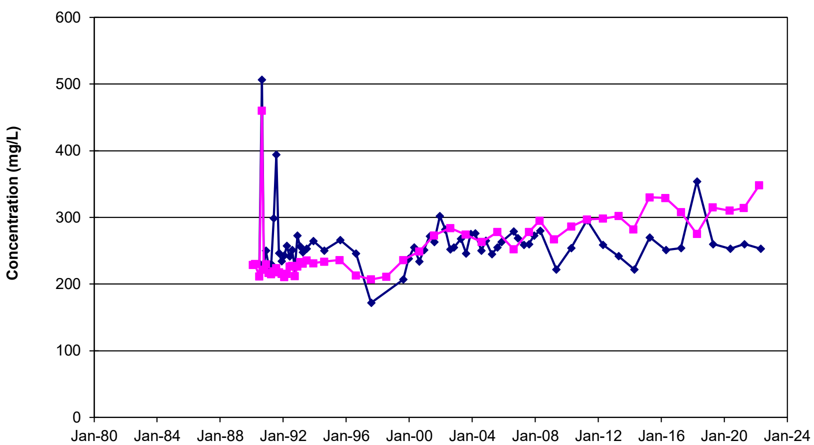
### CHLORIDE




### IRON




### ALKALINITY




### TOTAL KJELDAHL NITROGEN

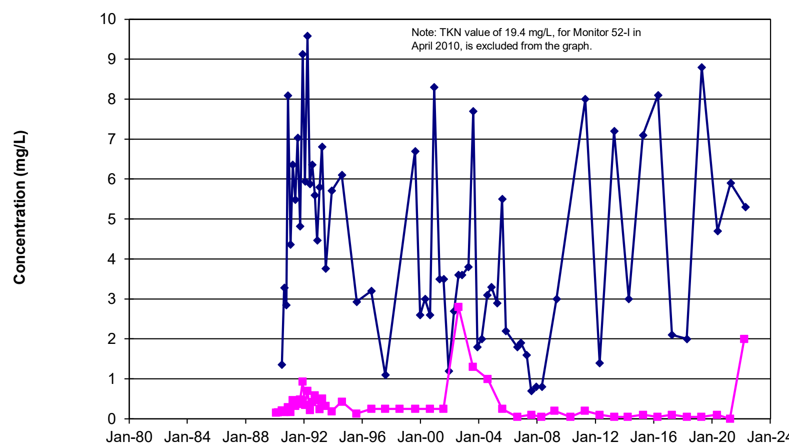
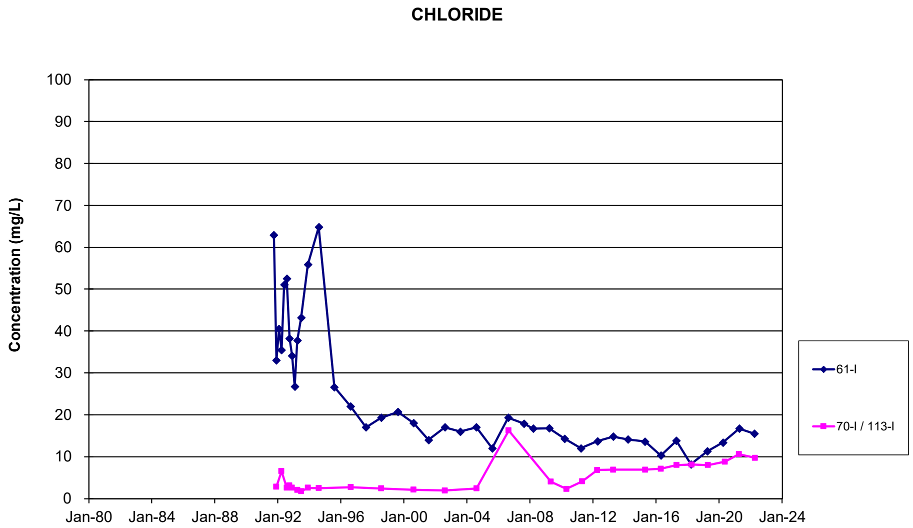
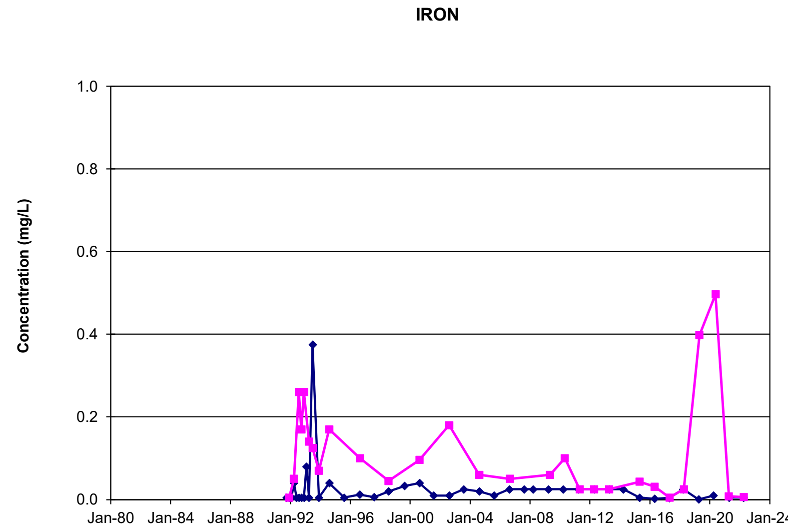
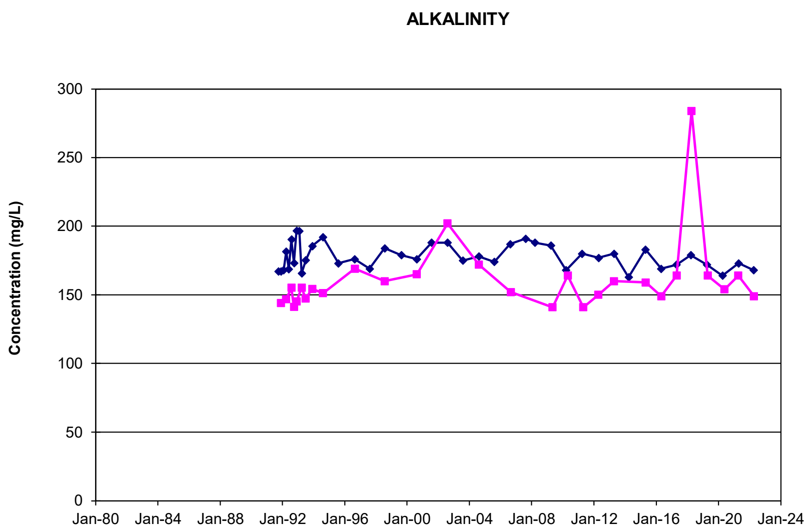


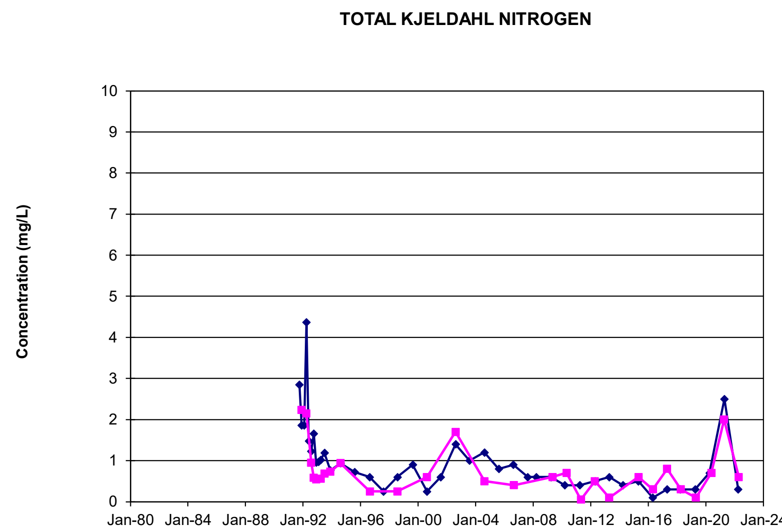
**Figure H.46**

**Time Concentration Graphs - Groundwater: Shallow Bedrock**



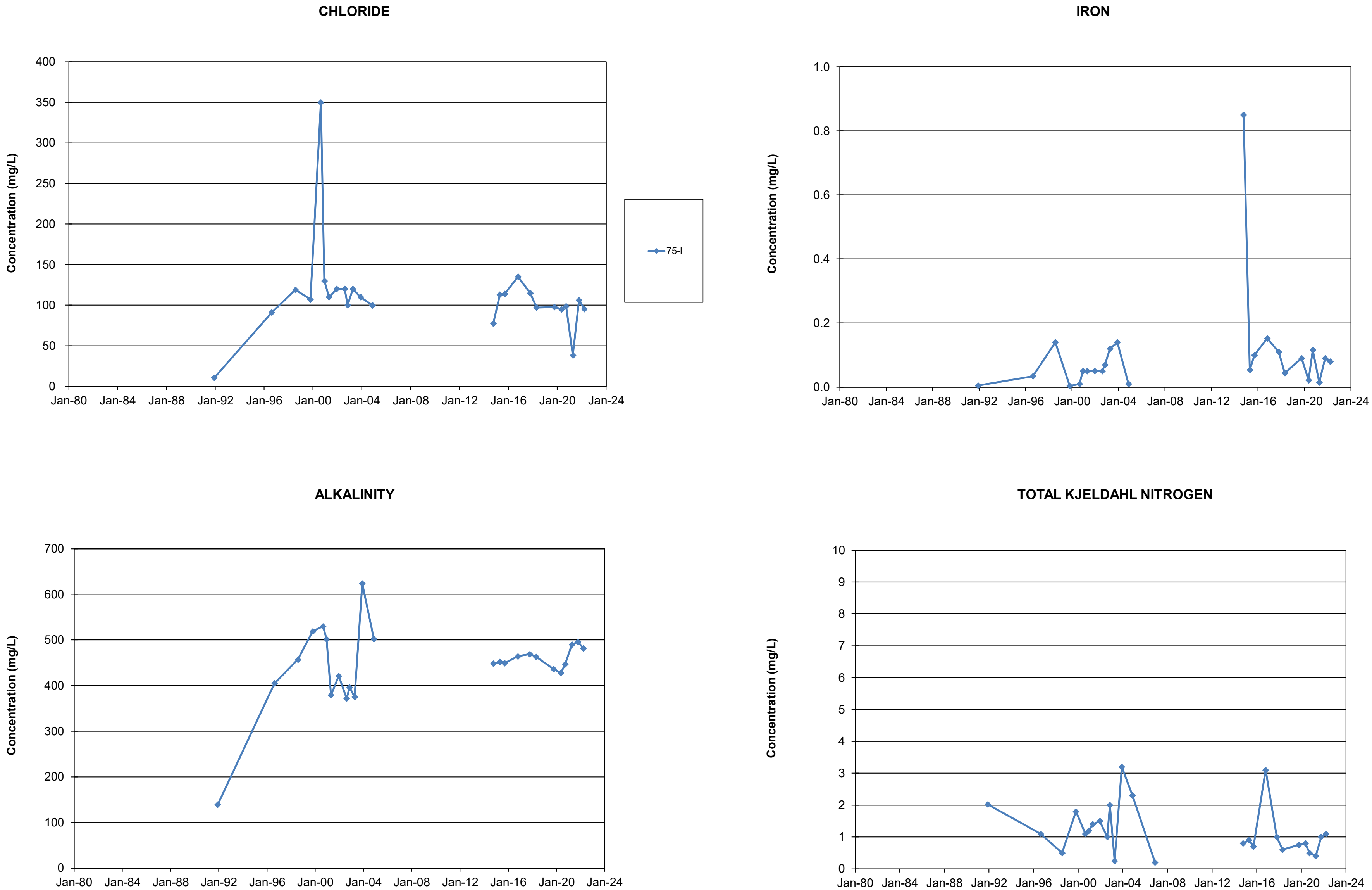



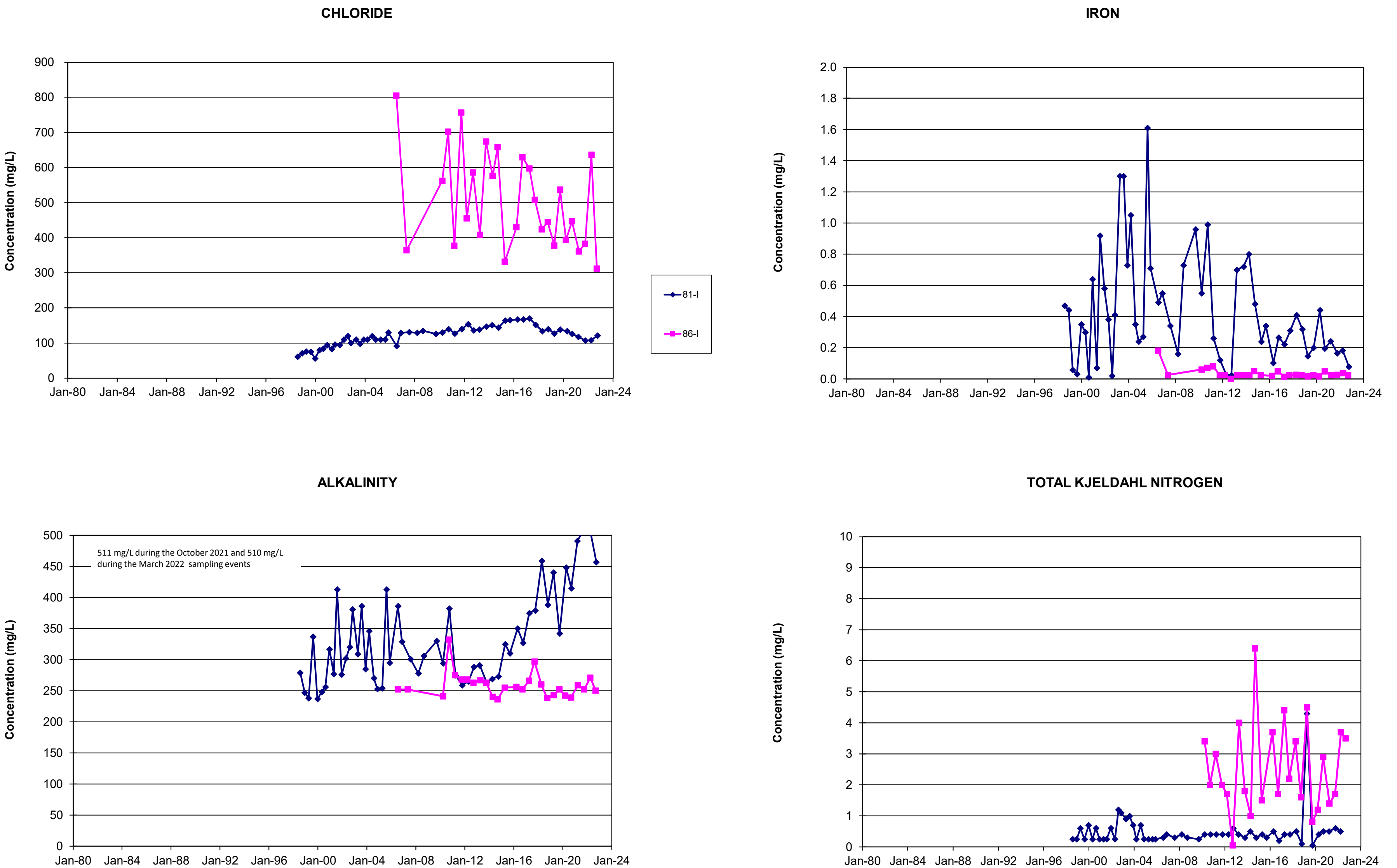
## Figure H.47

### Time Concentration Graphs - Groundwater: Shallow Bedrock



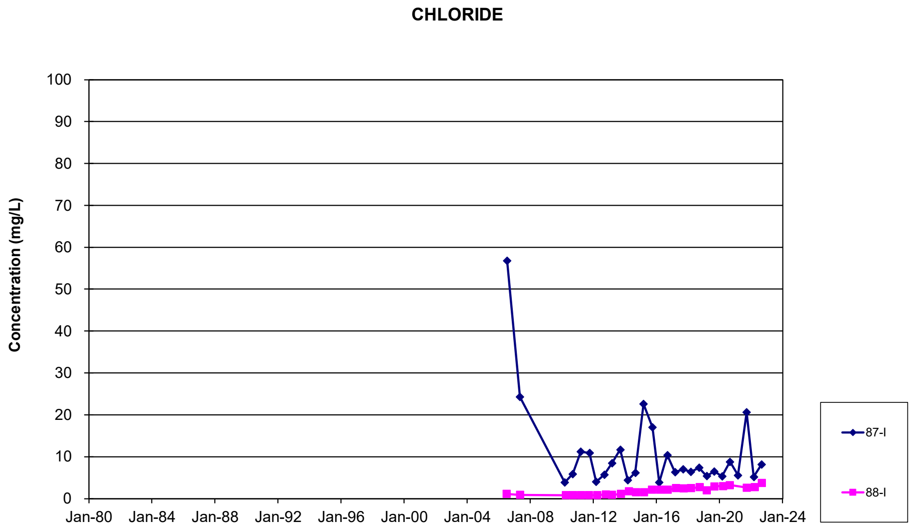
## Figure H.48

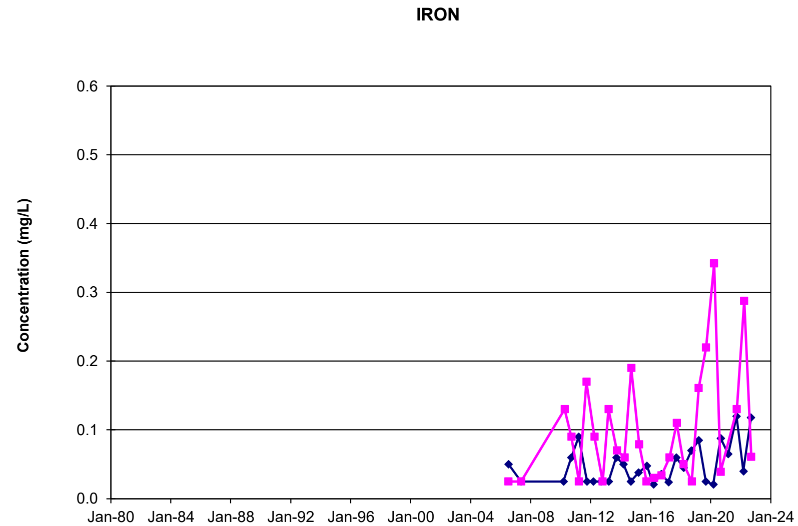
### Time Concentration Graphs - Groundwater: Shallow Bedrock

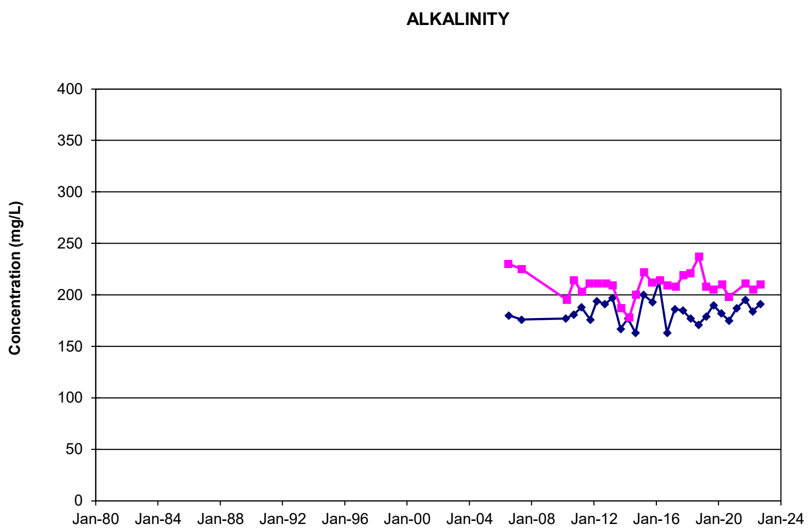


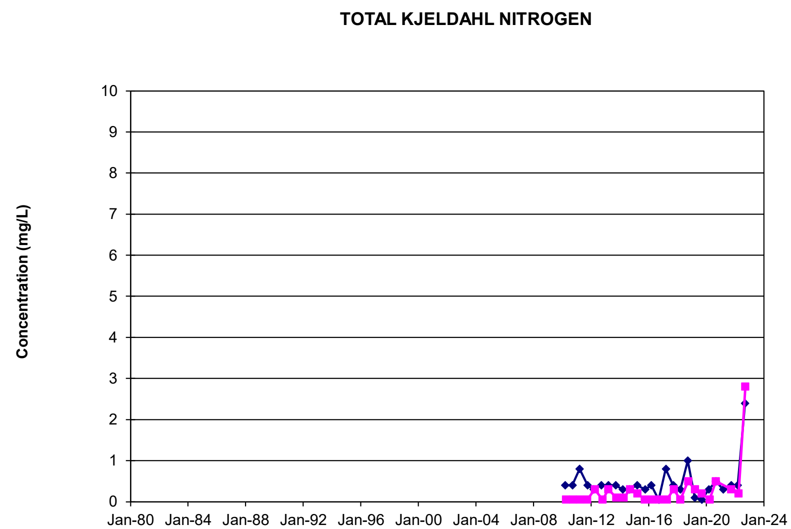
# Figure H.49

## Time Concentration Graphs - Groundwater: Shallow Bedrock



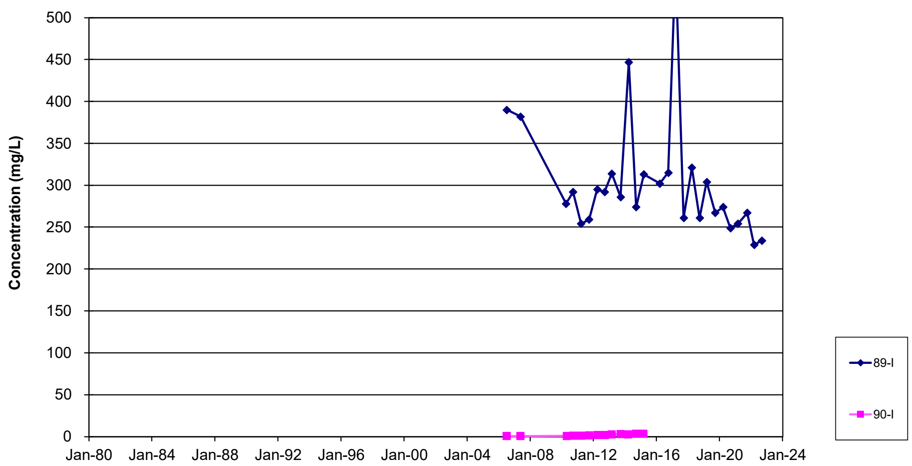



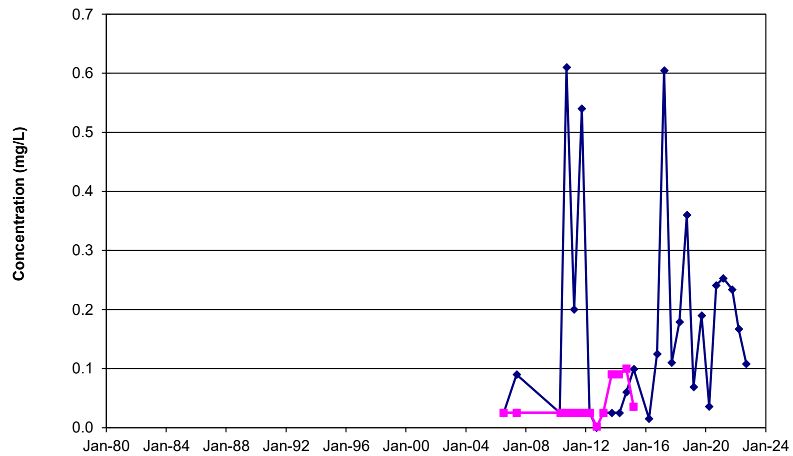
## Figure H.50

### Time Concentration Graphs - Groundwater: Shallow Bedrock

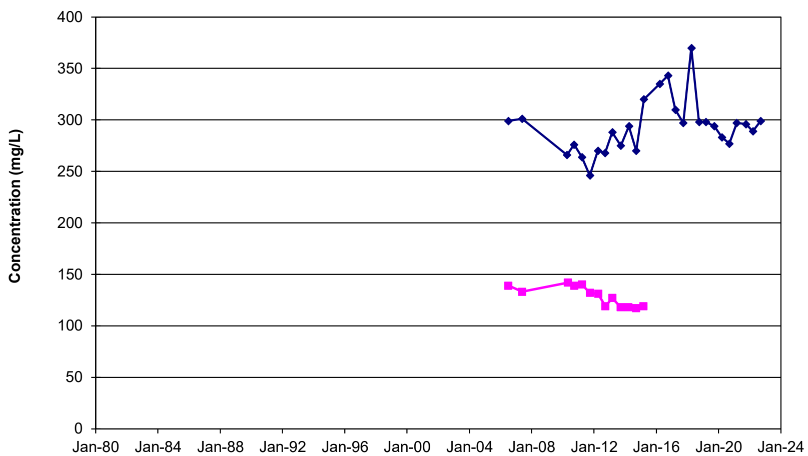
CHLORIDE



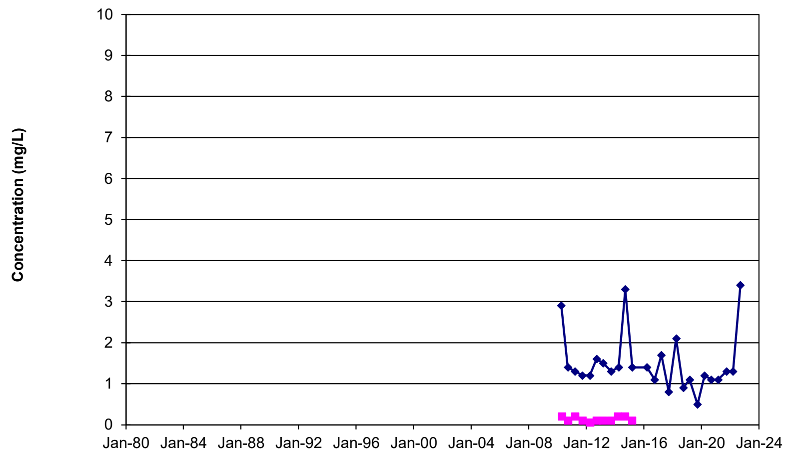

IRON




ALKALINITY



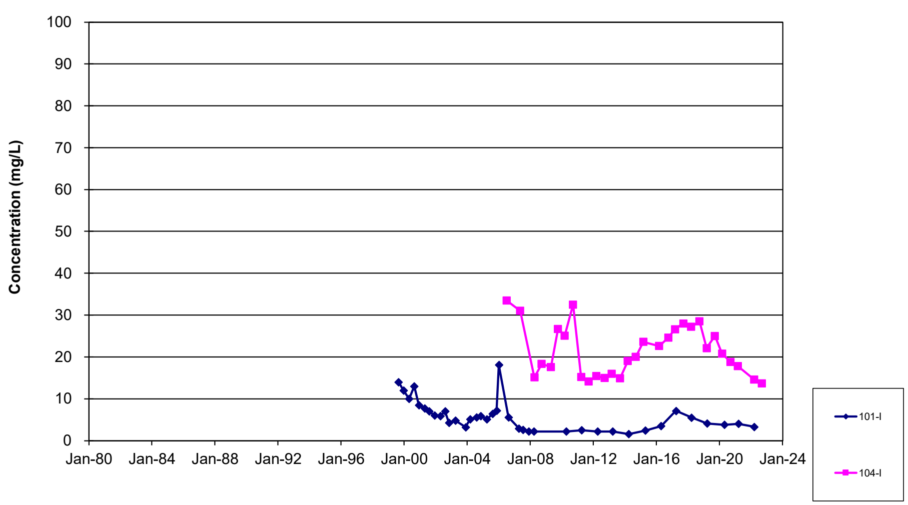

TOTAL KJELDAHL NITROGEN



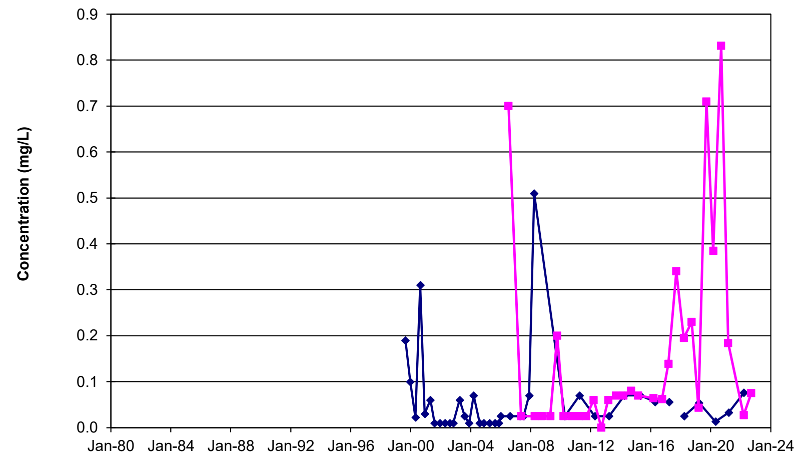
# Figure H.51

## Time Concentration Graphs - Groundwater: Shallow Bedrock

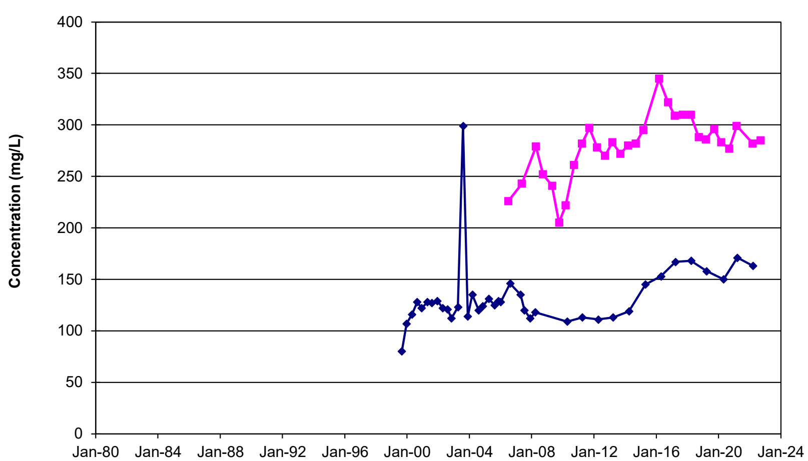
### CHLORIDE



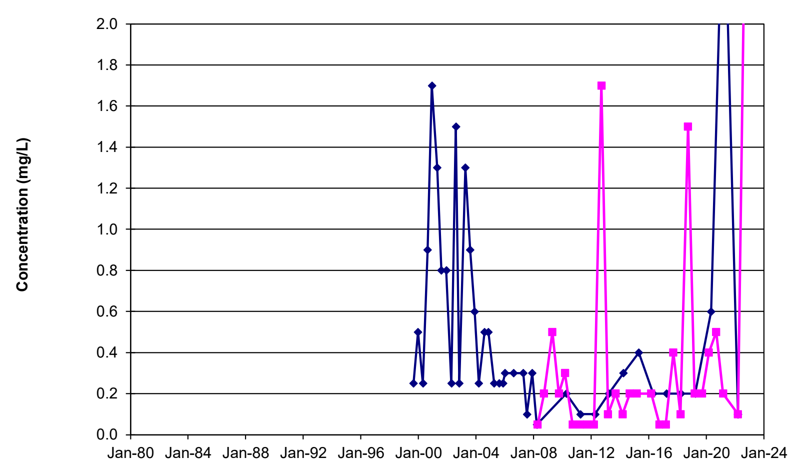

### IRON




### ALKALINITY

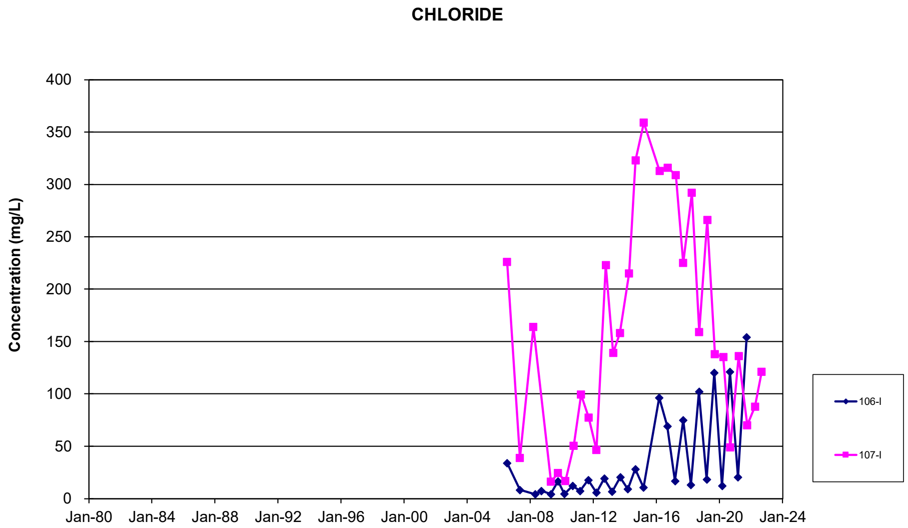


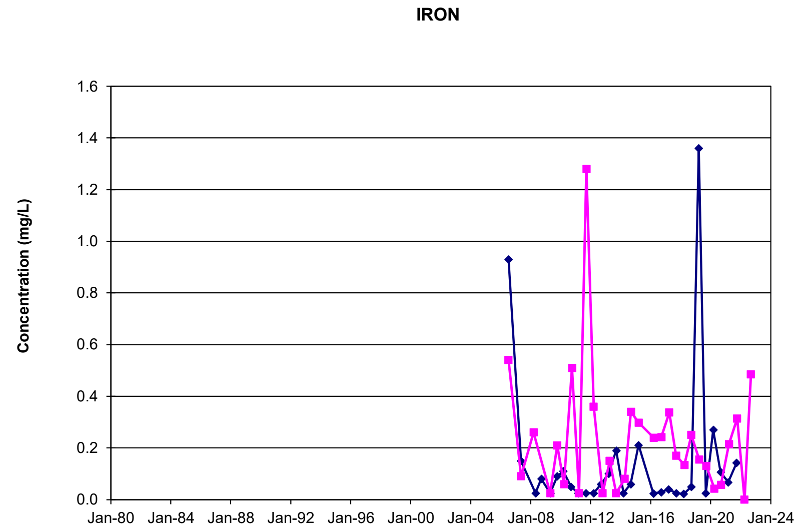

### TOTAL KJELDAHL NITROGEN

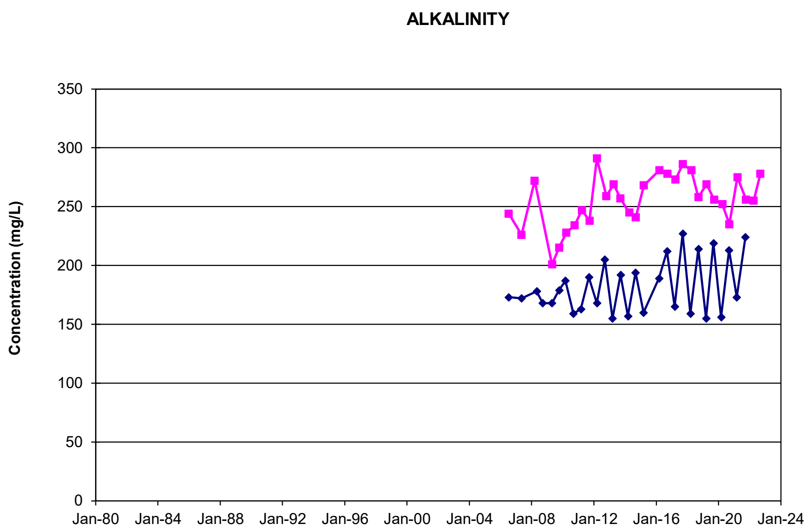


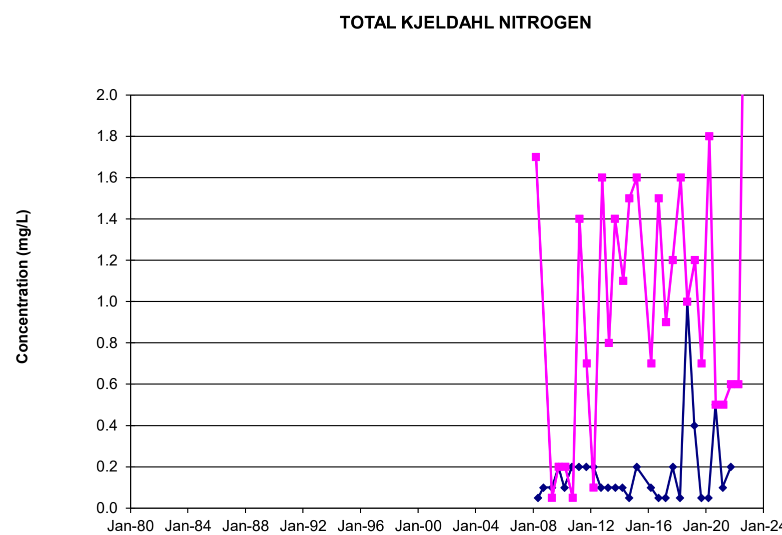
## Figure H.52

### Time Concentration Graphs - Groundwater: Shallow Bedrock



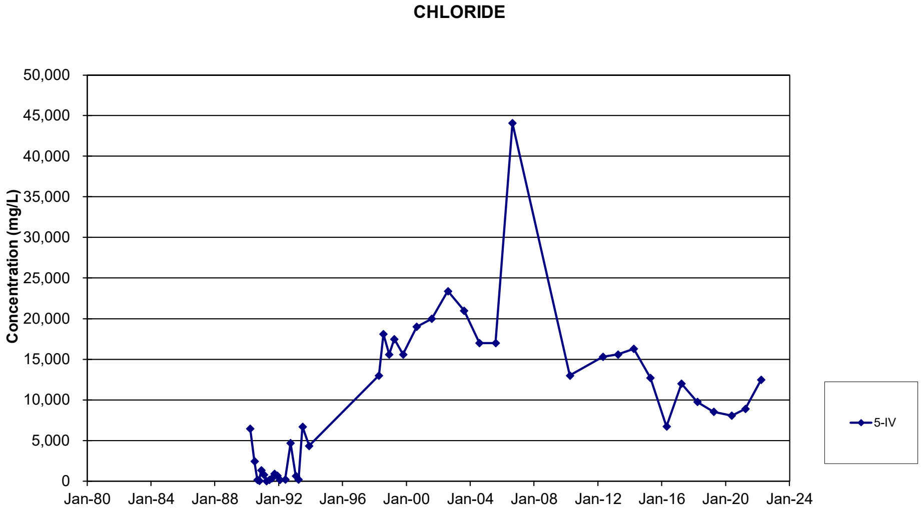



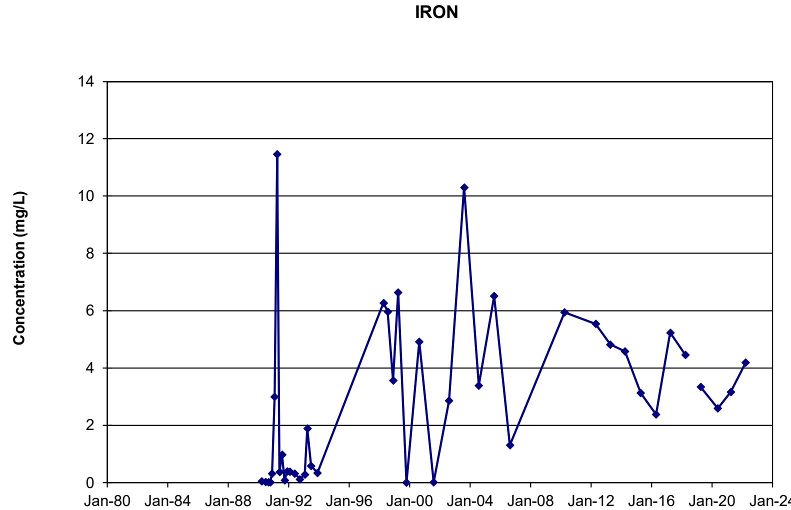



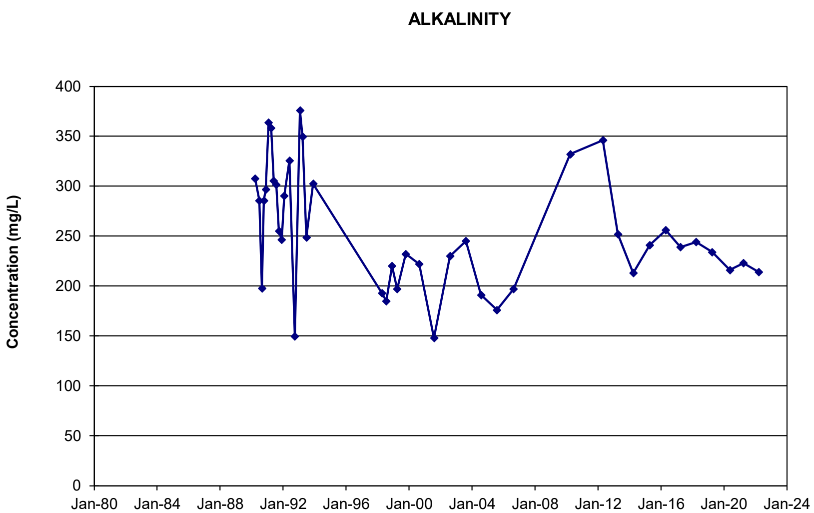



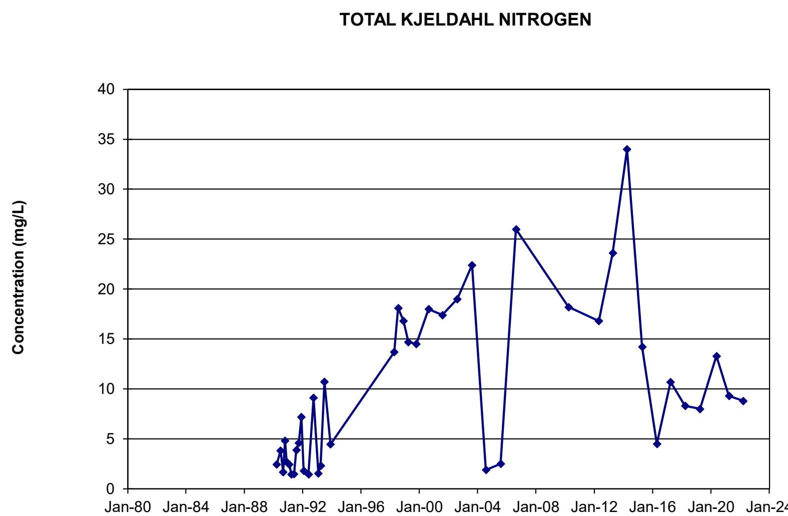
## Figure H.53

### Time Concentration Graphs - Groundwater: Deep Bedrock



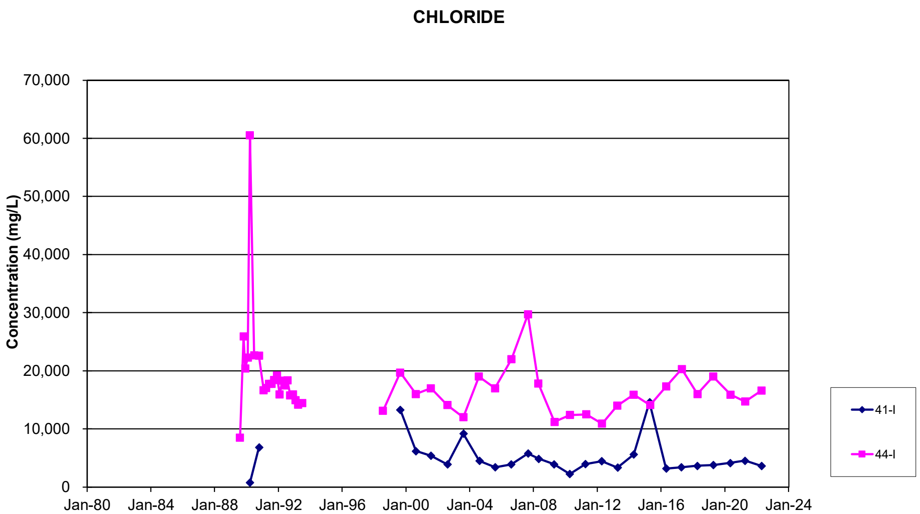



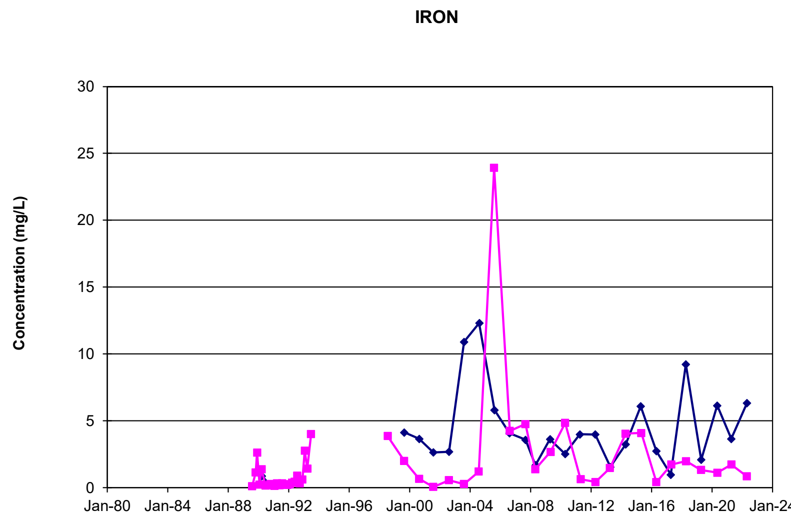



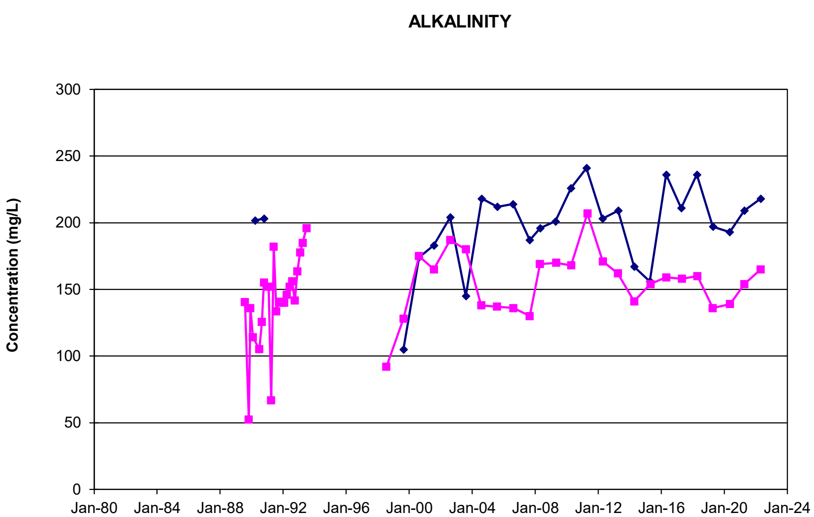



# Figure H.54

## Time Concentration Graphs - Groundwater: Deep Bedrock



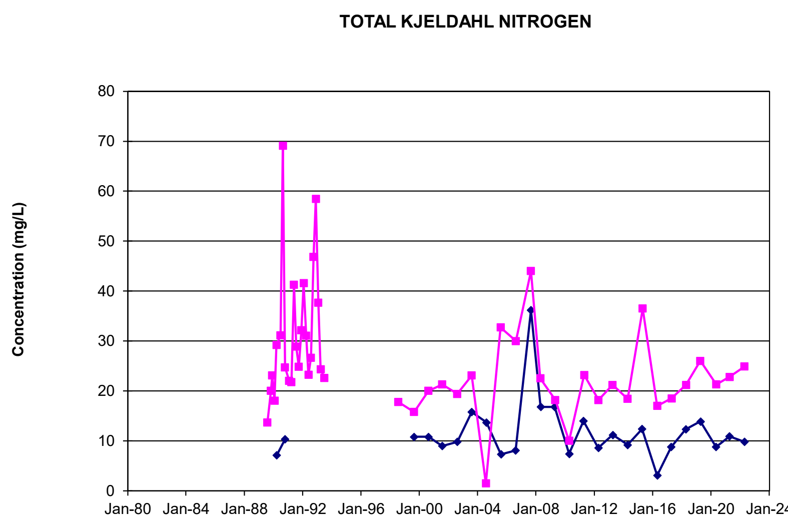
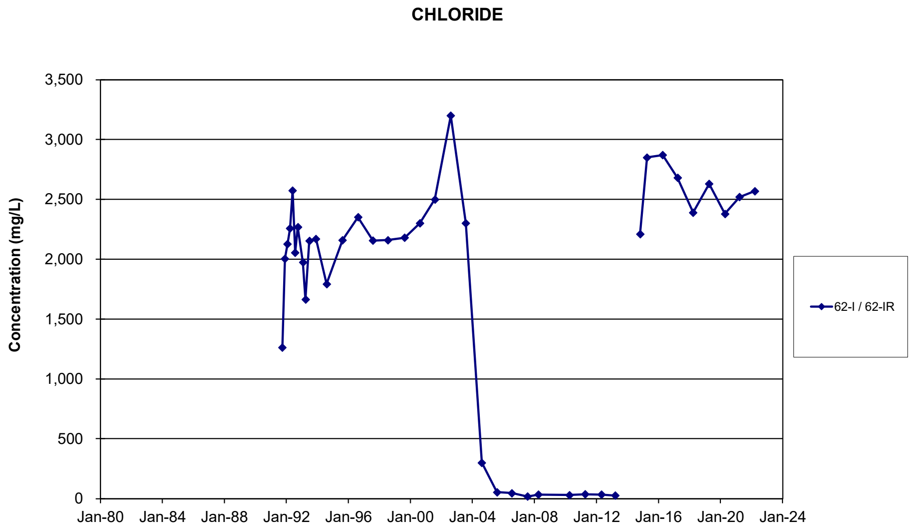
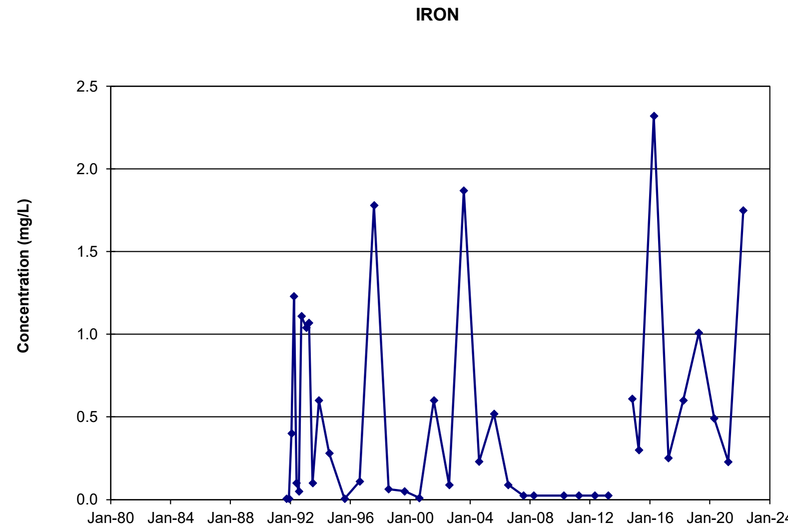
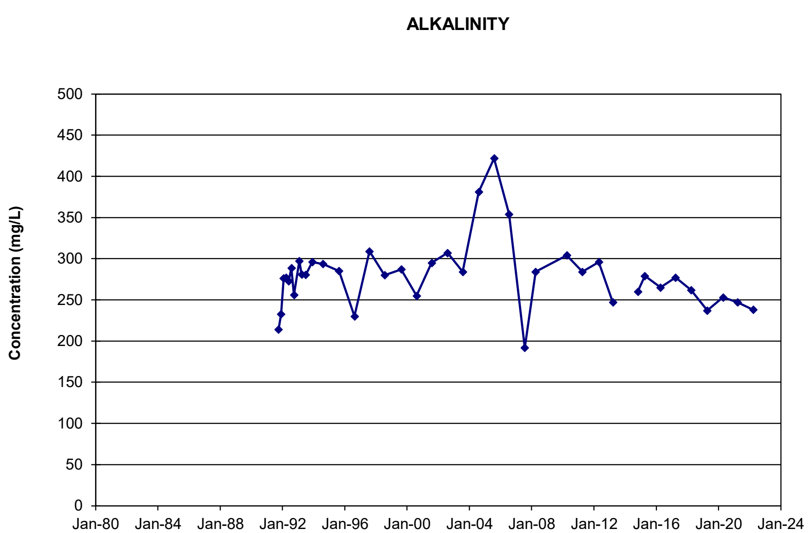



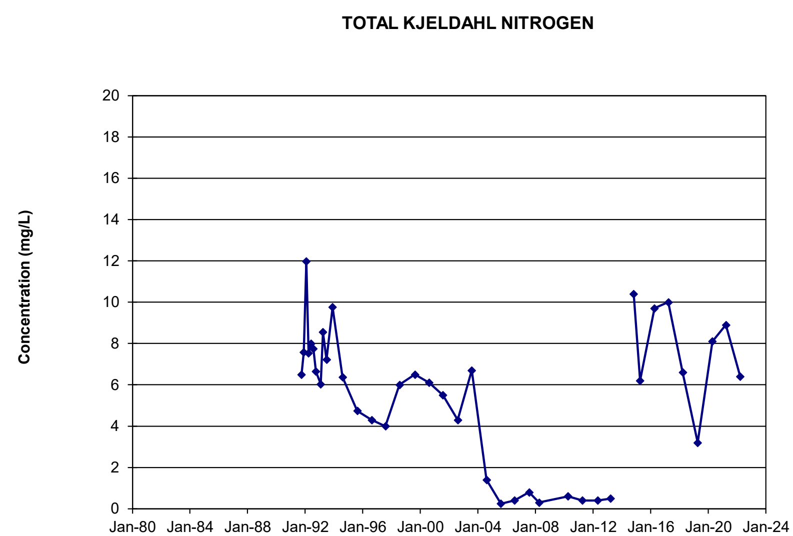
**Figure H.55**

**Time Concentration Graphs - Groundwater: Deep Bedrock**



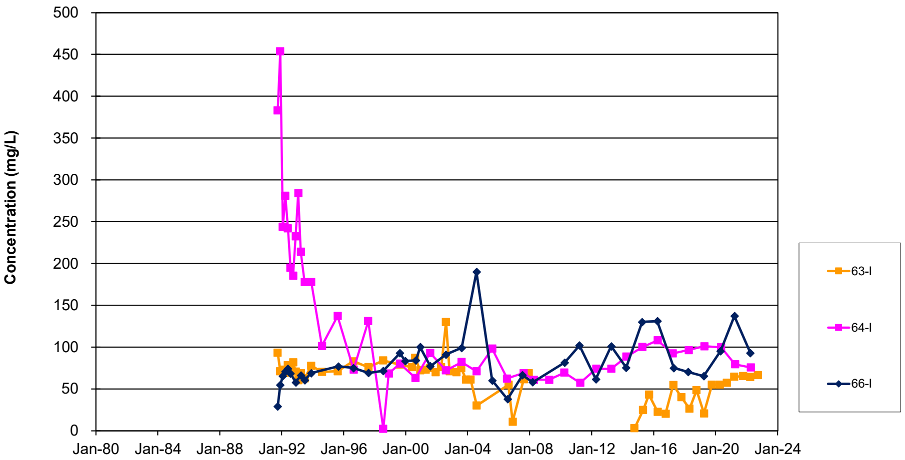



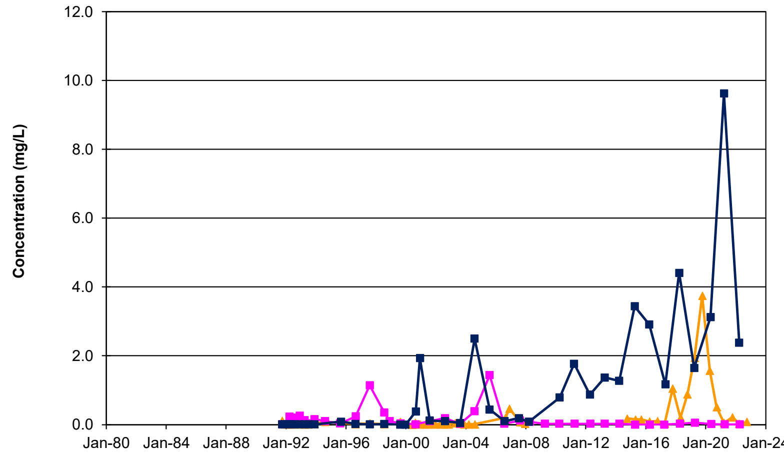
## Figure H.56

### Time Concentration Graphs - Groundwater: Deep Bedrock

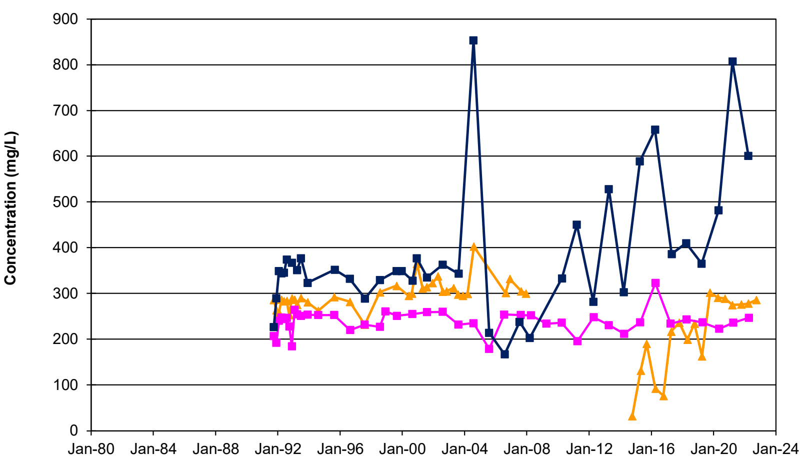
**CHLORIDE**



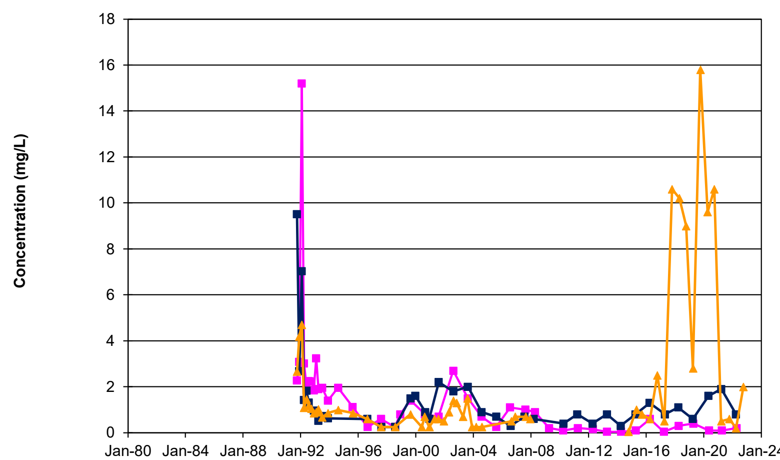

**IRON**




**ALKALINITY**



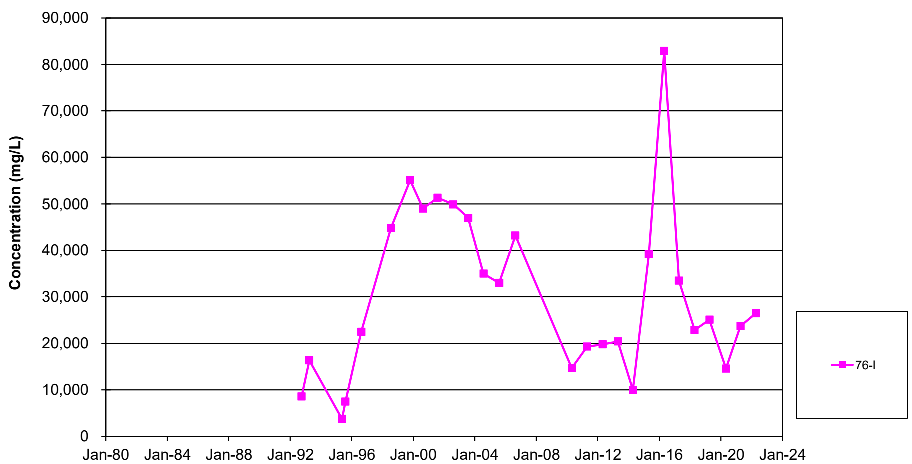

**TOTAL KJELDAHL NITROGEN**



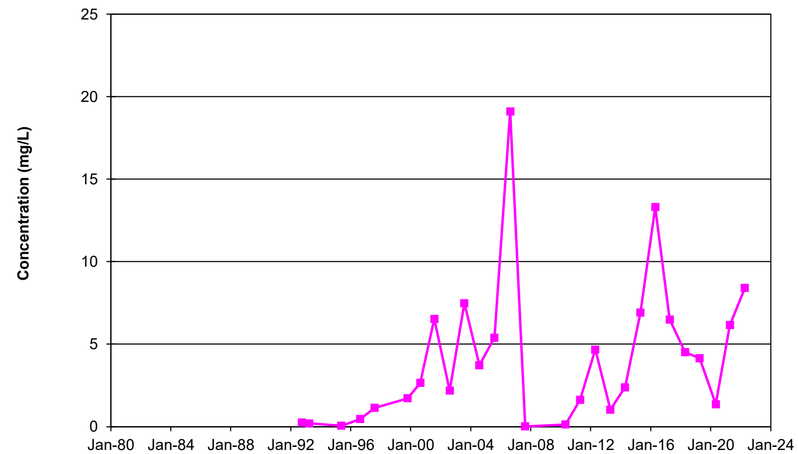
## Figure H.57

### Time Concentration Graphs - Groundwater: Deep Bedrock

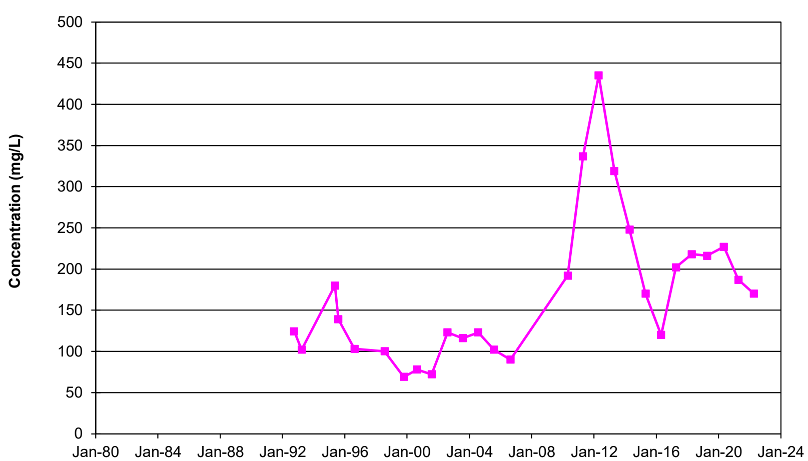
CHLORIDE



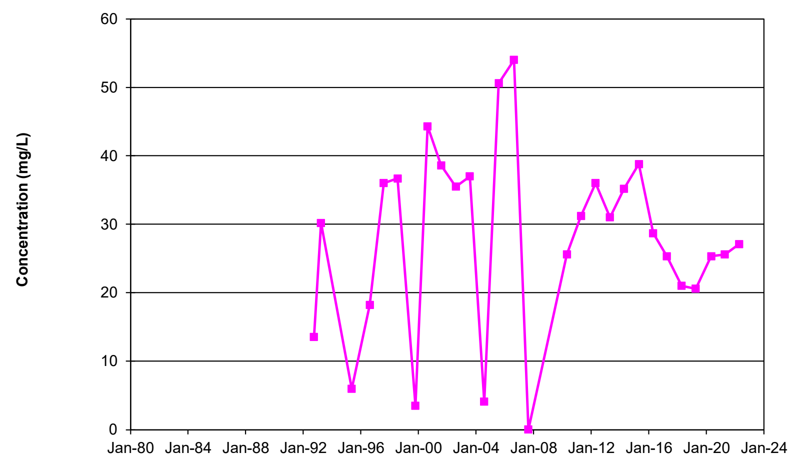

IRON




ALKALINITY




TOTAL KJELDAHL NITROGEN



# APPENDIX

# I

## QA/QC RESULTS

## Table I.1
## Field Duplicate Samples - Relative Percent Differences - Groundwater (Inorganics)
## Peterborough County/City Waste Management Facility - 2022 Monitoring Program

| PARAMETER | UNITS | March 2022 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 5-VI | | | 63-III | | | 104-III | | | 106-II | | |
| | | Original | Duplicate | RPD (%) | Original | Duplicate | RPD (%) | Original | Duplicate | RPD (%) | Original | Duplicate | RPD (%) |
| **Alkalinity** | mg/L | 297 | 300 | **1** | 219 | 217 | **1** | 219 | 217 | **1** | 208 | 200 | **4** |
| **Aluminum** | mg/L | | | | <0.025 | <0.025 | | <0.025 | <0.025 | | <0.025 | <0.025 | |
| **Ammonia** | mg/L | 0.2 | 0.1 | **67** | 0.1 | 0.1 | **0** | 0.1 | 0.1 | **0** | 0.1 | 0.1 | **0** |
| **Arsenic** | mg/L | <0.0005 | <0.0005 | | <0.0005 | <0.0005 | | <0.0005 | <0.0005 | | <0.0005 | <0.0005 | |
| **Barium** | mg/L | | | | 0.029 | 0.031 | **7** | 0.029 | 0.031 | **7** | 0.237 | 0.218 | **8** |
| **Beryllium** | mg/L | | | | <0.0005 | <0.0005 | | <0.0005 | <0.0005 | | <0.0005 | <0.0005 | |
| **Bicarbonate** | mg/L | 296 | 299 | **1** | 218 | 216 | **1** | 218 | 216 | **1** | 208 | 199 | **4** |
| **Boron** | mg/L | | | | 0.0044 | 0.0037 | **17** | 0.0044 | 0.0037 | **17** | 0.0182 | 0.0172 | **6** |
| **Cadmium** | mg/L | | | | <0.0001 | <0.0001 | | <0.0001 | <0.0001 | | <0.0001 | <0.0001 | |
| **Calcium** | mg/L | 106 | 106 | **0** | 138 | 137 | **1** | 138 | 137 | **1** | 210.0 | 199.0 | **5** |
| **Carbonate** | mg/L | <1 | <1 | | <1 | <1 | | <1 | <1 | | <1 | <1 | |
| **Chemical Oxygen Demand** | mg/L | <10 | <10 | | <10 | <10 | | <10 | <10 | | <10 | <10 | |
| **Chloride** | mg/L | 6.1 | 5.7 | **7** | 10.6 | 10.7 | **1** | 10.6 | 10.7 | **1** | 576.0 | 478.0 | **19** |
| **Chromium** | mg/L | | | | <0.0005 | <0.0005 | | <0.0005 | <0.0005 | | <0.0005 | <0.0005 | |
| **Cobalt** | mg/L | | | | <0.0005 | <0.0005 | | <0.0005 | <0.0005 | | <0.0005 | <0.0005 | |
| **Conductivity** | µS/cm | 592 | 596 | **1** | 679 | 682 | **0** | 679 | 682 | **0** | 2370 | 2070 | **14** |
| **Copper** | mg/L | | | | <0.0005 | <0.0005 | | <0.0005 | <0.0005 | | 0.0009 | 0.0017 | **62** |
| **Dissolved Organic Carbon** | mg/L | 1.2 | 1.2 | **0** | 1.8 | 2.4 | **29** | 1.8 | 2.4 | **29** | 1.4 | 1.2 | **15** |
| **Hardness** | mg/L | 299 | 299 | **0** | 367 | 364 | **1** | 367 | 364 | **1** | 640 | 599 | **7** |
| **Iron** | mg/L | 0.035 | 0.031 | **12** | 0.006 | 0.008 | **29** | 0.006 | 0.008 | **29** | 0.008 | 0.010 | **22** |
| **Lead** | mg/L | | | | <0.0005 | <0.0005 | | <0.0005 | <0.0005 | | <0.0005 | <0.0005 | |
| **Magnesium** | mg/L | 8.32 | 8.3 | **0** | 5.47 | 5.34 | **2** | 5.47 | 5.34 | **2** | 28.2 | 24.7 | **13** |
| **Manganese** | mg/L | 0.0713 | 0.0583 | **20** | <0.0005 | <0.0005 | | <0.0005 | <0.0005 | | 0.0007 | 0.0007 | **0** |
| **Molybdenum** | mg/L | | | | <0.0005 | <0.0005 | | <0.0005 | <0.0005 | | <0.0005 | <0.0005 | |
| **Nickel** | mg/L | | | | <0.002 | <0.002 | | <0.002 | <0.002 | | <0.002 | <0.002 | |
| **Nitrate** | mg/L | <0.5 | <0.5 | | 23.1 | 23.1 | **0** | 23.1 | 23.1 | **0** | 1.4 | 0.9 | **43** |
| **Nitrite** | mg/L | <0.5 | <0.5 | | <0.5 | <0.05 | | <0.5 | <0.05 | | <0.5 | <0.5 | |
| **pH** | units | 7.38 | 7.38 | **0** | 7.56 | 7.61 | **1** | 7.56 | 7.61 | **1** | 7.35 | 7.43 | **1** |
| **Phenols** | µg/L | <1 | <1 | | | | | | | | 1 | <1 | |
| **Phosphate** | mg/L | <0.02 | <0.02 | | <0.02 | <0.02 | | <0.02 | <0.02 | | <0.02 | <0.02 | |
| **Phosphorus** | mg/L | <0.02 | <0.02 | | <0.02 | <0.02 | | <0.02 | <0.02 | | 0.02 | 0.02 | |
| **Potassium** | mg/L | <0.5 | <0.5 | | <0.5 | <0.5 | | <0.5 | <0.5 | | 2.2 | 1.9 | **15** |
| **Sodium** | mg/L | 2.2 | 2.1 | **5** | 3.2 | 3.1 | **3** | 3.2 | 3.1 | **3** | 208.0 | 202.0 | **3** |
| **Sulphate** | mg/L | 6 | 6.3 | **5** | 14.5 | 14.6 | **1** | 15 | 15 | **1** | 37.9 | 31.0 | **20** |
| **Total Kjeldhal Nitrogen** | mg/L | <0.1 | <0.1 | | 2.4 | <2.0 | **0-18** | 2.4 | <2.0 | | 0.1 | <0.1 | **0** |
| **Total Dissolved Solids** | mg/L | 310 | 340 | **9** | 450 | 490 | **9** | 450 | 490 | **9** | 1610 | 1410 | **13** |
| **Zinc** | mg/L | | | | <0.0005 | <0.0005 | | <0.0005 | <0.0005 | | 0.0009 | 0.0018 | **67** |

NOTES: 1) Blank indicates parameter not analysed, or RPD not calculated due to un-detected concentrations.

2) RPD = Relative Percent Difference $RPD = \frac{X1-X2}{Xavg} \times 100$

## Table I.1
## Field Duplicate Samples - Relative Percent Differences - Groundwater (Inorganics)
## Peterborough County/City Waste Management Facility - 2022 Monitoring Program

| PARAMETER | UNITS | April 2022 | | | | | | September 2022 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 70-II | | | 95-II | | | 18A | | | 19A | | |
| | | Original | Duplicate | RPD (%) | Original | Duplicate | RPD (%) | Original | Duplicate | RPD (%) | | | |
| **Alkalinity** | mg/L | 215 | 246 | **13** | 268 | 270 | **1** | 257 | 256 | **0** | | | |
| **Aluminum** | mg/L | | | | <0.025 | <0.025 | | | | | 580 | 578 | **0** |
| **Ammonia** | mg/L | 0.2 | 0.1 | **67** | 0.2 | 0.2 | **0** | 1.2 | 1.2 | **0** | | | |
| **Arsenic** | mg/L | <0.0005 | 0.0005 | **0** | 0.001 | 0.001 | **0** | <0.0005 | <0.0005 | | 68.1000 | 64.1000 | **6** |
| **Barium** | mg/L | | | | 0.131 | 0.13 | **1** | | | | <0.0005 | <0.0005 | |
| **Beryllium** | mg/L | | | | <0.0005 | <0.0005 | | | | | | | |
| **Bicarbonate** | mg/L | 214 | 245 | **14** | 267 | 269 | **1** | 256 | 255 | **0** | | | |
| **Boron** | mg/L | | | | 0.005 | 0.0042 | **17** | | | | 579 | 577 | **0** |
| **Cadmium** | mg/L | | | | <0.0001 | <0.0001 | | | | | | | |
| **Calcium** | mg/L | 118 | 119 | **1** | 127 | 125 | **2** | 83 | 83 | **1** | | | |
| **Carbonate** | mg/L | <1 | <1 | | <1 | <1 | | <1 | <1 | | 268 | 267 | **0** |
| **Chemical Oxygen Demand** | mg/L | <10 | <10 | | <10 | <10 | | <10 | <10 | | | | |
| **Chloride** | mg/L | 103 | 105 | **2** | 66.5 | 70.2 | **5** | 138 | 137 | **1** | 51.9 | 51.1 | **2** |
| **Chromium** | mg/L | | | | <0.0005 | <0.0005 | | | | | 2020 | 1880 | **7** |
| **Cobalt** | mg/L | | | | <0.0005 | <0.0005 | | | | | | | |
| **Conductivity** | µS/cm | 932 | 963 | **3** | 820 | 836 | **2** | 876 | 819 | **7** | 100 | 110 | **10** |
| **Copper** | mg/L | | | | 0.0011 | <0.0005 | **0-75** | | | | 6230 | 6220 | **0** |
| **Dissolved Organic Carbon** | mg/L | 1.7 | 1.7 | **0** | 3.6 | 3 | **18** | 1.6 | 1.5 | **6** | | | |
| **Hardness** | mg/L | 393 | 395 | **1** | 409 | 402 | **2** | 344 | 344 | **0** | 2 | 1 | **24** |
| **Iron** | mg/L | 1.38 | 1.43 | **4** | 2.11 | 2.01 | **5** | 0.26 | 0.26 | **2** | 13.500 | 11.400 | **17** |
| **Lead** | mg/L | | | | <0.0005 | <0.0005 | | | | | 17.2 | 17.4 | **1** |
| **Magnesium** | mg/L | 23.9 | 23.7 | **1** | 22.3 | 21.8 | **2** | 33.3 | 33.0 | **1** | | | |
| **Manganese** | mg/L | 0.0223 | 0.0236 | **6** | 0.287 | 0.295 | **3** | 0.016 | 0.016 | **1** | 140.0000 | 139.0000 | **1** |
| **Molybdenum** | mg/L | | | | <0.0005 | <0.0005 | | | | | 0.132 | 0.134 | **2** |
| **Nickel** | mg/L | | | | <0.002 | <0.002 | | | | | | | |
| **Nitrate** | mg/L | <0.5 | <0.5 | | <0.5 | <0.5 | | <0.05 | <0.05 | | | | |
| **Nitrite** | mg/L | <0.5 | <0.5 | | <0.5 | <0.5 | | <0.05 | <0.05 | | <0.5 | <0.5 | |
| **pH** | units | 7.4 | 7.4 | **0** | 7.45 | 7.48 | **0** | 7.56 | 7.61 | **1** | -49.40 | -45.90 | **-7** |
| **Phenols** | µg/L | <1 | <1 | | <1 | <1 | | <1 | <1 | | <1 | <1 | |
| **Phosphate** | mg/L | <0.02 | <0.02 | | <0.02 | <0.02 | | <0.02 | <0.02 | | 6.56 | 6.55 | **0** |
| **Phosphorus** | mg/L | <0.02 | <0.02 | | <0.02 | <0.02 | | <0.02 | <0.02 | | <0.02 | <0.02 | |
| **Potassium** | mg/L | 2.2 | 2.2 | **0** | 1.8 | 1.7 | **6** | 5.6 | 5.6 | **0** | | | |
| **Sodium** | mg/L | 35.9 | 36.2 | **1** | 21.4 | 21.4 | **0** | 57 | 57 | **0** | 12.4 | 12.5 | **1** |
| **Sulphate** | mg/L | 55.2 | 56.6 | **3** | 42 | 40.2 | **4** | 51 | 52 | **2** | 604 | 588 | **3** |
| **Total Kjeldhal Nitrogen** | mg/L | 0.2 | 0.8 | **120** | <0.2 | 0.2 | **0** | 2.6 | 2.5 | **4** | 11.0 | 11.1 | **1** |
| **Total Dissolved Solids** | mg/L | 510 | 540 | **6** | 470 | 460 | **2** | 590 | 570 | **3** | <2.0 | <2.0 | |
| **Zinc** | mg/L | | | | 0.0007 | <0.0005 | **0-33** | | | | 6.3 | 6.3 | **0** |

NOTES: 1) Blank indicates parameter not analysed, or RPD not calculated due to un-detected concentrations.

2) RPD = Relative Percent Difference $\quad RPD = \frac{X1-X2}{Xavg} \times 100$

**Table I.1**
**Field Duplicate Samples - Relative Percent Differences - Groundwater (Inorganics)**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | October 2022 | | | | | |
|---|---|---|---|---|---|---|---|
| | | 88-III | | | 94-I | | |
| | | | | | Original | Duplicate | RPD (%) |
| Alkalinity | mg/L | 235 | 234 | 0 | 189 | 190 | 1 |
| Aluminum | mg/L | | | | | | |
| Ammonia | mg/L | 0.3 | 0.3 | 0 | 0.2 | 0.2 | 0 |
| Arsenic | mg/L | 0.0013 | 0.0014 | 7 | 0.0021 | 0.0021 | 0 |
| Barium | mg/L | | | | | | |
| Beryllium | mg/L | | | | | | |
| Bicarbonate | mg/L | 234 | 233 | 0 | 188 | 189 | 1 |
| Boron | mg/L | | | | | | |
| Cadmium | mg/L | | | | | | |
| Calcium | mg/L | 72.3 | 71.7 | 1 | 59.8 | 59.9 | 0 |
| Carbonate | mg/L | <1 | <1 | | 1 | 1 | 0 |
| Chemical Oxygen Demand | mg/L | <10 | <10 | | <10 | <10 | |
| Chloride | mg/L | 5.5 | 5.5 | 0 | 11.7 | 11.6 | 1 |
| Chromium | mg/L | | | | | | |
| Cobalt | mg/L | | | | | | |
| Conductivity | µS/cm | 610 | 611 | 0 | 505 | 507 | 0 |
| Copper | mg/L | | | | | | |
| Dissolved Organic Carbon | mg/L | 1.4 | 1.2 | 15 | 1.2 | 1.4 | 15 |
| Hardness | mg/L | 320 | 318 | 1 | 247 | 248 | 0 |
| Iron | mg/L | 0.086 | 0.088 | 2 | 0.476 | 0.478 | 0 |
| Lead | mg/L | | | | | | |
| Magnesium | mg/L | 33.8 | 33.7 | 0 | 23.6 | 24 | 2 |
| Manganese | mg/L | 0.0182 | 0.0191 | 5 | 0.0108 | 0.0109 | 1 |
| Molybdenum | mg/L | | | | | | |
| Nickel | mg/L | | | | | | |
| Nitrate | mg/L | <0.5 | <0.5 | | <0.05 | <0.05 | |
| Nitrite | mg/L | <0.5 | <0.5 | | <0.05 | <0.05 | |
| pH | units | 7.61 | 7.61 | 0 | 7.89 | 7.88 | 0 |
| Phenols | µg/L | 2 | 2 | 0 | 2 | 2 | 0 |
| Phosphate | mg/L | <0.02 | <0.02 | | <0.02 | <0.02 | |
| Phosphorus | mg/L | <0.02 | <0.02 | | <0.02 | <0.02 | |
| Potassium | mg/L | 2.7 | 2.6 | 4 | 1.3 | 1.3 | 0 |
| Sodium | mg/L | 5.9 | 5.9 | 0 | 7.8 | 7.8 | 0 |
| Sulphate | mg/L | 85.9 | 84.6 | 2 | 58.2 | 58.8 | 1 |
| Total Kjeldhal Nitrogen | mg/L | 3.1 | 3.2 | 3 | 2.1 | 2.1 | 0 |
| Total Dissolved Solids | mg/L | 410 | 420 | 2 | 310 | 320 | 3 |
| Zinc | mg/L | | | | | | |

NOTES: 1) Blank indicates parameter not analysed, or RPD not calculated due to un-detected concentratic

2) RPD = Relative Percent Difference RPD = $\frac{X1-X2}{Xavg} \times 100$

**Table I.1**
**Field Duplicate Samples - Relative Percent Differences - Groundwater (Organics)**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | March 2022 | | | | | | | | | April 2022 | | | September 2022 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 63-III | | | 104-III | | | 106-III | | | 95-III | | | 74-III | | |
| | | Original | Duplicate | RPD (%) | Original | Duplicate | RPD (%) | Original | Duplicate | RPD (%) | Original | Duplicate | RPD (%) | Original | Duplicate | RPD (%) |
| 1,1,2,2-Tetrachlorethane | µg/L | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | |
| 1,1,2-Trichlorethane | µg/L | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | |
| 1,1-Dichloroethane | µg/L | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | |
| 1,1-Dichloroethylene | µg/L | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | |
| 1,2-Dichlorobenzene | µg/L | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | |
| 1,2-Dichloroethane | µg/L | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | |
| 1,2-Dichlorpropane | µg/L | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | |
| 1,3-Dichlorobenzene | µg/L | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | |
| 1,3-dichloropropene(E) | µg/L | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | |
| 1,4-Dichlorobenzene | µg/L | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | |
| Benzene | µg/L | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | |
| Bromodichloromethane | µg/L | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | |
| Bromoform | µg/L | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | |
| Bromomethane | µg/L | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | |
| Carbon Tetrachloride | µg/L | < 0.2 | < 0.2 | | < 0.2 | < 0.2 | | < 0.2 | < 0.2 | | < 0.2 | < 0.2 | | < 0.2 | < 0.2 | |
| Chlorobenzene | µg/L | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | |
| Chloroethane | µg/L | < 5 | < 5 | | < 5 | < 5 | | < 5 | < 5 | | < 5 | < 5 | | < 5 | < 5 | |
| Chloroform | µg/L | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | |
| Chloromethane | µg/L | < 5 | < 5 | | < 5 | < 5 | | < 5 | < 5 | | < 5 | < 5 | | < 5 | < 5 | |
| cis-1,2-Dichloroethylene | µg/L | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | |
| Dibromochloromethane | µg/L | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | |
| Dichloromethane | µg/L | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | |
| Ethyl Benzene | µg/L | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | |
| Ethylene dibromide | µg/L | < 0.2 | < 0.2 | | < 0.2 | < 0.2 | | < 0.2 | < 0.2 | | < 0.2 | < 0.2 | | < 0.2 | < 0.2 | |
| m/p-Xylenes | µg/L | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | |
| o-xylene | µg/L | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | |
| Styrene | µg/L | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | |
| Tetrachloroethylene | µg/L | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | |
| Toluene | µg/L | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | 48.8 | 34.5 | **34** |
| trans-1,2-Dichloroethylene | µg/L | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | |
| Trichloroethylene | µg/L | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | |
| Trichlorofluoromethane | µg/L | < 5 | < 5 | | < 5 | < 5 | | < 5 | < 5 | | < 5 | < 5 | | < 5 | < 5 | |
| Vinyl Chloride | µg/L | < 0.2 | < 0.2 | | < 0.2 | < 0.2 | | < 0.2 | < 0.2 | | < 0.2 | < 0.2 | | < 0.2 | < 0.2 | |
| Xylenes - total | µg/L | < 0.5 | < 0.5 | | < 0.5 | < 0.5 | | < 0.5 | <0.5 | | < 0.5 | <0.5 | | < 0.5 | < 0.5 | |

NOTES: 1) Blank indicates parameter not analysed, or RPD not calculated due to un-detected concentrations.

2) RPD = Relative Percent Difference RPD = $\frac{X1-X2}{Xavg} \times 100$

**Table I.2**
**Field Duplicate Samples - Relative Percent Differences - Surface Water**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | April 2022 | | | June 2022 | | |
|---|---|---|---|---|---|---|---|
| | | SW1 | | | SW21 | | |
| | | Original | Duplicate | RPD (%) | Original | Duplicate | RPD (%) |
| **Alkalinity** | mg/L | 259 | 261 | **1** | 224 | 223 | **0** |
| **Ammonia: total** | mg/L | 0.2 | 0.1 | **67** | 0.2 | 0.1 | **67** |
| **Arsenic** | mg/L | <0.0005 | <0.0005 | | <0.005 | <0.005 | |
| **Barium** | mg/L | 0.048 | 0.054 | **12** | 0.045 | 0.046 | **2** |
| **Biochemical Oxygen Demand** | mg/L | <2.0 | <2.0 | | 2.2 | 2.2 | **0** |
| **Boron** | mg/L | 0.0206 | 0.0203 | **1** | 0.03 | 0.03 | **0** |
| **Cadmium** | mg/L | <0.0001 | <0.0001 | | <0.001 | <0.001 | |
| **Chloride** | mg/L | 63.9 | 60.2 | **6** | 46.6 | 46.6 | **0** |
| **Chromium** | mg/L | <0.0005 | <0.0005 | | <0.001 | <0.001 | |
| **Chemical Oxygen Demand** | mg/L | 20 | 20 | **0** | 40 | 40 | **0** |
| **Conductivity** | µS/cm | 736 | 729 | **1** | 625 | 623 | **0** |
| **Copper** | mg/L | 0.0019 | 0.0011 | **53** | <0.005 | <0.005 | |
| **Iron** | mg/L | 0.071 | 0.08 | **12** | 0.24 | 0.24 | **0** |
| **Lead** | mg/L | <0.0005 | <0.0005 | | <0.01 | <0.01 | |
| **Mercury** | µg/L | <0.2 | <0.2 | | <0.2 | <0.2 | |
| **Nitrate** | mg/L | <0.05 | <0.05 | | <0.05 | <0.05 | |
| **Nitrite** | mg/L | <0.05 | <0.05 | | <0.05 | <0.05 | |
| **pH** | units | 7.78 | 7.8 | **0** | 7.84 | 7.85 | **0** |
| **Phenols** | µg/L | <1 | <1 | | <1 | 3 | **0-100** |
| **Phosphorus** | mg/L | <0.02 | 0.02 | **0** | 0.07 | 0.08 | **13** |
| **Sulphate** | mg/L | 15 | 14.9 | **1** | 16.2 | 16.3 | **1** |
| **Total Dissolved Solids** | mg/L | 430 | 390 | **10** | 380 | 360 | **5** |
| **Total Kjeldahl Nitrogen** | mg/L | 0.5 | 0.5 | | 0.8 | 0.8 | **0** |
| **Total Suspended Solids** | mg/L | <2.0 | <2.0 | | 3.2 | <2.0 | **0-46** |
| **Zinc** | mg/L | 0.0021 | 0.0012 | **55** | <0.01 | <0.01 | |

NOTES: 1) Blank indicates parameter not analysed.
2) RPD = Relative Percent Difference  $RPD = \frac{X1-X2}{Xavg} \times 100$

**TABLE I.3**
**Field Blanks Chemical Results**
**Peterborough County/CityWaste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | Field Blanks | | | | | | | | | Lab Filter Blanks | | Hydrasleeve Field Blanks | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Mar-22 | Mar-22 | Mar-22 | Apr-22 | Jun-22 | Jul-22 | Sep-22 | Sep-22 | Oct-22 | Apr-22 | Sep-22 | Mar-22 | Sep-22 |
| Alkalinity | mg/L | <5.0 | <5.0 | | <5.0 | <5.0 | <5.0 | <5.0 | | <5.0 | | | <5.0 | <5.0 |
| Aluminum | mg/L | <0.025 | <0.025 | <0.025 | | | | | <5.0 | | | | <0.025 | |
| Ammonia | mg/L | 0.2 | 0.2 | | 0.1 | 0.1 | 0.1 | 0.3 | | 0.2 | | | 0.2 | 0.2 |
| Arsenic | mg/L | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.005 | | <0.0005 | 0.1 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Barium | mg/L | <0.001 | 0.001 | <0.001 | <0.001 | <0.002 | | | <0.0005 | | | | <0.001 | |
| Beryllium | mg/L | <0.0005 | <0.0005 | <0.0005 | | | | | | | | | <0.0005 | |
| Biochemical Oxygen Demand | mg/L | | | | <2.0 | <2.0 | | | | | | | | |
| Boron | mg/L | <0.0005 | 0.0009 | 0.0009 | <0.0005 | <0.02 | | | | | | | 0.0005 | |
| Cadmium | mg/L | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.001 | | | | | | | <0.0001 | |
| Calcium | mg/L | <0.2 | <0.2 | <0.2 | | | <0.2 | <0.2 | | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Chloride | mg/L | <0.1 | <0.1 | | <0.1 | <0.1 | <0.1 | <0.1 | <0.2 | <0.1 | | | <0.1 | <0.1 |
| Chromium | mg/L | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.001 | | | 0.2 | | | | <0.0005 | |
| Cobalt | mg/L | <0.0005 | <0.0005 | <0.0005 | | | | | | | | | <0.0005 | |
| Chemical Oxygen Demand | mg/L | <10 | <10 | | <10 | <10 | <10 | <10 | | <10 | | | <10 | <10 |
| Conductivity | µS/cm | 1.4 | 1.1 | | 1.3 | 0.9 | 0.7 | 0.9 | <10 | 1.2 | | | 1.1 | 1.3 |
| Copper | mg/L | 0.0009 | 0.0007 | 0.0008 | <0.0005 | <0.005 | | | 1.3 | | | | <0.0005 | |
| Dissolved Organic Carbon | mg/L | <1.0 | <1.0 | <1.0 | | | <1.0 | 1.2 | | <1.0 | <1.0 | 1.1 | <1.0 | <1.0 |
| Iron | mg/L | <0.005 | <0.005 | <0.005 | <0.005 | <0.05 | | <0.005 | 1.1 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Lead | mg/L | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.01 | <0.05 | | <0.005 | | | | <0.0005 | |
| Magnesium | mg/L | <0.05 | <0.05 | <0.05 | | | <0.05 | <0.05 | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Manganese | mg/L | <0.0005 | <0.0005 | <0.0005 | | | | <0.0005 | <0.05 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Mercury | µg/L | | | | <0.2 | <0.2 | | | <0.0005 | | | | | |
| Molybdenum | mg/L | <0.0005 | <0.0005 | <0.0005 | | | | | | | | | <0.0005 | |
| Nickel | mg/L | <0.002 | <0.002 | <0.002 | | | | | | | | | <0.002 | |
| Nitrate | mg/L | <0.5 | <0.5 | | <0.05 | <0.05 | <0.05 | <0.05 | | <0.05 | | | <0.5 | <0.05 |
| Nitrite | mg/L | <0.5 | <0.5 | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | | | <0.5 | <0.05 |
| pH | units | 6.11 | 6.08 | | 5.83 | 6.35 | 6.02 | 5.8 | <0.05 | 5.63 | | | 5.78 | 5.62 |
| Phenols | µg/L | <1 | <1 | | <1 | <1 | <1 | <1 | 5.72 | <1 | | | 3 | <1 |
| Phosphate | mg/L | <0.02 | <0.02 | <0.02 | | | | <0.02 | <1 | <0.02 | | | <0.02 | <0.02 |
| Phosphorus | mg/L | <0.02 | <0.02 | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | | | <0.02 | <0.02 |
| Potassium | mg/L | <0.5 | <0.5 | <0.5 | | | <0.5 | <0.5 | <0.02 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Sodium | mg/L | <0.1 | <0.1 | <0.1 | | | <0.1 | <0.1 | <0.5 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Sulphate | mg/L | <0.2 | <0.2 | | <0.2 | <0.2 | <0.2 | <0.2 | 0.1 | <0.2 | | | <0.2 | <0.2 |
| Total Dissolved Solids | mg/L | <50 | <50 | | <50 | <50 | | <50 | <0.2 | <50 | | | <50 | <50 |
| Total Kjeldahl Nitrogen | mg/L | <0.1 | <0.2 | | <0.1 | <0.1 | 2 | <2.0 | <50 | <2.0 | | | <0.1 | 2.2 |
| Total Suspended Solids | mg/L | | | | <2.0 | <2.0 | | | <2.0 | | | | | |
| Vanadium | mg/L | | | | | | | | | | | | | |
| Zinc | mg/L | 0.0006 | <0.0005 | <0.0005 | <0.0005 | <0.01 | | | | | | | 0.001 | |

NOTE: Blank indicates parameter not analysed.

**TABLE I.3**
**Field Blanks Chemical Results**
**Peterborough County/CityWaste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | Field Blank | Hydrasleeve Field Blank |
|---|---|---|---|
| | | Mar-22 | Mar-22 |
| 1,1,2,2-Tetrachlorethane | µg/L | < 0.5 | < 0.5 |
| 1,1,2-Trichlorethane | µg/L | < 0.5 | < 0.5 |
| 1,1-Dichloroethane | µg/L | < 0.5 | < 0.5 |
| 1,1-Dichloroethylene | µg/L | < 0.5 | < 0.5 |
| 1,2-Dichlorobenzene | µg/L | < 0.5 | < 0.5 |
| 1,2-Dichloroethane | µg/L | < 0.5 | < 0.5 |
| 1,2-Dichlorpropane | µg/L | < 0.5 | < 0.5 |
| 1,3-Dichlorobenzene | µg/L | < 0.5 | < 0.5 |
| 1,3-dichloropropene(E) | µg/L | < 0.5 | < 0.5 |
| 1,3-Dichloropropene(Z) | µg/L | < 0.5 | < 0.5 |
| 1,4-Dichlorobenzene | µg/L | < 0.5 | < 0.5 |
| Benzene | µg/L | < 0.5 | < 0.5 |
| Bromodichloromethane | µg/L | < 0.5 | < 0.5 |
| Bromoform | µg/L | < 0.5 | < 0.5 |
| Bromomethane | µg/L | < 0.5 | < 0.5 |
| Carbon Tetrachloride | µg/L | < 0.2 | < 0.2 |
| Chlorobenzene | µg/L | < 0.5 | < 0.5 |
| Chloroethane | µg/L | < 5 | < 5 |
| Chloroform | µg/L | < 0.5 | < 0.5 |
| Chloromethane | µg/L | < 5 | < 5 |
| cis-1,2-Dichloroethylene | µg/L | < 0.5 | < 0.5 |
| Dibromochloromethane | µg/L | < 0.5 | < 0.5 |
| Dichloromethane | µg/L | < 0.5 | < 0.5 |
| Ethyl Benzene | µg/L | < 0.5 | < 0.5 |
| Ethylene dibromide | µg/L | < 0.2 | < 0.2 |
| m/p-Xylenes | µg/L | < 0.5 | < 0.5 |
| o-xylene | µg/L | < 0.5 | < 0.5 |
| Styrene | µg/L | < 0.5 | < 0.5 |
| Tetrachloroethylene | µg/L | < 0.5 | < 0.5 |
| Toluene | µg/L | < 0.5 | < 0.5 |
| trans-1,2-Dichloroethylene | µg/L | < 0.5 | < 0.5 |
| Trichloroethylene | µg/L | < 0.5 | < 0.5 |
| Trichlorofluoromethane | µg/L | < 5 | < 5 |
| Vinyl Chloride | µg/L | < 0.2 | < 0.2 |
| Xylenes: total | µg/L | < 0.5 | < 0.5 |

NOTE: Blank indicates parameter not analysed.

# APPENDIX

# J

## SURFACE WATER QUALITY DATA

**Table J.1**
**Surface Water Flow Measurements**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| AREA | STATION | EVENT | FLOW RATE (L/s) |
|---|---|---|---|
| CENTRAL WATER COURSE | SW1 | Feb-22 | Frozen |
| | | Apr-22 | 48 |
| | | Jun-22 | 24 |
| | | Aug-22 | Dry |
| | | Oct-22 | Dry |
| | | Dec-22 | Dry |
| | SW2 | Feb-22 | Frozen |
| | | Apr-22 | 53 |
| | | Jun-22 | 35 |
| | | Aug-22 | Dry |
| | | Oct-22 | Dry |
| | | Dec-22 | NMF |
| | SW3 | Feb-22 | Frozen |
| | | Apr-22 | 45 |
| | | Jun-22 | 31 |
| | | Aug-22 | Dry |
| | | Oct-22 | Dry |
| | | Dec-22 | NMF |
| | SW18 | Feb-22 | Frozen |
| | | Apr-22 | 42 |
| | | Jun-22 | 34 |
| | | Aug-22 | Dry |
| | | Oct-22 | Dry |
| | | Dec-22 | NMF |
| | SW19 | Feb-22 | Frozen |
| | | Apr-22 | NMF |
| | | Jun-22 | NMF |
| | | Aug-22 | Dry |
| | | Oct-22 | Dry |
| | | Dec-22 | Dry |
| | SW20 | Feb-22 | Frozen |
| | | Apr-22 | 45 |
| | | Jun-22 | NMF |
| | | Aug-22 | Dry |
| | | Oct-22 | Dry |
| | | Dec-22 | Dry |

**Table J.1**
**Surface Water Flow Measurements**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| AREA | STATION | EVENT | FLOW RATE (L/s) |
|---|---|---|---|
| BENSFORT ROAD | SW17 | Feb-22 | Frozen |
| | | Apr-22 | 18 |
| | | Jun-22 | 27 |
| | | Aug-22 | Dry |
| | | Oct-22 | Dry |
| | | Dec-22 | Dry |
| | SW21 | Feb-22 | Frozen |
| | | Apr-22 | 15 |
| | | Jun-22 | 23 |
| | | Aug-22 | Dry |
| | | Oct-22 | Dry |
| | | Dec-22 | NMF |
| | SW23 | Feb-22 | Frozen |
| | | Apr-22 | NMF |
| | | Jun-22 | NMF |
| | | Aug-22 | Dry |
| | | Oct-22 | Dry |
| | | Dec-22 | NMF |
| WETLAND (WESTERN WATER COURSE) | SW24 | Feb-22 | Frozen |
| | | Apr-22 | NMF |
| | | Jun-22 | NMF |
| | | Aug-22 | Dry |
| | | Oct-22 | Dry |
| | | Dec-22 | Dry |

NOTES: 1) NMF - No measurable flow
UMF - Unable to measurable flow, usually due to icy or partially frozen conditions.
2) Dry - Dry conditions, no sample obtained.

**Table J.2**
**Surface Water Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | PWQO[1] | SW1 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-17 | Jun-17 | Dec-17 | Apr-18 | Jun-18 | Dec-18 | Apr-19 | Jun-19 | Dec-19 |
| Alkalinity | mg/L | | 169 | 323 | 302 | 188 | 356 | 225 | 192 | 276 | 171 |
| Ammonia: total | mg/L | | 0.2 | <0.1 | <0.1 | 0.1 | 0.4 | 0.2 | 0.2 | <0.1 | 0.2 |
| Ammonia: un-ionized | µg/L | 20 | 2 | <2 | <2 | 1 | 4 | 1 | 3 | <3 | 1 |
| Arsenic | mg/L | 0.005 | <0.0005 | 0.0007 | <0.0005 | <0.0005 | 0.0009 | <0.0005 | <0.0005 | 0.0008 | <0.0005 |
| Barium | mg/L | | 0.036 | 0.042 | 0.057 | 0.036 | 0.106 | 0.060 | 0.039 | 0.043 | 0.045 |
| Biochemical Oxygen Demand | mg/L | | <2.3 | <2.3 | <2.3 | <2.3 | 2.7 | <2.0 | <2.0 | <2.0 | <2.0 |
| Boron | mg/L | 0.200 | 0.01 | 0.03 | 0.02 | 0.01 | 0.03 | 0.02 | 0.02 | 0.02 | 0.01 |
| Cadmium | mg/L | 0.0005 *** | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Chloride | mg/L | | 55.7 | 55.3 | 75.6 | 40.4 | 628 | 95.4 | 39.5 | 41.6 | 63.2 |
| Chromium | mg/L | 0.010 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0005 | <0.0005 |
| Chemical Oxygen Demand | mg/L | | <10 | 40 | 20 | 20 | 20 | 30 | 20 | 40 | 40 |
| Conductivity | µS/cm | | 580 | 741 | 823 | 536 | 2740 | 863 | 550 | 687 | 625 |
| Conductivity - field | µS/cm | | 576 | 758 | 851 | 517 | 2740 | 808 | 571 | 729 | 652 |
| Copper | mg/L | 0.005 **** | 0.0012 | 0.0007 | 0.001 | 0.0009 | 0.0009 | 0.0019 | 0.0015 | 0.0007 | 0.0018 |
| Dissolved Oxygen - field | mg/L | | 6.07 | 3.86 | 8.74 | 9.04 | 6.16 | 6.99 | 10 | 4.32 | 10.7 |
| Iron | mg/L | 0.3 | 0.03 | 0.33 | 0.07 | 0.05 | 0.82 | 0.16 | 0.07 | 0.36 | 0.09 |
| Lead | mg/L | 0.005 ***** | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Mercury | mg/L | | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Nitrate (as N) | mg/L | | 2.04 | <0.05 | <0.5 | 1.66 | 0.18 | 1.75 | 0.5 | <0.05 | 1.91 |
| Nitrite (as N) | mg/L | | 0.09 | <0.05 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.05 | <0.05 |
| pH | units | 6.5-8.5 | 7.94 | 7.87 | 7.82 | 7.86 | 7.63 | 7.66 | 7.92 | 7.9 | 7.87 |
| pH - field | units | 6.5-8.5 | 7.7 | 7.5 | 7.7 | 7.5 | 7.3 | 7.6 | 7.9 | 7.8 | 7.9 |
| Phenols: total | µg/L | 1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | 2 | <1 |
| Phosphorus | mg/L | 0.03 | 0.02 | 0.08 | 0.02 | 0.01 | 0.14 | 0.03 | 0.02 | 0.08 | 0.05 |
| Sulphate | mg/L | | 27.9 | 4.5 | 35.5 | 20.8 | 34.8 | 55.3 | 20.2 | 6.8 | 34.5 |
| Total Dissolved Solids | mg/L | | 390 | 450 | 450 | 340 | 1800 | 540 | 330 | 420 | 360 |
| Temperature - field | °C | | 10.3 | 19.9 | 2.8 | 8.2 | 22.1 | 0.8 | 7.6 | 17.5 | 0.2 |
| Total Kjeldahl Nitrogen | mg/L | | 0.4 | 0.8 | 0.4 | 0.4 | 1.2 | 0.4 | 0.6 | 0.8 | 0.4 |
| Total Suspended Solids | mg/L | | <2.0 | 6 | <2.0 | <2.0 | 8 | 3.2 | <2.0 | 4 | <2.0 |
| Zinc | mg/L | 0.020 | 0.0019 | 0.0025 | 0.0006 | <0.0005 | <0.0005 | 0.0019 | 0.0041 | 0.0038 | 0.004 |

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) "-" - Indicates parameter not analysed.
3) * - Aluminum PWQO value based on pH range of 6.5 to 9.0.
** - Beryllium PWQO value based on hardness >75 mg/L.
*** - Cadmium PWQO value based on hardness >100 mg/L.
**** - Copper PWQO value based on hardness >20 mg/L.
***** - Lead PWQO value based on hardness >80 mg/L.

**Table J.2**
**Surface Water Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | PWQO[1] | SW1 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Feb-20 | Apr-20 | Jun-20 | Dec-20 | Apr-21 | Oct-21 | Nov-21 | Apr-22 | Jun-22 |
| Alkalinity | mg/L | | 241 | 219 | 313 | 244 | 246 | 356 | 346 | 259 | 260 |
| Ammonia: total | mg/L | | 0.1 | 0.2 | 0.2 | <0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 |
| Ammonia: un-ionized | μg/L | 20 | <1 | 1 | 3 | <2 | 1 | 1 | 1 | 2 | 2 |
| Arsenic | mg/L | 0.005 | <0.0005 | <0.0005 | 0.0012 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.005 |
| Barium | mg/L | | 0.057 | 0.047 | 0.086 | 0.056 | 0.051 | 0.051 | 0.055 | 0.048 | 0.045 |
| Biochemical Oxygen Demand | mg/L | | <2.0 | <2.0 | 2.6 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 |
| Boron | mg/L | 0.200 | 0.01 | 0.01 | 0.03 | 0.02 | 0.02 | 0.02 | 0.01 | 0.02 | 0.03 |
| Cadmium | mg/L | 0.0005 *** | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.001 |
| Chloride | mg/L | | 102 | 46.8 | 82.7 | 86.9 | 53.2 | 65.2 | 52.6 | 63.9 | 47 |
| Chromium | mg/L | 0.010 | <0.0005 | <0.0005 | 0.0019 | <0.0005 | <0.0005 | <0.0005 | 0.0005 | <0.0005 | <0.001 |
| Chemical Oxygen Demand | mg/L | | 30 | 30 | 60 | 30 | 20 | 30 | <10 | 20 | 40 |
| Conductivity | μS/cm | | 865 | 639 | 878 | 832 | 715 | 900 | 822 | 736 | 673 |
| Conductivity - field | μS/cm | | 926 | 641 | 890 | 838 | 701 | 886 | 862 | 678 | 638 |
| Copper | mg/L | 0.005 **** | <0.0005 | 0.0012 | 0.002 | 0.003 | 0.0014 | 0.0044 | 0.0008 | 0.0019 | <0.005 |
| Dissolved Oxygen - field | mg/L | | 6.03 | 8.73 | 4.2 | 8.6 | 8.65 | 4.8 | 9.09 | 8.52 | 5.46 |
| Iron | mg/L | 0.3 | 0.06 | 0.11 | 2.39 | 0.05 | 0.08 | 0.10 | 0.17 | 0.07 | 0.35 |
| Lead | mg/L | 0.005 ***** | <0.0005 | <0.0005 | 0.0009 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.01 |
| Mercury | mg/L | | <0.1 | <0.1 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Nitrate (as N) | mg/L | | 0.2 | 0.6 | <0.5 | 4.41 | 0.64 | 0.2 | 1.08 | <0.05 | <0.05 |
| Nitrite (as N) | mg/L | | <0.05 | <0.5 | <0.5 | <0.5 | <0.05 | 1.03 | <0.05 | <0.05 | <0.05 |
| pH | units | 6.5-8.5 | 7.49 | 7.89 | 7.83 | 7.88 | 7.93 | 7.89 | 7.86 | 7.78 | 7.96 |
| pH - field | units | 6.5-8.5 | 7.5 | 7.8 | 7.7 | 7.8 | 7.9 | 7.5 | 7.6 | 7.6 | 7.6 |
| Phenols: total | μg/L | 1 | <1 | <1 | <1 | 2 | <1 | 1 | <1 | <1 | <1 |
| Phosphorus | mg/L | 0.03 | 0.03 | 0.02 | 0.25 | 0.03 | 0.02 | 0.05 | 0.01 | <0.02 | 0.09 |
| Sulphate | mg/L | | 30.5 | 20.1 | 7.4 | 51 | 24.8 | 18 | 21.3 | 15 | 14.9 |
| Total Dissolved Solids | mg/L | | 500 | 360 | 570 | 500 | 420 | 570 | 490 | 430 | 420 |
| Temperature - field | °C | | 1.2 | 5.1 | 16.0 | 0.5 | 3.9 | 9.8 | 0.7 | 10.7 | 17.6 |
| Total Kjeldahl Nitrogen | mg/L | | 0.3 | <0.2 | 1.1 | 0.7 | <2.0 | <2.0 | 0.5 | 0.5 | 0.7 |
| Total Suspended Solids | mg/L | | <2.0 | <2.0 | 52.4 | <2.0 | <2.0 | <2.0 | 2 | <2.0 | 3.6 |
| Zinc | mg/L | 0.020 | <0.0005 | 0.0043 | 0.01 | 0.0018 | 0.0044 | 0.0022 | 0.0019 | 0.0021 | <0.01 |

NOTES:
1) PWQO - Provincial Water Quality Objectives (1999)
2) "-" - Indicates parameter not analysed.
3) * - Aluminum PWQO value based on pH range of 6.5 to 9.0.
** - Beryllium PWQO value based on hardness >75 mg/L.
*** - Cadmium PWQO value based on hardness >100 mg/L.
**** - Copper PWQO value based on hardness >20 mg/L.
***** - Lead PWQO value based on hardness >80 mg/L.

**Table J.2**
**Surface Water Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | PWQO[1] | SW2 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-17 | Jun-17 | Oct-17 | Dec-17 | Apr-18 | Dec-18 | Apr-19 | Jun-19 | Dec-19 |
| Alkalinity | mg/L | | 170 | 320 | 353 | 301 | 188 | 220 | 208 | 278 | 169 |
| Ammonia: total | mg/L | | 0.2 | <0.1 | 0.2 | <0.1 | 0.1 | 0.1 | 0.2 | <0.1 | 0.2 |
| Ammonia: un-ionized | µg/L | 20 | 2 | <3 | 0 | <2 | 1 | 1 | 4 | <4 | 1 |
| Arsenic | mg/L | 0.005 | <0.0005 | 0.0007 | 0.0012 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0008 | <0.0005 |
| Barium | mg/L | | 0.036 | 0.039 | 0.121 | 0.055 | 0.036 | 0.061 | 0.039 | 0.043 | 0.043 |
| Biochemical Oxygen Demand | mg/L | | <2.3 | <2.3 | 5.7 | <2.3 | <2.3 | <2.0 | <2.0 | <2.0 | <2.0 |
| Boron | mg/L | 0.200 | 0.01 | 0.03 | 0.03 | 0.02 | 0.01 | 0.01 | 0.02 | 0.02 | 0.01 |
| Cadmium | mg/L | 0.0005 *** | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Chloride | mg/L | | 54.9 | 49 | 101 | 76.7 | 39.5 | 89.8 | 38.8 | 43.1 | 57.4 |
| Chromium | mg/L | 0.010 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Chemical Oxygen Demand | mg/L | | <10 | 40 | 100 | 40 | 30 | 30 | <10 | 30 | 30 |
| Conductivity | µS/cm | | 578 | 729 | 962 | 820 | 534 | 846 | 561 | 695 | 611 |
| Conductivity - field | µS/cm | | 585 | 733 | 978 | 857 | 523 | 803 | 567 | 733 | 637 |
| Copper | mg/L | 0.005 **** | 0.0013 | 0.0006 | 0.0005 | 0.0009 | 0.0009 | 0.0022 | 0.001 | 0.0006 | 0.0018 |
| Dissolved Oxygen - field | mg/L | | 7.05 | 3.37 | 1.2 | 9.72 | 9.53 | 8.51 | 12 | 5.22 | 11.4 |
| Iron | mg/L | 0.3 | 0.02 | 0.14 | 3.88 | 0.04 | 0.04 | 0.05 | 0.06 | 0.24 | 0.08 |
| Lead | mg/L | 0.005 ***** | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Mercury | mg/L | | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Nitrate (as N) | mg/L | | 2 | <0.05 | <0.5 | <0.5 | 1.62 | 1.76 | 0.5 | <0.05 | 1.77 |
| Nitrite (as N) | mg/L | | 0.08 | <0.05 | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.05 | <0.05 |
| pH | units | 6.5-8.5 | 8.07 | 7.86 | 7.34 | 7.92 | 7.91 | 7.75 | 8.04 | 7.96 | 7.9 |
| pH - field | units | 6.5-8.5 | 7.8 | 7.6 | 7.1 | 7.8 | 7.8 | 7.9 | 8.1 | 8.0 | 7.9 |
| Phenols: total | µg/L | 1 | <1 | <1 | 14 | <1 | <1 | <1 | 1 | 2 | <1 |
| Phosphorus | mg/L | 0.03 | 0.02 | 0.07 | 0.62 | 0.02 | 0.01 | 0.02 | 0.02 | 0.07 | 0.05 |
| Sulphate | mg/L | | 27.3 | 4.1 | 18.9 | 35.7 | 20.3 | 54.7 | 19.2 | 7.1 | 35.3 |
| Total Dissolved Solids | mg/L | | 380 | 440 | 650 | 460 | 330 | 540 | 340 | 420 | 350 |
| Temperature - field | °C | | 10.7 | 21.4 | 10.6 | 2.4 | 8.7 | 0.4 | 7.8 | 17.9 | 0.2 |
| Total Kjeldahl Nitrogen | mg/L | | 0.7 | 0.8 | 1.6 | 0.4 | 0.4 | 0.5 | 0.6 | 0.8 | 0.4 |
| Total Suspended Solids | mg/L | | <2.0 | <2.0 | 19.6 | 2 | <2.0 | <2.0 | <2.0 | 2 | <2.0 |
| Zinc | mg/L | 0.020 | 0.0018 | 0.0021 | 0.0044 | 0.0016 | <0.0005 | 0.0025 | 0.0051 | 0.003 | 0.0036 |

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) "-" - Indicates parameter not analysed.
3) * - Aluminum PWQO value based on pH range of 6.5 to 9.0.
** - Beryllium PWQO value based on hardness >75 mg/L.
*** - Cadmium PWQO value based on hardness >100 mg/L.
**** - Copper PWQO value based on hardness >20 mg/L.
***** - Lead PWQO value based on hardness >80 mg/L.

**Table J.2**
**Surface Water Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | PWQO[1] | SW2 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-20 | Jun-20 | Dec-20 | Apr-21 | Jun-21 | Aug-21 | Oct-21 | Nov-21 | Apr-22 | Jun-22 | Jun-22 |
| Alkalinity | mg/L | | 219 | 311 | 244 | 243 | 328 | 407 | 360 | 348 | 259 | 344 | 283 |
| Ammonia: total | mg/L | | 0.2 | 0.2 | <0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.2 | 0.2 |
| Ammonia: un-ionized | µg/L | 20 | 2 | 2 | <2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Arsenic | mg/L | 0.005 | <0.0005 | 0.0008 | <0.0005 | <0.0005 | 0.001 | 0.001 | <0.0005 | <0.0005 | <0.0005 | <0.005 | <0.005 |
| Barium | mg/L | | 0.044 | 0.070 | 0.054 | 0.047 | 0.046 | 0.071 | 0.050 | 0.054 | 0.043 | 0.047 | 0.083 |
| Biochemical Oxygen Demand | mg/L | | <2.0 | 2.1 | <2.0 | <2.0 | 9.3 | 15.7 | <2.0 | <2.0 | <2.0 | 4.3 | 5.2 |
| Boron | mg/L | 0.200 | 0.01 | 0.03 | 0.01 | 0.02 | 0.02 | 0.03 | 0.02 | 0.01 | 0.02 | 0.03 | 0.02 |
| Cadmium | mg/L | 0.0005 *** | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.001 | <0.001 |
| Chloride | mg/L | | 46.7 | 79.5 | 79.1 | 55.9 | 85.4 | 74.8 | 65.2 | 54.9 | 54.9 | 46.8 | 66.2 |
| Chromium | mg/L | 0.010 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.001 | <0.001 |
| Chemical Oxygen Demand | mg/L | | 20 | 40 | 50 | 30 | 50 | 80 | 20 | <10 | 20 | 60 | 50 |
| Conductivity | µS/cm | | 639 | 877 | 812 | 712 | 900 | 999 | 901 | 859 | 704 | 825 | 812 |
| Conductivity - field | µS/cm | | 636 | 871 | 828 | 694 | 874 | 948 | 896 | 875 | 664 | 837 | 771 |
| Copper | mg/L | 0.005 **** | 0.0013 | 0.0008 | 0.0009 | 0.001 | 0.0006 | 0.0005 | 0.0007 | 0.0007 | 0.0009 | <0.005 | <0.005 |
| Dissolved Oxygen - field | mg/L | | 9.03 | 0.67 | 6.68 | 11.3 | 0.62 | <0.05 | 4.37 | 10.7 | 9.09 | 0.24 | 1.45 |
| Iron | mg/L | 0.3 | 0.09 | 0.81 | 0.04 | 0.05 | 0.60 | 1.01 | 0.07 | 0.06 | 0.05 | 0.77 | 1.20 |
| Lead | mg/L | 0.005 ***** | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.01 | <0.01 |
| Mercury | mg/L | | <0.1 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Nitrate (as N) | mg/L | | 0.6 | <0.5 | 4.89 | 0.58 | <0.05 | <0.05 | 0.09 | 1.02 | <0.05 | <0.05 | <0.05 |
| Nitrite (as N) | mg/L | | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| pH | units | 6.5-8.5 | 7.96 | 7.7 | 7.86 | 8.06 | 7.52 | 7.55 | 7.82 | 7.9 | 7.83 | 7.64 | 7.61 |
| pH - field | units | 6.5-8.5 | 7.7 | 7.5 | 7.9 | 7.9 | 7.2 | 7.3 | 7.5 | 7.6 | 7.7 | 7.0 | 7.2 |
| Phenols: total | µg/L | 1 | <1 | <1 | 2 | 2 | 1 | 2 | 1 | 1 | <1 | <1 | 1 |
| Phosphorus | mg/L | 0.03 | 0.02 | 0.16 | 0.03 | 0.03 | 0.23 | 0.49 | 0.06 | 0.01 | <0.02 | 0.10 | 0.22 |
| Sulphate | mg/L | | 20.3 | 6.5 | 48.6 | 23.9 | 5.2 | 2 | 19.2 | 20.4 | 14.1 | 8 | 10 |
| Total Dissolved Solids | mg/L | | 340 | 580 | 470 | 420 | 620 | 680 | 510 | 450 | 400 | 480 | 530 |
| Temperature - field | °C | | 6.9 | 15.4 | 0.4 | 5.2 | 14.4 | 15.1 | 10.0 | 0.3 | 11.4 | 16.8 | 20.2 |
| Total Kjeldahl Nitrogen | mg/L | | <0.2 | 1.1 | 0.7 | <2.0 | 2.5 | 1.7 | 0.7 | 0.4 | 0.2 | 1 | 1 |
| Total Suspended Solids | mg/L | | <2.0 | 2.8 | <2.0 | <2.0 | 10 | 22 | <2.0 | <2.0 | <2.0 | 16 | 9.2 |
| Zinc | mg/L | 0.020 | 0.0029 | 0.0008 | <0.0005 | 0.0016 | 0.0013 | 0.0028 | 0.0034 | 0.0009 | 0.0012 | <0.01 | <0.01 |

NOTES:
1) PWQO - Provincial Water Quality Objectives (1999)
2) "-" - Indicates parameter not analysed.
3) * - Aluminum PWQO value based on pH range of 6.5 to 9.0.
** - Beryllium PWQO value based on hardness >75 mg/L.
*** - Cadmium PWQO value based on hardness >100 mg/L.
**** - Copper PWQO value based on hardness >20 mg/L.
***** - Lead PWQO value based on hardness >80 mg/L.

**Table J.2**
**Surface Water Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | PWQO[1] | SW3 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-17 | Jun-17 | Aug-17 | Oct-17 | Dec-17 | Apr-18 | Dec-18 | Apr-19 | Jun-19 | Dec-19 |
| Alkalinity | mg/L | | 175 | 335 | 429 | 379 | 302 | 197 | 220 | 197 | 283 | 190 |
| Ammonia: total | mg/L | | 0.2 | <0.1 | 0.8 | 0.2 | <0.1 | 0.1 | 0.1 | 0.2 | <0.1 | 0.2 |
| Ammonia: un-ionized | μg/L | 20 | 2 | <2 | 7 | 1 | <2 | 1 | 1 | 4 | <4 | 1 |
| Arsenic | mg/L | 0.005 | <0.0005 | 0.0008 | 0.0015 | 0.0008 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0008 | <0.0005 |
| Barium | mg/L | | 0.037 | 0.047 | 0.066 | 0.086 | 0.059 | 0.039 | 0.057 | 0.041 | 0.045 | 0.049 |
| Biochemical Oxygen Demand | mg/L | | <2.3 | <2.3 | <2.3 | <2.3 | <2.3 | <2.3 | <2.0 | <2.0 | <2.0 | <2.0 |
| Boron | mg/L | 0.200 | 0.01 | 0.03 | 0.02 | 0.03 | 0.01 | 0.01 | 0.01 | 0.02 | 0.03 | 0.02 |
| Cadmium | mg/L | 0.0005 *** | <0.0001 | <0.0001 | <0.0001 | 0.000 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Chloride | mg/L | | 52.2 | 43 | 42.3 | 61.4 | 74.6 | 39.9 | 82.5 | 39.5 | 38.3 | 72.2 |
| Chromium | mg/L | 0.010 | <0.0005 | <0.0005 | 0.0006 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0005 | <0.0005 |
| Chemical Oxygen Demand | mg/L | | <10 | 30 | 70 | 30 | 20 | 10 | 40 | 20 | 60 | 50 |
| Conductivity | μS/cm | | 569 | 734 | 885 | 945 | 818 | 544 | 826 | 557 | 688 | 703 |
| Conductivity - field | μS/cm | | 575 | 748 | 930 | 952 | 842 | 529 | 771 | 578 | 728 | 734 |
| Copper | mg/L | 0.005 **** | 0.0012 | 0.0007 | 0.0008 | 0.113 | 0.0011 | 0.001 | 0.0016 | 0.001 | 0.0008 | 0.0019 |
| Dissolved Oxygen - field | mg/L | | 8.07 | 3.68 | 1.9 | 2.8 | 9.61 | 11.5 | 9.53 | 12.1 | 5.58 | 11 |
| Iron | mg/L | 0.3 | 0.02 | 0.18 | 0.98 | 0.30 | 0.08 | 0.03 | 0.03 | 0.10 | 0.28 | 0.11 |
| Lead | mg/L | 0.005 ***** | <0.0005 | <0.0005 | <0.0005 | 0.0066 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Mercury | mg/L | | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Nitrate (as N) | mg/L | | 2.03 | 0.18 | 0.05 | <0.5 | <0.5 | 1.52 | 2.02 | 0.6 | 0.16 | 1.59 |
| Nitrite (as N) | mg/L | | <0.05 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.05 | <0.05 |
| pH | units | 6.5-8.5 | 8.15 | 7.96 | 7.86 | 7.51 | 7.96 | 8.1 | 7.83 | 8.17 | 8.07 | 7.99 |
| pH - field | units | 6.5-8.5 | 7.7 | 7.6 | 7.4 | 7.2 | 7.8 | 7.8 | 7.8 | 8.1 | 8.0 | 7.9 |
| Phenols: total | μg/L | 1 | <1 | <1 | <1 | 1 | <1 | <1 | 1 | 1 | 1 | <1 |
| Phosphorus | mg/L | 0.03 | <0.02 | 0.05 | 0.15 | 0.07 | 0.02 | 0.01 | 0.02 | 0.02 | 0.08 | 0.04 |
| Sulphate | mg/L | | 26.6 | 3.1 | 2.4 | 60 | 35.9 | 19.8 | 54.4 | 18.2 | 5.9 | 42.4 |
| Total Dissolved Solids | mg/L | | 360 | 440 | 520 | 590 | 460 | 320 | 520 | 330 | 390 | 410 |
| Temperature - field | °C | | 10.3 | 19.3 | 17.4 | 10.7 | 2.5 | 8.7 | 0.3 | 7.7 | 16.8 | 0.1 |
| Total Kjeldahl Nitrogen | mg/L | | 0.5 | 0.7 | 1.8 | 0.7 | 0.4 | 0.4 | 0.5 | 0.5 | 0.7 | 0.4 |
| Total Suspended Solids | mg/L | | <2.0 | <2.0 | 10 | 8.8 | <2.0 | <2.0 | <2.0 | 4 | 5 | 2.4 |
| Zinc | mg/L | 0.020 | 0.0011 | 0.002 | 0.0036 | 0.0703 | 0.0007 | <0.0005 | 0.0015 | 0.0052 | 0.0033 | 0.0022 |

NOTES:
1) PWQO - Provincial Water Quality Objectives (1999)
2) "-" - Indicates parameter not analysed.
3) * - Aluminum PWQO value based on pH range of 6.5 to 9.0.
** - Beryllium PWQO value based on hardness >75 mg/L.
*** - Cadmium PWQO value based on hardness >100 mg/L.
**** - Copper PWQO value based on hardness >20 mg/L.
***** - Lead PWQO value based on hardness >80 mg/L.

**Table J.2**
**Surface Water Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | PWQO[1] | SW3 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Feb-20 | Apr-20 | Jun-20 | Dec-20 | Apr-21 | Oct-21 | Nov-21 | Apr-22 | Jun-22 |
| Alkalinity | mg/L | | 259 | 226 | 335 | 258 | 253 | 369 | 359 | 262 | 272 |
| Ammonia: total | mg/L | | 0.2 | 0.2 | 0.3 | <0.1 | 0.1 | 0.2 | 0.2 | 0.1 | 0.2 |
| Ammonia: un-ionized | µg/L | 20 | 1 | 3 | 12 | <2 | 2 | 2 | 1 | 2 | 4 |
| Arsenic | mg/L | 0.005 | <0.0005 | <0.0005 | 0.0008 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.005 |
| Barium | mg/L | | 0.064 | 0.049 | 0.061 | 0.058 | 0.050 | 0.051 | 0.054 | 0.044 | 0.037 |
| Biochemical Oxygen Demand | mg/L | | <2.0 | <2.0 | 2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 |
| Boron | mg/L | 0.200 | 0.02 | 0.01 | 0.03 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 |
| Cadmium | mg/L | 0.0005 *** | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.001 |
| Chloride | mg/L | | 93 | 45.7 | 68.2 | 81.1 | 57 | 63.9 | 52.5 | 53.4 | 46.6 |
| Chromium | mg/L | 0.010 | <0.0005 | <0.0005 | 0.0006 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.001 |
| Chemical Oxygen Demand | mg/L | | 40 | 20 | 40 | 40 | 30 | 20 | <10 | 20 | 30 |
| Conductivity | µS/cm | | 876 | 645 | 874 | 837 | 719 | 906 | 860 | 714 | 701 |
| Conductivity - field | µS/cm | | 931 | 644 | 876 | 842 | 700 | 892 | 882 | 673 | 663 |
| Copper | mg/L | 0.005 **** | <0.0005 | 0.0021 | 0.0014 | 0.001 | 0.0011 | 0.0009 | 0.0007 | 0.0009 | <0.005 |
| Dissolved Oxygen - field | mg/L | | 6.96 | 9.67 | 5.7 | 8.51 | 10.7 | 7.93 | 10.6 | 12.8 | 5.68 |
| Iron | mg/L | 0.3 | 0.08 | 0.17 | 0.77 | 0.04 | 0.04 | 0.04 | 0.09 | 0.05 | 0.16 |
| Lead | mg/L | 0.005 ***** | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.01 |
| Mercury | mg/L | | <0.1 | <0.1 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Nitrate (as N) | mg/L | | 0.61 | 0.7 | <0.5 | 5.04 | 0.42 | 0.13 | 1.04 | 0.06 | 0.14 |
| Nitrite (as N) | mg/L | | <0.05 | <0.5 | <0.5 | 2.53 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| pH | units | 6.5-8.5 | 7.51 | 8.13 | 8.17 | 7.88 | 8.21 | 8.09 | 8.02 | 8.13 | 8.11 |
| pH - field | units | 6.5-8.5 | 7.5 | 8.0 | 8.1 | 7.9 | 8.3 | 7.8 | 7.7 | 8.0 | 7.8 |
| Phenols: total | µg/L | 1 | <1 | <1 | <1 | 2 | 2 | 2 | 1 | <1 | <1 |
| Phosphorus | mg/L | 0.03 | 0.03 | 0.03 | 0.12 | 0.03 | 0.02 | 0.04 | 0.03 | <0.02 | 0.09 |
| Sulphate | mg/L | | 31.4 | 19.2 | 5.8 | 48.1 | 23.2 | 16.3 | 19.5 | 14.5 | 14.6 |
| Total Dissolved Solids | mg/L | | 520 | 360 | 570 | 520 | 430 | 520 | 380 | 400 | 420 |
| Temperature - field | °C | | 1.1 | 7.4 | 17.4 | 0.0 | 5.6 | 9.8 | 0.3 | 11.7 | 17.1 |
| Total Kjeldahl Nitrogen | mg/L | | 0.4 | 0.6 | 1 | 1 | <2.0 | 0.7 | 0.5 | 0.4 | 0.7 |
| Total Suspended Solids | mg/L | | 2.4 | 4 | 11.2 | <2.0 | 4.7 | <2.0 | 2 | <2.0 | <2.0 |
| Zinc | mg/L | 0.020 | <0.0005 | 0.003 | 0.0028 | <0.0005 | 0.0012 | <0.0005 | 0.0017 | 0.0022 | <0.01 |

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) "-" - Indicates parameter not analysed.
3) * - Aluminum PWQO value based on pH range of 6.5 to 9.0.
** - Beryllium PWQO value based on hardness >75 mg/L.
*** - Cadmium PWQO value based on hardness >100 mg/L.
**** - Copper PWQO value based on hardness >20 mg/L.
***** - Lead PWQO value based on hardness >80 mg/L.

**Table J.2**
**Surface Water Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | PWQO[1] | SW17 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-17 | Jun-17 | Oct-17 | Dec-17 | Apr-18 | Dec-18 | Apr-19 | Jun-19 | Dec-19 |
| Alkalinity | mg/L | | 165 | 301 | 298 | 304 | 160 | 232 | 182 | 262 | 212 |
| Ammonia: total | mg/L | | 0.2 | <0.1 | 0.1 | <0.1 | 0.1 | 0.2 | 0.2 | <0.1 | 0.2 |
| Ammonia: un-ionized | µg/L | 20 | 2 | <2 | <1 | <1 | <1 | 1 | 2 | <3 | 1 |
| Arsenic | mg/L | 0.005 | <0.0005 | 0.0008 | 0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0008 | <0.0005 |
| Barium | mg/L | | 0.035 | 0.048 | 0.079 | 0.062 | 0.035 | 0.068 | 0.037 | 0.046 | 0.065 |
| Biochemical Oxygen Demand | mg/L | | <2.3 | <2.3 | <2.3 | <2.3 | <2.3 | <2.0 | <2.0 | <2.0 | <2.0 |
| Boron | mg/L | 0.200 | 0.02 | 0.06 | 0.03 | 0.03 | 0.02 | 0.03 | 0.03 | 0.03 | 0.04 |
| Cadmium | mg/L | 0.0005 *** | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Chloride | mg/L | | 74.4 | 109 | 235 | 118 | 47.3 | 149 | 46.6 | 50.2 | 137 |
| Chromium | mg/L | 0.010 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Chemical Oxygen Demand | mg/L | | <10 | 40 | 30 | 20 | 30 | 50 | 20 | 30 | 40 |
| Conductivity | µS/cm | | 613 | 854 | 1250 | 966 | 521 | 1080 | 554 | 703 | 962 |
| Conductivity - field | µS/cm | | 610 | 863 | 1250 | 995 | 506 | 1010 | 571 | 743 | 1000 |
| Copper | mg/L | 0.005 **** | 0.001 | <0.0005 | 0.0008 | 0.0006 | 0.0012 | 0.0014 | 0.0029 | <0.0005 | 0.0018 |
| Dissolved Oxygen - field | mg/L | | 8.93 | 2 | 4.91 | 9.12 | 10.3 | 9.42 | 10.4 | 1.89 | 9.92 |
| Iron | mg/L | 0.3 | 0.03 | 0.09 | 0.12 | 0.05 | 0.05 | 0.07 | 0.08 | 0.23 | 0.12 |
| Lead | mg/L | 0.005 ***** | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Mercury | mg/L | | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Nitrate (as N) | mg/L | | 0.44 | <0.05 | <0.5 | 0.5 | 1.55 | 1.01 | <0.5 | <0.05 | 2.48 |
| Nitrite (as N) | mg/L | | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.05 | <0.05 |
| pH | units | 6.5-8.5 | 8.06 | 7.88 | 7.61 | 7.91 | 7.93 | 7.76 | 7.96 | 7.8 | 7.84 |
| pH - field | units | 6.5-8.5 | 7.8 | 7.4 | 7.2 | 7.6 | 7.5 | 7.6 | 7.9 | 7.7 | 7.7 |
| Phenols: total | µg/L | 1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | 2 | <1 |
| Phosphorus | mg/L | 0.03 | 0.03 | 0.05 | 0.07 | 0.02 | 0.01 | 0.03 | 0.02 | 0.08 | 0.05 |
| Sulphate | mg/L | | 33.4 | 5.4 | 48 | 40.2 | 24.6 | 64.2 | 21.9 | 8.9 | 49.2 |
| Total Dissolved Solids | mg/L | | 390 | 530 | 760 | 540 | 320 | 650 | 340 | 430 | 550 |
| Temperature - field | °C | | 10.7 | 20.8 | 11.2 | 2.8 | 8.4 | 1.0 | 7.9 | 18.2 | 0.4 |
| Total Kjeldahl Nitrogen | mg/L | | 0.5 | 0.9 | 0.7 | 0.5 | 0.5 | 0.5 | 0.6 | 0.8 | <0.5 |
| Total Suspended Solids | mg/L | | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 |
| Zinc | mg/L | 0.020 | 0.0036 | 0.0028 | 0.0036 | 0.0016 | 0.0013 | 0.0037 | 0.005 | 0.003 | 0.0094 |

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) "-" - Indicates parameter not analysed.
3) * - Aluminum PWQO value based on pH range of 6.5 to 9.0.
** - Beryllium PWQO value based on hardness >75 mg/L.
*** - Cadmium PWQO value based on hardness >100 mg/L.
**** - Copper PWQO value based on hardness >20 mg/L.
***** - Lead PWQO value based on hardness >80 mg/L.

**Table J.2**
**Surface Water Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | PWQO[1] | SW17 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Feb-20 | Apr-20 | Jun-20 | Dec-20 | Apr-21 | Oct-21 | Nov-21 | Apr-22 | Jun-22 |
| Alkalinity | mg/L | | 218 | 220 | 297 | 226 | 254 | 321 | 334 | 246 | 228 |
| Ammonia: total | mg/L | | 0.1 | 0.2 | 0.2 | <0.1 | 0.1 | 0.2 | 0.2 | 0.1 | 0.2 |
| Ammonia: un-ionized | µg/L | 20 | 1 | 2 | 3 | <2 | 1 | 1 | 1 | 1 | 2 |
| Arsenic | mg/L | 0.005 | <0.0005 | <0.0005 | 0.001 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.005 |
| Barium | mg/L | | 0.063 | 0.047 | 0.073 | 0.058 | 0.052 | 0.057 | 0.063 | 0.050 | 0.047 |
| Biochemical Oxygen Demand | mg/L | | <2.0 | <2.0 | 2.4 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 |
| Boron | mg/L | 0.200 | 0.02 | 0.02 | 0.05 | 0.03 | 0.03 | 0.02 | 0.02 | 0.03 | 0.03 |
| Cadmium | mg/L | 0.0005 *** | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.001 |
| Chloride | mg/L | | 172 | 73.6 | 125 | 111 | 89.5 | 109 | 100 | 108 | 49.3 |
| Chromium | mg/L | 0.010 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.001 |
| Chemical Oxygen Demand | mg/L | | 40 | 30 | 70 | 30 | 40 | 30 | <10 | 20 | 40 |
| Conductivity | µS/cm | | 1040 | 731 | 991 | 876 | 850 | 973 | 993 | 878 | 634 |
| Conductivity - field | µS/cm | | 1150 | 722 | 1000 | 875 | 831 | 956 | 1010 | 824 | 606 |
| Copper | mg/L | 0.005 **** | <0.0005 | 0.0012 | 0.0005 | 0.0007 | 0.0008 | <0.0005 | 0.0005 | 0.0007 | <0.005 |
| Dissolved Oxygen - field | mg/L | | 10.3 | 7.34 | 3.66 | 8.85 | 9.06 | 5.65 | 9.42 | 8.37 | 2.84 |
| Iron | mg/L | 0.3 | 0.09 | 0.16 | 1.50 | 0.10 | 0.11 | 0.17 | 0.18 | 0.08 | 0.34 |
| Lead | mg/L | 0.005 ***** | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.01 |
| Mercury | mg/L | | <0.1 | <0.1 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Nitrate (as N) | mg/L | | 0.34 | <0.5 | <0.5 | 2.06 | <0.05 | <0.05 | 0.16 | <0.05 | <0.05 |
| Nitrite (as N) | mg/L | | <0.05 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| pH | units | 6.5-8.5 | 7.51 | 7.86 | 7.8 | 7.85 | 7.94 | 7.8 | 7.82 | 7.75 | 7.85 |
| pH - field | units | 6.5-8.5 | 7.8 | 7.8 | 7.7 | 7.9 | 7.9 | 7.5 | 7.5 | 7.5 | 7.4 |
| Phenols: total | µg/L | 1 | <1 | <1 | <1 | 2 | 2 | 2 | 2 | <1 | <1 |
| Phosphorus | mg/L | 0.03 | 0.05 | 0.03 | 0.22 | 0.05 | 0.03 | 0.06 | 0.03 | <0.02 | 0.09 |
| Sulphate | mg/L | | 29.2 | 25.2 | 10.2 | 58.5 | 33.4 | 25.9 | 21.6 | 19 | 15.5 |
| Total Dissolved Solids | mg/L | | 610 | 420 | 660 | 510 | 500 | 590 | 580 | 500 | 380 |
| Temperature - field | °C | | 1.3 | 6.3 | 16.5 | 0.4 | 4.6 | 10.4 | 0.7 | 11.4 | 18.4 |
| Total Kjeldahl Nitrogen | mg/L | | 0.3 | 0.7 | 1.3 | 0.4 | <2.0 | 0.8 | 0.6 | 0.5 | 0.8 |
| Total Suspended Solids | mg/L | | <2.0 | 2 | 18.8 | <2.0 | <2.0 | <2.0 | 2 | <2.0 | <2.0 |
| Zinc | mg/L | 0.020 | 0.0054 | 0.0041 | 0.0025 | 0.0027 | 0.0029 | <0.0005 | 0.0051 | 0.0014 | <0.01 |

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) "-" - Indicates parameter not analysed.
3) * - Aluminum PWQO value based on pH range of 6.5 to 9.0.
** - Beryllium PWQO value based on hardness >75 mg/L.
*** - Cadmium PWQO value based on hardness >100 mg/L.
**** - Copper PWQO value based on hardness >20 mg/L.
***** - Lead PWQO value based on hardness >80 mg/L.

**Table J.2**
**Surface Water Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | PWQO[1] | SW18 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-17 | Jun-17 | Oct-17 | Dec-17 | Apr-18 | Dec-18 | Apr-19 | Jun-19 | Dec-19 |
| Alkalinity | mg/L | | 172 | 328 | 374 | 301 | 191 | 222 | 188 | 293 | 191 |
| Ammonia: total | mg/L | | 0.2 | <0.1 | 0.4 | <0.1 | 0.1 | 0.1 | 0.2 | <0.1 | 0.2 |
| Ammonia: un-ionized | µg/L | 20 | 2 | <3 | 2 | <2 | 1 | 1 | 4 | <3 | 1 |
| Arsenic | mg/L | 0.005 | <0.0005 | 0.0009 | 0.0009 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0008 | <0.0005 |
| Barium | mg/L | | 0.036 | 0.048 | 0.091 | 0.058 | 0.038 | 0.057 | 0.040 | 0.050 | 0.047 |
| Biochemical Oxygen Demand | mg/L | | <2.3 | <2.3 | <2.3 | <2.3 | <2.3 | <2.0 | <2.0 | <2.0 | <2.0 |
| Boron | mg/L | 0.200 | 0.01 | 0.03 | 0.02 | 0.02 | 0.01 | 0.01 | 0.02 | 0.03 | 0.02 |
| Cadmium | mg/L | 0.0005 *** | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Chloride | mg/L | | 55.9 | 47 | 74.2 | 76.7 | 41 | 89.3 | 39.2 | 44.6 | 60.4 |
| Chromium | mg/L | 0.010 | <0.0005 | <0.0005 | 0.0007 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Chemical Oxygen Demand | mg/L | | <10 | 50 | 50 | 20 | 30 | 50 | 20 | 20 | 40 |
| Conductivity | µS/cm | | 577 | 743 | 973 | 822 | 541 | 846 | 550 | 725 | 660 |
| Conductivity - field | µS/cm | | 581 | 763 | 990 | 854 | 528 | 800 | 568 | 765 | 694 |
| Copper | mg/L | 0.005 **** | 0.0012 | 0.0011 | 0.002 | 0.0009 | 0.0009 | 0.0023 | 0.0009 | 0.0007 | 0.0021 |
| Dissolved Oxygen - field | mg/L | | 6.72 | 3.67 | 2.76 | 8.66 | 9.55 | 8.78 | 11.9 | 3.77 | 10.5 |
| Iron | mg/L | 0.3 | 0.02 | 0.27 | 0.71 | 0.02 | 0.02 | 0.03 | 0.04 | 0.45 | 0.20 |
| Lead | mg/L | 0.005 ***** | <0.0005 | <0.0005 | 0.0006 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Mercury | mg/L | | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Nitrate (as N) | mg/L | | 2.03 | 0.05 | <0.5 | <0.5 | 1.48 | 1.71 | 0.5 | 0.1 | 1.6 |
| Nitrite (as N) | mg/L | | 0.07 | <0.05 | <0.5 | <0.5 | <0.5 | <0.05 | <0.5 | <0.05 | <0.05 |
| pH | units | 6.5-8.5 | 8.06 | 7.93 | 7.58 | 7.96 | 8.09 | 7.84 | 8.12 | 7.96 | 7.92 |
| pH - field | units | 6.5-8.5 | 7.7 | 7.7 | 7.3 | 7.8 | 7.8 | 7.9 | 8.1 | 7.9 | 7.9 |
| Phenols: total | µg/L | 1 | <1 | <1 | 2 | <1 | <1 | <1 | <1 | 3 | <1 |
| Phosphorus | mg/L | 0.03 | 0.02 | 0.06 | 0.11 | 0.01 | 0.01 | 0.02 | 0.02 | 0.07 | 0.06 |
| Sulphate | mg/L | | 27.6 | 2.7 | 52.5 | 36 | 20.2 | 55.5 | 19.2 | 6.2 | 37.5 |
| Total Dissolved Solids | mg/L | | 370 | 440 | 620 | 470 | 320 | 540 | 320 | 430 | 390 |
| Temperature - field | °C | | 10.5 | 20.1 | 10.5 | 2.7 | 10.1 | 0.4 | 7.9 | 17.3 | 0.1 |
| Total Kjeldahl Nitrogen | mg/L | | 0.6 | 0.9 | 1 | 0.4 | 0.5 | 0.5 | 0.5 | 0.8 | 0.5 |
| Total Suspended Solids | mg/L | | <2.0 | <2.0 | 23.6 | <2.0 | <2.0 | <2.0 | <2.0 | 3 | 7.2 |
| Zinc | mg/L | 0.020 | 0.0016 | 0.0028 | 0.0076 | 0.0007 | <0.0005 | 0.0019 | 0.0027 | 0.0036 | 0.0037 |

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) "-" - Indicates parameter not analysed.
3) * - Aluminum PWQO value based on pH range of 6.5 to 9.0.
** - Beryllium PWQO value based on hardness >75 mg/L.
*** - Cadmium PWQO value based on hardness >100 mg/L.
**** - Copper PWQO value based on hardness >20 mg/L.
***** - Lead PWQO value based on hardness >80 mg/L.

**Table J.2**
**Surface Water Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | PWQO[1] | SW18 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-20 | Jun-20 | Dec-20 | Apr-21 | Oct-21 | Nov-21 | Apr-22 | Jun-22 |
| Alkalinity | mg/L | | 223 | 333 | 247 | 252 | 363 | 348 | 260 | 265 |
| Ammonia: total | mg/L | | 0.1 | 0.3 | <0.1 | 0.1 | 0.2 | 0.2 | 0.1 | 0.2 |
| Ammonia: un-ionized | µg/L | 20 | 2 | 6 | <2 | 2 | 2 | 1 | 1 | 2 |
| Arsenic | mg/L | 0.005 | <0.0005 | 0.0008 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.005 |
| Barium | mg/L | | 0.048 | 0.063 | 0.056 | 0.048 | 0.051 | 0.052 | 0.044 | 0.038 |
| Biochemical Oxygen Demand | mg/L | | <2.0 | 2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 |
| Boron | mg/L | 0.200 | 0.02 | 0.04 | 0.02 | 0.02 | 0.02 | 0.01 | 0.02 | 0.02 |
| Cadmium | mg/L | 0.0005 *** | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.001 |
| Chloride | mg/L | | 48.3 | 81.4 | 80.5 | 56.7 | 66.8 | 57 | 55.5 | 47.4 |
| Chromium | mg/L | 0.010 | <0.0005 | 0.0006 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.001 |
| Chemical Oxygen Demand | mg/L | | 20 | 40 | 20 | 30 | 30 | <10 | 30 | 40 |
| Conductivity | µS/cm | | 646 | 916 | 821 | 718 | 911 | 870 | 712 | 692 |
| Conductivity - field | µS/cm | | 642 | 924 | 834 | 700 | 894 | 923 | 669 | 669 |
| Copper | mg/L | 0.005 **** | 0.0015 | 0.0011 | 0.0009 | 0.0011 | 0.0007 | 0.0007 | 0.0012 | <0.005 |
| Dissolved Oxygen - field | mg/L | | 9.31 | 5.47 | 7.44 | 11.2 | 6.52 | 10.4 | 10.8 | 4.99 |
| Iron | mg/L | 0.3 | 0.16 | 1.10 | 0.06 | 0.08 | 0.05 | 0.15 | 0.05 | 0.22 |
| Lead | mg/L | 0.005 ***** | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.01 |
| Mercury | mg/L | | <0.1 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Nitrate (as N) | mg/L | | 0.6 | <0.5 | 4.65 | 0.5 | 0.12 | 1.03 | <0.05 | 0.07 |
| Nitrite (as N) | mg/L | | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| pH | units | 6.5-8.5 | 8.07 | 7.94 | 7.87 | 8.07 | 7.93 | 8 | 7.93 | 8 |
| pH - field | units | 6.5-8.5 | 8.0 | 7.8 | 8.0 | 8.0 | 7.7 | 7.6 | 7.8 | 7.6 |
| Phenols: total | µg/L | 1 | <1 | <1 | 2 | 1 | 1 | 2 | <1 | <1 |
| Phosphorus | mg/L | 0.03 | 0.03 | 0.15 | 0.04 | 0.02 | 0.05 | 0.03 | <0.02 | 0.08 |
| Sulphate | mg/L | | 20 | 5.5 | 48.3 | 24.2 | 17.8 | 19.5 | 14.1 | 14.2 |
| Total Dissolved Solids | mg/L | | 350 | 580 | 470 | 420 | 540 | 510 | 410 | 420 |
| Temperature - field | °C | | 9.4 | 17.4 | 0.1 | 6.2 | 10.7 | 0.1 | 11.8 | 17.5 |
| Total Kjeldahl Nitrogen | mg/L | | 0.6 | 1.1 | 0.4 | <2.0 | 0.7 | 0.6 | 0.5 | 0.9 |
| Total Suspended Solids | mg/L | | 2.8 | 11.6 | <2.0 | <2.0 | <2.0 | 2.4 | <2.0 | <2.0 |
| Zinc | mg/L | 0.020 | 0.0025 | 0.0033 | 0.0014 | 0.0013 | <0.0005 | 0.0009 | 0.0016 | <0.01 |

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) "-" - Indicates parameter not analysed.
3) * - Aluminum PWQO value based on pH range of 6.5 to 9.0.
** - Beryllium PWQO value based on hardness >75 mg/L.
*** - Cadmium PWQO value based on hardness >100 mg/L.
**** - Copper PWQO value based on hardness >20 mg/L.
***** - Lead PWQO value based on hardness >80 mg/L.

## Table J.2
## Surface Water Chemical Results
## Peterborough County/City Waste Management Facility - 2022 Monitoring Program

| PARAMETER | UNITS | PWQO[1] | SW19 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-17 | Jun-17 | Apr-18 | Apr-19 | Dec-19 | Apr-20 | Apr-21 | Oct-21 | Nov-21 | Apr-22 | Jun-22 |
| Alkalinity | mg/L | | 174 | 327 | 231 | 205 | 141 | 215 | 238 | 384 | 333 | 257 | 353 |
| Ammonia: total | mg/L | | 0.2 | <0.1 | 0.1 | 0.2 | 0.2 | <0.1 | <0.1 | 0.2 | 0.2 | 0.1 | 0.2 |
| Ammonia: un-ionized | μg/L | 20 | 2 | <2 | 1 | 3 | 2 | <2 | <2 | 2 | 1 | 1 | 2 |
| Arsenic | mg/L | 0.005 | <0.0005 | 0.0007 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.005 |
| Barium | mg/L | | 0.035 | 0.041 | 0.039 | 0.041 | 0.029 | 0.040 | 0.042 | 0.048 | 0.054 | 0.042 | 0.035 |
| Biochemical Oxygen Demand | mg/L | | <2.3 | <2.3 | <2.3 | 2.0 | <2.0 | <2.0 | <2.0 | <2.0 | 2.2 | <2.0 | <2.0 |
| Boron | mg/L | 0.200 | 0.01 | 0.02 | 0.01 | 0.01 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | <0.02 |
| Cadmium | mg/L | 0.0005 *** | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.001 |
| Chloride | mg/L | | 29.1 | 24.4 | 25.5 | 27.4 | 16.9 | 25.6 | 30.4 | 37.3 | 34.1 | 29.7 | 25.6 |
| Chromium | mg/L | 0.010 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0005 | <0.0005 | <0.001 |
| Chemical Oxygen Demand | mg/L | | <10 | 10 | 30 | 40 | 50 | 30 | 20 | 20 | <10 | 10 | 20 |
| Conductivity | μS/cm | | 523 | 659 | 559 | 555 | 394 | 562 | 622 | 841 | 778 | 620 | 770 |
| Conductivity - field | μS/cm | | 530 | 680 | 544 | 573 | 387 | 564 | 606 | 829 | 798 | 585 | 729 |
| Copper | mg/L | 0.005 **** | 0.0014 | 0.001 | 0.0007 | 0.001 | 0.002 | 0.0012 | 0.0009 | 0.001 | 0.0013 | 0.003 | <0.005 |
| Dissolved Oxygen - field | mg/L | | 8.09 | 2.11 | 8.65 | 7.2 | 11.3 | 8.21 | 11.5 | 6.68 | 9.57 | 7.64 | 2.17 |
| Iron | mg/L | 0.3 | 0.01 | 0.67 | 0.00 | 0.05 | 0.07 | 0.02 | 0.01 | 0.06 | 0.43 | 0.03 | 0.17 |
| Lead | mg/L | 0.005 ***** | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.01 |
| Mercury | mg/L | | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Nitrate (as N) | mg/L | | 6.21 | <0.05 | 2.54 | 2.5 | 0.88 | 1.1 | 1.56 | 0.27 | 1.52 | 0.4 | <0.05 |
| Nitrite (as N) | mg/L | | <0.05 | <0.05 | <0.5 | <0.5 | <0.05 | <0.5 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| pH | units | 6.5-8.5 | 8.06 | 7.98 | 7.83 | 7.8 | 7.86 | 7.95 | 8.11 | 7.94 | 8 | 7.77 | 7.98 |
| pH - field | units | 6.5-8.5 | 7.7 | 7.5 | 7.7 | 8.0 | 8.0 | 7.8 | 8.0 | 7.7 | 7.6 | 7.8 | 7.5 |
| Phenols: total | μg/L | 1 | <1 | <1 | <1 | 1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 |
| Phosphorus | mg/L | 0.03 | 0.02 | 0.05 | <0.01 | 0.02 | 0.04 | 0.02 | 0.02 | 0.04 | 0.03 | <0.02 | 0.05 |
| Sulphate | mg/L | | 20.9 | 3.8 | 15.7 | 18.2 | 21.9 | 17.6 | 21.7 | 15.2 | 20.7 | 15.9 | 10.9 |
| Total Dissolved Solids | mg/L | | 360 | 400 | 330 | 350 | 220 | 300 | 320 | 500 | 450 | 340 | 440 |
| Temperature - field | °C | | 10.4 | 20.2 | 8.0 | 7.2 | 0.0 | 5.6 | 6.3 | 9.4 | 0.3 | 10.0 | 15.1 |
| Total Kjeldahl Nitrogen | mg/L | | 0.6 | 0.7 | 0.5 | 0.2 | 0.7 | 0.5 | <2.0 | 0.6 | 0.5 | 0.3 | 0.6 |
| Total Suspended Solids | mg/L | | <2.0 | 4.4 | 2 | 14 | <2.0 | <2.0 | 3.3 | <2.0 | 14.8 | <2.0 | 2.8 |
| Zinc | mg/L | 0.020 | 0.0012 | 0.0032 | <0.0005 | 0.0032 | 0.0032 | 0.0007 | 0.0007 | <0.0005 | 0.0024 | 0.0005 | <0.01 |

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) "-" - Indicates parameter not analysed.
3) * - Aluminum PWQO value based on pH range of 6.5 to 9.0.
** - Beryllium PWQO value based on hardness >75 mg/L.
*** - Cadmium PWQO value based on hardness >100 mg/L.
**** - Copper PWQO value based on hardness >20 mg/L.
***** - Lead PWQO value based on hardness >80 mg/L.

**Table J.2**
**Surface Water Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | PWQO[1] | SW20 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-17 | Jun-17 | Aug-17 | Dec-17 | Apr-18 | Dec-18 | Apr-19 | Jun-19 | Dec-19 |
| Alkalinity | mg/L | | 179 | 336 | 448 | 303 | 237 | 216 | 206 | 310 | 138 |
| Ammonia: total | mg/L | | 0.2 | <0.1 | 0.5 | <0.1 | 0.1 | 0.2 | 0.2 | <0.1 | 0.2 |
| Ammonia: un-ionized | µg/L | 20 | 2 | <2 | 3 | <1 | 1 | 2 | 2 | <3 | 1 |
| Arsenic | mg/L | 0.005 | <0.0005 | 0.0007 | 0.001 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.001 | <0.0005 |
| Barium | mg/L | | 0.033 | 0.038 | 0.038 | 0.055 | 0.038 | 0.053 | 0.040 | 0.047 | 0.032 |
| Biochemical Oxygen Demand | mg/L | | <2.3 | <2.3 | <2.3 | <2.3 | <2.3 | <2.0 | <2.0 | <2.0 | <2.0 |
| Boron | mg/L | 0.200 | 0.01 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 |
| Cadmium | mg/L | 0.0005 *** | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Chloride | mg/L | | 27.9 | 23.3 | 23.4 | 37.5 | 25.1 | 41.4 | 26.2 | 23 | 23.3 |
| Chromium | mg/L | 0.010 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Chemical Oxygen Demand | mg/L | | <10 | 40 | 40 | <10 | 10 | 50 | 30 | 40 | 20 |
| Conductivity | µS/cm | | 519 | 670 | 860 | 715 | 558 | 677 | 541 | 678 | 424 |
| Conductivity - field | µS/cm | | 526 | 689 | 908 | 742 | 543 | 639 | 558 | 719 | 442 |
| Copper | mg/L | 0.005 **** | 0.0014 | <0.0005 | <0.0005 | 0.0012 | 0.0008 | 0.0025 | 0.001 | 0.0006 | 0.0014 |
| Dissolved Oxygen - field | mg/L | | 5.71 | 1.59 | 0.39 | 6.72 | 9.11 | 5.13 | 6.97 | 2.38 | 11 |
| Iron | mg/L | 0.3 | 0.01 | 0.44 | 2.11 | 0.04 | 0.03 | 0.24 | 0.01 | 0.70 | 0.08 |
| Lead | mg/L | 0.005 ***** | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Mercury | mg/L | | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Nitrate (as N) | mg/L | | 4.94 | <0.05 | <0.05 | <0.5 | 1.97 | 2.71 | 1.9 | <0.05 | 2.12 |
| Nitrite (as N) | mg/L | | 0.06 | <0.05 | <0.05 | <0.5 | <0.5 | <0.05 | <0.5 | <0.05 | <0.05 |
| pH | units | 6.5-8.5 | 8.03 | 7.83 | 7.84 | 7.85 | 7.86 | 7.71 | 7.83 | 7.84 | 7.95 |
| pH - field | units | 6.5-8.5 | 7.6 | 7.5 | 7.4 | 7.6 | 7.6 | 8.0 | 7.9 | 7.7 | 7.9 |
| Phenols: total | µg/L | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 2 | <1 |
| Phosphorus | mg/L | 0.03 | <0.02 | 0.04 | 0.08 | 0.01 | 0.01 | 0.04 | 0.01 | 0.05 | 0.06 |
| Sulphate | mg/L | | 21 | 2.7 | 2 | 31.6 | 15 | 45.8 | 16.8 | 2.8 | 23.4 |
| Total Dissolved Solids | mg/L | | 350 | 410 | 520 | 410 | 340 | 390 | 310 | 380 | 240 |
| Temperature - field | °C | | 10.1 | 20.8 | 15.1 | 1.4 | 9.0 | 0.1 | 7.4 | 17.6 | 0.1 |
| Total Kjeldahl Nitrogen | mg/L | | 0.6 | 0.8 | 1.8 | 0.4 | 0.6 | 0.4 | 0.5 | 0.8 | 0.4 |
| Total Suspended Solids | mg/L | | <2.0 | <2.0 | 8.8 | <2.0 | <2.0 | 2.8 | <2.0 | 3 | <2.0 |
| Zinc | mg/L | 0.020 | 0.0009 | 0.0016 | 0.0025 | 0.0006 | <0.0005 | 0.0024 | 0.0017 | 0.0018 | 0.0019 |

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) "-" - Indicates parameter not analysed.
3) * - Aluminum PWQO value based on pH range of 6.5 to 9.0.
** - Beryllium PWQO value based on hardness >75 mg/L.
*** - Cadmium PWQO value based on hardness >100 mg/L.
**** - Copper PWQO value based on hardness >20 mg/L.
***** - Lead PWQO value based on hardness >80 mg/L.

**Table J.2**
**Surface Water Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | PWQO[1] | SW20 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-20 | Jun-20 | Dec-20 | Apr-21 | Jun-21 | Aug-21 | Oct-21 | Nov-21 | Apr-22 | Jun-22 |
| Alkalinity | mg/L | | 216 | 358 | 252 | 240 | 381 | 438 | 375 | 336 | 264 | 334 |
| Ammonia: total | mg/L | | 0.1 | 0.2 | <0.1 | <0.1 | 0.7 | 0.3 | 0.1 | 0.2 | 0.1 | 0.2 |
| Ammonia: un-ionized | µg/L | 20 | 1 | 1 | <2 | <2 | 12 | 2 | 1 | 1 | 1 | 2 |
| Arsenic | mg/L | 0.005 | <0.0005 | 0.001 | <0.0005 | <0.0005 | 0.0018 | 0.0012 | <0.0005 | <0.0005 | <0.0005 | <0.005 |
| Barium | mg/L | | 0.041 | 0.050 | 0.049 | 0.041 | 0.072 | 0.066 | 0.050 | 0.052 | 0.041 | 0.037 |
| Biochemical Oxygen Demand | mg/L | | <2.0 | <2.0 | <2.0 | <2.0 | 7.0 | 2.4 | <2.0 | <2.0 | <2.0 | <2.0 |
| Boron | mg/L | 0.200 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.01 | 0.01 | 0.01 | <0.02 |
| Cadmium | mg/L | 0.0005 *** | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.001 |
| Chloride | mg/L | | 24.5 | 17.2 | 50.3 | 28.4 | 25.8 | 31.9 | 40 | 34.8 | 26.8 | 27.3 |
| Chromium | mg/L | 0.010 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0011 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.001 |
| Chemical Oxygen Demand | mg/L | | <10 | 40 | 30 | 20 | 90 | 60 | 20 | 470 | 10 | 20 |
| Conductivity | µS/cm | | 556 | 753 | 750 | 613 | 720 | 914 | 850 | 784 | 621 | 724 |
| Conductivity - field | µS/cm | | 557 | 756 | 758 | 592 | 767 | 866 | 836 | 779 | 584 | 704 |
| Copper | mg/L | 0.005 **** | 0.0022 | 0.0014 | 0.0008 | 0.0011 | 0.0017 | 0.0011 | 0.0009 | 0.0008 | 0.0014 | <0.005 |
| Dissolved Oxygen - field | mg/L | | 7.85 | 1.4 | 7.39 | 9.84 | 2.48 | 0.81 | 4.39 | 8.46 | 5.68 | 1.22 |
| Iron | mg/L | 0.3 | 0.03 | 1.46 | 0.02 | 0.04 | 2.42 | 1.79 | 0.07 | 0.03 | 0.04 | 0.22 |
| Lead | mg/L | 0.005 ***** | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0006 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.01 |
| Mercury | mg/L | | <0.1 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Nitrate (as N) | mg/L | | 0.9 | <0.5 | 8.14 | 1.31 | 0.05 | <0.05 | 0.37 | 1.49 | 0.24 | <0.05 |
| Nitrite (as N) | mg/L | | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| pH | units | 6.5-8.5 | 7.93 | 7.68 | 7.96 | 8.05 | 7.9 | 7.71 | 7.82 | 7.97 | 7.71 | 7.9 |
| pH - field | units | 6.5-8.5 | 7.7 | 7.4 | 8.0 | 8.0 | 7.8 | 7.4 | 7.5 | 7.6 | 7.5 | 7.4 |
| Phenols: total | µg/L | 1 | <1 | 1 | 6 | 2 | <1 | 2 | <1 | <1 | <1 | <1 |
| Phosphorus | mg/L | 0.03 | 0.01 | 0.11 | 0.03 | 0.02 | 0.15 | 0.15 | 0.03 | 0.01 | <0.02 | 0.06 |
| Sulphate | mg/L | | 16.9 | 1.6 | 43.1 | 21.6 | 0.7 | 1 | 18.4 | 22.2 | 12.8 | 10.3 |
| Total Dissolved Solids | mg/L | | 310 | 470 | 470 | 370 | 540 | 610 | 500 | 460 | 270 | 450 |
| Temperature - field | °C | | 5.5 | 13.9 | 0.2 | 5.2 | 15.5 | 14.9 | 8.3 | 0.4 | 10.3 | 16.0 |
| Total Kjeldahl Nitrogen | mg/L | | 0.5 | 1.1 | 0.5 | <2.0 | 4.4 | 2 | 0.6 | 0.4 | 0.4 | 0.4 |
| Total Suspended Solids | mg/L | | <2.0 | 3.6 | <2.0 | <2.0 | 32.7 | 10 | <2.0 | <2.0 | <2.0 | <2.0 |
| Zinc | mg/L | 0.020 | 0.0028 | <0.0005 | <0.0005 | 0.0006 | 0.0065 | 0.0019 | <0.0005 | 0.001 | 0.0008 | 0.01 |

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) "-" - Indicates parameter not analysed.
3) * - Aluminum PWQO value based on pH range of 6.5 to 9.0.
** - Beryllium PWQO value based on hardness >75 mg/L.
*** - Cadmium PWQO value based on hardness >100 mg/L.
**** - Copper PWQO value based on hardness >20 mg/L.
***** - Lead PWQO value based on hardness >80 mg/L.

**Table J.2**
**Surface Water Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | PWQO[1] | SW21 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-17 | Jun-17 | Aug-17 | Oct-17 | Dec-17 | Apr-18 | Jun-18 | Dec-18 | Apr-19 | Jun-19 | Oct-19 | Dec-19 |
| Alkalinity | mg/L | | 158 | 304 | 297 | 228 | 304 | 161 | 289 | 229 | 185 | 252 | 218 | 210 |
| Ammonia: total | mg/L | | 0.2 | <0.1 | 0.4 | 0.1 | <0.1 | 0.1 | 0.6 | 0.2 | 0.2 | <0.1 | 0.1 | 0.2 |
| Ammonia: un-ionized | µg/L | 20 | 2 | <2 | 5 | 1 | <1 | <1 | 6 | <1 | 2 | <3 | 1 | 1 |
| Arsenic | mg/L | 0.005 | <0.0005 | 0.0008 | 0.0009 | 0.0005 | <0.0005 | <0.0005 | 0.0011 | <0.0005 | <0.0005 | 0.0007 | <0.0005 | <0.0005 |
| Barium | mg/L | | 0.035 | 0.044 | 0.071 | 0.070 | 0.060 | 0.034 | 0.076 | 0.067 | 0.040 | 0.046 | 0.100 | 0.062 |
| Biochemical Oxygen Demand | mg/L | | <2.3 | <2.3 | <2.3 | <2.3 | <2.3 | <2.3 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 |
| Boron | mg/L | 0.200 | 0.01 | 0.06 | 0.04 | 0.04 | 0.02 | 0.02 | 0.02 | 0.03 | 0.03 | 0.03 | 0.02 | 0.03 |
| Cadmium | mg/L | 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 |
| Chloride | mg/L | | 68.2 | 80.3 | 211 | 156 | 107 | 45.9 | 153 | 136 | 42.9 | 56.1 | 373 | 133 |
| Chromium | mg/L | 0.010 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0005 | 0.0006 | <0.0005 | <0.0005 | 0.0007 | <0.0005 |
| Chemical Oxygen Demand | mg/L | | <10 | 60 | 40 | 30 | 30 | 30 | 40 | 60 | 40 | 50 | 30 | 30 |
| Conductivity | µS/cm | | 591 | 783 | 933 | 969 | 935 | 520 | 1000 | 1020 | 552 | 691 | 1770 | 938 |
| Conductivity - field | µS/cm | | 595 | 801 | 986 | 980 | 987 | 505 | 998 | 967 | 568 | 731 | 1820 | 994 |
| Copper | mg/L | 0.005 **** | 0.001 | <0.0005 | 0.0006 | 0.0009 | 0.0005 | 0.001 | 0.0008 | 0.0013 | 0.0008 | 0.0005 | 0.0023 | 0.0015 |
| Dissolved Oxygen - field | mg/L | | 9.28 | 1.59 | 3.65 | 5.94 | 11 | 11.7 | 4.43 | 9.48 | 10.5 | 2.72 | 6.94 | 10.9 |
| Iron | mg/L | 0.3 | 0.03 | 0.13 | 1.32 | 0.17 | 0.05 | 0.05 | 1.72 | 0.26 | 0.05 | 0.30 | 0.46 | 0.12 |
| Lead | mg/L | 0.005 ***** | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Mercury | mg/L | | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Nitrate (as N) | mg/L | | 0.45 | <0.05 | 0.06 | <0.5 | <0.5 | 1.59 | 0.1 | 1.11 | <0.5 | <0.05 | <0.5 | 2.74 |
| Nitrite (as N) | mg/L | | <0.05 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.05 | <0.5 | <0.05 |
| pH | units | 6.5-8.5 | 8.06 | 7.86 | 7.97 | 7.74 | 7.86 | 7.96 | 7.76 | 7.75 | 7.95 | 7.82 | 7.78 | 7.73 |
| pH - field | units | 6.5-8.5 | 7.6 | 7.4 | 7.5 | 7.5 | 7.7 | 6.8 | 7.5 | 7.2 | 7.7 | 7.8 | 7.7 | 7.7 |
| Phenols: total | µg/L | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 2 | 2 | <1 | <1 |
| Phosphorus | mg/L | 0.03 | 0.03 | 0.09 | 0.12 | 0.07 | 0.03 | 0.02 | 0.14 | 0.06 | 0.02 | 0.12 | 0.08 | 0.06 |
| Sulphate | mg/L | | 31.1 | 6.4 | 7.5 | 39.4 | 39.8 | 24.9 | 7.1 | 65.1 | 21.9 | 10.6 | 64 | 50.6 |
| Total Dissolved Solids | mg/L | | 370 | 480 | 560 | 590 | 540 | 320 | 690 | 600 | 330 | 420 | 1030 | 530 |
| Temperature - field | °C | | 11.2 | 20.5 | 18.1 | 11.8 | 2.9 | 8.4 | 16.5 | 2.7 | 8.7 | 17.6 | 9.3 | 1.6 |
| Total Kjeldahl Nitrogen | mg/L | | 0.6 | 1 | 1.1 | 0.7 | 0.4 | 0.4 | 2 | 0.5 | 0.6 | 0.8 | 0.4 | <0.5 |
| Total Suspended Solids | mg/L | | <2.0 | <2.0 | 14.8 | <2.0 | <2.0 | 2.4 | 15 | 3.2 | <2.0 | <2.0 | 10 | <2.0 |
| Zinc | mg/L | 0.020 | 0.0039 | 0.0026 | 0.008 | 0.0061 | 0.0022 | 0.0026 | 0.0086 | 0.0083 | 0.0045 | 0.0038 | 0.0114 | 0.0109 |

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) "-" - Indicates parameter not analysed.
3) * - Aluminum PWQO value based on pH range of 6.5 to 9.0.
** - Beryllium PWQO value based on hardness >75 mg/L.
*** - Cadmium PWQO value based on hardness >100 mg/L.
**** - Copper PWQO value based on hardness >20 mg/L.
***** - Lead PWQO value based on hardness >80 mg/L.

**Table J.2**
**Surface Water Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | PWQO[1] | SW21 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-20 | Jun-20 | Dec-20 | Apr-21 | Jun-21 | Aug-21 | Oct-21 | Nov-21 | Apr-22 | Jun-22 |
| Alkalinity | mg/L | | 217 | 298 | 226 | 252 | 394 | 366 | 319 | 328 | 243 | 224 |
| Ammonia: total | mg/L | | 0.1 | 0.3 | <0.1 | <0.1 | 1.6 | 0.9 | 0.2 | 0.2 | 0.1 | 0.2 |
| Ammonia: un-ionized | µg/L | 20 | <1 | 5 | <3 | <2 | 22 | 11 | 1 | 0 | 1 | 2 |
| Arsenic | mg/L | 0.005 | <0.0005 | 0.001 | <0.0005 | <0.0005 | 0.0008 | 0.0012 | <0.0005 | <0.0005 | <0.0005 | <0.005 |
| Barium | mg/L | | 0.049 | 0.085 | 0.056 | 0.051 | 0.164 | 0.155 | 0.067 | 0.066 | 0.049 | 0.045 |
| Biochemical Oxygen Demand | mg/L | | <2.0 | 4.4 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | 2.2 |
| Boron | mg/L | 0.200 | 0.02 | 0.04 | 0.03 | 0.02 | 0.02 | 0.03 | 0.02 | 0.02 | 0.02 | 0.03 |
| Cadmium | mg/L | 0.0005 *** | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.001 |
| Chloride | mg/L | | 69.2 | 109 | 101 | 89.6 | 572 | 366 | 108 | 88.9 | 90.9 | 46.6 |
| Chromium | mg/L | 0.010 | <0.0005 | 0.0008 | <0.0005 | <0.0005 | 0.0013 | 0.0021 | <0.0005 | <0.0005 | <0.0005 | <0.001 |
| Chemical Oxygen Demand | mg/L | | 50 | 70 | 30 | 50 | 50 | 70 | 40 | 20 | 20 | 40 |
| Conductivity | µS/cm | | 717 | 944 | 856 | 827 | 2540 | 1890 | 969 | 936 | 816 | 625 |
| Conductivity - field | µS/cm | | 721 | 948 | 865 | 814 | 2500 | 1810 | 959 | 961 | 769 | 597 |
| Copper | mg/L | 0.005 **** | 0.0012 | 0.0009 | 0.0006 | 0.0006 | 0.0016 | 0.0019 | 0.0008 | 0.0101 | 0.0009 | <0.005 |
| Dissolved Oxygen - field | mg/L | | 6.23 | 4.28 | 10.5 | 8.48 | 2.49 | 2.38 | 6.74 | 11.1 | 6.89 | 2.45 |
| Iron | mg/L | 0.3 | 0.10 | 1.76 | 0.10 | 0.09 | 1.37 | 2.22 | 0.37 | 0.20 | 0.07 | 0.24 |
| Lead | mg/L | 0.005 ***** | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0009 | 0.0013 | <0.0005 | 0.0008 | <0.0005 | <0.01 |
| Mercury | mg/L | | <0.1 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Nitrate (as N) | mg/L | | <0.5 | <0.5 | 2.17 | <0.05 | 0.05 | 0.07 | <0.05 | 0.09 | 0.06 | <0.05 |
| Nitrite (as N) | mg/L | | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| pH | units | 6.5-8.5 | 7.78 | 7.93 | 7.79 | 7.88 | 7.79 | 7.98 | 7.74 | 7.84 | 7.7 | 7.84 |
| pH - field | units | 6.5-8.5 | 7.4 | 7.7 | 8.3 | 8.1 | 7.6 | 7.6 | 7.4 | 6.8 | 7.5 | 7.3 |
| Phenols: total | µg/L | 1 | <1 | 1 | 1 | 1 | <1 | 1 | 2 | <1 | <1 | <1 |
| Phosphorus | mg/L | 0.03 | 0.03 | 0.35 | 0.05 | 0.03 | 0.15 | 0.19 | 0.10 | 0.05 | <0.02 | 0.07 |
| Sulphate | mg/L | | 26.2 | 11.4 | 61.6 | 31.6 | 21.3 | 14.4 | 24.2 | 22.5 | 20.9 | 16.2 |
| Total Dissolved Solids | mg/L | | 380 | 630 | 530 | 500 | 1500 | 1080 | 570 | 510 | 480 | 380 |
| Temperature - field | °C | | 6.1 | 16.2 | 1.6 | 5.2 | 17.3 | 16.2 | 9.8 | 2.0 | 10.6 | 18.9 |
| Total Kjeldahl Nitrogen | mg/L | | 0.5 | 1.4 | 0.5 | <2.0 | 3.2 | 1.4 | 0.9 | 0.6 | 0.4 | 0.8 |
| Total Suspended Solids | mg/L | | <2.0 | 26.4 | <2.0 | <2.0 | 42.7 | 30 | 5.6 | <2.0 | <2.0 | 3.2 |
| Zinc | mg/L | 0.020 | 0.0051 | 0.0083 | 0.0059 | 0.0028 | 0.0191 | 0.0298 | 0.0016 | 0.0189 | 0.0014 | <0.01 |

NOTES:
1) PWQO - Provincial Water Quality Objectives (1999)
2) "-" - Indicates parameter not analysed.
3) * - Aluminum PWQO value based on pH range of 6.5 to 9.0.
** - Beryllium PWQO value based on hardness >75 mg/L.
*** - Cadmium PWQO value based on hardness >100 mg/L.
**** - Copper PWQO value based on hardness >20 mg/L.
***** - Lead PWQO value based on hardness >80 mg/L.

**Table J.2**
**Surface Water Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | PWQO[1] | SW23 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-17 | Jun-17 | Oct-17 | Dec-17 | Apr-18 | Jun-18 | Dec-18 | Apr-19 | Jun-19 | Oct-19 | Dec-19 |
| Alkalinity | mg/L | | 166 | 298 | 280 | 303 | 155 | 237 | 233 | 181 | 262 | 109 | 213 |
| Ammonia: total | mg/L | | 0.2 | <0.1 | 0.1 | <0.1 | 0.1 | 0.2 | 0.2 | 0.2 | <0.1 | 0.1 | 0.2 |
| Ammonia: un-ionized | µg/L | 20 | 2 | <2 | <1 | <1 | <1 | 1 | 1 | 2 | <3 | 1 | 1 |
| Arsenic | mg/L | 0.005 | <0.0005 | 0.0008 | 0.0006 | <0.0005 | <0.0005 | 0.0009 | <0.0005 | <0.0005 | 0.0008 | 0.0007 | <0.0005 |
| Barium | mg/L | | 0.035 | 0.050 | 0.102 | 0.064 | 0.033 | 0.076 | 0.075 | 0.038 | 0.053 | 0.036 | 0.063 |
| Biochemical Oxygen Demand | mg/L | | <2.3 | 4.2 | 2.9 | <2.3 | <2.3 | 15.6 | <2.0 | <2.0 | 2.3 | 2.6 | <2.0 |
| Boron | mg/L | 0.200 | 0.02 | 0.06 | 0.04 | 0.03 | 0.02 | 0.01 | 0.03 | 0.03 | 0.03 | 0.02 | 0.03 |
| Cadmium | mg/L | 0.0005 *** | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Chloride | mg/L | | 72.5 | 91.6 | 227 | 116 | 48.1 | 129 | 146 | 45.2 | 50.7 | 129 | 136 |
| Chromium | mg/L | 0.010 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.001 | <0.0005 |
| Chemical Oxygen Demand | mg/L | | <10 | 50 | 50 | 20 | <10 | 70 | 60 | 40 | 40 | 20 | 50 |
| Conductivity | µS/cm | | 608 | 815 | 1280 | 958 | 521 | 915 | 1060 | 554 | 700 | 833 | 958 |
| Conductivity - field | µS/cm | | 613 | 833 | 1270 | 991 | 505 | 921 | 988 | 571 | 742 | 866 | 1000 |
| Copper | mg/L | 0.005 **** | 0.001 | <0.0005 | 0.0005 | 0.0007 | 0.001 | 0.0007 | 0.0021 | 0.0012 | <0.0005 | 0.0035 | 0.002 |
| Dissolved Oxygen - field | mg/L | | 7.97 | 2.83 | 1.07 | 8.05 | 10 | 2.91 | 7.64 | 11.3 | 2.18 | 5.62 | 10 |
| Iron | mg/L | 0.3 | 0.03 | 0.35 | 0.94 | 0.10 | 0.04 | 1.67 | 0.18 | 0.05 | 0.34 | 0.61 | 0.13 |
| Lead | mg/L | 0.005 ***** | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0008 | <0.0005 |
| Mercury | mg/L | | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Nitrate (as N) | mg/L | | 0.44 | <0.05 | <0.5 | <0.5 | 1.52 | <0.05 | 1.11 | <0.5 | <0.05 | 0.53 | 2.56 |
| Nitrite (as N) | mg/L | | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 | <0.05 | <0.5 | <0.05 |
| pH | units | 6.5-8.5 | 8.08 | 7.9 | 7.35 | 7.83 | 8 | 7.22 | 7.71 | 7.92 | 7.6 | 7.61 | 7.81 |
| pH - field | units | 6.5-8.5 | 7.7 | 7.4 | 6.9 | 7.6 | 7.2 | 7.0 | 7.5 | 7.8 | 7.7 | 7.8 | 7.7 |
| Phenols: total | µg/L | 1 | <1 | <1 | 1 | <1 | <1 | 12 | <1 | <1 | 2 | <1 | <1 |
| Phosphorus | mg/L | 0.03 | 0.03 | 0.15 | 0.11 | 0.03 | 0.02 | 0.14 | 0.05 | 0.02 | 0.12 | 0.28 | 0.06 |
| Sulphate | mg/L | | 33.3 | 6.5 | 73 | 39.9 | 24.7 | 2.7 | 64.3 | 21 | 9.2 | 82.6 | 51 |
| Total Dissolved Solids | mg/L | | 380 | 490 | 780 | 560 | 320 | 670 | 630 | 330 | 420 | 490 | 550 |
| Temperature - field | °C | | 10.6 | 22.8 | 12.0 | 2.8 | 8.5 | 18.9 | 1.0 | 8.1 | 18.1 | 10.2 | 0.3 |
| Total Kjeldahl Nitrogen | mg/L | | 0.6 | 1 | 0.8 | 0.4 | 0.4 | 1.6 | 0.4 | 0.6 | 0.8 | 0.9 | 0.6 |
| Total Suspended Solids | mg/L | | <2.0 | 6 | 7.6 | 3.2 | 2 | 15 | 4.8 | <2.0 | 2 | 11 | <2.0 |
| Zinc | mg/L | 0.020 | 0.004 | 0.0028 | 0.0023 | 0.0016 | 0.0009 | <0.0005 | 0.0068 | 0.0056 | 0.0029 | 0.0091 | 0.0106 |

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) "-" - Indicates parameter not analysed.
3) * - Aluminum PWQO value based on pH range of 6.5 to 9.0.
** - Beryllium PWQO value based on hardness >75 mg/L.
*** - Cadmium PWQO value based on hardness >100 mg/L.
**** - Copper PWQO value based on hardness >20 mg/L.
***** - Lead PWQO value based on hardness >80 mg/L.

**Table J.2**
**Surface Water Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | PWQO[1] | SW23 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-20 | Jun-20 | Oct-20 | Dec-20 | Apr-21 | Jun-21 | Aug-21 | Oct-21 | Nov-21 | Apr-22 | Jun-22 |
| Alkalinity | mg/L | | 218 | 296 | 213 | 225 | 253 | 335 | 332 | 320 | 327 | 247 | 227 |
| Ammonia: total | mg/L | | <0.1 | 0.2 | 0.2 | <0.1 | <0.1 | 0.2 | 0.2 | 0.1 | 0.2 | 0.1 | 0.2 |
| Ammonia: un-ionized | µg/L | 20 | <2 | 2 | 1 | <2 | <2 | 1 | 1 | 1 | 1 | 1 | 2 |
| Arsenic | mg/L | 0.005 | 0.0005 | 0.001 | 0.0005 | <0.0005 | <0.0005 | 0.0009 | 0.0007 | <0.0005 | <0.0005 | <0.0005 | <0.005 |
| Barium | mg/L | | 0.049 | 0.066 | 0.077 | 0.055 | 0.054 | 0.043 | 0.138 | 0.055 | 0.065 | 0.050 | 0.042 |
| Biochemical Oxygen Demand | mg/L | | <2.0 | 2.6 | 4.5 | <2.0 | <2.0 | 3.7 | 3.4 | <2.0 | 2.3 | <2.0 | 2.9 |
| Boron | mg/L | 0.200 | 0.02 | 0.05 | 0.04 | 0.02 | 0.03 | 0.03 | 0.04 | 0.02 | 0.02 | 0.02 | 0.03 |
| Cadmium | mg/L | 0.0005 *** | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.001 |
| Chloride | mg/L | | 71.1 | 121 | 253 | 108 | 94.9 | 155 | 352 | 105 | 94 | 98.8 | 51.2 |
| Chromium | mg/L | 0.010 | <0.0005 | <0.0005 | 0.0008 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.001 |
| Chemical Oxygen Demand | mg/L | | 40 | 50 | 70 | 30 | 50 | 60 | 40 | 40 | 30 | 30 | 40 |
| Conductivity | µS/cm | | 722 | 980 | 1310 | 865 | 845 | 1160 | 1720 | 972 | 972 | 852 | 643 |
| Conductivity - field | µS/cm | | 722 | 983 | 1260 | 858 | 824 | 1140 | 1740 | 946 | 980 | 809 | 610 |
| Copper | mg/L | 0.005 **** | 0.0017 | <0.0005 | 0.0016 | <0.0005 | 0.0006 | <0.0005 | <0.0005 | <0.0005 | 0.001 | 0.0006 | <0.005 |
| Dissolved Oxygen - field | mg/L | | 7.19 | 2.71 | 5.18 | 9.07 | 9.09 | 1.97 | <0.05 | 4.7 | 8.41 | 5.61 | 2.74 |
| Iron | mg/L | 0.3 | 0.14 | 1.14 | 1.02 | 0.08 | 0.10 | 0.48 | 0.92 | 0.12 | 0.24 | 0.07 | 0.24 |
| Lead | mg/L | 0.005 ***** | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.01 |
| Mercury | mg/L | | <0.1 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Nitrate (as N) | mg/L | | <0.5 | <0.5 | <0.05 | 2.13 | <0.05 | <0.05 | <0.05 | <0.05 | 0.15 | <0.05 | <0.05 |
| Nitrite (as N) | mg/L | | <0.5 | <0.5 | <0.05 | <0.5 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| pH | units | 6.5-8.5 | 7.85 | 7.73 | 7.18 | 7.84 | 7.96 | 7.43 | 7.44 | 7.78 | 7.79 | 7.67 | 7.84 |
| pH - field | units | 6.5-8.5 | 7.6 | 7.5 | 7.2 | 8.1 | 8.0 | 7.2 | 6.9 | 7.4 | 7.5 | 7.4 | 7.4 |
| Phenols: total | µg/L | 1 | <1 | <1 | 1 | 1 | 1 | <1 | 2 | <1 | <1 | <1 | <1 |
| Phosphorus | mg/L | 0.03 | 0.03 | 0.24 | 0.16 | 0.06 | 0.03 | 0.34 | 0.12 | 0.08 | 0.05 | <0.02 | 0.08 |
| Sulphate | mg/L | | 25.8 | 11.3 | 18.8 | 59.4 | 30.3 | 6.7 | 5.2 | 26.9 | 22.6 | 20 | 15.6 |
| Total Dissolved Solids | mg/L | | 430 | 640 | 770 | 530 | 450 | 780 | 1090 | 570 | 530 | 470 | 380 |
| Temperature - field | °C | | 5.6 | 16.8 | 11.7 | 0.5 | 5.0 | 17.2 | 15.9 | 10.3 | 0.5 | 11.4 | 18.6 |
| Total Kjeldahl Nitrogen | mg/L | | 0.6 | 1.4 | <1.0 | 0.5 | <2.0 | 2.1 | 1.1 | 0.8 | 0.6 | 0.5 | 0.6 |
| Total Suspended Solids | mg/L | | <2.0 | 2.8 | 14.5 | <2.0 | <2.0 | 4.7 | 6 | 2.4 | 4.4 | 2.4 | 3.6 |
| Zinc | mg/L | 0.020 | 0.0061 | 0.0025 | 0.0059 | 0.0023 | 0.003 | 0.0009 | 0.0103 | <0.0005 | 0.0103 | 0.0011 | <0.01 |

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) "-" - Indicates parameter not analysed.
3) * - Aluminum PWQO value based on pH range of 6.5 to 9.0.
** - Beryllium PWQO value based on hardness >75 mg/L.
*** - Cadmium PWQO value based on hardness >100 mg/L.
**** - Copper PWQO value based on hardness >20 mg/L.
***** - Lead PWQO value based on hardness >80 mg/L.

**Table J.2**
**Surface Water Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | PWQO[1] | SW24 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-17 | Jun-17 | Oct-17 | Dec-17 | Apr-18 | Apr-19 | Jun-19 | Dec-19 | Apr-20 |
| Alkalinity | mg/L | | 197 | 367 | 468 | 356 | 235 | 234 | 299 | 191 | 237 |
| Ammonia: total | mg/L | | 0.2 | 0.1 | 0.2 | <0.1 | 0.1 | 0.2 | <0.1 | 0.2 | <0.1 |
| Ammonia: un-ionized | µg/L | 20 | 1 | 1 | 1 | <1 | 1 | 2 | <2 | 1 | <2 |
| Arsenic | mg/L | 0.005 | <0.0005 | 0.002 | 0.0016 | <0.0005 | <0.0005 | <0.0005 | 0.0011 | 0.0006 | <0.0005 |
| Barium | mg/L | | 0.028 | 0.069 | 0.149 | 0.083 | 0.028 | 0.035 | 0.043 | 0.050 | 0.034 |
| Biochemical Oxygen Demand | mg/L | | <2.3 | <2.3 | <2.3 | <2.3 | <2.3 | <2.0 | <2.0 | <2.0 | <2.0 |
| Boron | mg/L | 0.200 | 0.01 | 0.05 | 0.04 | 0.02 | 0.01 | 0.01 | 0.02 | 0.03 | 0.01 |
| Cadmium | mg/L | 0.0005 *** | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Chloride | mg/L | | 10.6 | 12.8 | 15.7 | 11.7 | 63.5 | 6.4 | 6.8 | 9.2 | 6.4 |
| Chromium | mg/L | 0.010 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Chemical Oxygen Demand | mg/L | | <10 | 60 | 80 | 40 | 20 | 30 | 30 | 50 | <10 |
| Conductivity | µS/cm | | 489 | 752 | 1060 | 769 | 515 | 527 | 612 | 568 | 556 |
| Conductivity - field | µS/cm | | 497 | 810 | 1040 | 800 | 500 | 546 | 655 | 551 | 562 |
| Copper | mg/L | 0.005 **** | 0.0008 | <0.0005 | 0.0014 | 0.0009 | 0.0005 | 0.0005 | <0.0005 | 0.0021 | 0.0008 |
| Dissolved Oxygen - field | mg/L | | 7 | 4.42 | 6.86 | 8.67 | 9.11 | 6.85 | 2.5 | 7.35 | 4.77 |
| Iron | mg/L | 0.3 | 0.04 | 2.41 | 1.12 | 0.25 | 0.01 | 0.07 | 0.61 | 0.11 | 0.03 |
| Lead | mg/L | 0.005 ***** | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Mercury | mg/L | | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Nitrate (as N) | mg/L | | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | 0.15 | <0.5 |
| Nitrite (as N) | mg/L | | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | <0.05 | <0.05 | <0.5 |
| pH | units | 6.5-8.5 | 8.03 | 7.6 | 7.68 | 7.74 | 7.88 | 7.76 | 7.52 | 7.76 | 7.8 |
| pH - field | units | 6.5-8.5 | 7.6 | 7.2 | 7.4 | 7.6 | 7.6 | 7.9 | 7.5 | 7.7 | 7.6 |
| Phenols: total | µg/L | 1 | <1 | <1 | 1 | <1 | <1 | <1 | 1 | <1 | <1 |
| Phosphorus | mg/L | 0.03 | 0.03 | 0.12 | 0.14 | 0.02 | <0.01 | 0.03 | 0.07 | 0.06 | <0.01 |
| Sulphate | mg/L | | 36.5 | 37.1 | 118 | 60.6 | 24.4 | 27.7 | 8.3 | 79.9 | 35 |
| Total Dissolved Solids | mg/L | | 330 | 490 | 740 | 470 | 310 | 330 | 360 | 350 | 310 |
| Temperature - field | °C | | 9.6 | 20.0 | 10.7 | 3.1 | 8.8 | 7.1 | 14.8 | 1.2 | 7.4 |
| Total Kjeldahl Nitrogen | mg/L | | 0.5 | 1 | 1.3 | 0.6 | 0.2 | 0.2 | 0.6 | 0.6 | 0.3 |
| Total Suspended Solids | mg/L | | <2.0 | 3.2 | 16.8 | 8 | 2 | 7.2 | 9 | 3.6 | <2.0 |
| Zinc | mg/L | 0.020 | 0.0008 | 0.0022 | 0.0041 | 0.002 | <0.0005 | 0.0029 | 0.0035 | 0.0054 | 0.0011 |

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) "-" - Indicates parameter not analysed.
3) * - Aluminum PWQO value based on pH range of 6.5 to 9.0.
** - Beryllium PWQO value based on hardness >75 mg/L.
*** - Cadmium PWQO value based on hardness >100 mg/L.
**** - Copper PWQO value based on hardness >20 mg/L.
***** - Lead PWQO value based on hardness >80 mg/L.

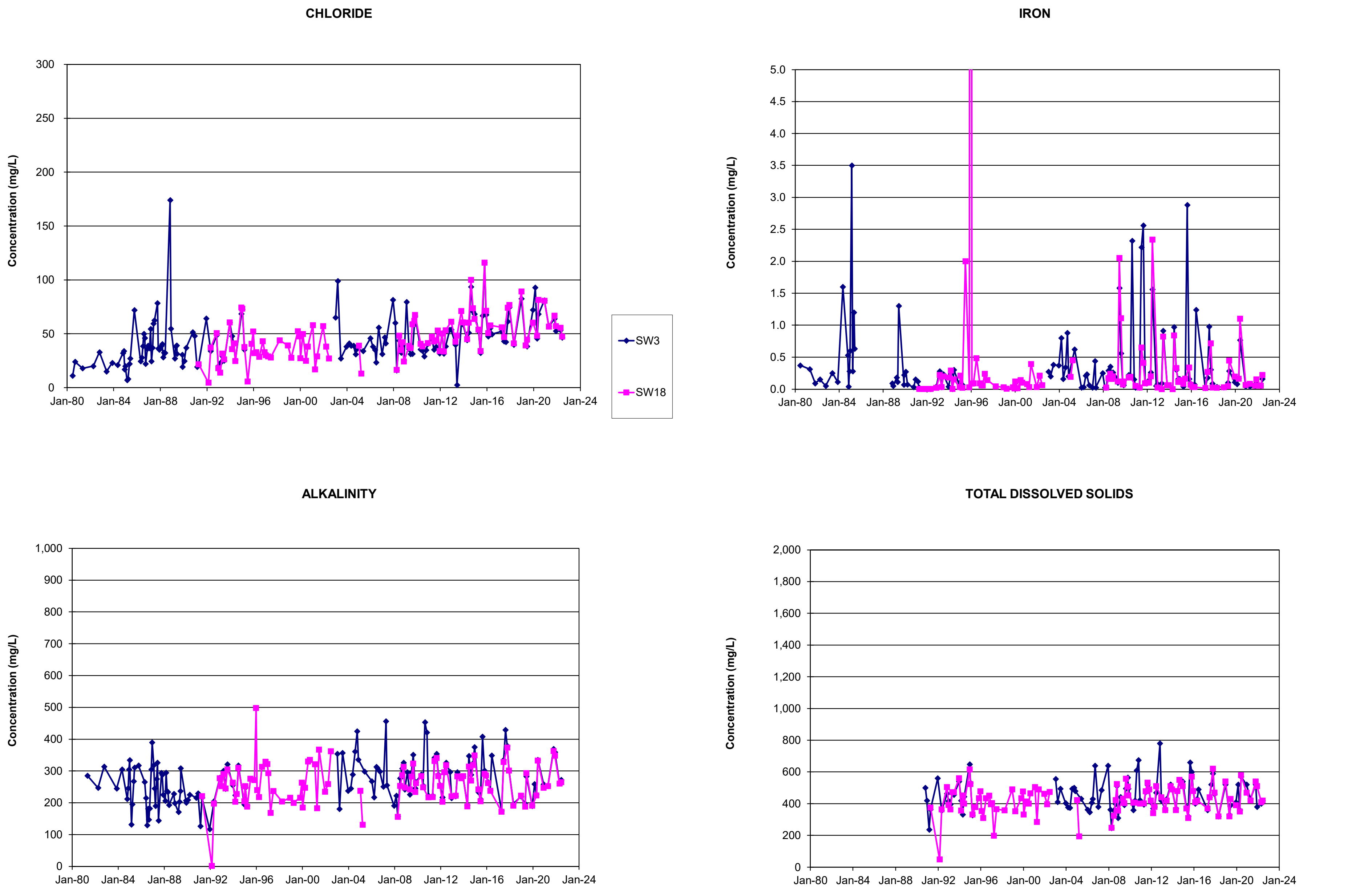
**Table J.2**
**Surface Water Chemical Results**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | PWQO[1] | SW24 | | | | |
|---|---|---|---|---|---|---|---|
| | | | Apr-21 | Oct-21 | Nov-21 | Apr-22 | Jun-22 |
| Alkalinity | mg/L | | 250 | 406 | 364 | 262 | 356 |
| Ammonia: total | mg/L | | 0.1 | 0.2 | 0.2 | 0.1 | 0.1 |
| Ammonia: un-ionized | µg/L | 20 | 1 | 1 | 0 | 1 | 1 |
| Arsenic | mg/L | 0.005 | 0.0005 | 0.0009 | <0.0005 | <0.0005 | <0.005 |
| Barium | mg/L | | 0.044 | 0.064 | 0.066 | 0.046 | 0.051 |
| Biochemical Oxygen Demand | mg/L | | <2.0 | <2.0 | 2.4 | <2.0 | <2.0 |
| Boron | mg/L | 0.200 | 0.01 | 0.02 | 0.01 | 0.01 | 0.03 |
| Cadmium | mg/L | 0.0005 *** | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.001 |
| Chloride | mg/L | | 8.2 | 8.1 | 8.2 | 5 | 4.9 |
| Chromium | mg/L | 0.010 | <0.0005 | <0.0005 | 0.0009 | <0.0005 | <0.001 |
| Chemical Oxygen Demand | mg/L | | 40 | 60 | 40 | 30 | 50 |
| Conductivity | µS/cm | | 562 | 762 | 687 | 551 | 682 |
| Conductivity - field | µS/cm | | 555 | 759 | 709 | 550 | 604 |
| Copper | mg/L | 0.005 **** | 0.0006 | 0.0006 | 0.0005 | 0.0006 | <0.005 |
| Dissolved Oxygen - field | mg/L | | 6.63 | 6.58 | 7.31 | 6.91 | 0.68 |
| Iron | mg/L | 0.3 | 0.11 | 0.37 | 0.46 | 0.11 | 0.64 |
| Lead | mg/L | 0.005 ***** | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.01 |
| Mercury | mg/L | | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Nitrate (as N) | mg/L | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Nitrite (as N) | mg/L | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| pH | units | 6.5-8.5 | 7.9 | 7.92 | 7.75 | 7.75 | 7.98 |
| pH - field | units | 6.5-8.5 | 7.7 | 7.6 | 7.4 | 7.7 | 7.4 |
| Phenols: total | µg/L | 1 | <1 | <1 | 1 | <1 | 4 |
| Phosphorus | mg/L | 0.03 | 0.02 | 0.05 | 0.05 | <0.02 | 0.09 |
| Sulphate | mg/L | | 27.4 | 9.4 | 8.2 | 18.4 | 4.1 |
| Total Dissolved Solids | mg/L | | 370 | 460 | 350 | 310 | 410 |
| Temperature - field | °C | | 6.2 | 10.9 | 0.5 | 9.9 | 16.7 |
| Total Kjeldahl Nitrogen | mg/L | | <2.0 | 0.9 | 0.6 | 0.4 | 0.8 |
| Total Suspended Solids | mg/L | | <2.0 | 4.8 | 27.2 | 2 | 10.4 |
| Zinc | mg/L | 0.020 | 0.0012 | <0.0005 | 0.0087 | 0.0007 | <0.01 |

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) "-" - Indicates parameter not analysed.
3) * - Aluminum PWQO value based on pH range of 6.5 to 9.0.
** - Beryllium PWQO value based on hardness >75 mg/L.
*** - Cadmium PWQO value based on hardness >100 mg/L.
**** - Copper PWQO value based on hardness >20 mg/L.
***** - Lead PWQO value based on hardness >80 mg/L.

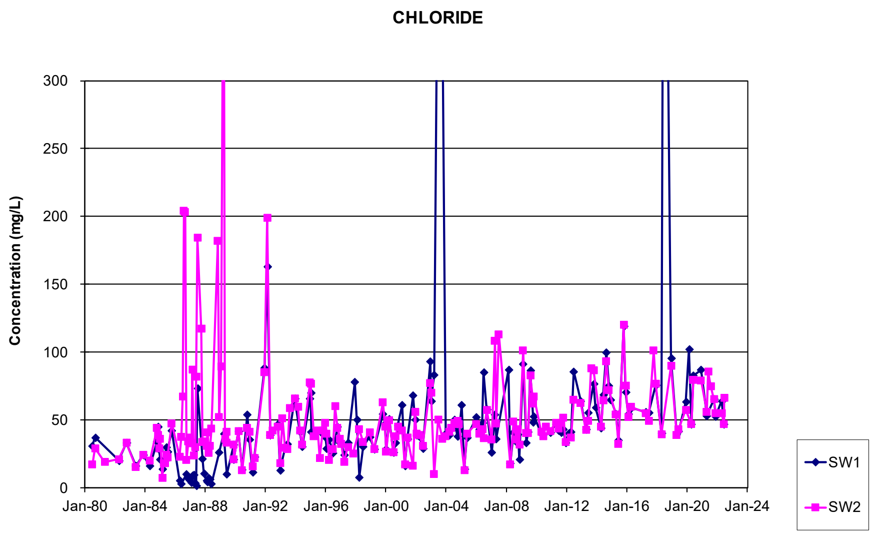
## Figure J.1

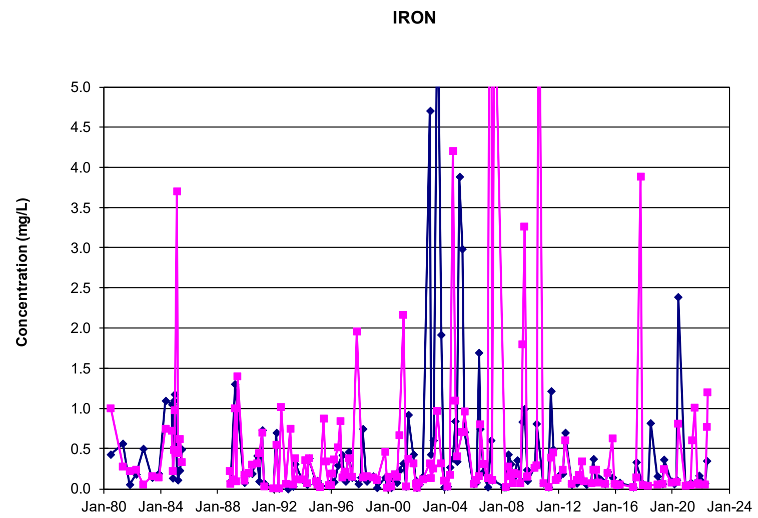
### Time Concentration Graphs - Surface Water Stations: Central Water Course

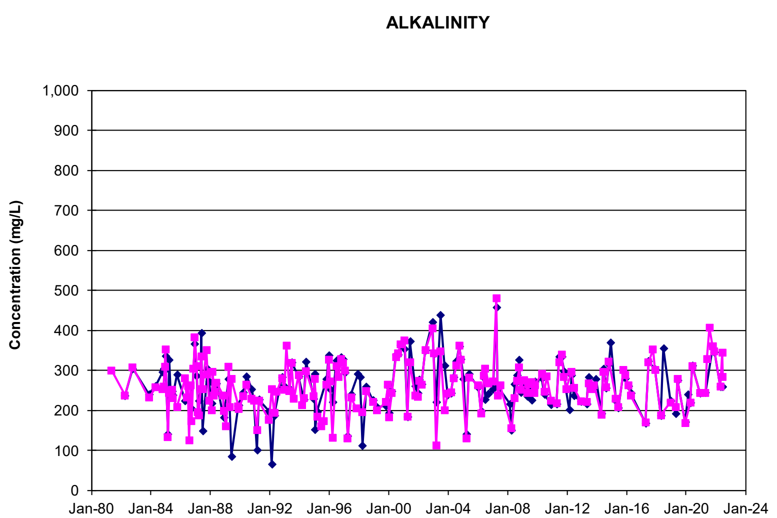


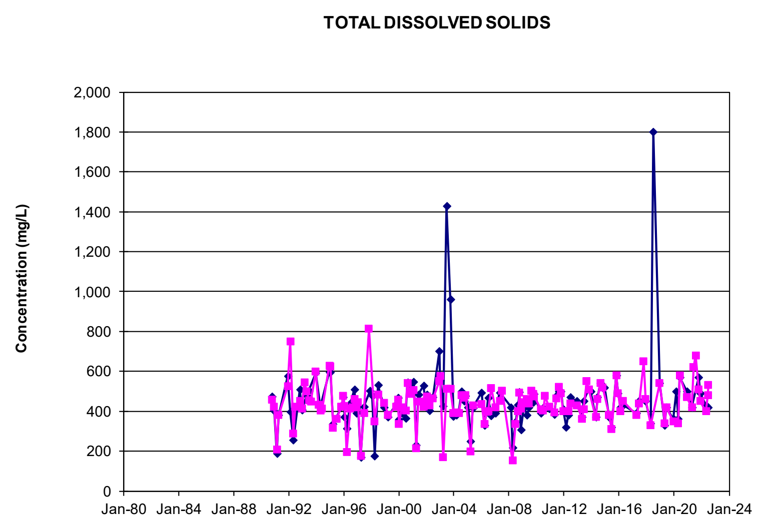
# Figure J.2

## Time Concentration Graphs - Surface Water Stations: Central Water Course



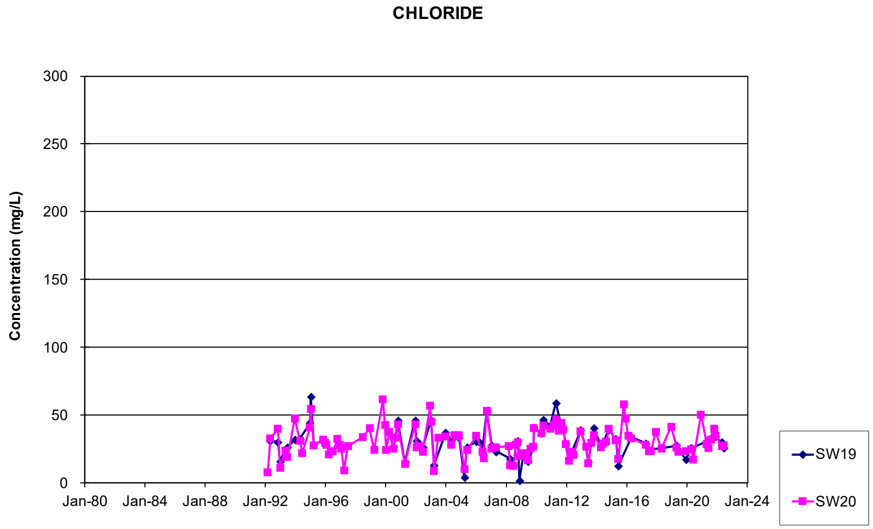



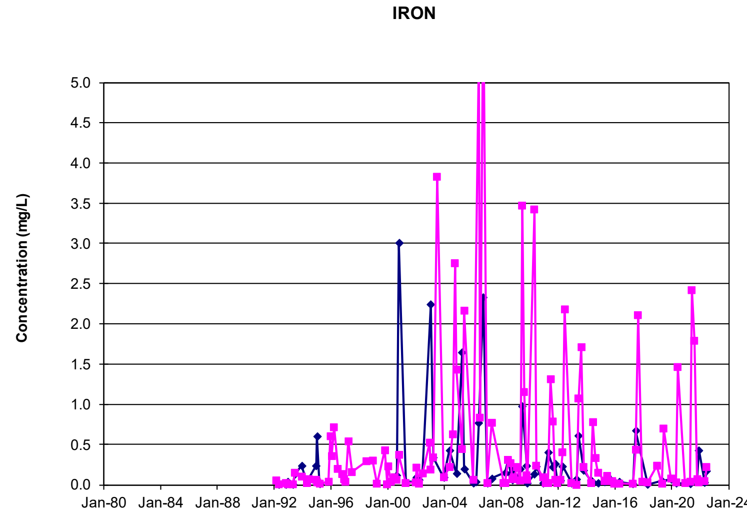



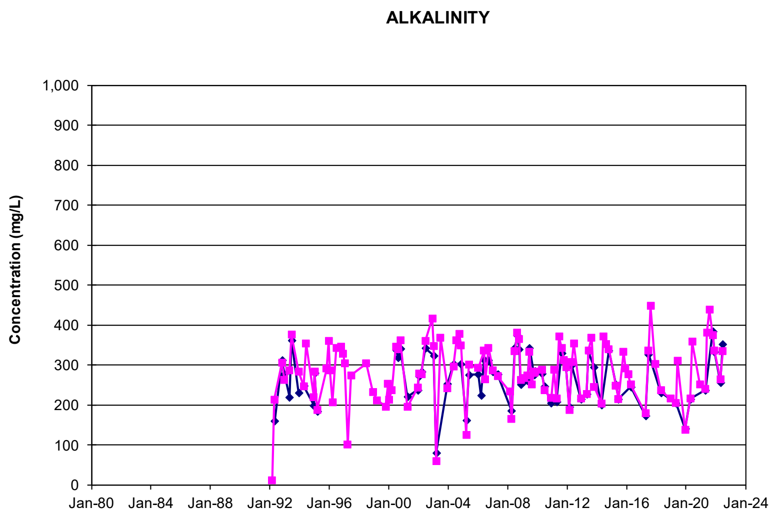



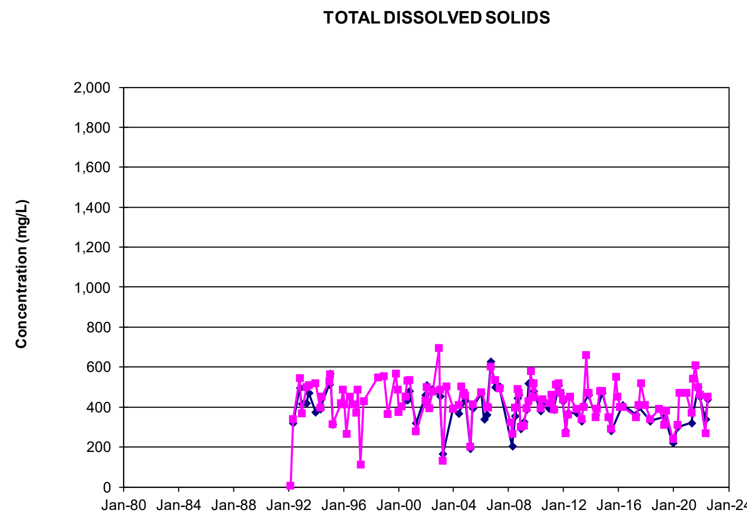
# Figure J.3

## Time Concentration Graphs - Surface Water Stations: Central Water Course



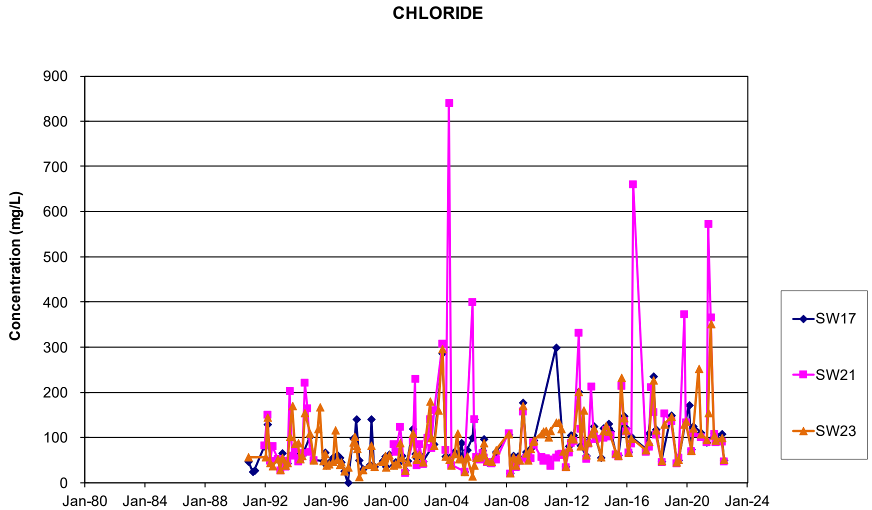



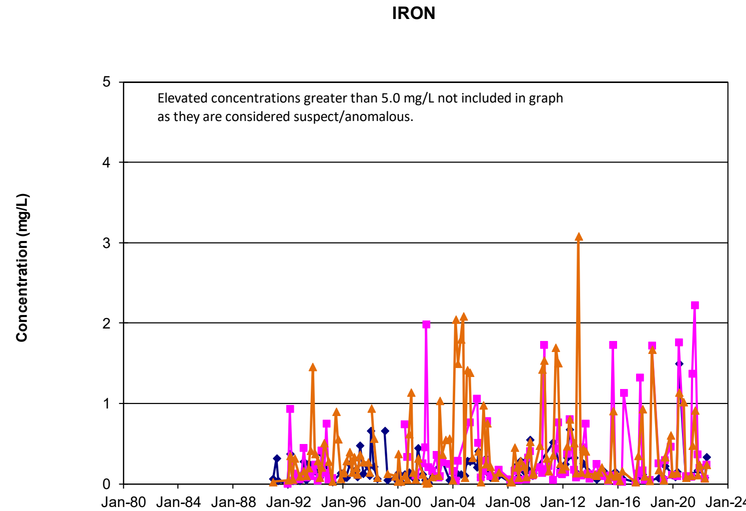



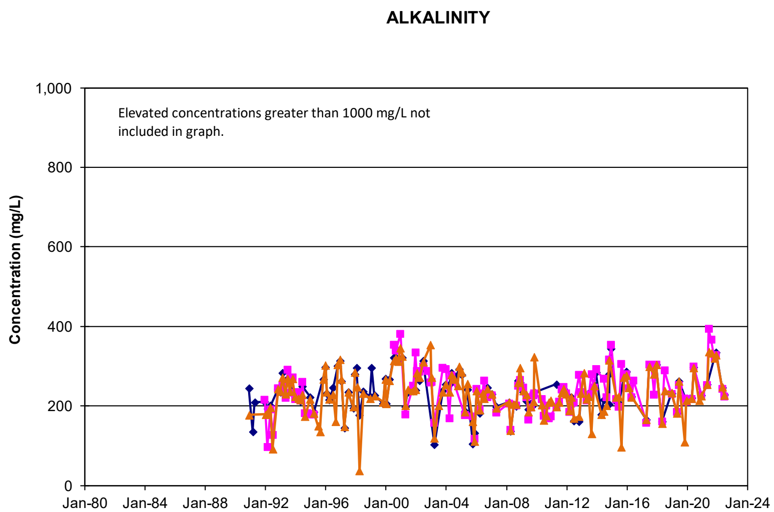



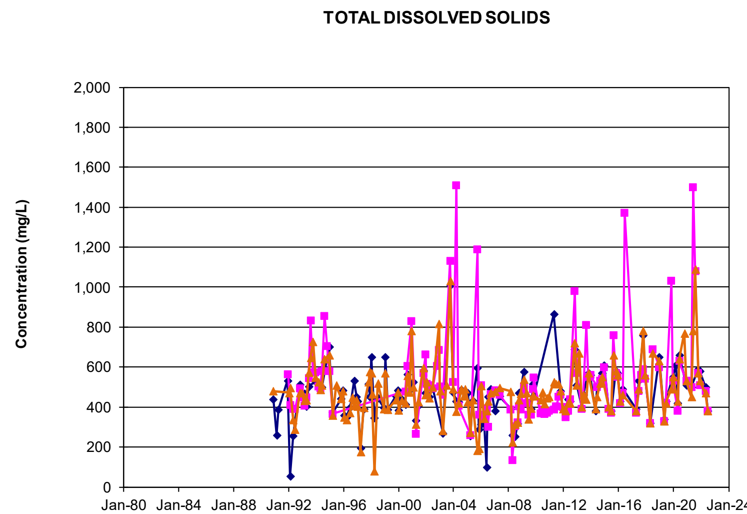
# Figure J.4

## Time Concentration Graphs - Surface Water Stations: Bensfort Road Ditch



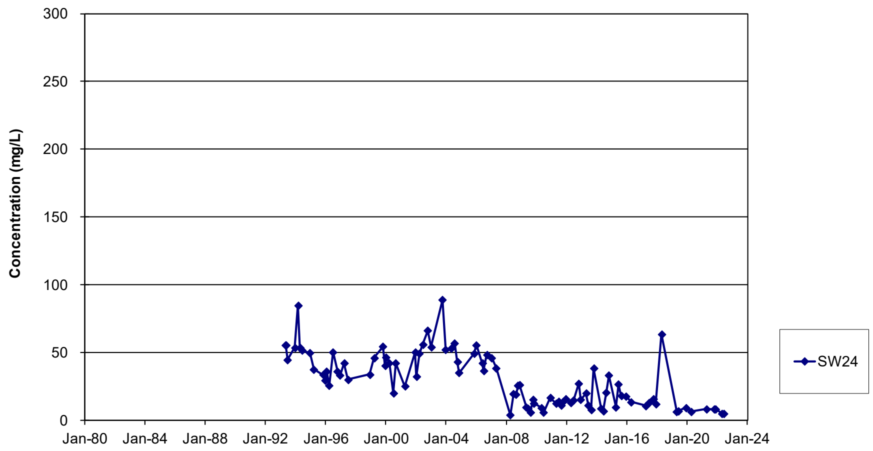



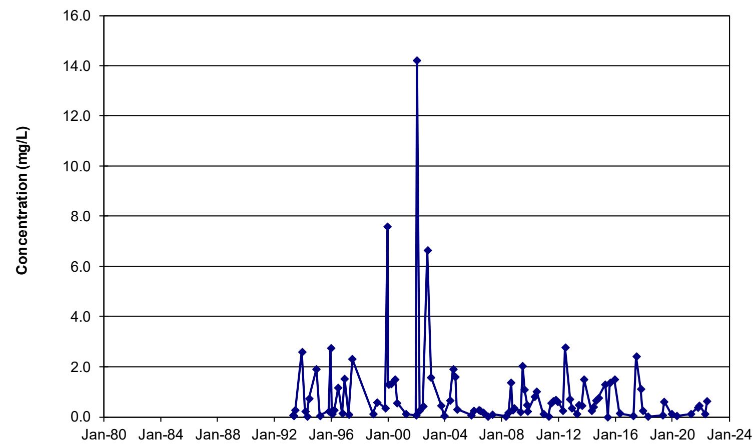
## Figure J.5

### Time Concentration Graphs - Surface Water Stations: Wetland Area (Western Water Course)

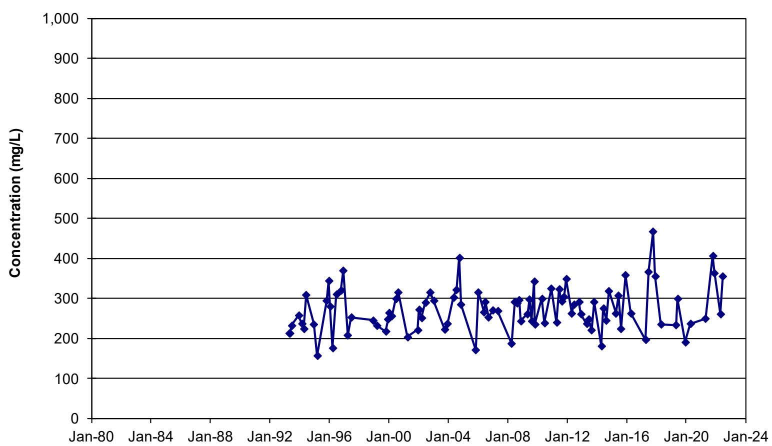
CHLORIDE




IRON




ALKALINITY




TOTAL DISSOLVED SOLIDS

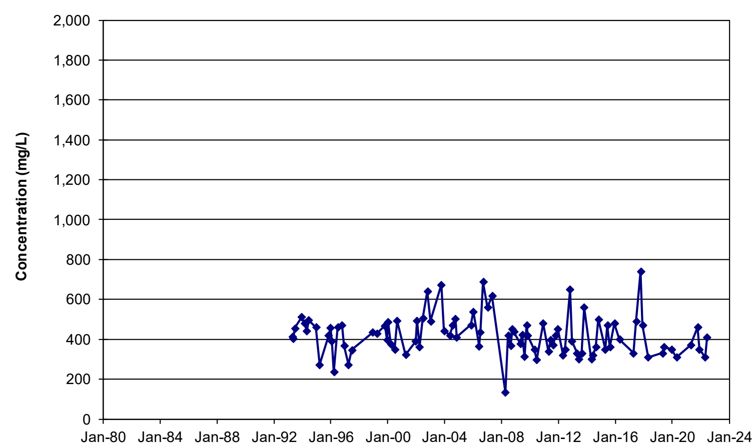


**Table J.3**
**NFA Stormwater Management Pond Sampling**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| AREA | SAMPLING LOCATIONS | EVENT DATE | SAMPLED | COMMENTS |
|---|---|---|---|---|
| NFA STORMWATER MANAGEMENT POND | INLET | 4-May-2022 | Dry | No flow. Both inlets were observed to have sediment and debris accumulated. Landfill manager was notified cleaning was required. |
| | | 7-Jun-2022 | Sampled | SW Inlet - low consistent flow, water turbid and light brown in colour. Litter observed in culvert at time of sampling.<br>NW Inlet - Low consistent flow and water was moderate/high turbidity. Litter observed in culvert at time of sampling.<br>Composite sample - Turbid to very turbid, light brown, slight odour and no sheen. |
| | OUTLET | 10-Feb-2022 | Dry | No sample collected - no storm pond discharge. Event initiated by elevated temperatures about 0 degrees for 2 consecutive days. Pond snow/ice covered. |
| | | 17-Feb-2022 | Sampled | Winter event sampled - Sample is turbid, light brown, sediment has slight odour but no detectable sheen. Bulk of flow travelling over the top of ice on frozen pond limiting retention time in SWM pond. Total rainfall prior to sampling ~20.57mm. |
| | | 4-May-2022 | NMS | Low flow from outlet pipe, unable to obtain sample. Discharge water was visually clear. |
| | | 7-Jun-2022 | Sampled | Spring sampling event - initiated by rain fall event. Total rainfall ~26.9mm. Discharge from outlet was clear with very few suspended solids, slight odour and no sheen. |
| | | 16-Jun-2022 | Sampled | Sampling event initiated by rainfall event - total rainfall prior to sampling ~12.2mm. Outlet pipe had moderate and consistent flow. Foam was observed on rip rap rocks where pipe discharges. Sample was observed to be clear with slight brown tinge, few suspended solids, slight odour and no sheen. Litter present around pond edge. |
| | | 5-Jul-2022 | Dry | No sample collected - pond level was ~15cm below outlet level. Pond water being used for Cell 4 construction and dust control onsite from July - October. |
| | | 14-Jul-2022 | Dry | No sample collection - pond level was 35-40cm below outlet level. |
| | | 18-Jul-2022 | Dry | No sample collection - pond level was 30-35cm below outlet level. |
| | | 25-Jul-2022 | Dry | No sample collection - pond level was 30-35cm below outlet level. |
| | | 31-Jul-2022 | Dry | No sample collection - pond level was 30-35cm below outlet level. |
| | | 1-Aug-2022 | Dry | No sample collection - pond level was 50-60cm below outlet level. |
| | | 3-Aug-2022 | Dry | No sample collection - pond level was 50-60cm below outlet level. |
| | | 8-Aug-2022 | Dry | No sample collection - pond level was 50-60cm below outlet level. |
| | | 10-Aug-2022 | Dry | No sample collection - pond level was 50-60cm below outlet level. |
| | | 15-Aug-2022 | Dry | No sample collection - pond level was 50-60cm below outlet level. |
| | | 22-Aug-2022 | Dry | No sample collection - pond level was ~75cm below outlet level. Total rainfall prior to sampling from August 16-20 was 38.1mm. |
| | | 31-Aug-2022 | Dry | No sample collection - pond level was 70-75cm below outlet level. |
| | | September VD | Dry | No samples collected -Stormwater pond was checked on several occasions while conducting groundwater monitoring. Pond water levels ranged from ~1 to 1.5m below outlet level. |
| | | October VD | Dry | No samples collected -Stormwater pond was checked on several occasions while conducting groundwater monitoring. Pond water levels ranged from ~1 to 1.5m below outlet level. |
| | | November VD | Dry | No samples collected -Stormwater pond was checked on several occasions while conducting groundwater monitoring. Pond water levels ranged from ~1 to 1.5m below outlet level. |
| | | 2-Dec-2022 | Dry | No samples collected -Stormwater pond water level was 0.80cm below outlet level. |
| | | 14-Dec-2022 | Dry | No samples collected -Stormwater pond water level was 0.80cm below outlet level. |

NOTES:
1) NMS - No measurable sample
2) Dry - Dry conditions, no sample obtained.
3) VD - Various dates monitored throughout the month > 10 visits
4) Precipitation data obtained from Environment Canada, Peterborough Airport Station Data.

**Table J.4**
**Stormwater Pond Chemical Results - Inorganic Parameters**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | INLET | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Apr-17 | Nov-17 | May-18 | Nov-18 | Apr-19 | Oct-19 | Oct-20 | Apr-21 | Sep-21 | Jun-22 |
| Alkalinity | mg/L | 256 | 236 | 532 | 194 | 415 | 491 | 603 | 230 | 409 | 467 |
| Aluminum | mg/L | 2.26 | 0.79 | 17.7 | 5.05 | 12.7 | 15 | 19.5 | 6.33 | 11.9 | 18.1 |
| Ammonia: total | mg/L | 1 | 9.2 | 0.6 | 0.3 | 0.4 | 0.9 | 0.2 | 2.7 | 1.2 | 0.2 |
| Ammonia: un-ionized | mg/L | 0.009 | 0.108 | 0.036 | 0.002 | 0.017 | 0.037 | 0.025 | 0.113 | 0.048 | 0.011 |
| Antimony | mg/L | | | | | | | | | | |
| Arsenic | mg/L | | | | | | | | | | |
| Barium | mg/L | | | | | | | | | | |
| Beryllium | mg/L | | | | | | | | | | |
| Bismuth | mg/L | | | | | | | | | | |
| Biochemical Oxygen Demand | mg/L | 38.4 | 95.6 | <2.3 | 6.3 | 5 | 16.1 | 6 | 26.5 | 13.4 | 5.5 |
| Boron | mg/L | 0.147 | 0.36 | 0.0747 | 0.134 | 0.175 | 0.125 | 0.0502 | 0.126 | 0.19 | 0.13 |
| Bromide | mg/L | | | | | | | | | | |
| Cadmium | mg/L | 0.0002 | <0.001 | 0.0002 | <0.0001 | 0.0002 | 0.0003 | 0.0004 | 0.0001 | 0.0002 | 0.003 |
| Calcium | mg/L | 141 | 132 | 277 | 137 | 232 | 237 | 338 | 149 | 236 | 232 |
| Chloride | mg/L | 77.2 | 85.1 | 15.2 | 45.8 | 28.5 | 27.5 | 16.8 | 39 | 27.4 | 42.3 |
| Chromium | mg/L | 0.0043 | 0.004 | 0.0234 | 0.0057 | 0.0156 | 0.0224 | 0.0259 | 0.0079 | 0.0173 | 0.0320 |
| Cobalt | mg/L | | | | | | | | | | |
| Chemical Oxygen Demand | mg/L | 120 | 170 | 160 | 80 | 120 | 140 | 160 | 100 | 160 | 100 |
| Colour | TCU | 42 | 28 | 28 | 25 | 22 | 36 | 29 | 22 | 45 | 19 |
| Conductivity - field | µS/cm | 1050 | 1100 | 356 | 725 | 476 | 512 | 191 | 655 | 529 | 448 |
| Copper | mg/L | 0.0074 | 0.005 | 0.0214 | 0.0084 | 0.0201 | 0.0278 | 0.0478 | 0.0146 | 0.0209 | 0.038 |
| Dissolved Oxygen - field | mg/L | 11.2 | 9.14 | 7.31 | 11.2 | 8.17 | 9.63 | 8.12 | 7.64 | 5.68 | 7.96 |
| Dissolved Organic Carbon | mg/L | 40.2 | 61.9 | 5.4 | 14.3 | 8.7 | 15.2 | 4.3 | 22.2 | 23.8 | 9.2 |
| Fluoride | mg/L | | | | | | | | | | |
| Hardness | mg/L | 451 | 408 | 748 | 407 | 645 | | 908 | 431 | 661 | 649 |
| Iron | mg/L | 2.19 | 1.12 | 22 | 4.12 | 15.8 | 17.7 | 18.8 | 5.99 | 14.3 | 22.7 |
| Lead | mg/L | 0.0026 | <0.0015 | 0.0122 | 0.0031 | 0.0157 | 0.0218 | 0.0513 | 0.0069 | 0.0135 | 0.04 |
| Lithium | mg/L | | | | | | | | | | |
| Magnesium | mg/L | 24 | 19.1 | 13.6 | 15.8 | 16 | 15.6 | 15.5 | 14.4 | 17.4 | 16.9 |
| Manganese | mg/L | 0.291 | 0.344 | 0.557 | 0.136 | 0.56 | 0.497 | 0.668 | 0.197 | 0.442 | 0.608 |
| Mercury | µg/L | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.2 | <0.2 | <0.2 | <0.2 |
| Molybdenum | mg/L | | | | | | | | | | |
| Nickel | mg/L | 0.005 | 0.006 | 0.019 | 0.008 | 0.014 | 0.017 | 0.021 | 0.008 | 0.015 | 0.023 |
| Nitrate | mg/L | 0.27 | <0.5 | 1.24 | 1.45 | <0.5 | 2.89 | 0.76 | 1.35 | 0.6 | 0.27 |
| Nitrite | mg/L | <0.05 | <0.5 | <0.5 | <0.05 | <0.5 | 0.27 | <0.05 | 0.07 | <0.05 | <0.05 |
| Oil and Grease - total | mg/L | <10.0 | <10.0 | 18.2 | 13.3 | 12.7 | 25.5 | 20.9 | 75.5 | 17.5 | 15.0 |
| Oxydation Reduction Potential | mV | | | - | | | | | - | | |
| pH | units | 7.87 | 8.05 | 8.08 | 8.22 | 8.05 | 8.11 | 8.67 | 8.04 | 8.02 | 8.16 |
| pH - field | units | 7.9 | 7.8 | 8.2 | 7.7 | 8.3 | 8.3 | 8.8 | 8.1 | 7.8 | 7.8 |
| Phenols | µg/L | 11 | 36 | 1 | <1 | 2 | 3 | <1 | 11 | 8 | <1 |
| Phosphate | mg/L | | | | | | | | | | |
| Phosphorus | mg/L | 0.24 | 0.16 | 0.86 | 0.28 | 0.75 | 0.83 | 1.18 | 0.35 | 0.64 | 0.91 |
| Potassium | mg/L | 34.4 | 20.9 | 9.1 | 13.4 | 12 | 13.4 | 7.3 | 9.7 | 16.3 | 9.1 |
| Selenium | mg/L | <0.0005 | <0.02 | 0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.02 |
| Silver | mg/L | <0.0001 | <0.01 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.01 |
| Sodium | mg/L | 44 | 64.2 | 14.1 | 37.7 | 28.2 | 21.4 | 14.8 | 33 | 21.1 | 25.5 |
| Strontium | mg/L | | | | | | | | | | |
| Sulfur | mg/L | | | | | | | | | | |
| Sulphate | mg/L | 196 | 179 | 67.3 | 158 | 61.1 | 61.2 | 10.4 | 111 | 77 | 78.5 |
| Tellurium | mg/L | | | | | | | | | | |
| Temperature - field | °C | 5.9 | 9.9 | 19.9 | 6.4 | 13.8 | 10.7 | 12 | 10.2 | 16.5 | 17.5 |
| Thallium | mg/L | | | | | | | | | | |
| Tin | mg/L | | | | | | | | | | |
| Titanium | mg/L | | | | | | | | | | |
| Total Kjeldahl Nitrogen | mg/L | 2.4 | 12.7 | 2.8 | 0.6 | 0.9 | 6.6 | 0.6 | 7.8 | 6.6 | 2.8 |
| Total Suspended Solids | mg/L | 80 | 32 | 905 | 163 | 746 | 705 | 1120 | 266 | 393 | 570 |
| Tungsten | mg/L | | | | | | | | | | |
| Turbidity | NTU | 130 | 36 | 2620 | 180 | 1300 | 1870 | 3920 | 320 | 1260 | 2150 |
| Uranium | mg/L | | | | | | | | | | |
| Vanadium | mg/L | 0.0034 | <0.002 | 0.0311 | 0.0073 | 0.0214 | 0.0282 | 0.0344 | 0.0095 | 0.0234 | 0.0370 |
| Zinc | mg/L | 0.03 | <0.02 | 0.062 | 0.019 | 0.0728 | 0.107 | 0.169 | 0.045 | 0.0563 | 0.10 |
| Zirconium | mg/L | | | | | | | | | | |

NOTES: 1) Blank indicates parameter not analysed.

**Table J.4**
**Stormwater Pond Chemical Results - Inorganic Parameters**
**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | PEO | OUTLET | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apr-17 | Jun-17 | Jul-17 | Nov-17 | Jan-18 | May-18 | Nov-18 | Dec-18 | Apr-19 | Jun-19 | Oct-19 | Dec-19 |
| Alkalinity | mg/L | | 147 | | | 89.2 | | 41 | 84.6 | | 132 | | 96.4 | |
| Aluminum | mg/L | | 0.211 | | 0.05 | 0.06 | | 0.05 | 1.99 | | 0.516 | | 0.252 | |
| Ammonia: total | mg/L | | 0.1 | <0.1 | 0.2 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.6 |
| Ammonia: un-ionized | mg/L | 0.020 | 0.001 | 0.005 | 0.005 | 0.003 | 0.003 | 0.076 | 0.003 | 0.001 | 0.004 | 0.001 | 0.008 | 0.002 |
| Antimony | mg/L | | | | <0.02 | | | | | | | | | |
| Arsenic | mg/L | | | | <0.01 | | | | | | | | | |
| Barium | mg/L | | | | 0.042 | | | | | | | | | |
| Beryllium | mg/L | | | | <0.001 | | | | | | | | | |
| Bismuth | mg/L | | | | <0.05 | | | | | | | | | |
| Biochemical Oxygen Demand | mg/L | | 2.9 | | | <2.3 | | 3.8 | 2.9 | | 2.6 | | <2.0 | |
| Boron | mg/L | 0.2 | 0.0561 | | 0.18 | 0.14 | | 0.0896 | 0.0805 | | 0.0762 | | 0.0542 | |
| Bromide | mg/L | | | | | | | | | | | | | |
| Cadmium | mg/L | | <0.0001 | | <0.001 | <0.001 | | <0.0001 | <0.0001 | | <0.0001 | | <0.0001 | |
| Calcium | mg/L | | 83.6 | | 48.2 | 37.2 | | 30.1 | 42.6 | | 65.4 | | 51 | |
| Chloride | mg/L | | 198 | | | 64.5 | | 142 | 52.8 | | 78.8 | | 58.9 | |
| Chromium | mg/L | | 0.0007 | | <0.002 | <0.001 | | <0.0005 | 0.0023 | | 0.0012 | | 0.0006 | |
| Cobalt | mg/L | | | | <0.002 | | | | | | | | | |
| Chemical Oxygen Demand | mg/L | | <10 | | | <10 | | 50 | 40 | | 30 | | 30 | |
| Colour | TCU | | 16 | | | 15 | | 32 | 16 | | 12 | | 15 | |
| Conductivity - field | µS/cm | | 1050 | 615 | 529 | 498 | 929 | 697 | 414 | 591 | 628 | 433 | 563 | 806 |
| Copper | mg/L | | 0.0024 | | <0.005 | <0.005 | | <0.0005 | 0.004 | | 0.0024 | | 0.0036 | |
| Dissolved Oxygen - field | mg/L | | 10.3 | 7.34 | 3.52 | 12 | 9.4 | 7.88 | 10 | 17.1 | 7.95 | 5.69 | 6.27 | 11 |
| Dissolved Organic Carbon | mg/L | | 9.7 | | | 9.8 | | 10 | 8.8 | | 6.3 | | 6.8 | |
| Fluoride | mg/L | | | | | | | | | | | | | |
| Hardness | mg/L | | 255 | | | 129 | | 118 | 137 | | 196 | | | |
| Iron | mg/L | 0.3 | 0.277 | | 0.2 | 0.07 | | 0.2 | 1.48 | | 0.489 | | 0.31 | |
| Lead | mg/L | | <0.0005 | | 0.0119 | <0.0015 | | <0.0005 | 0.002 | | 0.0008 | | <0.0005 | |
| Lithium | mg/L | | | | <0.1 | | | | | | | | | |
| Magnesium | mg/L | | 11.3 | | 8.63 | 8.8 | | 10.5 | 7.37 | | 7.96 | | 7.38 | |
| Manganese | mg/L | | 0.0157 | | 0.451 | 0.006 | | 0.0332 | 0.0538 | | 0.0242 | | 0.0983 | |
| Mercury | µg/L | | <0.1 | | | <0.1 | | <0.1 | <0.1 | | <0.1 | | <0.1 | |
| Molybdenum | mg/L | | | | <0.005 | | | | | | | | | |
| Nickel | mg/L | | <0.002 | | <0.005 | <0.005 | | <0.002 | 0.004 | | <0.002 | | <0.002 | |
| Nitrate | mg/L | | 0.13 | | | <0.5 | | <0.5 | 0.17 | | <0.5 | | 1.88 | |
| Nitrite | mg/L | | <0.05 | | | <0.5 | | <0.5 | <0.05 | | <0.5 | | <0.05 | |
| Oil and Grease - total | mg/L | 15 | <10.0 | <10.0 | <10.0 | <10.0 | <10.0 | 10.5 | 16.4 | 14.8 | <10.0 | <10.0 | 10.7 | <10.0 |
| Oxydation Reduction Potential | mV | | | | | | | - | | | | | | |
| pH | units | 6.5 - 8.5 | 7.79 | 8.05 | 7.78 | 8.28 | 7.65 | 9.32 | 8.55 | 8.14 | 7.96 | 8.15 | 8 | 7.86 |
| pH - field | units | | 7.9 | 7.8 | 7.6 | 8.3 | 7.2 | 9.1 | 8.1 | 7.8 | 7.98 | 7.27 | 8.17 | 7.53 |
| Phenols | µg/L | | <1 | | 3 | <1 | | 1 | <1 | | 1 | | <1 | |
| Phosphate | mg/L | | | | | | | | | | | | | |
| Phosphorus | mg/L | | 0.05 | | 0.04 | <0.01 | | 0.04 | 0.08 | | 0.05 | | 0.15 | |
| Potassium | mg/L | | 11.1 | | 12.2 | 10.3 | | 7.1 | 8.6 | | 5.9 | | 6.5 | |
| Selenium | mg/L | | <0.0005 | | <0.02 | <0.02 | | <0.0005 | <0.0005 | | <0.0005 | | <0.0005 | |
| Silver | mg/L | | <0.0001 | | <0.01 | <0.01 | | <0.0005 | <0.0005 | | <0.0005 | | <0.0005 | |
| Sodium | mg/L | | 93.4 | | 34.3 | 42.6 | | 89.8 | 40.4 | | 50.5 | | 40.4 | |
| Strontium | mg/L | | | | 0.2 | | | | | | | | | |
| Sulfur | mg/L | | | | 11.7 | | | | | | | | | |
| Sulphate | mg/L | | 92.1 | | | 49.8 | | 63.7 | 48.2 | | 45.9 | | 55.7 | |
| Tellurium | mg/L | | | | <0.10 | | | | | | | | | |
| Temperature - field | °C | | 7.2 | 24.1 | 20.4 | 7.3 | 0.7 | 24.3 | 6.4 | 3.1 | 12.9 | 18.6 | 10.1 | 1.3 |
| Thallium | mg/L | | | | <0.01 | | | | | | | | | |
| Tin | mg/L | | | | <0.02 | | | | | | | | | |
| Titanium | mg/L | | | | 0.003 | | | | | | | | | |
| Total Kjeldahl Nitrogen | mg/L | | 0.8 | | | 0.7 | | 2 | 0.7 | | 0.7 | | 3.9 | |
| Total Suspended Solids | mg/L | | 6.8 | <2.0 | <2.0 | <2.0 | 10.8 | <2.0 | 34 | 121 | <2.0 | 4 | 2 | 4.8 |
| Tungsten | mg/L | | | | <0.005 | | | | | | | | | |
| Turbidity | NTU | 25 | 16 | 2.4 | 7.9 | 2.9 | 27.6 | 2.4 | 75 | 199 | 25.4 | 5.2 | 11.7 | 7.1 |
| Uranium | mg/L | | | | <0.03 | | | | | | | | | |
| Vanadium | mg/L | | 0.0006 | | <0.002 | <0.002 | | 0.0008 | 0.0028 | | 0.0009 | | 0.0008 | |
| Zinc | mg/L | | 0.0061 | | 0.05 | <0.02 | | <0.0005 | 0.0114 | | 0.0081 | | 0.0332 | |
| Zirconium | mg/L | | | | <0.01 | | | | | | | | | |

NOTES: 1) PEO - Pond Effluent Objectives for outlet, as outlined in Condition 7 of Amended ECA 2231-8YCPHG, dated September 28, 2012.
2) Blank indicates parameter not analysed.

**Table J.4**

**Stormwater Pond Chemical Results - Inorganic Parameters**

**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | PEO | OUTLET | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mar-20 | Oct-20 | Mar-21 | Apr-21 | Jul-21 | Sep-21 | Oct-21 | Dec-21 | Feb-22 | Jun-22 | Jun-22 |
| Alkalinity | mg/L | | | 115 | | 77.3 | | 109 | | | | 82.5 | |
| Aluminum | mg/L | | | 0.122 | | 0.041 | | 1.21 | | | | 0.049 | |
| Ammonia: total | mg/L | | 1.5 | 0.3 | 0.6 | 0.1 | 0.2 | 0.2 | 0.1 | 0.2 | 0.7 | 0.3 | 0.2 |
| Ammonia: un-ionized | mg/L | 0.020 | 0.001 | 0.011 | 0.002 | 0.004 | 0.006 | 0.006 | <0.003 | 0.009 | 0.018 | 0.010 | 0.007 |
| Antimony | mg/L | | | | | | | | | | | | |
| Arsenic | mg/L | | | | | | | | | | | | |
| Barium | mg/L | | | | | | | | | | | | |
| Beryllium | mg/L | | | | | | | | | | | | |
| Bismuth | mg/L | | | | | | | | | | | | |
| Biochemical Oxygen Demand | mg/L | | | 5.6 | | <2.0 | | 2.6 | | | | <2.0 | |
| Boron | mg/L | 0.2 | | 0.0478 | | 0.0532 | | 0.05 | | | | 0.06 | |
| Bromide | mg/L | | | | | | | | | | | | |
| Cadmium | mg/L | | | <0.0001 | | <0.0001 | | <0.0001 | | | | <0.001 | |
| Calcium | mg/L | | | 47.7 | | 49.1 | | 53.9 | | | | 45.9 | |
| Chloride | mg/L | | | 58.6 | | 131 | | 40.3 | | | | 219 | |
| Chromium | mg/L | | | <0.0005 | | <0.0005 | | 0.0018 | | | | <0.001 | |
| Cobalt | mg/L | | | | | | | | | | | | |
| Chemical Oxygen Demand | mg/L | | | 30 | | 20 | | 20 | | | | 20 | |
| Colour | TCU | | | 11 | | 14 | | 23 | | | | 20 | |
| Conductivity - field | µS/cm | | 974 | 499 | 435 | 648 | 654 | 390 | 472 | 755 | 450 | 917 | 635 |
| Copper | mg/L | | | 0.0012 | | 0.0013 | | 0.0012 | | | | <0.005 | |
| Dissolved Oxygen - field | mg/L | | 3.37 | 6.43 | 12.5 | 11 | 3.17 | 3.61 | 8.5 | 11.9 | 16.2 | 6.30 | 6.73 |
| Dissolved Organic Carbon | mg/L | | | 9.3 | | 7.4 | | 7.6 | | | | 7.7 | |
| Fluoride | mg/L | | | | | | | | | | | | |
| Hardness | mg/L | | | 147 | | 160 | | 156 | | | | 156 | |
| Iron | mg/L | 0.3 | | 0.175 | | 0.1 | | 1.1 | | | | 0.28 | |
| Lead | mg/L | | | <0.0005 | | <0.0005 | | 0.0011 | | | | <0.01 | |
| Lithium | mg/L | | | | | | | | | | | | |
| Magnesium | mg/L | | | 6.87 | | 9.2 | | 5.25 | | | | 10.1 | |
| Manganese | mg/L | | | 0.0256 | | 0.017 | | 0.0854 | | | | 0.2920 | |
| Mercury | µg/L | | | <0.2 | | <0.2 | | <0.2 | | | | <0.2 | |
| Molybdenum | mg/L | | | | | | | | | | | | |
| Nickel | mg/L | | | <0.002 | | <0.002 | | <0.002 | | | | <0.005 | |
| Nitrate | mg/L | | | 0.28 | | <0.05 | | 0.24 | | | | 0.42 | |
| Nitrite | mg/L | | | <0.05 | | <0.05 | | <0.05 | | | | <0.05 | |
| Oil and Grease - total | mg/L | 15 | 13.2 | 10.5 | <10.0 | 20 | <10.0 | <10.0 | <10.0 | <10.0 | 16.4 | 15.3 | 14.3 |
| Oxydation Reduction Potential | mV | | | | | | | | | | | | |
| pH | units | 6.5 - 8.5 | 7.49 | 8 | 8.13 | 8.05 | 7.92 | 7.89 | 7.87 | 8.08 | 7.82 | 7.96 | 7.97 |
| pH - field | units | | 6.93 | 8.29 | 7.43 | 8.05 | 7.36 | 7.57 | 7.48 | 7.96 | 7.65 | 7.60 | 7.37 |
| Phenols | µg/L | | | <1 | | 2 | | 1 | | | | 2 | |
| Phosphate | mg/L | | | | | | | | | | | | |
| Phosphorus | mg/L | | | 0.11 | | 0.02 | | 0.07 | | | | 0.06 | |
| Potassium | mg/L | | | 6.8 | | 4.8 | | 5.4 | | | | 4.1 | |
| Selenium | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | | | <0.02 | |
| Silver | mg/L | | | <0.0005 | | <0.0005 | | <0.0005 | | | | <0.01 | |
| Sodium | mg/L | | | 40.7 | | 75.3 | | 18.8 | | | | 119 | |
| Strontium | mg/L | | | | | | | | | | | | |
| Sulfur | mg/L | | | | | | | | | | | | |
| Sulphate | mg/L | | | 25.6 | | 49.8 | | 22.6 | | | | 28.5 | |
| Tellurium | mg/L | | | | | | | | | | | | |
| Temperature - field | °C | | 0.5 | 10.7 | 1.8 | 11.7 | 18.6 | 17 | 15.9 | 3.3 | 0.3 | 16.6 | 22.0 |
| Thallium | mg/L | | | | | | | | | | | | |
| Tin | mg/L | | | | | | | | | | | | |
| Titanium | mg/L | | | | | | | | | | | | |
| Total Kjeldahl Nitrogen | mg/L | | | 0.9 | | 3 | | 3.7 | | | | 2.8 | |
| Total Suspended Solids | mg/L | | 6 | 11.2 | 17 | <2.0 | 18.4 | 127 | 2.8 | <2.0 | 100 | 4 | 3.2 |
| Tungsten | mg/L | | | | | | | | | | | | |
| Turbidity | NTU | 25 | 7.8 | 4.8 | 38.6 | 2.2 | 28.1 | 45.1 | 5.2 | 7 | 365 | 2.4 | 5.4 |
| Uranium | mg/L | | | | | | | | | | | | |
| Vanadium | mg/L | | | <0.0005 | | <0.0005 | | 0.0022 | | | | <0.002 | |
| Zinc | mg/L | | | 0.0125 | | 0.0018 | | 0.0047 | | | | <0.01 | |
| Zirconium | mg/L | | | | | | | | | | | | |

NOTES: 1) PEO - Pond Effluent Objectives for outlet, as outlined in Condition 7 of Amended ECA 2231-8YCPHG, dated September 28, 2012.

2) Blank indicates parameter not analysed.

**Table J.5**

**Stormwater Pond Chemical Results - Organic Parameters**

**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | INLET | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Aug-16 | Apr-17 | Nov-17 | May-18 | Nov-18 | Apr-19 | Oct-19 | Oct-20 | Apr-21 | Sep-21 | Jun-22 |
| 1,1,2,2-Tetrachlorethane | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,1,2-Trichlorethane | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,1-Dichloroethane | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,1-Dichloroethylene | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,2-Dichlorobenzene | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,2-Dichloroethane | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,2-Dichlorpropane | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,3-Dichlorobenzene | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,3-Dichloropropene(E) | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | |
| 1,4-Dichlorobenzene | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| Benzene | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| Bromodichloromethane | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | |
| Bromoform | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| Bromomethane | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| Carbon Tetrachloride | µg/L | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | < 0.2 | < 0.2 | < 0.2 |
| Chlorobenzene | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| Chloroethane | µg/L | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | < 5 | < 5 | |
| Chloroform | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| Chloromethane | µg/L | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | < 5 | < 5 | < 5 |
| cis-1,2-Dichloroethylene | µg/L | <0.5 | <0.5 | <0.5 | | <0.5 | | | <0.5 | < 0.5 | < 0.5 | |
| Dibromochloromethane | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| Dichloromethane | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | |
| Ethyl Benzene | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | |
| Ethylene dibromide | µg/L | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | < 0.2 | < 0.2 | < 0.2 |
| m/p-Xylenes | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| o-Xylene | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| Styrene | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| Tetrachloroethylene | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| Toluene | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| trans-1,2-Dichloroethylene | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| Trichloroethylene | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| Trichlorofluoromethane | µg/L | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | < 5 | < 5 | < 5 |
| Vinyl Chloride | µg/L | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | < 0.2 | < 0.2 | < 0.2 |
| Xylenes - total | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | |

NOTE: Blank indicates parameter not analysed.

**Table J.5**

**Stormwater Pond Chemical Results - Organic Parameters**

**Peterborough County/City Waste Management Facility - 2022 Monitoring Program**

| PARAMETER | UNITS | OUTLET | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Apr-17 | Nov-17 | May-18 | Nov-18 | Apr-19 | Oct-19 | Oct-20 | Apr-21 | Sep-21 | Jun-22 |
| 1,1,2,2-Tetrachlorethane | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,1,2-Trichlorethane | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,1-Dichloroethane | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,1-Dichloroethylene | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,2-Dichlorobenzene | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,2-Dichloroethane | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,2-Dichlorpropane | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,3-Dichlorobenzene | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| 1,3-Dichloropropene(E) | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | |
| 1,3-Dichloropropene(Z) | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | |
| 1,4-Dichlorobenzene | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| Benzene | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| Bromodichloromethane | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | |
| Bromoform | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| Bromomethane | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| Carbon Tetrachloride | µg/L | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | < 0.2 | < 0.2 | < 0.2 |
| Chlorobenzene | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| Chloroethane | µg/L | <5 | <5 | <5 | <5 | <5 | <5 | <5 | < 5 | < 5 | |
| Chloroform | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| Chloromethane | µg/L | <5 | <5 | <5 | <5 | <5 | <5 | <5 | < 5 | < 5 | < 5 |
| cis-1,2-Dichloroethylene | µg/L | <0.5 | <0.5 | | <0.5 | | | <0.5 | < 0.5 | < 0.5 | |
| Dibromochloromethane | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| Dichloromethane | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | |
| Ethyl Benzene | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | |
| Ethylene dibromide | µg/L | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | < 0.2 | < 0.2 | < 0.2 |
| m/p-Xylenes | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| o-Xylene | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| Styrene | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| Tetrachloroethylene | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| Toluene | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| trans-1,2-Dichloroethylene | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| Trichloroethylene | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 |
| Trichlorofluoromethane | µg/L | <5 | <5 | <5 | <5 | <5 | <5 | <5 | < 5 | < 5 | < 5 |
| Vinyl Chloride | µg/L | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | < 0.2 | < 0.2 | < 0.2 |
| Xylenes - total | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | < 0.5 | < 0.5 | |

NOTE: Blank indicates parameter not analysed.

# APPENDIX

# K

## LANDFILL GAS ODOUR CONTROL SYSTEM

# LANDFILL GAS ODOUR CONTROL SYSTEM DESCRIPTION

## TABLE OF CONTENTS

## 1.0 General

In March 2000, a Landfill Gas Odour Control System (LFG System) was established on site in the South Fill Area (SFA) with the following objectives:

- to actively collect landfill gas (LFG) from the waste to provide odour control; and
- to operate in accordance with Conditions identified in ECA No. A341508.

The major components of the LFG System are the collection field, the gas control facility, and the Landfill Gas Utilization Plant (LGUP). Figure 7.1 shows the current LFG System components and layout.

## 1.1 Landfill Gas Collection Field

Five LFG wells were initially installed with the LFG System in 2000 along with ten connections to the leachate collection system (LCS). The gas collection field was expanded to 17 LFG extraction wells in 2004 and 22 wells in 2007 to further improve odour control and to replace the collection capacity of eight gas system interconnections[1] to the LCS that were lost as a result of the vertical and horizontal expansion into Cell 1 – West A in 2005. The 2002 and 2007 expansion of the LFG System was also intended to achieve additional emission reductions as part of the City and the County's participation in Environment Canada's Pilot Emission Removals, Reductions and Learning (PERRL) Initiative report for the Site submitted in draft to Environment Canada in February 2008. The PERRL program terminated December 31, 2007.

A new LFG System connection to the LCS was made at the high end clean out HCO5 – 95 in Fall 2005 to increase gas draw from that portion of the LCS. The LFG System connection to the high end of the toe drain, formerly at TD-VC, was re-installed in Fall 2006 with a connection to TD-00-05. A connection from the main header to manhole MH J3 was made in 2007 to provide odour control at this location. Two new LFG valve chambers were installed in the north area of the SFA in 2008 connecting to MH I1. These connections were made as part of

[1] Connections removed at: VC1-94, VC2-94, VC3-94, VC4-94, VC5-95, VC6-95, VC7-95 and TD-VC.

the City's on-going efforts to control odour on the east and north sides of the SFA.

In 2011 24 new gas wells and the associated collection pipe were installed in the SFA.

The SFA LFG collection field is currently comprised of:

- 46 vertical extraction wells in Cell1 South and North; and
- 5 tie-ins to the leachate toe drain MHI1, MHD2, HC05-95, TD-00-05, and MH J3.

The extraction wells and LCS are connected to the LFG System utilizing a network of lateral and header piping. Each of the wells and four of LCS tie-ins are controlled by individual control valves. Monitoring ports are used to ensure that the LFG System is effectively balanced based on the methane and oxygen content of the collected landfill gas. The collection piping is graded so that any condensate forming in the piping is drained into the extraction wells or the existing LCS. Condensate collected at the gas control plant is pumped to the LCS.

Construction of Phase 1 of the LFG System in the NFA was completed in 2015. Phase 1 included installation of horizontal LFG collection pipes within Cell 2. The collection pipes were connected to the existing LCS manholes in Cell 2 to alleviate odour issues originating from the LCS. Horizontal pipes directe collected LFG to the existing LGUP and flare on site. A valve chamber and isolation valves were installed west of Cell 2 to isolate gas collected from the NFA and SFA. A test port was installed at the valve chamber to monitor quality of LFG collected from Cell 2.

Phase 2 of the LFG System in the NFA was completed in February 2018. Phase 2 included the perimeter header pipes around Cells 2 and 3, and 4 vertical LFG extraction wells in Cell 2.

Phase 3 of the LFG system in the NFA was completed in February 2020. Phase 3 included installation of horizontal LFG collection pipes in Cell 3 and three vertical LFG extraction wells. The horizontal collection pipes and extraction wells were connected to the perimeter header pipes previsouly installed in 2018.

## 1.2 Landfill Gas Control Facility

The control facility of the LFG System was relocated to the NFA on November 25, 2005 to facilitate the optimization of the SFA capacity. The LFG Control Facility is located in a fenced compound near the NFA. Approximately 600 metres of header pipe connect the Control Facility to the SFA collection field. The Control Facility has the following primary structures:

- blower and associated piping and valving;
- LFG flare stack;
- condensate trap;
- control panel;
- continuous gas analyzer; and
- continuous flow meter.

The controls and monitor for the plant are fully automated and include the following features:

- thermocouple connected to a datalogger and automated temperature controls;
- warning and alarm notification, or shutdown upon occurrence of fault conditions; and
- monitoring of flare operating temperatures and gas flows.

The operation of the flare is governed by thermocouples and the supply of LFG to the flare. A gas analyzer and flow meter were supplementary features installed for the quantification of emission reductions for the PERLL program. Both instruments are not required for the operation of the LFG System under the ECA. A blower with a capacity in the range of approximately 14.2 cubic metres per minute (500 cubic feet per minute) applies a vacuum on the LFG collection field. The extracted LFG is transferred through the condensate trap to remove moisture and particulate matter. Condensate is collected in a rigid wall tank in the condensate trap and is pumped out as required by the Owner. The LFG is then directed to the flare stack, which combusts the LFG at a temperature of 875°C with a minimum retention time of 0.75 seconds to ensure a high level of hydrocarbon destruction efficiency and to minimize greenhouse gas emissions. Poured-in-place concrete pads have been constructed to house the blower, valves, and associated piping. Electrical controls, monitoring instrumentation, and electrical distribution equipment are housed in a weatherproof electrical cabinet, all of which have been now located in the vicinity of the new operations control area in the NFA.

Construction of the LGUP adjacent to the NFA commenced in October 2012 and was completed in July 2013. The LGUP is owned and operated by Peterborough Utilities Group (PUG). In July 2013 the LGUP started to receive landfill gas collected from the SFA and convert it to electricity. The electricity is then fed to the nearby electrical grid.

The perimeter LFG piping in Cell 2 was connected to the existing LGUP and flare on August 17, 2015.

As a result of an unscheduled inspection by the Technical Safety and Standards Association (TSSA) on May 29, 2013 upgrades to the Landfill Gas Control Facility were required. Major upgrades to the facility included replacement of the flare refractory, valves, and burner management system. The upgrades were completed in 2015 to satisfy TSSA requirements. The flare remains operational as a contingency to burn collection gas when the LGUP is not running.

## Peterborough County/City Waste Management Facility
## Landfill Gas Monitoring

Date: Jan. 20-24, 2022

Measurements from Gas Utilization Plant Equipment:

Pressure at Gas Utilization Plant: N/A "$H_20$

Flow at Gas Utilization Plant: N/A cfm

Temp. at Gas Utilization Plant: N/A degrees C at point of entry

Notes:
- PUG was not onsite.
- Cold weather influenced Gem 2000 readings. Field work was completed during multiple days due to cold weather. Weather tempature ranged from -18 to -25°C during field work.
- Sample port damaged at GW4-10. Snapped off while monitoring well.

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | $CH_4$ | $CO_2$ | $O_2$ | Balance | | | |
| Gas Utilization Plant | - | - | - | - | - | - | Generator is operating, PUG was not onsite. |
| GW04-10 | 49.6 | 30.7 | 2.6 | 17.1 | 0.4 | 4.2 | No indicator on valve to determine positioning - Plastic tube snapped with cold and taped |
| GW05-10 | 55.8 | 34.0 | 0.0 | 10.2 | 0.6 | 4.8 | No indicator on valve to determine positioning |
| GW06-03 | 61.7 | 38.2 | 0.0 | 0.1 | 3.4 | 3.4 | 40% Closed |
| GW07-03 | 62.0 | 37.9 | 0.0 | 0.1 | 4.0 | 4.0 | 95% Closed |
| GW05-00 | 62.4 | 37.3 | 0.0 | 0.3 | 4.1 | 4.1 | 75% Closed |
| GW04-00 | 13.5 | 9.0 | 16.0 | 61.5 | -7.3 | -7.3 | 95% Closed |
| LCMV1 | 0.3 | 0.2 | 20.3 | 79.2 | -7.3 | 0.1 | 85% Closed |
| GW03-00 | 18.1 | 11.5 | 14.3 | 56.1 | -7.2 | -7.1 | 30% Closed |
| LCMV2 | 65.7 | 33.1 | 1.2 | 0.0 | 0.2 | -5.7 | 100% Closed |
| GW02-00 | 19.2 | 12.1 | 14.3 | 54.4 | -7.4 | -7.4 | 100% Open |
| GW01-00 | 65.2 | 34.8 | 0.0 | 0.0 | 3.2 | 3.1 | 20% Closed |
| LCMV3 | 64.4 | 35.5 | 0.0 | 0.1 | 0.2 | 0.2 | 70% Closed |
| GW17-03 | 64.1 | 35.9 | 0.0 | 0.0 | 2.1 | 2.2 | 70% Closed |
| GW16-03 | 55.0 | 31.7 | 4.3 | 9.0 | 1.7 | 1.9 | 80% Closed |
| GW15-03 | 62.0 | 37.0 | 0.0 | 1.0 | 4.3 | 3.5 | 100% Open |
| LCMV5 | 66.5 | 32.7 | 0.0 | 0.8 | 2.5 | 2.4 | 95% Closed. LCMV5 is the smaller wellhead with white house in GW14-03. |
| GW14-03 | 64.1 | 35.4 | 0.5 | 0.0 | 0.2 | 2.4 | 95% Closed. GW14-03 is the larger wellhead with orange hose in GW14-03. |

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | $CH_4$ | $CO_2$ | $O_2$ | Balance | | | |
| GW13-03 | 64.5 | 35.1 | 0.4 | 0.0 | 2.6 | 2.6 | 80% Closed |
| GW12-03 | 67.2 | 32.7 | 0.0 | 0.1 | 2.6 | 2.5 | 50% Closed |
| GW11-03 | 36.3 | 20.5 | 4.5 | 38.7 | 0.5 | -0.2 | 90% closed |
| GW23-10 | 61.8 | 32.6 | 1.2 | 4.4 | 0.2 | 0.2 | No indicator on valve to determine positioning. |
| GW24-10 | 64.2 | 35.7 | 0.0 | 0.1 | 0.5 | 0.5 | No indicator on valve to determine positioning |
| GW22-10 | N/A | N/A | N/A | N/A | N/A | N/A | 100% Closed. Results unavailable due to equipment malfunction in cold weather. |
| GW17-10 | 66.0 | 33.9 | 0.0 | 0.1 | 18.5 | N/A | No indicator on valve to determine positioning. Suspected blockage in lateral between GW17-10 and GW13-10. |
| GW20-10 | 50.9 | 26.9 | 4.3 | 17.9 | -1.4 | -2.4 | No indicator on valve to determine positioning |
| GW18-10 | 31.3 | 16.2 | 12.4 | 40.1 | -3.3 | -3.3 | No indicator on valve to determine positioning |
| GW21-10 | 66.0 | 32.0 | 0.0 | 2.0 | 6.6 | 6.6 | No indicator on valve to determine positioning. |
| GW19-10 | 51.9 | 27.7 | 3.4 | 17.0 | 12.4 | -3.2 | No indicator on valve to determine positioning |
| GW10-03 | 66.6 | 29.9 | 3.3 | 0.2 | -3.1 | -3.1 | 40% Closed |
| GW09-03 | 70.5 | 25.8 | 0.7 | 3.0 | -3.2 | -3.2 | 50% Closed |
| GW08-03 | 54.8 | 23.6 | 4.1 | 17.5 | -3.2 | -3.2 | 70% Closed |
| GW18-07 | N/A | N/A | N/A | 100.0 | N/A | N/A | 100% Open. Sample port frozen. |
| LCMV4 | 66.4 | 33.2 | 0.3 | 0.1 | 0.0 | 0.0 | 85% Closed |
| GW20-07 | 70.4 | 29.5 | 0.0 | 0.1 | 7.0 | 5.9 | 80% Closed |
| GW02-10 | 14.9 | 8.4 | 17.0 | 59.7 | -4.0 | 4.1 | No indicator on valve to determine positioning |
| GW21-07 | 20.8 | 13.0 | 12.2 | 54.0 | -4.0 | -4.0 | 70% Closed |
| GW22-07 | 44.4 | 23.6 | 9.2 | 22.8 | -4.0 | -4.2 | Approximately 80% Closed - Valve indicator sticker missing |
| GW01-10 | 27.8 | 17.0 | 11.7 | 43.5 | -4.1 | -4.1 | No indicator on valve to determine positioning. |
| GW03-10 | N/A | N/A | N/A | N/A | N/A | N/A | No indicator on valve to determine positioning. Results unavailable due to equipment malfunction in cold weather. |
| GW06-10 | N/A | N/A | N/A | N/A | N/A | N/A | No indicator on valve to determine positioning. Results unavailable due to equipment malfunction in cold weather. |

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | $CH_4$ | $CO_2$ | $O_2$ | Balance | | | |
| GW07-10 | N/A | N/A | N/A | N/A | N/A | N/A | No indicator on valve to determine positioning. Results unavailable due to equipment malfunction in cold weather. |
| GW08-10 | N/A | N/A | N/A | N/A | N/A | N/A | No indicator on valve to determine positioning. Results unavailable due to equipment malfunction in cold weather. |
| GW19-07 | 71.7 | 28.3 | 0.0 | 0.0 | 5.0 | 3.5 | 85% Closed |
| GW16-10 | 61.9 | 33.9 | 0.0 | 4.2 | 0.1 | -3.1 | No indicator on valve to determine positioning |
| GW15-10 | N/A | N/A | N/A | N/A | N/A | N/A | No indicator on valve to determine positioning. Results unavailable due to equipment malfunction in cold weather. |
| GW12-10 | N/A | N/A | N/A | N/A | N/A | N/A | No indicator on valve to determine positioning. Results unavailable due to equipment malfunction in cold weather. |
| GW11-10 | 67.1 | 32.9 | 0.0 | 0.0 | 26.4 | -18.1 | No indicator on valve to determine positioning. |
| GW14-10 | N/A | N/A | N/A | N/A | N/A | N/A | No indicator on valve to determine positioning. Results unavailable due to equipment malfunction in cold weather. |
| GW13-10 | 63.7 | 35.1 | 0.0 | 1.2 | 14.9 | -6.9 | No indicator on valve to determine positioning. GW13-10 is connected to GW14-10 lateral above ground as buried lateral from GW13-10 heading North is considered compromised. Lateral between GW13-10 and GW17-10 also suspected to be compromised. |
| GW10-10 | 63.6 | 36.4 | 0.0 | 0.0 | 18.7 | -18.4 | 90% Closed |
| GW09-10 | 32.6 | 19.4 | 9.8 | 38.2 | -5.9 | 4.8 | No indicator on valve to determine positioning |
| NFA Perimeter LFG System | N/A | N/A | N/A | N/A | N/A | N/A | Results unavailable due to equipment malfunction in cold weather. |
| NGW-1 | N/A | N/A | N/A | N/A | N/A | N/A | 70% Closed. Results unavailable due to equipment malfunction in cold weather. |
| NGW-2 | N/A | N/A | N/A | N/A | N/A | N/A | 100% Open. Results unavailable due to equipment malfunction in cold weather. |
| NGW-3 | N/A | N/A | N/A | N/A | N/A | N/A | 75% Closed. Results unavailable due to equipment malfunction in cold weather. |
| NGW-4 | N/A | N/A | N/A | N/A | N/A | N/A | 70% Closed. Results unavailable due to equipment malfunction in cold weather. |
| NGW-5 | N/A | N/A | N/A | N/A | N/A | N/A | 80% Closed. Results unavailable due to equipment malfunction in cold weather. |
| NGW-9 | N/A | N/A | N/A | N/A | N/A | N/A | 75% Closed. Results unavailable due to equipment malfunction in cold weather. |
| NGW-14 | N/A | N/A | N/A | N/A | N/A | N/A | 80% Closed. Results unavailable due to equipment malfunction in cold weather. |
| HC-3 | N/A | N/A | N/A | N/A | N/A | N/A | 95% Closed. Results unavailable due to equipment malfunction in cold weather. |
| HC-1 | N/A | N/A | N/A | N/A | N/A | N/A | 50% Closed. Results unavailable due to equipment malfunction in cold weather. |

Notes:

1. To convert from inches of water to kPa divide by 4.01.

2. Static pressure is the pressure of the monitoring point relative to the atmospheric pressure. (http://www.geotechuk.com/technical-faqs/ga2000-and-gem2000-platform/pressure-definitions.aspx)

3. Differential pressure is the pressure exerted by a gas when the body on which the pressure is exerted is not in motion. (http://www.geotechuk.com/technical-faqs/ga2000-and-gem2000-platform/pressure-definitions.aspx)

**Peterborough County/City Waste Management Facility**
**Landfill Gas Monitoring**

Date: 22-Feb-22

Notes:
- PUG was not onsite.

Measurements from Gas Utilization Plant Equipment:

Pressure at Gas Utilization Plant: N/A "$H_20$

Flow at Gas Utilization Plant: N/A cfm

Temp. at Gas Utilization Plant: N/A degrees C at point of entry

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | $CH_4$ | $CO_2$ | $O_2$ | Balance | | | |
| Gas Utilization Plant | - | - | - | - | - | - | Generator operating |
| GW04-10 | 57.5 | 30.3 | 1.0 | 11.2 | 0.0 | 3.0 | No indicator on valve to determine positioning. |
| GW05-10 | 63.1 | 31.7 | 0.0 | 5.2 | 5.4 | 5.4 | No indicator on valve to determine positioning |
| GW06-03 | 57.8 | 33.6 | 0.0 | 8.6 | 3.2 | 3.2 | 40% Closed |
| GW07-03 | 58.4 | 37.6 | 0.1 | 3.9 | 3.1 | 2.9 | 95% Closed |
| GW05-00 | 59.4 | 36.6 | 0.0 | 4.0 | 1.6 | 1.3 | 95% Closed |
| GW04-00 | 8.5 | 7.4 | 19.1 | 65.0 | 1.3 | 1.3 | 100% Closed |
| LCMV1 | 24.8 | 17.9 | 14.0 | 43.3 | -1.8 | -1.8 | 85% Closed |
| GW03-00 | 61.8 | 37.2 | 0.1 | 0.9 | -2.1 | -2.3 | 30% Closed |
| LCMV2 | 61.0 | 37.1 | 0.8 | 1.1 | 0.3 | -2.6 | 90% Closed |
| GW02-00 | 62.9 | 36.7 | 0.3 | 0.1 | -2.4 | -2.4 | 100% Open |
| GW01-00 | 64.7 | 35.2 | 0.0 | 0.1 | -2.4 | -2.3 | 20% Closed |
| LCMV3 | 61.9 | 38.0 | 0.0 | 0.1 | 0.7 | 0.7 | 80% Closed. |
| GW17-03 | 61.4 | 36.2 | 2.1 | 0.3 | -1.1 | 0.0 | 70% Closed |
| GW16-03 | 62.6 | 36.3 | 0.9 | 0.2 | -1.2 | -1.3 | 80% Closed |
| GW15-03 | 62.5 | 37.2 | 0.1 | 0.2 | 6.8 | 6.3 | 100% Open |
| LCMV5 | 3.2 | 2.6 | 19.6 | 74.6 | -1.2 | -1.2 | 95% Closed. LCMV5 is the smaller wellhead with white house in GW14-03. |
| GW14-03 | 3.2 | 2.6 | 19.6 | 74.6 | -1.2 | -1.2 | 95% Closed. GW14-03 is the larger wellhead with orange hose in GW14-03. |

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | $CH_4$ | $CO_2$ | $O_2$ | Balance | | | |
| GW13-03 | 62.3 | 35.6 | 2.0 | 0.1 | -1.3 | 1.3 | 80% Closed |
| GW12-03 | 65.6 | 33.5 | 0.8 | 0.1 | -1.2 | -1.2 | 50% Closed |
| GW11-03 | 18.3 | 11.8 | 13.9 | 56.0 | -1.1 | -1.2 | 95% Closed |
| GW23-10 | 62.6 | 36.6 | 0.7 | 0.1 | 0.3 | 0.3 | No indicator on valve to determine positioning. |
| GW24-10 | 61.8 | 38.0 | 0.1 | 0.1 | 2.6 | 2.6 | No indicator on valve to determine positioning |
| GW22-10 | 61.5 | 36.7 | 1.6 | 0.2 | 0.6 | 0.9 | 100% Closed |
| GW17-10 | 60.7 | 36.6 | 2.6 | 0.1 | 19.4 | 19.4 | No indicator on valve to determine positioning. Suspected blockage in lateral between GW17-10 and GW13-10. |
| GW20-10 | 62.8 | 35.8 | 1.2 | 0.2 | 0.0 | 0.7 | No indicator on valve to determine positioning |
| GW18-10 | 65.5 | 34.3 | 0.1 | 0.1 | 1.7 | 1.7 | No indicator on valve to determine positioning |
| GW21-10 | 64.6 | 34.8 | 0.5 | 0.1 | -1.4 | -1.4 | No indicator on valve to determine positioning. Sample port damaged. |
| GW19-10 | 62.1 | 35.8 | 0.5 | 1.6 | -0.6 | -1.3 | No indicator on valve to determine positioning |
| GW10-03 | 66.3 | 33.0 | 0.7 | 0.0 | -1.3 | -1.3 | 30 % Closed |
| GW09-03 | 67.9 | 31.7 | 0.2 | 0.2 | -1.2 | -1.2 | 50% Closed |
| GW08-03 | 63.1 | 30.4 | 2.5 | 4.0 | -0.8 | -1.2 | 70% Closed |
| GW18-07 | 63.4 | 36.4 | 0.1 | 0.1 | -10.3 | -10.4 | 100% Open |
| LCMV4 | 62.2 | 36.9 | 0.8 | 0.1 | 0.1 | 0.1 | 95% Closed |
| GW20-07 | 70.4 | 28.0 | 0.6 | 1.0 | 0.0 | 0.0 | 80% Closed |
| GW02-10 | 63.8 | 34.5 | 1.6 | 0.1 | -3.3 | -3.4 | No indicator on valve to determine positioning |
| GW21-07 | 70.3 | 29.6 | 0.0 | 0.1 | -3.4 | -3.4 | 80% Closed |
| GW22-07 | 64.7 | 35.2 | 0.0 | 0.1 | -3.4 | -3.2 | No indicator on valve to determine positioning |
| GW01-10 | 62.9 | 36.9 | 0.1 | 0.1 | -3.3 | -3.5 | No indicator on valve to determine positioning |
| GW03-10 | 64.9 | 35.1 | 0.0 | 0.0 | 0.0 | 0.0 | No indicator on valve to determine positioning |
| GW06-10 | 64.5 | 35.4 | 0.0 | 0.1 | -3.5 | -3.3 | No indicator on valve to determine positioning |

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | $CH_4$ | $CO_2$ | $O_2$ | Balance | | | |
| GW07-10 | 65.9 | 34.0 | 0.0 | 0.1 | -3.4 | 3.3 | No indicator on valve to determine positioning |
| GW08-10 | 66.3 | 33.0 | 0.5 | 0.2 | -3.1 | -3.3 | No indicator on valve to determine positioning |
| GW19-07 | 63.3 | 35.9 | 0.6 | 0.2 | 9.1 | 8.5 | 80% Closed |
| GW16-10 | 63.2 | 36.0 | 0.0 | 0.8 | 0.5 | -0.4 | No indicator on valve to determine positioning |
| GW15-10 | 66.8 | 33.2 | 0.0 | 0.0 | 9.2 | 0.2 | No indicator on valve to determine positioning |
| GW12-10 | 65.1 | 33.8 | 1.0 | 0.1 | -3.4 | -3.2 | No indicator on valve to determine positioning |
| GW11-10 | 64.7 | 34.7 | 0.5 | 0.1 | -26.2 | -3.2 | No indicator on valve to determine positioning |
| GW14-10 | 64.6 | 35.3 | 0.0 | 0.1 | -3.2 | -3.2 | No indicator on valve to determine positioning |
| GW13-10 | 62.0 | 37.3 | 0.6 | 0.1 | 15.1 | 15.1 | No indicator on valve to determine positioning. GW13-10 is connected to GW14-10 lateral above ground as buried lateral from GW13-10 heading North is considered compromised. Lateral between GW13-10 and GW17-10 also suspected to be compromised. Sample port damaged on GW13-10. |
| GW10-10 | 62.0 | 37.8 | 0.0 | 0.2 | -3.3 | 4.2 | No indicator on valve to determine positioning |
| GW09-10 | 61.9 | 38.0 | 0.0 | 0.1 | -3.4 | -3.3 | No indicator on valve to determine positioning |
| NFA Perimeter LFG System | - | - | - | - | - | - | |
| NGW-1 | 61.4 | 38.4 | 0.1 | 0.1 | -4.2 | -4.2 | 85% Closed |
| NGW-2 | 61.6 | 38.3 | 0.0 | 0.1 | -4.3 | -4.3 | 100% Open |
| NGW-3 | 62.1 | 37.8 | 0.0 | 0.1 | -4.4 | -4.4 | 60% Closed |
| NGW-4 | 61.7 | 34.2 | 0.0 | 4.1 | -4.2 | -4.2 | 70% Closed |
| NGW-5 | 60.7 | 38.7 | 0.5 | 0.1 | -4.4 | -4.4 | 85% Closed. |
| NGW-9 | 61.5 | 38.4 | 0.0 | 0.1 | -4.3 | -4.3 | 70% Closed |
| NGW-14 | 61.6 | 38.3 | 0.0 | 0.1 | -4.3 | -4.0 | 90% Closed |
| HC-3 | 0.7 | 3.6 | 20.5 | 75.2 | -4.4 | -4.4 | 100% Closed |
| HC-1 | 60.2 | 39.4 | 0.3 | 0.1 | 4.7 | -4.2 | 50% Closed. |

Notes:
1. To convert from inches of water to kPa divide by 4.01.
2. Static pressure is the pressure of the monitoring point relative to the atmospheric pressure. (http://www.geotechuk.com/technical-faqs/ga2000-and-gem2000-platform/pressure-definitions.aspx)
3. Differential pressure is the pressure exerted by a gas when the body on which the pressure is exerted is not in motion. (http://www.geotechuk.com/technical-faqs/ga2000-and-gem2000-platform/pressure-definitions.aspx)

**Peterborough County/City Waste Management Facility**
**Landfill Gas Monitoring**

Date: 30-Mar-22

Measurements from Gas Utilization Plant Equipment:

Pressure at Gas Utilization Plant: N/A "$H_20$

Flow at Gas Utilization Plant: N/A cfm

Temp. at Gas Utilization Plant: N/A degrees C at point of entry

Notes:
- PUG was not onsite.
- Minimal odours observed in SFA and NFA during monitoring event.
- Water flowing through LCMV2 was audible during monitoring event.
- Broken sample port at GW11-10 in the SFA.
- Compost facility earth works is ongoing onsite.

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | $CH_4$ | $CO_2$ | $O_2$ | Balance | | | |
| Gas Utilization Plant | - | - | - | - | - | - | |
| GW04-10 | 40.8 | 52.6 | 5.6 | 1.0 | -3.2 | -0.1 | No indicator on valve to determine positioning. |
| GW05-10 | 41.5 | 54.9 | 3.4 | 0.2 | -2.4 | -2.8 | No indicator on valve to determine positioning |
| GW06-03 | 29.1 | 64.1 | 6.2 | 0.6 | -4.5 | -4.0 | 40% Closed |
| GW07-03 | 34.3 | 22.5 | 9.5 | 33.7 | -2.2 | -4.5 | 95% Closed |
| GW05-00 | 0.0 | 0.1 | 21.7 | 78.2 | -5.1 | -4.9 | 95% Closed |
| GW04-00 | 0.1 | 0.1 | 21.9 | 77.9 | -5.0 | -5.2 | 95% Closed |
| LCMV1 | 3.6 | 2.5 | 20.6 | 73.3 | -5.0 | -5.0 | 85% Closed |
| GW03-00 | 0.0 | 0.1 | 21.8 | 78.1 | -5.1 | -5.1 | 30% Closed |
| LCMV2 | 59.2 | 34.6 | 6.1 | 0.1 | -0.1 | 0.0 | 95% Closed |
| GW02-00 | 44.7 | 25.6 | 7.1 | 22.6 | -5.0 | -5.0 | 100% Open |
| GW01-00 | 63.4 | 36.5 | 0.0 | 0.1 | 22.4 | 21.3 | 20% Closed |
| LCMV3 | 60.4 | 39.6 | 0.0 | 0.0 | -0.1 | -0.1 | 80% Closed. |
| GW17-03 | 63.4 | 33.7 | 2.7 | 0.2 | 40.4 | 0.4 | 70% Closed |
| GW16-03 | 32.4 | 18.6 | 10.7 | 38.3 | -2.2 | -2.3 | 80% Closed |
| GW15-03 | 59.5 | 40.9 | 0.0 | -0.4 | 7.2 | 0.0 | 100% Open |
| LCMV5 | 3.1 | 1.9 | 20.1 | 74.9 | -2.3 | -2.5 | 100% Closed. LCMV5 is the smaller wellhead with white house in GW14-03. |
| GW14-03 | 64.2 | 35.7 | 0.0 | 0.1 | 0.1 | -2.4 | 95% Closed. GW14-03 is the larger wellhead with orange hose in GW14-03. |

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | $CH_4$ | $CO_2$ | $O_2$ | Balance | | | |
| GW13-03 | 42.3 | 23.4 | 7.6 | 26.7 | -2.3 | -2.9 | 80% Closed |
| GW12-03 | 44.8 | 21.4 | 7.5 | 26.3 | -2.2 | -2.2 | 50% Closed |
| GW11-03 | 10.4 | 6.0 | 17.2 | 66.4 | -2.4 | -2.5 | 90% Closed |
| GW23-10 | 62.2 | 36.7 | 0.9 | 0.2 | -0.1 | -1.3 | No indicator on valve to determine positioning. |
| GW24-10 | 62.9 | 37.1 | 0.0 | 0.0 | 1.0 | 0.0 | No indicator on valve to determine positioning |
| GW22-10 | 19.1 | 10.7 | 14.8 | 55.4 | 1.7 | 1.0 | 95% Closed |
| GW17-10 | 63.0 | 36.9 | 0.0 | 0.1 | 17.7 | 17.7 | No indicator on valve to determine positioning. Suspected blockage in lateral between GW17-10 and GW13-10. |
| GW20-10 | 53.9 | 29.8 | 3.1 | 13.2 | -1.9 | -1.9 | No indicator on valve to determine positioning |
| GW18-10 | 1.4 | 0.9 | 20.6 | 77.1 | -2.4 | -2.6 | No indicator on valve to determine positioning |
| GW21-10 | 77.2 | 34.2 | 66.6 | -78.0 | 0.7 | 0.8 | No indicator on valve to determine positioning |
| GW19-10 | 33.5 | 19.4 | 1.7 | 45.4 | -1.7 | -2.0 | No indicator on valve to determine positioning. Sample port damaged. Result not obtained, possible malfunction of GEM. |
| GW10-03 | 29.7 | 13.9 | 12.1 | 44.3 | -2.0 | -2.7 | 30% Closed |
| GW09-03 | 56.7 | 21.9 | 7.7 | 13.7 | 2.3 | 2.3 | 45% Closed |
| GW08-03 | 35.1 | 15.9 | 9.4 | 39.6 | -1.9 | -2.0 | 75% Closed |
| GW18-07 | 75.5 | 36.5 | 66.6 | -78.6 | 0.3 | 0.2 | 100% Open |
| LCMV4 | 75.7 | 35.2 | 66.6 | -77.5 | 0.2 | 0.2 | 85% Closed |
| GW20-07 | 64.4 | 23.9 | 3.4 | 8.3 | 2.5 | 21.8 | 80% Closed |
| GW02-10 | 64.7 | 34.6 | 0.5 | 0.2 | -4.5 | -4.6 | No indicator on valve to determine positioning |
| GW21-07 | 16.6 | 6.0 | 16.4 | 61.0 | -4.6 | -4.6 | 80% Closed |
| GW22-07 | 33.8 | 18.7 | 11.2 | 36.3 | -4.3 | -4.5 | Approximately 80% Closed - Valve indicator sticker missing |
| GW01-10 | 49.5 | 27.9 | 5.9 | 16.7 | -4.6 | -4.6 | No indicator on valve to determine positioning |
| GW03-10 | 34.9 | 19.3 | 10.6 | 35.2 | -4.6 | -4.6 | No indicator on valve to determine positioning |
| GW06-10 | 36.1 | 19.9 | 9.5 | 34.5 | -4.5 | -4.5 | No indicator on valve to determine positioning |

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | $CH_4$ | $CO_2$ | $O_2$ | Balance | | | |
| GW07-10 | 49.0 | 26.6 | 8.5 | 15.9 | -2.0 | -2.0 | No indicator on valve to determine positioning |
| GW08-10 | 0.1 | 0.1 | 21.1 | 78.7 | -0.3 | -4.5 | No indicator on valve to determine positioning |
| GW19-07 | 67.1 | 32.4 | 0.3 | 0.2 | -0.3 | 0.4 | 80% Closed |
| GW16-10 | 63.0 | 36.9 | 0.0 | 0.1 | 0.3 | 1.9 | No indicator on valve to determine positioning |
| GW15-10 | 55.5 | 25.1 | 4.7 | 14.7 | -1.5 | -1.4 | No indicator on valve to determine positioning |
| GW12-10 | 0.0 | 0.2 | 21.1 | 78.7 | 0.0 | -4.1 | No indicator on valve to determine positioning |
| GW11-10 | 62.5 | 37.4 | 0.0 | 0.1 | 25.1 | -4.3 | No indicator on valve to determine positioning. Sample port damaged/leaking on gas well. |
| GW14-10 | 14.3 | 7.8 | 16.8 | 61.1 | 0.2 | -3.6 | No indicator on valve to determine positioning |
| GW13-10 | 73.8 | 38.8 | 66.6 | -79.2 | 14.8 | 14.8 | No indicator on valve to determine positioning. GW13-10 is connected to GW14-10 lateral above ground as buried lateral from GW13-10 heading North is considered compromised. Lateral between GW13-10 and GW17-10 also suspected to be compromised. Sample port damaged on GW13-10. Same malfunction on gas meter. |
| GW10-10 | 13.5 | 9.3 | 16.8 | 60.4 | -3.3 | -3.3 | 75% Closed |
| GW09-10 | 0.1 | 0.2 | 20.7 | 79.0 | -3.6 | -3.6 | No indicator on valve to determine positioning |
| NFA Perimeter LFG System | 0.3 | 0.5 | 19.8 | 79.4 | -5 | -5 | N/A |
| NGW-1 | 0.1 | 0.2 | 21.0 | 78.7 | -4.6 | -4.6 | 90% closed |
| NGW-2 | 0.0 | 0.1 | 21.0 | 78.9 | -4.2 | -4.4 | 100% Open |
| NGW-3 | 0.0 | 0.1 | 21.0 | 78.9 | -4.4 | -4.4 | 60% closed |
| NGW-4 | 7.6 | 4.2 | 20.3 | 67.9 | -4.4 | -4.4 | 70% closed |
| NGW-5 | 0.0 | 0.1 | 21 | 78.9 | -4.3 | -4.3 | 75% Closed. |
| NGW-9 | 0.1 | 0.1 | 20.2 | 79.6 | -4.3 | -4.3 | 75% Closed |
| NGW-14 | 6.9 | 3.9 | 18.0 | 71.2 | -4.3 | -4.3 | 75% Closed |
| HC-3 | 0.2 | 1.9 | 20.6 | 77.3 | -1.2 | -1.2 | 95% Closed |
| HC-1 | 1.1 | 1.3 | 20.4 | 77.2 | -3.2 | -5.0 | 60% Closed. |

Notes:
1. To convert from inches of water to kPa divide by 4.01.
2. Static pressure is the pressure of the monitoring point relative to the atmospheric pressure. (http://www.geotechuk.com/technical-faqs/ga2000-and-gem2000-platform/pressure-definitions.aspx)
3. Differential pressure is the pressure exerted by a gas when the body on which the pressure is exerted is not in motion. (http://www.geotechuk.com/technical-faqs/ga2000-and-gem2000-platform/pressure-definitions.aspx)

**Peterborough County/City Waste Management Facility**
**Landfill Gas Monitoring**

Date: 22-Apr-22

Notes:
- PUG was onsite and results were obtained from the Gas Utilization Plant
- Minimal odours observed onsite in the NFA and SFA.

Measurements from Gas Utilization Plant Equipment:

Pressure at Gas Utilization Plant: -2.2 "$H_2O$

Flow at Gas Utilization Plant: 185 cfm

Temp. at Gas Utilization Plant: 7 degrees C at point of entry

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | $CH_4$ | $CO_2$ | $O_2$ | Balance | | | |
| Gas Utilization Plant | 55.4 | 35.1 | 1.4 | 8.1 | - | - | |
| GW04-10 | 63.4 | 35.8 | 0.6 | 0.2 | -0.2 | -1.9 | No indicator on valve to determine positioning. |
| GW05-10 | 64.5 | 34.5 | 0.6 | 0.4 | 0.2 | 0.2 | No indicator on valve to determine positioning |
| GW06-03 | 59.4 | 39.1 | 0.3 | 1.2 | -2.0 | -2.0 | 40% Closed |
| GW07-03 | 59.1 | 39.4 | 0.3 | 1.2 | -2.0 | -2.0 | 95% Closed |
| GW05-00 | 45.1 | 31.5 | 4.6 | 18.8 | -2.1 | -2.1 | 95% Closed |
| GW04-00 | 20.1 | 12.8 | 13.9 | 53.2 | -1.3 | -2.0 | 95% Closed |
| LCMV1 | 12.3 | 8.9 | 16.9 | 61.9 | -0.3 | -1.6 | 90% Closed |
| GW03-00 | 61.6 | 37.7 | 0.4 | 0.3 | -2.0 | -2.0 | 30% Closed |
| LCMV2 | 48.6 | 31.7 | 3.5 | 16.2 | 0.0 | -1.9 | 95% Closed |
| GW02-00 | 62.8 | 36.6 | 0.3 | 0.3 | -2.0 | -2.0 | 100% Open |
| GW01-00 | 64.4 | 35.3 | 0.1 | 0.2 | -1.9 | -1.9 | 20% Closed |
| LCMV3 | 56.2 | 36.7 | 1.4 | 5.7 | -0.8 | -1.7 | 70% Closed. |
| GW17-03 | 63.1 | 36.5 | 0.2 | 0.2 | -1.3 | -1.5 | 70% Closed |
| GW16-03 | 64.3 | 35.1 | 0.3 | 0.3 | -1.9 | -2.0 | 80% Closed |
| GW15-03 | 62.1 | 37.1 | 0.2 | 0.6 | 6.4 | 6.4 | 100% Open |
| LCMV5 | 13.4 | 8.6 | 15.5 | 62.5 | -1.5 | -2.0 | 95% Closed. LCMV5 is the smaller wellhead with white house in GW14-03. |
| GW14-03 | 52.0 | 32.2 | 0.1 | 15.7 | -0.1 | -2.0 | 95% Closed. GW14-03 is the larger wellhead with orange hose in GW14-03. |

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | $CH_4$ | $CO_2$ | $O_2$ | Balance | | | |
| GW13-03 | 60.6 | 34.1 | 0.5 | 4.8 | -1.8 | -2.0 | 80% Closed |
| GW12-03 | 67.2 | 31.9 | 0.2 | 0.7 | -2.0 | -2.0 | 50% Closed |
| GW11-03 | 31.4 | 21.9 | 3.3 | 43.4 | -1.8 | -2.0 | 90% Closed |
| GW23-10 | 51.2 | 34.0 | 0.1 | 14.7 | -0.2 | -1.1 | No indicator on valve to determine positioning. |
| GW24-10 | 63.3 | 35.8 | 0.1 | 0.8 | 0.7 | 0.9 | No indicator on valve to determine positioning |
| GW22-10 | 42.6 | 26.0 | 6.4 | 25.0 | -0.8 | -1.9 | 95% Closed |
| GW17-10 | 64.2 | 35.4 | 0.2 | 0.2 | 5.3 | 5.3 | No indicator on valve to determine positioning. Suspected blockage in lateral between GW17-10 and GW13-10. |
| GW20-10 | 53.5 | 33.7 | 0.2 | 12.6 | -0.4 | -1.3 | No indicator on valve to determine positioning |
| GW18-10 | 66.7 | 32.7 | 0.1 | 0.5 | -1.9 | -2.0 | No indicator on valve to determine positioning |
| GW21-10 | 49.0 | 27.1 | 3.7 | 20.2 | 0.3 | 0.3 | No indicator on valve to determine positioning |
| GW19-10 | 51.2 | 32.4 | 0.2 | 16.2 | -1.5 | -2.0 | No indicator on valve to determine positioning. |
| GW10-03 | 68.9 | 30.6 | 0.4 | 0.1 | -2.0 | -2.0 | 30% Closed |
| GW09-03 | 69.8 | 28.2 | 0.8 | 1.2 | -1.8 | -1.8 | 45% Closed |
| GW08-03 | 69.1 | 30.6 | 0.1 | 0.2 | -1.8 | -2.0 | 70% Closed |
| GW18-07 | 19.3 | 11.6 | 13.0 | 56.1 | -0.7 | -1.9 | 100% Open |
| LCMV4 | 65.0 | 34.5 | 0.3 | 0.2 | -1.9 | -1.9 | 85% Closed |
| GW20-07 | 71.2 | 28.3 | 0.3 | 0.2 | 0.8 | 0.6 | 80% Closed |
| GW02-10 | 65.7 | 34.0 | 0.1 | 0.2 | -1.9 | -2.0 | No indicator on valve to determine positioning |
| GW21-07 | 69.9 | 29.5 | 0.2 | 0.4 | -1.9 | -1.9 | 80% Closed |
| GW22-07 | 65.1 | 34.3 | 0.3 | 0.3 | -1.8 | -1.8 | Approximately 80% Closed - Valve indicator sticker missing |
| GW01-10 | 63.1 | 36.7 | 0.1 | 0.1 | -1.9 | -1.9 | No indicator on valve to determine positioning |
| GW03-10 | 65.5 | 34.2 | 0.1 | 0.2 | -1.9 | -1.9 | No indicator on valve to determine positioning |
| GW06-10 | 64.2 | 35.6 | 0.1 | 0.1 | -1.9 | -1.9 | No indicator on valve to determine positioning |

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | $CH_4$ | $CO_2$ | $O_2$ | Balance | | | |
| GW07-10 | 66.6 | 33.1 | 0.1 | 0.2 | -1.8 | -1.9 | No indicator on valve to determine positioning |
| GW08-10 | 66.9 | 32.8 | 0.1 | 0.2 | -1.8 | -1.9 | No indicator on valve to determine positioning |
| GW19-07 | 68.5 | 31.2 | 0.1 | 0.2 | -1.7 | -1.8 | 80% Closed |
| GW16-10 | 52.0 | 34.6 | 0.1 | 13.3 | 0.1 | -1.7 | No indicator on valve to determine positioning |
| GW15-10 | 68.0 | 31.8 | 0.1 | 0.1 | -1.6 | -1.6 | No indicator on valve to determine positioning |
| GW12-10 | 66.6 | 33.3 | 0.1 | 0.0 | -1.9 | -1.9 | No indicator on valve to determine positioning |
| GW11-10 | 65.6 | 34.3 | 0.0 | 0.1 | 6.9 | -1.9 | No indicator on valve to determine positioning. Sample port damaged/leaking on gas well. |
| GW14-10 | 65.8 | 34.0 | 0.1 | 0.1 | -1.8 | -1.8 | No indicator on valve to determine positioning |
| GW13-10 | 62.6 | 37.1 | 0.0 | 0.3 | -1.9 | -1.9 | No indicator on valve to determine positioning. GW13-10 is connected to GW14-10 lateral above ground as buried lateral from GW13-10 heading North is considered compromised. Lateral between GW13-10 and GW17-10 also suspected to be compromised. |
| GW10-10 | 61.2 | 38.4 | 0.0 | 0.4 | -1.8 | -1.9 | 80% Closed |
| GW09-10 | 62.2 | 37.6 | 0.2 | 0.0 | -1.8 | -1.8 | No indicator on valve to determine positioning |
| NFA Perimeter LFG System | - | - | - | - | - | - | No flow observed to present results |
| NGW-1 | 62.1 | 37.4 | 0.3 | 0.2 | -2.7 | -2.8 | 40% closed |
| NGW-2 | 61.8 | 37.7 | 0.3 | 0.2 | -2.8 | -2.8 | 100% Open |
| NGW-3 | 63.1 | 36.5 | 0.2 | 0.2 | -2.9 | -2.9 | 20% closed |
| NGW-4 | 61.9 | 37.8 | 0.2 | 0.1 | -2.8 | -2.8 | 40% closed |
| NGW-5 | 61.9 | 37.8 | 0.2 | 0.1 | -2.7 | -2.8 | 50% Closed. |
| NGW-9 | 61.7 | 38.0 | 0.2 | 0.1 | -2.9 | -2.9 | 50% Closed. |
| NGW-14 | 61.7 | 37.6 | 0.4 | 0.3 | -2.8 | -2.8 | 60% Closed |
| HC-3 | 4.2 | 39.2 | 0.2 | 56.4 | 0.1 | -2.8 | 100% Closed |
| HC-1 | 60.5 | 39.2 | 0.2 | 0.1 | -0.7 | -2.9 | 30% Closed. |

Notes:
1. To convert from inches of water to kPa divide by 4.01.
2. Static pressure is the pressure of the monitoring point relative to the atmospheric pressure. (http://www.geotechuk.com/technical-faqs/ga2000-and-gem2000-platform/pressure-definitions.aspx)
3. Differential pressure is the pressure exerted by a gas when the body on which the pressure is exerted is not in motion. (http://www.geotechuk.com/technical-faqs/ga2000-and-gem2000-platform/pressure-definitions.aspx)

## Peterborough County/City Waste Management Facility
## Landfill Gas Monitoring

Date: 30-May-22

Measurements from Gas Utilization Plant Equipment:

Pressure at Gas Utilization Plant: N/A "$H_2$0

Flow at Gas Utilization Plant: N/A cfm

Temp. at Gas Utilization Plant: N/A degrees C at point of entry

Notes:
- Generator and Flare both down upon arrival to site. Around 9:30am the flare was operating for a few hours.
- Odours observed in the NFA during monitoring event.
- Cell 4 construction and SSO facility material placement is on-going onsite.
- Tomlinson was observed to be placing cover placement along the north and south slopes of Cell 2.

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | $CH_4$ | $CO_2$ | $O_2$ | Balance | | | |
| Gas Utilization Plant | - | - | - | - | - | - | Generator is down for maintenance. |
| GW04-10 | 34.2 | 21.2 | 7.8 | 36.8 | 1.4 | 1.4 | No indicator on valve to determine positioning. |
| GW05-10 | 66.8 | 33.1 | 0.0 | 0.1 | 4.3 | 4.3 | No indicator on valve to determine positioning |
| GW06-03 | 60.2 | 36.6 | 0.0 | 3.2 | 1.9 | 2.0 | 40% Closed |
| GW07-03 | 60.4 | 37.3 | 0.0 | 2.3 | 1.8 | 1.8 | 95% Closed |
| GW05-00 | 61.5 | 37.4 | 0.0 | 1.1 | 2.0 | 2.0 | 95% Closed |
| GW04-00 | 48.1 | 26.2 | 4.0 | 21.7 | 2.0 | 2.0 | 95% Closed |
| LCMV1 | 55.2 | 33.4 | 1.7 | 9.7 | 1.9 | 2.0 | 90% Closed |
| GW03-00 | 63.2 | 36.2 | 0.0 | 0.6 | 2.0 | 2.0 | 30% Closed |
| LCMV2 | 63.0 | 36.6 | 0.0 | 0.4 | 2.0 | 2.0 | 90% Closed |
| GW02-00 | 64.6 | 35.0 | 0.0 | 0.4 | 2.0 | 2.0 | 100% Open |
| GW01-00 | 66.1 | 33.2 | 0.0 | 0.7 | 2.0 | 2.0 | 20% closed |
| LCMV3 | 62.6 | 36.9 | 0.0 | 0.5 | 0.7 | 0.7 | 70% Closed. |
| GW17-03 | 64.2 | 35.2 | 0.0 | 0.6 | 2.4 | 2.4 | 70% Closed |
| GW16-03 | 63.8 | 34.8 | 0.0 | 1.4 | 1.8 | 1.8 | 80% Closed |
| GW15-03 | 63.3 | 35.2 | 0.0 | 1.5 | 7.7 | 7.7 | 100% Open |
| LCMV5 | 36.3 | 13.3 | 12.0 | 38.4 | -1.0 | -1.0 | 95% Closed. LCMV5 is the smaller wellhead with white house in GW14-03. |
| GW14-03 | 67.0 | 31.4 | 0.0 | 1.6 | 0.0 | -1.0 | 90% Closed. GW14-03 is the larger wellhead with orange hose in GW14-03. |

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | $CH_4$ | $CO_2$ | $O_2$ | Balance | | | |
| GW13-03 | 54.8 | 28.1 | 3.2 | 13.9 | -1.2 | -1.2 | 80% Closed |
| GW12-03 | 55.1 | 24.7 | 3.6 | 16.6 | -1.2 | -1.2 | 50% Closed |
| GW11-03 | 41.2 | 22.3 | 4.7 | 31.8 | -1.3 | -1.3 | 95% Closed |
| GW23-10 | 64.3 | 33.2 | 0.4 | 2.1 | 0.0 | 0.0 | No indicator on valve to determine positioning. |
| GW24-10 | 63.2 | 34.9 | 0.0 | 1.9 | 2.4 | 2.3 | No indicator on valve to determine positioning |
| GW22-10 | 44.4 | 25.3 | 5.1 | 25.2 | -0.4 | -1.5 | 95% Closed |
| GW17-10 | 66.0 | 33.8 | 0.1 | 0.1 | 5.0 | 5.0 | No indicator on valve to determine positioning. Suspected blockage in lateral between GW17-10 and GW13-10 |
| GW20-10 | 60.3 | 30.5 | 1.7 | 7.5 | -0.6 | -1.3 | No indicator on valve to determine positioning |
| GW18-10 | 47.8 | 22.8 | 5.3 | 24.1 | -1.7 | -1.8 | No indicator on valve to determine positioning |
| GW21-10 | 69.0 | 30.7 | 0.1 | 0.2 | 1.1 | 1.0 | No indicator on valve to determine positioning |
| GW19-10 | 53.7 | 28.4 | 3.1 | 14.8 | -1.0 | -1.6 | No indicator on valve to determine positioning |
| GW10-03 | 49.2 | 22.0 | 5.2 | 23.6 | -1.5 | -1.5 | 30% Closed |
| GW09-03 | 55.8 | 20.7 | 4.4 | 19.1 | -1.6 | -1.6 | 45% Closed |
| GW08-03 | 54.9 | 23.7 | 3.9 | 17.5 | -1.5 | -1.5 | 75% Closed |
| GW18-07 | 66.3 | 32.1 | 0.0 | 1.6 | 0.0 | 0.5 | 100% open |
| LCMV4 | 67.1 | 32.7 | 0.1 | 0.1 | 0.0 | 0.5 | 90% closed |
| GW20-07 | 72.1 | 27.7 | 0.1 | 0.1 | 2.3 | 1.2 | 80% closed |
| GW02-10 | 38.3 | 21.0 | 7.9 | 32.8 | -2.2 | -2.1 | No indicator on valve to determine positioning |
| GW21-07 | 47.4 | 19.8 | 6.1 | 26.7 | -2.1 | -2.1 | 80% Closed |
| GW22-07 | 44.2 | 23.7 | 6.3 | 25.8 | -2.2 | -2.2 | Approximately 80% Closed - Valve indicator sticker missing |
| GW01-10 | 41.2 | 24.7 | 6.4 | 27.7 | -2.2 | -2.2 | No indicator on valve to determine positioning |
| GW03-10 | 37.5 | 20.2 | 8.2 | 34.1 | -2.1 | -2.2 | No indicator on valve to determine positioning |
| GW06-10 | 43.8 | 24.0 | 6.3 | 25.9 | -2.0 | -2.1 | No indicator on valve to determine positioning |

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | |
|---|---|---|---|---|---|---|---|
| | $CH_4$ | $CO_2$ | $O_2$ | Balance | | | |
| GW07-10 | 39.3 | 19.2 | 8.2 | 33.3 | -2.0 | -2.0 | No indicator on valve to determine positioning |
| GW08-10 | 38.2 | 18.8 | 8.6 | 34.4 | -2.0 | -2.1 | No indicator on valve to determine positioning |
| GW19-07 | 72.4 | 27.0 | 0.2 | 0.4 | 0.1 | -0.5 | 85% Closed |
| GW16-10 | 66.1 | 31.6 | 0.1 | 2.2 | 0.0 | 0.0 | No indicator on valve to determine positioning |
| GW15-10 | 41.5 | 18.7 | 7.5 | 32.3 | -1.6 | -1.6 | No indicator on valve to determine positioning |
| GW12-10 | 43.5 | 21.2 | 6.6 | 28.7 | -2.0 | -2.1 | No indicator on valve to determine positioning |
| GW11-10 | 65.6 | 32.8 | 0.2 | 1.4 | 22.7 | -2.0 | No indicator on valve to determine positioning |
| GW14-10 | 42.7 | 22.2 | 6.6 | 28.5 | -2.1 | -2.1 | No indicator on valve to determine positioning |
| GW13-10 | 36.5 | 22.6 | 6.1 | 34.8 | -2.0 | -2.1 | No indicator on valve to determine positioning. GW13-10 is connected to GW14-10 lateral above ground as buried lateral from GW13-10 heading North is considered compromised. Lateral between GW13-10 and GW17-10 also suspected to be compromised. |
| GW10-10 | 54.3 | 33.7 | 2.1 | 9.9 | -1.9 | -2.2 | 90% Closed |
| GW09-10 | 53.9 | 31.0 | 2.8 | 12.3 | -2.2 | -2.2 | No indicator on valve to determine positioning |
| NFA Perimeter LFG System | 2.6 | 1.5 | 20.1 | 75.8 | - | - | |
| NGW-1 | 64.0 | 36.0 | 0.0 | 0.0 | 2.1 | 2.2 | 40% Closed |
| NGW-2 | 63.3 | 36.5 | 0.0 | 0.2 | 2.1 | 2.1 | 100% Open |
| NGW-3 | 63.9 | 35.8 | 0.2 | 0.1 | 2.1 | 2.1 | 20% closed |
| NGW-4 | 63.3 | 36.1 | 0.0 | 0.6 | 2.0 | 2.0 | 40% closed |
| NGW-5 | 63.1 | 36.7 | 0 | 0.2 | 2.2 | 2.2 | 50% Closed |
| NGW-9 | 62.0 | 35.8 | 0.0 | 2.2 | 2.0 | 2.1 | 50% Closed |
| NGW-14 | 62.6 | 36.0 | 0.0 | 1.4 | 2.1 | 2.2 | 60% Closed |
| HC-3 | 4.7 | 25.4 | 10.4 | 59.5 | 1.8 | 1.8 | 100% Closed |
| HC-1 | 62.2 | 37.4 | 0.0 | 0.4 | 2.7 | 2.7 | 30% Closed |

Notes:
1. To convert from inches of water to kPa divide by 4.01.
2. Static pressure is the pressure of the monitoring point relative to the atmospheric pressure. (http://www.geotechuk.com/technical-faqs/ga2000-and-gem2000-platform/pressure-definitions.aspx)
3. Differential pressure is the pressure exerted by a gas when the body on which the pressure is exerted is not in motion. (http://www.geotechuk.com/technical-faqs/ga2000-and-gem2000-platform/pressure-definitions.aspx)

**Peterborough County/City Waste Management Facility**
**Landfill Gas Monitoring**

Date: 28-Jun-22

Measurements from Gas Utilization Plant Equipment:

Pressure at Gas Utilization Plant: - "$H_20$

Flow at Gas Utilization Plant: - cfm

Temp. at Gas Utilization Plant: - degrees C at point of entry

Notes:
- PUG was not onsite to obtained readings from the Gas Utilization Plant
- Generator was operating
- Cell 4 construction underway and crew onsite.
- Leachate seep was observed by NGW-14. Don Briand was informed and Tomlinson was contacted to complete the repair.
- Minimal odours observed onsite in the NFA and SFA.

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | $CH_4$ | $CO_2$ | $O_2$ | Balance | | | |
| Gas Utilization Plant | - | - | - | - | - | - | - PUG was not onsite to gather readings. |
| GW04-10 | 22.1 | 16.2 | 10.8 | 50.9 | 0.0 | -2.7 | No indicator on valve to determine positioning. |
| GW05-10 | 64.0 | 33.2 | 0.2 | 2.6 | -0.5 | -0.6 | No indicator on valve to determine positioning |
| GW06-03 | 53.5 | 35.3 | 1.4 | 9.8 | -3.0 | -3.0 | 40% Closed |
| GW07-03 | 57.6 | 37.7 | 0.2 | 4.5 | -2.9 | -2.9 | 95% Closed |
| GW05-00 | 49.7 | 33.6 | 2.3 | 14.4 | -2.9 | -2.9 | 95% Closed |
| GW04-00 | 26.3 | 18.0 | 10.5 | 45.2 | -2.9 | -2.9 | 95% Closed |
| LCMV1 | 7.6 | 6.3 | 17.0 | 69.1 | -2.9 | -2.9 | 90% Closed |
| GW03-00 | 59.3 | 34.9 | 0.6 | 5.2 | -2.8 | -2.8 | 30% Closed |
| LCMV2 | 29.2 | 22.6 | 7.1 | 41.1 | -0.6 | -2.9 | 80% Closed |
| GW02-00 | 61.4 | 34.5 | 0.2 | 3.9 | -2.8 | -2.8 | 100% Open |
| GW01-00 | 62.6 | 32.5 | 0.1 | 4.8 | -2.7 | -2.7 | 20% Closed |
| LCMV3 | 49.0 | 32.3 | 2.1 | 16.6 | -1.8 | -2.9 | 70% Closed. |
| GW17-03 | 52.0 | 30.6 | 2.3 | 15.1 | -2.5 | -2.5 | 70% Closed |
| GW16-03 | 59.3 | 34.3 | 0.1 | 6.3 | -2.7 | -2.7 | 80% Closed |
| GW15-03 | - | - | - | - | - | - | 100% Open. Couldn't sample well as it flooded.When sample ports were opened, water was observed spraying from ports. |
| LCMV5 | 6.6 | 5.5 | 17.3 | 70.6 | -2.8 | -2.8 | 95% Closed. LCMV5 is the smaller wellhead with white house in GW14-03. |
| GW14-03 | 27.2 | 26.9 | 0.1 | 45.8 | -2.2 | -2.6 | 95% Closed. GW14-03 is the larger wellhead with orange hose in GW14-03. |

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | $CH_4$ | $CO_2$ | $O_2$ | Balance | | | |
| GW13-03 | 43.7 | 29.2 | 0.0 | 27.1 | -2.6 | -2.6 | 80% Closed |
| GW12-03 | 65.2 | 29.3 | 0.0 | 5.5 | -2.5 | -2.6 | 50% Closed |
| GW11-03 | 50.8 | 24.6 | 2.6 | 22.0 | -2.6 | -2.6 | 90% Closed |
| GW23-10 | 57.7 | 25.0 | 1.0 | 16.3 | -0.4 | -1.5 | No indicator on valve to determine positioning. Sample port on the systems side of the well head could be heard leaking. Sample port should be replaced. |
| GW24-10 | 61.2 | 33.2 | 0.0 | 5.6 | 0.3 | 0.2 | No indicator on valve to determine positioning |
| GW22-10 | 27.7 | 16.8 | 10.4 | 45.1 | -1.0 | -1.5 | 95% Closed |
| GW17-10 | 62.1 | 32.4 | 0.0 | 5.5 | 4.5 | 4.4 | No indicator on valve to determine positioning. Suspected blockage in lateral between GW17-10 and GW13-10. |
| GW20-10 | 52.1 | 31.7 | 0.0 | 16.2 | -1.5 | -2.5 | No indicator on valve to determine positioning |
| GW18-10 | 64.0 | 30.2 | 0.0 | 5.8 | -2.7 | -2.7 | No indicator on valve to determine positioning |
| GW21-10 | 63.5 | 29.4 | 0.0 | 7.1 | 0.1 | 0.1 | No indicator on valve to determine positioning |
| GW19-10 | 44.2 | 28.8 | 0.5 | 26.5 | -2.0 | -2.6 | No indicator on valve to determine positioning. |
| GW10-03 | 62.0 | 27.4 | 0.6 | 10.0 | -2.7 | -2.7 | 30% Closed |
| GW09-03 | 63.5 | 2.7.3 | 0.0 | 36.5 | -2.6 | -2.6 | 45% Closed |
| GW08-03 | 66.6 | 27.2 | 0.0 | 6.2 | -2.6 | -2.6 | 70% Closed |
| GW18-07 | 61.1 | 31.3 | 0.0 | 7.6 | -2.7 | -2.7 | 100% Open |
| LCMV4 | 7.0 | 6.7 | 15.1 | 71.2 | -0.9 | -2.7 | 85% Closed |
| GW20-07 | 68.7 | 26.4 | 0.0 | 4.9 | -1.4 | -1.4 | 80% Closed |
| GW02-10 | 61.0 | 31.8 | 0.0 | 7.2 | -2.9 | -2.9 | No indicator on valve to determine positioning |
| GW21-07 | 67.1 | 25.7 | 0.0 | 7.2 | -2.9 | -2.9 | 80% Closed |
| GW22-07 | 61.3 | 31.7 | 0.0 | 7.0 | -2.8 | -2.8 | Approximately 80% Closed - Valve indicator sticker missing |
| GW01-10 | 57.3 | 33.0 | 0.3 | 9.4 | -2.9 | -2.9 | No indicator on valve to determine positioning |
| GW03-10 | 61.9 | 31.0 | 0.0 | 7.1 | -2.9 | -2.9 | No indicator on valve to determine positioning |
| GW06-10 | 61.1 | 32.3 | 0.0 | 6.6 | -2.8 | -2.8 | No indicator on valve to determine positioning |

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | $CH_4$ | $CO_2$ | $O_2$ | Balance | | | |
| GW07-10 | 63.9 | 30.2 | 0.0 | 5.9 | -2.9 | -2.9 | No indicator on valve to determine positioning |
| GW08-10 | 63.7 | 30.0 | 0.0 | 6.3 | -2.9 | -2.9 | No indicator on valve to determine positioning |
| GW19-07 | 65.0 | 28.5 | 0.0 | 6.5 | -2.6 | -2.6 | 80% Closed |
| GW16-10 | 45.1 | 30.8 | 0.0 | 24.1 | -0.1 | -2.6 | No indicator on valve to determine positioning |
| GW15-10 | 64.5 | 29.4 | 0.0 | 6.1 | -2.1 | -2.1 | No indicator on valve to determine positioning |
| GW12-10 | 63.8 | 29.4 | 0.0 | 6.8 | -2.8 | -2.8 | No indicator on valve to determine positioning |
| GW11-10 | 63.4 | 31.2 | 0.0 | 5.4 | 20.7 | -2.8 | No indicator on valve to determine positioning. Sample port damaged/leaking on gas well. |
| GW14-10 | 62.2 | 30.6 | 0.0 | 7.2 | -2.8 | -2.8 | No indicator on valve to determine positioning |
| GW13-10 | 59.3 | 33.5 | 0.0 | 7.2 | -2.7 | -2.7 | No indicator on valve to determine positioning. GW13-10 is connected to GW14-10 lateral above ground as buried lateral from GW13-10 heading North is considered compromised. Lateral between GW13-10 and GW17-10 also suspected to be compromised. |
| GW10-10 | 59.2 | 33.6 | 0.0 | 7.2 | -2.6 | -2.6 | 80% Closed |
| GW09-10 | 59.5 | 34.0 | 0.0 | 6.5 | -2.8 | -2.8 | No indicator on valve to determine positioning |
| NFA Perimeter LFG System | - | - | - | - | - | - | No flow observed to present results |
| NGW-1 | 63.1 | 36.8 | 0.0 | 0.1 | -3.9 | -4.0 | 40% closed |
| NGW-2 | 62.8 | 36.9 | 0.0 | 0.3 | -4.0 | -4.0 | 100% Open |
| NGW-3 | 61.7 | 38.3 | 0.0 | 0.0 | -4.0 | -4.0 | 20% closed |
| NGW-4 | 62.7 | 36.0 | 0.8 | 0.5 | -3.8 | -3.8 | 40% closed |
| NGW-5 | 63.0 | 36.7 | 0 | 0.3 | -4 | -4 | 50% Closed. |
| NGW-9 | 57.5 | 35.8 | 1.0 | 5.7 | -3.8 | -3.9 | 50% Closed. |
| NGW-14 | 52.9 | 33.8 | 2.5 | 10.8 | -3.9 | -3.9 | 60% Closed |
| HC-3 | 3.4 | 21.6 | 12.6 | 62.4 | 1.3 | -3.8 | 100% Closed |
| HC-1 | 49.2 | 32.4 | 3.1 | 15.3 | -1.2 | -3.8 | 30% Closed. |

Notes:
1. To convert from inches of water to kPa divide by 4.01.
2. Static pressure is the pressure of the monitoring point relative to the atmospheric pressure. (http://www.geotechuk.com/technical-faqs/ga2000-and-gem2000-platform/pressure-definitions.aspx)
3. Differential pressure is the pressure exerted by a gas when the body on which the pressure is exerted is not in motion. (http://www.geotechuk.com/technical-faqs/ga2000-and-gem2000-platform/pressure-definitions.aspx)

## Peterborough County/City Waste Management Facility
## Landfill Gas Monitoring

Date: 15-Jul-22

Measurements from Gas Utilization Plant Equipment:

Pressure at Gas Utilization Plant: -2.1 "$H_20$

Flow at Gas Utilization Plant: 220 cfm

Temp. at Gas Utilization Plant: 17.8 degrees C at point of entry

Notes:
- PUG was onsite and results were obtained from the Gas Utilization Plant.
- Minimal odours observed onsite in the NFA and SFA.
- Cell 4 construction underway and crew obsvered onsite.

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | $CH_4$ | $CO_2$ | $O_2$ | Balance | | | |
| Gas Utilization Plant | 50.2 | 33.2 | 2.1 | 14.5 | - | - | PUG was onsite. |
| GW04-10 | 16.6 | 13.5 | 11.7 | 58.2 | -0.2 | -3.7 | No indicator on valve to determine positioning. |
| GW05-10 | 63.5 | 32.8 | 0.1 | 3.6 | -1.5 | -1.5 | No indicator on valve to determine positioning |
| GW06-03 | 53.9 | 35.2 | 0.1 | 10.8 | -3.8 | -3.8 | 40% Closed |
| GW07-03 | 57.7 | 37.5 | 0.1 | 4.7 | -3.8 | -3.8 | 95% Closed |
| GW05-00 | 50.9 | 35.6 | 2.1 | 11.4 | -3.8 | -3.8 | 95% Closed |
| GW04-00 | 20.4 | 13.6 | 13.2 | 52.8 | -3.9 | -3.9 | 95% Closed |
| LCMV1 | 6.2 | 2.6 | 17.8 | 73.4 | -3.8 | -3.8 | 90% Closed |
| GW03-00 | 61.3 | 35.6 | 0.1 | 3.0 | -3.8 | -3.8 | 30% Closed |
| LCMV2 | 46.3 | 27.8 | 8.3 | 17.6 | -0.8 | -3.8 | 80% Closed |
| GW02-00 | 62.6 | 36.9 | 0.0 | 0.5 | -3.8 | -3.8 | 100% Open |
| GW01-00 | 64.6 | 33.8 | 0.0 | 1.6 | -3.7 | -3.0 | 20% Closed |
| LCMV3 | 41.2 | 35.2 | 4.3 | 19.3 | -2.5 | -3.8 | 70% Closed. |
| GW17-03 | 58.2 | 34.6 | 1.0 | 6.2 | -1.7 | -1.7 | 70% Closed |
| GW16-03 | 35.0 | 30.2 | 8.6 | 26.2 | -1.6 | -1.5 | 80% Closed |
| GW15-03 | - | - | - | - | - | - | 100% Open. Couldn't sample from ports as the well was flooded. |
| LCMV5 | 1.0 | 0.2 | 19.2 | 79.6 | -1.7 | -1.7 | 95% Closed. LCMV5 is the smaller wellhead with white house in GW14-03. |
| GW14-03 | 58.2 | 33.7 | 0.0 | 8.1 | -1.5 | -1.5 | 95% Closed. GW14-03 is the larger wellhead with orange hose in GW14-03. |

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | $CH_4$ | $CO_2$ | $O_2$ | Balance | | | |
| GW13-03 | 59.7 | 34.1 | 1.2 | 5.0 | -1.7 | -1.7 | 80% Closed |
| GW12-03 | 63.2 | 35.6 | 1.1 | 0.1 | -1.7 | -1.7 | 50% Closed |
| GW11-03 | 52.8 | 33.2 | 3.7 | 10.3 | -1.7 | -1.8 | 90% Closed |
| GW23-10 | 49.2 | 36.2 | 3.5 | 11.1 | -0.2 | -0.2 | No indicator on valve to determine positioning. Leaking Valve observed. |
| GW24-10 | 65.9 | 34.0 | 0.0 | 0.1 | 1.6 | 1.8 | No indicator on valve to determine positioning |
| GW22-10 | 41.8 | 20.2 | 9.5 | 28.5 | -0.2 | -0.2 | 95% Closed |
| GW17-10 | 65.7 | 34.2 | 0.0 | 0.1 | 4.2 | 4.2 | No indicator on valve to determine positioning. Suspected blockage in lateral between GW17-10 and GW13-10. |
| GW20-10 | 61.6 | 32.8 | 3.4 | 2.2 | -0.7 | -1.2 | No indicator on valve to determine positioning |
| GW18-10 | 63.8 | 34.8 | 0.5 | 0.9 | 0.3 | 0.3 | No indicator on valve to determine positioning |
| GW21-10 | 62.3 | 35.4 | 1.9 | 0.4 | -3.1 | -3.2 | No indicator on valve to determine positioning |
| GW19-10 | 43.4 | 35.6 | 2.5 | 18.5 | -1.0 | -1.6 | No indicator on valve to determine positioning. |
| GW10-03 | 68.7 | 31.0 | 0.1 | 0.2 | -1.5 | -1.5 | 30% Closed |
| GW09-03 | 64.5 | 31.9 | 3.5 | 0.1 | -3.3 | -3.3 | 45% Closed |
| GW08-03 | 65.7 | 32.0 | 2.2 | 0.1 | -3.3 | -3.4 | 70% Closed |
| GW18-07 | 59.1 | 30.2 | 6.7 | 4.0 | -3.4 | -3.4 | 100% Open |
| LCMV4 | 55.6 | 34.5 | 3.4 | 6.5 | -0.7 | -3.5 | 85% Closed |
| GW20-07 | 69.5 | 29.9 | 0.0 | 0.6 | -1.2 | -1.2 | 80% Closed |
| GW02-10 | 63.8 | 33.3 | 0.2 | 2.7 | -3.3 | -3.4 | No indicator on valve to determine positioning |
| GW21-07 | 57.0 | 29.9 | 3.8 | 9.3 | -3.4 | -3.4 | 80% Closed |
| GW22-07 | 65.7 | 33.6 | 0.2 | 0.5 | -3.4 | -3.4 | Approximately 80% Closed - Valve indicator sticker missing |
| GW01-10 | 64.5 | 34.1 | 0.1 | 1.3 | -3.4 | -3.4 | No indicator on valve to determine positioning |
| GW03-10 | 51.7 | 43.8 | 4.1 | 0.4 | -3.4 | -3.4 | No indicator on valve to determine positioning |
| GW06-10 | 63.9 | 34.9 | 1.1 | 0.1 | -3.3 | -3.4 | No indicator on valve to determine positioning |

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | $CH_4$ | $CO_2$ | $O_2$ | Balance | | | |
| GW07-10 | 66.3 | 33.2 | 0.0 | 0.5 | -3.4 | -3.4 | No indicator on valve to determine positioning |
| GW08-10 | 65.2 | 34.1 | 0.3 | 0.4 | -3.4 | -3.4 | No indicator on valve to determine positioning |
| GW19-07 | 69.4 | 30.1 | 0.2 | 0.3 | -3.3 | -3.4 | 80% Closed |
| GW16-10 | 64.0 | 35.6 | 0.0 | 0.4 | 0.0 | -1.7 | No indicator on valve to determine positioning |
| GW15-10 | 64.3 | 34.2 | 0.0 | 1.5 | -3.2 | -3.2 | No indicator on valve to determine positioning |
| GW12-10 | 56.1 | 43.8 | 0.1 | 0.0 | -3.4 | -3.4 | No indicator on valve to determine positioning |
| GW11-10 | 66.1 | 33.5 | 0.0 | 0.4 | 20.7 | -3.5 | No indicator on valve to determine positioning. Sample port damaged/leaking on gas well. |
| GW14-10 | 65.9 | 34.0 | 0.0 | 0.1 | -3.2 | -3.3 | No indicator on valve to determine positioning |
| GW13-10 | 60.1 | 37.6 | 0.0 | 2.3 | -3.2 | -3.2 | No indicator on valve to determine positioning. GW13-10 is connected to GW14-10 lateral above ground as buried lateral from GW13-10 heading North is considered compromised. Lateral between GW13-10 and GW17-10 also suspected to be compromised. |
| GW10-10 | 65.3 | 34.7 | 0.0 | 0.0 | -3.2 | -3.2 | 80% Closed |
| GW09-10 | 67.2 | 32.8 | 0.0 | 0.0 | -3.4 | -3.4 | No indicator on valve to determine positioning |
| NFA Perimeter LFG System | - | - | - | - | - | - | No flow observed to present results |
| NGW-1 | 65.8 | 34.1 | 0.0 | 0.1 | -5.2 | -5.4 | 40% closed |
| NGW-2 | 67.5 | 32.3 | 0.1 | 0.1 | -5.4 | -5.4 | 100% Open |
| NGW-3 | 68.5 | 31.5 | 0.0 | 0.0 | -5.3 | -5.4 | 20% closed |
| NGW-4 | 62.4 | 37.6 | 0.0 | 0.0 | -5.3 | -5.4 | 40% closed |
| NGW-5 | 66.5 | 33.4 | 0.1 | 0.0 | -5.3 | -5.4 | 50% Closed. |
| NGW-9 | 64.7 | 35.3 | 0.0 | 0.0 | -5.3 | -5.4 | 50% Closed. |
| NGW-14 | 65.5 | 34.5 | 0.0 | 0.0 | -5.4 | -5.4 | 60% Closed |
| HC-3 | 5.6 | 34.3 | 11.2 | 48.9 | 0.7 | -5.4 | 100% Closed |
| HC-1 | 63.4 | 36.0 | 0.4 | 0.2 | -5.5 | -5.5 | 30% Closed. |

Notes:
1. To convert from inches of water to kPa divide by 4.01.
2. Static pressure is the pressure of the monitoring point relative to the atmospheric pressure. (http://www.geotechuk.com/technical-faqs/ga2000-and-gem2000-platform/pressure-definitions.aspx)
3. Differential pressure is the pressure exerted by a gas when the body on which the pressure is exerted is not in motion. (http://www.geotechuk.com/technical-faqs/ga2000-and-gem2000-platform/pressure-definitions.aspx)

## Peterborough County/City Waste Management Facility
## Landfill Gas Monitoring

Date: 26-Aug-22

Measurements from Gas Utilization Plant Equipment:

Pressure at Gas Utilization Plant: N/A "$H_20$

Flow at Gas Utilization Plant: N/A cfm

Temp. at Gas Utilization Plant: N/A degrees C at point of entry

Notes:
- PUG was not onsite to obtain results from the Gas Utilization Plant (GUP). GUP was operating during monitoring event.
- Minimal odours observed onsite in the NFA.
- Odours observed in the north-west location of the SFA coming from manhole T8.
- Cell 4 construction in the NFA and berm works south of the landfill underway.

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | $CH_4$ | $CO_2$ | $O_2$ | Balance | | | |
| Gas Utilization Plant | - | - | - | - | - | - | - PUG was not onsite to obtain data. |
| GW04-10 | 14.8 | 13.8 | 11.2 | 60.2 | -0.5 | -3.0 | No indicator on valve to determine positioning. |
| GW05-10 | 65.5 | 33.8 | 0.5 | 0.2 | 1.8 | 1.6 | No indicator on valve to determine positioning |
| GW06-03 | 60.7 | 38.9 | 0.3 | 0.1 | -2.8 | -2.8 | 40% Closed |
| GW07-03 | 61.1 | 38.4 | 0.2 | 0.3 | -3.7 | -4.0 | 95% Closed |
| GW05-00 | 56.9 | 35.5 | 2.5 | 5.1 | -3.3 | -3.5 | 95% Closed |
| GW04-00 | 50.2 | 36.2 | 0.6 | 13.0 | -2.7 | -3.0 | 95% Closed |
| LCMV1 | 17.1 | 12.2 | 14.4 | 56.3 | -2.9 | -2.2 | 90% Closed |
| GW03-00 | 62.2 | 36.9 | 0.6 | 0.3 | -3.1 | -3.2 | 30% Closed |
| LCMV2 | 47.0 | 31.3 | 4.4 | 17.3 | -0.5 | -3.1 | 80% Closed |
| GW02-00 | 63.7 | 35.9 | 0.0 | 0.4 | -2.9 | -2.9 | 100% Open |
| GW01-00 | 66.1 | 33.5 | 0.3 | 0.1 | -4.2 | -4.2 | 20% Closed |
| LCMV3 | 61.3 | 37.3 | 0.2 | 1.2 | -1.6 | -2.9 | 70% Closed. |
| GW17-03 | 62.3 | 34.7 | 0.5 | 2.5 | -2.3 | -2.4 | 70% Closed |
| GW16-03 | 39.1 | 27.1 | 6.5 | 27.3 | -2.0 | -2.0 | 80% Closed |
| GW15-03 | - | - | - | - | - | - | 100% Open. Couldn't sample from ports as the well was flooded. |
| LCMV5 | 2.8 | 5.3 | 17.2 | 74.7 | -0.7 | -1.7 | 95% Closed. LCMV5 is the smaller wellhead with white house in GW14-03. |
| GW14-03 | 37.0 | 27.4 | 1.5 | 34.1 | -1.3 | -1.7 | 85% |

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | $CH_4$ | $CO_2$ | $O_2$ | Balance | | | |
| GW13-03 | 57.3 | 31.2 | 0.6 | 10.9 | -1.7 | -2.0 | 80% Closed |
| GW12-03 | 69.2 | 29.8 | 0.4 | 0.6 | -2.3 | -2.3 | 50% Closed |
| GW11-03 | 73.7 | 26.0 | 0.3 | 0.0 | -1.9 | -2.5 | 90% Closed |
| GW23-10 | 41.4 | 29.3 | 0.1 | 29.2 | -0.8 | -1.2 | No indicator on valve to determine positioning. Leaking valve. |
| GW24-10 | 64.3 | 34.8 | 0.4 | 0.5 | 7.0 | 7.2 | No indicator on valve to determine positioning |
| GW22-10 | 63.1 | 34.1 | 0.3 | 2.5 | 0.0 | -1.4 | 95% Closed |
| GW17-10 | 65.0 | 33.1 | 0.3 | 1.6 | 15.5 | 5.5 | No indicator on valve to determine positioning. Suspected blockage in lateral between GW17-10 and GW13-10. |
| GW20-10 | 60.0 | 33.7 | 0.4 | 5.9 | -0.3 | -1.0 | No indicator on valve to determine positioning |
| GW18-10 | 67.3 | 32.4 | 0.2 | 0.1 | -3.2 | -3.6 | No indicator on valve to determine positioning |
| GW21-10 | 69.7 | 29.9 | 0.2 | 0.2 | 1.5 | 1.6 | No indicator on valve to determine positioning |
| GW19-10 | 56.1 | 32.4 | 0.4 | 11.1 | -1.5 | -2.2 | No indicator on valve to determine positioning. |
| GW10-03 | 68.9 | 30.3 | 0.2 | 0.6 | -1.9 | -1.9 | 30% Closed |
| GW09-03 | 70.9 | 28.5 | 0.3 | 0.3 | -2.3 | -2.3 | 45% Closed |
| GW08-03 | 70.8 | 27.7 | 0.0 | 1.5 | -2.0 | -2.2 | 70% Closed |
| GW18-07 | 66.3 | 33.3 | 0.4 | 0.0 | -2.9 | -3.1 | 100% Open |
| LCMV4 | 29.4 | 20.6 | 5.1 | 44.9 | -1.7 | -3.1 | 85% Closed |
| GW20-07 | 70.0 | 28.9 | 0.3 | 0.8 | 4.8 | 4.2 | 80% Closed |
| GW02-10 | 65.2 | 34.4 | 0.3 | 0.1 | -2.9 | -3.1 | No indicator on valve to determine positioning |
| GW21-07 | 71.0 | 25.3 | 1.9 | 1.8 | -2.7 | -2.7 | 80% Closed |
| GW22-07 | 65.0 | 33.2 | 0.2 | 1.6 | -3.2 | -3.2 | Approximately 80% Closed - Valve indicator sticker missing |
| GW01-10 | 63.5 | 35.8 | 0.1 | 0.6 | -3.4 | -3.4 | No indicator on valve to determine positioning |
| GW03-10 | 66.1 | 33.4 | 0.4 | 0.1 | -3.5 | -3.5 | No indicator on valve to determine positioning |
| GW06-10 | 65.4 | 33.8 | 0.2 | 0.6 | -2.9 | -2.9 | No indicator on valve to determine positioning |

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | CH4 | $CO_2$ | $O_2$ | Balance | | | |
| GW07-10 | 68.0 | 31.6 | 0.3 | 0.1 | -2.7 | -3.3 | No indicator on valve to determine positioning |
| GW08-10 | 67.5 | 31.9 | 0.2 | 0.4 | -3.5 | -3.5 | No indicator on valve to determine positioning |
| GW19-07 | 60.9 | 30.9 | 0.2 | 8.0 | -3.5 | -3.5 | 80% Closed |
| GW16-10 | 59.5 | 34.2 | 0.0 | 6.3 | 0.3 | -1.9 | No indicator on valve to determine positioning |
| GW15-10 | 67.1 | 31.6 | 0.2 | 1.1 | -1.2 | -1.2 | No indicator on valve to determine positioning |
| GW12-10 | 66.0 | 30.6 | 0.5 | 2.9 | -3.5 | -3.5 | No indicator on valve to determine positioning |
| GW11-10 | 67.8 | 31.8 | 0.1 | 0.3 | 50.3 | -3.1 | No indicator on valve to determine positioning. |
| GW14-10 | 66.6 | 31.6 | 0.3 | 1.5 | -2.5 | -2.5 | No indicator on valve to determine positioning |
| GW13-10 | 64.3 | 35.3 | 0.4 | 0.0 | -2.9 | -2.9 | No indicator on valve to determine positioning. GW13-10 is connected to GW14-10 lateral above ground as buried lateral from GW13-10 heading North is considered compromised. Lateral between GW13-10 and GW17-10 also suspected to be compromised. |
| GW10-10 | 63 | 35.4 | 0.3 | 1.3 | -3.5 | -3.5 | 80% Closed |
| GW09-10 | 63.7 | 35.5 | 0.1 | 0.7 | -2.9 | -3.1 | No indicator on valve to determine positioning |
| NFA Perimeter LFG System | - | - | - | - | - | - | No flow observed to present results |
| NGW-1 | 64.1 | 35.4 | 0.3 | 0.2 | -21.3 | -21.3 | 40% closed |
| NGW-2 | 64.1 | 34.3 | 0.3 | 1.3 | -21.9 | -21.9 | 100% Open |
| NGW-3 | 64.2 | 35.1 | 0.5 | 0.2 | -19.4 | -19.4 | 20% closed |
| NGW-4 | 60.7 | 35.0 | 0.3 | 4.0 | -20.8 | -20.8 | 40% closed |
| NGW-5 | 63.7 | 35.6 | 0.1 | 0.6 | -21.2 | -21.1 | 50% Closed. |
| NGW-9 | 63.6 | 34.7 | 0.4 | 1.3 | -21.3 | -21.3 | 50% Closed. |
| NGW-14 | 57.5 | 34.0 | 1.8 | 6.7 | -21.1 | -21.1 | 60% Closed |
| HC-3 | 3.3 | 19.9 | 13.1 | 63.7 | -1.6 | -20.6 | 100% Closed |
| HC-1 | 60.3 | 36.2 | 0.3 | 3.2 | -12.5 | -21.5 | 30% Closed. |

Notes:
1. To convert from inches of water to kPa divide by 4.01.
2. Static pressure is the pressure of the monitoring point relative to the atmospheric pressure. (http://www.geotechuk.com/technical-faqs/ga2000-and-gem2000-platform/pressure-definitions.aspx)
3. Differential pressure is the pressure exerted by a gas when the body on which the pressure is exerted is not in motion. (http://www.geotechuk.com/technical-faqs/ga2000-and-gem2000-platform/pressure-definitions.aspx)

**Peterborough County/City Waste Management Facility**
**Landfill Gas Monitoring**

Date: 29-Sep-22

Measurements from Gas Utilization Plant Equipment:

Pressure at Gas Utilization Plant: N/A "$H_20$

Flow at Gas Utilization Plant: N/A cfm

Temp. at Gas Utilization Plant: N/A degrees C at point of entry

Notes:
- PUG was not onsite to obtain results from the Gas Utilization Plant (GUP). GUP was operating during monitoring event.
- Minimal odours observed onsite in the NFA and SFA during survey.
- Cell 4 construction in the NFA underway.

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | $CH_4$ | $CO_2$ | $O_2$ | Balance | | | |
| Gas Utilization Plant | - | - | - | - | - | - | PUG was not onsite to obtain data. |
| GW04-10 | 32.7 | 24.1 | 5.2 | 38.0 | -0.3 | -2.5 | No indicator on valve to determine positioning. |
| GW05-10 | 65.1 | 34.9 | 0.0 | 0.0 | -1.0 | -1.0 | No indicator on valve to determine positioning |
| GW06-03 | 59.3 | 40.5 | 0.1 | 0.1 | -3.4 | -3.4 | 40% Closed |
| GW07-03 | 59.7 | 40.0 | 0.0 | 0.3 | -3.3 | -3.4 | 95% Closed |
| GW05-00 | 47.8 | 33.1 | 3.5 | 15.6 | -3.4 | -3.4 | 95% Closed |
| GW04-00 | 26.9 | 25.5 | 5.7 | 41.9 | -2.8 | -3.4 | 95% Closed |
| LCMV1 | 9.6 | 6.5 | 17.8 | 66.1 | -3.4 | -3.4 | 90% Closed |
| GW03-00 | 61.1 | 38.9 | 0.0 | 0.0 | -3.2 | -3.2 | 30% Closed |
| LCMV2 | 29.2 | 25.3 | 6.4 | 39.1 | -0.6 | -3.3 | 80% Closed |
| GW02-00 | 61.7 | 38.3 | 0.0 | 0.0 | -3.2 | -3.2 | 100% Open |
| GW01-00 | 64.5 | 35.3 | 0.1 | 0.1 | -3.1 | -3.1 | 20% Closed |
| LCMV3 | 48.6 | 34.2 | 2.3 | 14.9 | -1.3 | -4.5 | 70% Closed. |
| GW17-03 | 56.3 | 33.8 | 1.9 | 8.0 | -3.0 | -3.0 | 70% Closed |
| GW16-03 | 25.8 | 19.7 | 10.1 | 44.4 | -3.1 | -3.1 | 80% Closed |
| GW15-03 | 62.9 | 36.5 | 0.1 | 0.1 | -0.8 | -0.8 | 100% Open |
| LCMV5 | 0.6 | 1.5 | 19.1 | 78.8 | -3.8 | -3.0 | 95% Closed. LCMV5 is the smaller wellhead with white house in GW14-03. |
| GW14-03 | 11.2 | 19.9 | 2.9 | 66.0 | -2.6 | -3.0 | 85% Closed |

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | $CH_4$ | $CO_2$ | $O_2$ | Balance | | | |
| GW13-03 | 46.2 | 30.5 | 0.2 | 23.1 | -3.0 | -3.0 | 80% Closed |
| GW12-03 | 68.1 | 31.6 | 0.0 | 0.3 | -2.9 | -2.9 | 50% Closed |
| GW11-03 | 57.3 | 27.4 | 2.3 | 13.0 | -2.9 | -2.9 | 90% Closed |
| GW23-10 | 31.4 | 27.9 | 0.1 | 40.6 | -0.9 | -0.9 | No indicator on valve to determine positioning. |
| GW24-10 | 62.8 | 37.1 | 0.0 | 0.1 | 0.9 | 0.9 | No indicator on valve to determine positioning |
| GW22-10 | 38.1 | 23.7 | 6.1 | 32.1 | -0.2 | -2.4 | 95% Closed |
| GW17-10 | 65.1 | 34.9 | 0.0 | 0.0 | 2.9 | 2.9 | No indicator on valve to determine positioning. Suspected blockage in lateral between GW17-10 and GW13-10. |
| GW20-10 | 59.2 | 36.1 | 0.1 | 4.6 | -1.6 | -2.2 | No indicator on valve to determine positioning |
| GW18-10 | 66.7 | 32.9 | 0.1 | 0.3 | -2.4 | -2.4 | No indicator on valve to determine positioning |
| GW21-10 | 68.6 | 31.2 | 0.0 | 0.2 | 0.3 | 0.2 | No indicator on valve to determine positioning |
| GW19-10 | 45.0 | 32.2 | 0.2 | 22.6 | -1.8 | -2.3 | No indicator on valve to determine positioning. |
| GW10-03 | 68.6 | 30.5 | 0.1 | 0.8 | -2.8 | -2.8 | 30% Closed |
| GW09-03 | 67.8 | 31.7 | 0.2 | 0.3 | -2.8 | -2.8 | 45% Closed |
| GW08-03 | 70.3 | 28.9 | 0.1 | 0.7 | -2.8 | -2.8 | 70% Closed |
| GW18-07 | 64.9 | 35.0 | 0.1 | 0.0 | -2.9 | -2.9 | 100% Open |
| LCMV4 | 10.2 | 9.4 | 13.8 | 66.6 | -1.1 | -2.9 | 85% Closed |
| GW20-07 | 69.3 | 30.6 | 0.0 | 0.1 | -0.5 | -0.5 | 80% Closed |
| GW02-10 | 65.2 | 34.8 | 0.0 | 0.0 | -3.2 | -3.2 | No indicator on valve to determine positioning |
| GW21-07 | 47.9 | 20.6 | 6.6 | 24.9 | -2.9 | -2.9 | 80% Closed |
| GW22-07 | 64.3 | 35.6 | 0.0 | 0.1 | -3.0 | -3.2 | Approximately 80% Closed - Valve indicator sticker missing |
| GW01-10 | 62.1 | 37.1 | 0.0 | 0.8 | -3.2 | -3.2 | No indicator on valve to determine positioning |
| GW03-10 | 64.9 | 35.0 | 0.0 | 0.1 | -3.1 | -3.2 | No indicator on valve to determine positioning |
| GW06-10 | 62.6 | 34.5 | 0.4 | 2.5 | -2.4 | -2.4 | No indicator on valve to determine positioning |

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | CH4 | $CO_2$ | $O_2$ | Balance | | | |
| GW07-10 | 66.8 | 33.2 | 0.0 | 0.0 | -2.9 | -3.2 | No indicator on valve to determine positioning |
| GW08-10 | 66.2 | 33.7 | 0.0 | 0.1 | -3.1 | -3.1 | No indicator on valve to determine positioning |
| GW19-07 | 68.2 | 31.8 | 0.0 | 0.0 | -2.8 | -2.8 | 80% Closed |
| GW16-10 | 47.6 | 34.1 | 0.0 | 18.3 | -0.1 | -2.4 | No indicator on valve to determine positioning |
| GW15-10 | 67.7 | 32.3 | 0.0 | 0.0 | -2.3 | -2.3 | No indicator on valve to determine positioning |
| GW12-10 | 67.7 | 32.1 | 0.0 | 0.2 | -2.2 | -2.2 | No indicator on valve to determine positioning |
| GW11-10 | 66.5 | 33.4 | 0.1 | 0.0 | 10.7 | -2.3 | No indicator on valve to determine positioning. |
| GW14-10 | 66.6 | 33.2 | 0.0 | 0.2 | -2.3 | -2.3 | No indicator on valve to determine positioning |
| GW13-10 | 63.0 | 36.3 | 0.0 | 0.7 | -2.3 | -2.3 | No indicator on valve to determine positioning. GW13-10 is connected to GW14-10 lateral above ground as buried lateral from GW13-10 heading North is considered compromised. Lateral between GW13-10 and GW17-10 also suspected to be compromised. |
| GW10-10 | 61.1 | 38.0 | 0.0 | 0.9 | -2.5 | -2.5 | 80% Closed |
| GW09-10 | 62.8 | 37.2 | 0.0 | 0.0 | -2.4 | -2.4 | No indicator on valve to determine positioning |
| NFA Perimeter LFG System | - | - | - | - | - | - | No flow observed to present results |
| NGW-1 | 62.9 | 37.0 | 0.0 | 0.1 | -1.7 | -1.7 | 50% closed |
| NGW-2 | 62.7 | 37.3 | 0.0 | 0.0 | -1.6 | -1.6 | 40% Closed |
| NGW-3 | 63.3 | 36.4 | 0.0 | 0.3 | -1.7 | -1.7 | 70% closed |
| NGW-4 | 62.1 | 37.9 | 0.0 | 0.0 | -1.6 | -1.6 | 40% closed |
| NGW-5 | 61.8 | 37.7 | 0 | 0.5 | -1.63 | -2 | 20% Closed. |
| NGW-9 | 62.1 | 37.6 | 0.0 | 0.3 | -1.6 | -1.6 | 80% Closed. |
| NGW-14 | 62.0 | 37.9 | 0.1 | 0.0 | -1.6 | -1.6 | 80% Closed |
| HC-3 | 8.3 | 32.2 | 5.9 | 53.6 | -1.1 | -1.6 | 100% Closed |
| HC-1 | 60.8 | 38.9 | 0.0 | 0.3 | 0.4 | -1.8 | 30% Closed. |

Notes:

1. To convert from inches of water to kPa divide by 4.01.
2. Static pressure is the pressure of the monitoring point relative to the atmospheric pressure. (http://www.geotechuk.com/technical-faqs/ga2000-and-gem2000-platform/pressure-definitions.aspx)
3. Differential pressure is the pressure exerted by a gas when the body on which the pressure is exerted is not in motion. (http://www.geotechuk.com/technical-faqs/ga2000-and-gem2000-platform/pressure-definitions.aspx)

**Peterborough County/City Waste Management Facility**
**Landfill Gas Monitoring**

Date: 21-Oct-22

Measurements from Gas Utilization Plant Equipment:

Pressure at Gas Utilization Plant: N/A "$H_20$

Flow at Gas Utilization Plant: N/A cfm

Temp. at Gas Utilization Plant: N/A degrees C at point of entry

Notes:
- Gas Utilization Plant (GUP) and flare not operating. Both are down for maintenance. Don indicated that the GUP will be back running later this afternoon. PUG was onsite in the afternoon, but was not able to obtain readings from the GUP as it was still offline upon finishing monitoring.
- Minimal odours observed onsite in the NFA and SFA during survey.
- Cell 4 construction in the NFA underway.

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | $CH_4$ | $CO_2$ | $O_2$ | Balance | | | |
| Gas Utilization Plant | - | - | - | - | - | - | - GUP was not operating. |
| GW04-10 | 52.3 | 32.3 | 1.2 | 14.2 | 0.5 | 0.1 | No indicator on valve to determine positioning. |
| GW05-10 | 64.9 | 34.2 | 0.2 | 0.7 | 1.9 | 1.9 | No indicator on valve to determine positioning |
| GW06-03 | 59.4 | 38.6 | 2.0 | 0.0 | 0.3 | 0.3 | 40% Closed |
| GW07-03 | 58.7 | 37.6 | 1.0 | 2.7 | 0.3 | 0.3 | 95% Closed |
| GW05-00 | 59.8 | 38.8 | 0.3 | 1.1 | 0.4 | 0.4 | 95% Closed |
| GW04-00 | 47.2 | 35.4 | 1.8 | 15.6 | 0.4 | 0.4 | 95% Closed |
| LCMV1 | 20.1 | 14.4 | 13.4 | 52.1 | 0.3 | 0.4 | 90% Closed |
| GW03-00 | 62.0 | 37.7 | 0.2 | 0.1 | 0.3 | 0.3 | 30% Closed |
| LCMV2 | 46.1 | 30.5 | 2.5 | 20.9 | 0.2 | 0.2 | 80% Closed |
| GW02-00 | 62.0 | 36.7 | 0.6 | 0.7 | 0.3 | 0.3 | 100% Open |
| GW01-00 | 65.0 | 34.5 | 0.2 | 0.3 | 0.3 | 0.3 | 20% Closed |
| LCMV3 | 48.9 | 30.9 | 2.4 | 17.8 | 0.2 | 0.2 | 70% Closed. |
| GW17-03 | 62.7 | 36.5 | 0.1 | 0.7 | 0.3 | 0.3 | 70% Closed |
| GW16-03 | 20.6 | 15.0 | 12.3 | 52.1 | 0.4 | 0.4 | 80% Closed |
| GW15-03 | 62.6 | 35.8 | 0.4 | 0.1 | 0.5 | 0.5 | 100% Open |
| LCMV5 | 25.0 | 22.8 | 2.9 | 49.3 | -0.6 | 0.3 | 95% Closed. LCMV5 is the smaller wellhead with white house in GW14-03. |
| GW14-03 | 37.8 | 28.6 | 0.8 | 32.8 | 0.4 | 0.3 | 85% Closed |

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | $CH_4$ | $CO_2$ | $O_2$ | Balance | | | |
| GW13-03 | 63.8 | 35.0 | 0.1 | 1.1 | 0.5 | 0.5 | 80% Closed |
| GW12-03 | 68.0 | 31.8 | 0.1 | 0.1 | 0.4 | 0.4 | 50% Closed |
| GW11-03 | 72.5 | 25.9 | 0.0 | 1.6 | 0.4 | 0.4 | 90% Closed |
| GW23-10 | 64.9 | 34.4 | 0.1 | 0.6 | 0.3 | 0.3 | No indicator on valve to determine positioning. |
| GW24-10 | 63.5 | 35.7 | 0.1 | 0.7 | 4.4 | 4.3 | No indicator on valve to determine positioning |
| GW22-10 | 64.9 | 34.6 | 0.1 | 0.4 | 0.3 | 0.3 | 95% Closed |
| GW17-10 | 65.3 | 34.5 | 0.0 | 0.2 | 8.2 | 7.9 | No indicator on valve to determine positioning. Suspected blockage in lateral between GW17-10 and GW13-10. |
| GW20-10 | 65.1 | 34.5 | 0.0 | 0.4 | 0.9 | 0.9 | No indicator on valve to determine positioning |
| GW18-10 | 66.9 | 33.0 | 0.0 | 0.1 | 1.3 | 1.3 | No indicator on valve to determine positioning |
| GW21-10 | 65.9 | 32.8 | 0.1 | 1.2 | 0.6 | 0.6 | No indicator on valve to determine positioning |
| GW19-10 | 66.5 | 33.4 | 0.1 | 0.0 | 0.5 | 0.5 | No indicator on valve to determine positioning. |
| GW10-03 | 69.6 | 30.3 | 0.1 | 0.0 | 1.3 | 1.3 | 30% Closed |
| GW09-03 | 59.8 | 29.4 | 0.3 | 10.5 | 1.2 | 1.1 | 45% Closed |
| GW08-03 | 70.2 | 29.1 | 0.2 | 0.5 | 0.7 | 0.7 | 70% Closed |
| GW18-07 | 64.9 | 33.8 | 0.2 | 1.1 | 0.6 | 0.6 | 100% Open |
| LCMV4 | 60.3 | 35.4 | 0.7 | 3.6 | 0.1 | 0.6 | 85% Closed |
| GW20-07 | 69.0 | 30.9 | 0.1 | 0.0 | 1.4 | 1.4 | 80% Closed |
| GW02-10 | 63.2 | 35.4 | 0.1 | 1.3 | 0.4 | 0.4 | No indicator on valve to determine positioning |
| GW21-07 | 71.4 | 28.1 | 0.3 | 0.2 | 0.7 | 0.7 | 80% Closed |
| GW22-07 | 64.4 | 34.6 | 0.1 | 0.9 | 1.0 | 0.9 | Approximately 80% Closed - Valve indicator sticker missing |
| GW01-10 | 61.5 | 36.6 | 0.1 | 1.8 | 0.8 | 0.8 | No indicator on valve to determine positioning |
| GW03-10 | 64.6 | 34.0 | 0.0 | 1.4 | 1.1 | 1.0 | No indicator on valve to determine positioning |
| GW06-10 | 65.0 | 34.8 | 0.1 | 0.1 | 1.2 | 1.2 | No indicator on valve to determine positioning |

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | CH4 | $CO_2$ | $O_2$ | Balance | | | |
| GW07-10 | 67.2 | 32.5 | 0.1 | 0.2 | 1.2 | 1.2 | No indicator on valve to determine positioning |
| GW08-10 | 65.5 | 33.2 | 0.1 | 1.2 | 1.2 | 1.0 | No indicator on valve to determine positioning |
| GW19-07 | 67.0 | 33.0 | 0.0 | 0.0 | 1.2 | 1.2 | 80% Closed |
| GW16-10 | 61.8 | 34.5 | 0.2 | 3.5 | 0.4 | 0.4 | No indicator on valve to determine positioning |
| GW15-10 | 64.3 | 32.5 | 0.3 | 2.9 | 1.2 | 1.2 | No indicator on valve to determine positioning |
| GW12-10 | 67.4 | 32.6 | 0.0 | 0.0 | 1.2 | 1.1 | No indicator on valve to determine positioning |
| GW11-10 | 66.9 | 33.0 | 0.0 | 0.1 | 16.5 | 1.3 | No indicator on valve to determine positioning. |
| GW14-10 | 66.6 | 33.4 | 0.0 | 0.0 | 1.1 | 1.1 | No indicator on valve to determine positioning |
| GW13-10 | 62.6 | 35.7 | 0.1 | 1.6 | 3.9 | 3.8 | No indicator on valve to determine positioning. GW13-10 is connected to GW14-10 lateral above ground as buried lateral from GW13-10 heading North is considered compromised. Lateral between GW13-10 and GW17-10 also suspected to be compromised. |
| GW10-10 | 60.6 | 37.4 | 0.1 | 1.9 | 1.3 | 1.3 | 80% Closed |
| GW09-10 | 63.0 | 36.7 | 0.2 | 0.1 | 5.6 | 1.3 | No indicator on valve to determine positioning |
| NFA Perimeter LFG System | - | - | - | - | - | - | No flow observed to present results |
| NGW-1 | 63.4 | 35.1 | 0.1 | 1.4 | 1.2 | 1.2 | 50% closed |
| NGW-2 | 62.8 | 35.7 | 0.0 | 1.5 | 1.2 | 1.2 | 70% Closed |
| NGW-3 | 64.3 | 34.5 | 0.2 | 1.0 | 1.3 | 1.3 | 35% closed |
| NGW-4 | 62.4 | 36.0 | 0.0 | 1.6 | 1.3 | 1.3 | 40% closed |
| NGW-5 | 62.3 | 35.6 | 0 | 2.1 | 1.3 | 1.3 | 70% Closed. |
| NGW-9 | 61.4 | 36.6 | 0.1 | 1.9 | 1.4 | 1.4 | 80% Closed. |
| NGW-14 | 62.5 | 36.6 | 0.1 | 0.8 | 1.3 | 1.3 | 80% Closed |
| HC-3 | 8.8 | 33.2 | 5.0 | 53.0 | 0.9 | 1.4 | 100% Closed |
| HC-1 | 60.5 | 36.9 | 0.5 | 2.1 | 2.8 | 0.4 | 30% Closed. |

Notes:

1. To convert from inches of water to kPa divide by 4.01.
2. Static pressure is the pressure of the monitoring point relative to the atmospheric pressure. (http://www.geotechuk.com/technical-faqs/ga2000-and-gem2000-platform/pressure-definitions.aspx)
3. Differential pressure is the pressure exerted by a gas when the body on which the pressure is exerted is not in motion. (http://www.geotechuk.com/technical-faqs/ga2000-and-gem2000-platform/pressure-definitions.aspx)

**Peterborough County/City Waste Management Facility**
**Landfill Gas Monitoring**

Date: 24-Nov-22

Measurements from Gas Utilization Plant Equipment:

Pressure at Gas Utilization Plant: N/A "$H_2$0

Flow at Gas Utilization Plant: N/A cfm

Temp. at Gas Utilization Plant: N/A degrees C at point of entry

Notes:
- Gas Utilization Plant (GUP) operating.
- Minimal odours observed onsite in the NFA and SFA during survey.
- Cell 4 construction in the NFA underway.

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | $CH_4$ | $CO_2$ | $O_2$ | Balance | | | |
| Gas Utilization Plant | - | - | - | - | - | - | - GUP operating, PUG was not onsite during monitoring event. |
| GW04-10 | 66.3 | 31.9 | 0.1 | 1.7 | 1.3 | -5.6 | No indicator on valve to determine positioning. |
| GW05-10 | 68.5 | 31.5 | 0.0 | 0.0 | -2.4 | -2.4 | No indicator on valve to determine positioning |
| GW06-03 | 57.3 | 33.6 | 1.2 | 7.9 | -6.2 | -6.2 | 40% Closed |
| GW07-03 | 63.6 | 36.2 | 0.0 | 0.2 | -5.9 | -5.6 | 95% Closed |
| GW05-00 | 52.4 | 31.2 | 3.4 | 13.0 | -5.7 | -5.7 | 95% Closed |
| GW04-00 | 26.0 | 23.4 | 6.8 | 43.8 | -5.2 | -5.7 | 95% Closed |
| LCMV1 | 8.8 | 6.8 | 16.9 | 67.5 | -6.2 | -6.2 | 90% Closed |
| GW03-00 | 63.9 | 33.3 | 0.7 | 2.1 | -6.1 | -6.1 | 30% Closed |
| LCMV2 | 31.6 | 21.9 | 7.8 | 38.7 | -0.8 | -6.2 | 80% Closed |
| GW02-00 | 65.7 | 33.3 | 0.0 | 1.0 | -6.0 | -6.0 | 100% Open |
| GW01-00 | 65.6 | 30.8 | 0.9 | 2.7 | -5.7 | -5.7 | 20% Closed |
| LCMV3 | 53.6 | 31.9 | 1.3 | 13.2 | -2.6 | -6.1 | 70% Closed |
| GW17-03 | 54.3 | 28.9 | 2.9 | 13.9 | -4.6 | -4.6 | 70% Closed |
| GW16-03 | 23.0 | 16.4 | 11.2 | 49.4 | -5.6 | -5.6 | 80% Closed |
| GW15-03 | 66.2 | 32.2 | 0.0 | 1.6 | -5.7 | -5.7 | 100% Open |
| LCMV5 | 0.1 | 2.9 | 18.0 | 79.0 | -4.3 | -5.4 | 95% Closed. LCMV5 is the smaller wellhead with white house in GW14-03. |
| GW14-03 | 20.2 | 23.3 | 0.4 | 56.1 | -4.1 | -5.4 | 85% Closed |

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | $CH_4$ | $CO_2$ | $O_2$ | Balance | | | |
| GW13-03 | 47.5 | 28.1 | 0.0 | 24.4 | -5.5 | -5.5 | 80% Closed |
| GW12-03 | 70.3 | 28.5 | 0.0 | 1.2 | -5.5 | -5.5 | 50% Closed |
| GW11-03 | 69.5 | 28.0 | 0.8 | 1.7 | -5.4 | -5.4 | 90% Closed |
| GW23-10 | 24.5 | 23.8 | 0.8 | 50.9 | -0.5 | -0.5 | No indicator on valve to determine positioning. |
| GW24-10 | 67.5 | 32.0 | 0.2 | 0.3 | 4.3 | 4.3 | No indicator on valve to determine positioning |
| GW22-10 | 63.2 | 30.1 | 0.3 | 6.4 | -0.1 | -0.3 | 95% Closed |
| GW17-10 | 69.2 | 30.8 | 0.0 | 0.0 | 21.7 | 21.5 | No indicator on valve to determine positioning. Suspected blockage in lateral between GW17-10 and GW13-10. |
| GW20-10 | 45.6 | 29.0 | 0.2 | 25.2 | -2.3 | -5.2 | No indicator on valve to determine positioning |
| GW18-10 | 70.7 | 27.1 | 0.0 | 2.2 | -5.4 | -5.4 | No indicator on valve to determine positioning |
| GW21-10 | 70.1 | 28.8 | 0.5 | 0.6 | 1.3 | 1.1 | No indicator on valve to determine positioning |
| GW19-10 | 60.6 | 30.2 | 0.0 | 9.2 | 0.0 | -5.2 | No indicator on valve to determine positioning. |
| GW10-03 | 65.3 | 27.0 | 1.8 | 5.9 | -5.2 | -5.2 | 30% Closed |
| GW09-03 | 71.5 | 27.7 | 0.0 | 0.8 | -6.4 | -6.4 | 45% Closed |
| GW08-03 | 71.6 | 25.9 | 0.2 | 2.3 | -4.9 | -5.1 | 70% Closed |
| GW18-07 | 66.9 | 30.2 | 0.1 | 2.8 | -5.3 | -5.3 | 100% Open |
| LCMV4 | 9.8 | 10.9 | 10.6 | 68.7 | -0.6 | -5.1 | 85% Closed |
| GW20-07 | 71.5 | 28.3 | 0.0 | 0.2 | 0.9 | 0.2 | 80% Closed |
| GW02-10 | 68.0 | 29.9 | 0.0 | 2.1 | -5.5 | -5.5 | No indicator on valve to determine positioning |
| GW21-07 | 74.0 | 23.4 | 0.4 | 2.2 | -5.2 | -5.2 | 80% Closed |
| GW22-07 | 68.0 | 29.5 | 0.0 | 2.5 | -4.7 | -5.1 | Approximately 80% Closed - Valve indicator sticker missing |
| GW01-10 | 64.6 | 31.5 | 0.0 | 3.9 | -5.4 | -5.4 | No indicator on valve to determine positioning |
| GW03-10 | 68.3 | 29.6 | 0.0 | 2.1 | -5.3 | -5.5 | No indicator on valve to determine positioning |
| GW06-10 | 65.5 | 29.3 | 0.0 | 5.2 | -5.1 | -5.1 | No indicator on valve to determine positioning |

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | CH4 | $CO_2$ | $O_2$ | Balance | | | |
| GW07-10 | 70.2 | 29.0 | 0.0 | 0.8 | -5.4 | -5.4 | No indicator on valve to determine positioning |
| GW08-10 | 68.0 | 28.8 | 2.0 | 1.2 | -5.4 | -5.4 | No indicator on valve to determine positioning |
| GW19-07 | 56.2 | 25.2 | 3.1 | 15.5 | -4.3 | -5.1 | 80% Closed |
| GW16-10 | 45.3 | 28.2 | 0.0 | 26.5 | 0.0 | -4.9 | No indicator on valve to determine positioning |
| GW15-10 | 71.7 | 28.0 | 0.0 | 0.3 | -4.7 | -4.7 | No indicator on valve to determine positioning |
| GW12-10 | 71.7 | 27.7 | 0.0 | 0.6 | -5.2 | -5.2 | No indicator on valve to determine positioning |
| GW11-10 | 71.1 | 28.8 | 0.0 | 0.1 | 41.0 | -5.1 | No indicator on valve to determine positioning. |
| GW14-10 | 68.8 | 29.3 | 0.0 | 1.9 | -5.1 | -5.1 | No indicator on valve to determine positioning |
| GW13-10 | 67.6 | 32.3 | 0.0 | 0.1 | 12.1 | 11.2 | No indicator on valve to determine positioning. GW13-10 is connected to GW14-10 lateral above ground as buried lateral from GW13-10 heading North is considered compromised. Lateral between GW13-10 and GW17-10 also suspected to be compromised. |
| GW10-10 | 66.5 | 32.9 | 0.1 | 0.5 | -5.3 | -5.3 | 80% Closed |
| GW09-10 | 66.8 | 33.1 | 0.1 | 0.0 | -5.1 | -5.5 | No indicator on valve to determine positioning |
| NFA Perimeter LFG System | 8.0 | 20.1 | 14.6 | 57.3 | - | - | |
| NGW-1 | 64.0 | 32.0 | 1.4 | 2.6 | -8.6 | -8.6 | 50% Closed |
| NGW-2 | 64.3 | 32.9 | 0.0 | 2.8 | -7.6 | -7.6 | 75% Closed |
| NGW-3 | 67.8 | 32.0 | 0.0 | 0.2 | -8.1 | -9.1 | 30% Closed |
| NGW-4 | 65.5 | 33.1 | 0.0 | 1.4 | -9.1 | -9.1 | 40% closed |
| NGW-5 | 66.3 | 33.7 | 0 | 0.0 | -8.5 | -8.5 | 75% Closed |
| NGW-9 | 63.4 | 32.9 | 0.0 | 3.7 | -8.7 | -8.7 | 60% Closed |
| NGW-14 | 66.4 | 33.0 | 0.0 | 0.6 | -8.6 | -8.6 | 70% Closed |
| HC-3 | 4.7 | 22.4 | 11.2 | 61.7 | 7.9 | 0.0 | 100% Closed |
| HC-1 | 64.9 | 34.5 | 0.0 | 0.6 | -10.7 | -10.7 | 20% Closed |

Notes:
1. To convert from inches of water to kPa divide by 4.01.
2. Static pressure is the pressure of the monitoring point relative to the atmospheric pressure. (http://www.geotechuk.com/technical-faqs/ga2000-and-gem2000-platform/pressure-definitions.aspx)
3. Differential pressure is the pressure exerted by a gas when the body on which the pressure is exerted is not in motion. (http://www.geotechuk.com/technical-faqs/ga2000-and-gem2000-platform/pressure-definitions.aspx)

## Peterborough County/City Waste Management Facility
## Landfill Gas Monitoring

Date: 22-Dec-22

Measurements from Gas Utilization Plant Equipment:

Pressure at Gas Utilization Plant: N/A "$H_20$

Flow at Gas Utilization Plant: N/A cfm

Temp. at Gas Utilization Plant: N/A degrees C at point of entry

Notes:
- Gas Utilization Plant (GUP) operating.
- Minimal odours observed onsite in the NFA and SFA during survey.
- Cell 4 construction complete.
- No pressure on system observed in SFA during event. The City was notified. The following day the City confirmed the condensate pump stopped operating and filled the condensate trap with leachate not allowing gas flow to the GUP.

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | $CH_4$ | $CO_2$ | $O_2$ | Balance | | | |
| Gas Utilization Plant | - | - | - | - | - | - | - GUP operating, PUG was not onsite during monitoring event. |
| GW04-10 | 66.2 | 31.6 | 1.0 | 1.2 | -0.1 | -0.1 | No indicator on valve to determine positioning. |
| GW05-10 | 69.1 | 30.9 | 0.0 | 0.0 | 1.1 | 1.2 | No indicator on valve to determine positioning |
| GW06-03 | 62.7 | 34.7 | 0.0 | 2.6 | 0.0 | 0.0 | 40% Closed |
| GW07-03 | 63.2 | 34.7 | 0.0 | 2.1 | 0.0 | 0.0 | 95% Closed |
| GW05-00 | 62.1 | 34.7 | 0.0 | 3.2 | -0.1 | -0.1 | 95% Closed |
| GW04-00 | 61.9 | 34.6 | 0.0 | 3.5 | -0.1 | -0.1 | 95% Closed |
| LCMV1 | 23.2 | 16.4 | 9.0 | 51.4 | 0.0 | 0.0 | 90% Closed |
| GW03-00 | 64.3 | 33.0 | 1.2 | 1.5 | 0.0 | 0.0 | 30% Closed |
| LCMV2 | 63.8 | 33.9 | 0.0 | 2.3 | 0.0 | 0.0 | 80% Closed |
| GW02-00 | 64.6 | 32.9 | 0.0 | 2.5 | 0.0 | 0.0 | 100% Open |
| GW01-00 | 67.3 | 30.8 | 0.0 | 1.9 | 0.0 | 0.0 | 20% Closed |
| LCMV3 | 63.3 | 33.8 | 0.0 | 2.9 | 0.0 | 0.0 | 70% Closed |
| GW17-03 | 66.9 | 32.3 | 0.0 | 0.8 | 1.3 | 0.0 | 70% Closed |
| GW16-03 | 64.4 | 32.0 | 0.0 | 3.6 | 0.0 | 0.0 | 80% Closed |
| GW15-03 | 66.0 | 32.0 | 0.0 | 2.0 | 0.0 | 0.0 | 100% Open |
| LCMV5 | 63.5 | 31.0 | 0.0 | 5.5 | 0.0 | 0.0 | 95% Closed. LCMV5 is the smaller wellhead with white house in GW14-03. |
| GW14-03 | 45.4 | 25.2 | 4.3 | 25.1 | 0.0 | 0.0 | 85% Closed |

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | $CH_4$ | $CO_2$ | $O_2$ | Balance | | | |
| GW13-03 | 68.3 | 30.7 | 0.0 | 1.0 | 0.0 | 0.0 | 80% Closed |
| GW12-03 | 70.7 | 29.3 | 0.0 | 0.0 | 0.1 | 0.0 | 45% Closed |
| GW11-03 | 70.4 | 28.4 | 0.0 | 1.2 | 0.0 | 0.0 | 90% Closed |
| GW23-10 | 67.8 | 30.9 | 0.7 | 0.6 | 0.2 | 0.0 | No indicator on valve to determine positioning. |
| GW24-10 | 66.6 | 31.6 | 0.0 | 1.8 | 3.8 | 3.8 | No indicator on valve to determine positioning |
| GW22-10 | 67.1 | 31.5 | 0.0 | 1.4 | 0.9 | 0.0 | 95% Closed |
| GW17-10 | 69.1 | 30.9 | 0.0 | 0.0 | 22.8 | 22.8 | No indicator on valve to determine positioning. Suspected blockage in lateral between GW17-10 and GW13-10. |
| GW20-10 | 66.8 | 30.9 | 0.0 | 2.3 | 0.2 | 0.0 | No indicator on valve to determine positioning |
| GW18-10 | 69.4 | 30.6 | 0.0 | 0.0 | 0.0 | 0.0 | No indicator on valve to determine positioning |
| GW21-10 | 72.0 | 27.9 | 0.0 | 0.1 | 1.0 | 0.0 | No indicator on valve to determine positioning |
| GW19-10 | 62.5 | 27.6 | 0.6 | 9.3 | 0.1 | 0.3 | No indicator on valve to determine positioning. |
| GW10-03 | 71.8 | 28.2 | 0.0 | 0.0 | 0.2 | 0.2 | 30% Closed |
| GW09-03 | 73.6 | 26.3 | 0.0 | 0.1 | 0.1 | 0.0 | 45% Closed |
| GW08-03 | 73.2 | 26.6 | 0.0 | 0.2 | 0.2 | 0.2 | 75% Closed |
| GW18-07 | 67.9 | 31.3 | 0.1 | 0.7 | 0.0 | 0.0 | 100% Open |
| LCMV4 | 60.1 | 28.9 | 0.0 | 11.0 | 0.0 | 0.0 | 85% Closed |
| GW20-07 | 71.3 | 28.7 | 0.0 | 0.0 | 2.2 | 2.2 | 80% Closed |
| GW02-10 | 67.9 | 31.6 | 0.0 | 0.5 | 0.0 | 0.0 | No indicator on valve to determine positioning |
| GW21-07 | 72.9 | 26.7 | 0.0 | 0.4 | 0.0 | 0.0 | 90% Closed |
| GW22-07 | 67.7 | 31.3 | 0.0 | 1.0 | 0.0 | 0.0 | Approximately 80% Closed - Valve indicator sticker missing |
| GW01-10 | 65.8 | 32.1 | 0.8 | 1.3 | 0.0 | 0.0 | No indicator on valve to determine positioning |
| GW03-10 | 68.2 | 31.3 | 0.0 | 0.5 | 0.1 | 0.1 | No indicator on valve to determine positioning |
| GW06-10 | 67.9 | 31.2 | 0.0 | 0.9 | 0.0 | 0.0 | No indicator on valve to determine positioning |

| Well | Gas Concentrations (%) | | | | Static Pressure on the well (inches $H_2O$) | Static Pressure on the system (inches $H_2O$) | Comments |
|---|---|---|---|---|---|---|---|
| | CH4 | $CO_2$ | $O_2$ | Balance | | | |
| GW07-10 | 70.1 | 29.8 | 0.0 | 0.1 | 0.0 | 0.0 | No indicator on valve to determine positioning |
| GW08-10 | 68.9 | 29.9 | 0.0 | 1.2 | 0.0 | 0.0 | No indicator on valve to determine positioning |
| GW19-07 | 70.7 | 29.1 | 0.0 | 0.2 | 0.0 | 0.0 | 85% Closed |
| GW16-10 | 65.1 | 31.5 | 0.0 | 3.4 | 0.0 | 0.1 | No indicator on valve to determine positioning |
| GW15-10 | 71.7 | 28.2 | 0.0 | 0.1 | 0.0 | 0.0 | No indicator on valve to determine positioning |
| GW12-10 | 71.4 | 28.0 | 0.0 | 0.6 | 0.1 | 0.1 | No indicator on valve to determine positioning |
| GW11-10 | 70.6 | 29.4 | 0.0 | 0.0 | 0.1 | 0.1 | No indicator on valve to determine positioning. |
| GW14-10 | 69.2 | 30.8 | 0.0 | 0.0 | 0.0 | 0.0 | No indicator on valve to determine positioning |
| GW13-10 | 67.5 | 32.2 | 0.0 | 0.3 | 0.0 | 0.1 | No indicator on valve to determine positioning. GW13-10 is connected to GW14-10 lateral above ground as buried lateral from GW13-10 heading North is considered compromised. Lateral between GW13-10 and GW17-10 also suspected to be compromised. |
| GW10-10 | 65.5 | 32.7 | 0.0 | 1.8 | 0.1 | 0.0 | 80% Closed |
| GW09-10 | 66.9 | 32.9 | 0.0 | 0.2 | 0.0 | 0.0 | No indicator on valve to determine positioning |
| NFA Perimeter LFG System | - | - | - | - | - | - | No Flow |
| NGW-1 | 66.9 | 32.6 | 0.0 | 0.5 | -14.7 | -14.7 | 50% Closed |
| NGW-2 | 58.6 | 30.2 | 3.9 | 7.3 | -14.6 | -14.6 | 80% Closed |
| NGW-3 | 67.8 | 32.1 | 0.0 | 0.1 | -14.6 | -14.6 | 30% Closed |
| NGW-4 | 67.3 | 32.4 | 0.0 | 0.3 | 6.2 | 6.3 | 40% closed |
| NGW-5 | 66.6 | 33.3 | 0.0 | 0.1 | -14.6 | -14.2 | 75% Closed |
| NGW-9 | 66.6 | 33.4 | 0.0 | 0.0 | -10.7 | -10.7 | 60% Closed |
| NGW-14 | 66.6 | 33.2 | 0.0 | 0.2 | -10.6 | -10.6 | 70% Closed |
| HC-3 | 8.8 | 26.1 | 5.0 | 60.1 | -1.0 | -12.3 | 100% Closed |
| HC-1 | 30.2 | 20.7 | 9.2 | 39.9 | -8.7 | -14.6 | 20% Closed |

Notes:
1. To convert from inches of water to kPa divide by 4.01.
2. Static pressure is the pressure of the monitoring point relative to the atmospheric pressure. (http://www.geotechuk.com/technical-faqs/ga2000-and-gem2000-platform/pressure-definitions.aspx)
3. Differential pressure is the pressure exerted by a gas when the body on which the pressure is exerted is not in motion. (http://www.geotechuk.com/technical-faqs/ga2000-and-gem2000-platform/pressure-definitions.aspx)

# 2022 LANDFILL SURFACE MONITORING

## PETERBOROUGH COUNTY/CITY WASTE MANAGEMENT FACILITY

PROJECT NO.: 111-53296-14

DATE: January 2023

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UNIT 2
126 DON HILLOCK DRIVE
AURORA, ON, CANADA L4G 0G9

T: +1 905 750-3080
F: +1 905 727-0463
WSP.COM

January 10, 2023

Don Briand
Coordinator, Waste Operations
City of Peterborough
500 George Street North
Peterborough, Ontario
K9H 3R9

**Subject: 2022 Landfill Surface Monitoring
Peterborough County/City Waste Management Facility**

Dear Mr. Briand

WSP Canada Inc. (WSP) is pleased to provide the results of the surface emission study for the above noted site. The field sampling program was completed on November 23 and 24, 2022. The sampling program consisted of a walk-over survey of the capped South Fill Area (SFA) landfill using a handheld flame ionization detector (FID) for total hydrocarbons (THC) analysis and a photo ionization detector (PID) for combustible gas analysis. The purpose of this monitoring was to determine areas of elevated THC and combustible gas concentrations, which are indicators of areas in which landfill gas may be escaping through the existing cover soils. Although methane gas is odourless, it is a surrogate measurement for a leak where the odourous compounds such as total reduced sulphur (TRS) compounds or volatile organic compounds (VOCs) may be emitted from the landfill site.

## SAMPLING METHODOLOGY

The monitoring was based on procedures outlined in the South Coast Air Quality Management District Rule 1150.2 "*CONTROL OF GASEOUS EMISSIONS FROM MUNICIPLE SOLID WASTE LANDFILLS"* (Rule 1150.2).

The landfill monitoring consisted of walking over the covered landfill using a THC and PID analyzer. Equipment used to collect the measurements was a Thermofisher model TVA2020. The TVA2020 can use both FID and PID simultaneously. The FID measures organic compounds by flame ionization detection, which is based upon the increase in electrical conductivity caused by generation of ions when the analyte passes through a high temperature flame of burning hydrogen/air. The FID was calibrated against methane gas as per U.S. EPA guidance. The FID was used as a THC analyzer in the study. The PID consists of an ultraviolet (UV) lamp of a specific energy and an ionization chamber and is used to detect aromatics, unsaturated hydrocarbons and chlorinated hydrocarbons as well as some inorganic gases. The PID was calibrated to isobutylene and used to sample combustible gases.

Unit 2
126 Don Hillock Drive
Aurora, ON, Canada L4G 0G9
T: +1 905 750-3080
F: +1 905 727-0463

Since both TVA2020 detectors can be displayed and logged simultaneously, the relative signal response of the two detectors will provide some reference about the identity of the compounds being measured. For instance, the PID does not respond to the presence of methane gas, but the FID responds readily to compounds containing carbon and hydrogen. A high FID reading with virtually no PID response might indicate the presence of methane gas. Consequently, PIDs respond very well to the presence of some inorganic gases which the FID cannot detect. A high PID reading with no FID reading might suggest the presence of an inorganic compound. The TVA2020 allows readings from both detectors to be readily available, the unit can help a user make decisions about a certain type of organic compound present and which detector reading to use.

The monitoring was conducted in a grid formation, measuring the THC and combustible gas concentrations at approximately five (5) centimeters (cm) above the ground. Measurements were obtained along a pre-defined grid with spacing in the north-south and east-west direction of 20 meters, unless "hotspots" were identified. "Hotspots" are defined as any visible cracking larger than five (5) cm in width, areas of bubbling surface water, areas with no vegetation, and/or areas consisting of dead vegetation. These "hotspots", if identified, were measured in addition to the points along the pre-defined grid pattern.

In accordance with Rule 1150.2 methodology, the maximum concentration of organic compounds as methane, measured at any point on the surface of the landfill, shall not exceed 500 ppm. Any areas or points exhibiting readings higher than 500 ppm THC, as methane, were noted as part of this monitoring event. These points were marked by recording the UTM co-ordinates from a GPS. The results of the monitoring are presented in **Table 1**, and the locations are shown in **Figure 1**.

## RESULTS

During the monitoring survey, a WSP representative walked over approximately two thirds of the refuse area monitoring THC and combustible gas levels. During the survey, the ambient temperature ranged between 2 °C and 5 °C, and wind was light, approximately 2 km/h. There had been no measurable precipitation for the 72 hours preceding the sampling days. These conditions were considered acceptable for the monitoring program.

Due to equipment malfunction, THC and combustible gas monitoring was aborted on November 10, 2022. Monitoring resumed on November 23 and November 24, 2022. Site conditions provided only a limited window to obtain measurements on both days. As such, measurements were not acquired for approximately one third of the refuse area (to the NW of site) and the 2022 monitoring survey was partially completed.

A majority of the closed landfill site is covered in vegetation with some small barren areas and some unpaved roads. There were only a few sample locations (3 out of 188) that had a THC concentration greater than 500 ppm, all of which came from maintenance holes or barren patches. The survey locations can be found on Figure 1 and Table 1.

## DISCUSSION

Three (3) survey locations on the capped SFA landfill had a concentration of over 500 ppm for THC. WSP presents the following summary of the findings:

- Physical areas on the SFA surface that had high concentrations of THC were relatively small. WSP recommends that barren points where emissions exceeding 500 ppm were observed be further assessed to determine if the final cover was damaged. If so, appropriate repairs should be made during the 2023 construction season; and,
- Several of the maintenance holes and barren areas with elevated THC reading recorded during the 2021 survey were no longer elevated above 500 ppm during the site visit in 2022.
- Two (2) of three (3) THC readings were detected emanating from maintenance holes connected to the leachate collection system and nearby monitoring wells. It is likely that landfill gas is entering the leachate collection system and being released through these manholes. As with previous maintenance holes on site, WSP can assist with additional reviews and remediation work at these locations, if requested.
- There were no areas where THC concentrations were elevated above 500 ppm that were not already identified in the 2021 survey.

As part of the routine site inspections completed by City staff for the site, visual indicators of gas emissions should be identified, including bubbling surface water, dead vegetation, or visible cracking larger than five (5) cm in width. If the findings from site inspections suggest a potential change in the cover material, then additional quantitative measurements may be required.

We trust that this letter is satisfactory for your needs. If you have any questions or comments, please contact the undersigned.

Yours truly,

**WSP Canada Inc.**

Josh G

Josh Guthrie, B.Sc.
Environmental Technician
Monitoring

Roy Sabino, P.Eng.
Team Lead, Senior Air Quality Engineer

# FIGURES


LEGEND

SAMPLE LOCATION EXHIBITING READING HIGHER THAN 500 ppm THC (THC CONCENTRATION)

30 15 0 30 Metres

N W E S

CLIENT:

CITY OF PETERBOROUGH

PROJECT:

2022 LANDFILL SURVEY MONITORING

| PROJECT NO: | DATE: |
|---|---|
| 111-53296-14 | DECEMBER 2022 |

DESIGNED BY: -

DRAWN BY: JG

CHECKED BY: RS

| FIGURE NO: | SCALE: |
|---|---|
| 1 | 1:3,000 |

TITLE:

2021 LANDFILL SURVEY GAS MONITORING

DISCIPLINE: ENVIRONMENT

ISSUE:

REV.: -

# APPENDIX

# A

## SUMMARY OF LANDFILL SURFACE MONITORING RESULTS

Table 1: Summary of Landfill Surface Monitoring Locations with Results Above 500 ppm
2022 Landfill Surface Monitoring
Peterborough County/City Waste Management Facility
Project Number: 111-53296-14

| SAMPLE ID | PID | FID | UTM E | UTM N | FEATURE |
|---|---|---|---|---|---|
| 36 | 0 | 3058 | 716841 | 4899698 | Maintenance Hole |
| 90 | 0 | 3253 | 716944 | 4899721 | Maintenance Hole LC-06 |
| 188 | 0 | 752 | 716869 | 4899829 | GW24-10, Barren/Vegetated |

Table 2: Landfill Surface Monitoring Locations
2022 Landfill Surface Monitoring
Peterborough County/City Waste Management Facility
Project Number: 111-53296-14

| SAMPLE ID | PID | FID | UTM E | UTM N | FEATURE |
|---|---|---|---|---|---|
| 1 | 0 | 0.2 | 717025 | 4900312 | Maintenance Hole 13 |
| 2 | 0 | 0.2 | 717035 | 4900290 | Vegetated Area |
| 3 | 0 | 0.1 | 717037 | 4900282 | Maintenance Hole 14 |
| 4 | 0 | 0.5 | 717043 | 4900262 | Vegetated Area |
| 5 | 0 | 0.1 | 717047 | 4900254 | Maintenance Hole 15 |
| 6 | 5.9 | 371 | 717058 | 4900226 | Maintenance Hole J1 |
| 7 | 0 | 0.1 | 717068 | 4900201 | Maintenance Hole J2 |
| 8 | 0 | 0.1 | 717071 | 4900180 | Vegetated Area |
| 9 | 0 | 0 | 717080 | 4900170 | Maintenance Hole J3 |
| 10 | 0 | 0.2 | 717090 | 4900154 | Vegetated Area |
| 11 | 0 | 0.3 | 717097 | 4900138 | Maintenance Hole |
| 12 | 0 | 0.3 | 717107 | 4900118 | Maintenance Hole on Road |
| 13 | 0 | 0.1 | 717111 | 4900098 | Vegetated Area |
| 14 | 0 | 0.1 | 717114 | 4900078 | Vegetated Area |
| 15 | 0 | 0.1 | 717111 | 4900053 | Vegetated Area |
| 16 | 0 | 0 | 717102 | 4900026 | Holding tank |
| 17 | 0 | 0 | 717104 | 4899997 | Vegetated Area |
| 18 | 0 | 0.1 | 717103 | 4899970 | Vegetated Area |
| 19 | 0 | 0.1 | 717095 | 4899937 | Vegetated Area |
| 20 | 0 | 0.9 | 717087 | 4899907 | Vegetated Area |
| 21 | 0 | 0.4 | 717076 | 4899873 | Vegetated Area |
| 22 | 0 | 0.4 | 717065 | 4899846 | Vegetated Area |
| 23 | 0 | 0.3 | 717056 | 4899824 | Vegetated Area |
| 24 | 0 | 0.3 | 717042 | 4899808 | Maintenance Hole |
| 25 | 0 | 0.1 | 717039 | 4899789 | Vegetated Area |
| 26 | 0 | 0.2 | 717021 | 4899769 | Vegetated Area |
| 27 | 0 | 0 | 717018 | 4899743 | Vegetated Area |
| 28 | 0 | 0 | 716998 | 4899722 | Barren |
| 29 | 0 | 0 | 716978 | 4899705 | Vegetated Area |
| 30 | 0 | 0 | 716952 | 4899696 | Vegetated Area |
| 31 | 0 | 0.1 | 716927 | 4899683 | Vegetated Area |
| 32 | 0 | 1.0 | 716902 | 4899678 | Vegetated Area |
| 33 | 1.5 | 21.6 | 716893 | 4899672 | Maintenance Hole |
| 34 | 0 | 30.6 | 716860 | 4899677 | Vegetated Area |
| 35 | 0 | 41.3 | 716852 | 4899687 | Barren |
| 36 | 2.4 | 3058 | 716841 | 4899698 | Maintenance Hole |
| 37 | 0 | 0.7 | 716872 | 4899695 | Maintenance Hole HC01 |
| 38 | 0 | 0.1 | 716892 | 4899701 | Vegetated Area |
| 39 | 0 | 1.8 | 716944 | 4899721 | Maintenance Hole HC02 |
| 40 | 0 | 0.7 | 716951 | 4899728 | Maintenance Hole LC01 |
| 41 | 0 | 0.5 | 716980 | 4899746 | Vegetated Area |
| 42 | 0 | 1.2 | 716990 | 4899745 | Barren |
| 43 | 0 | 0.2 | 717005 | 4899763 | Barren |
| 44 | 0 | 0.3 | 717046 | 4899779 | Vegetated Area |
| 45 | 0 | 0.4 | 717024 | 4899800 | Vegetated Area |
| 46 | 0 | 0.6 | 717034 | 4899821 | Vegetated Area |
| 47 | 0 | 0.6 | 717043 | 4899838 | Vegetated Area |

Table 2: Landfill Surface Monitoring Locations
2022 Landfill Surface Monitoring
Peterborough County/City Waste Management Facility
Project Number: 111-53296-14

| SAMPLE ID | PID | FID | UTM E | UTM N | FEATURE |
|---|---|---|---|---|---|
| 48 | 0 | 1.0 | 717050 | 4899857 | Barren |
| 49 | 0 | 0.4 | 717056 | 4899874 | Vegetated Area |
| 50 | 0 | 0.4 | 717065 | 4899895 | Vegetated Area |
| 51 | 0 | 0.5 | 717071 | 4899911 | Maintenance Hole |
| 52 | 0 | 0.4 | 717076 | 4899929 | Vegetated Area |
| 53 | 0 | 0.4 | 717084 | 4899936 | Vegetated Area |
| 54 | 0 | 16 | 717085 | 4899963 | Barren |
| 55 | 0 | 0.4 | 717085 | 4899986 | Vegetated Area |
| 56 | 0 | 1.3 | 717084 | 4900006 | Vegetated Area |
| 57 | 0 | 38.5 | 717083 | 4900022 | Barren |
| 58 | 0 | 4.2 | 717085 | 4900044 | Barren |
| 59 | 0 | 1.6 | 717087 | 4900063 | Vegetated Area |
| 60 | 0 | 0.5 | 717092 | 4900083 | Vegetated Area |
| 61 | 0 | 0.6 | 717087 | 4900107 | Vegetated Area |
| 62 | 0 | 3.3 | 717078 | 4900123 | Vegetated Area |
| 63 | 0 | 6.1 | 717067 | 4900143 | Vegetated Area |
| 64 | 0 | 204 | 717055 | 4900163 | LMV 3 |
| 65 | 0 | 0.7 | 717045 | 4900178 | Vegetated Area |
| 66 | 0 | 0.5 | 717034 | 4900193 | Vegetated Area |
| 67 | 0 | 0.3 | 717028 | 4900206 | Vegetated Area |
| 68 | 0 | 0.3 | 717022 | 4900220 | Vegetated Area |
| 69 | 0 | 1.4 | 717017 | 4900232 | Vegetated Area |
| 70 | 0 | 1.8 | 717011 | 4900251 | Vegetated Area |
| 71 | 0 | 1.2 | 717004 | 4900269 | Vegetated Area |
| 72 | 0 | 0.9 | 716994 | 4900280 | Vegetated Area |
| 73 | 0 | 0.8 | 716985 | 4900291 | Vegetated Area |
| 74 | 0 | 0.6 | 716976 | 4900302 | Barren/Vegetated |
| 75 | 0 | 0.7 | 716967 | 4900313 | Barren/Vegetated |
| 76 | 0 | 0.8 | 716972 | 4900298 | Barren/Vegetated |
| 77 | 0 | 0.4 | 716974 | 4900282 | Vegetated Area |
| 78 | 0 | 0.4 | 716979 | 4900257 | Vegetated Area |
| 79 | 0 | 0.3 | 716989 | 4900235 | Vegetated Area |
| 80 | 0 | 0.2 | 716999 | 4900213 | GW2-0, Vegetated Area |
| 81 | 0 | 0.2 | 717012 | 4900187 | Vegetated Area |
| 82 | 0 | 3.7 | 717026 | 4900162 | GW1-0, Vegetated Area |
| 83 | 0 | 0.3 | 717036 | 4900139 | Vegetated Area |
| 84 | 0 | 0.5 | 717046 | 4900117 | Maintenance Hole |
| 85 | 0 | 1.3 | 717056 | 4900093 | Vegetated Area |
| 86 | 0 | 1.0 | 717067 | 4900070 | Vegetated Area |
| 87 | 0 | 1.2 | 717063 | 4900047 | Vegetated Area |
| 88 | 0 | 2.4 | 717060 | 4900025 | Maintenance Hole |
| 89 | 0 | 0.4 | 717055 | 4900003 | Vegetated Area |
| 90 | 1.5 | 3253 | 717051 | 4899981 | Maintenance Hole LC-06 |
| 91 | 0 | 0.5 | 717042 | 4899953 | Vegetated Area |
| 92 | 1.5 | 46.4 | 717034 | 4899926 | Maintenance Hole |
| 93 | 0 | 63.5 | 717030 | 4899915 | Maintenance Hole/Gravel/Veg |
| 94 | 0 | 0.3 | 717024 | 4899895 | Maintenance Hole by 16-03 |

Table 2: Landfill Surface Monitoring Locations
2022 Landfill Surface Monitoring
Peterborough County/City Waste Management Facility
Project Number: 111-53296-14

| SAMPLE ID | PID | FID | UTM E | UTM N | FEATURE |
|---|---|---|---|---|---|
| 95 | 0 | 23.8 | 717015 | 4899868 | Maintenance Hole South OF 16-03 |
| 96 | 0 | 0.3 | 717006 | 4899840 | Vegetated Area |
| 97 | 0 | 2.3 | 716999 | 4899822 | Maintenance Hole |
| 98 | 0 | 0.4 | 716986 | 4899793 | GW15-03 |
| 99 | 0 | 0.5 | 716977 | 4899772 | Maintenance Hole |
| 100 | 0 | 0.4 | 716954 | 4899764 | Vegetated Area |
| 101 | 0 | 0.5 | 716960.5 | 4899784 | Vegetated Area |
| 102 | 0 | 0.5 | 716967 | 4899804 | Vegetated Area |
| 103 | 0 | 2.8 | 716980 | 4899825 | Barren |
| 104 | 0 | 6.3 | 716983 | 4899844 | Barren |
| 105 | 0 | 4.9 | 716989 | 4899848 | Barren/Vegetated |
| 106 | 0 | 5.2 | 716995 | 4899894 | Barren/Vegetated |
| 107 | 0 | 3.7 | 717005 | 4899913 | Barren/Vegetated |
| 108 | 0 | 0.4 | 717012 | 4899943 | Barren/Vegetated |
| 109 | 0 | 0.3 | 717022 | 4899973 | Vegetated Area |
| 110 | 0 | 0.4 | 717026 | 4899993 | Barren/Vegetated |
| 111 | 0 | 0.4 | 717037 | 4900026 | Vegetated Area |
| 112 | 0 | 0.5 | 717039 | 4900052 | Vegetated Area |
| 113 | 0 | 0.2 | 717034 | 4900084 | Vegetated Area |
| 114 | 0 | 0.1 | 717022 | 4900117 | Vegetated Area |
| 115 | 0 | 0.2 | 717010 | 4900144 | Vegetated Area |
| 116 | 0 | 3.1 | 716998 | 4900167 | Barren |
| 117 | 0 | 4.6 | 716986 | 4900207 | Barren |
| 118 | 0 | 23.5 | 716968 | 4900238 | Barren |
| 119 | 0 | 78.1 | 716955 | 4900261 | Barren |
| 120 | 0 | 104 | 716947 | 4900280.5 | Vegetated Area |
| 121 | 0 | 44.7 | 716941 | 4900300 | Vegetated Area |
| 122 | 0 | 5.8 | 716917 | 4900284 | Vegetated Area |
| 123 | 0 | 7.7 | 716922 | 4900265 | Vegetated Area |
| 124 | 0 | 2.4 | 716929 | 4900241 | Vegetated Area |
| 125 | 0 | 0.9 | 716940 | 4900217 | Vegetated Area |
| 126 | 0 | 0.8 | 716944 | 4900184 | Vegetated Area |
| 127 | 0 | 0.7 | 716948 | 4900153 | Vegetated Area |
| 128 | 0 | 0.9 | 716965 | 4900103 | Vegetated Area |
| 129 | 0 | 1.2 | 716971 | 4900085 | Vegetated Area |
| 130 | 0 | 0.4 | 716980 | 4900069 | Vegetated Area |
| 131 | 0 | 0.2 | 716985 | 4900045 | Vegetated Area |
| 132 | 0 | 1.1 | 716992 | 4900027 | Vegetated Area |
| 133 | 0 | 22.1 | 717008 | 4900013 | GW09-03, Vegetated Area |
| 134 | 0 | 1.3 | 717002 | 4899989 | Vegetated Area |
| 135 | 0 | 5.2 | 716995 | 4899959 | GW10-03, Vegetated Area |
| 136 | 0 | 0.7 | 716984 | 4899936 | Vegetated Area |
| 137 | 0 | 1.2 | 716973 | 4899911 | Vegetated Area |
| 138 | 0 | 0.9 | 716966 | 4899885 | Vegetated Area |
| 139 | 0 | 4.3 | 716957 | 4899854 | GW12-03, Vegetated Area |
| 140 | 0 | 1.1 | 716942 | 4899830 | Vegetated Area |
| 141 | 0 | 0.7 | 716930 | 4899805 | S of GW13-03, Vegetated Area |

Table 2: Landfill Surface Monitoring Locations
2022 Landfill Surface Monitoring
Peterborough County/City Waste Management Facility
Project Number: 111-53296-14

| SAMPLE ID | PID | FID | UTM E | UTM N | FEATURE |
|---|---|---|---|---|---|
| 142 | 0 | 0.1 | 716918 | 4899788 | Vegetated Area |
| 143 | 0 | 1.1 | 716910 | 4899770 | GW14-03, Vegetated Area |
| 144 | 0 | 0.1 | 716881 | 4899759 | Vegetated Area |
| 145 | 0 | 8.3 | 716851 | 4899753 | Vegetated Area |
| 146 | 0 | 17.4 | 716820 | 4899746 | Vegetated Area |
| 147 | 0 | 5.8 | 716800 | 4899747 | Barren/Road |
| 148 | 0 | 3.6 | 716806 | 4899781 | Barren/Road |
| 149 | 0 | 0.9 | 716833 | 4899778 | Vegetated Area |
| 150 | 0 | 6.3 | 716860 | 4899787 | Vegetated Area |
| 151 | 0 | 1.4 | 716880 | 4899800 | Vegetated Area |
| 152 | 0 | 1.9 | 716901 | 4899821 | Vegetated Area |
| 153 | 0 | 5.7 | 716918 | 4899847 | Vegetated Area |
| 154 | 0 | 4.2 | 716923 | 4899874 | Vegetated Area |
| 155 | 0 | 2.6 | 716939 | 4899900 | Barren |
| 156 | 0 | 0.7 | 716945 | 4899921 | Vegetated Area |
| 157 | 0 | 42.9 | 716953 | 4899943 | GW21-10, Vegetated Area |
| 158 | 0 | 0.6 | 716961 | 4899966 | Vegetated Area |
| 159 | 0 | 3.2 | 716964 | 4899987 | GW19-10, Vegetated Area |
| 160 | 0 | 2.3 | 716957 | 4900018 | Vegetated Area |
| 161 | 0 | 1.1 | 716947 | 4900041 | Vegetated Area |
| 162 | 0 | 2.8 | 716935 | 4900059 | Vegetated Area |
| 163 | 0 | 3.1 | 716927 | 4900088 | Vegetated Area |
| 164 | 0 | 2.4 | 716916 | 4900115 | Vegetated Area |
| 165 | 0 | 3.5 | 716906 | 4900136 | Vegetated Area |
| 166 | 0 | 3.8 | 716895 | 4900164 | Vegetated Area |
| 167 | 0 | 2.0 | 716890 | 4900185 | Vegetated Area |
| 168 | 0 | 11.7 | 716882 | 4900208 | Vegetated Area |
| 169 | 0 | 57.1 | 716881 | 4900225 | Vegetated Area |
| 170 | 0 | 64.3 | 716878 | 4900248 | Barren/Vegetated |
| 171 | 0 | 3.7 | 716871 | 4900273 | Vegetated Area |
| 172 | 0 | 66.9 | 716848 | 4900268 | Barren/Vegetated |
| 173 | 0 | 3.3 | 716850 | 4900247 | Vegetated Area |
| 174 | 0 | 11.9 | 716860 | 4900225 | GW05-00, Vegetated Area |
| 175 | 0 | 150 | 716856 | 4900187 | GW, Barren |
| 176 | 0 | 1.9 | 716860 | 4900155 | Vegetated Area |
| 177 | 0 | 3.2 | 716867 | 4900125 | Vegetated Area |
| 178 | 0 | 2.2 | 716880 | 4900097 | Vegetated Area |
| 179 | 0 | 4.3 | 716890 | 4900070 | Vegetated Area |
| 180 | 0 | 4.7 | 716900 | 4900042 | Vegetated Area |
| 181 | 0 | 51.9 | 716910 | 4900011 | Barren/Vegetated |
| 182 | 0 | 2.2 | 716925 | 4899986 | Vegetated Area |
| 183 | 0 | 5.7 | 716909 | 4899961 | GW18-10, Vegetated Area |
| 184 | 0 | 2.8 | 716907 | 4899928 | GW20-10, Barren |
| 185 | 0 | 3.3 | 716897 | 4899908 | Vegetated Area |
| 186 | 0 | 11.1 | 716888 | 4899882 | Vegetated Area |
| 187 | 0 | 1.7 | 716880 | 4899850 | Vegetated Area |
| 188 | 0 | 752 | 716869 | 4899829 | GW24-10, Barren/Vegetated |

# APPENDIX

# B

## SELECT HOTSPOT PHOTOGRAPHS

**2022 Landfill Surface Monitoring**

**Peterborough County/City Waste Management Facility**

Photograph 1: Location of exceedance at Sample ID 36. THC concentration of 3058 ppm.

Photograph 2: Location of exceedance at Sample ID 90. THC concentration of 3253 ppm.


Photograph 3: Location of exceedance at Sample ID 188. THC concentration of 752 ppm.

# APPENDIX

# L

## MONITORING & SCREENING CHECKLIST

# Appendix D-Monitoring and Screening Checklist
# General Information and Instructions

**General Information: The checklist is to be completed, and submitted with the Monitoring Report.**
**Instructions:** A complete checklist consists of:
(a) a completed and signed checklist, including any additional pages of information which can be attached as needed to provide further details where indicated.
(b) completed contact information for the Competent Environmental Practitioner (CEP)
(c) self-declaration that CEP(s) meet(s) the qualifications as set out below and in Section 1.2 of the Technical Guidance Document.

**Definition of Groundwater CEP:**
For groundwater, the CEP must have expertise in hydrogeology and meet one of the following:
(a) the person holds a licence, limited licence or temporary licence under the *Professional Engineers Act*; or
(b) the person holds a certificate of registration under the *Professional Geoscientists Act, 2000* and is a practicing member, temporary, member or limited member of the Association of Professional Geoscientists of Ontario. O. Reg. 66/08, s. 2..
**Definition of Surface water CEP:**
A CEP for surface water assessments is a scientist, professional engineer or professional geoscientist as described in (a) and (b) above with demonstrated experience and post-secondary education, either a diploma or degree, in hydrology, aquatic ecology, limnology, aquatic biology, physical geography with specialization in surface water, and/or water resource management.

The type of scientific work that a CEP performs must be consistent with that person's education and experience. If an individual has appropriate training and credentials in both groundwater and surface water and is responsible for both areas of expertise, the CEP may then complete and validate both sections of the checklist.

## Monitoring Report and Site Information

| | |
|---|---|
| **Waste Disposal Site (WDS) Name** | Peterborough County/City Waste Management Facility |
| **Location (e.g. street address, lot, concession)** | 1260 Bensfort Road; Part Lots 13, 14, and 15, Concessions 13 and 14 |
| **GPS Location (taken within the property boundary at front gate/ front entry)** | 717033, 4900342, Zone 17, NAD 83 |
| **Municipality** | Township of Otonabee-South Monaghan, County of Peterborough |
| **Client and/or Site Owner** | County/City of Peterborough |
| **Monitoring Period (Year)** | 2022 |
| This Monitoring Report is being submitted under the following: | |
| **Environmental Compliance Approval (ECA) Number (formerly "Certificate of Approval" (C of A)) :** | A341508 |
| **Director's Order No.:** | |
| **Provincial Officer's Order No.:** | |

| | | | |
|---|---|---|---|
| **Other:** | | | |
| **Report Submission Frequency** | (●) **Annual**<br>( ) **Other** | | |
| **The site is:**<br>**(Operation Status)** | (●) **Open**<br>( ) **Inactive**<br>( ) **Closed** | | |
| **Is there an active waste transfer station at the site?** | ( ) **Yes**<br>(●) **No** | | |
| **Does this WDS have a Closure Plan?** | (●) **Not yet submitted**<br>( ) **Submitted and under review**<br>( ) **Submitted and approved** | | |
| **Total Approved Capacity** | 4,445,000 | *Units* | Cubic Metres |
| **Maximum Approved Fill Rate** | 85,000 | *Units* | Tonnes per Year |
| **Total Waste Received within Monitoring Period (Year)** | 46,379 | *Units* | Tonnes |
| **Total Waste Received within Monitoring Period (Year)**<br>*Describe the methodology used to determine this quantity* | Weighed | | |
| **Estimated Remaining Capacity** | 794,100 | *Units* | Cubic Metres |
| **Estimated Remaining Capacity**<br>*Describe the methodology used to determine this quantity* | Direct Survey (GPS/Total Station) | | |
| **Estimated Remaining Capacity**<br>*Date Last Determined* | December 20, 2022 | | |
| **Non-Hazardous Approved Waste Types** | [X] Domestic<br>[X] Industrial, Commercial & Institutional (IC&I)<br>[ ] Source Separated Organics (Green Bin)<br>[ ] Tires | [X] Contaminated Soil<br>[ ] Wood Waste<br>[ ] Blue Box Material<br>[ ] Processed Organics<br>[ ] Leaf and Yard Waste | [ ] Food Processing/Preparation Operations Waste<br>[ ] Hauled Sewage<br>Other: Asbestos |
| **Subject Waste Approved Waste Classes: Hazardous & Liquid Industrial**<br>*(separate waste classes by comma)* | | | |

| | | | |
|---|---|---|---|
| **Year Site Opened** *(enter the Calendar Year only)* | 1981 | **Current ECA Issue Date** | 09/07/2018 |

| | |
|---|---|
| **Is your Site required to submit Financial Assurance?** | ( ) **Yes**<br>(•) **No** |
| **Describe how your WDS is designed.** | ( ) Natural Attenuation only ( ) Fully engineered Facility<br>(•) Partially engineered Facility |
| **Does your Site have an approved Contaminant Attenuation Zone?** | ( ) **Yes**<br>(•) **No** |
| **If closed, specify ECA, control or authorizing document closure date:** | Select Date |
| **Has the nature of the operations at the site changed during this monitoring period?** | ( ) **Yes**<br>(•) **No** |
| **If yes, provide details:** | |

| | |
|---|---|
| **Have any measurements been taken since the last reporting period that indicate landfill gas volumes have exceeded the MOE limits for subsurface or adjacent buildings? (i.e. exceeded the LEL for methane)** | ◯ Yes<br>◉ 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**<br>◯ **No** | |
| **2) All groundwater, leachate and landfill gas sampling and monitoring for the monitoring period being reported on was successfully completed as required by ECA or other relevant authorizing/ control document(s):** | ◉ **Yes**<br>◯ **No**<br>◯ **Not Applicable** | If no, list exceptions below or attach information. |

| Groundwater Sampling Location | Description/Explanation for change<br>(change in name or location, additions, deletions) | Date |
|---|---|---|
| | | |
| | | |

| | | |
|---|---|---|
| | | |
| | | |
| 3) a) Some or all groundwater, leachate and landfill gas sampling and monitoring requirements have been established or defined outside of a ministry ECA, authorizing, or control document. | ○ Yes<br>◉ No<br>○ 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<br>○ No<br>◉ 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** |
|---|---|---|
| | | |
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| 4) All field work for groundwater investigations was done in accordance with Standard Operating Procedures (SOP) 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<br>( ) No | |
| **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<br>( ) No | |
| 6) The site meets compliance and assessment criteria. | (●) Yes<br>( ) No | Please see Section 5 of the 2022 Annual Monitoring 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<br>( ) No | |

| | | | |
|---|---|---|---|
| **1) Is one or more of the following risk reduction practices in place at the site:**<br>***(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**<br>***(b)*** **There is a predictive monitoring program in-place (modeled indicator concentrations projected over time for key locations); or**<br>***(c)*** **The site meets the following two conditions (typically achieved after 15 years or longer of site operation):**<br>***i.*****The site has developed stable leachate mound(s) and stable leachate plume geometry/ concentrations; and**<br>***ii.*****Seasonal and annual water levels and water quality fluctuations are well understood.** | ◉ **Yes**<br>○ **No** | **Note which practice(s):** | ☒ **(a)**<br>☐ **(b)**<br>☒ **(c)** |
| **9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):** | ○ **Yes**<br>◉ **No**<br>○ **Not Applicable** | Please see Section 5 of the 2022 Annual Monitoring Report. | |

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

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

## Recommendations:

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

| | |
|---|---|
| ◉ **No changes to the monitoring program are recommended** | |
| ○ **The following change(s) to the monitoring program is/ are recommended:** | |
| ◉ **No Changes to site design and operation are recommended** | |
| ○ **The following change(s) to the site design and operation is/are recommended:** | |
| **Name:** | Albert Siertsema |
| **Seal:** | Add Image  |

| | | | |
|---|---|---|---|
| **Signature:** | | **Date:** | 15-May-2023 |
| **CEP Contact Information:** | Albert Siertsema | | |
| **Company:** | WSP Canada Inc. | | |
| **Address:** | 4 Hughson Street South, Suite 300, Hamilton, ON, Canada, L8N 3Z1 | | |
| **Telephone No.:** | 905-529-4414 | Fax No. : | |
| **E-mail Address:** | albert.siertsema@wsp.com | | |
| **Co-signers for additional expertise provided:** | | | |
| **Signature:** | | **Date:** | |
| **Signature:** | | **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)** | Un-named water courses and low lying areas. |

| | | |
|---|---|---|
| **Distance(s)** | On and adjacent to the site. | |
| **Based on all available information and site knowledge, it is my opinion that:** | | |

## Sampling and Monitoring Program Status:

| | | |
|---|---|---|
| **1) The current surface water monitoring program continues to effectively characterize the surface water conditions, and includes data that relates upstream/background and downstream receiving water conditions:** | (•) **Yes**<br>( ) **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 ECA or relevant authorizing/control document(s) (if applicable):** | ( ) **Yes**<br>(•) **No**<br>( ) **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** |
|---|---|---|
| Outlined in Section 6.2 of the 2022 Annual Monitoring Report. | | |
| | | |
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|---|---|---|
| **3) a) Some or all surface water sampling and monitoring program requirements for the monitoring period have been established outside of a ministry ECA or authorizing/control document.** | ( ) **Yes**<br>(•) **No**<br>( ) **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**<br>( ) **No**<br>(•) **Not Applicable** | If no, specify below or provide details in an attachment. |

| Surface Water Sampling Location | Description/Explanation for change (change in name or location, additions, deletions) | Date |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

| | | |
|---|---|---|
| 4) All field work for surface water investigations was done in accordance with SOP, 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<br>( ) No | |

## Sampling and Monitoring Program Results/WDS Conditions and Assessment:

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

If no, list parameters that exceed criteria outlined above and the amount/percentage of the exceedance as per the table on the following page 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. ECA limit, PWQO, background | e.g. X% above PWQO |
| Please see Section 6 of the 2022 Annual Monitoring Report. | | |
| | | |
| | | |
| | | |
| **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**<br>◯ **No** | Please see Section 6 of the 2022 Annual Monitoring Report. |

| | | |
|---|---|---|
| **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**<br>◯ **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<br>◯ No<br>◯ Not Known<br>◯ Not Applicable | Please see Section 5 and 6 of the 2022 Annual Monitoring Report. |
| **9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):** | ◯ **Yes**<br>◯ **No**<br>(●) **Not Applicable** | |

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

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

## Recommendations:

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

| | |
|---|---|
| ◉ **No Changes to the monitoring program are recommended**<br><br>○ **The following change(s) to the monitoring program is/are recommended:** | |
| ◉ **No changes to the site design and operation are recommended**<br><br>○ **The following change(s) to the site design and operation is/ are recommended:** | |

| | |
|---|---|
| **CEP Signature** | |
| **Relevant Discipline** | Geological Engineer |
| **Date:** | 15-May-2023 |
| **CEP Contact Information:** | Albert Siertsema |
| **Company:** | WSP Canada Inc. |
| **Address:** | 4 Hughson Street South, Suite 300, Hamilton, ON, Canada, L8N 3Z1 |
| **Telephone No.:** | 905-529-4414 |
| **Fax No. :** | |
| **E-mail Address:** | albert.siertsema@wsp.com |

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